

**Agilent Technologies 8960 Series 10 E5515A,B Wireless Communications Test Set
Agilent Technologies E1960A GSM Mobile Test Application**

Reference Manual

Test Application Revision A.04

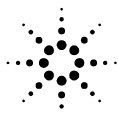
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Revision H

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Legal Information

Manufacturer's Declaration

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

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

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

Herstellerbescheinigung

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

Safety Considerations

GENERAL

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

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

SAFETY EARTH GROUND

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

SAFETY SYMBOLS



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



Indicates hazardous voltages.



Indicates earth (ground) terminal

WARNING

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

CAUTION

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

WARNING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Product Markings

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

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

CERTIFICATION

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

WARRANTY

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

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

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

LIMITATION OF WARRANTY

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

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

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

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

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

| | |
|---------------------------|--|
| Manufacturer's Name: | Agilent Technologies Inc. |
| Manufacturer's Address: | 24001 E. Mission Avenue Liberty Lake, Washington 99019-9599 USA |
| declares that the product | |
| Product Name: | Agilent Technologies 8960 Series 10 Wireless Communications Test Set |
| Model Number: | Agilent Technologies E5515A,B |
| Product Options: | This declaration covers all options of the above product. |

conforms to the following Product specifications:

Safety: IEC 1010-1:1990+A1+A2 / EN 61010-1:1993

EMC: CISPR 11:1990/EN 55011:1991- Group 1, Class A
EN 50082-1 : 1992
IEC 801-2:1991 - 4kV CD,8kV AD
IEC 801-3:1984 3V/m
IEC 801-4:1988 0.5 kV Sig. Lines, 1 kV Power Lines

Supplementary Information:

This 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-marking accordingly.

Spokane, Washington USA November 20, 1998


Vince Roland
Reliability & Regulatory
Engineering Manager

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1 Call Processing

Establishing an Active 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 286](#).
2. If necessary, set the IMSI state. See [“CALL:PAGing:IMSI” on page 268](#).

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 269](#).

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 35](#).
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 35](#)

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 286](#).
2. Configure the necessary call processing connect/disconnect synchronization conditions. See [“Call Processing State Synchronization” on page 35](#).
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 35](#)

Operating Considerations

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

Call Processing Event Synchronization

February 14, 2000

Description

Synchronizing the test set with an external controller ensures that neither device does something before it is supposed to, which can cause errors, or does something well after it could have, which wastes time.

Using the call processing subsystem overlapped command synchronization commands, the user 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 of 2

| 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> |

Table 2 of 2

| Command | Purpose Of Command | Example |
|--------------|--|---|
| :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> |
| :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

Table 1 of 2

| Call Processing Command | Purpose Of Command | Pending Operation Flag (POF) is false when |
|--|---|---|
| CALL:ORIGinate See "CALL:ORIGinate" on page 267. | Performs a base station call origination. | The call processing state leaves the Idle state (when the operating mode is active cell), or The test set has noted this parameter change (when the operating mode is test mode). |
| CALL:END See "CALL:END" on page 247. | Performs a base station call termination. | The call processing state reaches the Idle state (when the operating mode is active cell), or The test set has noted this parameter change (when the operating mode is test mode). |
| CALL[:CELL[1]]:BCHannel[:ARFCn][:SElected] See "CALL[:CELL]:BCHannel[:ARFCn][:SElected]" on page 236. | Sets the BCH ARFCN for currently selected broadcast band. | The downlink signal is transmitting on the new broadcast channel. |
| CALL[:CELL[1]]:BCHannel[:ARFCn]:<broadcast band> See "CALL:BCHannel" on page 236. | Sets the BCH ARFCN for a broadcast band not currently selected. | The test set has noted this parameter change. |

Table 2 of 2

| Call Processing Command | Purpose Of Command | Pending Operation Flag (POF) is false when |
|---|---|--|
| CALL:TCHannel[:ARFCn][:SElected] See “CALL:TCHannel[:ARFCn][:SElected]” on page 287. | Sets the TCH ARFCN for currently selected traffic band. | At least one of the following conditions has been met for all occurrences of these call processing commands that have begun execution: |
| CALL:TCHannel[:ARFCn]:<traffic band> See “CALL:TCHannel” on page 286. | Sets the TCH ARFCN for a traffic band not currently selected. | The channel assignment has been successfully completed (when a call is established), or |
| CALL:TCHannel:TSLot See “CALL:TCHannel:TSLot” on page 291. | Sets the TCH timeslot. | The test set has noted this parameter change (no call established), or |
| CALL:MS:TADVance See “CALL:MS:TADVance” on page 262. | Sets the mobile station timing advance. | The test set has noted this parameter change (not currently selected band), or |
| CALL:MS:TXLevel[:SElected] See “CALL:MS:TXLevel[:SElected]” on page 262. | Sets the mobile station transmit level for currently selected band. | An error message was generated. |
| CALL:MS:TXLevel:<traffic band>. | Sets the mobile station transmit level for a traffic band not currently selected. | |
| CALL:CONNected:ARM[:IMMediate] See “CALL:CONNected:ARM[:IMMediate]” on page 241. | Arms the call control status change detector. | The call control status change detector has been disarmed. See “Connected/Idle Query” on page 35. |

Related Topics

“Call Processing State Synchronization” on page 35

“Measurement Event Synchronization” on page 132

“Test System Synchronization Overview” on page 39

Call Processing State Synchronization

Description

Call Processing State Query

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

There are six possible call processing states that the test set can be in.

Query returns one of the following:

- "IDLE"
- "SREQ"
- "PROC"
- "ALER"
- "CONN"
- "DISC"

The following command returns the current state of a call:

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

The call processing states are shown in the <Operating Mode> section of the instrument status area.

Connected/Idle Query

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

Query returns one of the following:

- 0 = idle
- 1 = connected

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

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

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

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

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

```
10 OUTPUT 714;"CALL:ORIGINATE" ! Begin the BS originated call.
```

Call Processing State Synchronization

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

Call State Change Detector

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

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

- the call processing state has progressed to either connected or idle
or...
- the attempt to connect or disconnect a call failed and one of the test set's Fixed Timers has timed out
or...
- no call processing state changes occurred within the time period specified by the timeout timer

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

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

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

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

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

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

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

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

```

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

```

STATUS:OPERation:CALL:GSM Status Register

The STATUS subsystem provides a status register group that allows the user to query call processing states. Call processing state synchronization can be performed using the bit transitions of STATUS:OPERATION:CALL:GSM to generate interrupts to the external controller. Refer to ["STATUS:OPERation:CALL:GSM Condition Register Bit Assignment" on page 446](#) for status bit definitions and GPIB command syntax. See ["Call State STATUS:OPERation:CALL:GSM Program Example" on page 37](#).

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

```

Call Processing State Synchronization

```
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 30](#)

["CALL:STATus\[:STATe\]?" on page 283](#)

["CALL:CONNected:ARM\[:IMMediate\]" on page 241](#)

["CALL:CONNected:TIMEout" on page 241](#)

["Instrument Status Area" on page 537](#)

Test System Synchronization Overview

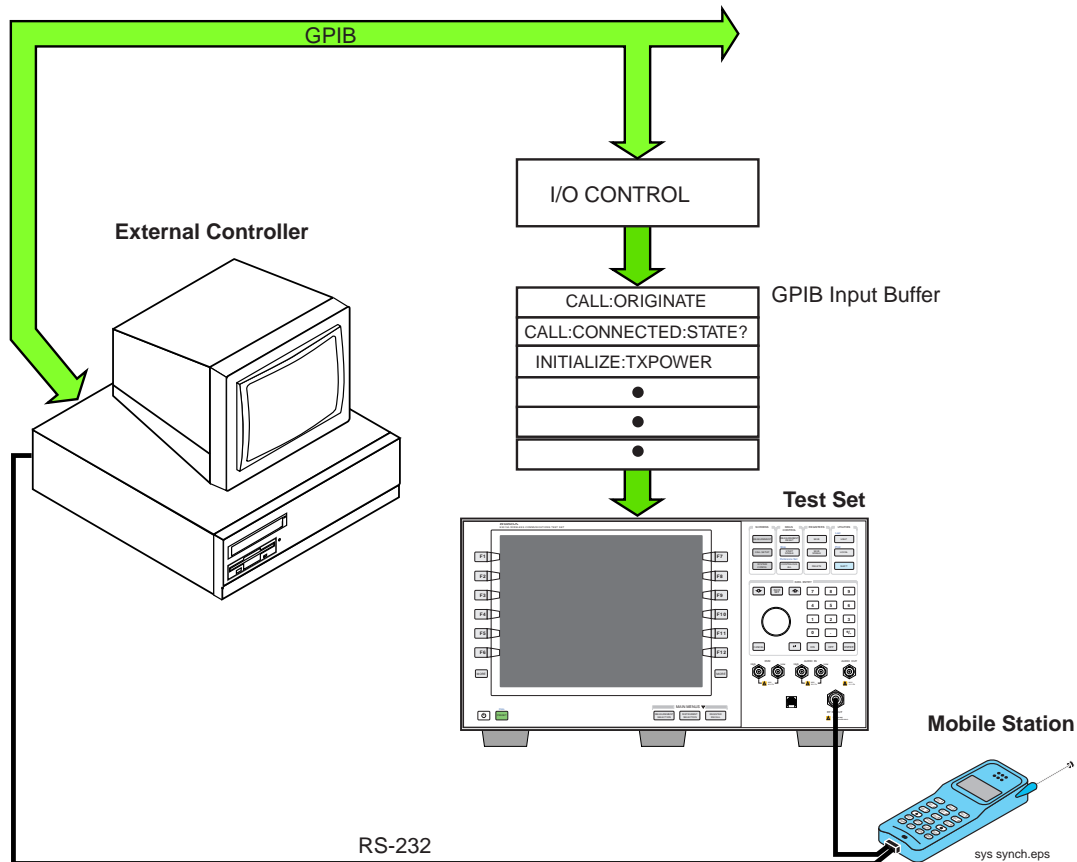
February 14, 2000

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 are easiest to synchronize

to because subsequent commands are not executed until the previous sequential command is finished. Once the test set has begun execution of an overlapped command, however, another command or commands may begin executing, allowing the test set to use its internal resources as efficiently as possible. Overlapped commands are more difficult to synchronize to 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.

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

Methods for synchronization

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.

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.

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.

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 processing state.
3. Program the test set to generate a service request when an operation has completed or the test set is in a certain state

Commands used for synchronization:

- [“CALL:STATus\[:STATe\]?” on page 283](#)

This command queries the test set's current call processing state. This command supports synchronization method five. (See [“Call Processing State Query” on page 35](#)).

- [“CALL:CONNected\[:STATe\]?” on page 240](#)

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 35](#)). 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 31](#).)

- **: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 31.](#))
- **: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 31.](#))
- **“INITiate:DONE?” on page 357**
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 132.](#))
- **STATUS:<register>**
Status bits in the [“STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 446](#) 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 451](#) 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 437.](#)
- **“SYSTem:SYNChronized” on page 496**
This specialized command puts a 1 in the test set’s output queue when the test set responds to the query by sending a 1 to the external controller, all prior sequential commands have completed and all prior overlapped commands have at least begun execution. This command supports synchronization method four.
- **“SYSTem:SYNChronized” on page 496**
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 at least begun execution. (See [“STATus:OPERation Condition Register Bit Assignment” on page 442](#)). This command supports synchronization four and six.
- **“*OPC” on page 497, “*OPC?” on page 497, and “*WAI” on page 498 (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 35](#)

[“Measurement Event Synchronization” on page 132](#)

[“Call Processing Event Synchronization” on page 30](#)

[“SYSTem:SYNChronized” on page 496](#)

2 Measurements

Analog Audio Measurement Description

February 14, 2000

How is an analog audio measurement made?

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

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

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

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

The analog audio measurement returns the following measurement results:

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

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

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

If noise is making your audio measurement difficult, use the 100 Hz bandwidth tunable band pass filter. This narrow band filter reduces the noise significantly. Refer to [“SETup:AAUDio:FILTer\[:SFRequency\]” on page 382](#).

Trigger Source

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

Related Topics

[“Programming an Analog Audio Measurement” on page 45](#)

[“Test Adherence to Standards” on page 110](#)

Programming an Analog Audio Measurement

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

The following procedure assumes that an audio source is connected to the AUDIO IN connector. See [“Analog Audio Measurement Description” on page 44](#).

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

Programming Example

```

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

```

Returned Values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 125](#) (0 means a successful measurement with no errors).
- Analog_audio returns the analog audio level in volts rms.

Related Topics

[“Analog Audio Measurement Description” on page 44](#)

[“INITiate” on page 355](#)

[“SETup:AAUDio” on page 380](#)

[“FETCh:AAUDio” on page 296](#)

[“Comprehensive Program Example” on page 200](#)

AAudio Troubleshooting

Possible Setup Issues

During remote operation of the analog audio measurement the user should configure the trigger arm to single, see [“SETup:AAudio:CONTinuous” on page 381](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

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

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

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

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

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

Bit Error Measurement Description

February 14, 2000

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 the user 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 69](#).

| | |
|-------------|--|
| NOTE | <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 the user 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).

The user must set the measurement type from one of the 6 measurement types available, (see [“SETup:BERror\[:TYPE\]” on page 387](#)). If the user queries a residual result when a non-residual measurement is initiated, the test set returns 9.91 E+37 (NAN). Measurement type must be set before initiating a BER measurement. See [“Measurements type” on page 49](#)

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 386](#) 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, the user may manually set the delay (see [“SETup:BERRor:LDControl:AUTO” on page 388](#)).

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 136](#)

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

Measurements type

Residual:

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

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

Non-residual:

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

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

BER measurement results

The results of a BER measurement can be displayed in two ways, (number of errors counted) or (the ratio bad bits (errors) to total bits counted). The manual user will need to select either Count or % from the Measurement Units field. For the remote user these results are available by using the FETCh command, see [“FETCh:BERRor:COUNT\[:BITS\]?” on page 303](#) or [“FETCh:BERRor:RATio\[:BITS\]?” on page 306](#). Alternatively the [“FETCh:BERRor\[:ALL\]?” on page 302](#) or [“FETCh:BERRor:FULL?” on page 305](#) can also be used to return the results.

Type A Residual Measurement Results

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

Type B Non-Residual Measurement Results

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

Related Topics

[“Programming a Bit Error Measurement” on page 51](#)

[“Test Adherence to Standards” on page 110](#)

[“Fast Bit Error Measurement Description” on page 69](#)

[“Programming a Fast Bit Error Measurement” on page 72](#)

[“CALL:TCHannel:LOOPback” on page 291](#)

[“BERR Troubleshooting” on page 54](#)

Programming a Bit Error Measurement

February 14, 2000

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 Link with the Mobile Station” on page 28](#).

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

Program Example

```
10  OUTPUT 714;"SETUP:BERROR:TIMEOUT:TIME 5" ! BER measurement times out after
20                                     ! 5 seconds.
30  OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -102 DBM" ! Sets the cell power level
40                                     ! to a "low" level for the
50                                     ! BER measurement.
60  OUTPUT 714;"SETUP:BERROR:CONTINUOUS OFF" ! Configures a BER measurement to
70                                     ! Single Trigger.
80  OUTPUT 714;"SETUP:BERROR:COUNT 10000" ! Sets the number of bits to measure
90                                     ! at 10,000.
100 OUTPUT 714;"SETUP:BERROR:CLSDELAY:STIME 500 MS" ! Sets the Close Loop Delay
110                                     ! to 500 ms.
120 OUTPUT 714;"SETUP:BERROR:SLCONTROL ON" ! Sets the Signal Loop Control state to on.
130 OUTPUT 714;"SETUP:BERROR:TYPE TYPEIA" ! Sets the Measurement Type to IA.
140 OUTPUT 714;"SETUP:BERROR:LDCONTROL:AUTO OFF" ! Configure loopback delay
150                                     ! control to manual.
160 OUTPUT 714;"SETUP:BERROR:MANUAL:DELAY 6" ! Set frame delay to 6 frames in order
170                                     ! to correlate uplink and downlink bits.
180 OUTPUT 714;"INITIATE:BERROR" ! Start a BER measurement.
190 REPEAT
200     OUTPUT 714;"INITIATE:DONE?"
210     ENTER 714;Meas_comp$
220     PRINT Meas_comp$
230 UNTIL Meas_comp$="BERR"
240 OUTPUT 714;"FETCH:BERROR?" ! BERR results.
250 ENTER 714;Integrity,Bits_tested,Bit_err_ratio,Bit_err_count
260 OUTPUT 714;"FETCH:BERROR:COUNT:CRC?" ! Query CRC Count results.
270 ENTER 714;Crc_count
280 OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -85 DBM" ! Sets the cell power level
290                                     ! to a good level.
300 END
```

Alternatively, you could use the **"FETCh:BERRor:FULL?"** query to return the same results but for all bit types simultaneously.

Returned values

The measurements returned by this program are:

- Integrity Indicator returns the [“Integrity Indicator” on page 125](#) (0 means a successful measurement with no errors).
- Bits_tested returns the number of bits tested.
- Bit_err_ratio returns the ratio of bit errors to total bits tested.
- Bit_err_count returns the number of bit errors.
- Crc_count returns the CRC count (cyclic redundancy check).

Related Topics

[“Bit Error Measurement Description” on page 48](#)

[“SETup:BERRor” on page 385](#)

[“INITiate” on page 355](#)

[“FETCh:BERRor” on page 300](#)

[“Comprehensive Program Example” on page 200](#)

[“BERR Troubleshooting” on page 54](#)

BERR Troubleshooting

February 14, 2000

Possible Setup Issues

During remote operation of the bit error measurement the user should configure the trigger arm to single, see [“SETup:BERror:CONTInuous” on page 387](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

If you have a BER measurement active and your mobile drops the call it may be that you have the [“SETup:BERror:SLControl” on page 389](#) command set to OFF. This is likely to occur with mobiles that do not respond to downlink signalling when loopback is closed. To solve this problem set the command to ON.

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

Decoded Audio Measurement Description

June 2, 1999

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 (MS) 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 220](#) for set up commands for the test set's audio generator.
2. The mobile station digitizes and encodes the audio signal that is transmitted on the uplink TCH.
3. The uplink TCH is decoded with a bit accurate GSM RPE-LTP decoder to yield a block of 13-bit PCM samples within the DSP. As described in ETSI GSM 06.10.

NOTE The MS needs to be stimulated with a pulsed audio signal during a DAUDIO measurement. The audio signal must be pulsed at a 10 Hz rate with 50% duty cycle. See [“AFGenerator:PULSe\[:STATe\]” on page 221](#).

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 57](#)

[“Test Adherence to Standards” on page 110](#)

Programming a Decoded Audio Measurement

June 2, 1999

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 Link with the Mobile Station” on page 28](#).

1. Configure decoded audio measurement parameters using the SETUp subsystem.
2. Setup the audio source to stimulate the MS 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 125](#) (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 55](#)

[“SETup:DAUDio” on page 398](#)

[“INITiate” on page 355](#)

[“FETCh:DAUDio” on page 308](#)

[“Comprehensive Program Example” on page 200](#)

Decoded Audio (DAUDio) Troubleshooting

February 14, 2000

Possible Setup Issues

During remote operation of the analog audio measurement the user should configure the trigger arm to single, see [“SETup:DAUDio:CONTinuous” on page 399](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

The audio signal expected by the DAUDio measurement is, pulsed at a 10 Hz rate and has a 50% duty cycle. The device under test should have echo cancellation disabled.

The signal measured is whatever is coming back in the speech frames, this includes any electrical or acoustical coupling from the downlink signal, earpiece or any noise coupled from the microphone of the MS.

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

If PCM Full Scale Warning (14) is returned the measurement is accurate, however the user 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 290](#)), Questionable Result Due To Channel Mode (16) is returned. This is because the DAUDio measurement is not supported in this channel mode.

Dynamic Power Measurement Description

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. 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 404](#)).

Types of Signals Dynamic Power can Measure

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

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

Input Signal Requirements

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

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

Trigger Source

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

Related Topics

[“SETup:DPOWer” on page 403](#)

[“FETCh:DPOWer” on page 312](#)

[“Test Adherence to Standards” on page 110](#)

I/Q Tuning Measurement Description

How is an I/Q Tuning Measurement Made?

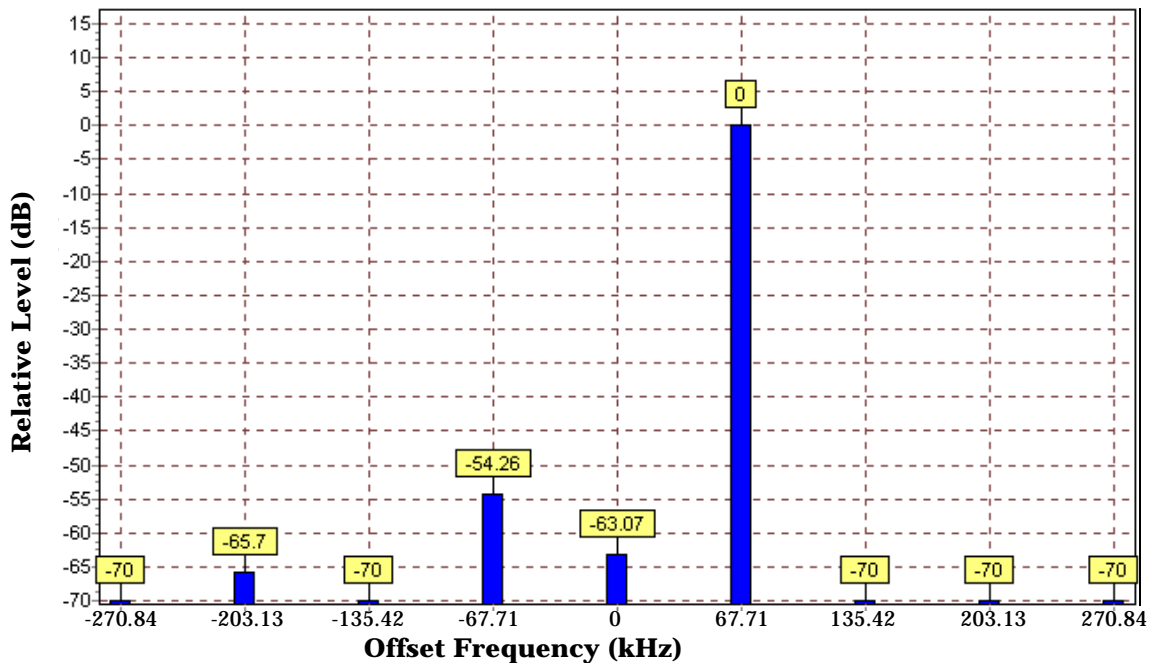
The I/Q Tuning measurement is used in the production process (normally at mobile pre-test) where the I/Q modulator of the mobile is being calibrated. The measurement is normally performed with the mobile station in test mode and transmitting a GMSK modulated sequence of all 0s or all 1s. The mobile can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

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

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

Figure 2. 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 65](#)

[“Test Adherence to Standards” on page 110](#)

Programming an I/Q Tuning Measurement

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

1. Ensure that the mobile is in test mode and is transmitting all 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.

Program Example

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

```

10 PRINT "Ensure your mobile is transmitting:" !On-screen prompts.
20 PRINT "-all 1s or all 0s."
30 PRINT "-on ARFCN 30."
40 PRINT "-a power level of 10 dBm."
50 PRINT " "
60 PRINT "Press any key to continue."
70 LOOP
80     ON KBD GOTO Key_exit
90 END LOOP
100 Key_exit: !
110 OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:SELECTED 30" !Configures the
120             !test set to expect a transmission on ARFCN 30.
130 OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10 DBM" !Configures
140             !the test set to expect a power level of 10 dBm.
150 OUTPUT 714;"SETUP:IQTUNING:CONTINUOUS OFF" !Configures trigger
160             !mode to single for an I/Q Tuning measurement.
170 OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER 50" !Configures the
180 OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE ON" !Configures spur on.
190 OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY 10MHZ" !Configures a
200 !power measurement at 10MHz from the carrier.
210 !multi_measurement state to ON with a measurement count value
220 !of 50.
230 OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE RISE" !Configures the
240             !trigger source to RF RISE.
250 OUTPUT 714;"SETUP:IQTUNING:REFERENCE:FREQUENCY AUTO" !Sets the
260 !set to choose which offset frequency is to be used as the ref.
270 OUTPUT 714;"INITIATE:IQTUNING" !Start I/Q Tuning measurement.
280 REPEAT
290     OUTPUT 714;"INITIATE:DONE?"!Check to see if I/Q Tuning
300     !measurement complete.
310     ENTER 714;Meas_complete$

```

Programming an I/Q Tuning Measurement

```
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 125](#) (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 63](#)

[“SETup:IQTuning” on page 406](#)

[“INITiate” on page 355](#)

[“FETCh:IQTuning” on page 318](#)

I/Q Tuning Troubleshooting

Possible Setup Issues

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 125.

Fast Bit Error Measurement Description

July 8, 1999

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 MS has been configured to loopback Type C.

The test set allows the user 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 48](#).

| | |
|-------------|--|
| NOTE | <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 the user to set the loopback type, and did not have a feature that allowed time for the loop to close.</p> |
|-------------|--|

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

During FBER measurements, the test set generates a downlink TCH with (Pseudo Random Binary Sequence) PRBS-15 data at a known low level. The mobile station receives the data, loops it back to its transmitter, and returns the data to the test set. The test set compares data sent to data received, and FBER is calculated. see [“CALL:TCHannel” on page 286](#)

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

When a call is established on the TCH, the loopback type is sent to the mobile station if the signal loopback control is on, see [“SETup:FBERror:SLControl” on page 395](#). If the user sets signal loopback control to off, the loopback type is controlled using [“CALL:TCHannel:LOOPback” on page 291](#), manually the Mobile Loopback F12 key provides user access.

FBER measurements use MS 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 MS, 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 392](#) 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, the user may manually set the delay. See [“SETup:FBERror:LDControl:AUTO” on page 394](#) or [“SETup:FBERror:MANual:DELay” on page 395](#)

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

The FBER, BERR and the DAUDIO (uplink speech level) measurements are mutually exclusive, that is which ever of these measurements is activated last forces the other to become inactive. see [“Decoded Audio Measurement Description” on page 55](#)

FBER measurement trigger source is always set to immediate. The FBER measurement does not offer multi-measurement results. see [“Statistical Measurement Results” on page 136](#)

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). For the remote user these results are available by using the FETCh command, see [“FETCh:FBERror:COUNT?” on page 316](#) or [“FETCh:FBERror:RATio?” on page 317](#). The manual user will need to select either Count or % from the Measurement Units field.

Manual user 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 results:

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

Related Topics

[“Programming a Fast Bit Error Measurement” on page 72](#)

[“Test Adherence to Standards” on page 110](#)

[“Bit Error Measurement Description” on page 48](#)

[“Programming a Bit Error Measurement” on page 51](#)

[“CALL:TCHannel:LOOPback” on page 291](#)

Programming a Fast Bit Error Measurement

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 Link with the Mobile Station” on page 28](#).

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.

Program 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 125 (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 69](#)

[“SETup:FBError” on page 391](#)

[“INITiate” on page 355](#)

[“FETCh:FBError” on page 314](#)

[“Comprehensive Program Example” on page 200](#)

FBER Troubleshooting

July 8, 1999

Possible Setup Issues

During remote operation of the Fast BER measurement the user should configure the trigger arm to single, see [“SETup:FBERror” on page 391](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

Set signalling loopback control to on; if signalling loopback control is off, set loopback to Type C, see [“CALL:TCHannel:LOOPback” on page 291](#).

The test set may never correlate the uplink and downlink, see [“SETup:FBERror:LDControl:AUTO” on page 394](#) so that the measurement appears to hang. The MS may not have closed its loop after the loopback type was set, the user needs to allow sufficient time for the MS to close its loop and set time out mechanisms see [“SETup:FBERror:TIMEout\[:STIME\]” on page 396](#).

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

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

Output RF Spectrum Measurement Description

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

ORFS is a narrow-band measurement that provides information about the distribution of the mobile station transmitter's out-of-channel spectral energy due to modulation and switching as defined in ETSI 05.05, section 4.2.1 and ETSI 11.10, section 13.4.2.

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 the user requests 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. The user may set from 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. The user may set from 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, there is no user calibration required.

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 the [“Transmit Power Measurement Description” on page 106](#), 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 user specified offset, 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 the user. The 30 kHz bandwidth power at zero offset is measured only if the user requests 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 1800 kHz offset frequency the ORFS due to modulation measurement is made using 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 be 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 makes the results available to the user.

The 30 kHz bandwidth power at zero offset measurement is not made during ORFS due to switching measurements. In order to make that measurement, the user 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 136 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. Multi-measurement count state OFF means only one ORFS measurement will be completed at each offset (that is, one ORFS due to modulation, and one ORFS due to switching measurement).

- If the user wants 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.

Types of Signals ORFS can Measure

ORFS 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.
- 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:

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

Trigger Source

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

Table 1. Recommended Trigger Source Settings

| Input Signal Type | Recommended Trigger Source |
|---|----------------------------|
| Normal GSM TCH burst with mobile station in active cell mode | Protocol |
| Normal GSM TCH burst with mobile station in test mode | RF Rise |
| Non-bursted signal including GMSK data with mobile station in test mode | RF Rise |

Related Topics

[“Programming an Output RF Spectrum Measurement” on page 78](#)

[“Test Adherence to Standards” on page 110](#)

Programming an Output RF Spectrum Measurement

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

The following procedure assumes that an active link is established between the test set and the mobile station. See [“Establishing an Active Link with the Mobile Station” on page 28](#).

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.

Example Program

```

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 125 (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 75](#)

[“SETup:ORFSpectrum” on page 412](#)

[“INITiate” on page 355](#)

[“FETCh:ORFSpectrum” on page 322](#)

[“Comprehensive Program Example” on page 200](#)

ORFS Troubleshooting

Possible Setup Issues

During remote operation of the Output RF Spectrum measurement the user should configure the trigger arm to single, see [“SETUp:ORFSpectrum” on page 412](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

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 325](#) or [“FETCh:ORFSpectrum:SWITChing:FREQuency\[:OFFSet\]\[:MAXimum\]?” on page 327](#) for GPIB commands.

The ORFS Transmit Power, 30 kHz BW Power, Max switching offset level and Average switching offset level results are shifted in proportion to the value of Amplitude Offset that a user may set. The following table shows the measurements that are affected and how amplitude offset affects them. For more information about amplitude offset commands, see [“Measurement Related Configuration” on page 563](#).

Table 2. Measurements affected by amplitude offset

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

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

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 564](#).

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 GSM 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 the ETSI 05.05 and 11.10 standards.

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 to the user with 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 integrity indicator available to the user regardless of single or multiple burst measurements.

Types of Signals PFER can Measure

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

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

Input Signal Requirements

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

- Frequency error measurement accuracy of ± 12 Hz + timebase reference.
- rms phase error measurement accuracy of less than ± 1 degree.
- Peak phase error measurement accuracy of less than ± 4 degrees.

under these conditions

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

Trigger Source

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

Table 3. Recommended Trigger Source settings

| Input Signal Type | Recommended Trigger Source |
|--|----------------------------|
| Normal GSM TCH burst with mobile station in active cell mode | Midamble or Amplitude |
| RACH burst with mobile station in active cell mode | Midamble or Amplitude |
| Normal GSM TCH burst with mobile station in test mode | Amplitude |
| RACH burst with mobile station in test mode | Amplitude |
| Bursted signal with GMSK modulation but no valid midamble | Amplitude |
| Non-bursted non-GMSK signals with a manual frequency offset of ± 67.7083 kHz | Immediate |

Burst Synchronization

The PFER measurement provides the user a choice for the time reference (burst synchronization). see [“Burst Synchronization of Measurements” on page 115](#)

Table 4.

| 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 Phase and Frequency Error Measurement” on page 85](#)

[“Test Adherence to Standards” on page 110](#)

Programming a Phase and Frequency Error Measurement

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

The following procedure assumes that an active link is established between the test set and the mobile station. See [“Establishing an Active Link with the Mobile Station” on page 28](#).

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.

Example Program

```

10 OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Configures a PFER measurement to
20                                     !single trigger mode.
30 OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 100 !Configures a multi-measurment
40                                     !of 100.
50 OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO"!Configure trigger source
60                                     !to auto.
70 OUTPUT 714;"SETUP:PFERROR:BSYNC:MIDAMBLE !Configures a PFER measurement so
80                                     !that burst synchronization, which
90                                     !will synchronize the timing of the
100                                    !measurement algorithm relative to
110                                    !the data sample, will be set
120                                    !to midamble.
130 OUTPUT 714;"INITIATE:PFERROR" !Starts the PFER measurement.
140 REPEAT
150 OUTPUT 714;"INITIATE:DONE?" !Query to see if PFER measurement is done
160 ENTER 714;Meas_complete$
170 UNTIL Meas_complete$="PFER"
180 OUTPUT 714;"FETCH:PFERROR:ALL?"
190 ENTER 714;Integrity, Max_phase_err, Max_peak_error, Worst_freq_err
200 END

```

Returned values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 125](#) (0 means a successful measurement with no errors).
- Max_phase_err returns the maximum rms phase error in degrees
- Max_peak_phase_error returns the maximum peak phase error in degrees
- Worst_freq_err returns the the frequency, in Hz, that is the furthest from zero, if the most positive and the most negative frequency error are the same value, the most positive will be returned.

Related Topics

[“Phase and Frequency Error Measurement Description” on page 82](#)

[“SETup:PFERror” on page 421](#)

[“INITiate” on page 355](#)

[“FETCh:PFERror” on page 329](#)

[“Comprehensive Program Example” on page 200](#)

PFER Troubleshooting

June 29, 1999

Possible Setup Issues

During remote operation of the Phase and Frequency Error measurement the user should configure the trigger arm to single, see [“SETup:PFERror:CONTinuous” on page 422](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

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 520](#) 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 125](#).

If the signal has both over range (5) and under range (6) conditions only the over range (5) will be 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 239](#)

Power versus Time Measurement Description

July 6, 1999

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 91](#).

During a PvT measurement, the test set makes a narrowband point-by-point measurement of the instantaneous power received during the GSM burst. A pass or fail result is returned based on a mask comparison (defined in "ETSI GSM 05.05 Ver 4.21.0 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 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 106](#)).

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

This measurement conforms to "ETSI GSM 11.10 Ver 4.21.1 Sect 13.3" which is based on "ETSI GSM 05.05 Ver. 4.21.0 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 to the user 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 340](#).

For statistical analysis, the test set allows the user 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 429](#). Note that these points are not the same as those used in the point-by-point comparison which determines the pass/fail result.

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

- Results for **multi-measurement** PvT measurements include:
 1. Average of transmit carrier power measurements (average of averages)
 2. Maximum transmit carrier power measured across each burst
 3. Minimum transmit carrier power measured across each burst
 4. Standard deviation of transmit carrier power measured across each burst
- Statistical PvT measurement results, calculated from measurements taken at each of the active time offset markers or across a subset of the markers and available only through programming commands, include:
 1. Average Power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
 2. Maximum power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
 3. Minimum power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
 4. Standard deviation of power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
- The measurement integrity indicator is another result available for any completed PvT measurement. This result provides information about error conditions which occurred and may have affected the accuracy of the most recently completed measurement. For more information about measurement integrity, refer to [“Integrity Indicator” on page 125](#).
- Measurement progress report is a feature that allows the user 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 user settings and 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. RACH burst with valid midamble with mobile station in active cell mode

Power vs. Time Input Signal Requirements

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

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

Trigger Source

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

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

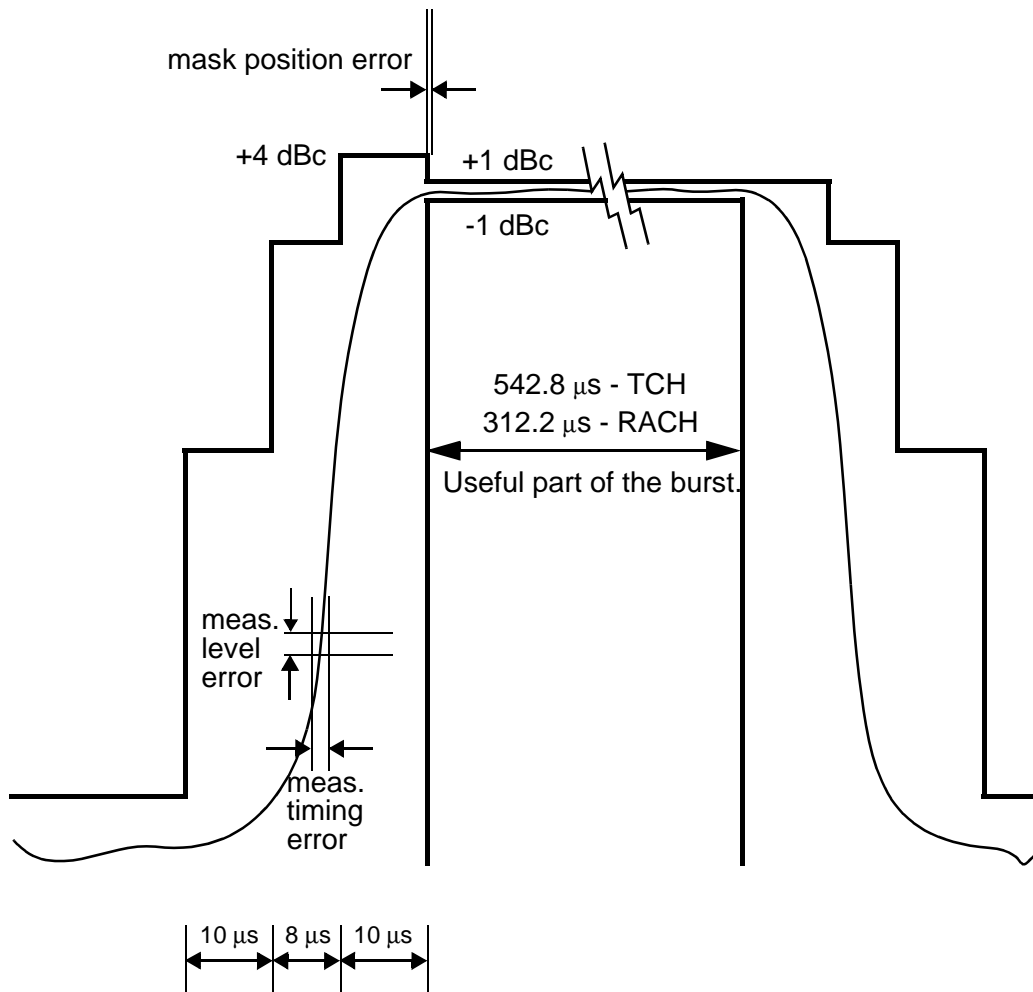
In situations where no protocol trigger is available, the test set will choose RF rise triggering for the PvT measurement. An example of this situation might be when the test set is in test mode operating mode.

Table 5. 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 149](#).

Figure 3. Typical GSM PvT Measurement



Burst Synchronization

The P_vT measurement provides the user a choice for the time reference (burst synchronization). see [“Burst Synchronization of Measurements” on page 115](#)

Table 6.

| Burst Synchronization | Description |
|-----------------------|--|
| Midamble | References measurement timing to the midamble transmitted within a timeslot. |
| RF Amplitude | The amplitude rise and fall of a transmitted burst determines the measurement time reference. |
| None | No edge of the burst 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 93](#)

[“Test Adherence to Standards” on page 110](#)

Programming a Power versus Time Measurement

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

The following procedure assumes that an active link is established between the test set and the mobile station. See [“Establishing an Active Link with the Mobile Station” on page 28](#).

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.

Example Program

```

10 OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF" !Configures a PvT measurement to
20                                     !single trigger mode.
30 OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER 100 !Configures a multi-measurment
40                                     !of 100.
50 OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Configure trigger source
60                                     !to auto.
70 OUTPUT 714;"SETUP:PVTIME:BSYNC MIDAMBLE" !Configures a PvT measurement so
80                                     !that burst synchronization, which
90                                     !will synchronize the time of the
100                                    !measurement algorithm relative to
110                                    !the data sample, will be set
120                                    !to midamble.
130 OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28US,-18US !Turns on time markers
140                                     !-28 and -18 microseconds.
150 OUTPUT 714;"INITIATE:PVTIME" !Start PvT measurement.
160 REPEAT
170 OUTPUT 714;"INITIATE:DONE?" !Check to see if PvT measurement is done.
180 ENTER 714;Meas_complete$
190 UNTIL Meas_complete$="PVT"
200 OUTPUT 714;"FETCH:PVTIME:ALL?" !PvT results for time measurements.
210 ENTER 714;Integrity,Pvt_mask, Pvt_power, Max_offset
220 END

```

Returned values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 125](#) (0 means a successful measurement with no errors).
- Pvt_mask returns the mask pass/fail indicator. When the multi-measurement count is greater than 1, the PvT mask pass/fail result will return Fail (1) if any single measurement fails.
- Pvt_power returns the PvT carrier power in dBm.
- Max_offset returns the maximum offset level in dB, relative to the PvT carrier power.

Related Topics

[“Power versus Time Measurement Description” on page 88](#)

[“SETup:PVTime” on page 426](#)

[“INITiate” on page 355](#)

[“FETCh:PVTime” on page 336](#)

[“Comprehensive Program Example” on page 200](#)

PVT Troubleshooting

June 29, 1999

Possible Setup Issues

During remote operation of the Power vs. Time measurement the user should configure the trigger arm to single, see [“SETup:PVTime:CONTinuous” on page 427](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

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

The PVT Transmit Power measurement results are shifted in proportion to the value of Amplitude Offset that a user may set. The following table shows the measurements that are affected and how amplitude offset affects them. For more information about amplitude offset commands, see [“Measurement Related Configuration” on page 563](#).

Table 7. Measurements affected by amplitude offset

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

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

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 564](#).

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 564](#).

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 239](#)

RACH Measurement Description

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 **SHIFT PRESET**. 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 **F7** and set the **Receiver Control** to **Manual**.
4. Press **F9** and change the **Manual Channel** 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 **F1**, **Power vs Time Setup**.
8. Press **F1**, **Measurement Setup**.
9. Set **Trigger Arm** to **Single**.
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 rapidly after 331 μ s. To examine the results select **F6**, **Return to PVT Control**, **F2**, **Change View**, then select **F2**, **Numeric 1 of 2** and **F3**, **Numeric 2 of 2**.
13. To do further measurements on the TCH ensure that the Receiver Control is returned to Auto.

Related Topics

[“Programming a RACH Measurement” on page 99](#)

[“RACH Troubleshooting” on page 102](#)

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. |
|-------------|--|

Example Procedure

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

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

```

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

```

Related Topics

["RACH Measurement Description" on page 97](#)

["RACH Troubleshooting" on page 102](#)

RACH Troubleshooting

February 14, 2000

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 428](#)
- [“SETup:TXPower:COUNT:STATE” on page 434](#)
- [“SETup:PFERror:COUNT:STATE” on page 423](#)

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

SACCH Report Measurement Descriptions

July 12, 1999

When a call is established (the operating mode is active cell and the call status is not idle), the MS 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 MS, results are reported to the user 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 MS 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 MS. The SACCH reported TCH timing advance should eventually match the value in the Timing Advance field once the MS has time to react.

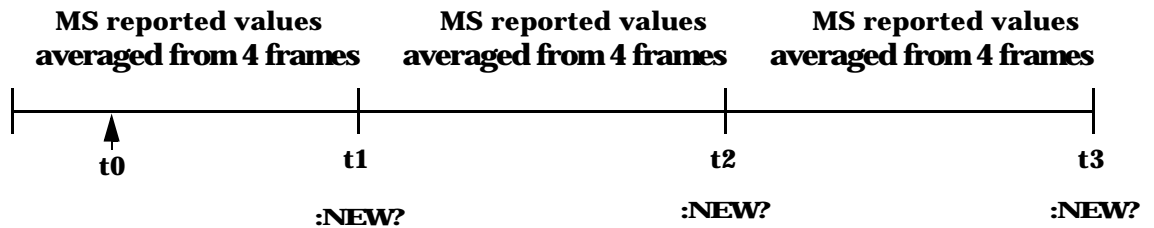
SACCH data will report any time there is a downlink TCH and the MS is synchronized to the test set transmitting a valid SACCH on the uplink.

:NEW? and [:LAST?] Queries

:NEW? queries hang until a new SACCH message is received by the test set. The MS 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 MS during the next period. Measurements must be stable in order to give valid (stable) results for a :NEW? query. Therefore, it may take up to three SACCH reports before a reported value accurately reflects a change to any of its parameters. See Figure 1.

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

Figure 4. SACCH Report Measurement Cycle

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

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

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

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

Related Topics

[“Configuring Mobile Station Operating Parameters” on page 517](#)

[“CALL:MS:REPorted:TXLevel\[:LAST\]?” on page 261](#)

[“CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?” on page 262](#)

[“CALL:MS:REPorted:TADVance\[:LAST\]?” on page 261](#)

[“CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?” on page 261](#)

[“CALL:MS:REPorted:RXLevel\[:LAST\]?” on page 259](#)

[“CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?” on page 259](#)

[“CALL:MS:REPorted:RXQuality\[:LAST\]?” on page 260](#)

[“CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?” on page 260](#)

[“CALL:MS:REPorted:NEIGHbour\[1\]?” on page 258](#)

Transmit Power Measurement Description

How is a transmit power (TXP) measurement made?

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

In order to provide the user with a very fast TXP measurement the test set measures the power without synchronizing it to the midamble. The measurement is made with RF amplitude synchronization; therefore, the signal does not need to be demodulated to determine the midamble. This technique is different than the TXP measurement defined in ETSI GSM 11.10. (See [“Burst Synchronization of Measurements” on page 115](#)). The power versus time measurement provides a carrier power measurement that is synchronized to the burst's midamble, and conforms to the ETSI GSM 11.10 standard. (See the [“Power versus Time Measurement Description” on page 88](#).)

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

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

Single or Multi-Measurements

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

Types of Signals TX Power can Measure

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

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

Input Signal Requirements

The TX Power measurement will complete and meet its accuracy specification of less than ± 0.6 dB when.

- Level is between -20 dBm and $+3$ dBm.
- Level within ± 3 dB of the expected input level.
- Frequency is within ± 100 kHz of expected input frequency.

Trigger Source

Auto triggering is the recommended trigger source for each measurement allowing the test set may choose the preferred trigger source. However the user may want to select the trigger source. See Table 8. on page 107

Table 8. Recommended Trigger Source Settings

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

Related Topics

[“Programming a Transmit Power Measurement” on page 108](#)

[“Test Adherence to Standards” on page 110](#)

Programming a Transmit Power Measurement

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

The following procedure assumes that an active link is established between the test set and the mobile station. See [“Establishing an Active Link with the Mobile Station” on page 28](#).

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.

Example Program

```

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 125](#) (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 106](#)

[“SETup:TXPower” on page 432](#)

[“INITiate” on page 355](#)

[“FETCh:TXPower” on page 349](#)

[“Comprehensive Program Example” on page 200](#)

Transmit Power Troubleshooting

June 29, 1999

Possible Setup Issues

During remote operation of the Transmit Power measurement the user should configure the trigger arm to single, see [“SETup:TXPower” on page 432](#).

Failure to set trigger arm to single may result in the measurement never giving 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 150](#).

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

The Transmit Power Average, Transmit Power Maximum, Transmit Power Minimum results are shifted in proportion to the value of Amplitude Offset that a user may set. The following table shows the measurements that are affected and how amplitude offset affects them. For more information about amplitude offset commands, see [“Measurement Related Configuration” on page 563](#).

Table 9. Measurements affected by amplitude offset

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

Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 125](#).

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 564](#).

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 564](#).

Test Adherence to Standards

February 14, 2000

The Agilent Technologies 8960 series 10 is compliant with ETSI GSM 11.10 Phase 2 Technical specifications.

Frequency Error and Phase Error - ETSI GSM 11.10 section 13.1

The method of test implemented by the test set's Phase & Frequency Error measurement conforms to the measurement method defined in "ETSI GSM 11.10 Ver 4.21.1 Sect 13.1."

Measurements

["Phase and Frequency Error Measurement Description" on page 82](#)

Transmitter Output Power and Burst Timing Error - ETSI GSM 11.10 section 13.3

To make transmitter output power measurement that conforms to ETSI GSM 11.10 standards, perform a Power versus Time measurement with the desired setup. An ETSI compliant, transmitter output power (TXPower) result is available as a result of this measurement. Pass/fail checking of the Power versus Time mask is also available done by the Power versus Time measurement. The Burst Timing Error is available on the Call Setup screen and by issuing a query to the CALL subsystem ("[CALL:STATus:TCHannel:TERRor?](#)" on [page 285](#)).

Making a faster Transmitter Output Power Measurement.

An alternative method of test for making a transmitter output power measurement is to use 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. Obviously, speed is the benefit to the alternative technique used here. This measurement is approximately four times faster than the synchronized method with the same accuracy. However, provided the input signal meets the GSM Power vs. Time (PvT) characteristics, the TX Power measurement gives the same results as the midamble synchronized PvT Carrier Power result.

Measurements

["Transmit Power Measurement Description" on page 106](#)

["Power versus Time Measurement Description" on page 88](#)

Output RF Spectrum Testing Method of Test - ETSI GSM 11.10 section 13.4.4

The Output RF Spectrum due to Switching method of test conforms to the measurement method in "ETSI GSM 11.10 Ver 4.21.1 Sect 13.4.4" for offsets < 1800 kHz.

The Output RF Spectrum due to Modulation method of test conforms to the measurement method in "ETSI GSM 11.10 Ver 4.21.1 Sect 13.4.4" for offsets < 1800 kHz and when "Multi-Measurement Count (Modulation)" is Off, or 1.

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 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 to the user, effectively doubling measurement throughput. Secondly, it provides additional information regarding the spurious performance of the mobile.

The method of test in 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.

Measurements

[“Output RF Spectrum Measurement Description” on page 75](#)

Reference Sensitivity - ETSI GSM 11.10 section 14.2

The method of test implemented by the test set's Bit Error measurement conforms to the measurement method defined in "ETSI GSM 11.10 Ver 4.21.1 Sect 14.2."

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.

Measurements

[“Bit Error Measurement Description” on page 48](#)

[“Fast Bit Error Measurement Description” on page 69](#)

I/Q Tuning Measurement

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

Measurements

[“I/Q Tuning Measurement Description” on page 63](#)

Dynamic Power Measurement

The Dynamic Power measurement is not an ETSI specified measurement.

Measurements

[“Dynamic Power Measurement Description” on page 61](#)

3 General Programming

Burst Synchronization of Measurements

Measurement Synchronization

Measurement Synchronization Description

Measurement synchronization determines how a measurement's time reference is determined from the measurement data (a sampled time record). Measurement synchronization occurs after the measurement data is captured.

For the transmit power and ORFS (switching and modulation) measurements, the RF amplitude of the input signal is used for measurement synchronization. For Phase and Frequency Error Measurement and the Power versus Time Measurement (see [“Phase and Frequency Error Measurement Description” on page 82](#) and [“Power versus Time Measurement Description” on page 88.](#)), however, 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 Power vs. Time measurements performs the average power measurement and does provide 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 526.](#)

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 zero = normal. The following integrity indicators reveal problems with measurement synchronization:

Burst Synchronization of Measurements

- (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 125](#) 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 125](#)

[“INITiate” on page 355](#)

[“SETup Subsystem” on page 379](#)

Programming a Channel Mode Change

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 Link with the Mobile Station” on page 28](#).

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.

Program 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 125](#) (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 533](#)

[“CALL:TCHannel:CMODE” on page 290](#)

Programming a Dualband Handover

February 14, 2000

The dualband handover function has been implemented as an interband channel assignment rather than an interband handover, since the test set currently has one BCH (cell).

How the Test Set Performs a Dualband Handover

The test set has the ability to switch traffic channels (TCH) from the EGSM or PGSM band to the DCS or PCS band, from the DCS or PCS band to the EGSM or PGSM band. No other combinations of traffic channel band handovers are supported. Also, the traffic channel band can be changed only when an active link exists between the test set and a mobile station. See [“Establishing an Active Link with the Mobile Station” on page 28](#)

To perform a handover from the test set's front panel from PGSM select DCS or PCS from the Traffic Band field in the Call Params window.

To perform a handover from the test set's front panel from EGSM select DCS or PCS from the Traffic Band field in the Call Params window.

There is a set of 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 501](#). 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, the user can set up any of the BCH and TCH parameters for both bands involved in the handover because the test set will remember the settings and switch to them when the handover occurs.

Programming Example

```
OUTPUT 714;"CALL:TCHANNEL:BAND DCS" !Performs a dualband handover to the
                                     !currently selected DCS traffic channel.
```

Related Topics

[“Performing a Dual-Band Handover” on page 193](#)

[“CALL:TCHannel” on page 286](#)

Dealing With Semicolon Separated Response Data Lists

Discription

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

Query Response Data Types Used By Test Set

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

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

Semicolon Separated Response Data Lists Containing Mixed Data Types

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

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

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

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

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

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

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


In the Rocky Mountain Basic programming environment the above ENTER statement will fail with an 'Insufficient data for ENTER' error. Some programming languages, Rocky Mountain Basic for example, cannot use the semicolon character as a data item terminator for string variables. In this example Rocky Mountain Basic will attempt to enter data into Imsi\$ until it sees an LF (line feed) data item terminator. The test set does not send the LF until all the data has been sent. Consequently when Rocky Mountain 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's block diagram includes three parallel signal paths. One path, the demodulation downconverter, is primarily used for base station emulation. This frees the measurement downconverter and power detector from performing functions necessary to maintain an active RF link. Since measurements are DSP (digital signal processor) based, and there are four A/D converters available to digitize or "sample" the input signal for analysis by the DSP, the test set will always have the capability to perform link maintenance, one transmitter, and one receiver measurement concurrently. The test set's ability to perform multiple transmitter, or multiple receiver tests concurrently will depend on the availability of resources within the test set and availability of the signal to be tested.

Concurrent Measurements For The E1960A Test Application

This table shows the concurrency considerations for the E1960A GSM Mobile Test Application .

Table 1. Concurrency Considerations

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

Table Key:

Empty cell: No concurrency considerations

A: Cannot operate concurrently. Whichever measurement is activated most recently will cause all other conflicting measurements to be deactivated.

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

C: The test set will not prevent the user from changing the TCH ARFCN or transmit power level while the measurement is in progress. However, changing the TCH ARFCN or transmit power level while the measurement is in progress will cause the measurement to start over which will cause the measurement to take longer to execute.

The only absolute restriction regarding concurrency is that 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. (The test set prevents the user from accessing the downlink speech source while the FBER or BER measurements are running). Other than this restriction, multiple measurements can always be initiated with a single program message, and the test set will manage and report the sequence that measurement results are made available to the controlling application through the INITiate:DONE? query.

Related Topics

[“Measurement Event Synchronization” on page 132](#)

[“Block Diagram” on page 504](#)

Integrity Indicator

Description

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

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

The values returned by the measurement integrity indicator range from 0 to 16. Not all of the values are available for each measurement or Test Application, if a value doesn't apply it will not be available.

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

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

- (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.
- (6) Under Range: Indicates that the input signal is under range. The amplitude of the DUT's signal is not high enough for the DSP sampler to produce accurate results with the measurement algorithm.
- (7) Burst Short: Indicates that the burst duration is too short, or part of the burst was not sampled due to improper triggering.
- (8) Trigger Early or Fall Early: Indicates that the DUT's burst amplitude fell prematurely or, due to an early trigger (early relative to a transmitted burst) the measurement sampling operation terminated before the falling edge of the burst.
- (9) Trigger Late or Rise Late: Indicates that either the rising edge of the DUT's burst was late or, due to a late

trigger (late relative to a transmitted burst) the measurement sampling operation didn't start until after the rising edge of the transmitted burst.

(10) Signal Too Noisy: Indicates that the measurement algorithm has found the signal measured to be too noisy to provide accurate results.

(11) Sync Not Found: Indicates that the midamble was not found therefore the measurement was not synchronized.

(12) Oven Out of Range: Indicates that a temperature controlled oven (other than the internal timebase oven) is outside of its operating range. The power meter's oven is checked and its condition reported with this value. (The internal timebase generates a temporary error message (out of lock) that is sent to the system error queue and the display. This is not an integrity indicator value, it is an error message.)

(13) Unidentified Error: Indicates errors which are not covered by the other integrity values. Examples include: parameter errors, algorithm memory errors (too many measurements), measurements unavailable (unable to control), autorange unable to converge, default calibration data used.

(14) PCM Full Scale Warning: Indicates that the PCM signal has reached plus or minus full scale. The measurement made will be accurate on the PCM signal but would typically indicate an overdriven or oscillating element in the DUT.

(15) Questionable Result for PGSM: Indicates that the user attempted to make an FBER measurement in a phase 1 system. FBER is only possible in a phase 2 GSM system. This indicator is available only when the selected broadcast band is PGSM.

(16) Questionable Result Due To Channel Mode: Indicates that the channel mode was set to Enhanced Full Rate Speech while a Decoded Audio measurement was active. Decoded Audio is not supported for EFR Speech.

Integrity Indicators verses Error Message

Error messages are divided into four classes: integrity errors, fatal errors, persistent errors, and non-persistent errors.

Integrity indicator errors are 1 of 16 different messages that indicate if a measurement was valid.

Fatal errors consist of asserts and exceptions. Asserts occur when firmware encounters a condition that should never occur. Exceptions occur when firmware attempts to access a memory location that is invalid.

Non-persistent occur errors if a condition exists that is incorrect but has no serious lasting effect on instrument operation.

Persistent errors occur when hardware failures are found or when damage or injury to a person or the test set may occur.

Example Program

```
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 576](#)

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 2. List of Timeouts and Default Values

| Measurement Function | Default Timeout Time | Default Timeout State | Integrity Indicator Value |
|---|----------------------|-----------------------|---------------------------|
| Transmit Power | 10 seconds | OFF | 2 |
| Power versus Time | 10 seconds | OFF | 2 |
| Phase and Frequency Error | 10 seconds | OFF | 2 |
| Output RF Spectrum | 10 seconds | OFF | 2 |
| Fast Bit Error Rate | 10 seconds | OFF | 2 |
| Bit Error Rate | 10 seconds | OFF | 2 |
| Analog Audio | 10 seconds | OFF | 2 |
| Decoded Audio also know as Uplink Speech Level | 10 seconds | OFF | 2 |
| IQ Tuning | 10 seconds | OFF | 2 |
| Dynamic Power | 10 seconds | OFF | 2 |
| Call Connected Timeout | 10 seconds | NA | Not included |

Program Example

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

```

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

```

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

Related Topics

["Integrity Indicator" on page 125](#)

["SETup Subsystem" on page 379](#)

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 the user understand the condition that caused the invalid result.

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

$9.9E+37$ (INFINITY)

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

$-9.9E+37$ (NINFINITY)

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

$9.91E+37$ (NAN)

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

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

FETCH? and READ? Invalid Results

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

Manual Users Invalid Results

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

Measurement Progress Report

Description

The measurement progress report is a query of how far along a multi-measurement cycle has progressed. When the multi-measurement count is greater than one, the measurement progress report will indicate the number of measurements that have completed. The returned value will be the last update and not the actual number, because the value is updated periodically and not for each multi-measurement cycle. Every measurement has the measurement progress report available.

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 136](#)

Measurement Event Synchronization

February 14, 2000

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

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

- "TXP" - The transmit power measurement results are available
- "PVT" - The power versus time measurement results are available.
- "PFER" - The phase and frequency error measurement results are available.
- "FBER" - The fast bit error measurement results are available.
- "BERR" - The bit error measurement results are available.
- "AAUD" - The analog audio measurement results are available.
- "DAUD" - The decoded audio measurement results are available.
- "ORFS" - The output RF spectrum measurement results are available.
- "DPOW" - The dynamic power measurement results are available.
- "IQT" - The I/Q Tuning measurement results are available.
- "WAIT" - There are one or more measurements which are in the measuring state which are not excluded from the query. See ["INITiate:DONE:FLAG<measurement mnemonic>" on page 358](#). 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 358](#). This would indicate that all measurements results are available or none have been initiated.

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 Link with the Mobile Station” on page 28](#) and [“Triggering Process Description” on page 150](#).

```

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 451](#) for more details about this command.

The user must enable the following so that as soon as the enabled NMRReady bit is true the program moves on.

- Positive or negative transition filter. See [“Transition Filters” on page 145](#).
- 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 437](#) or [“Status Subsystem Overview” on page 137](#).
- STATUS:OPERation bit (512 for NMRReady).
- Service Request Enabling (*SRE 128 for NMRReady). See .

The [“STATUS:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 451](#) status register provides status reporting on the following measurement completions:

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

Example 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 has completed. This code assumes a call is already connected and the BERR measurement is setup (mobile station must be in loopback type A or B).

```

10 OUTPUT 714;"STATUS:OPERATION:NMRREADY: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.

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

Related Topics

["INITiate Command Functions" on page 353](#)

["What Happens When a Measurement is INITiated?" on page 353](#)

["Concurrent Measurements" on page 122](#)

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:SNUMBER 10" !Enters a TX Power multi-measurement count
                                           !value of 10, and turns the TX Power
                                           !multi-measurement state on.
```

Related Topics

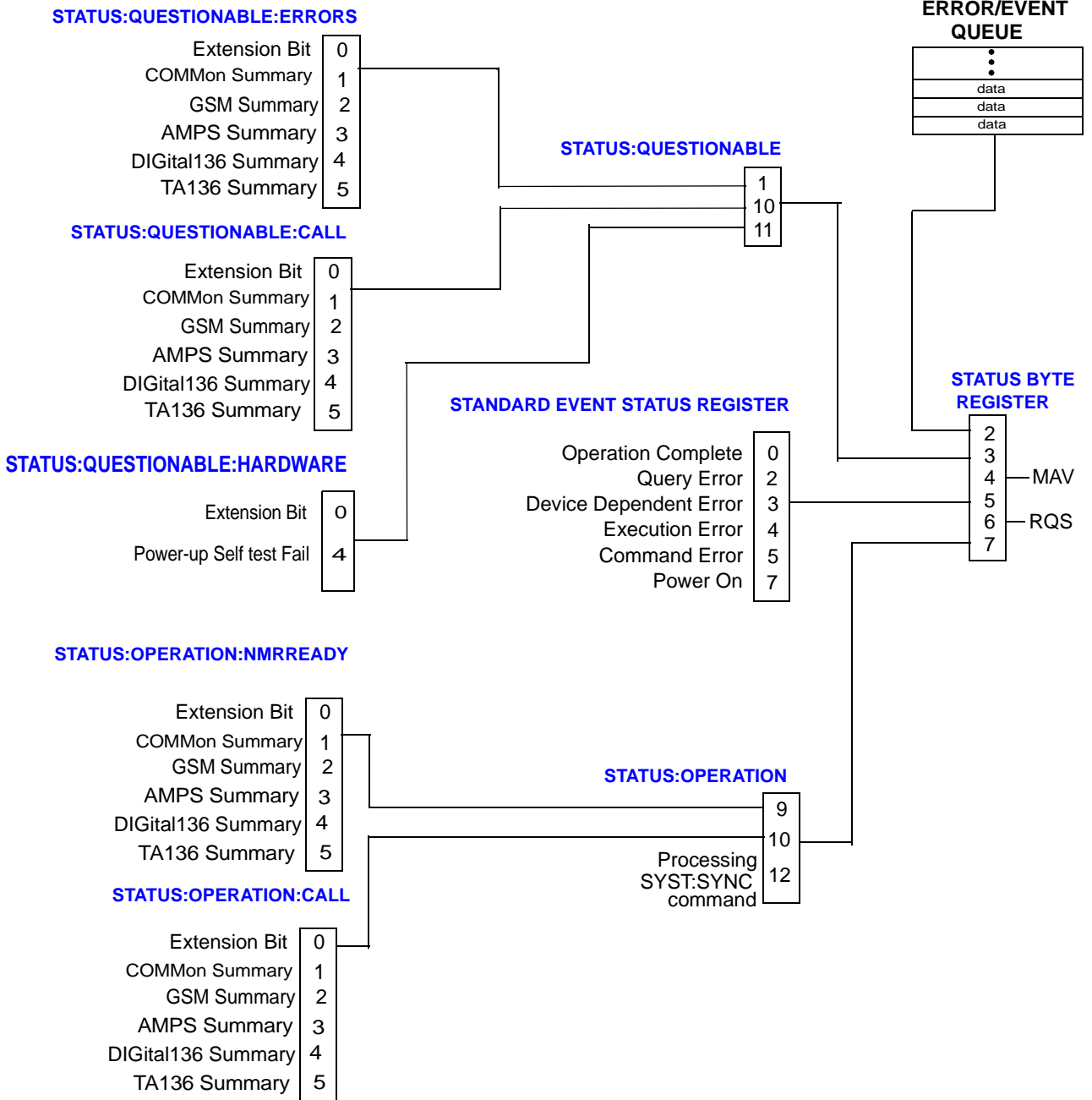
["Measurement Progress Report" on page 131](#)

Status Subsystem Overview

February 14, 2000

Description

Overview of STATus Reporting Structure



Status Reporting Structure For The GSM Test Application

STATUS:QUESTIONABLE:CALL:GSM

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

Bit 2
STATUS
QUESTIONABLE

STATUS:QUESTIONABLE:ERRORS:GSM

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

Bit 2
STATUS
QUESTIONABLE
ERRORS

STATUS:OPERATION:NMRREADY:GSM

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

Bit 2
STATUS
OPERATION
NMRREADY

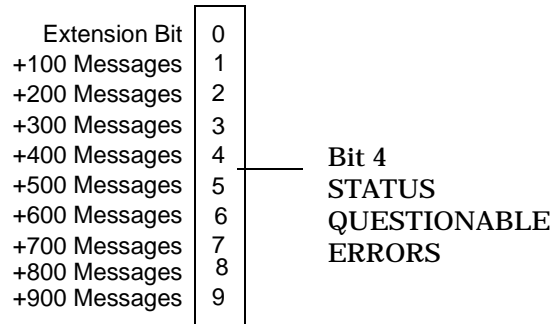
STATUS:OPERATION:CALL:GSM

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

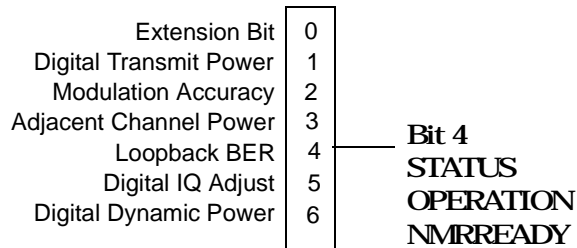
Bit 2
STATUS
OPERATION
CALL

Status Reporting Structure For The DIGital136 Test Application

STATUS:QUESTIONABLE:ERRORS:DIGital136

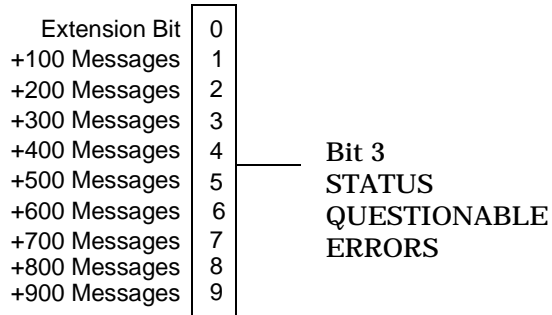


STATUS:OPERATION:NMRREADY:DIGital136

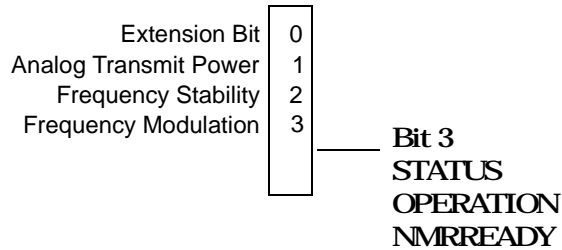


Status Reporting Structure For The AMPS Test Application

STATUS:QUESTIONABLE:ERRORS:AMPS

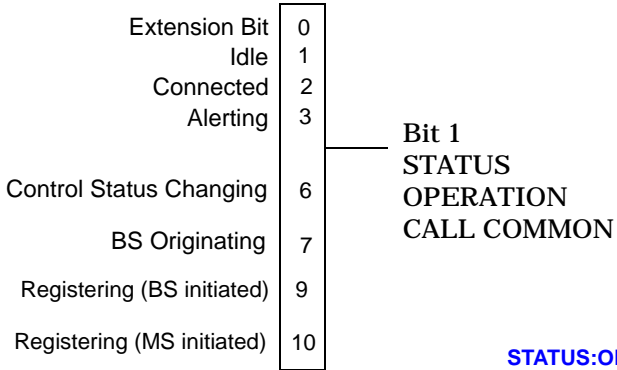


STATUS:OPERATION:NMRREADY:AMPS

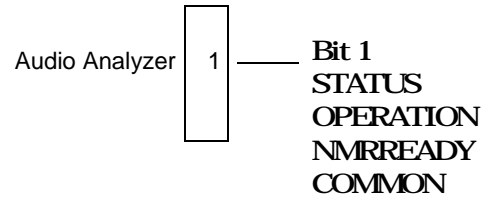


Status Reporting Structures For The COMMON Registers

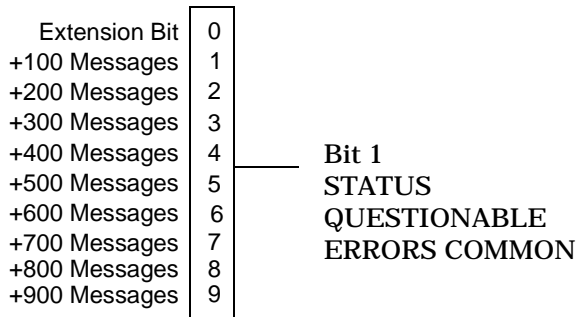
STATUS:OPERATION:CALL:COMMON



STATUS:OPERATION:NMRREADY:COMMON



STATUS:QUESTIONABLE:ERRORS:COMMON



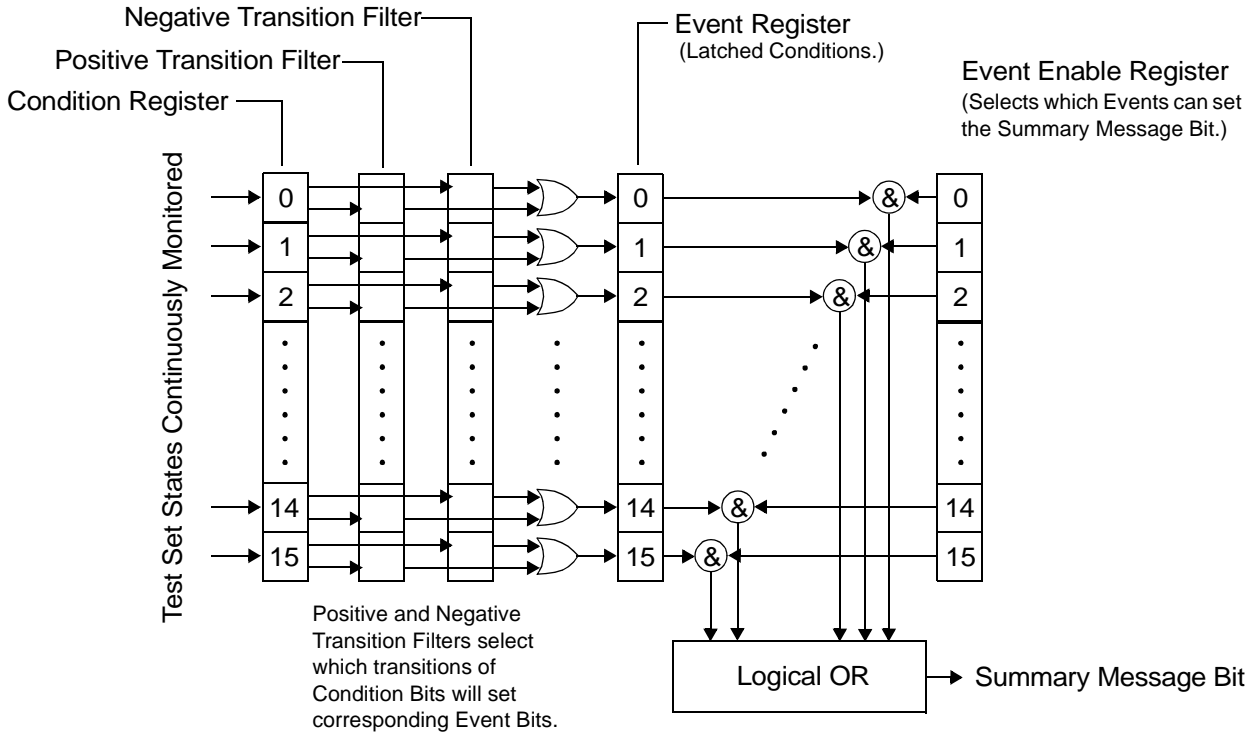
Status Reporting Structures For The TA136 Registers

STATUS:QUESTIONABLE:ERRORS:TA136

| | | |
|---------------|---|---|
| Extension Bit | 0 | |
| +100 Messages | 1 | |
| +200 Messages | 2 | |
| +300 Messages | 3 | |
| +400 Messages | 4 | |
| +500 Messages | 5 | Bit 5 STATUS QUESTIONABLE ERRORS TA136 |
| +600 Messages | 6 | |
| +700 Messages | 7 | |
| +800 Messages | 8 | |
| +900 Messages | 9 | |

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.

Some status register groups do not implement Condition registers for certain test set conditions. In the tables labeled “Bit Definitions”, these conditions are indicated by the word “NO” in the column labeled “Is Condition Register Implemented?”.

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, or if there is no Condition Register/Transition Filter combination, each bit corresponds to a specific condition in the test set. 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 either 8 or 16 bits long and may contain unused bits. All unused bits return a zero value when read.

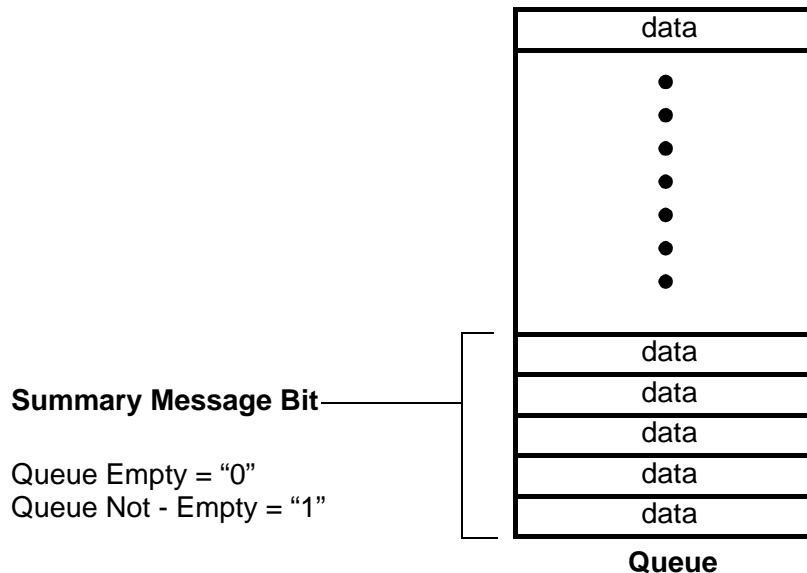
Event Enable Register The Event Enable Register defines which bits in the Event Register will be used to generate the Summary Message. Each bit in the Enable Register has a corresponding bit in the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then 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 either 8 or 16 bits long and may contain unused bits which correspond to unused bits in the associated Event Register. All unused bits return a zero value when read and are ignored when written to. Enable Registers are unaffected by a *CLS (clear status) command or queries.

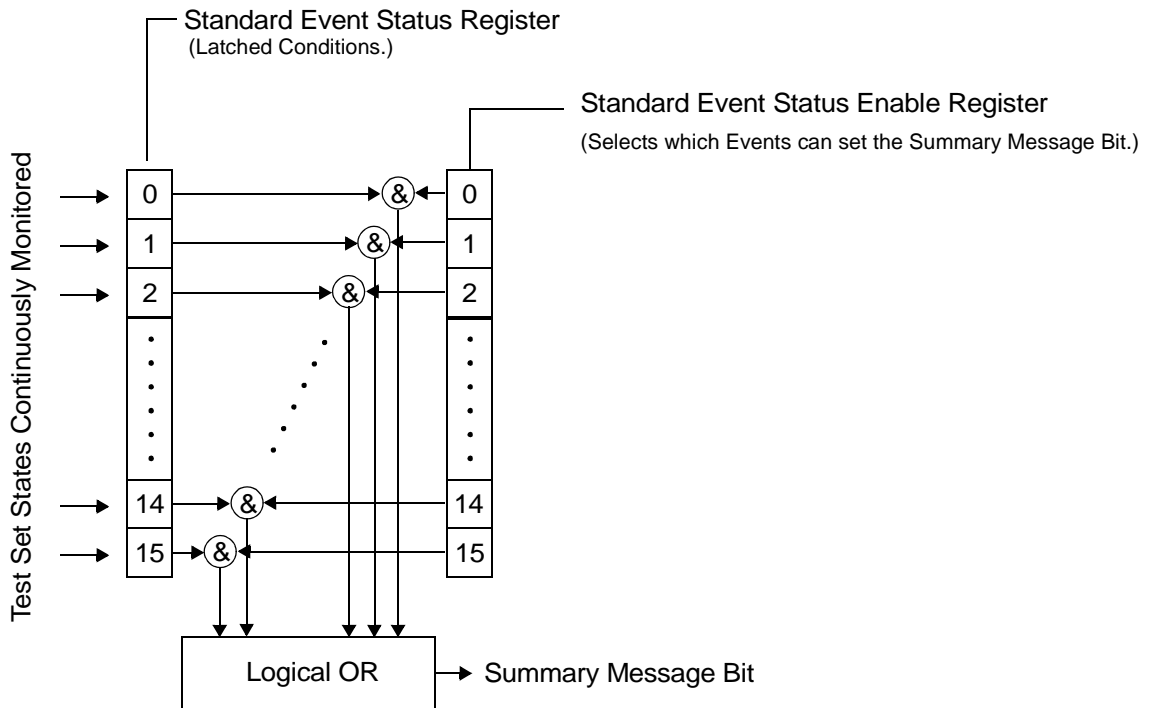
Summary Message Bit The Summary Message is a single-bit message which indicates whether or not one or more of the enabled events have occurred since the last reading or clearing of the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs an inclusive OR on all the resulting bits to generate the Summary Message. By use of the enable bits, the application program can direct the test set to set the Summary Message to the 1, or TRUE, state for a single event or an inclusive OR of any group of events. The Summary Message is TRUE when an enabled event in the Event Register is set TRUE. Conversely, the Summary Message is FALSE when no enabled events are TRUE. Summary Messages are always seen as bits in another register.

Status Data Structure - Queue Model

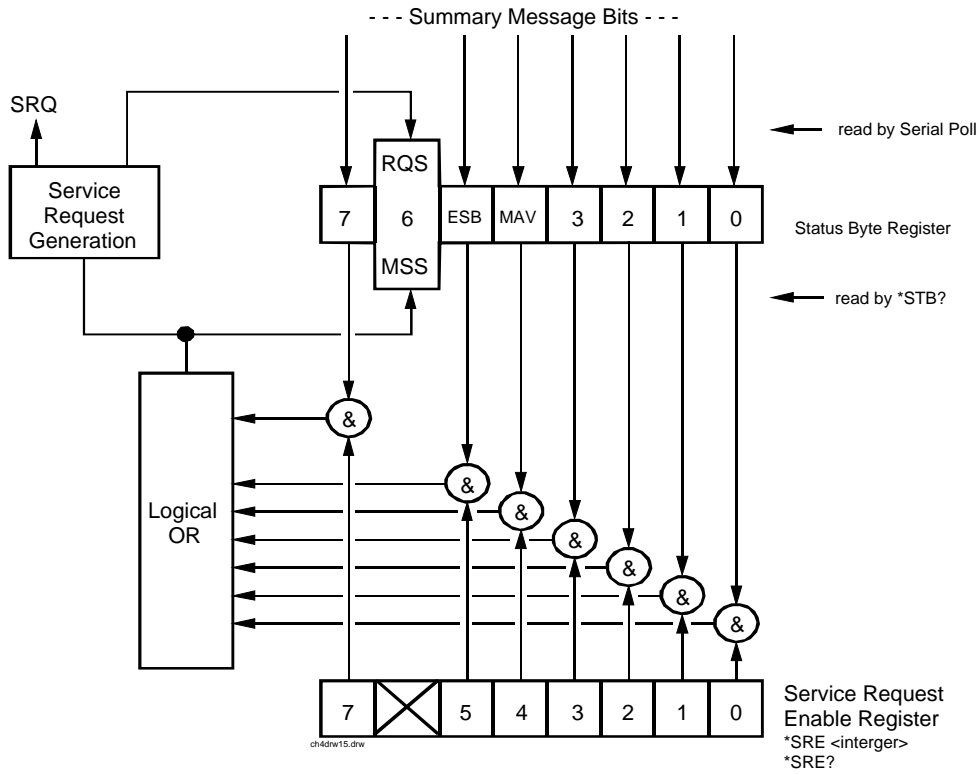
The generalized status queue model is the basis upon which all the status queues in the test set are built. A queue is a data structure containing a sequential list of information. The queue is empty when all information has been read from the list. The associated Summary Message is TRUE, logic 1, if the queue contains some information and FALSE, logic 0, if the queue is empty. Queues can be cleared by reading all the information from the queue. Queues, except the Output Queue, can also be cleared using the *CLS (clear status) command.



Standard Event Status Register Model



Service Request Enabling Register Model



Related Topics

[“STATUS Subsystem Description” on page 437](#)

[“Standard Event Status Register” on page 470](#)

Triggering of Measurements

E1960A Operating Considerations

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

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

Table 3. Trigger Source choices

| Trigger Source | Function |
|----------------|--|
| RF Rise | Generated from a change in the amplitude of the signal being measured. |
| Protocol | Generated from a specific data word in the mobile station's transmission. |
| External | Generated from an external signal. |
| Immediate | Generated from measurement initiation. |
| Auto | The test set selects the trigger source optimized for a given measurement. |

RF Rise Trigger Source: When RF rise triggering is selected, a measurement dependent threshold is used to define the trigger point on the envelope of the signal being measured. The envelope amplitude must fall below this threshold and remain there for a measurement-dependent period of time before the trigger is armed. After the trigger is armed, a trigger will occur as the envelope amplitude increases and passes through the threshold.

Protocol Trigger Source: When protocol triggering is selected, a data capture is triggered by a protocol generated signal. The test set's protocol engine knows when the DUT's signal should be present and generates a trigger signal for use by the measurement to trigger the data capture.

External Trigger Source: When external triggering is selected, the user supplies an external trigger signal 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.

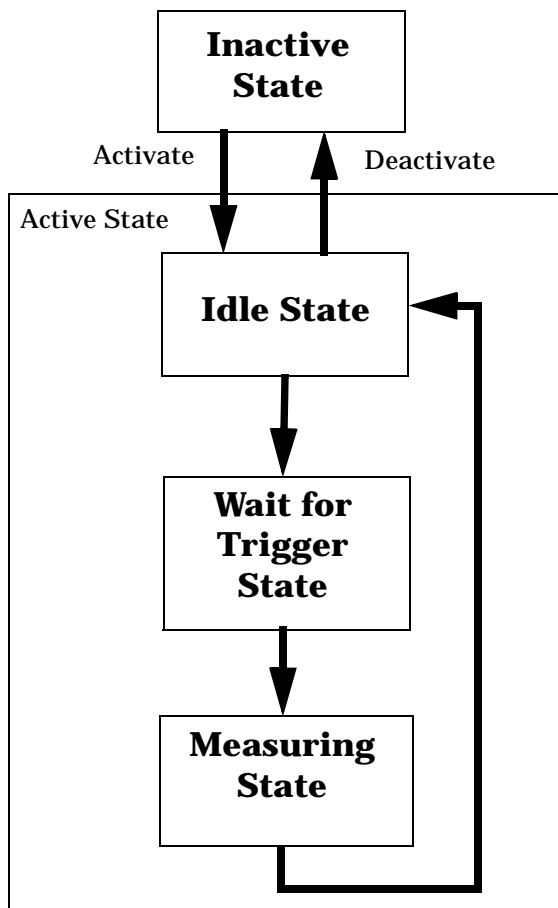
Auto Trigger Source: When auto triggering is selected, the test set automatically chooses the best trigger source for that measurement. This trigger source setting is convenient because the measurement trigger doesn't need to be changed when switching parameters. Auto trigger source is the best choice 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 150.

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 4. Trigger Arm Default Settings

| Action | Trigger Arm Default Setting |
|---------------------------|-----------------------------|
| Power up of test set | Continuous |
| Manual Full Preset | Continuous |
| *RST (Remote) Full Preset | Single |
| Partial Preset | No change |

Trigger Delay Description

Trigger delay controls the delay time between the trigger and the start of sampling. Resolution is 1

nanosecond per measurement and the units are in seconds. A negative value indicates the sampling should occur prior to the trigger. The default is zero seconds which is preferred for most measurements.

Trigger Qualifier Description

When the trigger qualifier is on, the test set 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 125](#)

[“SETup:ORFSpectrum:TRIGger:SOURce” on page 420](#)

[“SETup:PFERror:TRIGer:SOURce” on page 425](#)

[“SETup:PVTime:TRIGger:SOURce” on page 431](#)

[“SETup:IQTuning:TRIGger:SOURce” on page 411](#)

[“SETup:TXPower:TRIGger:SOURce” on page 435](#)

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

Introduction

Conventions Used in This Programming Guide

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

Purpose of This Programming Guide

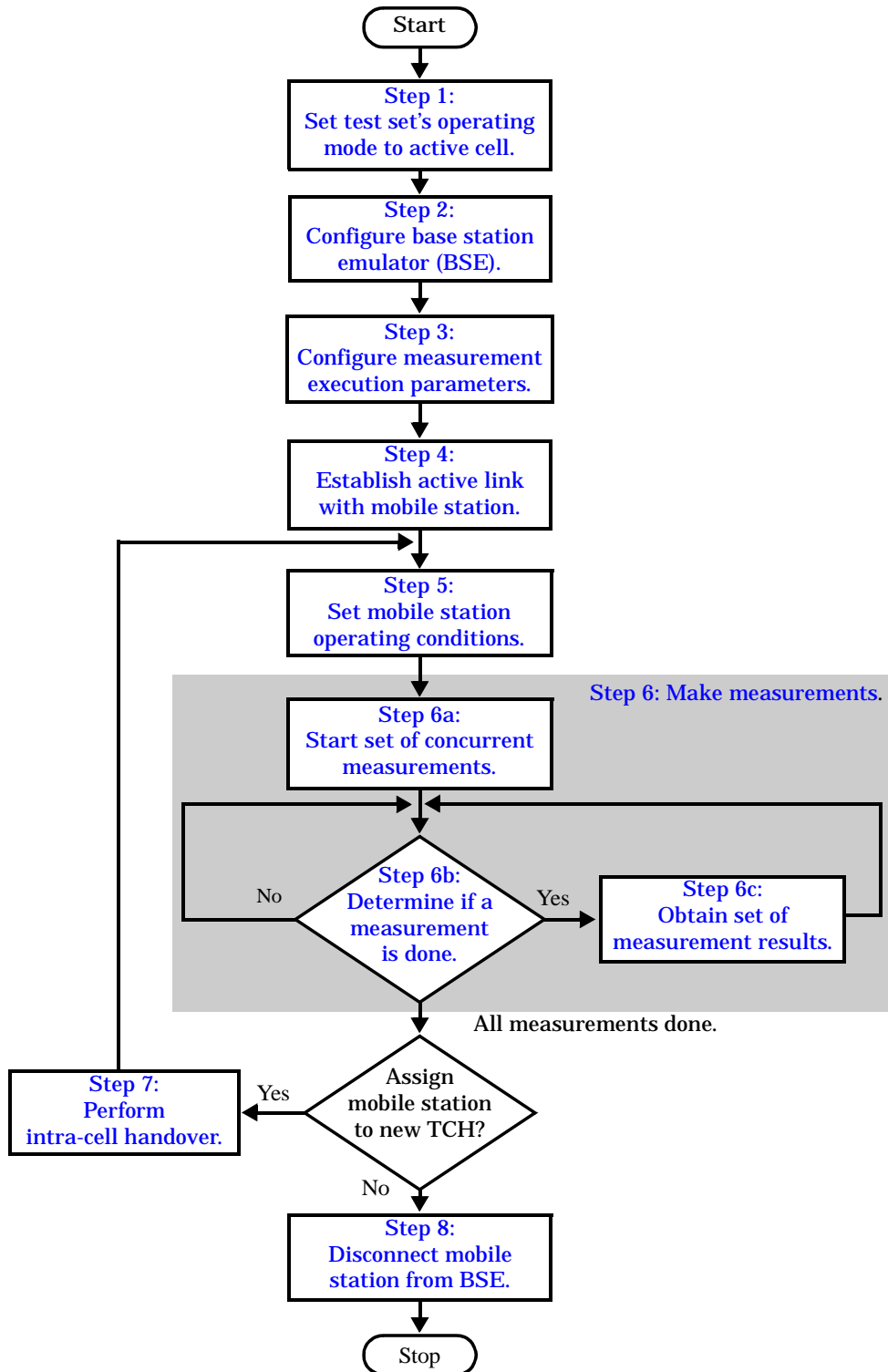
The test set represents state-of-the-art technology in one-box-testers and contains many powerful test capabilities which are accessible through easy-to-use GPIB programming commands. The purpose of this Programming Guide is to teach you how to write a basic control program, using the test set’s GPIB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

How This Programming Guide Is Organized

The Programming Guide is organized around a typical set of tasks a control program would normally perform when testing a GSM mobile station in a manufacturing environment. The set of tasks is shown in [“Figure 1. Typical Flow of Tasks Performed by Control Program”](#) on page 155.

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

Figure 1. Typical Flow of Tasks Performed by Control Program



How to Use This Programming Guide

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

The last section of the Programming Guide presents a [“Comprehensive Program Example” on page 200](#) which uses all of the topics discussed in sections 1 through 8 together in one program to give the programmer a sense of how to tie everything together.

About the Programming Examples Presented in This Programming Guide

Programming Language:

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

Syntax Used in Programming Examples:

1. Programming examples use the shortened form of the command syntax to minimize GPIB bus transactions. The shortened form of a command is defined by use of capital letters in the command syntax.

Example 1. Command Syntax:

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

Example 2. Shortened Form:

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

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

Example 3. Command Syntax:

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

Example 4. Command Syntax without Default Nodes:

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

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

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

Background

The test set contains a GSM base station emulator (BSE). The BSE'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 (MS).

An important characteristic of the test set's BSE is its operating mode. The operating mode sets the way in which the BSE interacts with the mobile station. The BSE 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 MS via over-the-air signaling, but downlink stimulus and uplink measurements are still needed.

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

Overview of Active Cell Operating Mode

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

Active Cell Features

The basic features provided by the BSE 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 MS and BSE originated.
- Changing TCH parameters during a call using over-the-air signaling.
- BSE initiated and MS initiated call disconnection.
- All measurements supported in the test application are available.
- The BSE automatically controls the test set's demodulation receiver.

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

Setting the Test Set's Operating Mode to Active Cell

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

Example 1. Command Syntax:

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

Example 2. Programming Example:

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

Step 2: Configure the Base Station Emulator (BSE)

Background

The test set contains a GSM base station emulator (BSE). In active cell operating mode the BSE, using the test set's GMSK modulated source, generates a downlink (BSE to MS direction) broadcast channel (BCH) which represents a cell. The MS can camp to this signal, just as it would camp to a cell on a real network. The BSE can then page the MS on the BCH and listen to the response of the MS on the uplink (MS to BSE 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 BSE's measuring receiver, under essentially identical conditions to that which the MS would experience on a real network.

The BS 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

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

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

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

Configuring the Broadcast Channel Parameters

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

Broadcast Channel Settable Parameters

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

Table Footnotes

- 1 The broadcast band setting becomes the selected (:SElected) band (see note 3).
- 2 Sets amplitude to <numeric value> and state to ON in one command.
- 3 Sets the BCH channel for the broadcast band selected with the broadcast band command (see note 1).
- 4 Can only be set when Cell Activated State = OFF. See ["Things That Can Go Wrong" on page 163](#).
- 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 MS to use discontinuous reception (that is, DRX = ON).

Example 1. Programming Example:

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

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

Configuring the Traffic Channel Parameters

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

Traffic Channel Settable Parameters

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

Table Footnotes

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

Example 2. Programming Example:

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

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

Things That Can Go Wrong

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

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

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

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

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

Example 3. Command Syntax:

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

Example 4. Programming Example:

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

Effects of Activating and Deactivating the Cell

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

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

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

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

Step 3: Configure the Measurement Execution Parameters

Background

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

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

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

Overview

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

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

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

Measurement Mnemonics Used In The SETup Subsystem

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

Configuring Measurement Averaging Parameters

Multi-Measurement Count State Parameter

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

Example 1. Command Syntax:

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

Example 2. Programming Example:

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

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

Multi-Measurement Count Number Parameter

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

Example 3. Command Syntax:

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

Example 4. Programming Example:

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

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

Configuring Multi-Measurement Count State and Count Number Simultaneously

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

Example 5. Command Syntax:

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

Example 6. Programming Example:

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

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

Configuring Measurement Triggering Parameters

Trigger Source Parameter

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

Example 7. Command Syntax:

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

Example 8. Programming Example:

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

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

Trigger Delay Parameter

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

Example 9. Command Syntax:

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

Example 10. Programming Example:

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

would set the trigger delay to 10 μ s for the transmit power measurement.

Trigger Qualifier Parameter

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

Example 11. Command Syntax:

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

Example 12. Programming Example:

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

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

Step 3: Configure the Measurement Execution Parameters

Trigger Arm Parameter

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

Example 13. Command Syntax:

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

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

Example 14. Programming Example:

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

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

Configuring the Burst Synchronization Parameter

Burst Synchronization Parameter

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

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

Example 15. Command Syntax:

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

Example 16. Programming Example:

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

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

Configuring Measurement Timeout Parameters

Measurement Timeout State Parameter

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

Example 17. Command Syntax:

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

Example 18. Programming Example:

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

would enable measurement timeouts for the power versus time measurement.

Measurement Timeout Time Parameter

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

Example 19. Command Syntax:

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

Example 20. Programming Example:

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

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

Configuring Measurement Timeout State and Timeout Time Simultaneously

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

Example 21. Command Syntax:

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

Example 22. Programming Example:

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

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

Configuring Measurement Specific Parameters

Background

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

Sending Comma-Separated Parameter Configuration Lists to the Test Set

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

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

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

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

- Using a string variable:

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

- Using numeric arrays:

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

Example 23. Programming Example:

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

```

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

```

Step 4: Establish an Active Link with Mobile Station

Background

Call Connect/Disconnect Synchronization

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

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

Call States

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

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

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

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

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

Determining if a Call Connect/Disconnect Process is Completed

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

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

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

The test set implements a set of commands designed specifically for call connect/disconnect synchronization. (see [“Step 8: Disconnect the Mobile Station from the BSE” on page 196](#) 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”.

Example 1. Command Syntax:

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

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

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

Example 2. Command Syntax:

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

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

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

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

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

Example 3. Command Syntax:

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

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

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

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

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

Example 4. Command Syntax:

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

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

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

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

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

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

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

Overview

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

- Base station originated call
- Mobile station originated call

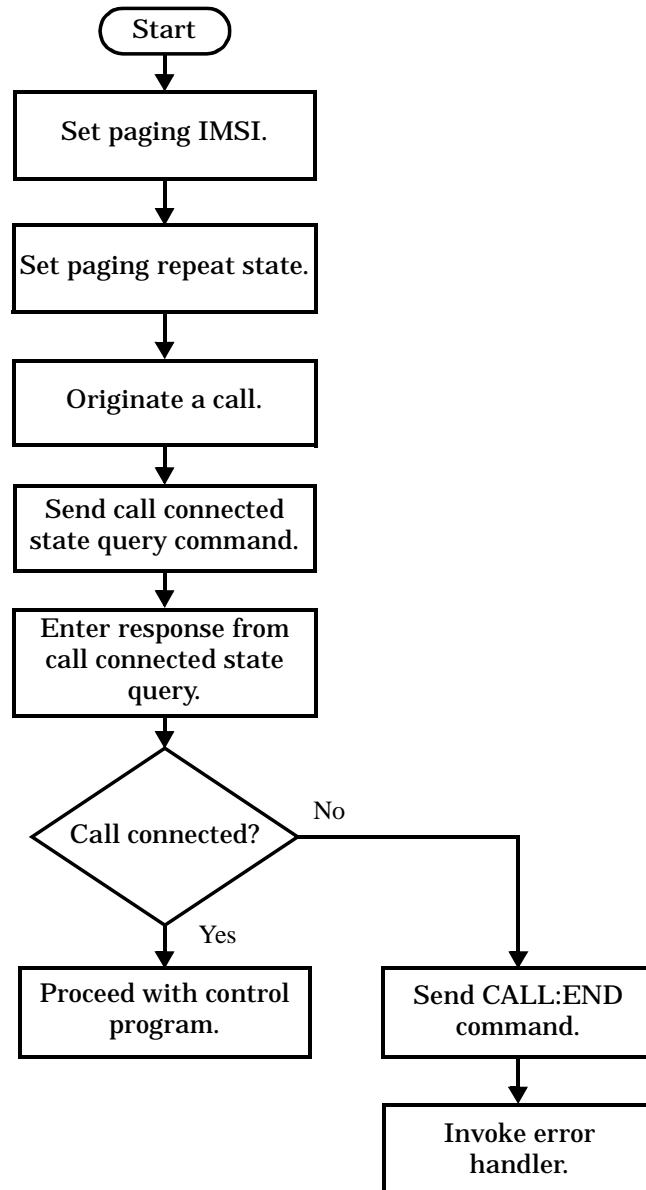
Process for Making a Base Station Originated Call

The recommended process for making a base station originated call is shown in [“Step 4: Figure 1. Process for Making a Base Station Originated Call” on page 177](#).

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

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

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



Step 4: Establish an Active Link with Mobile Station

Example 5. Programming Example:

```
!*****
! Step 4: Establish Active Link with Mobile Station
!*****
!
OUTPUT Test_set;"CALL:PAG:IMSI `001012345678901'" ! Set paging IMSI
OUTPUT Test_set;"CALL:PAG:REP OFF" ! Set paging repeat state to off
OUTPUT Test_set;"CALL:ORIG" ! Start a base station originated call
OUTPUT Test_set;"CALL:CONN:STAT?" ! Hanging GPIB query
ENTER Test_set;Call_connected ! Program will hang here until
! origination passes or fails
IF NOT Call_connected THEN ! Check if connection successful
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected so proceed with control program
```

Call Origination Process Commands

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

Example 6. Command Syntax:

```
CALL:ORIGinate
```

Example 7. Programming Example:

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

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

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

Example 8. Command Syntax:

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

Example 9. Programming Example:

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

would set the paging IMSI to 001012345678901.

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

Example 10. Command Syntax:

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

Example 11. Programming Example:

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

would turn on paging repeat.

Process for Making a Mobile Station Originated Call

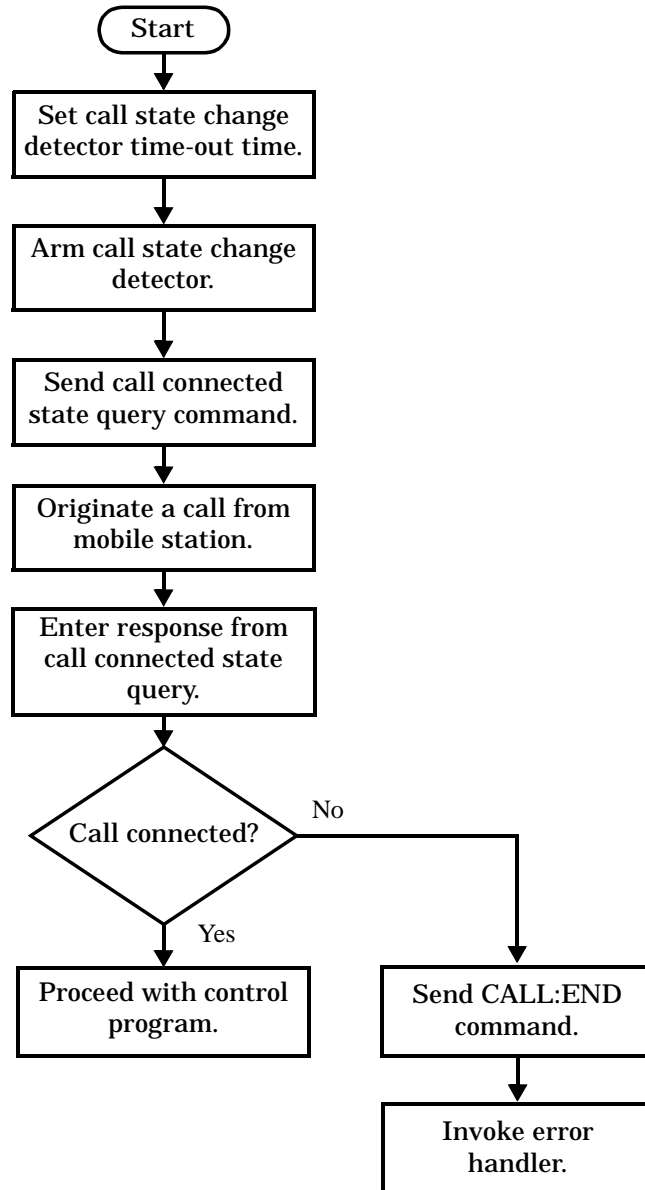
The recommended process for making a mobile station originated call is shown in “[Step 4: Figure 2. Process For Making A Mobile Station Originated Call](#)” on page 180.

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

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

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

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



Example 12. Programming Example:

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

Step 5: Set the Mobile Station's Operating Conditions

Overview

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

Settable Mobile Station Operating Conditions

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

Table Footnotes

1 The TCH band setting becomes the selected band.

Example 1. Programming Example:

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

Step 6: Make Measurements

Background

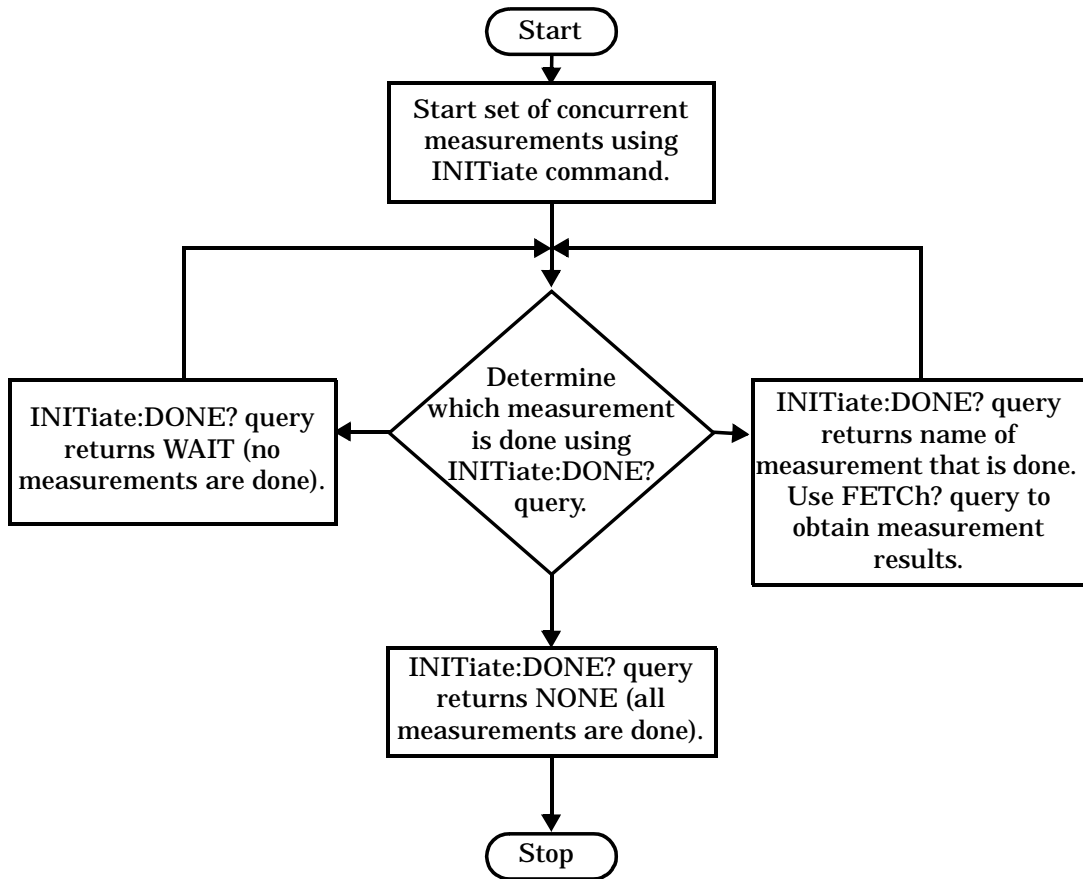
The multiple signal path, DSP based, multiple processor architecture of the test set allows the test set to make concurrent measurements. This means that:

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

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

“[Step 6: Figure 1. Process for Making Measurements](#)” on [page 184](#) shows the recommended process for making concurrent measurements using the test set’s command set.

Step 6: Figure 1. Process for Making Measurements



Example 1. Programming Example:

The following program segment illustrates making a transmit power measurement and a phase and frequency error measurement concurrently using the recommended process shown in “[Step 6: Figure 1. Process for Making Measurements](#)” on page 184.

```

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

```

Things That Can Go Wrong

Measurement Integrity Always Returns a Value of 6

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

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

Suggested Workaround Fixture loss or cable loss can be compensated for by using the RF IN/OUT port's amplitude offset parameter.

Example 2. Command Syntax:

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

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

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

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

Example 3. Programming Example:

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

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

Step 6a: Start Set Of Concurrent Measurements

Starting Measurements

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

Example 1. Command Syntax:

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

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

Measurement Mnemonics Used In The INITiate Subsystem

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

Example 2. Programming Example:

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

would start the transmitter power measurement.

Using Compound Commands to Start Multiple Measurements

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

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

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

Step 6b: Determine if a Measurement Is Done

July 12, 1999

Background

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

Overview

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

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

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

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

Responses Returned from INITiate:DONE? Query

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

Example 1. Command Syntax:

INITiate:DONE?

Example 2. Programming Example:

See [“Programming Example:”](#) on page 185.

Step 6c: Obtain a Set of Measurement Results

Background

In order to minimize bus traffic in the manufacturing environment the test set's high-level measurements have been designed to return multiple measured values in response to a single measurement request.

For example: if a transmit power measurement with averaging is initiated there will be five measurement results available as follows:

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

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

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

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

Overview

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

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

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

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

Measurement Mnemonics Used In The FETCh Subsystem

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

Example 1. Command Syntax:

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

Example 2. Programming Example:

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

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

Step 7: Perform an Intra-Cell Handover

Background

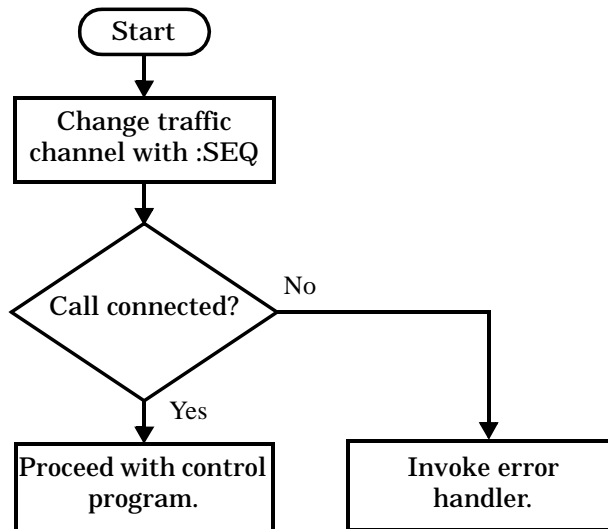
A handover is defined as assigning the mobile station to a new traffic channel. The test set is capable of performing two types of handovers:

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

Performing an Intra-Cell Handover

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

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



Example 1. Command Syntax:

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

OR

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

Example 2. Programming Example:

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

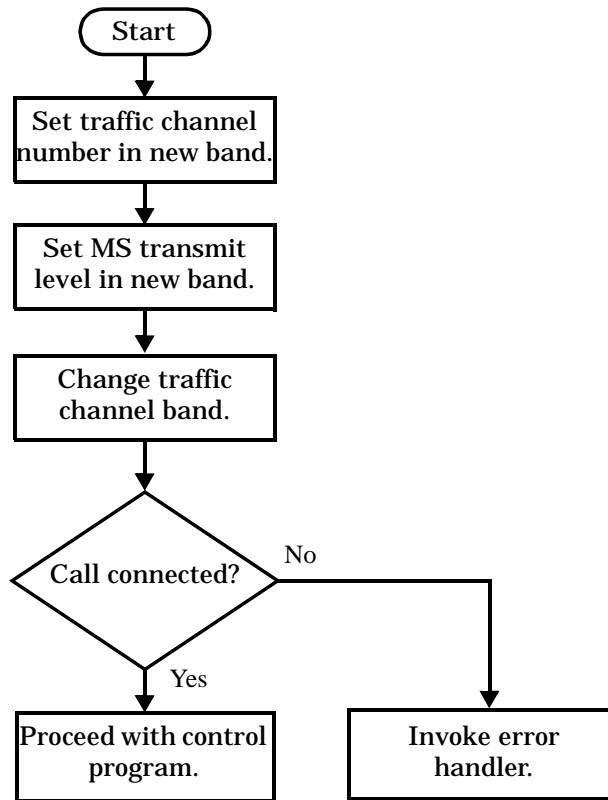
```
! existing conditions: a mobile station is connected to the test
! set, operating mode is set to active cell and a call is in the
! connected state.
! Step 1: Change the traffic channel number
OUTPUT Test_set;"CALL:TCH:SEQ 65"!Starts process of handing over MS
!to new traffic channel 65.
!No other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

Performing a Dual-Band Handover

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

Step 7: Perform an Intra-Cell Handover

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



Example 3. Programming Example:

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

```

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

```

Step 8: Disconnect the Mobile Station from the BSE

Background

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

Using the Call Connected State Query for Call Disconnect Synchronization

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

Using the Call Connected Arm Command for Call Disconnect Synchronization

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

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

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

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

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

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

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

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

Overview

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

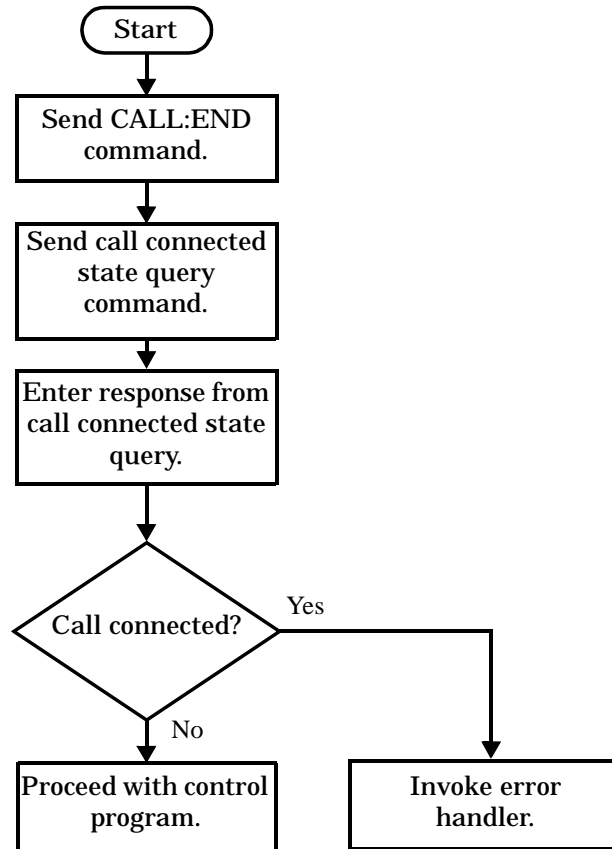
- Terminate the active call from the base station emulator
- Terminate the active call from the mobile station

Terminating an Active Call from the Base Station Emulator

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

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

Step 8: Figure 1. Process for Terminating an Active Call from the BSE



Step 8: Disconnect the Mobile Station from the BSE

Example 1. Programming Example:

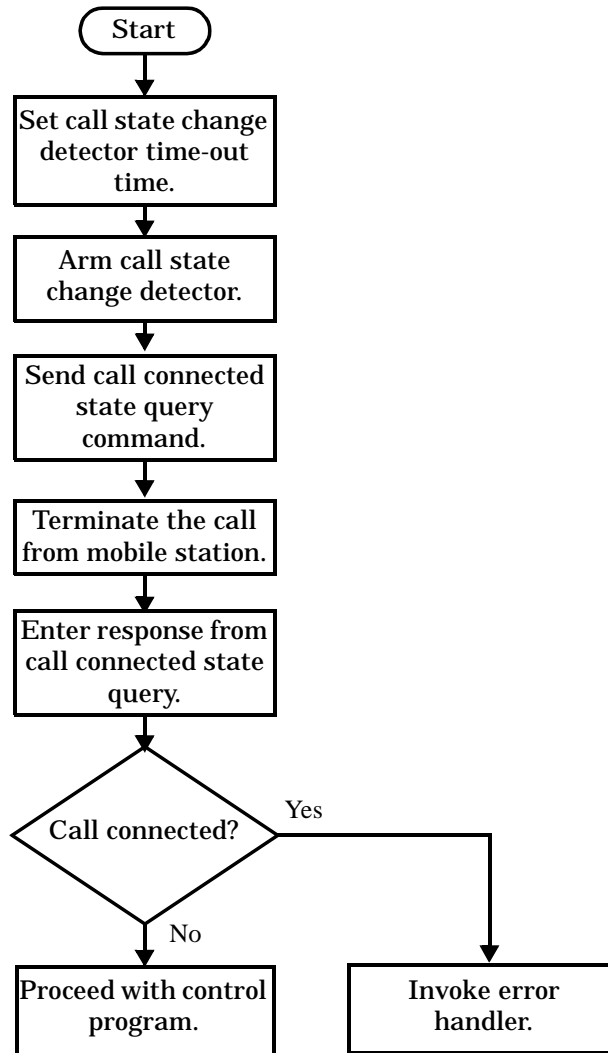
```
!*****  
! Step 8: Disconnect Mobile Station From BSE  
!*****  
!  
OUTPUT Test_set;"CALL:END"           ! Initiate a base station disconnect.  
OUTPUT Test_set;"CALL:CONN:STAT?"    ! Initiate call connect state query.  
ENTER Test_set;Call_connected        ! Program will hang here until state 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

Terminating an Active Call from the Mobile Station

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

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

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

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

```

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

Comprehensive Program Example

This section presents two example programs for making measurements using the test set. The first program follows the task flow presented at the beginning of the programming note (see “[Figure 1. Typical Flow of Tasks Performed by Control Program](#)” on page 155) and which is discussed throughout the programming guide. The second program, “[Example Program Without Comments](#)” on page 206, is basically the same as the first but comments have been removed and the coding reflects the use of compound commands and complex commands to achieve coding efficiency.

Example Program With Comments

```

10      ! Prog Name: com_man_ex.txt      Rev: A.0.2      Date Code: 12/18/98
20      !
30      ! Configure the BASIC environment, dimension and initialize variables.
40      ! These actions are unrelated to programming the Agilent 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 (BSE)
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:SGA -6" ! MS has a -6 dB fixture loss.
460 !
470 OUTPUT Test_set;"CALL:CELL:BAND PGSM" ! Set active broadcast band to PGSM.
480 OUTPUT Test_set;"CALL:ACT OFF" ! Deactivate cell to set network parms.
490 OUTPUT Test_set;"CALL:CELL:MCC 1;LAC 1;MNC 1;NCC 1;BCC 5" ! Set network parms.
500 OUTPUT Test_set;"CALL:ACT ON" ! Reactivate the cell.
510 OUTPUT Test_set;"CALL:BCH 20" ! Set broadcast channel to 20.
520 OUTPUT Test_set;"CALL:POW:SAMP -85" ! Set cell power to -85 dBm and cell
530 ! power state to ON with complex command.
540 OUTPUT Test_set;"CALL:TCH 45" ! Set traffic channel to 45.
550 OUTPUT Test_set;"CALL:TCH:TSL 4" ! Set timeslot to 4.
560 !
570 !*****
580 ! Step 3: Configure the Measurement Execution Parameters
590 !*****
600 !
610 ! Configure ORFS Measurement:
620 !
630 OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5" ! Examples of using complex commands to
640 OUTPUT Test_set;"SET:ORFS:MOD:COUN 10" ! set multi-meas state and count at
650 ! same time.
660 OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO" ! Set trig source to AUTO.
670 OUTPUT Test_set;"SET:ORFS:CONT OFF" ! Set trig mode to single.
680 OUTPUT Test_set;"SET:ORFS:TIM 60" ! Set timeout time to 60 seconds.
690 ! Put switching and modulation offsets to be tested into string variables.
700 Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
710 Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
720 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
730 OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod_offs$
740 !
750 ! Configure TX Power Measurement:
760 !
770 OUTPUT Test_set;"SET:TXP:COUN 3"
780 OUTPUT Test_set;"SET:TXP:TRIG:SOUR RISE;QUAL ON"
790 OUTPUT Test_set;"SET:TXP:CONT OFF"
800 OUTPUT Test_set;"SET:TXP:TIM 20"
810 !
820 ! Configure Phase & Frequency Error Measurement:
830 !
840 OUTPUT Test_set;"SET:PFER:COUN 8"
850 OUTPUT Test_set;"SET:PFER:TRIG:SOUR PROT;QUAL ON"
860 OUTPUT Test_set;"SET:PFER:CONT OFF"
870 OUTPUT Test_set;"SET:PFER:TIM 30"
880 OUTPUT Test_set;"SET:PFER:BSYN MID"
890 !
900 !*****
910 ! Step 4: Establish an Active Link with the Mobile Station
920 !*****

```

Comprehensive Program Example

```
930      !
940      OUTPUT Test_set;"CALL:PAG:IMSI '001012345678901'"      ! Set paging IMSI.
950      OUTPUT Test_set;"CALL:PAG:REP OFF"      ! Set paging repeat state to off.
960      !
970      ! This example uses a BSE originated call. The MS must be camped to the BSE
980      ! in order for the BSE to originate a call. The following code will try to
990      ! originate a call 50 times and then STOP the program. This should give
1000     ! adequate time for the MS to camp to the BSE.
1010     !
1020     ! NOTE: This technique will cause the following error to be displayed on the
1030     !       test set's display and be put in the error message queue each time
1040     !       that the call fails to connect. This is normal for this technique.
1050     ! 'GSM call disconnected; No response to page (Timer T3113 expiry)'
1060     !
1070     Tries=1
1080     LOOP
1090         OUTPUT Test_set;"CALL:ORIG"      ! Originate a call.
1100         OUTPUT Test_set;"CALL:CONN:STAT?"      ! CALL:CONNECTed hanging GPIB 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

```

Comprehensive Program Example

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

```

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 BSE
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 200](#) but comments have been removed and the coding reflects the use of compound commands and complex commands to achieve coding efficiency.

```

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

```

```

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

```

Comprehensive Program Example

```
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
```


5 GPIB Command Syntax

Diagram Conventions

July 7, 1999

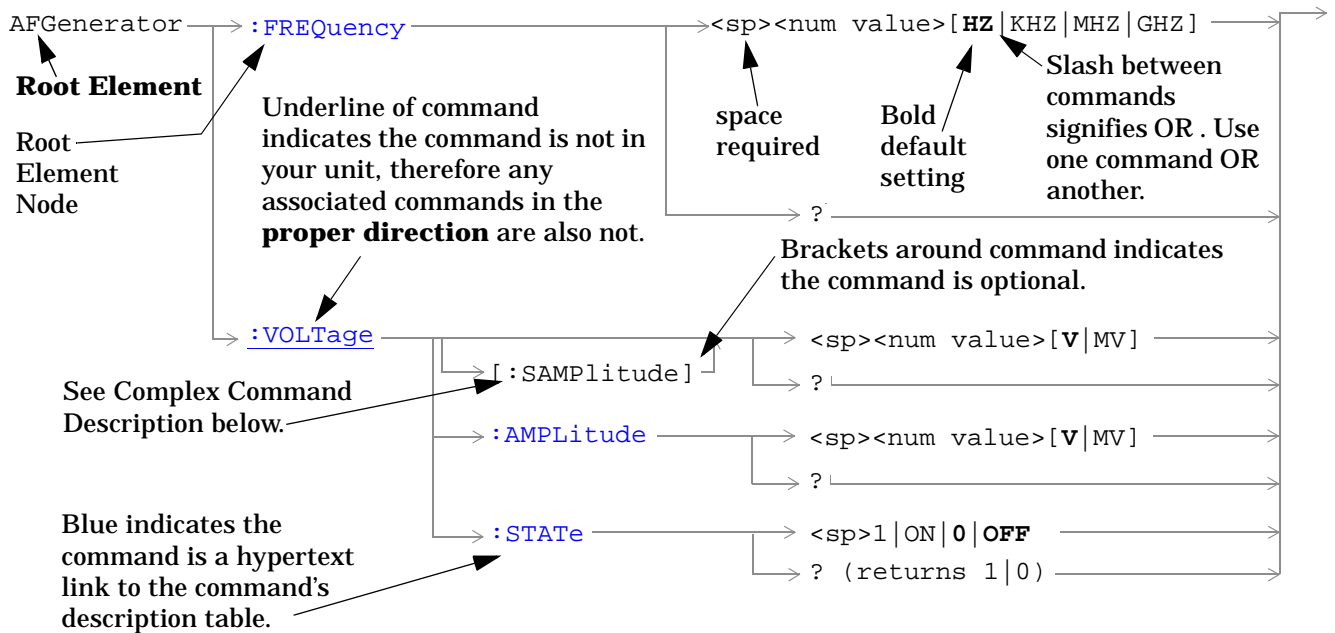


Diagram Description

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 **proper direction** is syntactically correct. The drawings show the proper use of spaces. Where spaces are required they are indicated by **<sp>**, otherwise no spaces are allowed between statement elements.

Complex Command Description

A complex command sets the state of the parameter to ON, and is used to set a value for that parameter. These parameters; amplitude, frequency, gain, number, time, and value can be used as a complex command. Refer to the specific command for the parameter that applies.

Developing Code

It is recommended that you set the Test Set's operating environment to debug. To set the Test Set debug mode to "ON" use the following syntax:

```
SYSTem:COMMunicate:GPIB:DEBug ON
```

Units-of-Measure

If you do not specify units-of-measure in your code the following table indicates the default units-of-measure that will be assumed.

| | |
|---------------------|-----|
| Amplitude (linear) | V |
| Frequency | HZ |
| Power (logarithmic) | dBm |
| Time | S |

ABORT Subsystem

Description

The ABORT command causes a measurement cycle in progress to stop. If the measurement is not being continuously armed (single trigger) , the measurement will remain in the idle state after this event. If the measurement is being continuously armed, 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.

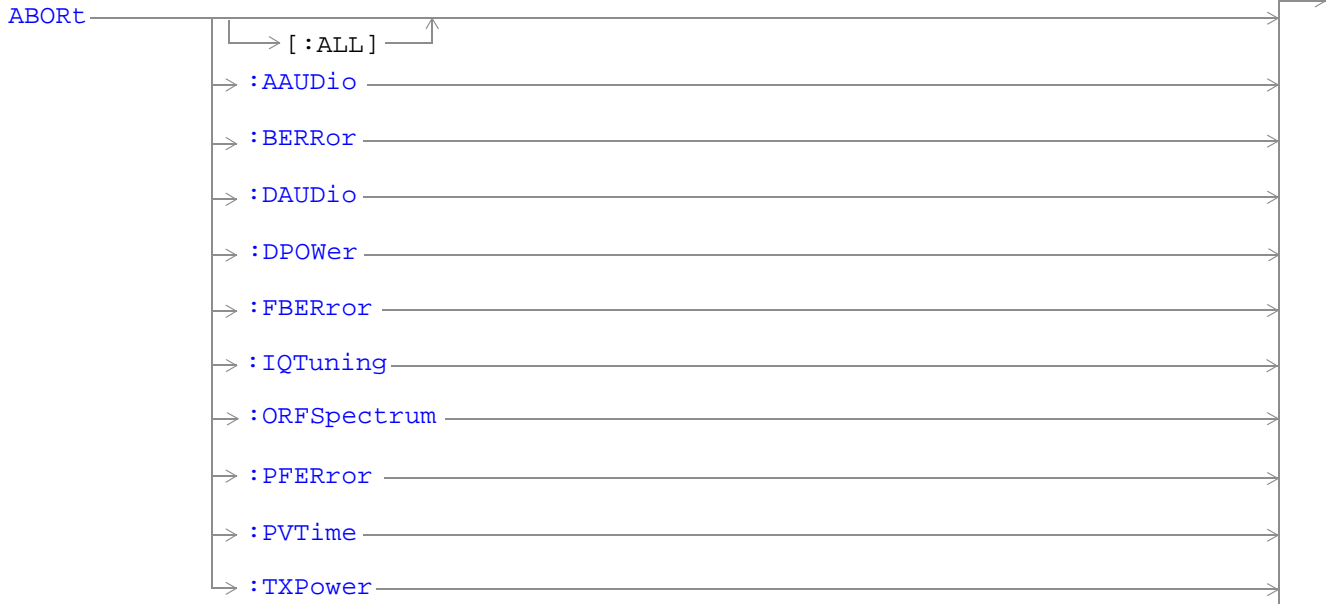
READ:<meas>? will execute an ABORT:<meas> action that aborts just one trigger sequence and then combines the INITiate and FETCh? commands.

Syntax Diagram and Command Descriptions

“ABORT”

ABORt

February 14, 2000



“Diagram Conventions” on page 213

ABORT[:ALL]

| | |
|--|--|
| Function | <p>Stops any and all measurements that are active. See “Measurement States” on page 150</p> <p>If the trigger arm is set to single, see “Trigger Arm (Single or Continuous) Description” on page 151 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 | <p>Range</p> <ul style="list-style-type: none"> • AAUDio • BERRor • DAUDio • DPOWer • FBERRor • IQTuning • ORFSpectrum • PFERror • PVTime • TXPower |
| <p>Programming Example</p> <pre>OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.</pre> | |

ABORT

ABORT:<meas-mnemonic>

| | |
|---|--|
| Function | <p>Stops the selected measurement if it is active. See “Measurement States” on page 150</p> <p>If the trigger arm is set to single, see “Trigger Arm (Single or Continuous) Description” on page 151 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 | <p>Range</p> <ul style="list-style-type: none">• AAUDio• BERRor• DAUDio• DPOWer• FBERRor• ORFSpectrum• IQTuning• PFERror• PVTime• TXPower |
| <p>Programming Example</p> <pre>OUTPUT 714;"ABORT:PVTIME" !Aborts a PvT measurement.</pre> | |

AFGenerator Subsystem

Description

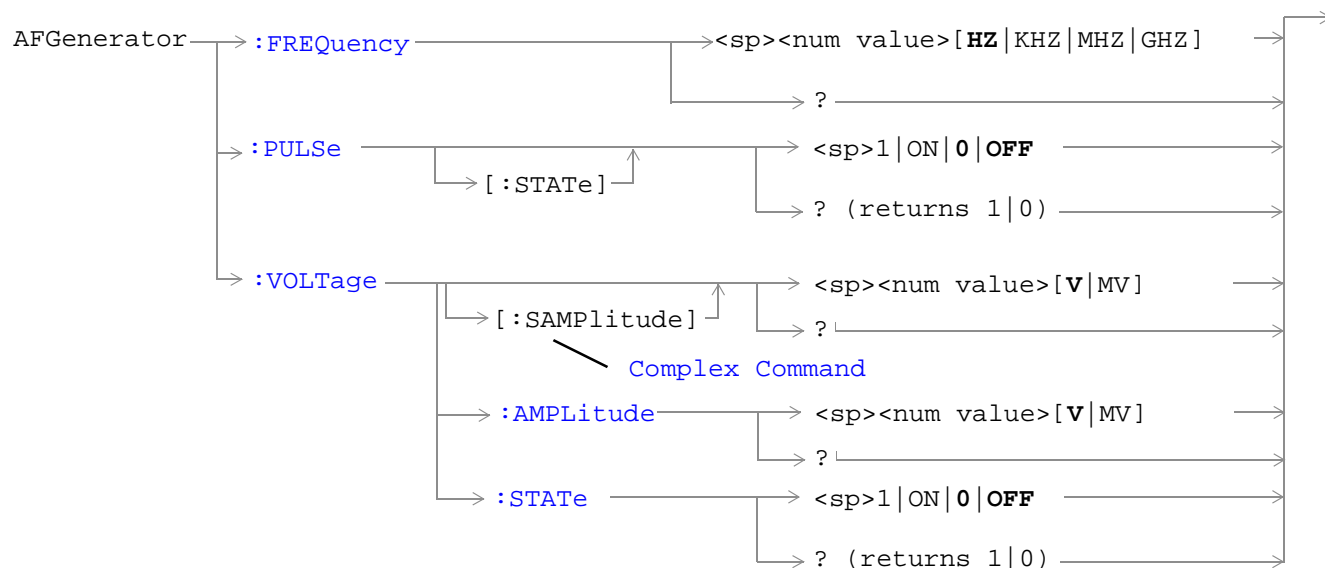
The AFGenerator subsystem is used to control the audio source that is available at the Audio Output connector.

Syntax Diagram and Command Descriptions

[“AFGenerator”](#)

AFGenerator

June 28, 1999



["Diagram Conventions" on page 213](#)

AFGenerator:FREQUENCY

| | |
|---|---|
| Function | Sets/queries the frequency of the audio generator. The units (HZ KHZ MHZ GHZ) are optional, if no units are specified then units default to HZ. |
| Setting | Range: 1 Hz to 20 kHz Resolution: .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 | <p>Sets/queries the audio generator pulse state.</p> <p>The pulse state must be on when the test set's audio generator is used for audio stimulation during a decoded audio measurement.</p> <p>When the state is on, the audio signal from the test set is pulsed at a 10 Hz rate with a 50% duty cycle.</p> <p>The amplitude and frequency of the pulse is set with afgenerator commands. See "AFGenerator" on page 220.</p> |
| Setting | Range: 0 OFF 1 ON |
| Query | Range: 0 1 |
| *RST setting | 0 off |
| Programming Example <pre>OUTPUT 714;"AFGENERATOR:PULSE ON" !Sets the audio generator pulse to ON.</pre> | |

AFGenerator:VOLTage[:SAMPlitude]

| | |
|---|---|
| Function | <p>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.</p> |
| Setting | <p>Range: 0 - 9 v pk.</p> <p>Resolution:</p> <ul style="list-style-type: none"> .5mv pk. <= 1v pk. output 5mv pk. > 1v pk. output |
| Query | <p>Range: 0 - 9 v pk.</p> <p>Resolution:</p> <ul style="list-style-type: none"> .5mv pk. <= 1v pk. output 5mv pk. > 1v pk. output |
| *RST setting | zero volts |
| Programming Example <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE 2.1" !Sets the state to on and the output !voltage to 2.1 volts.</pre> | |

AFGenerator:VOLTage:AMPLitude

| | |
|--|--|
| Function | Sets/queries the amplitude for the audio generator when the audio generator state is on. The units (V MV) are optional, if no units are specified then units default to V. |
| Setting | Range: 0 - 9 v pk. Resolution: <ul style="list-style-type: none"> .5mv pk. <= 1v pk. output 5mv pk. > 1v pk. output |
| Query | Range: 0 - 9 v pk. Resolution: <ul style="list-style-type: none"> .5mv pk. <= 1v pk. output 5mv pk. > 1v pk. output |
| *RST setting | zero volts |
| Programming Example <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE:AMPLITUDE 1.414" !Sets the audio generator output !voltage to 1.414 volts peak.</pre> | |

AFGenerator:VOLTage:STATE

| | |
|--|--|
| Function | Sets/queries the audio generator state |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST setting | 0 off |
| Programming Example <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE:STATE ON" !Set the audio generator state to ON.</pre> | |

CALibration Subsystem

Description

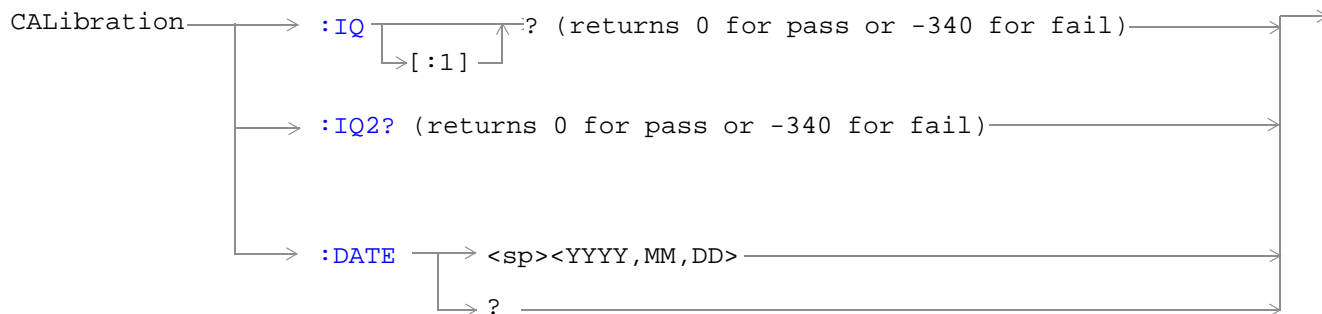
The only user calibration that can be performed is for the IQ modulator. This calibration is required if the Baseband Generator or the Vector Output modules are serviced or swapped. The CALibration:IQ subsystem should not be used as part of frequent (i.e. daily, weekly or monthly) test set calibration.

Syntax Diagram and Command Descriptions

“CALibration”

CALibration

April 30, 1999



[“Diagram Conventions” on page 213](#)

CALibration:IQ[:1]?

| | |
|---|---|
| Function | Sets/queries the calibration of the IQ modulator for RF generator 1. It takes some time to complete calibration and can't be aborted except by cycling the power switch. <ul style="list-style-type: none"> Calibrates the IQ modulator for RF generator 1. Returns a value indicating success or failure of calibration. |
| Query | Range <ul style="list-style-type: none"> 0 = Pass -340 = Fail |
| Programming Example <pre> OUTPUT 714;"CALIBRATION:IQ?" !Performs a calibration of the IQ modulator for !RF generator 1 and returns a value indicating !success or failure. </pre> | |

NOTE When the the calibration is done the test set display will display:
IQ Calibration completed successfully for modulator 1. Cycle power to continue.

CALibration:IQ2?

| | |
|---|---|
| Function | 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. <ul style="list-style-type: none"> • Calibrates the IQ modulator for RF generator 2. • Returns a value indicating success or failure of calibration. |
| Query | Range <ul style="list-style-type: none"> • 0 = Pass • -340 = Fail |
| Programming Example <pre>OUTPUT 714;"CALLIBRATION:IQ2?" !Performs a calibration of the IQ modulator for !RF generator 2 and returns a value indicating !success or failure.</pre> | |

NOTE When the the calibration is done the test set display will display:
IQ Calibration completed successfully for modulator 1. Cycle power to continue.

CALibration:DATE

| | |
|---|--|
| Function | Sets/queries the date of the last system calibration done to the test set not the IQ calibration date. Returns a comma separated list YYYY,MM,DD in that order. |
| Setting | Sets the system calibration date. Range <ul style="list-style-type: none"> • Year = 0000 to 9999 • Month = 01 to 12 • Day = 01 to 31 |
| Query | Returns the date when system calibration was performed. Range <ul style="list-style-type: none"> • Year = 0000 to 9999 • Month = 1 to 12 • Day = 1 to 31 |
| Programming Example <pre>OUTPUT 714;"CALIBRATION:DATE 1999,01,04" !Sets the date of the last system !calibration year, month and day.</pre> | |

CALL Subsystem

Description

The CALL subsystem handles all the call processing functions including mobile station (MS) and CELL setup, control, and query functions.

Syntax Diagrams and Command Descriptions

[“CALL:ACTivated” on page 227](#)

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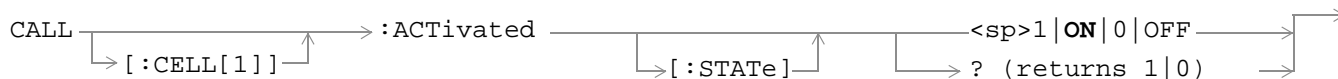
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CALL:ACTivated

April 20, 1999



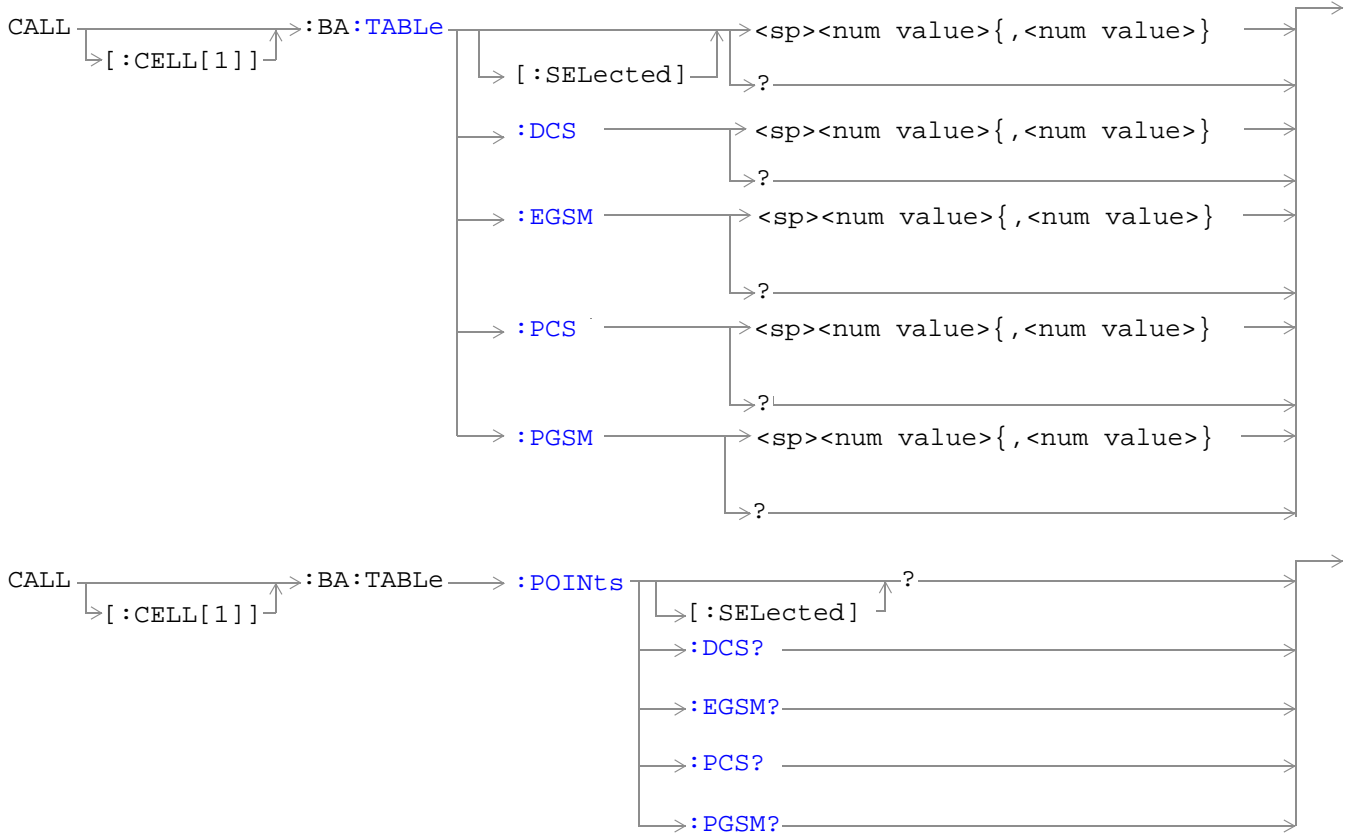
[“Diagram Conventions” on page 213](#)

CALL[:CELL]:ACTivated[:STATe]

| | |
|--|---|
| Function | Turns BS Emulator control of all signalling operations, uplink demodulation and downlink (BCH & TCH) generation on or off. Query form returns a 1 (state = on) or a 0 (state = off). 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 526 . |
| Setting | range: 1 ON 0 OFF |
| Query | range: 1 0 |
| *RST Setting | 1 (state = ON) |
| Related Topics | “Configuring the Broadcast Channel (BCH)” on page 511 |
| Programming Example <pre>OUTPUT 714;"CALL:CELL:ACTIVATED:STATE OFF" !Turns all signalling operations, !uplink demodulation and downlink !(BCH & TCH) generation off.</pre> | |

CALL:BA

June 30, 1999



“Diagram Conventions” on page 213

CALL[:CELL]:BA:TABLE[:SElected]

| | |
|---|---|
| Function | 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). |
| Setting | Depends upon the selected broadcast band: range: <ul style="list-style-type: none"> • PGSM broadcast band range: 1 to 124 • EGSM broadcast band range: 0 to 124 975 to 1023 • DCS broadcast band range: 512 to 885 • PCS broadcast band range: 512 to 810 resolution: 1 |
| Query | range: 0 to 9.91 E +37 |
| *RST Setting | Depends upon the selected broadcast band: entries: <ul style="list-style-type: none"> • PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117 • EGSM BA Table: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110 • DCS BA Table: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862 • PCS BA Table: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790 states: <ul style="list-style-type: none"> • first entry = ON, all others = OFF |
| Programming Example <pre> OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED 512,689,885" !Sets 3 table entries for the !selected broadcast band. !States of the remaining 13 !entries are set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED" !Sets states of all table entries to OFF. </pre> | |

CALL:BA

CALL[:CELL]:BA:TABLE:DCS

| | |
|---|---|
| Function | 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). |
| Setting | range: 512 to 885 resolution: 1 |
| Query | range: 0 to 9.91E+37 |
| *RST Setting | entries: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862 states: 512 = ON, all others = OFF |
| <p>Programming Example</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> | |

CALL[:CELL]:BA:TABLE:EGSM

| | |
|---|--|
| Function | 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). |
| Setting | range: 0 to 124 975 to 1023 resolution: 1 |
| Query | range: 0 to 9.91E+37 |
| *RST Setting | entries: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110 states: 20 = ON, all others = OFF |
| <p>Programming Example</p> <pre> OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 120,975,1012" !Sets three BA table entries for !the EGSM broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM" !Sets states of all table entries to OFF. </pre> | |

CALL[:CELL]:BA:TABLE:PCS

| | |
|---|---|
| Function | 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). |
| Setting | range: 512 to 810 resolution: 1 |
| Query | range: 0 to 9.91E+37 |
| *RST Setting | entries: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790 states: 512 = ON, all others = OFF |
| Programming Example <pre> OUTPUT 714;"CALL:CELL:BA:TABLE:PCS 660,710,790" !Sets three BA table entries for !the PCS broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:PCS" !Sets states of all table entries to OFF. </pre> | |

CALL[:CELL]:BA:TABLE:PGSM

| | |
|---|--|
| Function | 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). |
| Setting | range: 1 to 124 resolution: 1 |
| Query | range: 0 to 9.91E+37 |
| *RST Setting | entries: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117 states: 20 = ON, all others = OFF |
| Programming Example <pre> OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM 20,36,120" !Sets three BA Table entries for !the PGSM broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM" !Sets states of all BA Table entries to OFF. </pre> | |

CALL:BA

CALL[:CELL]:BA:TABLE:POINTS[:SElected]?

| | |
|---|---|
| Function | 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. |
| Query | range: 0 to 16 resolution: 1 |
| *RST Setting | 1 |
| Programming Example OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:SELECTED?" !Queries the number of entries !that are in the ON state in the !selected broadcast band's BA Table. | |

CALL[:CELL]:BA:TABLE:POINTS:DCS?

| | |
|---|---|
| Function | 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. |
| Query | range: 0 to 16 resolution: 1 |
| *RST Setting | 1 |
| Programming Example OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:DCS?" !Queries the number of entries that are !in the ON state in the DCS broadcast !band BA Table. | |

CALL[:CELL]:BA:TABLE:POINTS:EGSM?

| | |
|--|---|
| Function | 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. |
| 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?

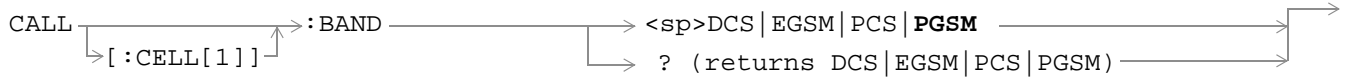
| | |
|--|---|
| Function | Queries the number of entries that are in the ON state in the PCS cellband BA Table. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLE:PCS? query. A return value of zero indicates that there are no table entries in the ON state. |
| Query | range: 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 | 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. |
| Query | range: 0 to 16 resolution: 1 |
| *RST Setting | 1 |
| Related Topics | See "Configuring the Broadcast Channel (BCH)" on page 511 |
| 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

February 14, 2000



[“Diagram Conventions” on page 213](#)

CALL[:CELL]:BAND

| | |
|---|---|
| Function | Defines which GSM-defined broadcast band the test set is configured for. This defines the kind of cell being emulated, either PGSM, EGSM, DCS or PCS. Setting the broadcast band will change the receiver control to auto. see “RFANalyzer:CONTROL:AUTO” on page 372 |
| Setting | range: PGSM EGSM DCS PCS |
| Query | range: PGSM EGSM DCS PCS |
| *RST Setting | PGSM |
| Related Topics | Frequency Banded Parameter “Cell Band Parameter” on page 502. |
| Programming Example OUTPUT 714;"CALL:CELL:BAND PGSM" !Configures the test set to emulate a PGSM cell. | |

CALL:BCCode

February 14, 2000

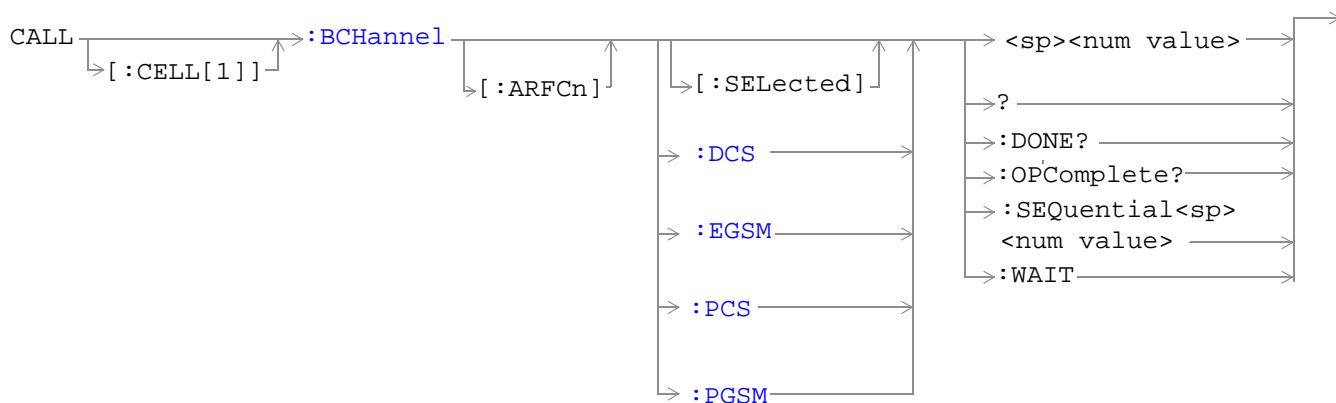


[“Diagram Conventions” on page 213](#)

CALL[:CELL]:BCCode

| | |
|--|---|
| Function | Sets/queries the value of the Base Station Colour Code (BCC). |
| Setting | range: 0 to 7 resolution: 1 |
| Query | range: 0 to 7 resolution: 1 |
| *RST Setting | 5 |
| Related Topics | See “Configuring the Broadcast Channel (BCH)” on page 511 . |
| Programming Example OUTPUT 714;"CALL:CELL:BCCODE 4" !Sets the cell's base station color code to 4. | |

CALL:BCHannel



“Diagram Conventions” on page 213

CALL[:CELL]:BCHannel[:ARFCn][:SElected]

| | |
|--|---|
| Function | 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"> PGSM broadcast band range: 1 to 124 EGSM broadcast band range: 0 to 124 975 to 1023 DCS broadcast band range: 512 to 885 PCS broadcast band range: 512 to 810 resolution: 1 |
| Query | Depends upon the selected broadcast band. range: <ul style="list-style-type: none"> PGSM broadcast band range: 1 to 124 EGSM broadcast band range: 0 to 124 975 to 1023 DCS broadcast band range: 512 to 885 PCS broadcast band range: 512 to 810 resolution: 1 |
| *RST Setting | 20 |
| 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 | Sets/queries the Broadcast Channel number for the DCS broadcast band. |
| Setting | range: 512 to 885 resolution: 1 |
| Query | range: 512 to 885 resolution: 1 |
| *RST Setting | 512 |
| Related Topics | “Configuring the Broadcast Channel (BCH)” on page 511. |
| 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 | Sets/queries the Broadcast Channel number for the EGSM broadcast band. |
| Setting | range: 0 to 124 975 to 1023 resolution: 1 |
| Query | range: 0 to 124 975 to 1023 resolution: 1 |
| *RST Setting | 20 |
| Programming Example <pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:EGSM 120" !Sets BCH ARFCN for EGSM broadcast !band to 120.</pre> | |

CALL[:CELL]:BCHannel[:ARFCn]:PCS

| | |
|--|--|
| Function | Sets/queries the Broadcast Channel number for the PCS broadcast band. |
| Setting | range: 512 to 810 resolution: 1 |
| Query | range: 512 to 810 resolution: 1 |
| *RST Setting | 512 |
| Related Topics | “Configuring the Broadcast Channel (BCH)” on page 511. |
| Programming Example <pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PCS 800" !Sets BCH ARFCN for PCS broadcast !band to 800.</pre> | |

CALL:BCHannel

CALL[:CELL]:BCHannel[:ARFCn]:PGSM

| | |
|--|--|
| Function | Sets/queries the Broadcast Channel number for the PGSM broadcast band. |
| Setting | range: 1 to 124 resolution: 1 |
| Query | range: 1 to 124 resolution: 1 |
| *RST Setting | 20 |
| Related Topics | "Configuring the Broadcast Channel (BCH)" on page 511. |
| Programming Example OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PGSM 113" !Sets BCH ARFCN for PGSM broadcast !band to 113. | |

CALL:BURSt

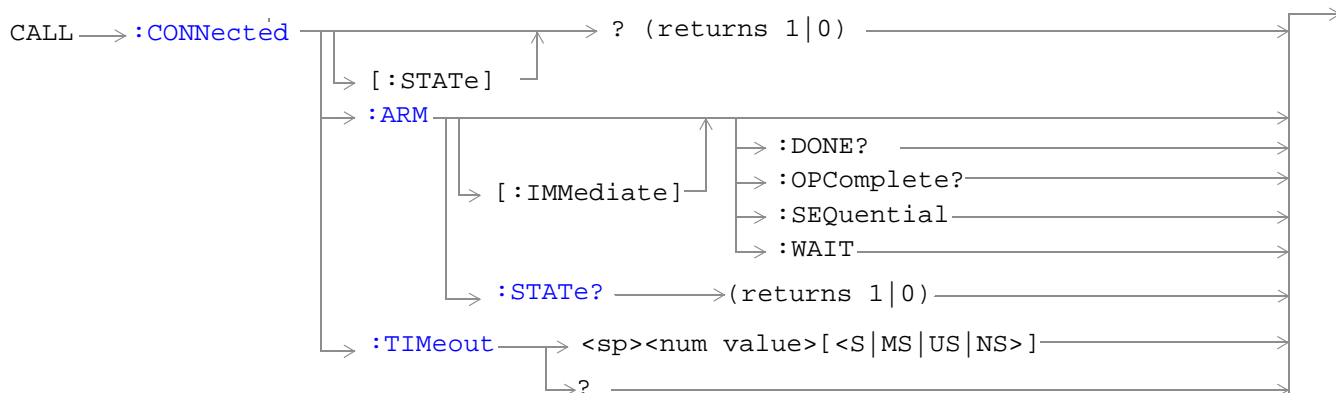


[“Diagram Conventions” on page 213](#)

CALL:BURSt:TYPE

| | |
|---|---|
| Function | 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 or 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.) For more details on this parameter, see “Expected Burst” on page 526 . |
| Setting | range: RACH TSC0 TSC1 TSC2 TSC3 TSC4 TSC5 TSC6 TSC7 |
| Query | range: RACH TSC0 TSC1 TSC2 TSC3 TSC4 TSC5 TSC6 TSC7 |
| *RST Setting | TSC5 |
| Related Topics | “Test Mode Operating Mode” on page 524 . |
| Programming Example <pre>OUTPUT 714; "CALL:BURST:TYPE TSC2" !Sets the test set to expect a TCH with midamble !pattern TSC2.</pre> | |

CALL:CONNEcted



“Diagram Conventions” on page 213

CALL:CONNEcted[:STATe]?

| | |
|---|--|
| Function | 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 35 . |
| Query | Range: 0 1 |
| *RST Setting | 0 |
| Programming Example | |
| OUTPUT 714; "CALL:CONNECTED:STATE?" !Returns 1 if call connected, !0 if call disconnected. | |

CALL:CONNECTed:ARM[:IMMediate]

| | |
|---------------------|--|
| Function | <p>Sets (arms) the call-state-change detector. Arming the call-state-change detector allows the control program to tell the test set that it is expecting a change to the state of a call prior to initiating the state change.</p> <p>Once armed, The detector remains armed until there is a call state change to Idle or Connected from one of the transitory states. The call-state-change-detector is not disarmed by a call state change to one of the transitory states, nor is it disarmed by any transitions from Idle to Idle, or Connected to Connected.</p> <p>When used in conjunction with the CALL:CONNECTed:STATE? and the CALL:CONNECTed:TIMEout commands, the CALL:CONNECTed:ARM command allows the control program to synchronize to call connection/disconnection. See “Call Processing State Synchronization” on page 35.</p> |
| Programming Example | <pre>OUTPUT 714;"CALL:CONNECTED:ARM:IMMEDIATE" !Arms the call-state-change detector.</pre> |

CALL:CONNECTed:ARM:STATE?

| | |
|---------------------|---|
| Function | <p>Queries the arm state of the call-state-change detector. This command never hangs and immediately returns a 1 if the call-state-change detector is armed and a 0 if it is not armed. See “Call Processing State Synchronization” on page 35.</p> |
| Query | Range: 0 1 |
| *RST Setting | 0 |
| Programming Example | <pre>OUTPUT 714;"CALL:CONNECTED:ARM:STATE?" !Returns arm state of !call-state-change detector.</pre> |

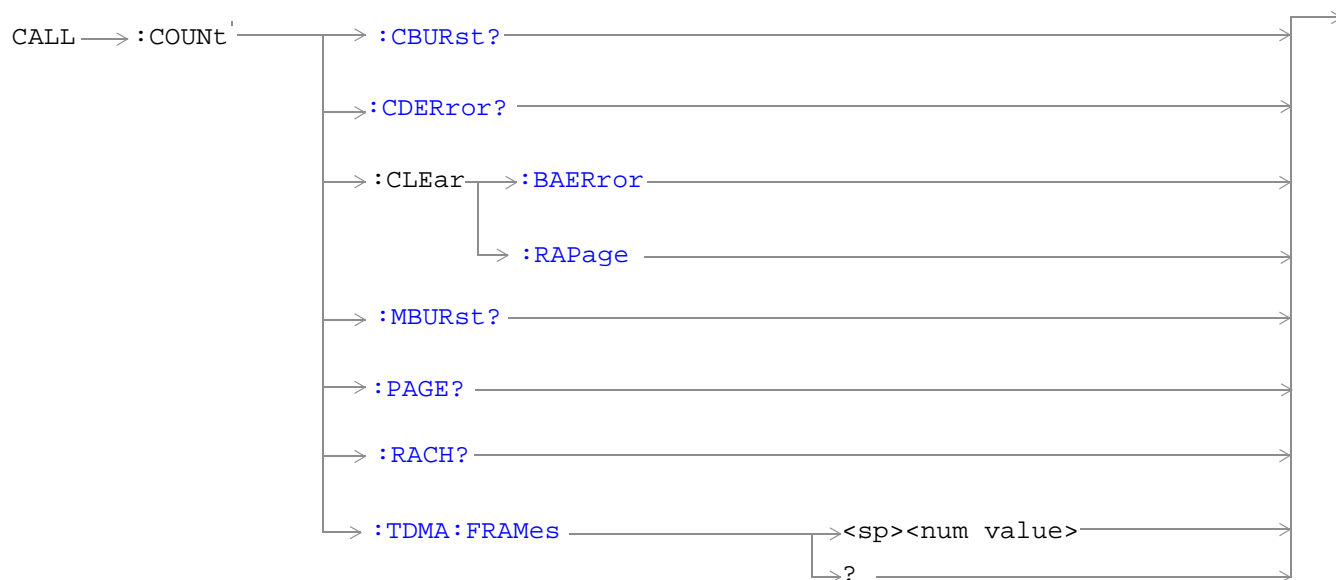
CALL:CONNECTed:TIMEout

| | |
|--------------|--|
| Function | <p>Sets/queries the maximum time the test set will wait for a hanging CALL:CONNECTed:STATE? query to complete. Default setting units are seconds. To set timeout time in units other than seconds include optional unit specifier in command string.</p> <p>A timeout timer is started whenever the call-state-change-detector becomes armed or gets rearmed when already armed. The duration of this timeout is a set using the CALL:CONNECTed:TIMEout command and should be greater than the maximum amount of time the control program needs/wants to wait between arming the call-state-change detector and the connect/disconnect operation starting. Once the process starts and the call state has moved into one of the transitory states the GSM defined protocol timers take over and prevent the call state from staying in a transitory state forever. See “Call Processing State Synchronization” on page 35.</p> |
| Setting | <p>Range: 0 to 100 seconds Resolution: 0.1 seconds</p> |
| Query | <p>Range: 0 to 100 seconds Resolution: 0.1 seconds</p> |
| *RST Setting | 10 seconds |

CALL:CONNECTed

| | |
|--|--|
| Related Topics | "Call Processing State Synchronization" on page 35 |
| | "Call Processing Event Synchronization" on page 30 |
| 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



[“Diagram Conventions” on page 213](#)

CALL:COUNT:CBURst?

| | |
|---|--|
| Function | 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. |
| 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 | 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. |
| 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

CALL:COUNT:CLEAR:BAERror

| | |
|---------------------|--|
| Function | Sets the corrupt burst, missing burst, and decode error counters' count to zero. |
| Programming Example | OUTPUT 714 ; "CALL : COUNT : CLEAR : BAERROR " |

CALL:COUNT:CLEAR:RAPage

| | |
|---------------------|---|
| Function | Sets the RACH and page counters' count to zero. |
| Programming Example | OUTPUT 714 ; "CALL : COUNT : CLEAR : RAPAGE " |

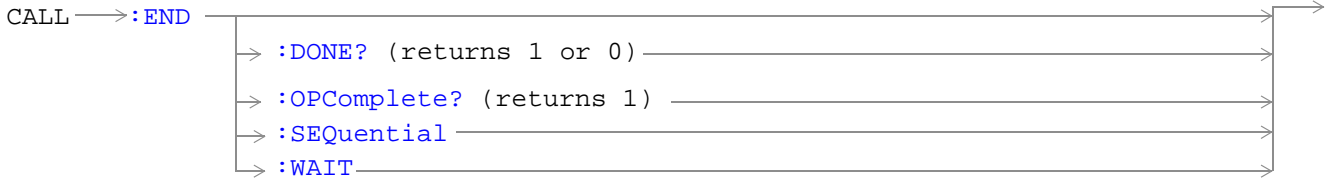
CALL:COUNT:MBURst?

| | |
|---------------------|---|
| Function | 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. |
| Query | Range: 0 to 99999 Resolution: 1 |
| *RST Setting | 0 |
| Programming Example | OUTPUT 714 ; "CALL : COUNT : MBURST? " |

CALL:COUNT:PAGE?

| | |
|---------------------|---|
| Function | 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. |
| Query | Range: 0 to 9999 Resolution: 1 |
| *RST Setting | 0 |
| Programming Example | OUTPUT 714 ; "CALL : COUNT : PAGE? " |

CALL:END



["Diagram Conventions" on page 213](#)

CALL:END

| | |
|---|---|
| Function | Overlapped command used to terminate the active call. |
| Programming Example | |
| OUTPUT 714;"CALL:END" !Terminate the active call. | |

CALL:END:DONE?

| | |
|--|--|
| Function | 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. |
| Query | range: 0 1 |
| *RST Setting | 1 |
| Programming Example | |
| <pre>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</pre> | |

CALL:END:OPComplete?

| | |
|---|---|
| Function | 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. |
| Query | range: 1 |
| *RST Setting | 1 |
| Programming Example | |
| <pre>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.</pre> | |

CALL:END

CALL:END:SEQential

| | |
|--|---|
| Function | 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 :SEQential modifier forces an overlapped command to execute as a sequential command. |
| Programming Example OUTPUT 714;"CALL:END:SEQUENTIAL" !Terminate the active call with !sequential operation. | |

CALL:END:WAIT

| | |
|---|--|
| Function | 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. |
| Related Topics | "Call Processing Event Synchronization" on page 30 "Call Processing State Synchronization" on page 35 |
| 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:IMEI

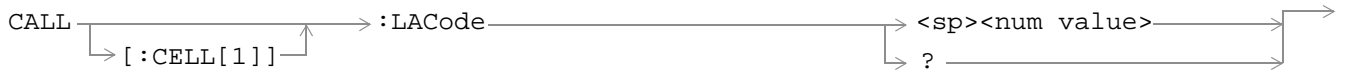
April 30, 1999

CALL → : IMEI : AUTO → `<sp>1 | ON | 0 | OFF` →
 → ? (returns 1 | 0) →

[“Diagram Conventions” on page 213](#)

CALL:IMEI:AUTO

| | |
|---|--|
| Function | Sets/queries whether or not the base station emulator should request the international mobile equipment identity (IMEI) on call setup. |
| Setting | Range: 1 ON 0 OFF |
| Query | Range: 1 0 |
| *RST Setting | 1 |
| Related Topics | “Configuring the Broadcast Channel (BCH)” on page 511 |
| Programming Example OUTPUT 714; "CALL:IMEI:AUTO OFF" !Sets automatically get IMEI state to OFF. | |

CALL:LACode

[“Diagram Conventions” on page 213](#)

CALL[:CELL]:LACode

| | |
|--|---|
| Function | Sets/queries the value of the cell's Location Area Code (LAC). |
| Setting | range: 0 to 65535 resolution: 1 |
| Query | range: 0 to 65535 resolution: 1 |
| *RST Setting | 1 |
| Related Topics | “Configuring the Broadcast Channel (BCH)” on page 511 |
| Programming Example | |
| OUTPUT 714;"CALL:CELL:LACODE 456" !Sets the cell's location area code 456. | |

CALL:MCCode

[“Diagram Conventions” on page 213](#)

CALL[:CELL]:MCCode

| | |
|---|---|
| Function | Sets/queries the value of the Mobile Country Code (MCC). |
| Setting | range: 0 to 999 resolution: 1 |
| Query | range: 0 to 999 resolution: 1 |
| *RST Setting | 1 |
| Related Topics | “Configuring the Broadcast Channel (BCH)” on page 511 |
| Programming Example OUTPUT 714; "CALL:CELL:MCCODE 4" !Sets the cell's mobile country code to 4. | |

CALL:MNCCode

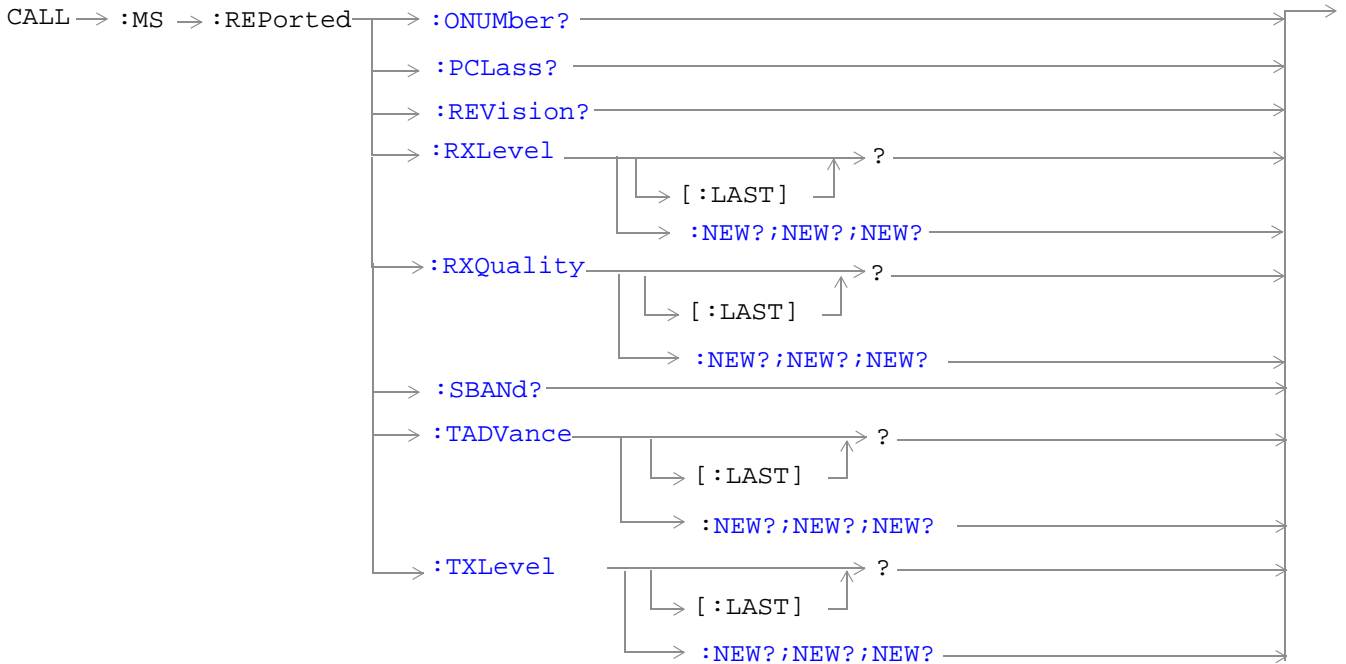
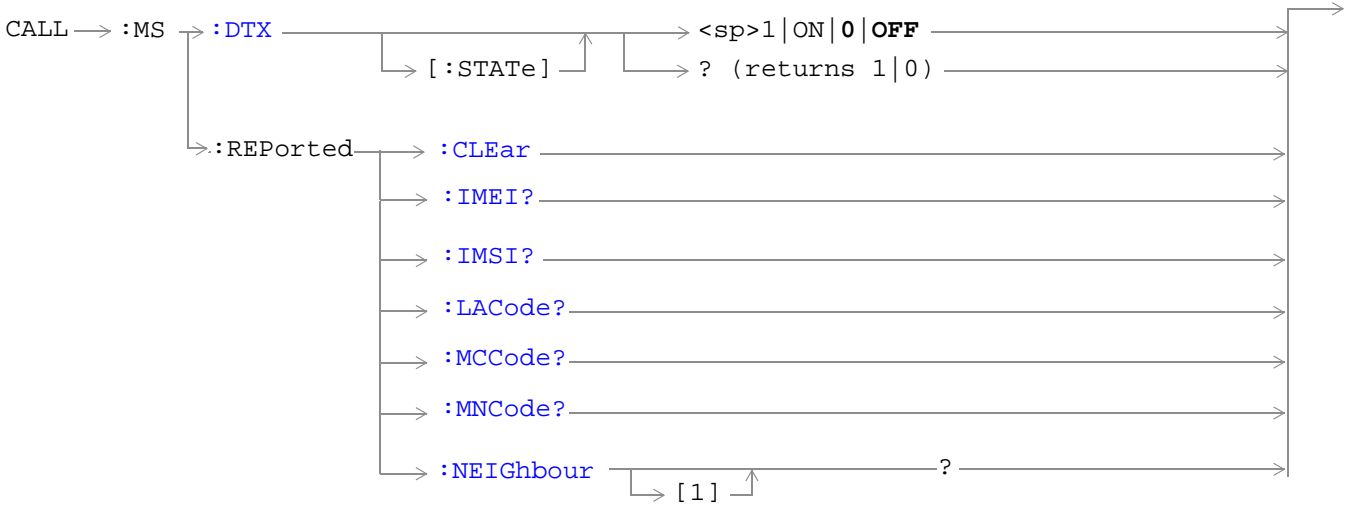
[“Diagram Conventions” on page 213](#)

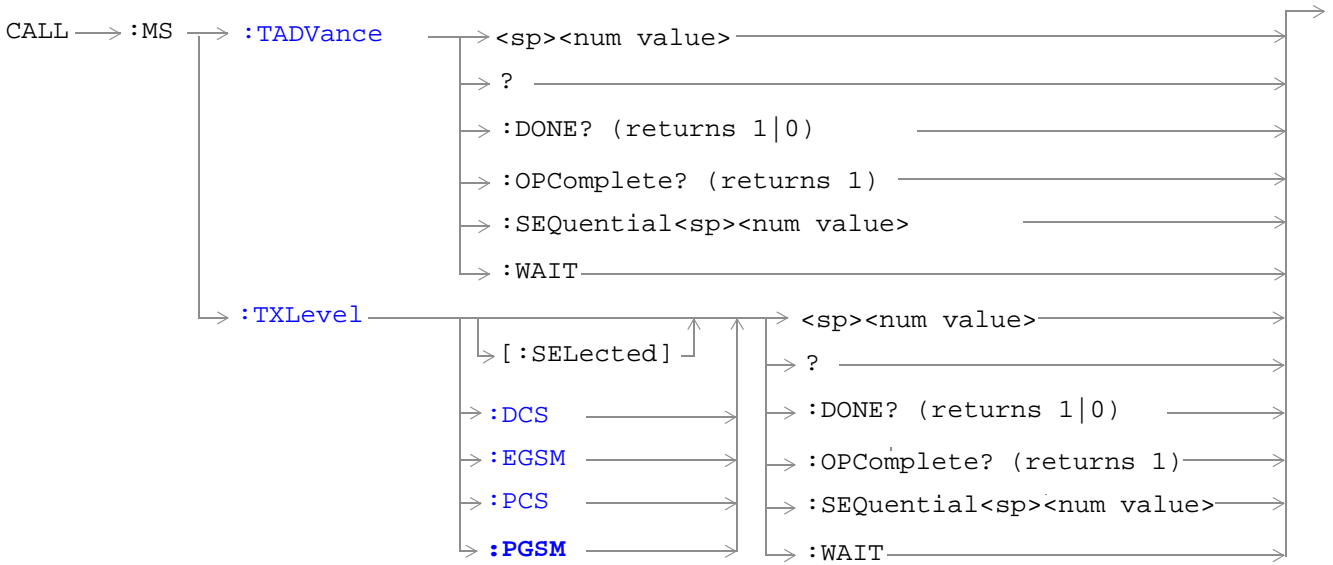
CALL[:CELL]:MNCCode

| | |
|--|---|
| Function | Sets/queries the value of the Mobile Network Code (MNC). |
| Setting | range: 0 to 99 resolution: 1 |
| Query | range: 0 to 99 resolution: 1 |
| *RST Setting | 1 |
| Related Topics | “Configuring the Broadcast Channel (BCH)” on page 511 |
| Programming Example | |
| OUTPUT 714;“CALL:CELL:MNCODE 45” !Sets the cell’s mobile network code to 45. | |

CALL:MS

July 1, 1999





“Diagram Conventions” on page 213

CALL:MS:DTX[:STATE]

| | |
|--|--|
| Function | Turns mobile station Discontinuous Transmission (DTX) on or off. Query form returns a 1 (state = on) or a 0 (state = off). See “Configuring Mobile Station Operating Parameters” on page 517 . |
| Setting | range: 1 ON 0 OFF |
| Query | range: 0 1 |
| *RST Setting | 0 (state = OFF) |
| Programming Example <pre>OUTPUT 714;"CALL:MS:DTX OFF" !Turns mobile station discontinuous !transmission OFF.</pre> | |

CALL:MS:REPorted:CLEar

| | |
|--|---|
| Function | 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). |
| Programming Example <pre>OUTPUT 714;"CALL:MS:REPORTED:CLEAR"</pre> | |

CALL:MS:REPorted:IMEI?

| | |
|--|---|
| Function | Query of the International Mobile Equipment Identity of the ME. ME is an MS without a SIM. This parameter is reported if the IMEI:AUTO state is ON, see “CALL:IMEI” on page 250 or the MS has no SIM. |
| Query | range: up to 15 decimal digits and “” resolution: 1 |
| *RST Setting | “” (null string) |
| Programming Example <pre>OUTPUT 714;"CALL:MS:REPORTED:IMEI?"</pre> | |

CALL:MS:REPorted:IMSI?

| | |
|--|---|
| Function | Query of the International Mobile Subscriber Identity of the SIM in the MS. |
| Query | range: up to 15 decimal digits and “” resolution: 1 |
| *RST Setting | “” (null string) |
| Programming Example <pre>OUTPUT 714;"CALL:MS:REPORTED:IMSI?"</pre> | |

CALL:MS:REPorted:LACode?

| | |
|--|--|
| Function | Query of the last Location Area Code the MS was camped on. |
| 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 | Query of the last Mobile Country Code the MS was camped on. |
| Query | range: 0 to 999 and 9.91E+37 resolution: 1 |
| *RST Setting | 9.91E+37 (NAN) |
| Programming Example OUTPUT 714 ; "CALL:MS:REPORTED:MCCODE?" | |

CALL:MS:REPorted:MNCode?

| | |
|--|---|
| Function | Query of the last Mobile Network Code the MS was camped on. |
| 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

CALL:MS:REPorted:NEIGHbour[1]?

| | |
|---|---|
| Function | This query will return 4 data items separated by commas for neighbour cell one. ARFCN, RFLEVEL,NCC,BCC are returned in that order. |
| 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 | Query the MS for the originated number keyed in on the MS. |
| 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 | Query the MS for its Power Class mark. |
| 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 | Query the MS to determine which Phase of GSM standards it complies with. |
| Query | range: UNKNown PHASe1 PHASe2 |
| *RST Setting | PHAS2 |
| Programming Example | |
| OUTPUT 714; "CALL:MS:REPORTED:REVISION?" | |

CALL:MS:REPorted:RXLevel[:LAST]?

| | |
|--|--|
| Function | Received level of the TCH in dB (relative to -110 dBm) which the MS measured during the last SACCH multiframe. |
| Query | range: 0 to 63 and 9.91E+37 resolution: 1 |
| *RST Setting | 9.91E+37 (NAN) |
| Programming Example | |
| OUTPUT 714; "CALL:MS:REPORTED:RXLEVEL:LAST?" | |

CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?

| | |
|---|--|
| Function | Queries the received level of the TCH in dB (relative to -110 dBm) which the MS measured. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the MS reports a new SACCH message to test set. This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| 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 | The MS reported quality of the signal used for the RX Level during the last SACCH report. |
| 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 | Queries the MS reported received quality from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the MS reports a new SACCH message to test set. This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| 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 | Query for the frequency band supported by the MS. |
| Query | range: PGSM EGSM DCS PCS "" |
| *RST Setting | "" (null string) |
| Programming Example OUTPUT 714; "CALL:MS:REPORTED:SBAND?" | |

CALL:MS:REPorted:TADVance[:LAST]?

| | |
|---|---|
| Function | Query the MS for the last TCH Timing Advance actually used by the MS. |
| Query | range: 0 to 63 and 9.91E+37 resolution: 1 |
| *RST Setting | 9.91E+37 (NAN) |
| Programming Example OUTPUT 714 ; "CALL:MS:REPORTED:TADVANCE:LAST?" | |

CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?

| | |
|---|---|
| Function | Queries the MS reported timing advance from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the MS reports a new SACCH message to test set. This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| 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 | Query the MS for the last reported transmit level. |
| Query | range: 0 to 31 and 9.91E+37 resolution: 1 |
| *RST Setting | 9.91E+37 (NAN) |
| Programming Example OUTPUT 714 ; "CALL:MS:REPORTED:TXLEVEL:LAST?" | |

CALL:MS

CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?

| | |
|--|---|
| Function | Queries the MS reported transmit level from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the MS reports a new SACCH message to test set. This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| 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 | Commands the MS what TCH timing advance to use on the uplink. Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 33. |
| Query | range: 0 to 63 resolution: 1 |
| *RST Setting | zero |
| Programming Example OUTPUT 714;"CALL:MS:TADVANCE 3" !Sets the MS TCH Timing Advance to 3 on !the uplink. | |

CALL:MS:TXLevel[:SElected]

| | |
|---|---|
| Function | Selects the MS uplink power control level for the band already selected. See "Frequency Banded Parameters" on page 501. Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 33. |
| Setting | range: 0 to 31 resolution: 1 |
| Query | range: 0 to 31 resolution: 1 |
| *RST Setting | Band: PGSM TXLevel: 15 |
| Programming Example OUTPUT 714;"CALL:MS:TXLEVEL:SELECTED 10" | |

CALL:MS:TXLevel:DCS

| | |
|--|--|
| Function | Selects the MS uplink power control level for the DCS band. See “Frequency Banded Parameters” on page 501 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 . |
| 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 | Selects the MS uplink power control level for the EGSM band. See “Frequency Banded Parameters” on page 501 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 . |
| Setting | range: 0 to 31 (default 15) resolution: 1 |
| Query | range: 0 to 31 resolution: 1 |
| *RST Setting | Band: PGSM TXLevel: 15 |
| Programming Example OUTPUT 714 ; "CALL:MS:TXLEVEL:EGSM 20" | |

CALL:MS:TXLevel:PCS

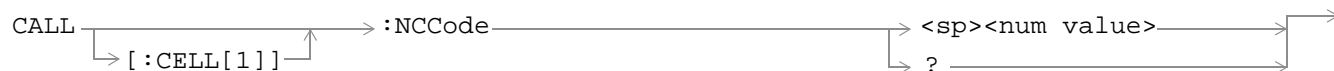
| | |
|---|--|
| Function | Selects the MS uplink power control level for the PCS band. See “Frequency Banded Parameters” on page 501 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 . |
| Setting | 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 | Selects the MS uplink power control level for the PGSM band. See “Frequency Banded Parameters” on page 501 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 . |
| 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

April 20, 1999



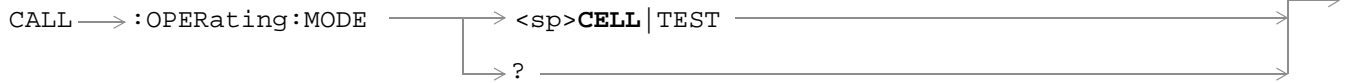
[“Diagram Conventions” on page 213](#)

CALL[:CELL]:NCCode

| | |
|---|--|
| Function | Sets/queries the Network Color Code. See “Configuring the Broadcast Channel (BCH)” on page 511 . |
| 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

April 20, 1999



[“Diagram Conventions” on page 213](#)

CALL:OPERating:MODE

| | |
|--|--|
| Function | Sets/queries the operating mode (behavior) of the test set. See “Test Mode Operating Mode” on page 524 or “Active Cell Operating Mode” on page 509 . |
| Setting | range: cell test |
| Query | range: CELL TEST |
| *RST Setting | CELL |
| Programming Example OUTPUT 714;"CALL:OPERATING:MODE TEST" !Places the Test Set into Test Mode. | |

CALL:ORIGinate

April 20, 1999

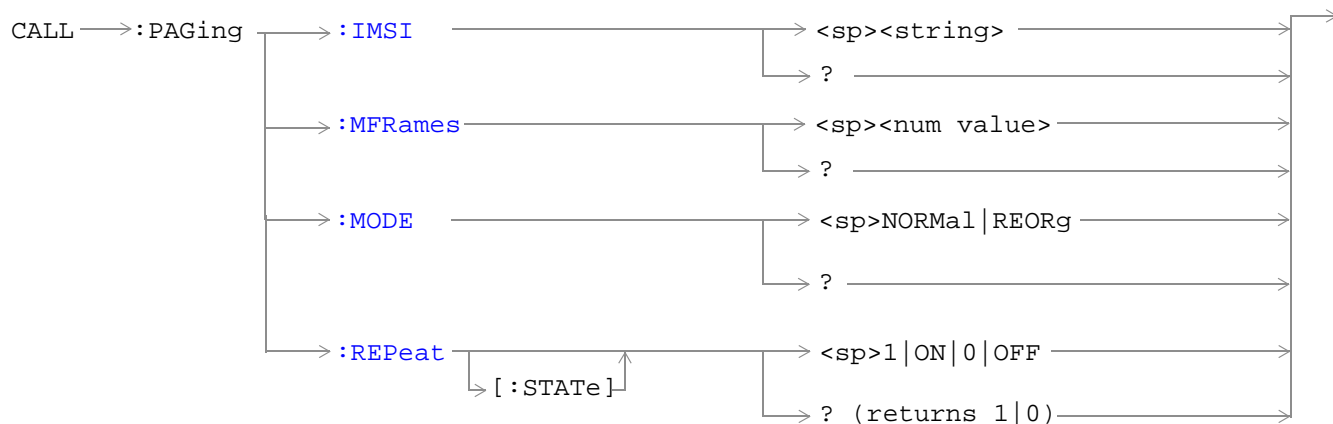


[“Diagram Conventions” on page 213](#)

CALL:ORIGinate

| | |
|--|--|
| Function | Performs a BS Originated call. See “Call Processing Event Synchronization” on page 30 . Additional commands can be appended to aid in controller/Mobile Station synchronization. |
| <p>Programming Example</p> <pre>OUTPUT 714;"CALL:ORIGINATE:SEQUENTIAL" !Orignates a base station call. !Appending SEQUENTIAL to this command !causes the command to be !performed sequentially.</pre> | |

CALL:PAGIng



“Diagram Conventions” on page 213

CALL:PAGIng:IMSI

| | |
|--|--|
| Function | Sets/queries the paging IMSI (International Mobile Subscriber Identity) field, used for paging the MS. The test set will stay in Active Cell Status (Setup Request), see “Call Processing State Synchronization” on page 35 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. |
| Setting | range: up to 15 decimal digits resolution: 1 |
| Query | range: up to 15 decimal digits resolution: 1 |
| *RST Setting | 001012345678901 |
| Programming Example <pre> OUTPUT 714;"CALL:PAGIng:IMSI `01012345678901`"!Set paging IMSI !to 01012345678901. </pre> | |

CALL:PAGIng:REPeat[:STAtE]

| | |
|--|---|
| Function | 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 “Fixed Timer Messages” on page 578 . |
| 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 | <p>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.</p> <p>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 channel without waiting for the defined paging group.</p> <p>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.</p> |
| Setting | range: REORg NORMAl |
| Query | range: REOR NORM |
| *RST Setting | Reorg |
| Programming Example | |
| OUTPUT 714; "CALL:PAGING:MODE REOR" ! MS will be sent a page on the ! next available paging subchannel | |

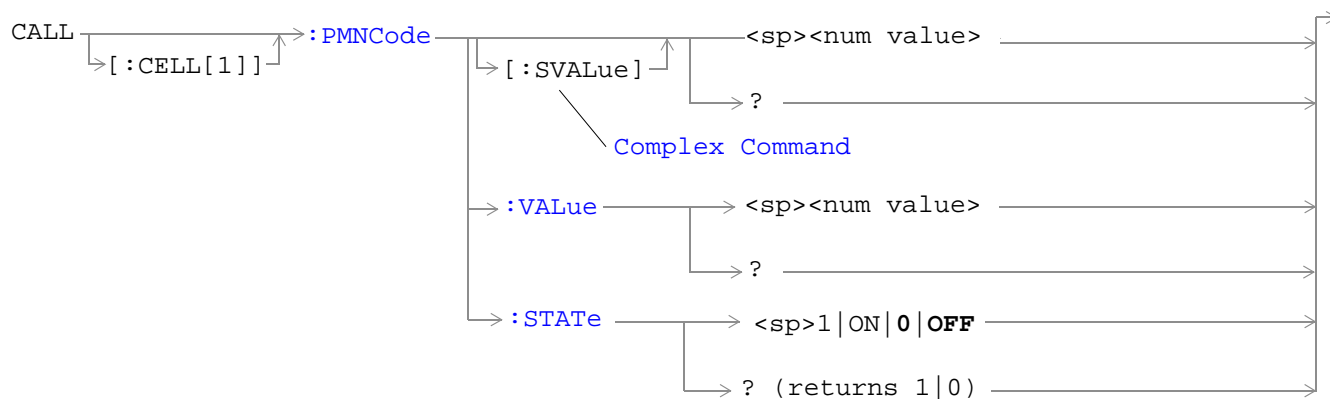
CALL:PAGing

CALL:PAGing:MFRames

| | |
|--|--|
| Function | 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. |
| Setting | range: 2 to 9 resolution: 1 |
| Query | range: 2 to 9 resolution: 1 |
| *RST Setting | 2 |
| Programming Example OUTPUT 714;"CALL:PAGING:MFRAMES 5" ! Sets the number of multiframes ! between paging subchannels. | |

CALL:PMNCode

July 1, 1999



[“Diagram Conventions” on page 213](#)

CALL[:CELL]:PMNCode[:SVALue]

| | |
|---|--|
| Function | 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. See “3 Digit MNC for PCS” on page 513 . |
| 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 | Sets/queries the 3 digit mobile network code value. This command is used for PCS band only. See "3 Digit MNC for PCS" on page 513. |
| 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 | Sets/queries the MNC state. This command is used for the PCS band only. See "3 Digit MNC for PCS" on page 513. |
| Setting | range: 0 OFF 1 ON |
| Query | range: 0 OFF 1 ON |
| *RST Setting | OFF |
| Programming Example OUTPUT 714;"CALL:CELL:PMNCode:STATE ON" | |

CALL:POWer

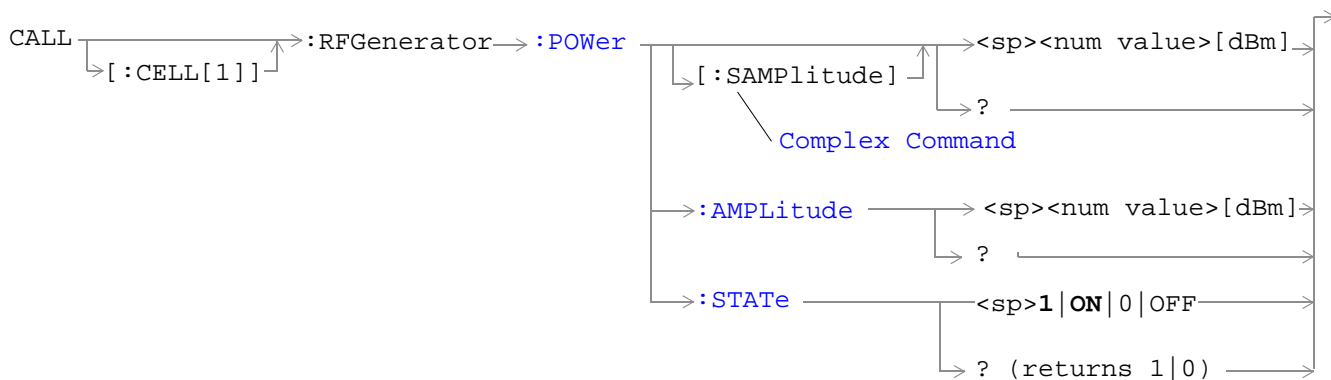
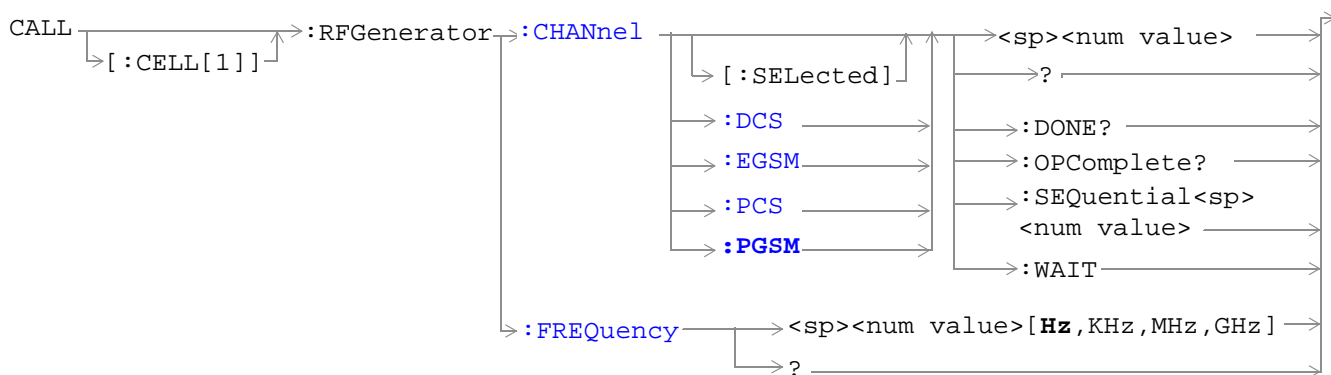
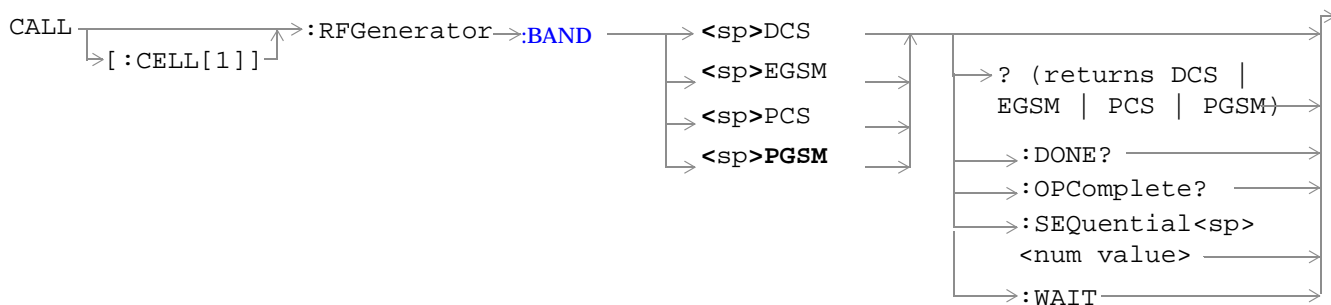
CALL[:CELL]:POWer:AMPLitude

| | |
|--|--|
| Function | Sets/queries the Cell Power of the test set, this is the same for BCH and TCH. The suffix dBm is optional. The Cell Power field is affected when there is an amplitude offset, see "Measurement Related Configuration" on page 563 . |
| 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 OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -50dBm" !Set the cell power from test !set to -50dBm. | |

CALL[:CELL]:POWer:STATE

| | |
|--|----------------------------------|
| Function | Sets/queries the RF Power state. |
| Setting | range: 0 OFF 1 ON |
| Query | range: 0 OFF 1 ON |
| *RST Setting | ON |
| Programming Example OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -50dBm" !Set the cell power from test !set to -50dBm. | |

CALL:RFGenerator



“Diagram Conventions” on page 213

CALL[:CELL]:RFGenerator:BAND

| | |
|--|--|
| Function | Sets/queries the RF Gen Channel band. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 531 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 for examples. |
| Setting | range: <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124 |
| Query | range: <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124 |
| *RST Setting | 20 (PGSM band) |
| Programming Example | |
| OUTPUT 714; "CALL:CELL:RFGENERATOR:BAND DCS" !Sets the RF Generator band to DCS. | |

CALL[:CELL]:RFGenerator:CHANnel[:SElected]

| | |
|---|---|
| Function | <p>Sets/queries the RF Gen Channel for the band already selected.</p> <p>Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 531.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 for examples.</p> |
| Setting | <p>range:</p> <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124 |
| Query | <p>range:</p> <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124 |
| *RST Setting | 20 (PGSM band) |
| <p>Programming Example</p> <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 | Sets/queries the RF Gen Channel for the DCS band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 531 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 33 for examples. |
| 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 | Sets/queries the RF Gen Channel for the EGSM band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 531 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 33 for examples. |
| 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 | Sets/queries the RF Gen Channel for the PCS band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 531 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 for examples. |
| 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 | Sets/queries the RF Gen Channel for the PGSM band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 531 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 33 for examples. |
| 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 | Sets/queries the RF Gen Frequency selection. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 531 . The units (Hz KHz MHz GHz) are optional, if no units are specified then units default to Hz. |
| 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 | Sets/queries the value for RF Gen Power and turns the state to ON. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 531 . The RF Gen Power field is affected when there is an amplitude offset, see “Measurement Related Configuration” on page 563 . |
| 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 | Set/queries Rf Gen Power. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. see “CW Test Function Behavior” on page 531. The RF Gen Power field is affected when there is an amplitude offset, see “Measurement Related Configuration” on page 563. |
| 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 | Sets/queries the RF Gen Power State. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 531. |
| Setting | range: 0 OFF 1 ON |
| Query | range: 0 OFF 1 ON |
| *RST Setting | ON |
| Programming Example | |
| OUTPUT 714 ; "CALL:CELL:RFGENERATOR:POWER:STATE OFF" | |

CALL:SIGNaling

CALL → :SIGNaling → :MS → :TXLevel → :FACCH → <sp><1|ON|0|OFF> →
 ↳ ? (returns 1|0) →

“Diagram Conventions” on page 213

CALL:SIGNaling:MS:TXLevel:FACCH

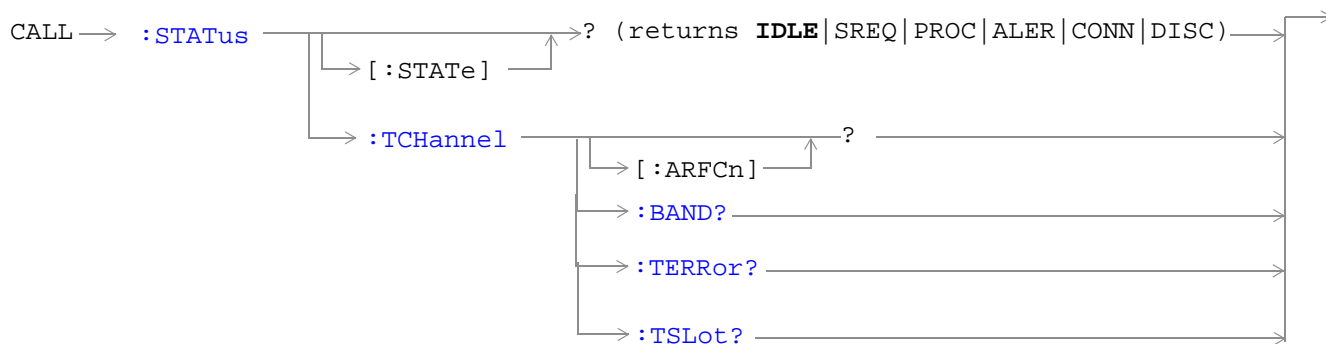
| | |
|--|--|
| Function | <p>Sets/queries the TX Level FACCH Signaling parameter.</p> <p>When TX Level FACCH Signaling is set to on, the base station emulator uses both a FACCH (Fast Associated Control CHannel) channel assignment and an update to the SACCH (Slow Associated Control CHannel) header to 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> |
| Setting | range: 1 ON 0 OFF |
| Query | 1 0 |
| *RST Setting | 1 ON |
| Programming Example OUTPUT 714;"CALL:SIGNALING:MS:TXLEVEL:FACCH 0" | |

Related Topics

“Configuring the Broadcast Channel (BCH)” on page 511

CALL:STATUS

July 12, 1999



[“Diagram Conventions” on page 213](#)

CALL:STATUS[:STATe]?

| | |
|----------------------------------|---|
| Function | Query returns the status of the call. See “Call Processing State Synchronization” on page 35. |
| Setting | range: IDLE SREQ PROC ALER CONN DISC |
| Query | range: IDLE SREQ PROC ALER CONN DISC |
| *RST Setting | IDLE |
| Programming Example | |
| OUTPUT 714; "CALL:STATUS:STATE?" | |

CALL:STATUS:TCHannel[:ARFCN]?

| | |
|--|--|
| Function | Query returns the TCH ARFCN for the current band. The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE]?” on page 283. |
| Query | range: <ul style="list-style-type: none"> • DCS band, channels 512 to 885 • EGSM band, channels 975 to 1023 and 0 to 124 • PCS band, channels 512 to 810 • PGSM band, channels 1 to 124 • 9.91E+37 resolution: 1 |
| *RST Setting | 9.91E+37 (NAN) |
| Programming Example | |
| OUTPUT 714 ; "CALL : STATUS : TCHANNEL : ARFCN ? " | |

CALL:STATUS:TCHannel:BAND?

| | |
|---|--|
| Function | Query the current TCH band. See “Configuring the Traffic Channel (TCH)” on page 521. The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE]?” on page 283. |
| Query | range: DCS EGSM PCS PGSM "" |
| *RST Setting | "" (null string) |
| Programming Example | |
| OUTPUT 714 ; "CALL : STATUS : TCHANNEL : BAND ? " | |

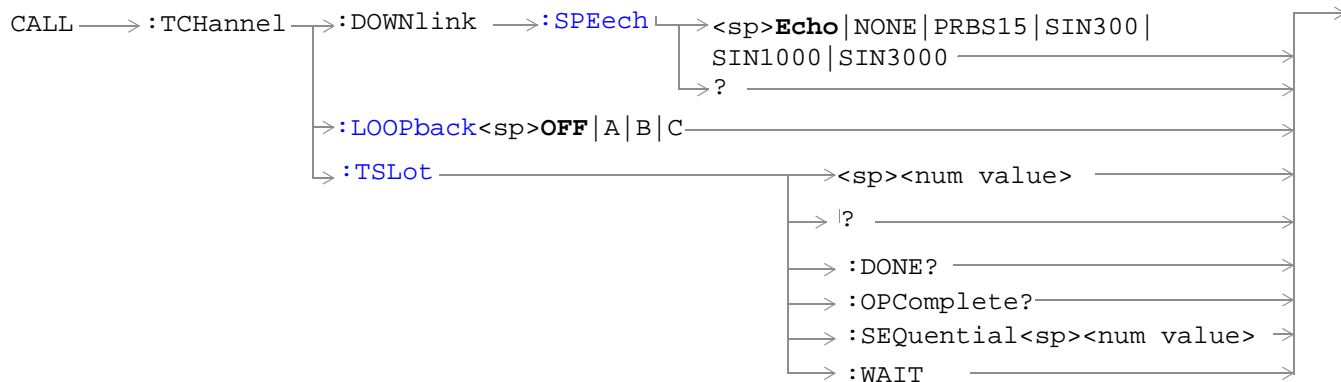
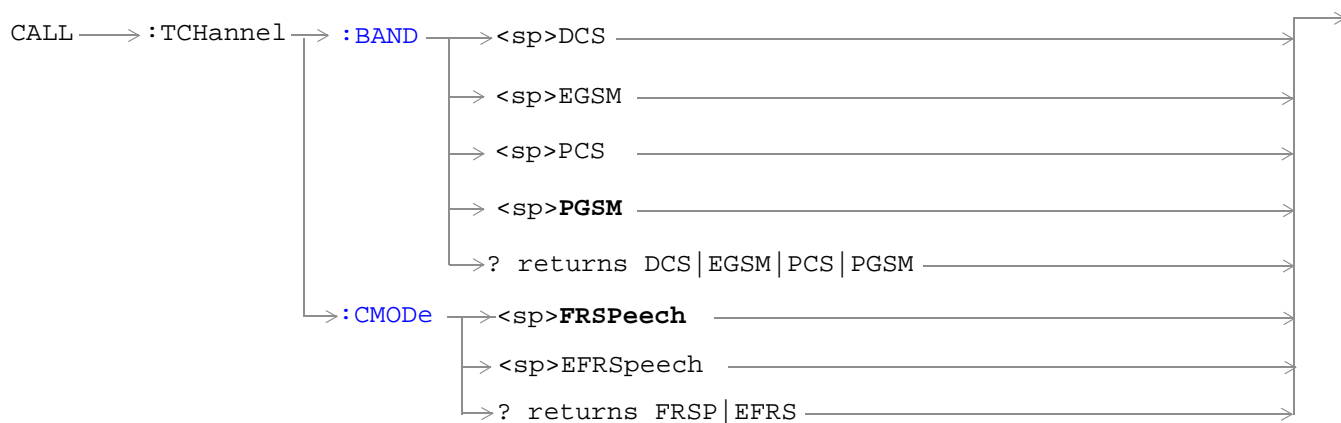
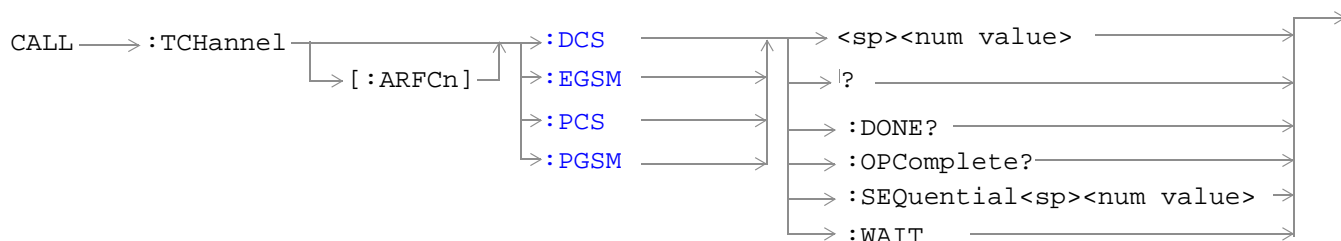
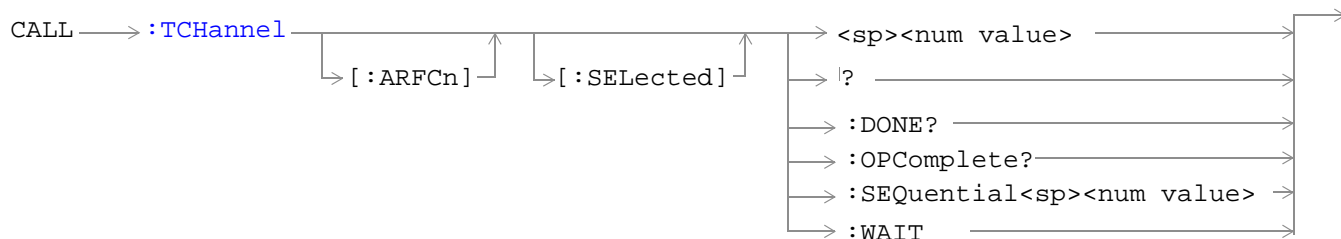
CALL:STATUS:TCHannel:TERRor?

| | |
|---|---|
| Function | <p>Query returns the last burst timing error measurement.</p> <p>Indicates the worst case timing error of all bursts received in a reporting period. If all of the bursts reporting in a period are missing, the query returns 9.91E+37 (NAN).</p> <p>The reference for burst timing error measurements is with respect to the (downlink TCH slot) + (3 slot TX/RX delay [468.75 bits]) - (TCH Timing Advance).</p> <p>The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE]?” on page 283.</p> <p>Burst timing error is continuously updated every 480 ms. Burst timing error is displayed in the Call Setup window.</p> |
| Query | <p>range: -8 to +30 T [T=48/13,000,000 seconds approximately 3.69 μs] and 9.91E+37</p> <p>resolution: .25 T [approximately .923 μs]</p> |
| *RST Setting | 9.91E+37 (NAN) |
| <p>Programming Example</p> <p>OUTPUT 714; "CALL:STATUS:TCHANNEL:TERROR?" ! Returns Burst Timing Error.</p> | |

CALL:STATUS:TCHannel:TSLot?

| | |
|--|---|
| Function | <p>Query the Timeslot that the BS Emulator is using for the TCH. See “Configuring the Traffic Channel (TCH)” on page 521.</p> <p>The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE]?” on page 283.</p> |
| Query | range: 3 4 5 9.91E+37 |
| *RST Setting | 9.91E+37 (NAN) |
| <p>Programming Example</p> <p>OUTPUT 714; "CALL:STATUS:TCHANNEL:TSLOT?"</p> | |

CALL:TCHannel



“Diagram Conventions” on page 213

CALL:TCHannel[:ARFCn][:SElected]

| | |
|--|---|
| Function | Sets/queries the channel number of downlink and uplink TCH for the band already selected. Additional commands can be appended to aid in controller/Mobile Station synchronization. See for examples. |
| Setting | range: <ul style="list-style-type: none"> • DCS band, channels 512 to 885 • EGSM band, channels 975 to 1023 and 0 to 124 • PCS band, channels 512 to 810 • PGSM band, channels 1 to 124 resolution: 1 |
| Query | range: <ul style="list-style-type: none"> • DCS band, channels 512 to 885 • EGSM band, channels 975 to 1023 and 0 to 124 • PCS band, channels 512 to 810 • PGSM band, channels 1 to 124 resolution: 1 |
| *RST setting | 30 (PGSM band) |
| Programming Example OUTPUT 714; "CALL:TCHANNEL:ARFCN:SELECTED 512" !Selects ARFCN of 512 on the !test set. | |

CALL:TCHannel[:ARFCn]:DCS

| | |
|---|--|
| Function | Sets/queries the channel number for downlink and uplink TCH for DCS band. See “Configuring the Traffic Channel (TCH)” on page 521 . TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATUS[:STATE]?” on page 283 . Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 31 for examples. |
| Setting | range: 512 to 885 (default: 698) resolution: 1 |
| Query | range: 512 to 885 resolution: 1 |
| *RST setting | 30 (PGSM band) |
| Programming Example OUTPUT 714; "CALL:TCHANNEL:ARFCN:DCS 512" | |

CALL:TCHannel

CALL:TCHannel[:ARFCn]:EGSM

| | |
|--|--|
| Function | <p>Sets/queries channel number for downlink and uplink TCH for EGSM band. See “Configuring the Traffic Channel (TCH)” on page 521.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATUS[:STATE]?” on page 283.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 31 for examples.</p> |
| 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 (PGSM band) |
| Programming Example | |
| OUTPUT 714; "CALL:TCHANNEL:ARFCN:EGSM 124" | |

CALL:TCHannel[ARFCN]:PCS

| | |
|---|---|
| Function | <p>Sets/queries channel number for downlink and uplink TCH for PCS band. See “Configuring the Traffic Channel (TCH)” on page 521.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATUS[:STATE]?” on page 283.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 31 for examples.</p> |
| Setting | <p>range: 512 to 810 (default: 698)</p> <p>resolution: 1</p> |
| Query | <p>range: 512 to 810</p> <p>resolution: 1</p> |
| *RST Setting | 30 (PGSM band) |
| Programming Example | |
| OUTPUT 714; "CALL:TCHANNEL:ARFCN:PCS 512" | |

CALL:TCHannel[:ARFCn]:PGSM

| | |
|---|---|
| Function | <p>Set channel number for downlink and uplink TCH for PGSM band. See “Configuring the Traffic Channel (TCH)” on page 521.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATUS[:STATE]?” on page 283.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 31 for examples.</p> |
| Setting | <p>range: 1 to 124 (default: 30)</p> <p>resolution: 1</p> |
| Query | <p>range: 1 to 124</p> <p>resolution: 1</p> |
| *RST Setting | 30 (PGSM band) |
| Programming Example OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:PGSM 124" | |

CALL:TCHannel:BAND

| | |
|---|--|
| Function | <p>Sets/queries which GSM band the BS Emulator should use for the TCH.</p> <p>The test set may be queried for the current TCH band when the CALL:STATUS:STATE is idle or connected, see “CALL:STATUS[:STATE]?” on page 283.</p> <p>The test set uses this command to perform a channel assignment, see “Programming a Dualband Handover” on page 119 when the MS will support the band and the CALL:STATUS:STATE is CONNECTed.</p> |
| Setting | <p>range: DCS EGSM PCS PGSM bands</p> <p>resolution: 1</p> |
| Query | <p>range: DCS EGSM PCS PGSM bands</p> <p>resolution: 1</p> |
| *RST Setting | PGSM |
| Related Topic | Frequency Banded Parameters “Traffic Band Parameter” on page 502 . |
| Programming Example OUTPUT 714 ; "CALL:TCHANNEL:BAND DCS" | |

CALL:TCHannel

CALL:TCHannel:CMODE

| | |
|---|---|
| Function | Sets/queries which channel mode the mobile station should use for speech data. This setting is either full rate speech (FRSPeech) or enhanced full rate speech (EFRSPeech). See “Programming a Channel Mode Change” on page 117 . |
| Setting | range: FRSPeech EFRSPeech |
| Query | range: FRSP EFRS |
| *RST Setting | FRSPeech |
| Programming Example | |
| OUTPUT 714; "CALL:TCHANNEL:CMODE EFRSPEECH" | |

CALL:TCHannel:DOWNlink:SPEech

| | |
|--|---|
| Function | Set which kind of Speech data is transmitted on the downlink TCH. See “Configuring the Traffic Channel (TCH)” on page 521 or “Fast Bit Error Measurement Description” on page 69 or “Test Mode Operating Mode” on page 524 . |
| 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 | <p>Sets traffic channel loopback state and type for the MS.</p> <p>The loopback type must be set before a Fast Bit Error or a Bit Error measurement will function.</p> <p>The test set will automatically set the correct loopback type if the signalling loopback control is set to on, after the measurement the test set will automatically set the loopback to off. See “SETup:BERRor:SLControl” on page 389 or “SETup:FBERRor:SLControl” on page 395.</p> <p>See “Fast Bit Error Measurement Description” on page 69 or “Bit Error Measurement Description” on page 48.</p> |
| Setting | <p>range:</p> <ul style="list-style-type: none"> • OFF - Sets the TCH Loop state for the MS to OFF. The loop back is open. • A- Sets the TCH Loop state for the MS to type A. Full-rate speech TCH loopback with signaling of erased frames, (residual). • B- Sets the TCH Loop state for the MS to type B. Full-rate speech TCH loopback without signaling of erased frames, (non-residual). • C - Sets the TCH Loop state for the MS to type C. TCH burst by burst loopback. |
| *RST Setting | OFF |
| Programming Example OUTPUT 714;"CALL:TCHANNEL:LOOPBACK C" !Sets loopback type. | |

CALL:TCHannel:TSLot

| | |
|--|--|
| Function | <p>Sets the Timeslot number used for downlink and uplink Traffic Channel.</p> <p>See “Configuring the Traffic Channel (TCH)” on page 521.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 31 for examples.</p> |
| Setting | <p>range: 3 4 5</p> <p>resolution: 1</p> |
| Query | <p>range: 3 4 5</p> <p>resolution: 1</p> |
| *RST Setting | 4 |
| Programming Example OUTPUT 714;"CALL:TCHANNEL:TSLOT 5" !Sets time slot number. | |

DISPlay Subsystem

Description

The DISPlay subsystem is used to configure the test set's display mode or display brightness . Use of the DISPlay subsystem is not required to set or query any data or results.

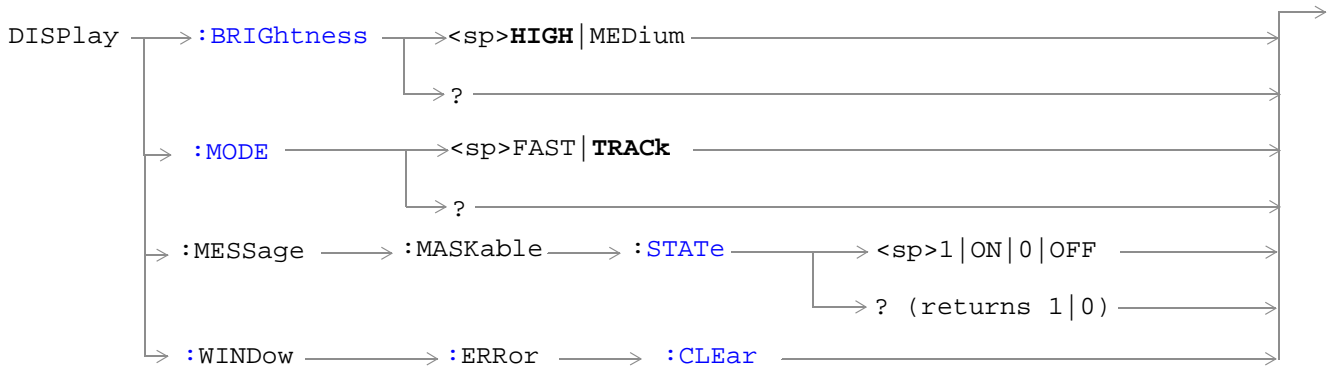
Display Backlight Dimming

The test set's display brightness parameter has two settings at this time, high and medium. The life of the display's backlight will be maximized when brightness is set to medium. The test set has an auto dimming feature that will lower the display brightness automatically if approximately 10 minutes pass without a key being pressed on the test set's front panel. The display will return to the brightness level shown in the Display Brightness field when the test set is set to local and any front panel key is pressed. There is no other user control for this feature.

Syntax Diagram and Command Descriptions

“DISPlay”

DISPlay



[“Diagram Conventions” on page 213](#)

DISPlay:BRIGHtness

| | |
|--|--|
| Function | Sets/queries the test set’s display brightness. A display backlight dimming feature lowers the display brightness after approximately 10 minutes without any manual user interaction with the test set. See “Display Backlight Dimming” on page 292 . |
| Setting | Range: MEDium HIGH |
| Query | Range: MED HIGH |
| Factory setting | HIGH (this parameter is not affected by any reset operation and can only be changed by direct user access) |
| Programming Example OUTPUT 714;"DISPLAY:BRIGHTNESS MEDIUM" !Sets display brightness to medium. | |

DISPlay

DISPlay:MODE

| | |
|--|---|
| Function | Sets/queries the test set's display mode. See "Display Mode (Track/Fast)" on page 566. |
| Range | FAST TRACK |
| Query | FAST TRAC |
| *RST setting | TRACK |
| Programming Example OUTPUT 714;"DISPLAY:MODE FAST" !Sets display mode to fast. | |

DISPlay:MESSAge:MASKable:STATe

| | |
|---|---|
| Function | Blocks maskable messages from appearing on the test set display display screen but not from the Message Log. Maskable messages are reported to the Message Log in either state. |
| Setting | Range: On Off |
| Query | Range: On Off |
| Factory setting | On |
| Programming Example OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display. | |

DISPlay:WINDow:ERRor:CLEAr

| | |
|--|--|
| Function | Clears the error message from the display screen but not from the Message Log. |
| Programming Example OUTPUT 714;"DISPLAY:WINDOW:ERROR:CLEAR" !Clears an error message from the display. | |

FETCh? Subsystem

Description

The FETCh? query is a function that allows users to query results from a measurement that was previously INITiated or READ. It does NOT begin a measurement. If no measurement is in progress it will return the integrity and measurement values from the last measurement made, or return an integrity of No Result Available and results of NAN. If a measurement is in process, the query will hang until the results are available, or the measurement fails or times out. The exact results returned with a FETCh? will depend on the specific measurement. A measurement may have a number of different results or combination of results for a FETCh?. The FETCh? queries are intended to be used to provide overlapped operation access to measurement results from the test set. When used along with SETup and INITiate commands , FETCh? is the primary way for the user to retrieve measurement results. In order to use the test set's concurrent test capabilities the overlapped commands of INITiate and FETCh? must be used. Overlapped commands allow the user to send commands and not wait for completion.

Syntax Diagrams and Command Descriptions

[“FETCh:AAUDio” on page 296](#)

[“FETCh:BERRor” on page 300](#)

[“FETCh:DAUDio” on page 308](#)

[“FETCh:DPOWer” on page 312](#)

[“FETCh:FBERRor” on page 314](#)

[“FETCh:IQTuning” on page 318](#)

[“FETCh:ORFSpectrum” on page 322](#)

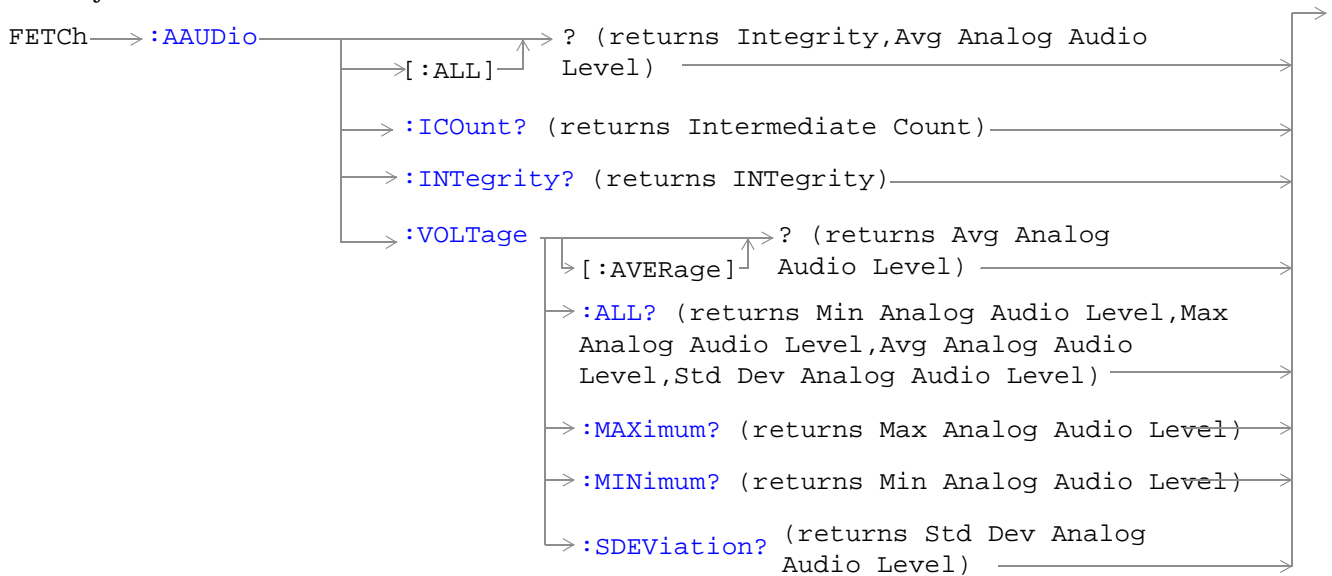
[“FETCh:PFERRor” on page 329](#)

[“FETCh:PVTime” on page 336](#)

[“FETCh:TXPower” on page 349](#)

FETCh:AAudio

February 14, 2000



[“Diagram Conventions” on page 213](#)

FETCh:AAudio[:ALL]?

| | |
|----------|--|
| Function | <p>Queries the analog audio measurement results. This query returns an integrity indicator and average analog audio level. Values are returned in a comma-separated list.</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> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Analog audio level</p> <ul style="list-style-type: none"> • Range: 10 mV_{rms} to 20 V_{rms} • Resolution: 0.1 mV_{rms} |

FETCh:AAUDio:ICount?

| | |
|----------|---|
| Function | Queries the intermediate count of analog audio multi-measurements completed. This value is not displayed on the test set. |
| Query | Range: 1 to 999 Resolution: 1 |

FETCh:AAUDio:INTEgrity?

| | |
|----------|--|
| Function | Queries the integrity indicator for the last analog audio measurement completed. Zero indicates a normal measurement. See “Integrity Indicator” on page 125 for descriptions of non-zero integrity indicators. |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:AAUDio:VOLTage[:AVERage]?

| | |
|----------|---|
| Function | Queries the average analog audio level. Value is returned in units of V_{rms} . If the analog audio multi-measurement count field is off, the level returned by this command is displayed in the Analog Audio In Level field. If the analog audio multi-measurement count is on, the level returned by this command is displayed in the Analog Audio Average field |
| Query | Range: 10 mV_{rms} to 20 V_{rms} Resolution: 0.1 mV_{rms} |

FETCh:AAUDio:VOLTage:ALL?

| | |
|----------|--|
| Function | Queries the analog audio multi-measurement minimum, maximum, average and standard deviation. Values are returned in a comma-separated list The values returned are displayed in the Analog Audio Minimum, Maximum, Average, and Std. Dev. fields, which are displayed when the Analog Audio multi-measurement count is not off. |
|----------|--|

| | |
|--------------|---|
| <p>Query</p> | <p>Minimum</p> <ul style="list-style-type: none"> • Range: 10 mV_{rms} to 20 V_{rms} • Resolution: 0.1 mV_{rms} <p>Maximum</p> <ul style="list-style-type: none"> • Range: 10 mV_{rms} to 20 V_{rms} • Resolution: 0.1 mV_{rms} <p>Average</p> <ul style="list-style-type: none"> • Range: 10 mV_{rms} to 20 V_{rms} • Resolution: 0.1 mV_{rms} <p>Standard deviation</p> <ul style="list-style-type: none"> • Range: 0 V to 14.14214 V • Resolution: 0.01 mV |
|--------------|---|

FETCh:AAUDio:VOLTage:MAXimum?

| | |
|----------|---|
| Function | Queries the analog audio multi-measurement maximum analog audio voltage. The value returned is displayed in the Analog Audio Maximum field, which is displayed when the analog audio multi-measurement count is not off. |
| Query | Range: 10 mV _{rms} to 20 V _{rms} Resolution: 0.1 mV _{rms} |

FETCh:AAUDio:VOLTage:MINimum?

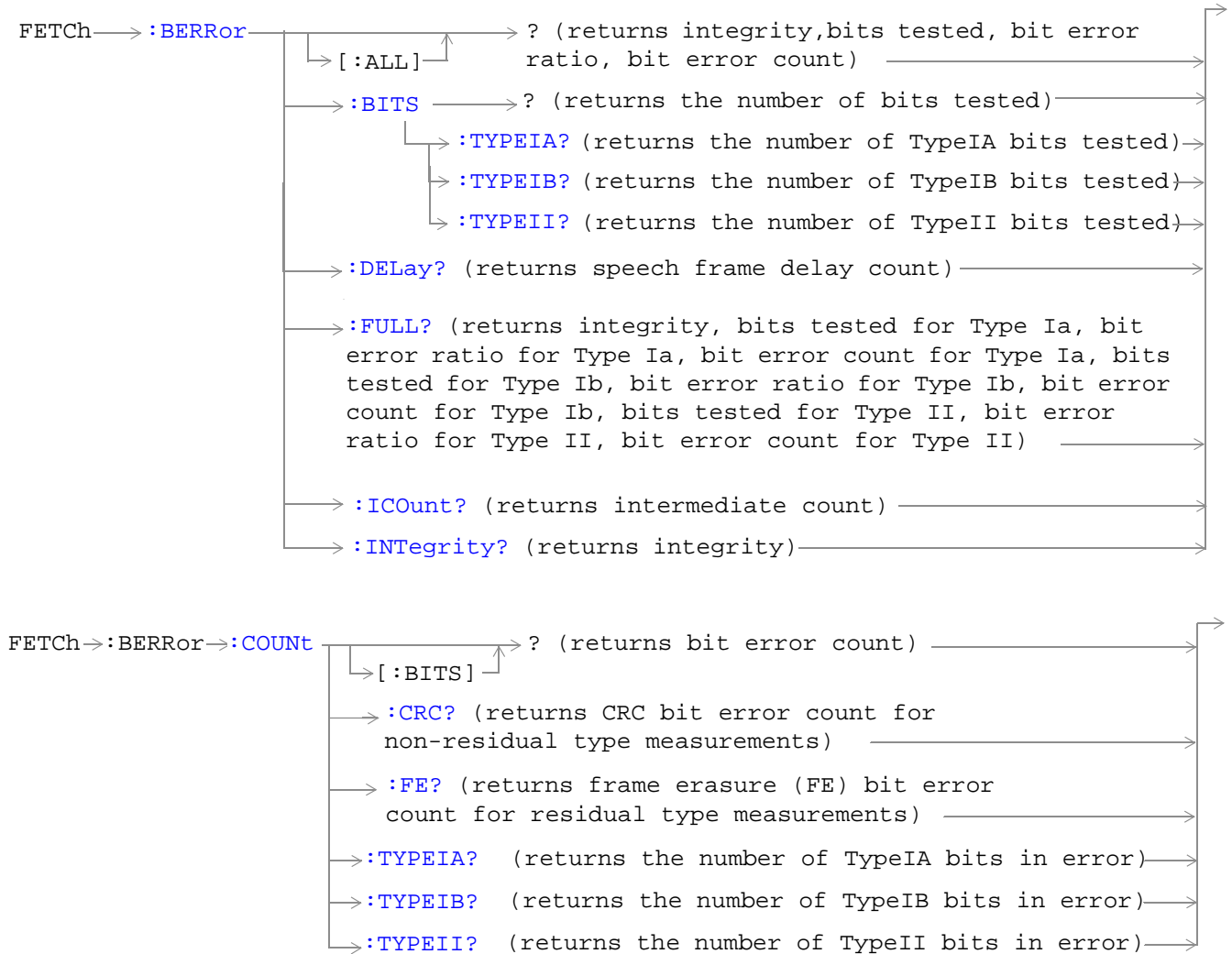
| | |
|----------|--|
| Function | Queries the analog audio multi-measurement minimum analog audio voltage The value returned is displayed in the Analog Audio Minimum field, which is displayed when the analog audio multi-measurement count is not off. |
| Query | Range: 10 mV _{rms} to 20 V _{rms} Resolution: 0.1 mV _{rms} |

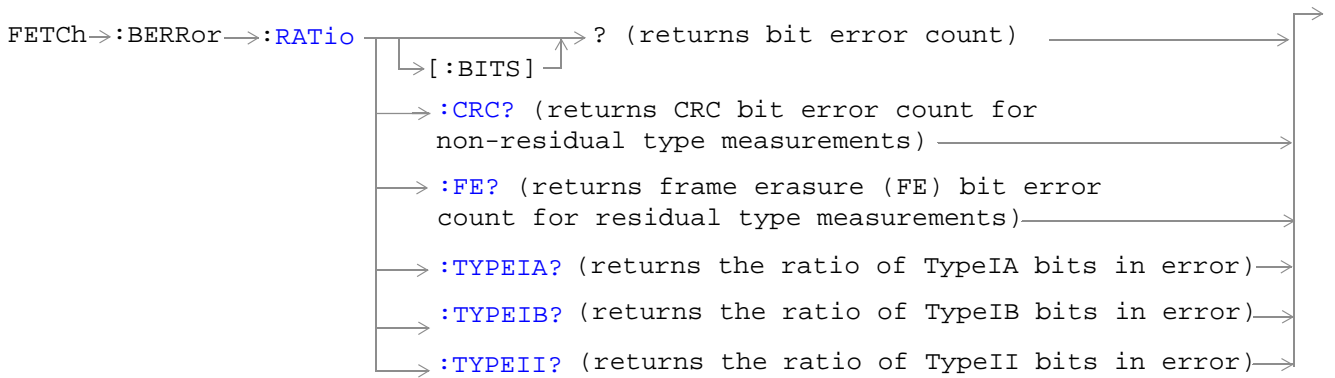
FETCh:AAUDio:VOLTage:SDEviation?

| | |
|----------|--|
| Function | Queries the analog audio multi-measurement standard deviation. The value returned is displayed in the Analog Audio Std Dev. field, which is displayed when the Analog Audio multi-measurement count is not off. |
| Query | Range: 0 V to 14.14214 V Resolution: 0.01 mV |

FETCh:BERRor

February 14, 2000





“Diagram Conventions” on page 213

FETCh:BERRor[:ALL]?

| | |
|----------|---|
| Function | Queries the bit error measurement. Query returns integrity indicator, bits tested, bit error ratio, and bit error count. (A similar query, “ FETCh:BERRor:FULL? ” on page 305, returns the same results but for all bit types simultaneously.) See “ Bit Error Measurement Description ” on page 48. |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 999,131 and 9.91 E+37 (NAN) • Resolution: 1 <p>Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91 E+37 (NAN) • Resolution: 0.01 <p>Bit error count</p> <ul style="list-style-type: none"> • Range: 1 to 999,131 and 9.91 E+37 (NAN) • Resolution: 1 |

FETCh:BERRor:BITS?

| | |
|--------------|---|
| Function | <p>Queries the number of bits actually tested. This query only returns the result of the bit type set using the SETup:BERRor[:TYPE] command.</p> <p>The number of bits actually tested will exceed the number requested because the test set rounds up the number requested to the nearest number that results in an integral number of speech frames. One speech frame is 132 bits. The test set measures complete a speech frame and it is queried for bits. See “Bit Error Measurement Description” on page 48</p> |
| Query | <p>Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 999,131 and 9.91 E+37 (NAN) • Resolution: 1 |
| *RST Setting | 10,000 |

FETCh:BERRor:BITS:TYPEIA|TYPEIB|TYPEII?

| | |
|----------|---|
| Function | Queries the number of bits which have been tested. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. See “Bit Error Measurement Description” on page 48 |
| 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 | Queries the number of bits that were in error during the last bit error test. See “Bit Error Measurement Description” on page 48 The manual user must set the measurement unit to count. |
| Query | Range: 1 to 999,131 and 9.91 E+37 (NAN) Resolution: 1 |

FETCh:BERRor:COUNt:CRC?

| | |
|----------|---|
| Function | Queries the number of bad cyclic redundancy checks (CRCs) for a non-residual measurement type, loopback type B test. See “Bit Error Measurement Description” on page 48 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. |
| Query | Range: 0 to 19,980 and 9.91 E+37 (NAN) Resolution: 1 |

FETCh:BERRor

FETCh:BERRor:COUNT:FE?

| | |
|----------|---|
| Function | Queries the number of frames erased during a residual measurement type, looback type A test. The manual user must set the measurement's unit to count. |
| Query | Range: 0 to 19,980 and 9.91 E+37 (NAN) Resolution: 1 |

FETCh:BERRor:COUNT:TYPEIA|TYPEIB|TYPEII?

| | |
|----------|---|
| Function | Queries the number of bits in error. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. See "Bit Error Measurement Description" on page 48 |
| Query | Range for Type Ia: 0 to 999,000 and 9.91 E+37 (NAN) Range for Type Ib: 0 to 2,637,369 and 9.91 E+37 (NAN) Range for Type II: 0 to 1,558,440 and 9.91 E+37 (NAN) Resolution: 1 |

FETCh:BERRor:DELay?

| | |
|--------------|---|
| Function | Queries the delay (in speech frames) that the test set used during the last bit error measurement to correlate uplink information bits with downlink information bits. This value is displayed in the Speech Frames Delay field. This value can be determined automatically, or manually set by the user. See "SETup:BERRor:MANual:DELay" on page 389 and "SETup:BERRor:LDControl:AUTO" on page 388 . Refer also to the "Bit Error Measurement Description" on page 48 for a description of frame delay and how it is used in the bit error measurement. |
| Query | Range: 0 to 15 and 9.91 E+37 (NAN) Resolution: 1 |
| *RST Setting | Auto |

FETCh:BERRor:FULL?

| | |
|----------|---|
| Function | <p>Queries the bit error measurement.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 125, Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II bits. (A similar query, “FETCh:BERRor[:ALL]?” on page 302, returns the same results but only for the bit type previously set using the SETup:BERRor[:TYPE] command.) See “Bit Error Measurement Description” on page 48</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 999,000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 999,000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 2,637,369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 2,637,369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 15,584,400 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type II Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 1,558,440 and 9.91E+37 (NAN) • Resolution: 1 |

FETCh:BERRor

FETCh:BERRor:ICount?

| | |
|----------|--|
| Function | Queries the intermediate count of bits tested (measurement progress report). See “Measurement Progress Report” on page 131 |
| Query | Range: 0 to 999 Resolution: 1 |

FETCh:BERRor:INTEgrity?

| | |
|----------|---|
| Function | Returns the integrity indicator value for the last bit error measurement performed. Zero indicates a normal result. See “Integrity Indicator” on page 125 for descriptions of non-zero integrity indicators. |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:BERRor:RATIo[:BITS]?

| | |
|----------|--|
| Function | Queries the ratio of bits in error to the number of bits tested during the last bit error test and returns it as a percentage. See “Bit Error Measurement Description” on page 48 The manual user must set the measurement unit to %. |
| Query | Range: 1 to 100 and 9.91 E+37 (NAN) Resolution: 0.01 |

FETCh:BERRor:RATIo:CRC?

| | |
|----------|---|
| Function | Queries the ratio of bad cyclic redundancy checks (CRCs) to the total number of CRCs received for a non-residual measurement type, looback type B test and returns it as a percentage. See “Bit Error Measurement Description” on page 48 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 %. |
| Query | Range: 0 to 100 and 9.91 E+37 (NAN) Resolution: 0.01 |

FETCh:BERror:RATio:FE?

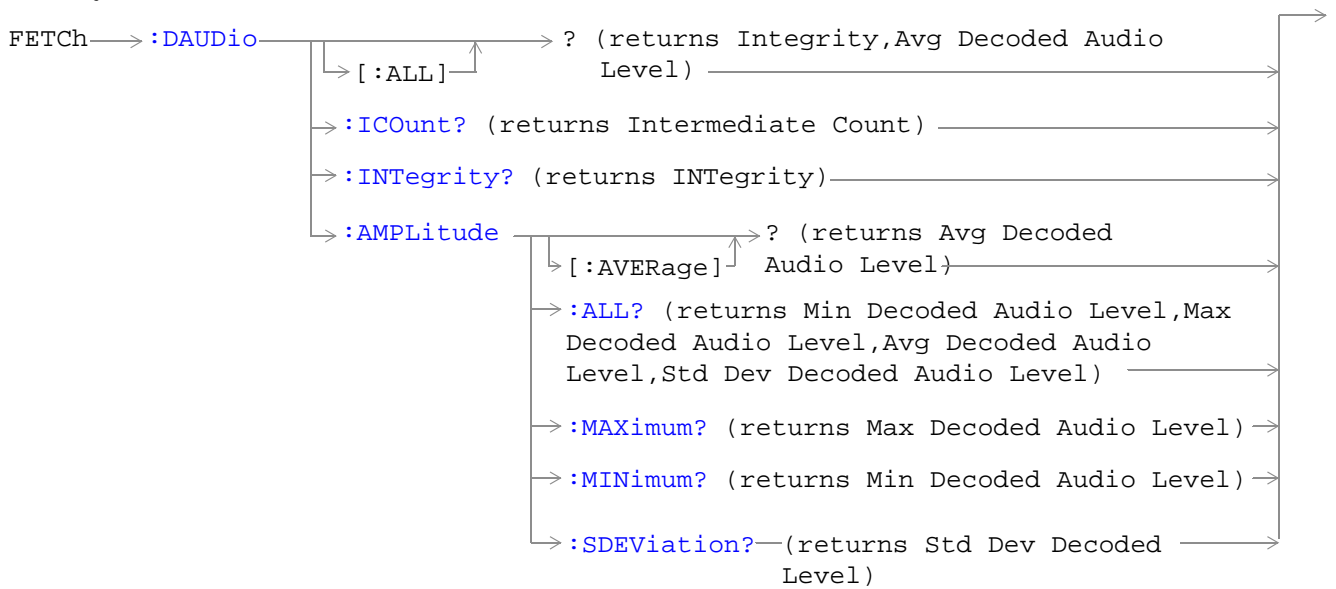
| | |
|----------|--|
| Function | Queries the ratio of erased frames to the total number of frames received for a residual measurement type, looback type A test and returns them as a percentage. See “Bit Error Measurement Description” on page 48 The manual user must set the measurement’s unit to %. |
| Query | Range: 0 to 100 and 9.91 E+37 (NAN) Resolution: 0.01 |

FETCh:BERror:RATio:TYPEIA|TYPEIB|TYPEII?

| | |
|----------|--|
| Function | Queries the number of bits in error to the number of bits tested. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. The result is returned as a percentage. See “Bit Error Measurement Description” on page 48 |
| Query | Range: 0 to 100 and 9.91 E+37 (NAN) Resolution: 0.01 |

FETCh:DAUDio

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[“Diagram Conventions” on page 213](#)

FETCh:DAUDio[:ALL]?

| | |
|----------|--|
| Function | Queries integrity indicator and average decoded audio results. Values are returned in a comma-separated list. |
| Query | Integrity indicator: <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 Decoded audio: <ul style="list-style-type: none"> • Range: 0 to 100% • Resolution: 0.01% FS |

FETCh:DAUDio:ICount?

| | |
|----------|---|
| Function | Queries the intermediate count of decoded audio multi-measurements completed. This value is not displayed on the test set. |
| Query | Range: 1 to 999 Resolution: 1 |

FETCh:DAUDio:INTEgrity?

| | |
|----------|--|
| Function | Queries the integrity indicator for the last decoded audio measurement completed. Zero indicates a normal measurement. See “Integrity Indicator” on page 125 for descriptions of non-zero integrity indicators. |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:DAUDio:AMPLitude[:AVERage]?

| | |
|----------|--|
| Function | 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 |
| Query | Range: 0 to 100% Resolution: 0.01% FS |

FETCh:DAUDio:AMPLitude:ALL?

| | |
|----------|--|
| Function | <p>Queries the decoded audio multi-measurement minimum, maximum, average and standard deviation. Values are returned in a comma-separated list.</p> <p>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.</p> |
| Query | <p>Minimum:</p> <ul style="list-style-type: none"> • Range: 0 to 100% • Resolution: 0.01% FS <p>Maximum:</p> <ul style="list-style-type: none"> • Range: 0 to 100% • Resolution: 0.01% FS <p>Average:</p> <ul style="list-style-type: none"> • Range: 0 to 100% • Resolution: 0.01% FS <p>Standard deviation:</p> <ul style="list-style-type: none"> • Range: 0 to 71% • Resolution: 0.001% FS |

FETCh:DAUDio:AMPLitude:MAXimum?

| | |
|----------|--|
| Function | <p>Queries the decoded audio multi-measurement maximum decoded audio voltage.</p> <p>The value returned is displayed in the Decoded Audio Maximum field, which is displayed when the decoded audio multi-measurement count is not off.</p> |
| Query | <p>Range: 0 to 100%</p> <p>Resolution: 0.01% FS</p> |

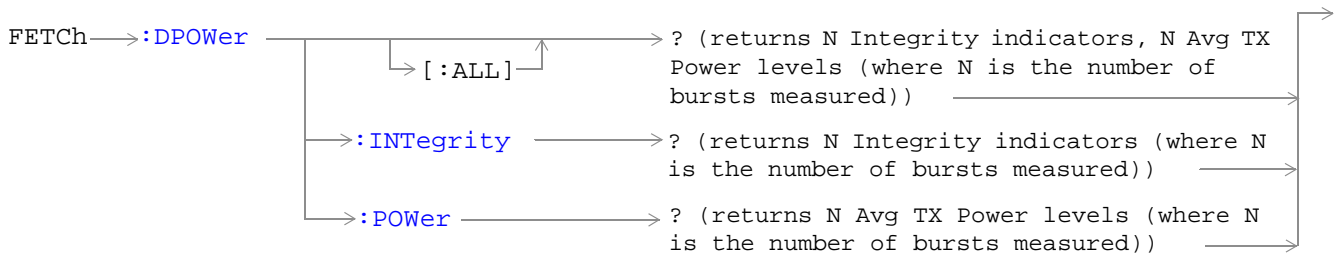
FETCh:DAUDio:AMPLitude:MINimum?

| | |
|----------|---|
| Function | <p>Queries the decoded audio multi-measurement minimum decoded audio voltage</p> <p>The value returned is displayed in the Decoded Audio Minimum field, which is displayed when the decoded audio multi-measurement count is not off.</p> |
| Query | <p>Range: 0 to 100%</p> <p>Resolution: 0.01% FS</p> |

FETCh:DAUDio:AMPLitude:SDEVIation?

| | |
|----------|---|
| Function | 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. |
| Query | Range: 0 to 71% Resolution: 0.001% FS |

FETCh:DPOWer



“Diagram Conventions” on page 213

FETCh:DPOWer[:ALL]?

| | |
|----------|--|
| Function | Queries the Dynamic Power measurement results. Query returns N integrity indicators and N average TX power levels (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWer:COUNT:NUMBER” on page 404. |
| Query | <p>Integrity indicators for each individual burst</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Average TX power levels for each individual burst</p> <ul style="list-style-type: none"> • Range: -100 to +100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dBm |

FETCh:DPOWer:INTEgrity?

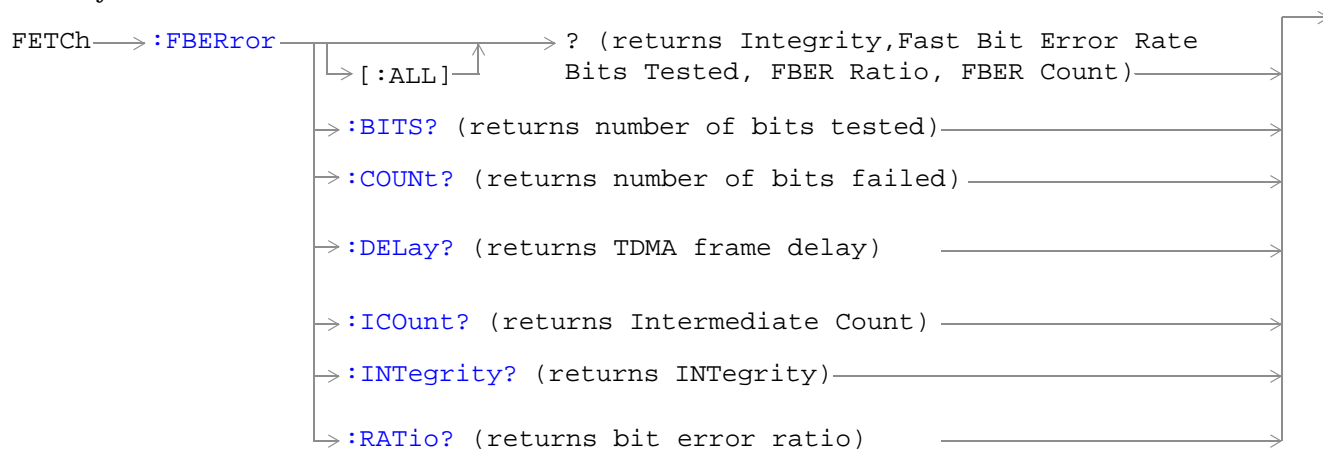
| | |
|----------|--|
| Function | Returns N integrity indicators (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWer:COUNT:NUMBER” on page 404. |
| Query | <p>Range: 0 to 16</p> <p>Resolution: 1</p> |

FETCh:DPOWer:POWer?

| | |
|----------|--|
| Function | Queries the average TX power levels for the Dynamic Power measurement. Returns N average power levels (where N is the number of bursts measured. To set the number of bursts you want to measure, see "SETup:DPOWer:COUNt:NUMBer" on page 404. |
| Query | Range: -100 to +100 dB and 9.91 E+37 (NAN) Resolution: 0.01 dB |

FETCh:FBERror

February 14, 2000



"Diagram Conventions" on page 213

FETCh:FBERror[:ALL]?

| | |
|----------|--|
| Function | <p>Queries the fast bit error measurement. Query returns integrity indicator, bits tested, bit error ratio, and bit error count.</p> <p>Bit error ratio is displayed in the Fast Bit Error field. The other values returned by this query are not available on the front panel display.</p> |
| Query | <p>Integrity indicator:</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Bits tested:</p> <ul style="list-style-type: none"> • Range: 1 to 999,455 and 9.91 E+37 (NAN) • Resolution: 1 <p>Bit error ratio:</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91 E+37 (NAN) • Resolution: 0.01 <p>Fast bit error count:</p> <ul style="list-style-type: none"> • Range: 1 to 999,455 and 9.91 E+37 (NAN) • Resolution: 1 |

FETCh:FBERror:BITS?

| | |
|----------|---|
| Function | <p>Queries the total number of information bits tested during the last fast bit error measurement. See “SETup:FBERror:COUNT” on page 394</p> |
| | <p>Queries the total number of information bits tested during the last fast bit error measurement. See “SETup:FBERror:COUNT” on page 394</p> <p>This value is not available on the front panel display.</p> |
| Query | <p>Range: 1 to 999,455 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p> |

FETCh:FBERror:COUNT?

| | |
|----------|--|
| Function | 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. |
| Query | Range: 1 to 999,455 and 9.91 E+37 (NAN) Resolution: 1 |

FETCh:FBERror:DELay?

| | |
|----------|--|
| Function | Queries the delay (in TDMA frames) the test set used during the last fast bit error measurement to correlate uplink information bits with downlink information bits. This value is displayed in the TDMA Frame Delay field. This value can be determined automatically, or set by the user. See “SETup:FBERror:MANual:DELay” on page 395 and “SETup:FBERror:LDControl:AUTO” on page 394 for setting this value manually. Refer also to the “Fast Bit Error Measurement Description” on page 69 for a description of frame delay and how it is used in the fast bit error measurement. |
| Query | Range: 0 to 26 and 9.91 E+37 Resolution: 1 |

FETCh:FBERror:ICOut?

| | |
|----------|---|
| Function | Queries the intermediate count (measurement progress report) of bits tested |
| Query | Range: 0 to 999,455 and 99.9 E+37 |

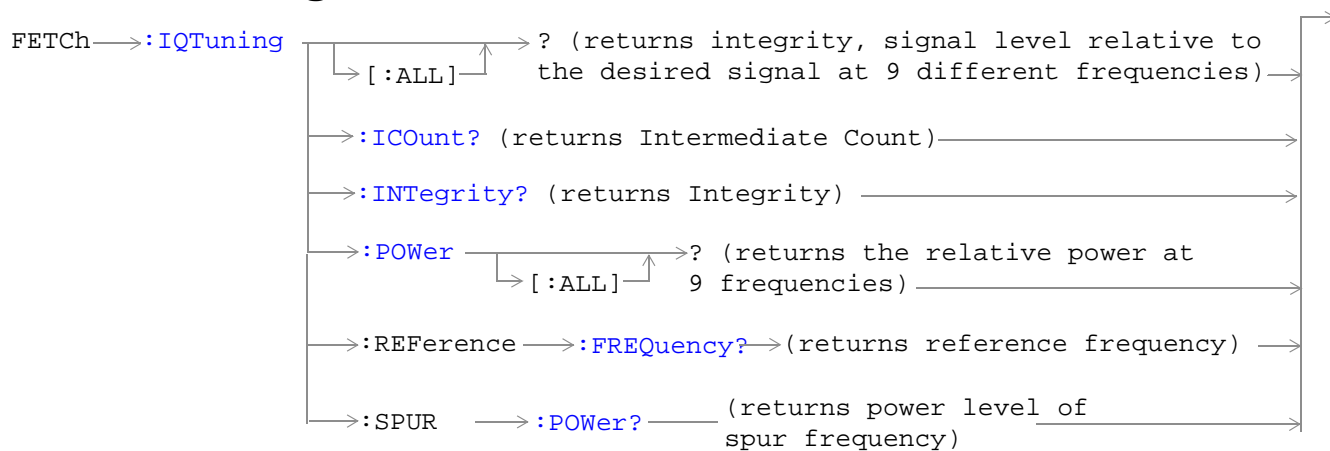
FETCh:FBERror:INTegrity?

| | |
|----------|--|
| Function | Returns the integrity indicator value for the last fast bit error measurement performed. Zero indicates a normal result. See “Integrity Indicator” on page 125 for descriptions of non-zero integrity indicators. |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:FBERror:RATio?

| | |
|----------|---|
| Function | Queries the ratio of bits deemed bad to total bits tested during the last fast bit error measurement performed. |
| Query | Range: 0 to 100 and 9.99 E+37 Resolution: 0.01 |

FETCh:IQTuning



“Diagram Conventions” on page 213

FETCh:IQTuning[:ALL]?

| | |
|----------|--|
| Function | 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. |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> • -270.833 kHz • -203.125 kHz • -135.417 kHz • -67.7083 kHz • carrier frequency • +67.7083 kHz • +135.417 kHz • +203.125 kHz • +270.833 kHz <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91E+37 (NAN) • Resolution: 0.01 dB |

FETCh:IQTuning:ICount?

| | |
|----------|---|
| Function | Queries the intermediate number of I/Q Tuning multi-measurements completed. |
| Query | <p>Range: 0 to 999</p> <p>Resolution: 1</p> |

FETCh:IQTuning:INTEgrity?

| | |
|----------|--|
| Function | Returns the integrity indicator value for the last I/Q Tuning measurement performed. Zero indicates a normal result. |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:IQTuning:POWer[:ALL]?

| | |
|----------|---|
| Function | Queries the I/Q Tuning measurement results. Query returns the relative power level at the following offset frequencies: carrier frequency, ± 67.7083 kHz, ± 135.417 kHz, ± 203.125 kHz, ± 270.833 kHz. The spur measurement result is also returned. |
| Query | <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> • -270.833 kHz • -203.125 kHz • -135.417 kHz • -67.7083 kHz • carrier frequency • +67.7083 kHz • +135.417 kHz • +203.125 kHz • +270.833 kHz <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91E+37 (NAN) • Resolution: 0.01 dB |

FETCh:IQTuning:REFerence:FREQuency?

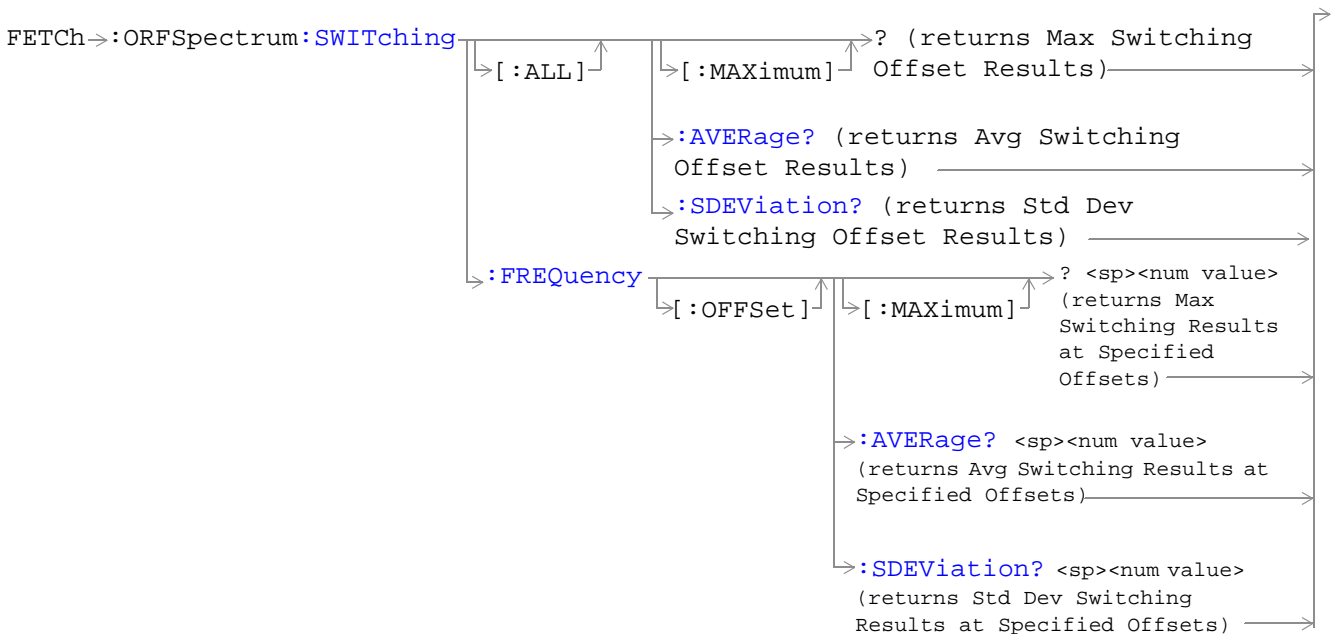
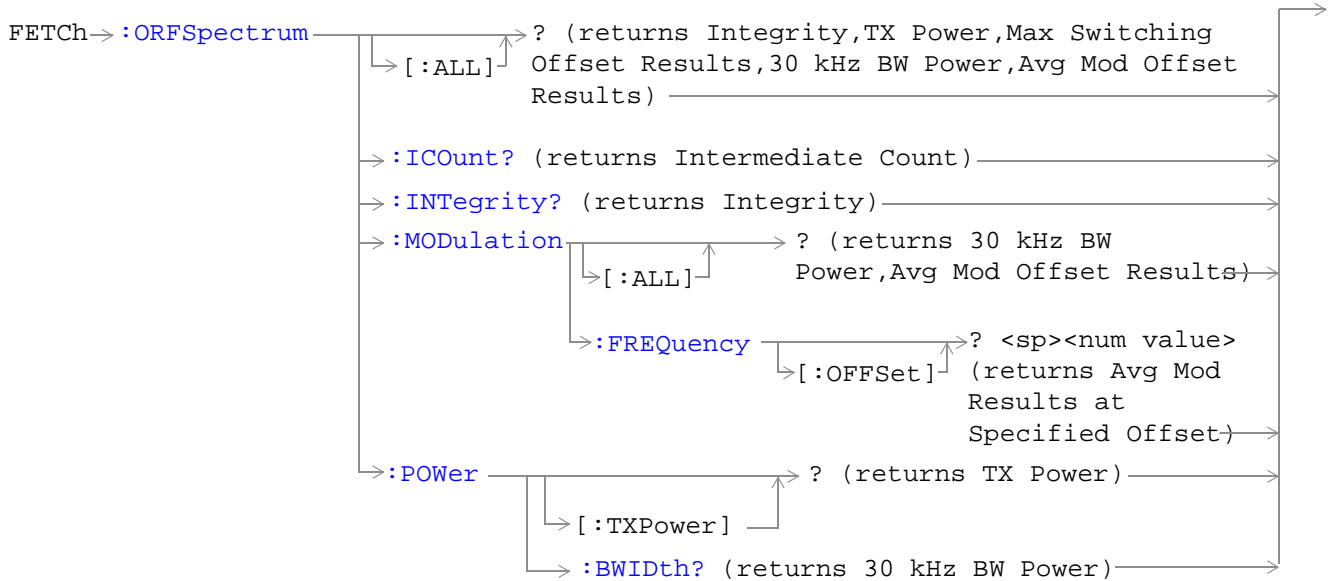
| | |
|----------|---|
| Function | Queries the offset frequency being used as the reference for the measurement. |
| Query | NEG67KHZ ZEROKHZ POS67KHZ UNKNOWN |

FETCh:IQTuning:SPUR:POWer?

| | |
|----------|---|
| Function | Queries the relative power level of the spur frequency. |
| Query | Range: -100 to +100 dB and 9.91 E+37 (NAN) Resolution: 0.01 dB |

FETCh:ORFSpectrum

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“Diagram Conventions” on page 213

FETCh:ORFSpectrum[:ALL]?

| | |
|----------|--|
| Function | <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> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>TX Carrier Power</p> <ul style="list-style-type: none"> • Range: –100 dBm to +100 dBm and 9.91 E+37 • Resolution: 0.01 dB <p>Output RF Spectrum Due to Switching (Max)</p> <ul style="list-style-type: none"> • Range: –100 dBm to +100 dBm and 9.91 E+37 • Resolution: 0.01 dB <p>30 kHz Bandwidth Power</p> <ul style="list-style-type: none"> • Range: –100 dBm to +100 dBm and 9.91 E+37 • Resolution: 0.01 dB <p>Output RF Spectrum due to Modulation (Average)</p> <ul style="list-style-type: none"> • Range: –200 dB to +100 dB and 9.91 E+37 • Resolution: 0.01 dB |

FETCh:ORFSpectrum:ICount?

| | |
|----------|--|
| Function | Queries the intermediate count of ORFS multi-measurements completed. This number will climb to the number returned by “ SETup:ORFSpectrum:ICount:MAXimum? ” on page 414. |
| Query | Range: 0 to 29971 Resolution: 1 |

FETCh:ORFSpectrum:INTEgrity?

| | |
|----------|--|
| Function | Queries the integrity indicator for the output RF spectrum analyzer measurement. Zero indicates a normal result. See “ Integrity Indicator ” on page 125 for descriptions of non-zero integrity indicators. |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:ORFSpectrum:MODulation[:ALL]?

| | |
|----------|--|
| Function | Queries TX Carrier Power, 30 kHz BW Power, and up to 22 comma-separated output RF spectrum due to modulation (average) results The “ SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet] ” command sets up the number of output RF spectrum due to modulation offsets that are turned on and their frequency values. The “ SETup:ORFSpectrum:MODulation:FREQuency:POINts? ” command queries the number of output RF spectrum due to modulation points that are turned on, indicating the number of output RF spectrum due to modulation (average) values to expect when you FETCh output RF spectrum due to modulation results. |
| Query | TX Carrier Power <ul style="list-style-type: none"> • Range: –100 dBm to +100 dBm and 9.91 E+37 • Resolution: 0.01 dB 30 kHz Bandwidth Power <ul style="list-style-type: none"> • Range: –100 dBm to +100 dBm and 9.91 E+37 • Resolution: 0.01 dB Output RF Spectrum due to Modulation (Average) <ul style="list-style-type: none"> • Range: –200 dB to +100 dB and 9.91 E+37 • Resolution: 0.01 dB |

FETCh:ORFSpectrum:MODulation:FREQuency[:OFFSet]?

| | |
|---|--|
| Function | <p>Queries the ORFS due to modulation measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to modulation (average) measurements at the frequencies listed, in the order they are listed.</p> <p>Frequencies must have a one-to-one correspondence to ORFS due to modulation frequency offsets that are currently turned on. Frequencies must be separated by commas. (See “SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]” 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 | <p>Range: -200 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: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 | <p>Returns the TX carrier power measurement result from the last ORFS measurement. This measurement is made using the method described in the “Transmit Power Measurement Description” on page 106.</p> |
| Query | <p>Range: -100 dBm to +100 dBm and NAN.</p> <p>Resolution: 0.01 dB</p> |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCH:ORFSPECTRUM:POWER:TXPOWER?" !Returns TX carrier power.</pre> | |

FETCh:ORFSpectrum:POWer:BWIDth?

| | |
|----------|---|
| Function | <p>Queries the ORFS 30 kHz bandwidth power measurement. See “Output RF Spectrum Measurement Description” on page 75</p> |
| Query | <p>Range: -100 dBm to +100 dBm and NAN.</p> <p>Resolution: 0.01 dB</p> |

FETCh:ORFSpectrum:SWITChing[:ALL][:MAXimum]?

| | |
|---|---|
| Function | <p>Queries output RF spectrum due to switching (maximum) 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 (max) values to expect when you FETCh results.</p> |
| Query | <p>Range: –100 dBm to +100 dBm and 9.91 E+37</p> <p>Resolution: 0.01 dB</p> |
| <p>Programming Example</p> <pre> OUTPUT 714;"FETCh:ORFSPECTRUM:SWITChing:ALL:MAXIMUM?" !Returns the ORFS due to !switching (maximum) !measurement results at !all frequency offsets !currently turned on. </pre> | |

FETCh:ORFSpectrum:SWITChing[:ALL]:AVERage?

| | |
|---|---|
| Function | <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> |
| Query | <p>Range: –100 dBm to +100 dBm and 9.91 E+37</p> <p>Resolution: 0.01 dB</p> |
| <p>Programming Example</p> <pre> OUTPUT 714;"FETCh:ORFSPECTRUM:SWITChing:ALL: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 | <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> |
| Query | <p>Range: -100 dB to +100 dB and 9.91 E+37</p> <p>Resolution: 0.01 dB</p> |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCh:ORFSpectrum:SWITChing:FREQUency:OFFSet:MAXimum? 200 KHZ, 400 KHZ" !Returns the ORFS due to switching (maximum) measurement results !at the 200 kHz and 400 kHz offsets only, assuming these offsets are !turned on</pre> | |

FETCh:ORFSpectrum:SWITChing:FREQUency[:OFFSet]:AVERAge?

| | |
|---|--|
| Function | <p>Queries the ORFS due to switching measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to switching (average) measurements at the frequencies listed, in the order they are listed.</p> <p>Frequencies must have a one-to-one correspondence to ORFS due to switching frequency offsets that are currently turned on. Frequencies must be separated by commas. (See “SETUp:ORFSpectrum:SWITChing:FREQUency[:OFFSet]” for the command that turns on frequency offsets.)</p> <p>Each value is (optionally) followed by: HZ KHZ MHZ GHZ . The default units are HZ (hertz).</p> |
| 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?

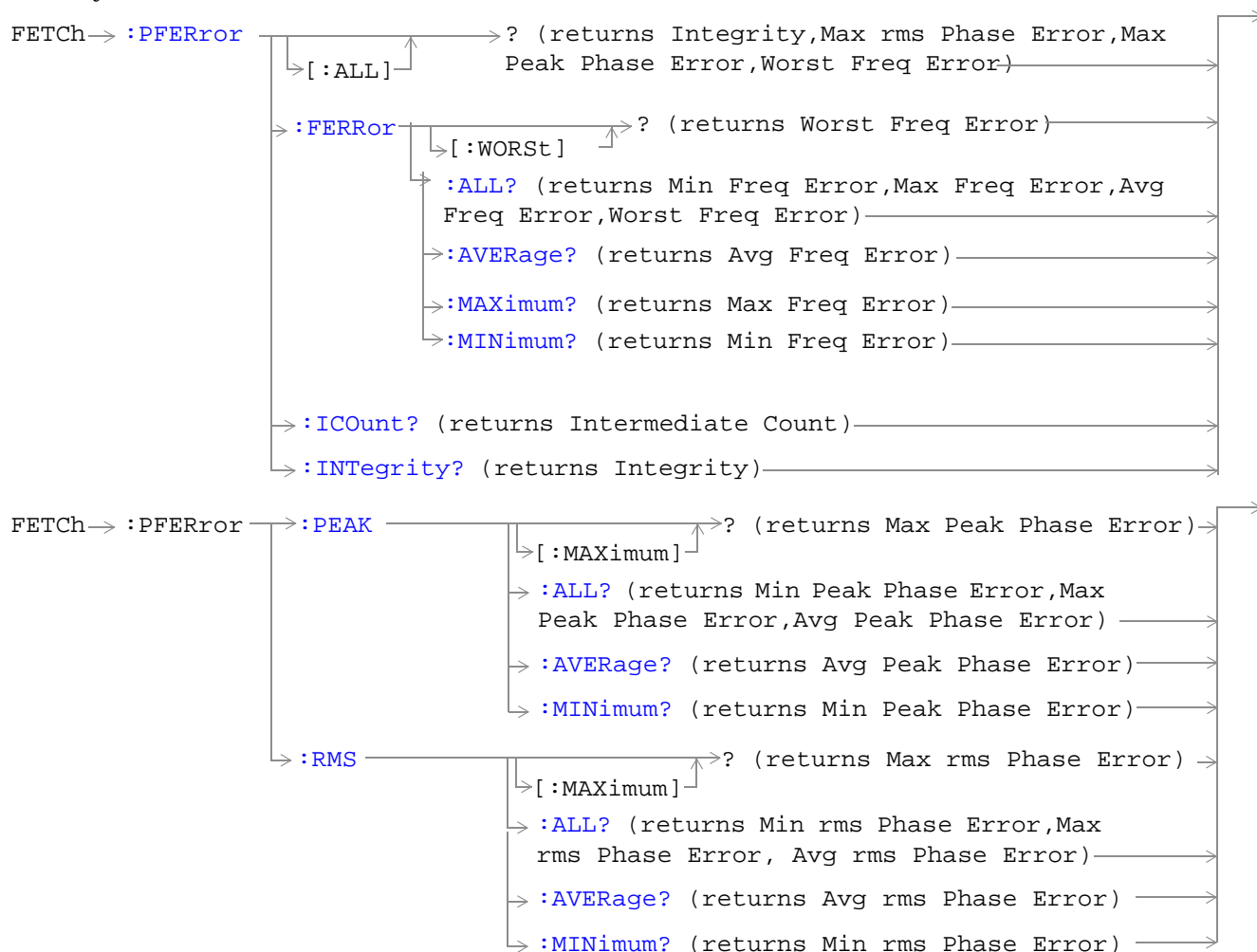
| | |
|---|---|
| Function | <p>Queries the ORFS due to switching measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to switching (standard deviation) measurements at the frequencies listed, in the order they are listed.</p> <p>Frequencies must have a one-to-one correspondence to ORFS due to switching frequency offsets that are currently turned on. Frequencies must be separated by commas. (See “SETUp:ORFSpectrum:SWITChing:FREQUency[:OFFSet]” for the command that turns on frequency offsets.)</p> <p>Each value is (optionally) followed by: HZ KHZ MHZ GHZ . The default units are HZ (hertz).</p> |
| 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 | <p>Queries output RF spectrum due to switching (standard deviation) measurement results at all frequency offsets currently turned on (there can be up to eight).</p> <p>The “SETUp:ORFSpectrum:SWITChing:FREQUency[:OFFSet]” command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The “SETUp:ORFSpectrum:SWITChing:FREQUency:POINts?” queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching values to expect when you FETCh results.</p> |
| Query | <p>Range: -100 dBm to +100 dBm and 9.91 E+37</p> <p>Resolution: 0.01 dB</p> |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCh:ORFSpectrum:SWITChing:ALL:SDEVIATION?" !Returns the ORFS due !to switching !(standard !deviation) !measurement !results at all !frequency offsets !currently turned on.</pre> | |

FETCh:PFERror

February 14, 2000



“Diagram Conventions” on page 213

FETCH:PFERror[:ALL]?

| | |
|--|---|
| Function | Queries integrity indicator, maximum rms phase error, maximum peak phase error and worst frequency error. |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Maximum rms Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Maximum Peak Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Worst Frequency Error</p> <ul style="list-style-type: none"> • Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) • Resolution: 0.1 kHz |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PFERROR:ALL?" !Returns integrity, maximum rms phase error, !maximum peak phase error and worst !frequency error.</pre> | |

FETCH:PFERror:FERRor[:WORSt]?

| | |
|----------|---|
| Function | 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. |
| 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 | Queries minimum, maximum, average, and worst frequency error, in Hz. The minimum frequency error is the value closest to negative infinity from the last multi-measurement cycle. The maximum frequency error is the value closest to positive infinity from the last multi-measurement cycle. |
| Query | <p>Minimum Frequency Error</p> <ul style="list-style-type: none"> • Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) • Resolution: 0.1 kHz <p>Maximum Frequency Error</p> <ul style="list-style-type: none"> • Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) • Resolution: 0.1 kHz <p>Average Frequency Error</p> <ul style="list-style-type: none"> • Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) • Resolution: 0.1 kHz <p>Worst Frequency Error</p> <ul style="list-style-type: none"> • Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) • Resolution: 0.1 kHz |
| <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 | Queries the single or average (from a multi-measurement) frequency error measurement result, in Hz. |
| 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 | Queries the maximum (from a multi-measurement) frequency error measurement result, in Hz. |
| 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 | Queries the minimum (from a multi-measurement) frequency error measurement result, in Hz. |
| Query | Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) Resolution: 0.1 kHz |

FETCh:PFERror:ICount?

| | |
|----------|---|
| Function | 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 423 . |
| Query | Range: 0 to 999 Resolution: 1 |

FETCh:PFERror:INTegrity?

| | |
|----------|--|
| Function | Queries the integrity indicator for the phase and frequency error measurement. Zero indicates a normal result. See “Integrity Indicator” on page 125 for descriptions of non-zero integrity indicators. |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:PFERror:PEAK[:MAXimum]?

| | |
|----------|---|
| Function | Queries the maximum (from a multi-measurement) peak phase error result, in degrees. |
| Query | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees |

FETCh:PFERror:PEAK:ALL?

| | |
|--|---|
| Function | Queries the minimum, maximum, and average peak phase error measurement result, in degrees. |
| Query | <p>Minimum Peak Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Maximum Peak Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Average Peak Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees |
| <p>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 | Queries the single or average (from a multi-measurement) peak phase error measurement result, in degrees. |
| 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 | Queries the minimum (from a multi-measurement) peak phase error measurement result, in degrees. |
| 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 | Queries the Maximum (from a multi-measurement) rms phase error measurement result, in degrees. |
| Query | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees |
| Programming Example OUTPUT 714;"FETCh:PFERror:rms:MAXimum?" !Returns the maximum rms phase error. | |

FETCh:PFERror:rms:ALL?

| | |
|---|---|
| Function | Queries the minimum, maximum, and average rms phase error measurement result, in degrees. |
| Query | Minimum rms Phase Error <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees Maximum rms Phase Error <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees Average rms Phase Error <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees |
| Programming Example OUTPUT 714;"FETCh:PFERror:rms:ALL?" !Returns minimum, maximum, and average !rms phase error. | |

FETCh:PFERror:rms:AVERAge?

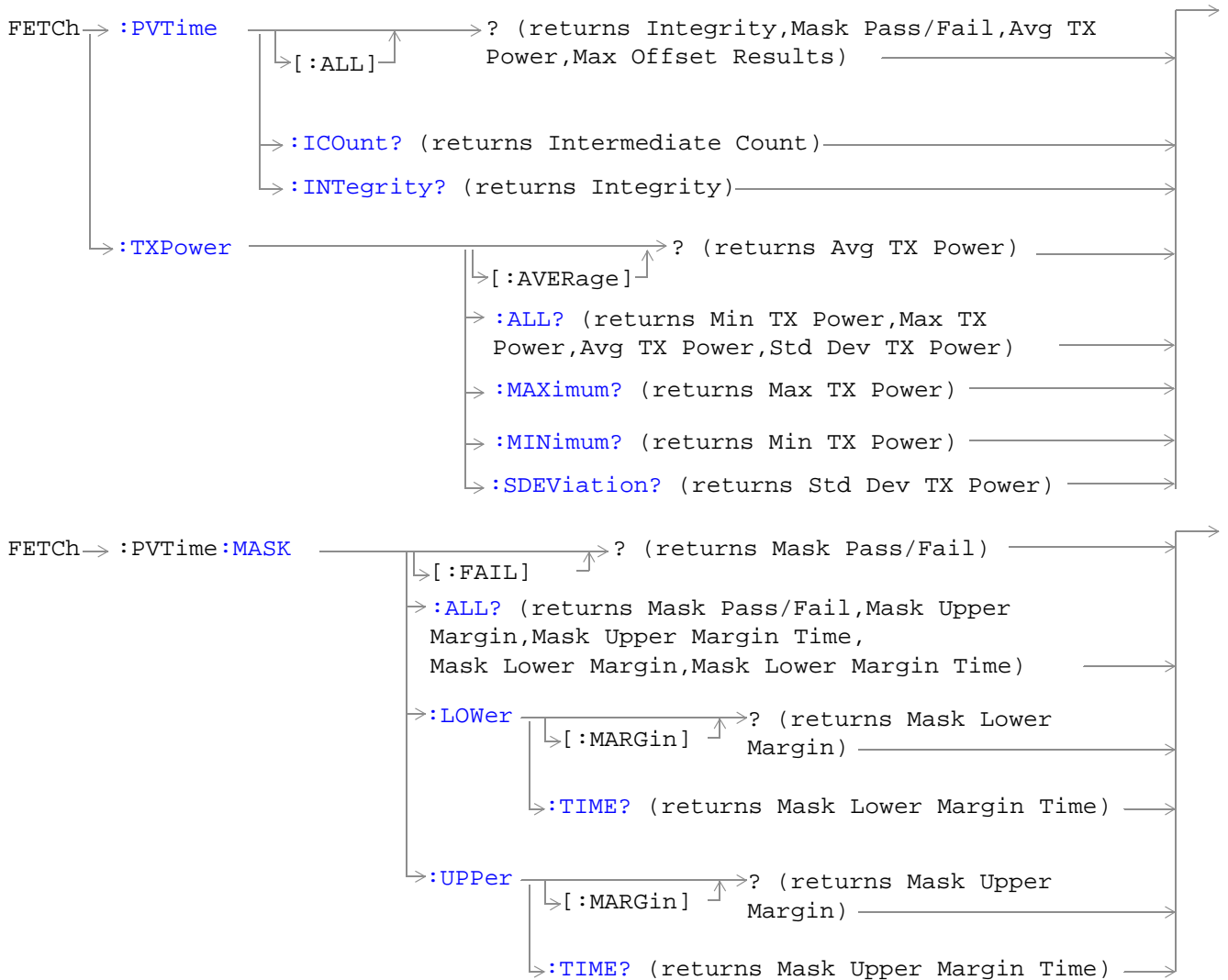
| | |
|----------|--|
| Function | Queries the single or average (from a multi-measurement) rms phase error measurement result, in degrees. |
| Query | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees |

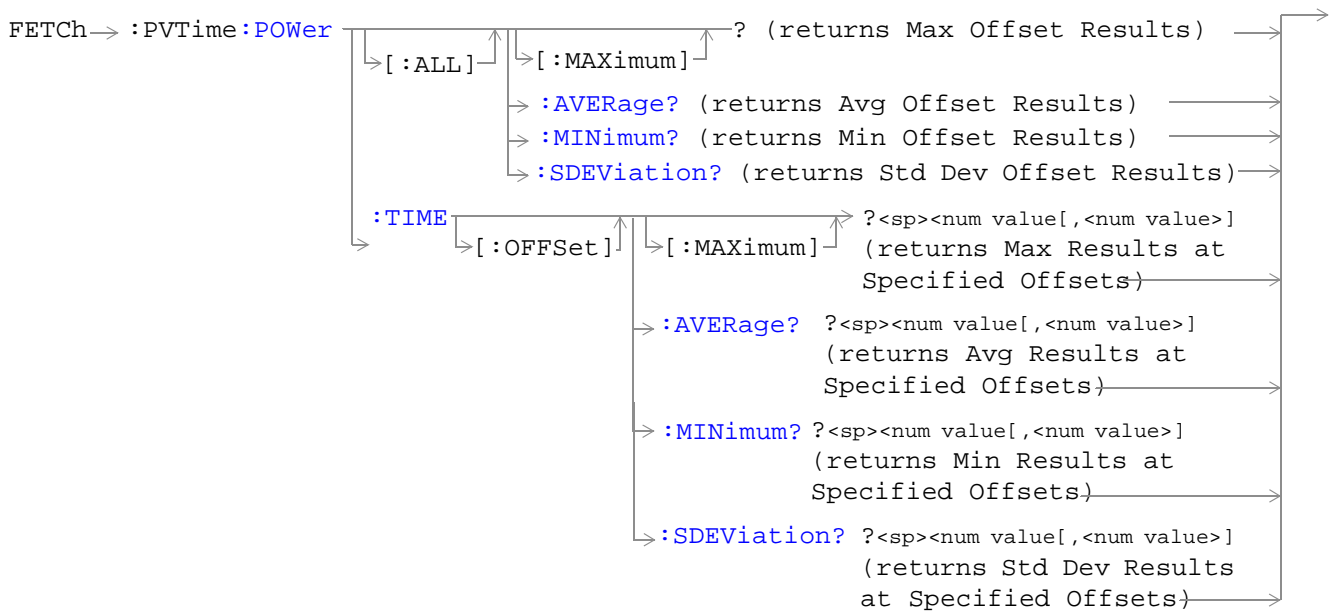
FETCh:PFERror:rms:MINimum?

| | |
|----------|--|
| Function | Queries the minimum (from a multi-measurement) rms phase error measurement result, in degrees. |
| Query | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees |

FETCh:PVTime

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“Diagram Conventions” on page 213

FEtCh:PvTime[:ALL]?

| | |
|----------|---|
| Function | <p>Queries integrity indicator, mask pass/fail indicator, power versus time (PvT) transmit power (average), and PvT power (maximum) at up to 12 time offsets.</p> <p>The number of PvT measurement offsets that will be returned can be queried using the “SETup:PvTime:TIME:POINTs?” on page 430. The time offsets are set up using the command “SETup:PvTime:TIME[:OFFSet]” on page 429.</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) <p>Power versus time TX carrier power</p> <ul style="list-style-type: none"> • Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time power (maximum)</p> <ul style="list-style-type: none"> • Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB |

FETCh:PVTime:TXPower:ALL?

| | |
|----------|--|
| Function | 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). |
| Query | <p>Power versus time carrier power (average)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (minimum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (maximum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (standard deviation)</p> <ul style="list-style-type: none"> • Range: 0 dB to 100 dB and 9.91 E+37 (NAN) • Resolution: 0.001 dB |

FETCh:PVTime:TXPower:MINimum?

| | |
|----------|--|
| Function | Queries power versus time carrier power (minimum). |
| 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 | Queries power versus time carrier power (maximum). |
| Query | <p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p> |

FETCh:PVTime

FETCh:PVTime:TXPower[:AVERage]?

| | |
|----------|---|
| Function | Queries power versus time carrier power (average). |
| Query | Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) Resolution: 0.01 dB |

FETCh:PVTime:TXPower:SDEVIation?

| | |
|----------|---|
| Function | Queries power versus time carrier power (standard deviation). |
| 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 | <p>Queries the power versus time measurement mask pass/fail indicator and the following worst case margins:</p> <ul style="list-style-type: none">• Upper limit margin time• Upper limit margin result• Lower limit margin time• Lower limit margin result <p>Margin time is the point in time, relative to burst bit 0, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the power level boundary specified by the power versus time mask). See the “Typical GSM PvT Measurement” on page 91.</p> <p>Margin result is the difference between the measured power and the power level boundary specified by the power versus time mask. See the “Typical GSM PvT Measurement” on page 91.</p> |
|----------|--|

| | |
|-------|--|
| Query | <p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) <p>Power versus time upper limit margin time worst case result</p> <ul style="list-style-type: none"> • Range: -50 μs to 593 μs and 9.91 E+37 (NAN) • Resolution: 1 ns <p>Power versus time upper limit margin worst case result:</p> <ul style="list-style-type: none"> • Range: -100 dB to 0 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time lower limit margin time worst case result</p> <ul style="list-style-type: none"> • Range: -50 μs to 593 μs and 9.91 E+37 (NAN) • Resolution: 1 ns <p>Power versus time lower limit margin worst case result</p> <ul style="list-style-type: none"> • Range: -100 dB to 0 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB |
|-------|--|

FETCh:PVTime:MASK[:FAIL]?

| | |
|----------|---|
| Function | Queries power versus time measurement mask pass/fail indicator. |
| Query | Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) |

FETCh:PVTime:MASK:UPPer[:MARGIn]?

| | |
|----------|---|
| Function | <p>Queries the power versus time measurement upper limit margin worst case result.</p> <p>The upper limit margin, worst case result is the power versus time measurement with the least difference between measured power and the power level boundary specified by the power versus time mask. See the “Typical GSM PvT Measurement” on page 91.</p> |
| 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 | <p>Queries the power versus time measurement’s upper limit margin time, worst case result.</p> <p>The upper limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the upper power level boundary specified by the power versus time mask). See the “Typical GSM PvT Measurement” on page 91.</p> |
| Query | <p>Range: -50 μs to 593 μs and 9.91 E+37 (NAN)</p> <p>Resolution: 1 ns</p> |

FETCh:PVTime:MASK:LOWer[:MARGIn]?

| | |
|----------|--|
| Function | <p>Queries the power versus time measurement’s lower limit margin, worst case result.</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 “Typical GSM PvT Measurement” on page 91.</p> |
| Query | <p>Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p> |

FETCh:PVTime:MASK:LOWer:TIME?

| | |
|----------|--|
| Function | <p>Queries the power versus time measurement's lower limit margin time, worst case result.</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 "Typical GSM PVT Measurement" on page 91.</p> |
| Query | <p>Range: -50 μs to 593 μs and 9.91 E+37 (NAN)</p> <p>Resolution: 1 ns</p> |

FETCh:PVTime:POWER[:ALL]:MINimum?

| | |
|----------|--|
| Function | <p>Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Power levels are relative to the power versus time carrier power measurement.</p> <p>The "SETup:PVTime:TIME[:OFFSet]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime:TIME:POINts?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command.</p> |
| Query | <p>Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p> |

FETCh:PVTime:POWER[:ALL][:MAXimum]?

| | |
|----------|--|
| Function | <p>Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Power levels are relative to the power versus time carrier power measurement.</p> <p>The "SETup:PVTime:TIME[:OFFSet]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime:TIME:POINts?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command.</p> |
| Query | <p>Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p> |

FETCh:PVTime:POWer[:ALL]:AVERage?

| | |
|----------|---|
| Function | <p>Queries the average power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Results are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime:TIME:POINts?” queries the number of offset points that are turned on, indicating the number of values to expect when you send this command.</p> |
| Query | <p>Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p> |

FETCh:PVTime:POWer[:ALL]:SDEVIation?

| | |
|----------|--|
| Function | <p>Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset that is currently turned on.</p> <p>The “SETup:PVTime:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime:TIME:POINts?” queries the number of offset points that are turned on, indicating the number of values to expect when you send this command.</p> |
| Query | <p>Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.001 dB</p> |

FETCh:PVTime:POWer:TIME[OFFSet]:MINimum?

| | |
|---|--|
| Function | <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> |
| Query | <p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Time offsets:</p> <ul style="list-style-type: none"> • Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet]" query. |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MINIMUM? 0 US, 570.8 US" !Returns the !minimum of power versus time measurements at the 0.0 ms and !570.8 ms offsets.</pre> | |

FETCh:PVTime:POWer:TIME[:OFFSet][:MAXimum]?

| | |
|--|--|
| <p>Function</p> | <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> |
| <p>Query</p> | <p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> • Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet]" query. |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MAXIMUM? 0 US, 570.8 US" !Returns the maximum of power versus time measurements at the 0.0 ms !and 570.8 ms offsets.</pre> | |

FETCh:PVTime:POWer:TIME[:OFFSet]:AVERAge?

| | |
|--|--|
| Function | <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> |
| Query | <p>Power levels:</p> <ul style="list-style-type: none"> • Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN) <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> • Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query. |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:AVERAGE? 0 US, 570.8 US" !Returns the average of power versus time measurements at the !0.0 ms and 570.8 ms offsets.</pre> | |

FETCh:PVTime:POWer:TIME[:OFFSet]:SDEVIation?

| | |
|---|---|
| Function | <p>Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset appended to this command. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) will be returned for specified offsets that do not correspond to offsets currently turned on).</p> <p>Power levels are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. Measurements will be returned by this query in the same order they are listed in the command.</p> |
| Query | <p>Power levels:</p> <ul style="list-style-type: none"> • Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN) • Resolution: 0.001 dB <p>Time offsets:</p> <ul style="list-style-type: none"> • Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query. |
| <p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:SDEVIATION? 0 US, 570.8 US" !Returns the standard deviation of power versus time measurements at the 0.0 ms and 570.8 ms offsets.</pre> | |

FETCh:PVTime:ICount?

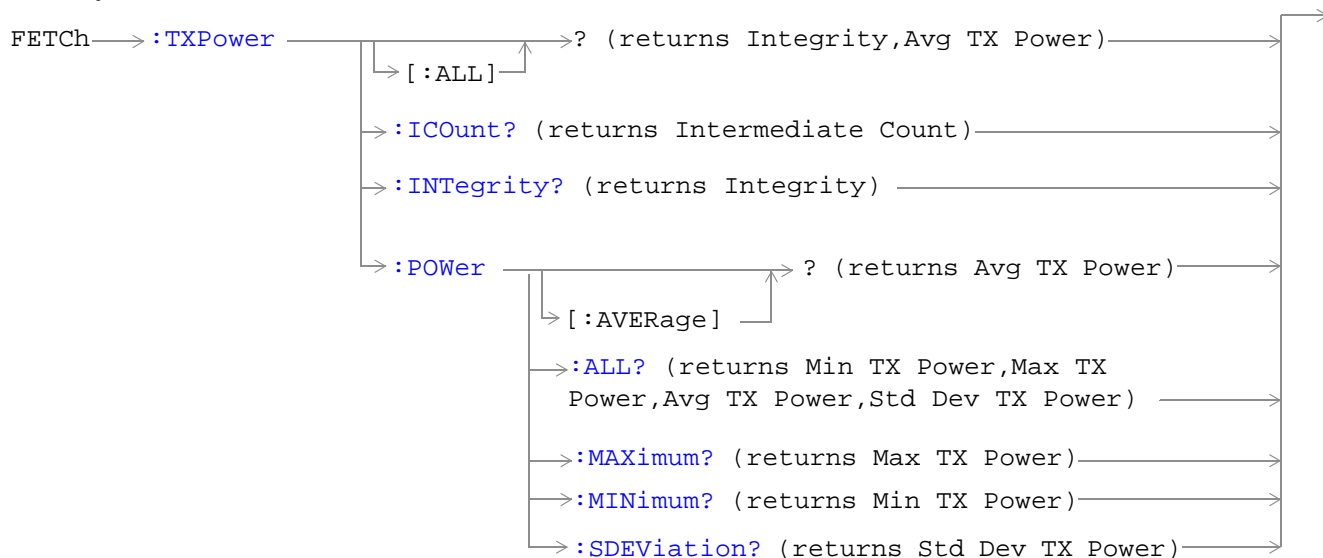
| | |
|----------|---|
| Function | Queries the intermediate count of power versus time multi-measurements completed. |
| Query | <p>Range: 0 to 999</p> <p>Resolution: 1</p> |

FETCh:PVTime:INTegrity?

| | |
|----------|---|
| Function | <p>Queries the integrity indicator for the power versus time measurement. Zero indicates a normal result.</p> <p>See “Integrity Indicator” on page 125 for descriptions of non-zero integrity indicators.</p> |
| Query | <p>Range: 0 to 16</p> <p>Resolution: 1</p> |

FETCh:TXPower

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“Diagram Conventions” on page 213

FETCh:TXPower[:ALL]?

| | |
|----------|--|
| Function | Queries integrity indicator and average transmit power. A value of zero for the integrity indicator is normal. See “Integrity Indicator” on page 125 for non-zero integrity indicators. |
| Query | Integrity: <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 Transmit power: <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB |

FETCh:TXPower:ICount?

| | |
|----------|--|
| Function | Queries the intermediate count of transmit power measurements completed. |
| Query | Range: 1 to 999 Resolution: 1 |

FETCh:TXPower:INTegrity?

| | |
|----------|--|
| Function | Queries the integrity indicator. Zero indicates normal. For non-zero integrity indicators, refer to “Integrity Indicator” on page 125 |
| Query | Range: 0 to 16 Resolution: 1 |

FETCh:TXPower:POWER[:AVERage]?

| | |
|----------|---|
| Function | Queries average transmit power. |
| Query | Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) Resolution: 0.01 dB |

FETCh:TXPower:POWer:ALL?

| | |
|----------|--|
| Function | Queries average, minimum, maximum and standard deviation of transmit power multi-measurement results. |
| Query | <p>Average:</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Minimum:</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Maximum:</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Standard deviation:</p> <ul style="list-style-type: none"> • Range: 0 dB to 100 dB and 9.91 E+37 (NAN) • Resolution: 0.001 dB |

FETCh:TXPower:POWer:MAXimum?

| | |
|----------|--|
| Function | Queries maximum transmit power results from a multi-measurement. |
| 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 | Queries minimum transmit power results from a multi-measurement. |
| Query | <p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p> |

FETCH:TXPower

FETCH:TXPower:SDEviation?

| | |
|----------|---|
| Function | Queries the standard deviation from a transmit power multi-measurement. |
| Query | Range: 0 dB to 100 dB and 9.91 E+37 (NAN) Resolution: 0.001 dB |

INITiate Subsystem

Syntax Diagrams and Command Descriptions

[“INITiate” on page 355](#)

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. Also, if a timeout is specified, the timeout period is begun.

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 132](#).

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 150](#).

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"
```

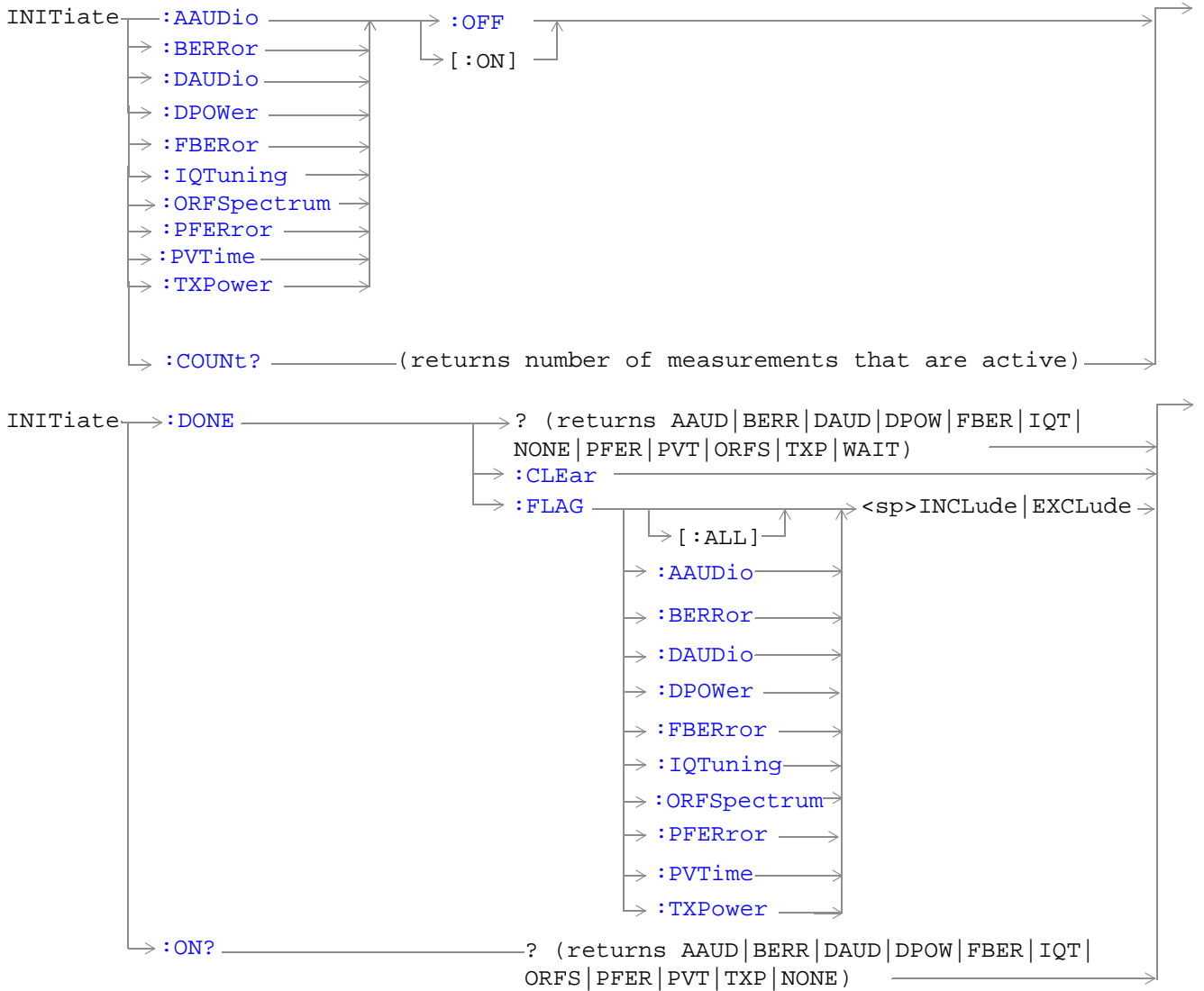
!Hands over traffic channel to channel 65, waits for process to complete before accepting next command

```
OUTPUT 714;"INITiate:TXPower"
```

!Initiates TX power measurement

INITiate

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["Diagram Conventions" on page 213](#)

INITiate

INITiate:<measurement mnemonic>[:ON]

| | |
|--|---|
| Function | <p>Starts measurements with the test set.</p> <p>The INITiate command is associated with the SETup command, and the FETCh? command, see “SETup Subsystem” on page 379 and “FETCh? Subsystem” on page 295.</p> <p>One or more measurements may be initiated on the same program line. See “Concurrent Measurements” on page 122.</p> <p>This command is also used to activate a measurement. See “INITiate Programming Examples (how INIT commands are used)” on page 353.</p> |
| Programming Example | |
| <pre>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.</pre> | |

INITiate:<measurement mnemonic>:OFF

| | |
|---|--|
| Function | <p>Deactivates the selected measurement. See “Measurement States” on page 150.</p> <p>Only one measurement can be deactivated at a time, to stop one or more measurements and leave them in the active state, see “ABORt” on page 216.</p> |
| Programming Example | |
| <pre>OUTPUT 714;"INITIATE:TXPOWER:OFF" !Deactivates TX power measurement.</pre> | |

INITiate:COUNt?

| | |
|----------|---|
| Function | <p>Queries the number of measurements that have been initiated (that are activate). See “Measurement States” on page 150.</p> |
| Query | <p>Range: 0 to 10</p> <p>Resolution: 1</p> |

INITiate:DONE?

| | |
|----------|--|
| Function | <p>Queries (one at a time) which measurements if any are available or have timed out.</p> <p>See “Measurement Event Synchronization” on page 132 for how to use this command.</p> <p>See “Measurement States” on page 150 to understand the test set’s measurement states.</p> <p>See “INITiate:DONE:FLAG<measurement mnemonic>” on page 358 for include or exclude commands</p> |
| Query | <p>Range: NONE TXP PVT PFER ORFS AAUD DAUD DPOW FBER BERR IQT WAIT</p> |

INITiate:DONE:CLEAr

| | |
|---------------------|--|
| Function | Clears the done flag from all measurements. See “INITiate:DONE?” on page 357 . |
| Programming Example | <pre>OUTPUT 714;"INITIATE:DONE:CLEAR" !clears done flag.</pre> |

INITiate:DONE:FLAG[:ALL]

| | |
|---------------------|--|
| Function | <p>Specifies that all measurements are considered, (included or excluded) when the DONE? query is sent.</p> <p>If a measurements trigger arm, see “Trigger Arm (Single or Continuous) Description” on page 151, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see “INITiate:DONE?” on page 132. The INITiate:DONE? query will probably not be able to catch the measurement at the instant it is done, therefore the measurement will never appear to be done. If a measurement trigger arm must be left in continuous mode the user should (exclude) it, using this command, from the INITiate:DONE? query results.</p> <p>Once the INITiate:DONE:FLAG has been set to EXCLUDE for a measurement, the user must send the INCLude command for that measurement in order to query that measurement with, the INITiate:DONE? query. The test set will not reset any (excluded measurement) to be an (included measurement) with any form of preset, see “Preset Descriptions” on page 535.</p> |
| Setting | <p>Range</p> <ul style="list-style-type: none"> • INCLude: include all measurements • EXCLude: exclude all measurements |
| Programming Example | <pre>OUTPUT 714;"INITIATE:DONE:FLAG:ALL EXCLUDE" !Excludes all measurements from !contributing the INITIATE:DONE? !query, see "INITiate:DONE?" on !page 6.</pre> |

INITiate

INITiate:DONE:FLAG<measurement mnemonic>

| | |
|---|---|
| Function | <p>Specifies which measurements are considered, (included or excluded) when the DONE? query is sent.</p> <p>If a measurements trigger arm, see “Trigger Arm (Single or Continuous) Description” on page 151, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see “INITiate:DONE?” on page 132. The INITiate:DONE? query will probably not be able to catch the measurement at the instant it is done, therefore the measurement will never appear to be done. If a measurement trigger arm must be left in continuous mode the user should (exclude) it, using this command, from the INITiate:DONE? query results.</p> <p>Once the INITiate:DONE:FLAG has been set to EXCLude for a measurement, the user must send the INCLude command for that measurement in order to query that measurement with, the INITiate:DONE? query. The test set will not reset any (excluded measurement) to be an (included measurement) with any form of preset, see “Preset Descriptions” on page 535.</p> |
| Setting | <p>Range</p> <ul style="list-style-type: none"> • INCLude <ul style="list-style-type: none"> :AAUDio :BERRor :DAUDio :DPOWer :FBERror :IQTuning :ORFSpectrum :PFERror :PVTime :TXPower • EXCLude <ul style="list-style-type: none"> :AAUDio :BERRor :DAUDio :DPOWer :FBERror :IQTuning :ORFSpectrum :PFERror :PVTime :TXPower |
| Related Topics | <p>“INITiate:DONE?” .</p> |
| <p>Programming Example</p> <pre>OUTPUT 714;"INITIATE:DONE:FLAG:AAUDIO EXCLUDE" !excludes AAUDIO measurements !from contributing the !INIATIAE:DONE? query.</pre> | |

INITiate:ON?

| | |
|----------|--|
| Function | <p>Queries the names of the measurements (none, one, or more than one) that are ON in a comma separated list of measurement mnemonics. See “INITiate:<measurement mnemonic>[:ON]” on page 356.</p> |
| Query | <p>Range: AAUD BERR DAUD DPOW FBER IQT ORFS PFER PVT TXP NONE</p> |

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.

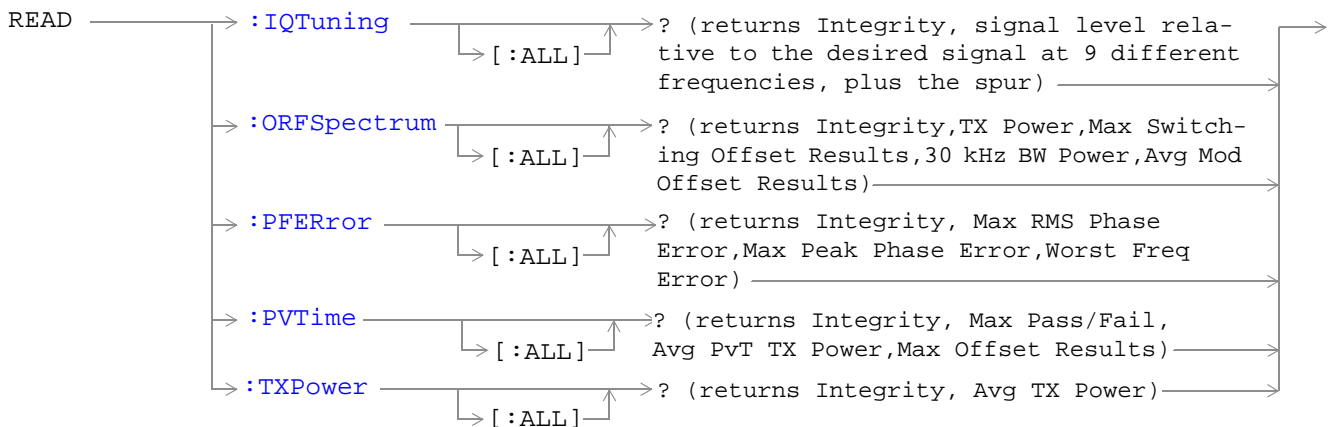
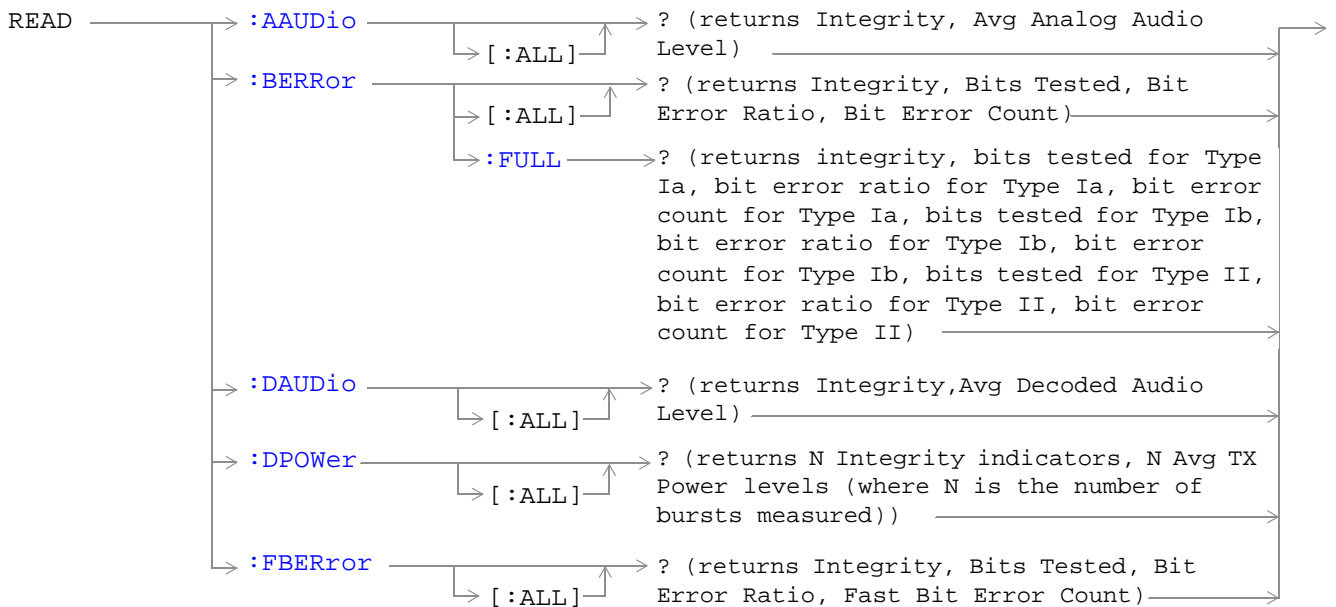
NOTE Trigger arming for each measurement is controlled in the SETUp subsystem. Best practice during remote operation is to set trigger arm to single (Continuous Off).

Program Example - READ:TXPower?

```
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

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“Diagram Conventions” on page 213

READ:AAUDio[:ALL]?

| | |
|----------|--|
| Function | Queries (initiates and fetches) one analog audio measurement as a sequential operation. Returns Integrity Indicator, see “Integrity Indicator” on page 125 and analog audio (average). The FETCh command should be used to obtain other measurement results. See “FETCh:AAUDio” on page 296 . |
| Query | Integrity indicator <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 Analog audio (average) <ul style="list-style-type: none"> • Range: 0 to 20 volts • Resolution: 0.1mv |

READ:BERRor[:ALL]?

| | |
|----------|---|
| Function | Queries (initiates and fetches) one RX bit error measurement as a sequential operation. Returns Integrity Indicator see “Integrity Indicator” on page 125 , Bits Tested, Bit Error Ratio and Bit Error Count for the bit type set using the SETup:BERRor[:TYPE] command. (A similar query, “READ:BERRor:FULL?” on page 362 , returns the same results but for all bit types simultaneously.) The FETCh command should be used to obtain other measurement results. See “FETCh:BERRor” on page 300 . |
| Query | Integrity indicator <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 Bits tested <ul style="list-style-type: none"> • Range: 0 to (<RX bits to test +131) and 9.91E+37 (NAN) • Resolution: 1 Bit error ratio <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 1 Bit error count <ul style="list-style-type: none"> • Range: 0 to (<RX bits to test +131) and 9.91E+37 (NAN) • Resolution: 1 |

READ:BERRor:FULL?

| | |
|----------|---|
| Function | <p>Queries (initiates and fetches) one RX bit error measurement as a sequential operation.</p> <p>Returns Integrity Indicator, see “Integrity Indicator” on page 125, Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II. (A similar query, “READ:BERRor[:ALL]?” on page 361, returns the same results but only for the bit type previously set using the SETup:BERRor[:TYPE] command.) The FETCh command should be used to obtain other measurement results. See “FETCh:BERRor” on page 300.</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 999000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 999000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 2637369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 2637369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 15584400 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type II Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 1558440 and 9.91E+37 (NAN) • Resolution: 1 |

READ

READ:DAUDio[:ALL]?

| | |
|----------|---|
| Function | <p>Queries (initiates and fetches) one decoded audio (uplink speech level) measurement as a sequential operation.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 125 and decoded audio (average). The FETCh command should be used to obtain other measurement results. See “FETCh:DAUDio” on page 308.</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none">• Range: 0 to 16• Resolution: 1 <p>Decoded audio (average)</p> <ul style="list-style-type: none">• Range: 0 to 100% FS (full scale)• Resolution: 0.01% FS |

READ:DPOWER[:ALL]?

| | |
|----------|--|
| Function | <p>Queries the Dynamic Power measurement results. Query returns N integrity indicators and N average TX power levels (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWER:COUNT:NUMBER” on page 404.</p> |
| Query | <p>Integrity indicators for each individual burst</p> <ul style="list-style-type: none">• Range: 0 to 16• Resolution: 1 <p>Average TX power levels for each individual burst</p> <ul style="list-style-type: none">• Range: -100 to +100 dBm and 9.91 E+37 (NAN)• Resolution: 0.01 dBm |

READ:FBERror[:ALL]?

| | |
|----------|--|
| Function | <p>Queries (initiates and fetches) one fast bit error measurement as a sequential operation.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 125, Bits Tested, Bit Error Ratio, and Fast Bit Error Count using mobile station burst-by-burst loopback (type C loopback). The FETCh command should be used to obtain other measurement results. See “FETCh:FBERror” on page 314.</p> |
|----------|--|

| | |
|-------|--|
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN) • Resolution: 1 <p>Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 1 <p>Fast bit error count</p> <ul style="list-style-type: none"> • Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN) • Resolution: 1 |
|-------|--|

READ:IQTuning[:ALL]?

| | |
|----------|--|
| Function | <p>Queries (initiates and fetches) the I/Q Tuning measurement results. Query returns the integrity indicator and the relative power level at the following offset frequencies: carrier frequency, ± 67.7083 kHz, ± 135.417 kHz, ± 203.125 kHz, ± 270.833 kHz. The spur measurement result is also returned.</p> <p>The FETCh command should be used to return other measurement results. See “FETCh:IQTuning” on page 318.</p> |
|----------|--|

| | |
|--------------|--|
| <p>Query</p> | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> • -270.833 kHz • -203.125 kHz • -135.417 kHz • -67.7083 kHz • carrier frequency • +67.7083 kHz • +135.417 kHz • +203.125 kHz • +270.833 kHz <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91E+37 (NAN) • Resolution: 0.01 dB |
|--------------|--|

READ:ORFSpectrum[:ALL]?

| | |
|----------|---|
| Function | <p>Queries (initiates and fetches) one output RF spectrum measurement as a sequential operation.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 125, TX Power, Output RF Spectrum due to Switching (Max), 30 kHz Bandwidth Power, and Output RF Spectrum due to Modulation (Average). The FETCh command should be used to obtain other measurement results. See “FETCh:ORFSpectrum” on page 322.</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>TX power</p> <ul style="list-style-type: none"> • Range: –100 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB <p>Output RFspectrum due to switching (Max)</p> <ul style="list-style-type: none"> • Range: 0 to 8 comma separated values –100 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB <p>30 kHz bandwidth power</p> <ul style="list-style-type: none"> • Range: –100 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB <p>Output RF spectrum due to modulation (average)</p> <ul style="list-style-type: none"> • Range: 0 to 22 comma separated values –200 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB |

READ

READ:PFERror[:ALL]?

| | |
|----------|---|
| Function | <p>Queries (initiates and fetches) one Phase and Frequency Error measurement as a sequential operation.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 125, RMS Phase Error (Max), Peak Phase Error(Max), Frequency Error (Worst). The FETCh command should be used to obtain other measurement results. See “FETCh:PFERror” on page 329.</p> <p>Worst frequency error (negative or positive) is the value furthest from zero.</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none">• Range: 0 to 16• Resolution: 1 <p>rms phase error (max)</p> <ul style="list-style-type: none">• Range: 0 to 180 degrees and 9.91E+37 (NAN)• Resolution: 0.01 dB <p>Peak phase error (max)</p> <ul style="list-style-type: none">• Range: 0 to 180 degrees and 9.91E+37 (NAN)• Resolution: 0.01 degrees <p>Frequency error (worst)</p> <ul style="list-style-type: none">• Range: -750 kHz to +750 kHz and 9.91E+37 (NAN)• Resolution: 0.01 Hz |

READ:PVTime?

| | |
|----------|--|
| Function | <p>Queries (initiates and fetches) one power versus time measurement as a sequential operation.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 125, Mask pass/fail, power versus time transmit power and up to 12 power versus time offset (max) results. The FETCh command should be used to obtain other measurement results. See “FETCh:PVTime” on page 336.</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 1 and 9.91E+37 (NAN) <p>Power versus time transmit power</p> <ul style="list-style-type: none"> • Range: –100 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time offset (max)</p> <ul style="list-style-type: none"> • Range: Up to 12 comma-separated power versus time values returned with max power = –100 dBc to +100 dBc (relative to power versus time carrier power) and 9.91E+37 (NAN) • Resolution: 0.01 dB |

READ:TXPower[:ALL]?

| | |
|-----------|--|
| Functions | <p>Queries (initiates and fetches) one TX power measurement as a sequential operation.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 125 and transmit power (average). The FETCh command should be used to obtain other measurement results. See “FETCh:TXPower” on page 349.</p> |
| Query | <p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: 0 to 16 • Resolution: 1 <p>Transmit power (average)</p> <ul style="list-style-type: none"> • Range: –100 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB |

RFANalyzer Subsystem

July 1, 1999

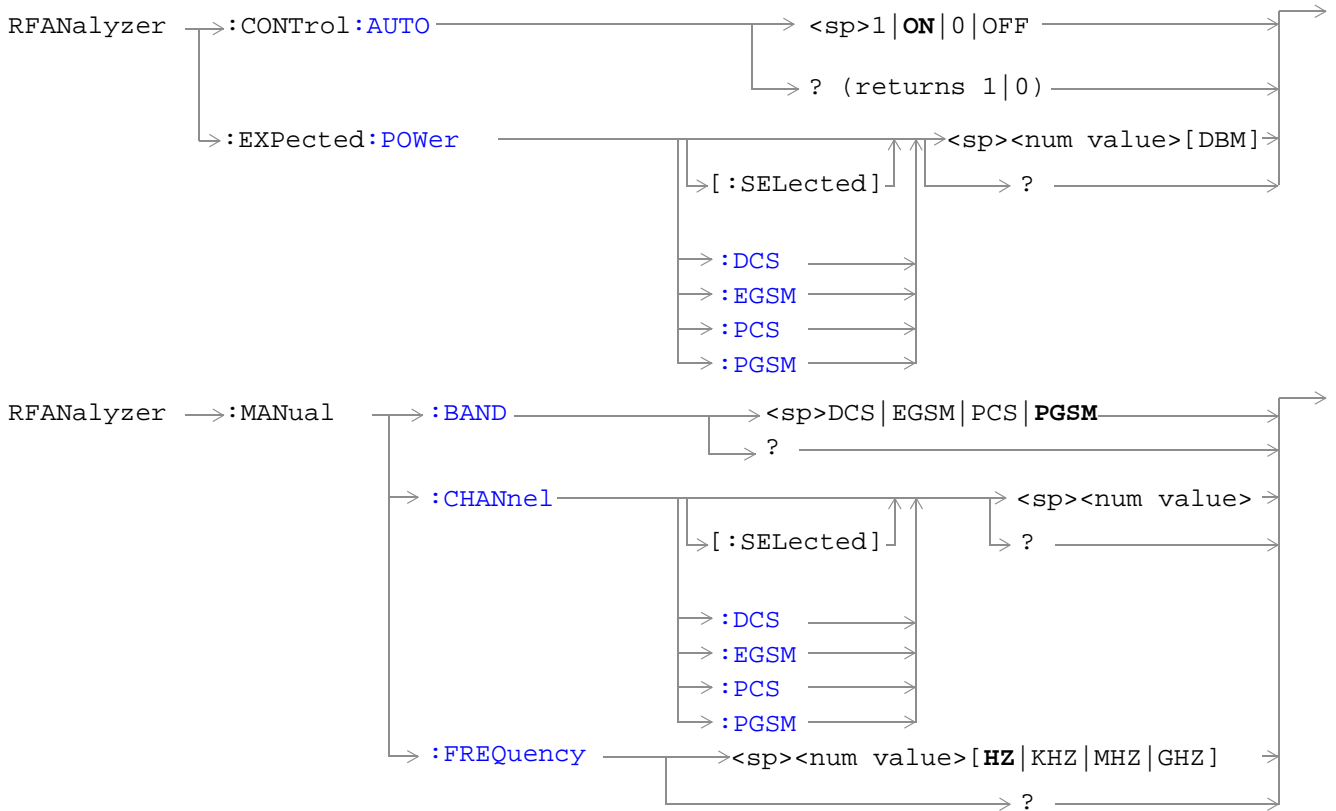
Description

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 371](#)

RFAnalyzer



“Diagram Conventions” on page 213

RFAnalyzer:CONTROL:AUTO

| | |
|---|---|
| Function | <p>Sets/queries the test set's receiver control. The measuring receiver is under the control of the test set's base station emulator (auto) or under the control of the user (manual). see "Receiver Control" on page 518</p> <p>Setting the manual band will change the receiver control to manual. see "RFAnalyzer:MANual:BAND" on page 375</p> <p>Setting the manual channel in the band that is currently active will change the receiver control to manual. see "RFAnalyzer:MANual:CHANnel[:SELEcted]" on page 375</p> <p>Setting the manual frequency will change the receiver control to manual. see "RFAnalyzer:MANual:FREQuency" on page 378</p> <p>Setting the broadcast band will change the receiver control to auto. See "CALL:BAND" on page 234</p> |
| Setting | Manual = 0 OFF , Auto = 1 ON (default ON) |
| Query | 0 1 |
| *RST setting | 0 on |
| Programming Example <pre>OUTPUT 714;"RFANALYZER:CONTROL:CONTROL:AUTO 0" !Sets receiver control to manual.</pre> | |

RFAnalyzer:EXPEcted:POWer[:SELEcted]

| | |
|---|--|
| Function | <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 "Expected Power" on page 520.</p> |
| Setting | <p>Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see "Measurement Related Configuration" on page 563</p> <p>Resolution: .01 DBM</p> |
| Query | <p>Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see "Measurement Related Configuration" on page 563</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> |
| Programming Example <pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10" !Sets the test set expected !input level to 10 DBM.</pre> | |

RFAnalyzer:EXPeCted:POWeR:DCS

| | |
|---|--|
| Function | Sets/queries the power level in DBM that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. see “Receiver Control” on page 518 |
| Setting | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| Query | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| *RST setting | Sets the receiver control to auto Band: PGSM Expected Power: +13DBM |
| Programming Example <pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:DCS -10" !Sets expected power in DCS band !to -10 DBM.</pre> | |

RFAnalyzer:EXPeCted:POWeR:EGSM

| | |
|---|--|
| Function | Sets/queries the power level in DBM that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. see “Receiver Control” on page 518 |
| Setting | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| Query | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| *RST setting | Sets the receiver control to auto Band: PGSM Expected Power: +13DBM |
| Programming Example <pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:EGSM -10" !Sets expected power in EGSM !band to -10 DBM.</pre> | |

RFAnalyzer:EXPeCted:POWeR:PCS

| | |
|---|--|
| Function | Sets/queries the power level in DBM that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. see “Receiver Control” on page 518 |
| Setting | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| Query | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| *RST setting | Sets the receiver control to auto Band: PGSM Expected Power: +13DBM |
| 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 | Sets/queries the power level in DBM that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. see “Receiver Control” on page 518 |
| Setting | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| Query | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 563 Resolution: .01 DBM |
| *RST setting | Sets the receiver control to auto Band: PGSM Expected Power: +13DBM |
| Programming Example <pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PGSM -10" !Sets expected power in PGSM !band to -10 DBM.</pre> | |

RFAnalyzer:MANual:BAND

| | |
|--|--|
| Function | <p>Sets/queries the frequency band that the test set will expect the mobile station to operate on. This setting is used by the test set to map an expected channel (ARFCN) to an uplink frequency. see “Receiver Control” on page 518</p> <p>The receiver control is set to manual when a manual band is selected. see “RFAnalyzer:CONTRol:AUTO” on page 372</p> <p>The manual band must be set before manual channel will update.</p> |
| 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 | <p>Sets/queries the ARFCN that the mobile station is expected to transmit o for the band selected. The test set will tune to the corresponding uplink frequency for the frequency band currently selected. see “Receiver Control” on page 518</p> <p>The manual band must be set before manual channel will update.</p> |
| Setting | Any ARFCN within the currently selected frequency band. |
| Query | Any ARFCN within the currently selected frequency band. |
| *RST setting | <p>Sets the receiver control to auto</p> <p>Band: PGSM</p> <p>Traffic Channel: 30</p> |
| Programming Example <pre>OUTPUT 714;"RFANALYZER:MANUAL:SELECTED 512" !Configures the test set to !ARFCN 512.</pre> | |

RFAnalyzer:MANual:CHANnel:DCS

| | |
|---|---|
| Function | Sets/queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the DCS frequency band. see "Receiver Control" on page 518 The manual band must be set before manual channel will update. see "RFAnalyzer:MANual:BAND" on page 375 |
| 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 | Sets /queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the EGSM frequency band. see "Receiver Control" on page 518 The manual band must be set before manual channel will update. see "RFAnalyzer:MANual:BAND" on page 375 |
| 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 | Sets/queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the PCS frequency band. see “Receiver Control” on page 518 The manual band must be set before manual channel will update. see “RFAnalyzer:MANual:BAND” on page 375 |
| 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 | |
| OUTPUT 714;“RFANALYZER:MANUAL:CHANNEL:PCS 512” !Sets ARFCN for PCS in manual !receiver mode. | |

RFAnalyzer:MANual:CHANnel:PGSM

| | |
|---|--|
| Function | Sets/queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the PGSM frequency band. see “Receiver Control” on page 518 The manual band must be set before manual channel will update. see “RFAnalyzer:MANual:BAND” on page 375 |
| 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 | |
| OUTPUT 714;“RFANALYZER:MANUAL:CHANNEL:PGSM 124” !Sets ARFCN for PGSM in manual !receiver mode. | |

RFAnalyzer:MANual:FREQUENCY

| | |
|---|--|
| Function | <p>Sets/queries the frequency that the mobile station is expected to transmit on. See "Receiver Control" on page 518 .</p> <p>The units (HZ KHZ MHZ GHZ) are optional, if no units are specified then units default to HZ.</p> <p>Setting the manual frequency changes the receiver control to manual. see "RFAnalyzer:CONTROL:AUTO" on page 372</p> |
| Range | <p>Range: 292.5 MHZ to 2700 MHZ</p> <p>Resolution: .01 HZ</p> |
| Query | <p>Range: 292.5 MHZ to 2700 MHZ</p> <p>Resolution: .01 HZ</p> |
| *RST setting | 896 MHZ |
| <p>Programming Example</p> <pre>OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 942.6MHZ" !Sets the expected frequency !to 942.6 MHZ in manual !receiver mode.</pre> | |

SETup Subsystem

Description

The SETup subsystem is used to configure the test set for each measurement. Typical settings include:

- Specifying whether a measurement will run continuously or need to be INITiated.
- How a measurement is triggered
- How many measurements will be made each time a measurement is INITiated

NOTE Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. In most cases, it is a best practice (during remote operation) to use “single” measurement mode. This simplifies the tasks of starting concurrent measurements, using the INIT subsystem commands to determine which measurements are ready to be fetched, then using the FETCh subsystem to obtain results. The command “SETup:CONTInuous:OFF sets all measurements to “single” trigger mode.

Syntax Diagrams and Command Descriptions

[“SETup:CONTInuous” on page 397](#)

[“SETup:AAUDio” on page 380](#)

[“SETup:BERRor” on page 385](#)

[“SETup:DAUDio” on page 398](#)

[“SETup:DPOWer” on page 403](#)

[“SETup:FBERror” on page 391](#)

[“SETup:IQTuning” on page 406](#)

[“SETup:ORFSpectrum” on page 412](#)

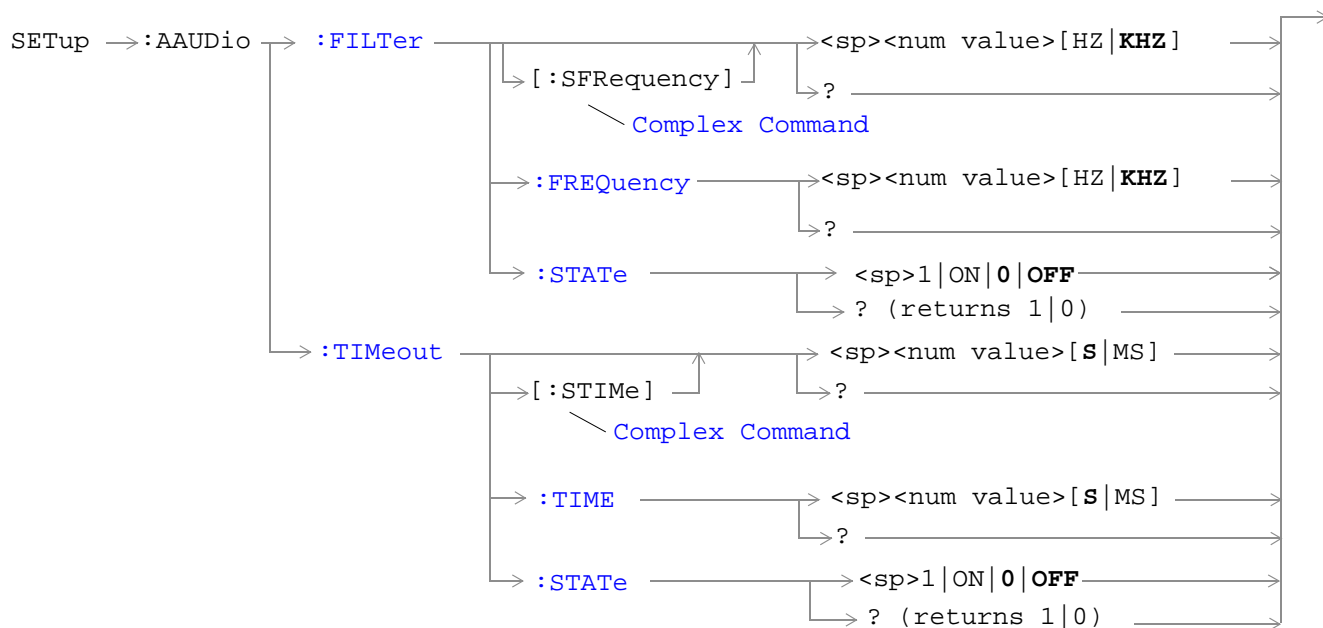
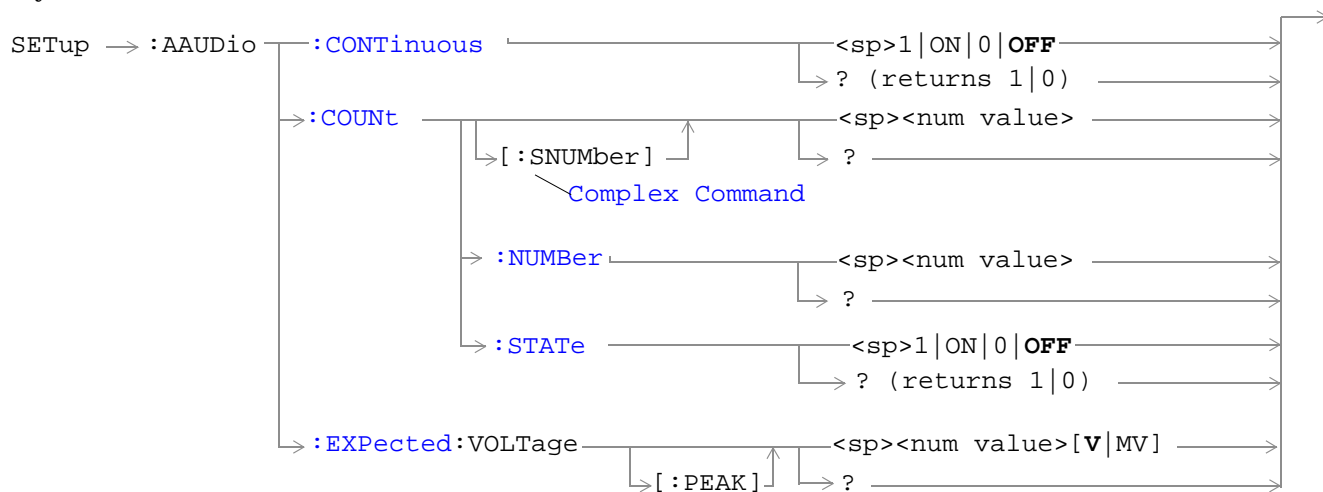
[“SETup:PFERror” on page 421](#)

[“SETup:PVTime” on page 426](#)

[“SETup:TXPower” on page 432](#)

SETup:AAUDio

July 1, 1999



“Diagram Conventions” on page 213

SETup:AAUDio:CONTInuous

| | |
|--|--|
| Function | Selects/queries the trigger arm state for Analog Audio measurements. |
| Setting | Continuous trigger arm mode = 1 ON Single trigger arm mode = 0 OFF |
| Query | 0 1 |
| *RST setting | Single |
| Programming Example 10 OUTPUT 714;"AAUDIO:COUNTINUOUS OFF" !Selects single trigger mode. | |

SETup:AAUDio:COUNT[:SNUMber]

| | |
|--|--|
| Function | Selects the number of Analog Audio multi-measurements the Test Set will make and sets the count state to ON. |
| Setting | Range: 1 to 999 / Resolution: 1 |
| *RST setting | OFF |
| Programming Example OUTPUT 714;"AAUDIO:COUNT :SNUMBER 5" !Sets the value to 5 and the state to on. | |

SETup:AAUDio:COUNT:NUMBER

| | |
|--|---|
| Function | Selects/queries the number of Analog Audio measurements the Test Set will make when the "SETup:AAUDio:COUNT:STATE" is on. |
| Setting | Range: 1 to 999 / Resolution: 1 |
| Query | Range: 1 to 999 / Resolution: 1 |
| *RST setting | 10 |
| Programming Example OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress. OUTPUT 714;"SETUP:AAUDIO:COUNT:NUMBER 10" !Sets the audio multi-measurement !count number. | |

SETup:AAUDio:COUNT:STATE

| | |
|--|---|
| Function | Selects/queries the Analog Audio multi-measurement count state. |
| 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:EXPEcted:VOLTage[:PEAK]

| | |
|---|--|
| Function | 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 380 |
| 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 | 20V |
| Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO: EXPECTED:VOLTAGE 5 V" !Sets the clipping level of !Analog Audio measurements !to +5 volts.</pre> | |

SETup:AAUDio:FILTer[:SFRequency]

| | |
|--|---|
| Function | Sets/queries the state to on and the center frequency for the 100 Hz bandpass filter applied to Analog Audio measurements. Units (KHZ HZ) are optional, if no units are specified then units default to Hz. see "Analog Audio Measurement Description" on page 44 |
| Setting | Range: 200 Hz to 8.0 kHz / Resolution: 1 Hz |
| Query | Range: 200 Hz to 8.0 kHz / Resolution: 1 Hz |
| *RST setting | 1000 Hz |
| Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:FILTER :SFREQUENCY 1000" !This is a complex command that !sets the audio filter state !to on and sets the bandpass !filter frequency to 1 kHz.</pre> | |

SETup:AAUDio:FILTer:FREquency

| | |
|--|--|
| Function | 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 380 |
| Setting | Range: 200 Hz to 8.0 kHz / Resolution: 1 Hz |
| Query | Range: 200 Hz to 8.0 kHz / Resolution: 1 Hz |
| *RST setting | 1 kHz |
| Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:FREQUENCY 217HZ" !Set audio bandpass filter to 217 hz.</pre> | |

SETup:AAUDio:FILTer:STATe

| | |
|---|---|
| Function | Selects/queries the state of the Analog Audio bandpass filter. see “SETup:AAUDio” on page 380 |
| Setting | 1 ON 0 OFF |
| Query | 1 0 |
| *RST setting | 0 OFF |
| Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:FILTER:STATE ON" !Sets filter state on.</pre> | |

SETup:AAUDio:TIMEout[:STIME]

| | |
|---|--|
| Function | 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. |
| Setting | Range: .1 to 999 / Resolution: .1 |
| Query | Range: .1 to 999 / Resolution: .1 |
| *RST setting | 10 |
| Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STIME 3" !A complex command that sets timeout !state to on and sets the !timeout value.</pre> | |

SETup:AAUDio:TIMEout:STATe

| | |
|--|---|
| Function | Selects/queries the Analog Audio measurement timeout state. |
| Setting | 1 ON 0 OFF |
| Query | 1 0 |
| *RST setting | 0 OFF |
| Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.</pre> | |

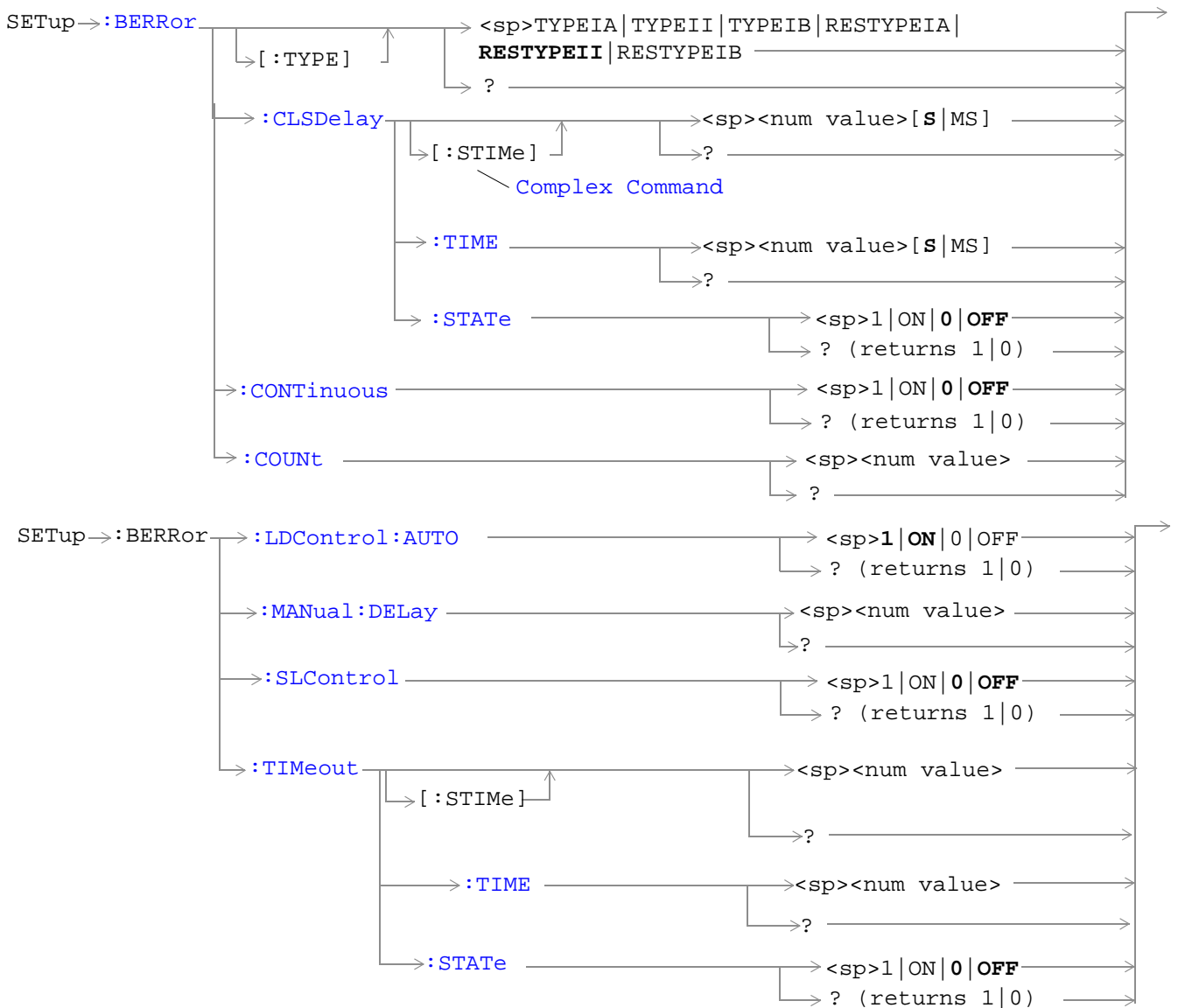
SETup:AAUDio

SETup:AAUDio:TIMEout:TIME

| | |
|--|---|
| Function | 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. |
| Setting | Range: .1 to 999 / Resolution: .1 |
| Query | Range: .1 to 999 / Resolution: .1 |
| *RST setting | 10 |
| Programming Example OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:TIME 5" !Sets timeout value to 5 seconds. | |

SETup:BERRor

February 14, 2000



"Diagram Conventions" on page 213

SETup:BERRor:CLSDelay[:STIME]

| | |
|--|--|
| Function | <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> |
| 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 | 500 ms |
| <p>Programming Example</p> <pre>OUTPUT 714;"SETUP:BERROR:CLSDELAY:STIME 400 MS" ! Set state to on ! and delay time</pre> | |

SETup:BERRor:CLSDelay:TIME

| | |
|---|---|
| Function | <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> |
| 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 | 500 ms |
| <p>Programming Example</p> <pre>OUTPUT 714;"SETUP:BERROR:CLSDELAY:TIME 600MS" ! Set delay time</pre> | |

SETup:BERRor:CLSDelay:STATE

| | |
|---|--|
| Function | <p>Selects/queries the closed loop signalling delay state for Bit Error measurements. If the state is off the test set will not wait to start a BERR measurement after a downlink signalling operation has completed.</p> <p>The delay time defines how long the test set should wait before starting and BERR measurement after a downlink signalling operation has completed and after the test set has sent a close loop command to the MS.</p> <p>When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period.</p> |
| Setting | Range: 1 ON 0 OFF |
| Query | Range: 1 0 |
| *RST | 1 ON |
| Programming Example OUTPUT 714;"SETUP:BERROR:CLSDELAY:STATE ON" | |

SETup:BERRor[:TYPE]

| | |
|--|---|
| Function | Sets the measurement type for BER measurements including Type A (residual) and Type B (non-residual). |
| 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:CONTInuous

| | |
|--|---|
| Function | Sets/queries the trigger state to single trigger mode or continuous trigger mode for BER measurement. |
| Setting | Range: 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 0 off |
| Programming Example OUTPUT 714;"BERROR:CONTINUOUS OFF" !Sets BER measurement to single trigger mode. | |

SETup:BERRor

SETup:BERRor:COUNT

| | |
|--|---|
| Function | Sets/queries the number of BER measurements the test set will make when the count state is on |
| Setting | Range: 1 to 999,000 Resolution: 1 |
| Query | Range: 1 to 999,000 Resolution: 1 |
| *RST Setting | 10,000 |
| Programming Example <pre>OUTPUT 714;"SETUP:BERROR:COUNT 880" !Set BER multi-measurement count !to 880.</pre> | |

SETup:BERRor:LDControl:AUTO

| | |
|---|--|
| Function | <p>Sets/queries speech frames delay control mode. If speech frames delay control mode is automatic (Auto), the test set will determine the frame delay value that will allow correlation between uplink information bits with downlink information bits.</p> <p>If speech frames delay control mode is manual (not Auto), the test set will use the frame delay value entered in the Speech Frames Delay field. Refer to. see "SETup:BERRor:MANual:DELay" on page 389</p> <p>Refer also to the "Bit Error Measurement Description" on page 48 for a description of frame delay and its use in the BER measurement.</p> |
| Setting | Range: 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 1 auto |
| Related Topics | "SETup:BERRor:MANual:DELay" on page 389 |
| Programming Example <pre>OUTPUT 714;"SETUP:BERROR:LDCONTROL:AUTO OFF" !sets BER delay to manual the user !must select the manual frame !delay number.</pre> | |

SETup:BERRor

SETup:BERRor:TIMEout[:STIME]

| | |
|---|---|
| Function | 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: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST Setting | 10 seconds |
| Programming Example | |
| OUTPUT 714;"SETUP:BERR:TIMEOUT:STIME 8" !Sets BER measurement timeout to !8 seconds and the state to on. | |

SETup:BERRor:TIMEout:TIME

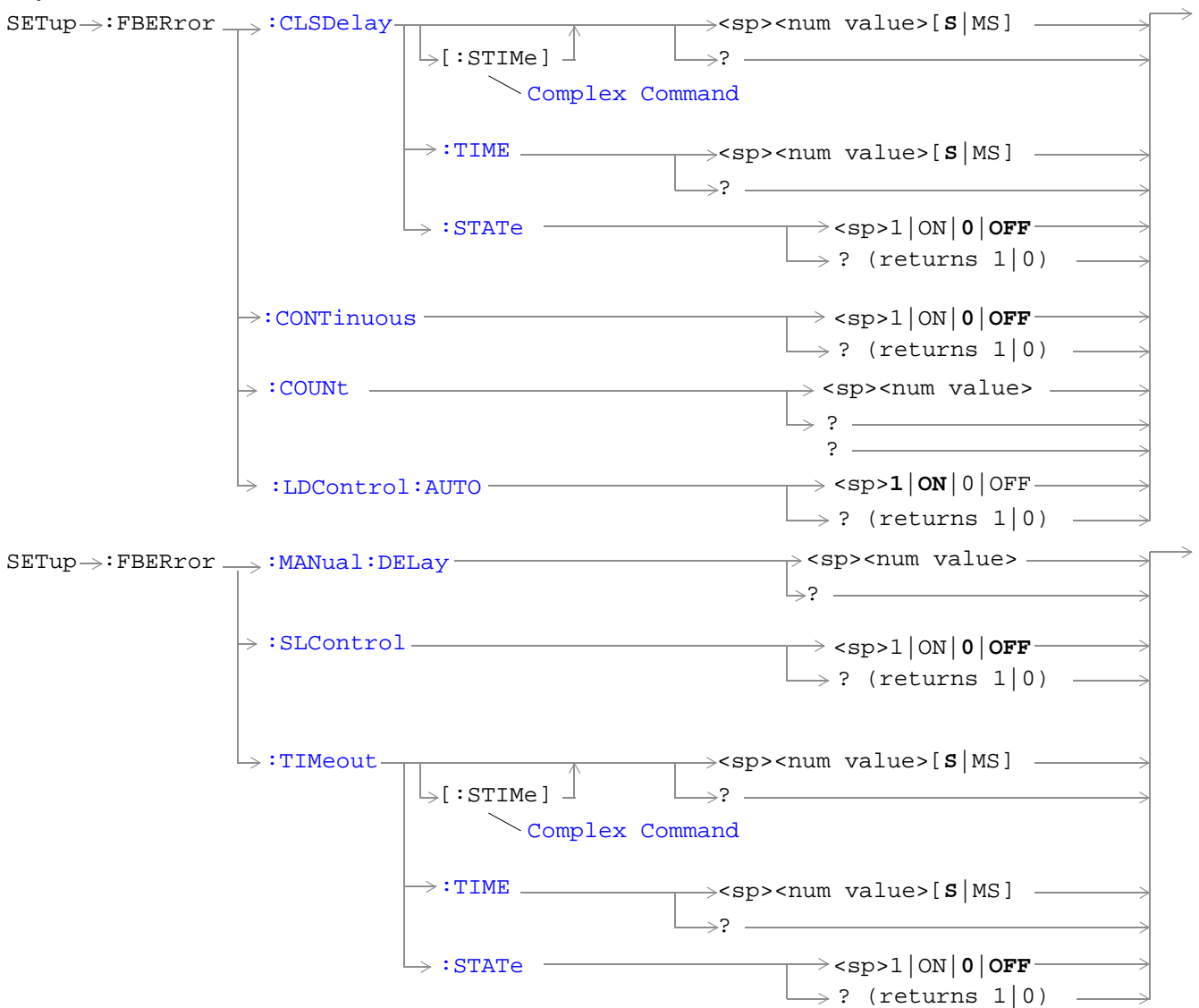
| | |
|--|--|
| Function | Sets/queries the timeout value in seconds for the trigger state during BER measurements. The units (S MS) are optional, if no units are specified than units default to S (seconds). |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *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 | 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:BERROR:TIMEOUT:STATE ON" !Sets the timeout state to on. | |

SETup:FBError

July 8, 1999



“Diagram Conventions” on page 213

SETup:FBERror:CLSDELAY[:STIME]

| | |
|--|---|
| Function | <p>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> |
| 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 | 500 ms |
| <p>Programming Example</p> <pre>OUTPUT 714;"SETUP:FBERROR:CLSDELAY:STIME 500 MS" ! Sets the Close Loop Delay ! to 500 ms.</pre> | |

SETup:FBERror:CLSDELAY:TIME

| | |
|---|--|
| Function | <p>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> |
| Setting | <p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p> |
| Query | <p>Range: 0 to 5 seconds</p> <p>Resolution: 100ms</p> |
| *RST | 500 ms |
| <p>Programming Example</p> <pre>OUTPUT 714;"SETUP:FBERROR:CLSDELAY:TIME 500 MS" ! Sets the Close Loop Delay ! to 500 ms.</pre> | |

SETup:FBERror:CLSDelay:STATE

| | |
|--|---|
| Function | <p>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.</p> <p>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.</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> |
| Setting | Range: 1 ON 0 OFF |
| Query | Range: 1 0 |
| *RST | 1 ON |
| Programming Example <pre>OUTPUT 714;"SETUP:FBERROR:CLSDELAY:STATE ON" ! Sets the Close Loop Delay ! state to on.</pre> | |

SETup:FBERror:CONTinuous

| | |
|---|---|
| Function | Selects/queries the trigger state for Fast Bit Error Rate tests. |
| Setting | Range: 1 ON = Continuous trigger mode 0 OFF = Single trigger mode |
| Query | Range: 1 0 |
| *RST | 0 single |
| Programming Example <pre>OUTPUT 714;"SETUP:FBERROR:CONTINUOUS 0" !Specifies single trigger mode for Fast !BER measurements.</pre> | |

SETup:FBERror:COUNT

| | |
|---|--|
| Function | Sets/queries the number of bits to test during each Fast Bit Error Rate test. |
| Setting | Range: 1 to 999,000 Resolution: 1 |
| Query | Range: 1 to 999,000 Resolution: 1 |
| *RST | 10,000 |
| Comments | The actual number of bits that are tested will be determined by the number of frames tested, and will be at least as great as this count |
| Programming Example <pre>OUTPUT 714; ``SETUP:FBERROR:COUNT 10000" !Specifies the number of Fast BER bits !to test at 10,000 bits.</pre> | |

SETup:FBERror:LDControl:AUTO

| | |
|---|--|
| Function | <p>Sets/queries loopback delay control mode. If loopback control mode is automatic (auto on), the test set will determine the frame delay value that will allow correlation between uplink information bits with downlink information bits. .</p> <p>If loopback delay control mode is manual (auto off) , the test set will use the frame delay value entered in the TDMA Frames Delay field. Refer to “SETup:FBERror:MANual:DELay” on page 395 .</p> <p>Refer also to the “Fast Bit Error Measurement Description” on page 69 for a description of frame delay and its use in the fast bit error rate measurement.</p> |
| Setting | Range: 1 ON 0 OFF |
| Query | Range: 1 0 |
| *RST | 1 AUTO |
| Related Topics | see “SETup:FBERror:MANual:DELay” on page 395 |
| Programming Example <pre>OUTPUT 714; "SETUP:FBERROR:LDCONTROL OFF" !Set delay control to manual the user !must select the manual frame !delay number.</pre> | |

SETup:FBError:MANual:DElay

| | |
|--|--|
| Function | <p>Sets/queries the number of frames the test set will use to correlate uplink information bits with downlink information bits when loopback delay control mode is manual (auto off). To set the loopback delay mode to manual, refer to “SETup:FBError:LDControl:AUTO” on page 394.</p> <p>This value is displayed in the TDMA Frames Delay field when Auto is not displayed. (If you want to display this value and Auto is currently displayed, press the front panel key labeled MANUAL).</p> <p>Refer to “Fast Bit Error Measurement Description” on page 69 for a description of frame delay and how it is used in this measurement.</p> |
| Setting | <p>Range: 0 to 26</p> <p>Resolution: 1</p> |
| Query | <p>Range: 0 to 26</p> <p>Resolution: 1</p> |
| *RST | 5 (loopback delay control is reset to automatic (auto on)). |
| Related Topics | see “SETup:FBError:LDControl:AUTO” on page 394 |
| Programming Example <pre>OUTPUT 714;"SETUP:FBERROR:MANUAL:DELAY 6" !Set frame delay to 6 frames.</pre> | |

SETup:FBError:SLControl

| | |
|--|--|
| Function | <p>Selects/queries the Signalling loopback control state for an FBError measurement.</p> <p>When the state is set to on, the test set will automatically send the command for Type C (burst-by-burst) loopback to the MS when a FBError measurement is activated, and then set loopback to off when the measurement is complete.</p> <p>The loopback type is controlled manually from the Mobile Loopback F12 key, see “CALL:TCHannel:LOOPback” on page 291 for a program example and details about the command.</p> |
| Setting | Range: 1 ON 0 OFF |
| Query | Range: 1 0 |
| *RST | 1 ON |
| Programming Example <pre>OUTPUT 714;"SETUP:FBERROR:SLCONTROL ON" ! Sets the Signal Loop Control state to on.</pre> | |

SETup:FBError:TIMEout[:STIME]

| | |
|---|---|
| Function | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST | 10 seconds |
| Programming Example | |
| OUTPUT 714;"SETUP:FBERROR:TIMEOUT:STIME 20" !Sets the time out value to !20 seconds and the state to on. | |

SETup:FBError:TIMEout:TIME

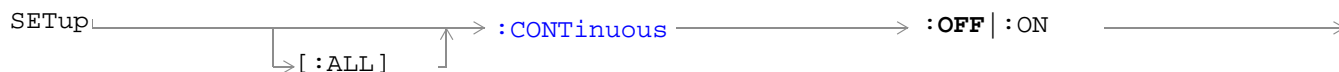
| | |
|--|--|
| Function | Selects/queries the timeout value in seconds for the trigger state during Fast Bit Error measurements. The units (S MS) are optional, if no units are specified than units default to S. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST | 10 seconds |
| Programming Example | |
| OUTPUT 714;"SETUP:FBERROR:TIMEOUT:TIME 20" !Sets the time out value to !20 seconds. | |

SETup:FBError:TIMEout:STATe

| | |
|--|---|
| Function | Sets/queries the timeout state for Fast BER measurements. |
| Setting | Range: 0 OFF 1 ON |
| Query | Range: 0 1 |
| *RST | 0 OFF |
| Programming Example | |
| OUTPUT 714;"SETUP:FBERROR:TIMEOUT:STATE ON" !Sets the timeout state to on. | |

SETup:CONTInuous

February 14, 2000



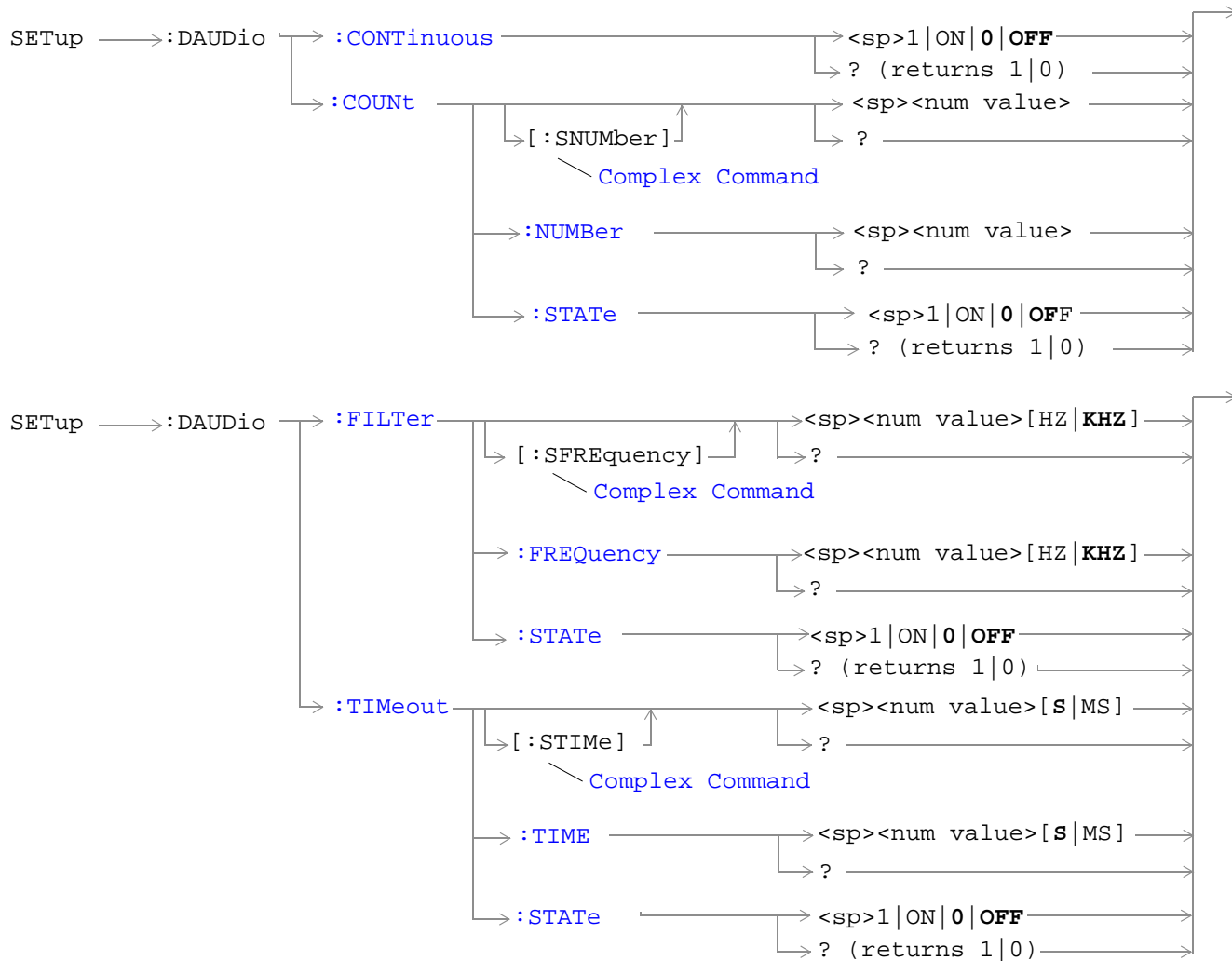
[“Diagram Conventions” on page 213](#)

SETup[:ALL]:CONTInuous

| | |
|---|---|
| Function | <p>Sets trigger arm to OFF (single trigger) or ON (continuous trigger) for all measurements. See “Trigger Arm (Single or Continuous) Description” on page 151.</p> <p>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 535.</p> <p>Remote full preset sets the trigger arm to single, this is the recommended trigger arm for any remote measurements.</p> <p>Trigger arm may be set and queried for each individual measurement.</p> |
| Setting | <p>Range</p> <ul style="list-style-type: none"> • Continuous trigger = ON • Single trigger = OFF |
| *RST Setting | Single |
| <p>Programming Example</p> <pre>OUTPUT 714;"SETUP:ALL:CONTINUOUS:OFF" !Sets trigger arm for all measurements !to single. OUTPUT 714;"SETUP:PVTIME:CONTINUOUS:OFF" !Sets trigger arm for power versus !time measurements to single each !measurment can be set individually. OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS?" !Queries trigger arm for TX power !measurements. Trigger arm may be queried !only one measurement at a time.</pre> | |

SETup:DAUDio

February 14, 2000



“Diagram Conventions” on page 213

SETup:DAUDio:CONTInuous

| | |
|--|---|
| Function | Selects/queries the trigger state for Decoded Audio measurements. |
| Setting | Continuous 1 ON Single 0 OFF |
| Query | 1 0 |
| *RST setting | 0 single |
| Programming Example <pre>OUTPUT 714;"SETUP:DAUDIO:CONTINUOUS OFF" !Set DAUDIO measurement to single !trigger mode.</pre> | |

SETup:DAUDio:COUNt[:SNUMber]

| | |
|---|---|
| Function | Selects/queries the number of Decoded Audio multi-measurements the Test Set will make. This command sets the count state to ON. |
| Setting | Range: 1 to 999 / Resolution: 1 |
| Query | Range: 1 to 999 / Resolution: 1 |
| *RST setting | 10 |
| Programming Example <pre>OUTPUT 714;"SETUP:DAUDIO:COUNT:SNUMBER 10" !Sets the value to 10 and the state !to on.</pre> | |

SETup:DAUDio:COUNt:NUMBer

| | |
|--|---|
| Function | Selects/queries the number of Decoded Audio measurements the test set will make when the multi-measurement count state is on. |
| Setting | Range: 1 to 999 / Resolution: 1 |
| Query | Range: 1 to 999 / Resolution: 1 |
| *RST setting | 10 |
| Programming Example <pre>OUTPUT 714;"SETUP:DAUDIO:COUNT:NUMBER 25" !Sets the number of DAUDIO !measurements that will be made.</pre> | |

SETup:DAUDio:COUNT:STATE

| | |
|---|--|
| Function | Selects/queries the Decoded Audio multi-measurement count state. |
| 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 | Sets/queries the center frequency for the 100 Hz bandpass filter applied to Decoded Audio measurements. This command sets the count state to ON. The units (HZ KHZ) are optional, if no units are specified then units default to KHZ. see "Decoded Audio Measurement Description" on page 55 |
| Setting | Range: 200 Hz to 3.6 kHz / Resolution: 1 HZ |
| Query | Range: 200 Hz to 3.6 kHz / Resolution: 1 HZ |
| *RST setting | 1000 HZ |
| Programming Example <pre>OUTPUT 714;"SETUP:DAUDIO:FILTER:SFREQUENCY 2.2KHZ" !This is a complex command !that sets the value and the !state to on.</pre> | |

SETup:DAUDio:FILTer:FREquency

| | |
|--|--|
| Function | Sets/queries the center frequency for the 100 Hz bandpass filter applied to Decoded Audio measurements. The units (HZ KHZ) are optional, if no units are specified then units default to KHZ. see "Decoded Audio Measurement Description" on page 55 |
| Setting | Range: 200 Hz to 3.6 kHz / Resolution: 1 HZ |
| Query | Range: 200 Hz to 3.6 kHz / Resolution: 1 HZ |
| *RST setting | 1000 HZ |
| Programming Example <pre>OUTPUT 714;"DAUDIO:FILTER:FREQUENCY 217HZ" !Sets bandpass filter frequency.</pre> | |

SETup:DAUDio:FILTer:STATe

| | |
|--|---|
| Function | Selects/queries the Decoded Audio bandpass filter state. see “Decoded Audio Measurement Description” on page 55 |
| 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 | 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. |
| Setting | Range: .1 to 999 / Resolution: .1 |
| Query | Range: .1 to 999 / Resolution: .1 |
| *RST setting | 10 seconds |
| Programming Example | |
| OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:STIME 6" !Sets the value to 6 seconds and the !state to on. | |

SETup:DAUDio:TIMEout:TIME

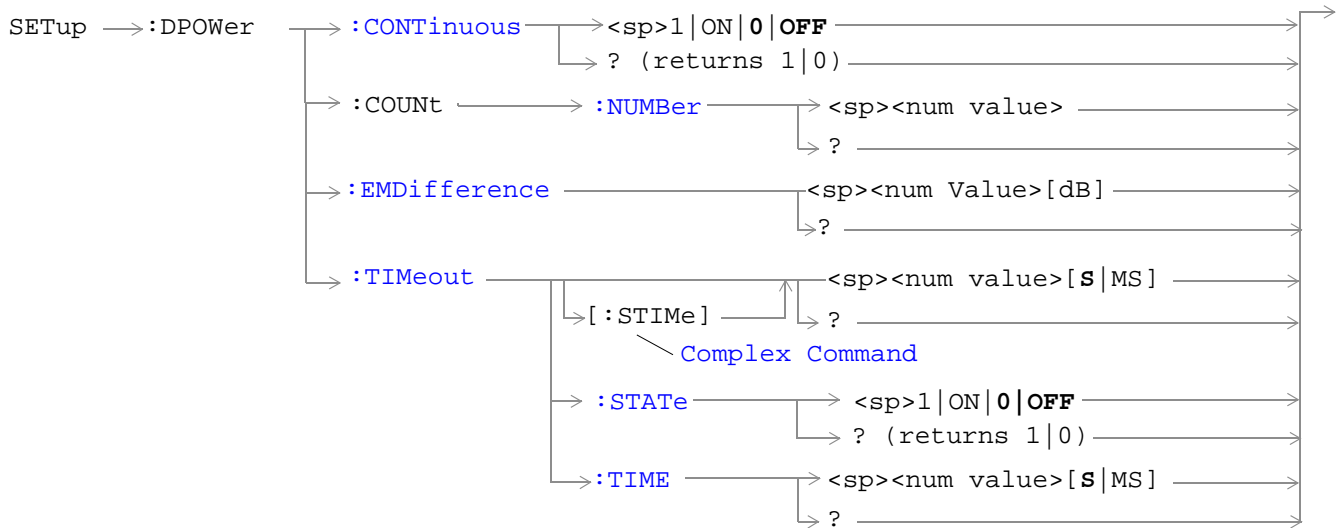
| | |
|--|---|
| Function | Selects/queries the timeout value used for Decoded Audio measurements when the timeout state is ON. The units (S MS) are optional, if no units are specified then units default to S. |
| Setting | Range: .1 to 999 / Resolution: .1 |
| Query | Range: .1 to 999 / Resolution: .1 |
| *RST setting | 10 seconds |
| Programming Example | |
| OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:TIME 15" !Sets timeout value to 15 seconds. | |

SETup:DAUDio

SETup:DAUDio:TIMEout:STATE

| | |
|--|--|
| Function | Selects/queries the Decoded Audio measurement timeout state. |
| Setting | 1 ON 0 Off |
| Query | 1 0 |
| *RST setting | 0 OFF |
| Programming Example OUTPUT 714; "SETUP:DAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on. | |

SETup:DPOWER



[“Diagram Conventions” on page 213](#)

SETup:DPOWER:CONTInuous

| | |
|---|---|
| Function | Selects/queries the trigger state for Dynamic Power measurements. |
| Setting | Continuous trigger mode: 1 ON Single trigger mode: 0 OFF |
| Query | 1 0 |
| *RST | 0 OFF |
| Programming Example OUTPUT 714;"SETUP:DPOWER:CONTINUOUS ON" !Sets trigger mode to continuous for a Dynamic Power measurement. | |

SETup:DPOWer

SETup:DPOWer:COUNT:NUMBER

| | |
|---|--|
| Function | Sets/queries the number of bursts for the Dynamic Power measurement. |
| Setting | Range: 1 to 100 Resolution: 1 |
| Query | Range: 1 to 100 Resolution: 1 |
| *RST | 10 |
| Programming Example OUTPUT 714;"SETUP:DPOWER:COUNT:NUMBER 30" !Sets the number of bursts for the Dynamic Power measurement to 30. | |

SETup:DPOWer:EMDifference

| | |
|--|--|
| Function | Sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement. The units dB are optional. 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. The setting of this parameter does not affect the receiver Expected Power parameter. See "RFAnalyzer:EXPEcted:POWer[:SELEcted]" on page 372. |
| Setting | Range: -30 dB to +30 dB Resolution: 0.01 dB |
| Query | Range: -30 dB to +30 dB Resolution: 0.01 dB |
| Programming Example OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE -3" !Sets the Expected Maximum ! Difference from previous measurement parameter ! to -3 dB. (Example: If the previous burst ! measures 0 dB and you expect the maximum ! amplitude of the next burst to be 3 dB, set the ! Expected Maximum Difference parameter to 3). | |

SETup:DPOWer:TIMEout[:STIME]

| | |
|--|---|
| Function | Sets/queries the Dynamic Power 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST | 10 seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME 5" !Sets the timeout state to on and the timeout value to 5 seconds for the Dynamic Power measurement.</pre> | |

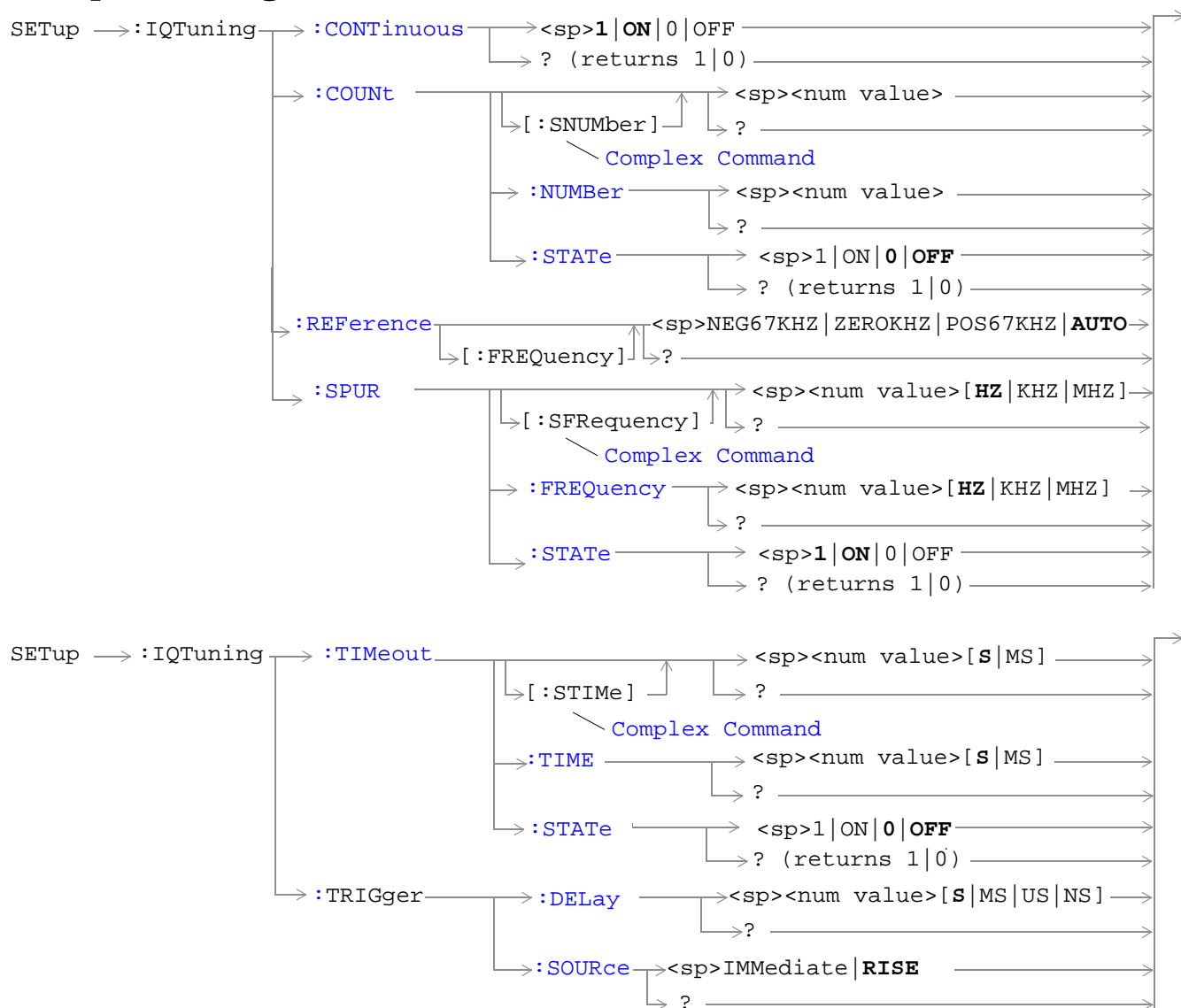
SETup:DPOWer:TIMEout:STATe

| | |
|---|--|
| Function | Sets/queries the time-out state for the Dynamic Power measurement. |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST | 0 OFF |
| Programming Example <pre>OUTPUT 714;"SETUP:DPOWER:IQTUNING:TIMEOUT:STATE ON" !Sets the timeout state to on for a Dynamic Power measurement.</pre> | |

SETup:DPOWer:TIMEout:TIME

| | |
|---|---|
| Function | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST | 10 seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME 6" !Sets the timeout value to 6 seconds for a dynamic power measurement.</pre> | |

SETup:IQTuning



“Diagram Conventions” on page 213

SETup:IQTuning:CONTInuous

| | |
|--|---|
| Function | Selects/queries the trigger state for I/Q Tuning measurements. |
| Setting | Continuous trigger mode: 1 ON Single trigger mode: 0 OFF |
| Query | 1 0 |
| *RST | 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 | Sets/queries the I/Q Tuning multi-measurement count state. |
| Setting | Range: 0 OFF 1 ON |
| Query | 0 1 |
| *RST | 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 | Sets/queries the number of I/Q Tuning multi-measurements the test set makes when the multi-measurement count state is on. See "I/Q Tuning Measurement Description" on page 63. |
| Setting | Range: 1 to 999 Resolution: 1 |
| Query | Range: 1 to 999 Resolution: 1 |
| *RST | 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

SETup:IQTuning:COUNT[:SNUMBer]

| | |
|---|---|
| Function | Sets/queries the number of I/Q Tuning multi-measurements the test set makes. This command sets the count state to ON. |
| Setting | Range: 1 to 999 Resolution: 1 |
| Query | Range: 1 to 999 Resolution: 1 |
| *RST | 10 |
| Programming Example 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 | 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. |
| Setting | NEG67KHZ ZEROKHZ POS67KHZ AUTO |
| Query | NEG67KHZ ZEROKHZ POS67KHZ AUTO |
| *RST | AUTO |
| Programming Example OUTPUT 714;"SETUP:IQTUNING:REFERENCE:FREQUENCY NEG67KHZ" !Sets the I/Q Tuning measurements reference frequency to -67 kHz. | |

SETup:IQTuning:SPUR:FREQuency

| | |
|---|--|
| Function | 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. |
| 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 | 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 | Sets/queries the spur state for the I/Q Tuning measurement. |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST | 0 OFF |
| Programming Example OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE ON" !Sets the spur state to on. | |

SETup:IQTuning:SPUR[:SFREquency]

| | |
|--|--|
| Function | 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. |
| 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 | 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 | Sets/queries the time-out state for the I/Q Tuning measurement. |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST | 0 OFF |
| Programming Example <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 | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST | 10 seconds |
| Programming Example <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 | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST | 10 seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME 4" !Sets the timeout value to 4 seconds.</pre> | |

SETup:IQTuning:TRIGger:DELay

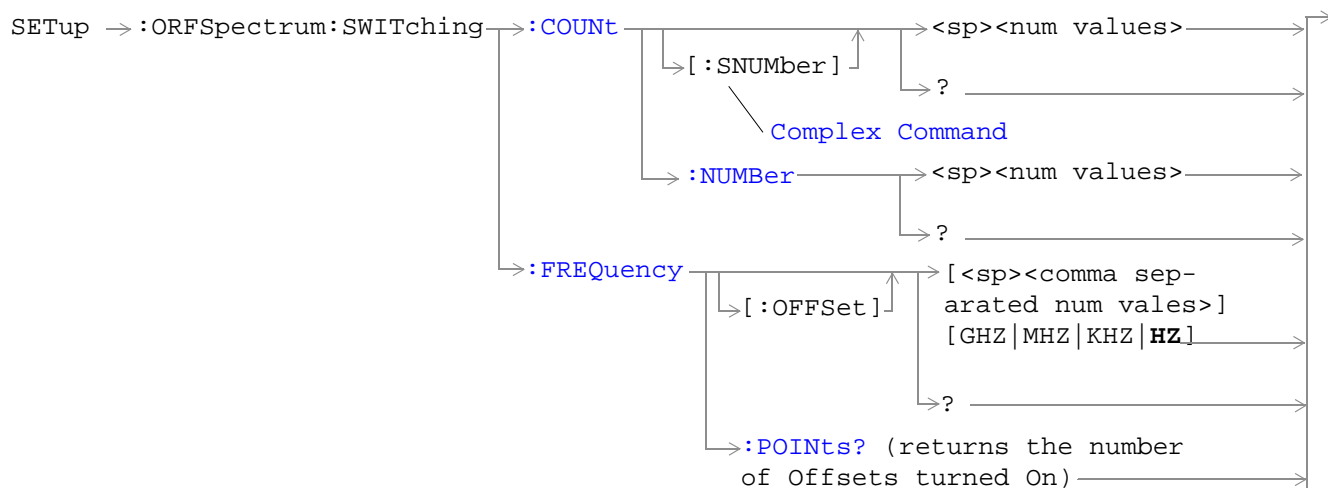
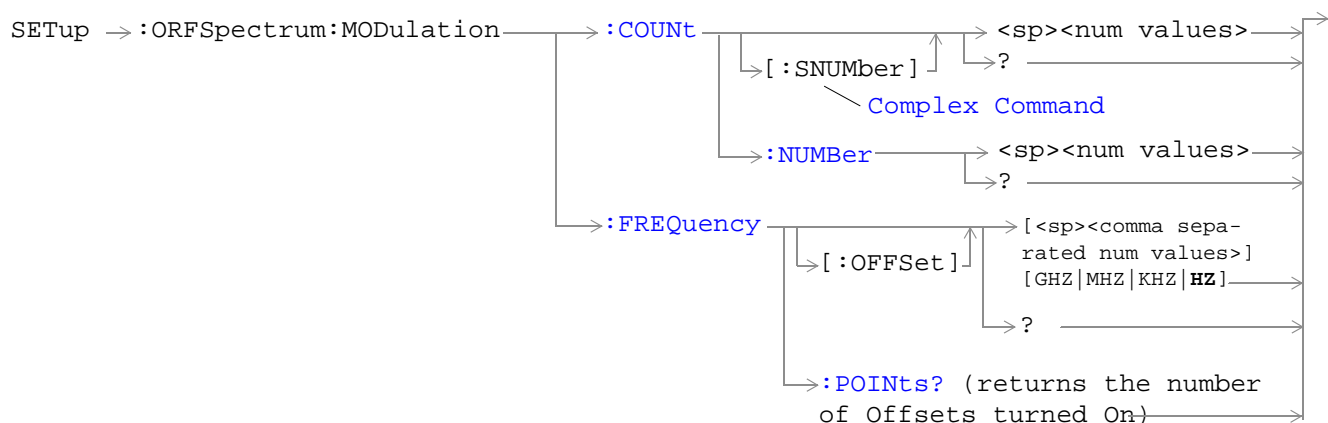
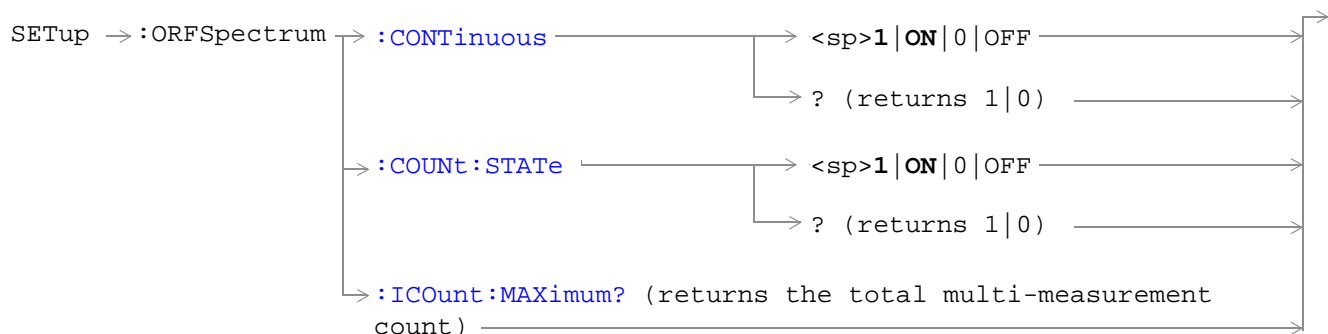
| | |
|---|---|
| Function | Sets/queries the trigger delay time in seconds for an I/Q Tuning measurement. The units (S MS US NS) are optional, if no units are specified then the default is S. |
| Setting | Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST | zero seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY 1.2MS" !Sets the trigger delay time to 1.2 milli seconds.</pre> | |

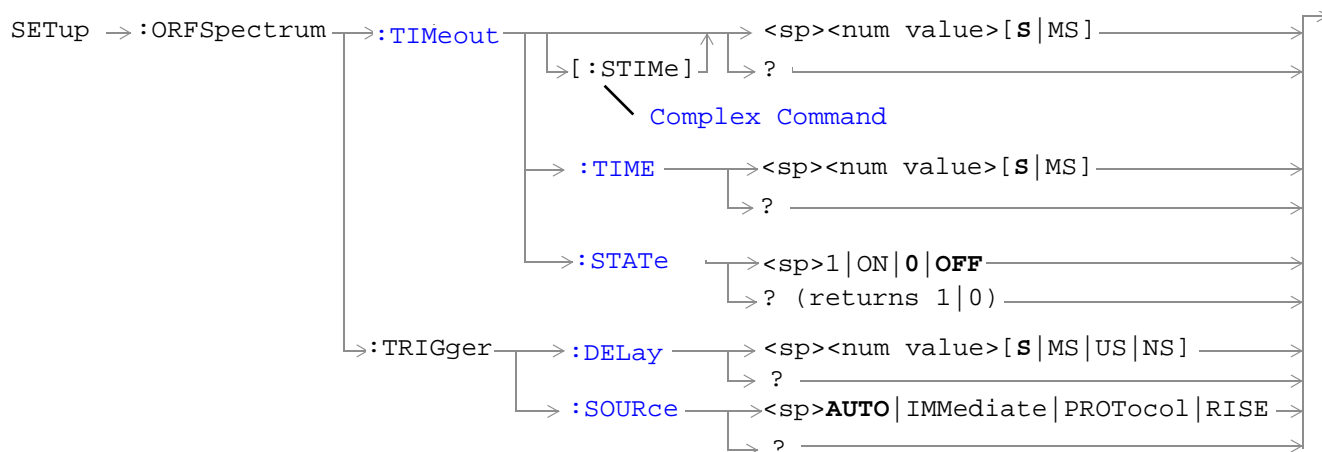
SETup:IQTuning:TRIGger:SOURce

| | |
|--|---|
| Function | Sets/queries the trigger source for an I/Q Tuning measurement. |
| Setting | RISE IMMEDIATE See "Triggering of Measurements" on page 149. |
| Query | RISE IMM |
| *RST | RISE |
| Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE IMM" !Sets the trigger source to immediate.</pre> | |

SETup:ORFSpectrum

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“Diagram Conventions” on page 213

SETup:ORFSpectrum:CONTInuous

| | |
|--|--|
| Function | Selects/queries the trigger state for output RF spectrum measurements. |
| Range | Continuous trigger mode: 1 ON Single trigger mode: 0 OFF |
| Query Setting | 1 0 |
| *RST | 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 | Selects/queries output RF spectrum due to switching and modulation multi-measurement count state. |
| Setting | 0 OFF 1 ON |
| Query Setting | 0 1 |
| *RST | 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 | <p>Queries the total number measurements made each time an ORFS measurement is initiated. This number will vary depending on the number of offsets and number of multi-measurements the user chooses.</p> <p>The total number of measurements is calculated using the following formula:</p> $\text{ICO MAX} = 1 + M + S$ <p><i>Where:</i></p> <p>$M = (\text{the number of modulation offsets}) \times (\text{the number of multi-measurements for ORFS due to modulation}).$</p> <p>$S = (\text{the number of switching offsets}) \times (\text{the number of multi-measurements for ORFS due to switching}).$</p> <p>See "Output RF Spectrum Measurement Description" on page 75 for a description of modulation and switching offsets.</p> |
| Query | <p>Range: 1 to 29971</p> <p>Resolution: 1</p> |

SETup:ORFSpectrum:MODulation:COUNT[:SNUMBER]

| | |
|--|---|
| Function | Sets/queries the number of output RF spectrum due to modulation multi-measurements the test set will make. This command sets the count state to ON. |
| Setting | <p>Range: 1 to 999</p> <p>Resolution: 1</p> |
| Query | <p>Range: 1 to 999</p> <p>Resolution: 1</p> |
| *RST Setting | 20 |
| <p>Programming Example</p> <pre>OUTPUT 714"SETUP:ORFSPECTRUM:MODULATION:COUNT:SNUMBER 99" !Sets the value to 99 !multi-measurements !and the state to on.</pre> | |

SETup:ORFSpectrum:MODulation:COUNT:NUMBER

| | |
|---|---|
| Function | Sets/queries the number of output RF spectrum due to modulation multi-measurements the test set will make when the multi-measurement count state is on. see “Output RF Spectrum Measurement Description” on page 75 |
| 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 | Specifies/queries the list of output RF spectrum due to modulation frequency offsets. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to modulation measurement will not be made. The units (GHZ MHZ KHZ HZ) are optional, if no units are specified than units default to HZ. see "Output RF Spectrum Measurement Description" on page 75 |
| 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:MODulation:FREQuency:POINts?

| | |
|----------|--|
| Function | Queries the number of frequency offsets currently on during an ORFS due to modulation measurement. See “Output RF Spectrum Measurement Description” on page 75 |
| Query | Range: 0 to 22 Resolution: 1 |

SETup:ORFSpectrum:SWITChing:COUNT[:SNUMber]

| | |
|--|---|
| Function | Sets /queries the ORFS due to switching multi-measurement count value and turns the state on. |
| 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 | Sets/queries the ORFS due to switching multi-measurement count value. see “Output RF Spectrum Measurement Description” on page 75 |
| 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 | Sets/queries the list of output RF spectrum due to switching frequency offsets. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to switching measurement will not be made. The units (GHZ MHZ KHZ HZ) are optional, if no units are specified than units default to HZ. See "Output RF Spectrum Measurement Description" on page 75 |
| Setting | Range: 0 to 8 comma-separated values ranging from -1.8 MHz to -10 Hz, and +10 Hz to +1.8 MHz Resolution: 10 Hz |
| Query | Range: 0 to 8 comma-separated values ranging from -1.8 MHz to -10 Hz, and +10 Hz to +1.8 MHz Resolution: 10 Hz |
| *RST Setting | Offset 1 = 400.0 kHz Offset 2 = 600.0 kHz Offsets 3 to 8 off |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to switching measurement offsets and sets them
!to 400 kHz and 700 kHz offsets. All other offsets are in the off state.
```

```
OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET 700 KHZ" !Turns on the
!first ORFS
!due to
!switching
!measurement
!offset and
!sets it to
!700 kHz
!offsets. All
!other offsets
!are in the
!off state.
```

```
OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET" !Turns all of the ORFS
!due to switching
!measurements offsets
!to off.
```

SETup:ORFSpectrum:SWITching:FREQuency:POINts?

| | |
|----------|---|
| Function | Queries the number of frequency offsets currently on during an ORFS due to switching measurement. See “Output RF Spectrum Measurement Description” on page 75 |
| Query | Range: 0 to 8 Resolution: 1 |

SETup:ORFSpectrum:TIMEout:TIME

| | |
|--|--|
| Function | Selects/queries the timeout value in seconds that will be used for output RF spectrum measurements when the “SETup:ORFSpectrum:TIMEout:STATE” is ON. The units (S MS) are optional, if no units are specified than units default to S. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST Setting | 10 seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:TIME 1" !Sets the timeout value to !15 seconds.</pre> | |

SETup:ORFSpectrum:TIMEout[:STIME]

| | |
|--|---|
| Function | Sets/queries the timeout value in seconds that will be used for output RF spectrum 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: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST Setting | 10 seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STIME 12" !Sets the timeout value to !10 seconds and the state to on.</pre> | |

SETup:ORFSpectrum

SETup:ORFSpectrum:TIMEout:STATE

| | |
|--|---|
| Function | Selects/queries output RF spectrum measurement timeout state. |
| 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

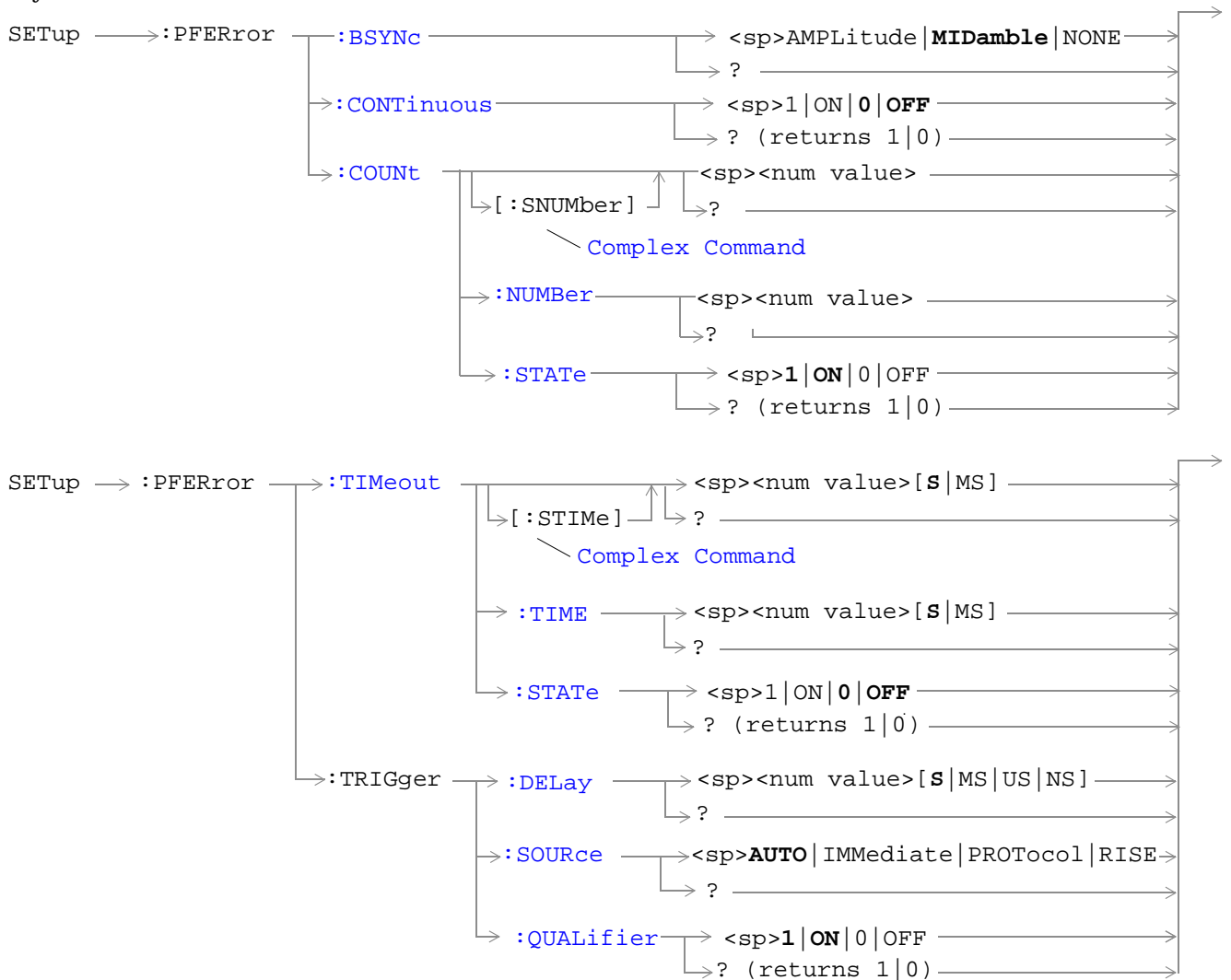
| | |
|--|---|
| Function | Sets/queries the trigger delay for output RF spectrum measurements. The units (S MS US NS) are optional, if no units are specified than units default to S. |
| Range | Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 nanoseconds whichever is greater |
| 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 | Selects/queries the trigger source for output RF spectrum measurements. See “Output RF Spectrum Measurement Description” on page 75. |
| Setting | Range: AUTO IMMEDIATE PROTOCOL RISE See “Triggering of Measurements” on page 149. |
| Query | Range: AUTO IMM PROT RISE |
| *RST Setting | AUTO |
| Programming Example | |
| OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE AUTO" !Sets trigger source. | |

SETup:PFERror

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“Diagram Conventions” on page 213

SETup:PFERror

SETup:PFERror:BSYNc

| | |
|--|--|
| Function | Sets/queries the burst synchronization mode for phase/frequency measurements. See “Burst Synchronization of Measurements” on page 115. |
| 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 | Sets/queries the trigger state for phase/frequency measurements. |
| 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 | Sets/queries the number of phase/frequency measurements the test set will make and turns the multi-measurement count state on. |
| 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:COUNT:NUMBer

| | |
|---|--|
| Function | Sets/queries the number of phase/frequency measurements the Test Set will make when the multi-measurement count state is on. |
| Setting | Range: 1 to 999 Resolution: 1 |
| Query | Range: 1 to 999 Resolution: 1 |
| *RST Setting | 10 |
| Programming Example <pre>OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 55" !Sets the multi-measurement count !value to 55.</pre> | |

SETup:PFERror:COUNT:STATe

| | |
|---|---|
| Function | Sets/queries the phase/frequency multi-measurement count state. |
| Setting | Range: 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 0 off |
| Programming Example <pre>OUTPUT 714;"SETUP:PFERROR:COUNT:STATE ON" !Turns on multi-measurement mode for !the phase/frequency measurement.</pre> | |

SETup:PFERror:TIMEout[:STIME]

| | |
|--|--|
| Function | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST Setting | 10 seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STIME 3" !Sets the timeout state to on and the !timeout value to 3 seconds.</pre> | |

SETup:PFERror

SETup:PFERror:TIMEout:TIME

| | |
|---|---|
| Function | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *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 | Selects/queries the timeout state for a phase/frequency measurement. |
| 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 | 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 "Phase and Frequency Error Measurement Description" on page 82 |
| 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:TRIGger:SOURce

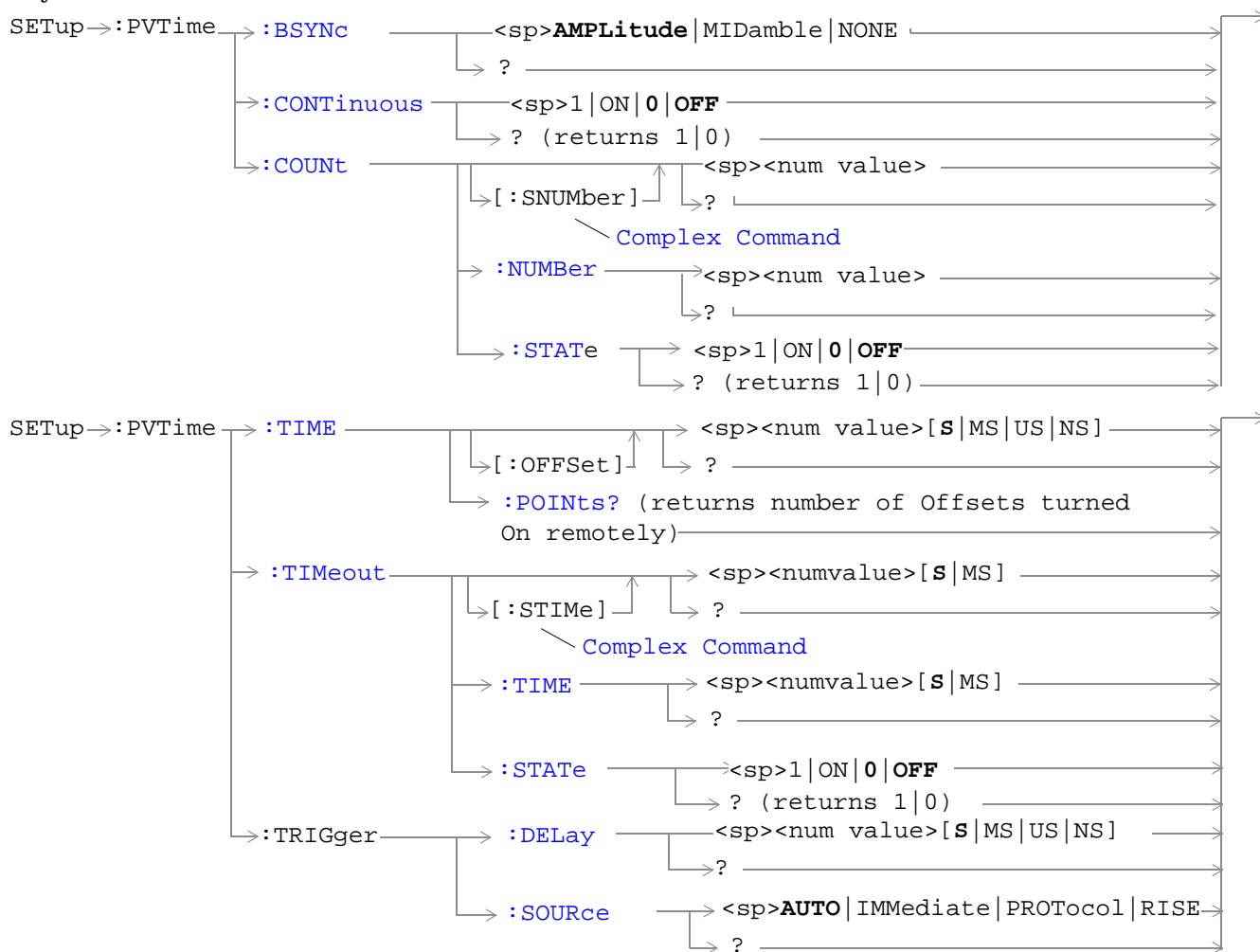
| | |
|---|---|
| Function | Sets/queries the trigger source for phase/frequency measurements. See “Phase and Frequency Error Measurement Description” on page 82. |
| Range | AUTO PROTOcol RISE IMMEDIATE See “Triggering of Measurements” on page 149. |
| Query | AUTO PROT RISE IMM |
| *RST Setting | AUTO |
| Programming Example <pre>OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO" !Sets trigger source to AUTO.</pre> | |

SETup:PFERror:TRIGger:QUALifier

| | |
|--|--|
| Function | Selects/queries the trigger qualifier for phase/frequency measurements. See “Trigger Qualifier Description” on page 152. |
| Setting | Range: 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 1 on |
| Programming Example <pre>OUTPUT 714;"SETUP:PFERROR:TRIGGER:QUALIFIER OFF" !Sets trigger qualifier state !to off.</pre> | |

SETup:PVTime

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“Diagram Conventions” on page 213

SETup:PVTime:BSYNc

| | |
|---|--|
| Function | Sets/queries the burst synchronization mode for power versus time measurements. See "Burst Synchronization of Measurements" on page 115. |
| 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 | Sets/queries the trigger state for power versus time measurements. See "Measurement States" on page 150 |
| Range | 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 | Sets/queries the number of power versus time measurements the test set will make and turns the multi-measurement count state on. |
| 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 | Sets/queries the number of Power vs. Time measurements the test set will make when multi-measurement state is on. |
| 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 | Sets/queries power versus time multi-measurement count state. |
| 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:TIME[:OFFSet]

| | |
|--|---|
| Function | <p>Sets/queries the time offsets in seconds for power vs time power measurement, (not the mask measurement).</p> <p>All 12 time offsets are set to on by default. If less than 12 values are sent with this command, the remaining offsets are turned off, see "Power versus Time Measurement Description" on page 88. 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: 0 to 12 comma-separated values ranging from: -50 us to 593 μs and 9.91E+37 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 μs</p> <p>time offset 2 = -18 μs</p> <p>time offset 3 = -10 μs</p> <p>time offset 4 = 0 μs</p> <p>time offset 5 = 321.2 μs</p> <p>time offset 6 = 331.2 μs</p> <p>time offset 7 = 339.2 μs</p> <p>time offset 8 = 349.2 μs</p> <p>time offset 9 = 542.8 μs</p> <p>time offset 10 = 552.8 μs</p> <p>time offset 11 = 560.8 μs</p> <p>time offset 12 = 570.8 μs</p> |
| <p>Programming Example</p> <pre> OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28.0 US, -18.0 US, -10.0 US, 0" !Configures the first four time offset points and turns the remaining eight off. !Using the query form of this command would return four time offset values OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28.0 US" !Configures the first time offset !point and turns the remaining !eleven off. Using the query form !of this command would return one !time offset value OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET" !Turns all 12 offset points off. Using the !query form of this command would return !9.91E+37 (NAN) </pre> | |

SETup:PVTime

SETup:PVTime:TIME:POINts?

| | |
|--------------|--|
| Function | Queries the number of Measurement Offset points that are turned on during a power versus time measurement. |
| Query | Range: 0 to 12 Resolution: 1 |
| *RST Setting | 12 |
| Comments | This command is useful for determining how many time values will be returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet]" query is sent, and how many power values will be returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 343 command is sent. |

SETup:PVTime:TIMEout[:STIME]

| | |
|---|---|
| Function | Sets/queries the timeout value in seconds that will be used for power versus time measurements. This command also sets the timeout state to on. The units (S MS) are optional, if no units are specified then units default to S. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *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 | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *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 | Sets/queries power versus time timeout state. |
| 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

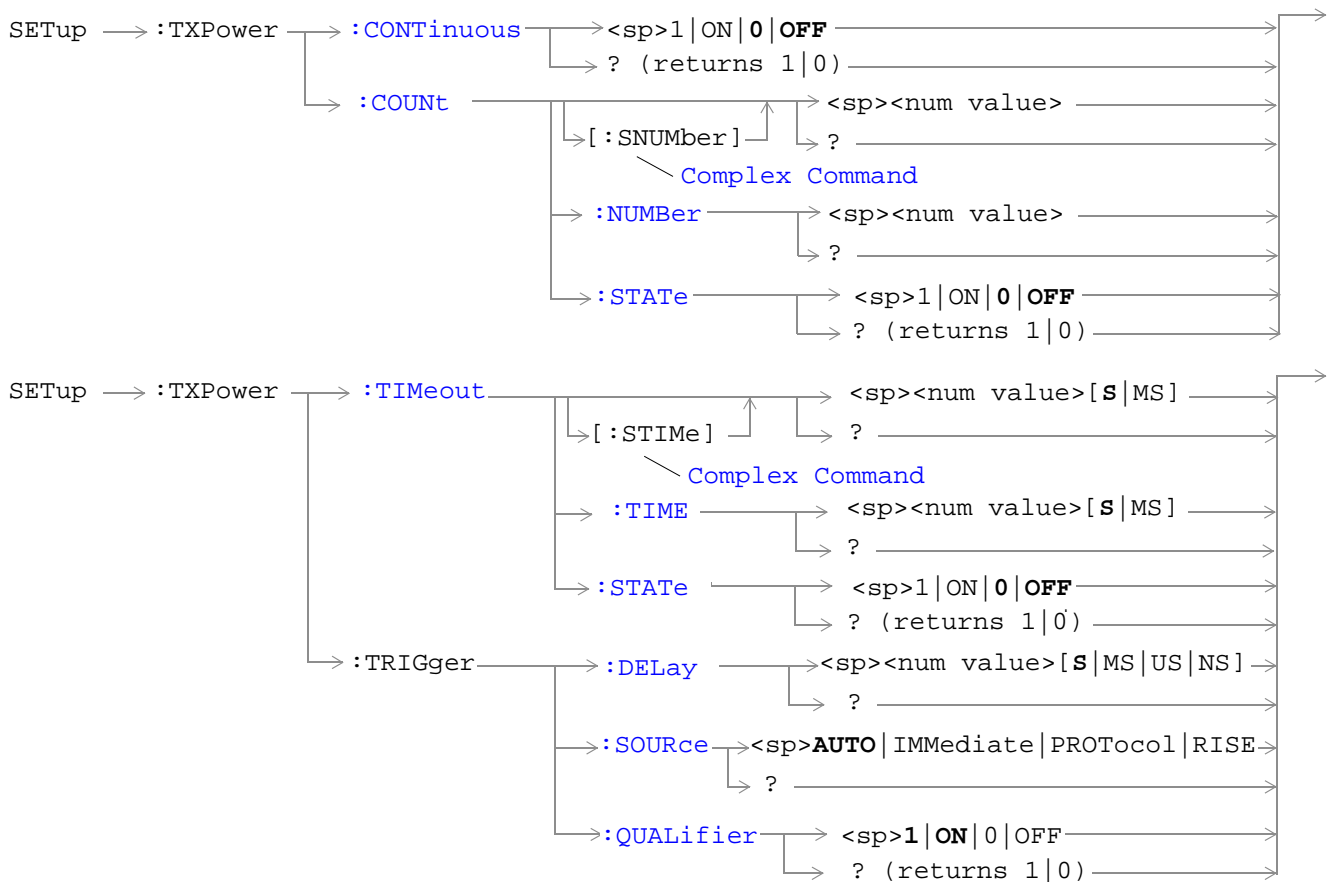
| | |
|---|--|
| Function | Selects/queries the trigger delay in seconds for power versus time measurements. The units (S MS US NS) are optional, if no units are specified then units default to S. |
| Range | Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | 0 seconds |
| Programming Example | |
| OUTPUT 714;"SETUP:PVTIME:TRIGGER:DELAY 1.1MS" !Sets trigger delay value to 1.1 !milli-seconds. | |

SETup:PVTime:TRIGger:SOURce

| | |
|--|---|
| Function | Selects/queries the trigger source for power versus time measurements. See "Triggering of Measurements" on page 149 |
| 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 AUT. | |

SETup:TXPower

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“Diagram Conventions” on page 213

SETup:TXPower:CONTInuous

| | |
|--|--|
| Function | Sets/queries the trigger state for TX carrier power measurements. |
| Setting | Single trigger mode = 0 OFF Continuous trigger mode = 1 ON |
| Query | 0 1 |
| *RST Setting | 0 off |
| Program Example | OUTPUT 714;"SETUP:TXPOWER: CONTINUOUS OFF" ! specifies single trigger mode for TX Carrier Power measurements. |
| Programming Example OUTPUT 714;"SETUP:TXPOWER: CONTINUOUS OFF" !Specifies single trigger mode for !TX Carrier Power measurements. | |

SETup:TXPower:COUNT[:SNUMBER]

| | |
|--|---|
| Function | Sets/queries the number of TX carrier power measurements the test set will make and turns the multi-measurement count state on. |
| 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 | Sets/queries the number of TX power measurements the test set will make when the multi-measurement state is on. |
| 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

SETup:TXPower:COUNT:STATE

| | |
|---|--|
| Function | Sets/queries the TX power multi-measurement count state. |
| Setting | 0 Off 1 On |
| Query | 0 1 |
| *RST Setting | 0 off |
| Programming Example | |
| OUTPUT 714; "SETUP:TXPOWER:COUNT:STATE ON" !Sets the multi-measurement count !state to on. | |

SETup:TXPower:TIMEout[:STIME]

| | |
|---|--|
| Function | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST Setting | 10 seconds |
| Programming Example | |
| OUTPUT 714; "SETUP:TXPOWER:TIMEOUT:STIME 20" !Sets the state to on and the !timeout value to 20 seconds. | |

SETup:TXPower:TIMEout:TIME

| | |
|---|--|
| Function | 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. |
| Setting | Range: .1 to 999 Resolution: .1 |
| Query | Range: .1 to 999 Resolution: .1 |
| *RST Setting | 10 seconds |
| Programming Example | |
| OUTPUT 714; "SETUP:TXPOWER:TIMEOUT:TIME 20" !Sets the TX power measurement !timeout to 20 seconds. | |

SETup:TXPower:TIMEout:STATE

| | |
|--|---|
| Function | Selects/queries TX carrier power measurement timeout state. |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 0 off |
| Programming Example <pre>OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE 1" !Turns the TX carrier power timeout !state on.</pre> | |

SETup:TXPower:TRIGger:DELay

| | |
|--|--|
| Function | 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. |
| Setting | Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | zero seconds |
| Programming Example <pre>OUTPUT 714;"SETUP:TXPOWER:TRIGGER:DELAY 1.5MS" !Set trigger delay time to !1.5 milliseconds</pre> | |

SETup:TXPower:TRIGger:SOURce

| | |
|---|--|
| Function | Selects/queries the trigger source for TX carrier power measurements. See “Triggering of Measurements” on page 149 |
| Setting | AUTO PROTOcol RISE IMMEDIATE |
| Query | AUTO PROT RISE IMM |
| *RST Setting | AUTO |
| Programming Example <pre>OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Sets trigger source to AUTO.</pre> | |

SETup:TXPower

SETup:TXPower:TRIGger:QUALifier

| | |
|---|--|
| Function | Sets/queries the trigger qualification for TX carrier power measurements. When ON, an automatic trigger re-arm occurs if a measurement is triggered when no valid signal (burst) is present. See "Trigger Qualifier Description" on page 152 |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 1 on |
| Programming Example OUTPUT 714; "SETUP:TXPOWER:TRIGGER:QUALIFIER ON" !Sets trigger qualifier state !to on. | |

STATus Subsystem Description

Description

The STATus subsystem is used to communicate current test set status information to the controlling application program.

Syntax Diagrams and Command Descriptions

[“STATus:OPERation” on page 438](#)

[“STATus:PRESet” on page 454](#)

[“STATus:QUEStionable” on page 455](#)

[“Standard Event Status Register” on page 470](#)

[“Status Byte Register” on page 469](#)

Status Register Bit Definitions

[“Status Byte Register Bit Assignments” on page 469](#)

[“Standard Event Status Register Bit Assignment” on page 471](#)

[“STATus:QUEStionable Condition Register Bit Assignment” on page 459](#)

[“STATus:QUEStionable:CALL Condition Register Bit Assignment” on page 460](#)

[“STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment” on page 461](#)

[“STATus:QUEStionable:ERRors Condition Register Bit Assignment” on page 463](#)

[“STATus:QUEStionable:ERRors:GSM Condition Register Bit Assignment” on page 466](#)

[“STATus:QUEStionable:HARDware Condition Register Bit Assignment” on page 468](#)

[“STATus:OPERation Condition Register Bit Assignment” on page 442](#)

[“STATus:OPERation:CALL Condition Register Bit Assignment” on page 444](#)

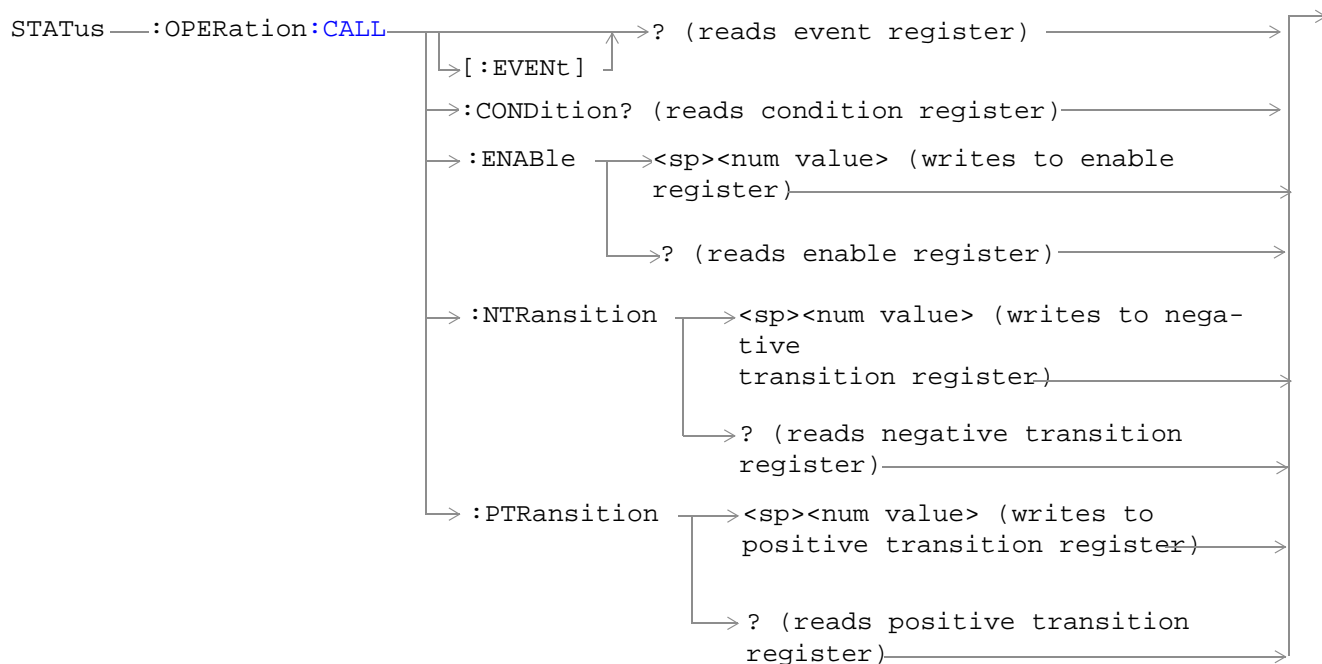
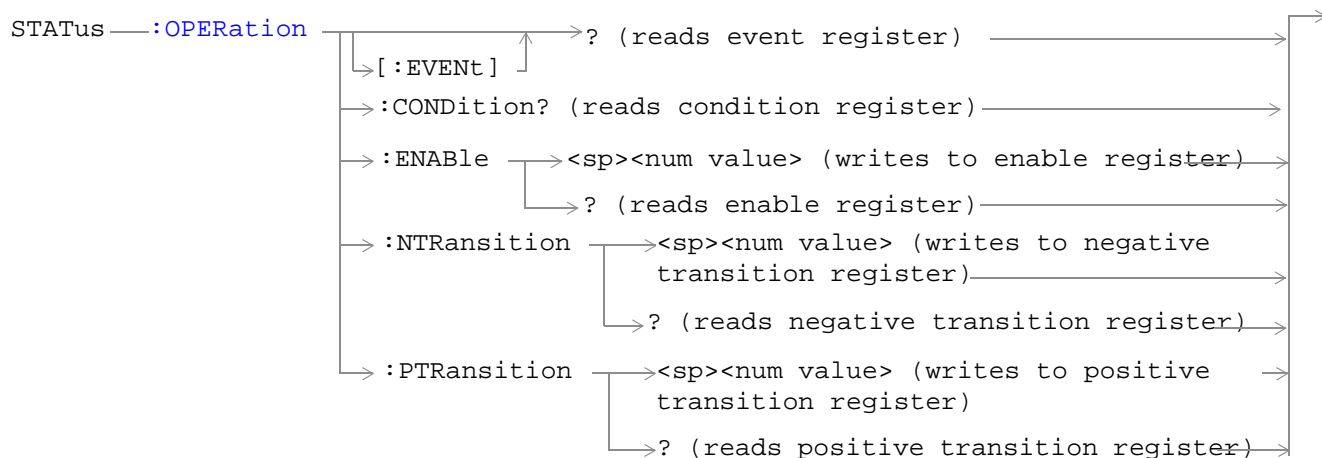
[“STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 446](#)

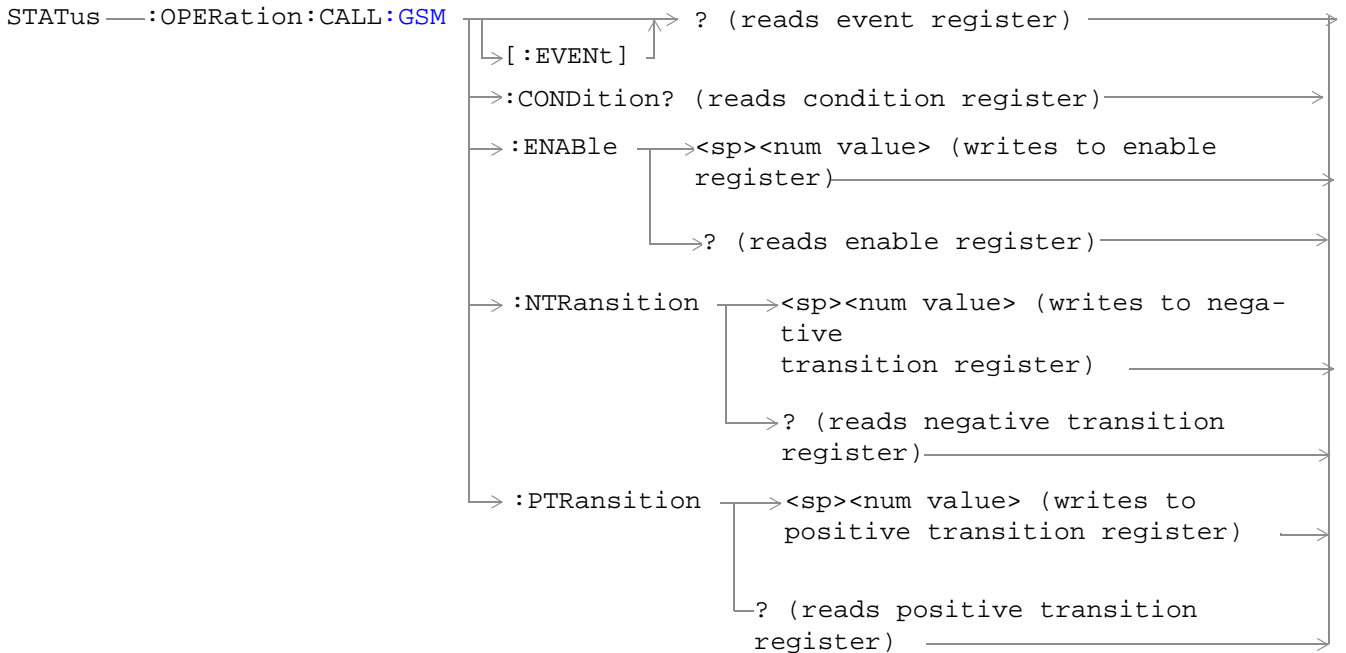
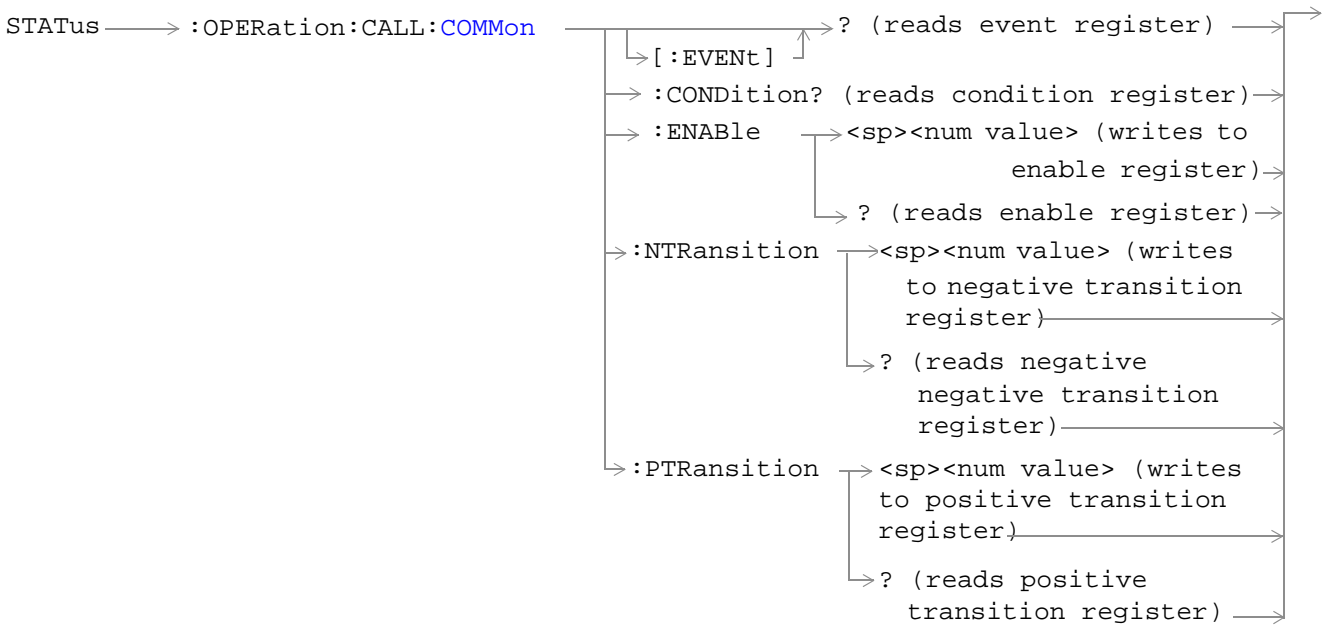
[“STATus:OPERation:NMRReady Condition Register Bit Assignment” on page 448](#)

[“STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 451](#)

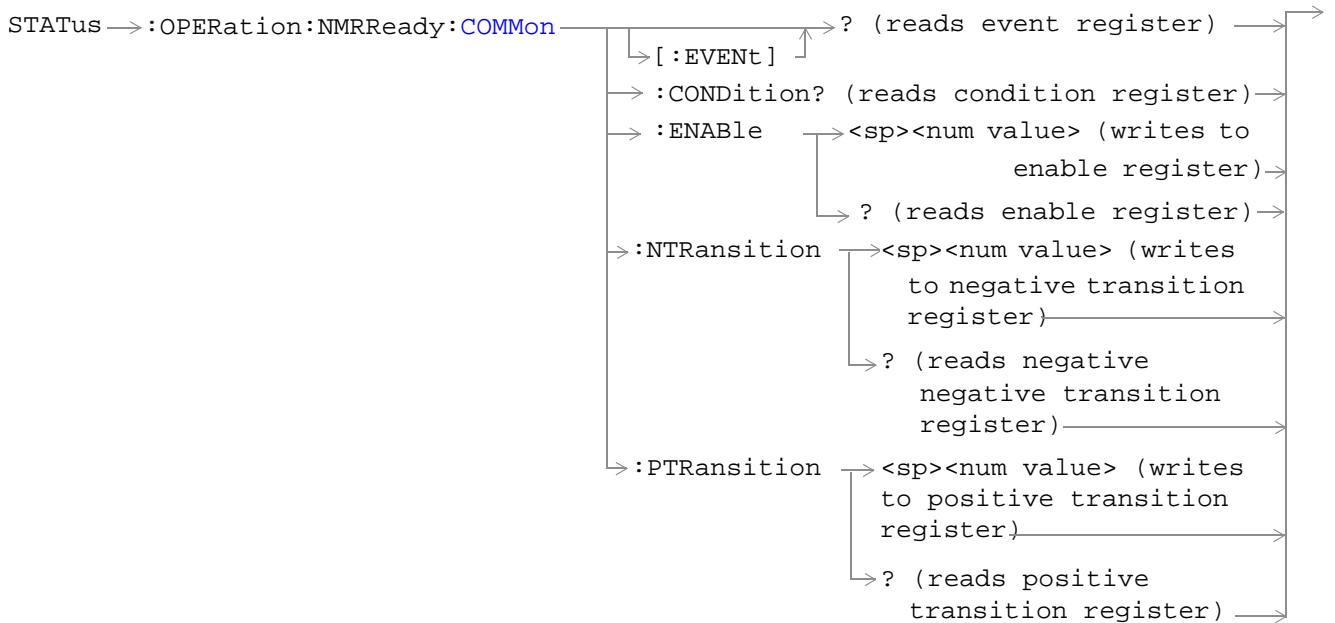
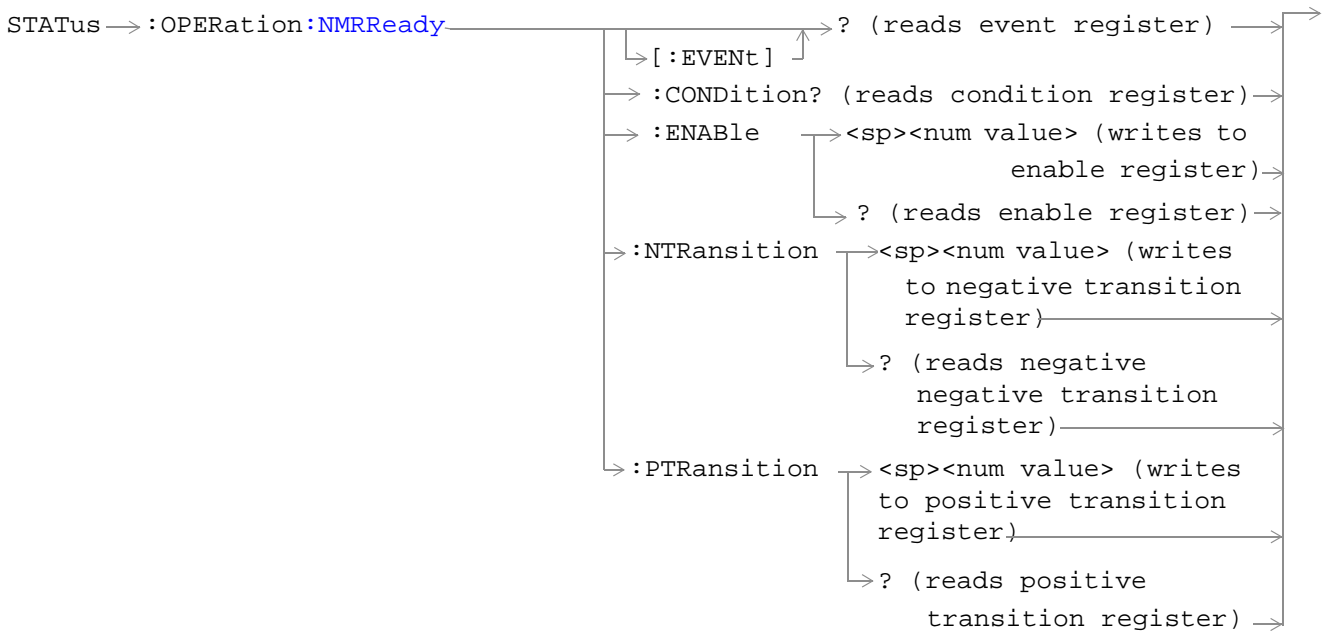
STATUS:OPERation

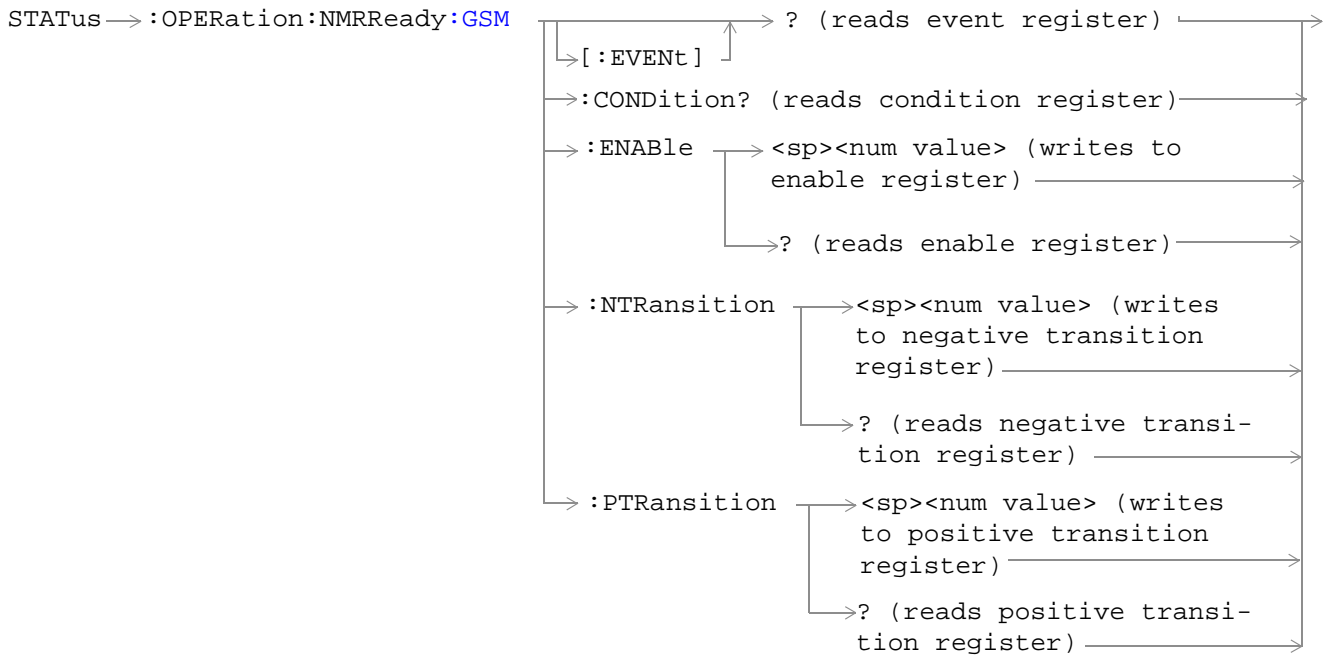
February 14, 2000





STATUS:OPERation





[“Diagram Conventions” on page 213](#)

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 bit for the OPERATION:CALL register. |
| 9 | 512 | NMRReady (New Measurement Result Ready) Summary | This bit is the summary 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 the
!Operation Event Register.
OUTPUT 714;"STATUS:OPERATION:CONDITION?" !Queries the
!Operation Condition Register.
OUTPUT 714;"STATUS:OPERATION:ENABLE 1024" !Sets bit
!10 (2^10 equals 1024) of the Operation Enable Register.
OUTPUT 714;"STATUS:OPERATION:NTR 1024" !Sets bit
!10 (2^10 equals 1024) of the Operation Negative Transition Register.
OUTPUT 714;"STATUS:OPERATION:PTR 512" !Sets bit
!
! 9 (2^9 equals 512) of the Operation Positive Transition Register.
```

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 OPERation:CALL:TA136 register. |
| 4 | 16 | DIGital136 Summary bit | This bit is the summary bit for the OPERation:CALL:DIGital136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the OPERation:CALL:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the OPERation:CALL:GSM register. |
| 1 | 2 | COMMon Summary bit | This bit is the summary bit for the 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 the Operation Call Event
!Register.
```

```
OUTPUT 714;"STATUS:OPERATION:CALL:CONDITION?" !Queries the Operation Call
!Condition Register.
```

```
OUTPUT 714;"STATUS:OPERATION:CALL:ENABLE 4" !Sets the Operation Call Enable
!Register for bit 4.
```

```
OUTPUT 714;"STATUS:OPERATION:CALL:NTR 4" !Sets the Negative Transition
!Register for bit 4.
```

```
OUTPUT 714;"STATUS:OPERATION:CALL:PTR 256" !Sets the Positive Transition
!Register for bit 256.
```

STATUS:OPERation:CALL:COMMON Condition Register Bit Assignment

The STATUS:OPERation:CALL:AMPS: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"> Active Cell mode - the call processing state leaves the idle state Test mode - the test set has noted a base station origination. |
| 6 | 64 | Call Control Status Changing | This bit is set to a 1 when the call control status change detector has been armed. |
| 5 | 32 | Reserved for future use. | This bit will always be 0. |
| 4 | 16 | Reserved for future use. | This bit will always be 0. |
| 3 | 8 | Call Control Status Alerting | This bit will be a 1 when the test set is in the call alerting state (ringing). |
| 2 | 4 | Call Control Status Connected | This bit will be a 1 when the test set is in the call connected state. |
| 1 | 2 | Call Control Status Idle | This bit will be a 1 when the test set is in the call idle state. |
| 0 | 1 | Extension Bit | This bit will always be 0. |

STATUS:OPERation:CALL:GSM Condition Register Bit Assignment

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"> Active Cell mode - the call processing state reaches (or is in) the idle state Test mode - the test set has noted a base station termination. |
| 7 | 128 | BS Originating | This bit will be a 1 when: <ul style="list-style-type: none"> Active Cell mode - the call processing state leaves the idle state Test mode - the test set has noted a base station origination. |
| 6 | 64 | Call Control Status Changing | This bit is set to a 1 when the call control status change detector has been armed. |
| 5 | 32 | TCH Assignment in Progress | This bit will be a 1 when: <ul style="list-style-type: none"> The channel assignment is successfully completed (when a call is established). The test set notes a change in the TCH ARFCN, cell band, TCH timeslot, or mobile station timing advance. An error message is generated. |
| 4 | 16 | BCH Changing | This bit will be a 1 when: <ul style="list-style-type: none"> The downlink signal is transmitting on the new broadcast channel. The test set has noted a change in cell band. |
| 3 | 8 | Call Control Status Alerting | This bit will be a 1 when the test set is in the call alerting state (ringing). |

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|-------------------------------|--|
| 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 the GSM Operation Call
!Event Register.
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:CONDITION?" !Queries the GSM Operation Call
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:ENABLE 4" !Sets the GSM Operation Call
!Enable Register for bit 4.
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:NTR 4" !Sets the GSM Negative Transition
!Register for bit 4.
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:PTR 256" !Sets the GSM Positive Transition
!Register for bit 256.

```

STATUS:OPERation:NMRReady Condition Register Bit Assignment

The STATUS:OPERation:NMRReady register bits indicate when a measurement has been completed and new measurement results are available.

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|----------------------------|---|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit will always be 0. |
| 14 | 16384 | Reserved for future use. | This bit will always be 0. |
| 13 | 8192 | Reserved for future use. | This bit will always be 0. |
| 12 | 4096 | Reserved for future use. | This bit will always be 0. |
| 11 | 2048 | Reserved for future use. | This bit will always be 0. |
| 10 | 1024 | Reserved for future use. | This bit will always be 0. |
| 9 | 512 | Reserved for future use. | This bit will always be 0. |
| 8 | 256 | Reserved for future use. | This bit will always be 0. |
| 7 | 128 | Reserved for future use. | This bit will always be 0. |
| 6 | 64 | Reserved for future use. | This bit will always be 0. |
| 5 | 32 | TA136 Summary bit | This bit is the summary bit for the OPERation:NMRReady:TA136 register. |
| 4 | 16 | DIGital136 Summary bit | This bit is the summary bit for the OPERation:NMRReady:DIGital136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the OPERation:NMRReady:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the OPERation:NMRReady:GSM register. |
| 1 | 2 | COMMon Summary bit | This bit is the summary bit for the OPERation:NMRReady:COMMon register. |
| 0 | 1 | Extension Bit | This bit will always be 0. |

Program Examples - STATus:OPERation:NMRReady

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:EVENT?" !Queries the New Measurement
!Results Ready Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:CONDITION?" !Queries the New Measurement
!Results Ready
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:ENABLE 16" !Sets New Measurement Results
!Ready Enable Register
!for bit 16.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:NTR 2" !Sets the New Measurement Results
!Ready Negative Transition
!Register for bit 4.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:PTR 4" !Sets the New Measurement
!Results Ready Positive
!Transition Register
!for bit 4
```

STATUS:OPERation:NMRReady:COMMON Condition Register Bit Assignment

The STATUS:OPERation:NMRReady:COMMON register bits indicate when a measurement has been completed and new measurement results are available.

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|----------------------------|--|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit will always be 0. |
| 14 | 16384 | Reserved for future use. | This bit will always be 0. |
| 13 | 8192 | Reserved for future use. | This bit will always be 0. |
| 12 | 4096 | Reserved for future use. | This bit will always be 0. |
| 11 | 2048 | Reserved for future use. | This bit will always be 0. |
| 10 | 1024 | Reserved for future use. | This bit will always be 0. |
| 9 | 512 | Reserved for future use. | This bit will always be 0. |
| 8 | 256 | Reserved for future use. | This bit will always be 0. |
| 7 | 128 | Reserved for future use. | This bit will always be 0. |
| 6 | 64 | Reserved for future use. | This bit will always be 0. |
| 5 | 32 | Reserved for future use. | This bit will always be 0. |
| 4 | 16 | Reserved for future use. | This bit will always be 0. |
| 3 | 8 | Reserved for future use. | This bit will always be 0. |
| 2 | 4 | Reserved for future use. | This bit will always be 0. |
| 1 | 2 | Audio Analyzer | This is the summary bit for the OPERation:NMRReady:COMMON Audio Analyzer register. |
| 0 | 1 | Extension Bit | This bit will always be 0. |

Program Examples - STATUS:OPERation:NMRReady:COMMON

```

OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:EVENT?" !Queries the New Measurement
                !Results Ready Common Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:CONDITION?" !Queries the New Measurement
                !Results Ready Common
                !Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:ENABLE 2" !Sets New Measurement Results
                !Ready Common Enable Register
                !for bit 2.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:NTR 2" !Sets the New Measurement Results
                !Ready Common Negative Transition
                !Register for bit 2.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:PTR 2" !Sets the New Measurement
                !Results Ready Common Positive
                !Transition Register for bit 2
    
```

STATUS:OPERation:NMRReady:GSM Condition Register Bit Assignment

The STATUS:OPERation:NMRReady:GSM register bits indicate when a GSM measurement has been completed and new measurement results are available.

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|---|--|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit will always be 0. |
| 14 | 16384 | Reserved for future use. | This bit will always be 0. |
| 13 | 8192 | Reserved for future use. | This bit will always be 0. |
| 12 | 4096 | Reserved for future use. | This bit will always be 0. |
| 11 | 2048 | Reserved for future use. | This bit will always be 0. |
| 10 | 1024 | DPOWer New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See "Measurement States" on page 150. |
| 9 | 512 | I/Q Tuning New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See "Measurement States" on page 150. |
| 8 | 256 | BERRor New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See "Measurement States" on page 150. |
| 7 | 128 | FBERRor New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See "Measurement States" on page 150. |
| 6 | 64 | DAUDio New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See "Measurement States" on page 150. |
| 5 | 32 | AAUDio New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See "Measurement States" on page 150. |

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|--|--|
| 4 | 16 | ORFSpectrum New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See “Measurement States” on page 150. |
| 3 | 8 | PFERror New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See “Measurement States” on page 150. |
| 2 | 4 | PVTime New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See “Measurement States” on page 150. |
| 1 | 2 | TXPower New Measurement Result Ready | This bit will be a 1 if the measurement has been initiated. This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See “Measurement States” on page 150. |
| 0 | 1 | Extension Bit | This bit will always be 0. |

Program Examples - STATUS:OPERation:NMRReady:GSM

```

OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:EVENT?" !Queries the GSM New Measurement
!Results Ready Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:CONDITION?" !Queries the GSM New Measurement
!Results Ready
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:ENABLE 16" !Sets the GSM New Measurement Results
!Ready Enable Register
!for bit 16.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:NTR 2" !Sets the GSM New Measurement Results
!Ready Negative Transition
!Register for bit 4.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:PTR 4" !Sets the GSM New Measurement
!Results Ready Positive
!Transition Register
!for bit 4

```

Related Topics

[“Triggering of Measurements” on page 149](#)

STATus:PRESet

July 12, 1999

STATus → :PRESet →

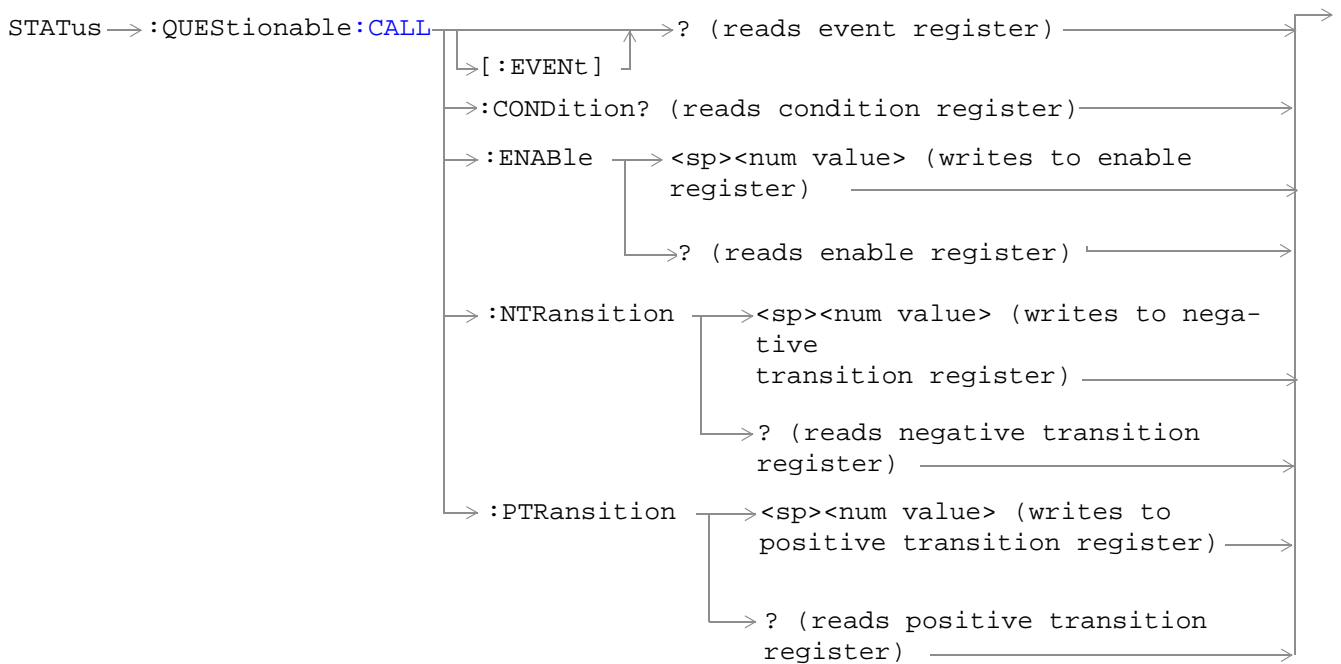
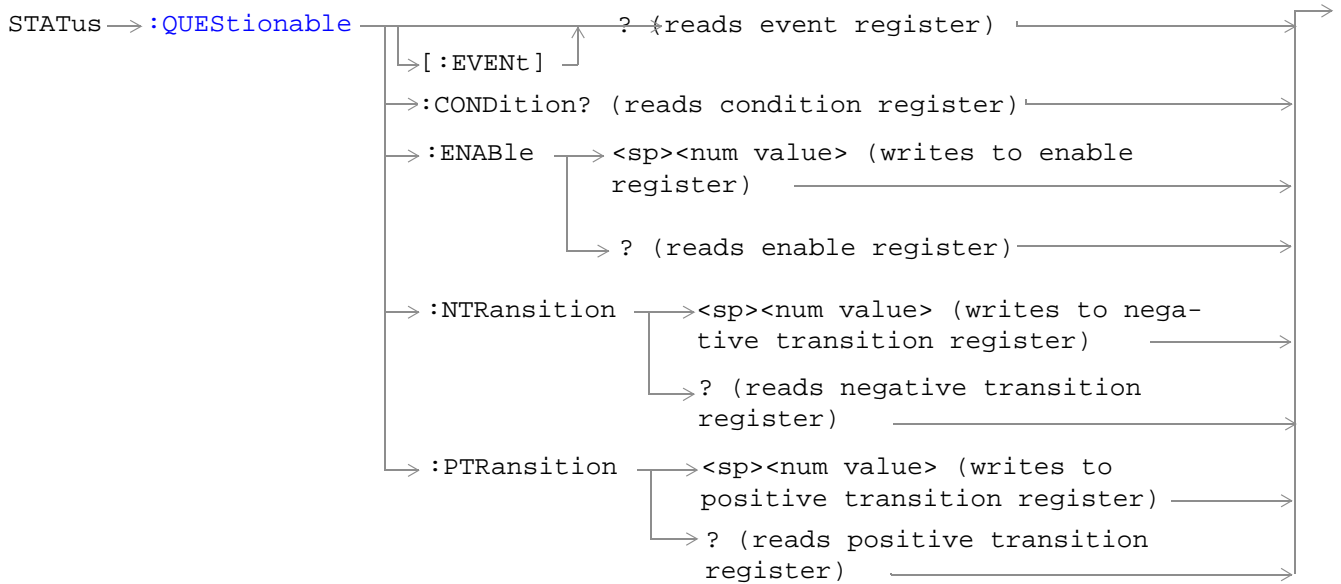
[“Diagram Conventions” on page 213](#)

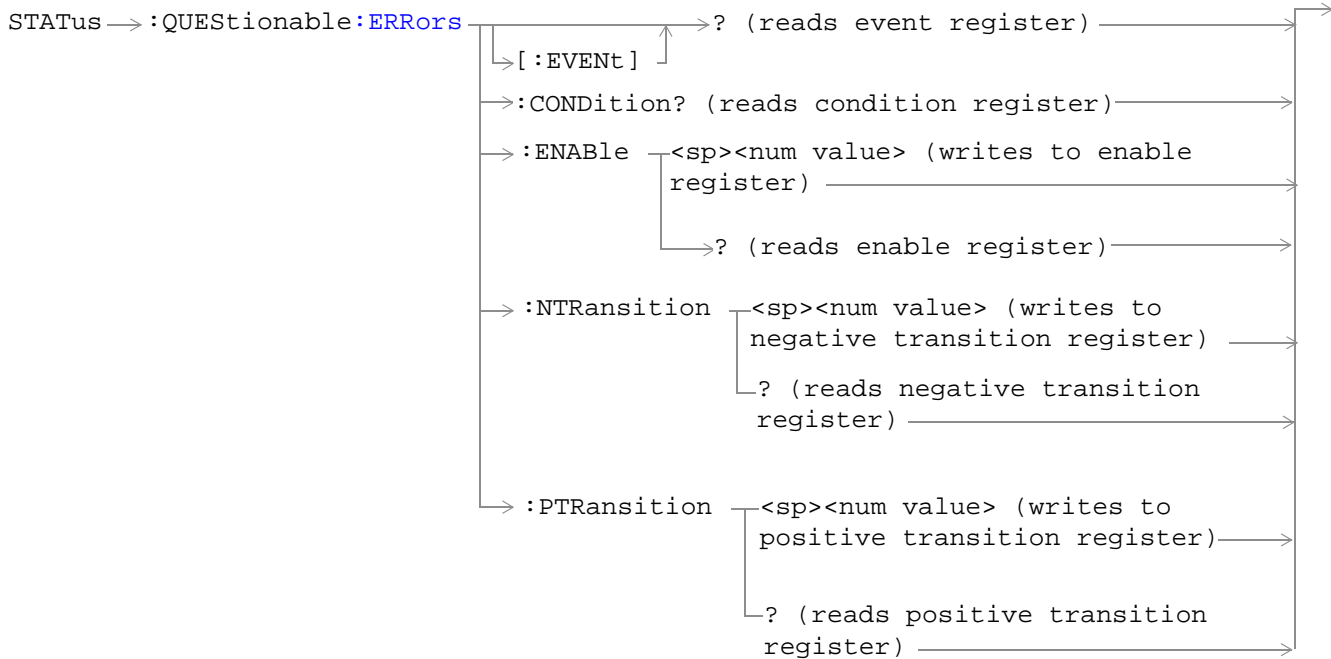
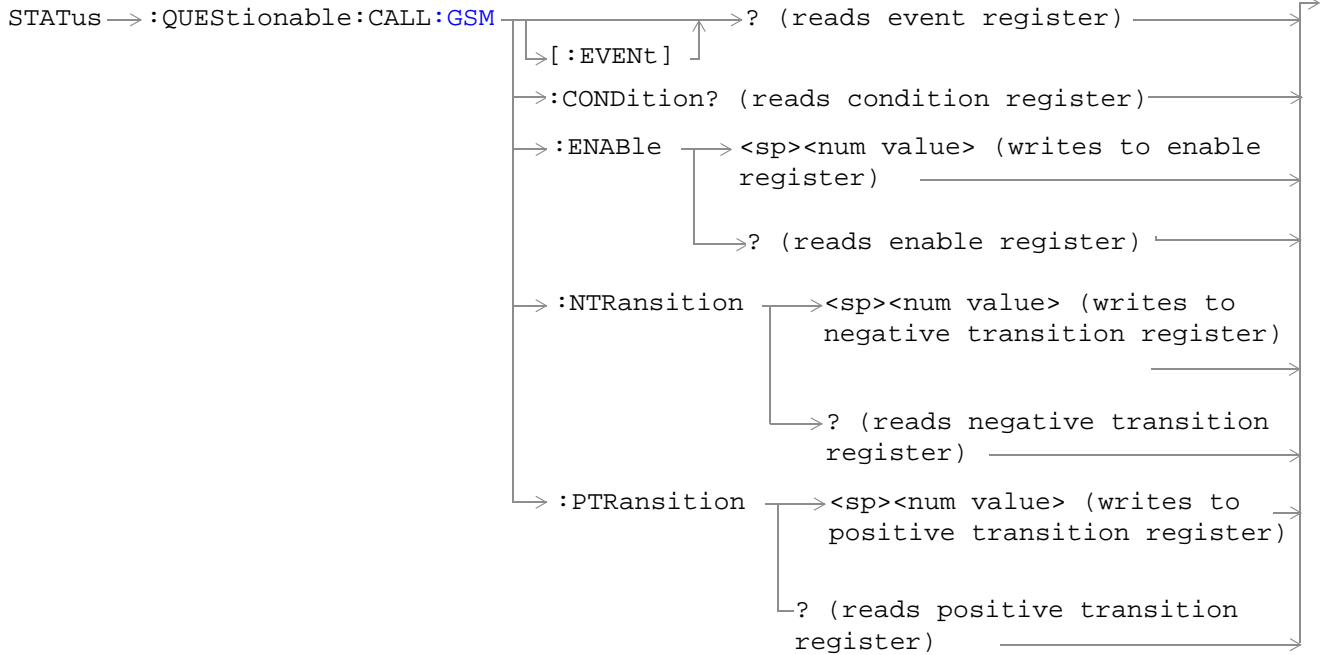
STATus:PRESet

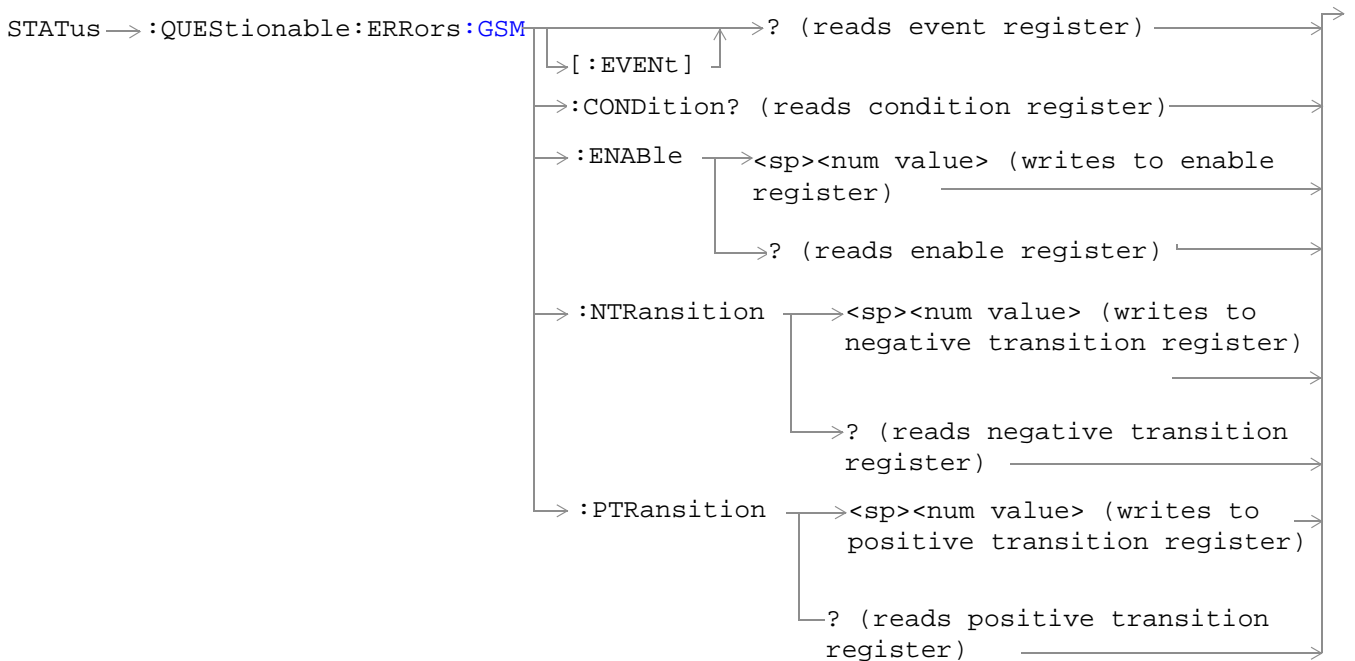
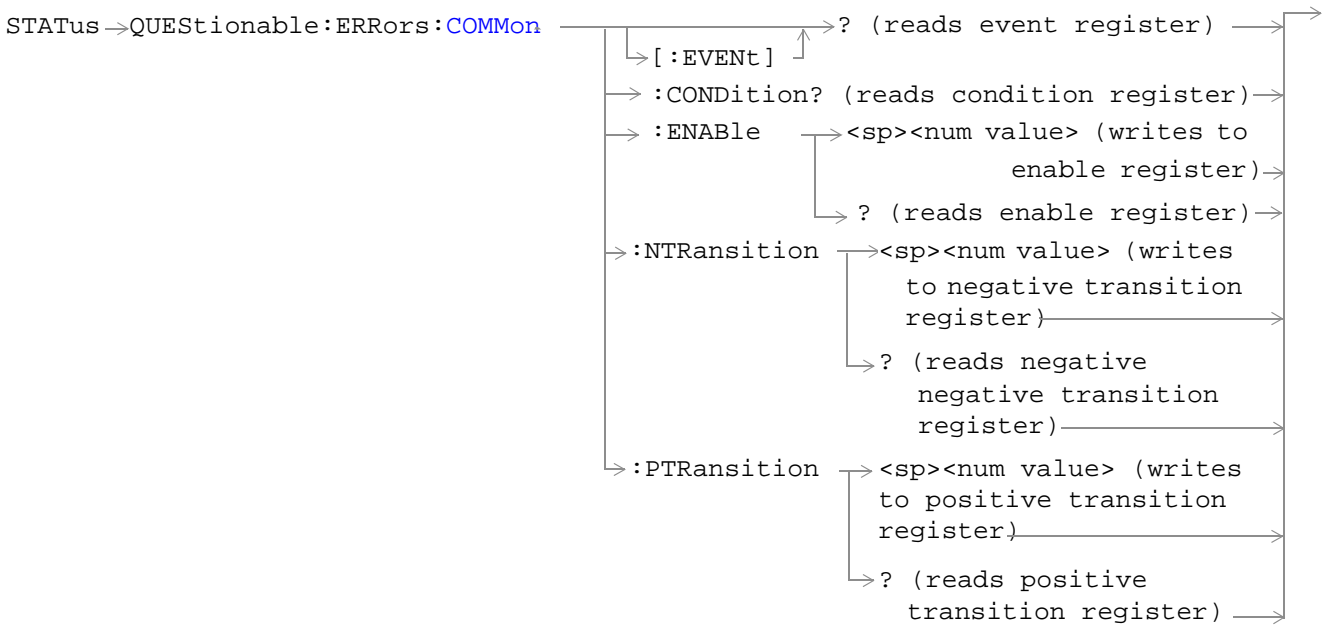
| | |
|----------|---|
| Function | <p>Presets the Status Subsystem</p> <p>Sets all Enable Registers to 0 (not enabled).</p> <p>Sets all Positive Transition Registers (PTR) to 1 (positive transitions enabled).</p> <p>Sets all Negative Transition Registers (NTR) to 0 (negative transitions disabled).</p> |
|----------|---|

STATUS:QUESTIONABLE

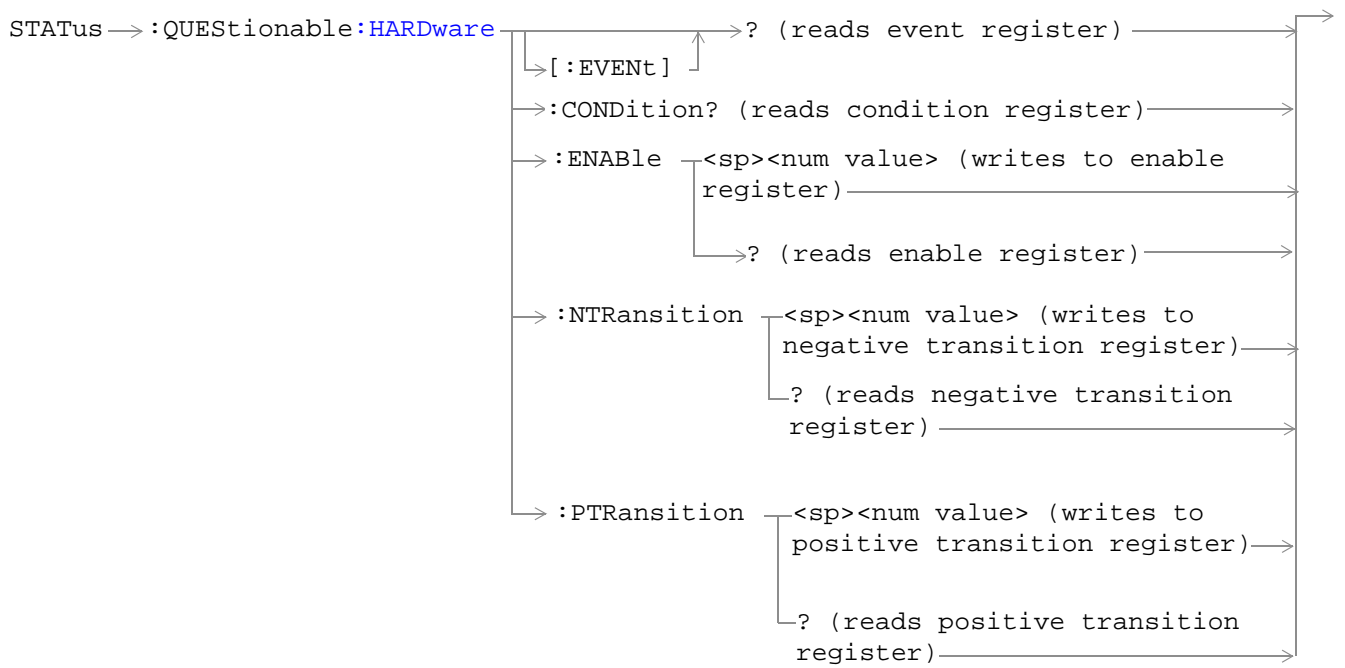
February 14, 2000







STATUS:QUESTIONable



["Diagram Conventions" on page 213](#)

STATUS:QUESTIONABLE Condition Register Bit Assignment

The STATUS:QUESTIONABLE register contains bits which give an indication that the data currently being acquired or generated is of questionable quality due to some condition affecting the parameter 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 bit for the QUESTIONABLE:HARDWARE register. |
| 10 | 1024 | QUESTIONABLE:CALL summary | This bit is the summary bit for the 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 bit for the 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 the Questionable Event
!Register.
```

STATUS:QUESTIONable:CALL Condition Register Bit Assignment

The STATUS:QUESTIONable:CALL registers will contain information about which event(s) occurred during call processing that indicate why the call processing procedure failed.

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|----------------------------|--|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit will always be 0. |
| 14 | 16384 | Reserved for future use. | This bit will always be 0. |
| 13 | 8192 | Reserved for future use. | This bit will always be 0. |
| 12 | 4096 | Reserved for future use. | This bit will always be 0. |
| 11 | 2048 | Reserved for future use. | This bit will always be 0. |
| 10 | 1024 | Reserved for future use. | This bit will always be 0. |
| 9 | 512 | Reserved for future use. | This bit will always be 0. |
| 8 | 256 | Reserved for future use. | This bit will always be 0. |
| 7 | 128 | Reserved for future use. | This bit will always be 0. |
| 6 | 64 | Reserved for future use. | This bit will always be 0. |
| 5 | 32 | TA136 Summary bit | This bit is the summary bit for the QUESTIONable:CALL:TA136 register. |
| 4 | 16 | DIGITAL136 Summary bit | This bit is the summary bit for the QUESTIONable:CALL:DIGital136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the QUESTIONable:CALL:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the QUESTIONable:CALL:GSM register. |
| 1 | 2 | COMMON Summary bit | This bit is the summary bit for the QUESTIONable:CALL:COMMON register. |
| 0 | 1 | Extension Bit | This bit will always be 0. |

Program Example - STATUS:QUESTIONable:CALL Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CONDITION?" !Queries the Questionable
!Call Condition Register
```

STATUS:QUESTIONABLE:CALL:GSM Condition Register Bit Assignment

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. |
| 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. |

STATUS:QUESTIONable

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|---------------------------------------|--|
| 2 | 4 | Call disconnected: Radio Link Failure | This bit is a 1 if the radio link time out (T100) has expired. The timer expires if a radio link is not detected within four SACCH 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:CONDITION?" !Queries the GSM Questionable  
!Call Condition Register
```

STATUS:QUESTIONABLE:ERRORS Condition Register Bit Assignment

The STATUS:QUESTIONABLE:ERRORS register bits will be used to indicate information about test set device-specific errors (positive error numbers).

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|----------------------------|--|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit 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 QUESTIONABLE:ERRORS:TA136 register. |
| 4 | 16 | DIGITAL136 Summary bit | This bit is the summary bit for the QUESTIONABLE:ERRORS:DIGITAL136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the QUESTIONABLE:ERRORS:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the QUESTIONABLE:ERRORS:GSM register. |
| 1 | 2 | COMMON Summary bit | This bit is the summary bit for the QUESTIONABLE:ERRORS:COMMON register. |
| 0 | 1 | Extension Bit | This bit will always be 0. |

Program Example - STATUS:QUESTIONABLE:ERRORS Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:EVENT?" !Queries the Questionable Errors
!Event Register
```

STATUS:QUESTIONable:ERRORs:COMMON Condition Register Bit Assignment

The STATUS:QUESTIONable:ERRORs:COMMON 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 | +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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one of these errors occurred. |
| 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one of these errors occurred. |

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|---------------|---|
| 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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 the Questionable Errors
!Common Event Register
```

STATUS:QUESTIONable:ERRORs:GSM Condition Register Bit Assignment

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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one of these errors occurred. |
| 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one of these errors occurred. |

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|---------------|---|
| 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. Query the Event Register to find out if one 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. Query the Event Register to find out if one 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 the GSM Questionable
!Errors Event Register
```

STATUS:QUESTIONable:HARDware Condition Register Bit Assignment

The STATUS:QUESTIONable:HARDware register bits give an indication that the data/signals currently being acquired or generated are of questionable quality.

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|------------------------------|---|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit will always be 0. |
| 14 | 16384 | Reserved for future use. | This bit will always be 0. |
| 13 | 8192 | Reserved for future use. | This bit will always be 0. |
| 12 | 4096 | Reserved for future use. | This bit will always be 0. |
| 11 | 2048 | Reserved for future use. | This bit will always be 0. |
| 10 | 1024 | Reserved for future use. | This bit will always be 0. |
| 9 | 512 | Reserved for future use. | This bit will always be 0. |
| 8 | 256 | Reserved for future use. | This bit will always be 0. |
| 7 | 128 | Reserved for future use. | This bit will always be 0. |
| 6 | 64 | Reserved for future use. | This bit will always be 0. |
| 5 | 32 | Reserved for future use. | This bit will always be 0. |
| 4 | 16 | Power-up Self Test(s) Failed | This bit will be a 1 if the power-up self tests failed. |
| 3 | 8 | Reserved for future use. | This bit will always be 0. |
| 2 | 4 | Reserved for future use. | This bit will always be 0. |
| 1 | 2 | Reserved for future use. | This bit will always be 0. |
| 0 | 1 | Extension Bit. | This bit will always be 0. |

Program Example - STATUS:QUESTIONable:HARDware Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:CONDITION?" !Queries the Questionable
!Hardware Condition
!Register.
```

Status Byte Register

July 12, 1999

*STB?

*STB? 

NOTE The Status Byte Register can also be read with a serial poll. For example, the command "Status_byte = SPOLL(714)" would perform a serial poll of the Status Byte Register, returning and releasing RQS (bit 6).

Status Byte Register Bit Assignments

| Bit Number | Binary Weighting | Label | Description |
|------------|------------------|---------------------------------------|---|
| 7 | 128 | STATus: OPERation | Summarizes the STATus: OPERation Status Register, which fans out to the NMRReady and CALL Status Registers. |
| 6 | 64 | RQS (SRQ TRUE?)/Master Summary Status | RQS is read by a serial poll (SPOLL) Master Summary Status is read by a *STB? query - defined by IEEE 488.2 |
| 5 | 32 | Standard Event Status Register | Summarizes the Standard Event Status Register |
| 4 | 16 | Message Available | SCPI - Defined |
| 3 | 8 | STATus: QUEStionable Status Register | Summary Message comes from the STATus: QUEStionable Status Register, which fans out to the CALL and HARDware Status Registers |
| 2 | 4 | Error/ Event Queue | SCPI - Defined |
| 1 | 2 | Reserved | |
| 0 | 1 | Reserved | |

Program Example - Status Byte Register Bit Assignments

OUTPUT 714: "*STB?" !Queries the Status Byte.

Standard Event Status Register

July 12, 1999

*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 213](#)

Standard Event Status Register Bit Assignment

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|--------------------------|---|
| 15 | 32768 | Reserved by IEEE. | This bit will always be 0. |
| 14 | 16384 | Reserved by IEEE. | This bit will always be 0. |
| 13 | 8192 | Reserved by IEEE. | This bit will always be 0. |
| 12 | 4096 | Reserved by IEEE. | This bit will always be 0. |
| 11 | 2048 | Reserved by IEEE. | This bit will always be 0. |
| 10 | 1024 | Reserved by IEEE. | This bit will always be 0. |
| 9 | 512 | Reserved by IEEE. | This bit will always be 0. |
| 8 | 256 | Reserved by IEEE. | This bit will always be 0. |
| 7 | 128 | Power On | This bit is set to 1 if the power supply has been turned off and on since the last time this register was read or otherwise cleared. Defined in "IEEE Std. 488.2-1992", 11.5.1.1.2 |
| 6 | 64 | Reserved for future use. | This bit will always be 0. |
| 5 | 32 | Command Error | This bit is set to 1 if the test set detects an error while trying to process a command. The following events cause a command error: <ul style="list-style-type: none"> An IEEE 488.2 syntax error. The test set received a message that did not follow the syntax defined by the standard. A semantic error. For example the test set received an incorrectly spelled command. The test set received a group execution trigger (GET) inside a program message |
| 4 | 16 | Execution Error | This bit is set to 1 if the test set detects an error while trying to execute a command. The following events cause a execution error: <ul style="list-style-type: none"> A <PROGRAM DATA> element received in a command is outside the legal range for the test set, or it is inconsistent with the operation of the test set. The test set could not execute a valid command due to some test set hardware/firmware condition. |
| 3 | 8 | Device Dependent Error | This bit is set to 1 if a test set operation does not execute properly due to an internal condition (such as, overrange). This bit indicates that the error was not a command, query, or execution error. |

Standard Event Status Register

| Bit Number | Binary Weighting | Condition | Description |
|------------|------------------|--------------------------|--|
| 2 | 4 | Query Error | This bit is set to 1 if an error has occurred while trying to read the test set's output queue. The following events cause a query error: <ul style="list-style-type: none">• An attempt is made to read data from the output queue when no data is present or is pending.• Data in the output queue has been lost. An example of this would be an output queue overflow. |
| 1 | 2 | Reserved for future use. | This bit will always be 0. |
| 0 | 1 | Operation Complete | This bit is set to 1 when the test set has completed all pending operations and is ready to accept new commands. This bit is only generated in response to the *OPC IEEE 488.2 common command. |

Program Example - Standard Event Status Register

```
OUTPUT 714:"*ESR?" !Queries (reads) the Standard Event Status Register.
```

SYSTEM Subsystem

Description

The SYSTEM subsystem performs system configuration and non-measurement related functions such as:

- Setting the GPIB and LAN addresses
- Setting Date and Time
- Correcting for RF path loss
- Presetting the test set

Syntax Diagrams and Command Descriptions

[“SYSTEM:BEEPer” on page 480](#)

[“SYSTEM:COMMunicate” on page 481](#)

[“SYSTEM:CONFigure” on page 484](#)

[“SYSTEM:CORRection” on page 485](#)

[“SYSTEM:CURRent:TA” on page 487](#)

[“SYSTEM:ERRor?” on page 488](#)

[“SYSTEM:FTRigger” on page 490](#)

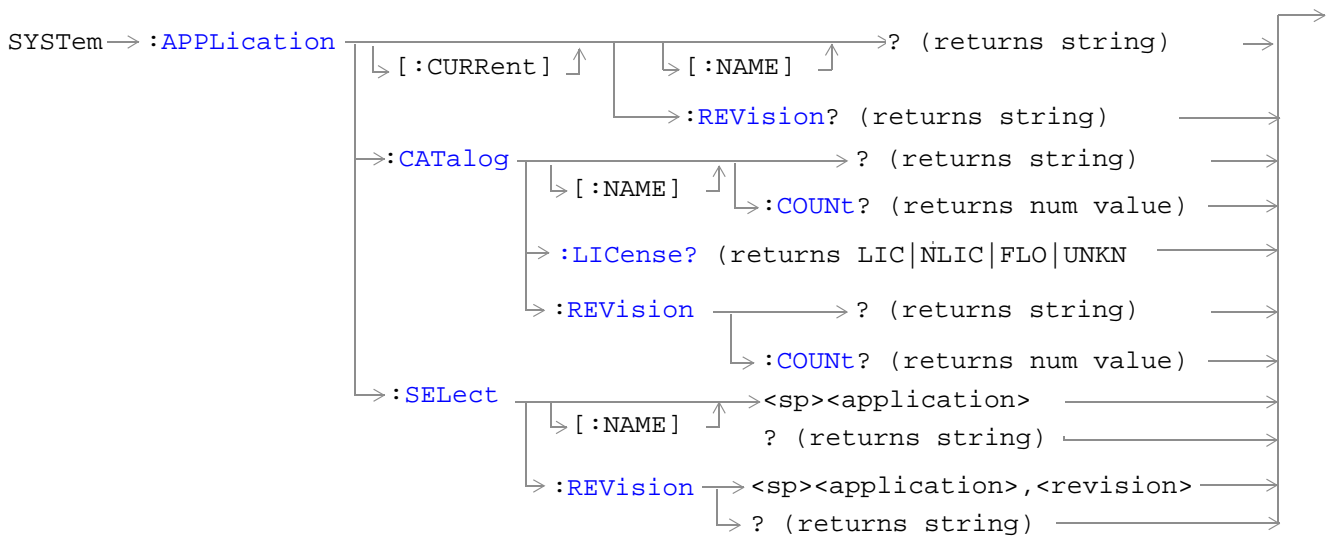
[“SYSTEM:MEASurement” on page 492](#)

[“SYSTEM:PRESet” on page 493](#)

[“SYSTEM:ROSCillator” on page 495](#)

[“SYSTEM:SYNChronized” on page 496](#)

SYSTem:APPLication



“Diagram Conventions” on page 213

SYSTem:APPLication:CATalog:LiCense?

| | |
|--|--|
| Function | <p>Query the license status for a selected revision.</p> <p>The query must include two strings separated by a comma. The test application name and revision must be entered as they appear in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <p>The returned values are:</p> <ul style="list-style-type: none"> • “LIC” indicates this is a licensed test application. • “NLIC” indicates this is not a licensed test application. • “UNKN” indicates that license status is unknown. |
| Query | Range: LIC NLIC UNKN |
| <p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.00'"</pre> | |

SYSTem:APPLication:CATalog:REViSion?

| | |
|---|--|
| Function | Query the test set for all of the revision numbers stored on the test set's hard drive. You must specify a test application. |
| Query | Range: One or more comma separated strings including a null string |
| <p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'AMPS/136 MOBILE TEST' "</pre> | |

SYSTem:APPLication:CATalog:REViSion:COUnT?

| | |
|---|--|
| Function | 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. |
| Query | Range: 0 through 30 |
| <p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? 'AMPS/136 MOBILE TEST' "</pre> | |

SYSTem:APPLication:CATalog[:NAME]?

| | |
|--|--|
| Function | Query the test set for all of the names of the test applications stored on the hard drive. |
| Query | Range: AMPS/136 Mobile Test GSM Mobile Test |
| Programming Example OUTPUT 714 ; "SYSTEM:APPLICATION:CATALOG:NAME?" | |

SYSTem:APPLication:CATalog[:NAME]:COUNT?

| | |
|--|--|
| Function | Query the test set for the total number test application names stored on the hard drive. Up to 30 test applications can be stored. |
| Query | Range: 0 through 30 |
| Programming Example OUTPUT 714 ; "SYSTEM:APPLICATION:CATALOG:NAME:COUNT?" | |

SYSTem:APPLication[:CURRent][:NAME]?

| | |
|--|--|
| Function | Query the test set for the name of the currently running test application. |
| Query | Range: Any string up to 25 characters including null. AMPS/136 Mobile Test GSM Mobile Test |
| Programming Example OUTPUT 714 ; "SYSTEM:APPLICATION:CURRENT:NAME?" | |

SYSTem:APPLication[:CURRent]:REVision?

| | |
|--|--|
| Function | Query the test set for the currently running test application revision number. |
| Query | Range: Any string up to 20 characters including null. A typical example would be A.01.01 for a licensed version. |
| Programming Example OUTPUT 714 ; "SYSTEM:APPLICATION:CURRENT:REVISION?" | |

SYSTem:APPLication:SElect[:NAME]

| | |
|---|---|
| Function | <p>Selects a test application and reboots the test set. This will switch the test application to the revision already selected. There is no need to re-select the revision before switching. The reboot process takes about 1 minute.</p> <p>Queries the test set for the test application that is selected and will run after the next reboot of the test set.</p> <hr/> <p>NOTE Selecting the correct name and the desired revision of a test application is important. This information should be reviewed before proceeding. The directions for how to determine test application name and revision are found in this document.</p> |
| Setting | Range: Any string up to 25 characters. This string is not case sensitive. |
| Query | <p>Range: Any string up to 25 characters including a null string.</p> <p>AMPS/136 Mobile Test</p> <p>GSM Mobile Test</p> |
| <p>Programming Example</p> <p>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME 'AMPS/136 MOBILE TEST'"</p> | |

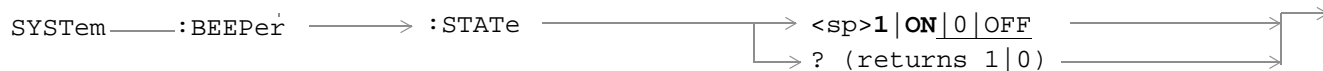
SYSTem:APPLication:SElect:REvision

| | |
|--|--|
| Function | <p>Selects a test application revision. 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 test application revision that has been selected.</p> <hr/> <p>NOTE GSM Mobile Test; revisions before A.04.00 did not have test application switching and provide no way to return to revisions that have switching. Users will need to reload a revision that has test application switching following the download process for upgrading firmware.</p> |
| Setting | Range: Any string up to 20 characters. This string is not case sensitive. |
| Query | Range: Any string up to 20 characters including null. |
| <p>Programming Example</p> <p>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM MOBILE TEST','A.04.00'"</p> | |

Related Topics

[“Selecting a Radio Personality” on page 569](#)

SYSTem:BEEPer



[“Diagram Conventions” on page 213](#)

SYSTem:BEEPer:STATE

| | |
|---|--|
| Function | Sets/queries the beeper state of the test set. |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 1 on |
| Programming Example OUTPUT 714;"SYSTem:BEEPER:STATE OFF" !Sets beeper state to off. | |

SYSTem:COMMunicate:GPIB:DEBug[:STATe]

| | |
|---|---|
| Function | <p>Sets/queries the test set's SCPI debugger state.</p> <p>When the state is on; enhanced error messages (generated from GPIB commands with syntax errors) are shown the test set display.</p> <p>The error message is printed along with the syntax. <ERR> is displayed at the end of the incorrect node. Non-printable characters will be replaced with the \$ symbol. See "Error Messages" on page 575 for a list of the errors.</p> <p>The debugger state should be set to on only during GPIB code development. Test times will increase if the debugger state is left on.</p> |
| Setting | Range: 0 OFF 1 ON |
| Query | 0 1 |
| *RST setting | 0 off |
| <p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:DEBUG:STATE ON" !Sets debugger to on.</pre> | |

SYSTem:COMMunicate:LAN[:SELF]:ADDRESS

| | |
|--|--|
| Function | <p>Sets/queries the test set's LAN IP address. The value of A is used to determine the subnet mask, see "SYSTem:COMMunicate:LAN[:SELF]:SMASK" on page 483.</p> <p>If the LAN address is changed the subnet mask should be checked to insure that it is set to the proper class for that LAN address.</p> |
| Setting | Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces) |
| Query | Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces) |
| Factory setting | 0.0.0.0 (this parameter is not affected by any reset operation and can only be changed by direct user access) |
| <i>Related Topics</i> | "LAN IP Address" on page 560 |
| <p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:ADDRESS `200.015.156.255`" !Sets the !LAN IP !address.</pre> | |

SYSTem:COMMunicate:LAN[:SELF]:DGATeway

| | |
|---|---|
| Function | Sets/queries the LAN IP router/gateway address for the test set. |
| Setting | Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces), blank field |
| Query | Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D = 0 to 255 (no embedded spaces). blank field |
| Factory setting | blank field, (this parameter is not affected by any reset operation) |
| Programming Example OUTPUT 714 ; "SYSTEM:COMMUNICATE:LAN:SELF:DGATEWAY `15.2.6.200` " | |

SYSTem:COMMunicate:LAN[:SELF]:SMASK

| | |
|--|---|
| Function | 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. |
| 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 `15.2.6.200` " | |

SYSTem:CONFigure

SYSTem→:CONFigure→:INFormation→:HARDware→:VERBose?→(returns model number, serial number, revision number, board ID and Cal file information)→

[“Diagram Conventions” on page 213](#)

SYSTem:CONFigure:INFormation:HARDware:VERBose?

| | |
|--------------|---|
| Function | 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 562 . |
| *RST Setting | Resets have no effect on this information. The information is gathered during the power up cycle. |

Related Topics

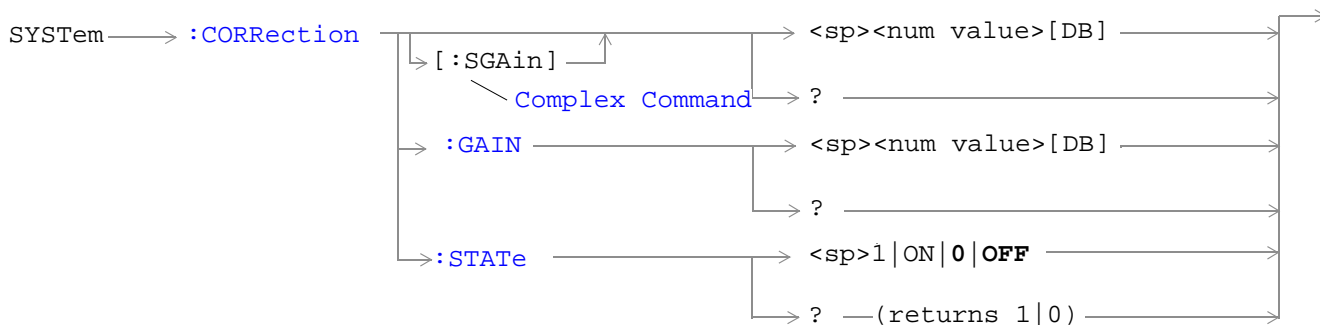
[“Hardware Configuration Report” on page 562](#)

[“SYSTem:CURRent:TA” on page 487](#)

[“Obtaining Test Application Information” on page 567](#)

[“Obtaining Identification Information *IDN?” on page 558](#)

SYSTem:CORRection



“Diagram Conventions” on page 213

SYSTem:CORRection[:SGAIN]

| | |
|---|---|
| Function | Sets/queries the amplitude offset value in dB, used to correct for RF path loss and also turns the STATE ON. See “Measurement Related Configuration” on page 563. The units, dB, are optional, if no units are specified then units default to dB. |
| Setting | Range: -100 to +100 Resolution: .1 |
| Query | Range: -100 to +100 Resolution: 0.1 |
| *RST Setting | 0 dB |
| Programming Example OUTPUT 714;"SYSTEM:CORRECTION:SGAIN 6" !Sets an amplitude offset of 6 dB. | |

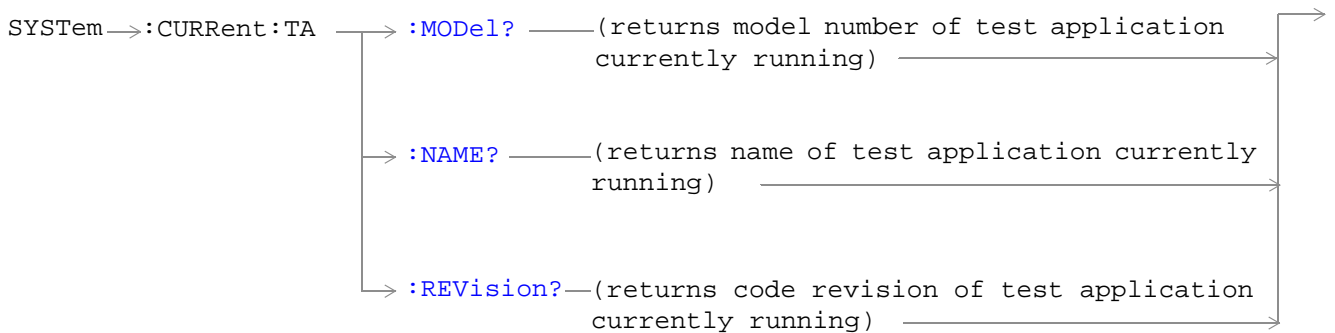
SYSTem:CORRection:GAIN

| | |
|---|--|
| Function | Sets/queries the amplitude offset value in DB, used to correct for RF path loss when the correction state is on. See “Measurement Related Configuration” on page 563 The units DB are optional, if no units are specified then units default to DB. |
| Setting | Range: -100 to +100 Resolution: .1 |
| Query | Range: -100 to +100 Resolution: .1 |
| *RST Setting | 0 dB |
| Programming Example OUTPUT 714;"SYSTEM:CORRECTION:GAIN 6" !Sets an amplitude offset of 6 dB. | |

SYSTem:CORRection:STATe

| | |
|---|--|
| Function | Sets/queries the amplitude offset state. See “Measurement Related Configuration” on page 563 |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 0 off |
| Programming Example OUTPUT 714;"SYSTEM:CORRECTION:STATE ON" !Sets amplitude offset state on. | |

SYSTem:CURRent:TA



“Diagram Conventions” on page 213

SYSTem:CURRent:TA:MODEl?

| | |
|--------------|--|
| Function | Query the model number of the test application running. Printable ASCII characters up to a 15 character string. See “Obtaining Test Application Information” on page 567 . |
| 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 | This query is not the recommended method to determine the name of the Test Application. See xref to SYSTem:APPLIcation:CURRent:NAME? Query the name of the test application running. Printable ASCII characters up to a 25 character string. This command is not recommended see “SYSTem:APPLIcation” on page 475 . |
| Query | Range: ASCII codes 32 - 126 decimal excluding comma and semicolon |
| *RST Setting | non volatile, read from the test set’s hard disk |

SYSTem:CURRent:TA:REVisIon?

| | |
|--------------|--|
| Function | Query the coordinated codeware revision for the test application running. Printable ASCII characters up to a 20 character string. This command is not recommended see “SYSTem:APPLIcation” on page 475 . |
| 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?

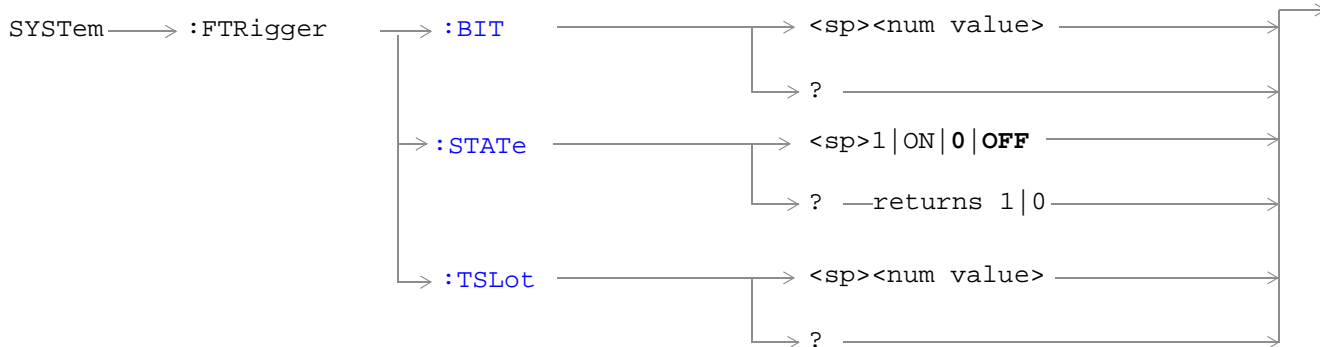
SYSTEM → :ERRor? — (returns contents of error/event queue) →

[“Diagram Conventions” on page 213](#)

SYSTEM:ERRor?

| | |
|----------|--|
| Function | <p>Queries the contents of the Error/Event Queue. The Error/Event Queue may contain one or more messages with an error or event description.</p> <p>Manual users may view the Message Log from the SYSTEM CONFIG screen. The contents of the Error/Event Queue and the Message log may not match. Example, manual user errors are not displayed with SYSTEM:ERRor? they are viewed from the Message Log. See “Error Messages” on page 575.</p> |
| Query | <p>Error/Event Queue</p> <ul style="list-style-type: none"> • Range: 0 to 100 messages up to 255 characters in length |

SYSTem:FTRigger



“Diagram Conventions” on page 213

SYSTem:FTRigger:BIT

| | |
|--|---|
| Function | Selects/queries which bit, after zero, will be used for frame trigger pulse positioning. See “Setting Frame Trigger Parameters” on page 515 |
| Setting | Range: 0 to 1250 Resolution: 1 |
| Query | Range: 0 to 1250 Resolution: 1 |
| *RST Setting | zero |
| Programming Example | |
| <pre>OUTPUT 714;"SYSTEM:FRTIGGER:BIT 14" !Would cause external frame trigger pulses !to occur 14 bits after bit 0 of the !selected timeslot.</pre> | |

SYSTem:FTRigger:STATE

| | |
|--|--|
| Function | Sets/queries the frame trigger state. See “Setting Frame Trigger Parameters” on page 515 |
| Setting | 0 OFF 1 ON |
| Query | 0 1 |
| *RST Setting | 0 off |
| Programming Example | |
| <pre>OUTPUT 714;"SYSTEM:FRTIGGER:STATE ON" !Set frame trigger state to on.</pre> | |

SYSTem:FTRigger:TSLot

| | |
|--|--|
| Function | Selects/queries the timeslot for frame trigger pulse positioning. See “Setting Frame Trigger Parameters” on page 515 |
| Setting | Range: 0 to 7 Resolution: 1 |
| Query | Range: 0 to 7 Resolution: 1 |
| *RST Setting | zero |
| Programming Example | |
| OUTPUT 714; "SYSTEM:FRTIGGER:TSLot 5" !Dets the frame trigger timeslot to 5. | |

SYSTem:MEASurement

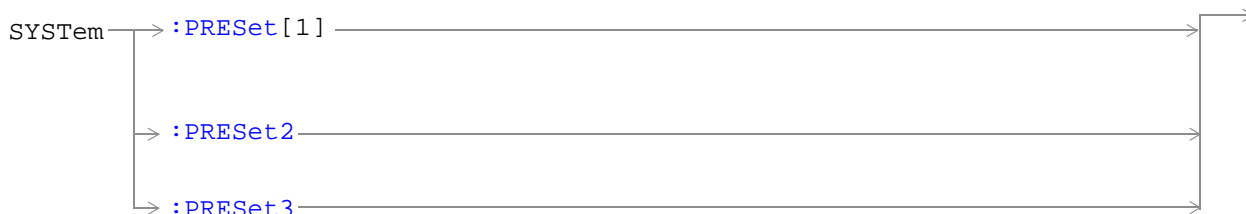


[“Diagram Conventions” on page 213](#)

SYSTem:MEASurement:RESet

| | |
|--|--|
| Function | <p>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 151</p> <p>Any measurement results are cleared and the Integrity Indicator is set to 1 (No_Result_Available). See “Integrity Indicator” on page 125</p> |
| Setting | <p>These results are set to their default values:</p> <ul style="list-style-type: none"> • RACH Count • Page Count • Missing Burst Count • Corrupted Burst Count • Channel Decoder Error Count • MS TX Level Reported • TCH Timing Advance Reported • RX Level • RX Qual |
| <p>Programming Example</p> <pre>OUTPUT 714;"SYSTem:MEASUREMENT:RESET" !Resets current measurements.</pre> | |

SYSTem:PRESet



[“Diagram Conventions” on page 213](#)

SYSTem:PRESet[1] (not recommended for use)

| | |
|---|--|
| Function | <p>Not recommended for use at this time, use the SYSTEM:PRESET3 command for partial preset.</p> <p>Performs a partial preset. This is the recommended command when a user wants to change from remote operation to manual operation and a partial preset is needed.</p> <p>Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed.</p> <p>A partial preset will not modify any measurement settings including trigger arm. See “Trigger Arm (Single or Continuous) Description” on page 151.</p> |
| Related Topics | See “Partial Preset” on page 535 for more details |
| Programming Example OUTPUT 714;"SYSTEM:PRESET" !Partial preset when changing from remote to manual operation. | |

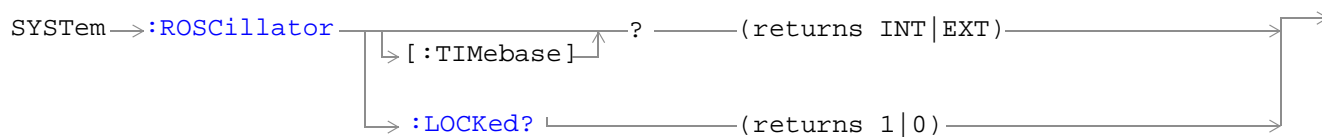
SYSTem:PRESet2

| | |
|---|--|
| Function | <p>Performs a full preset the same as using the *RST command. Either command may be used when a full preset is needed during remote operation of the test set.</p> <p>All parameters are set to their default values. All measurements are aborted the trigger arm is set to single. See “Trigger Arm (Single or Continuous) Description” on page 151.</p> |
| Related Topics | See “Full Preset” on page 536 for more details. |
| Programming Example OUTPUT 714;"SYSTEM:PRESET2" !Full preset. | |

SYSTem:PRESet3

| | |
|---|---|
| <p>Function</p> | <p>Performs a partial preset. This is the recommended command for users when a partial preset is needed during remote operation of the test set.</p> <p>Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed.</p> <p>A partial preset will not modify any measurement settings including trigger arm. See “Trigger Arm (Single or Continuous) Description” on page 151.</p> |
| <p>Related Topics</p> | <p>See “Partial Preset” on page 535 for more details.</p> |
| <p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:PRESET3" !Partial preset when in remote operation.</pre> | |

SYSTem:ROSCillator



[“Diagram Conventions” on page 213](#)

SYSTem:ROSCillator[:TIMebase]?

| | |
|----------|--|
| Function | <p>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.</p> <p>A suitable external source must have:</p> <ul style="list-style-type: none"> • an output level of 0 to +13DBM • frequency of 10 MHZ |
| Query | INT EXT |

SYSTem:ROSCillator:LOCKed?

| | |
|----------|--|
| Function | Query the status of the reference oscillator and indicate if it is locked or unlocked. |
| Query | 0 = Unlocked 1 = Locked |

SYSTem:SYNChronized



“Diagram Conventions” on page 213

SYSTem:SYNChronized

| | |
|----------------|--|
| Function | Sets/queries the test set that all prior sequential commands have completed and all prior overlapped commands have started indicating that the input buffer is synchronized. (See “Call Processing Event Synchronization” on page 30.) |
| Setting | Bit 12 of the status operation condition register is pulsed. See “STATus:OPERation Condition Register Bit Assignment” on page 442. |
| Query | 1 |
| Related Topics | See “Status Subsystem Overview” on page 137. See “Call Processing Event Synchronization” on page 30. |

Programming Example

```

OUTPUT 714;"SYSTEM:SYNCHRONIZED" !Pulses bit 12 of the status operation
!condition register.
OUTPUT 714;"SYSTEM:SYNCHRONIZED?" !Returns a 1 indicating all prior sequential
!commands have completed and all overlapped
!commands have started.

```

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 command is defined in “IEEE Std 488.2-1992”, 10.32. The *RST command is a full preset, which restores a majority of settings to their default values.

***SRE**

The *SRE, service request enable command, is defined in “IEEE Std 488.2-1992”, 10.34. The parameter range for this command is 0 through 255.

***SRE?**

The *SRE?, service request enable query, is defined in “IEEE Std 488.2-1992”, 10.35. Values returned by this query range from 0 through 255.

***STB?**

The *STB?, read status byte query, is defined in “IEEE Std 488.2-1992”, 10.36. Values returned by this query range from 0 through 255.

***WAI**

The *WAI, wait-to-continue command, is defined in “IEEE Std 488.2-1992”, 10.39. The *WAI command prevents the test set from executing any further commands or queries until all pending operation flags are false. The *WAI common command is not recommended for use as an overlapped command.

Related Topics

[“Call Processing Event Synchronization” on page 30](#)

[“Preset Descriptions” on page 535](#)

[“Obtaining Identification Information *IDN?” on page 558](#)

6 General Usage

Frequency Banded Parameters

The majority of the test set's parameters are active regardless of the frequency band selected. There are, however, six parameters that have a band specifier; PGSM, EGSM, DCS, or PCS. These exceptions are referred to as frequency banded parameters.

Frequency banded parameters are activated upon selection of a band. Parameters that select frequency bands are the cell band, traffic band, and manual band fields.

The user can set values for parameters that are activated by a band that is not currently selected, and the test set will store the setting for future use. For example, during a call on the PGSM band, the MS TX level can be set to 10 for the DCS frequency band. When a handover (see [“Programming a Dualband Handover” on page 119](#)) to the DCS band is made, the MS TX level of 10 for DCS will already be set.

If the user does not specify a frequency band when setting frequency banded parameters, settings to the parameter will be made in the currently selected band.

List of Frequency Banded Parameters

You can control the frequency banded parameters with these six parameters:

For control of the broadcast channel, channel number, and BA table:

- Broadcast channel see [“CALL:BCChannel” on page 236](#)
- BA table (broadcast allocation table and broadcast allocation table points) see [“CALL:BA” on page 228](#)

For control of the traffic band, channel number, and level:

- Traffic channel and traffic band see [“CALL:TChannel\[:ARFCn\]\[:SElected\]” on page 287](#).
- MS TX level (mobile station transmit level) see MS TX LEVEL NEW

For manual control of the test set's receiver:

- Manual channel see [“RFANalyzer:MANual:CHANnel\[:SElected\]” on page 375](#).
- Expected power see [“RFANalyzer:EXPEcted:POWEr\[:SElected\]” on page 372](#).

Examples

```
OUTPUT 714;"CALL:CELL:BCCHANNEL:ARFCN:DCS 512" !Sets broadcast channel to 512
!for DCS.
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 20,37,124,975,986,1008,1019" !Sets BA table to
!to 7 of 16
!possible channels.
OUTPUT 714;"CALL:TCHANNEL:ARFCN:PGSM 124" !Sets traffic channel to 124 for PGSM band.
OUTPUT 714;"CALL:MS:TXLEVEL:PGSM 7" !Sets the mobile station uplink power control
!level to 7 for PGSM band.
OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:EGSM 24" !Manually sets the RF analyzer to
!EGSM channel 24.
OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PGSM -15DBM" !Sets the RF analyzer's input
!power to -15 dbm for PGSM band.
```

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 249](#).
- When the operating mode is test mode and the test function is set to CW, the cell band parameter should be used.

Example 1.

```
OUTPUT 714;"CALL:CELL:BAND EGSM" !Sets the broadcast band and traffic band to EGSM.
```

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 [“Programming a Dualband Handover” on page 119](#).
- 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 249](#).

Example 2.

```
OUTPUT 714;"CALL:TCHANNEL:BAND DCS" !Sets the traffic band to DCS.
```

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. Users will need to set receiver control back to manual.

Example 3.

```
OUTPUT 714;"RFANALYZER:MANUAL:BAND DCS" !Sets the manual band to DCS.
```

Related Topics

[“Programming a Dualband Handover” on page 119](#)

[“Configuring the Broadcast Channel \(BCH\)” on page 511](#)

[“Configuring the Traffic Channel \(TCH\)” on page 521](#)

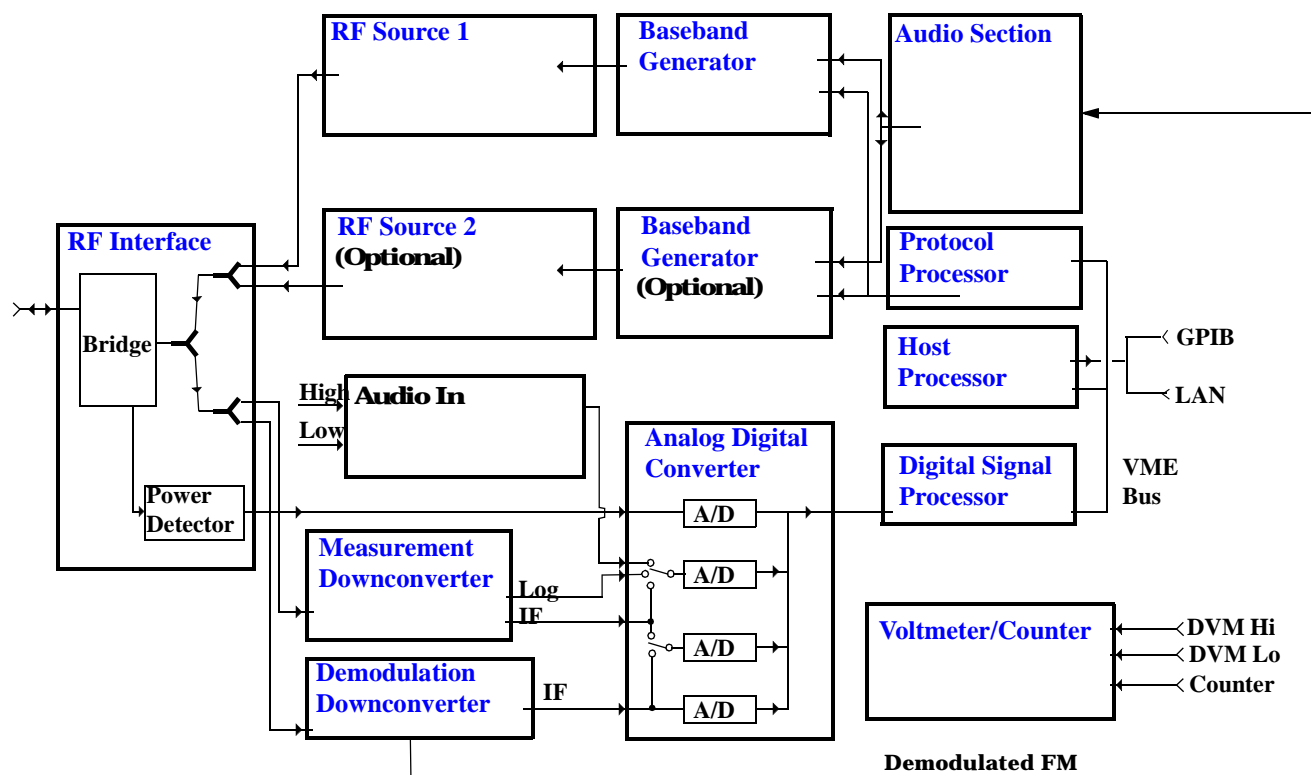
[“Receiver Control” on page 518](#)

[“CALL:CONNECTed\[:STATe\]?” on page 240](#)

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 122.

Description



RF Interface Module

Input and output signals are routed through the RF Interface module. The RF Interface module consists of a directional bridge for sampling incoming power and hybrid power splitters which create 4 bidirectional ports, (two receiver ports and two source ports), RF amplifiers, video gain circuits, and fast and slow power detectors.

The sampled input power from the directional bridge is routed to a fast power detector or a slow detector. The fast power detector has a response time of several microseconds and can measure power during the bursts of TDMA systems.

The RF Interface module provides two identical RF Source path connections to the In/Out port of the instrument. There is about 25 dB of isolation between the two source paths. There is about 35 dB of isolation between the source paths and either receiver path. The RFIO module has nominally 23 dB of insertion loss in the source path. A temperature sensing circuit facilitates compensation for path loss variation with

temperature.

The sampled input power from the directional bridge can be amplified by as many as two 18 dB range amplifiers and then can be directed to the fast detector, or the slow detector. The input power to the fast detector is detected by a diode detector that is part of a feedback loop. The input to the slow detector is measured in a bridge using a pair of RMS thermal detectors in a feedback loop. Signals from the fast and slow power detectors are calibrated with Gain DAC's. Video gain can be applied in 6 dB and 1.5 dB steps.

Signal Downconversion

The test set's downconversion receiver section has two downconversion modules; a high performance Measurement Downconversion Module for making measurements, and a Demodulation Downconversion Module for maintaining the radio link.

Measurement Downconverter Module The Measurement Downconverter module is a part of the receiver, it provides high quality (wide dynamic range, spurious free) signals to the Analog To Digital Converter module's measurement sampler input. These signals are:

- 10 KHz - 6 MHz Intermediate Frequency signal
- detected envelope of the Intermediate Frequency signal

The Measurement Downconverter module is designed for very high performance operation to ensure accurate and repeatable measurement results. The Measurement Downconverter module contains two downconversion stages, two local oscillators, and a logarithmic IF envelope detector . Both first and second LO synthesizers are tunable. The first LO is used when tuning to the RF input frequency, and the second LO is used when setting second IF frequency, which is fed to the measurement sampler on the Analog To Digital Converter module.

Demodulation Downconverter Module The Demodulation Downconverter module is used as part of the demodulation receiver to maintain the radio link of a given TA. The IF signal from the Demodulation Downconverter is sent to the Analog to Digital Converter, the digital data then goes to the protocol subsystem. That data allows the Protocol Processor module to set up a call with the DUT so that testing can be performed on the radio.

The Demodulation Downconverter module is also used as part of the BER testing path. For bit error ratio measurements the bits tested by the Protocol Processor module are taken from this path. The demodulated bits provided to the Protocol Processor contain the data that will be checked for errors.

Analog To Digital Converter Module

Following the Measurement Downconverter and Demodulation Downconverter modules is the Analog to Digital Converter module. The purpose of the Analog to Digital Converter module is to convert the downconverted analog signals into digital data streams which can be processed by the Digital Signal Processing module.

In order to maintain the radio link of a given TA, the downconversion path through the Demodulation Downconverter module has a dedicated A/D conversion path.

In order to optimize measurement throughput, the fast RF power detector also has a single dedicated A/D path. This allows power measurements, in many cases, to be made concurrently with other measurements. The two outputs from the Measurement Downconverter module, and the Audio In signal share a single multiplexed A/D path.

The outputs of the various analog to digital converters on the Analog to Digital Converter module share a common data bus to the Digital Signal Processing module.

Digital Signal Processing Module

The Digital Signal Processing (DSP) module is responsible for a variety of tasks within the overall test set architecture. These tasks are:

- demodulating data from the radio under test (data received from the Demodulation Downconverter module) and sending the demodulated data bits to the Protocol Processor module
- for some systems, perform audio measurements using audio information sent to the DSP module from the Protocol Processor module
- execute a variety of signal processing algorithms to perform measurements on the radio system of the currently loaded TA (data received from the power detector ADC, the measurement ADC and, in some cases, data received from the Demodulation Downconverter ADC)

The DSP processor communicates with the Host Processor and the Protocol Processor, as well as controlling the configuration and synchronization of the Analog To Digital Converter module.

Protocol Processor Module

The Protocol Processor module is responsible for maintaining the radio link between the test set and the mobile station under test. The primary tasks of the Protocol Processor module are:

- generating the protocol messaging necessary for the forward channel and sending that protocol stream to the test set's RF source for transmission to the mobile station
- decoding the protocol messaging received from the mobile station under test on the reverse channel
- computing measurement results which are associated with data bits contained within the mobile stations messaging, such as bit error ratio

Host Processor Module

The Host Processor module is responsible for a variety of tasks within the overall test set architecture. These tasks include:

- control of the manual user interface (MUI)
- executing commands and processing data received from the LAN interface
- executing commands and processing data received from the GPIB interface
- controlling disk access
- control of all RF and audio hardware modules
- routing measurement results received from the Digital Signal Processing and Protocol Processor modules to the appropriate output device (display, GPIB, LAN, serial, etc.)

Voltmeter/Counter

Voltmeter The voltmeter is primarily used to measure external DC & AC voltages. A secondary purpose is to measure internal voltages for instrument self-diagnostics.

The external voltmeter is capable of measuring DC voltages up to + 50 VDC and AC voltages up to 50 Vpk. A true RMS detector is used for measuring AC voltages. For internal measurements, a switch routes the diagnostic MUX output to the Voltmeter 1 path.

Frequency Counter The Frequency Counter is used to measure external frequencies from the front panel Audio IN, High or Low BNC connectors, and to measure internal signals for diagnostics. The external input can receive a signal between 20 Hz and 50 MHz, with a level from 25 mV to 8 V rms.

The counter circuit is based on the METRON IC. This IC contains a reciprocal counter. A reciprocal counter functions by counting the input signal and a reference signal simultaneously during a selected gate period. At the end of this period, the counting is stopped and the values of the signal and reference counters are read. The ratio of these values is used to calculate the input signal frequency.

Audio Section

Audio Analysis Path Externally applied audio signals can be analyzed through the test set's DSP module for such characteristics as AC level, SINAD, or distortion.

The audio signal to be analyzed is input to the test set using the front panel Audio IN High and Low connectors. The signal is then routed to the Analog To Digital Converter module's measurement sampler for analysis by the DSP module.

The Audio In connector accepts signals from 20 Hz to 15 KHz, at input levels from 10 mV to 20 Vpk.

Audio 1 Path The Audio 1 path provides analog baseband signals used for frequency modulation of the test set's RF sources. Up to four separate audio sources may be summed together in any combination to provide the composite Audio 1 output. These include the external FM input, internal direct digital synthesis (DDS,) regenerated SAT, and audio echo input.

The external FM input accepts an externally supplied audio signal with a peak voltage between 0.25 and 2 Vpk.

The internal DDS generates low distortion audio signals from DC to 20 KHz with 0.1 Hz resolution. One to four signals may be generated and internally summed, with independent level control of each waveform.

The SAT regeneration circuit outputs a signal which is phase-locked to a received SAT signal. This is useful for testing situations where the test set needs to emulate a mobile station.

The audio echo input is used for retransmitting the received audio after a selectable time delay, to check both radio transmit and receive paths simultaneously.

For most applications, only one or two of these Audio 1 path sources are enabled at any given time.

Audio 2 Path The Audio 2 path provides a secondary means for sending analog baseband signals to the FM modulator. Audio 2 contains only one source, a DDS similar to that used for Audio 1.

Typically, the Audio 2 path DDS is used for cases where multiple signals must be summed together with the lowest possible distortion. Another potential use of Audio 2 would be to obtain higher output levels than Audio 1 is capable of (up to twice as much), assuming the two outputs are set to the same frequency and phase, and then summed together at the Baseband Generator module.

Audio 2 is rarely used in practice because the DDS used for Audio 2 is the same DDS that is used for the front panel audio output.

Audio Out Path Any one of four inputs may be coupled to the front panel audio output connector. These include a 4 channel DDS (shared with Audio 2), receiver discriminator audio from the Demodulation Downconverter module, audio echo from the Analog To Digital Converter module, and audio vocoder.

The front panel output is capable of providing signal levels up to 9 Vpk into > 600 ohm loads, and up to 0.8 Vpk into an 8 ohm load (e.g. speaker). The output level is calibrated for all modes except discriminator audio,

Block Diagram

The discriminator audio has an uncalibrated volume control provided due to the high tolerances involved.

Typically the DDS mode is used to feed the MIC input of a radio, or it may simply be used as a general purpose low distortion function generator.

Demodulated audio can be selected from either of two Demodulation Downconverters. 300 - 3000 Hz BPF, 750 usec de-emphasis, and expandor circuits can be individually applied to the receiver audio, or bypassed.

Audio echo can be selected to route the received audio to the front panel audio output connector.

RF Sources

The test set can contain two identical RF sources. The RF sources are used to provide analog or digitally modulated RF carriers for use in parametric testing of mobile stations encompassing a variety of cellular radio formats. In general, the sources have a frequency range of 45 MHz to 2.7 GHz and an amplitude range of -13 dBm to -135 dBm.

The RF sources consist of a Synthesized Signal Generator module followed by a Vector Output module and an RF Attenuator module. Baseband modulation information is supplied to the RF sources from a Baseband Generator module preceded by an Audio Section module. The various components which make up the test set source system are described in the following sections.

Baseband Generators

The purpose of the Baseband Generator module is to provide, for the modulation type currently in effect, properly formatted baseband signals to the modulation circuits on the RF Source modules.

The Baseband Generator performs several functions related to the generation and processing of these base-band modulation signals. These are:

- Transform data and clock signals from the Protocol Processor module into base-band analog I-Q modulation signals for the I-Q modulator in the Vector Output module
- Transform data from the Protocol Processor module into baseband FSK modulation for the FM modulator in the Signal Generator module
- Provide baseband FM path source selection, gain adjustment and summing node for analog FM signals from the Audio module and internally generated baseband FSK signals which are output to the FM modulator in the Signal Generator module
- Transform burst and adjacent timeslot signals from the Protocol Processor module into baseband burst modulation signals for the burst modulator in the Vector Output module

Active Cell Operating Mode

April 20, 1999

The test set can operate in two different operating modes (active cell mode or test mode). The operating modes changes the way in which the test set interacts with the mobile station. Active cell mode is the default operating mode 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 (MS), but downlink stimulus and uplink measurements are still needed. see [“Test Mode Operating Mode” on page 524](#)

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.

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
```

Active Cell Features

The basic features provided by active cell operating mode are:

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

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

The test set’s operating mode is set using the CALL:OPERating:MODE, which is a sequential command.

Example 4. Command Syntax:

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

Example 5. Programming Example:

```
!*****
! Step 1: Set Test Set Operating Mode To Active Cell
!*****
!
OUTPUT 714;"CALL:OPER:MODE CELL
```

Setting the Active Cell Mode State

The control of all signalling operations, uplink demodulation and downlink (BCH & TCH) generation on or off. See “CALL[:CELL]:ACTivated[:STATe]” on page 227.

When cell activated state is on and the test set is in Operating Mode active cell, burst type is determined by protocol. When the cell activated state is off, (Operating Mode active cell or test) the burst type is determined by the “CALL:BURSt:TYPE” on page 239 command.

Example 6. Command Syntax:

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

Example 7. Programming Example:

```
OUTPUT 714;"CALL:ACT ON"
```

Related Topics

[“Configuring the Broadcast Channel \(BCH\)” on page 511](#)

[“CALL:OPERating” on page 266](#)

[“Configuring the Traffic Channel \(TCH\)” on page 521](#)

Configuring the Broadcast Channel (BCH)

The broadcast channel parameters are configured using the following call processing subsystem commands. For complete command syntax, refer to [“CALL:BCHannel” on page 236](#) for GPIB commands.

BCH Parameters

- Cell Band
- Cell Power
- Cell Power State
- Broadcast Chan (ARFCN)
- Mobile Country Code (MCC)
- Mobile Network Code (MNC)
- Location Area Code (LAC)
- Network Color Code (NCC)
- Base Station Color Code (BCC)
- Paging IMSI
- Repeat Paging
- Paging Mode
- Paging Multiframes
- Get IMEI at Call Setup
- TX Level FACCH Signaling
- BA Table
- 3 Digit MNC for PCS

Examples:

Cell Band

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

would set the cell to the PGSM band. See [“CALL\[:CELL\]:BAND” on page 234](#).

Cell Power

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

would set the cell's RF transmitter power to -85 dBm. See [“CALL\[:CELL\]:POWER\[:SAMPlitude\]” on page 273](#).

Cell Power State

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

would turn on the cell's RF transmitter on. See [“CALL\[:CELL\]:POWER:STATe” on page 274](#).

Broadcast Chan

```
OUTPUT 714;"CALL:BCH 50"
```

would set the broadcast channel to 50 for the selected (active) cell band. See [“CALL\[:CELL\]:BCHannel\[:ARFCn\]\[:SElected\]” on page 236](#).

```
OUTPUT 714;"CALL:BCH:DCS 556"
```

would set the broadcast channel to 556 for the DCS cell band. See [“CALL\[:CELL\]:BCHannel\[:ARFCn\]:DCS” on page 237](#).

Mobile Country Code

```
OUTPUT 714;"CALL:MCC 5"
```

would set the cell's mobile country code to 5. See [“CALL:MCCode” on page 252](#).

NOTE Can only be set when Cell Activated State = OFF.

Mobile Network Code

```
OUTPUT 714;"CALL:MNC 3"
```

would set the cell's mobile network code to 5. See [“CALL:MNCCode” on page 253](#).

NOTE Can only be set when Cell Activated State = OFF.

Location Area Code

```
OUTPUT 714;"CALL:LAC 4"
```

would set the cell's location area code to 4. See [“CALL:LACode” on page 251](#).

NOTE Can only be set when Cell Activated State = OFF.

Network Color Code

```
OUTPUT 714;"CALL:NCC 1"
```

would set the cell's network color code to 1. See [“CALL:NCCode” on page 265](#).

NOTE Can only be set when Cell Activated State = OFF.

Base Station Color Code

```
OUTPUT 714;"CALL:BCC 5"
```

would set the cell's base station color code to 5. See [“CALL:BCCode” on page 235](#).

NOTE Can only be set when Cell Activated State = OFF.

Paging IMSI

```
OUTPUT 714;"CALL:PAG:IMSI `001012345678901`"
```

would set the paging IMSI to 001012345678901. See [“CALL:PAGing:IMSI” on page 268](#).

Repeat Paging

```
OUTPUT 714;"CALL:PAG:REP OFF"
```

would turn repeat paging off. See [“CALL:PAGing:REPeat\[:STATe\]” on page 269](#).

Paging Mode

```
OUTPUT 714;"CALL:PAG:MODE REORG"
```

would set the paging mode so that the MS will sent a page on the next available paging subchannel without waiting for the mobile station's pre-selected paging subchannel. See [“CALL:PAGing:MODE” on page 269](#).

Paging Multiframe

```
OUTPUT 714;"CALL:PAG:MFR 5"
```

would set the number of multiframe between paging subchannels. See [“CALL:PAGing:MFRames” on page 270](#).

Get IMEI at Call Setup

```
OUTPUT 714;"CALL:IMEI:AUTO ON"
```

would cause the test set to automatically request the mobile station's IMEI at call setup. See [“CALL:IMEI” on page 250](#).

TX Level FACCH Signaling

```
OUTPUT 714;"CALL:SIGN:MS:TXL:FACCH ON"
```

would set the base station emulator to use both See [“CALL:SIGNaling” on page 282](#).

BA Table (broadcast allocation table)

```
OUTPUT 714;"CALL:BA:TABLE:DCS 512,612,787"
```

would set the first three DCS base allocation table entries to 512, 612, 787. The remaining 13 would be turned off. See [“CALL\[:CELL\]:BA:TABLE:DCS” on page 230](#).

3 Digit MNC for PCS

```
OUTPUT 714;"CALL:PMNCODE:STATE ON"
```

configures the PCS BCCH to use the PCS, 3-digit MNC when the current cell band is PCS. See [“CALL\[:CELL\]:PMNCODE:STATe” on page 272](#).

NOTE Can only be set when Cell Activated State = OFF.

Operating Considerations

There are a number of parameters for the broadcast channel and the traffic channel (see [“Configuring the Traffic Channel \(TCH\)” on page 521](#)) 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 227](#).

If the test set is in test mode (see [“Test Mode Operating Mode” on page 524](#)) 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 125](#).

Related Topics

[“Frequency Banded Parameters” on page 501](#)

Setting Frame Trigger Parameters

Frame Trigger Parameters

The frame trigger is a positive-going TTL compatible pulse that is one GSM bit wide, it is aligned to the downlink TDMA frame timing. The test set provides a frame trigger for synchronizing other test equipment to a measurement it is available at the rear-panel TRIG OUT connector.

The frame trigger has 3 parameters that the user must set. See “[SYSTEM:FTRigger](#)” on page 490.

- External Trigger State (on or off)
- External Trigger Timeslot (0 to 7)
- External Trigger Bit (0 to 1250)

Examples

External Trigger State

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

would set the external frame trigger ON.

External Trigger Timeslot

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

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

External Trigger Bit

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

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

Operating Considerations

Each frame is made up of 8 time slots. Time slots are defined in “ETSI GSM 05.10 Ver. 4.9.0 Section 5. Time slots 0 and 4 are 157 bit periods long, time slots 1, 2, 3, 5, 6, 7 are 156 bit periods long, the average time slot is 156.25 bits in duration. The external trigger timeslot can be set to any time slot 0 through 7, the external trigger bit position can be set from 0 through 1250. If the trigger bit position is set to 1250, that is one full frame beyond the setting of the external trigger timeslot, $(156.25 * 8 = 1250)$.

When the cell activated state is OFF, the frame trigger output is disabled (set to 0 volts) since there is no reference downlink TDMA frame structure available. However, the frame trigger state is not affected when there are changes to cell activated state.

The frame trigger can be set manually from the system configuration screen by pressing the External Trigger Setup soft key.

Related Topics

[“SYSTem:FTRigger” on page 490](#)

Configuring Mobile Station Operating Parameters

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

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

Mobile Station Operating Parameters

- MS TX Level (mobile station transmit level) [“Frequency Banded Parameters” on page 501](#)
- Timing Advance
- Mobile DTX State (mobile station discontinuous transmit state)

Examples:

MS TX Level

```
OUTPUT 714;"CALL:MS:TXL 15"
```

would set the active cell mobile station transmit power level to 15. See [“CALL:MS:TXLevel\[:SElected\]” on page 262](#).

```
OUTPUT 714;"CALL:MS:TXL:DCS 13"
```

would set the DCS cell mobile station transmit power level to 13. See [“CALL:MS:TXLevel:DCS” on page 263](#).

Timing Advance

```
OUTPUT 714;"CALL:MS:TADV 5"
```

would set the timing advance of the mobile station to 5. See [“CALL:MS:TADVance” on page 262](#).

Mobile DTX State

```
OUTPUT 714;"CALL:MS:DTX ON"
```

would set the discontinuous transmission state in the mobile station to on. See [“CALL:MS:DTX\[:STATe\]” on page 256](#).

Operating Considerations

There are a number of parameters for the broadcast channel (see [“Configuring the Broadcast Channel \(BCH\)” on page 511](#)) and the traffic channel (see [“Configuring the Traffic Channel \(TCH\)” on page 521](#)) that can be configured, however the test set’s default parameters should allow a properly functioning mobile station to successfully camp on the cell and make a call under most circumstances.

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

The MS TX Level parameter, besides informing the mobile station what uplink power to transmit to the test set, also updates the Expected Power parameter. See [“RFANalyzer:EXpected:POWer\[:SElected\]” on page 372](#).

Receiver Control

The user may want to control the internal receiver parameters rather than allow the test set to control them. manual receiver control is accomplished through the use of receiver control parameters.

Selecting Manual or Automatic Receiver Control

Receiver control defines whether the test set (auto) or the user (manual) is in control of 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 372.](#)

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 501](#) 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 518](#) 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 518](#) 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 375](#) for manual band or manual frequency details.

Table 1. 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 287](#) traffic channel details and [“CALL:TCHannel:BAND” on page 289](#) for traffic band details. See [“CALL\[:CELL\]:BAND” on page 234](#) for cell band details. See [“CALL:BCHannel” on page 236](#) for broadcast channel details.

Table 2. 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 3. 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

The expected power parameter is available to the user regardless of the receiver control setting. The MS TX level parameter sets the MS uplink power control level ranges while expected power sets the MS 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 563](#) 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 374](#) or [“CALL:MS:TXLevel\[:SElected\]” on page 262](#).

Related Topics

[“Active Cell Operating Mode” on page 509](#)

[“Test Mode Operating Mode” on page 524](#)

[“Frequency Banded Parameters” on page 501](#)

Configuring the Traffic Channel (TCH)

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

For complete command syntax, see [“CALL:TCHannel” on page 286](#).

TCH Parameters

- Traffic Channel Band
- Traffic Channel (ARFCN)
- Timeslot
- Mobile Loopback
- Speech
- Max Frames Allowed for Assignment
- Channel Mode

Examples:

Traffic Chan Band

```
OUTPUT 714;"CALL:TCH:BAND DCS"
```

would set the cell's traffic channel band to the DCS band. See [“CALL:TCHannel:BAND” on page 289](#).

Traffic Channel

```
OUTPUT 714;"CALL:TCH 45"
```

would set the active cell's traffic channel number to 45. See [“CALL:TCHannel\[:ARFCn\]\[:SElected\]” on page 287](#).

```
OUTPUT 714;"CALL:TCH:DCS 65"
```

would set DCS cell's traffic channel number to 65. See [“CALL:TCHannel\[:ARFCn\]:DCS” on page 287](#).

Timeslot

```
OUTPUT 714;"CALL:TCH:TSL 4"
```

would set the traffic channel timeslot to 4. See [“CALL:TCHannel:TSLot” on page 291](#).

Mobile Loopback

```
OUTPUT 714;"CALL:TCH:LOOP OFF"
```

would turn off loopback of the traffic channel data. See [“CALL:TCHannel:LOOPback” on page 291](#).

Speech

```
OUTPUT 714;"CALL:TCH:DOWN:SPE SIN1000"
```

would set the traffic channel downlink speech source to 1 kHz. See [“CALL:TCHannel:DOWNlink:SPEech” on page 290](#).

Max Frames Allowed for Assignment

```
OUTPUT 714;"CALL:COUNT:TDMA:FRAMES 20"
```

would set the maximum number of frames allowed during channel assignments to 20 frames. See [“CALL:COUNT:TDMA:FRAMES” on page 245](#).

Channel Mode

```
OUTPUT 714;"CALL:TCH:CMOD EFRS"
```

would set the channel mode of the mobile station to enhanced full rate speech. See [“CALL:TCHannel:CMODE” on page 290](#).

Operating Considerations

When configuring the base station emulator (BSE) you must configure the broadcast channel (see [“CALL:BCHannel” on page 236](#)) 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 [“Programming a Dualband Handover” on page 119](#). 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 249](#)) = “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 35](#)), 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 290](#).

- 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 256), the error is not generated, because when a mobile station is in discontinuous transmission mode, it is not required to transmit on the new channel, at least not until a SACCH, FACCH, or SID frame is ready. In this case, the mobile station may actually have changed channels in the correct time, but had nothing to transmit.

Related Topics

["Configuring the Broadcast Channel \(BCH\)" on page 511](#)

["Configuring Mobile Station Operating Parameters" on page 517](#)

["Receiver Control" on page 518](#)

["Traffic Band Parameter" on page 502](#)

["CALL:TCHannel" on page 286](#)

["Fast Bit Error Measurement Description" on page 69](#)

Test Mode Operating Mode

The test set can operate in two different 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. Test mode (see [“CALL:OPERating” on page 266](#) for GPIB syntax) is used 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 526](#))
- BCH + TCH (broadcast channel + traffic channel) (see [“BCH + TCH Test Function Behavior” on page 529](#))
- CW (continuous wave) (see [“CW Test Function Behavior” on page 531](#))

See [“CALL:FUNction” on page 249](#) for test function GPIB syntax.

Test Mode Operation

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

- No over the air signaling is available.
- No capability to demodulate and decode uplink RACH bursts is available.
- Test mode features are determined by the test function: BCH, BCH + TCH, or CW.
- When the operating mode is set to test mode, auto triggering sets the trigger source to RF Rise. See [“RF Rise Trigger Source:” on page 149](#).

The test set's receiver remains on the uplink frequency determined by the broadcast channel see [“CALL\[:CELL\]:BCHannel\[:ARFCn\]\[:SElected\]” on page 236](#) as long as receiver control is set to auto. If the user needs 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 518](#).

NOTE [“Setting the Active Cell Mode State” on page 510](#) has no effect while the test set is in test mode.

Receiver Control - Auto

If the receiver control field is set to auto (see “[RFANalyzer:CONTROL:AUTO](#)” on page 372), the test set’s receiver frequency is set according to the fields or GPIB commands in the following table.

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

| Test Function | Receiver Frequency Fields | GPIB Command |
|---------------|---------------------------|---|
| BCH | Broadcast Chan (1) | “ CALL[:CELL]:BCHannel[:ARFCn][:SElected] ” on page 236 |
| BCH + TCH | Traffic Channel (2) | “ CALL:TCHannel[:ARFCn][:SElected] ” on page 287 |
| CW | RF Gen Channel | “ CALL[:CELL]:BCHannel[:ARFCn][:SElected] ” on page 236 |

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 372), the test set’s receiver frequency is set according to the fields or GPIB commands in the following table.

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

| Test Function | Receiver Frequency Fields | GPIB Command |
|---------------|---------------------------|--|
| Don't Care | Manual Channel (1) | “ RFANalyzer:MANual:CHANnel[:SElected] ” on page 375 |
| | Manual Frequency | “ RFANalyzer:MANual:FREQuency ” on page 378 |

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 239](#). (If you are using the test set manually, the Expected Burst field is in the Call Parm window, screen 3 of 3, F12.)

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

BCH Test Function Behavior

- The test set generates a BCH without a TCH. BCH configuration and timeslot configuration are the same as when the operating mode is set to active cell.
- Cell power is set using the [“CALL:POWer” on page 273](#) command.
- By default, the test set expects the mobile station to transmit on the uplink BCH. The test set's receiver frequency can be set manually, which de-couples the automatic setting.
- Changes to the MS TX level will couple to the expected power, and the MS TX Level parameter will be transmitted on the downlink BCCH.
- All measurements are available to the user, the same as if the operating mode was set to active mode.

Example 8. BCH Test Function Using Auto Receiver Control

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

1. Select test mode.

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

2. Select PGSM as the broadcast band.

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

3. Select BCH as the test function.

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

4. Configure the receiver control to auto.

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

5. Set the BCH to channel 21.

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

6. Set the MS TX level to 12.

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

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

Example 9. 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 375

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 273 command.
- Manually synchronizing the mobile station to the BCCH is not under direct control of the test set, it is the user’s responsibility.
- Changes to the TCH timeslot and TCH ARFCN will reconfigure the downlink (although no channel assignment signaling will take place).
- By default, the test set’s receiver is configured to receive the mobile station’s signal at the TCH uplink frequency. The test set’s receiver frequency can be set manually, which decouples the automatic setting.
- Changes to the MS TX level will couple to the expected power, and the MS TX Level parameter will be transmitted on the downlink BCCH and SACCH.
- Changes to TCH timing advance will also appear on the downlink SACCH. Whether the mobile station makes use of these parameters is a function of the mobile station.
- All measurements are available to the user, the same as if operating mode was active mode.

Example 10. BCH + TCH Test Function Using Auto Receiver Control

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

1. Select test mode.

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

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

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

3. Select BCH as the test function.

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

4. Configure the receiver control to auto.

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

5. Set the BCH to channel 21.

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

6. Set the TCH to channel 31.

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

7. Set the MS TX Level to 12.

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

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

Example 11. 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 375

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

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

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

CW Test Function Behavior

When the test set's downlink function is set to CW the test set operates like a signal generator with level and frequency controls. The Call Parm's selections change from Cell Power to RF Gen Power, from Cell Band to RF Gen Band, from Broadcast Chan to RF Gen Channel. The CW setting also gives the user 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 280 command.
- The RF generator's band is set using the `"CALL[:CELL]:RFGenerator:BAND"` on page 276 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 277 command.
- The RF generator's frequency is set using the `"CALL[:CELL]:RFGenerator:FREQUENCY"` on page 280 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 the user updates 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 the user may choose to select a frequency that is not a channel.

Example 12. CW Test Function Using RF Generator Frequency

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

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

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

2. Select test mode.

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

3. Select PGSM as the RF generator band.

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

4. Select CW as the test function.

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

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

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

Related Topics

[“Configuring the Broadcast Channel \(BCH\)” on page 511](#)

[“Configuring the Traffic Channel \(TCH\)” on page 521](#)

[“CALL:OPERating” on page 266](#)

[“Receiver Control” on page 518](#)

Testing a Mobile for Enhanced Full Rate Speech Channel Mode

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 59](#)).

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 290](#)), you may hear momentary unpleasant audio bursts from the mobile.

Related Topics

[“Programming a Channel Mode Change” on page 117](#)

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.

Examine the results in Tables 4 and 5 to determine which preset to use for your situation.

Partial Preset

Users save setup time with a partial preset because measurement setup parameters remain unchanged. This is the recommended way to place the test set in a known condition.

Press the green PRESET key on the front panel to perform a partial preset.

Table 1. Partial Preset Behavior

| Function | Result |
|---------------------------------|-------------------------|
| Trigger Arm | no change |
| Measurement parameters | no change |
| Call in progress | aborted |
| Operating Mode | Active Cell |
| Measurements | aborted and inactivated |
| Measurement results | NAN |
| Cell Activated State | ON |
| Cell Power State | ON |
| Call Control Status | Idle |
| Call Counters | cleared |
| Call Error Counters | cleared |
| SACCH | cleared |
| Measurement integrity indicator | 1 = no result available |

Example

```
OUTPUT 714;"SYSTEM:PRESET3" !Command for a partial preset when user in
!remote operation.
```

SYSTEM:PRESET3 is the recommended command for a Partial Preset operation. The SYSTEM:PRESET[1]

Preset Descriptions

command is not recommended for use at this time.

Full Preset

A full preset requires the user to setup new measurements and their parameters. If new setup parameters are not needed, use a partial preset to save time. Transmit power is set to its default value. Transmit power is not set to OFF during a full preset.

Full preset behavior is the same as partial preset behavior with the exception of Trigger Arm and Measurement Parameters, see the results listed below.

Press the blue SHIFT key and then the green PRESET key to perform a full preset.

Table 2. Full Preset Behavior

| Function | Result |
|--------------------------------|---------------------------------|
| Trigger Arm | Continuous (manual full preset) |
| Trigger Arm | Single (remote full preset) |
| Maskable Message Display State | On (manual full preset) |
| Maskable Message Display State | Off (remote full preset) |
| Measurement Parameters | all set to defaults |

Example

```
OUTPUT 714;"*RST" !Command for a full preset when user in remote operation.
```

The *RST common command is the recommended command for a Full Preset operation. The SYSTEM:PRESET2 command is not recommended for use at this time.

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" !Presets the STATUS subsystem.
```

Related Topics

["SYSTEM:PRESet" on page 493](#)

["*RST" on page 497](#)

Instrument Status Area

Description

The Instrument status area is found on the bottom center of the test set's display.

Figure 1. 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 the user 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.

Offset

Indicates that the Amplitude Offset state is set to On.

R L T S

This annunciator indicates the state of four different conditions of the test set:

- Remote annunciator. 'R' turns on when the test set is operated remotely.
- Listen annunciator. 'L' turns on when the test set is listening to a command.
- Talk annunciator. 'T' turns on when the test set is providing information over GPIB.
- SRQ annunciator. 'S' turns on when an SRQ is active.

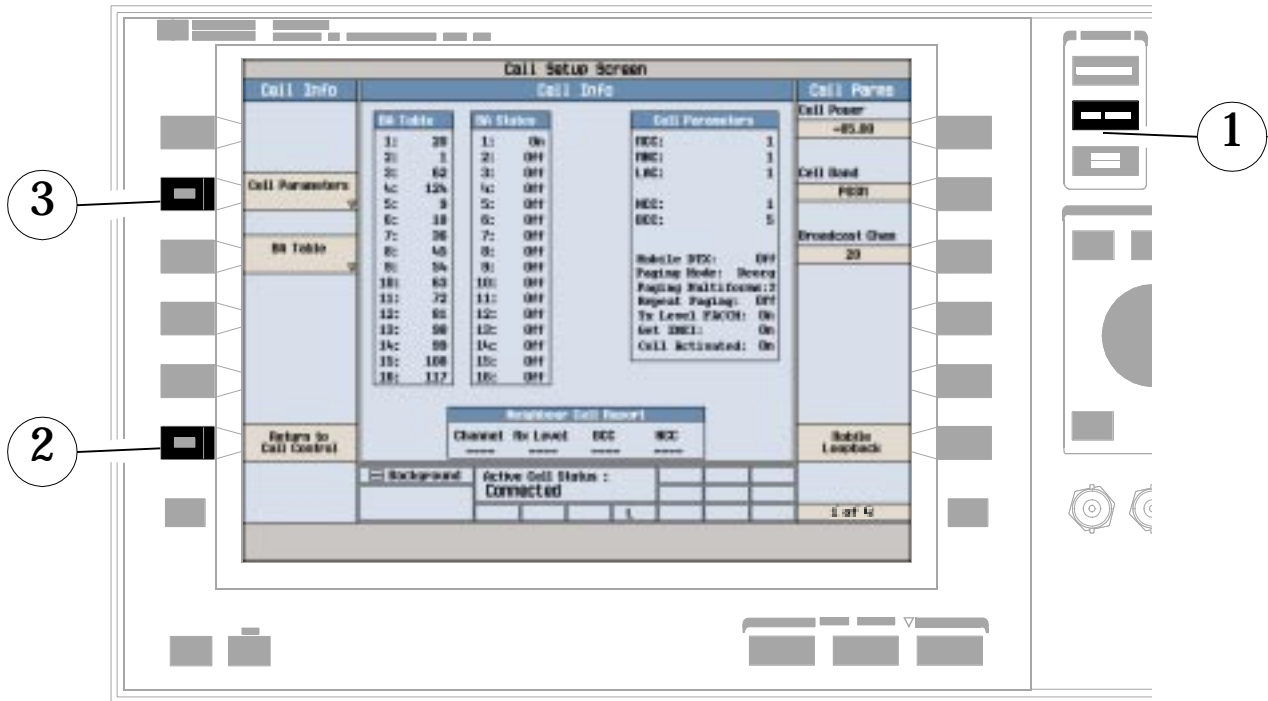
How Do I Change Call Parameters?



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 Parms). Note: For a dual-band handover, change Traffic Band selection (F7 on Call Parms menu 2 of 4).

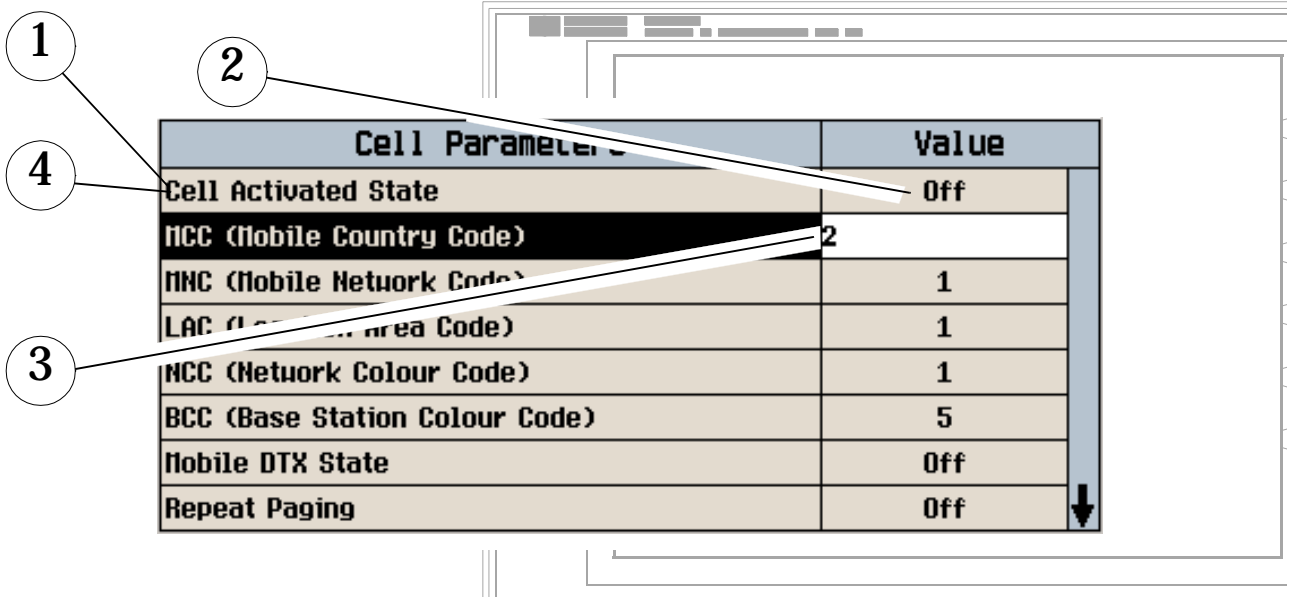
How Do I Change Cell Parameters?

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:

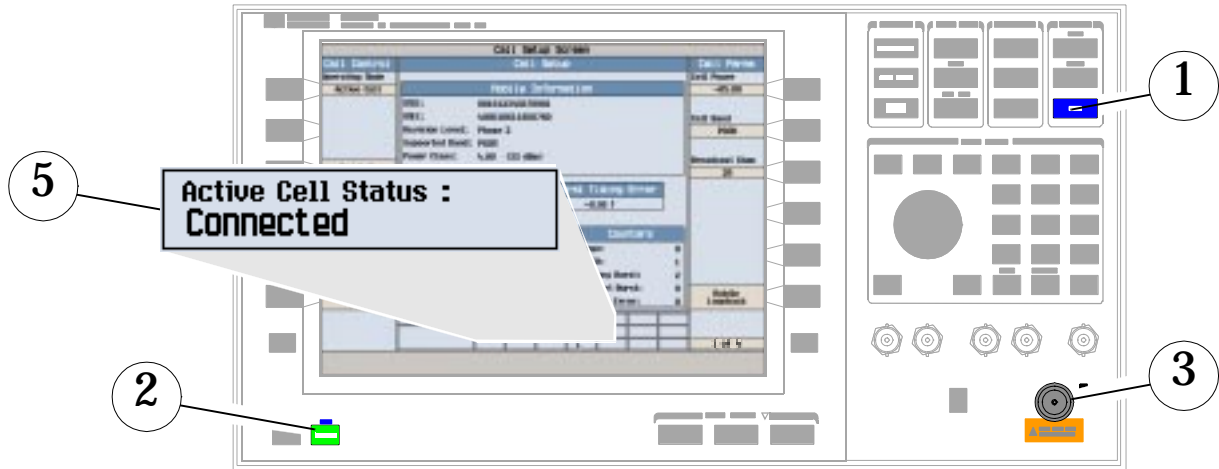
Highlight the parameter, press the knob, enter a value, and press the knob.

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.

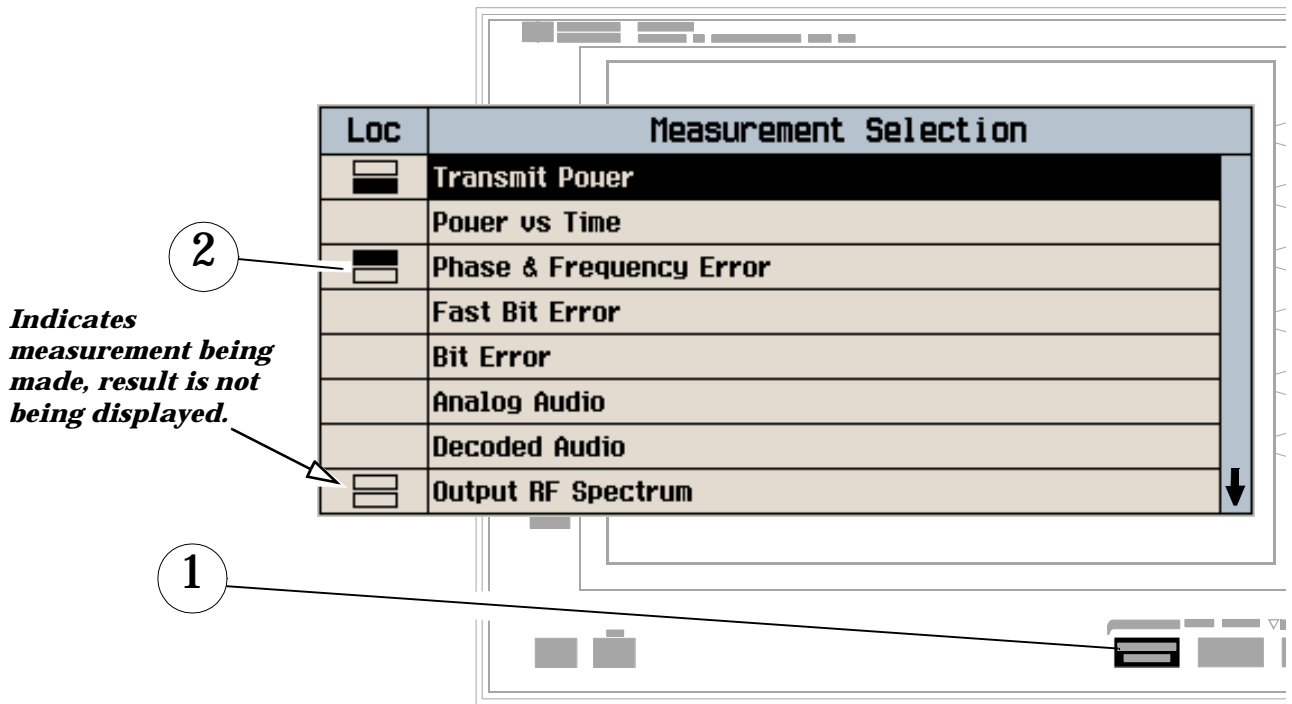
How Do I Make Measurements on a Mobile?

A. Establish a call.



1. Press the SHIFT key.
2. Press the 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.

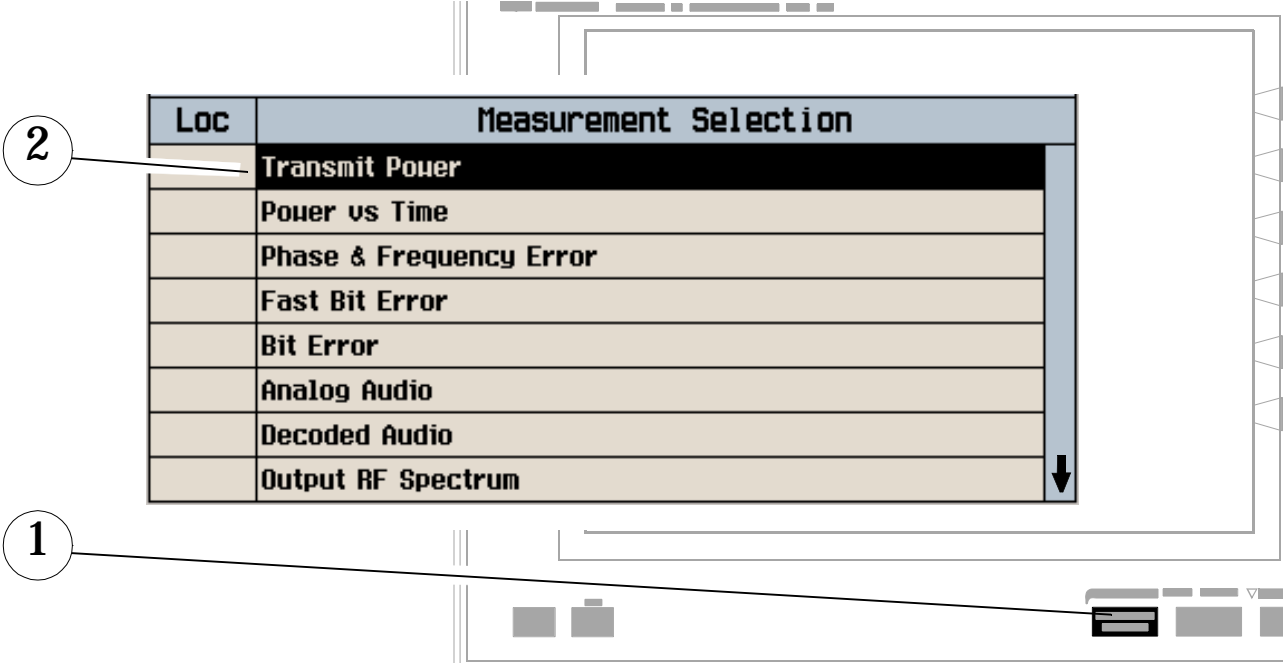
B. Select measurements.



1. Press the MEASUREMENT SELECTION key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.

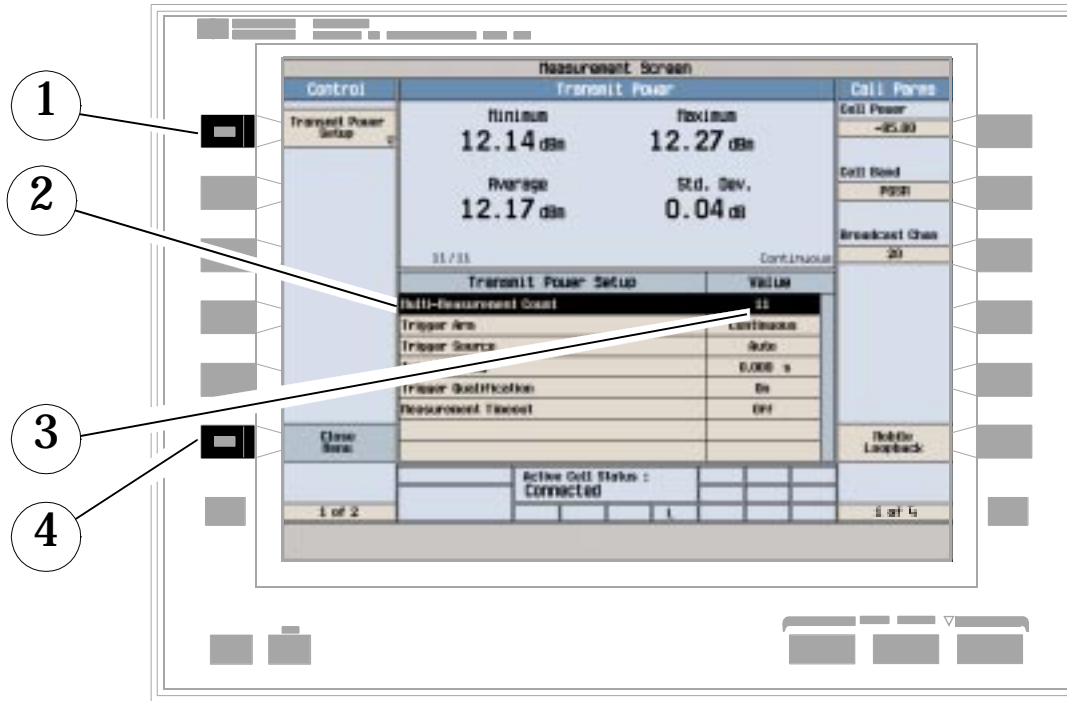
How Do I Change Measurement Setup?

A. Select a measurement.



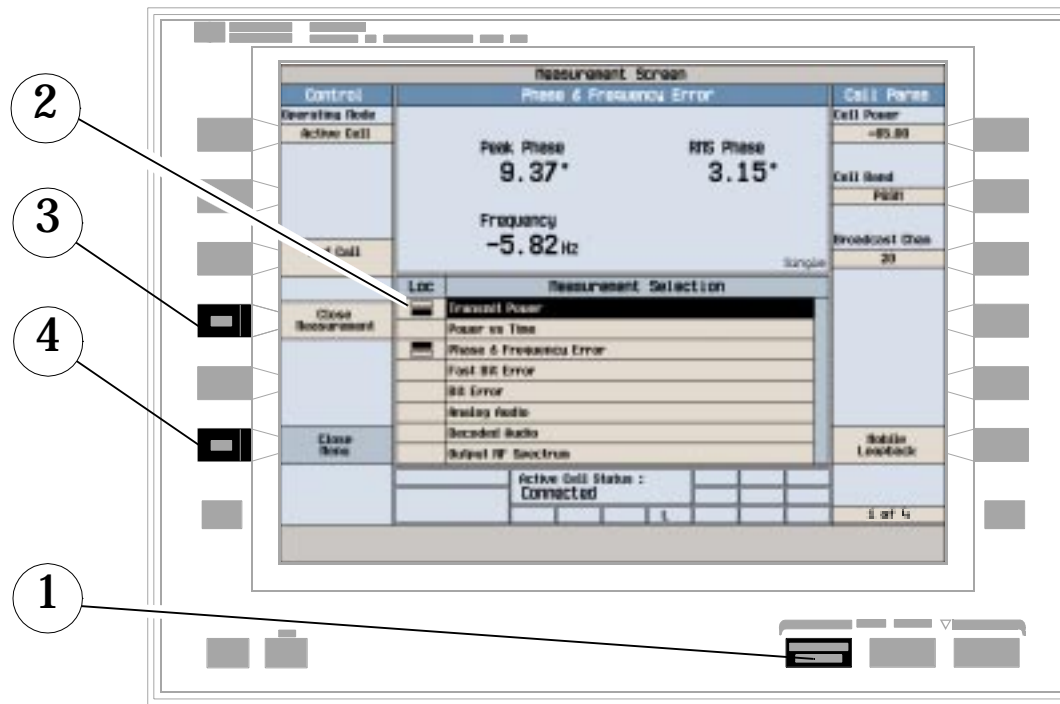
1. Press the MEASUREMENT SELECTION key.
2. Highlight a measurement to setup and press the knob.

B. Set up the measurement.



1. Press the setup key (F1).
2. Highlight a parameter and press the knob.
3. Enter a value or selection and press the knob. Note: For statistical measurement results, change the Multi-Measurement Count Number parameter from "Off" to a number >1.
4. Press Close Menu (F6).

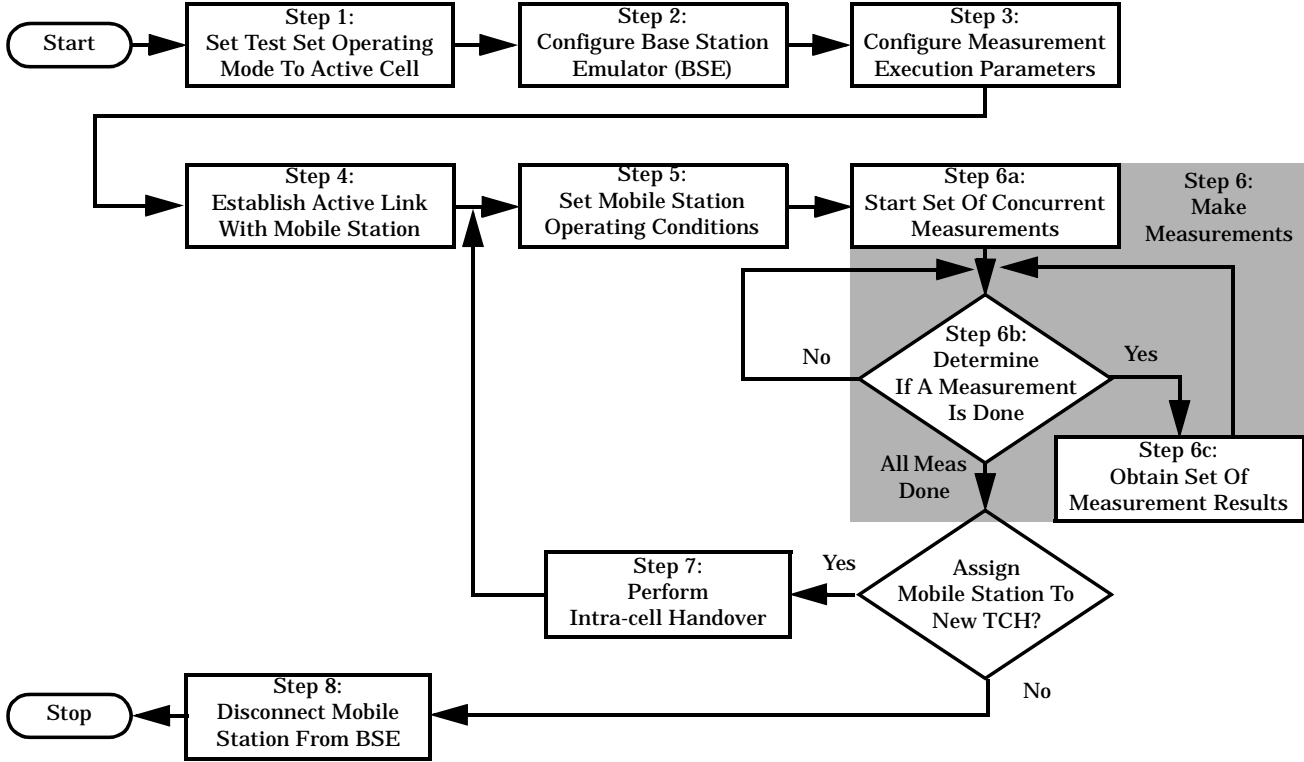
How Do I Turn Off a Measurement?



1. Press the MEASUREMENT SELECTION key.
2. Highlight the measurement you want to turn off.
3. Press Close Measurement (F4).
4. Press Close Menu (F6).

Programming Overview

Figure 2. Typical Flow Of Tasks Performed By Control Program

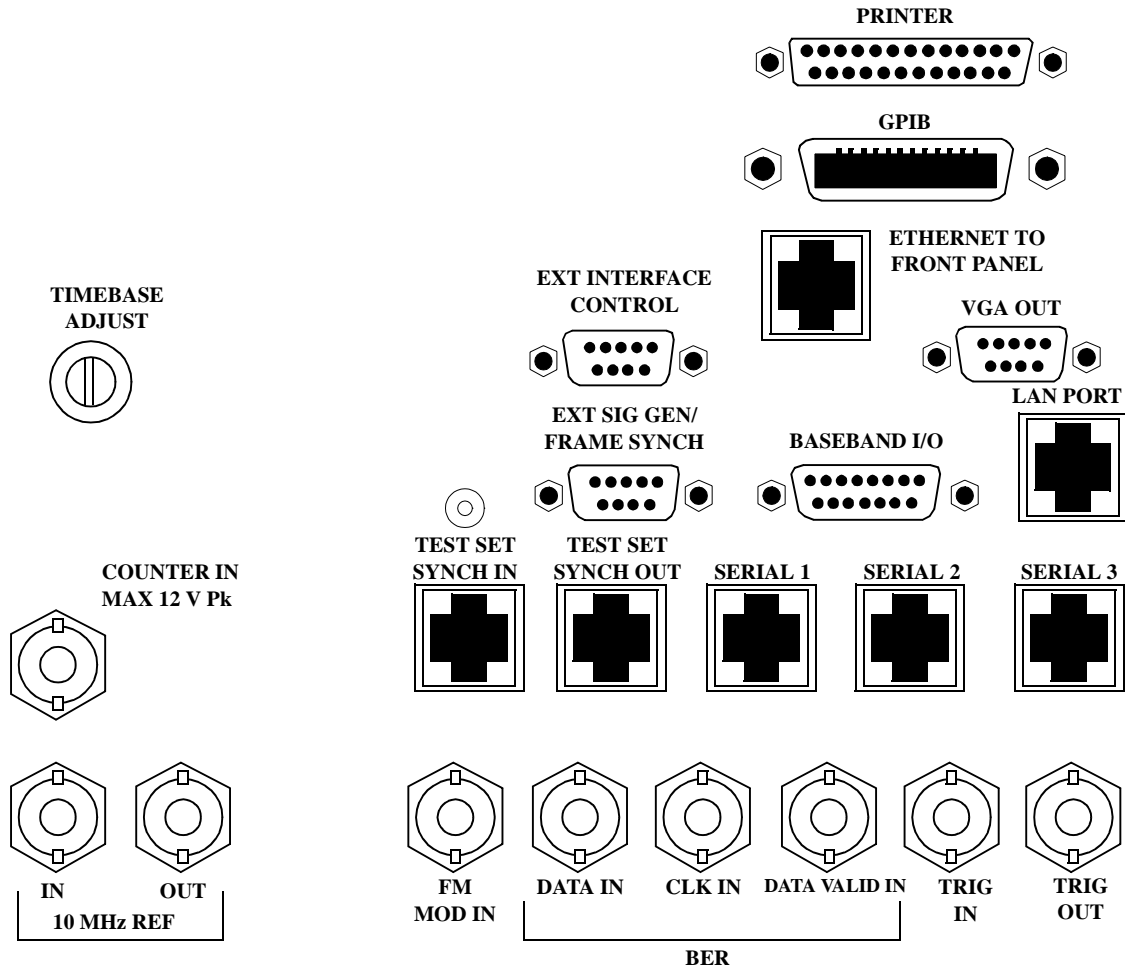


Related Topics

- *****
- [“Programming a Phase and Frequency Error Measurement” on page 85](#)
- [“Programming a Transmit Power Measurement” on page 108](#)
- [“Programming an Output RF Spectrum Measurement” on page 78](#)
- [“Programming a Power versus Time Measurement” on page 93](#)
- [“Programming a Fast Bit Error Measurement” on page 72](#)
- [“Establishing an Active Link with the Mobile Station” on page 28](#)

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 ETHERNET TO FRONT PANEL connector on the rear panel is connected to the DATA connector on the front panel internally, as a convenience to the user the LAN connection to the test set may be routed to the front panel DATA connector for access. The user must connect the rear panel LAN PORT to the rear panel ETHERNET TO FRONT PANEL connector with the LAN jumper cable in order to use the front panel DATA connector.

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 communications with compatible devices.

LAN PORT

This RJ-45 connector provides for LAN communication between the test set and the network.

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 515](#)

[“Timebase Description/Configuration” on page 568](#)

[“SYSTEM:ROSCillator” on page 495](#)

[“Configuring the Test Set’s GPIB Address” on page 557](#)

[“Configuring the Test Set’s LAN” on page 560](#)

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 will be closed, and any manual entries will be aborted when the test set transitions from local mode to remote mode.

The user will need to press the LOCAL key on the front panel in order to gain manual control of the test set, if the test set is in remote mode.

The remote annunciator (R) will appear on the test set's display to indicate that the test set is in remote mode.

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.

7 Installation/Configuration

Display Brightness

Description

This parameter allows the user 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 293](#)

Test Set Beeper

Description

This parameter allows the user 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 480](#)

["Error Messages" on page 575](#)

Configuring the Test Set's GPIB Address

February 14, 2000

Description

The GPIB address is an integer between 0 and 30. The test set comes with a default address of 14 and may be set/queried using the SYSTem subsystem or manually through the system configuration screen by selecting the parameter and changing the number with the knob or the keypad.

The GPIB address is a non-volatile parameter. The GPIB address is not affected by any reset operation and can only be changed by direct access to the parameter itself.

Related Topics

["SYSTem:COMMunicate:GPIB:\[:SELF\]:ADDRess" on page 481](#)

Obtaining Identification Information *IDN?

February 14, 2000

Description

The identification query provides information about the origin, nature, and definition of the test set and is divided into four parts Manufacturer, Model Number, Serial Number, and Firmware Revision. *IDN? is defined in IEEE Std. 488.2-1992, 10.14.

*IDN query returns identification information as a common separated string.

*IDN? Programming Example

```
DIM A$(100)
OUTPUT 714;"*IDN?" !returns manufacturer,model number, serial number and "0"
                  !separated by commas
ENTER 714;A$
PRINT A$          !would print, for example "Agilent Technologies, 8960 Series 10 E5515A,
                  !US38020105,0
```

Manufacturer

Example: Agilent Technologies

Model Number

Printable ASCII characters excluding comma and semicolon up to a 15-character string.

Example: 8960 Series 10 E5515A

Serial Number

Printable ASCII characters excluding comma and semicolon up to a 10-character string.

Example: US00000123

Firmware

Printable ASCII characters excluding comma and semicolon up to a 20-character string.

Example: 0

Related Topics

[“*IDN?” on page 497](#)

[“CALibration:DATE” on page 225](#)

[“Obtaining Test Application Information” on page 567](#)

[“SYSTem:COMMunicate” on page 481](#)

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 value in a different network class (than the previous value), 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 value in a different network class (than the previous value), 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 482](#)

[“SYSTem:COMMunicate:LAN\[:SELF\]:DGATeway” on page 483](#)

[“SYSTem:COMMunicate:LAN\[:SELF\]:SMASK” on page 483](#)

Hardware Configuration Report

Description

You can generate a list of the test set's hardware configuration over the LAN or GPIB. The report includes: model number, serial number, revision number, board ID, and cal file information.

LAN Query

Connect the test set to the LAN and determine the LAN IP address. It can be found in the SYSTEM CONFIG screen. Open a WEB browser. In the address field, enter the test set's LAN IP address, followed by the "iconfig" command.

LAN Example:

15.2.2.147/iconfig

GPIB Query

Data from the GPIB query must be saved as html, and then read with a WEB browser in order for the information to be presented in the same format as the LAN query.

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.

Related Topics

["SYSTEM:CONFigure" on page 484](#)

["SYSTEM:CURREnt:TA" on page 487](#)

["Obtaining Test Application Information" on page 567](#)

["Obtaining Identification Information *IDN?" on page 558](#)

["Rear Panel Connectors" on page 547](#)

Measurement Related Configuration

Amplitude Offset (RF In/Out port)

Amplitude offset is provided in order to offset RF levels at the RF IN/OUT port of the test set and represent the power level at the device under test. The offset is the same for both transmit and receive power so the network being compensated for must have the same gain or loss in both directions. The amplitude offset value is found in the SYSTEM CONFIG screen, Port Configuration key, F5.

Examples

The SYSTEM:CORRECTION:STATE command turns amplitude offset on or off. When SYSTEM:CORRECTION:STATE is on; the annunciator “Offset” will be shown on the display. see [“SYSTem:CORRection” on page 485](#)

```
OUTPUT 714;"SYSTEM:CORRECTION:STATE ON" !Set amplitude offset state ON.
OUTPUT 714;"SYSTEM:CORRECTION:GAIN -3DB" !Set amplitude offset to 3 dB loss in network.
OUTPUT 714;"SYSTEM:CORRECTION:GAIN 6DB" !Set amplitude offset to 6 dB gain in network.
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -2DB" !Set amplitude offset to ON and a 2 dB loss
!in the network.
```

Measurements reflect the actual power at the connection to the device under test, known as the DUT plane. The test set; cell power indicates a change to compensate for loss or gain in the network; however, the expected power setting remains unchanged. See [“CALL:POWer” on page 273](#) for cell power or [“RFANalyzer:EXPEcted:POWer\[:SELEcted\]” on page 372](#) for expected power details.

Transmitter example

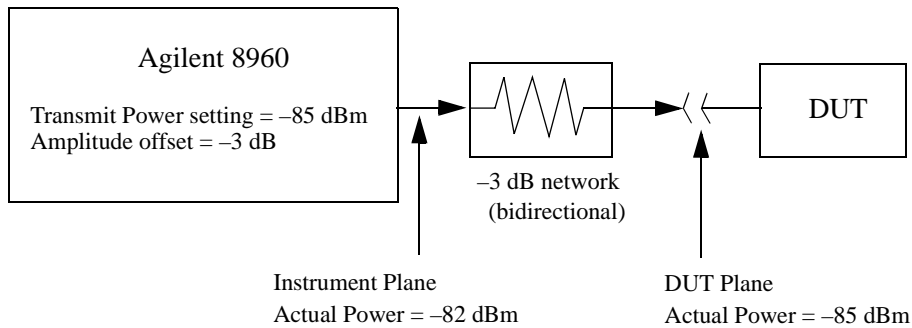
Cell power reflects the actual power at the device under test, including any gain or loss entered as an amplitude offset.

If the cell power setting is -85 dBm, and the SYSTEM:CORRECTION:SGAIN -3DB command is sent, the cell power setting indicates -88 dBm, which represents the cell power at the mobile station after a 3 dB loss in the network.

When you set Cell Power level, the test set uses the amplitude offset value to adjust the actual power so that, power at the device under test will match the Cell Power setting.

The following figure shows a transmitter example. Transmit power is the combination of the cell power and the amplitude offset values.

Figure 3. Amplitude Offset Transmitter Example



When amplitude offset is non-zero, the transmit power setting reflects the actual power at the DUT plane.

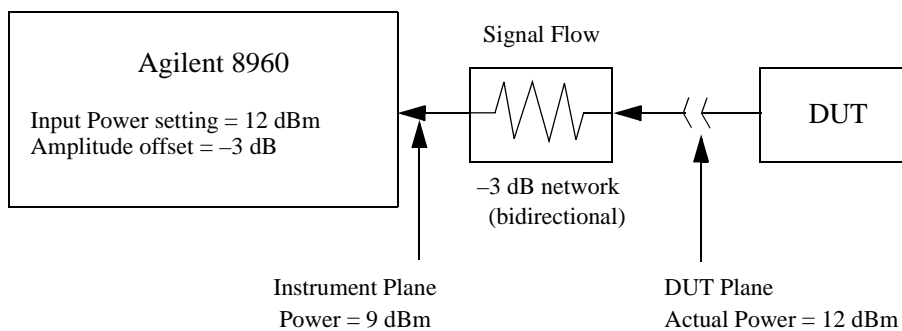
Receiver example

The expected power setting reflects the actual power at the device under test. This means the value displayed for expected power does not change; however, the test set's hardware changes internally to expect a level that includes the offset.

If the expected power setting is 12 dBm, and then the `SYSTEM:CORRECTION:SGAIN -3DB` command is sent, the expected power remains unchanged at 12 dBm to reflect the level at the device under test, but the test set's internal hardware changes to receive 9 dBm the actual power received at the test set's RF IN/OUT connector.

The following figure shows a receiver example. Input power is the combination of the expected power and amplitude offset values.

Figure 4. Amplitude Offset Receiver Example



When amplitude offset is non-zero, the input power setting reflects the actual power at the DUT plane.

Related Topics

[“RFANalyzer” on page 371](#)

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 the user changes 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 294](#)

Obtaining Test Application Information

February 14, 2000

Description

Test application information may be manually viewed from the SYSTEM CONFIG screen or using GPIB queries. You are able to query information about the current test application, selected test application, or any of test applications loaded on your test set.

Each test application has a name, model number, at least one revision, and a license status.

Example 13. Test Application Name Query

GSM Mobile Test

Example 14. Model Number Query

E1960A

Example 15. Revision Query

A.01.04

Example 16. License Status Query

LIC: indicates the status is licensed for use.

Related Topics

[“SYSTem:APPLication” on page 475](#)

[“Obtaining Identification Information *IDN?” on page 558](#)

[“Hardware Configuration Report” on page 562](#)

[“SYSTem:COMMunicate” on page 481](#)

[“CALibration:DATE” on page 225](#)

[“SYSTem:CURRent:TA” on page 487](#)

Timebase Description/Configuration

February 14, 2000

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.

The user 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. The user 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 495](#)

["Rear Panel Connectors" on page 547](#)

Selecting a Radio Personality

Description

Different radio personalities, (such as GSM or AMPS/136) can be tested when the optional test application for each radio personality is purchased from Agilent Technologies.

When the operations described in this section are queried, several seconds may pass before the information is ready to be displayed.

You can query the current revision, the selected revision, all the revisions, and the total count of revisions for a selected test application. These queries are helpful when changing revisions or loading new revisions. They are not usually necessary when switching test applications.

The test application Setup menu will display all of the test applications available along with the selected revision. The selected revision is the revision that would run if the test set was switched to that test application. There is no need to select a revision every time you want to switch test applications.

NOTE Selecting the correct name and the desired revision of a test application is important. This information should be reviewed before proceeding.

Test Applications Switching

Selecting of a different test application is accomplished manually using the front panel keys, or remotely over GPIB. The test set must be rebooted in order for the test application to become functional. The reboot will happen automatically when the you tell the test set to switch test applications. Rebooting to another test application takes about one minute.

Remote User In order to switch to another test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME 'GSM MOBILE TEST'"
```

Sending this command will cause the test set to reboot.

Manual User Test application switching is found on the SYSTEM CONFIG screen.

To switch to the test application you have selected.

1. Press the Test Application key.
2. Use the knob or arrows to scroll to the test application you want.
3. Press the knob or enter key.
4. A menu will appear asking "Switch Now?" If you answer "No" nothing will change, if you answer "Yes" the test set will reboot in the new test application.

Revision Selection

Different revisions of the test applications in your test set will provide different functionality. Switching revisions does not reboot the test set in a new test application. It merely selects a revision for the next switch.

A revision remains selected until a different revision is selected.

NOTE If you switch test applications to an older version that does not support test application switching you will not have a path to get back. Using the firmware upgrade process to load firmware with the correct version will fix this problem.

Test application switching is available on revisions greater than A.04.00 of GSM Mobile Test, and all other test applications that are developed there after.

Remote User This selects the revision and test application that you want, it does not make the switch.

- In order to query a **selected** test application revision (running or not) use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? `AMPS/136 MOBILE TEST`"
```

- In order to query the revision of the test application **currently running** use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:REVISION?"
```

- In order to query **all** of the revisions available for a test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? `AMPS/136 MOBILE TEST`"
```

- In order to **select** a revision of a test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION `GSM mobile test`,`A.04.00`"
```

- Query that returns the number of revisions for a specified test application:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? `GSM MOBILE TEST`"
```

License Status of Test Applications The test application license status can be queried for a particular test application and revision using the following GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? `GSM mobile test`,`A.04.00`"
```

This query returns one of the following:

- "LIC" The test application license status is, licensed
- "NLIC" The test application license status is, not licensed
- "UNKN" The test application license status is, unknown

If you switch to an unlicensed state the test set will reboot to SYSTEM CONFIG screen, unable to switch to any other screen or make any measurements. View the Test Application Setup menu to determine the licensed versions of test applications available. Use the Test Application key to switch to a licensed version of the test application.

Manual User Revision selection is found in the SYSTEM CONFIG screen, Test Application Setup menu. Revisions are shown with their license status. This is where you select the revision and test application that you want, it does not switch test applications. After the revision number is a letter, this letter indicates the revision license status; Licensed "L", Not Licensed "N", or Unknown "U".

- "L" This revision of test application appears to have a license. The test application may have been developed before licensing and therefore needs no license.
- "N" This test application does not appear to have a license. Selecting a not licensed revision will result in an

error +130.

- “U” This test application has unknown license status.
1. Press the Test Application Setup key.
 2. Use the knob or arrows and scroll to the test application you want.
 3. Press the knob or enter key to display the revision menu.
 4. Use the knob or enter key to scroll to the revision you want.
 5. Press the knob or enter key to select the revision.

Test Application Names

Each test application has a name associated with it.

- “AMPS/136 Mobile Test” for the E1961A test application
- “GSM Mobile Test” for the E1960A test application

Remote User name details In order to query or switch test applications remotely you must use the test application name exactly as it appears (without regard to case) in the Test Application Setup menu of the test set display.

- Query the name of the all test applications installed in the test set.

```
OUTPUT 714; "SYSTEM:APPLICATION:CATALOG:NAME?"
```

- Query the name of the selected test application (running or not):

```
OUTPUT 714; "SYSTEM:APPLICATION:SELECT:NAME?"
```

- Query the name of the currently running test application:

```
OUTPUT 714; "SYSTEM:APPLICATION:CURRENT:NAME?"
```

- It might be helpful to know the number of test applications installed in the test set. This can be queried using the following GPIB command:

```
OUTPUT 714; "SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"
```

Manual User The names of test applications installed in the test set can be viewed from the Test Application Setup menu found in the SYSTEM CONFIG screen. This menu shows you how each test application is spelled and should be used as a reference for GPIB commands.

Programming Example

This program example assumes that the you want to switch to the GSM test application.

1. Query the list of test application names to get exact spelling of the GSM test application. This is not necessary if you already know the exact name.
2. Query the test set to get a list of all revisions for “GSM Mobile Test.” This is not necessary if you are not changing revisions.
3. Select a revision of “GSM Mobile Test.” This is not necessary if you are not changing revisions.
4. Select the GSM test application. This will switch test applications and cause the test set to reboot.

Selecting a Radio Personality

```
10  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?" !Queries all of the test
20                                     !application names
30  ENTER 714;Name$
40  PRINT "The list of test application names is ",Name$
50  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'GSM MOBILE TEST'" !Queries all
60                                     !revisions of
70                                     !GSM Mobile
80                                     !Test
90  ENTER 714;Cat_rev$
100 PRINT "The revisions for the GSM Mobile test application are ";Cat_rev$
110 OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM MOBILE TEST','A.04.00'" !Selects
120                                     !a revision
130 OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME 'GSM MOBILE TEST'" !This will switch
140                                     !the test application
150                                     !to GSM
160  END
```

Related Topics

["SYSTEM:APPLICATION" on page 475](#)

8 Error Messages

Error Messages

Error Message Descriptions

[“Fixed Timer Messages” on page 578](#)

[“Manual User Error Messages” on page 581](#)

[“-400 to -499 Query Errors” on page 592](#)

[“-300 to -399 SCPI Specified Device-Specific Errors” on page 590](#)

[“-200 to -299 Execution Errors” on page 587](#)

[“-100 to -199 Command Errors” on page 583](#)

[“+100 to +199 Core Device-Specific Error” on page 593](#)

[“+200 to +299 Call Processing Device-Specific Error” on page 595](#)

[“+300 to +399 Link Control Device-Specific Error” on page 598](#)

[“+400 to +499 Core Hardware Device-Specific Error” on page 599](#)

[“+500 to +599 Test Application Hardware Device-Specific Error” on page 601](#)

[“+600 to +699 Instrument Device-Specific Error” on page 602](#)

[“+700 to +799 Test Application Measurement Device-Specific Error” on page 603](#)

[“+800 to +899 Core Measurement Device-Specific Error” on page 604](#)

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 Errors These errors occur while a measurement is being performed. They indicate something happened during the measurement to invalidate the result, or make the integrity indicator return a questionable result. These errors can be read by using the FETCh command, for a given measurement.

Non-Persistent Errors These messages are generated when a condition occurs that is incorrect, but has no serious or long lasting effect on the test set's operation. Examples could include an out of range value to a parameter, or an invalid GPIB mnemonic. The message window is cleared when any front panel key is pressed.

Persistent Errors These errors are generated when a non-transitory error condition exists. Persistent errors occur when a hardware failure is found, or when damage or injury to a person or the test set may occur.

The test set displays these errors in the error message window and as a prompt at the bottom of the display screen where it remains until the error condition no longer exists.

Fatal Errors When these errors occur no further operation of the test set is possible without cycling the power switch. Fatal errors are not saved in the error message log. The test set display will provide the user with information about what to do next and some details about what the test set was doing when the fatal error occurred.

Maskable Messages These messages are intended to inform the user of a condition within the test set. They are generally meant to provide information to the user. The user will need to decide if this condition is undesirable and if they want the message to appear.

Maskable Message Display State The Maskable Messages Display State found in the Instrument Setup menu gives users a way to block these messages and the associated beep from ever happening. When the state is Off these messages and their associated beep will be blocked. The Maskable Message Display State can be set manually or with the following GPIB command:

```
OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display.
```

Instrument Maskable Messages

- Instrument warning: Audio Generator instrument has been closed.
- Instrument warning: Audio Analyzer instrument has been closed.
- Instrument warning: Analog Audio instrument has been closed.

GSM Mobile Test Maskable Messages

- GSM measurement warning; TX Power measurement has been closed.
- GSM measurement warning; Power vs Time measurement has been closed.
- GSM measurement warning; Phase Frequency Error measurement has been closed.
- GSM measurement warning; Output RF Spectrum measurement has been closed.
- GSM measurement warning; Fast Bit Error measurement has been closed.
- GSM measurement warning; Decoded Audio measurement has been closed.
- GSM measurement warning; IQ Tuning measurement has been closed.

Related Topics

["SYSTem:COMMunicate:GPIB:DEBug\[:STATe\]" on page 482](#)

["Test Set Beeper" on page 556](#)

["SYSTem:ERRor?" on page 488](#)

["DISPlay:WINDow:ERRor:CLEar"](#)

["DISPlay:MESSage:MASKable:STATe" on page 294](#)

["Integrity Indicator" on page 125](#)

["FETCh? Subsystem" on page 295](#)

Fixed Timer Messages

Description

This is the list of fixed timers with a brief explanation and their values. A timer expiry message appears in its own window, on the test set display. The user has no access to these values and can not change them. None of the fixed timers are active when operating mode is Test Mode.

| Timer Name | Description | Value |
|---|--|--|
| T100 RADIO-LINK-TIMEOUT | Detects the presence of the radio link by detecting SACCH frames every 480 ms. | 4 SACCH multiframes. That is 1.92 seconds if the SACCH is completely absent. |
| T200 Data link timer | Used for re-transmission on the data link. The value varies depending on the message type. | 155 ms for FACCH |
| T301 Alerting (ringing) timer | Timer used to limit the amount of time a user has to answer a call. | 20 seconds |
| T303 Mobility Management connection timer | Time the network waits after sending a CM SERVICE REQUEST until receiving a response. This occurs before initiating call clearing procedures towards the MS. | 10 seconds |
| T305 Release timer | Time the network waits after transmitting a DISCONNECT message until receiving a RELEASE message. | 10 seconds |
| T306 In-band tones release timer | Time the network waits after transmitting a DISCONNECT message while in-band tones/announcements are provided, until receiving a RELEASE message. | 10 seconds |
| T308 Release timer | Time the network waits after sending a RELEASE message until receiving a RELEASE COMPLETE message. This occurs before re-transmitting the RELEASE or releasing the Mobility Management connection. | 10 seconds |
| T310 Call proceeding timer | Time the network waits after receiving a CALL CONFIRMED message until receiving a ALERTING, CONNECT, or DISCONNECT message before initiating clearing procedures towards the MS. | 10 seconds |

| Timer Name | Description | Value |
|--|--|------------|
| T313 Connect acknowledge timer | Time the network waits after transmitting a CONNECT message until receiving the CONNECT ACKNOWLEDGE message before performing clearing procedures with the MS. | 10 seconds |
| T323 Modify complete timer | Time the network waits after sending a MODIFY message during call mode changes, until receiving a MODIFY COMPLETE or MODIFY REJECT message before initiating call clearing procedures. | 10 seconds |
| T3101 Immediate assignment timer | Time the network waits after sending the IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT EXTENDED message until the main signalling link is established before releasing the newly allocated channels. | 1 second |
| T3103 Handover timer | Time the network waits after transmitting a HANOVER COMMAND message until receiving HANOVER COMPLETE or HANOVER FAILURE or the MS re-establishes the call before the old channels are released. If the timer expires and the network has not received a correctly decoded L2 (format A or B) or TCH frame, then the newly allocated channels are released. | 2 seconds |
| T3105 Physical information repetition timer | Time the network waits after sending the PHYSICAL INFORMATION message until receiving a correctly decoded L2 (format A or B) or TCH frame. This occur before re-transmitting the PHYSICAL INFORMATION message or releasing the newly allocated channels. | 50 ms |
| T3107 Channel assignment timer | Time the network waits after transmitting an ASSIGNMENT COMMAND message until receiving the ASSESSMENT FAILURE message or the MS re-establishes the call before releasing the old and the new channels. | 3 seconds |
| T3109 Signalling disconnection timer | Time the network waits after sending the CHANNEL RELEASE message before disconnecting the signalling link. | 5 seconds |
| T3111 Channel deactivation after disconnection timer | Time the network waits after disconnecting the signalling link before deactivating the channel. | 500 ms |

Fixed Timer Messages

| Timer Name | Description | Value |
|-------------------------------------|---|----------------------|
| T3113 Paging timer | Time the network waits after transmitting the PAGING REQUEST message until receiving the PAGING RESPONSE message. This occurs before re-transmitting the PAGING REQUEST (if the maximum number of re-transmissions have not been exceeded). | 5 seconds |
| T3212 Location update timer | The location update timer is set to zero, periodic location update by the MS are disabled. If the MS camps to the BCH and decodes a new MCC or MNC from the one it last camped on, it should perform a location update. | zero = infinite time |
| T3250 TMSI reallocation timer | Time the network waits after sending the TMSI REALLOCATION COMMAND until receiving TMSI REALLOCATION COMPLETE. This occurs before aborting the procedure and releasing the Radio Resource connection. | 5 seconds |
| T3260 Authentication response timer | Time the network waits after an AUTHENTICATION REQUEST until receiving AUTHENTICATION RESPONSE. This occurs before aborting the procedure and releasing the Radio Resource connection. | 5 seconds |

Manual User Error Messages

Description

These messages are only intended to be displayed on the manual user interface only, they are not entered into the Error/Event Queue.

| Error Message | Description |
|--|---|
| MUI1 The function you requested is not yet available. | The test set does not have this capability. |
| MUI2 IQ Calibration completed successfully for modulator <N>. Cycle power to continue. | <N> is the IQ modulator number that the user is attempting to calibrate, <N> is 1 or 2. |
| MUI3 IQ Calibration failed for modulator <N>. Cycle power to continue. | <N> is the IQ modulator number that the user is attempting to calibrate, <N> is 1 or 2. |
| MUI4 The function you requested is not available in this radio personality. | This function is used in another radio personality. |
| MUI5 IQ Calibration for modulator <N> in progress. Call processing disabled | <N> is the IQ modulator number that the user is attempting to calibrate, <N> is 1 or 2. |
| MUI6 Instrument warning: Audio generator instrument has been closed. | The audio generator instrument was closed automatically by the test set. |
| MUI7 Instrument warning: Audio Analyzer instrument has been closed. | The audio analyzer instrument was closed automatically by the test set. |
| MUI8 Measurement warning: Analog audio measurement has been closed. | Analog audio measurements have been closed by the test set. |

GSM 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 575](#).

Table 3.

| Message | Description |
|--|---|
| GSM 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 | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM 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 | 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 VI has been inactivated because of a resource conflict. |

-100 to -199 Command Errors

Description

A command error indicates that the test set's GPIB parser has detected an IEEE 488.2 syntax error.

When one of these errors is generated, the command error bit in the event status register is set.

| Error Message | Description |
|--------------------------------|---|
| -100 Command error | This event bit (Bit 5) indicates a syntax error, or a semantic error, or a GET command was entered, see IEEE 488.2, 11.5.1.1.4. |
| -101 Invalid character | Indicates a syntactic elements contains a character which is invalid for that type. |
| -102 Syntax error | Indicates that an unrecognized command or data type was encountered. For example, a string was received when the device does not accept strings. |
| -103 Invalid separator | The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit. |
| -104 Data type error | The parser recognized a data element different than one allowed. For example, numeric or string data was expected but block data was encountered. |
| -105 Get not allowed | Indicates a Group Execute Trigger was received within a program message. Correct the program so that the GET does not occur within the program code. |
| -108 Parameter not allowed | Indicates that more parameters were received than expected for the header. For example, *ESE common command only accepts one parameter, so *ESE 0,1 is not allowed. |
| -109 Missing parameter | Indicates that less parameters were received than required for the header. For example, *ESE requires one parameter, *ESE is not allowed. |
| -110 Command header error | Indicates an error was detected in the header. This error is used when the device cannot detect the more specific errors -111 through -119. |
| -111 Header separator error | Indicates that a character that is not a legal header separator was encountered while parsing the header. |
| -112 Program mnemonic too long | Indicates that the header contains more than twelve characters, see IEEE 488.2, 7.6.1.4.1. |

-100 to -199 Command Errors

| Error Message | Description |
|----------------------------------|---|
| -113 Undefined header | Indicates the header is syntactically correct, but it is undefined for this specific device. For example, *XYZ is not defined for any device. |
| -114 Header suffix out of range | Indicates the value of a header suffix attached to a program mnemonic makes the header invalid. |
| -120 Numeric data error | This error, as well as errors -121 through -129, are generated when parsing a data element which appears to be numeric, including non-decimal numeric types. This particular error is used if the device cannot detect a more specific error. |
| -121 Invalid character in number | Indicates an invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a "9" in octal data. |
| -123 Exponent too large | Indicates the magnitude of an exponent was greater than 32000, see IEEE 488.2, 7.7.2.4.1. |
| -124 Too many digits | Indicates the mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros, see IEEE 488.2, 7.7.2.4.1. |
| -128 Numeric data not allowed | Indicates that a legal numeric data element was received, but the device does not accept one in this position for the header. |
| -130 Suffix error | This error, as well as errors -131 through -139, are generated when parsing a suffix. This particular error message is used if the device cannot detect a more specific error. |
| -131 Invalid suffix | Indicates the suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device. |
| -134 Suffix too long | Indicates the suffix contain more than 12 characters, see IEEE 488.2, 7.7.3.4. |
| -138 Suffix not allowed | Indicates that a suffix was encountered after a numeric element that does not allow suffixes. |
| -140 Character data error | This error, as well as errors -141 through -149, are generated when parsing a character data element. This particular error message is used if the device cannot detect a more specific error. |
| -141 Invalid character data | Indicates that the character data element contains an invalid character or the particular element received is not valid for the header. |
| -144 Character data too long | Indicates the character data element contains more than twelve characters, see IEEE 488.2, 7.7.1.4. |

| Error Message | Description |
|--------------------------------------|--|
| -148 Character not allowed | Indicates a legal character data element was encountered where prohibited by the device. |
| -150 String data error | This error, as well as errors -151 through -159, are generated when parsing a string data element. This particular error message is used if the device cannot detect a more specific error. |
| -151 Invalid string data | Indicates that a string data element was expected, but was invalid, see IEEE 488.2, 7.7.5.2. For example, an END message was received before the terminal quote character. |
| -158 String data not allowed | Indicates that a string data element was encountered but was not allowed by the device at this point in parsing. |
| -160 Block data error | This error, as well as errors -161 through -169, are generated when parsing a block data element. This particular error message is used if the device cannot detect a more specific error. |
| -161 Invalid block data | Indicates a block data element was expected, but was invalid, see IEEE 488.2, 7.7.6.2. For example, and END message was received before the end length was satisfied. |
| -168 Block data not allowed | Indicates a legal block data element was encountered, but not allowed by the device at this point in parsing. |
| -170 Expression error | This error, as well as errors -171 through -179, are generated when parsing an expression data element. This particular error message is used if the device cannot detect a more specific error. |
| -171 Invalid expression | Indicates the expression data element was invalid, see IEEE 488.2, 7.7.7.2. For example, unmatched parentheses or an illegal character. |
| -178 Expression data not allowed | Indicates a legal expression data was encountered, but was not allowed by the device at this point in parsing. |
| -180 Macro error | This error, as well as error -181 through -189, are generated when defining a macro or execution a macro. This particular error message is used if the device cannot detect a more specific error. |
| -181 Invalid output macro definition | Indicates that a macro parameter place holder was encountered outside of a macro definition. |
| -183 Invalid inside macro definition | Indicates that the program message unit sequence, sent with a *DDT or a *DMC command, is syntactically invalid, see IEEE 488.2, 10.7.6.3. |

-100 to -199 Command Errors

| Error Message | Description |
|----------------------------|--|
| -184 Macro parameter error | Indicates that a command inside the macro definition had the wrong number or type of parameters. |

Related Topics

[“Standard Event Status Register” on page 470](#)

-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. |

| Error Message | Description |
|-------------------------------------|---|
| -273 Illegal macro label | Indicates that the macro label was not accepted, it did not agree with the definition in IEEE 488.2, 10.7.3 |
| -274 Macro parameter error | Indicates that the macro definition improperly used a macro parameter placeholder, see IEEE 488.2, 10.7.3. |
| -275 Macro definition too long | Indicates that a syntactically legal macro program data sequence could not be executed because the string of block contents were too long for the device to handle, IEEE 488.2, 10.7.6.1. |
| -276 Macro recursion error | Indicates that a syntactically legal macro program data sequence count not be executed because it would be recursive, see IEEE 488.2, 10.7.6.6. |
| -277 Macro redefinition not allowed | Indicates that redefining an existing macro label, see IEEE 488.2, 10.7.6.4. |
| -278 Macro header not found | Indicates that a legal macro label in the *GMS?, see IEEE 488.2, 10.13, could not be executed because the header was not previously defined. |

-300 to -399 SCPI Specified Device-Specific Errors

Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error. When one of these errors is generated, the device specific error bit in the event status register is set.

| Error Message | Description |
|--------------------------------------|---|
| -300 Device specific error | This event bit (Bit 3) indicates that a device operation did not properly complete due to some condition, such as overrange see IEEE 488.2, 11.5.1.1.6. |
| -311 Memory error | Indicates some physical fault in the devices memory, such as a parity error. |
| -312 PUD memory lost | Indicates protected user data saved by the *PUD command has been lost, see IEEE 488.2, 10.27. |
| -313 Calibration memory lost | Indicates that nonvolatile calibration data used by the *CAL? command has been lost, see IEEE 488.2, 10.2. |
| -314 Save/recall memory lost | Indicates that the nonvolatile data saved by the *SAV command has been lost, see IEEE 488.2, 10.33. |
| -315 Configuration memory lost | Indicates that nonvolatile configuration data saved by the device has been lost. |
| -320 Storage fault | Indicates that the firmware detected a fault when using data storage. This is not an indication of physical damage or failure of any mass storage element. |
| -321 Out of memory | An internal operation needed more memory than was available |
| -330 Self test failed | Indicates a problem with the device that is not covered by a specific error message. The device may require service. |
| -340 Calibration failed | Indicates a problem during calibration of the device that is not covered by a specific error. |
| -350 Queue overflow | Indicates that there is no room in the queue and an error occurred but was not recorded. This code is entered into the queue in lieu of the code that caused the error. |
| -360 Communication error | This is the generic communication error for devices that cannot detect the more specific errors described for error -361 through -363. |
| -361 Parity error in program message | Parity bit not correct when data received for example, on a serial port. |

| Error Message | Description |
|---------------------------------------|---|
| -362 Framing error in program message | A stop bit was not detected when data was received for example, on a serial port (for example, a baud rate mismatch). |
| -363 Input buffer overrun | Software or hardware input buffer on serial port overflows with data caused by improper or nonexistent pacing. |

Related Topics

[“Standard Event Status Register” on page 470](#)

-400 to -499 Query Errors

Description

A Query error is generated either when data in the instrument's GPIB output queue has been lost, or when an attempt is being made to read data from the output queue when no output is present or pending.

| Error Message | Description |
|---|---|
| -400 Query error | This event bit (Bit 2) indicates that an attempt to read data from the Output Queues when no output is present or pending, or data in the Output Queue has been lost see IEEE488.2, 11.5.1.1.7. |
| -410 Query INTERRUPTED | Indicates the test set has been interrupted by a new program message before it finishes sending a RESPONSE MESSAGE see IEEE 488.2, 6.3.2.3. |
| -420 Query UNTERMINATED | Indicates an incomplete Query in the program see IEEE 488.2, 6.3.2.2. |
| -430 Query DEADLOCKED | Indicates that the Input Buffer and Output Queue are full see IEEE 488.2, 6.3.1.7. |
| -440 Query UNTERMINATED after indefinite response | Indicates that a query was received in the same program message after a query requesting an indefinite response was executed see IEEE 488.2, 6.5.7.5. |

+100 to +199 Core Device-Specific Error

Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error.

These are general errors generated by the core instrument. When one of these errors is generated, the '+100 errors' bit in the questionable error status register is set.

| Error Message | Description |
|---|---|
| +101 Assert; Cycle power. Assert message<message1> | <p><message1> will appear as:</p> <p>If the DSP generated the assert:</p> <p style="padding-left: 40px;">;P:DSP T:<task ID> E:<error code> C:<error classif.> F1:<flag 1> F2:<flag 2></p> <p>If the Protocol processor generated the assert:</p> <p style="padding-left: 40px;">;P:Protocol T:<task ID> L:<line number> F:<file name></p> <p>If the Host processor generated the assert:</p> <p style="padding-left: 40px;">;P:Host T:<task ID> L:<line number> F:<file name></p> |
| +102 Exception; Cycle power. Exception message<message2> | <p><message2> will appear as: T:<task ID> or V:<vector number> or PC:<program counter> or DA:<data adrs reg value>.</p> <p>Vector number, program counter and data address register values are hexadecimal format.</p> |
| +103 Failure; No measurements or settings can be made | Indicates none of the VTs are operational because a serious problem exists. |
| +104 Failure; No settling operations will take place | Indicates none of the VTs are operational because a serious problem exists. |
| +105 Failure; No measurements or setting can be made for the function selected | Indicates none of the VTs are operational because a serious problem exists. |
| +110 Input pacing; Internal communication queue overflow likely | Indicates that GPIB commands are too fast for the device input queue and should be slowed. |
| +111 Input pacing; Internal communication queue overflow imminent. Pacing increased | Indicates that GPIB commands were too fast and the device input queue has not kept pace. |
| +112 Internal error; Protocol error <message3> | <message3> is an eight digit hexadecimal number that is the error code reported by protocol. |

+100 to +199 Core Device-Specific Error

| Error Message | Description |
|---|---|
| +113 Internal error; <VI NAME> forced inactive | Indicates that a VI is inactivated when not executed. <VI NAME> could be : "IntVmVI", "GSMFixedVI", "MiscVI", or "GSMSacchMriVI" |
| +114 Internal error; <VI NAME> not responding | Indicates that a VI has not been instantiated or the state is not available. |
| +120 Warning; Receiver overrange due to present setting of amplitude offset (SYST:CORR:GAIN) | Indicates the combination of Expected Power and Amplitude Offset are out of range for the test set. |
| +121 Warning; Receiver underrange due to present setting of amplitude offset (SYST:CORR:GAIN) | Indicates the combination of Expected Power and Amplitude Offset are out of range for the output level of the MS. |
| +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. |
| +130 Configuration error; Unable to switch to indicated Test Application | The test application selected is not available for this test set. |

+200 to +299 Call Processing Device-Specific Error

These errors are generated when a problem occurs maintaining the link between the test set and the DUT. These errors generally occur as a result of a problem on the link such as if the DUT did not respond to a message, or the user attempted to perform an invalid operation in the current instrument state.

Errors with a description beginning with “GSM call disconnected” mean that the call is dropped when the error occurs. Errors beginning with “GSM protocol failure” mean that the call is not necessarily dropped, these are informational messages.

| Error Message | Description |
|--|--|
| +201 GSM call disconnected; Radio link failure (Timer T100 expiry) | “Fixed Timer Messages” on page 578 |
| +202 GSM call disconnected; Immediate assignment failure (Timer T3101 expiry) | “Fixed Timer Messages” on page 578 |
| +203 GSM call disconnected; Handover failure (Timer T3103 expiry) | “Fixed Timer Messages” on page 578 |
| +204 GSM call disconnected; Channel assignment failure (Timer T3107 expiry) | “Fixed Timer Messages” on page 578 |
| +205 GSM call disconnected; No response to page (Timer T3113 expiry) | “Fixed Timer Messages” on page 578 |
| +206 GSM call disconnected; No answer (Timer T301 expiry) | “Fixed Timer Messages” on page 578 |
| +207 GSM call disconnected; No response to setup (Timer T303 expiry) | “Fixed Timer Messages” on page 578 |
| +210 GSM call disconnected; No response to release 2 times (Timer T308 expiry) | “Fixed Timer Messages” on page 578 |
| +211 GSM call disconnected; No alert from mobile (Timer T310 expiry) | “Fixed Timer Messages” on page 578 |
| +212 GSM call disconnected; No response to connect (Timer T313 expiry) | “Fixed Timer Messages” on page 578 |
| +213 GSM call disconnected; Data link failure (Timer T200 expiry) | “Fixed Timer Messages” on page 578 |
| +214 GSM call disconnected; Physical information repetition failed (Timer T3105 expiry) | “Fixed Timer Messages” on page 578 |
| +217 GSM call disconnected; TMSI (Temporary Mobile Subscriber Identity) reallocation failed (Timer T3250 expiry) | “Fixed Timer Messages” on page 578 |
| +218 GSM call disconnected; Authentication failed (Timer T3260 expiry) | “Fixed Timer Messages” on page 578 |

+200 to +299 Call Processing Device-Specific Error

| Error Message | Description |
|--|---|
| +219 GSM Call disconnected; Mobile not capable of supporting the selected Channel Mode | Indicates that the mobile station cannot support the requested channel mode. |
| +220 GSM call processing failure; (Call processing not available | Indicates the BS Emulator VI cannot be instantiated. |
| +230 GSM operation rejected; Call processing disabled | Indicates an attempt to perform a BS Emulator action when the BS emulator VI is inactive. |
| +231 GSM operation rejected; Attempting to set MCC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the BCC. |
| +232 GSM operation rejected; Attempting to set LAC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the BCC. |
| +233 GSM operation rejected; Attempting to set BCC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the BCC. |
| +234 GSM operation rejected; Attempting to set NCC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the BCC. |
| +235 GSM operation rejected; Attempting to set MNC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the BCC. |
| +236 GSM operation rejected; Only one call can be supported at a time | Indicates an attempt at a second call being activated. |
| +237 GSM operation rejected; Requested TCH Band is invalid in current state | Indicates that there is not an active link between the MS and the test set. |
| +250 GSM protocol failure; No response to disconnect (Timer T305 expiry) | “Fixed Timer Messages” on page 578 |
| +251 GSM protocol failure; No response to release (Timer T308 expiry) | “Fixed Timer Messages” on page 578 |
| +252 GSM protocol failure; Channel release failed (Timer T3109 expiry) | “Fixed Timer Messages” on page 578 |
| +253 GSM protocol failure; (Timer T3270 expiry) | “Fixed Timer Messages” on page 578 |
| +254 GSM protocol failure; Unknown identity type received from mobile | Indicates that an identity type other than 1, 2, 3 or 4 was received from the MS. |
| +255 GSM protocol failure; Unexpected identity type received from mobile | Indicates that the MS has responded with an unexpected identity type. Example MS returned IMSI when IMEI was queried. See “CALL:MS:REPorted:IMEI?” on page 256 . |
| +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). |
| +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 |

+300 to +399 Link Control Device-Specific Error

July 12, 1999

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 470 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 |
|--|
| +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 |
| +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 |
| +425 Hardware failure; Invalid EEPROM checksum <EEPROM board ID> |

| Error Message |
|--|
| +426 Hardware failure; Unable to write to EEPROM <EEPROM board ID> |
| +427 Hardware failure; Unable to read from EEPROM <EEPROM board ID> |
| +428 Hardware failure; Board not identified <board ID> |
| +429 Hardware failure; Could not create board identification <board ID> |
| +430 Hardware failure; Control version not compatible with FW <board ID> |
| +431 Hardware failure; RF IO DAC cannot be calibrated due to present temperature |

<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 470](#)

+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 470](#)

+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 hardware. |

Related Topics

["Standard Event Status Register" on page 470](#)

+700 to +799 Test Application Measurement Device-Specific Error

February 14, 2000

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 470](#) for information on this register.

| Error Message | Description |
|--|---|
| +701 GSM measurement failure; TX power hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +702 GSM measurement failure; Power vs time hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +703 GSM measurement failure; Phase frequency error hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +704 GSM measurement failure; Output RF spectrum hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +705 GSM measurement failure; Fast bit error hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +706 GSM measurement failure; Bit error hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +707 GSM measurement failure; Decoded audio hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +708 GSM measurement failure; IQ tuning hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +709 GSM measurement failure; Dynamic power hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +729 GSM measurement warning; Dynamic Power measurement has been closed | Indicates that a VI 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). Note that these measurements may not be present in every test application and therefore, these errors may not be present in every test application.

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 measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |
| +802 Measurement failure; Audio analyzer hardware is not responding | Indicates that a measurement VI cannot be instantiated or a problem occurs when attempting to control the measurement's hardware. |

Related Topics

["Standard Event Status Register" on page 470](#)

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 575](#)

Revision Information

February 14, 2000

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.04 Release - March 2000” on page 606](#)
- [“A.03 Release - December 1999” on page 607](#)
- [“A.02 Release - July 1999” on page 608](#)
- [“A.01 Release - March 1999” on page 609](#)
- [“A.00 Initial Release - January 1999” on page 609](#)

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\[:NAME\]” on page 478](#).

NOTE It is not recommended that you switch to a GSM Test Application that has a revision earlier than A.04. Earlier revisions did not have the capability to select Test Applications.

There may be up to a three second delay between the time the Test Application is selected and it being implemented in the test set.

- Options installed display is now active
The Options Installed display on the System Configuration screen has been activated to allow for the optional second source. Although the second source has been optional since the A.03 release, the Options Installed display has remained blank until this current release.
- Usability enhanced through gray fields
Non-enabled menu items are now denoted as gray text, versus enabled menu items that are a standard black text. Currently there are no GSM Test Application menu items that use this feature.

- **Measurement time-out resolution increased**
The measurement time-out resolution has been increased from 1 second to 0.1 seconds. The minimum time-out has also been reduced from 1 second to 0.1 seconds.
- **Warning messages can be masked from the display**
A new command is available in the DISPLAY subsystem which allows you to set whether or not the test set displays and beeps warning messages. For further information on this command refer to [“DISPlay:MESSAge:MASKable:STATe” on page 294](#). 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 294](#).
- **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.

Revision Information

- **Enhanced status subsystem for multi-format capability**
The status subsystem has been enhanced with radio system nodes where necessary for future multi-format capability. This will cause some status subsystem commands to be in error condition, unless they are replaced with the modified commands. The commands are:
 - STATus:QUEStionable:ERRors is now STATus:QUEStionable:ERRors:GSM
 - STATus:QUEStionable:CALL is now STATus:QUEStionable:CALL:GSM
 - STATus:OPERation:CALL is now STATus:OPERation:CALL:GSM
 - STATus:OPERation:NMRReady is now STATus:OPERation:NMRReady:GSM
- **Instrument configuration information available remotely**
Information on the instrument hardware can be obtained through a remote command over the GPIB, and through a remote command via the LAN and a web browser. For further information on the commands refer to [“Hardware Configuration Report” on page 562](#).
- **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

Revision Information

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*IDN?, 558

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