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4. Delete This field deletes the hop frequency at the currently displayed address. Hop frequencies after the deletion move down by one address and address 2047 is changed to 0 MHz.

If Hop Trig is set to Arm, this field will not execute. If Source is set to Seq, this field is not displayed.

5. Hop Mode This field selects between the Hop and Non-Hop modes of the RF Analyzer. If Hop Trig is set to Arm, this field cannot be modified.

Note 

Do not make measurements with Hop Mode set to Hop and Hop Trig set to Disarm.

6. Hop Trig This field arms or disarms the hop controller to accept a hop trigger.

Hop Trig cannot be set to Arm under the following conditions:

1. Hop Mode is set to Non-Hop.
2. There are no hop frequencies entered.
3. Hop frequencies entered cross frequency bands.

Note 

Do not make measurements with Hop Trig set to Disarm and Hop Mode set to Hop.

7. Insert This field inserts an entry of 0 MHz at the currently displayed address. Hop frequencies after the insertion move up one address and the frequency at address 2047 is lost.

If Hop Trig is set to Arm, this field will not execute. If Source is set to Seq, this field is not displayed.

8. Next This field is displayed only when Source is set to Seq. It is used with the Address field to define the next hop address. The next hop address can be defined for each address. The default setting is the value of Address plus 1, modulo 2048.

9. Reset Adrs This field is displayed only when Source is set to Seq. It resets the internal hop Address to zero when Source is set to Seq and Hop Trig is set to Disarm.

If Hop Trig is set to Arm, this field cannot be modified.

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10. RF Analyzer Hop Frequencies

This is the hop frequency entry field for the RF Analyzer.

Range

10.0 to 1015.0 MHz in 5 bands.

```
Hop frequency bands:

  10     to  150    MHz
 150     to  380.7  MHz
 380.7   to  650    MHz
 650     to  710    MHz
 710     to  1015   MHz
```

11. Settling

This field changes the settling mode.

If Hop Trig is set to Arm, this field cannot be modified, and it will not execute.

Choices

- **Normal** is used for hops less than 75 MHz.
- **LargeHops** is used for hops greater than 75 MHz.

12. Source

This field selects an internal or external source for the hop address.

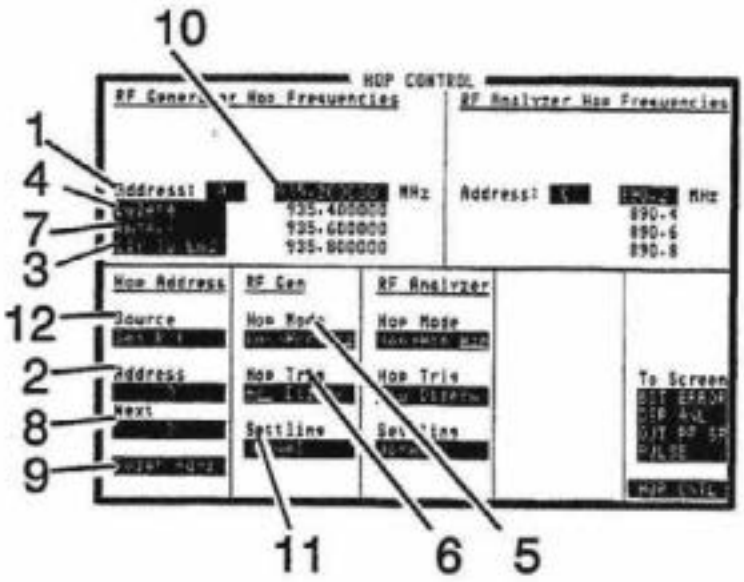
When Seq is selected, frequency hopping is sequenced through the hop frequencies in an order determined by the Address and Next fields. While Activated, internal sources control hopping.

When Ext is selected, the hop address of the next hop frequency comes from the address lines on the SYSTEM BUS connector on the rear panel.

If Hop Trig is set to Arm, this field cannot be modified.

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Hop Control (RF Generator)



1. Address This field selects the hop frequency address and displays the corresponding hop frequency in the RF Generator Hop Frequencies field. Changing this field also changes the other Address fields.

Range

0 to 2047.

2. Address This field is only displayed when Source is set to Seq. It works with the Next field to determine the hop sequence for both the RF Generator and RF Analyzer. Changing this field also changes the other Address fields.

Range

0 to 2047.

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3. Clr to End This field replaces all frequency entries from the currently displayed address onward with 0 MHz.

If Source is set to Seq, this field effects both the RF Generator and RF Analyzer frequencies.

4. Delete This field deletes the hop frequency at the currently displayed address. Hop frequencies after the deletion move down by one address and address 2047 is changed to 0 MHz.

If Hop Trig is set to Arm, this field will not execute. If Source is set to Seq, this field effects both the RF Generator and RF Analyzer frequencies.

5. Hop Mode This field selects between the Hop and Non-Hop modes of the RF Generator. If Hop Trig is set to Arm, this field cannot be modified, and it will not execute.

Note 

Do not make measurements with Hop Mode set to Hop and Hop Trig set to Disarm.

6. Hop Trig This field arms or disarms the hop controller to accept a hop trigger.

Hop Trig cannot be set to Arm under the following conditions:

1. Hop Mode is set to Non-Hop.
2. There are no hop frequencies entered.
3. Hop frequencies entered cross frequency bands.

Note 

Do not make measurements with Hop Trig set to Disarm and Hop Mode set to Hop.

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7. Insert

This field inserts an entry of 0 MHz at the currently displayed address. Hop frequencies after the insertion move up one address and the frequency at address 2047 is lost.

If Hop Trig is set to Arm, this field will not execute. If Source is set to Seq, this field effects both the RF Generator and RF Analyzer hop tables.

8. Next

This field is displayed only when Source is set to Seq. It is used with the address field to define the next hop address. The next hop address can be defined for each address. The default setting is the value of Address plus 1, modulo 2048.

9. Reset Adrs

This field is displayed only when Source is set to Seq. It resets the internal hop address to zero when Source is set to Seq and Hop Trig is set to Disarm.

If Hop Trig is set to Arm, this field cannot be modified.

10. RF Generator Hop Frequencies

This is the hop frequency entry field for the RF Generator.

Range

10.0 to 1015.0 MHz in 6 bands.

```
Hop frequency bands:

  10     to  20     MHz
  20     to  249    MHz
 249     to  380.7  MHz
 380.7   to  501    MHz
 501     to  710    MHz
 710     to  1015   MHz
```

11. Settling

This field changes the settling mode.

If Hop Trig is set to Arm, this field cannot be modified.

Choices

- **Normal** is used for hops less than 75 MHz.
- **LargeHops** is used for hops greater than 75 MHz.

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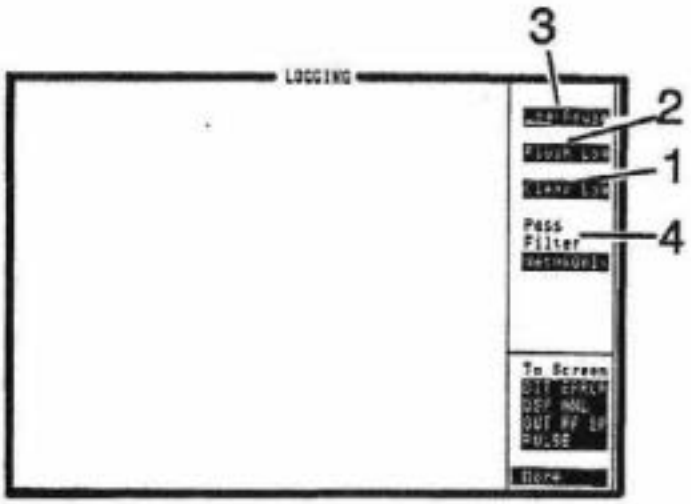
12. Source This field selects an internal or external source for the hop address.

When Seq is selected, frequency hopping is sequenced through the hop frequency in an order determined by the Address and Next fields. While Activated, internal sources control hopping.

When Ext is selected, the hop address of the next hop frequency comes from the address lines on the SYSTEM BUS connector on the rear panel.

If Hop Trig is set to Arm, this field cannot be modified.

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Important

Option 003 must be installed and an external Protocol Logger must be connected for Logging functions to work. Logging captures protocol messages to and from the mobile station in buffers in the HP 8922G. Messages can then be sent to an external Protocol Logger through the Protocol Interface connector on the rear panel. No protocol logging messages appear on the HP 8922G Logging screen.

To log protocol messages into the HP 8922G

1. Select Pause
2. Select Clear
3. Select Log
4. Initiate event

When the event is over

1. Select Pause
2. Select Flush Log

1. Clear Log Clear erases the contents of the logging buffers.

2. Flush Log Flush Log transfers messages from partially full buffers to an external Protocol Logger through the Protocol Interface connector (rear panel).

When buffers are full, they are automatically flushed. Messages continue to be logged-in during Flush Log.

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3. Log/Pause

Log will activate accumulation, or "logging" of protocol messages into dual circular logging buffers in the HP 8922G. Although the messages are delayed, the original sequence is maintained.

Pause will suspend logging.

4. Pass Filter

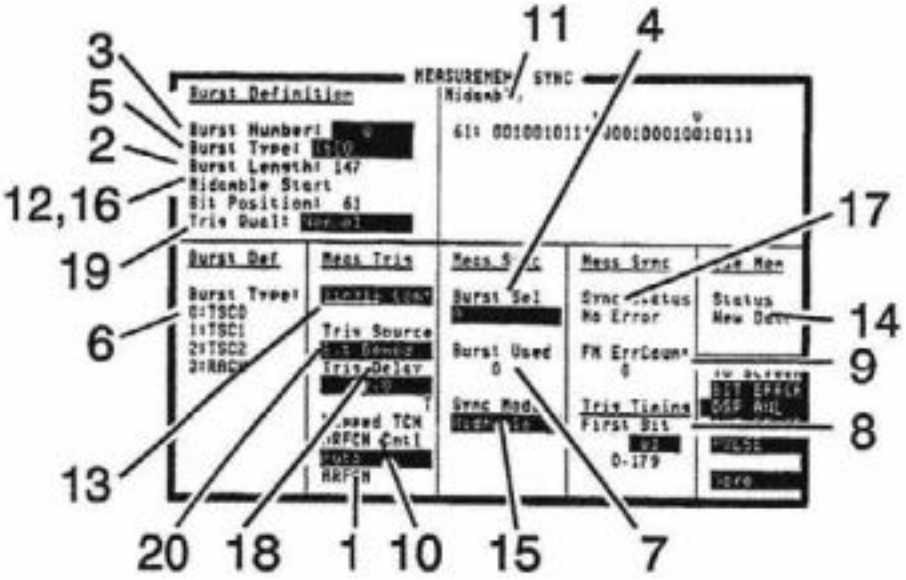
The Pass Filter allows you to select only the category of protocol messages you want logged into the HP 8922G internal logging buffers. Note: The Pass Filter will not filter out GSM messages defined after the release date of the current version of the Firmware (see Configure screen for current version of Firmware).

Choices

- **NetwkOnly** will pass these messages:
  - peer-to-peer messages between the network layers (signaling layer 3).
- **+Datalink** will pass these messages:
  - peer-to-peer messages between the network layers
  - peer-to-peer messages between the data link layers.
- **+Service** will pass these messages as (defined by GSM recommendations):
  - peer-to-peer messages between the network layers
  - peer-to-peer messages between data link layers
  - intra-layer/inter-layer service request and response messages.
  - Service primitives exchanged between the signaling layer of the HP 8922G.

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Measurement Sync



This screen defines settings that determine how synchronization will occur for any of the following measurements:

- DSP Analyzer
- Output RF Spectrum
- Pulse On/Off Ratio

1. ARFCN

If Auto is chosen in the Hopped TCH ARFCN Cntl field, the measured ARFCN will be displayed in this field, as soon as a measurement is completed on a Hopped TCH. It will be the lowest frequency ARFCN in the hop sequence.

If Specific is chosen from the Hopped TCH ARFCN Cntl field, enter a specific ARFCN from the hop sequence into this field. After Meas Arm is selected, the HP 8922G will make a measurement when the mobile is transmitting on the selected frequency.

2. Burst Length

This field displays the burst length of the Burst Type selected. If Burst Type is set to User Defined, the Burst Length will be 87 or 147.

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3. Burst Number

This field selects which burst definition is being displayed.

Range

0 to 3.

4. Burst Sel

This field selects the burst that the measurement will synchronize to.

Choices

- 0
- 1
- 2
- 3
- **Ext** is used for selecting burst number 0, 1, 2, or 3 in real- time using the SYSTEM BUS (rear-panel connector) or using internal signals while Activated.

5. Burst Type

This field defines the burst type. Choose from eleven burst types, or User Def for specifying a user defined burst type.

Choices

- **TSC0 through TSC7** (Training Sequence Codes) are used for normal bursts.
- **RACH** (Random Access Channel) is used for access bursts.
- **SCH** (Synchronization Channel) is used for synchronization bursts.
- **FCH** (Frequency Channel) is used for frequency correction bursts.
- **User Def** (User Defined) is used when your burst does not conform to any of the burst types listed (such as PRBS), or when measuring noisy signals.

User defined burst lengths must be 87 or 147 (plus 4 guard bits), and the User Defined Sync Pattern can comprise part of or all of the bits in the burst.

To measure a noisy signal (approx 10 deg rms), enter the entire burst in User Defined Sync Pattern, and use Midamble Expected (see Screens: DSP Analyzer: Data Bits or Phase Err). The ideal phase trajectory will be calculated from the User Defined Sync Pattern, eliminating the problem of extremely high peak phase error due to bit errors.

User Def is not allowed for Digital Demod.

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6. Burst Type This field displays a summary of the Burst Type definitions for the four definable bursts.

7. Burst Used This field displays which one of four possible burst types was used for synchronization or alignment during a measurment. Refer to the Burst Definition or Burst Def fields.

8. First Bit This field displays the position in time of the of the burst's first useful bit relative to the delayed measurement trigger.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

9. FM ErrCount This field displays the number of bit differences detected when comparing the demodulated data bits to the selected synchronization pattern when Sync Mode is set to Midamble. This field will display 0 if Sync Mode is set to Amplitude.

See Also

Screens: DSP Analyzer: Data Bits

10. Hopped TCH ARFCN Cntl

This field is used to determine the HP 8922G's method for selecting which ARFCN to measure during a hopping TCH.

The frequency of the ARFCN selected in this field is displayed in the HopMeasFreq field on the RF Generator/RF Analyzer screen.

Choices

- **Auto** causes the HP 8922G to make a measurement on the lowest ARFCN in the hop sequence and display it in the ARFCN field.
- **Specific** requires that you enter an ARFCN in the field that appears when Specific is chosen. Make sure this ARFCN is in an MA table and a CA table (see Screens: Cell Configuration). If the specified ARFCN is not in the MA table, no measurement triggers will be generated and the HP 8922G will wait until the measurement is disarmed.

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11. Midamble

This field displays the midamble bit pattern of the Burst Type selected for bursts other than user defined bursts.

12. Midamble Start Bit Position/Sync Pattern Start Position

If Midamble Start Bit Position is displayed, the number displayed represents the expected position (within the Burst Type you have selected) of the first bit of the burst's midamble. Example: If you have selected Burst Type TSC0, the Midamble Start Bit Position will be 61, and you will see this number displayed in this field and in the Midamble field to the right.

If Sync Pattern Start Position is displayed, the number displayed represents the expected position (within a User Defined burst) of the first bit in a user defined pattern that the DSP Analyzer will try to synchronize to. The field labeled Burst Type must be set to User Def for Sync Pattern Start Position to be displayed.

13. Single/Cont (Meas Trig)

Single performs one GSM measurement (DSP Analyzer, Pulse On/Off, and Output RF Spectrum) after Meas Arm is selected and a valid trigger event occurs.

Cont performs GSM measurements continuously. Each time a GSM measurement is performed, the measurement screen will be updated with new information.

Note

Screens that display traces update more slowly than screens that display numbers.

If no measurements are being made while in continuous (Cont), check Trig Qual (see Screens:RF Generator/RF Analyzer). If it is set to RF Power, change it to Normal.

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14. Status (Use Mem)

This field will indicate whether any data is available for a Use Mem measurement, and whether current data has had a measurement performed on it. (The Use Mem function allows DSP measurements over one archived GSM burst.)

- **No Data:** No data has been stored.
- **Old Data:** Data is available for a measurement, but Digital Demod has been disarmed and then armed again since the data was stored. This indicates that a measurement was made on the data.
- **New Data:** Data is available for a measurement and Digital Demod has not been disarmed and then armed again since the data was stored.

See Also

Keys: Use Mem
Screens: Measurement Sync (`Status (Use Mem)`)
Screens: Digital Demod (`Trig Source (Use Mem)`)

15. Sync Mode

This field selects how the location of the demodulated data bits are determined within the measured burst.

Choices

- **Midamble** attempts to bit pattern match the demodulated data bits to the selected Midamble or User Defined Sync Pattern.
- **Amplitude** centers the demodulated data within the detected amplitude envelope.

16. Sync Pattern Start Position

This field is only displayed when Burst Type is set to User Def. It selects the starting bit position of a user defined synchronization pattern.

Range

0 to 147.

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17. Sync Status

This field displays problems that were detected during digital demodulation or DSP analyzer measurements.

See Also

Making Measurements: Solving Problems
Messages

18. Trig Delay

This field sets the time delay between a valid trigger event and the beginning of a measurement.

Range

0 to 5000.000000 μs.

19. Trig Qual

This field selects whether a trigger qualifier will be used.

Choices

- **Normal,** no trigger qualifier is used.
- **RF Power,** trigger events will only be valid when RF power is detected at the selected input. If no RF Power is present at the time of the trigger, the measurement will re-arm after seven timeslots.

Note

If no measurements are being made while in continuous (Cont), check Trig Qual (see Screens:RF Generator/RF Analyzer). If it is set to RF Power, change it to Normal.

20. Trig Source

This field selects the source of the trigger. When Activated (see Screens: Cell Configuration), triggers for digital demodulation are generated internally.

Choices

- **Ext Demod** selects triggering through RP_DMOD_TRIG on the rear-panel SYSTEM BUS CONNECTOR.
- **RF Rise** selects triggering when the rising edge of an RF signal is detected. RF Rise is used with pulsed RF input signals.
- **Ext Meas** selects triggering through the MEASURE TRIGGER IN connector.

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Message

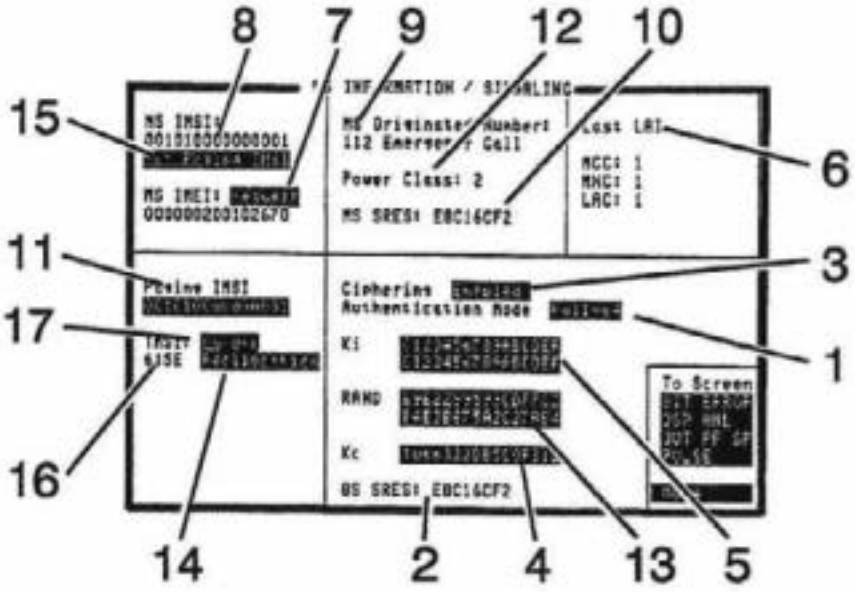


This screen makes a record of any messages. Up to 10 messages can be displayed. If the 10-message limit is exceeded, the latest message is added to the bottom of the screen, and the top message is removed from the screen.

If the same operation error occurs multiple times, you will see the number of occurrences at the end of the message.

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MS Information / Signaling



1. Authentication Mode

Choices

- **Full-64** Authentication Mode requires that you use a test SIM that implements the authentication algorithm specified in Rec. 11.10, sec. III.1.6.3
  - You must enter an Authentication Key (Ki). If no Ki is entered, a default value of 0 is used.
  - When an authentication request occurs, the BS SRES generated by the HP 8922G should match the MS SRES received from the mobile station.
- **Full-54** Authentication Mode requires that you use a test SIM that implements the authentication algorithm specified in Rec. 11.10, sec. III.1.6.3
  - The HP 8922G generates 0's for the 10 least significant bits of the 64 bit Cipher Key (Kc).
  - You must enter an Authentication Key (Ki). If no Ki is entered, a default value of 0 is used.
  - When an authentication request occurs, the BS SRES generated by the HP 8922G should match the MS SRES received from the mobile station.
- **Partial** Authentication Mode requires that you enter a RANDom number and the associated Kc for a particular SIM. The MS SRES from the mobile station will be displayed, but no BS SRES will be generated by the HP 8922G.
- **None** results in no authentication being performed.

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2. BS SRES

This field is the Base Stations Signed RESponse, and is only displayed when Authentication Mode is Full.

BSRES is calculated by the HP 8922G, then used to validate MSRES by checking for a match between BSRES and MSRES.

When the Authentication Mode field is Partial or None, this field will be blanked.

3. Ciphering

This field selects the ciphering mode of the mobile station and the HP 8922G during the next call made.

Choices

- **Off** results in no ciphering signal.
- **Enabled** (Option 005 only) sends a ciphering mode message and enables ciphering. (If the Authentication Mode is Full-64 or Full-54, MSRES and BSRES must match for the call to proceed and enable ciphering.
- **Disabled** sends a ciphering mode message, and disables ciphering.

4. Kc

This field displays the Ciphering Key (Kc) generated by the HP 8922G when the Authentication Mode is Full.

If the Authentication Mode is Partial or None, you must enter Kc into this field.

The HP 8922G will use all 64 bits from this field. Entries into the Kc field must account for any truncation of bits that may be done by the mobile station.

Example: If the mobile station truncates 10 bits, resulting in a 54-bit Kc, enter a hexadecimal number in the HP 8922G Kc field that correctly positions the 54 bits that will be used, inserting 0's where necessary.

5. Ki

This field is used to enter the mobile station's Authentication Key (Ki). When the Authentication Mode is Partial or None, this field is not displayed.

6. Last LAI

These fields display the mobile station's LAI (Local Area Identification) after the last location update.

7. MS IMEI:Request

When this field is selected during a call, the HP 8922G will attempt to obtain the IMEI (International Mobile Equipment Identity) number of the mobile station. If a correct IMEI number is obtained, it will be displayed directly below MS IMEI:Request.

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8. MS IMSI This field displays the mobile station's IMSI (International Mobile Subscriber Identity) number, obtained from the mobile station during call setup or a location update.

9. MS Originated Number

This field displays the called party BCD number the mobile station sent during the last MS originated call.

This field is updated each time an MS initiated call is accepted.

This field is blank if no called party BCD number was included in the message from the mobile station.

If an emergency call is made, 112_EMERGENCY_CALL is displayed.

10. MS SRES This field is the Mobile Stations Signed RESponse to an authentication request. When the Authentication Mode field is None, this field will be blanked. When the Authentication Mode is Full, BSRES and MSRES should match. If BSRES and MSRES don't match, the call will be cleared.

11. Paging IMSI This is the IMSI number the HP 8922G will use when paging the mobile station. If you would like to automatically enter an MS (mobile station) obtained IMSI into this field , make a MS originated call, then select Set Paging IMSI.

You can also enter the IMSI number manually.

12. Power Class This field displays the power class of the mobile station, as sent by the mobile station during a call. This number will correspond with a maximum power level the mobile station is allowed to transmit.

13. RAND This field displays the RAND number when the Authentication Mode is Full. You must enter the RAND number (and Kc) when the Authentication Mode is Partial. This field is not displayed when Authentication Mode is None.

14. Reallocation When this field is selected a random TMSI number is generated for reallocation to a mobile station. The random TMSI number is displayed in the TMSI Number field.

15. Set Paging IMSI When this field is selected, the MS IMSI number reported by the mobile station is copied to the Paging IMSI field, to be used for HP 8922G BS (base station) originated calls (Mobile Terminated Calls).

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16. TMSI Number

This field displays the current Temporary Mobile Subscriber Identity (TMSI) number assigned to the mobile station.

If a TMSI received from the mobile station is not valid, the HP 8922G will calculate a new TMSI and automatically reallocate it to the mobile station. Any time a signaling link is established, TMSI reallocation can be performed manually. See Reallocation.

17. TMSI On/Off

When On is selected, the HP 8922G will attempt to identify the mobile station by its TMSI (Temporary Mobile Subscriber Identity) number.

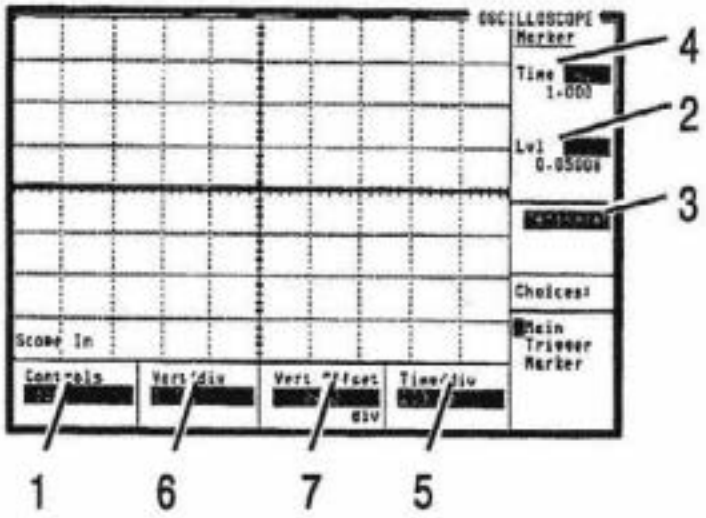
The TMSI is checked as part of the call setup process. During an initial call setup with a mobile station, the TMSI will have to be assigned to the mobile station by the HP 8922G. This assigned TMSI is then expected by the HP 8922G during subsequent call setups, as long as a TMSI is used and the IMSI remains the same.

If a TMSI received from the mobile station is not valid, the HP 8922G will calculate a new TMSI and reallocate it to the mobile station as part of the call setup. The following situations can cause a TMSI to not be valid; when the mobile station identifies itself with an IMEI number (emergency call), or when a new IMSI is used.

When Off is selected, the mobile station will continue to use the old TMSI until the next location update occurs. When the next location update occurs, the mobile station will be instructed to delete its last TMSI, and the HP 8922G will perform the identification procedure to determine the IMSI.

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Oscilloscope, Main Controls



This screen displays the measurements on an oscilloscope display. The input signal is selected by the AF Anl In field on the CW MEAS/AF ANALYZER screen. The selected input is shown in the lower-left corner of the oscilloscope's display.

See Also Screens: CW Meas/AF Analyzer, AF Analyzer (AF Anl In)
Screens: CW Meas/AF Analyzer, AF Analyzer (Scope To)

1. Controls This field selects the set of oscilloscope controls.

Choices

- Main
- Trigger
- Marker

2. Lvl This field displays the signal level at the current marker position. The units-of-measure for this field are determined by the AF Anl In selection.

See Also

Screens: CW Meas/AF Analyzer, AF Analyzer (AF Anl In)
Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

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3. Meas Reset Selecting Meas Reset will erase any accumulated measurements used for calculating a final result, and re-start the measurement process for the following functions:

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys: HI LIMIT, LO LIMIT, AVG

4. Time This field displays the time elapsed from the trigger point to the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, Units

5. Time/div This field selects the horizontal sweep time per division.

Choices

- 200, 100, 50, 20, 10, 5, 2, or 1 ms
- 500, 200, 100, 50, 20, 10, 5, 2, or 1 μs

6. Vert/div This field, vertical sensitivity, sets the vertical amplitude per division. The units-of-measure for this field are determined by the AF Anl In selection.

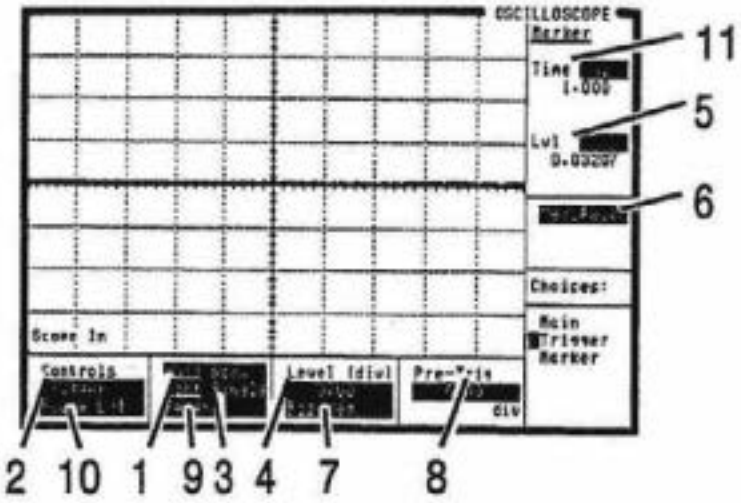
See Also

Screens: CW Meas/AF Analyzer, AF Analyzer (`AF Anl In`)

7. Vert Offset This field moves the displayed signal trace above or below the oscilloscope's fixed centerline.

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Oscilloscope, Trigger Controls



1. Auto/Norm This field affects triggering as described below.

Auto automatically triggers a sweep if a triggering signal is not detected within ≈50 ms of the end of the previous sweep when in Cont triggering mode.

Norm requires a specific triggering signal before triggering.

2. Controls This field selects the set of oscilloscope controls.

Choices

- Main
- Trigger
- Marker

3. Cont/Single This field specifies how measurements are armed to accept a trigger.

If Cont is selected, the oscilloscope is continuously armed to accept a sweep trigger.

If Single is selected, the oscilloscope is armed each time Reset is selected.

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4. Level (div) This field sets the trigger level when the Scope Lvl is the trigger source. The trigger level is indicated by small pointers that appear on each side of the graticule. The units are vertical divisions.

5. Lvl This field displays the signal level at the current marker position. The units-of-measure for this field are determined by the AF Anl In selection.

See Also

Screens: CW Meas/AF Analyzer, AF Analyzer (AF Anl In)
Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

6. Meas Reset Selecting Meas Reset will erase any accumulated measurements used for calculating a final result, and re-start the measurement process for the following functions:

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys: HI LIMIT, LO LIMIT, AVG

7. Pos/Neg This field specifies whether triggering occurs on the trigger signal's positive-going (Pos), or negative-going (Neg) slope.

8. Pre-Trig This field specifies the number of horizontal divisions to be displayed previous to the trigger point. The trigger point is indicated by small pointers that appear at the top and bottom of the graticule.

9. Reset This field is used to arm a sweep trigger when Single is selected.

10. Scope Lvl This field selects the trigger source.

Choices

- **Scope Lvl** uses the input signal level for triggering.
- **External** uses the front-panel MEASURE TRIGGER IN signal for triggering.

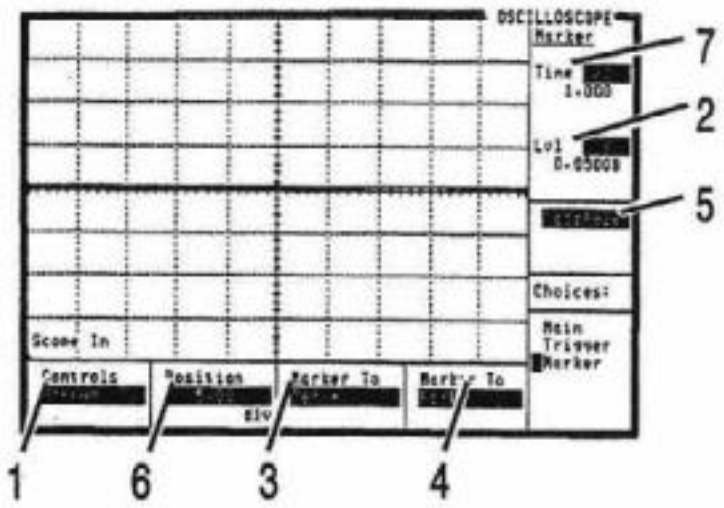
11. Time This field displays the time elapsed from the trigger point to the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

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Oscilloscope, Marker Controls



1. Controls This field selects the set of oscilloscope controls.

Choices

- Main
- Trigger
- Marker

2. Lvl This field displays the signal level at the current marker position. The units-of-measure for this field are determined by the AF Anl In selection.

See Also

Screens: CW Meas/AF Analyzer, AF Analyzer (AF Anl In)
Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

3. Marker To (Peak+) This field causes the marker to move to the highest positive peak displayed.

4. Marker To (Peak–) This field causes the marker to move to the lowest negative peak displayed.

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5. Meas Reset Selecting Meas Reset will erase any accumulated measurements used for calculating a final result, and re-start the measurement process for the following functions:

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys

6. Position This field controls the position of the marker.

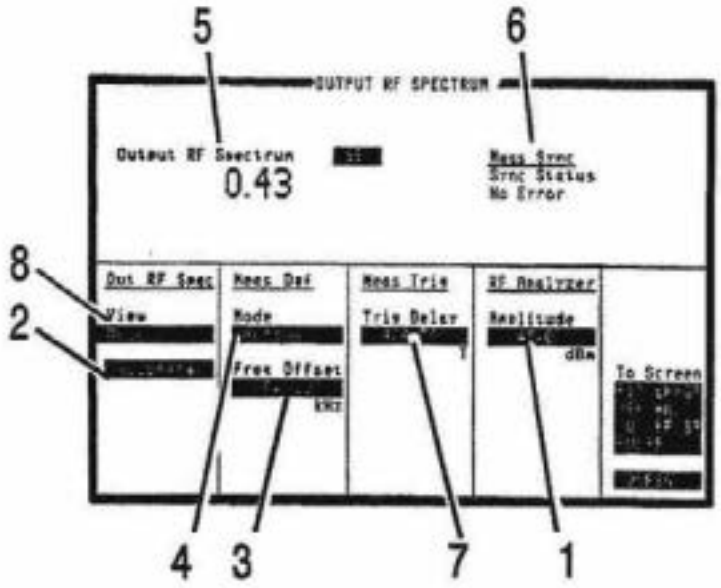
7. Time This field displays the time elapsed from the trigger point to the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

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Output RF Spectrum, Main View



The HP 8922G uses a 3-pole synchronously tuned filter to make Output RF Spectrum measurements rather than a 5-pole filter as specified in the GSM recommendations. Refer to the technical paper titled "Output RF Spectrum Measurements Using a 3-Pole Synchronously Tuned Measurement Filter, found at the front of this manual set."

1. Amplitude This is a copy of the RF Analyzer Amplitude field. This is the amplitude to be assumed at the selected input port, see RF Analyzer Functions).

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

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2. Calibrate

This field calibrates the spectrum analyzer for making Output RF Spectrum and Pulse On/Off Ratio measurements.

Note

This function should be executed within 5 minutes before making this measurement to maintain measurement accuracy.

3. Freq Offset

This sets the frequency offset for the Output RF Spectrum measurement. This field is used when not making reference measurements. The offset used is 0.0 kHz when Mode is set to Ramp Ref or Mod Ref.

Range

−2.0 MHz to +2.0 MHz.

4. Mode

This field selects the Output RF Spectrum measurement Mode.

Choices

- **Ramping** measures the Output RF Spectrum power due to ramping. (The peak value is returned within the time interval 28 μs before bit 0 to 28 μs after bit 147 or bit 87, depending on the burst type.)
- **Ramp Ref** makes a reference measurement needed for the Output RF Spectrum measurement when making ramping measurements.
- **Modulatn** (modulation) measures the Output RF Spectrum power due to modulation.
- **Mod Ref** makes a reference measurement needed for the Output RF Spectrum measurement when making modulation measurements.

5. Output RF Spectrum

This field displays the measured Output RF Spectrum power at the specified Freq Offset setting.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

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6. Sync Status This field displays any errors that occurred while trying to synchronize to the demodulated data.

See Also

Making Measurements: Solving Problems
Messages

7. Trig Delay This field sets the time delay between a valid trigger event and the beginning of a measurement.

Range

0 to 5000.000000 μs

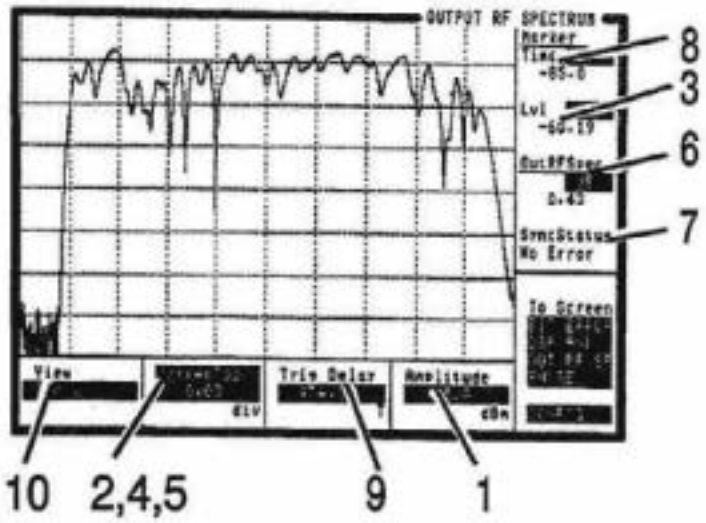
8. View This field selects the alternate views of the Output RF Spectrum measurement.

Choices

- **Main**
- **Trace** displays Output RF Spectrum power spectral density (at the Freq Offset setting) versus time.

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Output RF Spectrum, Trace View



This view displays output RF spectrum power spectral density (at the Freq Offset setting) versus time.

The HP 8922G uses a 3-pole synchronously tuned filter to make Output RF Spectrum measurements rather than a 5-pole filter as specified in the GSM recommendations. Refer to the technical paper titled "Output RF Spectrum Measurements Using a 3-Pole Synchronously Tuned Measurement Filter, found at the front of this manual set."

1. Amplitude This is a copy of the RF Analyzer Amplitude field. This is the amplitude to be assumed at the selected input port.

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

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2. Freq Offs This sets the frequency offset for the Output RF Spectrum measurement. This field is used when not making reference measurements. The offset used is 0.0 kHz when Mode is set to Ramp Ref or Mod Ref.

Range

−2.0 MHz to +2.0 MHz.

3. Lvl This field displays the level at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

4. MarkerPos This field controls the marker position.

Choices

- **MarkerPos**
- **Freq Offs** selects the frequency offset for the trace.
- **Meas Mode** selects the output RF spectrum measurement mode.

5. Meas Mode This field selects the Output RF Spectrum measurement Mode.

Choices

- **Ramping** measures the Output RF Spectrum power due to ramping. (The peak value is returned within the time interval 28 μs before bit 0 to 28 μs after bit 147 or bit 87, depending on the burst type.)
- **Ramp Ref** makes a reference measurement needed for the Output RF Spectrum measurement when making ramping measurements.
- **Modulatn** (modulation) measures the Output RF Spectrum power due to modulation.
- **Mod Ref** makes a reference measurement needed for the Output RF Spectrum measurement when making modulation measurements.

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6. OutRFSpec This field displays the measured Output RF Spectrum power at the specified Freq Offset setting.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

7. SyncStatus This field displays any errors that occurred while trying to synchronize to the demodulated data.

See Also

Making Measurements: Solving Problems
Messages

8. Time This field displays the time at the current marker position relative to the center of bit zero.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

9. Trig Delay This field sets the time delay between a valid trigger event and the beginning of a measurement.

Range

0 to 5000.000000 μs

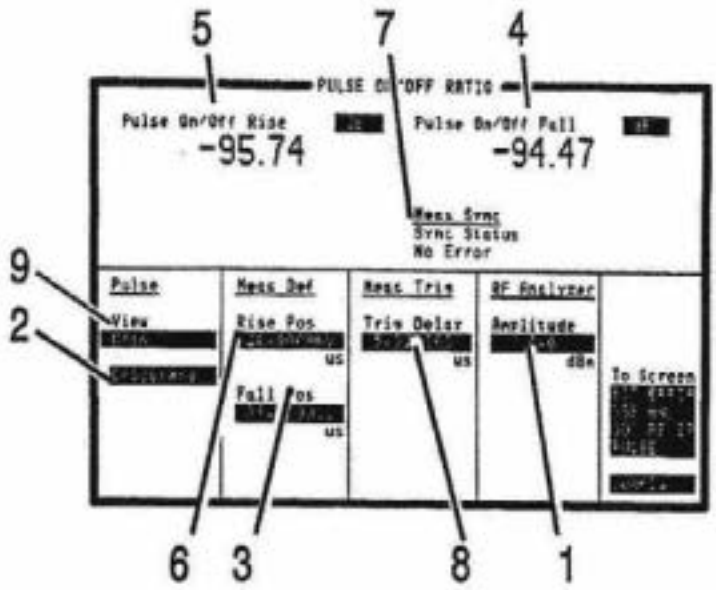
10. View This field selects the alternate views of the Output RF Spectrum measurement.

Choices

- Main
- Trace displays Output RF Spectrum power spectral density (at the Freq Offset setting) versus time.

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Pulse On/Off Ratio, Main View



1. Amplitude This is a copy of the RF Analyzer Amplitude field. This is the amplitude to be assumed at the selected input port.

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

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2. Calibrate

This field calibrates the spectrum analyzer for making Pulse On/Off Ratio or Output RF Spectrum measurements.

Note

This function should be executed within 5 minutes before making this measurement to maintain measurement accuracy.

3. Fall Pos

This field selects the time (relative to the center of the last bit) that the amplitude on the amplitude envelope will be measured.

Range

0.0 μs to +56 μs.

4. Pulse On/Off Fall

This field displays the measured amplitude at the fall-position time relative to the average On power over the useful bits in the measured burst.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, METER, Units

5. Pulse On/Off Rise

This field displays the measured amplitude at the rise-position time relative to the average On power over the useful bits in the measured burst.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, METER, Units

6. Rise Pos

This field selects the time (relative to the center of bit zero) that the amplitude on the amplitude envelope will be measured.

Range

−56.0 μs to 0.0 μs.

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7. Sync Status This field displays any errors that occurred while trying to synchronize to the demodulated data.

See Also

Making Measurements: Solving Problems
Messages

8. Trig Delay This field sets the time delay between a valid trigger event and the beginning of a measurement.

Range

0 to 5000.000000 μs

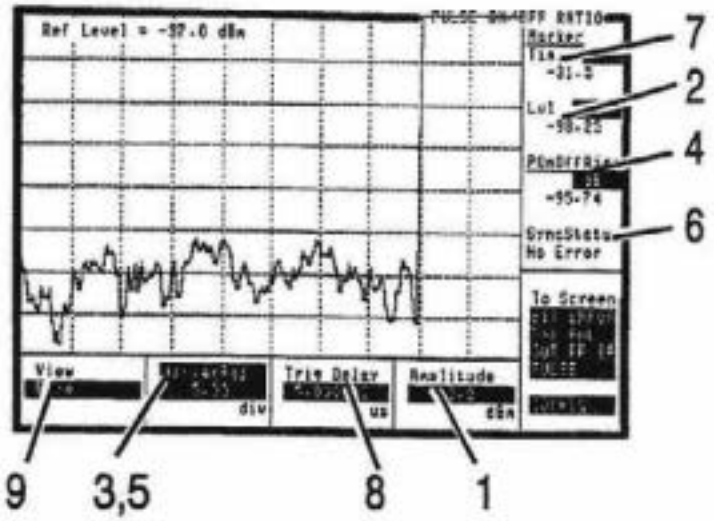
9. View This field selects the alternate Views of the Pulse On/Off Ratio measurement.

Choices

- Main
- Rise displays the rising portion of the pulse trace.
- Fall displays the falling portion of the pulse trace.

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Pulse On/Off Ratio, Rise View



This view displays Pulse On/Off power spectral density versus time for the rising portion of the burst.

1. Amplitude This is a copy of the RF Analyzer Amplitude field. This is the amplitude to be assumed at the selected input port,

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

2. Lvl This field displays the level at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

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3. MarkerPos This field selects the marker position for the rising trace.

Choices

- MarkerPos
- Rise Pos

4. POnOffRise This field displays the measured amplitude at the rise-position time relative to the average On power over the useful bits in the measured burst.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, Units

5. Rise Pos This field selects the time (relative to the center of bit zero) that the amplitude on the amplitude envelope will be measured.

Choices

- MarkerPos
- Rise Pos

Range

−56.0 μs to 0.0 μs.

6. SyncStatus This field displays any errors that occurred while trying to synchronize to the demodulated data.

See Also

Making Measurements: Solving Problems
Messages

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7. Time This field displays the time elapsed from the center of bit zero to the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

8. Trig Delay This field sets the time delay between a valid trigger event and the beginning of a measurement.

Range

0 to 5000.000000 μs

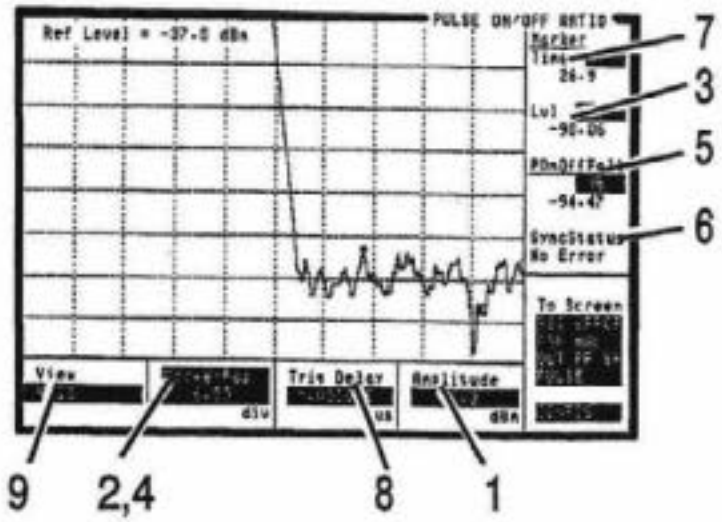
9. View This field selects the alternate Views of the Pulse On/Off Ratio measurement.

Choices

- Main
- **Rise** displays the rising portion of the pulse trace.
- **Fall** displays the falling portion of the pulse trace.

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Pulse On/Off Ratio, Fall View



This view displays Pulse On/Off power spectral density versus time for the falling portion of the burst.

1. Amplitude This is a copy of the RF Analyzer Amplitude field. This is the amplitude to be assumed at the selected input port,

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

2. Fall Pos This field selects the time (relative to the center of the last bit zero) that the amplitude on the amplitude envelope will be measured.

Choices

- MarkerPos
- Fall Pos

Range

0.0 to +56.0 µs

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3. Lvl This field displays the level at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

4. MarkerPos This field selects the marker position for the rising trace.

Choices

- MarkerPos
- Fall Pos

5. POnOffFall This field displays the measured amplitude at the fall-position time relative to the average On power over the useful bits in the measured burst.

6. SyncStatus This field displays any errors that occurred while trying to synchronize to the demodulated data.

See Also

Making Measurements: Solving Problems
Messages

7. Time This field displays the time elapsed from the center of the last bit to the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

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8. Trig Delay This field sets the time delay between a valid trigger event and the beginning of a measurement.

Range

0 to 5000.000000 μs

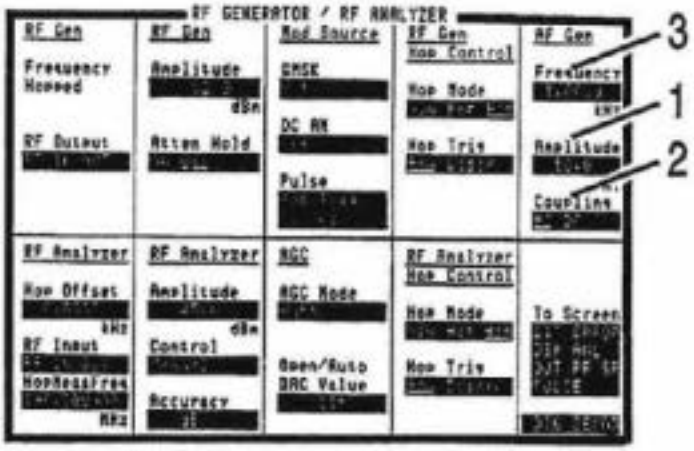
9. View This field selects the alternate Views of the Pulse On/Off Ratio measurement.

Choices

- Main
- Rise displays the rising portion of the pulse trace.
- Fall displays the falling portion of the pulse trace.

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RF Generator / RF Analyzer (AF Gen)



1. Amplitude This field is the AF Generator Audio Out amplitude setting.

Range

0.0 mV rms to 8.84 V rms.

2. Coupling This field selects ac or dc coupling of the AF Generator Audio Out signal.

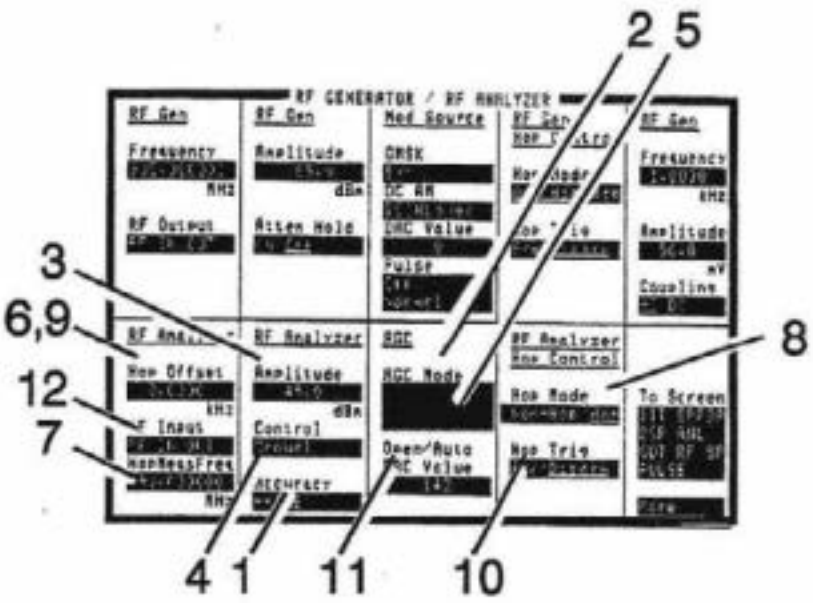
3. Frequency This field is the AF Generator Audio Out Frequency setting.

Range

dc to 30 kHz.

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RF Generator / RF Analyzer (RF Analyzer)



1. Accuracy This field selects the input accuracy of the RF Amplitude setting to be assumed by the instrument for setting the Open/Auto DAC Value when in Auto AGC mode.

Choices

- +-3 dB
- +-1 dB

2. AGC Mode This field selects the AGC Mode.

Choices

- **Closed** is closed-loop AGC operation. It is used for stable, repeating RF signals and provides greater accuracy measurements.
- **Open** is used for isolated pulses, for example RACHs.
- **Auto** is used to automatically set the Open/Auto DAC Value based on the entered amplitude and accuracy.

3. Amplitude This field is the input amplitude to be assumed at the selected RF Analyzer input. The amplitude shown is for the port selected in the RF Input field.

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

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4. Control

This field determines how the RF Analyzer amplitude is selected.

Choices

- **MS TX Lev** automatically selects the RF Analyzer amplitude based on the level set in TX Level on the Cell Control screen if the RF analyzer's RF input connector selection is RF IN/OUT.
- **Manual** requires setting the RF Analyzer amplitude using the front-panel keys.

5. Do Open Cal

This field is displayed only when AGC Mode is closed. When selected, the correct Open/Auto DAC Value for the signal input, using the present RF Analyzer setting, is entered in the Open/Auto Dac Value field.

A stable, repeating RF signal is required for open loop calibration.

Doing an open loop calibration is useful for establishing an AGC DAC Value to be used when AGC Mode is Open.

See Also

Screens: RF Analyzer (AGC Mode, Open/Auto DAC Value)

6. Frequency

This field sets Frequency when RF Analyzer Hop Mode is set to Non-Hop.

Range

10.0 to 1015.0 MHz.

7. Hop Meas Freq

This is the frequency entry field for the frequency assumed when making measurements while the RF Analyzer is frequency hopping.

8. Hop Mode

This field selects between the Hop and Non-Hop modes of the RF Analyzer. Hop Mode cannot be set to Non-Hop until Hop Trig is set to Disarm.

Note



Do not make measurements with Hop Mode set to Hop and Hop Trig set to Disarm.

9. Hop Offset

This field sets the Hop Offset when the RF Analyzer Hop Mode is set to Hop. The frequency offset is applied to all of the frequencies in the RF Analyzer Hop Frequency table when the RF Analyzer is hopping.

Range

−50.000 to +50.000 kHz.

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10. Hop Trig This field selects whether the RF Analyzer is armed or disarmed to accept a hop trigger. Hop Trig cannot be set to Arm until Hop Mode is set to Hop.

Note 

Do not make measurements with Hop Trig set to Disarm and Hop Mode set to Hop

11. Open/Auto DAC Value

This field is the AGC level DAC value when in Open or Auto AGC mode. This value can be entered automatically by choosing Auto AGC Mode. It can also be entered by performing a Do Open Cal operation while in Open AGC mode, or manually while in Open or Closed AGC Mode.

During Auto operation, the DAC value is based on the RF Analyzer Amplitude setting, and will be updated each time RF Analyzer Amplitude is changed.

See Also

Screens: RF Analyzer (Do Open Cal, AGC Mode)

Range

0 to 255.

12. RF Input This field selects the RF input port for the RF Analyzer.

Choices

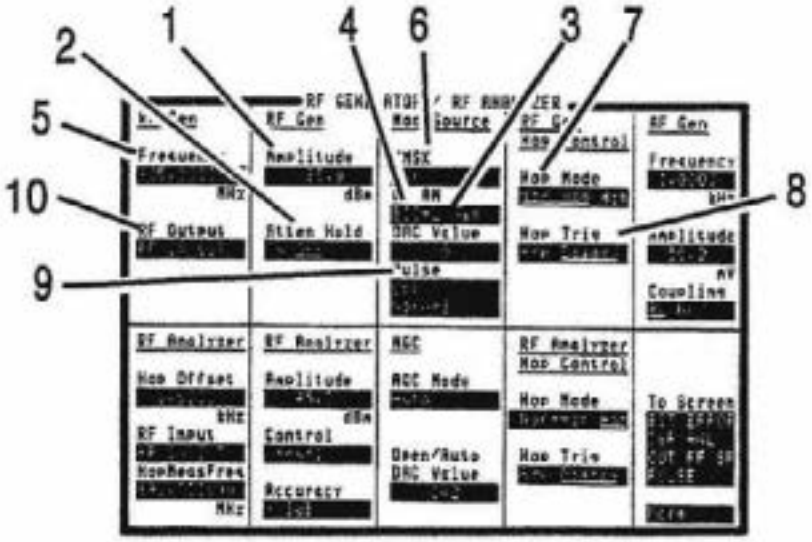
- RF IN/OUT
- AUX RF IN

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

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RF Generator / RF Analyzer (RF Gen)



1. Amplitude This is the amplitude entry field. The amplitude shown is for the port selected in the RF Output field.

Range

RF IN/OUT: −127.0 to −12.0 dBm.
AUX RF OUT: −127.0 to +14.0 dBm.

2. Atten Hold This field prevents attenuator switching when On is selected.

3. DAC Value This field allows the DC AM modulation level to be set through the modulation source DAC.

Range

0 through 255

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4. DC AM This field selects the status of DC AM. When the instrument mode is Activated (see Screens: Cell Configuration), the broadcast and traffic channels' amplitude can be lowered using choices in this field.

Choices

- **Ext** turns on the front-panel input for DC AM.
- **Off** turns off DC AM.
- **TCH Lower** reduces the TCH amplitude by a level determined by DAC Value.
- **BCCH Lower** reduces the BCCH amplitude by a level determined by DAC Value.
- **Both Lower** reduces the TCH and BCCH amplitude by a level determined by DAC Value.

See Also

Screens: RF Generator / RF Analyzer, Mod Source (DAC Value)
Screens: Cell Configuration

5. Frequency This is the non-hopped frequency entry field. When the RF Gen, Hop Control, Hop Mode is set to Hop, this field will show the frequency status as Hopped.

Range

10.0 to 1015.0 MHz.

6. GMSK This field turns on the input for external GMSK modulation. When Activated (see Screens: Cell Configuration), Ext is connected to internally generated signals.

Choices

- Ext
- Off

7. Hop Mode This field selects between the Hop and Non-Hop modes of the RF Generator.

Note Do not make measurements with Hop Mode set to Hop and Hop Trig set to Disarm.

8. Hop Trig This field selects whether the RF Generator is armed or disarmed to accept a hop trigger.

Note Do not make measurements with Hop Trig set to Disarm and Hop Mode set to Hop

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9. Pulse

This field selects pulse modulation and triggering. When Activated (see Screens: Cell Configuration) these signals are internally generated.

Choices

- **Off** turns pulse modulation off.
- **Hop Trig** automatically pulses the RF Generator off for one timeslot at a valid hop trigger.
- **Ext** allows the pulse signal to be input from the MODULATION IN PULSE connector or pin 6 (PULSE_MOD_IN) on the SYSTEM BUS connector.
- **Normal and Ext** pulses the RF signal >80 dB below the RF Generator Amplitude setting when a TTL low is present. And, when a TTL high is present, the RF Generator output is at the set Amplitude.
- **Normal and Hop Trig** pulses the RF signal >80 dB below the RF Generator Amplitude setting for one timeslot at a hop trigger.
- **30 dB and EXT** pulses the RF Generator output 30 dB *above* the RF Generator Amplitude setting, when a TTL high is present. And, when a TTL low is present, the RF Generator output is at the set RF Amplitude.
- **30 dB and Hop Trig** pulses the RF Generator output down 30 dB to the set Amplitude for one timeslot on a hop trigger.

10. RF Output

This field selects the RF output port.

Choices

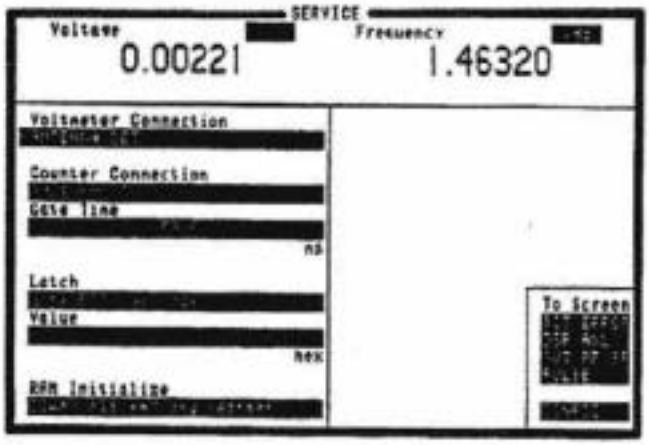
- RF IN/OUT
- AUX RF OUT

Range

RF IN/OUT: −127.0 to −12.0 dBm.
AUX RF OUT: −127.0 to +14.0 dBm.

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Service

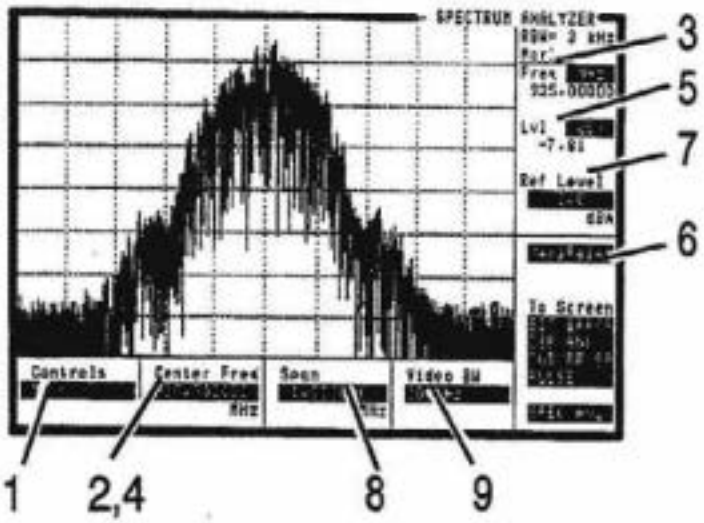


This screen will be documented in the service documentation.

To escape, press PREV.

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Spectrum Analyzer, Main Controls



This screen displays the Spectrum Analyzer power spectral density versus frequency trace.

Important Consideration

When Reference is set to Tunable (see Configure screen) and Offset is ≠0 ppm, the frequency calibration of the Spectrum Analyzer will be inaccurate.

This also affects RF Analyzer outputs such as FM DEMOD OUT, DSP Analyzer frequency measurement results, Phase, and Output RF Spectrum.

1. Controls

This field selects the alternate Controls of the Spectrum Analyzer measurement.

Choices

- Main
- RF Gen
- Marker
- Auxiliary

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2. Center Freq This field sets the center frequency when the RF Analyzer's Hop Mode is set to Non-Hop.

Range

10.0 to 1015.0 MHz.

3. Freq This field displays the frequency at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

4. Hop Offset This field sets the hop offset when the RF Analyzer's Hop Mode is set to Hop. The frequency offset is applied to all of the frequencies in the RF Analyzer Hop Frequency table when the RF Analyzer is hopping.

Range

−50.000 to +50.000 kHz.

5. Lvl This field displays the level at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

6. Meas Reset Selecting Meas Reset will erase any accumulated measurements used for calculating a final result, and re-start the measurement process for the following functions:

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys: HI LIMIT, LO LIMIT, AVG

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7. Ref Level This field is the reference level entry field for the selected RF input port.

Range

RF IN/OUT: −18.9 dBm to +48.0 dBm.
AUX RF IN: −55.0 dBm to +23.0 dBm.

8. Span This field sets the frequency span.

Range

5 kHz to 4 MHz.

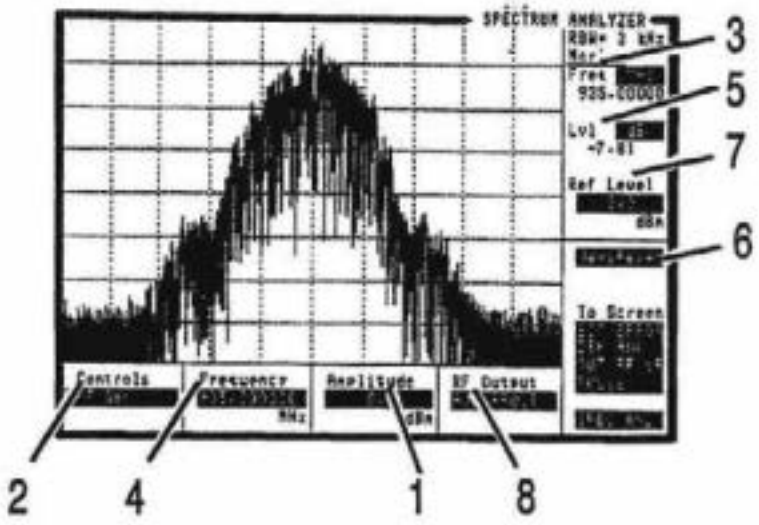
9. Video BW This field selects the video bandwidth.

Choices

- 30 kHz
- 100 kHz
- 1 MHz

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Spectrum Analyzer, RF Gen Controls



1. Amplitude This field sets the RF generator's amplitude. The amplitude shown is for the port selected in the RF Output field.

Range

RF IN/OUT: −127.0 to −12.0 dBm.
AUX RF OUT: −127.0 to +14.0 dBm.

2. Controls This field selects the alternate Controls of the Spectrum Analyzer measurement.

Choices

- Main
- RF Gen
- Marker
- Auxiliary

3. Freq This field displays the frequency at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

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4. Frequency This field sets the non-hopped frequency; or if the RF Gen, Hop Control, Hop Mode is set to Hop, this field will show the frequency status as Hopped.

Range

10.0 to 1015.0 MHz.

5. Lvl This field displays the level at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

6. Meas Reset Selecting Meas Reset will erase any accumulated measurements used for calculating a final result, and re-start the measurement process for the following functions:

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys: HI LIMIT, LO LIMIT, AVG

7. Ref Level This field is the reference level entry field for the selected RF input port.

Range

RF IN/OUT: −18.9 dBm to +48.0 dBm.
AUX RF IN: −55.0 dBm to +23.0 dBm.

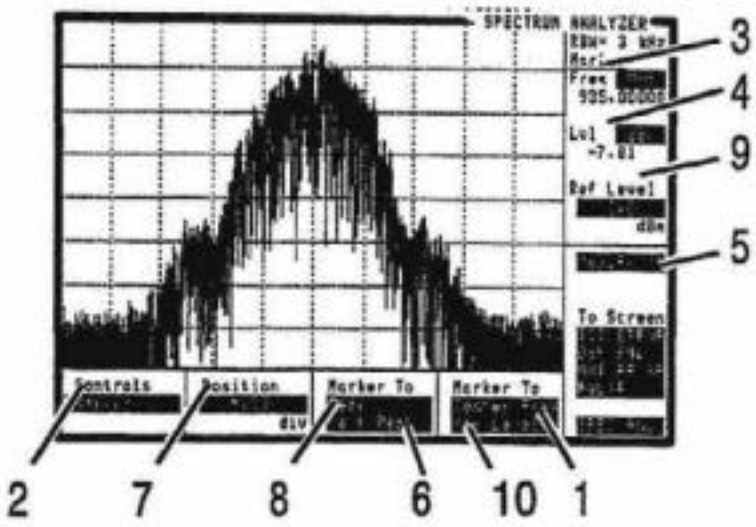
8. RF Output This field selects between the RF IN/OUT and the AUX RF OUT ports as the RF output port.

Range

RF IN/OUT: −127.0 to −12.0 dBm.
AUX RF OUT: −127.0 to +14.0 dBm.

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Spectrum Analyzer, Marker Controls



1. Center Freq (Marker To)

This field changes the center frequency setting to the frequency at the marker position.

2. Controls

This field selects the alternate Controls of the Spectrum Analyzer measurement.

Choices

- Main
- RF Gen
- Marker
- Auxiliary

3. Freq

This field displays the frequency at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

4. Lvl

This field displays the level at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

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5. Meas Reset

Selecting Meas Reset will erase any accumulated measurements used for calculating a final result, and re-start the measurement process for the following functions:

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys: HI LIMIT, LO LIMIT, AVG

6. Next Peak (Marker To)

This field moves the marker to the next amplitude peak to the right of the current marker position.

7. Position

This field sets the Marker Position for the trace.

Range

0 to 10 divisions.

8. Peak (Marker To)

This field moves the marker to the highest amplitude point on the trace.

9. Ref Level

This field sets the reference level for the selected RF input port.

Range

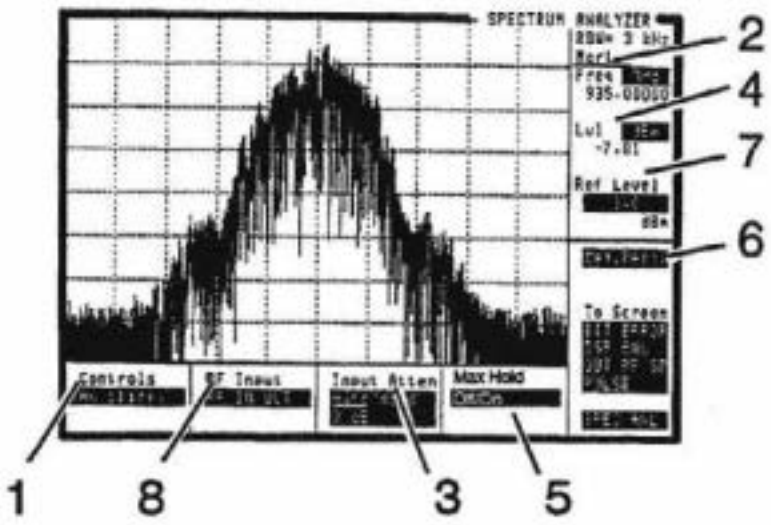
RF IN/OUT: −18.9 dBm to +48.0 dBm.
AUX RF IN: −55.0 dBm to +23.0 dBm.

10. Ref Level (Marker To)

This field changes the Ref Level setting to the level at the marker position.

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Spectrum Analyzer, Auxiliary Controls



1. Controls This field selects the alternate Controls of the Spectrum Analyzer measurement.

Choices

- Main
- RF Gen
- Marker
- Auxiliary

2. Freq This field displays the frequency at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, Units

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3. Input Atten

This field selects the Input Attenuator mode or value. The list of choices depends on the Radio Type selected on the Configure screen (GSM900 or DCS1800).

Choices (GSM900)

- **Auto** selects the input attenuation automatically.
- **Hold** allows the input attenuation to be changed manually.
- **0 dB**
- **10 dB**
- **20 dB**
- **30 dB**
- **40 dB**

Choices (DCS1800)

- **Auto** selects the input attenuation automatically.
- **Hold** allows the input attenuation to be changed manually.
- **0 dB**
- **5 dB**
- **10 dB**
- **15 dB**
- **20 dB**
- **25 dB**
- **30 dB**
- **35 dB**

See Also

Screens: Configure (`Radio Type`)

4. Lvl

This field displays the level at the current marker position.

See Also

Keys: ON/OFF, HI LIMIT, LO LIMIT, REF, AVG, Units

5. Max Hold

When Max Hold is on traces accumulate on the display until Max Hold is turned off.

See Also

Screens: Spectrum Analyzer: Auxiliary Controls (`Meas Reset`)

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6. Meas Reset

Selecting Meas Reset will erase any accumulated measurements used for calculating a final result, and re-start the measurement process for the following functions:

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys: HI LIMIT, LO LIMIT, AVG

7. Ref Level

This field sets the reference level for the selected RF input port.

Range

RF IN/OUT: −18.9 dBm to +48.0 dBm.
AUX RF IN: −55.0 dBm to +23.0 dBm.

8. RF Input

This field selects the RF input port for the spectrum analyzer.

Choices

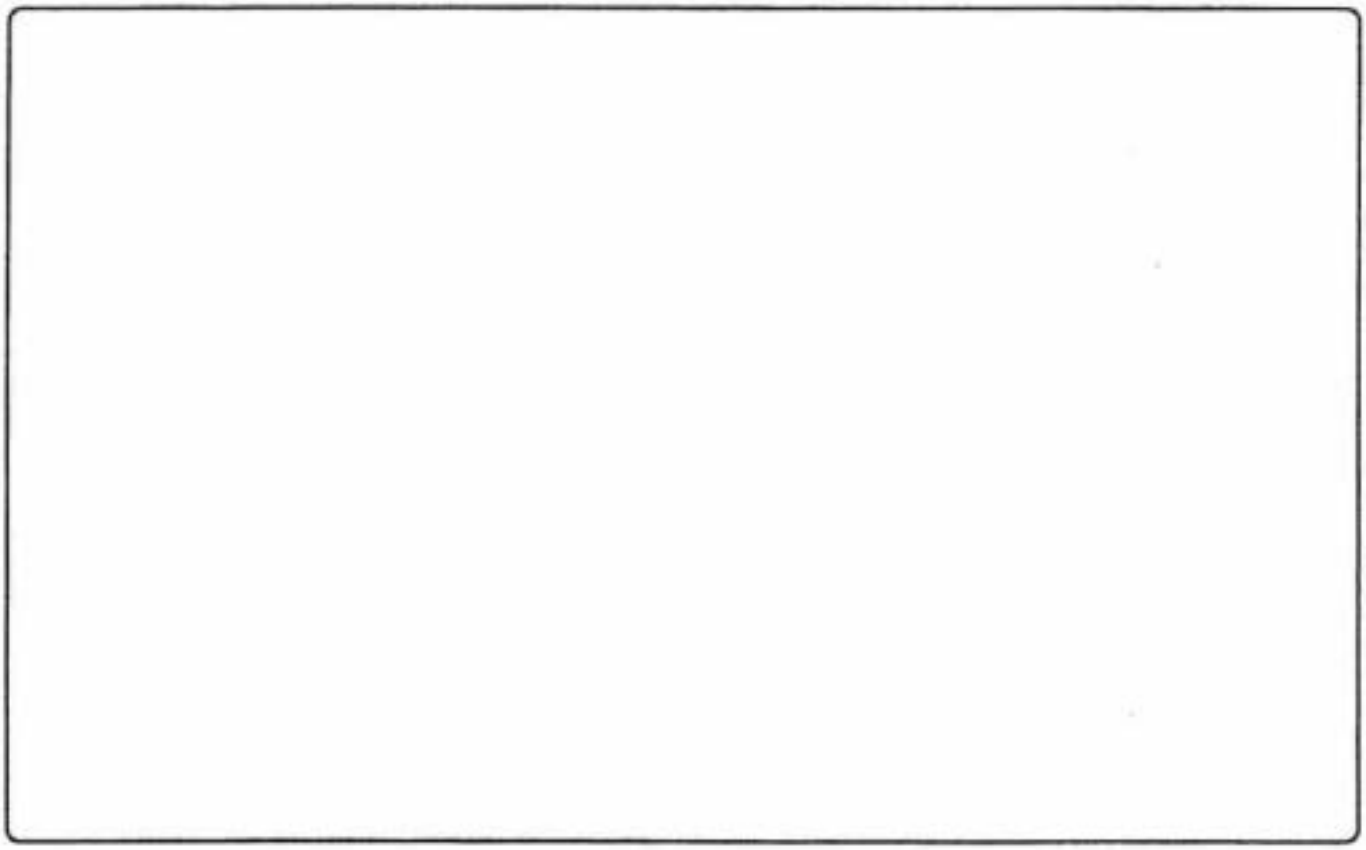
- RF IN/OUT
- AUX RF IN

Range

RF IN/OUT: −21.9 to +45.0 dBm.
AUX RF IN: −58.0 to +20.0 dBm.

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Tests

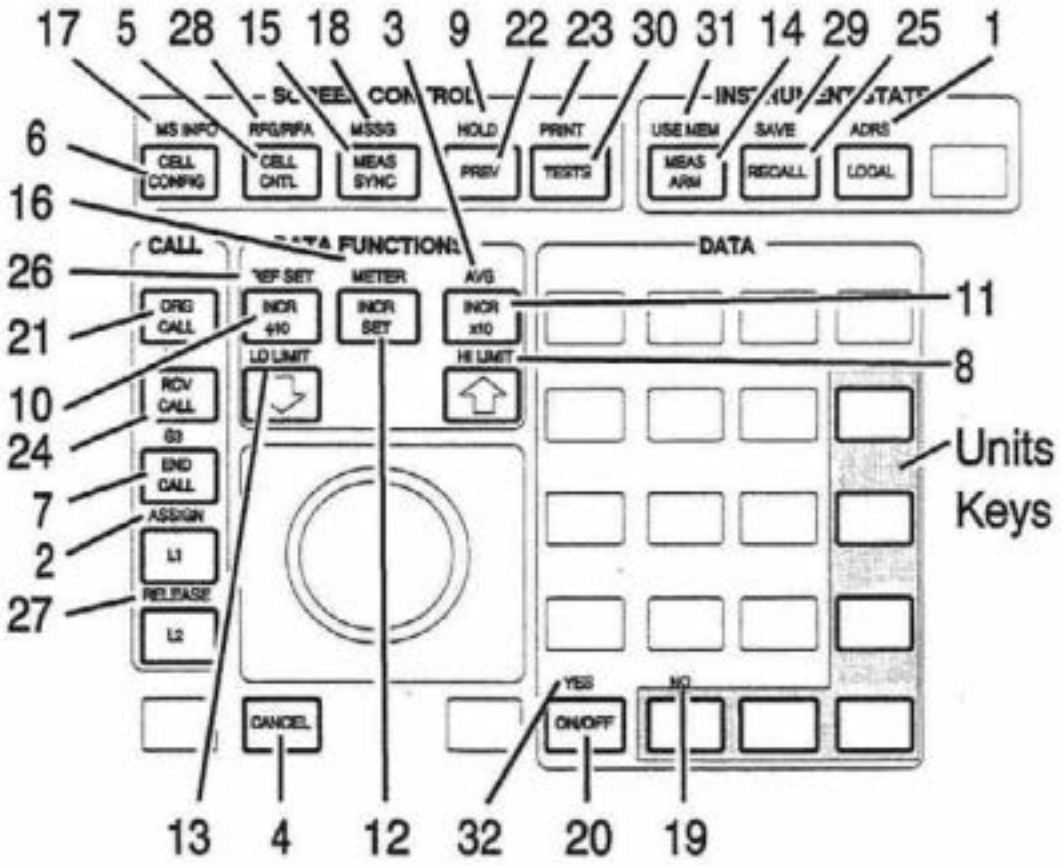


Instrument BASIC Refer to chapter 10, *Instrument BASIC* for information about the Tests Screen.

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Keys



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Function Keys

1. ADRS This key is used to display the HP-IB address.

2. ASSIGN This key is used to assign global (G1, G2, G3) and local (L1, L2) keys for single-keystroke access to a field on the currently displayed screen, or to display a field from another screen.

See Also

Global Keys
Local Keys

3. AVG This key allows you to display the average value of a number of measurements when the instrument is continuously making measurements.

To Use Measurement Averaging

1. Position the cursor in front of the measurement's unit-of-measure.
2. Press [SHIFT], AVG. The default number of average samples is displayed below the measurement.
   a. Enter the desired number of measurement samples to be used for calculating the average, or
   b. Press [ON/OFF] to use the currently displayed number of samples.
3. To turn averaging off, position the cursor in front of the unit-of-measure, and press [SHIFT], AVG, [ON/OFF].

4. CANCEL This key cancels the current operation.

5. CELL CNTL This key accesses the Cell Control screen.

See Also

Screens: Cell Control

6. CELL CONFIG This key accesses the Cell Config screen.

See Also

Screens: Cell Config

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7. END CALL This key ends a call-in-progress.

8. HI LIMIT This key is used if you want to be alerted when a measurement exceeds a specified value.

To Set a High Limit

- Position the cursor at the measurement field of your choice.
- Press (SHIFT)
- Press (⇧) (HI LIMIT).
- Enter the value you want the high limit to be.
- Press (ENTER) or a units key. A HI (or H) annunciator will appear.

If a limit is exceeded during a measurement, a beep will sound (if the beeper is on) and "Measurement high limit exceeded" will be displayed. The HI (or H) annunciator will also flash as long as the measurement is displayed.

To Turn Off (or On) a High limit

When a limit is turned off, its value is retained but is not used.

- Press (SHIFT)
- Press (⇧) (HI LIMIT).
- Press (ON/OFF)

9. HOLD This key is used to retain measurement results by stopping swept or continuously updated measurements.

10. INCR ÷10 This key is used to adjust the increment value by a factor of ÷10. To display the increment value, press (INCR SET).

11. INCR ×10 This key is used to adjust the increment value by a factor of ×10. To display the increment value, press (INCR SET).

12. INCR SET This key is used to display or set the increment value.

1. Press (INCR SET).
2. Enter an increment value using the DATA keys.

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13. LO LIMIT

This key is used if you want to be alerted when a measurement is less than a specified value.

To Set a Low Limit

- Position the cursor at the measurement field of your choice.
- Press (SHIFT)
- Press (⇩) (LO LIMIT).
- Enter the value you want the lower limit to be.
- Press (ENTER) or a units key. A LO (or L) annunciator will appear.

If a limit is exceeded during a measurement, a beep will sound (if the beeper is on) and "Measurement low limit exceeded" will be displayed. The LO annunciator will also flash as long as the measurement is displayed.

To Turn Off (or On) a Low limit:

When a limit is turned off, its value is retained but is not used.

- Press (SHIFT)
- Press (⇩) (LO LIMIT).
- Press (ON/OFF)

14. MEAS ARM

This key is used to arm a one-time-only (Meas Trig, Single) measurement. After MEAS ARM is pressed, the instrument will wait for a valid trigger event, then make the measurement currently selected. Meas Arm only applies to DSP analyzer, output RF spectrum, and pulse on/off measurements.

See Also

Screens: Measurement Sync (`Meas Trig`)

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15. MEAS SYNC This key is used to access the measurement synchronization screen.

See Also

Screens: Measurement Sync

16. METER This key is used to display a measurement in both a digital readout and an analog meter display.

1. Position the cursor in front of the unit-of-measure for the measurement you want to display.
2. Press (SHIFT), METER to display the Meter menu in the lower-right corner of the screen.
3. Select On/Off to display the meter.

17. MS INFO This key is used to access the MS (mobile station) Information/Signaling screen.

18. MSSG This key is used to access the message screen.

See Also

Screens: Message

19. NO This key is used to respond to Yes/No questions that appear on the screen.

20. ON/OFF This key is used to turn functions on or off.

21. ORG CALL This key, Originate Call, is used to make a base-station-originated call from the HP 8922G.

22. PREV This key is used to return to the screen displayed prior to the current screen.

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23. PRINT

This key is used to print the current screen.

See Also

Screens: Configure

24. RCV CALL

This key, Receive Call, causes a mobile-station-originated call to be received by the HP 8922G. It is not necessary to press RCV CALL when the Connect field on the Cell Control screen is set to Auto.

See Also

Screens: Cell Control

25. RECALL

This key is used to recall instrument setups.

To Recall an Instrument Setup

1. Press (RECALL).
2. Use the knob to select the desired setup to be recalled from the choices at the bottom right of the screen.

When Recall is pressed, the following fields are ALWAYS set to their default settings regardless of their setting in the saved setup.

- Meas Trig, Single/Cont is always reset to Single (Measurement Sync screen).
- Demod Arm, Arm/Disarm is always reset to Disarm (Digital Demod and Cell Control screens).
- Settable or Activated is always reset to Settable (Cell Configuration screen).
- Hop Mode, Hop/Non-Hop is always reset to Non-Hop (Hop Control and RF Genenerator/RF Analyzer screens).
- Hop Control, Arm/Disarm is always reset to Disarm (Hop Control and RF Genenerator/RF Analyzer screens).

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26. REF SET

This key is used to set a reference if you want a measurement result to be offset by a certain value.

To Set a Reference

1. Use the knob to position the cursor at the measurement field of your choice.
2. Press (SHIFT)
3. Press (INCR ÷10) (REF SET)

   The current reference value, with the word Reference below it, is displayed.

   If you want the current measurement result to be the reference, press (ENTER) and skip the next two steps.
4. Enter the value you want the Reference to be.
5. Press a units key to set the Reference. Or, press (ENTER) or the knob to default to the units currently displayed.

   When a measurement is displayed, REF (or R) will be displayed below it.

To Turn a Reference Off or On

When a reference is turned off, its value is stored but not applied to the measurement.

A Reference can be turned off, or turned back on using the ON/OFF key.

- Press (SHIFT)
- Press (INCR ÷10) (REF SET)
- Press (ON/OFF).

The REF (or R) annunciator will be dimly displayed when the Reference is on. When you turn the Reference off, the absolute measurement value will be displayed with no annunciator.

27. RELEASE

This key is used to clear a global (G1, G2, G3) or local (L1, L2) key.

See Also

Global Keys
Local Keys

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28. RFG/RFA

This key is used to access the RF Generator / RF Analyzer screen.

See Also

Screens: RF Generator / RF Analyzer

29. SAVE

This key is used to save instrument setups to be recalled later.

Changes made on the Configure and Tests screens are automatically maintained through power-down and Preset cycles.

Help, Message, and Tests screens cannot be saved. The states of the following fields will not be saved: Demod Arm, Hop Arm, Activated, Meas Arm.

To Save an Instrument Setup

1. Make any changes to the instrument that you want to SAVE.
2. Press (SHIFT), SAVE.
3. Name the setup using the data keys, or the Save choices at the bottom right of the screen. (You can use numbers, letters, or a combination of both.)

30. TESTS

This key is used to access the Tests screen. Refer to chapter 10 *Instrument BASIC* for more information.

See Also

Screens: Tests

31. USE MEM

This key arms and triggers a DSP measurement using data captured in memory. USE MEM is not available when Activated is selcted.

For information about data capture see Screens: Digital Demod, Trig Source (Use Mem).

See Also

Screens: Digital Demod (`Trig Source (Use Mem)`, `Status (Use Mem)`)
Screens: Measurement Sync (`Status`)
Screens: Cell Configuration

32. YES

This key is used to respond to Yes/No questions that appear on the screen.

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Local Keys

L1, L2 Keys L1 and L2 are local keys. They are used to move between fields on the screen that is currently displayed.

To Assign a Local Key

- Use the knob to position the cursor at the field of your choice.
- Press [SHIFT]
- Press [L1] (ASSIGN).
- Press one of the Local keys [L1], [L2].

The field you assigned should now have the local number next to it.

When you press the local key, the chosen field will be accessed. A toggled field will toggle or cause immediate action in certain types of fields.

Re-assigning the local key clears the previous setting, or pressing RELEASE and then a local key clears that key.

Note 

Some fields cannot be assigned to local keys.

To Use Pre-Assigned Local Keys

Fields that might be used frequently have local keys assigned to them by the factory. Following this procedure will make the factory assigned local keys available.

1. Press [SHIFT], ASSIGN, [ENTER]. The numbers 1 and 2 will appear in front of the two pre-assigned fields.
2. Press the Local key (L1 or L2) and notice how the cursor immediately moves to the corresponding field.
3. To stop using the default Local keys, press [SHIFT], RELEASE, [ENTER].

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Global Keys

G1, G2, G3

Keys G1 through G3 ([SHIFT] [G1], [G2], or [G3]) are global keys. They can access fields that are not displayed on the current screen.

To Assign a Global Key,

- Use the knob to position the cursor at the field of your choice.

Note

The following screens do not allow global keys to be assigned, or allow fields to be pulled in from other screens: TEST, HELP, and MESSAGE.

The SERVICE screen only allows fields to be pulled in.

- Press [SHIFT]
- Press [L1] (ASSIGN).
- Press [SHIFT]
- Press one of the global keys, G1, G2, or G3.

The field you assigned can now be accessed from any allowable screen. You can also make changes to the assigned field.

Note

Some fields cannot be assigned to global keys.

Units Keys

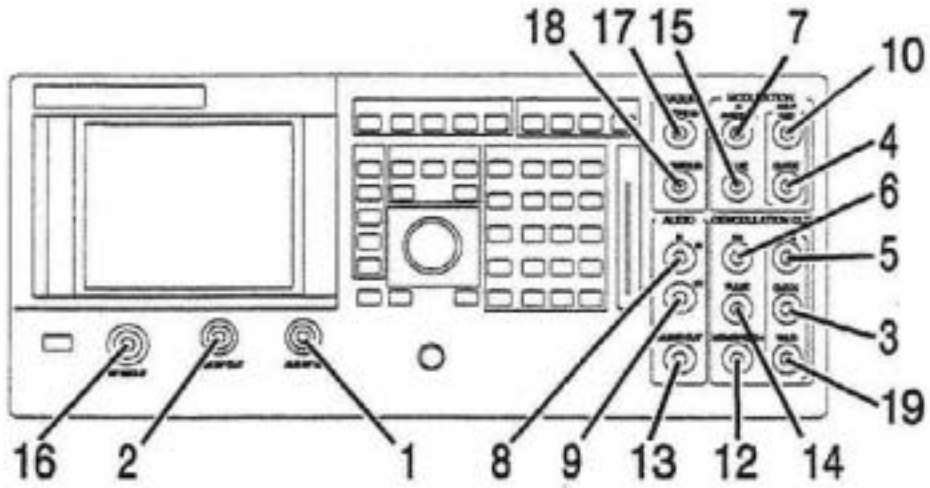
Units in some field types can be changed by pressing an applicable units key.

- Pressing a units key while the cursor is positioned next to a measurement field converts the measurement to the new units.
- Pressing a units key before a measurement is displayed changes the units displayed and will display any new measurement in the new units.
- Pressing a units key while the measurement display is turned off will turn on the measurement display showing the new units.

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Connectors

Front-Panel Connectors



1. AUX RF IN The auxiliary RF input connects to the input section and to the RF analyzer (if selected). This connector provides a higher sensitivity and lower maximum-power connection from the DUT. It is not normally used for transceiver testing.

AUX RF IN has its own input level setting (RF analyzer amplitude) separate from RF IN/OUT. It is reverse power protected.

This connector is selected when the RF analyzer's RF input is set to AUX RF IN.

See Also

Screens: RF Generator / RF Analyzer, RF Analyzer

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2. AUX RF OUT

The auxiliary RF output connects to the input section from the RF generator's step attenuators (if selected). This connector provides higher output levels to a device-under-test (DUT). It is not normally used for transceiver testing.

This connector has its own output amplitude setting (RF generator amplitude) separate from RF IN/OUT. It is reverse power protected.

This connector is selected when the RF generator's RF output is set to AUX RF OUT.

See Also

Screens: RF Generator / RF Analyzer, RF Gen

3. CLOCK (DEMODULATION OUT)

The clock connector is connected to the DSP analyzer's digital demodulation clock output. This signal is the digital demodulation CLOCK signal which is generated when digitally demodulating one out of eight timeslots of GSM 0.3 GMSK modulation.

CLOCK (DEMODULATION OUT) is only active when the digital demodulation mode is selected and armed. This is a fast burst of clocks, not a continuous clock.

This connector is undefined when the demodulation output data valid signal is TTL high

This connector is connected directly in parallel with DEMOD_CLK on the SYSTEM BUS connector.

Requirements

High drive: 1 mA
Low drive: 1 mA
Duty cycle: 50%
Repetition Rate: 1 MHz

See Also

Screens: DSP Analyzer
Specifications
Signal Descriptions for the System Bus
Timing Diagrams

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4. CLOCK (MODULATION)

CLOCK (Input)

The clock connector is connected to the Premod/NSM circuitry. This connector is used in combination with DATA (MODULATION IN).

CLOCK (MODULATION IN) is selected when the RF generator's modulation source GMSK field is set to Ext. This connector is directly in parallel with FP_CLOCK on the SYSTEM BUS connector.

This must be a continuous signal. Also, significant phase changes or loss of this signal will result in an out-of-lock condition in the data synchronizer.

Note

The two inputs are directly coupled to each other. Avoid putting signals on both inputs simultaneously.

Clock Input Requirements

High drive requirement: 100 μA
Low drive requirement: 1.2 mA
Active edge: rising edge

CLOCK (Output)

When Activated is selected and Aux BCCH is set to Adjacent, CLOCK is an output.

As and output, this connector can be use in conjunction with IN/OUT DATA to clock data to an external GMSK signal generator.

When used as an output, this line must be terminated in 50 ohms at the destination.

Clock Output Requirements

Drive: 3 mA TTL
Active Edge: rising
Termination: 50 ohms at destination

See Also

Screens: RF Generator / RF Analyzer, RF Gen
Screens: Cell Configuration (Aux BCCH)
Specifications
Signal Descriptions for the System Bus

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5. DATA (DEMODULATION OUT)

The data connector is connected to the DSP analyzer's digital demodulation data output. This connector is the digital demodulation DATA signal which is generated when digitally demodulating one out of eight timeslots of GSM 0.3 GMSK modulation.

DATA (DEMODULATION OUT) is only active when digital demodulation mode is selected and armed. This is a fast burst of data, not continuous data.

This output is undefined when the demodulation output data valid signal is TTL HIGH. Differential data decoding is done internally.

DATA (DEMODULATION OUT) is active only when the digital demodulator's State field is set to Arm.

This connector is connected directly in parallel with DEMOD_DATA on the SYSTEM BUS connector.

Requirements

High drive: 1 mA
Low drive: 1 mA

See Also

Screens: DSP Analyzer
Specifications
Signal Descriptions for the System Bus
Timing Diagrams

6. FM (DEMODULATION OUT)

The FM connector is connected to the receiver circuitry. This connector provides an output of the FM discriminated signal.

This signal is muted whenever the pulsed RF input signal is OFF.

This output is always active.

See Also

Specifications

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7. IN AM/SPEECH (MODULATION)

This connector can be used for transmitting speech to an MS. To select speech, choose Cond or Uncond from the Cell Control screen, Speech field.

This connector is also used as the DC AM input of the HP 8922G. To select DC AM, choose Ext from the RF Generator/RF Analyzer screen, DC AM field. The RF carrier will now be AM modulated (with fixed sensitivity) through this connector.

See Also

Screens: Cell Control (Speech)
Screens: RF Generator/RF Analyzer, RF Gen (DC AM)
Screens: CW Meas/AF Analyzer, AF Analyzer (AF Anl In)
Specifications

Note

IN AM/SPEECH and AM IN (a rear-panel connector) are connected directly in parallel. Avoid putting signals on both inputs simultaneously.

8. IN HI (AUDIO)

The input high connector is connected to the audio analyzer input. This connector is used as the main (external) audio analyzer input connection (when selected). This connector is also used in combination with the audio input low signal to input a floating input signal (for better noise performance) to the audio analyzer.

See Also

Screens: CW Meas/AF Analyzer, RF Analyzer
IN LO (AUDIO)

9. IN LO (AUDIO)

The input low connector is connected to the audio analyzer input. This connector is the main (external) audio analyzer input connection (when selected, and in FLOAT mode).

This connector is used in combination with the audio input, high signal to input a floating input signal (for better noise performance) to the audio analyzer.

See Also

Screens: CW Meas/AF Analyzer, RF Analyzer
IN HI (AUDIO)

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10. IN/OUT DATA (MODULATION)

Data Input

This connector is a data input when the instrument is settable. (See the Cell Configuration screen.) It is used to input 0.3 GMSK modulation data (if selected) to the RF generator.

This connector is selected when RF generator's modulation source GMSK field is set to Ext. This connector is connected directly in parallel with FP_DATA on the SYSTEM BUS connector.

Note

The two inputs are directly coupled to each other. Avoid putting signals on both inputs simultaneously.

Data Input Requirements:

High drive requirement: 100 μA
Setup Time: 150 ns
Hold Time: 0
Low drive requirement: 1.2 mA
An internal differential data encoder is used.
Sense: TTL HIGH results in a positive frequency deviation.

Data Output

IN/OUT DATA becomes a data output when Activated is selected and Aux BCCH is set to Adjacent. To simulate an adjacent cell BCCH, IN/OUT DATA and Modulation Clock can be connected to an external 0.3 GMSK signal generator. THe channel characteristics of the auxiliary BCCH will be the same as the serving cell BCCH, except that the base station color code (BCC) for the auxiliary BCCH is modulo 4.

Data Output Requirements:

Drive: 4 mA TTL
Valid: rising edge of modulation clock
Termination: 50 ohms at destination
Bit Rate: 13E6/48 bps

See Also

Screens: Cell Configuration (`Activated`, `Aux BCH` and `Serving Cell`, `Colour`)
Screens: RF Generator / RF Analyzer (RF Gen)
Specifications
Signal Descriptions for the System Bus

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12. MON/SPEECH

This connector is the output of the Audio Analyzer. One of several uses for this connector is to monitor the received speech from an MS. To choose demodulated speech, select SpeechOut from the CW Meas/AF Analyzer screen, AF Anl In field. The same signal choices made for AF Analyzer measurements apply to this output. The same signal that goes to the AF Analyzer appears at this connector.

MON/SPEECH is directly in parallel with the rear-panel MONITOR OUT connector.

This output is always active.

See Also

Screens: CW Meas/AF Analyzer, AF Analyzer (`AF Anl In`)

13. OUT (AUDIO)

The out connector is connected to the modulation distribution board from AFG1 (unless OFF). It is a general purpose audio signal(s) output. No internal connection is provided for this signal.

See Also

Screens: RF Generator / RF Analyzer, AF Gen

14. PULSE (DEMODULATION OUT)

The pulse connector is connected to the receiver circuitry. This signal provides the demodulated envelope of the RF input signal.

This output is always active.

See Also

Specifications

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15. PULSE (MODULATION)

The PULSE connector connects to the hop controller and to output section (when selected as active).

This signal is the TTL input to externally control when the amplitude is pulsed ON (TTL HIGH) or OFF (TTL LOW). It also pulses the envelope up (TTL HIGH) and down (TTL LOW) when in 30 dB Pulse mode.

This connector can be used in combination with AM (MODULATION IN) to generate pulsed and/or shaped amplitude envelopes of different levels for each RF generator pulse in real-time.

PULSE (MODULATION IN) is selected when the RF generator's modulation source Pulse field is set to Ext. This connector is connected directly in parallel with PULSE_MOD_IN on the SYSTEM BUS connector.

Note

The two inputs are directly coupled to each other. Avoid putting signals on both inputs simultaneously.

Requirements

High drive requirements: 100 μA
Low drive requirements: 1 mA
TTL HIGH: On or Higher Level
TTL LOW: Off or Lower Level

See Also

Screens: RF Generator / RF Analyzer RF Gen
Specifications
Signal Descriptions for the System Bus

16. RF IN/OUT

The RF input/output is connected to the input section to the RF analyzer and the RF generator's step attenuators. It is the main device-under-test (DUT) connection for the radio's RF signals. It is normally used for transceiver testing.

This connector is not reverse power protected, but can handle high power levels for extended periods of time because there is a temperature sensor for this signal.

This is connector is selected when the RF generator's RF output is set to RF IN/OUT or when the RF analyzer's RF input is set to RF IN/OUT.

See Also

Screens: RF Generator / RF Analyzer

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17. SCOPE IN (MEASURE)

The measurement input for the oscilloscope connects to the Audio analyzer and to the oscilloscope (when selected as an Audio analyzer input source). This is the input for general purpose oscilloscope measurements, but it can be used for other measurements as well (for example, audio analyzer measurements, filtering an audio signal when used with the demodulation output monitor signal).

See Also

Screens: Oscilloscope

18. TRIGGER IN (MEASURE)

The measurement trigger input is the trigger source for the oscilloscope, spectrum analyzer, and DSP analyzer. It can also be used for digital demodulation.

All triggered measurements, when trigger is selected as external, are triggered by this signal: oscilloscope, spectrum analyzer, and DSP analyzer.

It is not possible to separately trigger an oscilloscope or spectrum analyzer measurement from a DSP analyzer measurement.

TRIGGER IN is selected when the digital demodulator's Trig Source is set to Ext Meas, or when the measurement synchronization Trig Source is set to Ext Meas.

See Also

Screens: Digital Demod, DSP Analyzer, Oscilloscope, Spectrum Analyzer

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19. VALID (DEMODULATION OUT)

The valid connector is connected to the DSP analyzer's digital demodulation data valid output.

This signal is the digital demodulation data valid signal which is generated when digitally demodulating one out of eight timeslots of GSM 0.3 GMSK modulation. It can be used to load the digitally demodulated data.

This signal is used for gate timing when the demodulation output data-signal and the demodulation output clock-signal are valid.

This output is only active while outputting, not while demodulating, and it is only active when the digital demodulation mode is selected and armed.

This connector is connected directly in parallel with DEMOD_VALID on the SYSTEM BUS connector.

Specifications

High drive: 1 mA
Low drive: 1 mA
Active level: LOW
Active for: leading tailbits, first half of data, midamble, second half of data, and trailing tailbits.
Inactive for: guard bits
Duration depends on type of burst being demodulated.

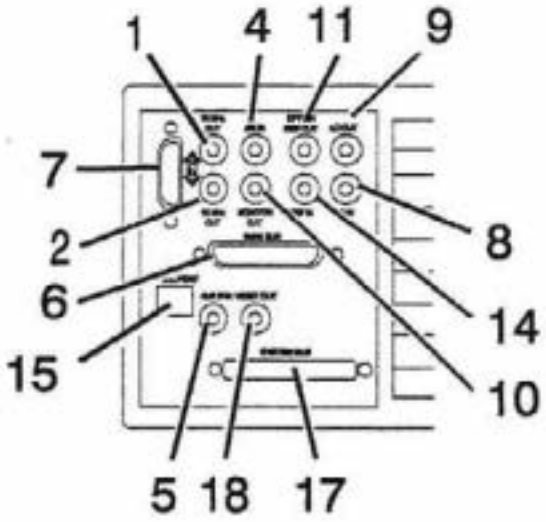
See Also

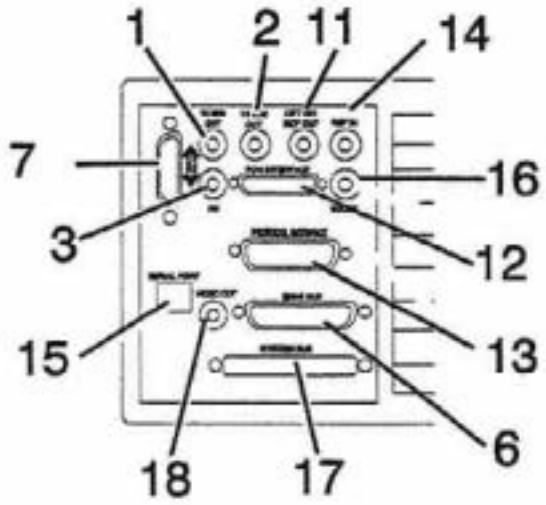
Screens: DSP Analyzer
Specifications
Signal Descriptions for the System Bus

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Rear-Panel Connectors

You will have one of the following rear-panel configurations on your instrument.





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1. 10 MHz OUT

The 10 MHz output connector is connected to the 10 MHz oscillator in the reference circuitry. This signal is a general-purpose 10 MHz reference output (sine wave). This connector can be either free-running or locked to an external reference of 1, 2, 5, 10 or 13 MHz reference. Typically, it is locked to the HP 10811 high-stability timebase reference, (if option 001 is installed, connected, and enabled).

10 MHz OUT is always active.

See Also

Specifications
REF IN

2. 13 MHz OUT

The 13 MHz output connector is connected to the 13 MHz oscillator in the reference circuitry. This signal is a general-purpose 13 MHz reference output, (sine wave). It can either be free-running or locked to any external reference of 1, 2, 5, 10 or 13 MHz reference. Typically, it is locked to the HP 10811 high-stability timebase reference, (if option 001 is installed, connected, and enabled).

13 MHz OUT is always active.

See Also

Specifications
REF IN

3. AM

Note This connector is not present on earlier versions of the instrument.

This connector is used in conjuction with the HP 83220A DCS 1800 Test Set. Refer to HP 83220A DCS1800 Test Set manual (part number 83220-90000).

4. AM IN

The AM input connector connects to the modulation distribution board and to the output section when selected as an active DC AM input.

This connector provides external DC AM (fixed sensitivity) for controlling either the amplitude envelope shaping or for generating different levels for each RF generator pulse in real-time.

For DC AM, this connector is always dc-coupled. This connector is connected directly in parallel with the front-panel AM (MODULATION IN) connector. It is selected when the RF generator's modulation source DC AM field is set to Ext.

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Note

The two inputs are directly coupled to each other. Avoid putting signals on both inputs simultaneously.

This connector is not present on later versions of the instrument.

See Also

Screens: RF Generator / RF Analyzer (RF Gen)
Specifications
AM (MODULATION IN)

5. AUX IF IN

Note

This connector is not present on later versions of the instrument.

The auxiliary IF input connector connects to the DSP analyzer input (if selected from the Service screen using latch control). It can be used to bypass the receiver circuitry, which may be useful for better phase accuracy, and so forth. This input can also be used for digital demodulation.

See Also

Screens: Configure, Service, DSP Analyzer

6. EMMI BUS

The EMMI bus is the Digital Audio Interface defined by GSM Rec. 11.10 sec III.1.4. The EMMI Bus is used to emulate the GSM-standard man-to-machine interface and for DAI control.

The pin assignment of the connector is as follows:

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Pin	Usage	Function	To/From
1		Chassis ground	
2	EMMI TX	Signal	To ME
3	EMMI RX	Signal	From ME
4—6	Not used		
7	EMMI	Signal ground	
8—10	Not Used		
11	DAI	Test control 1	To ME
12	DAI	Signal ground	To ME
13	DAI	Test control 2	To ME
14—21	Not Used		
22	DAI	Reset	To ME
23	DAI	Data	From ME
24	DAI	Data Clock	From ME
25	DAI	Data	To ME

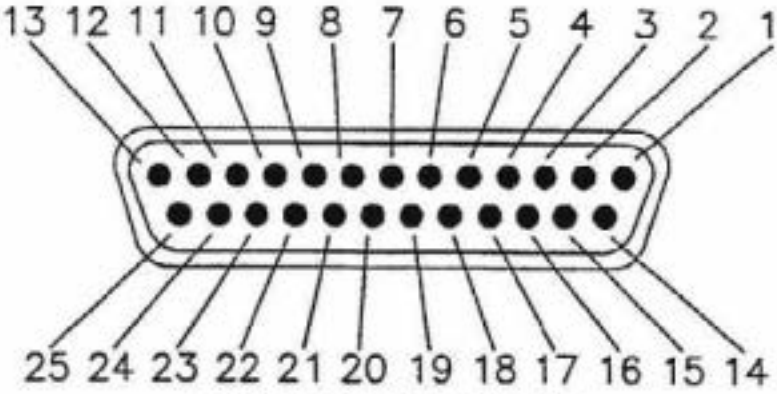
DAI input 24, Data Clock, is terminated in 10 kΩ.

Electrical Characteristics of the DAI/EMMI

The state of a signal pin is defined by the voltage (V) between the pin and its associated ground.

Logical State	Voltage (V)	Current
0 or LOW or ON	$0\ V < V < +0.8\ V$	2.4 mA
1 or HIGH or OFF	$+3.5\ V < V < +5\ V$	$-400\ \mu A$
Undefined	$+0.8\ V < V < 3.5\ V$	
Forbidden	$V < 0\ V$ or $V > +5\ V$	

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EMMI Connector Pin Numbers

See Also

Screens: Cell Control (DAI: `Test`, `Norm`)

7. HP-IB

The Hewlett-Packard Interface Bus is an IEEE-488.1 connector. It is connected to the main microprocessor. This connector is used for IEEE-488.1 operation and control of other instruments using IBASIC (if available).

The instrument can be talker and listener, or a controller, depending on selection made in the Mode field on the Configure screen.

HP-IB is always active.

See Also

Screens: Configure
Specifications
HP-IB
HP-IB Connections

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8. LO IN

Note This connector is not present on later versions of the instrument.

The local oscillator input connector should always be connected to the LO OUT connector. Internally, this input is connected to the receiver circuitry. It is the LO signal for the receiver.

This connector is normally connected to LO OUT using a short HP-supplied coax jumper. It can be disconnected from LO OUT if LO IN is to be used to substitute a user-provided local oscillator for the receiver (for example, to get better frequency resolution, noise, or switching time characteristics).

RF Analyzer hopping is still operational when this input is connected to a user-provided LO (for example, the input section filters will still be hopped); however, the actual hopping of the receiver's demodulation will depend on the signal connected to LO IN being hopped at the right time.

LO IN is always active.

See Also

Installing Your HP 8922A
EXT LO OUT

9. LO OUT

Note This connector is not present on later versions of the instrument.

The local oscillator output connector should always be connected to the LO IN connector. Internally, this output is connected to the receiver circuitry's step loop (LO) output signal.

This connector is only supplied as a connection to LO IN (using an HP-supplied short coax jumper). It will be disconnected from LO IN when LO IN is connected to a substitute LO for the receiver.

LO OUT is always active.

See Also

LO IN

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10. MONITOR OUT

Note This connector is not present on later versions of the instrument.

The monitor output is connected to the output of the audio analyzer. The same signal choices made for AF Analyzer measurements apply to this output. The same signal that goes to the AF Analyzer appears at this connector.

This connector is directly in parallel with the front-panel MONITOR OUT (DEMODULATION OUT) connector.

This output is always active.

See Also

Screens: CW Meas/AF Analyzer (AF Analyzer)
MONITOR OUT (DEMODULATION OUT)

11. OPT 001 REF OUT

The option 001 reference output connector is connected to an HP 10811 high-stability 10 MHz reference, (if option 001 is installed). Typically, it is connected to REF IN (using a HP-supplied short jumper cable) to get all timebase references locked to the high-stability timebase reference. This connector can also be used as a general-purpose output.

This output should be turned off when not in use, to reduce spurs and other unwanted signals.

Option 001 REF OUT is turned on and off by the OPT 001 REF OUT field on the Configure screen.

See Also

Screens: Configure
Specifications
REF IN

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12. PCN Interface

Note This connector is not present on earlier versions of the instrument.

This connector is used in conjuction with the HP 83220A DCS 1800 Test Set. Refer to HP 83220A DCS1800 Test Set manual (part number 83220-90000).

13. PROTOCOL INTERFACE

Note This connector is not present on earlier versions of the instrument.

This connector is used in conjunction with the HP 37900D Signaling Test Set. It is available only when option 003 is ordered.

14. REF IN

The timebase reference input is a BNC connector. It is connected to the reference circuitry. This connector is the main timebase reference input. Normally, it is connected to Option 001 REF OUT (if option 001 is installed) using an HP-supplied short jumper cable. RF IN can also be connected to a user-provided 1, 2, 5, 10 or 13 MHz reference by selecting the appropriate frequency from the Reference field on the Configure screen.

If RF IN is left unconnected, the internal timebase will not be locked to any external reference.

See Also

Screens: Configure
Specifications

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15. SERIAL PORT

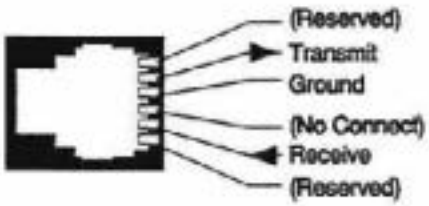
The serial interface port is a multipin connector. It is connected to the main microprocessor. It is used to connect a terminal to develop IBASIC programs, locally, without an external HP-IB controller. It can also be used for printing the contents of the display.

SERIAL PORT is always active.

Specifications

Baud Rates:

300
1200
2400
4800
9600
19200



16. SCOPE

Refer to HP 83220A DCS1800 Test Set manual (part number 83220-90000).

17. SYSTEM BUS

The system bus connector is used to externally control frequency hopping and contains duplications of several individual connectors.

See Also

Signal Descriptions for the System Bus

18. VIDEO OUT

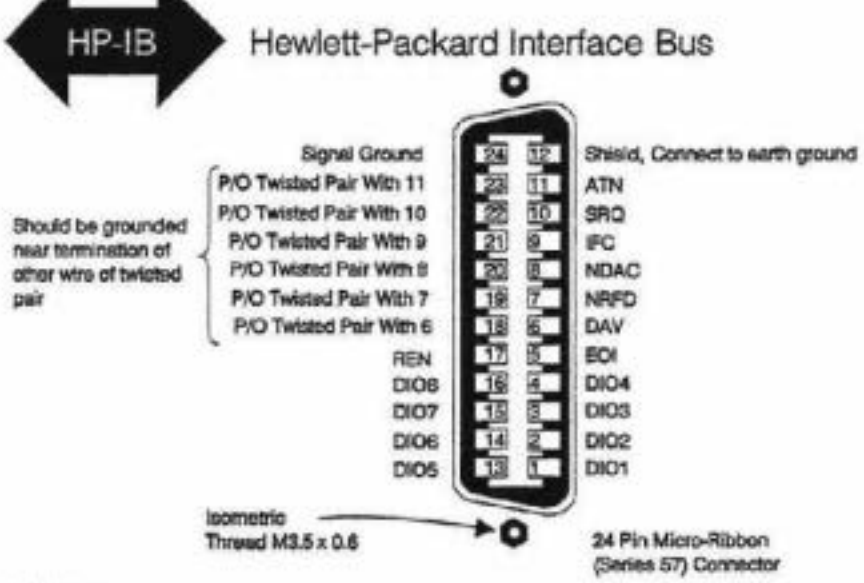
The video output connector connects to the CRT hardware. It can be used to connect a larger display.

VIDEO OUT is always active.

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HP-IB Connections



Logic Levels

The Hewlett-Packard Interface Bus logic levels are TTL compatible, that is, the true (1) state is 0.0 Vdc to +0.4 Vdc and the false state (0) is +2.5 Vdc to +5 Vdc.

Mating Connector

HP 1251-0293; Amphenol 57-30240

Mating Cables Available

HP 10833A, 1 meter (3.3 ft.)
HP 10833B, 2 meters (6.6 ft.)
HP 10833C, 4 meters (13.2 ft.)
HP 10833D, 0.5 meters (1.6 ft.)

Cabling Restrictions

1. A Hewlett-Packard Interface Bus system may contain no more than 2 meters (6.6 ft.) of connecting cable per instrument.

2. The maximum accumulative length of connecting cable for any Hewlett-Packard Interface Bus system is 20 meters (65.5 ft.).

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Signal Descriptions for SYSTEM BUS

DEMOD_DATA, DEMOD_CLK, DEMOD_VALID

DATA-Pin 22
CLK-Pin 4
VALID-Pin 23
Outputs

These are the digital demodulation data output signal, the digital demodulation clock output signal, and the digital demodulation valid output signal. These signals are connected directly in parallel with their respective front-panel connectors.

See Also

Front Panel Connectors: DATA (DEMODULATION OUT), CLOCK (DEMODULATION OUT), VALID (DEMODULATION OUT)

FP_DATA, FP_CLOCK

DATA-Pin 1
CLOCK-Pin 20
Inputs

These are the front-panel DATA, and CLOCK inputs. These signals are connected directly in parallel with their respective front-panel connectors.

Note



The two inputs are directly coupled to each other. Avoid putting signals on both inputs simultaneously.

See Also

DATA (MODULATION IN)
CLOCK (MODULATION IN)

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G_EXT_TRIG_OUT

Pin 24
Output

This output is a 1-bit-wide trigger. The timeslot and bit position in the timeslot are programmable on the Service screen.

Requirements

Amplitude: TTL Levels
Low Drive: 10 μA
High Drive: 2 mA

See Also

Screens: Service

MEAS_TRIG_OUT

Pin 21
Output

This is the measurement trigger output. It is connected to the DSP analyzer trigger-source multiplexer hardware. It is used as an auxiliary trigger output signal for use with an external spectrum analyzer.

PULSE_MOD_IN

Pin 6
Input

This is the pulse modulation input. This signal is connected directly in parallel with the PULSE (MODULATION IN) front-panel connector.

Note



The two inputs are directly coupled to each other. Avoid putting signals on both inputs simultaneously.

See Also

Screens: RF Generator
Front-Panel Connectors: PULSE (MODULATION IN)

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RP_BURST_T1, RP_BURST_T2

T1-Pin 26, T2-Pin 8
Select/Control

These are the rear-panel DSP analyzer burst type select signals. They are connected to the DSP analyzer. These signals can be used during digital demodulation or DSP Analyzer measurements to select the burst type in real-time for each burst being operated on.

When digitally demodulating, burst select must be set to Ext to use these signals. When making triggered measurements, the measurement synchronization burst selection must be set to Ext. Each of the four burst type definitions can be selected.

Requirements

Amplitude: TTL levels
High drive requirement: 100 μA
Low drive requirement: 2 mA

Table 6-1.

RP_BURST_T2	RP_BURST_T1	BURST NUMBER SELECTED
TTL LOW	TTL LOW	0
TTL LOW	TTL HIGH	1
TTL HIGH	TTL LOW	2
TTL HIGH	TTL HIGH	3

See Also

Screens: Measurement Sync, Digital Demod
Specifications
Timing Diagrams

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RP_DMOD_TRIG

Pin 7
Input

This is the rear-panel trigger signal input for digital demodulation. It connects to the DSP analyzer. It can also be used for other triggered measurements.

This signal is active when the digital demodulator's demodulation trigger source is set to Ext Demod, or when the measurement synchronization trigger source is set to Ext Demod.

Requirements

Amplitude: TTL levels
High drive requirements: 100 μA
Low drive requirements: 2 mA
Active edge: rising edge.

See Also

Screens: DSP Analyzer, Digital Demod
Specifications
Timing Diagrams

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RP_GSM_RST_IN

Pin 3
Input

This connector is an active low input that halts and resets the HP 8922G GSM counters (frame, timeslot, and bits). It is used when two or more HP 8922Gs are connected together (daisy-chained) to simulate a GSM system.

Requirements

Amplitude: TTL Levels
Low Drive: 100 μA
High Drive: 2 mA
Active Level: Low

RP_GSM_RST_OUT

Pin 5
Output

This connector indicates whether the HP 8922G GSM counters have been halted (by RP-GSM-RST-IN). It is always active (TTL Low) when the HP 8922G is in the Settable Mode.

Requirements

Amplitude: TTL Levels
Low Drive: 100 μA
High Drive: 2 mA
Active Level: Low

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RP_HOP_ADRS0, through RP_HOP_ADRS9, RP_HOP_ADRS10

ADRS0-Pin 12, ADRS1-Pin 31
ADRS2-Pin 13, ADRS3-Pin 32
ADRS4-Pin 14, ADRS5-Pin 33
ADRS6-Pin 15, ADRS7-Pin 34
ADRS8-Pin 16, ADRS9-Pin 35
ADRS10-Pin 17, Inputs

These are the rear-panel hop frequency table address input lines. They connect to the to hop controller. These lines select entries from user-entered RF generator and RF analyzer hop frequency tables. These lines have multiple uses, depending on the selected modes.

1. Used in combination with RP_TX_HOP to frequency hop the RF generator.
2. Used in combination with RP_RX_HOP to frequency hop the RF analyzer.
3. Used in combination with RP_RST_SEQ_HOP to reset the internal hop address register.

These signals are read on the positive-going edge of RP_TX_HOP when the RF generator's hop mode is set to Hop, the hop trigger is set to Arm, and the hop address source is set to Ext.

These signals can also be read on the positive-going edge of RP_RX_HOP when the RF analyzer's hop mode is set to Hop, the hop trigger is set to Arm, and the hop address source is set to Ext.

Or, these signals are read on the positive going edge on RP_SEQ_HOP when the address source is set to Seq, the RF analyzer's hop trigger is set to Arm, or RF generator's hop trigger is set to Arm.

Requirements

Amplitude: TTL levels
High drive requirement: 100 μA
Low drive requirement: 1 mA
Format: unassigned binary, high=1.

See Also

Screens: Hop Control (RF Generator), Hop Control (RF Analyzer)
Specifications
Timing Diagrams

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RP_HOP_INHIBIT

Pin 30
Input

This is the rear-panel internal hop inhibit input. It connects to the hop controller. It is used to inhibit internal hopping. The internal hop sequence address register is still sequenced, however. This signal should normally be kept TTL high.

This line is active whenever the hop controller' hop address source is set to Seq.

Requirements

Amplitude: TTL levels
High drive requirements: 100 μA
Low drive requirements: 2 mA
Active level: Low

See Also

Screens: Hop Control (RF Generator), Hop Control (RF Analyzer)
Specifications
Timing Diagrams

RP_RST_SEQ_HOP

Pin 11
Input

This is the rear-panel input to reset the internal hop sequence address register. It connects to the hop controller. This signal is primarily used to reset the internal hop address register to zero before a hopping sequence reaches the end of the hop frequency table(s). The signal should normally be kept TTL high.

This signal is always active. To reset the internal hop sequence counter, however, the reset will only occur on a subsequent RP_SEQ_HOP signal when the hop controller's hop address source is set to Seq.

Requirements

Amplitude: TTL levels
High drive requirement: 100 μA
Low drive requirement: 2 mA
Active level: Low

See Also

Screens: Hop Control (RF Generator), Hop Control (RF Analyzer)
Specifications
Timing Diagrams

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RP_RX_HOP

Pin 10
Input

This is the rear-panel trigger signal input for hopping the RF analyzer (if selected). It is used when externally addressing the hop frequencies.

You must supply signals on the rear-panel hop frequency table address input lines to select each RF analyzer hop frequency for each RF analyzer hop trigger. Also, the hop controller's hop address source must be set to Ext.

This line is active when the hop controller's hop address source is set to Ext, the RF analyzer's hop mode is set to Hop, and the RF analyzer's hop trigger is set to Arm.

Requirements

Amplitude: TTL levels
High drive requirement: 100 μA
Low drive requirement: 2 mA
Triggered by: rising edge

See Also

Screens: Hop Control (RF Generator), Hop Control (RF Analyzer)
Specifications
Timing Diagrams

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RP_SEQ_HOP

Pin 29
Input

This is the rear-panel trigger signal input for hopping the RF generator and/or the RF analyzer (if selected). It is used when internally sequencing through the hop frequencies. It is connected to the hop controller.This signal can also be configured to control RF generator output pulsing (automatic level pulsing when this trigger occurs). It is used along with internal hop sequence reset input to control frequency hopping through user-entered RF generator and RF analyzer hop frequency tables.

Hop frequencies are automatically selected through user-entered RF generator and RF analyzer hop frequency tables. Hop frequency table address input lines are used for resetting the internal sequence address register.

For the hop sequence to be active, the hop controller's hop address source must be set to Seq. To generate frequency hops, the hop controller's hop address source must be set to internal, the RF generator's (or RF analyzer's) hop mode must be set to hop, and the RF generator's (or RF analyzer's) hop trigger must be set to arm.

Requirements

Amplitude: TTL levels
High drive requirements: 100 μA
Low drive requirements: 2 mA
Triggered by: rising edge

See Also

Screens: Hop Control (RF Generator), Hop Control (RF Analyzer)
Specifications
Timing Diagrams
RP_RST_SEQ_HOP

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RP_TXD, RP_RXD

TXD-Pin 37
RXD-Pin 18
Output/Input

These are the rear-panel serial transmit data and rear-panel serial receive data lines.

Note

Ground signals not listed individually here.

RP_TX_HOP

Pin 28
Input

This is the rear-panel trigger signal input for hopping the RF generator (if selected). It is used when externally addressing the hop frequencies. It is connected to the hop controller. It can also be configured to control RF generator output pulsing (automatic level pulsing when this trigger occurs).

You must supply signals on the rear-panel hop frequency table address input lines to select each RF generator hop frequency for each hop trigger. Also, the hop controller's hop address Source field must be set to Ext.

This line is active when the hop controller's Source field is set to Ext, the RF generator's hop mode is set to Hop, and the RF generator's hop trigger is set to Arm.

Requirements

Amplitude: TTL levels
High drive requirement: 100 μA
Low drive requirement: 2 mA
Triggered by: rising edge

See Also

Screens: Hop Control (RF Generator), Hop Control (RF Analyzer)
Specifications
Timing Diagrams

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SEQ_TRIG_OUT

Pin 9
Output

This is the sequence trigger output. It is connected to the DSP analyzer. It outputs a positive-going pulse when an internal sequence goes through something other than the next higher address, or when reset occurs (Hop Address Source=Int).

USE_MEM_EXT_TRIG

27 Pin
Input

This is the external trigger source for Use Mem.

When Trig Source is Ext (see Screens: Digital Demod), a TTL high on this pin will initiate data capture for Use Mem.

RP_BURST_T1 and RP_BURST_T2 must select the correct burst number (see signal descriptions for RP_BURST_T1, RP_BURST_T2).

Input

High: demodulated data is stored for later use.
Low: data is not stored.

Requirements

TTL
High drive: 100 μA
Low: 2 mA

See Also

Keys: Use Mem
Connectors: System Bus, RP_BURST_T1, RP_BURST_T2

System Bus Pin Number Overview

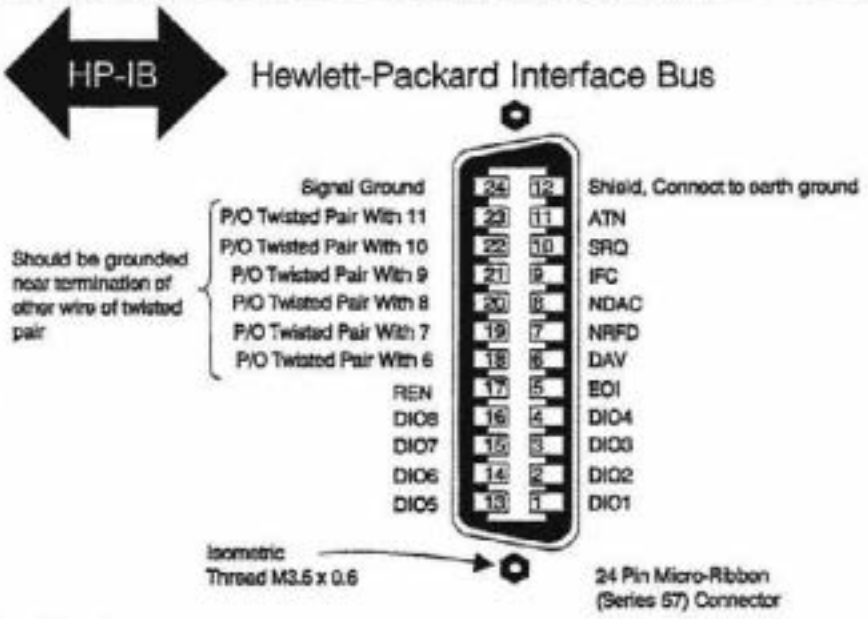
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Table 6-1. System Bus Connector Pin Numbers

Pin Number	Signal Name	Pin Number	Signal Name
1	FP_DATA	20	FP_CLOCK
2	GND	21	MEAS_TRIG_OUT
3	RP_GSM_RST_IN	22	DEMOD_DATA
4	DEMOD_CLK	23	DEMOD_VALID
5	RP_GSM_RST_OUT	24	G_EXT_TRIG_OUT
6	PULSE_MOD_IN	25	GND
7	RP_DMOD_TRIG	26	RP_BURST_T1
8	RP_BURST_T2	27	RP_BURST_T3
9	SEQ_TRIG_OUT	28	RP_TX_HOP
10	RP_RX_HOP	29	RP_SEQ_HOP
11	RP_RST_SEQ_HOP	30	RP_HOP_INHIBIT
12	RP_HOP_ADRS0	31	RP_HOP_ADRS1
13	RP_HOP_ADRS2	32	RP_HOP_ADRS3
14	RP_HOP_ADRS4	33	RP_HOP_ADRS5
15	RP_HOP_ADRS6	34	RP_HOP_ADRS7
16	RP_HOP_ADRS8	35	RP_HOP_ADRS9
17	RP_HOP_ADRS20	36	GND
18	RP_RXD	37	RP_TXD
19	GND		

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HP-IB Connections



Logic Levels

The Hewlett-Packard Interface Bus logic levels are TTL compatible, that is, the true (1) state is 0.0 Vdc to +0.4 Vdc and the false state (0) is +2.5 Vdc to +5 Vdc.

Mating Connector

HP 1251-0293; Amphenol 57-30240

Mating Cables Available

HP 10833A, 1 meter (3.3 ft.)
HP 10833B, 2 meters (6.8 ft.)
HP 10833C, 4 meters (13.2 ft.)
HP 10833D, 0.5 meters (1.6 ft.)

Cabling Restrictions

1. A Hewlett-Packard Interface Bus system may contain no more than 2 meters (6.6 ft.) of connecting cable per instrument.

2. The maximum accumulative length of connecting cable for any Hewlett-Packard Interface Bus system is 20 meters (65.5 ft.).

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Timing Diagrams

Contents

Digital Demod Timing Spec Table ..... Fig. 6-1
Digital Demod Timing Diagram ..... Fig. 6-2
Frequency Hop Timing Spec Table ..... Fig. 6-3
RF Generator Hop (Address Source = Ext) Timing Diagram ..... Fig. 6-4.
RF Analyzer Hop (Address Source = Ext) Timing Diagram ..... Fig. 6-5
RF Generator Hop (Address Source = Int) Timing Diagram ..... Fig. 6-6
RF Analyzer Hop (Address Source = Int) Timing Diagram ..... Fig. 6-7
Reset Hop Once (Address Source = Int) Timing Diagram ..... Fig. 6-8
Reset And Hold Hop (Address Source = Int) Timing Diagram ..... Fig. 6-9
Hop Inhibit (Address Source = Int) Timing Diagram ..... Fig. 6-10

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Symbol	min	max	description
Tbth	1.2 ms +Trig Delay		hold time of valid burst type after demod trigger
Tbtl		588 us +Trig Delay	latency time from demod trigger until valid burst type
Tdch	488 ns	688 ns	width of high state of DEMOD_CLK (rep rate 1 MHz)
Tdcl	488 ns	688 ns	width of low state of DEMOD_CLK (rep rate 1 MHz)
Tdh	188 ns		hold time of DEMOD_DATA after rising edge of DEMOD_CLK
Tds	188 ns		setup time of DEMOD_DATA prior to rising edge of DEMOD_CLK
Tdth	1 us		width of high state of demod trigger
Tdtl	1 us		width of low state of demod trigger
Tdtr	4.615 ms		time between subsequent demod triggers
Tdtv	3.8 ms +Trig Delay	4.2 ms +Trig Delay	latency time from demod trigger until DEMOD_VALID active
Tva	288 ns	488 ns	time from DEMOD_VALID active until rising edge of DEMOD_CLK
Tvi	588 ns	1 us	time from rising edge of last DEMOD_CLK until NOT DEMOD_VALID

Figure 6-1. Digital Demodulation Timing Specification Table

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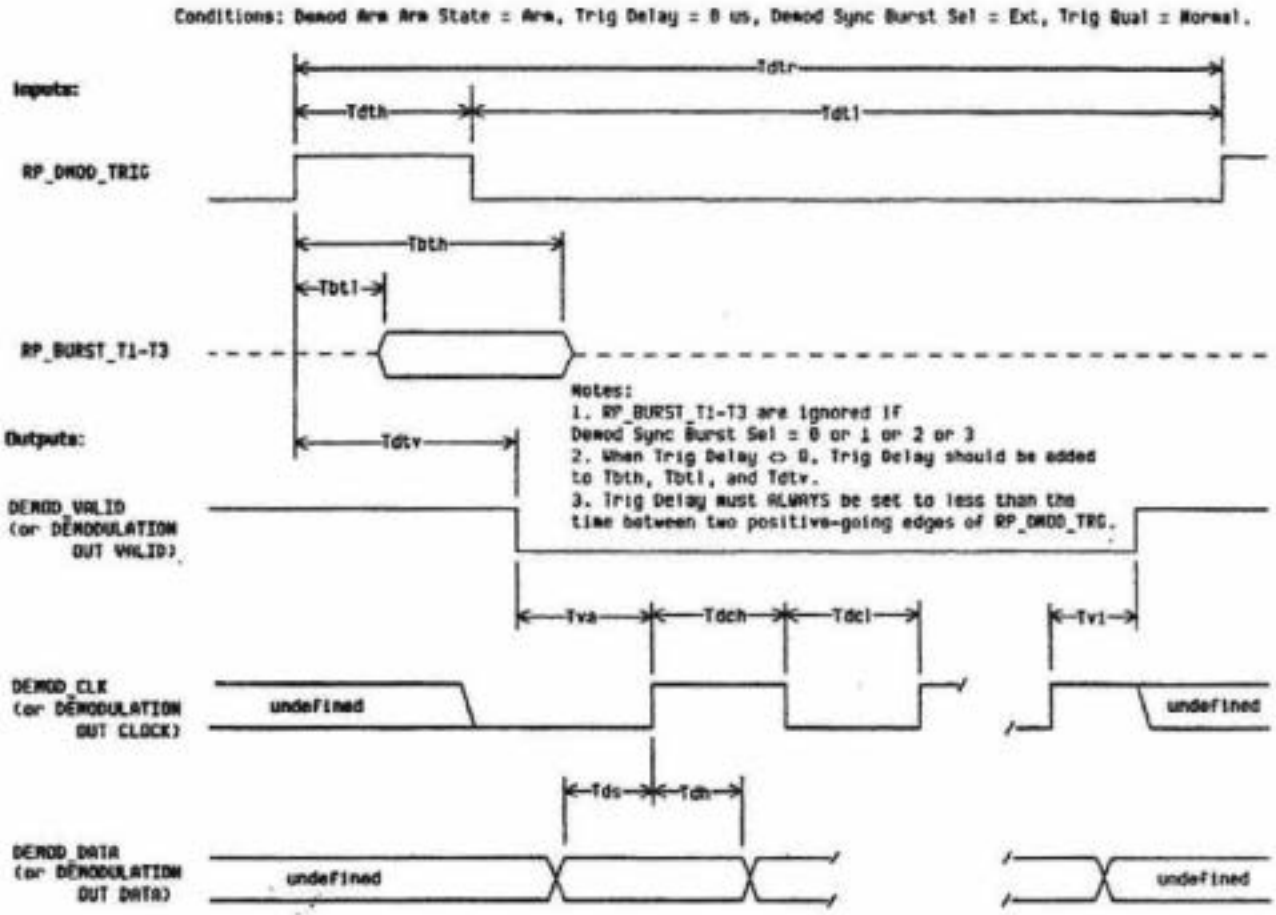


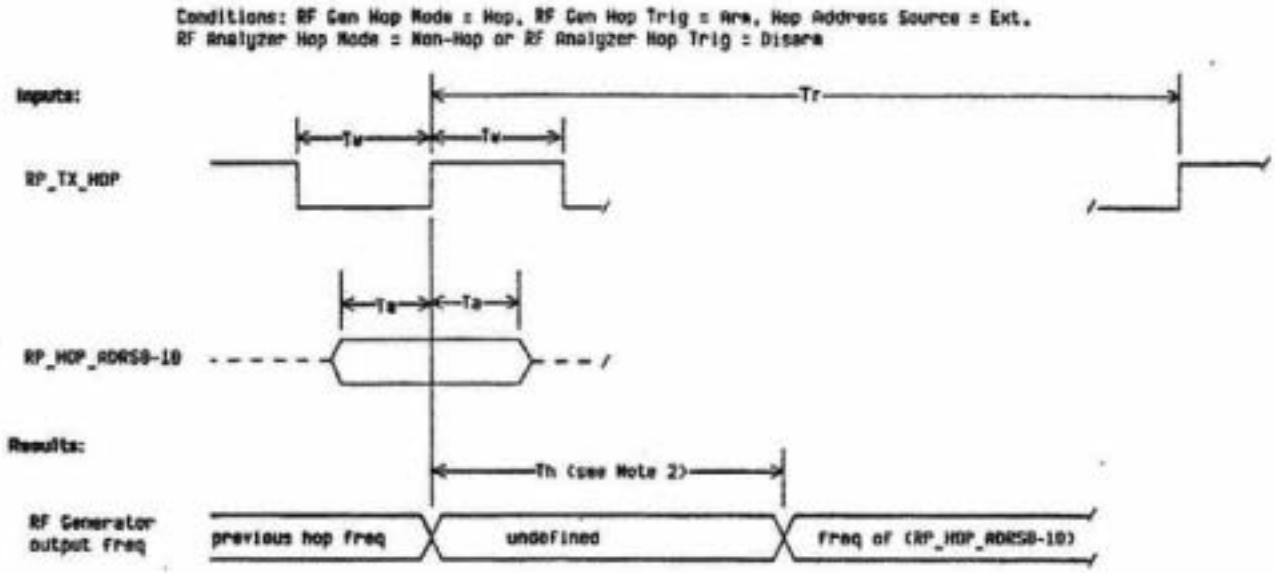
Figure 6-2. Digital Demod Timing Diagram

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Symbol	min	max	description
Ta	1 us		time RP_HOP_ADRS8-18 is stable before and/or after event
Th	0	578 us	time from hop trigger rising edge for RF Gen or RF Analyzer to meet frequency/phase specs (for 1 timeslot hop)
Th2	0	858 us	time from hop trigger rising edge for RF Gen or RF Analyzer to meet frequency/phase specs (for 1 timeslot hop) during simultaneous hopping
Tr	577 us		time between subsequent hop triggers of the same type (not useful less than 1.15 ms)
Trs	1 us		time after RP_RST_SEQ_HOP returns high until RP_SEQ_HOP rising edge can occur
Tsr	1 us		time after previous RP_SEQ_HOP rising edge until low RP_RST_SEQ_HOP can occur
Tw	1 us		pulse widths

Figure 6-3. Frequency Hop Timing Specification Table

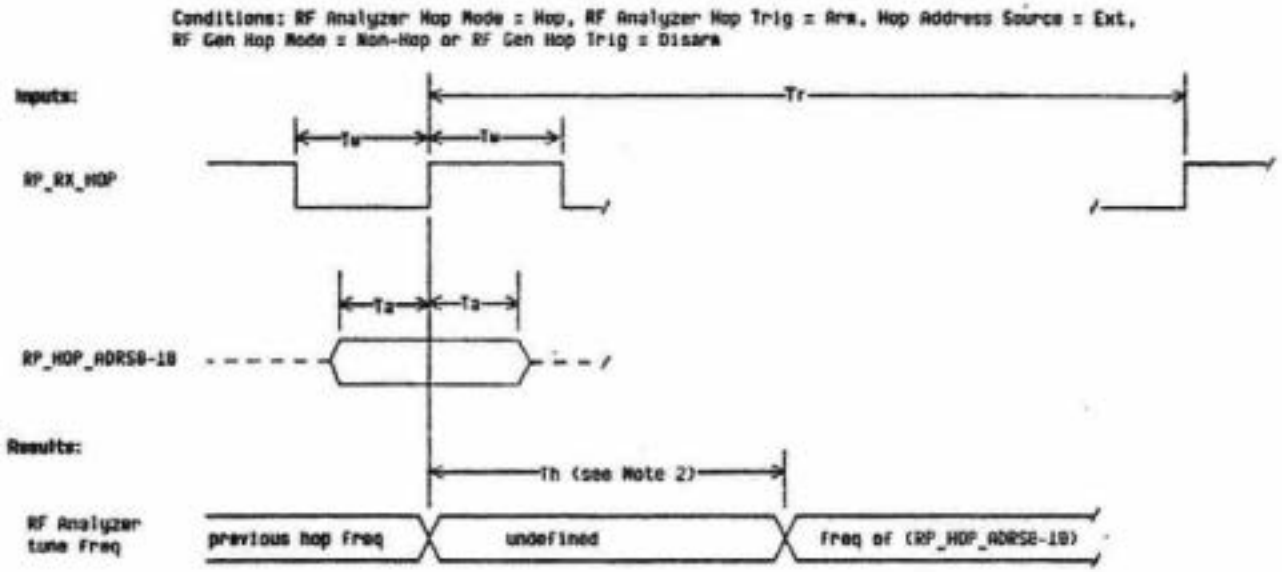
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Notes:
1. If RF Analyzer Hop Mode = Hop and RF Analyzer Hop Trig = Arm, then this timing diagram applies only if RP_RX_HOP occurs at least 250 us before RP_TX_HOP.
2. If RF Analyzer Hop Mode = Hop and RF Analyzer Hop Trig = Arm, and RP_RX_HOP occurs between 20 us and 250 us before RP_TX_HOP, then Th above doesn't apply. Rather, the RF Generator Output will be hopped within Th2 of the RP_RX_HOP.
3. When the RF Analyzer should hop before the RF Generator, RP_RX_HOP rising edge should lead the RP_TX_HOP rising edge by at least 10 us.
4. The RF Generator Output meets phase/frequency accuracy specs for the RF Generator Hop Frequency based on the address on the RP_HOP_ADRS0-10 signals.
5. The RF Generator Output can also be pulsed off automatically during hopping by selecting RF Generator Mod Source Pulse = Hop Trig.

Figure 6-4. RF Generator Hop (Address Source = Ext) Timing Diagram

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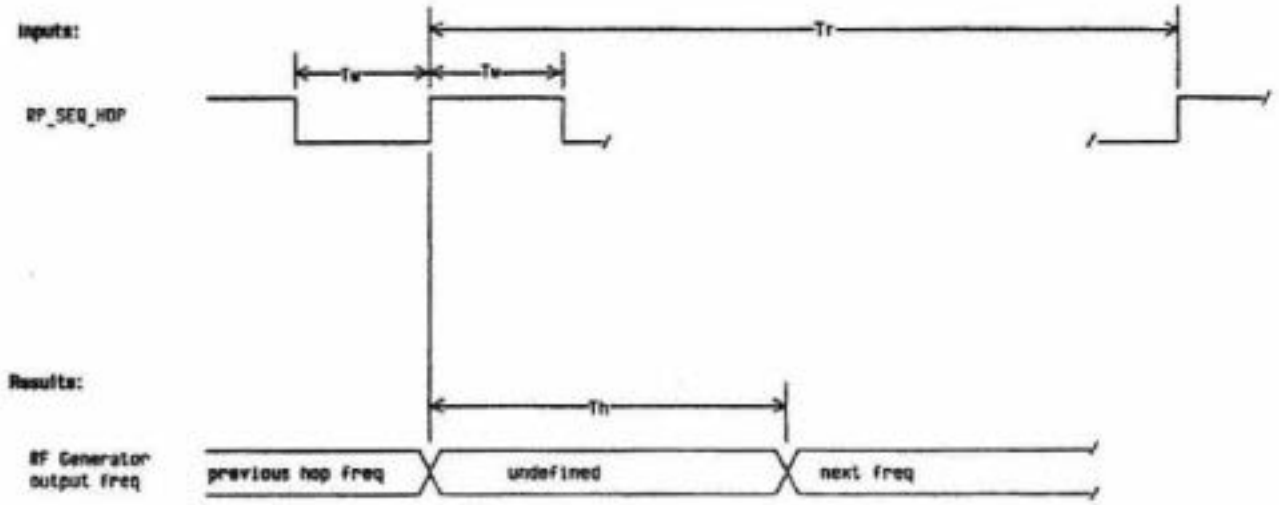


Notes:
1. If RF Gen Hop Mode = Hop and RF Gen Hop Trig = Arm, then this timing diagram applies only if RP_TX_HOP occurs at least 250 us before RP_RX_HOP.
2. If RF Gen Hop Mode = Hop and RF Gen Hop Trig = Arm, and RP_TX_HOP occurs less than 250 us before RP_RX_HOP, then Th above doesn't apply. Rather, the RF Analyzer tune freq will be hopped within Th2 of the RP_TX_HOP.
3. When the RF Analyzer should hop before the RF Generator, RP_RX_HOP rising edge should lead the RP_TX_HOP rising edge by at least 10 us.
4. The RF Analyzer is tuned based on the address on the RP_HOP_ADRS0-10 signals.

Figure 6-5. RF Analyzer Hop (Address Source = Ext) Timing Diagram

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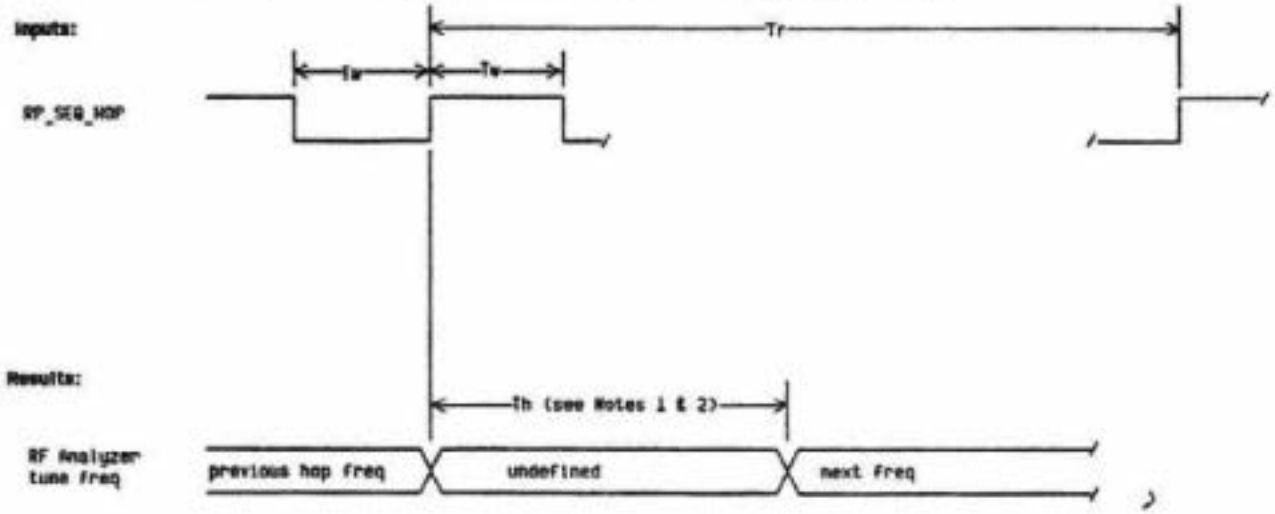
Conditions: RF Gen Hop Mode = Hop, RF Gen Hop Trig = Arm, Hop Address Source = Int, RP_RST_SEQ_HOP stays TTL HIGH.



Notes:
1. This Timing Diagram applies even if RF Analyzer Hop Mode = Hop and RF Analyzer Hop Trig = Arm.
2. The RF Generator Output power can also be pulsed off automatically during hopping by selecting RF Generator Mod Source Pulse = Hop Trig.

Figure 6-6. RF Generator Hop (Address Source = Int) Timing Diagram

Conditions: RF Analyzer Hop Mode = Hop, RF Analyzer Hop Trig = Arm, Hop Address Source = Int, RF Gen Hop Mode = Non-Hop or RF Gen Hop Trig = Disarm, RP_RST_SEQ_HOP stays TTL HIGH.

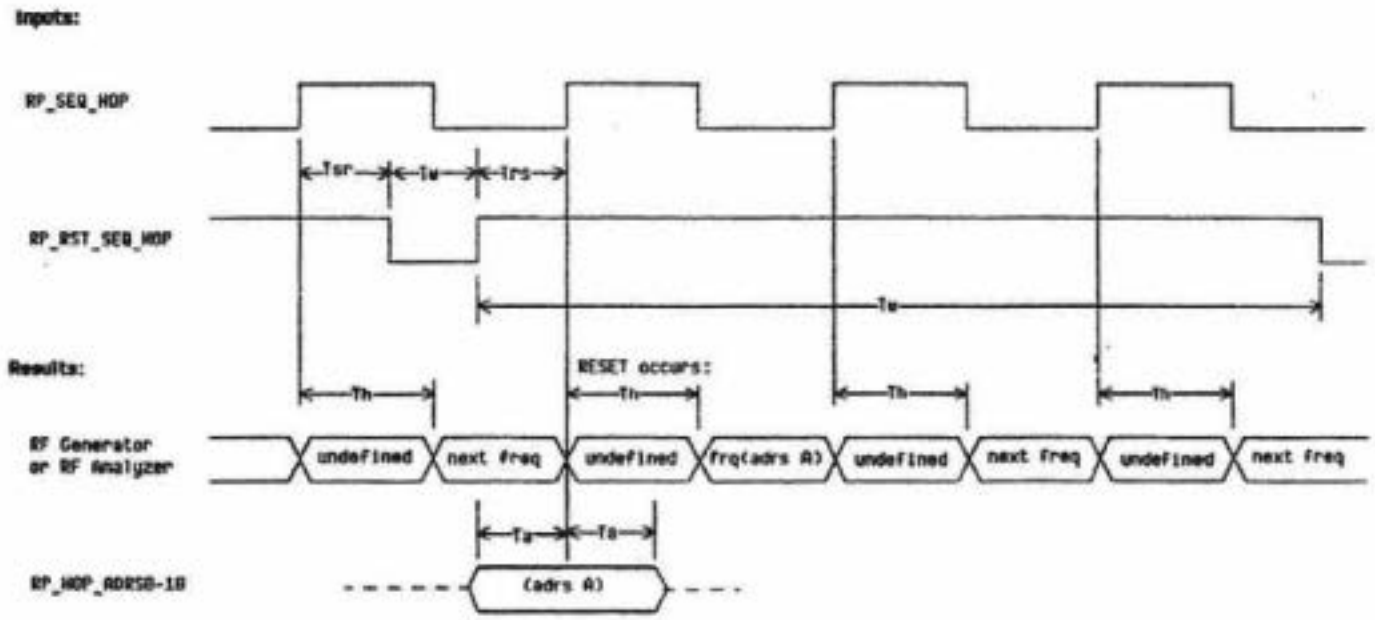


Notes:
1. If RF Gen Hop Mode = Hop and RF Gen Hop Trig = Arm, then Th2 applies instead of Th.
2. If the next freq is the same as the currently tuned frequency, no hopping will occur. This allows the RF Analyzer to settle longer which is needed for making accurate measurements.
3. RP_HOP_INHIBIT is assumed to be high here.

Figure 6-7. RF Analyzer Hop (Address = Int) Timing Diagram

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Conditions: Hop Address Source = Int and ([RF Gen Hop Mode = Hop and RF Gen Hop Trig = Arm] and/or [RF Analyzer Hop Mode = Hop and RF Analyzer Hop Trig = Arm]) .

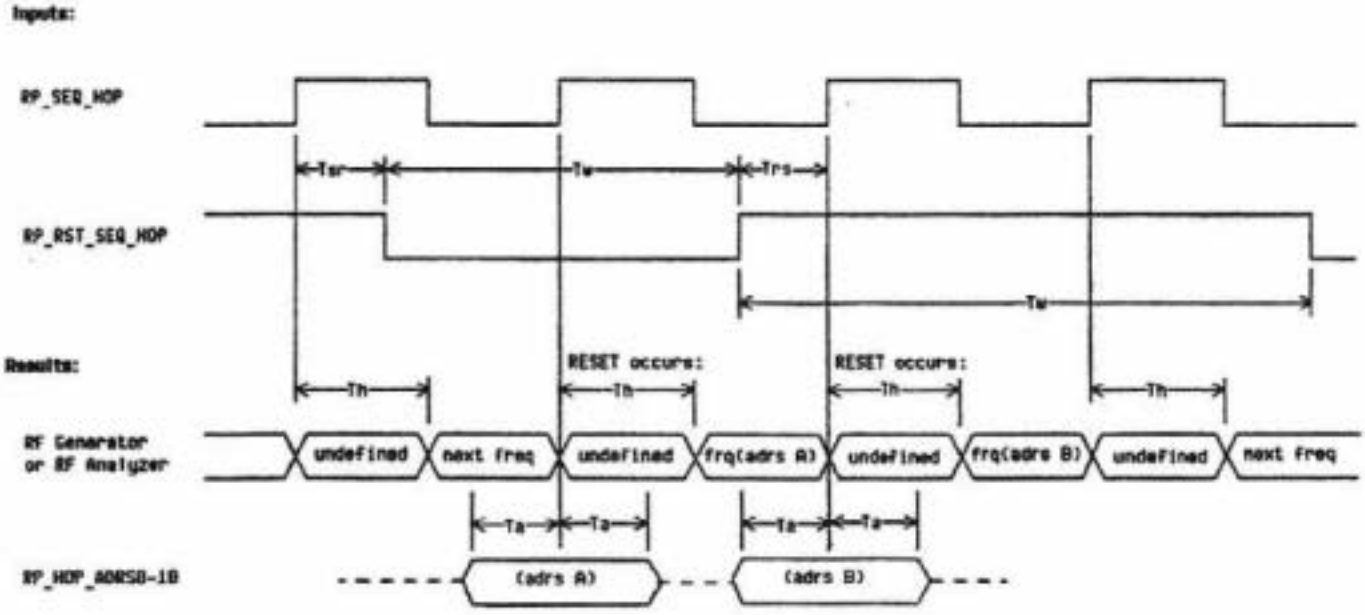


Notes:
1. Tw and Tr for RP_SEQ_HOP as well as Th or Th2 apply as per the other Address Source = Int Timing Diagrams.
2. Note that RP_RST_SEQ_HOP is not required to be TTL LOW at the actual RP_SEQ_HOP rising edge in order to cause RESET. RP_RST_SEQ_HOP is only required to have gone TTL LOW Tsr after the previous RP_SEQ_HOP rising edge and RP_RST_SEQ_HOP must be TTL LOW for at least Tw.
3. RP_HOP_INHIBIT is assumed to be high here.

Figure 6-8. Reset Hop Once (Address Source = Int) Timimg Diagram

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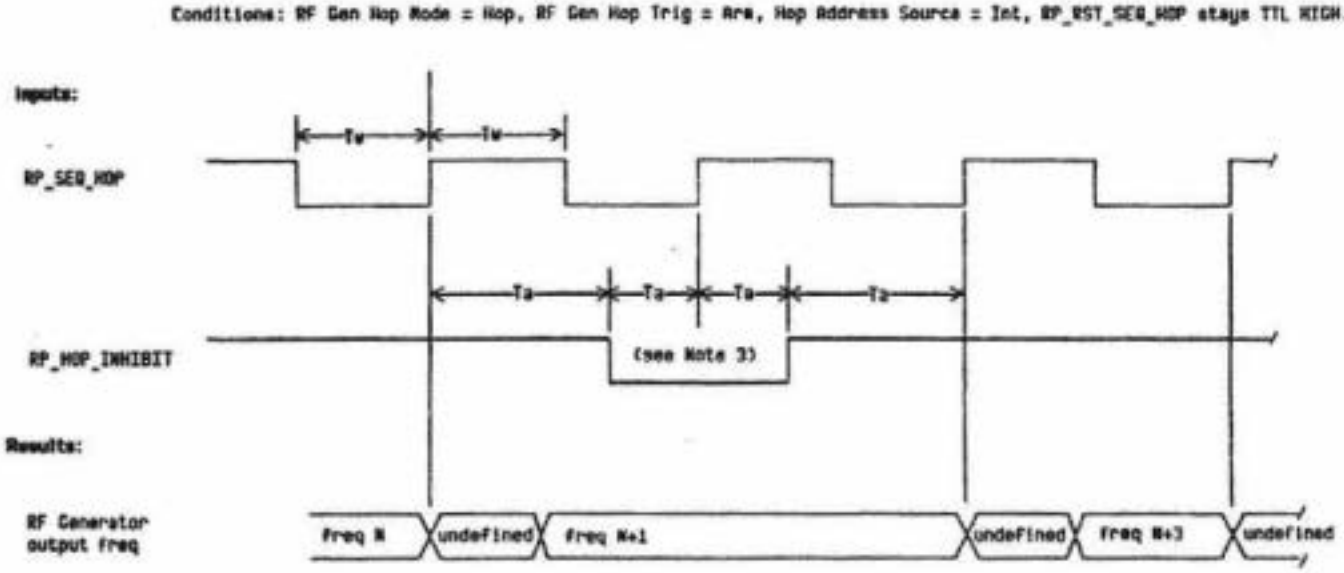
Conditions: Hop Address Source = Int and ([RF Gen Hop Mode = Hop and RF Gen Hop Trig = Arm] and/or
[RF Analyzer Hop Mode = Hop and RF Analyzer Hop Trig = Arm]) .



Notes:
1. Tw and Tr for RP_SEQ_HOP as well as Th or Th2 apply as per the other Address Source = Int Timing Diagrams.
2. RP_HOP_INHIBIT is assumed to be high here.

Figure 6-9. Reset and Hold Hop (Address Source = Int) Timing Diagram

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Notes:
1. This Timing Diagram applies even if RF Analyzer Hop Mode = Hop and RF Analyzer Hop Trig = Arm.
2. The RF Generator Output power can also be pulsed off automatically during hopping by selecting RF Generator Mod Source Pulse = Hop Trig.
3. Note that Freq N+2 is NOT hopped to, but the hop counter is incremented to N+2.
4. RF Analyzer hopping is affected similarly by the RP_HOP_INHIBIT signal.
5. Assumed here is a sequential hop table.

Figure 6-10. Hop Inhibit (Address Source = Int) Timing Diagram

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7

HP-IB

Notation

Extensive use is made of command syntax tables throughout this chapter. Associated with these tables are programming format conventions which are described in the following paragraphs.

Interpreting Command Tables

Command tables are used to define the set of HP 8922 HP-IB commands. The table shows the commands (keywords), their hierarchical relationships, and their related parameters (if any). (Refer to figure 7—1.) Following each command or parameter is a description.

The KEYWORDs provide the name of the command. The actual name of the command consists of one or more keywords (the commands are based on a hierarchical structure). Associated commands are grouped together under a common node in the hierarchy where the first keyword is considered the root level node.

A command (keyword) may be appended with a number if there are more than one commands with the same name. For example, the following commands exist: RFANalyzer:AMPLitude1 and RFANalyzer:AMPLitude2. This means that there are two separate amplitude commands that may be set for the RFANalyzer.

Note



When using the shortened form of the command, obtain the short form and then append the appropriate number (for example, RFAN:AMPL1 and RFAN:AMPL2).

The PARAMETER indicates the allowable input for the command. This may be a numeric value with or without units, a quoted string describing the parameter selection or an enumerated type (no quotes) describing the parameter selection.

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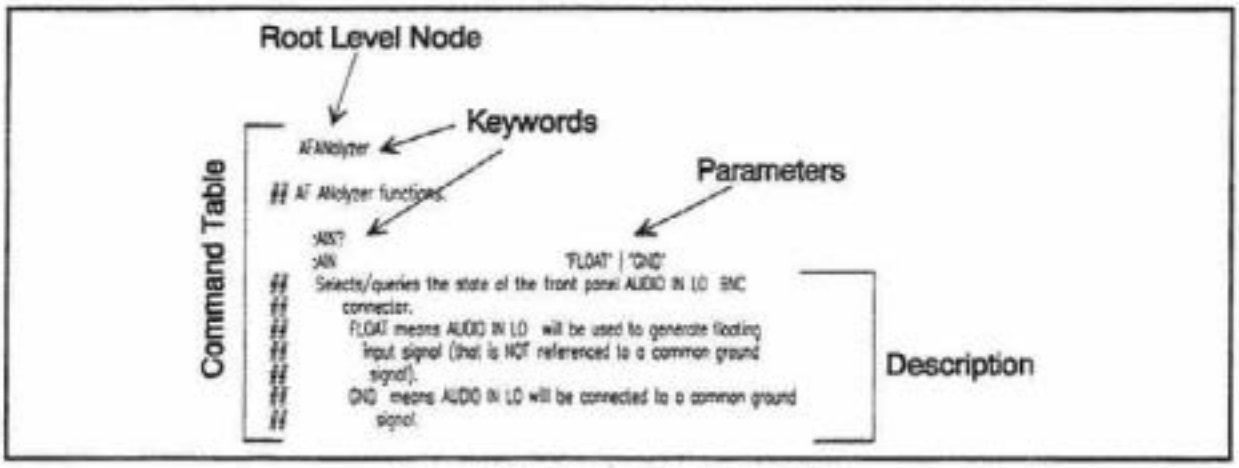


Figure 7-1. Command Syntax Table

Programming Format Conventions

Syntax commands and returned data descriptions use the following format conventions.

Upper case letters indicate the shortened acceptable form of a command.

Square brackets, [ ], indicate that enclosed command or command parameters are optional.

Vertical bar, |, indicates that one-and-only-one item separated by the vertical bar can be used at any given time. The vertical bar is read as "or." For example, A|B indicates that either A or B can be chosen, but not both.

Question mark, ?, indicates a query command. Most commands accept this command when it is entered immediately after the command name. The returned information (<value>) varies in format according to the type of the field.

- Fields that accept quoted string parameters will return the active choice in quotes when queried. For example if the RF generator Output was set to the RF IN/OUT parameter (RFG:OUTP "RF IN/OUT") and the queried (RFG:OUTP?), the return would be "RF IN/OUT".
- Fields that accept decimal numeric data will return the current field value as an exponentiated decimal number.
- Fields that accept floating point numeric data will return the current field value as a floating point number in the current HP-IB units.
- Fields that accept character data (unquoted strings) will return the queried information without quotes.

Quotation marks, " ", enclose command and string entries. Be sure to follow the correct syntax for using quotations that are specific to your basic language.

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Colons, :, are used to separate keywords and show hierarchical relationship.

```
"RFANalyzer:FREQuency 935 MHz"
```

A Semicolons + a Colon, ;:, is used to separate two or more root level command statements on the same line.

```
"RFAN:INP 'RF IN/OUT';:RFAN:AMPL1 -20 dBm".
```

Semicolons, ;, can also be used to condense command words on one line if the commands are equal, or of decreasing hierarchy under the keyword. (The following example is equivalent to the previous command statement, but the root level keyword :RFAN is removed by using semicolons.)

```
"RFAN:INP 'RF IN/OUT';AMPL1 -20 dBm"
```

Commas are used to separate multiple parameter entries.

Angle brackets, < >, enclose variable items that represent user choices (parameters) to be entered.

Units of Measure

Units for measurements are implemented such that a measurement query result will be returned in the current HP-IB unit.

Units for settings are implemented such that if a unit is not sent along with the setting value, then a default HP-IB unit is used.

- For example, RFGenerator:AMPLitude1 assumes dBm and RFGenerator:FREQuency assumes Hz. If a unit is sent with the setting, then this unit will be used. The HP-IB unit may be changed using the units commands described later.
- Each measurement or setting description defines the allowable units for that field. When units are sent with a command, they should not be quoted.

The complete allowable set of HP-IB units that setting queries or measurement queries may be returned in are:

- DB (dB), DBM (dBm), DBUV (dB micro-volt),
- DEG (degree), DIV (division),
- HZ (Hz), OHM (ohm), PCT (percent), PPM (parts-per-million),
- S (second), T (bit periods),
- V (volt), W (watts)

The complete allowable set of units that can be sent with setting commands or units that can be displayed on the front panel are:

- DB (dB), DBM (dBm), DBMW (dB milli-watt), DBUV (dB micro-volt),
- HZ (Hz), KHZ (kHz), MHZ (MHz), GHZ (GHz),
- T (bit periods), S (second), MS (milli-second), US (microsecond),
- V (volt), MV (millivolt), UV (microvolt),
- W (watts), MW (milliwatt),
- PCT (percent), PPM (parts-per-million),
- DEG (degree) DIV (division), OHM (ohm),

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Optional Commands

The following are symbols used to designate optional commands that may be used with the given command.

a. INUM is a symbol that designates the following list of optional commands that apply to Integer Numeric Entry fields.

   Included in INUM are the following commands:

```
      :INCRement?
##     Queries the field's current INCRement value.

      :INCRement              <UP | DOWN | (value)>
##     INCRement <value> sets the field INCRement value. INCR UP
##       or INCR DOWN cause the field to be modified up or down by
##       the current INCRement value.
```

b. FNUM is a symbol that designates the following list of optional commands that apply to Floating Point Numeric Entry fields.

   Included in FNUM are the following commands:

```
      :UNITs?
      :UNITs                          <HP-IB unit>
##     Sets/queries the HP-IB fundamental UNITs that the floating
##       point number queries will be returned in.

      :DUNits?
      :DUNits                         <measurement unit>
##     Sets/queries the Displayed UNits on the front panel for the
##       given floating point number.

      :INCRement?
##     Queries the field's current INCRement value.

      :INCRement              <UP | DOWN | (value) [units]>
##     INCRement <value> sets the field INCRement value. INCR UP
##       or INCR DOWN cause the field to be modified up or down by
##       the current INCRement value.

         :DUNits?
         :DUNits                      <increment unit>
##        Sets/queries the Displayed UNits on the front panel for
##          the field's increment setting.

         :MODE?
         :MODE                        LINear | LOGarithm
##        Sets/queries the MODE of INCRement value to be in
##          either LINear or LOGarithmic (displayed in dB) steps.

         :MULTiply
##        MULTiplies the INCRement value by 10.

         :DIVide
##        DIVides the INCRement value by 10.
```

c. FNUM_MOD includes all of the FNUM optional commands except INCR:MODE.

d. MM is a symbol that designates the following list of optional commands that control Measurement field functions. These attributes are listed here in hierarchal relationship. Included are commands for state, units, low limits and high limits, and reference.

   Included in MM are the following commands:

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```
      :STATe?
      :STATe                          ON | OFF | 1 | 0
##     Selects/queries the STATe of the measurement to be ON or
##       OFF.  Note: ON = 1 and OFF = 0

      :UNITs?
      :UNITs                          <HP-IB measurement unit>
##     Sets/queries the HP-IB fundamental UNITs that measurement
##       queries will be returned in.

      :DUNits?
      :DUNits                         <measurement unit>
##     Sets/queries the Displayed UNits on the front panel for the
##       given measurement.

      :AUNits?
      :AUNits                         <HP-IB attribute unit>
##     Sets/queries the HP-IB fundamental UNITs that measurement
##       Attribute queries (e.g., low limit, high limit, etc.) are
##       returned in.

      :HLIMit
##     High LIMit measurement information.

         :DUNits?
         :DUNits                      <measurement unit>
##        Sets/Queries the measurement High LIMit Displayed UNits.

         :EXCeeded?
##         Queries whether the High LIMit for the measurement was
##           EXCeeded.

         :RESet
##         RESet the High LIMit exceeded state so that new limit
##           data can be acquired.

         :STATe?
         :STATe                       ON | OFF | 1 | 0
##        Sets/queries the High LIMit STATe.
##          Note: ON = 1 and OFF = 0.

        [:VALue]?
        [:VALue]                      <numeric value>
##        Sets/queries the measurement High LIMit VALue.

      :LLIMit
##     Low LIMit measurement information.

         :DUNits?
         :DUNits                      <measurement unit>
##        Sets/queries the measurement Low LIMit Displayed UNits.

         :EXCeeded?
##        Queries whether the Low LIMit for the measurement was
##          EXCeeded.

         :RESet
##        RESet the Low LIMit exceeded state so that new limit
##          data can be acquired.

         :STATe?
         :STATe                       ON | OFF | 1 | 0
##        Sets/queries the Low LIMit STATe.
##          Note: ON = 1 and OFF = 0.

        [:VALue]?
```


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```
        [:VALue]                        <numeric value>
##        Sets/queries the measurement Low LIMit VALue.

      :REFerence
##    Measurement REFerence information.

        :DUNits?
        :DUNits                         <measurement unit>
##       Sets/queries the REFerence Displayed UNits on the front
##         panel for the given measurement.

        :STATe
        :STATe                          ON | OFF | 1 | 0
##       Sets/queries the REFerence STATe.
##         Note: ON = 1 and OFF = 0.

       [:VALue]?
       [:VALue]                         [<numeric value>]
##       Sets/queries the measurement REFerence VALue.
##         If no <numeric value> is specified, then the
##         REFerence VALue will be set to the current measurement
##         result.
```

e. MM_MOD includes all of the MM optional commands except the units commands (UNITs, DUNits, AUNits).

f. AVG is a symbol that designates the following list of optional commands that apply to measurement fields that use averaging. These attributes are listed here in hierarchal relationship.

Included in AVG are the following commands:

```
      :AVERage
##    MEASurement AVERage commands.  NOTE : These are only useful
##      for continuous measurements.

        :RESet
##       RESet the AVERaged measurement result to begin giving
##         measurement results from the first measurement up to
##         the number if measurements given by
##         <measurement>:AVERage:VALue.

        :STATe?
        :STATe                          ON | OFF | 1 | 0
         Sets/queries the AVERage STATe.
##         Note: ON = 1 and OFF = 0.
##         ON allows display of the average value of the number
##           of measurements given in
##           <measurement>:AVERage:VALue

       [:VALue]?
       [:VALue]                         <numeric value>
##       Sets/queries the number (VALue) of measurements to be
##         used in calculating the AVERaged measurement result.
```

g. MET is a symbol that designates the following list of optional commands that apply to measurement fields that use meters. These attributes are listed here in hierarchal relationship.

Included in MET are the following commands:

```
      :METer
##     METer commands.  NOTE : These are only useful for
##       continuous measurements.
```


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```
        :HEND?
        :HEND                          <numeric value>
##       Sets/queries the High END value to display on the METer
##         for the measurement.

        :DUNits?
        :DUNits                        <meter display unit>
##       Sets/queries the measurement METer High END Displayed
##         UNits.

        :INTerval?
        :INTerval                      <numeric value>
##       Sets/queries the number of INTervals to display on the
##         METer between the low end and high end for the
##         measurement.

        :LEND?
        :LEND                          <numeric value>
##       Sets/queries the Low END value to display on the METer
##         for the measurement.

          :DUNits?
          :DUNits                      <meter display unit>
##         Sets/Queries the measurement METer Low END Displayed
##           UNits.

        :STATe?
        :STATe                         ON | OFF | 1 | 0
##       Sets/queries the METer STATe.
##         Note: ON = 1 and OFF = 0.
```

Additional Program Information

All lines beginning with 2 pound signs (##) are comment lines that contain detailed, command descriptions.

The subsystems are organized in alphabetical order. The MEASure subsystem contains mainly measurement result queries and the settings are listed within separate subsystems. Trigger commands for most subsystems are available in the TRIGger subsystem.

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AF ANalyzer Subsystem

```
AFANalyzer
## AF ANalyzer functions.

   :AIN?
   :AIN                                 'FLOAT' | 'GND'
##  Selects/queries the state of the front panel AUDIO IN LO BNC connector.
##    FLOAT means AUDIO IN LO will be used to generate floating input
##      signal (that is NOT referenced to a common ground signal).
##    GND means AUDIO IN LO will be connected to a common ground signal.

   :DEMPhasis?
   :DEMPhasis                           '750 US' | 'OFF'
##  Selects/queries the AF ANalyzer DE-EMPhasis state.

      :GAIN?
      :GAIN                             '0 DB' | '10 DB' | '20 DB' | '30 DB'
##     Selects/queries the DE-EMPhasis GAIN selection.  This is typically
##       automatically selected, based on audio level.

   :DETector?
   :DETector                            'RMS' | 'PK+' | 'PK-' | 'PK+-/2' |
                                        'PK+-MAX' | 'PK+ HOLD' | 'PK- HOLD' |
                                        'PK+-/2 HD' | 'PK+-MX HD'
##  Selects/queries the AF ANalyzer DETector which is used for all AF ANalyzer
##    measurements.

      :PKLocation?
      :PKLocation                       'FILTERS' | 'DE-EMP'
##     Selects/queries the PeaK DETector Location.  These selections pick
##       locations in our block diagram that AF ANalyzer measurements will be
##       made.

      :SETTling?
      :SETTling                         'SLOW' | 'FAST'
##     Selects/queries the DETector SETTling mode.
##       SLOW is useful for low frequency audio measurements.
##       FAST is useful for higher frequency audio measurements.
```


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```
   :ELResistor?
   :ELResistor                          <(value) [units]> | [FNUM]
##  Sets/queries the External Load Resistor assumed for measuring watts
##    of power into an external load resistor.
##    Default HP-IB and display unit is Ohms.

   :FILTer1?
   :FILTer1                             '<20HZ HPF' | '50HZ HPF' |
                                        '300HZ HPF' |
##  Selects/queries the AF ANalyzer FILTer 1.

   :FILTer2?
   :FILTer2                             '300HZ LPF' | '3KHZ LPF' | '15KHZ LPF'|
                                        '>99KHZ LP' |
##  Selects/queries the AF ANalyzer FILTer 2.

   :GTIMe?
   :GTIMe                               <(value) [units]> | [FNUM]
##  Sets/queries the AF ANalyzer Gate TIMe (AF Cnt Gate).
##    Default HP-IB unit is seconds (S).
##    Default display unit is milli-seconds (MS).

   :INPut?
   :INPut                               'SCOPE IN' | 'FM DEMOD' | 'PLS DEMOD' |
                                        'AUDIO IN' | 'AUDIO OUT'| 'AM MOD IN' |
                                        'SPEECH IN' | 'SPEECHOUT'

##  Selects/queries the AF ANalyzer INPut.  This selection determines what
##    signal is to be measured by the AF ANalyzer as well as for the
##    oscilloscope.

      :GAIN?
      :GAIN                             '0 DB' | '20 DB' | '40 DB'
##     Selects/queries the INPut GAIN.  This is typically selected
##       automatically based on audio level.

   :SMPoint?
   :SMPoint                             'DE-EMP' | 'FILTERS' | 'INPUT' |
                                        'NOTCH'
##  Selects/queries the Scope Measurement Point.  This selection determines
##    where in the hardware block diagram the oscilloscope is making the
##    desired measurement.
```


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```
:NOTCh

    :GAIN?
    :GAIN                                   '0 DB' | '10 DB' | '20 DB' |
                                            '30 DB' | '40 DB'
##    Selects/queries the NOTCh GAIN.  This is typically selected
##      automatically based on audio level.

:RANGing?
:RANGing                                    'AUTO' | 'HOLD'
## Selects/queries the RANGing (Gain Cntl) STATe.
##   AUTO results in gain selections being made automatically based on
##     audio level.
##   HOLD causes all gain selections to maintain their present state
##     for either manual selection or until AUTO is selected.

:SPEaker

    :MODE?
    :MODE                                   'ON' | 'OFF'
##    Selects/queries the SPEaker ALC MODE.

    :VOLume?
    :VOLume                                 'POT' | 'OFF'
##    Selects/queries the SPEaker VOLume.
##      POT means the SPEaker VOLume is controlled via the front panel
##        VOLUME control.
##      OFF means the SPEaker VOLume is turned off, independent of the
##        front panel VOLUME control.
```


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AF Generator Subsystem

```
AFGenerator

## AF Generator commands.

   :AMPLitude?
   :AMPLitude                              <(value) [units]> | [FNUM]
##  Sets/queries the AF Generator Audio Output AMPLitude, which will
##    be present at the front panel AUDIO OUT connector.
##    HP-IB unit is Volts.
##    Display units are V and mV.
##    Default display unit is mV.

   :COUPling?
   :COUPling                               'AC' | 'DC'
##  Selects/queries the AF Generator Audio Output COUPling.

   :FREQuency?
   :FREQuency                              <(value) [units]> | [FNUM]
##  Sets/queries the AF Generator Audio Output, which will
##    be present at the front panel AUDIO OUT connector.
##    Default HP-IB unit is HZ.
##    Default display unit is kHZ.
```


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Bit Error Test Subsystem

```
BETest

## Bit Error Test commands.

   :BITS<n>?
   :BITS<n>                              <value> | [INUM]
##  Sets/queries the number of BITS to test to make this Bit
##    Error Test measurement complete, where <n> = 1 .. 4.

   :LOOPback
##  MS LOOPback parameters.

       :LDELay?
       :LDELay                           <value> | [INUM]
##      Sets/queries the Loop DELay.
##        This is the number of speech frames to be assumed for loopback.
##          delay.  This affects how/when bit error test measurement bit
##          patterns are compared.

          :MODE?
          :MODE                          'AUTO' | 'MANUAL'
##          Sets/queries the Loop DELay MODE.
##            AUTO automatically sets LDELay (above) once when the
##              measurement is started.  This is a timing calibration action.
##            MANUAL means the Loop DELay is controlled manually via the
##              :LDELay command.


   :TYPE<n>?
   :TYPE<n>                             'TYPEI' | 'RESTYPEI' | 'TYPEIA' |
                                        'RESTYPEIA' | 'TYPEII' | 'RESTYPEII' |
                                        'TYPEIB' | 'RESTYPEIB' | 'ALLFS' |
                                        'RESALLFS' | 'OFF'
##  Selects/queries the Bit Error Test measurement TYPE, where <n> = 1 .. 4.
##    This defines the Bit Error Test measurement TYPE for each of the 4
##    available Bit Error Test measurements.
```


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Cell Configuration Subsystem

```
CCONfigure

## Cell CONfiguration commands.

   :ABCCh?
   :ABCCh                                  'OFF' | 'ADJACENT'
##  Selects/queries the Auxiliary BCCH.
##    This defines the state of the auxiliary BCCH data and clock outputs.
##      OFF means the auxiliary BCCH is deactivated.
##      ADJACENT means the auxiliary BCCH outputs are intended to be used
##        to generate an adjacent cell BCCH (using an external 0.3 GMSK
##        RF Generator).

      :BCC?
##      Queries the Auxiliary Base station Color Code.
##        This is always the same as CCON:SCEL:BCC? plus one modulo four.

   :CCHannel?
   :CCHannel                               'SD/4' | 'SD/8' | 'FA' | 'SD/4+FA'
##  Selects/queries the type of Control CHannel to be used.
##    SD/4 means the SDCCH shares the same physical channel as the BCCH.
##    SD/8 means the SDCCH is separate from the BCCH and is on a physical
##      channel specified by the user.
##    FA is the same as SD/8, except the TCH1 configuration is used in
##      'signaling only' mode instead of using the SDCCH channel.
##    SD/4 + FA is the same as SD/4, except the TCH1 configuration is
##      used in 'signaling only' mode instead of using the SDCCH channel.

      :SDCCh8

         :ARFCn?
         :ARFCn                            <value> | [INUM]
##        Sets/queries the Control CHannel ARFCN (Absolute Radio Frequency
##          Channel Number) for the SDCCH/8.
##          This is used only when CCON:CCH is 'SD/8'.

         :TSLot?
         :TSLot                            <value> | [INUM]
##        Sets/queries the Time SLot for the SDCCH/8.
##          This is used only when CCON:CCH is 'SD/8'.
```


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```
   :DCS1800
##  DCS1800 Radio Type commands.
##  These are only valid for CONFigure:RADio 'DCS1800'.

      :BA<n>?
      :BA<n>                              0 | 512-885
##     Where <n> = 1 to 16
##      Sets/queries the Broadcast control channel Allocation.
##      Entries in BA table must be in contiguous ascending order.
##      The allocation must begin at BA1 and continue through BA<m>.
##      Zeros (0) are used to fill unallocated entries.
##      Where <m> = the highest number allocated in the range 1 to 16.

      :CA<n>?
      :CA<n>                              0 | 512-885
##     Where <n> = 1 to 16
##      Sets/queries the Cell Allocation.
##      Entries in CA table must be in contiguous ascending order.
##      The allocation must begin at CA1 and continue through CA<m>.
##      Zeros (0) are used to fill unallocated entries.
##      Where <m> = the highest number allocated in the range 1 to 16.


      :MA1?
      :MA1                                <quoted string>
##     Sets/queries the Mobile Allocation 1.
##      This is a binary string representing which CA ARFCNs will be in Mobile
##      Allocation number 1. This defines which of the first 16 entries in
##      the CA will be part of the sequential hop sequence for MA1.
##      NOTE: all 16 entries must be input.

         :IOFFset?
         :IOFFset                         <value> | [INUM]
##        Sets/queries the Mobile Allocation 1 Index OFFset.
##          This defines where the hop sequence starts for MA1.

      :MA2?
      :MA2                                <quoted string>
##     Sets/queries the Mobile Allocation 2.
##       This is a binary string representing which CA ARFCNs will be in Mobile
##       Allocation number 2. This defines which of the first 16 entries in
##       the CA will be part of the sequential hop sequence for MA2.
##       NOTE: all 16 entries must be input.

         :IOFFset?
         :IOFFset                         <value> | [INUM]
##        Sets/queries the Mobile Allocation 2 Index OFFset.
##          This defines where the hop sequence starts for MA2.
```


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```
  [:GSM900]
##  GSM900 Radio Type commands.
##  These are only valid for CONFigure:RADio 'GSM900'.

     :BA?
     :BA                                    <quoted string>
##    Sets/queries the Broadcast control channel Allocation.
##      This is binary string representing which ARFCNs are in the
##      BCCH Allocation.  A '1' in the first entry represents the
##      existence of ARFCN 1.  NOTE: all 124 entries must be input.

     :CA?
     :CA                                    <quoted string>
##    Sets/queries the Cell Allocation.
##      This is binary string representing which ARFCNs are in the Cell
##      Allocation.  A '1' in the first entry represents the existence of
##      ARFCN 1.  NOTE: all 124 entries must be input.

     :MA1?
     :MA1                                   <quoted string>
##    Sets/queries the Mobile Allocation 1.
##      This is binary string representing which CA ARFCNs will be in
##      Mobile Allocation number 1.  This defines which of the first 64
##      entries of 1's in the CA will be part of the sequential hop sequence
##      for MA1.  NOTE: all 64 entries must be input.

        :IOFFset?
        :IOFFset                            <value> | [INUM]
##       Sets/queries the Mobile Allocation 1 Index OFFset.
##         This defines where the hop sequence starts for MA1.

     :MA2?
     :MA2                                   <quoted string>
##    Sets/queries the Mobile Allocation 2.
##      This is binary string representing which CA ARFCNs will be in
##      Mobile Allocation number 2.  This defines which of the first 64
##      entries of 1's in the CA will be part of the sequential hop sequence
##      for MA2.  NOTE: all 64 entries must be input.

        :IOFFset?
        :IOFFset                            <value> | [INUM]
##       Sets/queries the Mobile Allocation 2 Index OFFset.
##         This defines where the hop sequence starts for MA2.
```


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```
   :LAI
##  Location Area Identification commands.

       :MCCode?
       :MCCode                          <value> | [INUM]
##      Sets/queries the Mobile Country Code (3 decimal digits).


       :MNCode?
       :MNCode                          <value> | [INUM]
##      Sets/queries the Mobile Network Code (2 decimal digits).

       :LACode?
       :LACode                          <value> | [INUM]
##      Sets/queries the Location Area Code.

   :SCELl
##  Serving CELl commands.

       :ARFCn?
       :ARFCn                           <value> | [INUM]
##      Sets/queries the Serving CELl ARFCN (Absolute Radio
##        Frequency Channel Number).

       :BCC?
       :BCC                             <value> | [INUM]
##      Sets/queries the Serving CELl Base station Color Code.

       :NCC?
       :NCC                             <value> | [INUM]
##      Sets/queries the Serving CELl Network Color Code.


   :STATe?
   :STATe                               'SETTABLE' | 'ACTIVATED'
##  Selects/queries the Cell CONfiguration STATe.
##    SETTABLE means that all CCON settings can be changed and that
##      the signaling state will be "None".  An active call will be
##      automatically terminated in this state.
##    ACTIVATED means that all CCON settings are "frozen" and the signaling
##      state will be at least "BCCH".  This state will not be allowed if the
##      settings on the CCON (Cell Config) screen are not compatible.
##      The instrument must also be in demodulation mode (on the Cell Config
##      screen or on the Dig Demod screen).
```


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Cell Control Subsystem

```
CELL

## CELL control commands.

   :AUDio
##  AUDio control commands.

       :DAI
##      Digital Audio Interface commands.

          :ATESt
##         This selects the DAI (Digital Audio Interface) Audio TESt mode.

          :NORMal
##         This selects the DAI (Digital Audio Interface) NORMal mode.

       :LOOPback
##      AUDio control LOOPback commands.

          :FE
##         Turns MS LOOPback on with Frame Erasure.

          :OFF
##         Turns MS LOOPback OFF.

          :NOFE
##         Turns MS LOOPback on with NO Frame Erasure.
```


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```
        :SPEech
            :CONFigure?
            :CONFigure                      'NONE' | 'UNCOND' |
                                            'COND' | 'ECHO' | 'PRBS'
##           Selects/queries the SPEech CONFiguration.
##             Note: this has couplings with DC AM.
##             NONE means that speech (hardware) is deactivated.
##             UNCOND means that speech will be unconditioned (i.e.,
##               not amplifiable).
##             COND means that speech will be conditioned (i.e., amplifiable).
##             ECHO means that speech (hardware) will be put into an "echo"
##               mode, where we will echo back to the MS whatever we
##               received, with a settable echo delay (time).
##             PRBS means that speech (hardware) is outputting a pseudo random
##               binary sequence.

            :EDELay?
            :EDELay                         <(value) [units]> | [FNUM]
##           Sets/queries the SPEech Echo DELay.
##             This is the delay time for the ECHO SPEech mode.  This only
##             applies when CELL:AUD:SPE:CONF is ECHO.
##             Default HP-IB and display unit is seconds (S).

            :GAIN?
            :GAIN                           <value> | [INUM]
##           Sets/queries the SPEech GAIN (unitless).
##             This is the SPEech GAIN for the CONDitioned SPEech mode.
##             This only applies when CELL:AUD:SPE:CONF is CONDitioned.

            :PRBS
                :PATTern?
                :PATTern            'CCITT-15' | 'CCITT-23' |
                                    '0' | '1' | '01' | '10'
##               Sets/queries the SPEech PRBS PATTern.
##                 This is the PATTern for the PRBS SPEech.
##                 This only applies when CELL:AUD:SPE:CONF is PRBS.
```


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```
    :CALL
##   CALL control commands.

        :CONNect?
        :CONNect                              'AUTO' | 'MANUAL'
##       Selects/queries the CONNect (mode).
##         AUTO means that we will automatically attempt to connect to
##           an MS-initiated call.
##         MANUAL means that you must use CELL:CALL:RECeive to receive
##           an MS-initiated call.

        :COUNt
##       CALL COUNt commands.

            :BSYNc?
##           COUNt of Bad SYNcs detected during this call or since COUNt:RESet.
##             Note: it is normal to detect Bad SYNcs during call setup.
            :DERRor?
##           COUNt of Decoding ERRors detected during this call or since
##             COUNt:RESet.  Note: it is normal to detect Decode ERRors
##             during call setup.

            :PAGE?
##           COUNt of PAGEs made during this call or since COUNt:RESet.

            :RACH?
##           COUNt of RACHs received during this call or since COUNt:RESet.

            :RESet
##           RESets all CALL COUNts to zero.

        :END
##       Executes an END (i.e., terminate) CALL.
##         This terminates a call in progress and is the same as selecting
##           the END CALL front panel hardkey.
```


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```
        :LIMit?
        :LIMit                              'BCCH' | 'DCCH' | 'TCH'
##       Selects/queries the CALL control LIMit.
##         This affects how far a call will be allowed to get, which is
##         useful when making measurements on transient states while
##         setting up a call.

        :ORIGinate
##       Executes an ORIGinate (i.e., make) a CALL.
##         This attempts a BS originated (MS terminated) call and is the same
##           as selecting the ORG CALL front-panel hardkey.

        :PAGing?
        :PAGing                             'CONT' | 'SINGLE'
##       Selects/queries the PAGing mode.
##         CONT means continuous pages will occur when attempting to make
##           a BS-originated call.
##         SINGLE means that just one page will occur when attempting to make
##           a BS-originated call.

        :RECeive
##       Executes RECeive (i.e., connect to) a CALL.
##         This connects the call ('answers the phone') and is the same as
##           selecting the RCV CALL front-panel hardkey.

        :SIGNaling?
        :SIGNaling                'NORMAL' | 'LIMITED'
##       Selects/queries the amount of SIGNaling that the HP8922G will
##         perform.
##         NORMAL signaling mode uses all the normal GSM messages to
##           change the channel configuration.
##         LIMITED specifies that the HP 8922G should perform an operation
##           with a limited amount of signaling.  The user can therefore
##           achieve the 'force TCH' capability by merely pressing the
##           ORG CALL front-panel hardkey.
```


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```
        :STATus
##       CALL STATus commands.

            :CALLer?
##             Returns 'BS', 'MS', or '--'.  Indicates who originated the call
##             in progress.  '--' indicates that the Call STatus is inactive.

            :CIPHering
            [:STATe]?
##               Queries the CIPHering STATe as 'On' or 'Off'.

            :MM
               [:STATe]?
##               Queries the Mobility Management (layer) STATe.
##                 Indicates the 'LOC UPD' | 'IDENT' | 'AUTH' |
##                 'TMSI' | 'INACTIVE' | 'ACTIVE' state of the Mobility
##                 Management protocol layer.
##                 INACTIVE means there are no MM-connections between the
##                   HP 8922G and the MS.
##                 IDENT means the MM sub-layer has initiated the Identification
##                   common procedure and is waiting for the MS to respond.
##                 AUTH means the MM sub-layer has initiated the Authentication
##                   common procedure and is waiting for the MS to respond.
##                 TMSI means the MM sub-layer has initiated the TMSI reallocation

##                   common procedure and is waiting for the MS to respond.
##                 LOC UPD means the MM sub-layer has received a Location
##                   Update Request from the MS.
##                 ACTIVE means an MM-connection exists between the 8922G and
##                   the MS, and may be used to transfer CC messages..

            :RR | :SIGNaling
               [:STATe]?
##               Queries the Radio Resource STATe.
##                 Indicates the 'BCCH' | 'DCCH' | 'TCH1' | 'TCH2' | 'NONE'
##                 state of signaling.
##                   BCCH means idle on a Broadcast Control CHannel.
##                   DCCH means on a Dedicated Control CHannel.
##                   TCH1 means on a Traffic CHannel as defined by TCH1 settings.
##                   TCH2 means on a Traffic CHannel as defined by TCH2 settings.
##                   NONE means that the signaling state is totally undefined
##                     (probably not even putting out a BCCH).
```


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```
            :STATe?
##           Queries the CALL STatus STATe.
##             Indicates the 'SETUP REQUEST' | 'PROCEEDING' | 'ALERTING' |
##             'SETUP CONFIRM' | 'CONNECTED' | 'INACTIVE' state of the call
##             in progress.

            :TCH
##           Traffic CHannel CALL STATus commands.

              :ARFCn?
##             Queries the current Traffic CHannel ARFCN (Absolute Radio
##               Frequency Channel Number).  This applies if TCH:MODE is 'SINGLE'.


              :MALLocation?
##             Queries the current Traffic CHannel Mobile ALLocation as 'MA1'
##               or 'MA2'.  This applies if TCH:MODE is 'HOPPED'.

              :MODE?
##             Queries the Traffic CHannel MODE as 'HOPPED' or 'SINGLE'.
##               HOPPED means that the current Traffic CHannel is a hopped
##                 traffic channel.
##               SINGLE means that the current Traffic CHannel is a
##                 non-hopped traffic channel (i.e., a single ARFCN).

              :TSLot?
##             Queries the current Traffic CHannel Time SLot.

              :TYPE?
##             Queries the current Traffic CHannel TYPE.
```


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```
        :TCHControl?
        :TCHControl                          'TCH1 HO' | 'TCH2 HO' |
                                             'TCH1 ASGN' | 'TCH2 ASGN'
##       Sets/queries the TCH Control selection.
##         TCH1 HO means upon execution, cause an intracell HandOver to TCH1
##           based on the CELL:TCH1 selections.
##         TCH2 HO means upon execution, cause an intracell HandOver to TCH2.
##           based on the CELL:TCH2 selections.
##         TCH1 ASGN means upon execution, do a traffic channel assignment
##           based on the CELL:TCH1 selections.
##         TCH2 ASGN means upon execution, do a traffic channel assignment
##           based on the CELL:TCH2 selections.

            :EXECute
##           Executes the TCH Control selection.


    :MS
##   Mobile Station commands.

        :DRX
           [:STATe]?
           [:STATe]                          'ON' | 'OFF
##           Selects/queries the Discontinuous RX (receiver) STATe.

        :DTX
           [:STATe]?
           [:STATe]                          'ON' | 'OFF
##           Selects/queries the Discontinuous TX (transmission) STATe.


        :TADVance?
        :TADVance                            <value> | [INUM]
##       Sets/queries the MS's Timing ADVance (setting) 0 to 63.

            :MODE?
            :MODE                            'AUTO' | 'MANUAL'
##           Selects/queries the MS's Timing ADVance (setting) MODE.
##             AUTO means we will automatically adjust the MS's timing
##               advance setting in real time to keep bit zero aligned.
##             MANUAL means the TADVance setting will directly set the
##               MS's timing advance setting.

        :TLEVel?
        :TLEVel                              <value> | [INUM]
##       Sets/queries the MS's TX (transmitter) (power) LEVel.
```


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```
   :TCH1
##  Traffic CHannel 1 commands.

       :ARFCn?
       :ARFCn                              <value> | [INUM]
##      Sets/queries the Traffic CHannel 1 ARFCN (Absolute Radio
##        Frequency Channel Number).
##        This only applies if CELL:TCH1:MODE is SINGLE.

       :MALLocation?
       :MALLocation                        'MA1' | 'MA2'
##      Selects/queries the Traffic CHannel 1 Mobile ALLocation.
##        This only applies if CELL:TCH1:MODE is HOPPED.

       :MODE?
       :MODE                               'HOPPED' | 'SINGLE'
##      Selects/queries the Traffic CHannel 1 MODE.
##        HOPPED means that TCH1 will be hopped traffic channel.
##        SINGLE means that TCH1 will be a non-hopped traffic channel
##          (i.e., a single ARFCN).

       :TSLot?
       :TSLot                              <value> | [INUM]
##      Sets/queries the Traffic CHannel 1 Time SLot (2 - 6 valid).

       :TYPE?
       :TYPE                               'FS'
##      Selects/queries the Traffic CHannel 1 TYPE.
```


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```
   :TCH2
##  Traffic CHannel 2 commands.

       :ARFCn?
       :ARFCn                              <value> | [INUM]
##      Sets/queries the Traffic CHannel 2 ARFCN (Absolute Radio
##        Frequency Channel Number).
##        This only applies if CELL:TCH2:MODE is SINGLE.

       :MALLocation?
       :MALLocation                        'MA1' | 'MA2'
##      Selects/queries the Traffic CHannel 2 Mobile ALLocation.
##        This only applies if CELL:TCH2:MODE is HOPPED.

       :MODE?
       :MODE                               'HOPPED' | 'SINGLE'
##      Selects/queries the Traffic CHannel 2 MODE.
##        HOPPED means that TCH2 will be hopped traffic channel.
##        SINGLE means that TCH2 will be a non-hopped traffic channel
##          (i.e., a single ARFCN).

       :TSLot?
       :TSLot                              <value> | [INUM]
##      Sets/queries the Traffic CHannel 2 Time SLot (2 - 6 valid).

       :TYPE?
       :TYPE                               'FS'
##      Selects/queries the Traffic CHannel 2 TYPE.
```


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Configure Subsystem

```
CONFigure

## CONFigure subsystem setting commands.

   :BADDress?
   :BADDress                                  <value> | [INUM]
##  Sets/queries the HP-IB Bus ADDress.  The range is 0 to 30.

   :BEEPer?
   :BEEPer                                    'OFF' | 'QUIET' | 'LOUD'
##  Selects/queries the audio BEEPer volume.

   :BMODe?
   :BMODe                                     'CONTROL' | 'TALK&LSTN'
##  Selects/queries the HP-IB Bus operating MODe.
##    CONTROL is used to control external instruments using the
##      HP 8922A/G.
##    TALK&LSTN is used for "normal" HP-IB operation.

   :DATE?
   :DATE                          <value> | [INUM]
##  Sets/queries the current DATE for the internal clock.

   :INTensity?
   :INTensity                                 <value> | [INUM]
##  Sets/queries the screen INTensity.
##    The range is 1 (very dim) to 8 (bright).
```


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```
   :OFLevel

       :MODE?
       :MODE                                  'ON' | 'OFF'
##      Selects/queries the RF OFfset Level MODE.

       :AUXIn?
       :AUXIn                                 <(value) [units]> | [FNUM]

##      Sets/queries the RF OFfset Level at the AUX RF In port.
##        In affect when OFL:MODE 'ON' is selected.
##        Valid unit is dB.

       :AUXOut?
       :AUXOut                                <(value) [units]> | [FNUM]

##      Sets/queries the RF OFfset Level at the AUX RF Out port.
##        In affect when OFL:MODE 'ON' is selected.
##        Valid unit is dB.

       :RFINout?
       :RFINout                               <(value) [units]> | [FNUM]

##      Sets/queries the RF OFfset Level at the RF IN/out port.
##        In affect when OFL:MODE 'ON' is selected.
##        Valid unit is dB.

   :OPERation

       :AUTO
##      Enables several auto-ranging routines, providing automatic
##        adjustment of the affected settings.
##        Turns the RF Analyzer attenuator hold setting to AUTO.
##          (SANalyzer:ATTenuator:MODE 'AUTO')
##        Turns the AF Analyzer gain cntl to AUTO.
##          (AFANalyzer:RANGing 'AUTO')

       :HOLD
##      Disables several auto-ranging routines, requiring manual
##        adjustment of the affected settings.
##        Turns the RF Analyzer attenuator hold setting to HOLD.
##          (SANalyzer:ATTenuator:MODE 'HOLD')
##        Turns the AF Analyzer gain cntl to HOLD.
##          (AFANalyzer:RANGing 'HOLD')
```


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```
   :PRINt

       :ADDRess?
       :ADDRess                          <value> | [INUM]
##      Sets/queries the HP-IB ADDRess of the PRINter connected
##        to the HP-IB port.

       :DESTination?
       :DESTination                          'SERIAL' | 'HPIB'
##      Selects/queries the PRINter DESTination (port).

       :TITLe?
       :TITLe                            <quoted string>
##      Enters/queries a string to be printed at the top of all
##        screen printouts.

   :RADio?
   :RADio                                    'GSM900' | 'DCS1800'

##  Selects/queries the RADio type mode of operation.

   :RFIMpedance?
   :RFIMpedance                                  '50 OHM' | 'EMF'
##  Selects/queries whether RF voltages should be expressed as the
##    voltage across a 50 OHM load or the open circuit voltage (EMF).
```


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```
   :ROSCillator

      :CALibrate
##     Executes a calibration cycle for the reference.

      [:FREQuency]?
      [:FREQuency]                          '13 MHZ' | '10 MHZ' |
                                            '5 MHZ' | '2 MHZ' | '1 MHZ'
##      Selects/queries the expected external Reference OSCillator
##        FREQuency.  This frequency will be locked to when an external
##        reference is connected.

      :OFFSet?
      :OFFSet                               <(value) [units]> | [FNUM]
##      Sets/queries the Reference OSCillator tuning OFFSet.
##        In affect when ROSC:TUN 'TUNABLE' is selected.
##        Default HP-IB and display unit is PPM.

      :TUNing?
      :TUNing                               'TUNABLE' | 'NORMAL'
##     Selects/queries the Reference OSCillator tuning MODE.
##       TUNABLE means the reference can be tuned by the value given
##         for ROSC:OFFSet.
##       NORMAL means the reference can lock to an external reference
##         selected by :ROSC[:FREQ] or if no external reference is
##         connected then the reference will be free-running.

   :ROUT?
   :ROUT                                    'ON' | 'OFF'
##  Selects/queries the OPT 001 REF OUT that appears on the rear panel.
##    ON means turn on the reference.
##    OFF means turn off the reference (timebase oven still kept warm).
```


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```
   :SPORt
##  Serial PORT commands.

       :BAUD?
       :BAUD                              '300' | '600' | '1200' | '2400' |
                                          '4800' | '9600' | '19200'
##      Selects/queries the BAUD rate for serial communications
##        when using the rear-panel Serial PORt .

       :DATA?
       :DATA                              '7 BITS' | '8 BITS'
##      Selects/queries the DATA length - the number of bits used
##        for each word of serial data when using the Serial PORt.

       :IBECho?
       :IBECho                            'ON' | 'OFF'
##      Selects/queries the Serial PORt RS-232 input IBasic
##        ECHo state as On or Off.  This enable/disable screen
##        and error message echoing from IBASIC.

       :IECHo?
       :IECHo                             'ON' | 'OFF'
##      Selects/queries the Serial PORt RS-232 input Instrument
##        ECHo state as On or Off - enable/disables screen echoing.

       :PARity?
       :PARity                            'NONE' | 'ODD' | 'EVEN' |
                                          'ALWAYS 1' | 'ALWAYS 0'
##      Selects/queries the Serial PORt PARity bits setting.

       :RPACe?
       :RPACe                             'XON/XOFF' | 'NONE'
##      Selects/queries the Serial PORt PACe when Receiving
##        serial data.
##        XON/XOFF lets the instrument 'talk' to the transmitting
##          device to alter the rate of the data being sent.
##        NONE disable the XON/XOFF function.

       :SIN?
       :SIN                               'INST' | 'IBASIC'
##      Selects/queries the Serial PORt RS-232 Serial INput.
##        INST configures the serial port to connect to an external
##          RS-232 terminal or computer.
##        IBASIC is used to allow the IBASIC controller to read the
##          serial port.
```


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```
        :STOP?
        :STOP                                   '1 BIT' | '2 BITS'
##       Selects/queries the STOP length- the number of stop bits used
##         when using the Serial PORt.

        :XPACe?
        :XPACe                                  'XON/XOFF' | 'NONE'
##       Selects/queries the Serial PORt PACe when transmitting (tX)
##         serial data.
##         XON/XOFF lets the receiving device 'talk' to the instrument
##           to alter the rate of the data being sent.
##         NONE disable the XON/XOFF function.

    :TIME?
    :TIME                                       <value> | [INUM]
##   Sets/queries the TIME-of-day for the instrument's clock
##     (given in HH.MM hour format).
```


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CW Subsystem

```
CW

## CW subsystem commands.

   :PMZero
##  Zeroes the Power Meter in order to make calibrated CW
##    Power measurements.  Note: The user should disconnect the
##    input signal when selecting this.  This field is the same as
##    DSP:AMPL:PMZero.
```


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Digital Demod Subsystem

```
DDEMod

## Digital DEMod subsystem setting commands.

   :BURSt
       :TQUalifier<n>?
       :TQUalifier<n>                        'NORMAL' | 'RF POWER'
##      Selects/queries the Trigger QUalifier for burst number n, where
##        <n> = 0 to 3.  Note: this selects the trigger qualifier for both
##        DDEMod:BURSt:TQU<n> and MSYNc:BURSt:TQU<n>.
##        NORMAL means no trigger qualifier.
##        RF POWER means 'automatically rearm for another trigger if RF
##          POWER never came up'.

       :TYPE<n>?
       :TYPE<n>                             'TSC0' | 'TSC1' | 'TSC2' | 'TSC3' |
                                            'TSC4' | 'TSC5' | 'TSC6' | 'TSC7' |
                                            'RACH' | 'SCH'  | 'FCH' | 'USER DEF'
##      Selects/queries the BURSt TYPE for burst number n, where <n> = 0 to 3.
##        Note: this selects the type for both DDEMod:BURSt:TYPE<n> and
##        MSYNc:BURSt:TYPE<n>.
##        Note: Demod cannot be armed if
##              :SYNC:BSELect = '0' and :BURSt:TYPE0 = 'USER DEF'
##           or :SYNC:BSELect = '1' and :BURSt:TYPE1 = 'USER DEF'
##           or :SYNC:BSELect = '2' and :BURSt:TYPE2 = 'USER DEF'
##           or :SYNC:BSELect = '3' and :BURSt:TYPE3 = 'USER DEF'
##           or :SYNC:BSELect = 'EXT' and :BURSt:TYPE0,1,2,or 3 = 'USER DEF'

   :SYNC
       :BSELect?
       :BSELect                             '0' | '1' | '2' | '3' | 'EXT'
##      Selects/queries the Burst SELection to SYNC demod to.
##        0 means always sync to burst number 0.
##        1 means always sync to burst number 1.
##        2 means always sync to burst number 2.
##        3 means always sync to burst number 3.
##        EXT means use external signals to decide which
##          burst number to sync to.

       :SSTatus?
##      Queries the Digital DEMod SYNC STatus.  Will return
##        'NO ERROR', or 'BAD SYNC'. This field will only be updated when the
##        demod arm state goes from "DISARM" to "ARM."
```


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DISPlay Subsystem

```
DISPlay

## DISPlay subsystem setting commands.

   [:SCReen]?
   [:SCReen]                              CONFigure | CWAFanalyzer | DDEMod |
                                          DSPanalyzer | FTCPower | HELP |
                                          HOPControl | MESSages| MSYNc |
                                          ORFSpectrum | OSCilloscope | PULSe |
                                          RFANalyzer | RFGenerator |
                                          SANalyzer | SERVice | TCONfigure |
                                          TESTs | TFReq | TSPec | BETest |
                                          CELL | CCONfigure | LOGGing | MSINfo
##  Selects/queries the screen to activate, display and perform any
##    necessary screen transitioning functionality.

       :BETest
##      Bit Error Test DISPlay commands.

          :MNUMber

              :LEFT?
              :LEFT                       '1' | '3'
##             Selects/queries the Bit Error Test Measurement NUMber to
##               DISPlay on the LEFT side of the screen.

              :RIGHt?
              :RIGHt                      '2' | '4'
##             Selects/queries the Bit Error Test Measurement NUMber to
##               DISPlay on the RIGHt side of the screen.
```


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```
        :CELL
##           CELL Control DISPlay commands.

            :SACCh
##           CELL Cont SACCH DISPlay commands.

               :ACELl?
               :ACELl                    <value> | [INUM]
##              Selects/queries the SACCH Adjacent Cell measurements to DISPlay
##              (1 - 6 valid).

            :TCH
##           Traffic CHannel DISPlay commands.

              [:SELect]?
              [:SELect]                  'TCH1' | 'TCH2'
##              Selects/queries which TCH parameters to display on the Cell
##                Control screen.

        :DSPanalyzer
##       DSP Analyzer SCReen DISPlay commands.

            :AMPLitude

               :MASK?
               :MASK                     'ON' | 'OFF'
##              Selects/queries whether the DSP analyzer AMPLitude MASK should
##                be DISPlayed on the 'AMPL MID', 'AMPL RISE' and 'AMPL FALL'
##                screen VIEWs.

            :VIEW?
            :VIEW                        'PHASEMAIN' | 'PHASE ERR' |
                                         'AMPL MAIN' | 'AMPL MID' |
                                         'AMPL RISE' | 'AMPL FALL' |
                                         'DATA BITS'
##           Selects/queries the VIEW to be selected when DISPlay:SCReen
##             DSPanalyzer is selected.
```


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```
        :MSYNc
##       Measurement SYNc SCReen DISPlay commands.

            :BURSt

                :NUMBer?
                :NUMBer                    <value> | [INUM]
##               Sets/queries the MSYNc BURSt NUMBer to be displayed when the
##                 MEAS SYNC screen is displayed.

        :ORFSpectrum
##       Output RF Spectrum SCReen DISPlay commands.

            :VIEW?
            :VIEW                          'MAIN' | 'TRACE'
##           Selects/queries the Output RF Spectrum VIEW to be selected when
##             DISPlay:SCReen ORFSpectrum is selected.

        :PULSe
##        DSP Analyzer PULSe On/Off SCReen DISPlay commands.

            :VIEW?
            :VIEW                          'MAIN' | 'FALL' | 'RISE'
##           Selects/queries the PULSe On/Off VIEW to be selected when
##             DISPlay:SCReen PULSe is selected.

        :SANalyzer

            :CONTrol?
            :CONTrol                       'MAIN' | 'RF GEN' |
                                           'MARKER' | 'AUXILIARY'
##           CONTrols the Spectrum ANalyzer views - various fields will appear
##             on the trace screen based on the CONTrol selection.
```


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DSP Analyzer Subsystem

```
DSPanalyzer

## DSP analyzer subsystem setting commands.

   :AMPLitude

       :MARKer
##      AMPLitude MARKer functions.
            :POSition

                :FALL?
                :FALL                       <value> | [INUM]
##               Sets/queries the  AMPLitude MARKer FALL trace position setting.
##                 The value is given in units of divisions from the
##                 left side of the FALL trace
##                 (144 Bit Periods (T) to 156 Bit Periods (T) = 6 divisions).

                :MID?
                :MID                        <value> | [INUM]
##               Sets/queries the  AMPLitude MARKer MID trace position setting.
##                 The value is given in units of divisions from the
##                 left side of the MID trace
##                 (-10 Bit Periods (T) to 160 Bit Periods (T) = 8.5 divisions).

                :RISE?
                :RISE                       <value> | [INUM]
##               Sets/queries the  AMPLitude MARKer RISE trace position setting.
##                 The value is given in units of divisions from the
##                 left side of the RISE trace
##                 (-8 Bit Periods (T) to 4 Bit Periods (T) = 6 divisions).
```


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```
        :PMZero
##       Zeroes the Power Meter in order to make calibrated Average TX
##         Power measurements.  Note: The user should disconnect the input
##         signal when selecting this. This field is the same as CW:PMZero.

        :TIME<n>?
        :TIME<n>                              <(value) [units]> | [FNUM]
##       Sets/queries the TIME<n=1..12> to make amplitude measurements.
##         HP-IB units are seconds (S), bit periods (T).
##           Default HP-IB unit is seconds (S).
##           Default display unit is micro-seconds (US).

    :DBITs
##   Data BITs commands.

        :TPOLarity
##       TOggle the POLarity of the Data BITs for the current measurement.

    :PHASe

        :MARKer
##       PHASe MARKer functions.

            :POSition?
            :POSition                         <value> | [INUM]
##           Sets/queries the PHASe MARKer POSition setting.
##             The value is given in units of divisions from the
##             left side of the trace (0 to 14.7 divisions).

        :MIDamble?
        :MIDamble                             'MEASURED' | 'EXPECTED'
##       Selects/queries the MIDamble to use for DSP analyzer phase displays
##         as the actual measured midamble or the midamble that the user
##         expects to use.
```


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Electrical Man-Machine Interface Subsystem

```
EMMI

   :BRATe?
   :BRATe    "600" | "1200" | "2400" | "4800" | "9600"
##  Selects/queries EMMI port Baud RATe.

   :DATA?
##  Returns a response message sent by the mobile station.  Response messages
##    are stored in a message in a message buffer in the HP 8922.
##    This EMMI DATA is in the form:
##
##    num-decimal-digits num-data-chars  emmi-hex-data  (no spaces)
##
##    num-decimal-digits: (range: 1..3) The number of characters following
##                        to be interpreted as num-data-chars.
##
##    num-data-chars:     (range: 0..510) The number of data characters
##                        that will follow.  NOTE: This must be an even
##                        number since every two characters will
##                        represent one byte of hex data.
##
##    emmi-hex-data:      Hex character data.  Each pair of characters
##                        represents one byte of EMMI hex data.
##
##      eg. #2161234567890abcdef
##          -  ----------------
##          |--       |
##          | |       emmi-hex-data = 12 34 56 78 90 ab cd ef
##          | |
##          | num-data-chars = 16
##          |
##          num-decimal-digits = 2
##
##      Note: #10 is interpreted as no EMMI data (num-data-chars = 0).
##
##   The user can do the following:
##     a) Read all the messages in the message buffer by sending EMMI:DATA?
##     commands until #10 is returned. (Messages are read first-in-first-out.)
##     b) Clear the message buffer by sending EMMI:RESet.
```


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```
   :DATA     <data entry>
##  Writes the DATA to the EMMI port using the form:

      # num-decimal-digits num-data-chars  emmi-hex-data  (no spaces)
##
##    num-decimal-digits: (range: 1..3) The number of characters following
##                        to be interpreted as num-data-chars.
##
##    num-data-chars:     (range: 0..510) The number of data characters
##                        that will follow.  NOTE: This must be an even
##                        number since every two characters will
##                        represent one byte of hex data.
##
##    emmi-hex-data:      Hex character data.  Each pair of characters
##                        represents one byte of EMMI hex data.
##
##      eg. #2161234567890abcdef
##          -  ----------------
##          |--       |
##          | |       emmi-hex-data = 12 34 56 78 90 ab cd ef
##          | |
##          | num-data-chars = 16
##          |
##          num-decimal-digits = 2
##
##    When the data write is complete, a status bit will be set that
##    reflects what happened with the EMMI data.  See the Status Subsystem
##    for EMMI.
```


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```
   :RESet
##  EMMI RESet clears out transmit and receive (message) buffers and
##    sends XON (ready to receive) frame to the mobile station.

   :TIMEout
       :MS
           :XON?
           :XON                    <(value) [units]> | [FNUM]
##          Sets/queries the EMMI TIMEout (time limit) allowed for the mobile
##            to send XON.  This adjusts a timer that provides the time delay
##            needed when the EMMI bus is attempting to send a message before
##            the MS or the HP 8922G are ready.  If the XON timeout expires,
##            then the STATus:EMMI:EVENt? will return a 4 (XON timeout exceeded).
##            Default HP-IB and display unit is seconds (S).

           :RESPonse?
           :RESPonse               <(value) [units]> | [FNUM]
##          Sets/queries the EMMI TIMEout (time limit) allowed for the mobile
##            stations' RESPonse (ie. to send an ACK or NAK to the HP 8922G).
##            If the response timeout expires, then the STATus:EMMI:EVENt? will
##            return an 8 (response timeout exceeded).
##            Default HP-IB and display unit is seconds (S).
```


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Hop Control Subsystem

```
HOPControl

## HOP Controller subsystem setting commands.

   :ADDRess?
   :ADDRess                                  <value> | [INUM]
##  Sets/queries the ADDRess for entering hop frequencies into the hop
##    tables and for entering the next frequency for HOPC:ADDR:SOUR:INT mode.

       :NEXT?
       :NEXT                                 <value> | [INUM]
##      Sets/queries the NEXT HOP ADDRess to hop to.  This is used when
##        HOPC:ADDR:SOUR is 'INT' to make looped internal sequences.

       :RESet
##      RESets the internal sequence hop address register to zero.

       :SOURce?
       :SOURce                               'SEQ' | 'EXT'
##      Selects/queries the HOP Control ADDRess SOURce.
##        SEQ hopping mode causes the hop control address to come
##          from a hop sequence address register.  Hop addresses
##          are automatically sequenced based on next settings.
##        EXT hopping mode causes the hop control address to come
##          from external lines.
```


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```
   :CTENd
##  This Clear To ENd command replaces the RF ANalyzer hop frequency entry
##    and the RF Generator hop frequency entry at HOPC:ADDRess, and all
##    hop frequency entries after them, with 0 MHz.
##    I.e., the hop frequency entry at HOPC:ADDRess, HOPC:ADDRess + 1, ...
##    up to entry 2047 are replaced with 0 MHz.
##    HOPC:ADDR:NEXT values are set to ADDRess+1 modulo 2048 starting at
##    ADDRess.

   :DELete
##  This DELetes the RF ANalyzer hop frequency entry and the RF Generator
##    hop frequency entry at HOPC:ADDRess. All other RF ANalyzer
##    and RF Generator hop frequency entries move down by one address.
##    Entry 2047 in the hop table is replaced with 0 MHz.

   :INSert
##  This INSerts an entry of 0 MHz into the RF ANalyzer hop table and the
##    RF Generator hop table.  All other entries move down one address.
##    Entry 2047 in the RF ANalyzer hop table and the RF Generator
##    hop table is lost (forever!).

   :RFANalyzer

      :CTENd
##     This Clear To ENd command replaces the RF ANalyzer hop frequency entry
##       at HOPC:ADDRess, and all hop frequency entries after it, with 0 MHz.
##       I.e., the hop frequency entry at HOPC:ADDRess, HOPC:ADDRess + 1, ...
##       up to entry 2047 are replaced with 0 MHz.

      :DELete
##     This DELetes the RF ANalyzer hop frequency entry at HOPC:ADDRess.
##       All other RF ANalyzer hop frequency entries move down by one
##       address.  Entry 2047 in the hop table is replaced with 0 MHz.
```


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```
        :FREQuency?
        :FREQuency                          <(value) [units]> | [FNUM]
##       Set/queries the RF ANalyzer hop FREQuency entry at HOPC:ADDRess.
##         Default HP-IB unit is HZ.
##         Default display unit is MHZ.

        :INSert
##       This INSerts an entry of 0 MHz into the RF ANalyzer hop table.  All
##         other entries move down one address.  The last entry in the
##         RF ANalyzer hop table is lost (forever!).

        :MODE?
        :MODE                               'NON-HOP' | 'HOP'
##       Selects/queries the RF ANalyzer hop MODE.

        :SETTling?
        :SETTling                           'NORMAL' | 'LARGEHOPS'
##       Selects/queries the RF ANalyzer hop SETTling.
##          NORMAL should be used for small hops.
##          LARGEHOPS should be used for large hops (~ >75 MHz).

      [:TRIGger]
          :ASTate?
          :ASTate                           'ARM' | 'DISARM'
##         Selects/queries the RF ANalyzer hop TRIGger Arm STate.

   :RFGenerator

        :CTENd
##       This Clear To ENd command replaces the RF Generator hop frequency entry
##         at HOPC:ADDRess, and all hop frequency entries after it, with 0 MHz.
##         I.e., the hop frequency entry at HOPC:ADDRess, HOPC:ADDRess + 1, ...
##         up to entry 2047 are replaced with 0 MHz.
```


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```
        :DELete
##       This DELetes the RF Generator hop frequency entry at HOPC:ADDRess.
##         All other RF Generator hop frequency entries move down by one
##         address.  Entry 2047 in the hop table is replaced with 0 MHz.

        :FREQuency?
        :FREQuency                          <(value) [units]> | [FNUM]
##       Sets/queries the RF Generator hop FREQuency entry at HOPC:ADDRess.
##         Default HP-IB unit is HZ.
##         Default display unit is MHZ.

        :INSert
##       This INSerts an entry of 0 MHz into the RF Generator hop table.  All
##         other entries move down one address.  Entry 2047 in the
##         RF Generator hop table is lost (forever!).

        :MODE?
        :MODE                               'NON-HOP' | 'HOP'
##       Selects/queries the RF Generator hop MODE.

        :SETTling?
        :SETTling                           'NORMAL' | 'LARGEHOPS'
##       Selects/queries the RF Generator hop SETTling.
##          NORMAL should be used for small hops.
##          LARGEHOPS should be used for large hops (~ >75 MHz).

      [:TRIGger]
          :ASTate?
          :ASTate                           'ARM' | 'DISARM'
##         Selects/queries the RF Generator hop TRIGger Arm STate.
```


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IEEE 488.2 Common Commands

```
   *CLS
##  CLears Status data structures - clears all event registers
##    summarized in the status byte.

   *ESE?
   *ESE                                    <value> | [INUM]
##  Sets/queries the Standard Event Status Enable Register.

   *ESR?
##  Queries the Standard Event Status Register.

   *IDN?
##  Returns the identification string which is the following fields
##  separated by commas.
##  Field 1: Manufacturer  - Hewlett-Packard
##  Field 2: Model Number  - 8922G
##  Field 3: Serial Number - 0 if unavailable
##  Field 4: Firmware Version Number - 0 if unavailable

   *OPC
##  Sets the 'Operation Complete' event-bit in the Event Status Register
##    when all pending device operations have been finished.

   *OPC?
##  The Operation Complete query places a '1' in the Output Queue when
##    all pending operations are completed.
##    Note: this function is only valid while measurements are running.
```


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```
   *OPT?
##  Returns an Option string for all options that are installed,
##    and returns a "0" for any options that are not installed
##    (these return values are separated by commas). Available
##    options are "CIPHERING" and "HP83220A" -- DCS1800 Test Set.
##    If all the given options are installed, *OPT? would return:
##    "CIPHERING,HP83220A".
##    If none of the given options are installed, *OPT? would return:
##    "0,0".

   *RCL                                    <value> | [INUM]
##  ReCaLls the state of the device from a memory register associated
##    with the received integer parameter.
##    IMPORTANT: the following fields do not participate in Save/Recall,
##               and will be set to the settings given when *RCL is executed:
##   Cell Config - Settable| Activated : SETTABLE
##        CCON:STAT 'SETTABLE'
##   Dig Demod Arm State - Arm | Disarm : DISARM
##        TRIG:DDEM:AST 'DISARM'
##   Meas Arm State - Arm | Disarm : DISARM
##        TRIG:AST 'DISARM'
##   Meas Sync - Single | Cont : SINGLE
##        TRIG:MODE:DSP 'SINGLE'
##   Bit Error Test - Run | Stop : STOP
##        TRIG:BET:MODE 'STOP'
##   Bit Error Test MS Loopback Loop Delay mode - Manual | Auto : Manual
##        BET:LOOP:LDEL:MODE 'AUTO'
##   Hop Control RF Generator - Arm | Disarm : DISARM
##        HOPC:RFG:TRIG:AST 'DISARM'
##   Hop Control RF Analyzer  - Arm | Disarm : DISARM
##        HOPC:RFAN:TRIG:AST 'DISARM'
##   Hop Control RF Generator - Non-Hop | Hop : NON-HOP
##        HOPC:RFG:MODE 'NON-HOP'
##   Hop Control RF Analyzer  - Non-Hop | Hop : NON-HOP
##        HOPC:RFG:MODE 'NON-HOP'
##   None of the CONFigure commands except :RADio, :ROSCillator:OFFSet,
##     ROSCillator:TUNing, and :PRINt:TITLe participate in Save/Recall,
##     and will instead remain at their last setting.
```


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```
   *RST
##  Causes the HP 8922G to do an instrument preset.  Sets operating
##    parameters to a known state.  It does not affect the status reporting
##    information, nor does it clear the error or message queue.

   *SAV                                    <value> | [INUM]
##  SAVe the current state of the device in a memory register associated
##    with the integer parameter.  (See *RCL for the fields that do not
##    participate in Save/Recall.

   *SRE?
   *SRE                                    <value> | [INUM]
##  Sets/queries the Service Request Enable Register.

   *STB?
##  Queries the HP-IB Status Byte.

   *TST?
##  Self-test query.  Returns a 0 unless the self-test was not completed or
##    was completed with errors detected.

   *WAI
##  The Wait-to-Continue command prevents the instrument from executing
##    any further commands or queries until there are no more operations
##    pending (HP-IB buffer empty).
##    Note: this function is only valid while measurements are running.
```


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LOGGing Subsystem

```
LOGGing

## LOGGing subsystem commands.

   :DATA

       :FLUSh
##      FLUSh the LOGGing DATA - empties the contents of the log into
##        an output stream to the external monitoring device.
##        Note, the data will not be cleared.

       :CLEar
##      CLEars the LOGGing DATA.

   :PFILter?
   :PFILter                    'NETWKONLY' | '+DATALINK' |  '+SERVICE'

##  Selects/queries the Pass FILter used when data is logged.
##    NETWKONLY means log peer-to-peer messages between the
##      network layers.
##    +DATALINK means NETWKONLY plus log peer-to-peer messages between the
##      between the data link layers.
##    +SERVICE means NETWKONLY plus DATALINK plus log inter-layer messages
##      and intra-layer service request and response messages.

   :STATe?
   :STATe                 'LOG' | 'PAUSE'
##  Selects/queries the current LOGGing STATe.
##    LOG indicates that data is being logged.
##    PAUSE indicates that data is temporarily not being logged.
```


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Measure Subsystem

```
MEASure

## Measure subsystem commands.
##    Measure commands are used to control measurements and get back the
##    value of the displayed measurement.  To get a valid measurement, the
##    instrument must first be set up to access the desired measurement.
##    In most cases, this means that you must be on the screen (or set of
##    screens) associated with the measurement.  For example, to retrieve Output
##    RF Spectrum measurement results, you must be on the Output RF Spectrum
##    'Main' screen or 'Trace' screen.  (See the DISPlay subsystem commands.)
##    The Trigger commands are then used to cause a measurement to occur.
##    Once a measurement result is available it may be queried.
```


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Audio Frequency Commands (Measure Subsystem)

```
    :AFRequency
##  Audio FRequency MEASurements.

        :ACLevel
            [MM] | [AVG] | [MET]
##       Sets/queries AC Level MEASurement attributes.
##         HP-IB unit is V.
##         Display units are dBm, V, mV, µV, dBµV, W;
##           default unit is V.

        :ACLevel?
##       Queries the AC Level MEASurement result for AF Analyzer inputs
##         (AFAN:INP) that are in units of AC level.

        :AM
            [MM] | [AVG] | [MET]
##       Sets/queries AM Depth MEASurement attributes.
##           HP-IB unit is % (PCT).
##           Display unit is % (PCT).

        :AM?
##       Queries the AM Depth MEASurement result for AF Analyzer inputs
##         (AFAN:INP) that are in units of percent.

        :DCAM
            [MM] | [AVG] | [MET]
##       Sets/queries DC AM Level MEASurement attributes.
##         HP-IB unit is % (PCT).
##         Display unit is % (PCT).
```


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```
        :DCAM?
##       Queries the DC Level MEASurement result for AF Analyzer inputs
##         (AFAN:INP) that are in units of percent.

        :DCFM
            [MM] | [AVG] | [MET]
##       Sets/queries DC FM Level MEASurement attributes.
##         HP-IB unit is HZ.
##         Display units are kHZ, HZ;
##           default unit is HZ.

        :DCFM?
##       Queries the DC Level MEASurement result for AF Analyzer inputs
##         (AFAN:INP) that are in units of Hertz.

        :DCVolts
            [MM] | [AVG] | [MET]
##       Sets/queries DC Volts MEASurement attributes.
##         HP-IB unit is V.
##         Display units are dBm, V, mV, µV, dBµV, W;
##           default unit is V.

        :DCVolts?
##       Queries the DC Level MEASurement result for AF Analyzer inputs
##         (AFAN:INP) that are in units of DC Volts.

        :DISTortion
            [MM] | [AVG] | [MET]
##       Sets/queries DISTortion MEASurement attributes.
##         HP-IB and display units are dB and percent (PCT);
##         default HP-IB and display unit is PCT.

        :DISTortion?
##       Queries the DISTortion MEASurement result.
```


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```
        :FM
            [MM] | [AVG] | [MET]
##       Sets/queries FM deviation MEASurement attributes.
##         HP-IB unit is HZ.
##         Display units are kHZ, HZ;
##           default unit is HZ.

        :FM?
##       Queries the FM deviation MEASurement result for FM DEMOD
##         AF Analyzer input.

        :FREQuency
            [MM] | [AVG] | [MET]
##       Sets/queries Audio Frequency MEASurement attributes.
##         HP-IB unit is HZ.
##         Display units are kHZ, HZ;
##           default unit is HZ.

        :FREQuency?
##       Queries the Audio FREQuency MEASurement result.

        :SELect?
        :SELect                          'AF FREQ' | 'DC LEVEL' |
                                         'DISTN' | 'SINAD'
##       Selects/queries the Audio FRequency SELected measurement
##         to provide measurement results for.
##         NOTE: to get valid measurements for DC AM, DC FM and
##         DC Volts, this filed must be set to 'DC LEVEL' and the
##         AF Analyzer Input (AFAN:INP) is set to look at an AM, FM,
##         or voltage source (respectively).

        :SINad
            [MM] | [AVG] | [MET]
##       Sets/queries SINad MEASurement attributes.
##         HP-IB and display units are dB and percent (PCT);
##         default HP-IB and display unit is dB.

        :SINad?
##       Queries the SINAD MEASurement result.
```


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Bit Error Test Commands (Measure Subsystem)

```
    :BETest
##  Bit Error Test measurement commands.

        :BESelect<n>?
        :BESelect<n>                          'BE COUNT' | 'BE RATIO'
##       Selects/queries the Bit Error SELected Bit Error Test measurement
##         to display (BE Ratio, BE Count) for the given measurement number n,
##         where <n> = 1..4.

        :BERRor
##       Bit ERRor measurement results.

            :COUNt<n>
                [MM_MOD] | [AVG]
##           Sets/queries Bit ERRor COUNt<n> MEASurement attributes,
##             where <n> = 1 .. 4.

            :COUNt<n>?
##           Queries the Bit ERRor COUNt<n> (completed), where <n> = 1 .. 4.

            :ICOunt<n>
                [MM_MOD] | [AVG]
##           Sets/queries Bit ERRor Intermediate COunt<n> MEASurement
##             attributes, where <n> = 1 .. 4.

            :ICOunt<n>?
##           Queries the Bit ERRor Intermediate COunt<n>, where <n> = 1 .. 4.
##             NOTE: This can only be queried when in the state
##                   TRIGger:BETest:MODE  'RUN'.
```


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```
            :IRATio<n>
                [MM] | [AVG]
##           Sets/queries Bit ERRor Intermediate RATio<n> MEASurement
##             attributes, where <n> = 1 .. 4.
##             HP-IB units are % (PCT), PPM;
##               default unit is PPM.
##             Display units are % (PCT), PPM;
##               default unit is PPM.

            :IRATio<n>?
##           Queries the Bit ERRor Intermediate RATio <n>, where <n> = 1 .. 4.
##             NOTE: This can only be queried when in the state
##                   TRIGger:BETest:MODE  'RUN'.

            :RATio<n>
                [MM] | [AVG]
##           Sets/queries Bit ERRor RATio<n> MEASurement attributes,
##             where <n> = 1 .. 4.
##             HP-IB units are % (PCT), PPM;
##               default unit is PPM.
##             Display units are % (PCT), PPM;
##               default unit is PPM.

            :RATio<n>?
##           Queries the Bit Error RATio<n> (completed), where <n> = 1 .. 4.

          :BTESted<n>?
##         Queries the number of Bits TESted for the completed Bit
##           Error Test measurements, where <n> = 1 .. 4.
```


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```
        :CRC
##       Cyclic Redundancy Check measurement results.
##         This is useful when No Frame Erasure is selected.

            :COUNt<n>
                [MM_MOD] | [AVG]
##           Sets/queries CRC COUNt<n> MEASurement attributes,
##             where <n> = 1 .. 4.

            :COUNt<n>?
##           Queries the CRC COUNt<n> (completed), where <n> = 1 .. 4.

            :ICOunt<n>
                [MM_MOD] | [AVG]
##           Sets/queries CRC Intermediate COunt<n> MEASurement attributes,
##             where <n> = 1 .. 4.

            :ICOunt<n>?
##           Queries the CRC Intermediate COunt<n>, where <n> = 1 .. 4.
##             NOTE: This can only be queried when in the state
##                   TRIGger:BETest:MODE  'RUN'.

            :IRATio<n>
                [MM] | [AVG]
##           Sets/queries CRC Intermediate RATio<n> MEASurement attributes,
##             where <n> = 1 .. 4.
##             HP-IB units are % (PCT), PPM;
##               default unit is PPM.
##             Display units are % (PCT), PPM;
##               default unit is PPM.

            :IRATio<n>?
##           Queries the CRC Intermediate RATio<n>, where <n> = 1 .. 4.
##             NOTE: This can only be queried when in the state
##                   TRIGger:BETest:MODE  'RUN'.

            :RATio<n>
                [MM] | [AVG]
##           Sets/queries CRC RATio<n> MEASurement attributes,
##             where <n> = 1 .. 4.

            :RATio<n>?
##           Queries the CRC RATio<n> (completed), where <n> = 1 .. 4.
```


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```
        :FERasure
##       Frame ERasure measurement results.

            :COUNt<n>
                [MM] | [AVG]
##           Sets/queries Frame ERasure COUNt<n> MEASurement attributes,
##             where <n> = 1 .. 4.

            :COUNt<n>?
##           Queries the Frame ERasure COUNt<n> (completed),
##             where <n> = 1 .. 4.

            :ICOunt<n>
                [MM_MOD] | [AVG]
##           Sets/queries Frame ERasure Intermediate COunt<n> MEASurement
##             attributes, where <n> = 1 .. 4.

            :ICOunt<n>?
##           Queries the Frame ERasure Intermediate COunt<n>,
##             where <n> = 1 .. 4.
##             NOTE: This can only be queried when in the state
##                   TRIGger:BETest:MODE  'RUN'.

            :IRATio<n>
                [MM] | [AVG]
##           Sets/queries Frame ERasure Intermediate RATio<n> MEASurement
##             attributes, where <n> = 1 .. 4.
##             HP-IB units are % (PCT), PPM;
##               default unit is PPM.
##             Display units are % (PCT), PPM;
##               default unit is PPM.

            :IRATio<n>?
##           Queries the Frame ERasure Intermediate RATio<n>,
##             where <n> = 1 .. 4.
##             NOTE: This can only be queried when in the state
##                   TRIGger:BETest:MODE  'RUN'.
```


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```
            :RATio<n>
                [MM] | [AVG]
##           Sets/queries Frame ERasure RATio<n> MEASurement attributes,
##             where <n> = 1 .. 4.
##             HP-IB units are % (PCT), PPM;
##               default unit is PPM.
##             Display units are % (PCT), PPM;
##               default unit is PPM.

            :RATio<n>?
##           Queries the Frame ERasure RATio<n> (completed),
##             where <n> = 1 .. 4.

          :FLSelect<n>?
          :FLSelect<n>                          'COUNT' |'RATIO'
##         Selects/queries the Frame Loss Selected Bit Error Test measurement to
##           display (Count or Ratio) for the given Frame Loss TYpe (FE or CRC).

          :FLTYpe<n>?
          :FLTYpe<n>                           'FE' | 'CRC'
##         Selects/queries the Frame Loss TYpe Bit Error Test measurement
##           to display (FE or CRC) for the given Frame Loss Select (Count
##           or Ratio) for the given measurement number n, where <n> = 1..4.

          :IBTested<n>?
##         Queries the number of Bits Tested for the Intermediate Bit
##           Error Test measurements, where <n> = 1 .. 4.
##           NOTE: This can only be queried when in the state
##                  TRIGger:BETest:MODE  'RUN'.

          :SSTatus?
##         Queries the Bit Error Test SYNC STatus.  Will return 'NO ERROR'
##           or 'BAD SYNC'.  This field will only be updated when the demod
##           arm state goes from "DISARM" to "ARM." This is the same as
##           DDEMod:SYNC:SSTatus.
```


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Mobile Station Commands (Measure Subsystem)

```
:CELL

    :MS
##   Mobile Station measurement commands.

       :TERRor?
##      Queries the Mobile Station Timing Error actually MEASured
##        by the HP8922G.

    :SACCh
##   Measurement results reported on the SACCH back from the MS.

       :ACELl
##      Adjacent CELl functions.
##        There are 6 of these, 1 representing the biggest adjacent cell
##        found.

         :ARFCn<n>?
##        Queries the Adjacent CELl ARFCN (Absolute Radio Frequency
##          Channel Number), where <n> = 1 .. 6.

         :BCC<n>?
##        Queries the Adjacent CELl (BSIC) Base station Color Code,
##          where <n> = 1 .. 6.

         :NCC<n>?
##        Queries the Adjacent CELl (BSIC) Network Color Code, where
##          <n> = 1 .. 6.

         :RLEVel<n>?
##        Queries the Adjacent CELl RX LEVel, where <n> = 1 .. 6.
```


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```
            :FULL

                :RLEVel?
##               Queries the FULL RX LEVel (serving cell).

                :RQUality?
##               Queries the FULL RX QUality (serving cell).

            :PARTial

                :RLEVel?
##               Queries the PARTial RX LEVel (serving cell).

                :RQUality?
##               Queries the PARTial RX QUality (serving cell).

            :RESet
##           RESets the SACCH measurement results.

            :TADVance?
##           Queries the SACCH Timing ADVance reported by the MS.

            :TLEVel?
##           Queries the SACCH TX LEVel reported by the MS.
```


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CW Commands (Measure Subsystem)

```
    :CW
##  CW MEASurements.

        :FREQuency

            [:ABSolute]
                [MM] | [AVG] | [MET]
##           Sets/queries the CW ABSolute FREQuency MEASurement attributes.
##             HP-IB unit is HZ.
##             Display units are GHZ, MHZ, kHZ, HZ;
##              default unit is MHZ.

            [:ABSolute]?
##           Queries the CW ABSolute FREQuency MEASurement result.

            :ERRor
                [MM] | [AVG] | [MET]
##           Sets/queries the CW FREQuency ERRor MEASurement attributes.
##             HP-IB unit is HZ.
##             Display units are GHZ, MHZ, kHZ, HZ;
##               default unit is MHZ.

            :ERRor?
##           Queries the CW FREQuency ERRor MEASurement result.

            :SELect?
            :SELect                          'CW FREQ' | 'CWFREQERR'
##           Selects/queries the CW FREQ SELected measurement
##             to display.

        :POWer
            [MM] | [AVG] | [MET]
##       Sets/queries the CW POWer MEASurement attributes.
##         HP-IB unit is W.
##         Display units are dBm, V, mV, µV, dBµV, W;
##           default unit is dBm.

        :POWer?
##       Queries the CW POWer MEASurement result.
##         This is only valid for RFAN:INP of 'RF IN/OUT'.
```


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DSP Analyzer Commands (Measure Subsystem)

```
    :DSPanalyzer
##   DSP Analyzer MEASurements.

       [:AMPLitude]
##      DSP Analyzer AMPLitude MEASurements.

            :AMPLitude<n>
                [MM] | [AVG]
##           Sets/queries the AMPLitude measurement attributes,
##             where <n> = 1 .. 12.
##             HP-IB unit is dB.
##             Display unit is dB.

            :AMPLitude<n>?
##           Queries the AMPLitude measurement result based on the
##             DSP:AMPL:TIME<n> setting, where <n> = 1 .. 12.

            :MARKer
##           AMPLitude MARKer MEASurements.

                :LEVel

                    :FALL
                        [MM] | [AVG]
##                   Sets/queries the AMPLitude MARKer FALL trace attributes.
##                     HP-IB unit is dB.
##                     Display unit is dB.

                    :FALL?
##                   Queries the AMPLitude MARKer FALL trace level which is
##                     relative amplitude data. This value is a function of the
##                     fall trace marker position set/queried by
##                     DSP:AMPL:MARK:POS:FALL.  This is only valid when on
##                     IMPORTANT: The user MUST be on the Amplitude Fall
##                     screen to query this result (DISP:DSP:VIEW 'AMPL FALL').
```


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```
                :MID
                    [MM] | [AVG]
##               Sets/queries the AMPLitude MARKer MID trace attributes.
##                 HP-IB unit is dB.
##                 Display unit is dB.

                :MID?
##               Queries the AMPLitude MARKer MID trace level which is
##                 relative amplitude data. This value is a function of the
##                 mid trace marker position set/queried by
##                 DSP:AMPL:MARK:POS:MID.
##                 IMPORTANT: The user MUST be on the Amplitude Mid
##                 screen to query this result (DISP:DSP:VIEW 'AMPL MID').

                :RISE
                    [MM] | [AVG]
##               Sets/queries the AMPLitude MARKer RISE trace attributes.
##                 HP-IB unit is dB.
##                 Display unit is dB.

                :RISE?
##               Queries the AMPLitude MARKer RISE trace level which is
##                 relative amplitude data. This value is a function of the
##                 rise trace marker position set/queried by
##                 DSP:AMPL:MARK:POS:RISE.
##                 IMPORTANT: The user MUST be on the Amplitude Rise
##                 screen to query this result (DISP:DSP:VIEW 'AMPL RISE').
```


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```
:TIME

    :FALL
        [MM] | [AVG]
##   Sets/queries the MARKer FALL trace TIME attributes.
##     HP-IB units are seconds (S),bit periods (T);
##       default unit is seconds (S).
##     Display units are US (micro-second), T (bit periods);
##       default unit is US (micro-second).

    :FALL?
##   Queries the MARKer FALL trace TIME which is the marker's
##     position relative to the last bit in the measured burst.
##     This value is a function of the fall trace marker
##     position set or queried by DSP:AMPL:MARK:POS:FALL.
##     IMPORTANT: The user MUST be on the Amplitude Fall
##     screen to query this result (DISP:DSP:VIEW 'AMPL FALL').

    :MID
        [MM] | [AVG]
##   Sets/queries the MARKer MID trace TIME attributes.
##     HP-IB units are seconds (S),bit periods (T);
##       default unit is seconds (S).
##     Display units are US (micro-second), T (bit periods);
##       default unit is US (micro-second).

    :MID?
##   Queries the MARKer MID trace TIME which is the marker's
##     position relative to bit zero in the measured burst..
##     This value is a function of the mid trace marker
##     position set or queried by DSP:AMPL:MARK:POS:MID.
##     IMPORTANT: The user MUST be on the Amplitude Mid
##     screen to query this result (DISP:DSP:VIEW 'AMPL MID').
```


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```
                    :RISE
                        [MM] | [AVG]
##                   Sets/queries the MARKer RISE trace TIME attributes.
##                     HP-IB units are seconds (S),bit periods (T);
##                       default unit is seconds (S).
##                     Display units are US (micro-second), T (bit periods);
##                       default unit is US (micro-second).

                    :RISE?
##                   Queries the MARKer RISE trace TIME which is the marker's
##                     position relative to bit zero in the measured burst.
##                     This value is a function of the rise trace marker
##                     position set or queried by DSP:AMPL:MARK:POS:RISE.
##                     IMPORTANT: The user MUST be on the Amplitude Rise
##                     screen to query this result (DISP:DSP:VIEW 'AMPL RISE').

               :MSUMmary?
##             Queries the AMPLitude Measurement SUMmary and returns 'PASSED',
##               'FAILED' or '- - - -'.
##               '- - - -' means that the MSUMmary results are currently
##                  indeterminate.
##               'PASSED' means that all of the following are true after an
##                  amplitude measurement completes:
##                  a) Each AMPLitude measurement (AMPL<1> thru AMPL<12>),
##                     does NOT exceed it's HI LO limits OR is OFF.
##                  b) Pk+ Flatness does NOT exceed it's HI LO limits OR
##                     Pk+ Flatness measurement is OFF. (PPFLatness)
##                  c) Pk- Flatness does NOT exceed it's HI LO limits OR
##                     Pk- Flatness measurement is OFF. (NPFLatness)
##                   AND for each of the above (a-c) that is ON it must have a
##                   valid measurement result (i.e. not '- - - -').
##                IMPORTANT: The user MUST be on the Amplitude Main (Ampl Main)
##                screen to query this result (DISP:DSP:VIEW 'AMPL MAIN').
```


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```
:NPFLatness
    [MM] | [AVG]
##  Sets/queries the Negative Peak FLatness measurement attributes.
##    HP-IB unit is dB.
##    Display unit is dB.

:NPFLatness?
##  Queries the Negative Peak FLatness measurement result.  This is
##    the most negative amplitude in dB relative to the average power
##    over the useful bits in the measured burst.

:PPFLatness
    [MM] | [AVG]
##  Sets/queries the Positive Peak FLatness measurement attributes.
##    HP-IB unit is dB.
##    Display unit is dB.

:PPFLatness?
##  Queries the Positive Peak FLatness measurement result.  This is
##    the most positive amplitude in dB relative to the average power
##    over the useful bits in the measured burst.

:PTCPower
    [MM] | [AVG]
##  Sets/queries the Peak Transmitter Carrier Power MEASurement
##    attributes.
##    HP-IB units are dBm, W;
##      default unit is dBm.
##    Display units are dBm, V, mV, µV, dBµV, W;
##      default unit is dBm.

:PTCPower?
##  Queries the Peak Transmitter Carrier Power MEASurement result.
##    This is the average power over the useful bits in the measured
##    burst.
```


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```
            :TRACe?
##           Returns the DSP Analyzer AMPLitude TRACe measured data
##             length(integer), time reference(floating point), and the
##             floating point TRACe AMPLitude data array for the given
##             length separated by commas.

        :DBITs?
##       Queries the demodulated Data BITs returned for the
##         current measurement made.

            :TAGS?
##           Queries the TAGS for each of the Data BITs.
##             M  means midamble bit.
##             -  means RF level error.

        :FBIT
            [MM] | [AVG]
##       Sets/queries the position of the First (useful) BIT attributes.
##         HP-IB units are seconds (S),bit periods (T);
##           default unit is seconds (S).
##         Display units are US (micro-second), T (bit periods);
##           default unit is US (micro-second).

        :FBIT?
##       Queries the position of the First (useful) BIT in time
##         relative to when the DSP measurement trigger occurred.

        :FMERrors?
##       A query of number of FM ERrors returns the number of FM demodulated
##         bits different from the best bit match (of the demodulated burst
##         bits) to the selected midamble before differential decoding for the
##         current DSP measurement.  This is only valid for
##         MSYN:SYNC:MODE 'MIDAMBLE'.
```


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```
        :PHASe
##       DSP Analyzer PHASe MEASurements.

           [:ERRor]

                :FREQuency
                    [MM] | [AVG]
##               Sets/queries the FREQuency ERRor MEASurement attributes.
##                 HP-IB unit is HZ.
##                 Display units are HZ, kHZ;
##                   default unit is HZ.

                :FREQuency?
##               Queries the FREQuency ERRor MEASurement result.  This is the
##                 slope of the average phase over the useful bits in the
##                 measured burst.

                :PEAK
                    [MM] | [AVG]
##               Sets/queries the PEAK PHASe ERRor MEASurement attributes.
##                 Display unit is degrees.

                :PEAK?
##               Queries the PEAK PHASe ERRor MEASurement result over the useful
##                 bits in the measured burst.
##                 HP-IB unit is degrees.

                :RMS
                    [MM] | [AVG]
##               Sets/queries the RMS PHASe ERRor MEASurement attributes.
##                 HP-IB unit is degrees.
##                 Display unit is degrees.

                :RMS?
##               Queries the RMS PHASe ERRor MEASurement result over the useful
##                 bits in the measured burst.
```


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```
          :MARKer
##         DSP Analyzer PHASe MARKer MEASurements.

               :ERRor
                   [MM] | [AVG]
##              Sets/queries the PHASe ERRor measurement attributes.
##                HP-IB unit is degrees.
##                Display unit is degrees.

               :ERRor?
##              Queries the PHASe ERRor measurement result.  This is the y-axis
##                MARKer position of the phase error. This value is a function
##                of the marker position set or queried by DSP:PHAS:MARK:POS.
##                IMPORTANT: The user MUST be on the Phase Err screen
##                to query this result (DISP:DSP:VIEW 'PHASE ERR').

               :TIME
                   [MM] | [AVG]
##              Sets/queries the MARKer TIMe attributes.
##                HP-IB units are seconds (S),bit periods (T);
##                  default unit is seconds (S).
##                Display units are US (micro-second), T (bit periods);
##                  default unit is US (micro-second).

               :TIME?
##              Queries the MARKer TIMe which is the marker's position relative
##                to bit zero in the measured burst.  This value is a function
##                of the marker position set or queried by DSP:PHAS:MARK:POS.
##                IMPORTANT: The user MUST be on the Phase Err screen
##                to query this result (DISP:DSP:VIEW 'PHASE ERR').

          :TRACe?
##         Returns the DSP Analyzer PHASe TRACe measured data length(integer),
##           and the floating point PHASe AMPLitude data array for the given
##           length separated by commas.
```


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```
        :SSTatus?
##       Queries the Sync STatus for the current DSP measurement.
##         Will return 'No Error', 'ShortBurst', 'Level Late', 'LevelShort',
##         'FM Error', 'Low Level', 'Math Error' or 'RF Ovrload'.
##         The message return priority (highest to lowest) is as follows:
##            Math Error
##            RF Ovrload | Low Level
##            FM Error
##            ShortBurst | Level Late | LevelShort
##            No Error
##         ShortBurst - amplitude envelope not long enough for the selected
##                      burst length
##         RF Ovrload - the DSP Analyzer sampler hardware overloaded during
##                      sampling
##         FM Error - at least one FM error was detected during the Midamble
##                    (or User Defined Sync Pattern) portion of the selected
##                    burst (only possible for MSYN:SYNC:MODE 'MIDAMBLE')
##         Level Late - amplitude of the burst did not rise until after the
##                      first few bits were received
##         Level Short - amplitude of the burst fell before the last few bits
##                      were received
##         Low Level - DSP Analyzer RF level never got high enough to make a
##                      valid measurement
##         Math Error - DSP Analyzer math-related error occurred
##         No Error - no error occurred in synchronizing to the selected burst
```


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Fast TX Carrier Power (Measure Subsystem)

```
:FTCPower

    [:POWer]
        [MM] | [AVG] | [MET]
##    Sets/queries the Fast Transmitter Carrier Power MEASurement attributes.
##      HP-IB units are dBm, W;
##        default unit is dBm.
##      Display units are dBm, V, mV, µV, dBµV, W;
##        default unit is dBm.

    [:POWer]?
##    Queries the Fast Transmitter Carrier Power MEASurement result.
##      This is only valid for RFAN:INP of 'RF IN/OUT'.
```


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Output RF Spectrum Commands (Measure Subsystem)

```
    :ORFSpectrum
##   Output RF Spectrum MEASurements.

       :FBIT
##      Sets/queries the position of the First (useful) BIT attributes.
##        HP-IB units are seconds (S),bit periods (T);
##          default unit is seconds (S).
##        Display units are US (micro-second), T (bit periods);
##          default unit is US (micro-second).

       :FBIT?
##      Queries the position of the First (useful) BIT in time relative
##        to when the Output RF Spectrum measurement trigger occurred.

       :FMERrors?
##      FM ERrors query returns the number of FM demodulated bits different
##        from the best bit match (of the demodulated burst bits) to the
##        selected midamble before differential decoding for ORFS[:POWer]
##        measurement.  This only valid for MSYN:SYNC:MODE 'MIDAMBLE'.

       :MARKer
##      Output RF Spectrum MARKer MEASurements.

          :LEVel
              [MM] | [AVG]
##         Sets/queries the MARKer LEVel attributes.
##           HP-IB unit is dB.
##           Display unit is dB.

          :LEVel?
##         Queries the MARKer LEVel which is relative amplitude data.
##           This value is a function of the marker position set or queried by
##           ORFSpectrum:MARKer:POSition.
##           Default unit is dB relative to the average power over the useful
##           bits in the measured burst when ORFS:FREQ was set to zero.

          :TIME
              [MM] | [AVG]
##         Sets/queries the MARKer TIME attributes.
##           HP-IB units are seconds (S),bit periods (T);
##             default unit is seconds (S).
##           Display units are US (micro-second), T (bit periods);
##             default unit is US (micro-second).

          :TIME?
##         Queries the MARKer TIME  which is the marker's position relative
##           to bit zero in the measured burst. This value is a function
##           of the marker position set or queried by ORFS:MARK:POS.
```


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```
      [:POWer]
           [MM] | [AVG]
##     Sets/queries the Output RF Spectrum POWer MEASurement attributes.
##       Default unit is dB relative (as per GSM rec. 5.05, etc.).
##       HP-IB unit is dB.
##       Display unit is dB.

      [:POWer]?
##     Queries the Output RF Spectrum POWer MEASurement result.

      :SSTatus?
##     Queries the Sync STatus for the current DSP measurement.
##       Will return 'No Error', 'ShortBurst', 'Level Late', 'LevelShort',
##       'FM Error', 'Low Level', 'Math Error' or 'RF Ovrload'.
##       The message return priority (highest to lowest) is as follows:
##          Math Error
##          RF Ovrload | Low Level
##          FM Error
##          ShortBurst | Level Late | LevelShort
##          No Error
##       ShortBurst - amplitude envelope not long enough for the selected
##                    burst length
##       RF Ovrload - the DSP Analyzer sampler hardware overloaded during
##                     sampling
##       FM Error - at least one FM error was detected during the Midamble
##                  (or User Defined Sync Pattern) portion of the selected
##                  burst (only possible for MSYN:SYNC:MODE 'MIDAMBLE')
##       Level Late - amplitude of the burst did not rise until after the
##                    first few bits were received
##       Level Short - amplitude of the burst fell before the last few bits
##                     were received
##       Low Level - DSP Analyzer RF level never got high enough to make a
##                   valid measurement
##       Math Error - DSP Analyzer math-related error occurred
##       No Error - no error occurred in synchronizing to the selected burst

      :TRACe?
##     Queries the Output RF Spectrum MEASurement result
##       and returns 417 floating-point numbers representing the trace.
##       NOTE: the time between each point is 1.7 µS.
```


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Oscilloscope Commands (Measure Subsystem)

```
    :OSCilloscope
##  OSCilloscope MEASurements.

        :MARKer

            :LEVel
##           OSCilloscope MARKer LEVel MEASurements.

                :AM
                    [MM] | [AVG]
##               Sets/queries the MARKer AM LEVel attributes.
##                 HP-IB unit is Percent (PCT);
##                 Display unit is Percent (PCT).

                :AM?
##               Queries the MARKer LEVel which is the signal level of the
##                 current marker position for AF Analyzer input
##                 selections (AFAN:INP) that have AM units of Percent.
##                 This value is a function of the marker position set or
##                 queried by OSC:MARK:POS.

                :FM
                    [MM] | [AVG]
##               Sets/queries the MARKer FM LEVel attributes.
##                 HP-IB unit is HZ;
##                 Display units are HZ, kHZ;
##                   default unit is kHZ.

                :FM?
##               Queries the MARKer LEVel which is the signal level of the
##                 current marker position for AF Analyzer input
##                 selections (AFAN:INP) that have FM units of Hertz.
##                 This value is a function of the marker position set or
##                 queried by OSC:MARK:POS.
```


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```
                :VOLTs
                    [MM] | [AVG]
##               Sets/queries the MARKer VOLTs LEVel attributes.
##                 HP-IB units is Volts (V);
##                 Display units is V, mV;
##                   default unit is V.

                :VOLTs?
##               Queries the MARKer LEVel which is the signal level of the
##                 current marker position for AF Analyzer input
##                 selections (AFAN:INP) that have units of VOLTs.
##                 This value is a function of the marker position set or
##                 queried by OSC:MARK:POS.

            :TIME
                [MM] | [AVG]
##           Sets/queries the MARKer TIME MEASurement attributes.
##             HP-IB unit is seconds (S);
##             Display units are S, MS;
##               default unit is MS.

            :TIME?
##           Queries the MARKer TIME MEASurement which time elapsed from the
##             trigger point to the current marker position.  This value is a
##             function of the marker position set or queried by OSC:MARK:POS.

            :TRACe?
##          Queries the OSCilloscope TRACe MEASurement result.
```


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Pulse On/Off Ratio Commands (Measure Subsystem)

```
    :PULSe
##   PULSe On/Off Ratio MEASurements.

       :FBIT
          [MM] | [AVG]
##      Sets/queries the position of the First (useful) BIT attributes.
##        HP-IB units are seconds (S),bit periods (T);
##          default unit is seconds (S).
##        Display units are US (micro-second), T (bit periods);
##          default unit is US (micro-second).

       :FBIT?
##      Queries the position of the First (useful) BIT in time relative
##        to when the Pulse On/Off measurement trigger occurred.

       :FMERrors?
##      FM ERrors query returns the number of FM demodulated bits different
##        from the best bit match (of the demodulated burst bits) to the
##        selected midamble before differential decoding for the Pulse
##        measurement.  This only valid for MSYN:SYNC:MODE 'MIDAMBLE'.

       :MARKer
##      PULSe On/Off Ratio MARKer MEASurements.

          :LEVel

              :FALL
                  [MM] | [AVG]
##              Sets/queries the FALL trace MARKer LEVel attributes.
##                Default unit is dB relative to the average power over the
##                useful bits in the measured burst.
##                HP-IB units are dB.
##                Display units are dB.
```


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```
                :FALL?
##               Queries the FALL trace MARKer LEVel which is relative amplitude
##                 data.  This value is a function of the marker position set
##                 or queried by PULS:MARK:POS:FALL.

                :RISE
                    [MM] | [AVG]
##               Sets/queries the RISE trace MARKer LEVel attributes.
##                 Default unit is dB relative to the average power over the
##                 useful bits in the measured burst.
##                 HP-IB units are dB.
##                 Display units are dB.

                :RISE?
##               Queries the RISE trace MARKer LEVel which is relative amplitude
##                 data.  This value is a function of the marker position set
##                 or queried by PULS:MARK:POS:RISE.

            :TIME

                :FALL
                    [MM] | [AVG]
##               Sets/queries the MARKer FALL trace TIME attributes.
##                 HP-IB units are seconds (S),bit periods (T);
##                   default unit is seconds (S).
##                 Display units are US (micro-second), T (bit periods);
##                   default unit is US (micro-second).

                :FALL?
##               Queries the MARKer FALL trace TIME which is the marker's
##                 position relative to bit zero in the measured burst.
##                 function of the marker position set or queried by
##                 PULS:MARK:POS:FALL.
```


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```
                :RISE?
                    [MM] | [AVG]
##               Sets/queries the MARKer RISE trace TIME attributes.
##                 HP-IB units are seconds (S), bit periods (T);
##                   default unit is seconds (S).
##                 Display units are US (micro-second), T (bit periods);
##                   default unit is US (micro-second).

                :RISE?
##               Queries the MARKer RISE trace TIME which is the marker's
##                 relative to bit zero in the measured burst.  This value
##                 is a function of the marker position set or queried by
##                 PULS:MARK:POS:RISE.

        :OORatio
##       Pulse On/Off Ratio measurement commands.

            :FALL
                [MM] | [AVG]
##           Sets/queries the PULSe On/Off Ratio FALL trace attributes.
##             Default units: dB relative to the average power over the
##               useful bits in the measured burst.
##             HP-IB unit is dB.
##             Display unit is dB.

            :FALL?
##           Queries the PULSe On/Off Ratio FALL trace MEASurement result.

            :RISE
                [MM] | [AVG]
##           Sets/queries the PULSe On/Off Ratio RISE trace attributes.
##             Default units: dB relative to the average power over the
##               useful bits in the measured burst.
##             HP-IB unit is dB.
##             Display unit is dB.

            :RISE?
##           Queries the PULSe On/Off Ratio RISE trace MEASurement result.
```


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```
        :SSTatus?
##       Queries the Sync STatus for the PULSe measurement.
##         Will return 'No Error', 'ShortBurst', 'Level Late', 'LevelShort',
##         'FM Error', 'Low Level', 'Math Error' or 'RF Ovrload'.
##         The message return priority (highest to lowest) is as follows:
##            Math Error
##            RF Ovrload | Low Level
##            FM Error
##            ShortBurst | Level Late | LevelShort
##            No Error
##         ShortBurst - amplitude envelope not long enough for the selected
##                      burst length
##         RF Ovrload - the DSP Analyzer sampler hardware overloaded during
##                       sampling
##         FM Error - at least one FM error was detected during the Midamble
##                    (or User Defined Sync Pattern) portion of the selected
##                    burst (only possible for MSYN:SYNC:MODE 'MIDAMBLE')
##         Level Late - amplitude of the burst did not rise until after the
##                      first few bits were received
##         Level Short - amplitude of the burst fell before the last few bits
##                      were received
##         Low Level - DSP Analyzer RF level never got high enough to make a
##                      valid measurement
##         Math Error - DSP Analyzer math-related error occurred
##         No Error - no error occurred in synchronizing to the selected burst

        :TRACe

            :FALL?
##           Queries the Pulse On/Off FALL TRACe MEASurement result
##             and returns 417 floating-point numbers representing the trace.
##             NOTE: the time between each point is 0.2 µS;S.

            :RISE?
##           Queries the Pulse On/Off RISE TRACe MEASurement result
##             and returns 417 floating-point numbers representing the trace.
##             NOTE: the time between each point is 0.2 µS.
```


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Spectrum Analyzer Commands (Measure Subsystem)

```
    :SANalyzer
##  Spectrum ANalyzer MEASurements.

        :MARKer

            :FREQuency
                [MM] | [AVG]
##           Sets/queries the MARKer FREQuency MEASurement attributes.
##             HP-IB unit is HZ.
##             Display units are MHZ, kHZ, HZ;
##               default unit is HZ.

            :FREQuency?
##           Queries the MARKer FREQuency MEASurement result.

            :LEVel
                [MM] | [AVG]
##           Sets/queries the MARKer LEVel MEASurement attributes.
##             HP-IB units are dBm, W.
##               default unit is dBm.
##             Display units are dBm, W, V, dBμV;
##               default unit is dBm.

            :LEVel?
##           Queries the MARKer LEVel MEASurement result.

        :TRACe?
##       Queries the Spectrum Analyzer TRACe MEASurement result.
```


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MS Information Subsystem

```
MSINfo

## MS INformation subsystem setting commands.

   :CIPHering
##  CIPHering (encryption) commands.

       :AMODe?
       :AMODe                    'FULL-54' | 'FULL-64' | 'PARTIAL' | 'NONE'
##      Selects/queries the CIPhering Authentication MODe.
##        FULL-54 means that the user need only provide the Authentication
##          Key (KI). Only the first 54 bits of the Authentication Key will
##          be used, and the 10 least-significant-bits will be unused.
##        FULL-64 means that the user need only provide the Authentication
##          Key (KI). The entire 64 bits of the Authentication Key will
##          be used.
##        PARTIAL means that the Ciphering Key (KC) and a random
##          number (RAND) is needed.
##        NONE means that no authentication will take place.

       :KC?
       :KC                       <quoted string representing a
                                        hexadecimal (64 bit) value>
##      Sets/queries the Ciphering Key (KC).

       :KI?
       :KI                       <quoted string representing a
                                        hexadecimal (128 bit) value>
##      Sets/queries the Authentication Key (KI).

       :RAND?
       :RAND                     <quoted string representing a
                                        hexadecimal (128 bit) value>
##      Sets/queries the RAND value (random number).
```


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```
        :SRES?
##       Queries the BS SRES (Signed RESponse to RAND).
##         This is a quoted string representing a 32 bit hexadecimal.

       [:STATe]?
       [:STATe]                    'OFF' | 'DISABLED' | 'ENABLED'
##       Selects/queries the CIPHering (encryption) STATe of the MS
##         and BS for the next call made.
##         OFF means no ciphering and don't send out the ciphering
##           signaling.
##         DISABLED meas send out the ciphering signaling, but select
##           ciphering disabled.
##         ENABLED means enable ciphering - this is only allowed if the
##           Ciphering Option is installed (see *OPT?).

    :MS
##   Mobile Station commands.

        :CMARk
##       Class MARk commands.

           :PCLass?
##          Queries the Class MARk Power CLass - comes from the
##            MS when a call is made.

        :IMEI?
##       Queries the MS International Mobile Equipment Identity.
##         (This is quoted string of up to 15 decimal digits).

           :REQuest
##          REQuests the IMEI from the MS - a call must be in place.
```


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```
        :IMSI?
##       Queries the MS's International Mobile Subscriber
##         Identity. (This is quoted string of up to 15 decimal digits).

           :SPAGing
##          Sets the PAGing IMSI - copies the MS's IMSI (MS:IMSI) to the
##            MS's Paging IMSI ([:PAGing]:IMSI).

        :LAI
##       MS's last Location Area Identification.

           :LACode?
##          Queries the Location Area Code portion of the last LAI.

           :MCCode?
##          Queries the Mobile Country Code portion of the last LAI.

           :MNCode?
##          Queries the Mobile Network Code portion of the last LAI.

        :ONUMber?
##       Queries the MS Originated NUMber.
##         This quoted string represents up to 20-digit decimal number
##         representing the party number the MS was calling for an
##         MS-initiated call.  The field will show a leading '+' if this
##         is an international call.

        :SRES
##       Queries the MS SRES (MS Signed RESponse to RAND).
##        This is a quoted string representing a 32 bit hexadecimal.
```


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```
[:PAGing]

      :IMSIdentity?
      :IMSIdentity                        <quoted string>
##     Sets/queries the MS's PAGing IMSI (International Mobile
##       Subscriber Identity). This is a quoted string representing
##       up to 15 decimal digits.

      :TMSI?
##     Queries the TMSI (Temporary Subscriber Identity) value.

         :REALlocation
##        REALocates a new TMSI value based on generating a
##          random number.

         :STATe?
         :STATe              'ON' | 'OFF'
##        Selects/queries whether to use the TMSI value when the
##          next call is made.
```


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Measurement Sync Subsystem

```
MSYNc

##  Measurement SYNc subsystem setting commands.

    :BURSt
##   MSYNc BURSt definition setting commands.

       :LENGth<n>?
       :LENGth<n>                          '87' | '147'
##      Selects/queries the MSYNc user-defined BURSt LENGth
##        for the selected burst number n, where <n> = 0 to 3.

       :SPSPosition<n>?
       :SPSPosition<n>                     <value> | [INUM]
##      Sets/queries the MSYNc user-defined Sync Pattern Start Position
##        for the selected burst number n, where <n> = 0 to 3.

       :TQUalifier<n>?
       :TQUalifier<n>                      'NORMAL' | 'RF POWER'
##      Selects/queries the Trigger QUalifier for the selected burst number
##        n, where <n> = 0 to 3.  Note: this selects the trigger qualifier for
##        both MSYNc:BURSt:TQU<n> and DDEMod:BURSt:TQU<n>.
##        NORMAL means no trigger qualifier.
##        RF POWER means 'rearm for another trigger if RF POWER never came up'.

       :TYPE<n>?
       :TYPE<n>                            'TSC0' | 'TSC1' | 'TSC2' | 'TSC3' |
                                           'TSC4' | 'TSC5' | 'TSC6' | 'TSC7' |
                                           'RACH' | 'SCH' | 'FCH' | 'USER DEF'
##      Selects/queries the MSYNc BURSt TYPE for the selected burst number
##        n, where <n> = 0 to 3.  Note: this selects the type for both
##        MSYN:BURSt:TYPE<n> and DDEMod:BURSt:TYPE<n>.
```


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```
        :UDSPattern<n>?
        :UDSPattern<n>                          <quoted string>
##       Sets/queries the MSYNc User Defined Sync Pattern definition
##         for the selected burst number n, where <n> = 0 to 3.

    :SYNC
##   MSYNc SYNC setting commands.

        :BSELect?
        :BSELect                              '0' | '1' | '2' | '3' | 'EXT'
##       Selects/queries the Burst SELection to SYNC measurements to.
##         0 means always sync to burst number 0.
##         1 means always sync to burst number 1.
##         2 means always sync to burst number 2.
##         3 means always sync to burst number 3.
##         EXT means use external signals to decide which
##           burst number to sync to.

        :BUSed?
##       Returns the burst definition that was selected (Burst USed) based on
##         Burst SELect (BSELect) when the measurement's ADC samples were taken.

        :MODE?
        :MODE                                 'MIDAMBLE' | 'AMPLITUDE'
##       Selects/queries the SYNC MODE algorithm that is used to determine
##         the location of the demodulated data bits in the measured burst.
##         MIDAMBLE means sync using the best bit match of the demodulated
##         data bits to the selected midamble or user-defined sync pattern.
##         AMPLITUDE means sync by centering the burst in the detected
##         amplitude envelope.
```


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Oscilloscope Subsystem

```
OSCilloscope

##  OSCilloscope subsystem setting commands.

   :CONTrol?
   :CONTrol                                'MAIN' | 'TRIGGER' | 'MARKER'
##  Selects/queries the OSCilloscope CONTrols - various
##    fields will appear based on the CONTrol selection.

   :MARKer

       :NPEak
##      Causes the OSCilloscope MARKer to move to the lowest
##        Negative PEak displayed.

       :PPEak
##      Causes the OSCilloscope MARKer to move to the highest
##        Positive PEak displayed.

       :POSition?
       :POSition                           <value> | [INUM]
##      Sets/queries the MARker POSition.  This is the number of divisions
##        from the left side of the graticule to the marker.

   :SCALe

       :TIME?
       :TIME                              '200 ms' | '100 ms' | '50 ms' | '20 ms' |
                                          '10 ms' | '5 ms' | '2 ms' | '1 ms', |
                                          '500 us' | '200 us' | '100 us' | '50 us' |
                                          '20 us' | '10 us' | '5 us' | '2 us' |
                                          '1 us'
##      Selects/queries the horizontal sweep time per division.
```


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```
:VERTical

    :AM?
    :AM                         '100 %' | '50 %' | '20 %' | '10 %' | '5 %'|
                                '2 %' | '1 %' | '500 m%' | '200 m%' |
                                '100 m%' | '50 m%' | '20 m%' | '10 m%' |
                                '5 m%' | '2 m%' | '1 m%' | '500 u%' |
                                '200 u%' | '100 u%' | '50 u%' | '20 u%' |
                                '10 u%' | '5 u%' | '2 u%'
##      Selects/queries the VERTical amplitude per division for AF Analyzer
##        input selections (AFAN:INP) that have AM units of Percent.

    :FM?
    :FM                         '50 kHz' | '20 kHz' | '10 kHz' | '5 kHz' |
                                '2 kHz' | '1 kHz' | '500 Hz' | '200 Hz' |
                                '100 Hz' | '50 Hz' | '20 Hz' | '10 Hz' |
                                '5 Hz' | '2 Hz' | '1 Hz' | '500 mHz' |
                                '200 mHz' | '100 mHz' | '50 mHz' |
                                '20 mHz' |'10 mHz' | '5 mHz' | '2 mHz'
##      Selects/queries the VERTical amplitude per division for AF Analyzer
##        input selections (AFAN:INP) that have FM units of Hertz.

    :OFFSet?
    :OFFSet                      <value> | [INUM]
##      Sets/queries the number of divisions that the displayed signal is
##        VERTically OFFSet above the Oscilloscope's fixed centerline.

    :VOLTs?
    :VOLTs                      '20 V' | '10 V' | '5 V' | '2 V' | '1 V' |
                                '500 mV' | '200 mV' | '100 mV' | '50 mV' |
                                '20 mV' | '10 mV' | '5 mV' | '2 mV' |
                                '1 mV' | '500 uV' | '200 uV' | '100 uV' |
                                '50 uV' | '20 uV' | '10 uV' | '5 uV' |
                                '2 uV' | '1 uV' | '500 nV' | '200 nV' |
                                '100 nV' | '50 nV' | '20 nV' | '10 nV'
##      Selects/queries the VERTical amplitude per division for AF Analyzer
##        input selections (AFAN:INP) that have units of VOLTs.
```


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```
:TRIGger

    :LEVel?
    :LEVel                              <value> | [INUM_MOD]
##   Sets/queries the TRIGger LEVel.  This only applies when TRIGger:SOURce
##     is 'Scope Lvl'.  The TRIGger LEVel is indicated by small pointers
##     that appear on each side of the graticule.
##      HP-IB units is DIV.
##      Example: "OSC:TRIG:LEV 2 DIV" set the oscilloscope trigger to 2
##      divisions above the horizontal axis.

    :MODE?
    :MODE                               'CONT' | 'SINGLE'
##   Selects/queries how measurements are armed to accept a trigger.
##     CONT means that the oscilloscope is continuously armed to
##       accept a trigger.
##     SINGLE means that the oscilloscope is armed to accept a trigger
##       each time that TRIGger:RESet is selected.
##   IMPORTANT: This command will set the trigger mode when in Local mode,
##     it is overridden by TRIGger:MODE:RETRigger REPetitive | SINGle
##     when in Remote mode.

    :PRETrigger?
    :PRETrigger                         <value> | [INUM_MOD]
##   Sets/queries the PRETrigger value.  This is the number of divisions
##     previous to the trigger point.

    :RESet
##   Arms a measurement when TRIGger:MODE 'SINGLE' is selected or when
##     TRIGger:MODE:RETRigger SINGle is selected.

    :SENSe?
    :SENSe                              'POS' | 'NEG'
##   Selects/queries whether TRIGgering occurs on the positive-going (POS)
##     or negative-going(NEG) trigger signal.
```


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```
        :SOURce?
        :SOURce                              'SCOPE LVL' |'EXTERNAL'
##       Selects/queries the Oscilloscope TRIGger SOURce.
##         SCOPE LVL means that the input signal level is used for triggering.
##         EXTERNAL means that the front panel MEASURE TRIGGER IN is used
##           for triggering.

        :TYPE?
        :TYPE                                'AUTO' | 'NORM'
##       Selects/queries the Oscilloscope TRIGger TYPE.
##         AUTO means automatically trigger a sweep is a triggering signal
##           is not detected within about 50 ms of the last trigger.
##         NORM meas that a specific triggering signal is required before
##           triggering.
```


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Output RF Spectrum Subsystem

```
ORFSpectrum

##  Output RF Spectrum subsystem setting commands.

    :FREQuency

        :OFFSet?
        :OFFSet                              <(value) [units]> | [FNUM]
##       Sets/queries the Output RF Spectrum FREQuency OFFSet setting.
##         This field is only used when not making reference measurements.
##         The offset is automatically set to 0.0 kHz when MODE is set to
##         either RAMP REF or MOD REF.
##         Default HP-IB unit is HZ.
##         Default display unit is kHZ.

    :MARKer
##   Output RF Spectrum MARKer functions.

        :POSition?
        :POSition                            <value> | [INUM]
##       Sets/queries the Output RF Spectrum MARKer POSition setting.
##         The value is given in units of divisions from the
##         left side of the trace (0 to 10 divisions).

    :MODE?
    :MODE                                    'RAMP REF' | 'RAMPING' |
                                             'MOD REF' | 'MODULATN'
##   Selects/queries the MODE for Output RF Spectrum measurements.
##      RAMP REF means make a reference measurement needed to make
##        Output RF Spectrum due to ramping measurements.
##      RAMPING means power is measured for the Output RF Spectrum
##        during the time when the envelope is ramping up and down.
##        (The peak value is returned within the time interval 28 us
##        before bit 0 to 28 us after bit 147.)
##      MOD REF means make a reference measurement needed to make
##        Output RF Spectrum due to modulation measurements.
##      MODULATN (modulation) means power is measured for the Output
##        RF Spectrum during the useful bits.

    :SACalibrate
##   Calibrates the Spectrum Analyzer for making Output RF Spectrum
##     or Pulse On/Off Ratio measurements.  This command is only
##     active when TRIG:MODE[:DSP] = 'SINGLE'.
```


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Pulse On/Off Ratio Subsystem

```
PULSe

##  PULSe On/Off Ratio subsystem setting commands.

    :MARKer
##   PULSe MARKer functions.

       [:POSition]

            :FALL?
            :FALL                          <value> | [INUM]
##           Sets/queries the PULSe MARKer FALL trace POSition
##             setting.  The value is given in units of divisions
##             from the left side of the trace (0 to 10 divisions).

            :RISE?
            :RISE                          <value> | [INUM]
##           Sets/queries the PULSe MARKer RISE trace POSition
##             setting.  The value is given in units of divisions
##             from the left side of the trace (0 to 10 divisions).

    :OPOSition

        :FALL                              <(value) [units]> | [FNUM]
##       Sets/queries the PULSe Off POSition FALL setting.
##         This is the time (relative to the center of the last bit)
##         that the amplitude on the amplitude envelope will be
##         measured.  The range is 0.0 us to +56.0 us.
##         HP-IB units are seconds (S), bit periods (T).
##           default unit is seconds (S),
##           default display unit is US (micro-second).
```


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```
        :RISE                              <(value) [units]> | [FNUM]
##       Sets/queries the PULSe Off POSition RISE setting.
##         This is the time (relative to the center of bit zero) that
##         the amplitude on the amplitude envelope will be measured.
##         The range is -56.0 us to 0.0 us.
##         HP-IB units are seconds (S), bit periods (T).
##           default unit is seconds (S),
##           default display unit is US (micro-second).

    :SACalibrate
##   Calibrates the Spectrum Analyzer for making Output RF Spectrum
##     or Pulse On/Off Ratio measurements.  This command is only
##     active when TRIG:MODE[:DSP] = 'SINGLE'.
```


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RF Analyzer Subsystem

```
RFANalyzer

## RF ANalyzer subsystem setting commands.

   :AGC

       :CALibrate
##      Does an open loop AGC CALibration if in RFAN:AGC:MODE 'CLOSED'.

       :DVALue?
       :DVALue                              <value> | [INUM]
##      Sets/queries the open/auto AGC DAC VALue.

       :MODE?
       :MODE                                'CLOSED' | 'OPEN' | 'AUTO'
##      Selects/queries the AGC MODE.  (NORMAL is closed loop.)

   :AMPLitude1?
   :AMPLitude1                              <(value) [units]> | [FNUM]
##  Sets/queries the amplitude (input level to assume) of the
##    RF IN/OUT port.  Used when RFAN:INP is 'RF IN/OUT'.
##    HP-IB and display units are dBm, Volts (V) and Watts (W);
##      Default HP-IB and display unit is dBm.

   :AMPLitude2?
   :AMPLitude2                              <(value) [units]> | [FNUM]
##  Set/queries the amplitude (input level to assume) of the
##    AUX RF IN port.  Used when RFAN:INP is 'AUX RF IN'.
##    HP-IB and display units are dBm, Volts (V) and Watts (W);
##      Default HP-IB and display unit is dBm.
```


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```
[:AMPLitude]

      :ACCuracy?
      :ACCuracy                          '+-3dB' | '+-1dB'
##     Selects/queries the RF ANalyzer AMPLitude ACCuracy.

      :CONTrol?
      :CONTrol                           'MS TX LEV' | 'MANUAL'
##     Selects/queries the RFAnalyzer AMPLitude CONTrolling mechanism.
##       MS TX LEV means that the AMPLitude (RFAN:AMPL1 or RFAN:AMPL2)
##         is set automatically based on the setting of CELL:MS:TLEVel.
##       MANUAL means that the user can manually set the AMPLitude
##         (RFAN:AMPL1 or RFAN:AMPL2).

   :FREQuency?
   :FREQuency                            <(value) [units]> | [FNUM]
##  Sets/queries the non-hop FREQuency for the RF ANalyzer.
##    Default HP-IB unit is HZ.
##    Default display unit is MHZ.

      :HMEas?
      :HMEas                             <(value) [units]> | [FNUM]
##     Sets/queries the Hop Meas Frequency, which is the frequency
##       to be assumed when making measurements while hopping.
##       Default HP-IB unit is HZ.
##       Default display unit is MHZ.

      :OFFSet?
      :OFFSet                            <(value) [units]> | [FNUM]
##     Sets/queries the hop frequency OFFSet for the RF ANalyzer.
##       Default HP-IB unit is HZ.
##       Default display unit is kHZ.

   :GTIMe?
   :GTIMe                                <(value) [units]> | [FNUM]
##  RF ANalyzer Gate TIME (RF Cnt Gate).
##    Default HP-IB unit is seconds (S).
##    Default display unit is micro-seconds (US).

   :INPut?
   :INPut                                'RF IN/OUT' | 'AUX RF IN'
##  Selects/queries the selected INPut port for the RF ANalyzer.
```


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RF Generator Subsystem

```
RFGenerator

## RF Generator subsystem setting commands.

   :AMPLitude1?
   :AMPLitude1                              <(value) [units]> | [FNUM]
##  Sets/queries the amplitude of the RF Generator when the RF IN/OUT
##    port is selected.
##    HP-IB and display units are dBm, Volts (V) and Watts (W);
##      Default HP-IB and display unit is dBm.

      :ATTenuation

         [:AUTO]?
         [:AUTO]                            'OFF' | 'ON'
##         Selects the ATTenuation of the RF IN/OUT port automatically
##           each time a change of amplitude setting occurs when ON.

   :AMPLitude2?
   :AMPLitude2                              <(value) [units]> | [FNUM]
##  Sets/queries the amplitude of the RF Generator when the AUX RFOUT
##    port is selected.
##    HP-IB and display units are dBm, Volts (V) and Watts (W);
##      Default HP-IB and display unit is dBm.

      :ATTenuation

         [:AUTO]?
         [:AUTO]                            'OFF' | 'ON'
##         Selects the ATTenuation of the AUX RFOUT port automatically
##           each time a change of amplitude setting occurs when ON.
```


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```
   :FREQuency?
   :FREQuency                              <(value) [units]> | [FNUM]
##  Sets/queries the non-hop FREQuency of the RF Generator.
##    Default HP-IB unit is HZ.
##    Default display unit is MHZ.

   :MODulation

       :DCAM?
       :DCAM                               'EXTERNAL' | 'OFF' |
                                           'TCH LOWER' | 'BCCHLOWER' |
                                           'BOTHLOWER'
##      Selects/queries the state of DC AM MODulation.
##        EXTERNAL means DC AM comes from an external AM input.
##        OFF means no DC AM.
##        TCH LOWER means the BCCH will be at the RF Level of the RF Analyzer
##          Amplitude setting and the TCH RF Level will be lower by the dB
##          determined by setting RFANalyzer:INPut.
##        BCCHLOWER means the TCH will be at the RF Level of the RF Analyzer
##          Amplitude setting and the TCH RF Level will be lower by the dB
##          determined by setting RFANalyzer:INPut.
##        BOTHLOWER means both the TCH and the BCCH will be lower by the dB
##          determined by setting RFANalyzer:INPut.

          :DVALue?
          :DVALue                          <value> | [INUM]
##         Sets/queries the DC AM DAC VALue for RFG:MODE:DCAM
##           selected as TCH LOWER', 'BCCHLOWER' or 'BOTHLOWER'.

       :GMSK?
       :GMSK                               'EXT' | 'OFF'
##      Selects/queries the state of GMSK modulation.
##        EXT means GMSK comes from external data and clock inputs.
##        OFF means the RF output is an unmodulated carrier.
```


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```
        :PULSe?
        :PULSe                              'EXT' | 'HOP TRIG' | 'OFF'
##       Selects/queries the state of PULSe modulation.
##         EXT means PULSe modulation comes from an external (TTL) input.
##         HOP TRIG means the RF output automatically pulses off (for a
##           little while) during switching transients when an RF Generator
##           hop trigger occurs.
##         OFF means no PULSe modulation.

           :MODE?
           :MODE                            'NORMAL' | '30 DB'
##          Selects/queries the pulse modulation level MODE.
##            NORMAL means pulse off will be very far down.
##            30 DB means the RF envelope will usually be 30 dB higher
##              than the selected amplitude and can be pulsed down to
##              the selected amplitude setting.

    :OUTPut?
    :OUTPut                                 'RF IN/OUT' | 'AUX RFOUT'
##   Selects/queries the selected OUTPut port for the RF Generator.
```


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Spectrum Analyzer Subsystem

```
SANalyzer

## Spectrum ANalyzer functions

   :ATTenuator? | ATTenuator1?
   :ATTenuator | ATTenuator1              '0 dB' | '10 dB' | '20 dB' |
                                          '30 dB' | '40 dB'
##  Selects/queries the input ATTenuator GSM900 selection.  This is
##    only valid when ATT1:MODE 'HOLD' is selected, otherwise,
##    automatic attenuator selection is done.
##    NOTE: This is only valid for CONFigure:RADio 'GSM900'.

       :MODE?
       :MODE                              'AUTO' | 'HOLD'
##      Selects/queries the ATTenuator1 MODE selection.

   :ATTenuator2?
   :ATTenuator2                           '0 dB' | '5 dB' | '10 dB' | '15 dB |
                                          '20 dB | '25 dB' | '30 dB' | '35 dB'
##  Selects/queries the input ATTenuator DSC1800 selection.  This is
##    only valid when ATT2:MODE 'HOLD' is selected, otherwise,
##    automatic attenuator selection is done.
##    NOTE: This is only valid for CONFigure:RADio 'DCS1800'.

       :MODE?
       :MODE                              'AUTO' | 'HOLD'
##      Selects/queries the ATTenuator2 MODE selection.

   :CFRequency?
   :CFRequency                            <(value) [units]> | [FNUM]
##  Center FRequency setting.  (This is the same as RFA:FREQ.)
##    Default HP-IB unit is HZ.
##    Default display unit is MHZ.

   :MARKer

       :CFRequency
##      Sets MARKer and signal to Center FRequency.

       :NPEak
##      Sets MARKer to Next PEak.

       :PEAK
##      Sets MARKer to PEAK.
```


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```
        :POSition?
        :POSition                              <value> | [INUM]
##       Sets/queries the MARKer POSition setting.

        :RLEVel
##       Sets MARKer and signal to Reference LEVel.


    :RLEVel1?
    :RLEVel1                                   <(value) [units]> | [FNUM]
##   Reference LEVel for the RF IN/OUT port.
##     HP-IB units are dBm, Volts (V) and Watts (W);
##       Default HP-IB and display unit is dBm.

    :RLEVel2?
    :RLEVel2                                   <(value) [units]> | [FNUM]
##   Reference LEVel for the AUX RF IN port.
##     HP-IB units are dBm, Volts (V) and Watts (W);
##       Default HP-IB and display unit is dBm.

    :SPAN?
    :SPAN                                      <(value) [units]> | [FNUM]
##   SPAN setting.  Default HP-IB unit is HZ.
##     Default display unit is MHz.

    :TRACe

        :MHOLd?
        :MHOLd                        'ON' | 'OFF'
##       Selects/queries the Spectrum Analyzer Max HOLd
##         function for the TRACe as On or Off.


    :VBWidth?
    :VBWidth                                   '30 kHz' | '100 kHz' | '1 MHz'
##   Selects/queries the Video BandWidth selection.
```


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Status Subsystem

```
STATus
## STATus commands.

## Status Structure descriptions:
##******

Status Byte:

   bit definitions:

    7 - Operation Status Register
    6 - RQS
    5 - Standard Event Status Register
    4 - MAV
    3 - Questionable Data/Signal Status Register
    1 - Hardware 2 Status Register
    0 - Hardware 1 Status Register


Hardware 1 Status Register:  Status Byte Bit 0

   condition register bit definitions:

    7  - Communication Status Register Summary
    6  - Power up tests failed
    5 -  Pulse On Trace RF Overload    (PULSe)
    4  - Measurement Trigger too early (DSPanalyzer, ORFSpectrum, PULSe)
    3  - Measurement Trigger too late  (DSPanalyzer, ORFSpectrum, PULSe)
    2  - Measurement Sync Error        (DSPanalyzer, ORFSpectrum, PULSe)
    0  - Measurement armed             (DSPanalyzer, ORFSpectrum, PULSe)

   event register bit definitions:

    1  - Measurement Limit(s) Exceeded
    8  - EMMI Status Register Event Summary
    14 - OverPower Protection Tripped
```


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```
Hardware 2 Status Register:  Status Byte Bit 1

   condition register bit definitions:

    2  - RF Frequency - change RF Gen Freq
    1  - RF Src Level setting
         - change Ref Level, Input Port or Attenuator (if using \"Hold\").",
    0  - RF Analyzer Level setting
         - change RF Gen Amplitude, Output Port or Atten Hold (if on).",


Questionable Data/Signal Status Register:  Status Byte Bit 3

## The QUEStionable status register set contains bits which give an
## indication of the quality of various aspects of the signal/data.
##
## A bit set in the condition register indicates that the data currently
## being acquired or generated is of questionable quality due to some
## condition affecting the parameter associated with that bit.

   condition register bit definitions:

    7  - CALibration Register Summary


Standard Event Status Register:  Status Byte Bit 5

   condition register bit definitions:

    5  - Command Error
    4  - Execution Error
    3  - Device Dependant Error
    2  - Query Error

   event register bit definitions:

    7  - Power On Occurred
    6  - User Request
    1  - Request Control
    0  - Operation Complete Occurred
```


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