User's Guide

Agilent Technologies
ESA-E Series Spectrum Analyzers
GSM Measurement Personality

This manual provides documentation for the following instruments:

ESA-E Series

E4402B (9 kHz - 3.0 GHz)
E4404B (9 kHz - 6.7 GHz)
E4405B (9 kHz - 13.2 GHz)
E4407B (9 kHz - 26.5 GHz)

Manufacturing Part Number: E4402-90015
Printed in USA
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Supersedes Part Number: E4401-90138

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The following safety notes are used throughout this manual. Familiarize yourself with these notes before operating this instrument.

WARNING **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

CAUTION Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

WARNING **This is a Safety Class 1 Product (provided with a protective earth ground incorporated in the power cord). The mains plug shall be inserted only in a socket outlet provided with a protected earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.**

WARNING **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.**

CAUTION Always use the three-prong AC power cord supplied with this product. Failure to ensure adequate grounding may cause product damage.

Contents

1 Understanding GSM

This chapter introduces you to basics of GSM technology and the general functionality of the ESA with the GSM measurement personality installed. In addition, sources for additional information on digital communications are listed.

GSM Standards

The Global System for Mobile communication (GSM) digital communications standard defines a voice and data over-air interface between a mobile radio and the system infrastructure. This standard was designed as the basis for a radio communications system. A base station control center (BSC) is linked to multiple base transceiver station (BTS) sites which provide the required coverage.

GSM 450, GSM 480, GSM 850, GSM 900, DCS 1800, and PCS 1900 are GSM-defined frequency bands. The term GSM 900 is used for any GSM system operating in the 900 MHz band, which includes P-GSM, E-GSM, and R-GSM. Primary (or standard) GSM 900 band (P-GSM) is the original GSM band. Extended GSM 900 band (E-GSM) includes all the P-GSM band plus an additional 50 channels. Railway GSM 900 band (R-GSM) includes all the E-GSM band plus additional channels. DCS 1800 is an adaptation of GSM 900, created to allow for smaller cell sizes for higher system capacity. PCS 1900 is intended to be identical to DCS 1800 except for frequency allocation and power levels. The term GSM 1800 is sometimes used for DCS 1800, and the term GSM 1900 is sometimes used for PCS 1900. For specifics on the bands, refer to Table 1-1.

The GSM digital communications standard employs an 8:1 Time Division Multiple Access (TDMA) allowing eight channels to use one carrier frequency simultaneously. The 270.833 kbits/second raw bit rate is modulated on the RF carrier using Gaussian Minimum Shift Keying (GMSK).

The standard includes multiple traffic channels, a control channel, and a cell broadcast channel. The GSM specification defines a channel spacing of 200 kHz.

Table 1-1 GSM Band Data

	P-GSM 900	E-GSM 900	R-GSM 900	DCS 1800	PCS 1900	GSM 450	GSM 480	GSM 850
Uplink (MS Transmit)	890 - 915 MHz	880 - 915 MHz	876 - 915 MHz	1710 - 1785 MHz	1850 - 1910 MHz	450.4 - 457.6 MHz	478.8 - 486.0 MHz	824.0 - 849.0 MHz
Downlink (BTS Transmit)	935 - 960 MHz	925 - 960 MHz	921 - 960 MHz	1805 - 1880 MHz	1930 - 1990 MHz	460.4 - 467.6 MHz	488.8 - 496.0 MHz	869.0 - 894.0 MHz
Range (ARFCN)	1 to 124	0 to 124 and 975 to 1023	1 to 124 and 955 to 1023	512 to 885	512 to 810	259 to 293	306 to 340	128 to 251
TX/RX Spacing (Freq.)	45 MHz	45 MHz	45 MHz	95 MHz	80 MHz	45 MHz	45 MHz	45 MHz
TX/RX Spacing (Time)	3 timeslots	3 timeslots	3 timeslots	3 timeslots	3 timeslots	3 timeslots	3 timeslots	3 timeslots
Modulation Data Rate	270.833 kbits/s	270.833 kbits/s	270.833 kbits/s	270.833 kbits/s	270.833 kbits/s	270.833 kbits/s	270.833 kbits/s	270.833 kbits/s
Frame Period	4.615 ms	4.615 ms	4.615 ms	4.615 ms	4.615 ms	4.615 ms	4.615 ms	4.615 ms
Timeslot Period	576.9 µs	576.9 µs	576.9 µs	576.9 µs	576.9 µs	576.9 µs	576.9 µs	576.9 µs
Bit Period	3.692 µs	3.692 µs	3.692 µs	3.692 µs	3.692 µs	3.692 µs	3.692 µs	3.692 µs
Modulation	0.3 GMSK	0.3 GMSK	0.3 GMSK	0.3 GMSK	0.3 GMSK	0.3 GMSK	0.3 GMSK	0.3 GMSK
Channel Spacing	200 kHz	200 kHz	200 kHz	200 kHz	200 kHz	200 kHz	200 kHz	200 kHz
TDMA Mux	8	8	8	8	8	8	8	8

The GSM framing structure is based on a hierarchical system consisting of timeslots, TDMA frames, multiframes, superframes, and hyperframes. One timeslot consists of 156.25 (157) bit periods including tail, training sequence, encryption, guard time, and data bits. Eight of these timeslots make up one TDMA frame. Either 26 or 51 TDMA frames make up one multiframe. Frames 13 and 26 in the 26 frame multiframe are dedicated to control channel signaling.

These principles of the GSM systems lead to the need for the fundamental transmitter measurements such as:

- Power vs Time - which verifies that the transmitter output power has the correct amplitude, shape, and timing for the TDMA sequence.
- Phase and Frequency Error - which verifies the accuracy of the transmitters 0.3 GMSK modulation process.
- Output RF Spectrum - which verifies that the RF carrier is contained within the designated 200 kHz channel.

Mobile Stations And Base Transceiver Stations

The cellular system includes the following:

- base transceiver stations, referred to as BTS
  (frequency ranges dependent on the standard; refer to Table 1-1 on page 1-3)
- mobile stations, referred to as MS
  (frequency ranges dependent on the standard; refer to Table 1-1 on page 1-3)

Uplink And Downlink

Uplink is defined as the path from the mobile station to the base transceiver station. Downlink is the path from the base transceiver station to the mobile station.

What Is An ARFCN?

An ARFCN is the Absolute Radio Frequency Channel Number used in the GSM system. Each RF channel is shared by up to eight mobile stations using Time Division Multiple Access (TDMA). The ARFCN is an integer (in a range dependent on the chosen standard, refer to Table 1-1 on page 1-3) which designates the carrier frequency.

What Is A Timeslot?

GSM utilizes Time Division Multiple Access (TDMA) with eight time slots per RF channel which allows eight users to use a single carrier frequency simultaneously. Users avoid one another by transmitting in series. The eight users can transmit once every 4.62 ms for 1 timeslot which is 577 µs long. The eight user timeslots are numbered from 0 to 7.

Typically, each 577 µs timeslot has a length of 156.25 bit periods, which consists of 148 data bits and 8.25 guard bits. The 4.62 ms required to cycle through eight timeslots is called a frame. In a TDMA system, the shape of each transmitted burst must be controlled carefully to avoid over-lapping bursts in time.

What Does The GSM Measurement Personality And Hardware Do?

When configured with a GSM mode personality module, the ESA series spectrum analyzer can help determine if a GSM transmitter or receiver is working correctly. The following documents detail GSM standards used when testing:

Table 1-2 Documents detailing the GSM standards used when testing

	GSM-450 GSM-480 GSM-850 GSM-900	**DCS-1800**	**PCS-1900**
Mobile station	ETS 300 607-1 (11.10)	ETS 300 607-1 (11.10)	J-STD-007
Base station	ETS 300 609-1 (11.21)	ETS 300 609-1 (11.21)	J-STD-007
Radio transmission and reception	ETS 300 910 (5.05)	ETS 300 910 (5.05)	J-STD-007

NOTE These standards are continually being updated by the communications industry. The software performs to the standard/date shown under **Mode Setup**, **Radio**.

When you select the standard format for use, the instrument automatically makes measurements using the measurement methods and limits defined in the standards. Detailed measurement results are displayed allowing you to analyze GSM system performance.

Measurement parameters may be altered for specialized analysis. This is done within narrow limits because the standards specify the test methods and settings.

For infrastructure testing, the instrument tests base station transmitters and receivers in a non-interfering manner by using a coupler or power splitter.

The instrument makes the following GSM one-button measurements (measurements activated by a single key press):

- Cable Fault Location
- Monitor Band/Channel
- Out of Band Spurious
- Output RF Spectrum
- Phase and Frequency Error
- Power Steps
- Power vs Time
- Receive (Rx) Band Spurious
- Transmit (Tx) Band Spurious
- Transmitter Power

In addition, the following manual measurements (measurements which are not activated by a single key press) can be performed:

- Loss/Gain (available in SA mode)
- Return Loss (VSWR) (available in SA mode)

Other Sources Of Measurement Information.

Application Notes

The following application notes describe digital communications measurements in much greater detail than discussed in this User Guide:

- Application Note 1298
  Digital Modulation in Communications Systems - An Introduction
  Agilent Technologies part number 5965-7160E
- Application Note 1311
  Understanding GSM Transmitter Measurements for Base Transceiver stations and Mobile Stations
  part number 5966-2833E
- Application Note 1313
  Testing and Troubleshooting Digital RF Communications Transmitter Designs
  part number 5968-3578E
- Application Note 1314
  Testing and Troubleshooting Digital RF Communications Receiver Designs
  part number 5968-3579E
- Application Note 150
  Spectrum Analyzer Basics
  part number 5952-0292

Additional Information

- Additional measurement application information is available from your local Agilent Technologies sales and service office.
- The latest information on ESA spectrum analyzers is available from the following URL:

  http://www.agilent.com/find/esa/

2 Getting Started

This chapter introduces you to basic features of the instrument, including the front panel keys, rear panel connections, and display annotation. Equipment required for GSM measurements, available documentation, and processes for installing and uninstalling applications are also described.

Instrument Overview

This section provides information on only GSM mode features. For those features not described here, refer to the *Agilent ESA Spectrum Analyzers User's Guide*.

Front-Panel Features

For further information on the features mentioned in the following section, refer to Chapter 5 of this document.

Figure 2-1 Front-Panel Feature Overview

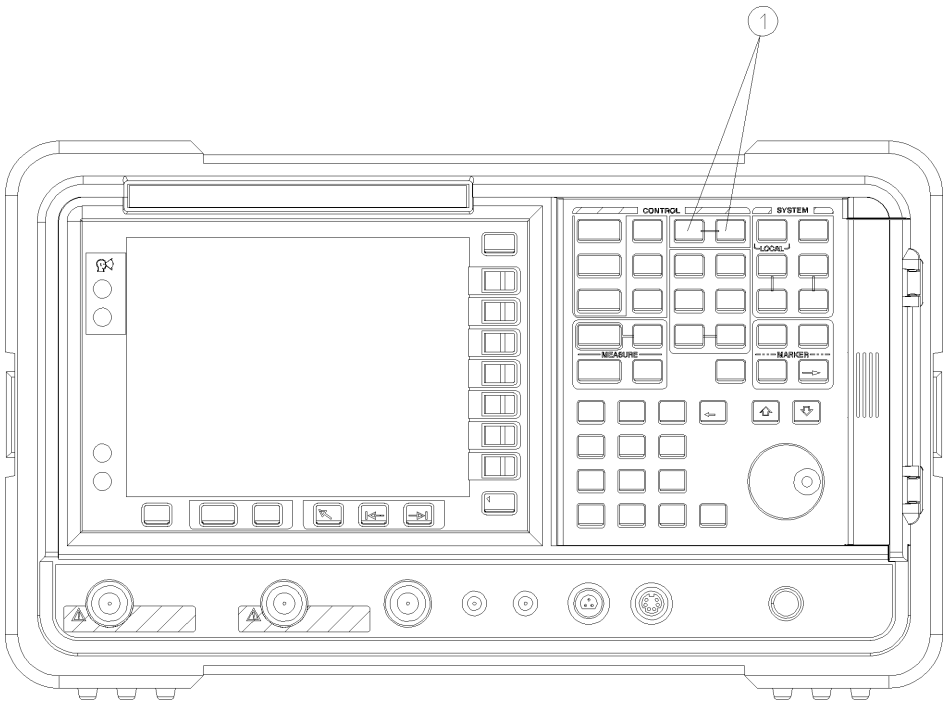


Table 2-1 Key to Figure 2-1 Front-Panel Feature Overview (above)

1 Mode keys These keys allow you to select the measurement mode and mode parameters such as input and trigger settings.

- **MODE** accesses menu keys to select the instrument mode. Each mode is independent of all other modes.
- **Mode Setup** accesses menu keys that allow you to configure the parameters specific to the current mode and affect all measurements within that mode.

Rear-Panel Features

This section provides information on GSM rear panel features only. For those features not described here, refer to the *ESA-E Series Spectrum Analyzers User's Guide.*

Figure 2-2 Rear-Panel Feature Overview

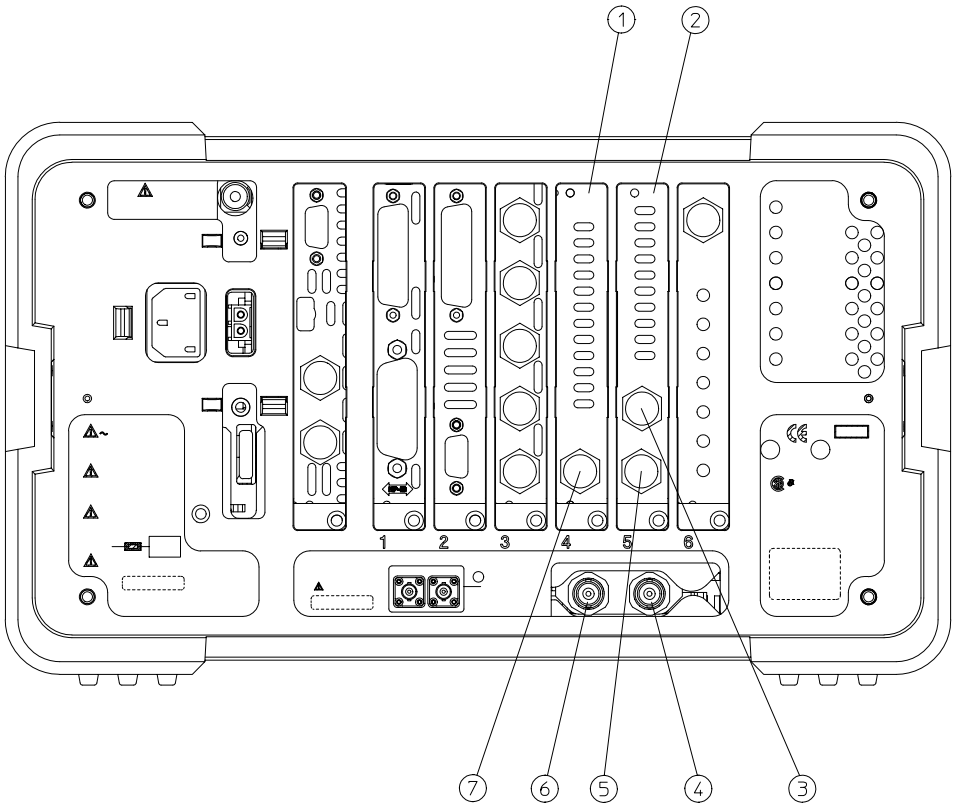


Table 2-2 Key to Figure 2-2 Rear-Panel Feature Overview (above)

1	**DSP and Fast ADC**	DSP and Fast ADC (*Option B7D*) provides digital signal processing and fast ADC required for many of the digital demodulation measurements in the GSM and cdmaOne measurement personalities. It must be ordered with Option B7E and Option 1D5.
2	**RF Comms Hardware**	RF Communications Hardware (*Option B7E*) provides the RF down convertor hardware required for digital demodulation measurements. It must be ordered with Option B7D and Option 1D5.
3	**Ext Ref In**	Accepts an external 1 MHz to 30 MHz reference frequency source.
4	**10 MHz REF IN**	Accepts an external frequency source to provide the 10 MHz, –15 to +10 dBm frequency reference used by the analyzer.

Table 2-2 Key to Figure 2-2 Rear-Panel Feature Overview (above)

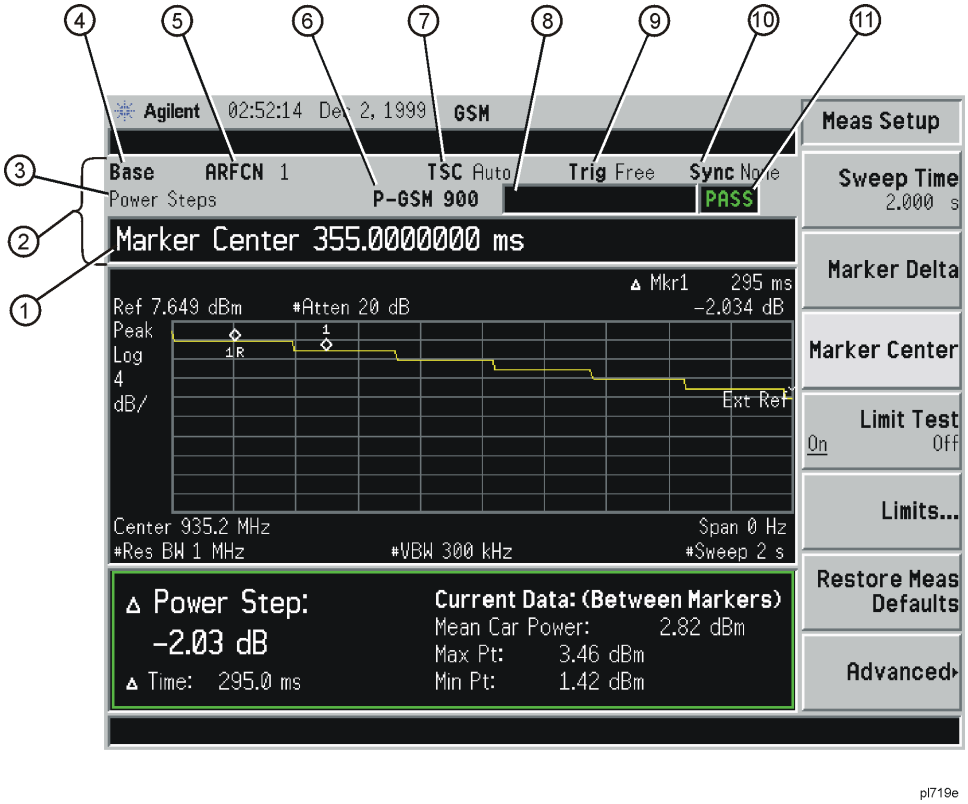
5	**10 MHz Out**	Provides a 10 MHz, 0 dBm minimum, timebase reference signal phase locked to the Ext Ref In.
6	**10 MHz REF OUT**	Provides a 10 MHz, 0 dBm minimum, timebase reference signal.
7	**Ext Frame Sync**	Accepts an external 0 to 5 V TTL trigger.

Display Annotation

This section describes GSM screen annotations which differ from SA mode annotations. Refer to the *ESA-E Series Spectrum Analyzers User's Guide* for information on screen annotations not described here.

The following screen provides an example of a screen annotation:

Figure 2-3 Screen Annotation: Example



NOTE Annotations are not always identical for different measurement screens and the annotations displayed depend on what is required to display critical measurement parameters. To view examples of the measurement displays, refer to the *ESA-E Series Spectrum Analyzers GSM Measurement Personality Measurement Guide.*

Table 2-3 Key to Figure 2-3 Screen Annotation: Example (above)

1	**Active Function Area**	Displays parameter entries. If you press a key which activates a function, the parameter description and value will appear in the active function area.
2	**Measurement Bar**	Displays information about measurements including some mode setup parameters.

Table 2-3 Key to Figure 2-3 Screen Annotation: Example (above)

3	**Current Measurement**	Displays the name of the current measurement.
4	**Base/Mobile**	Indicates which digital communications system platform you are testing, base station systems or a mobile unit.
5	**ARFCN**	Active Radio Frequency Channel Number.
6	**Base/Standard**	Displays the radio band currently in use.
7	**TSC**	Training sequence code. Displays the training sequence code used on the assigned channel.
8	**Averaging Indicator**	Displays the number of the current average (averaging progress) when averaging is turned on.
9	**Trig Source**	Displays the triggering mode selected for the current measurement. Possible values are External, Free, RF Burst and Frame Timer.
10	**Burst Sync**	Displays the type of burst sync selected for the current measurement. Possible values are Training Seq, RF Amptd, and None.
11	**Pass/Fail Status**	Indicates the status of the measurement limit pass/fail test when one or more limit test function is turned on.

Options Required

Installing the GSM measurement personality firmware and making the associated measurements require certain basic equipment. This section lists GSM compatible Agilent ESA Spectrum Analyzers and required hardware options.

Compatible spectrum analyzers

The GSM measurement personality is not compatible with all ESA spectrum analyzer models. Table 2-4 lists the models that are compatible and the upper frequency range of each.

Table 2-4 GSM Compatible Agilent ESA Spectrum Analyzers

Model Number	Upper Frequency Range
E4402B	3 GHz
E4404B	6.7 GHz
E4405B	13.2 GHz
E4407B	26.5 GHz

Hardware options required

Additional hardware options must be installed in the spectrum analyzer before GSM measurements can be made. Table 2-5 lists the hardware options available and the measurements that they enable. For optimum performance of GSM measurements, Option B74 should be installed in your Agilent ESA-E Series Spectrum Analyzer.

Not all of the options can be installed by the user. Some of the options require that the instrument be returned to the factory or an Agilent Technologies service center. In addition, some of the options require Performance Verification and Adjustments to be performed after installation. Refer to Table 2-5 for option specific information.

NOTE When transporting the instrument, use the original packaging or comparable packaging. If the shipping container is damaged, any part is missing, or you do not have an appropriate shipping container, notify Agilent Technologies at one of the addresses shown on "Service and Support" on page 6-6.

Table 2-5 GSM Hardware Options and measurements

Required/recommended option	Option Number	Measurement
GSM Measurement Personality	BAH	Required for all measurements.
Memory extension	B72	
DSP and Fast ADC	B7D[a]	Recommended options which enable Phase and Frequency Error and full triggering for all measurements. *Note: these options must be ordered together.*
RF Communications Hardware	B7E[a]	
50 Ohm Tracking Generator	1DN	Required for cable fault measurement.
Time Gated Spectrum Analysis	1D6	Required for Output RF Spectrum Modulation Swept measurement. The measurements will execute without the option but not to specification and the message “Gate option not installed. Results may not be accurate” displayed.
Fast Time Domain Sweep	AYX	Required for Output RF Spectrum, Transmitter Power, and Power vs Time measurements if options B7D/B7E are not ordered.
High Stability Frequency Reference	1D5[b]	Improves frequency reference accuracy.
RF and Digital Communication Hardware Option bundle	Option B74[b] Includes the following options: 1D6 B72 1D5 B7D B7E 1DS 1DR	Includes necessary hardware for the GSM measurement personality. The Cable Fault Location measurement also requires option 1DN.

a. Factory installation only.
b. Service center or factory installation, calibration required.

NOTE If the appropriate hardware is not present, the measurement softkey under the **Measure** menu will be grayed out and that measurement will not be available.

GSM Documentation For The ESA-E Series Spectrum Analyzer

Spectrum analyzers with GSM Installed

When you purchase your instrument already loaded with the GSM measurement personality, you receive the following materials:

Table 2-6 Personality Documentation

Part Number	Part Description	Notes
Refer to the ESA WEB site for the current part number.	*User's Guide* *ESA-E Series Spectrum Analyzers* *GSM Measurement Personality*	BAH Option manuals
	GSM Quick Reference Card	BAH Option manuals
	Measurement Guide *ESA-E Series Spectrum Analyzers* *GSM Measurement Personality*	BAH Option manuals
	Programming Commands *ESA-E Series Spectrum Analyzers* *GSM Measurement Personality*	BAH Option manuals
	Agilent ESA Series Spectrum Analyzers Specifications Guide	Includes specifications for all optional measurement personalities
	Agilent ESA Series Spectrum Analyzers Documentation and Instrument Driver CD-ROM	Does not include service documentation or software

Spectrum analyzers without GSM Installed

If your instrument is ordered without measurement personalties installed, you can order the GSM measurement personality as Option BAH instrument upgrade package. With the purchase of a personality option upgrade, you receive the documents listed in Table 2-6 and the document shown in Table 2-7.

Table 2-7 Personality Documentation

Part Number	Part Description	Notes
Refer to the ESA WEB site for the current part number.	*RF and Digital Communications Hardware Installation Note*	B74 Option manual

Understanding Digital Communications Measurements

Additional measurement application information is available through your local Agilent Technologies sales and service office. Refer to "Other Sources Of Measurement Information." on page 1-8 for applicable application notes.

Agilent ESA Spectrum Analyzers Update

For the latest information about this instrument, including firmware upgrades, application information, and product information, please visit the URL listed below

Updating the Firmware

Updated versions of the ESA-E Series Spectrum Analyzer firmware will be available via several sources. Information on the latest firmware revision can be accessed from the following URL:

http://www.agilent.com/find/esa/

Installing Optional Measurement Personalities

Active License Key

The measurement personality software you have purchased with your instrument has been installed and the license key has been enabled at the factory. With any future purchase of a new personality software, you will receive a certificate that displays the unique license key number. The license key enables you to install, or reinstall, any measurement personality you have purchased. If you return the instrument to the factory for the installation of measurement personality software, you will receive no documentation of the license key number, nor will you receive documentation of the license key number for the measurement personality software you have purchased with your instrument.

Installing the Licensing Key

If you are installing a new option, follow these steps to install the unique license key number for the measurement personality software that you want to install in your instrument:

1. Press **System**, **More**, **Licensing**, **Option**.

   When you press **Option** the alpha editor will be activated. For instructions on using the alpha editor, refer to the *Agilent ESA Spectrum Analyzers User's Guide*.

2. Use the alpha editor to enter the three letter designation for the software option that you wish to install in the instrument.

3. Press **Done** on the alpha editor menu.

4. Press **License Key**.

   When you press **Licensing Key** the alpha editor will be activated. For instructions on using the alpha editor, refer to the *Agilent ESA Spectrum Analyzers User's Guide*.

5. Use the alpha editor to enter the 12 character licensing key number for the software option that you wish to install in the instrument.

6. Press **Done** on the alpha editor menu.

7. Press **Activate** to turn on the licensing key. You may now install the measurement personality option software.

Using Install Key

You may want to install a software revision, install new measurement software or reinstall measurement software that you have previously uninstalled, or uninstall measurement software. Before you can install software, you will need a set of installation diskettes.

If you have ordered a measurement personality, you will receive the installation disk set in the option upgrade package. If you are updating an existing, previously installed measurement option, you may order the diskettes from Agilent Technologies or create a set from the Agilent internet site shown in "Updating the Firmware" on page 2-10. When you order the updated software disk set, you will need to order Option UE2. (Option UE2 is a firmware update and is needed to ensure that the firmware and the software are compatible.) A set of diskettes can be ordered from your local Agilent Technologies service or sales office. Refer to "Service and Support" on page 6-6 for the location of these offices. To create a disk set refer to "Creating Software Installation Disks" below.

Creating Software Installation Disks

To create the installation disks on-line, visit the Agilent internet site shown in "Updating the Firmware" on page 2-10. Follow the instructions provided on the internet site for downloading the current measurement personalty software and creating the installation disk set. The instructions for creating the disk set will step you through the process to create a firmware disk set when you create the measurement personalty software disk set. (A firmware update may be needed to ensure that the firmware and the software are compatible.) After you have created the disk set, follow the on-line instructions to install the firmware. After successfully installing the firmware update, proceed with the following instructions for installing the measurement personalty software in your instrument.

Installing Personality/Software Options

This procedure gives steps to install a new software option in an ESA-E Series Spectrum Analyzer using the internal floppy drive of the instrument. Screen messages display the update progress and give directions. The instrument will not need to be re-calibrated after this procedure since no changes are made to calibration or adjustment files.

If you have a problem with the installation process, refer to "Troubleshooting the Installer" on page 2-14.

NOTE When the installer starts up, it examines the instrument to ensure that all the required software and hardware options are present. If they are not, the installer will generate an error and you will not be able to install the personality.

1. If this is the installation of new personality option software, you must enter the License Key for the new option. For instructions on entering the License Key, refer to the "Installing the Licensing Key" on page 2-11.

   When you have completed entering the license key number, continue with the next step.

2. Insert disk one of the installation disk set into the disk drive located on the right side of the ESA front panel.

3. Press **System**, **More**, **Personalities**, and **Install**. The instrument will then load the installer from the floppy drive. If there is no floppy in the drive, the incorrect disk is inserted, or there is no installer on the disk, the error "No install disk present in disk drive" will be shown.

   Once the instrument has loaded the installer, the screen will change to the installer screen and the **Install Pers.** menu will be shown. For more information on the installer screen and menu, refer to "Installer Screen and Menu" on page 2-15.

4. When the installer first starts up, it will show a popup message. Select **Verify Disks**.

NOTE Once the installer has begun installing a personality, any error will cause the whole personality (including a previously installed version) to be removed from the instrument. Because of this, it is very important that you verify the disks prior to installing them. If any of the disks or files are bad, you will not be able to use the personality until you obtain a new installation disk set and run the install using them.

5. When prompted, insert the next disk and press **Verify Disks** again.

   When Verify Disks is running, the **Install Now** and **Exit Install** keys will be grayed out.

6. When the verification is complete, press **Install Now** and the installation of the personality will begin. Some of the disks may take only a short time to load or be skipped entirely, while others can take up to about 30 minutes to load.

   When installer is running, the **Verify Disks** and **Exit Install** keys will be grayed out.

7. When prompted, insert the next disk and press **Install Now** again.

8. Once the installation is complete, press **Exit Install**.

Troubleshooting the Installer

If the installation process stalls or fails in another way, follow these steps to resolve your problem.

1. If the instrument stops the update process before all the disks are loaded proceed as follows:

   a. Press **Exit Install** to abort the process.

   b. Return to step 2 under "Installing Personality/Software Options" and start the installation process again.

2. If the instrument fails after repeating the installation procedure, get in touch with your nearest Agilent sales and service office listed in "Service and Support" on page 6-6 for assistance. Please provide the following information:

   Model Number:

   Serial Number:

   State that you are having trouble installing a software option update.

Installer Screen and Menu

The top portion of the install screen is a table in which the files that are about to be installed are listed. The bottom portion of the screen contains information needed to track the progress of the install.

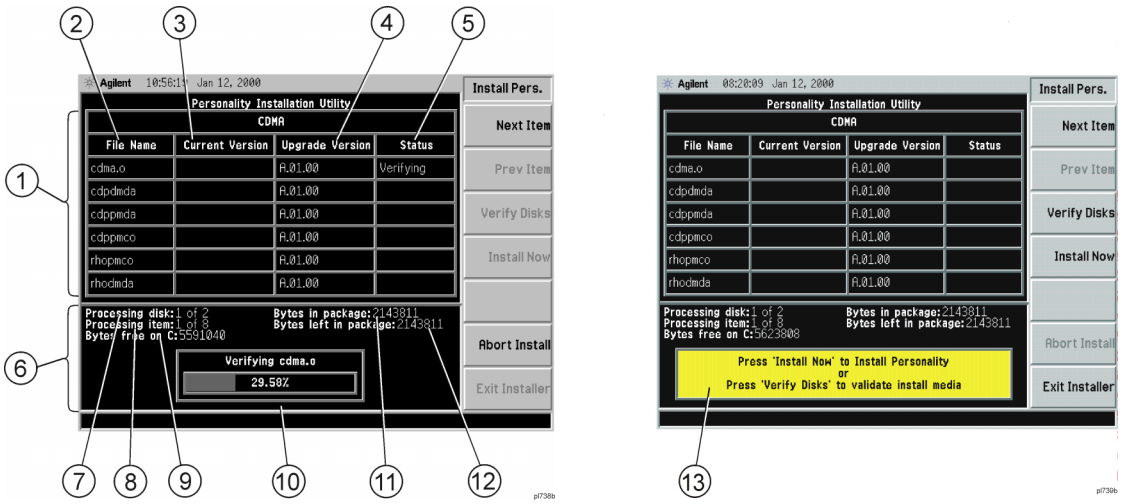


Table 2-8 **Key to Installer Screen and Menu Screen (above)**

1 **File Table** displays the files to be installed and various file information. If there are more then six files, **Next Item** and **Prev Item** allow you to scroll the table to view additional items.

2 **File Name** displays the name of the files on the installation disk.

3 **Current Version** displays the version of the file that is currently installed in the instrument. (This field will be blank if this file is not currently installed in the instrument or if the file is a data file that has no version.)

4 **Upgrade Version** shows the version of the file on the install disk. This is the version of the file that will replace the currently installed version.

5 **Status** is updated to reflect what the installer is doing to the current file as the install progress. The valid messages seen in this column are listed in Table 2-9 on page 2-16.

6 **Data Field** contains a status bar and various status information.

7 **Processing disk** shows the disk that is currently being read.

8 **Processing item** shows the file that is being processes by item number.

9 **Bytes free on C** is the number of bytes currently free on the instrument C: drive.

Table 2-8 Key to Installer Screen and Menu Screen (above)

10 **Status Bar** contains a status bar that runs from 0 to 100% and tracks the progress of the current step and a message line displays the step that is currently being executed.

11 **Bytes in package** lists the number of bytes in the install package/ fill.

12 **Bytes left in package** lists the number of bytes left to be read.

13 Message and error popup window that displays over the status bar. Information in this box will prompt you for action required to proceed to the next phase of the installation. It may also inform you of errors in the installation process and may prompt you for action required to correct the problem.

Table 2-9 Installer Status Messages

`Failed`	This means that something has gone wrong while processing this item. It is a fatal error and the installation can not be completed. The installer will try to get the system back to a good state which may entail completely removing the currently installed personality.
`Loading`	The file is currently being copied from the install media to the instrument's file system.
`Verifying`	This may mean one of two things: 1. If "Verify Disks" was pressed then Verifying means that the installer is currently reading the install media and comparing the known checksums to ensure the data is good. 2. If "Install Now" was pressed, then Verifying means that the installer is reading what was just loaded to ensure the checksum is correct.
`Loaded`	This means that the data has been placed on the instrument disk but has not yet been registered with the firmware.
`Installed`	This means that the data has been loaded into the instrument and registered. The install for this file is complete.
`Skipping`	This means that the installer has determined that this file does not need to be loaded into the instrument.

3 Setting Up GSM Mode

This chapter introduces the basic measurement procedure including mode setup and changing measurement frequency.

Preparing To Make Measurements

At initial power up, the analyzer is in spectrum analyzer (SA) mode, with the Meas Off selected in the **MEASURE** menu and the **FREQUENCY Channel** menu displayed.

To access the GSM measurement personality, press the **MODE** front panel key and select the **GSM** menu key.

Initial settings

Before making a measurement, make sure the mode setup, measurement setup, and frequency channel parameters are set to the appropriate settings. For further information refer to "Mode Setup" on page 5-32, "FREQUENCY Channel" on page 5-6, and "Meas Setup" on page 5-11.

- Resetting all parameters:
  To set all instrument parameters (including mode setup and measurement setup parameters) to factory default values, press the **Preset** front panel key. Note that the mode is changed from GSM to SA when the **Preset** front panel key is used. After using **Preset** you must use the **MODE** key to return to GSM mode.

  The **Preset** front panel key can also be used to return the instrument to a set of user preset values. Refer to the *ESA Spectrum Analyzers User's Guide* for further information.

- Resetting mode setup parameters:
  Mode setup parameters apply to all measurements in GSM mode. To reset them to factory default values, press **Mode Setup** then **Restore Mode Setup Defaults**.

- Resetting measurement setup parameters:
  Measurement setup parameters affect the current measurement only. To reset them to factory default values (for the current measurement only), press **Meas Setup** then **Restore Meas Defaults**.

Making A Measurement

GSM measurements are intended to be used as “one button” measurements. This means that the appropriate measurement can be selected and run by a single key press once the instrument has been connected to the equipment to be tested. The measurement is made automatically using default parameters defined by the selected standard and the tuning plan.

Even though the measurements are designed as one-button measurements, you may change the default settings using various setup keys. However, changing the default settings may produce measurement results that are outside of the parameters of the selected standard and tuning plan requirements.

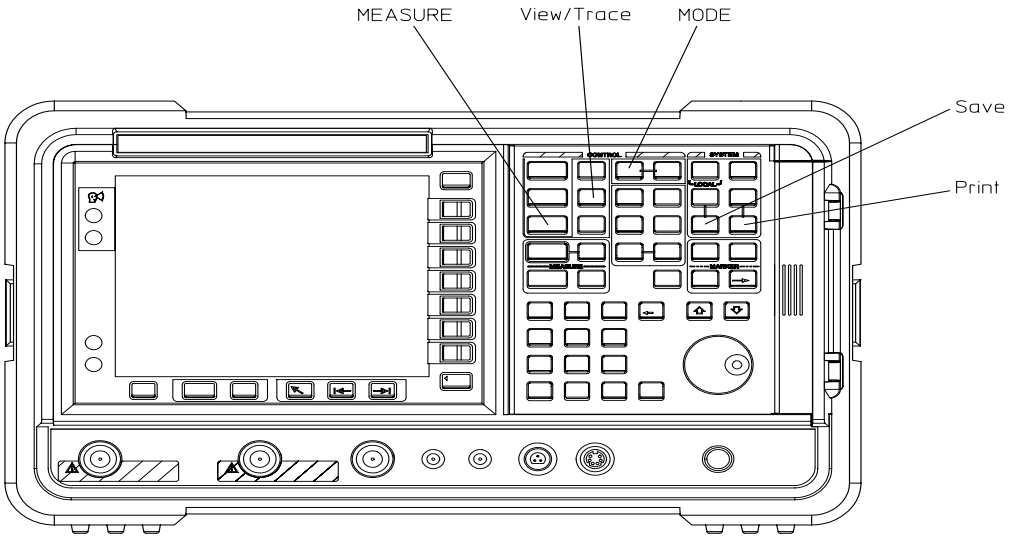
Most measurements can be performed using the simple four-step procedure outlined in the table below. Most measurements are performed using only the primary keys listed in conjunction with a minimum of setup keys. Measurement setup keys (**Meas Setup**) can be used for non-standards compliant testing. For more information see “Initial settings” above.

Table 3-1 Four Step Procedure For Performing Measurements

Step	Primary Key	Setup Keys	Related Keys
1. Select and set up mode	**MODE**	**Mode Setup**	**System**
2. Select and set up measurement	**MEASURE**	**Meas Setup**, **Restore Meas Defaults**, **FREQUENCY Channel**	**Meas Control**, **Restart**
3. Select and set up view	**View/Trace**	**Span X Scale**, **Amplitude Y Scale**, **Display**	**Marker**, **Search**
4. Saving and printing results	**File** **Print**	**Print Setup**	**Save**

The primary keys required for performing most measurements are shown in the following diagram.

Figure 3-1 Primary Keys Used for Performing Measurements



Saving Measurement Results

To save measurement results, follow the process shown below. For additional information on file management in the spectrum analyzer, refer to the *ESA Spectrum Analyzers User's Guide*.

1. Press **File**, **Save**, **Type**, **More**, and **Measurement Results**.
2. If you want to change the file name, press **Name**, and use the Alpha Editor the enter the new name. For more information on using the Alpha Editor, refer to the *ESA Spectrum Analyzers User's Guide*.
3. Press **Save Now** to complete the file saving process.
4. If you have used the default file name and wish to save additional measurement results, press **Save**. The current measurement result will be saved with the next default file name.
5. If you have not used the default file name and wish to save additional measurement results, repeat steps 1 through 3.

4 Menu Maps

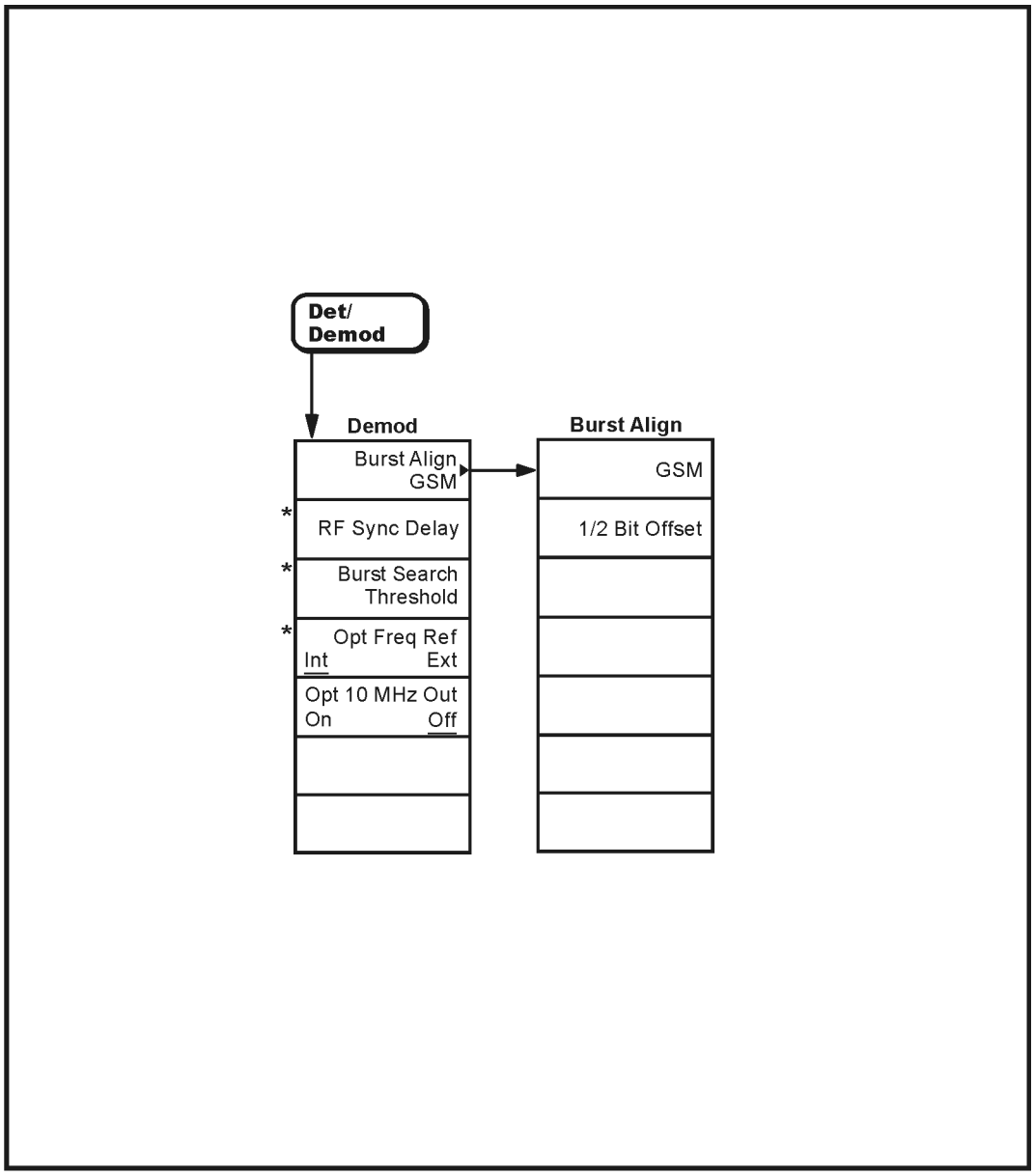
This chapter provides a visual representation of the front panel keys and their associated menu keys. For function key descriptions, refer to Chapter 5 , “Front-Panel Key Reference.”

What You Will Find In This Chapter

This chapter provides menu maps for the front panel keys having associated menus. The key menus appear in alphabetical order as follows:

Menus

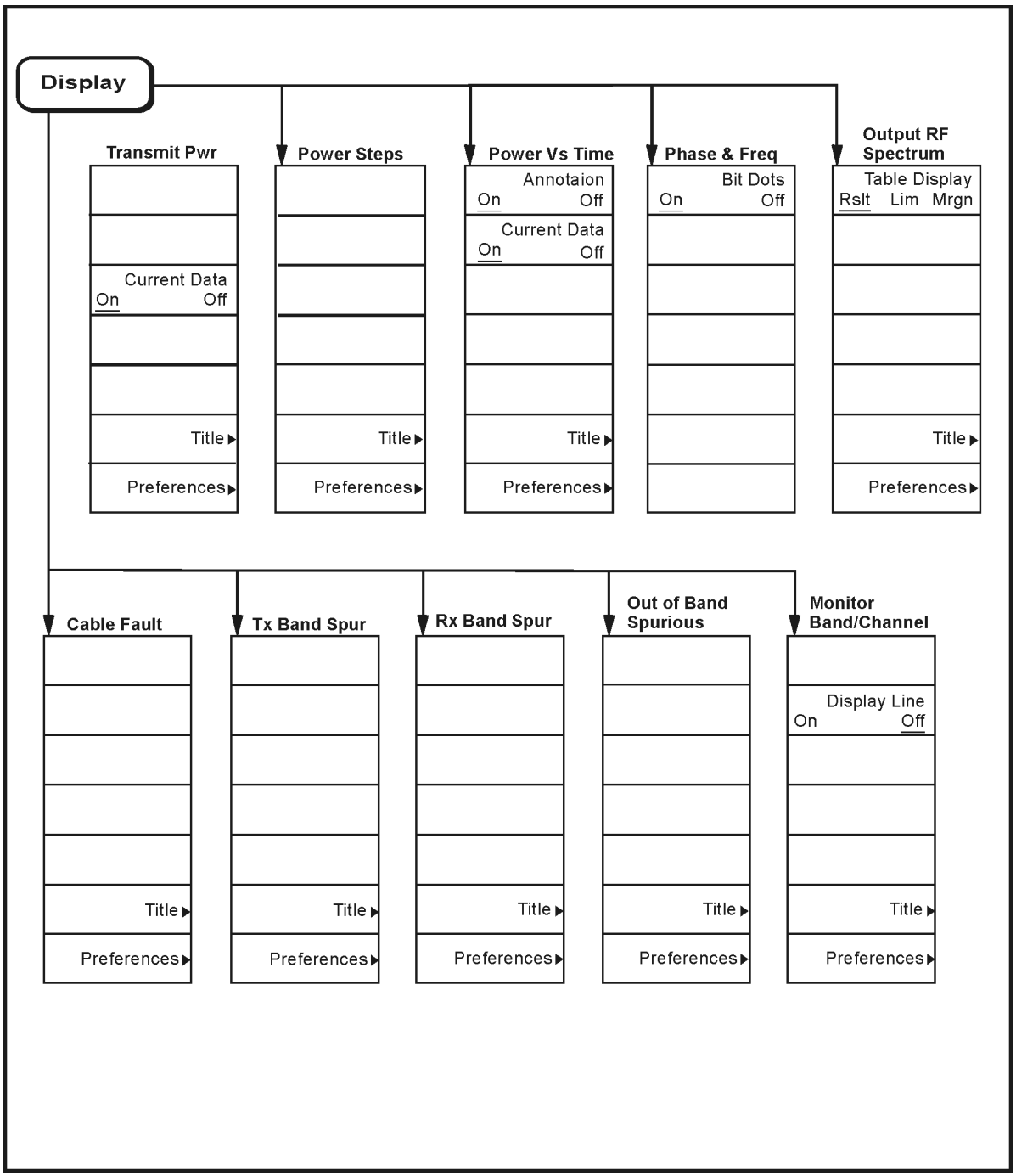
Detector and Demodulation Menu



* An active function that allows data entry

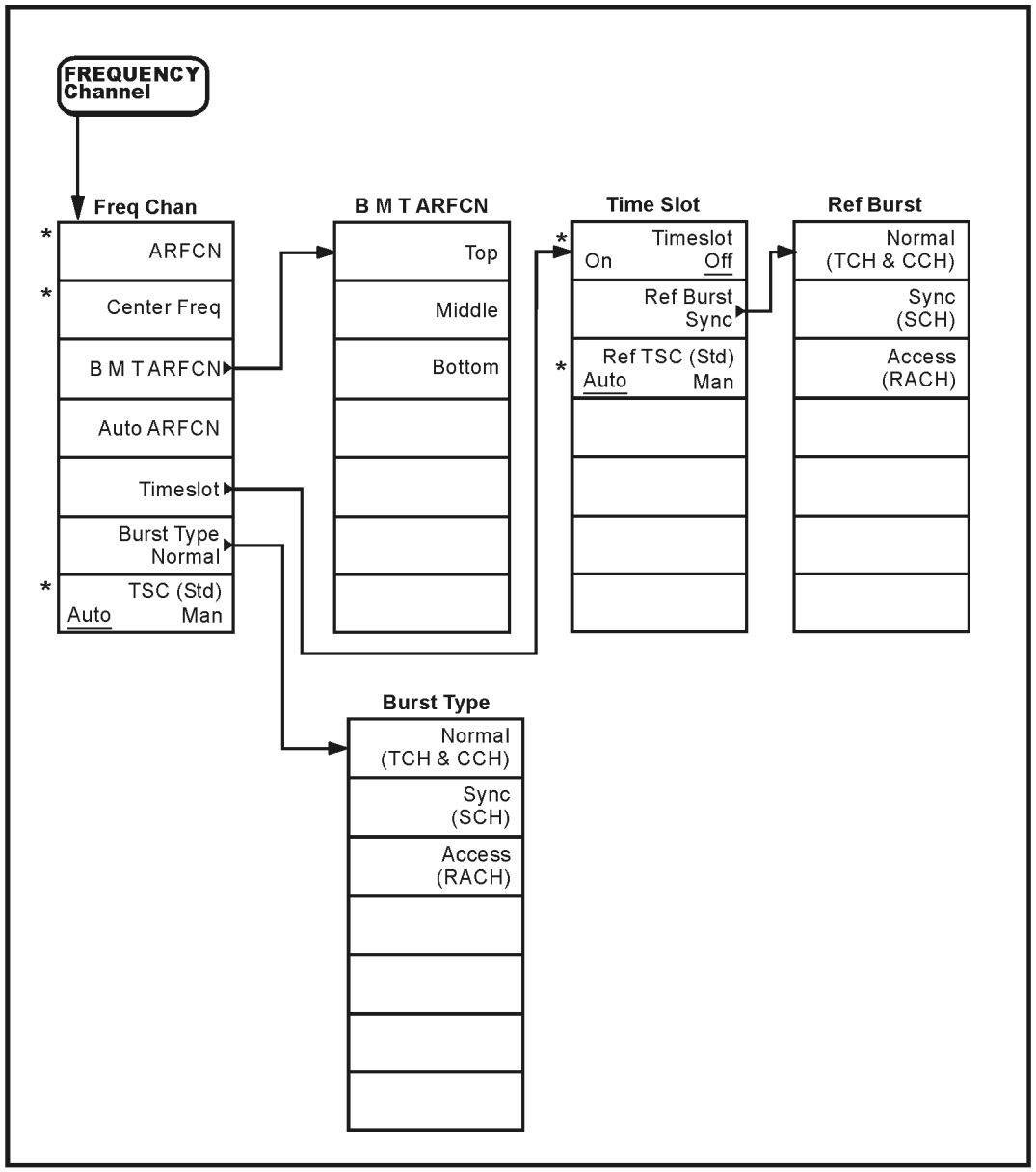
pl721c

Display Menu



pl75c

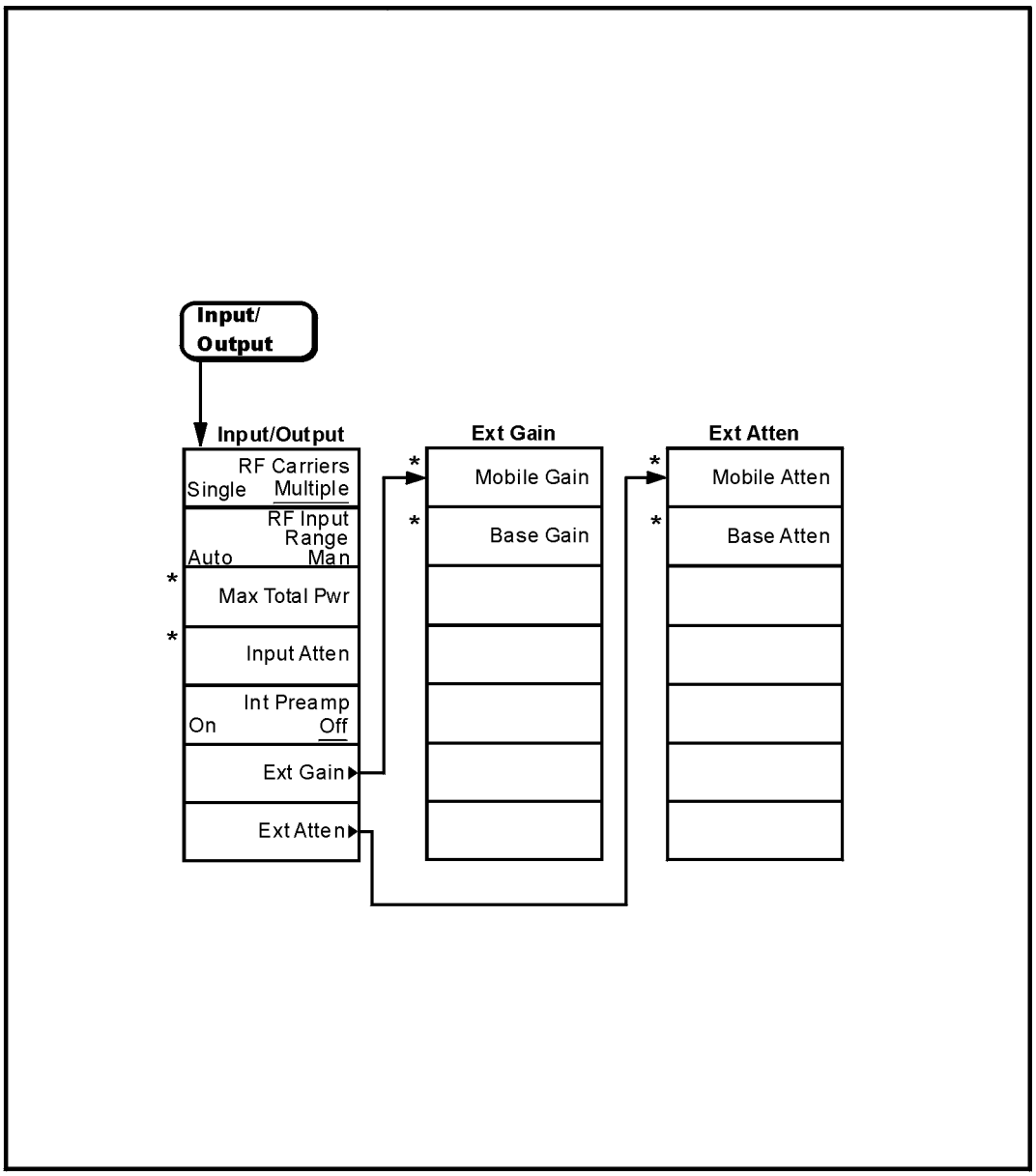
Frequency/Channel Menu



* An active function that allows data entry

pl74c

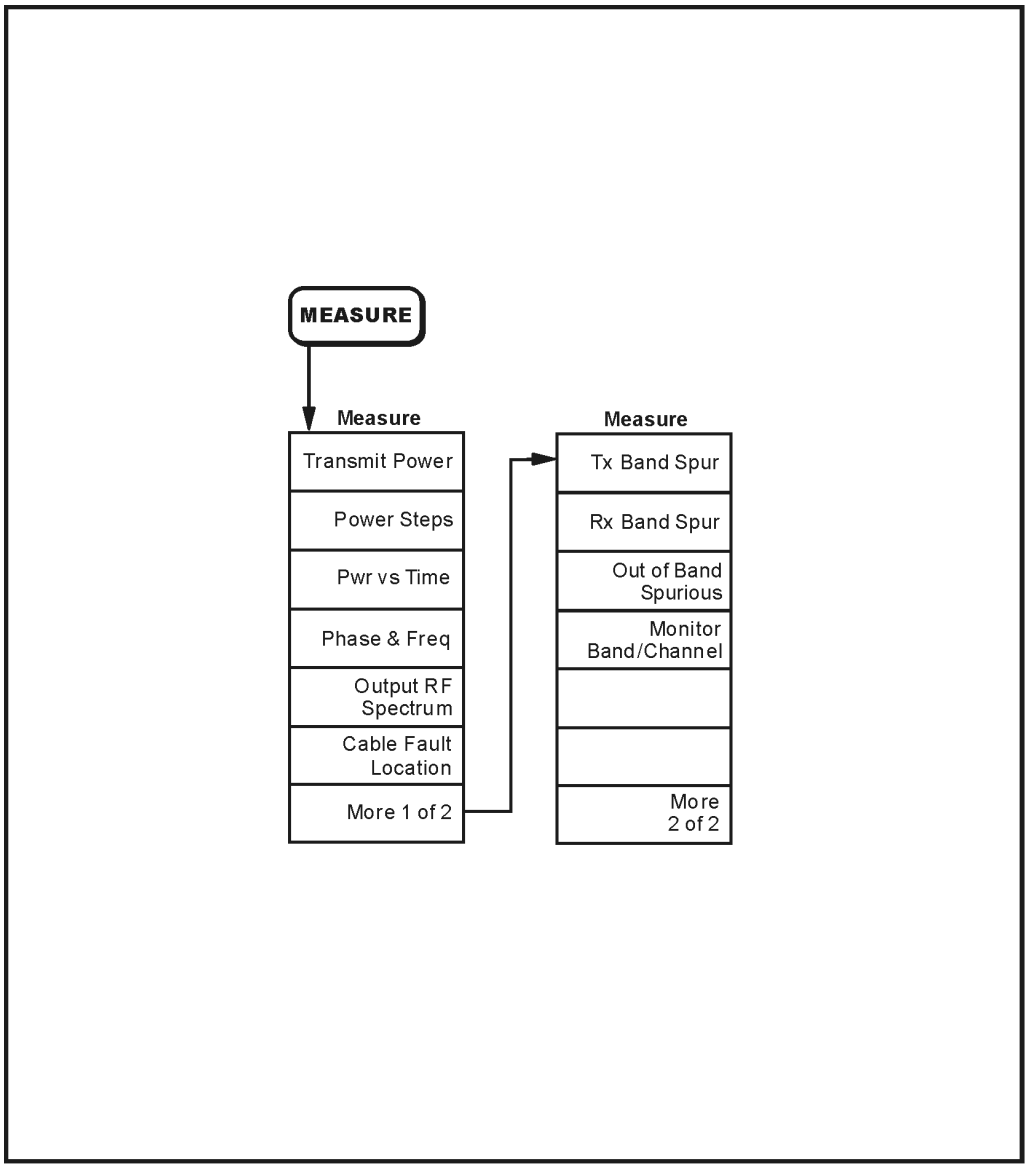
Input/Output Menu



* An active function that allows data entry

pl720c

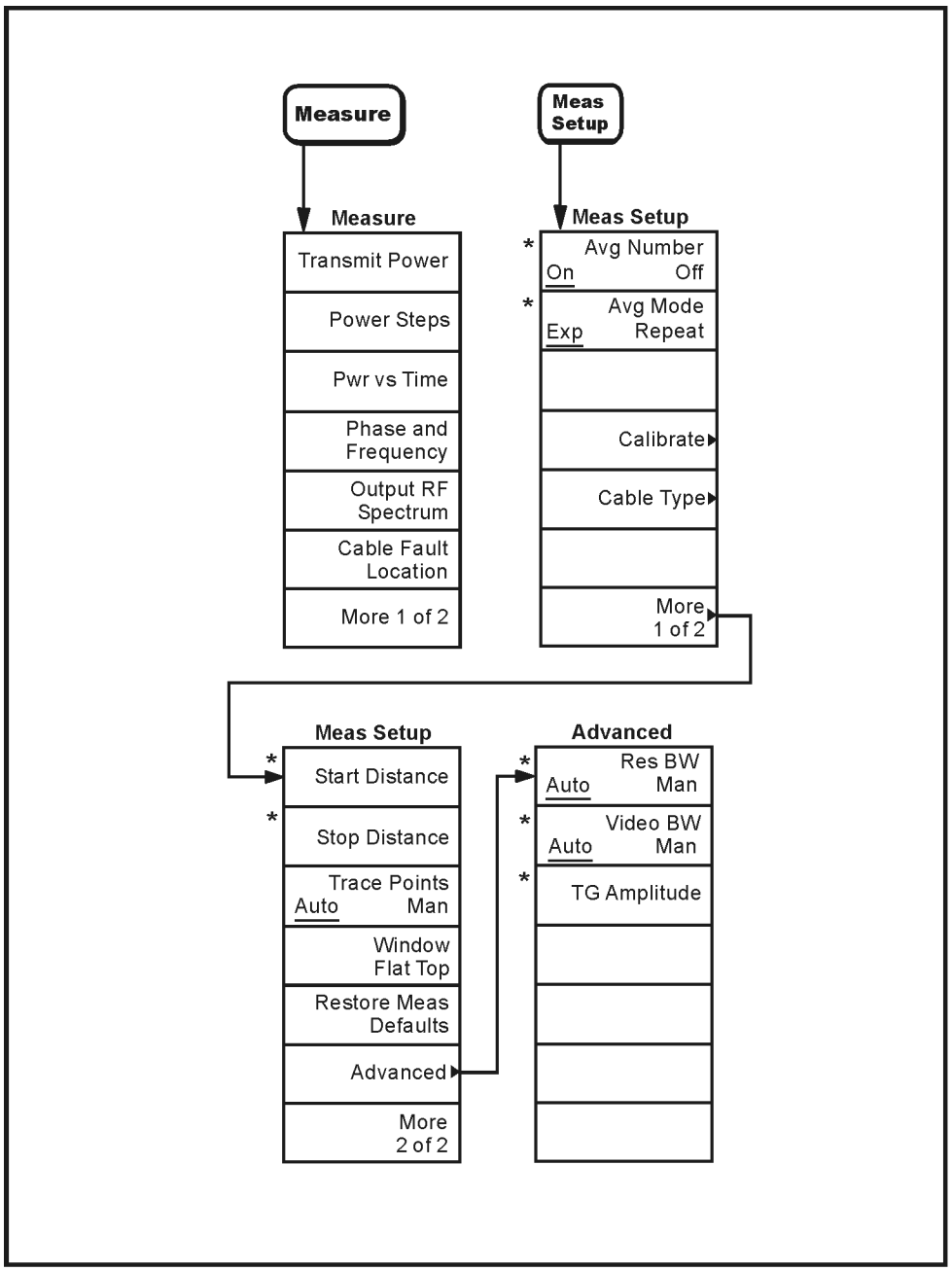
Measure Menu



pl73c

Measurement Setup Menus

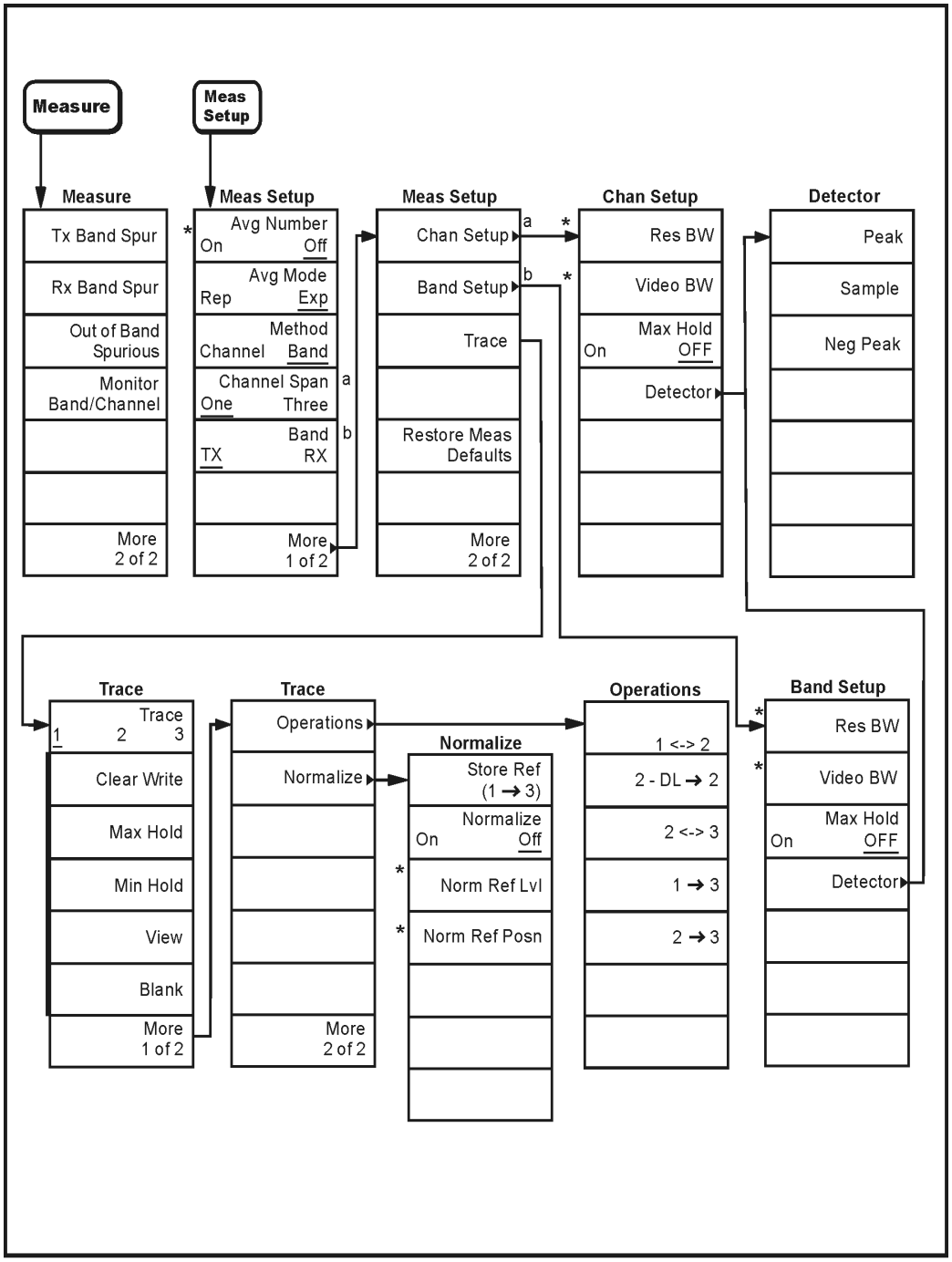
Cable Fault Location Measurement Setup Menu



* An active function that allows data entry.

pl716c

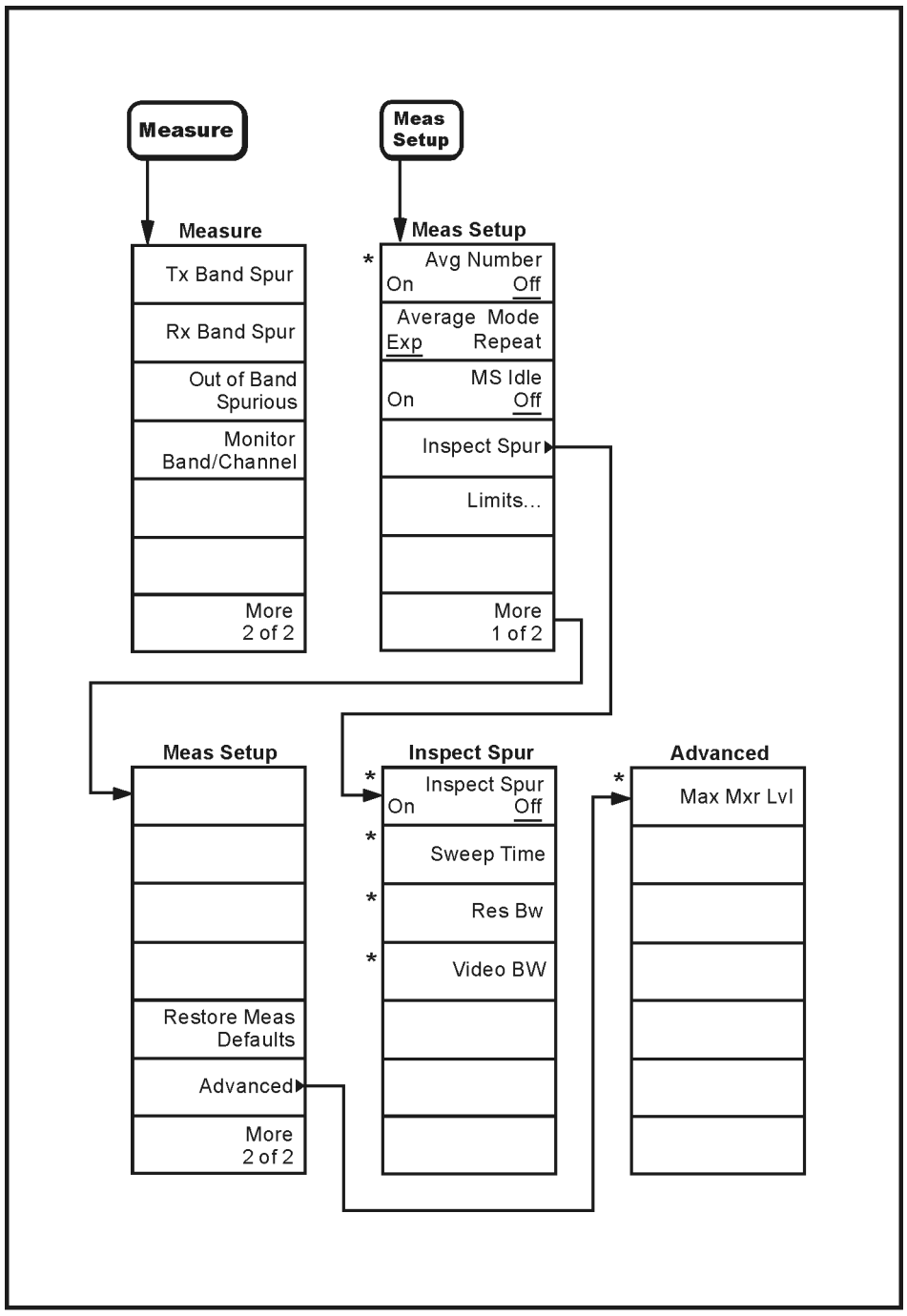
Monitor Band/Channel Measurement Setup Menu



a. If Method is set to **Band** this key is greyed out.
b. If Method is set to **Channel** this key is greyed out.
* An active function that allows data entry.

pl717c

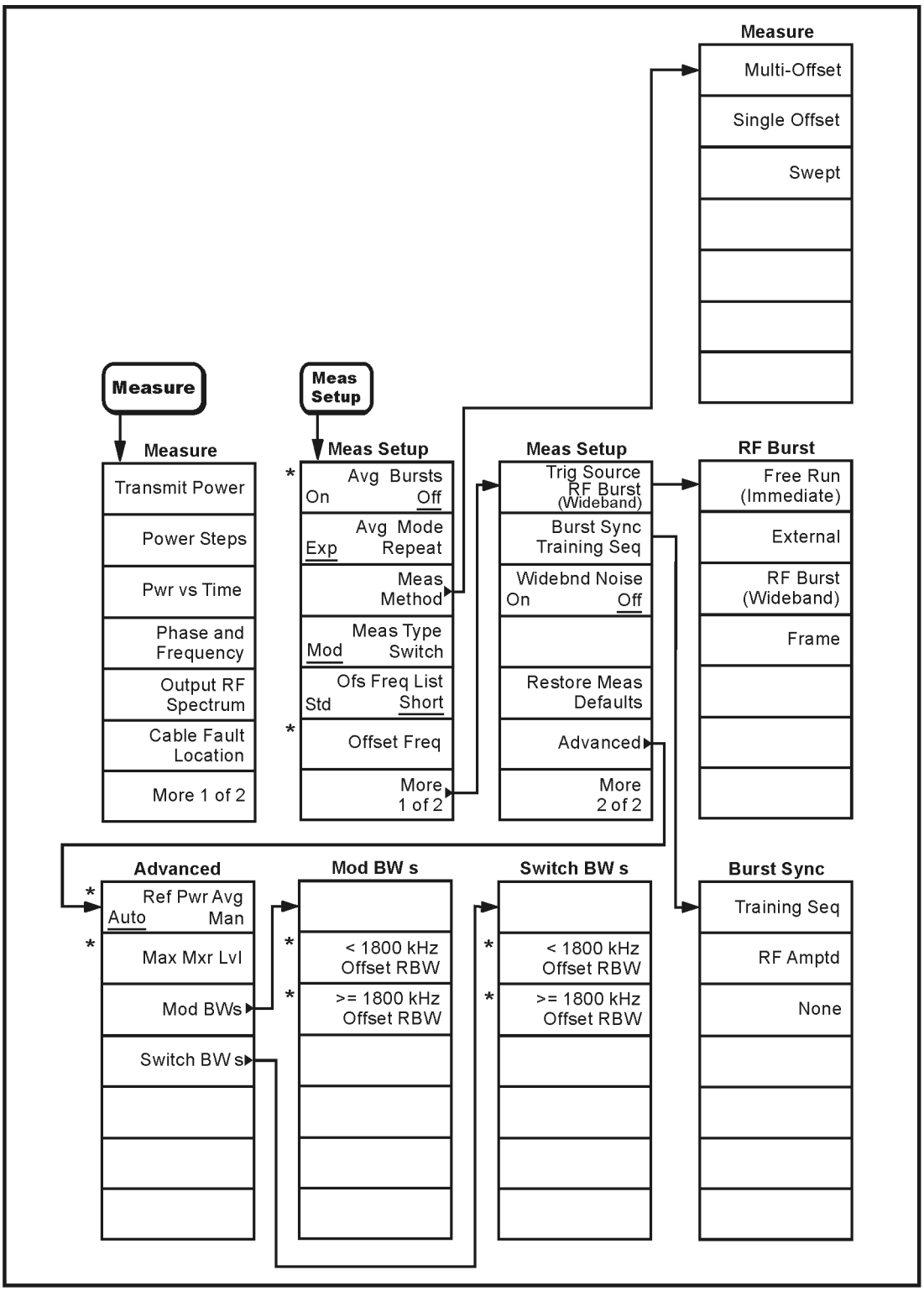
Out Of Band Spurious Measurement Setup Menu



* An active function which allows data entry

pl711c

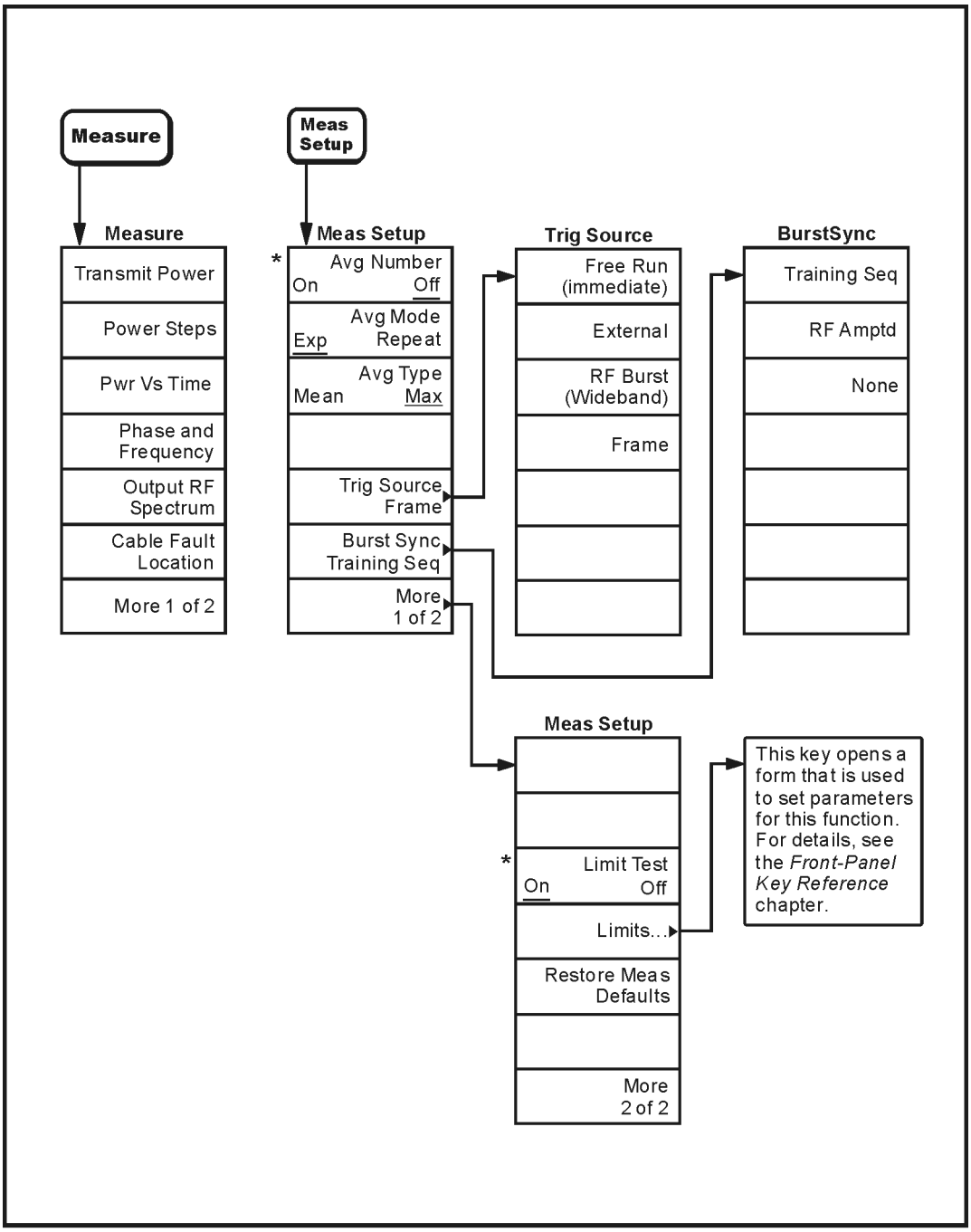
Output RF Spectrum Measurement Setup Menu



* An active function that allows data entry.

pl710c

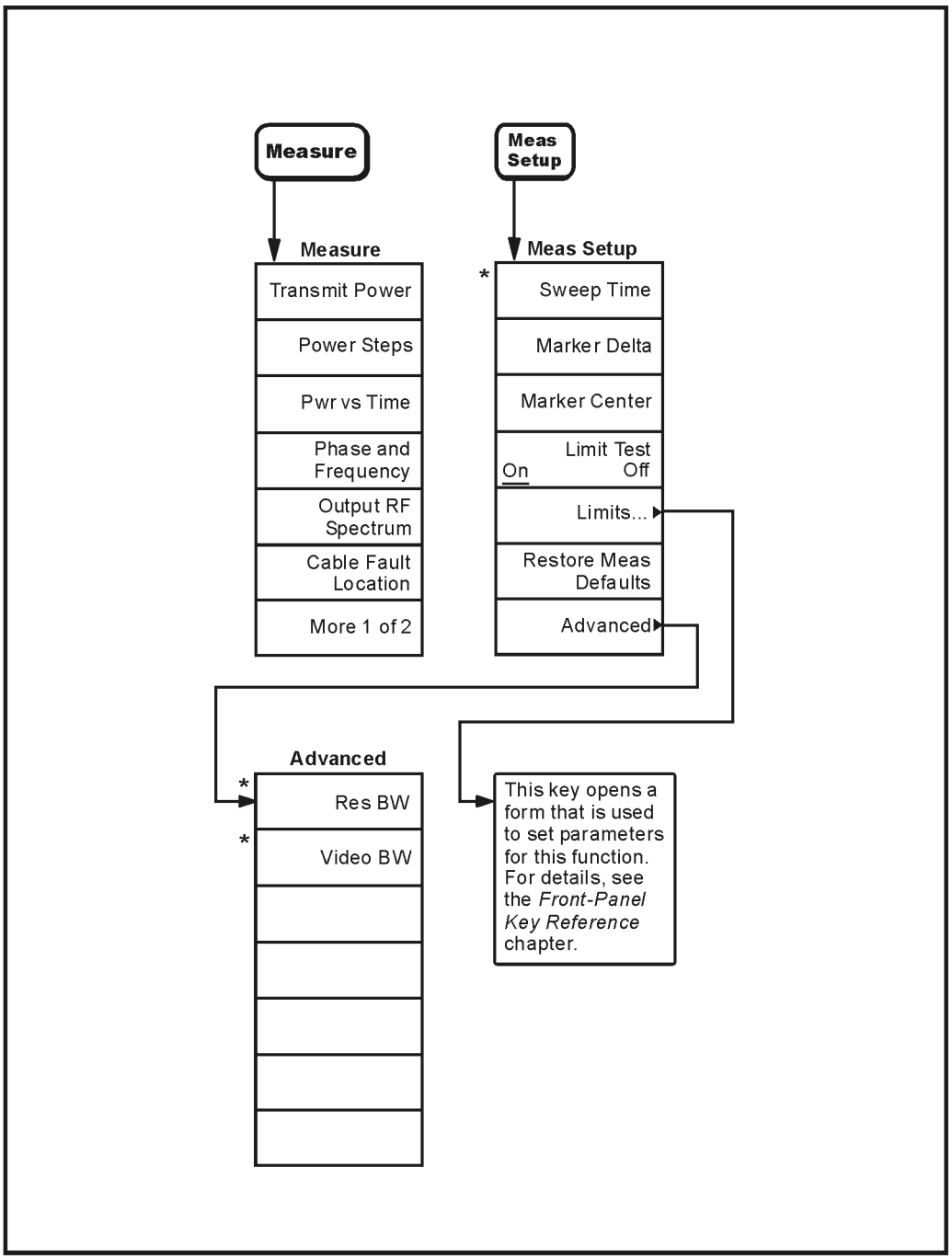
Phase And Frequency Error Measurement Setup Menu



* An active function that allows data entry

pl715c

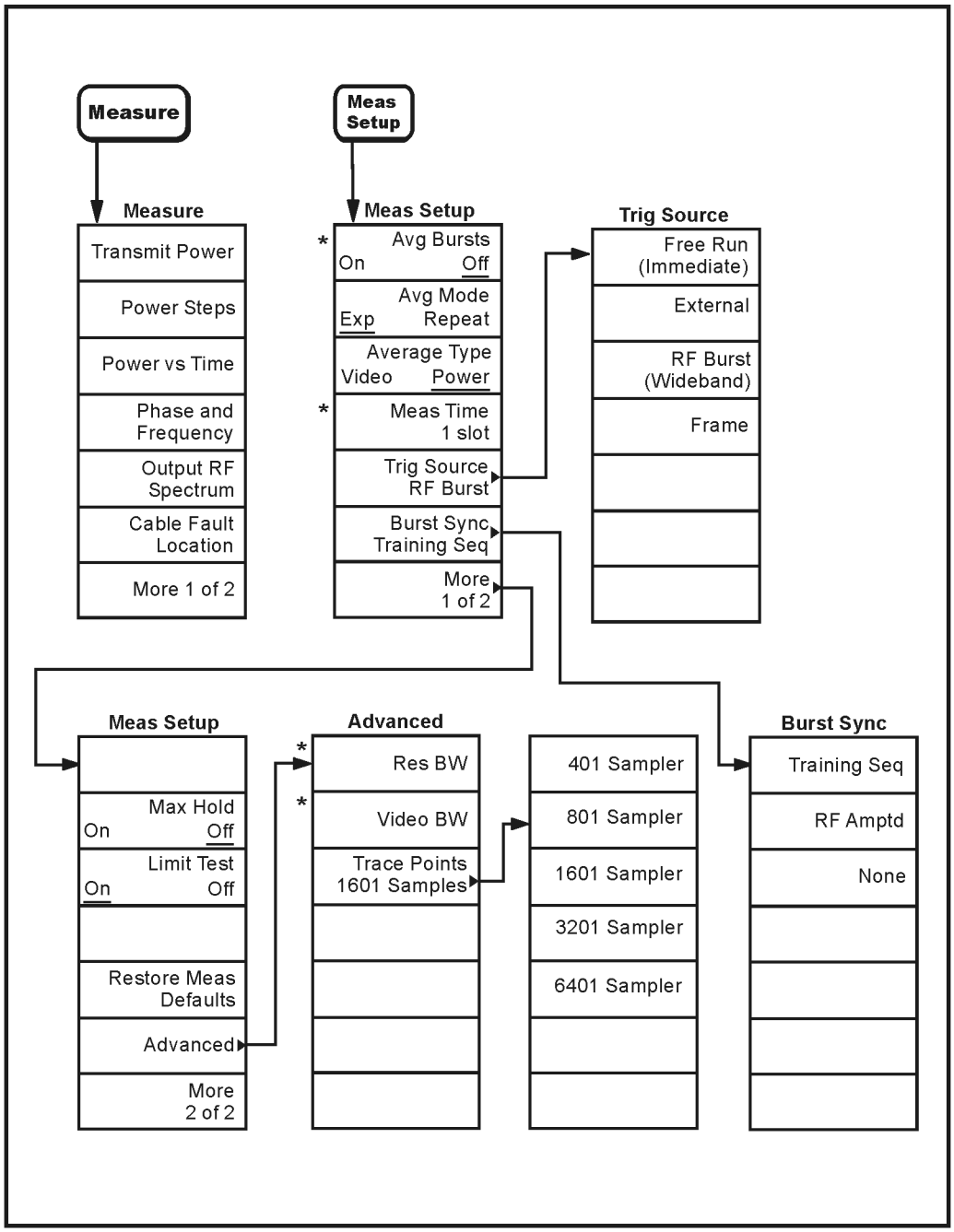
Power Steps Measurement Setup Menu



* An active function that allows data entry

pl78c

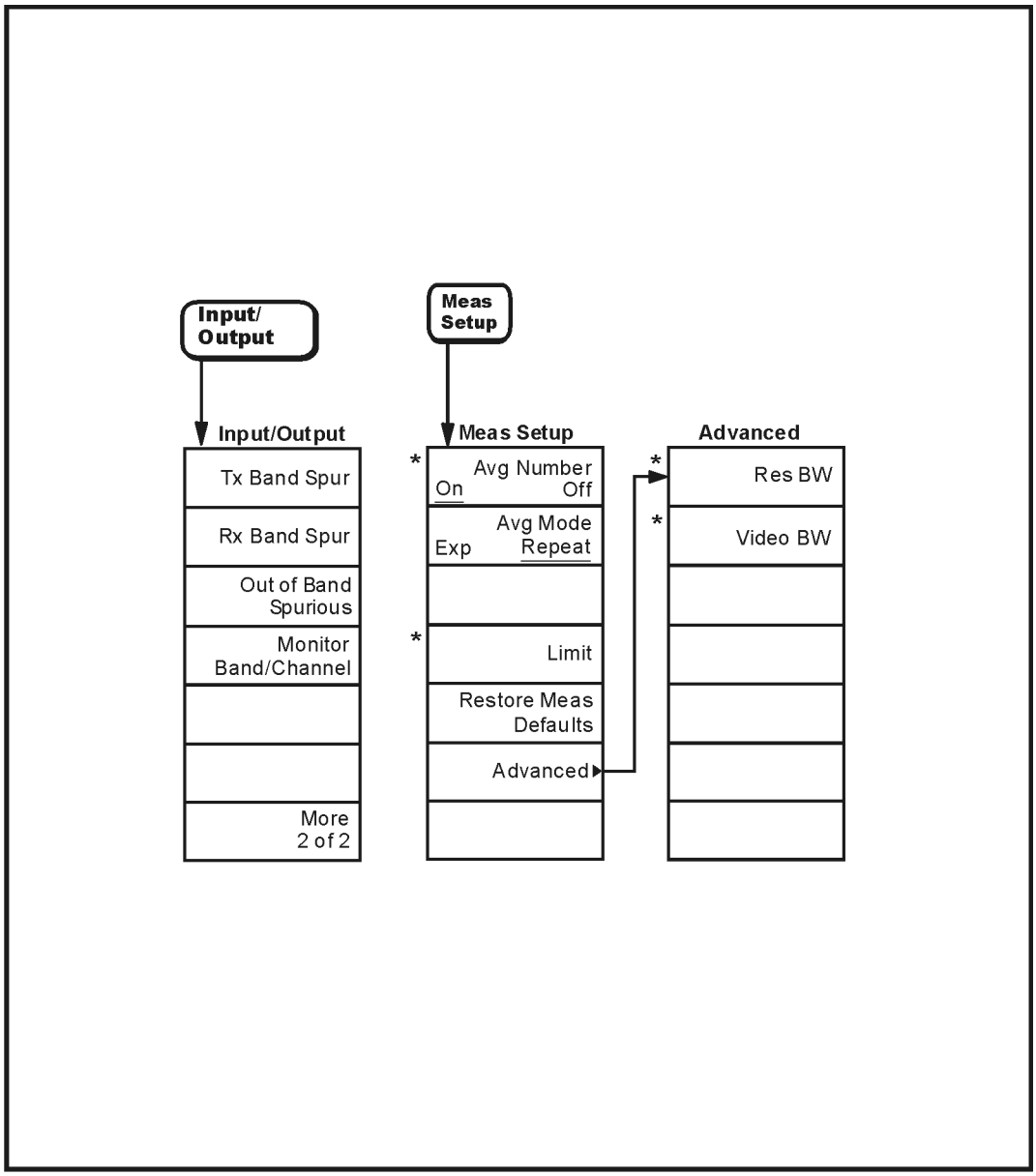
Power vs Time Measurement Setup Menu



* An active function that allows data entry.

pl79c

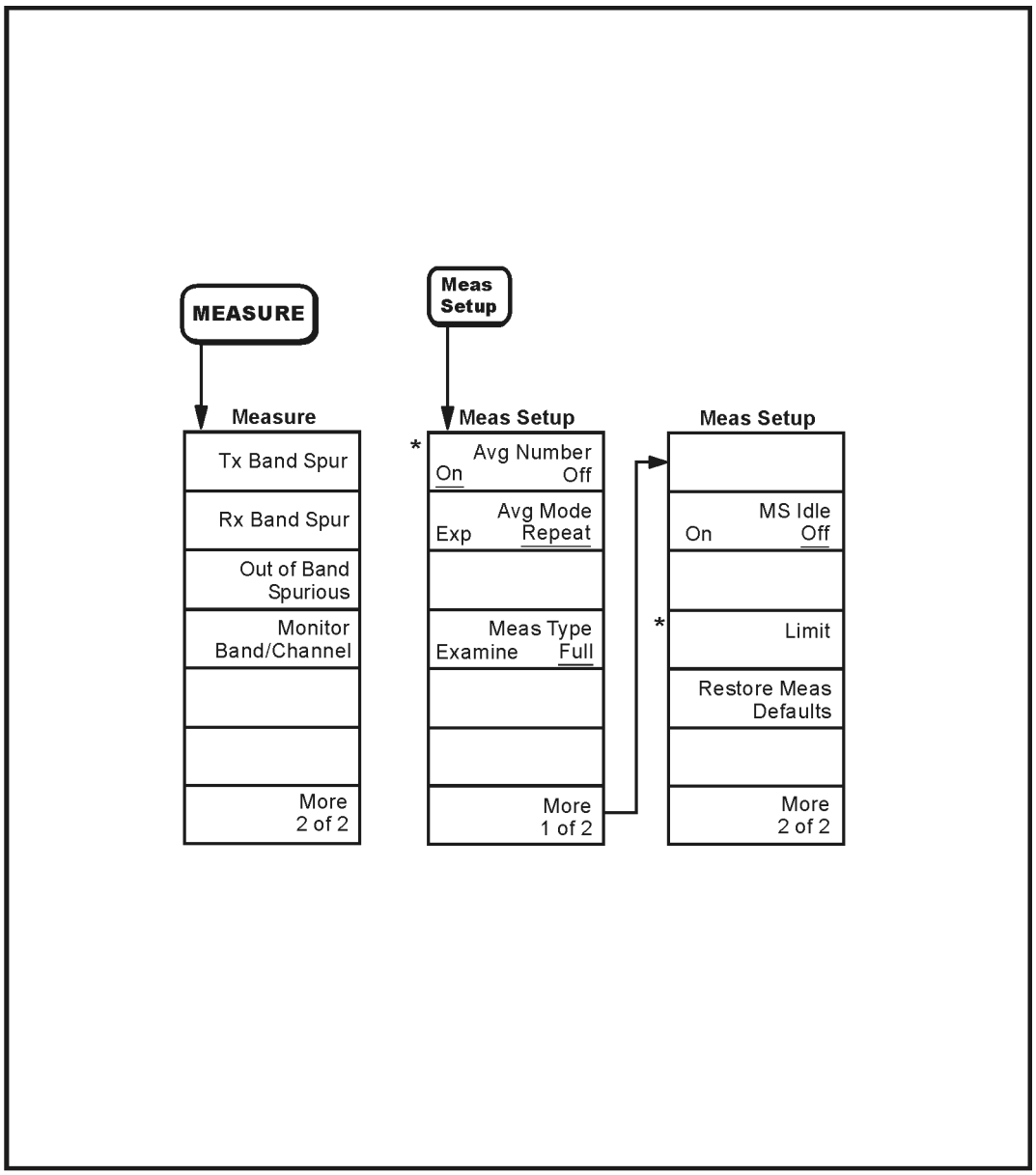
Receive Band Spurious Measurement Setup Menu



* An active function that allows data entry

pl714c

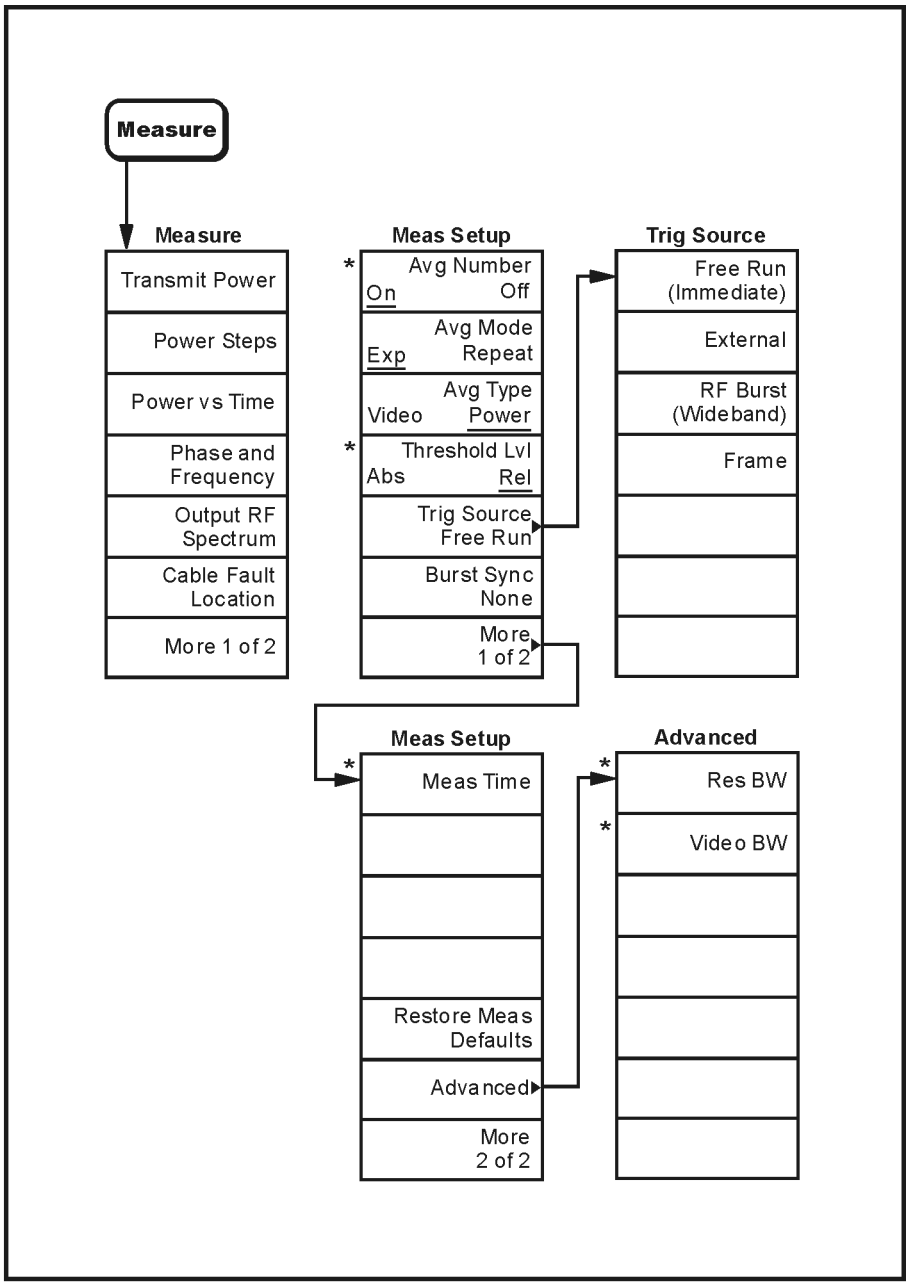
Transmit Band Spurious Measurement Setup Menu



* An active function that allows data entry

pl713c

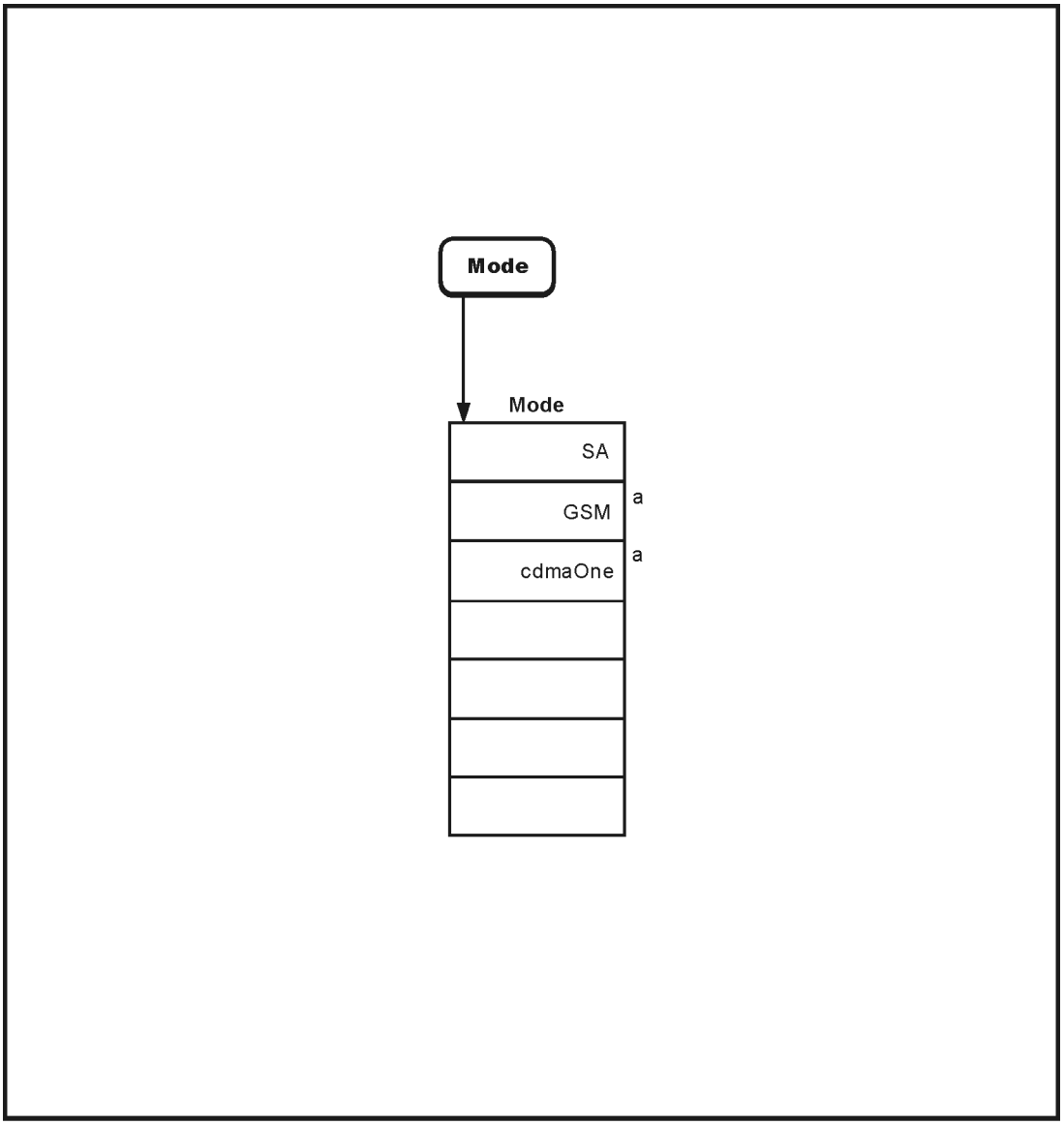
Transmitter Power Measurement Setup Menu



* An active function that allows data entry.

pl718c

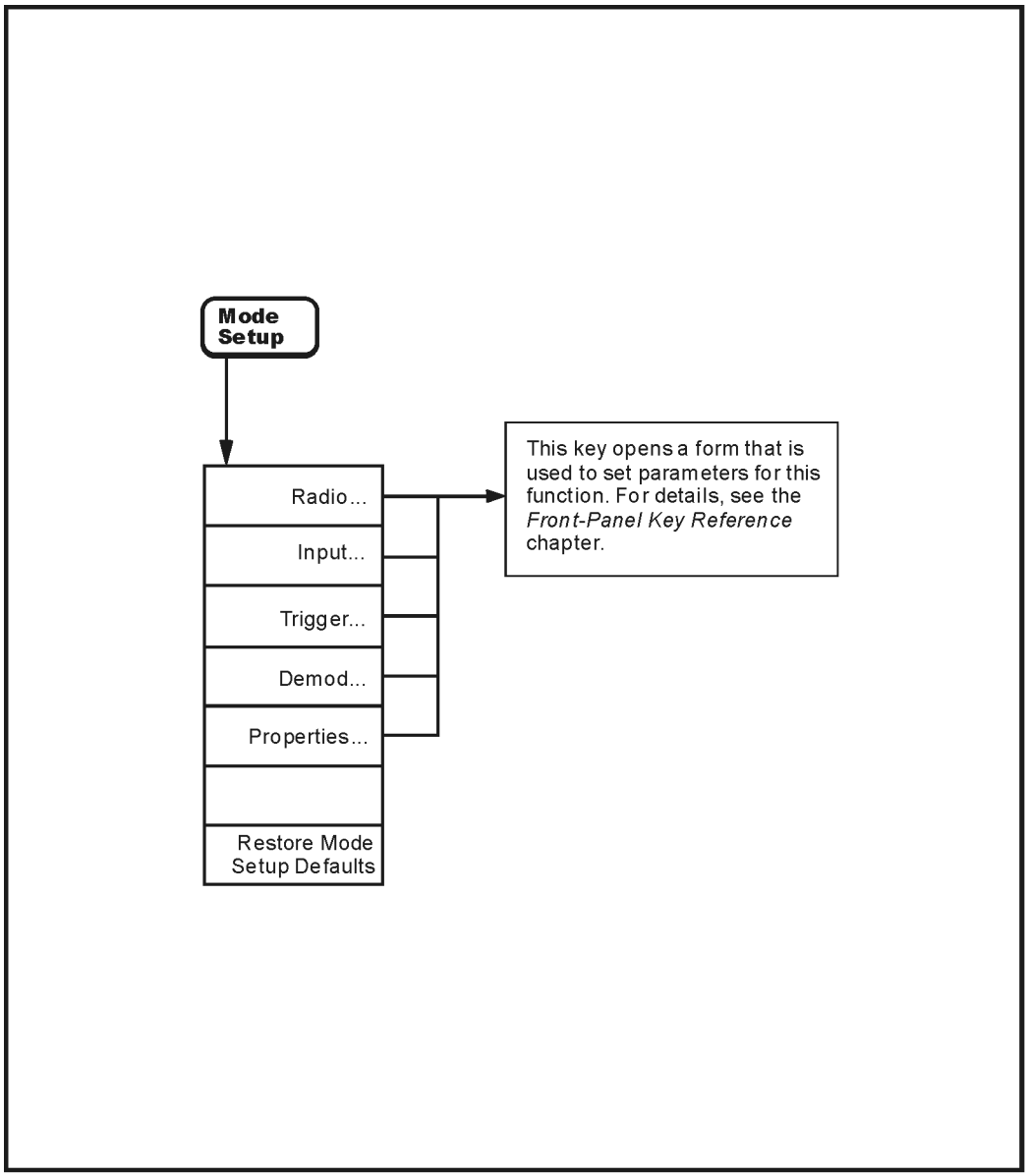
Mode Menu



a. These menu items will appear only when the measurement personality option has been installed and the license key has been activated. They may appear in any order.

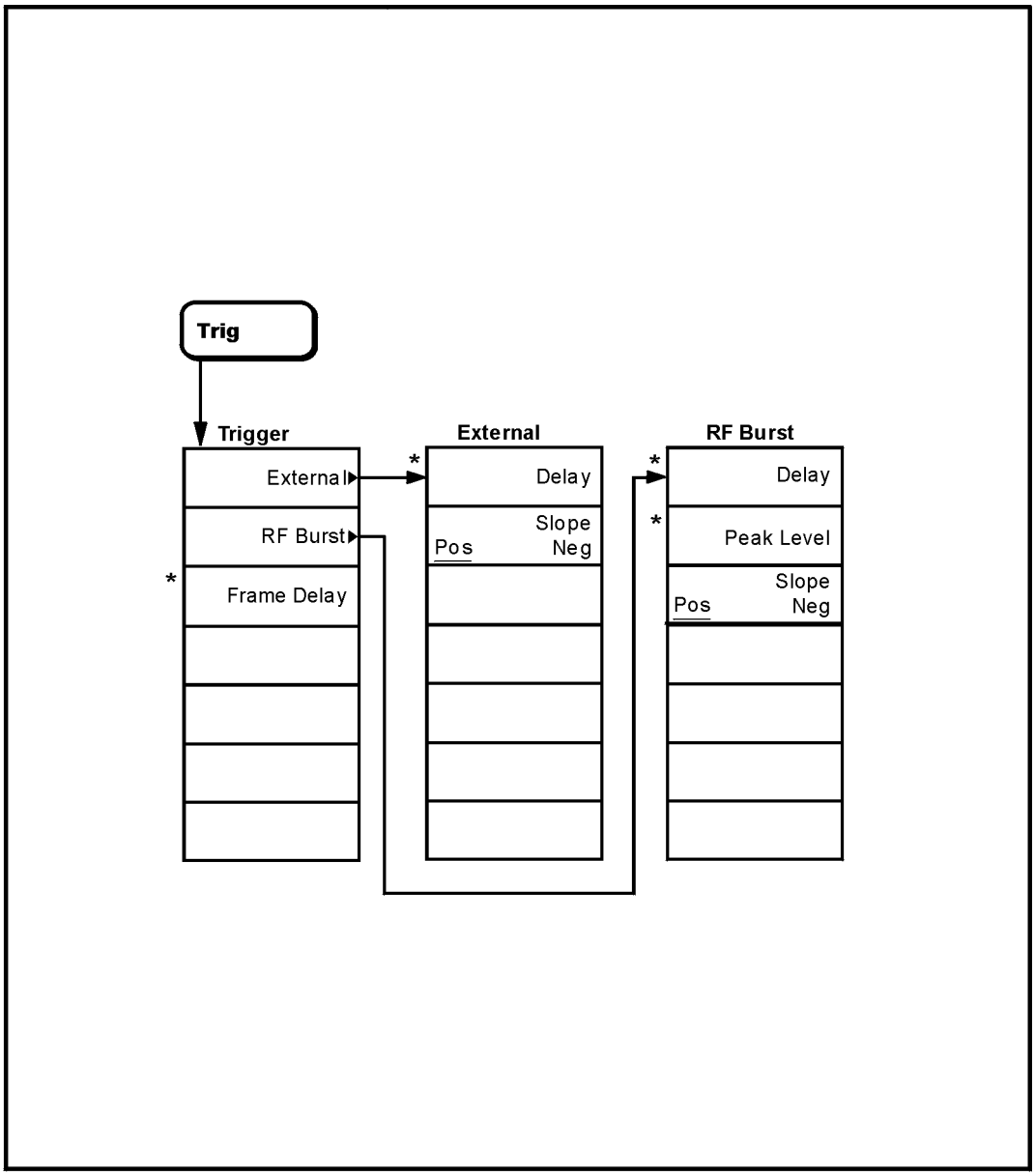
pl71c

Mode Setup Menu



pl72c

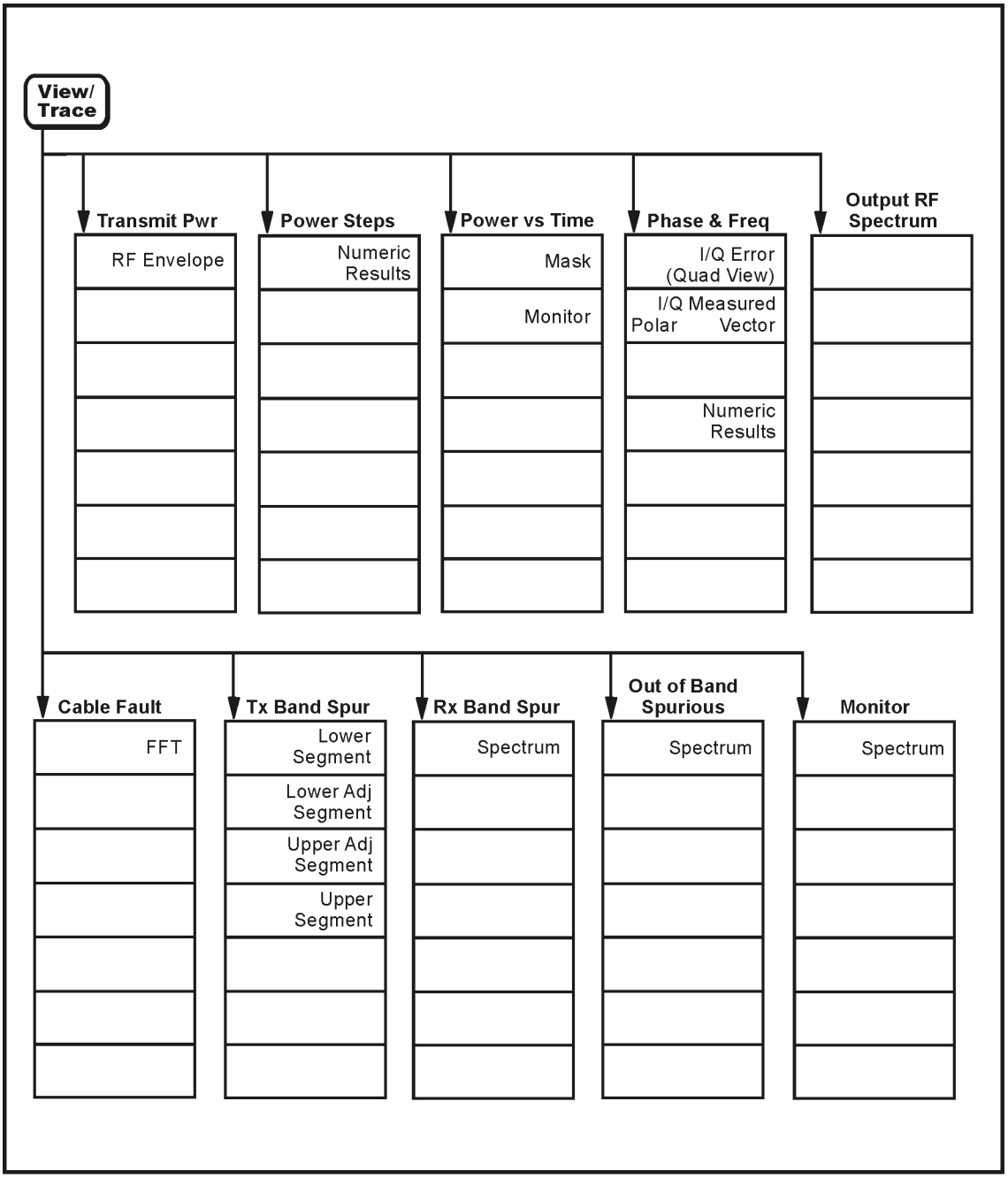
Trigger Menu



* An active function that allows data entry

pl722c

View/Trace Menu



pl76c

5 Front-Panel Key Reference

This chapter details the front-panel keys and menu keys that appear on the menu-maps presented in the previous chapter. The front-panel keys are listed alphabetically and are described with their associated menu keys. The menu keys are arranged as they appear on your analyzer menus.

Key Descriptions and Locations

This chapter provides information on GSM front panel keys which do not exist in SA mode or keys which have different functionality from SA mode equivalents. For information on SA mode keys not described in this chapter, refer to the *ESA Spectrum Analyzers User's Guide*.

Display

The **Display** front panel key leads to one of the GSM measurement display menus depending on which measurement is selected when the key is pressed.

Transmitter Power

Current Data The values for Mean Transmit Power, Max Pt, and Min Pt for the current trace are calculated and displayed on the results screen by default. **Current Data** is used to toggle on/off the calculation and display of these values. The measurement executes slightly more quickly when the parameter is set to off.

On Sets calculation and display on.

Off Sets calculation and display off.

The default value is On.

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Power Steps

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Power versus Time

Annotation Shows/hides any annotations on the graph area of the display.

On Shows annotations.

Off Hides annotations.

The default value is On.

Current Data The values for Mean Transmit Power, Max Pt, and Min Pt for the current trace are calculated and displayed on the results screen by default. **Current Data** is used to toggle on/off the calculation and display of these values. The measurement executes faster when the parameter is set to off.

On Sets calculation and display on.

Off Sets calculation and display off.

The default value is On.

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Phase & Freq

Bit Dots Allows you to turn the display of the measured values used to calculate the trace to On or Off. If turned on, these values (coordinates) are superimposed on the trace.

On Displays the measured values as well as the trace.

Off Displays the trace only.

The default value is On.

Output RF Spectrum

Table Display When the measurement method is set to multiple, the results table can be changed to show any of the following sets of values:

Rslt Displays the actual measurement results.

Lim Displays the absolute and relative limits for all offsets.

Mrgn Displays the margin by which the result meets specifications. Negative numbers indicate that the result has failed.

The default value is Rslt.

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Cable Fault Location

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Transmit (Tx) Band Spurious

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Receive (Rx) Band Spurious

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Out Of Band Spurious

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

Monitor Band/Channel

Display Line Turns on/off an adjustable horizontal line that is used as a visual reference line.

On Displays the line.

Off Turns off the line.

The default value is Off.

Title Leads to a menu enabling the title string to be changed or cleared.

Preferences Leads to a menu enabling the graph window graticule or annotation to be turned on/off.

FREQUENCY Channel

The **FREQUENCY Channel** front panel key provides access to menu keys which control the center frequency or channel number to be used for measurements. These parameters apply to all measurements in the current mode.

ARFCN

Absolute RF Channel Number. Used to enter the channel to be measured for the selected band. It is coupled with **Center Freq**—setting **ARFCN** sets **Center Freq** to the value corresponding to that **ARFCN**. Range is limited to valid channels for the selected band. Screen displays show the **ARFCN** if it correlates with the **Center Freq** value. If the two values do not correlate, the **Center Freq** value is displayed. Note that changing **ARFCN** does not affect the currently displayed **Center Freq** for any of the band measurements.

Channel Freq

Sets the channel frequency to be measured for the selected band. It is coupled with **ARFCN**—setting **Center Freq** sets **ARFCN** to the channel corresponding to that frequency. If the **Center Freq** value entered does not exactly correlate with an **ARFCN**, the softkey label changes to display the closest **ARFCN** to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that **ARFCN**.

BMT ARFCN

Enables quick selection from a subset of the available ARFCN numbers for the **Top**, **Middle**, or **Bottom** frequency in the selected band as follows.

	Bottom		Middle		Top	
Band	**Center Freq**	**ARFCN**	**Center Freq**	**ARFCN**	**Center Freq**	**ARFCN**
P-GSM	935.2	1	947.4	63	959.8	124
E-GSM	925.2	975	942.6	38	959.8	124
R-GSM	921.2	955	940.6	28	959.8	124
DCS	1805.2	512	1842.4	698	1879.8	885
PCS	1930.2	512	1960.0	661	1989.8	810
GSM450	460.4	259	464.0	277	467.6	295
GSM480	488.8	306	492.4	324	496.0	342
GSM850	869.0	128	881.4	190	894.0	253

Note that the above values apply when **Device** is set to BTS. When **Device** is set to MS, ARFCN values are the same but **Center Freq** values are different.

Auto ARFCN Invokes the Auto ARFCN routine which locates the current GSM signal and sets the channel RF Channel Frequency, ARFCN, and Band accordingly.

Timeslot Provides access to the following Reference Timeslot parameters

Timeslot Set timeslot on/off. Set on to select a specific timeslot over which to make the demodulation measurements. The timeslot feature is only supported in External and Frame trigger source modes:

- **External**

  Set the value to the number of the timeslot to be measured, from 0 to 7.

- **Frame**

  Set the value to the number of the timeslot to be measured, from 0 to 7.

The key is grayed out:

- If Options B7D: DSP with fast ADC and B7E: Digital Demod RF are not installed.
- If trigger source is not set to external or frame.

Ref Burst Used to select the type of burst to be used as the frame reference burst. Possible options are **Normal (TCH & CCH)**, **Sync (SCH)** or **Access (RACH)**

The key is grayed out:

- If Options B7D: DSP with fast ADC and B7E: Digital Demod RF are not installed.
- If trigger source is not set to frame.

Ref TSC (Std) Used to select the Training Sequence Code to be used as the frame reference burst

The key is grayed out:

- If Options B7D: DSP with fast ADC and B7E: Digital Demod RF, are not installed.
- If **Ref Burst** other than **Normal (TCH & CCH)** is selected.
- If trigger source is not set to frame.

Burst Type Used to select the type of burst to be measured. Possible options are **Normal (TCH & CCH)**, **Sync (SCH)** or **Access (RACH)**.

The key is grayed out:

- If Options B7D: DSP with fast ADC and B7E: Digital Demod RF are not installed.

TSC (Std) Training sequence code.

The key is grayed out:

- If Options B7D: DSP with fast ADC and B7E: Digital Demod RF, are not installed.
- If **Burst Type** other than **Normal (TCH & CCH)** is selected.

Default settings

The following table shows the default settings for the Frequency Channel menu keys.

Frequency Channel Menu Keys: Default Settings	
ARFCN	38
Center Freq	942.6 MHz (Mid for E-GSM)
BMT ARFCN	N/A
Auto ARFCN	N/A
Timeslot	Off
Burst Type	Normal
TSC	Auto

Marker

The functions accessed by the **Marker** key are identical to those accessed in SA mode. For further information refer to the *Agilent ESA Spectrum Analyzers User's Guide*.

MEASURE

The **MEASURE** front panel key provides access to menu keys which enable you to make the following ESA-E Series Spectrum Analyzer GSM measurements:

- **Transmitter Power**
- **Power Steps**
- **Power versus Time**
- **Phase And Frequency Error**
- **Output RF Spectrum**
- **Cable Fault Location**
- **Transmit (Tx) Band Spurious**
- **Receive (Rx) Band Spurious**
- **Out Of Band Spurious**
- **Monitor Band/Channel**

Meas Setup

The **Meas Setup** front panel key displays a menu that allows you to enter custom setup parameters for a measurement. The setup menu displayed depends on the measurement selected from the **MEASURE** menu.

Cable Fault Location

To access the keys for setting up a cable fault location measurement, press **MEASURE**, **Cable Fault Location**, and then the front panel **Meas Setup** key.

Avg Number

Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

On Sets measurement averaging on.

Off Sets measurement averaging off.

Default values are 10 and On, and range values are 1 to 1000.

Avg Mode

Used to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Exponential After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.

Repeat After reaching the average count, the averaging is reset and a new average is started.

The default value is Exp.

Calibrate

Used to calibrate the spectrum analyzer, removing any errors introduced by the cabling and components of the test setup before making the measurement.

Cable Type

Used to select the type of cable being tested. Provides access to the Cable Editor form, displaying a table listing relevant cable types, plus the following keys:

Cable Used to select an entry in the cable type table. Accepts numeric values.

Vel Factor The velocity factor for the cable type selected. The field's numeric value represents a proportion of the speed of light. The value can be edited and saved using the **Store Table** key.

Cable Loss/m The amount of signal lost per meter for the cable type selected, expressed in dB. The value can be edited and saved using the **Store Table** key.

Store Table Used to save any changes made to the **Cable**, **Vel Factor** or **Cable Loss/m** parameters.

Start Distance Used to define the starting point for the fault measurements. It is measured in meters from the Spectrum Analyzer

The default value is 0.00 m.

Stop Distance Used to define the finishing point for the fault measurements. It is measured in meters from the Spectrum Analyzer

The default value is 20.0 m.

NOTE The Stop Distance will normally bet set to slightly more than the full length of the cable being tested.

Trace Points The number of trace points used in the measurement. Changing the number of trace points affects the minimum and maximum measurable distances. As a general rule, the longer the cable, the more trace points you should use. It is possible to select up to 8192 trace points but due to the computationally intensive FFT, the higher the value, the slower the measurement becomes. To ensure the fastest possible speed, use a value that is a power of 2—for example 512, 1024 and so on.

Window Used to select the FFT windowing function to be used. The cable fault measurement uses an FFT to convert the analyzer frequency trace into a distance trace. To get the best possible results from the FFT, it is important to apply the most suitable windowing function to the frequency trace before performing the FFT. Possible values are Rectangular, Flat Top, Gaussian, and Hanning. The default value is Flat Top. The following table describes these values.

Function	Description	Max Side-Lobe Level	Side-Lobe Roll Off	Max Main
Rectangular	Results in no windowing.	–13.261 dB	20 dB/decade	–3.9224 dB
Flat Top (default)	The five term flat-top window. A good window to use when making amplitude measurements of relatively pure tones.	–95.1 dB		+/–0.002077456085 dB
Gaussian	A five term cosine window that resembles a Gaussian window.	–125.4 dB		–0.680056 dB

Function	Description	Max Side-Lobe Level	Side-Lobe Roll Off	Max Main
Hanning	Has a good frequency resolution and reasonably good side-lobe roll-off, but poor main-lobe flatness and relatively large side-lobe peaks.	–31.46730784 dB	60 dB/decade	–1.423622 dB

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Advanced Provides access to the following advanced measurement parameter settings:

Res BW Used to set the resolution bandwidth used for the measurement and to define whether it is automatic or manual. Default values are 3 MHz and Auto.

Video BW Used to set the video bandwidth used for the measurement and to define whether it is automatic or manual. Default values are 3 MHz and Auto.

TG Amplitude Used to set the power level of the internal source.

Monitor Band/Channel

To access the keys for setting up a monitor band/channel measurement, press **MEASURE**, **Monitor Band/Channel**, and then the front panel **Meas Setup** key.

Avg Number

Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

On Sets measurement averaging on.

Off Sets measurement averaging off.

Default values are 10 and On, and range values are 1 to 1000.

Avg Mode

Used to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Exponential After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.

Repeat After reaching the average count, the averaging is reset and a new average is started.

The default value is Exp.

Method

Used to select the method used for monitoring. Possible values are Channel and Band and the default value is Band.

Channel Span

Used to toggle between monitoring the current ARFCN by itself (One) or the ARFCN and the three channels on either side of it (Three). The default value is One. **Channel Span** is grayed out when **Method** is set to Band.

Band

Used to toggle between monitoring transmit (Tx) or receive (Rx). The default value is Tx. **Band** is grayed out when **Method** is set to Channel.

Chan Setup/ Band Setup

Chan Setup is displayed when **Method** is set to Channel. **Band Setup** is displayed when **Method** is set to Band. Both provide access to the following keys:

Res BW Used to change the 3 dB resolution bandwidth in a 1, 3, 10 sequence. The default value is 100 kHz for Band and 10 kHz for Channel.

Video BW Used to change the analyzer post detect filter in a 1, 3, 10 sequence. The default value is 100 kHz for Band and 10 kHz for Channel.

Max Hold Displays a trace of the maximum values for a measurement. The default value is Off.

Detector Used to change the type of video detection used. Possible values are Peak, Sample and Neg Peak. The default value is Peak. **Detector** is grayed out when **Method** is set to Band.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Out Of Band Spurious

To access the keys for setting up an out of band spurious measurement, press **MEASURE**, **Out Of Band Spurious**, and then the front panel **Meas Setup** key.

Avg Number Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- **On** Sets measurement averaging on.
- **Off** Sets measurement averaging off.

Default values are 10 and On, and range values are 1 to 1000.

Avg Mode Grayed out for this measurement.

MS Idle Used to specify that you wish to measure a mobile station that is in idle mode—that is, where no call is in progress. The measurement uses the filter bandwidths and sweep times appropriate to the specifications. This involves some longer sweep times of greater than 60 seconds. Possible values are On and Off. The default value is Off. **MS Idle** is grayed out unless Device Type is set to MS in the Radio Mode setup menu.

Inspect Spur Used to select a spur number to be examined once the measurement has finished running. **Inspect Spur** is grayed out when a measurement is in progress. When pressed, the key provides access to the following keys:

- **Inspect Spur** When set to On, the inspect spur functionality is made available and a spur number can be supplied for further examination. Possible values are On and Off. The default value is Off.
- **Sweep Time** The default value is 2 seconds and the range 4 ms to 500 seconds.
- **Res BW** The default value is 1 MHz and the range 1 kHz to 5 MHz
- **Video BW** The default value is 3 MHz and the range 1 kHz to 3 MHz.

Limits.... Accesses the limits form for changing the limits for the currently selected radio band and device. The measurement is restarted if any limits value is changed.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Advanced Provides access to the following advanced measurement parameter setting:

Max Mxr Lvl Used to set the maximum power level at the RF mixer input for the measurement. The instrument uses this value to automatically set the required attenuation to maintain the mixer input below the critical level. The default value is 5 dBm and the range –100 dBm to 10 dBm.

Output RF Spectrum

To access the keys for setting up an output RF spectrum measurement, press **MEASURE**, **Output RF Spectrum** and then the front panel **Meas Setup** key.

Avg Bursts Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- **On** Sets measurement averaging on.
- **Off** Sets measurement averaging off.

Default values are 10 and On, and range values are 1 to 1000.

Avg Mode Used to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

- **Exponential** After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.
- **Repeat** After reaching the average count, the averaging is reset and a new average is started.

The default value is Exp. Grayed out for Multiple measurement method—only Repeat is supported.

Measure Method Used to select the measurement method. Possible values are multi offset, single offset and swept. The default value is multi offset.

Meas Type Used to switch measurement type between Output RF Spectrum due to modulation (**Mod**) and Output RF Spectrum due to switching transients (**Switch**). The default value is Mod.

Ofs Freq List Used to select which set of frequency offsets to scan in multi offset mode. Possible values are **Standard** and **Short**. The default value is Short. Grayed out unless **Measure** is set to **Multi Offset**.

Offset Freq Used to select a frequency offset from the carrier at which to perform a single offset Output RF Spectrum measurement. The default value is 250 kHz and the range –6 MHz to +6 MHz.

Trig Source Used to select the trigger source for the measurement. Possible values are Free Run, RF Burst, External and Frame. The default value is RF Burst. RF Burst and Frame are grayed out when hardware Option B7D/B7E is not installed.

Burst Sync Used to select how the measurement will synchronize with the correct part of the burst. Possible values are Training Seq, RF Amptd and None. The default value is Training Seq. Training Seq is grayed out when hardware Option B7D/B7E is not installed. The parameter is not applicable to the swept measurement.

Widebnd Noise When set to Off, the analyzer is tuned to the carrier and –1800 kHz to +1800 kHz either side of the center frequency is swept. When set to On, the whole of the relevant band +2 MHz either side is swept. The default value is Off. The parameter is grayed out unless **Meas Type** is set to Mod and **Meas Method** to Swept.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Advanced Provides access to the following advanced measurement parameter settings:

Ref Pwr Avg Used to specify the number of averages to be taken when determining the reference power (at 0 Hz offset). This can be done by using a number of averages equal to that specified in the **Avg Bursts** parameter (Auto) or by specifying a number manually (Man). The default values is Auto (10). The parameter is grayed out unless **Meas Method** is set to Single Offset.

Max Mxr Lvl Used to set the maximum power at the input mixer for the out of band spurious measurement.

Mod BWs/ Switch BWs Used to deviate from the GSM standard by specifying custom RBW settings for the indicated frequency offsets—that is, <1800 kHz and ≥1800 kHz.

Phase And Frequency Error

To access the keys for setting up a phase and frequency error measurement, press **MEASURE**, **Phase & Freq**, and then the front panel **Meas Setup** key. The measurement is grayed out when the hardware Options B7D and B7E are not installed.

Avg Number Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

On Sets measurement averaging on.

Off Sets measurement averaging off.

Default values are 10 and Off, and range values are 1 to 1000.

Avg Mode Used to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Exponential After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.

Repeat After reaching the average count, the averaging is reset and a new average is started.

The default value is Exp.

Avg Type Used to select the type of averaging.

Maximum The maximum values are restored (the maximum of all values is retained).

Mean The mean values are restored (the average of all values is retained).

The default value is Maximum.

Trig Source Used to select the trigger source for the measurement. Possible values are Free Run, RF Burst, External and Frame. The default value is RF Burst.

Burst Sync Used to select how the measurement will synchronize with the correct part of the burst. Possible values are Training Seq, RF Amptd and External. The default value is Training Seq. The parameter is not applicable to the swept measurement.

Limit Test Used to turn limit checking on and off. This is not the same as limit line—the numeric phase and frequency error results are checked against the **RMS Phase Limit** and **Frequency Limit** parameters to see if they meet the limit requirements. The relevant PASS/FAIL annotation is displayed in the measurement bar. The default value is On.

Limits.... Provides access to the following:

RMS Phase Limit The RMS phase error must be less than or equal to this limit. If the RMS phase error exceeds it, the measurement display shows the RMS phase error in red and appends a red “F” to the value. The default value is 5 degree and the range from 0 degree to 100 degree.

Peak Phase Limit The peak phase error must be less than or equal to this limit. If the peak phase error exceeds it the measurement display shows the peak phase error in red and appends a red “F” to the value. The default value is 20 degree and the range from 0 degree to 100 degree.

Frequency Limit The frequency error must be less than or equal to this limit. If the frequency error exceeds it the measurement display shows the frequency error in red and appends a red “F” to the value. The default value is 0.05 ppm (BTS) and 0.1 ppm (MS) and the range from 0 ppm to 100 ppm.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Power Steps

To access the keys for setting up a power steps measurement, press **MEASURE**, **Power Steps,** and then the front panel **Meas Setup** key.

Sweep Time Used to set the length of the measurement interval. The default value is 2 seconds and the range 5 ms to 4000 seconds.

Marker Delta Used to adjust the marker separation distance. The distance is in time as the power steps measurement is performed in zero span. The results are updated as soon as the marker positions are changed.

Marker Center Used to adjust the delta marker's position on the trace without affecting the separation distance. The position is in time as the power steps measurement is performed in zero span. The results are updated as soon as the marker positions are changed.

Limit Test Used to turn limit checking on and off. This is not the same as limit line—the numeric power steps result is checked against the **Upper Limit** and **Lower Limit** parameters to see if they meet the limit requirements. The relevant PASS/FAIL annotation is displayed in the measurement bar. The default value is On.

Limits.... Provides access to the following:

- **Upper Limit** The absolute power step value must be less than or equal to this limit. If it exceeds it, the power step result is displayed in red and appended with a "F". The default value is 3.5 dB and the range 0 dB to 200 dB.
- **Lower Limit** The absolute power step value must be greater than or equal to this limit. If it is less, the power step result is displayed in red and appended with a "F". The default value is 0.5 dB and the range 0 dB to 200 dB.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Advanced Provides access to the following advanced measurement parameter settings:

- **Res BW** Used to change the 3 dB resolution bandwidth in a 1, 3, 10 sequence. The default value is 1 MHz and the range 1 kHz to 5 MHz.
- **Video BW** Used to change the analyzer post detect filter in a 1, 3, 10 sequence. The default value is 300 kHz and the range 30 Hz to 3 MHz.

Power versus Time

To access the keys for setting up a power versus time measurement, press **MEASURE**, **Pwr versus Time**, and then the front panel **Meas Setup** key.

Avg Bursts Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- **On** Sets measurement averaging on.
- **Off** Sets measurement averaging off.

Default values are 10 and Off and range values are 1 to 1000.

Avg Mode Used to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

- **Exponential** After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.
- **Repeat** After reaching the average count, the averaging is reset and a new average is started.

The default value is Exp.

Average Type Used to specify the type of trace and result averaging to use.

- **Video** Selects video averaging.
- **Power** Selects power averaging.

The default value is Power.

Meas Time Used to set the number of slots to be displayed on the trace in each measurement cycle. **Meas Time** is closely tied to sweep time. The default value is 1 slot and the range 1 to 8 slots.

Trig Source Used to select the trigger source for the measurement. Possible values are Free Run, RF Burst, External, and Frame. The default value is RF Burst. RF Burst and Frame are grayed out when the hardware Option B7D/B7E is not installed.

Burst Sync Used to select how the measurement will synchronize with the correct part of the burst. Possible values are Training Seq, RF Amptd, and External. The default value is Training Seq. Training Seq is grayed out when the hardware Option B7D/B7E is not installed. The parameter is not applicable to the swept measurement.

Max Hold Used to display a max hold trace to allow monitoring over time. **Max Hold** is grayed out and set to Off for all views except Monitor. The default value is Off. The **Max Hold Trace** softkey in the **Marker Trace** menu is grayed out when **Max Hold** is set to Off.

Limit Test Used to turn limit checking on and off. The default value is On.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Advanced Provides access to the following advanced measurement parameter settings:

Res BW Used to change the 3 dB resolution bandwidth in a 1, 3, 10 sequence. The default value is 300 kHz.

Video BW Used to change the analyzer post detect filter in a 1, 3, 10 sequence. The default value is 300 kHz.

Trace Points Used to change the number of trace points used in the measurement. Set to a lower number to decrease the resolution of the trace and the mask, but increase measurement speed. The default value is 1601 and the range 401 to 6401.

Receive Band Spurious

To access the keys for setting up a receive band spurious measurement, press **MEASURE**, **Rx Band Spur**, and then the front panel **Meas Setup** key.

Avg Number

Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

On Sets measurement averaging on.

Off Sets measurement averaging off.

Default values are 10 and Off and range values are 1 to 1000.

Avg Mode

Used to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Exponential After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.

Repeat After reaching the average count, the averaging is reset and a new average is started.

The default value is Exp. Grayed out for Multiple measurement method—only Repeat is supported.

Limit

The upper limit value for testing spurs. By default the parameter is based on the ETSI specification. It changes depending on the band/device in use. The default value is –98 dBm and the range –200 dBm to 100 dBm.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Advanced Provides access to the following advanced measurement parameter settings:

Res BW Used to change the 3 dB resolution bandwidth in a 1, 3, 10 sequence. The default value is 100 kHz and range 1 kHz to 5 MHz.

Video BW Used to change the analyzer post detect filter in a 1, 3, 10 sequence. The default value is 100 kHz and range 1 kHz to 3 MHz.

Transmit Band Spurious

To access the keys for setting up a transmit band spurious measurement, press **MEASURE**, **Tx Band Spurs**, and then the front panel **Meas Setup** key.

Avg Number

Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

On Sets measurement averaging on.

Off Sets measurement averaging off.

Default values are 10 and Off and range values are 1 to 1000.

Avg Mode

This key is permanently grayed out and cannot be accessed. It shows that the averaging action being taken after the specified number of data acquisitions (average count) has been reached is always Repeat.

Repeat After reaching the average count, the averaging is reset and a new average is started.

Exponential After the average count is reached, each successive data acquisition is exponentially weighted and combined with the exisiting average.

Exponential is not supported for this measurement.

Meas Type

Possible values are Examine and Full. The default value is Full.

Examine In continuous measure, after doing one full search across all segments, it stops on the worst segment and continuously updates that segment.

Full In continuous measure, it repeatedly does a full search of all segments.

MS Idle

Set to on when measuring with no active carriers. The specification document outlines different limits for cases where there is an active carrier present and absent. **MS Idle** is coupled to the **Limit** parameter.

Limit

The upper limit value for testing spurs. By default the parameter is based on the ETSI specification. It changes depending on the idle mode/band/device in use. The default value is –36 dBm and the range –200 dBm to 100 dBm.

Restore Meas Defaults

Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Transmitter Power

To access the keys for setting up a transmitter power measurement, press **MEASURE**, **Transmitter Power**, and then the front panel **Meas Setup** key.

Avg Number Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- **On** Sets measurement averaging on.
- **Off** Sets measurement averaging off.

Default values are 10 and On, and range values are 1 to 1000.

Avg Mode Used to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

- **Exponential** After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.
- **Repeat** After reaching the average count, the averaging is reset and a new average is started.

The default value is Exp.

Avg Type Used to specify the type of trace and result averaging to use.

- **Video** Selects video averaging.
- **Power** Selects power averaging.

The default value is Power.

Threshold Lvl The mean carrier power is calculated based on the trace above the threshold level. The threshold level may be described in dB (relative to the carrier) or dBm (absolute). A green line on the trace area will be displayed at the y-position associated with the current threshold level value, converted to the current amplitude display units. The default value is –6 dB and relative, and the range –60 dB to 60 dB.

Trig Source Used to select the trigger source for the measurement. Possible values are Free Run, RF Burst, External and Frame. The default value is RF Burst. RF Burst and Frame are grayed out when the hardware Option B7D/B7E is not installed.

Burst Sync Used to select how the measurement will synchronize with the correct part of the burst. Possible values are Training Seq, RF Amptd, and None. The default value is None. Training Seq is grayed out when hardware Option B7D/B7E is not installed.

Meas Time Used to set the number of timeslots to be displayed on the trace in each measurement cycle. **Meas Time** is closely tied to sweep time. The default value is 1 timeslot and the range 1 to 8 timeslots.

Restore Meas Defaults Restores all **Meas Setup** parameter values for the current measurement to their factory defaults.

Advanced Provides access to the following advanced measurement parameter settings:

Res BW Used to change the 3 dB resolution bandwidth in a 1, 3, 10 sequence. The default value is 300 kHz and range 1 kHz to 5 MHz.

Video BW Used to change the analyzer post detect filter in a 1, 3, 10 sequence. The default value is 300 kHz and range 30Hz to 3 MHz.

MODE

The **MODE** front panel key provides access to menu keys for selecting the analyzer measurement mode.

The basic spectrum analyzer comes with only SA mode installed—measurement personality firmware must be installed for other **MODE** menu keys to be labelled and functional.

SA Accesses the base-instrument spectrum analyzer mode menu keys.

GSM Accesses the GSM measurement personality menu keys and associated functions.

Mode Setup

The **Mode Setup** front panel key provides access to front panel key for setting up parameters that apply to all measurements for the selected mode. This contrasts to the **Meas Setup** hardkey which provides access to parameters which are measurement specific.

Radio Provides access to a screen enabling the following parameters to be changed:

Band/Standard Select from P-GSM 900, E-GSM 900, R-GSM 900, DCS 1800, PCS 1900, GSM 450, GSM 480 and GSM 850.

Device Select the device to test: MS (mobile station), BTS (base station), uBTS M1-3 (micro base station class M1-M3) or pBTS P1 (pico base station class P1).

Freq Hopping Repetition Factor Set frequency hopping repetition factor to On or Off. If set On, a default value of 3 is provided in the following field. The value has a range of 1 - 100. The key is grayed out for the Power Steps, Phase and Frequency and Transmit Band Spurious measurements.

DCS/PCS Overlap Priority Set to DCS or PCS. Determines which band/standard is automatically selected when entering an ARFCN in the range 512 - 810.

Input Provides access to a screen enabling the following parameters to be changed:

RF Carriers Possible values are **Single** and **Multiple**. Select **Single** if there is a single RF carrier present at the RF Input. Select **Multiple** if there is more than one carrier present at the RF Input. This will reject any adjacent channels for the modulation accuracy measurements. The key is grayed out for Phase and Frequency Error and Monitor Band/Channel measurements.

RF Input Range Possible values are **Auto** and **Manual**. If **Auto** is chosen, the instrument automatically sets the attenuator and reference level based on the total power level of the input signal carriers. If there are multiple carriers present, the total power might overdrive the front end. In this case you need to set the **RF Input Range** to **Manual** and enter the expected **Max Total Pwr**. **Manual** is also used if you want to hold the input attenuation constant (for the best relative power accuracy). For single carriers it is generally recommended that **RF Input**

Range is set to **Auto**. The key is grayed out for the Phase And Frequency Error measurement.

Max Total Power To set the maximum total power at the UUT (Unit Under Test). This is the maximum expected value of the mean carrier power referenced to the output of the UUT (may include multiple carriers). The Max Total Power setting is coupled to the **Input Atten** setting. Max Total Power is unavailable when the **RF Input Range** is set to **Auto**. The key is grayed out for the Phase And Frequency Error measurement.

Input Attenuation To set the input attenuator setting. The input attenuator setting is coupled to the **Max Total Power** setting. The **Input Attenuation** key reads out the actual internal input attenuator value that will be used for the current measurement. If more than one input attenuator value is used in a single measurement, the value used at the carrier frequency will be displayed. Input Attenuation is unavailable when the **RF Input Range** is set to **Auto**. The key is grayed out for the Phase And Frequency Error measurement.

NOTE As the **Max Total Power** and **Input Attenuation** settings are coupled together, changing the input **Max Total Power** by x dB changes the **Input Attenuation** by x dB, and vice-versa for a given measurement. When you switch to a different measurement, the **Max Total Power** is kept constant, but the **Input Attenuation** may change if the two measurements have different mixer margins. Thus, you can directly set the analyzer input attenuation, or you can set it indirectly by specifying the maximum expected power at the UUT (**Max Total Power** setting).

Internal Preamp Used to control the analyzer's in-built preamplifier for better sensitivity. Possible values are **Off** and **On**.

The key is grayed out:

- If Option 1DS: RF Preamp is not installed.
- For the Phase And Frequency Error measurement.

External Gain/Attenuation Used to enter the external attenuator/gain setting for any devices between the UUT and the analyzer. This enables the instrument to display the measurement results referenced to the output of the UUT.

Default settings

The following table shows the default settings for the Input screen.

Input Screen Default Settings	
RF Carriers	Single
RF Input Range	Auto
Internal Preamp	Off
Mobile/Base Gain	0
Mobile/Base Attenuation	0

Trigger

Provides access to the mode setup menu for the following trigger sources:

- **External**
- **RF Burst**
- **Frame Delay**

Pressing the trigger key enables you to set the **Delay**, **Level**, and **Slope** for each trigger source where applicable. **Delay**, **Level**, and **Slope** are grayed out when not applicable. Note that the trigger source for each measurement may be selected separately (under the **Meas Setup** key).

Delay For trigger delay use positive values. For pre-trigger, use negative values.

Level For the RF Burst selection, the level is relative to the peak level of the RF signal. This is not available for External and Frame Delay trigger sources

Slope Select from **Pos**itive or **Neg**ative to trigger on the leading edge (**Pos**) or the trailing edge (**Neg**) of the signal. This is only available if the trigger source is External

The following keys are grayed out:

- For trigger delay: the **RF Burst** key is grayed out when Option B7E: Digital Demod RF is not installed or when Options B7D: DSP with Fast ADC and B7E: Digital Demod RF are not installed.
- For trigger level: the **RF Burst** key is grayed out when Option B7E: Digital Demod RF is not installed.
- For trigger slope: the **RF Burst** key is grayed out when Option B7E: Digital Demod RF is not installed.

Default settings

The following table shows the trigger default settings.

Trigger Default Settings	
External Delay	0.000 s
External Level	N/A
External Slope	Pos
RF Burst Delay	0.000 s
RF Burst Level	–6.00 dBc
RF Burst Slope	Pos
Frame Delay	0.000 s
Frame Level	N/A
Frame Slope	N/A

Demod

The **Demod** key accesses a screen displaying the following parameters:

Burst Alignment Selects the sync alignment to the GSM standard or offset by 1/2 bit.

RF Sync Delay Sets the delay or offset applied when in RF Amptd alignment mode. When **Burst Sync** = **RF Amptd**, RF Sync Delay provides a common delay or offset of the burst alignment.

Burst Search Threshold Sets the relative power threshold from the peak power, which is used by the burst alignment algorithm to determine the burst rising edge and falling edge when **Burst Sync** = **RF Amptd**.

Opt Freq Ref Accessed menu keys allowing you to set the reference oscillator in the Option B74 RF assembly or the external oscillator as the reference oscillator (time base) source for the DDRF assembly. Possible values are:

- **Int** Sets the reference oscillator in the Option B74 RF assembly as the reference oscillator source.
- **Ext** Sets the external oscillator as the reference oscillator source.

Opt Freq Ref Allows you to enter the frequency of the external reference oscillator being supplied to the Option B74 RF assembly Ext Ref In jack. This provides the proper

frequency division in the Option B74 RF assembly to achieve the required 10 MHz reference frequency.

Opt 10MHz Out Allows you to enter the frequency source for the Option B74 RF assembly 10 MHz Ref Out jack to the option reference oscillator.

On Enables the 10 MHz Ref Out.

Off Disables the 10 MHz Ref Out.

The key is grayed out if Option B7E: Digital Demod RF is not installed.

Default settings

The following table shows the default settings for the Demod screen.

Demod Default Settings	
Burst Alignment	GSM
RF Sync Delay	0.00s
Burst Search Threshold	–10.00 dB
Opt Freq Ref	Int.
Opt Freq Ref	10.0 MHz
Opt 10 MHz Out	When Opt Freq Ref = Ext default value is OFF. When Opt Freq Ref = Int, default value is N/A

Properties Provides access to a screen displaying the GSM Application Version, DSP Bootrom Version and DSP GSM Code Version.

View/Trace

The **ViewTrace** front panel key leads to one of the GSM measurement view/display menus depending on which measurement is selected when the key is pressed. Used to select between different measurement views where appropriate.

Power versus Time

Mask Used to analyze a complete burst and compare it to a set of upper and lower limit lines.

Monitor Used to monitor up to an entire frame without the pass/fail limits.

Transmit (Tx) Band Spurious

The measurement splits the transmit band into four segments (or less if the currently selected ARFCN is at the edge of the band). Two of these segments are on each side of the ETSI specified transmit band. View/Trace allows you to view each segment in sequence after the measurement completes (Meas Type Full), to automatically home in on the worst performing segment (Meas Type Examine) or to manually select which segment to view (Meas Type Examine).

Lower Segment With Measurement Type Examine, you can choose to examine the lower segment only.

Lower Adj Segment With Measurement Type Examine, you can choose to examine the lower adjacent segment only.

Upper Adj Segment With Measurement Type Examine, you can choose to examine the upper adjacent segment only.

Upper Segment With Measurement Type Examine, you can choose to examine the upper segment only.

6 If You Have a Problem

This chapter includes information on how to check for a problem with your ESA spectrum analyzer, and how to return it for service. It also includes descriptions of all of the analyzer built-in messages.

If you have a Problem

Your analyzer is built to provide dependable service. However Agilent Technologies worldwide sales and service organization is ready to provide the support if you:

- Experience a problem.
- Desire additional information.
- Wish to order parts, options, or accessories.

In general, a problem can be caused by a hardware failure, a software error, or a user error. Follow these general steps to determine the cause and to resolve the problem.

1. Perform the quick checks listed in “Check the Basics” in this chapter. It is possible that a quick check may eliminate your problem altogether.
2. If the problem is a hardware problem, you have two options:

   a. Repair it yourself; see the “Service Options” on page 6-5 section in this chapter.

WARNING **There are no operator serviceable parts inside the analyzer. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.**

   b. Return the analyzer to Agilent Technologies for repair; if the analyzer is still under warranty or is covered by an Agilent Technologies maintenance contract, it will be repaired under the terms of the warranty or plan (the warranty is at the front of this manual).

      If the analyzer is no longer under warranty or is not covered by an Agilent Technologies maintenance plan, Agilent Technologies will notify you of the cost of the repair after examining the instrument. See “How to Call Agilent Technologies” on page 6-5 and “How to Return Your Analyzer for Service” on page 6-7 for more information.

3. If the problem is a software problem, you have two options:

   a. Reinstall the firmware and or the measurement personality DLP.

   b. Return the analyzer to Agilent Technologies for repair; if the analyzer is still under warranty or is covered by an Agilent Technologies maintenance contract, it will be repaired under the terms of the warranty or plan (the warranty is at the front of this manual).

      If the analyzer is no longer under warranty or is not covered by an Agilent Technologies maintenance plan, Agilent Technologies will notify you of the cost of the repair after examining the instrument. See "How to Call Agilent Technologies" on page 6-5 and "How to Return Your Analyzer for Service" on page 6-7 for more information.

Before You Call Agilent Technologies

Check the Basics

A problem can often be resolved by repeating the procedure that you were following when the problem occurred. Before calling Agilent Technologies or returning the analyzer for service, please perform the following checks:

- Check the line fuse.
- Check that there is power at the receptacle.
- Check that the analyzer turned on. Make sure the fan is running, which indicates that the power supply is on.
- If the display is dark or dim, press the upper **Viewing Angle** key in the upper-left corner of the front panel. If the display is too bright, adjust the lower **Viewing Angle** key in the upper-left corner of the front panel.
- If other equipment, cables, and connectors are being used with your ESA spectrum analyzer, make sure they are connected properly and operating correctly.
- Review the procedure for the measurement being performed when the problem appeared. Are all the settings correct?
- If the analyzer is not functioning as expected, return the analyzer to a known state by pressing the **Preset** key.

  Some analyzer settings are not affected by a Preset. If you wish to reset the analyzer configuration to the state it was in when it was originally sent from the factory, press **System**, **Power On/Preset**, **Preset (Factory)**.

- Is the measurement being performed and are the results that are expected within the specifications and capabilities of the analyzer? Refer to the "Specifications" chapters in the *ESA Spectrum Analyzers Specification Guide* for analyzer specifications.
- In order to meet specifications, the analyzer must be aligned. Either Auto Align All must be selected (press **System**, **Alignments**, **Auto Align**, **All**), or the analyzer must be manually aligned at least once per hour, or whenever the temperature changes more than 3° centigrade. When **Auto Align**, **All** is selected, AA appears on the left edge of the display (in SA mode only).
- Is the analyzer displaying an error message? If so, refer to the *Agilent ESA Spectrum Analyzers User's Guide*.
- If the necessary test equipment is available, perform the performance verification tests in the *ESA Spectrum Analyzers Calibration Guide*. Record all results on a Performance Verification Test Record form which follows the tests.

- If the equipment to perform the performance verification tests is not available, you may still be able to perform the functional checks in the *ESA Spectrum Analyzers User's Guide*.

Read the Warranty

The warranty for your analyzer is at the front of this manual. Please read it and become familiar with its terms.

If your analyzer is covered by a separate maintenance agreement, please be familiar with its terms.

Service Options

Agilent Technologies offers several optional maintenance plans to service your analyzer after the warranty has expired. Call your Agilent Technologies sales and service office for full details.

If you want to service the analyzer yourself after the warranty expires, you can purchase the service documentation that provides all necessary test and maintenance information.

You can order the service documentation, **Option OBW** (assembly level troubleshooting and adjustment procedures) and **Option OBV** (component level information including parts lists, component location diagrams and schematic diagrams), through your Agilent Technologies sales and service office. Service documentation is described under "Service Documentation and Adjustment Software (Option OBW)" and "Component Level Service Documentation (Option OBV)" in *ESA Spectrum Analyzers User's Guide*.

How to Call Agilent Technologies

Agilent Technologies has sales and service offices around the world to provide you with complete support for your analyzer. To obtain servicing information or to order replacement parts, get in touch with the nearest Agilent Technologies sales and service office listed in See "Service and Support" on page 6-6.. In any correspondence or telephone conversations, refer to your analyzer by its product number, full serial number, and firmware revision. (Press **System**, **More**, **Show System**, and the product number, serial number, and firmware revision information will be displayed on your analyzer screen.) A serial number label is also attached to the rear panel of the analyzer.

Service and Support

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

`http://www.agilent.com/find/assist`

Click on “Contact Us” and select your country.

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

United States	(800) 403-0801
Canada	(877) 429-9969
Europe	(41 22) 780.6111 (Switzerland) (33 1) 69 82 66 66 (France) (49 7031) 464-6222 (Germany) (44 188) 9696622 (Great Britain)
Japan	0120-32-0119
Latin America	(11) 7297-3700 (Brazil)
Australia/New Zealand	1-800-802-540 (Australia) 0800-738-378 (New Zealand)
Asia-Pacific	080-047-669

How to Return Your Analyzer for Service

Service Tag

If you are returning your analyzer to Agilent Technologies for servicing, fill in and attach a blue service tag. Several service tags are supplied at the end of this chapter. Please be as specific as possible about the nature of the problem. If you have recorded any error messages that appeared on the display, or have completed a Performance Test Record, or have any other specific data on the performance of your analyzer, please send a copy of this information with your analyzer.

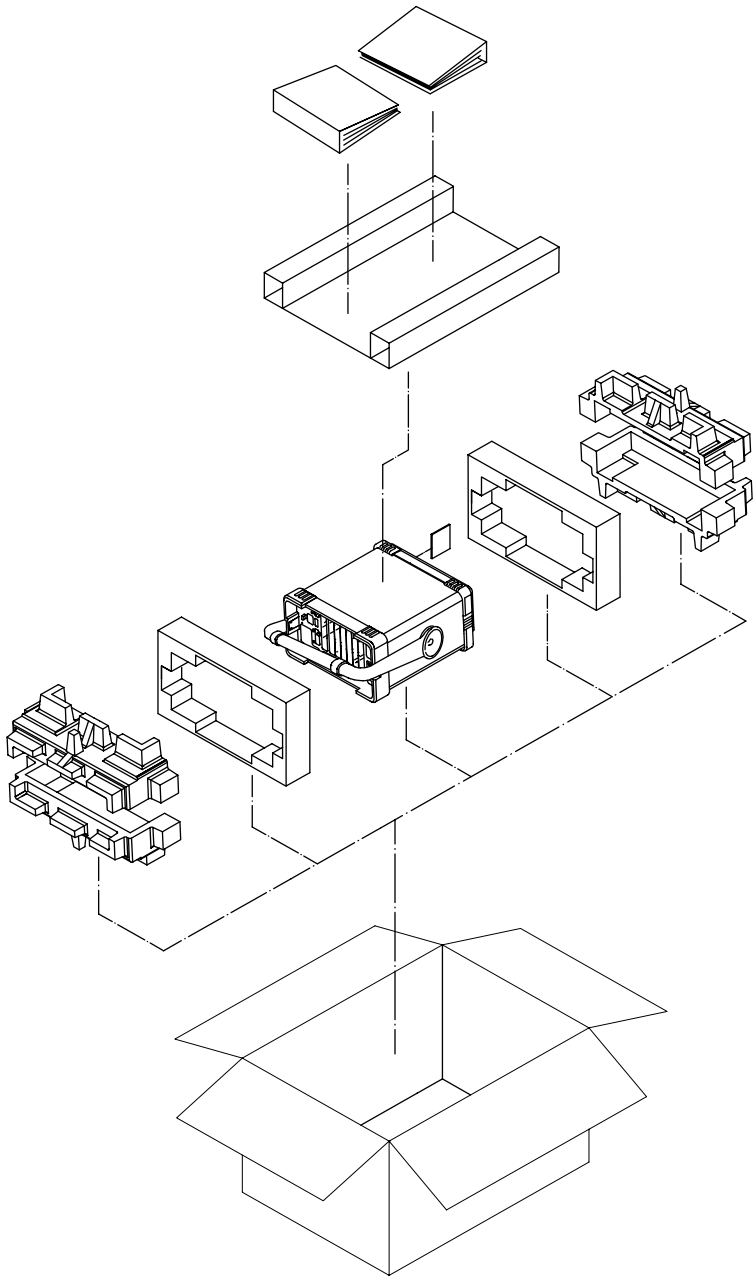
Original Packaging

Before shipping, pack the unit in the original factory packaging materials if they are available. If the original materials were not retained, see "Other Packaging" on page 6-9.

NOTE Ensure that the instrument handle is in the rear-facing position in order to reduce the possibility of damage during shipping. Refer to Figure 6-1 on page 6-8.

NOTE Install the transportation disk into the floppy drive to reduce the possibility of damage during shipping. If the original transportation disk is not available, a blank floppy may be substituted.

Figure 6-1



format122

Other Packaging

CAUTION Analyzer damage can result from using packaging materials other than those specified. Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the equipment or prevent it from shifting in the carton. They cause equipment damage by generating static electricity and by lodging in the analyzer louvers, blocking airflow.

You can repackage the instrument with commercially available materials, as follows:

1. Attach a completed Blue Repair Tag to the instrument.
2. Install the transportation disk or a blank floppy disk into the disk drive.
3. If you have a front-panel cover, install it on the instrument. If you do not have a front panel cover, make sure the instrument handle is in the forward-facing position to protect the control panel.
4. Wrap the instrument in antistatic plastic to reduce the possibility of damage caused by electrostatic discharge.
5. Use a strong shipping container. The carton must be both large enough and strong enough to accommodate the analyzer. A double-walled, corrugated cardboard carton with 159 kg (350 lb) bursting strength is adequate. Allow at least 3 to 4 inches on all sides of the analyzer for packing material.
6. Surround the equipment with three to four inches of packing material and prevent the equipment from moving in the carton. If packing foam is not available, the best alternative is S.D.-240 Air Cap™ from Sealed Air Corporation located in Hayward, California, 94545; telephone number (510) 887-8090. Air Cap looks like a plastic sheet filled with 1-1/4 inch air bubbles. Use the pink-colored Air Cap to reduce static electricity. Wrapping the equipment several times in this material should both protect the equipment and prevent it from moving in the carton.
7. Seal the shipping container securely with strong nylon adhesive tape.
8. Mark the shipping container “FRAGILE, HANDLE WITH CARE” to assure careful handling.
9. Retain copies of all shipping papers.

Warranty Information

Warranty

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

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

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

LIMITATION OF WARRANTY

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

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

EXCLUSIVE REMEDIES

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

Index