

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Keysight / Agilent 8922M* at our website: *Click HERE*

HP 8922G User's Guide

HEWLETT PACKARD

HP Part No. 08922-90022 (without Performance Test Disk)
08922-90011 (with Performance Test Disk)
08922-90028 Instructional Video Tape (NTSC format)
08922-90029 Instructional Video Tape (SECAM format)
08922-90030 Instructional Video Tape (PAL format)

Printed in USA August 3, 1993 (Rev. E)

Fifth Edition: Firmware Revision A.04.00

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notice

Information contained in this document is subject to change without notice.

All Rights Reserved. Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.

This material may be reproduced by or for the U.S. Government pursuant to the Copyright License under the clause at DFARS 52.227-7013 (APR 1988).

Hewlett-Packard Company
Learning Products Department
24001 E. Mission
Liberty Lake, WA 99019-9599
U.S.A

Ordering Information

To order this manual, call or write your nearest Hewlett-Packard Sales office. Within the USA, it is better to order directly from the HP Support Materials Organization in Roseville, California. Ask your nearest HP office for information and forms for the "Direct Order System."

© Copyright 1993, Hewlett-Packard Company. All rights reserved.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Sound Emission

Manufacturer's Declaration

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

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

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

Herstellerbescheinigung

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

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Safety Considerations

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

This product is a Safety Class I instrument (provided with a protective earth terminal).

Before Applying Power

Verify that the product is set to match the available line voltage and verify that the correct fuse is installed.

Safety Earth Ground

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

Safety Symbols

The following symbols may be found on the instrument or throughout the instrument's documentation.



This is the instruction manual symbol. The product will be marked with this symbol when it is necessary for the user to refer to the

instruction manual (refer to Table of Contents).



This symbol indicates hazardous voltages.



This symbol indicates earth (ground) terminal.

Warning



The WARNING symbol denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed

or adhered to, could result in personal injury. Do not proceed beyond a WARNING symbol until the indicated conditions are fully understood and met.

Caution



The CAUTION symbol denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed

or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION symbol until the indicated conditions are fully understood and met.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Safety Considerations for this Product

Warning



Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury. (Grounding one conductor of a two conductor outlet is not sufficient protection.)

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

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

Servicing instructions are for use by service trained personnel only. To avoid dangerous electric shock, do not perform any servicing unless qualified to do so.

Adjustments described in the manual are performed with power supplied to the instrument while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CERTIFICATION

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

WARRANTY

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

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

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP 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. HP 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. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

ASSISTANCE

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

REGIONAL SALES AND SERVICE OFFICES

SOUTH EAST EUROPE
Hewlett-Packard S.A.
World Trade Center
110 Avenue Louis-Casai
1215 Cointrin, **GENEVA**
Switzerland
Tel: (022) 98 96 51
Telex: 27225 hpner
Mail Address:
P.O. Box
CH-1217 Meyrin 1
GENEVA
Switzerland

MIDDLE EAST AND CENTRAL AFRICA
Hewlett-Packard S.A.
Middle East/Central
Africa Sales H.Q.
7, rue du Bois-du-Lan
P.O. Box 364
CH-1217 Meyrin 1
GENEVA, Switzerland
Tel: (022) 7807111
Telex: 27835 hmea ch

ASIA
Hewlett-Packard Asia Ltd.
22/F Bon Centre, West Tower
89 Queensway, Central
HONG KONG
G.P.O. Box 863 Hong Kong
Tel: 5-8487777
Telex: 76793 HPA HX
Cable: HPASIAL TD

NORTHERN EUROPE
Hewlett-Packard S.A.
V.D. Hooplaan 241
NL-1105 LN **AMSTELVEEN**
The Netherlands
Tel: 20 5479832
Telex: 18919 hpser

UNITED KINGDOM
Hewlett-Packard Ltd.
Nine Mile Ride
WOKINGHAM
Berkshire, RG113LL
Tel: 0344 773100

OTHER INTERNATIONAL AREAS
Hewlett-Packard Co.
Intercontinental
Headquarters
3495 Deer Creek Road
PALO ALTO, CA 94304

Tel: (415) 857-5027
Telex: 034 8300
Cable: HEWPACK

CANADA
Hewlett-Packard (Canada) Ltd.
6877 Goreway Drive
MISSISSAUGA, Ontario L4V 1M8
Tel: (416) 678-9430
V Mail: (416) 678-9533

EASTERN EUROPE
Hewlett-Packard Ges. m.b.h.
Liebigasse 1
P.O. Box 72
A-1222 **VIENNA**, Austria
Tel: (222) 2500-0
Telex: 1 3 4425 HEPA A

EASTERN USA
Hewlett-Packard Co.
4 Choke Cherry Road
ROCKVILLE, MD 20850
Tel: (301) 670-4300

MIDWESTERN USA
Hewlett-Packard Co.
5201 Tollview Drive
ROLLING MEADOWS
IL, 60008
Tel: (708) 255-9800

SOUTHERN USA
Hewlett-Packard Co.
2015 South Park Place
ATLANTA, GA 30339
Tel: (404) 955-1500

WESTERN USA
Hewlett-Packard Co.
5161 Lankershim Blvd.
NORTH HOLLYWOOD, CA 91601
Tel: (818) 505-5875

UNITED STATES OF AMERICA
Customer Information Center
Tel: (800) 752-0900
6:00 AM to 5:00 PM
Pacific Time

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

In This Book

This book contains operating information for the HP 8922G.

Use the instructional video tape to learn how to establish a link and place a phone call between the HP 8922G and a GSM mobile radio.

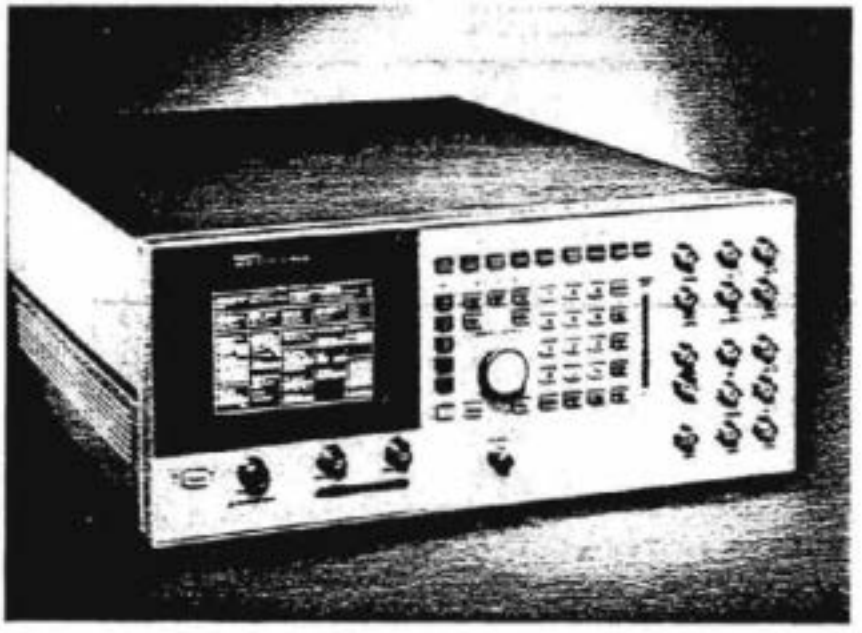
Use Volume 1 to learn how to perform measurements. It can also be used to remind you of the basic steps in the measurement process. If problems occur, see the Solving Problems section of Making Measurements. Use the performance test disk to verify performance. Specifications can be found in the Verifying Performance chapter.

Use Volume 2 to look up information about the product. It provides descriptions of the display screens, keys, connectors, and HP-IB (programming) codes. Refer to this volume whenever you need more information about the product's features.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

HEWLETT PACKARD

Output RF Spectrum Measurements Using a 3-Pole Synchronously Tuned Measurement Filter



GSM Recommendation 11.10 and 11.20 set the requirements for the out-of-channel performance of base station and mobile station transmitters with the Output RF Spectrum specification. The specification calls for the measurement of transmitted energy at several offsets from the carrier frequency. Two types of measurements are required: one to check the interference due to modulation, and one to check the interference due to the ramping of the signal amplitude (switching transients). Limits are specified for each type of measurement at specified frequency offsets. The GSM specified limits are based on a 5-pole synchronously tuned measurement filter.

In the HP 8922, Output RF Spectrum measurements are made using a 3-pole synchronously tuned measurement filter. The measurement results will differ from measurements using a 5-pole filter. The size of the difference depends on the characteristics of the measured signal (shape of the modulation spectrum and the shape of the signal amplitude envelope). Therefore, it is impossible to determine a correction factor that predicts the results of a measurement using a 5-pole filter from one using a 3-pole filter.

HP 8922 GSM Test Set

Given the complexity of determining a correction factor for 3-pole measurements, another approach is to determine equivalent limits based on a 3-pole synchronously tuned filter. For the modulation case, this is done by determining the difference between the GSM specified limits and measurements of an ideal signal using a 5-pole filter. This difference, called the specification margin, represents the allowed deviation of the transmitted spectrum from the ideal spectrum. The specification margin is then added to the results of measurements of the same ideal signal using a 3-pole filter to get the desired specification limits.

A similar approach is used to obtain the specification limits for Output RF Spectrum due to Switching Transients. Because there is no ideal signal for this case, a signal whose amplitude envelope conforms to both the amplitude versus time requirements and the switching transient specifications is used. Again, the specification margin is the difference between the GSM specified limits and measurements on this "ideal" signal using a 5-pole filter. The desired specification limits are obtained by adding the specification margin to the results of measurements of the same signal using a 3-pole filter.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The difference between measurements of the "ideal" signals using a 3-pole filter and a 5-pole filter are shown in tables 1 and 2. These values are added to the GSM specifications to obtain equivalent limits for Output RF Spectrum measurements using a 3-pole synchronously tuned measurement filter. The adjusted Output RF Spectrum limits based on a 3-pole filter are shown in tables 3 and 4.

Table 1 Adjustment for Output RF Spectrum due to Modulation Specification for 3-Pole Filter

3-Pole Specification Difference Output RF Spectrum due to Modulation					
	Offset from Carrier (kHz)				
	100	200	250	400	600 to 1800
Difference (dB)	0	2.5	1.0	9.0	0

Table 2 Adjustment Output RF Spectrum due to Switching Transients Specification for 3-Pole Filter

3-Pole Specification Difference Output RF Spectrum due to Switching				
	Offset from Carrier (kHz)			
	400	600	1200	1800
Difference (dB)	6	4	2	0

It is important to note that these values are estimates based on simulation and measurements. They are intended to allow the user to estimate their transmitters conformance to the GSM Output RF Spectrum requirement.

Although, the HP 8922 Output RF Spectrum measurements cannot guarantee conformance to GSM standards, they provide an indication of a mobile's performance and can be useful for comparative purposes. The measurements will indicate trends in the manufacturing process affecting Output RF Spectrum performance.

The HP 8922's 3-pole filter does not provide as much rejection as a 5-pole filter. This can result in higher adjacent channel levels when measured on an HP 8922 relative to measurements on a system with a 5-pole filter. If the HP 8922 measured value is better than the GSM specification (based on 5-pole filter), then the mobile is definitely good.

Table 3 Adjusted Output RF Spectrum due to Modulation Specifications for 3-Pole Filter

Adjusted Limits Based on 3-Pole Filter Output RF Spectrum Due to Modulation						
Power Control Level	Offset from Carrier (kHz)					
	0	100	200	250	400	600 to 1800
0 (43 dBm)	0 dB	0.5 dB	-27.5 dB	-32 dB	-51 dB	-70 dB
2 (39 dBm)	0	.5	-27.5	-32	-51	-66
3 (37 dBm)	0	.5	-27.5	-32	-51	-64
≥5 (≤33 dBm)	0	.5	-27.5	-32	-51	-60

Table 4 Adjusted Output RF Spectrum due to Switching Transients Specifications for 3-Pole Filter

Adjusted Limits Based on 3-Pole Filter Output RF Spectrum Due to Switching				
Power Level (dBm)	Offset from the Carrier (kHz)			
	400	600	1200	1800
43	-3 dBm	-17 dBm	-19 dBm	-24 dBm
41	-5	-17	-19	-24
39	-7	-17	-19	-24
37	-9	-17	-19	-24
35	-11	-17	-19	-24
33	-13	-17	-19	-24
31	-15	-19	-21	-26
29	-17	-21	-23	-28
27	-17	-22	-25	-30
25	-17	-22	-27	-32
23	-17	-22	-29	-34
≤21	-17	-22	-30	-36

Data subject to change
Printed in USA 3/92
1000-1223

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Contents—Volume 1

Chapter 1—Installing Your HP 8922G

Using this Chapter ..... 1—1
Equipment Supplied ..... 1—1
Installation Overview ..... 1—2
Fuses And Power Cords ..... 1—4
General Information ..... 1—6

Chapter 2—Making Measurements

Using this Chapter ..... 2—1
Method 1 ..... 2—3
Getting the Mobile Station to Camp On ..... 2—5
Originating and Receiving Calls ..... 2—11
To Run Tests and Analyze the GSM Signal ..... 2—17
Method 2 ..... 2—25
What You Need to Provide ..... 2—26
GSM Signal Requirements ..... 2—26
Finding More Information ..... 2—26
Setting Up the HP 8922G ..... 2—27
Making Measurements on Modules with the HP 8922G ..... 2—32
Demodulating Signals with the HP 8922G ..... 2—32
Choosing a Measurement or Demodulation ..... 2—33
Making an Amplitude/Peak TX Carrier Power Measurement ..... 2—35
Making a Fast TX Carrier Power Measurement ..... 2—39
Measuring Phase/Frequency Error ..... 2—43
Making a Data Bits Measurement ..... 2—47
Making a Pulse On/Off Measurement ..... 2—51
Making an Output RF Spectrum Measurement ..... 2—55
Performing Digital Demodulation ..... 2—59
If You Have Problems with a Measurement ..... 2—63

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 3—Verifying Performance

Setting up the Tests ..... 3—1

Getting the Right Equipment ..... 3—2

Installing and Operating the Software ..... 3—3

Understanding the Tests ..... 3—4

Test 01: Signal Generator Level ..... 3—4
Test 02: Signal Generator Spectral Purity ..... 3—4
Test 03: Signal Pulse Modulation ..... 3—5
Test 04: Signal Generator 0.3 GMSK Modulation ..... 3—5
Test 05: Audio Frequency Generator ..... 3—6
Test 06: Audio Frequency Analyzer ..... 3—6
Test 07: Oscilloscope ..... 3—7
Test 08: RF Analyzer Level ..... 3—7
Test 09: RF Analyzer GMSK Modulation ..... 3—8
Test A: RF Analyzer Pulse Demodulation ..... 3—8
Test B: Spectrum Analyzer ..... 3—9

Understanding Test Failures ..... 3—10

Specifications ..... 3—11

Index

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Contents—Volume 2

Chapter 4—Screens

Field Types ..... page 4—2
Bit Error Test ..... page 4—4
Cell Configuration ..... page 4—9
Cell Control ..... page 4—16
Configure ..... page 4—28
CW Meas/AF Analyzer (AF Analyzer) ..... page 4—35
CW Meas/AF Analyzer (CW Meas) ..... page 4—41
Digital Demod ..... page 4—44
DSP Analyzer: Amplitude, Ampl Main View ..... page 4—47
DSP Analyzer: Amplitude, Ampl Rise View ..... page 4—50
DSP Analyzer: Amplitude, Ampl Mid View ..... page 4—52
DSP Analyzer: Amplitude, Ampl Fall View ..... page 4—54
DSP Analyzer: Data Bits ..... page 4—56
DSP Analyzer: Phase, PhaseMain View ..... page 4—58
DSP Analyzer: Phase, Phase Err View ..... page 4—60
Fast TX Carrier Power ..... page 4—62
Hop Control (RF Analyzer) ..... page 4—65
Hop Control (RF Generator) ..... page 4—68
Logging ..... page 4—72
Measurement Sync: Manual Meas Cntl ..... page 4—74
Message ..... page 4—81
MS Information ..... page 4—82
Oscilloscope, Main Controls ..... page 4—86
Oscilloscope, Trigger Controls ..... page 4—88
Oscilloscope, Marker Controls ..... page 4—90
Output RF Spectrum, Main View ..... page 4—92
Output RF Spectrum, Trace View ..... page 4—95
Pulse On/Off Ratio, Main View ..... page 4—98
Pulse On/Off Ratio, Rise View ..... page 4—101
Pulse On/Off Ratio, Fall ..... page 4—104
RF Generator/RF Analyzer (AF Generator) ..... page 4—107
RF Generator/RF Analyzer (RF Analyzer) ..... page 4—108
RF Generator/RF Analyzer (RF Generator) ..... page 4—111
Service (documented in the service manual) ..... page 4—114
Spectrum Analyzer, Main Controls ..... page 4—115
Spectrum Analyzer, RF Gen Controls ..... page 4—118
Spectrum Analyzer, Marker Controls ..... page 4—120
Spectrum Analyzer, Auxiliary Controls ..... page 4—122
Tests (refer to chapter 10) ..... page 4—125

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 5—Keys

Function Keys ..... 5—2
Local Keys (L1, L2) ..... 5—9
Global Keys (G1, G2, G3) ..... 5—10
Units Keys ..... 5—10

Chapter 6—Connectors

Front-Panel Connectors ..... 6—1
Rear Panel Connectors ..... 6—11
Signal Descriptions for SYSTEM BUS ..... 6—18
HP-IB Connections ..... 6—30
Timing Diagrams ..... 6—31

Chapter 7—HP-IB Codes

Notation ..... 7—1
AF Analyzer Subsystem ..... 7—8
AF Generator Subsystem ..... 7—11
Bit Error Subsystem ..... 7—12
Cell Configuration ..... 7—13
Cell Control ..... 7—17
Configure Subsystem ..... 7—26
CW Subsystem ..... 7—32
Digital Demod Subsystem ..... 7—33
Display Subsystem ..... 7—34
DSP Analyzer Subsystem ..... 7—37
Electrical Man-Machine Interface (EMMI) ..... 7—39
Hop Control Subsystem ..... 7—42
IEEE 488.2 Common Commands ..... 7—46

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Logging ..... 7—49
Measure Subsystem ..... 7—50
Audio Frequency Measurements ..... 7—51
Bit Error Measurements ..... 7—54
Cell (Mobile Station Measurements) ..... 7—59
CW Measurements ..... 7—61
DSP Analyzer Measurements ..... 7—62
Fast TX Carrier Power Measurements ..... 7—71
Output RF Spectrum Measurements ..... 7—72
Oscilloscope Measurements ..... 7—74
Pulse Measurements ..... 7—76
Spectrum Analyzer Measurements ..... 7—80
MS Information ..... 7—81
Measurement Sync Subsystem ..... 7—85
Oscilloscope Subsystem ..... 7—87
Output RF Spectrum Subsystem ..... 7—91
Pulse On/Off Subsystem ..... 7—92
RF Analyzer Subsystem ..... 7—94
RF Generator Subsystem ..... 7—96
Spectrum Analyzer Subsystem ..... 7—99
Status Subsystem ..... 7—101
System Subsystem ..... 7—107
Trigger Subsystem ..... 7—108
HP-IB Program Examples ..... 7—113
Mobile Station Camp On ..... 7—114
HP 8922G Originated Call ..... 7—118
Mobile Station Originated Call ..... 7—121
Ending a Call ..... 7—128
Bit Error Test ..... 7—132
DSP Analyzer Measurement During a Call ..... 7—142
Pulse On/Off Measurement without Call Processing ..... 7—146
High Speed DSP Analyzer Measurement ..... 7—151
Transient Settling Times ..... 7—157

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 8—EMMI (Electrical Man-Machine Interface)

Using the Status Subsystem with the EMMI ..... 8—2
Using the EMMI Subsystem ..... 8—3
Example EMMI Program ..... 8—8

Chapter 9—Messages

Communication Failures ..... 9—1
Measurement Summary ..... 9—2
Sync Status ..... 9—3
Protocol Error Messages ..... 9—4
Timers ..... 9—5
Disconnects ..... 9—7

Chapter 10—Instrument BASIC

HP 8922G Instrument BASIC Overview ..... 10—1
Configuration and Control ..... 10—3
Loading, Storing, Running ..... 10—9
Entering and Editing ..... 10—14
Memory Cards ..... 10—18
Programming and Using the Tests Subsystem ..... 10—25

Index

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1

Installing Your HP 8922G

Using this Chapter

Use the following procedure to get the HP 8922G powered-up correctly. After completing this procedure, refer to Making Measurements for an introduction to operating the HP 8922G.

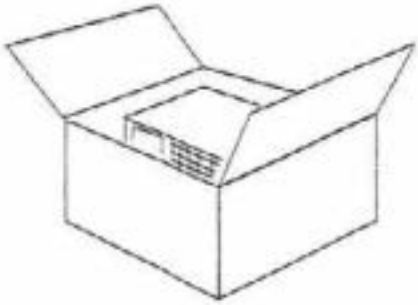
Equipment Supplied

- Fuse Envelope and Fuse
- LO IN/LO OUT cable
- REF OUT/REF IN cable (Option 001 only)
- Power Cord

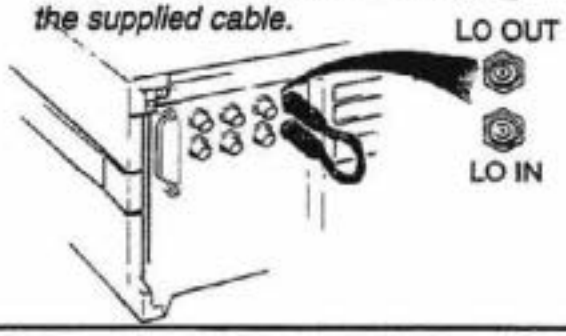
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Installation Overview

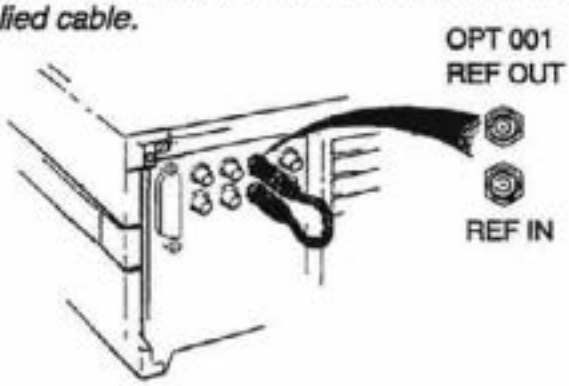
1 *Unpack the HP 8922G.*



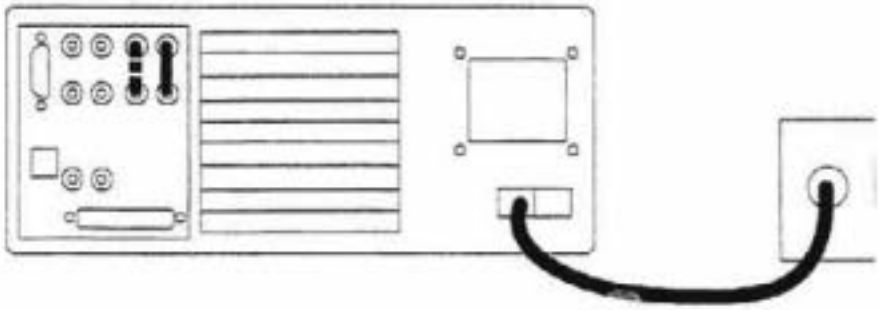
2 *If the LO IN and LO OUT connectors are present on your instrument, connect the LO OUT to LO IN using the supplied cable.*



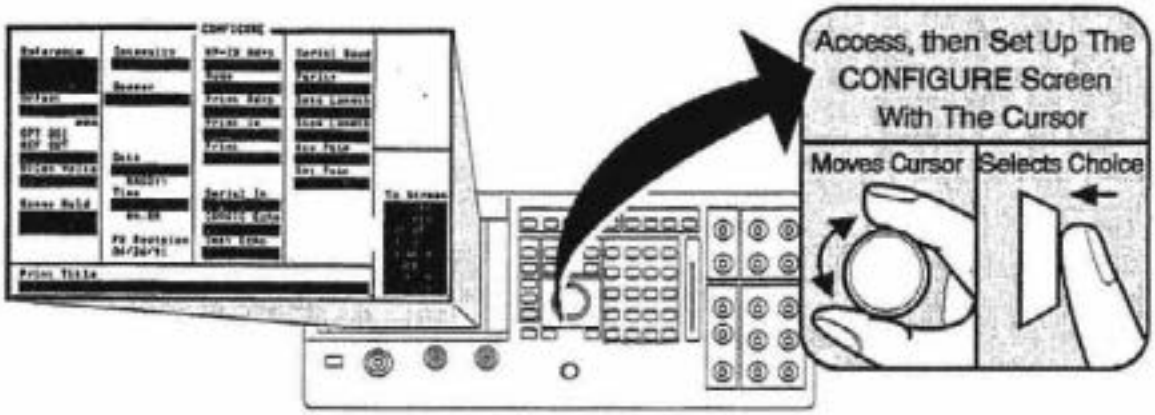
3 *Connect a 1, 2, 5, 10, or 13 MHz signal to REF IN. If you have OPT 001, connect as shown with the supplied cable.*



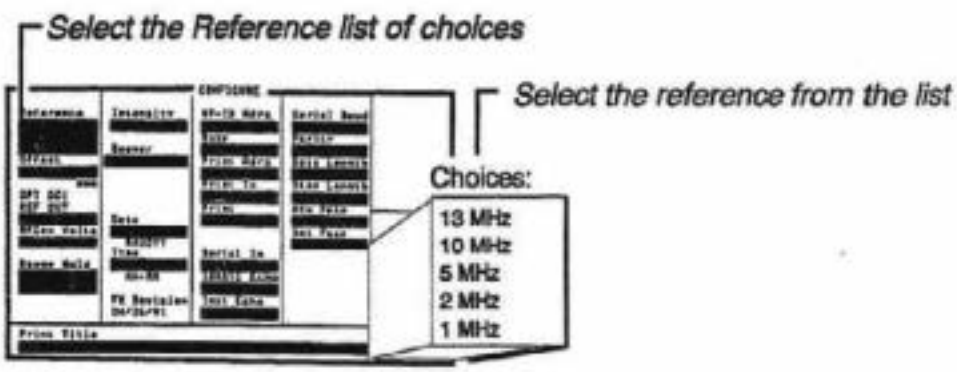
4 *Connect the supplied power cord to the HP 8922G and power up the instrument.*



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



5 *Enter 10 MHz for OPT 001, or enter your signals reference.*



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

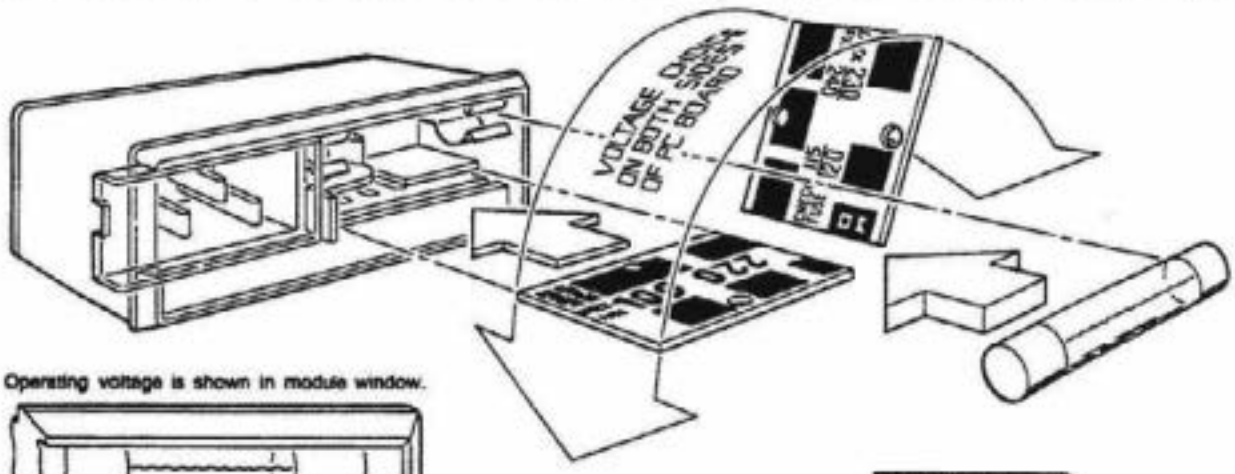
Fuses and Power Cords

Caution

Before plugging this instrument into the Mains (line) voltage, be sure the correct voltage on the line voltage selection card has been selected.

Line Voltage and Fuse Selection

Verify that the line voltage selection card is matched to the power source (see figure). Order fuse HP part 2110-0083 (2.5 A 250 V, normal blow) for replacement.



WARNING

To avoid the possibility of hazardous electrical shock, do not operate this instrument at line voltages greater than 126.5 Vac with line frequencies greater than 66 Hz (leakage currents at these line settings may exceed 3.5 mA).

1. Open cover door, pull the FUSE PULL lever and rotate to left. Remove the fuse.
2. Remove the Line Voltage Selection Card. Position the card so the line voltage appears at top-left cover. Push the card firmly into the slot.
3. Rotate the Fuse Pull lever to its normal position. Insert a fuse of the correct value in the holder. Close the cover door.

Voltage Selection Card and Fuse Installation

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Power Cords

Plug Type	Cable HP Part Number	C D	Plug Description	Cable Length (inches)	Cable Color	Location
250V 	8120-1351 8120-1703	0 4	90°/STR BS1363A* 90°/90°	90 90	Mint Gray Mint Gray	United Kingdom, Cyprus, Nigeria, Rhodesia, Singapore
250V 	8120-1369 8120-0696	0 4	STR/STR NZSS198/ASC112* STR/90°	79 80	Gray Gray	Australia, New Zealand
250V 	8120-1689 8120-1692	7 2	STR/STR* STR/90°	79 79	Mint Gray Mint Gray	East and West Europe, Saudi Arabia, Egypt. (unpolarized in many nations)
125V 	8120-1378 8120-1521 8120-1751	1 6 1	STR/STR NEMA5-15P* STR/90° STR/STR	80 80 90	Jade Gray Jade Gray Jade Gray	United States, Canada, Mexico, Philippines, Taiwan, U.S/Canada
100V (Same plug as above)	8120-4753 8120-4754	2 3	STR/STR STR/90°	90 90	Dark Gray Dark Gray	Japan only Japan only
250V 	8120-2104 8120-0296 8120-2957	3 4 4	STR/STR SEV1011 1959-24507 Type 12 STR/90° STR/90°	79 79 177	Gray Gray Gray	Switzerland
250V 	8120-0698	6	STR/STR NEMA6-15P	90	Black	United States, Canada
250V 	8120-2956 8120-2957 8120-3997	3 4 4	90°/STR 90°/90° STR/STR	79	Gray	Denmark
250V 	8120-4211 8120-4600	7 8	STR/STR*SEV1011-B1 STR/90°	79 79	Black Gray	South Africa, India
250V 	8120-1860 8120-1575 8120-2191 8120-4279	6 0 8 8	STR/STR*CEE22-V1 (Systems Cabinet Use) STR/STR STR/90° 90°/90°	59 31 99 80	Jade Gray Jade Gray Jade Gray Jade Gray	

* Part number shown for plug is industry identifier for plug only. Number shown for cable is HP Part Number for complete cable including plug. E = Earth Ground; L = Line; N = Neutral; STR = Straight

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

General Information

Operation and Storage Environment

Refer to *General Specifications* in the Specifications section of Verifying Performance for information about the operation or storage environment.

Instrument Options

Refer to Specifications in the Verifying Performance chapter for information about instrument options. (Also see the full-color brochure included in this manual.)

Specifications

Refer to Verifying Performance for instrument specifications.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2

Making Measurements

Using This Chapter

The HP 8922G provides you with 2 methods of making measurements on a GSM mobile station.

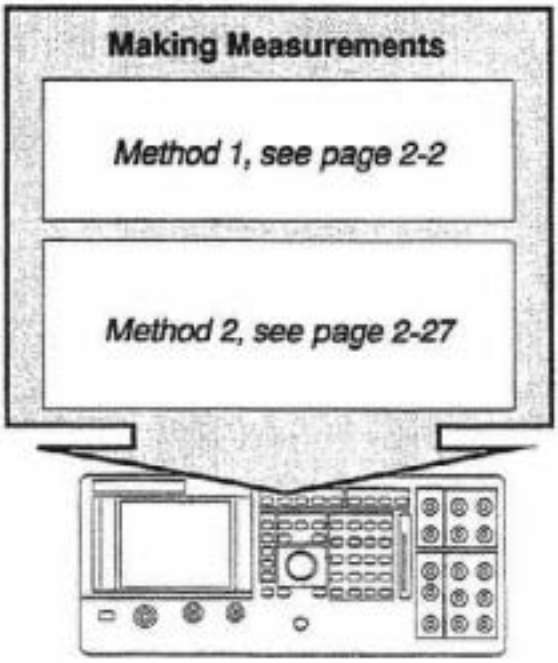
Method 1

Refer to Method 1 when you have a fully-operational mobile station, capable of establishing and maintaining a link. All of the measurement capability provided with Method 2, plus bit-error testing is provided with Method 1.

An instructional video tape is included with your HP 8922G to demonstrate Method 1 tasks. It shows how to get a mobile station to camp on, how to originate and receive calls, and how to run tests. If possible, watch the video as you perform these tasks, or view the video prior to doing Method 1 tasks.

Method 2

Refer to Method 2 when you do not want to establish a link between the HP 8922G and your mobile station (such as when you are testing modules only). When this method is chosen, some parameters that would be provided by a GSM link must be entered into the HP 8922G.

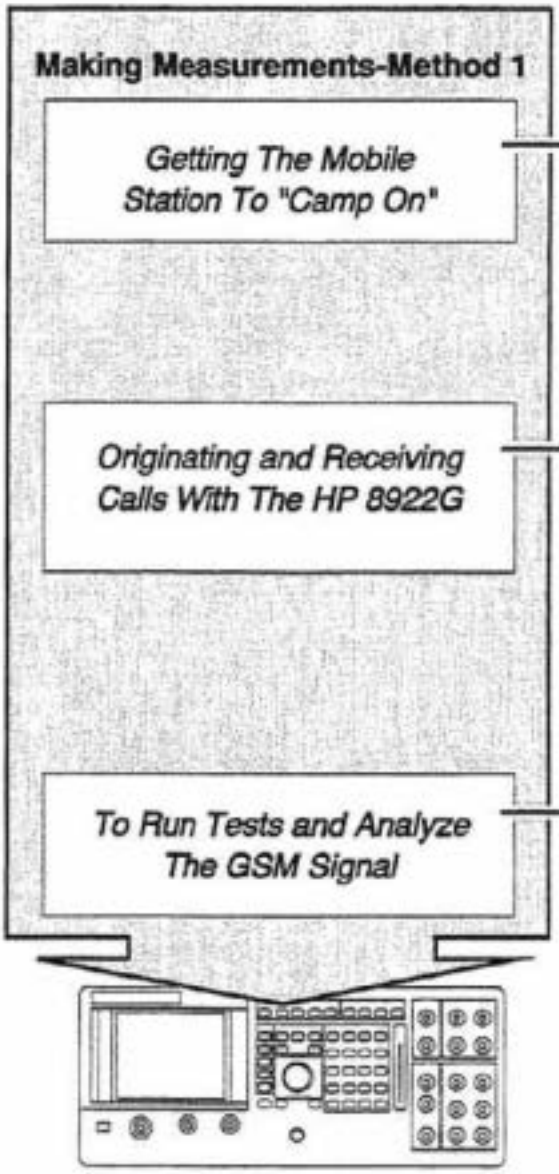


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Method 1

Use Method 1 when you have a fully-operational mobile station, capable of establishing and maintaining a link.



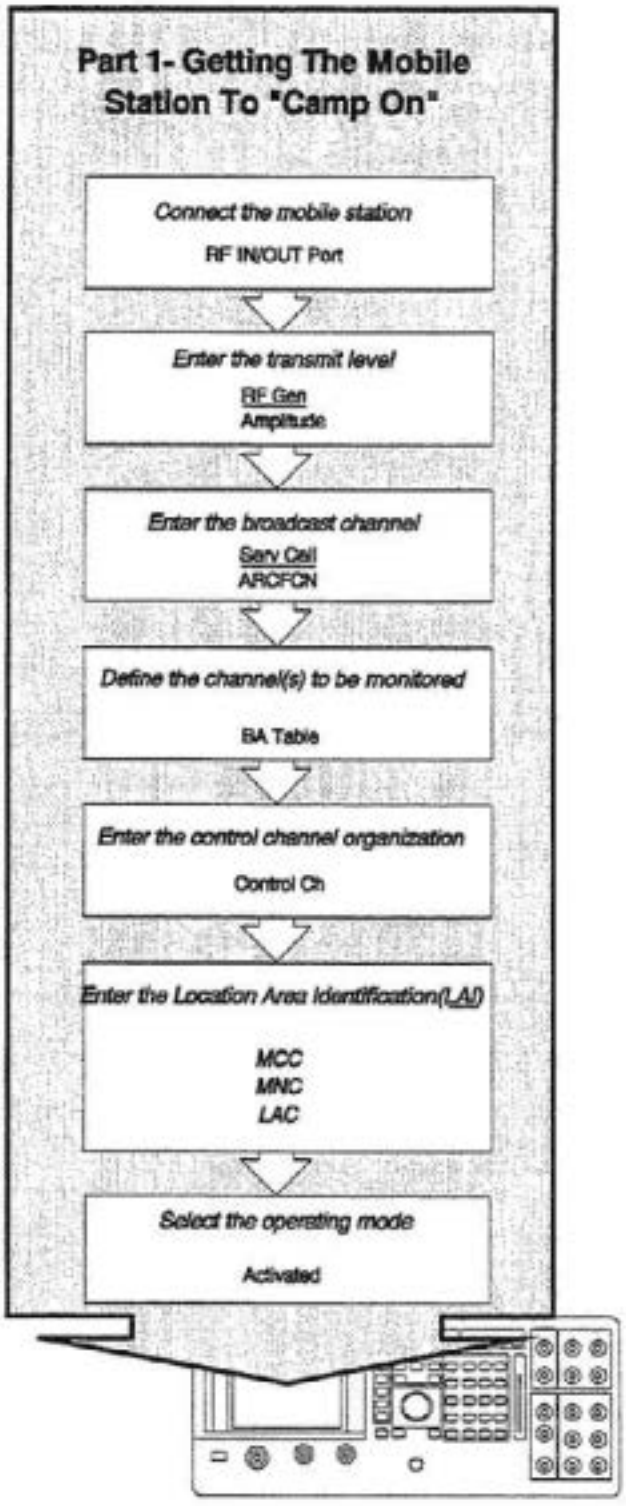
Part 1 consists of the steps to ouTput a broadcast channel from the HP 8922G and to get the mobile station to "camp on" to the broadcast channel.

Part 2 consists of steps for entering information about the mobile station and originating and receiving the GSM calls with the HP 8922G.

Part 3 consists of the steps to partially test the transmitter and receiver sections of the mobile station (DSP Analyzer, Bit Error Test, Fast TX Carrier Power).

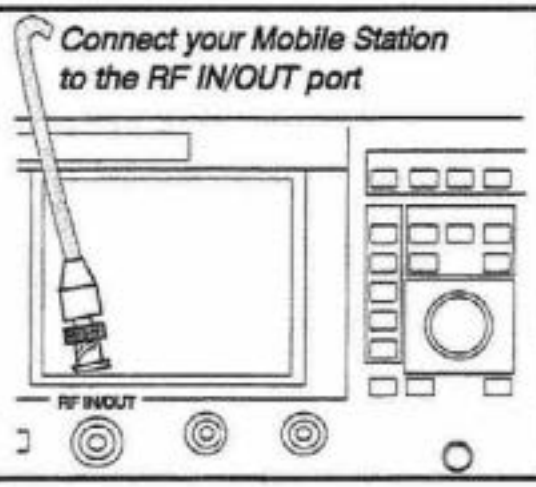
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



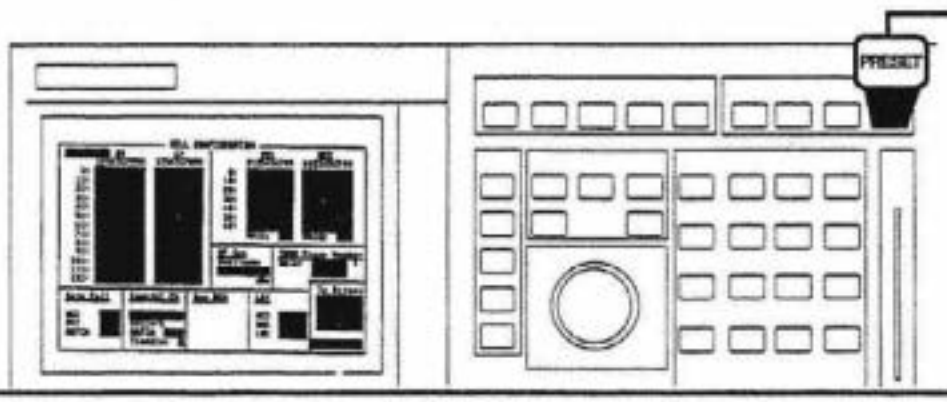
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1 *Connect your Mobile Station to the RF IN/OUT port*



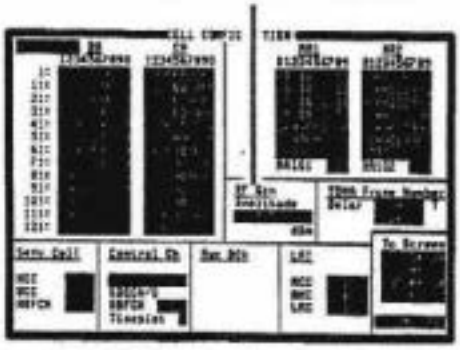
How to get the mobile station to "Camp On" the HP 8922G.

2 **Remove all previous settings from the HP 8922G memory:**

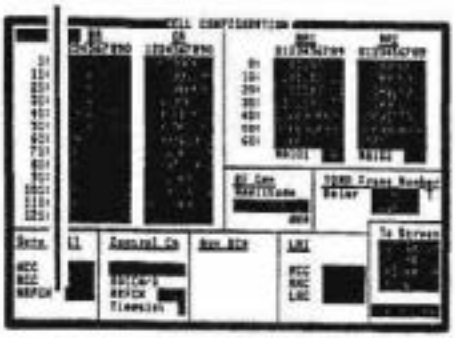


Press (The CELL CONFIGURATION screen should display.)

3 *Enter the transmit power level of the HP 8922G*



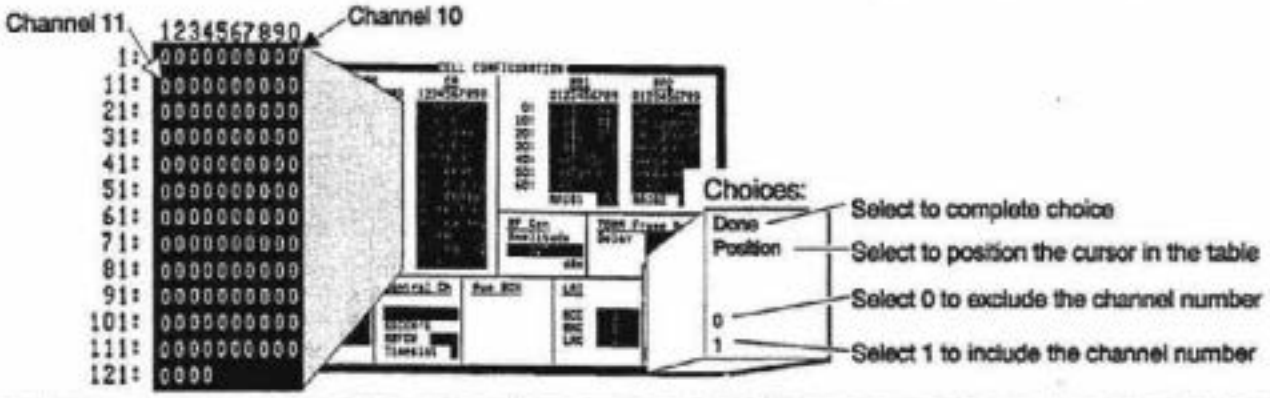
4 *Enter the Broadcast Channel ARFCN to be transmitted*



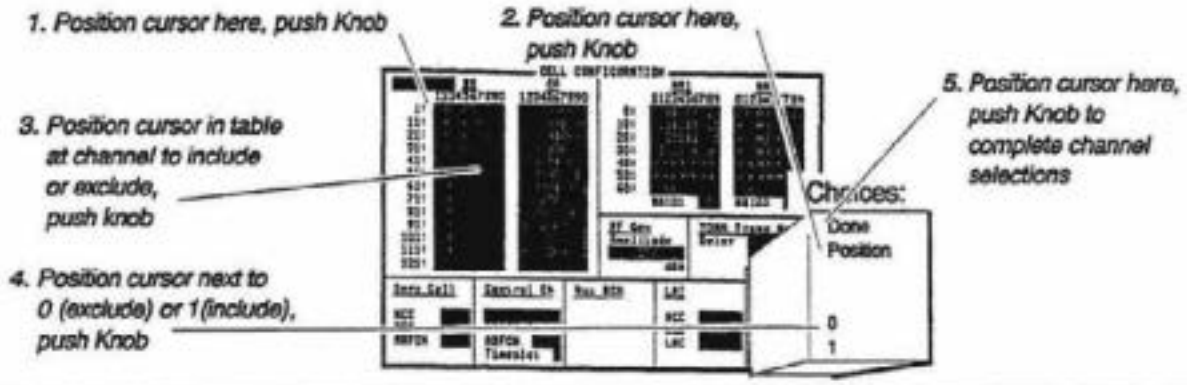
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The BA Table defines the channels the mobile station will monitor when it is searching for a Broadcast Channel (BCH) or measuring power levels of adjacent cells.

Editing information for the BA table modification (see steps below)



5 Select the channels for the BA table:



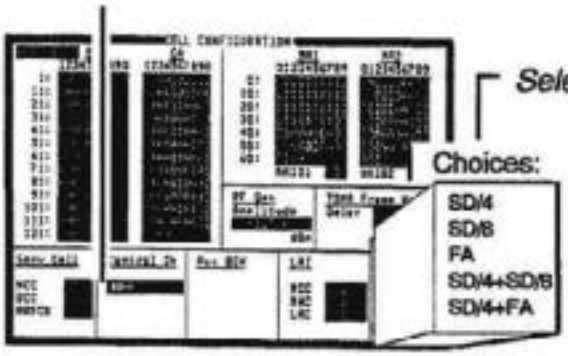
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Select a control channel. The control channel (Control Ch field) is used when originating or placing a call.

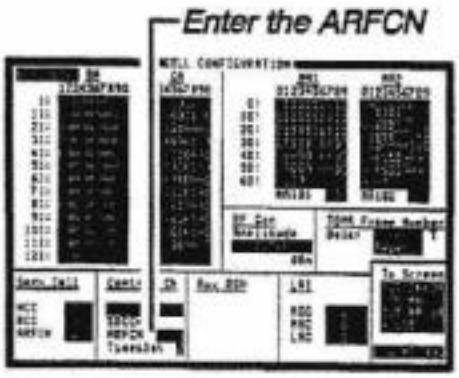
For information describing the Control Ch fields refer to Screens: Cell Config (Control Ch)

6 Select the control channel organization:

Select the list of Control Channel choices



7 Enter the ARFCN if SD/8 was selected in Step 6:

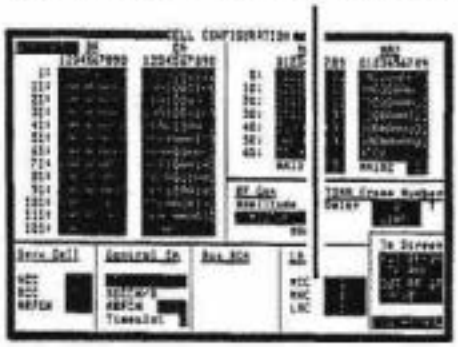


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Location Area Identification (LAI) fields must be entered. The Mobile Country Code (MCC field) and Mobile Network Code (MNC field) numbers must be part of the mobile station's list of allowable systems. The list of allowable systems is found in your mobile station's SIM module.

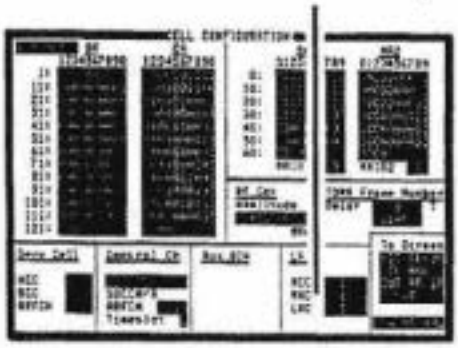
8

Enter the Mobile Country Code (MCC)



9

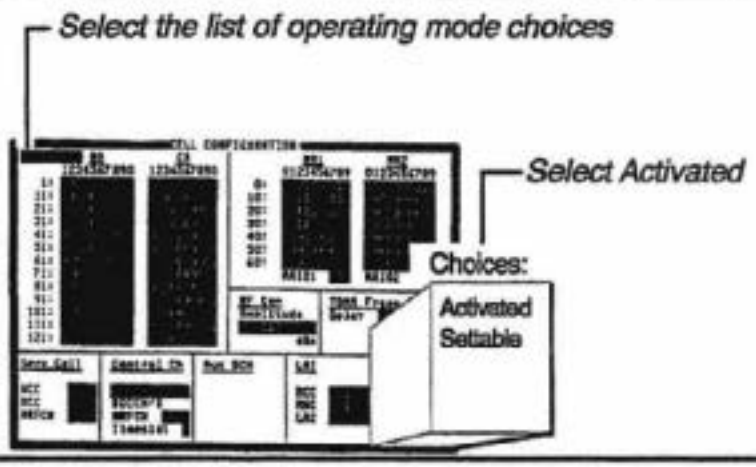
Enter the Mobile Network Code (MNC)



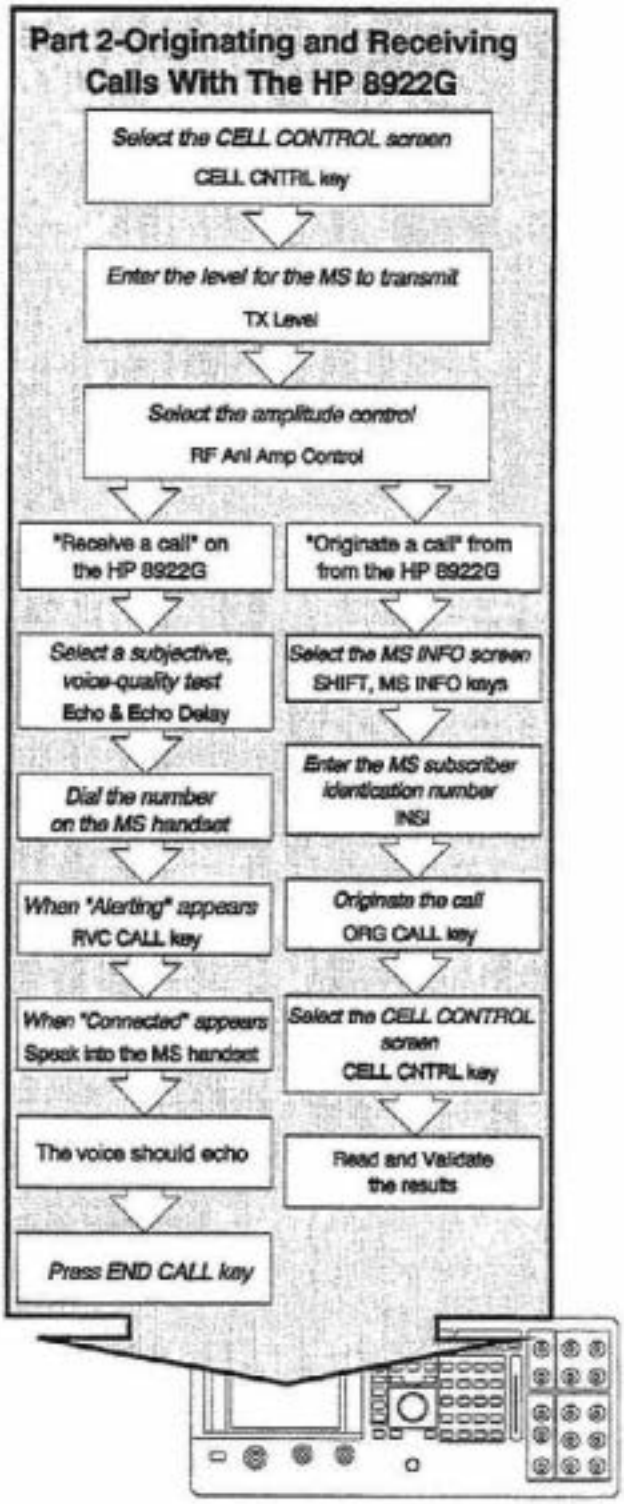
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To begin transmitting the Broadcast Channel, the operating mode is changed from "Settable" to "Activated". When "Activated" is displayed the HP 8922G begins transmitting a broadcast channel and the mobile station should "camp on" momentarily.

10



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

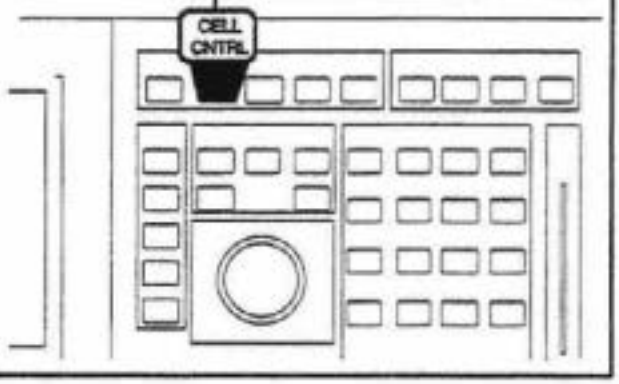


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

How to originate and receive calls.

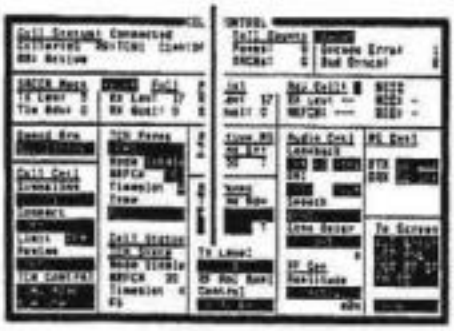
1

Press to display the CELL CONTROL screen



2

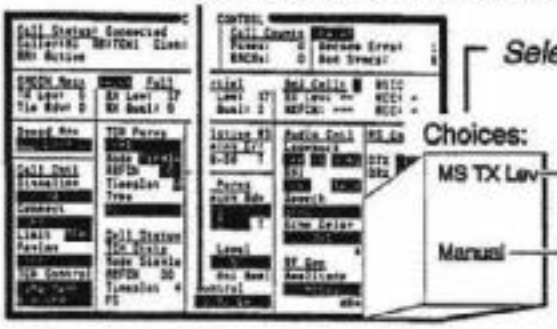
Enter the power level the mobile station will transmit



The correct sensitivity for the RF Analyzer input setting must be set based on the mobile station's transmit level. This can be automatic or manual.

3 **Select the RF Analyzer amplitude control mode:**

Select the list of Control choices



Select the choice

Choices:

MS TX Lev — Select for automatically setting the sensitivity based on the mobile station transmit level.

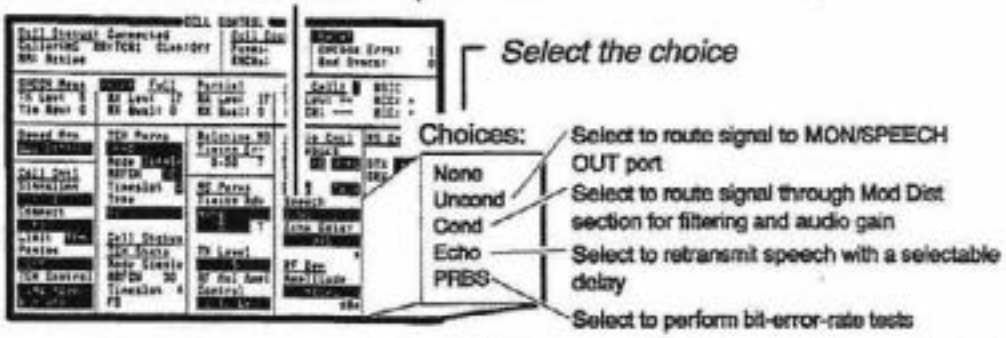
Manual — Select for manually setting the expected sensitivity of the mobile-station transmit level.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Use the Echo field to verify that a link has been established and to make a subjective voice quality test.

4 To make a subjective voice quality test:

Select the list of Speech choices



5 Enter a delay period if Echo is selected in Step 4:

Enter the delay time

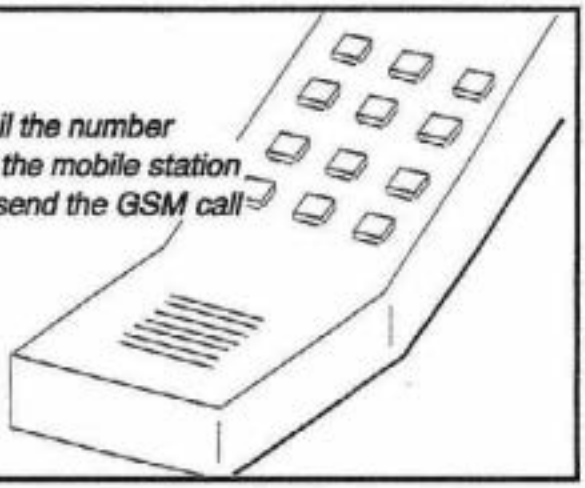


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To place a call from the mobile station and "receive the call" on the HP 8922G.

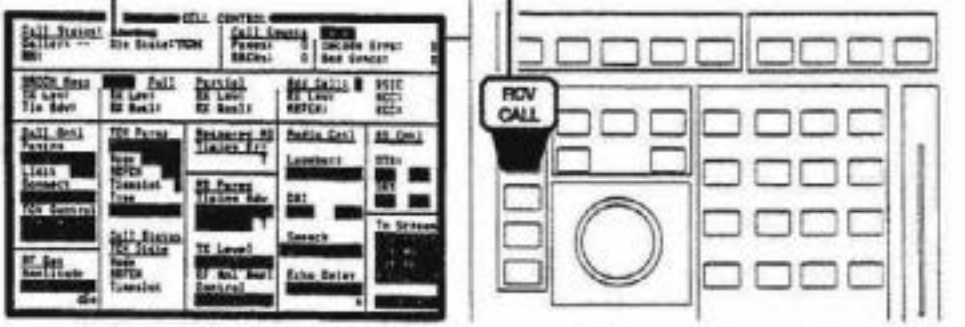
6

Dail the number on the mobile station to send the GSM call



7

When "Alerting" appears, press

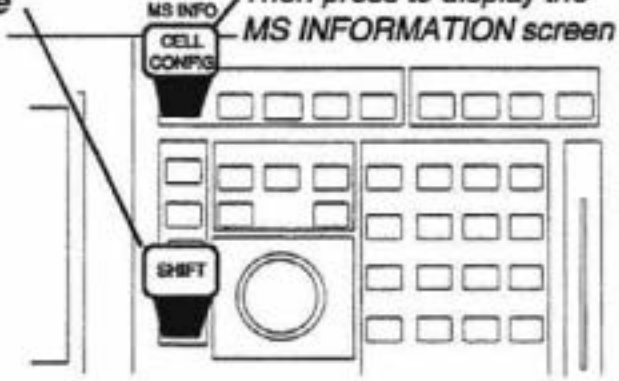


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To "originate a call" from the HP 8922G.

The HP 8922G must have the international mobile subscriber identification(IMSI) number entered.

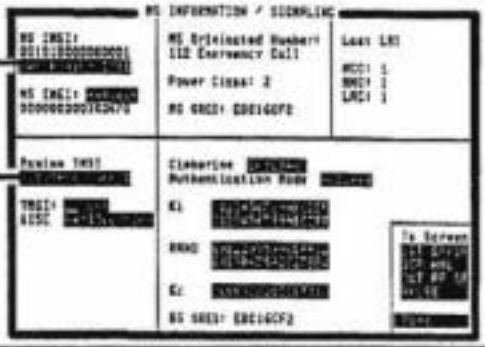
6A *Press and release* MS INFO / CELL CONFIG *Then press to display the MS INFORMATION screen*



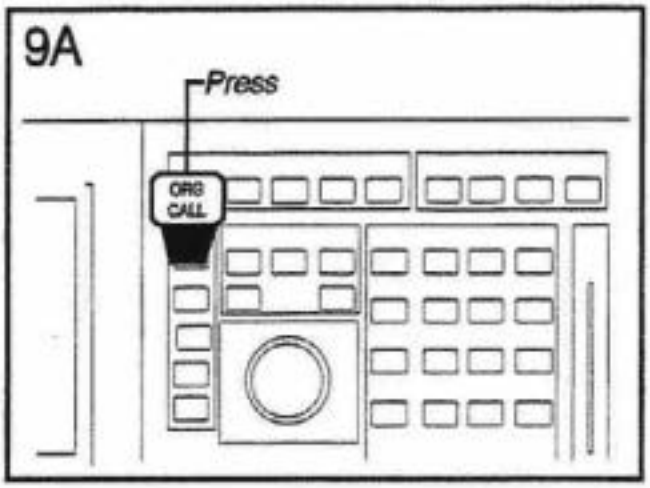
7A **Enter the MS subscriber identification number**

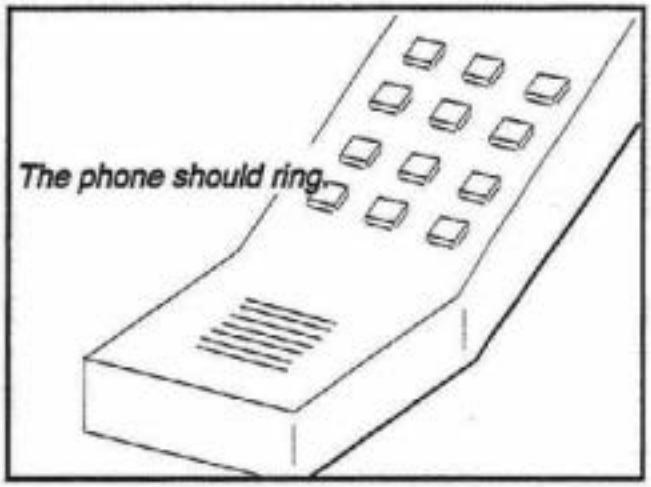
The IMSI number is entered automatically if a call was received on the HP 8922G, position cursor and press the knob.

The IMSI number is manually entered here.

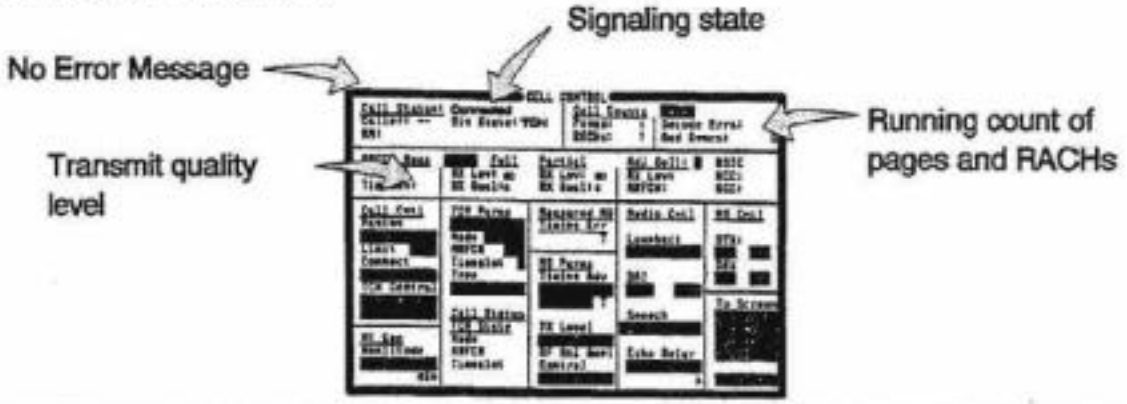


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

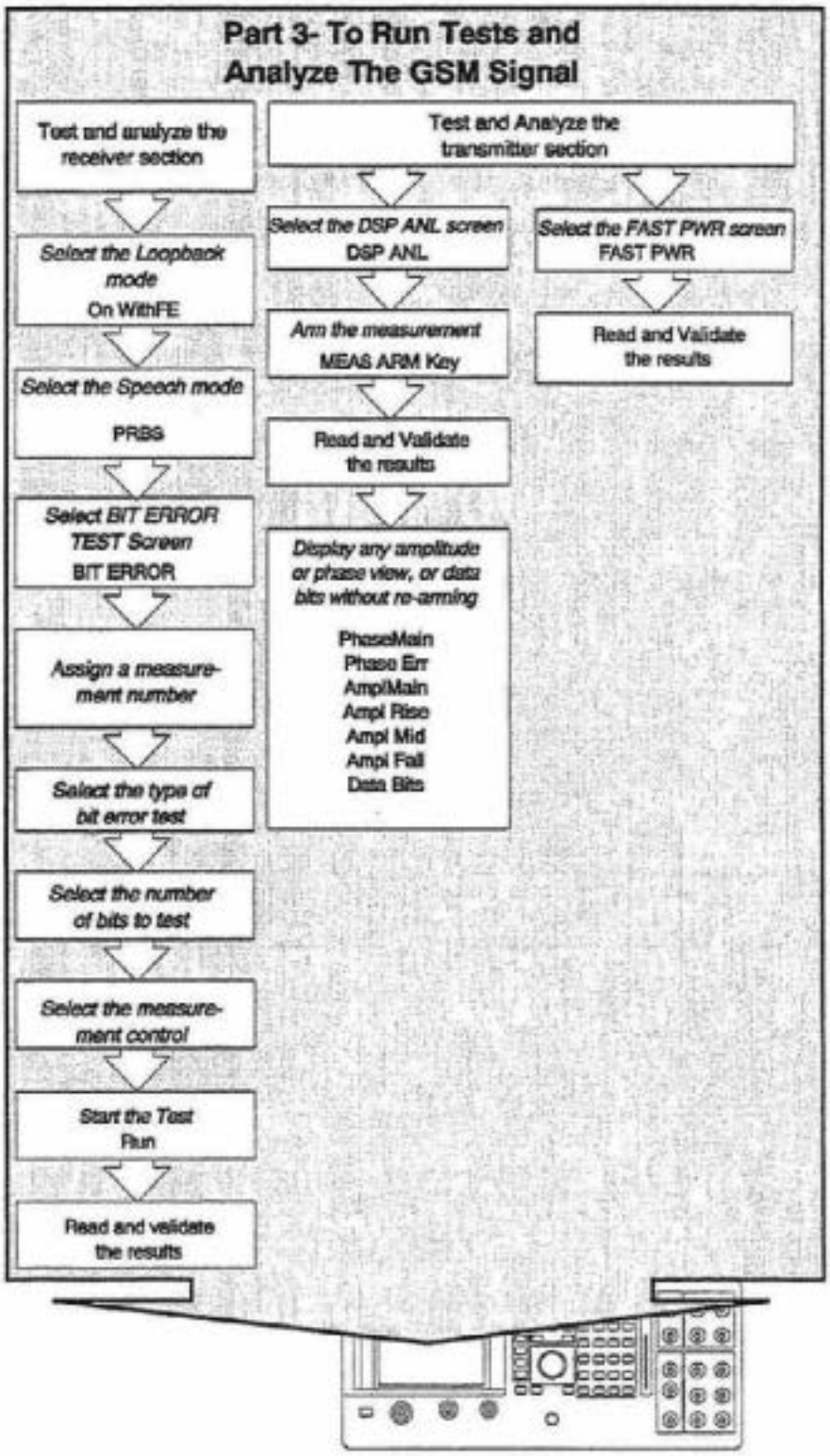




Read and validate the results:



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

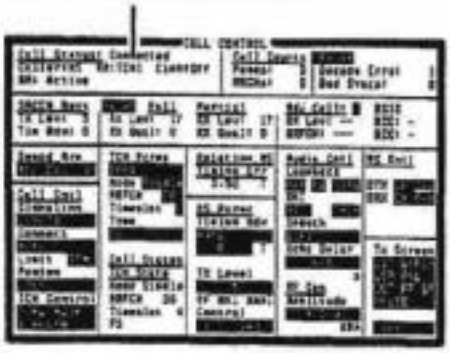


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To test and analyze the transmitter section of the mobile station using the DSP Analyzer screen.

1

Call Status: Connected



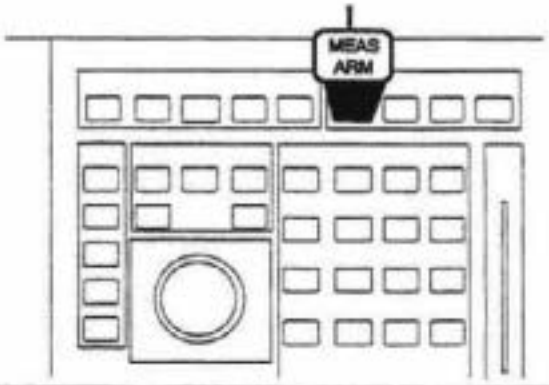
2

Select DSP ANL



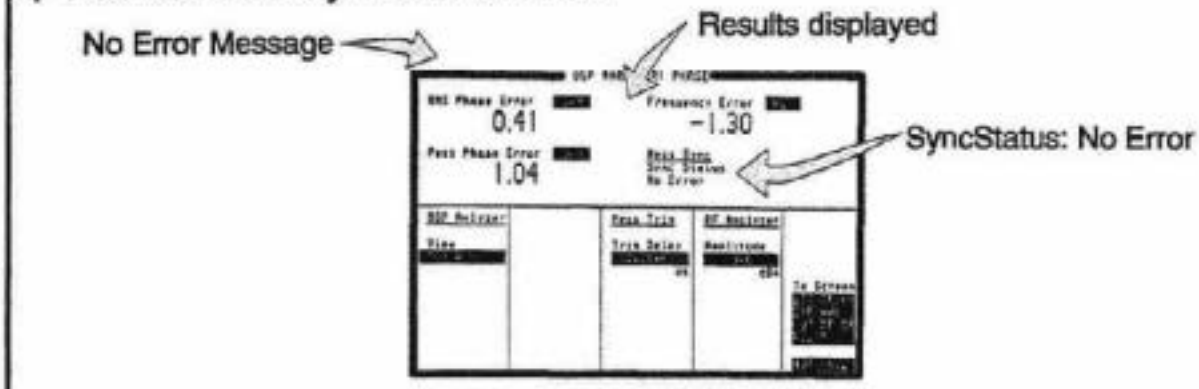
3

Press to arm the measurement

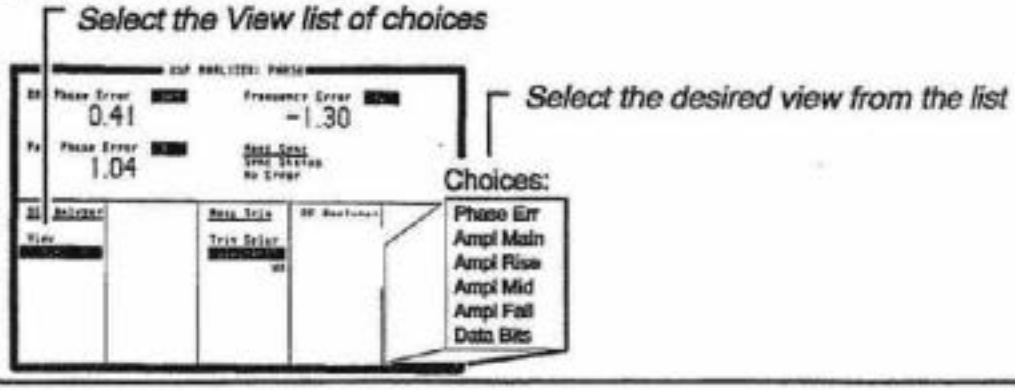


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4 Read and validate your measurement.



After a DSP analyzer measurement has been made, any of the phase or amplitude views can be chosen without re-arming.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To test and analyze the transmitter section of the mobile station using the FAST PWR screen.

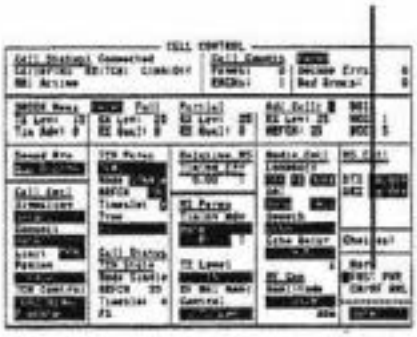
1

Call Status: Connected

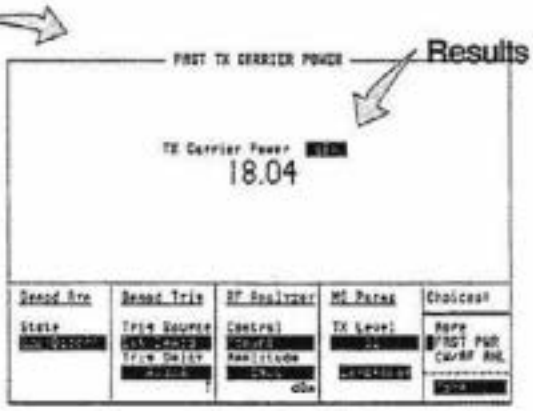


2

Select FAST PWR



3 No Error Message

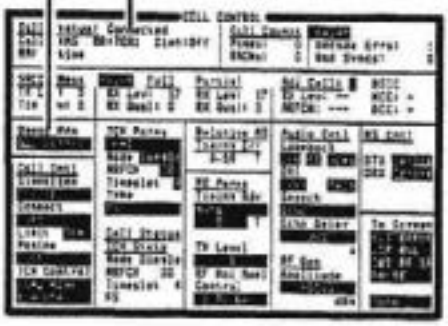


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To test and analyze the receiver section of the mobile station.

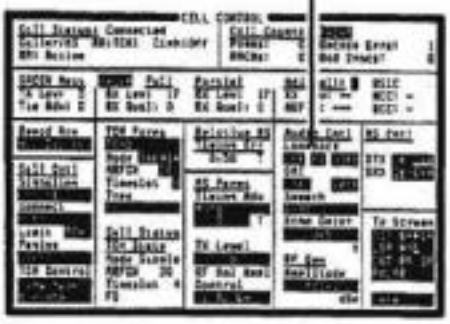
1 *Demod Arm: Arm*

Call Status: Connected



2 The mobile station must be in loopback mode:

Select the Loopback mode



Off — No loopback

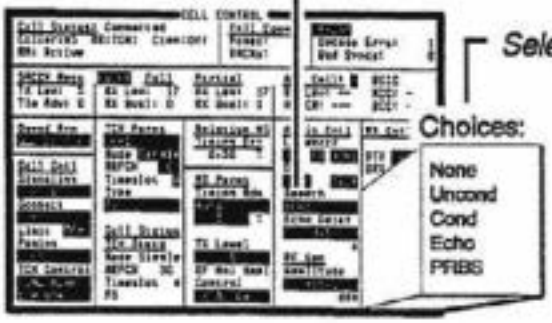
FE — Loopback on, with frame erasure

NoFE — Loopback on, without frame erasure

3 The HP 8922G needs to send a Pseudo-Random Bit Sequence:

Select the list of Speech choices

Select PRBS



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4 *Select BIT ERROR to display the BIT ERROR TEST screen*

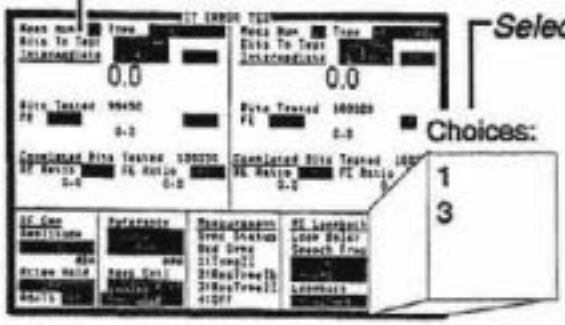


The HP 8922G is capable of doing four bit error tests simultaneously. All four bit error tests can be set up before running the test, however only two of the bit error tests are displayed at one time. The numbers selected in the Meas Num field determine which bit error test will be displayed.

5 **Assign a Measurement Number for the left portion of the screen:**

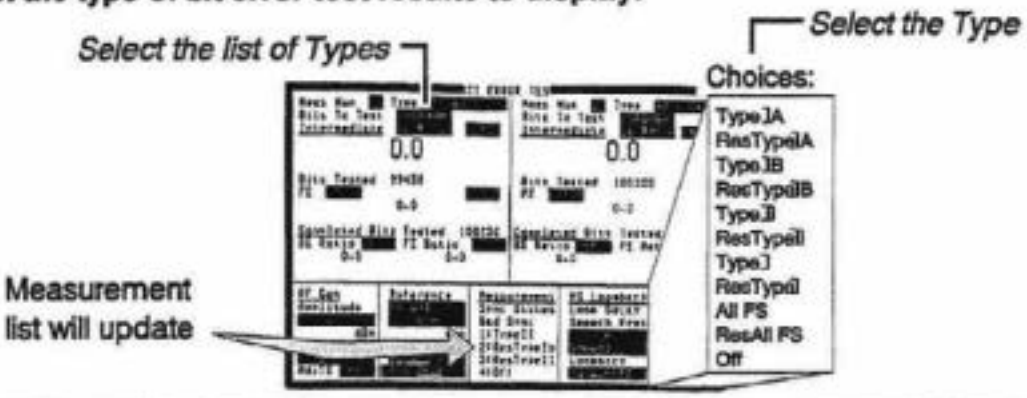
Select a number to identify the bit error test results

Select the number

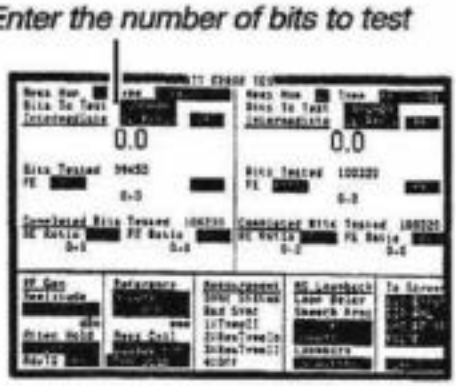


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

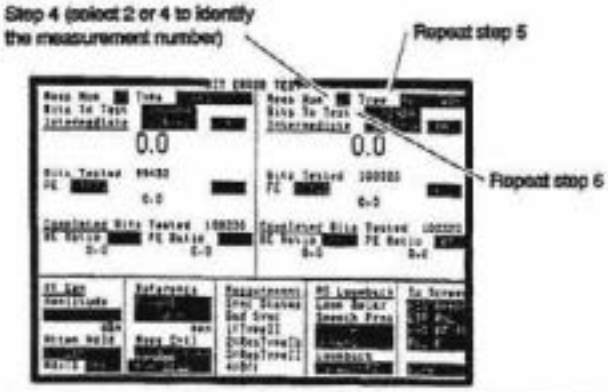
6 Select the type of bit error test results to display:



7



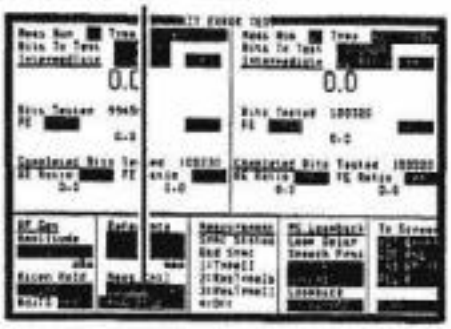
Repeat steps 4 through 6 for the second measurement results to display



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

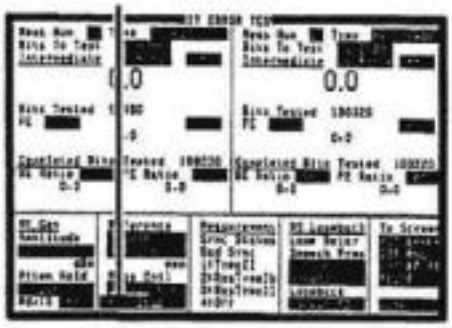
8 Select the type of Measurement Control for the bit error test :

Select Single or Cont(Continuous)

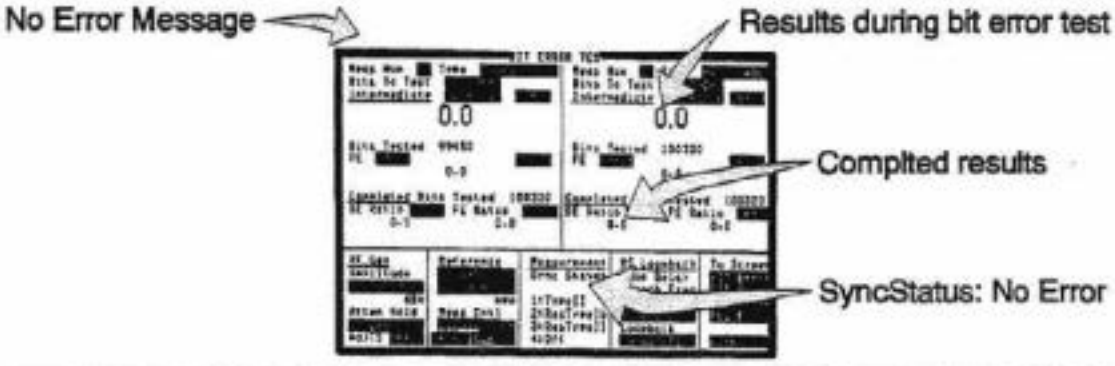


9 Start the bit error test:

Select Run



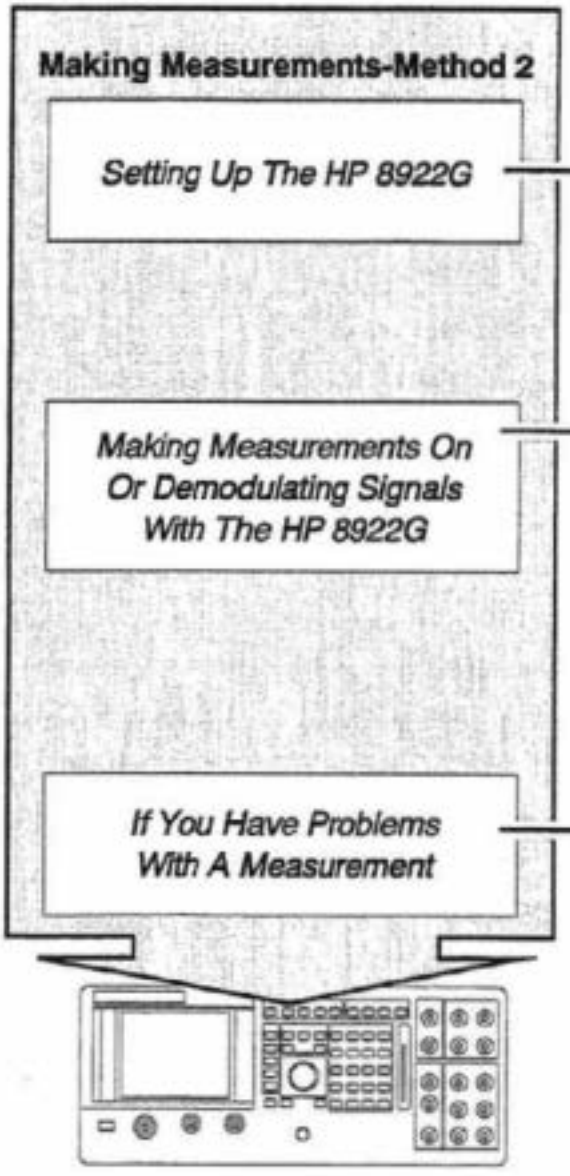
10 Read and validate the bit error tests



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Method 2

Use this method when you do not want to establish a link between the HP 8922G and your mobile station (such as when testing modules).



This section will show how to prepare the HP 8922G for measurements.

This section will show how to make measurements with the HP 8922G;
Amplitude/Peak TX Carrier Power,
Fast TX Carrier Power,
Phase/Frequency Error,
Data Bits,
Pulse On/Off Ratio,
Output RF Spectrum,
and Digital Demodulation.

This section will help solve problems that occur during measurements and explainerror messages.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

What You Need to Provide

If you want to use this method to learn how to operate the HP 8922, you must provide a GSM signal. In most cases you will also need to provide a trigger signal.

If you do not have the capability for generating a GSM signal that meets the requirements listed below, the HP 8922A K01 Pulse/Timing Generator is a good source. It provides GSM formatted data and clock signals and a trigger signal that modulate the HP 8922G generator.

GSM Signal Requirements

The GSM signal must have the following:

- At least one pulse every two frames with equal length pulses.
- One of the following midambles (unless you choose Amplitude in the Sync Mode field):
  1. Training Sequence Color Code (TSC) 0, 1, 2, 3, 4, 5, 6, 7.
  2. Random Access Channel (RACH).
  3. Synchronization Channel (SCH).
- A known amplitude (to within ±3 dB).
- For digital demodulation, an input signal that meets the following specifications:
  1. Frequency Error < 0.1 ppm
  2. RMS Phase Error < 5°
  3. Peak Phase Error < 20°
  4. Amplitude Flatness < 0.1 dB (during burst)

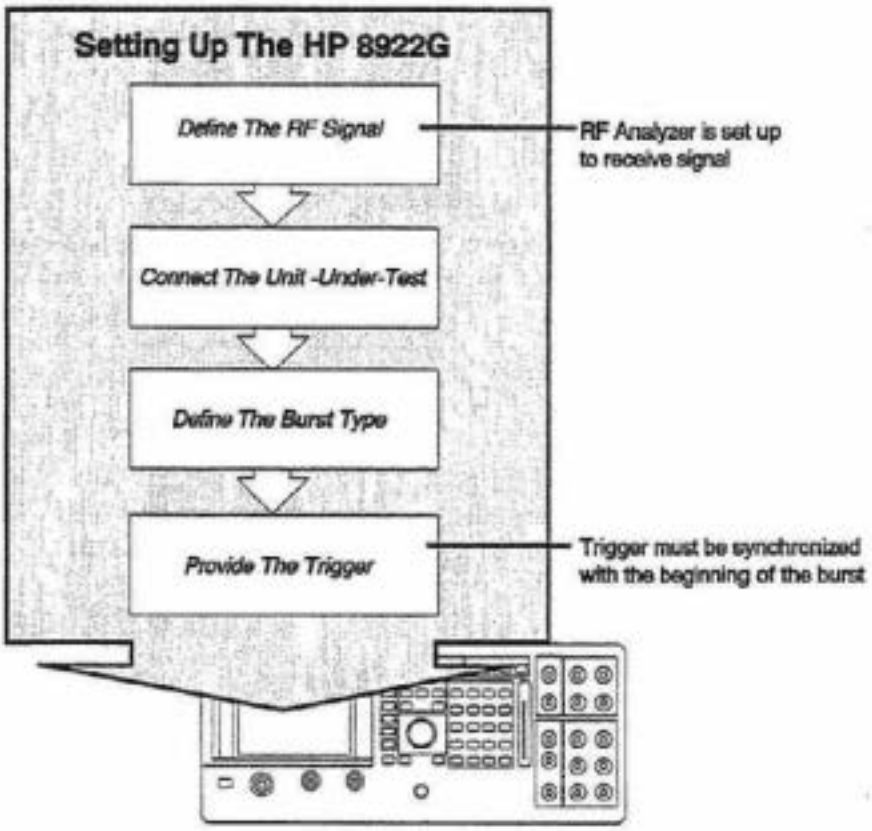
Finding More Information

Refer to Volume 2, Reference Information, for the specific requirements and features of each screen, key, or connector.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Setting up the HP 8922G

Whenever measurements are made without placing a call between the HP 8922G and the mobile station, you must set the HP 8922G to pre-measurement conditions. The steps for setting these conditions are shown in this section.



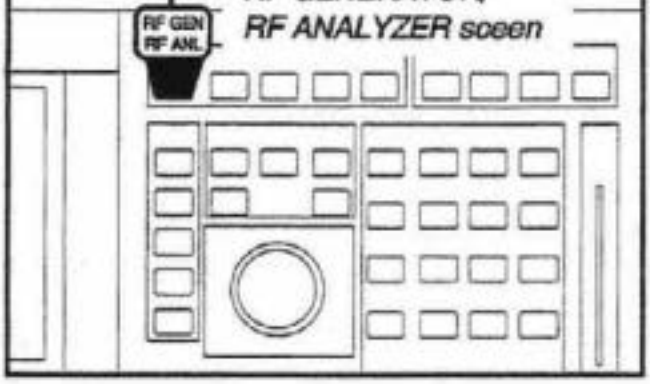
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

All GSM measurements begin with accessing the RF GENERATOR/RF ANALYZER screen to define the RF signal, and to select your signal's connection.

Press the PRESET key or cycle the power to the HP 8922 to place the instrument in a known state.

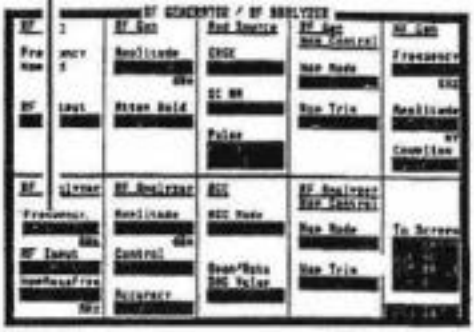
1

Press to display the RF GENERATOR/ RF ANALYZER sceen



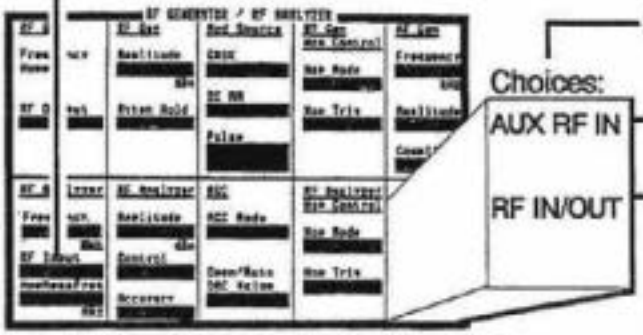
2

Enter your signal's RF Frequency



3

Select the RF Input list of choices



Select an RF input from the list

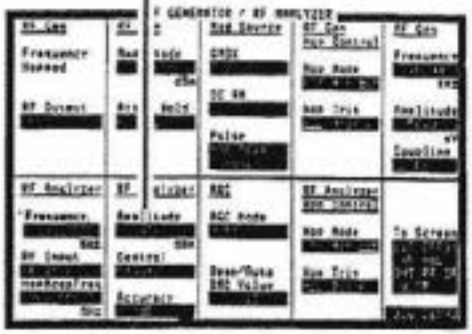
Choices:

AUX RF IN – If your signal's amplitude level range is -36 to +20 dBm.

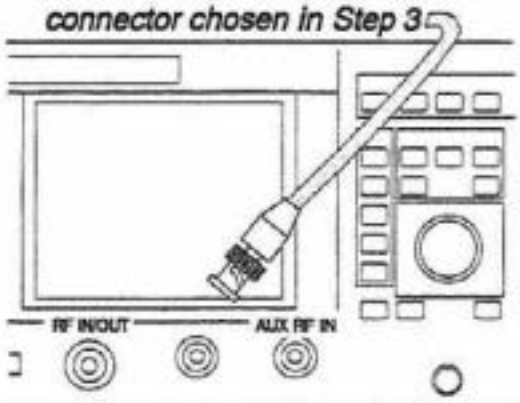
RF IN/OUT – If your signal's amplitude level range is 0 to +45 dBm. (Must be selected for Peak Transmitter Carrier Power or Pulse On/Off measurements).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4 *Enter the expected amplitude of your signal*



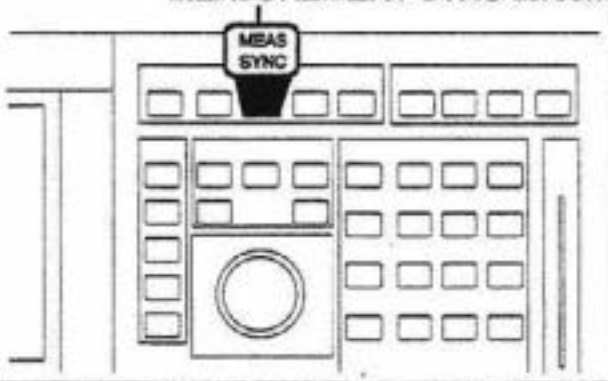
5 *Connect your signal to the HP 8922 connector chosen in Step 3*



If you want to demodulate clock and data from your signal, turn to Performing Digital Demodulation. For all other measurements ...

Continue the set up by accessing the MEASUREMENT SYNC screen to define the your signal's midamble or "burst" type. The burst type must be displayed in the Burst Def: field before it can be selected.

6 *Press to display the MEASUREMENT SYNC screen*

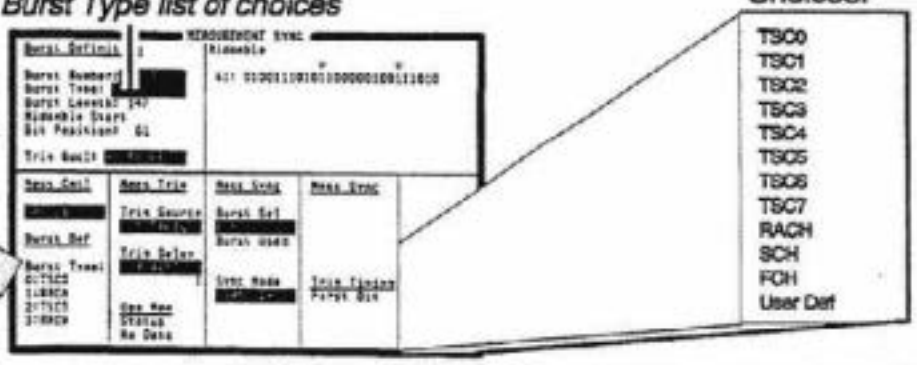


7 **Define your signal's Burst Type: (If it is already displayed in Burst Def: go to Step 9)**

Select the Burst Type list of choices

Burst Def is the list of currently defined burst types

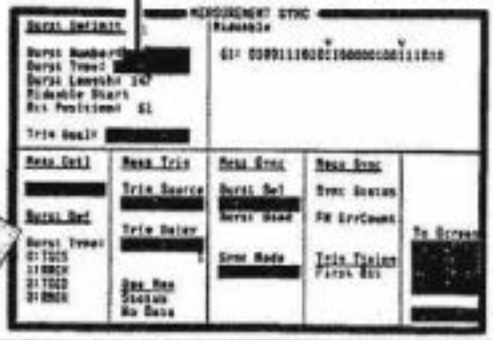
Choices: — *Select your signal's Burst Type*



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8 Assign any of the 4 available Burst Numbers to your signals' Burst Type defined in Step 7:

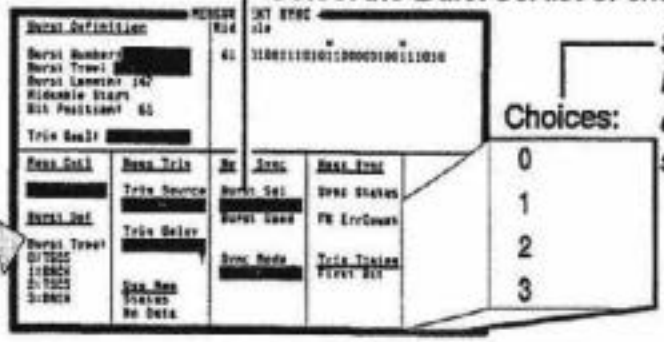
Select a number to identify your signal's Burst Type



Burst Def types will update

9 Select the Burst Number the HP 8922G will use in the measurement:

Select the Burst Sel list of choices

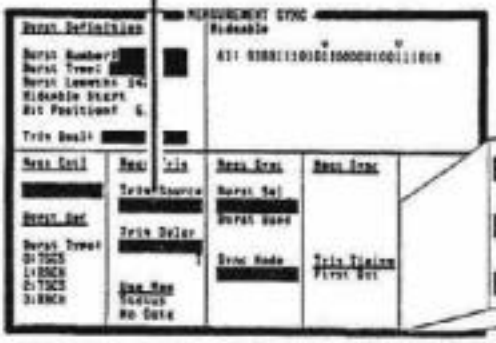


Select the Burst Number that corresponds to your signal's Burst Type

Your signal's Burst Type must be displayed to select

10

Select the Trigger Source list of choices



Select a Trigger Source from the list

Choices:

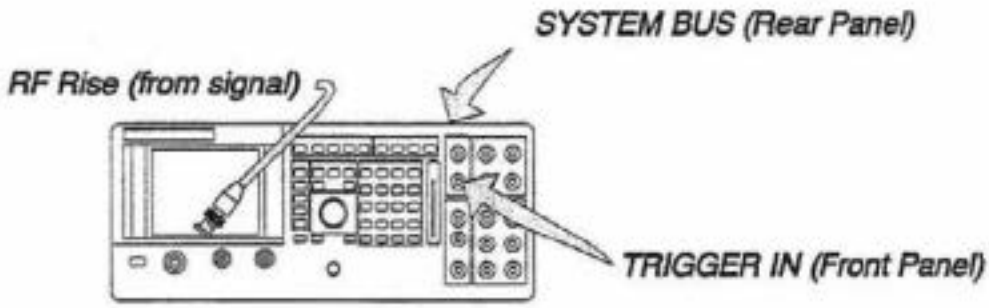
- Ext Demod — Rear panel SYSTEM BUS connector
- RF Rise — Rising edge of the amplitude envelope
- Ext Meas — Front panel TRIGGER IN connector

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Trigger signals on the SYSTEM BUS or the TRIGGER IN front-panel connector must occur near bit 0 of the transmitted burst, or be delayed to occur near bit 0 using the Trigger Delay field (see Screens, Measurement Sync).

If RF Rise is chosen as the Trigger Source, the trigger is automatically generated when the rising edge of the amplitude envelope is detected.

11 **Connect the trigger signal to the HP 8922G:**



You have now completed setting up the HP 8922G for GSM measurements or demodulating signals.

See the following section for:

Making an Amplitude and Peak Transmitter Carrier Power Measurement,
Making a Phase/Frequency Error Measurement,
Making a Data Bits Measurement,
Making a Pulse On/Off Ratio Measurement,
Making an Output RF Spectrum Measurement,
Performing Digital Demodulation.

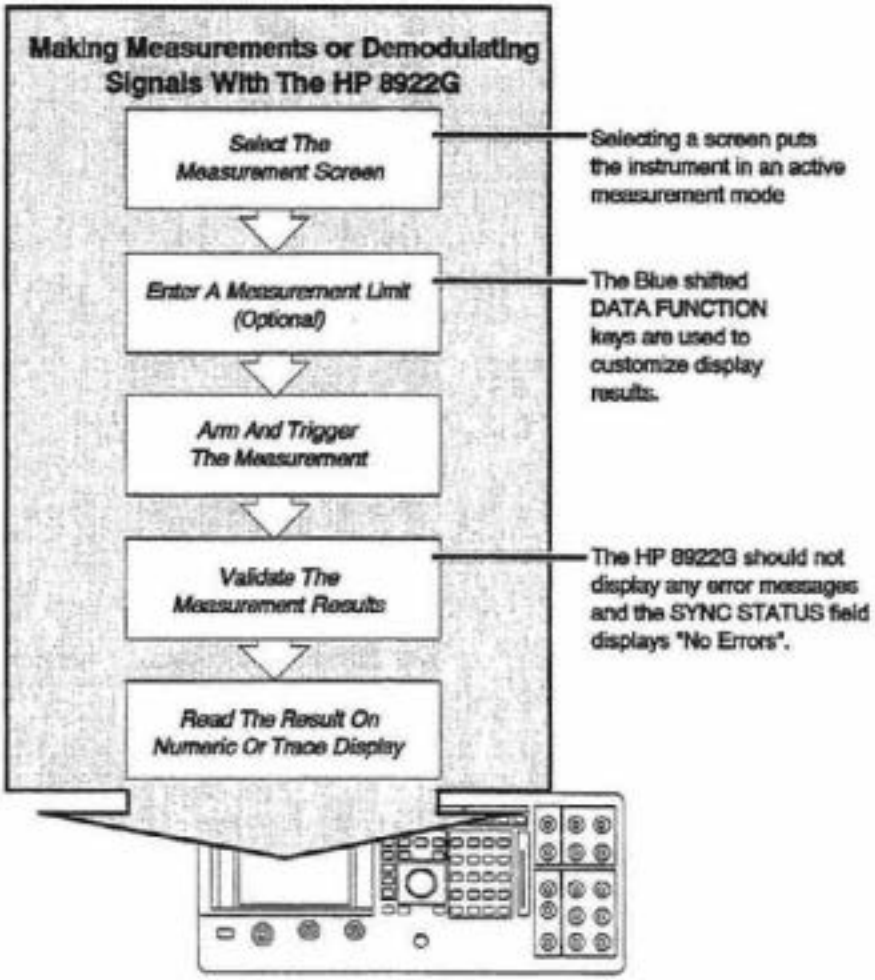
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Making Measurements on Modules with the HP 8922G

Making measurements on modules begins with selecting a measurement screen from the To Screen (in the lower-right corner of the display). After completing the measurement setup just described, all you need to do is arm the instrument. The measurement will then be made on the next valid trigger event. You can display the measurement results in a graphic format (a trace, or in some cases, a meter) or in a numeric format (a digital readout).

Demodulating Signals with the HP 8922G

Digital demodulation begins with selecting DIG DEMOD from the To Screen (in the lower-right corner of the display). After completing the measurement setup just described, all you need to do is follow the instructions given in *Performing Digital Demodulation*.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Choosing a Measurement or Demodulation

After you have set up your instrument, choose one of the following procedures.

Making an Amplitude/Peak Transmitter Carrier Power Measurement

The amplitude measurement provides 12 amplitude measurements, taken from time-positions within the burst. You can choose your own time-positions, or use the default settings. The dynamic range of the amplitude envelope measurement is specified to −30 dB. You can also view the rising, middle, or falling portions of the amplitude trace.

Peak transmitter carrier power averages the transmitter carrier power for a single burst. The average is calculated over the time that the useful information bits are transmitted. Performing this measurement also displays peak± flatness over the useful bits in a measured burst.

Making a Fast Transmitter Carrier Power Measurement

Fast transmitter carrier power averages the transmitter carrier power for a single burst. The average is calculated over the time that the useful information bits are transmitted. Performing this measurement also displays peak± flatness over the useful bits in a measured burst.

Measuring Phase/Frequency Error

Phase error and frequency error measure the difference between a theoretical, expected phase trajectory for a signal, and a sampled measurement of that signal. You can also view the phase error trace versus time.

Making a Data Bits Measurement

The Data Bits screen displays the demodulated data with midamble bits and RF level error bits marked.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Making a Pulse On/Off Ratio Measurement

Pulse on/off ratio measures the ratio of the average transmitter-power (pulse on) to a specified time-position when power is reduced (pulse off). You can view the rising or falling portion of the pulse trace.

Making an Output RF Spectrum Measurement

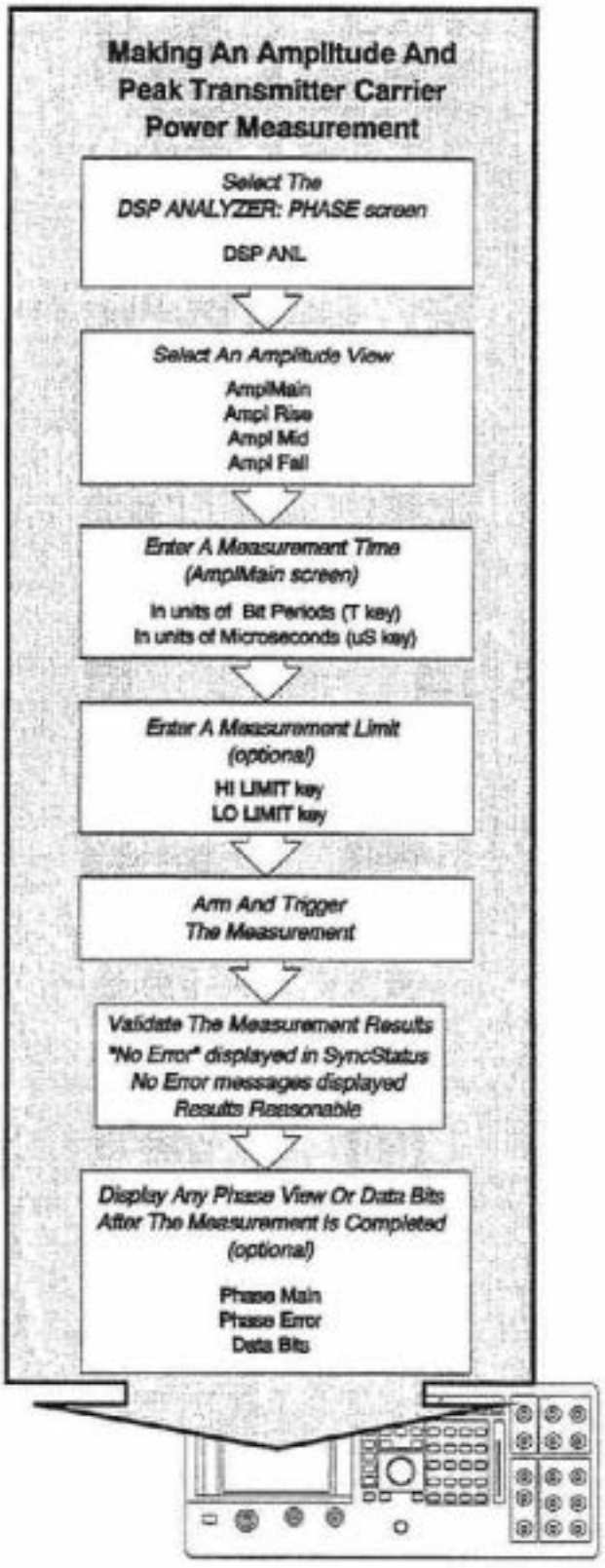
Output RF spectrum measures the spectral power (due to the effects of ramping or modulation) at a specified frequency offset. You can view the output RF spectrum trace.

Performing Digital Demodulation

Digital demodulation demodulates 0.3 GMSK clock and data from the RF input signal. The demodulated clock and data are output to the front-panel Demodulation Out connectors, and to the rear-panel System Bus connector.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Making an Amplitude/Peak TX Carrier Power Measurement

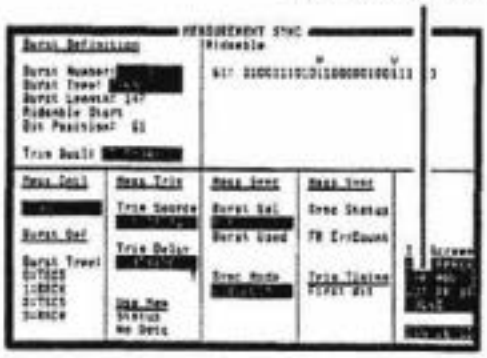


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The HP 8922G must be set up before starting this measurement, see Setting Up The HP 8922G.

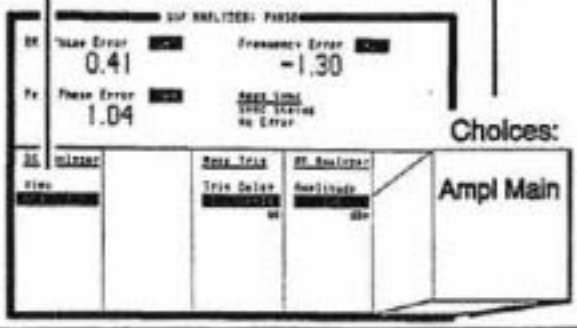
The Peak Transmitter Carrier Power will be valid if the the RF IN/OUT connector is chosen as the RF Input.

1 *Select DSP ANL*



2 *Select the View list of choices*

Select Ampl Main from the list



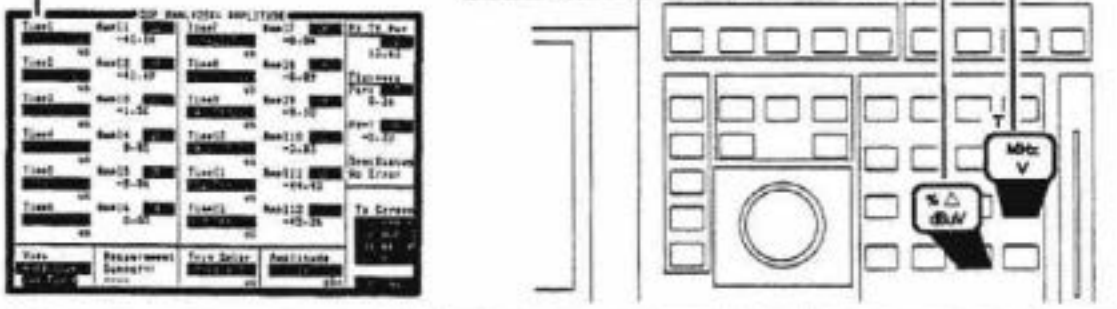
The DSP ANALYZER: AMPLITUDE Main screen displays 12 power measurements. The time displayed with each measurement is relative to bit 0 of the GSM burst.

3 Enter the measurement time:

Key in the measurement time,

.....to enter the time in bit period, press

.....to enter the time in uS, press



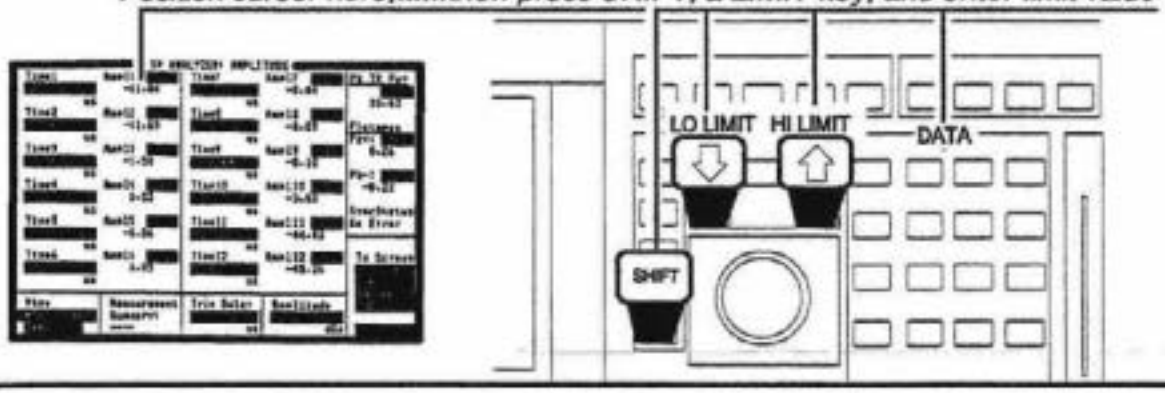
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

It is optional to set high and low measurement limits. If the measurement exceeds a limit, the Hi or Lo annuciators will flash.

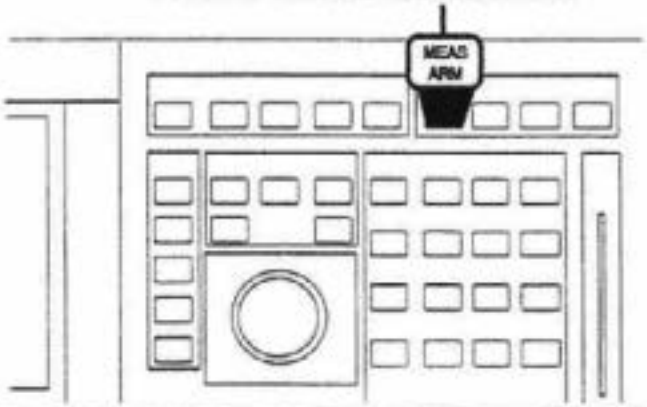
Limits can also be set for Pk Tx Pwr or Flatness measurements.

4 **Enter the measurement limit:**

Position cursor here,.....then press SHIFT, a LIMIT key, and enter limit value

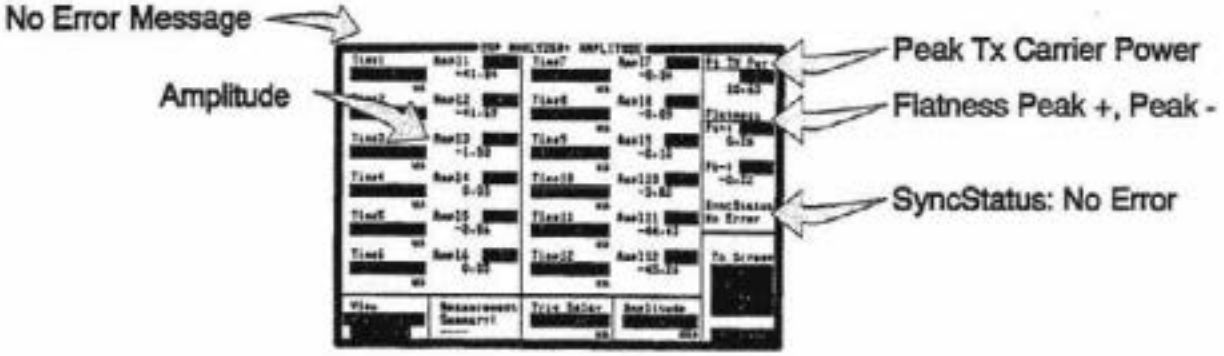


5 *Press to arm the measurement*

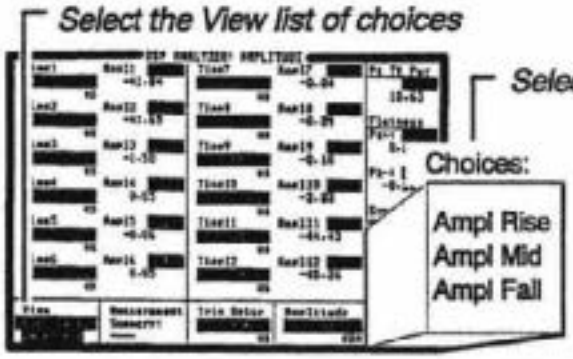


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

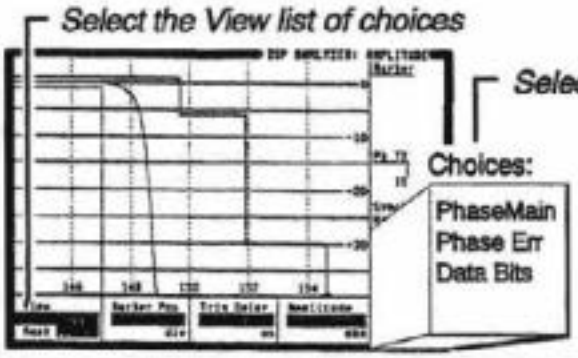
6 Read and validate your measurement.



7 Display portions of the amplitude envelope as a trace:

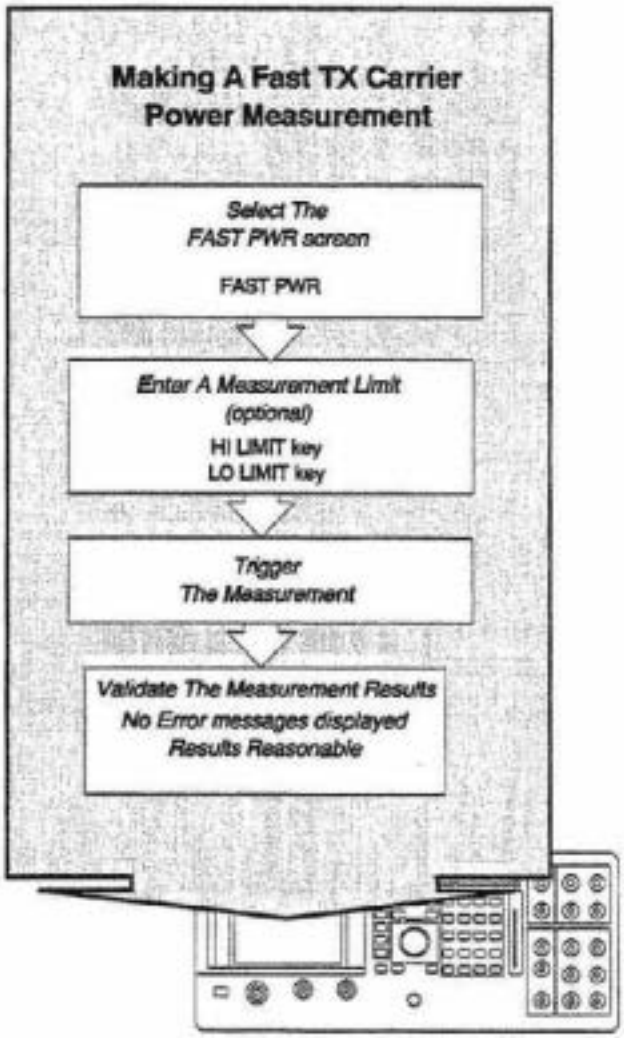


After a DSP Analyzer measurement has been made, any of the phase views or data bits can be chosen without re-arming and triggering.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Making a Fast TX Carrier Power Measurement



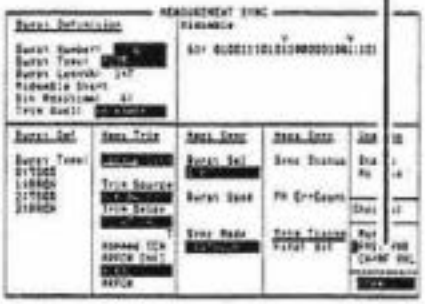
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The HP 8922G must be set up before starting this measurement, see Setting Up The HP 8922G.

The Fast Transmitter Carrier Power will be valid only if the RF IN/OUT connector is chosen as the RF input.

1

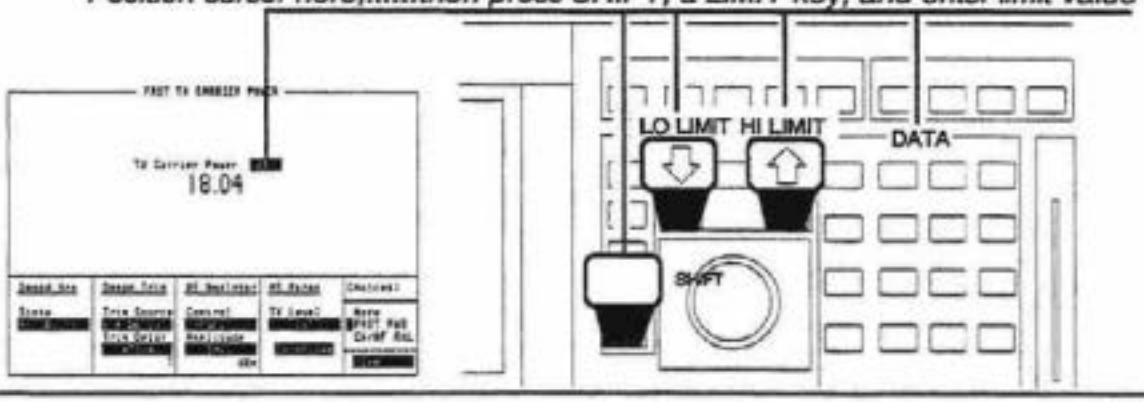
Select FAST PWR



It is optional to set high and low measurement limits. If the measurement exceeds a limit, the Hi or Lo annuciators will flash.

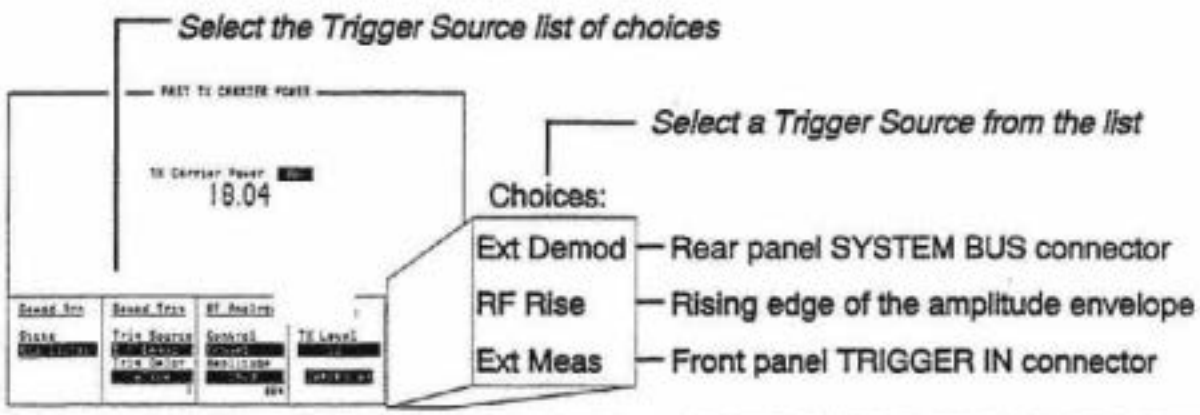
2 **Enter the measurement limit:**

Position cursor here,.....then press SHIFT, a LIMIT key, and enter limit value



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

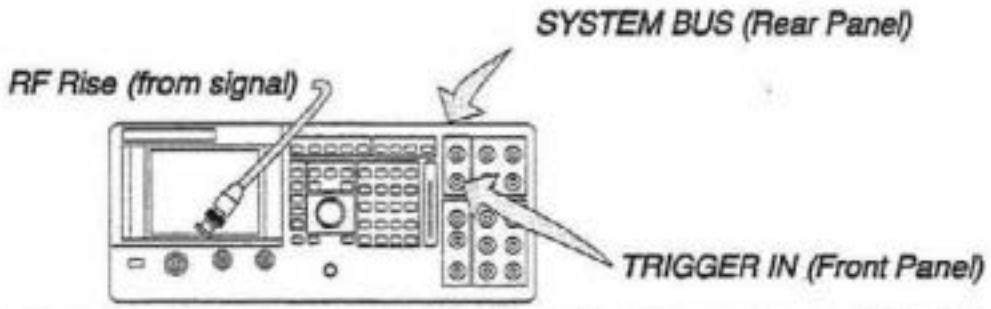
3



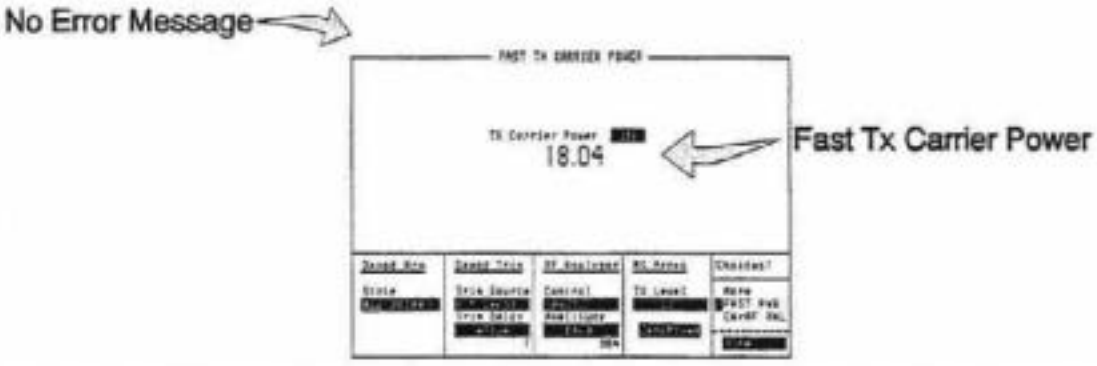
Trigger signals on the SYSTEM BUS or the TRIGGER IN front-panel connector must occur near bit 0 of the transmitted burst, or be delayed to occur near bit 0 using the Trigger Delay field (see Screens, FAST PWR).

If RF Rise is chosen as the Trigger Source, the trigger is automatically generated when the rising edge of the amplitude envelope is detected.

4 **Connect the trigger signal to the HP 8922G:**



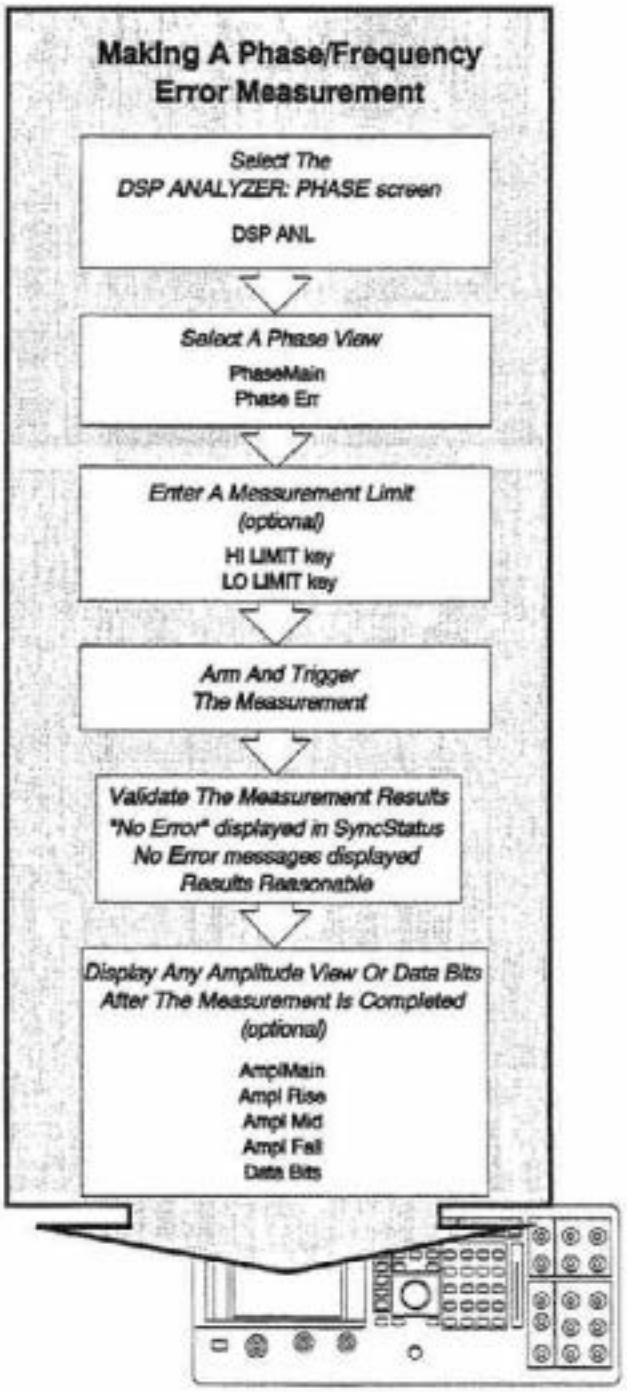
5 **Read and validate your measurement.**



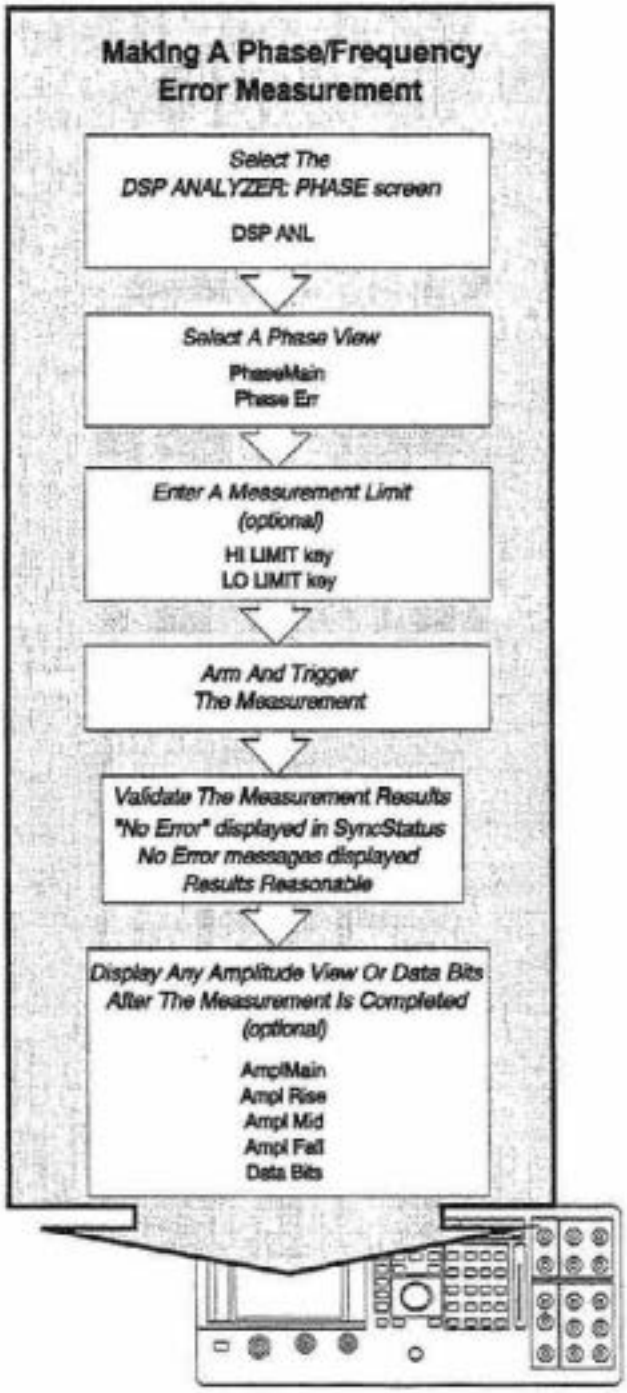
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Measuring Phase/Frequency Error



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

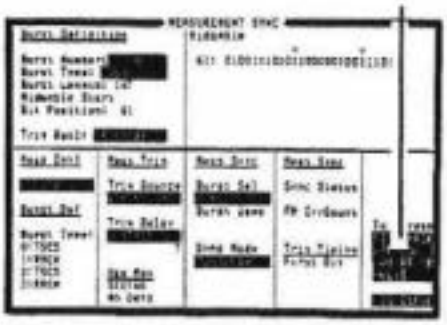


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The HP 8922G must be set up before starting this measurement, see Setting Up The HP 8922G.

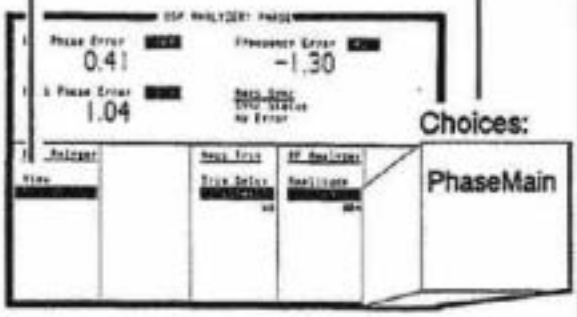
1

Select DSP ANL



2 *Select the View list of choices*

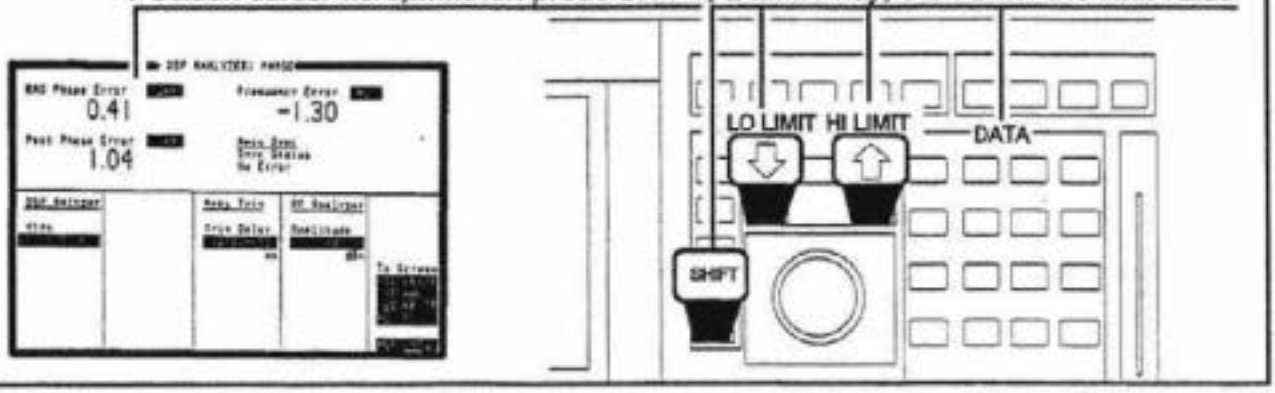
Choose PhaseMain from the list



It is optional to set high and low measurement limits. If the measurement exceeds a limit, the HI or Lo annuciator will flash.

3 **Enter the measurement limit:**

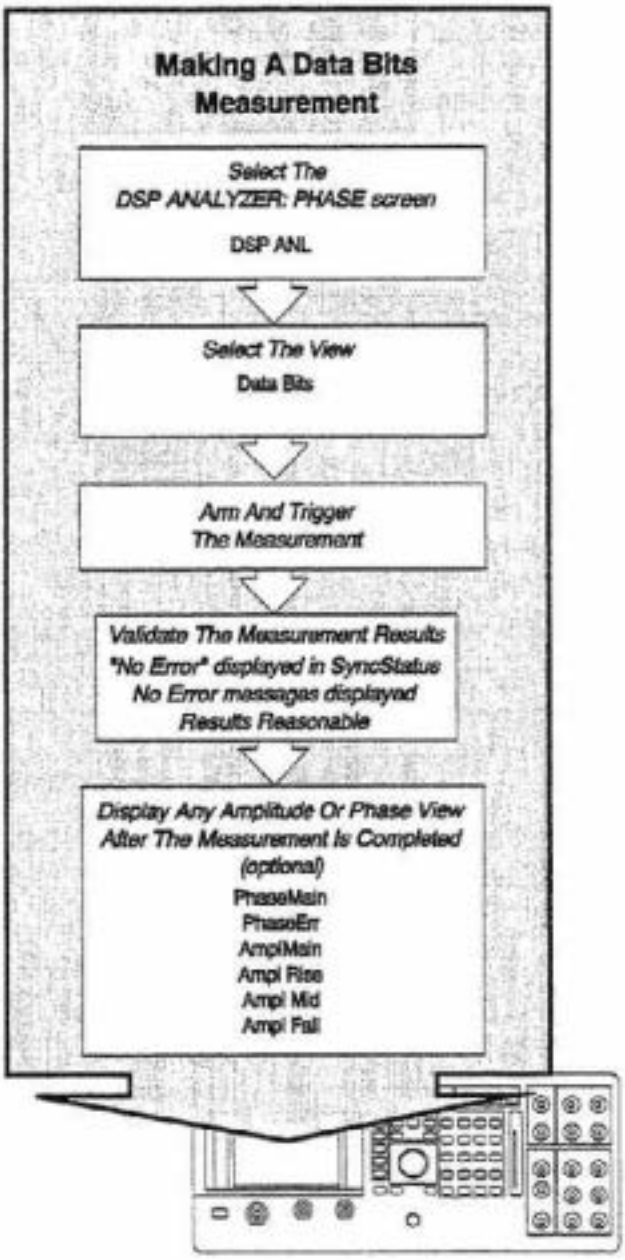
Position cursor here,.....then press SHIFT, a LIMIT key, then enter the limit value



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Making a Data Bits Measurement

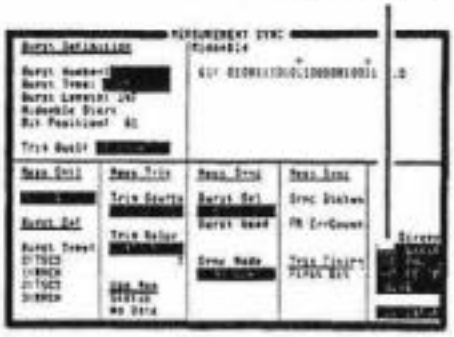


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The HP 8922G must be set up before starting this measurement, see Setting Up The HP 8922G.

1

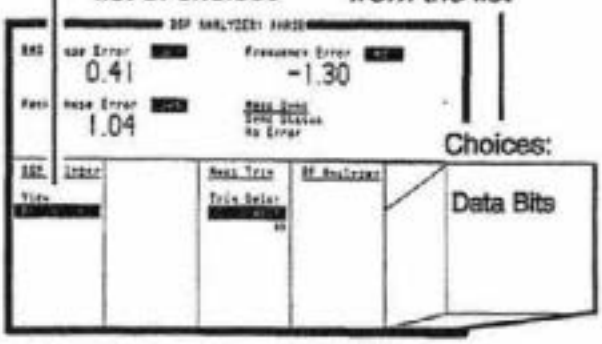
Select DSP ANL



2

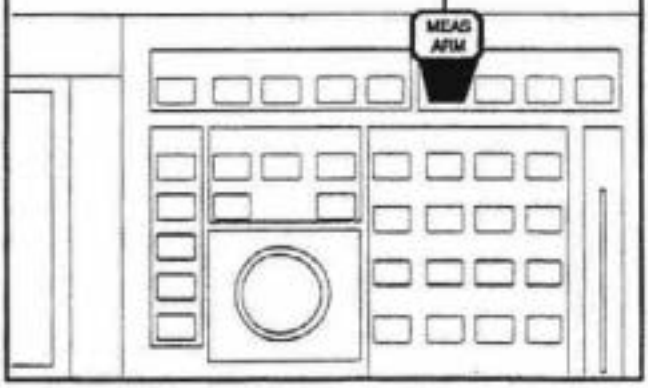
Select the View list of choices

Select Data Bits from the list



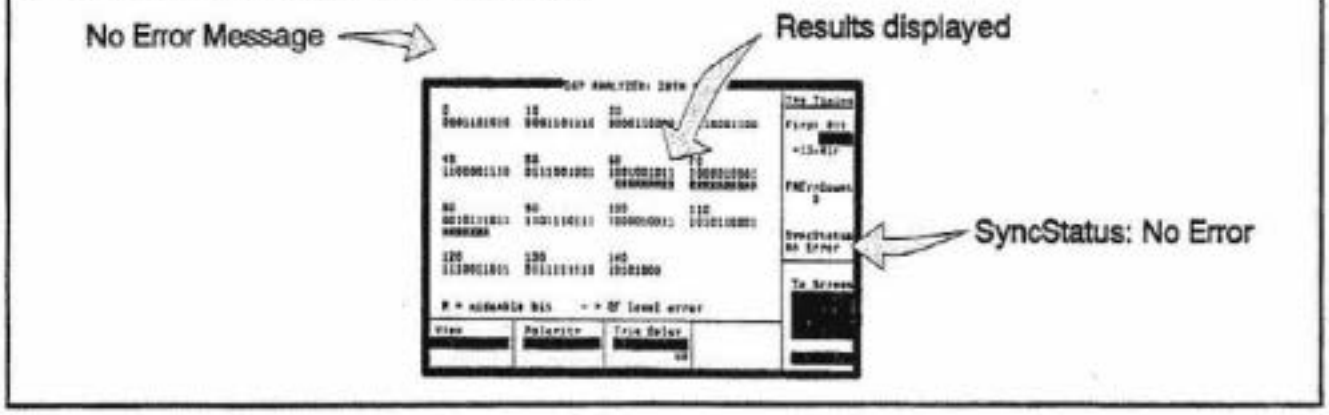
3

Press to arm the measurement

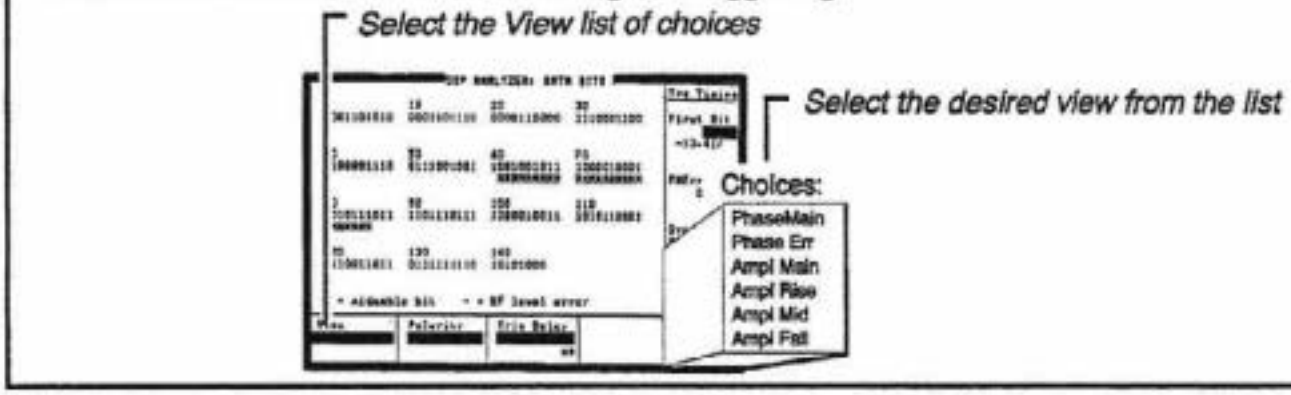


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4 Read and validate your measurement.



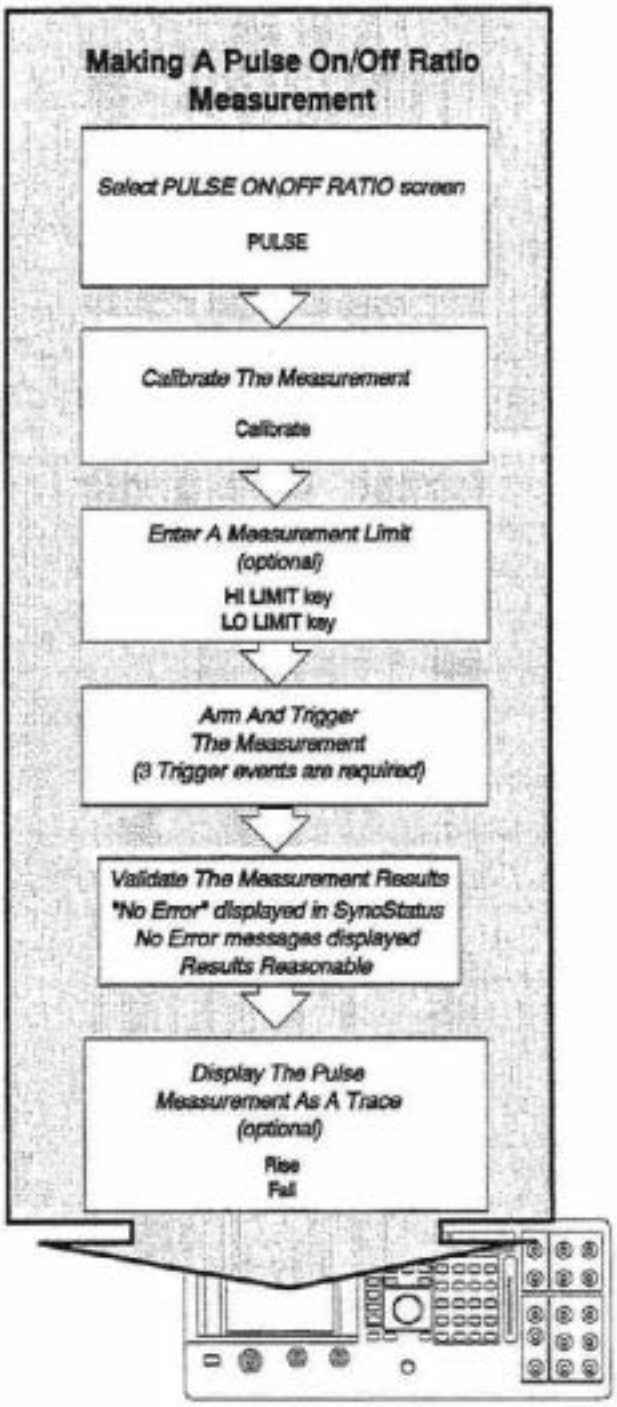
After a DSP analyzer measurement has been made, any of the phase or amplitude views can be chosen without re-arming and triggering.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Making a Pulse On/Off Measurement

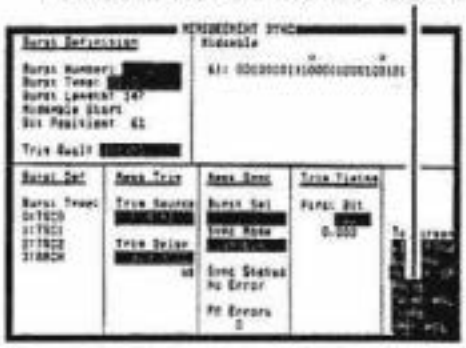


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The HP 8922G must be set up before starting this measurement, see Setting Up The HP 8922G.

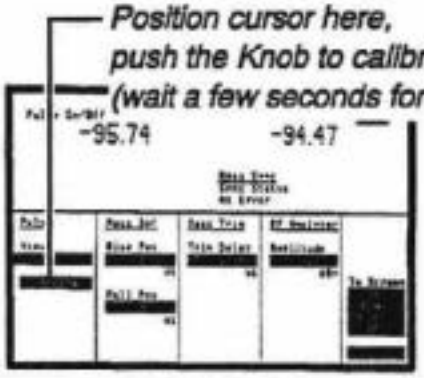
The Trigger Source for this measurement must be Ext Demod or Ext Meas, see Step 10 of Setting Up The HP 8922G.

1 *Select PULSE to display the PULSE ON/OFF RATIO screen*



2 **The Pulse measurement must be calibrated within 5 minutes of making a measurement:**

Position cursor here,
push the Knob to calibrate
(wait a few seconds for calibration)

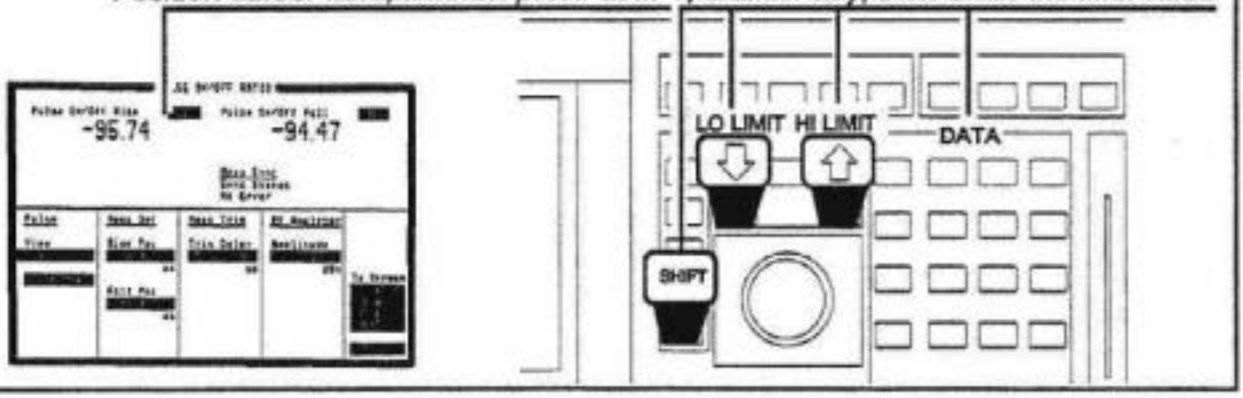


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

It is optional to set high and low measurement limits. If the measurement exceeds a limit, the HI or LO annuciator will flash.

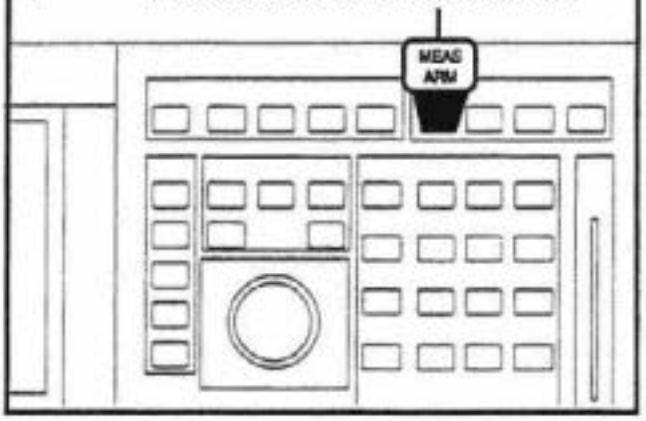
3 Enter the measurement limit:

Position cursor here,.....then press SHIFT, a LIMIT key, then enter the limit value

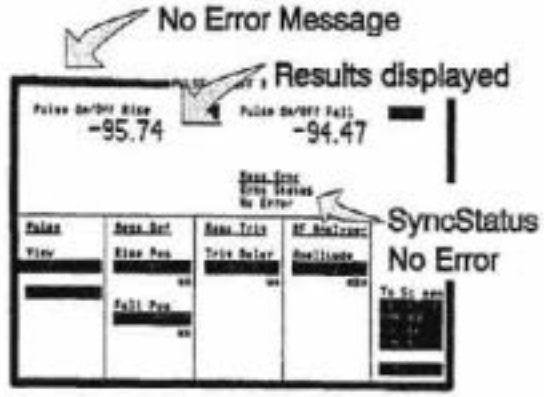


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

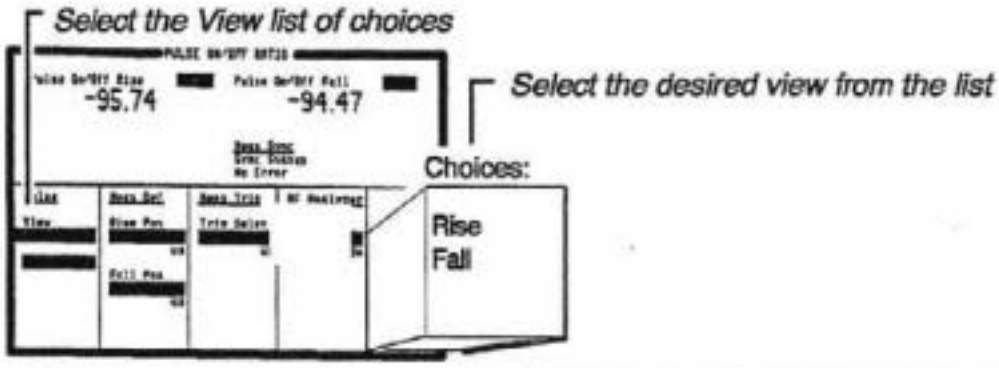
4 *Press to arm the measurement*



5 **Read and validate your measurement.**

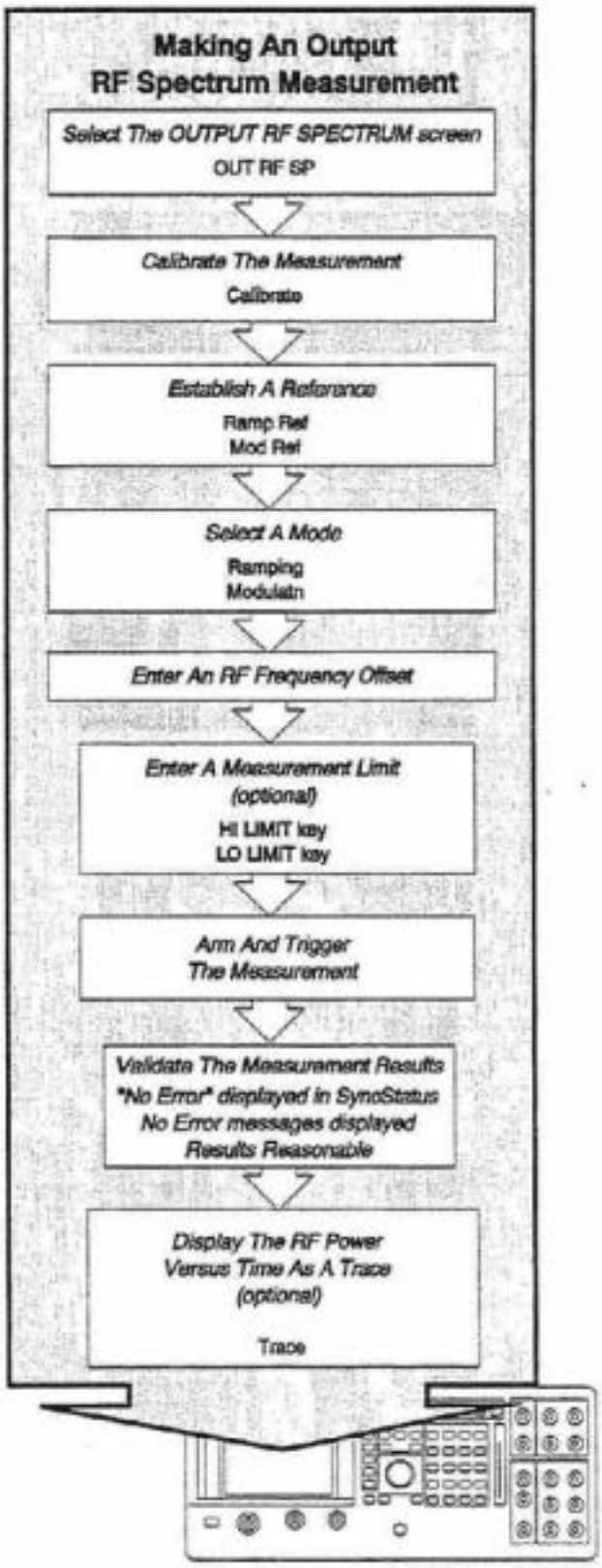


6 **A trace view of the rising or falling portion of the pulse can be displayed:**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

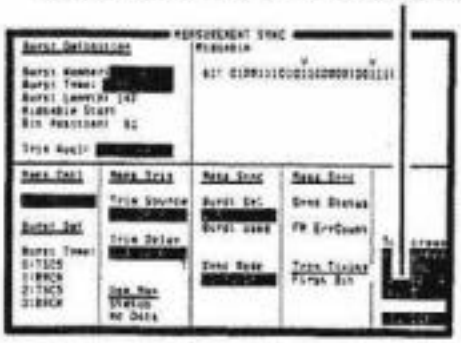
Making an Output RF Spectrum Measurement



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

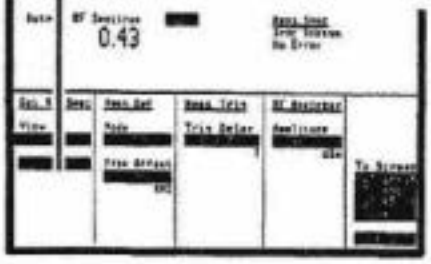
The HP 8922G must be set up before starting this measurement, see Setting Up The HP 8922G.

1 *Select OUT RF SP to display the OUTPUT RF SPECTRUM screen*



2 **Spectrum Analyzer measurements must be calibrated within 5 minutes of making a measurement:**

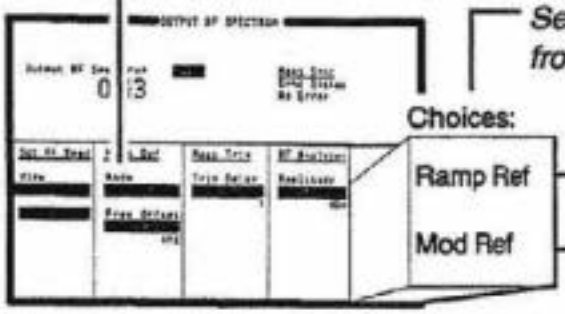
Position cursor here, push the Knob to calibrate (wait a few seconds for calibration)



3 **A reference must be established:**

Select the Mode list of choices

Select the desired reference measurement from the list



Choices:

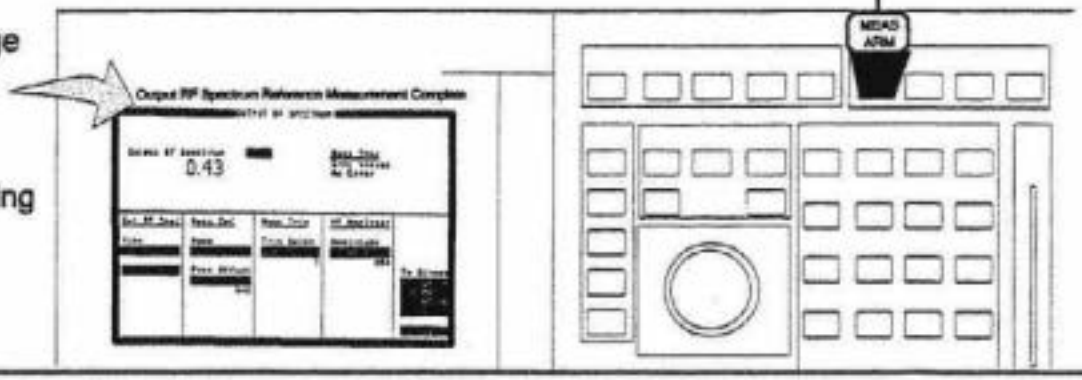
Ramp Ref — For Output RF Spectrum due to pulse ramp

Mod Ref — For Output RF Spectrum due to modulation

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4 *Press to establish a reference*

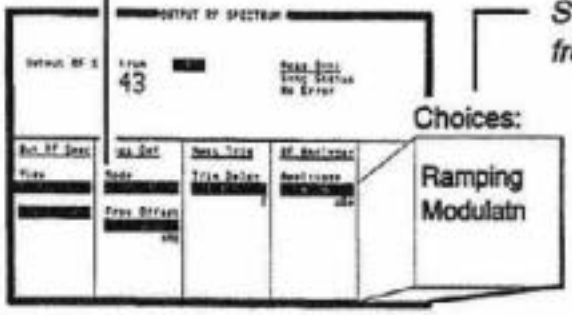
Message must display before continuing



5 **Select the mode that corresponds to the established reference (Step 3):**

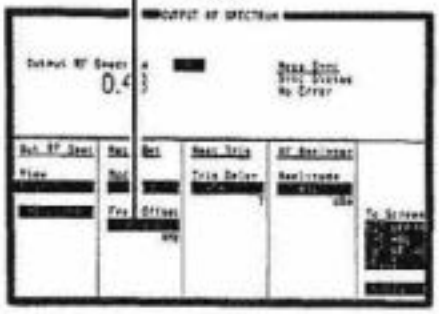
Select the Mode list of choices

Select Ramping or Modulation from the list



6

Enter an RF Frequency Offset

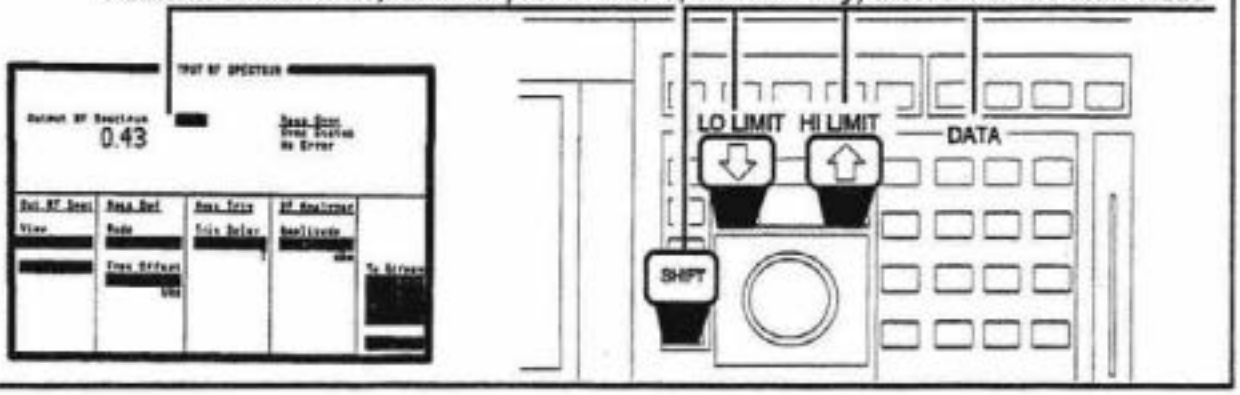


It is optional to set high and low measurement limits. If the measurement exceeds a limit, the HI or LO annunciator will flash.

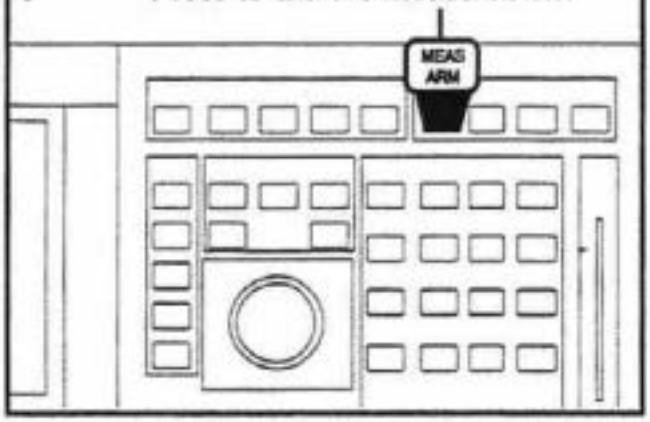
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7 Enter the measurement limit:

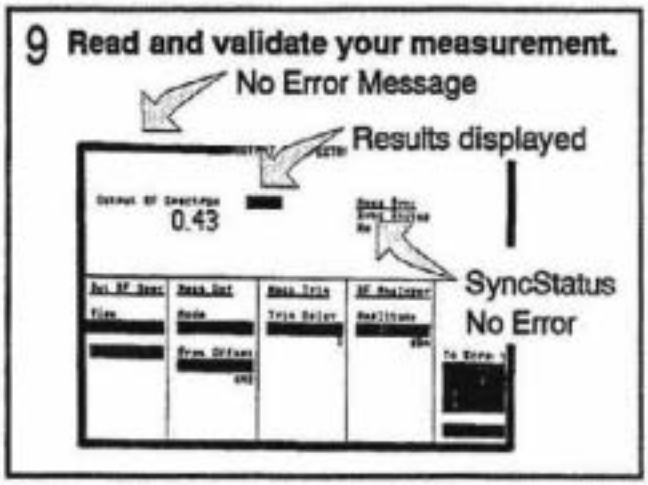
Position cursor here,.....then press SHIFT, a LIMIT key, then enter the limit value



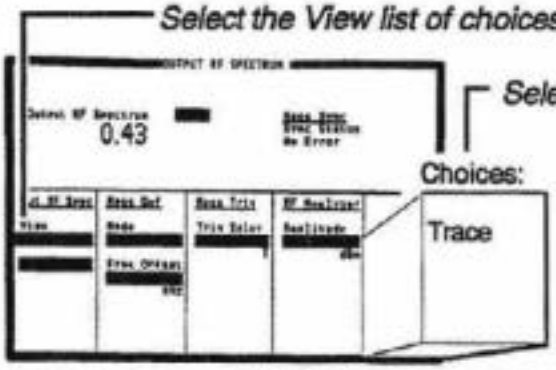
8 *Press to arm the measurement*



9 Read and validate your measurement.

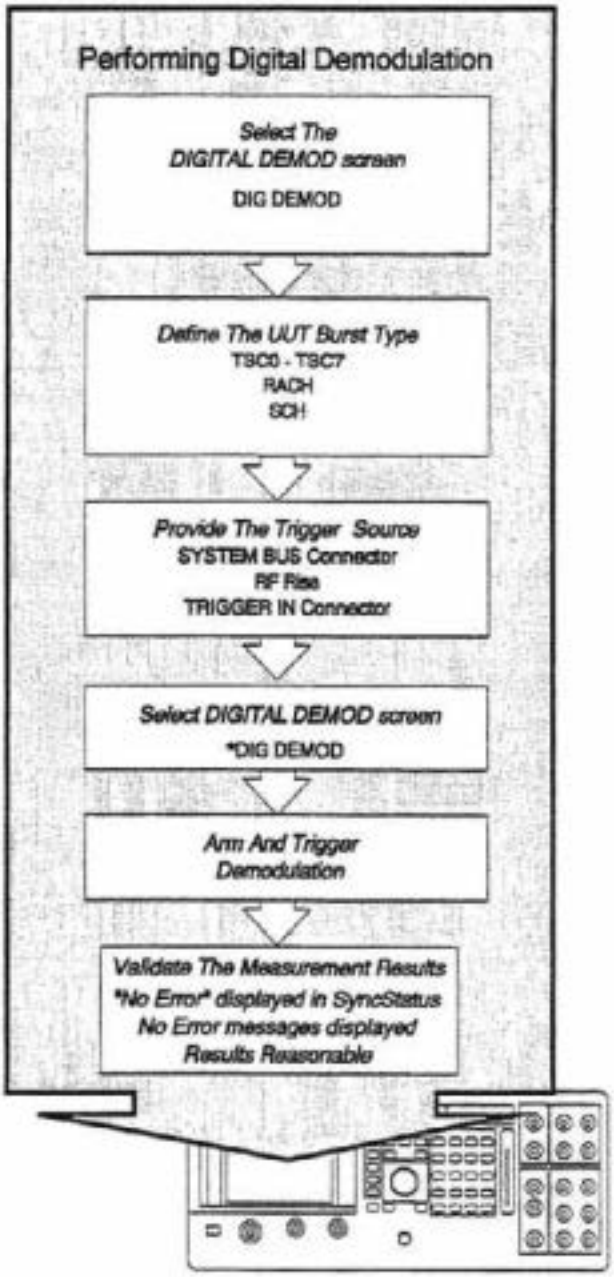


10 A trace view of RF power versus time can be displayed:



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

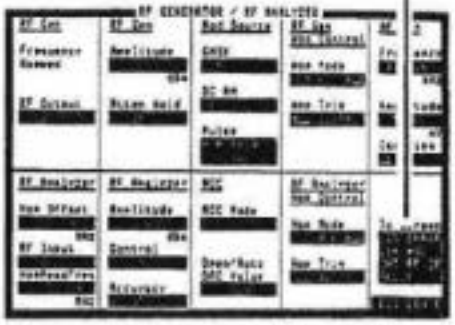
Performing Digital Demodulation



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The HP 8922G must be set up before starting this measurement, see Setting Up The HP 8922G. Steps 1 through 5.

1 *Select DIG DEMOD to display the DIGITAL DEMOD screen*

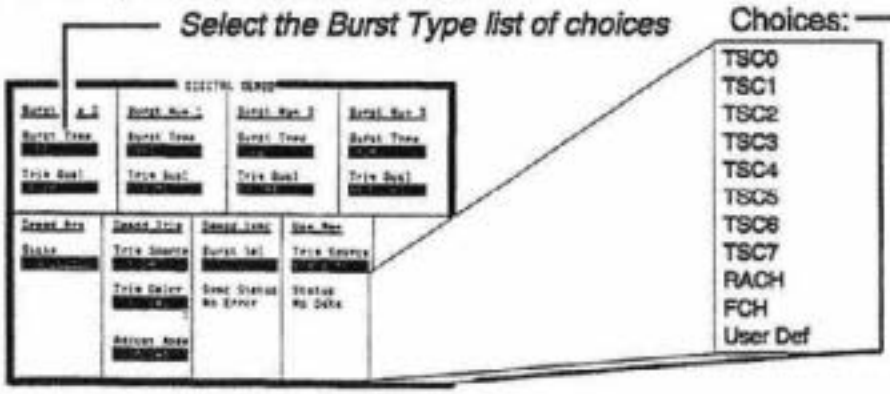


The DIGITAL DEMOD screen is used to define your signal's midamble or "burst" types.

A burst must be defined before it can be selected. The currently assigned Burst Types are displayed in the Burst Num 0, Burst Num 1, Burst Num 2, Burst Num 3 columns.

2 **Define your signal's Burst Type:**

Select the Burst Type list of choices

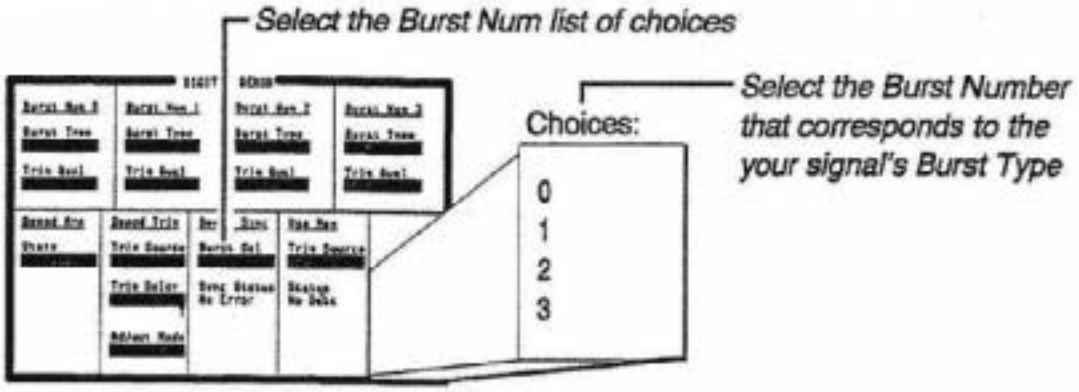


Choices: *Select your signal's Burst Type*

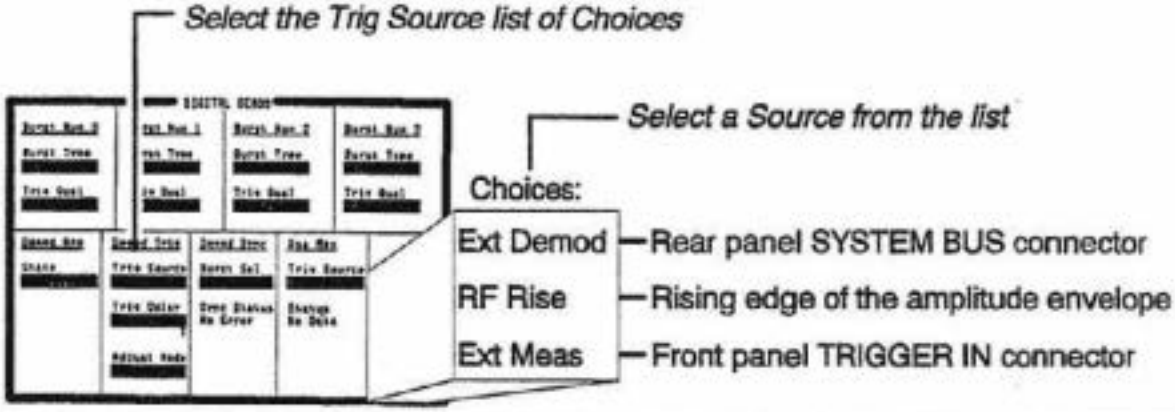
TSC0
TSC1
TSC2
TSC3
TSC4
TSC5
TSC6
TSC7
RACH
FCH
User Def

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3 **Select the Burst Number the HP 8922G will use in the measurement:**



4

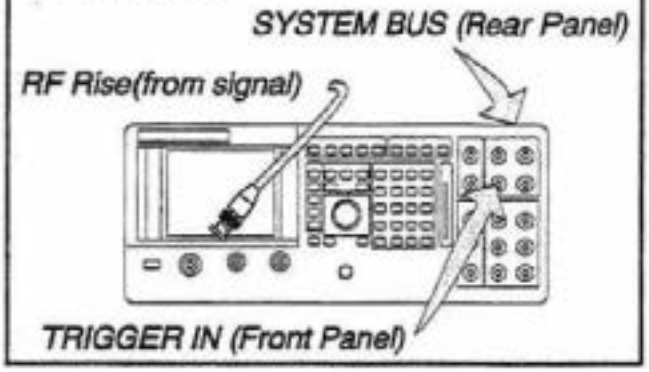


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Trigger signals on the SYSTEM BUS or the TRIGGER IN front-panel connector must occur near bit 0 of the transmitted burst, or be delayed to occur near bit 0 using the Trigger Delay field.

If RF Rise is chosen as the Source, the trigger is automatically generated when the rising edge of the amplitude envelope is detected.

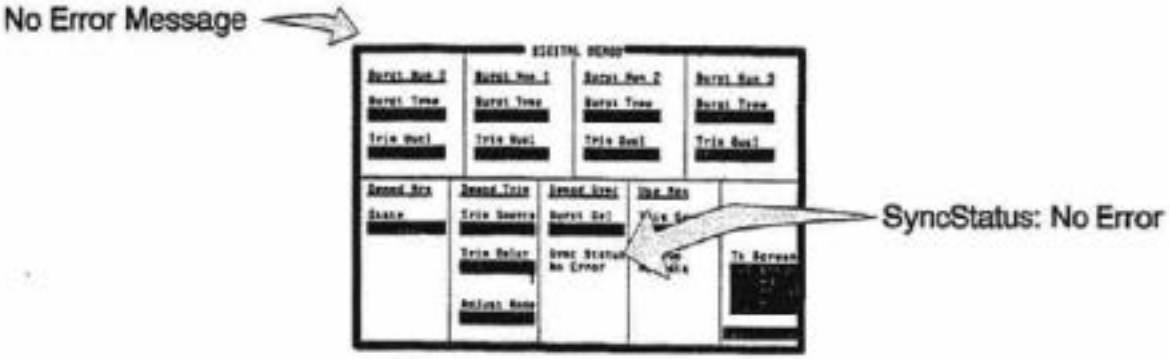
5 Connect the trigger signal to the HP8922G.



6



7 Validate your measurement.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

If You Have Problems with a Measurement

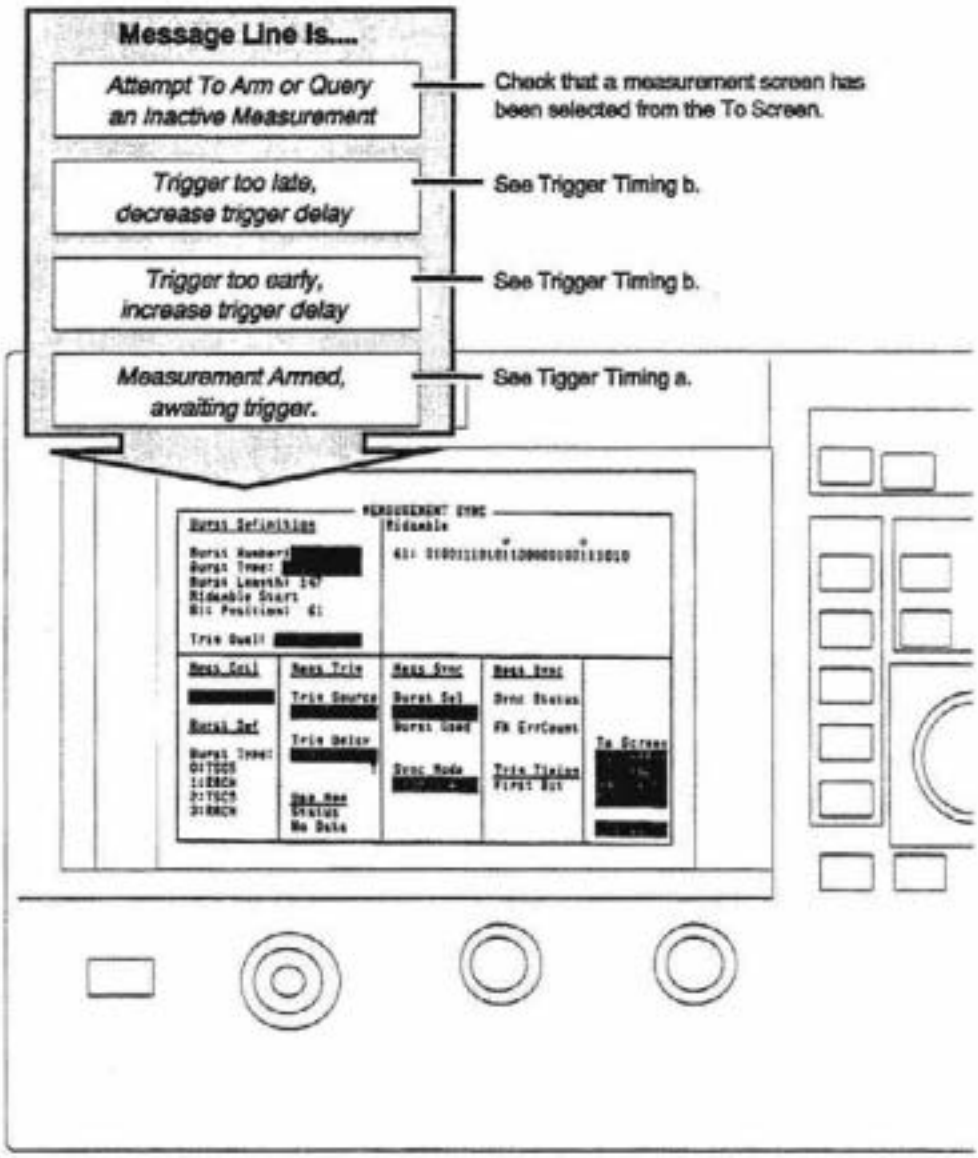
This section tells you what to do if either of the following screen display events occurs.

- Message Line Messages
- Sync Status Messages

See the Messages chapter in volume 2 for more information about messages.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

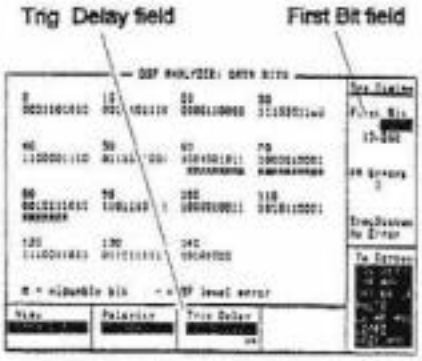
Is A Message Line displayed at the top of the screen?



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Possible solutions to Message Line errors.

Trigger Timing



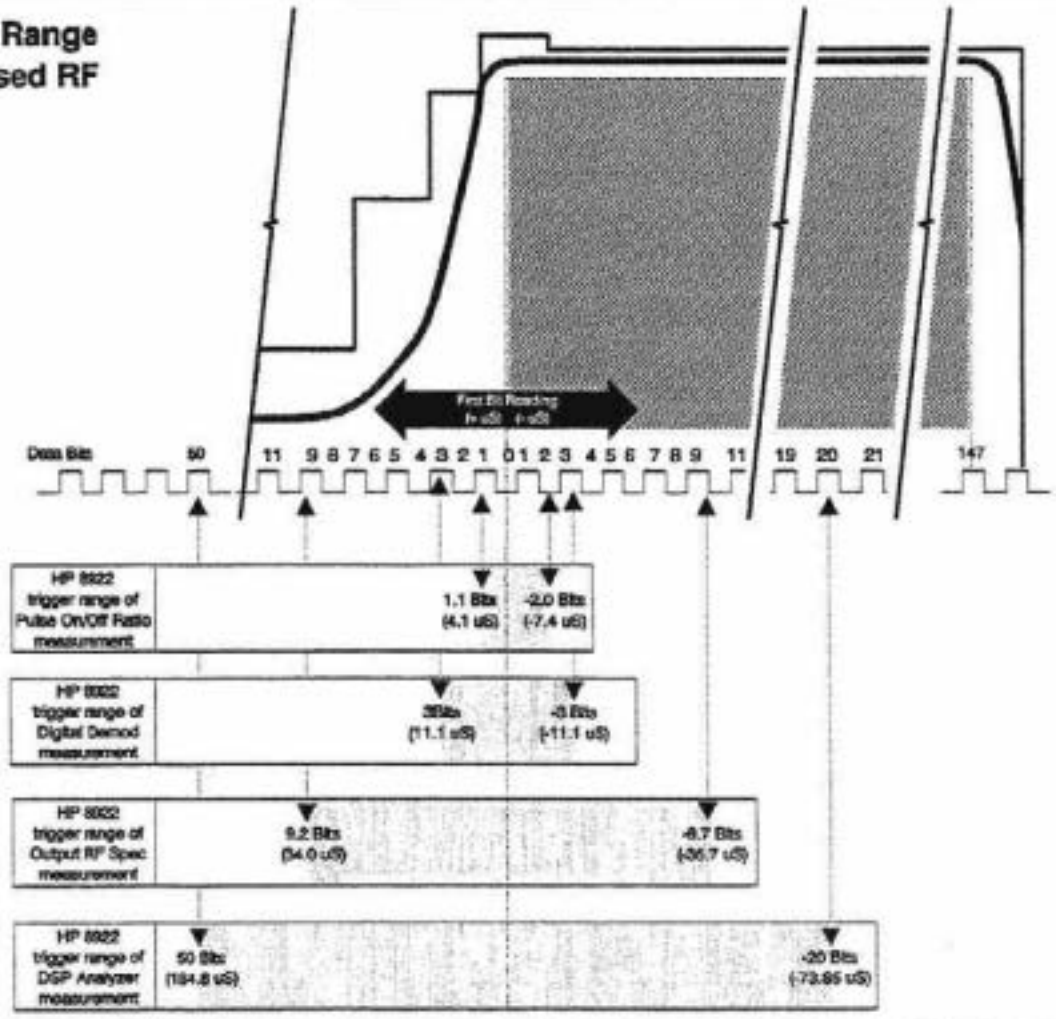
❑ *a. Check if the trigger is being received.*

On the MEASUREMENT SYNC screen check if the correct burst type has been defined. See Steps 10 and 11 in Setting Up the HP 8922G.

❑ *b. Check if the trigger is being received at the correct time.*

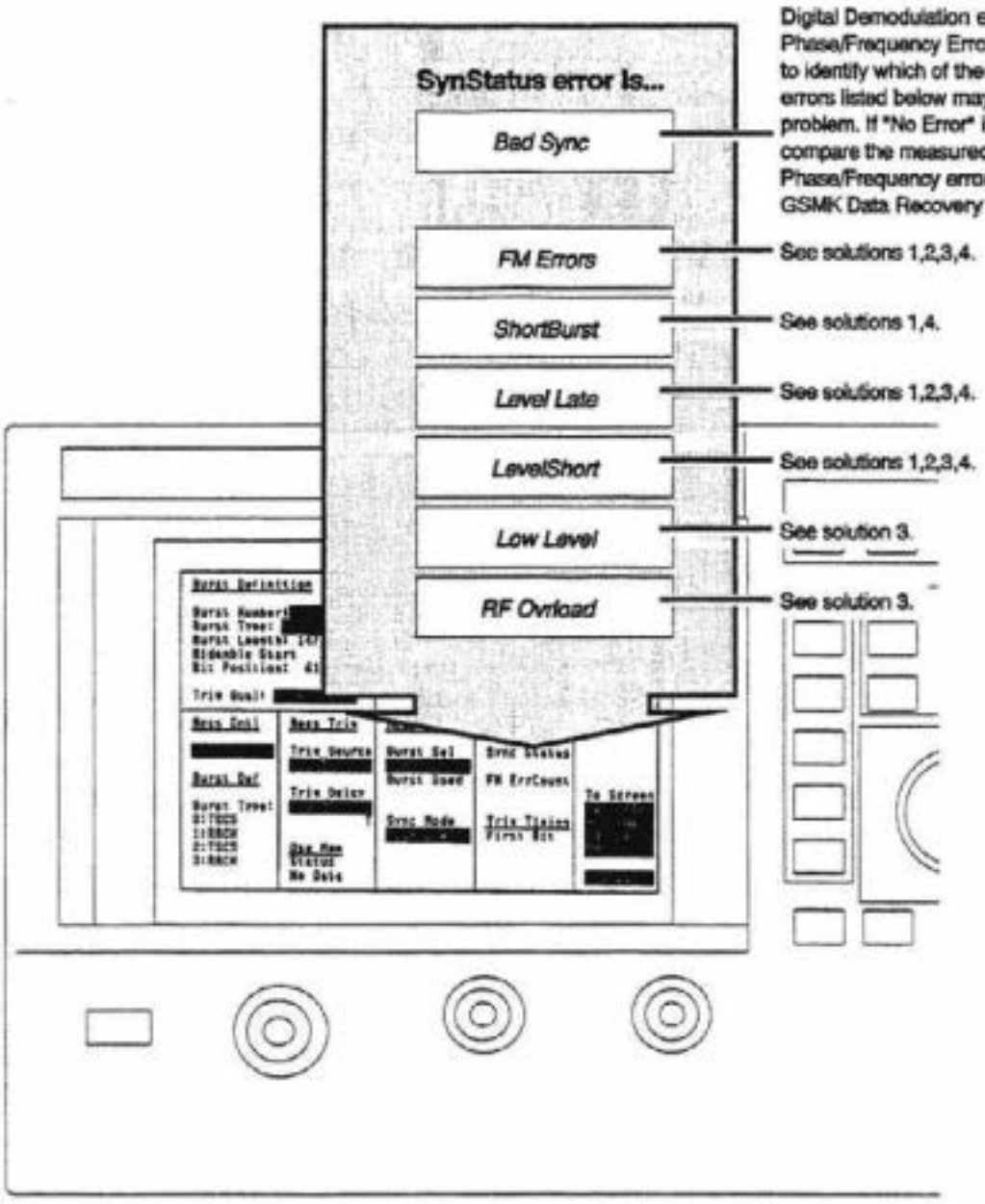
The First Bit field on the DATA BITS screen displays the time difference between when a trigger is being received and when the first bit of a burst occured. The time difference is only valid if FMErrCount is 0.

Trigger Range For Pulsed RF



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Is an error message displayed in the SyncStatus field?



Digital Demodulation error - perform a Phase/Frequency Error measurement to identify which of the SyncStatus errors listed below may be the possible problem. If "No Error" is the result, compare the measured Phase/Frequency error to the 0.3 GSMK Data Recovery specification.

See solutions 1,2,3,4.

See solutions 1,4.

See solutions 1,2,3,4.

See solutions 1,2,3,4.

See solution 3.

See solution 3.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Possible solutions to SyncStatus errors.

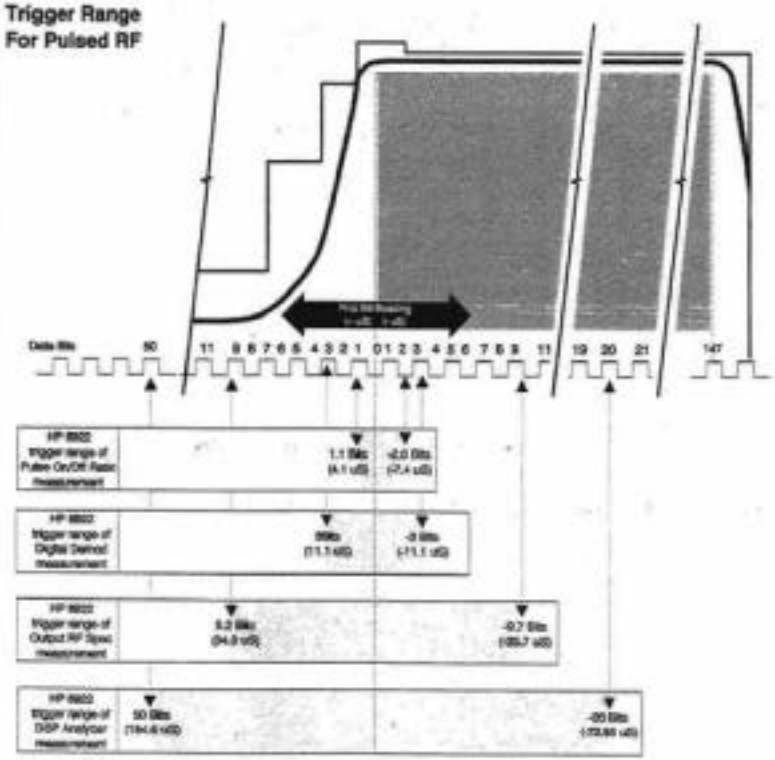
1. Trigger Timing

☐ *Check if the trigger is being received.*
On the MEASUREMENT SYNC screen check if the correct burst type has been defined. See Steps 10 and 11 in Setting Up the HP 8922G.

☐ *Check if the trigger is being received at the correct time.*
The First Bit field on the DATA BITS screen displays the time difference between when a trigger is being received and when the first bit of a burst occured. The time difference is only valid if FMErrCount is 0.



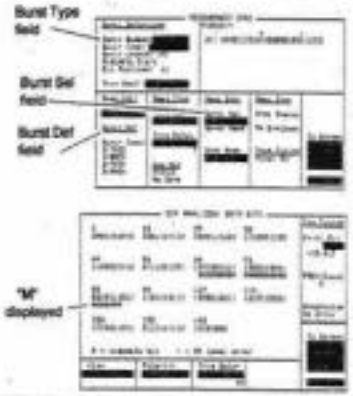
Trigger Range For Pulsed RF



2. Midamble Sync

☐ *Check the definition of the signal's burst type.*
On the MEASUREMENT SYNC screen check the Burst Sel field. See Steps 7-9, in Setting Up the HP 8922G.

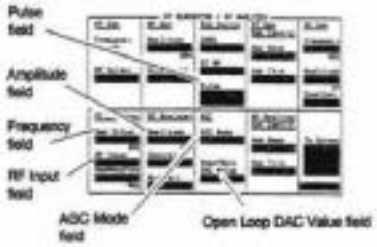
☐ *Check the bit pattern of your measurement.*
Perform a Data Bits measurement. An 'M' will display under the bits that are identified as the midamble bits. See Making a Data Bits Measurement.



3. Level

☐ *Check the following fields on the RF GENERATOR/RF ANALYZER screen.*
Frequency field for the correct frequency, see Step 2 in Setting Up the HP 8922G.
RF Input field for the correct connector choice, see Step 3 in Setting Up the HP 8922G.
Amplitude field for the expected amplitude, see Step 4 in Setting Up the HP 8922G.
AGC Mode field. If either Open or Auto is the selected mode, check the value in the Open Loop DAC Value field. If Closed is the selected mode, check that the burst is repetitive (at least 1 timeslot every 2 frames).
Pulse field (if signal is pulsed) Ext or Hop Trig should be selected.

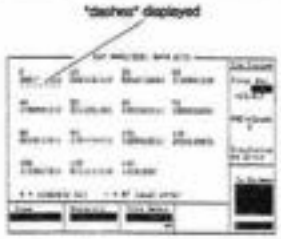
☐ *Check the actual amplitude of the input signal.*
Perform a Peak TX Power Carrier measurement. See Making an Amplitude/Peak TX Carrier Power measurement.



4. Amplitude Envelope

☐ *Check if the Pulse Amplitude is ±1 dB of the expected value during the useful part of the burst.*
If FM Errors:
Perform a Data Bits measurement. Dashes will display under the bits that are where power is too low. See Making a Data Bits Measurement.

If No FM Errors:
Perform a pulse demodulation measurement. Connect PULSE DEMODULATION OUT connector to SCOPE IN, MEASURE connector.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3

Verifying Performance

The tests in this chapter verify the electrical performance of the HP 8922 Test Set using the HP 8922 Performance Test Software provided with this manual. If the instrument passes this verification, its operation and specifications are assured within the measurement uncertainties provided in the performance test print out. Because of the specialized nature of the HP 8922 and the equipment required to support it, it is recommended that calibration and repair be performed only by specially equipped Hewlett-Packard service centers.

A list of specifications is found at the end of this chapter.

Setting up the Tests

This chapter contains the following information:

Getting the Right Test Equipment

Required Test Equipment lists the test equipment needed for the performance tests. This is the only equipment supported by the HP 8922 Performance Test Software and is required to verify instrument operation. Equipment substitutions or manual performance tests are not recommended or supported by Hewlett-Packard.

Installing and Operating the Software

Performance Test Software describes how to install and operate the HP 8922 Performance Test software.

Understanding the Tests

Test Descriptions contains a description of each test that is performed by the Performance Test software. This description is intended to help locate problems if the software fails to execute properly or to help users understand the test methodology that is used in each performance test. The descriptions are not step-by-step procedures for manual performance tests.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Understanding Test Failures

Test Failures contains a matrix that describes which hardware modules would be the most likely to cause certain performance tests to fail. This section is intended to be used in conjunction with the 8922 Assembly Level Repair Manual to isolate hardware problems.

Getting the Right Equipment

The following equipment is required to do all of the performance tests. The test descriptions have an equipment list that specifies the equipment used for each particular test.

Required Test Equipment

Equipment	HP Model Number
Measuring Receiver	HP 8902A
Sensor Module	HP 11722A
Audio Analyzer	HP 8903B
Voltmeter	HP 3456A
Signal Generator	HP 8657B
Multifunction Synthesizer	HP 8904A Opt. 001, 002
Pulse Generator	HP 8116A
Spectrum Analyzer	HP 8566B
Technical Computer with Rocky Mountain BASIC and DS Disk Drive	HP 9000 Series 200/300
HP-IB printer	HP 2225A

Installing and Operating the Software

Performance Test Software is supplied on a 3.5-inch, double-sided floppy disk and is written to run with BASIC 5.0 and later. Modifications to the program should be limited to changing the default addresses and storing copies for back-up purposes.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To Load the Program

1. Put the disk in the disk drive.
2. Type `LOAD "PT_8922"`, then press ENTER.

To Configure the HP-IB Addresses

1. With the program loaded, type `EDIT DEFAULT_ADDRESS`, then press ENTER.
2. Modify each line to indicate the proper instrument address (700-730).

   It is now possible to re-store the program as "PT_8922" or store it under a different name.

To Run the Program

1. Type `RUN`, then press ENTER.
2. Follow the directions as they appear on the screen.

Notes on Running the Program.

The first screen which appears is the HP-IB status of each piece of test equipment that is supported. It is only necessary to have the instruments responding that will be used in each particular test. Make certain that each instrument you will be using is responding at the proper address. Duplicate addresses may make an instrument appear to be responding but this is not allowed. Press "I" (for Ignore) to continue past this screen.

The second screen which will appear is the main Performance Tests selection menu. Three options are available on this screen:

- Select the performance test to run. Remember, the test instruments and UUT must be responding over HP-IB.
- Turn the printer function ON or OFF. If the printer function is turned on it must be responding over HP-IB or the program will lock up.
- Exit from the program.

Press the key corresponding to the option that you would like to perform.

The other screens that appear are connection instructions, error messages and output results.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Understanding the Tests

This section describes the theory of each performance test, lists the equipment needed for the test, and provides some problem solving information.

Test 01: Signal Generator Level

Equipment Required

HP 8902A ..... Measuring Receiver
HP 11722A ..... Sensor Module

Theory of the Test

The UUT is set to generate CW signals at various levels and frequencies. The HP 8902A/HP 11722A is used as a power meter to measure high level signals and the HP 8902A tuned RF level function is used to measure low level signals.

Things To Check In Case Of Problems

- The HP 8902A/HP 11722A must be calibrated and zeroed for accurate measurement results. The HP 11722A calibration factors must be entered into the HP 8902A.
- Low level signals from the HP 8922 must be very stable to be measured by the tuned RF level function of the HP 8902A. The instrument timebases should be locked together. Also, if the HP 8922 source has unusually high residual FM it may cause the low level measurements to fail because the HP 8902A cannot lock onto the signal.
- Mismatch uncertainty causes a high level of uncertainty in this measurement.

Test 02: Signal Generator Spectral Purity

Equipment Required

HP 8566B ..... Spectrum Analyzer

Theory of the Test

The UUT is set to generate a CW signal at various levels and frequencies. The HP 8566B is used to measure the signal level and then the level of the harmonics or spurious signals.

Things To Check In Case Of Problems

- The instruments should have their timebases locked together to assure that the frequency offsets for the spurious measurements are accurate.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Test 03: Signal Pulse Modulation

Equipment Required

HP 8116A ..... Pulse Generator

Theory of the Test

HP 8922A/B

The pulse generator drives the pulse input of the UUT and causes it to generate pulsed RF signals. These signals are detected with the internal UUT pulse demodulator and analyzed with the UUT's oscilloscope. The UUT is set to generate two different on/off ratios: 30 dB and 80 to 90 dB. Rise time and fall time for each of these is measured.

HP 8922E/G

The reference signals for this test are generated using the loopback feature of the 8922E/G. No external equipment is required.

Things To Check In Case Of Problems

- The oscilloscope is used to automatically measure rise and fall times. If the RF signal has high video feedthrough, it may cause the oscilloscope to make a faulty reading by triggering on the video feedthrough instead of the actual pulse.

Test 04: Signal Generator 0.3 GMSK Modulation

Equipment Required

HP 8904A Option 001, 002 ..... Multifunction Synthesizer

Theory of the Test

HP 8922A/B

The HP 8904A is used to generate a 270.833 kHz clock and random data. This drives the UUT RF generator to generate the 0.3 GMSK modulated signals with random data. This signal is then analyzed by the UUT to assure that the frequency and phase errors are correct.

HP 8922E/G

The reference signals for this test are generated using the loopback feature of the 8922E/G. No external equipment is required.

Things To Check In Case Of Problems

- This test should only be performed if the UUT analyzer is known to be accurate. Run test #9 first if there is any question about the accuracy of the UUT analyzer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Even when the accuracy of the UUT analyzer is known, its specification is such that this test still has a high degree of measurement uncertainty.
- It is possible to verify an instrument that fails this test by using a second HP 8922 to analyze the signal or by using the HP 11836A 0.3 GMSK measurement software. This software (and its associated hardware) has a lower measurement uncertainty but is not currently supported with the HP 8922 Performance Test software.

Test 05: Audio Frequency Generator

Equipment Required

HP 3456A ..... Voltmeter
HP 8903B ..... Audio Analyzer
HP 8902A ..... Measuring Receiver

Theory of the Test

The UUT is set to generate audio signals at various levels and frequencies. The voltmeter measures AC and DC level accuracy, the audio analyzer measures residual distortion, and the measuring receiver measures frequency accuracy.

Things To Check In Case Of Problems

- The measuring receiver and the UUT should have their timebases locked to make accurate frequency measurements.

Test 06: Audio Frequency Analyzer

Equipment Required

HP 8904A Option 001, 002 ..... Multifunction Synthesizer
HP 3456A ..... Voltmeter

Theory of the Test

The HP 8904A is used to generate accurate test signals which are analyzed by the UUT. The voltmeter is used to reduce measurement uncertainty by accurately characterizing the test signal level to predict the correct response of the UUT. The voltmeter is used in the AC level, DC level, SINAD, and distortion measurements. Distortion test signals are generated by summing two sinewaves in the HP 8904A; one as the desired signal, the other as a distortion product.

Things To Check In Case Of Problems

- For frequency accuracy measurements the HP 8904A timebase should be locked to the UUT.
- The voltmeter reading is used as a reference to normalize the reading from the UUT. The output "measured" result is the

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

actual reading from the UUT normalized by the actual reading from the voltmeter. If the voltmeter makes a faulty reading, it will normalize the actual UUT response and cause it to appear faulty also. If the front panel reading from the UUT is significantly different than the printed "measured" response, the normalization may be the cause.

Test 07: Oscilloscope

Equipment Required

HP 8903B ..... Audio Analyzer
HP 3456A ..... Voltmeter

Theory of the Test

The audio analyzer is used to generate CW reference signals which are characterized by the voltmeter and fed into the UUT. The voltmeter reading is used to normalize the reading from the UUT oscilloscope. The oscilloscope measurements are taken using the UUT marker function which is set to the peak of the input sinewave.

Things To Check In Case Of Problems

- The voltmeter reading is used as a reference to normalize the reading from the UUT. The output "measured" result is the actual reading from the UUT normalized by the actual reading from the voltmeter. If the voltmeter makes a faulty reading, it will normalize the actual UUT response and cause it to appear faulty also. If the front panel reading from the UUT is significantly different than the printed "measured" response, the normalization may be the cause. If the oscilloscope triggers incorrectly, the peak search may not find the actual peak response on the display.

Test 08: RF Analyzer Level

Equipment Required

HP 8657A/B ..... Signal Generator
HP 8902A ..... Measuring Receiver
HP 11722A ..... Sensor Module

Theory of the Test

The signal generator is used to generate CW signals at various frequencies and power levels. These are accurately characterized by the HP 8902A/HP 11722A and used as a reference. The CW signals are then used to test the UUT which is compared to the reference reading taken by the HP 8902A/HP 11722A.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Things To Check In Case Of Problems

- Mismatch uncertainties cause a high level of measurement uncertainty in this measurement. If the HP 11722A or HP 8657 has a high SWR, the accuracy of the results may be reduced.

Test A: RF Analyzer Pulse Demodulation

Equipment Required

HP 8657B Option 003 ..... Signal Generator
HP 8116A ..... Pulse Generator

Theory of the Test

The Pulse generator drives the signal generator to generate Pulsed RF signals at various frequencies. The UUT demodulates these signals and the oscilloscope measures the rise and fall time of the demodulated waveform. This test verifies the demodulator rise and fall time specifications.

Things To Check In Case Of Problems

- The oscilloscope measurement functions are used to measure the 10% to 90% rise and fall time. If the demodulated waveform has significant video feedthrough or the oscilloscope cannot trigger the measurements properly, an incorrect measurement may result.

Test B: Spectrum Analyzer

Equipment Required

HP 8657B ..... Signal Generator

Theory of the Test

The signal generator is used to stimulate the UUT spectrum analyzer at various frequencies. At each frequency, the spectrum analyzer is tuned to measure its own image and spurious responses. The level of the signal generator is set to various levels to determine the spectrum analyzer's log-linearity.

Things To Check In Case Of Problems

- The absolute accuracy of the signal generator causes a significant measurement uncertainty in the log linearity measurements. A more accurate measurement is to reduce the signal level using a precision attenuator. This is an acceptable secondary manual test if the UUT fails the automated test.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Understanding Test Failures

This section is intended to be used in conjunction with the 8922 Assembly Level Repair Manual for assembly level repair and troubleshooting. If a performance test fails and hardware is suspected, the following table is a guideline to help identify the hardware assemblies most likely to cause each failure. Before replacing an assembly, the memory card diagnostics (supplied with the Assembly Level Repair Manual) should also be run to help verify which assembly is defective.

ASSEMBLIES TESTED (P=Primary S=Secondary)																				
Performance Test	A2	A3	A4	A5	A6	A9	A11	A12	A13	A14	A15	A16	A17	A18	A19	A22	A24	A25	A26	A27
Sig Gen Level				S				S	P		S					P	S	S	S	S
Sig Gen Spectral Purity				S				S	S		S					S	S	S	S	S
Sig Gen Pulse Mod				S				P	S	P	S					S	S	S	S	S
Sig Gen .3 GMSK				P				S	S	S	S					S	S	S	S	P
AF Generator			S		S															
AF Analyzer	P	P													S					
Oscilloscope		S													S					
RF Analyzer Power															S	P				
RF Analyzer GMSK Mod						P	S					P	S			S				
RF Analyzer Pulse Demod							S					P	S			S				
Spectrum Analyzer							S					S	S	P		S				

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

HP 8922G Specifications

SPECIFICATIONS
Describe the instrument's warranted performance and apply after a 30 minute warm-up. These SPECIFICATIONS are valid over its Operating / Environmental Range unless otherwise noted.

GSM Functionality

Bit/Frame Error Rate Measurements: Class Ia, Ib, and Class II bits in both raw and residual form.
MS Power Output Level Control: 0-15 with RF analyzer auto adjust.
Broadcast Channel Capability: BCCH+CCCH or BCCH+CCCH+SDCCH/4.
Control Channels (SDCCH, FACCH, SACCH): BCCH+CCCH, BCCH+CCCH+SDCCH/4, SDCCH/8 (non-hopped), and SACCH/FACCH.
Call Control Capabilities: BS originated call (FS), MS originated call (FS), MS camp on, BS call disconnect, MS call disconnect.
Traffic Channels: TCH/FS.
Timing: Auto, manual, uplink-downlink offset measurement.
Hopping: Cyclic only, two independent MA tables with offsets.
Digital Audio Interface (DAI): Normal operation and test of acoustic devices and A/D & D/A (according to GSM Rec. 11.10 section III.1.4).
Speech Encoding/Decoding: Full rate speech.
Echo Mode: User selectable delay, 0 to 5 sec.
Measurement Coordination: Flexible control of burst and ARFCN.
SACCH MEAS Results: RXLEV, RXQUAL, and timing advance.
Encryption: Future firmware release will support ON, OFF, User supplied key.
Electrical Man Machine Interface: Future firmware release will support via HP-IB.

[1]GSM frequency bands are 890 to 915 MHz and 935 to 960 MHz, however specifications apply from 890 to 935 MHz and 935 to 980 MHz.
[2]Specification applies to the lower level in 30 dB pulse mode.
[3]Level Accuracy degrades 0.2 dB when using the RF In/Out connector for both RF Generator and RF Analyzer.

SUPPLEMENTAL CHARACTERISTICS
(shown in *italics*) are intended to provide additional information, useful in applying the instrument by giving typical (expected), but not warranted performance parameters. These characteristics are shown in italics or labeled as "typical", "useable to", or "nominal".

RF Generator Specifications

Frequency

Range: 10 MHz to 1 GHz.
Resolution: 1 Hz.
Accuracy: Reference accuracy ± 0.5 Hz.
Stability: Same as Reference.
Supplemental Characteristics
Frequency Overrange: *to 1015 MHz with uncalibrated output and modulation.*
Switching Speed: *577 µs over the GSM frequency bands[1] in hop mode (refer to 0.3 GMSK modulation specs).*

Output

RF In/Out Connector
Level Range: -19 to -127 dBm.
Level Resolution: 0.1 dB.
Level Accuracy[2]
GSM bands[1]: ±1.0 dB[3], levels ≥-127 dBm.
±1.0 dB[3], typically for levels ≥-127 dBm while hopping.
10 MHz-1 GHz: ±1.5 dB, levels ≥-107 dBm.
±2.0 dB, levels -107 to -127 dBm.
Reverse Power: 30 watts continuous.
100 watts for 10 seconds/minute.
SWR: 1.5:1.
Aux RF Out Connector
Level Range: +7 to -127 dBm.
Level Resolution: 0.1 dB.
Level Accuracy
GSM bands[1]: ±1.0 dB, levels ≥-107 dBm.
±1.5 dB, levels -107 to -127 dBm.
±1.0 dB, typically for levels ≥-127 dBm while hopping.
10 MHz - 1 GHz: ±1.5 dB, levels ≥-107 dBm.
±2.0 dB, levels -107 to -127 dBm.
Reverse Power: 200 milliwatts.
SWR: 2.0:1, level <+4 dBm.

Spectral Purity

Spurious Signals (for ≤+1 dBm output level at Aux RF Out or ≤-25 dBm output level at RF In/Out).
Harmonics: <-25 dBc.
Non-Harmonic Spurious: <-50 dBc, >5 kHz offset from carrier.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

0.3 GMSK Modulation

After one timeslot, 577 µs, from an isolated RF Generator Hop Trigger in the GSM frequency bands[1].

Phase Error: ≤1° rms.
Peak Phase Error: ≤4° peak.
Frequency Error: ±(0.02 ppm (18 Hz) + reference accuracy), for normal bursts.
Typically ±(0.03 ppm (27 Hz) + reference accuracy), for RACHs.
Amplitude Flatness: ±0.25 dB peak.
Clock Input
Frequency: 270.833 kHz ± 2 Hz (relative to reference).
Level: TTL.
Data Input
Format: Non differentially encoded input[4].
Level: TTL.
Supplemental Characteristics
After three timeslots, 1.73 ms, from an isolated RF Generator Hop Trigger in the GSM frequency bands[1].
Phase Error: *≤0.5° rms.*
Peak Phase Error: *≤2.0° peak.*
Frequency Error: *±(0.01 ppm (9 Hz) + reference accuracy), for normal bursts.*
±(0.02 ppm (18 Hz) + reference accuracy), for RACH bursts.

Pulse Modulation

Input Levels: TTL.
Rise/Fall Time
(10 - 90%): ≤5 µs.
Supplemental characteristics
On/off ratio: *>80 dB.*

30 dB Pulse Modulation

All timeslots 30 dB higher than desired/active timeslot, to test adjacent timeslot rejection.

Input Levels: TTL.
Rise/Fall Time
(10 - 90%): ≤5 µs.

Delay Times:
Supplemental Characteristics:
Transition from +30 or 0 dB to +24 dB: 8.9 ± 2 µs.
Transition from +30 db to -6 dB: 15 ± 3.5 µs.

AM for Level Control

For output levels ≤+1 dBm at Aux RF Out or ≤-25 dBm at RF In/Out.
Supplemental Characteristics
Input
Range: *-1.0 V to +0.6 V.*
Impedance: *600 Ω nominal, DC coupled.*
Sensitivity: *100% AM per volt, nominal.*
Calibration: *0 VDC input produces calibrated output from the RF Generator.*
Rise/Fall Time
(10 - 90%): *≤10 µs.*

[4]Can be switched to accept data that has already been differentially encoded.
[5]When setting up the RF Analyzer for measurements, the user will need to enter the value for the incoming signal within the limits shown for specified performance.
[6]To calculate accuracy, add or subtract the 0.5 dB error (0.6 dB for Peak Transmitter Carrier Power) from the absolute power in dBm then convert to mW and add or subtract the 0.75 mW noise effect.

RF Analyzer Specifications

Frequency

Range: 10 MHz to 1 GHz.
Resolution: 1 Hz.
Hop Mode -
Resolution: 100 kHz.
Offset Frequency: ≤50 kHz.
Offset Resolution: 1 Hz for digital data recovery and modulation accuracy measurements.
RF In/Out SWR: <1.5:1.
Supplemental Characteristics
Frequency Overrange: *to 1015 MHz.*
Offset Resolution: *500 Hz for FM Demodulation Out.*

CW RF Frequency Measurement

Range: 10 MHz to 1 GHz.
Level Range
RF In/Out: 0 to +45 dBm.
Aux RF IN: -36 to +20 dBm.
Input Frequency Setting Error[5]: ±500 kHz.
Accuracy: ±(1 Hz + reference accuracy).
Supplemental Characteristics
Minimum Resolution: *1 Hz.*

CW RF Power Measurement

RF In/Out only
Range: +10 to +45 dBm.
Input Frequency Setting Error[5]: ±500 kHz.
Accuracy[6]: ±0.5 dB ± noise effects (0.75 mW).
Supplemental Characteristics
Minimum Resolution: *0.01 dB.*

Peak Transmitter Carrier Power Measurement

RF In/Out only. After one timeslot, 577 µs, from an isolated Receiver Hop Trigger in the GSM bands[1].
Range: +10 to +45 dBm.
Input Frequency Setting Error[5]: ±10 kHz.
Input Level Setting Error[5]: ±3 dB.
Accuracy[6]: ±0.6 dB ± noise effects (0.75 mW).
Supplemental Characteristics
Minimum Resolution: *0.2 dB.*

Pulse ON/OFF Ratio Measurement

ON power is averaged over the useful part of the burst. OFF power is averaged over a 1 bit interval centered at a user specified time. Non-hopped mode only.
Input Frequency Setting Error[5]: ±10 kHz.
Input Level Setting Error[5]: ±3 dB.
Timing Accuracy: ±1.7 µs *(±1.1 µs typical)*
Accuracy (ON/OFF ≥40 dB, RF In/Out only):

Amplitude Envelope Measurement

After one timeslot, 577 µs, from an isolated Receiver Hop Trigger in the GSM frequency bands[1].
Measurement Range

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

OFF Power (dBm)	ON/OFF Ratio Accuracy	
-24 to +5	±2.4 dB	±1.1 dB typically
-31 to -24	±2.9 dB	±1.3 dB typically
-36 to -31	±3.7 dB	±1.7 dB typically
-41 to -36	±4.2 dB	±2.1 dB typically

RF In/Out: 0 to +45 dBm.
Aux RF In: -36 to +20 dBm.
Input Frequency Setting Error[3]: ±10 kHz.
Inaccuracy due to Noise (for overshoots ≤1 dB):

Relative Level	Input Level Setting Error[4]		
	±1 dB	±3 dB	±3 dB w/5 averages
0 dB	<±0.15 dB pk	<±0.2 dB pk	<±0.2 dB pk
-4 dB	<±0.2 dB	<±0.3 dB	<±0.3 dB
-30 dB	<+3.0 dB -3.8 dB	<+4.2 dB -7.5 dB	<+2.2 dB -2.6 dB

Phase and Frequency Measurement

(as described in GSM recommendation 11.10)
After one timeslot, 577 µs, from an isolated Receiver Hop Trigger in the GSM frequency bands[1].
Range
RF In/Out: 0 to +45 dBm.
Aux RF In: -36 to +20 dBm.
Input Frequency Setting Error[3]: ±10 kHz.
Input Level Setting Error[4]: ±3 dB.
RMS Phase Error Accuracy: ≤1° rms
Peak Phase Error Accuracy: ≤4° peak
Frequency Error Accuracy: ±(0.02 ppm (18 Hz) + reference accuracy), for normal bursts.
Typically, ±(0.03 ppm (27 Hz) + reference accuracy), for RACHs.
Supplemental Characteristics
After three timeslots, 1.73 ms, from an isolated Receiver Hop Trigger in the GSM frequency bands[1].
RMS Phase Error Accuracy: *≤0.5° rms*
Peak Phase Error Accuracy: *≤2° peak*
Frequency Error Accuracy: *±(0.01 ppm (9 Hz) + reference accuracy), for normal bursts.*
±(0.02 ppm (18 Hz) + reference accuracy), for RACH bursts.

0.3 GMSK Data Recovery

After one timeslot, 577 µs, from an isolated Receiver Hop Trigger in the GSM frequency bands[1].
Range
RF In/Out: 0 to +45 dBm.
Aux RF IN: -36 to +20 dBm.
Input Frequency Setting Error[3]: ±100 Hz.
Required Input Phase Accuracy: ≤5° rms, ≤20° peak.
Demodulation Duty Cycle: 1 timeslot per frame.
Outputs: Data, Clock, and Data Valid
Data Output Clock: Clocked at 1 MHz rate.
Delay, data: ≤1 frame (4.62 ms).
Output Level: TTL.

FM Demodulation Output

Range
RF IN/OUT: 0 to +45 dBm.
AUX RF IN: -36 to +20 dBm.
Sensitivity: 20 µV/Hz ± 5% (into open circuit).
Input Frequency Setting Error[3]: ±50 kHz, with ≤100 kHz pk deviation.
Input Level Setting Error[4]: ±3 dB.
Supplemental Characteristics
3 dB Bandwidth: *DC to 270 kHz.*
Output Impedance: *600 Ω.*
DC Offset: *≤5 mV.*

Pulse Demodulation Output

Range
RF In/Out: 0 to +45 dBm.
Aux RF In: -36 to +20 dBm.
Input Frequency Setting Error[3]: ±50 kHz.
Input Level Setting Error[4]: ±3 dB.
Rise time (10 - 90%): ≤2.5 µs.
Fall time (90 - 10%): ≤2.5 µs.
Supplemental Characteristics
Output Impedance: *600 Ω, DC coupled.*
Output Level: *2 Vpk into an open circuit.*

Output RF Spectrum Measurement

After one timeslot, 577 µs, from an isolated Receiver Hop Trigger in the GSM frequency bands[1].
Range
RF In/Out: 0 to +45 dBm.
Aux RF IN: -36 to +20 dBm.
Input Levels for Optimum Dynamic Range
RF In/Out: +13, +23, +33, +43 dBm.
Aux RF IN: -23, -13, -3, +7 dBm.
Input Frequency Setting Error[3]: ±10 kHz
Input Level Setting Error[4]: ±3 dB.
Supplemental Characteristics
Log Linearity: *±0.4 dB*
Amplitude Flatness: *±1.0 dB*
Amplitude Resolution: *0.4 dB*
Dynamic Range (dB): *This describes the spectrum analyzer resolution bandwidth filter used when measuring Output RF Spectrum. The dynamic range of the measurement will be a combination of this filter response and the modulation spectrum of the incoming signal.*

	Offset (kHz)					
	100	200	300	400	600	800 to 1800
Range (dB)	29	45	51	63	75	75

Note: *When using Output RF Spectrum due to Ramping measurement, the dynamic range is decreased by 12 dB (due to Peak Hold).*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Spectrum Analyzer Specifications

Frequency Range: 10 MHz to 1 GHz.

Frequency Span/Resolution Bandwidth (coupled):

Span	Bandwidth
≤50 kHz	300 Hz
<200 kHz	1 kHz
<1.5 MHz	3 kHz
≤4 MHz	30 kHz

Display: Log, 10 dB/div.
Display Range: 80 dB.
Log Linearity: ±1.1 dB.
Reference Level Range
RF In/Out: +48 to -18 dBm.
Aux RF In: +23 to -55 dBm.
Non-harmonic Spurious Responses: -50 dBc max, for inputs ≤-30 dBm.
Residual Responses: <-70 dBm (no input signal, 0 dB attenuation).
Image Rejection: >50 dB.
Supplemental Characteristics
Level Accuracy: *±2.5 dB.*
Frequency Overrange: *To 1015 MHz.*
Displayed Average Noise Level: *<-116 dBm (0 dB attenuation, <50 kHz spans).*

Audio Source Specifications

Frequency

Range: DC to 25 kHz.
Accuracy: 0.025% of setting.
Supplemental Characteristics
Minimum Resolution: *0.1 Hz.*

Output Level

Range: 0.1 mV to 4 V_{rms}.
Maximum Output Current: 20 mA peak.
Output Impedance: <1 Ω.
Accuracy: ±(2% of setting + resolution). Level ≥ 50 mV_{rms}

Residual Distortion (THD+noise, amplitude >200 mV_{rms}): 0.1%, 20 Hz to 25 kHz in 80 kHz BW.
Supplemental Characteristics
Minimum Resolution: *Level ≤0.01 V: 50 µV. Level ≤0.1 V: 0.5 mV. Level ≤ 1 V: 5 mV. Level > 1 V: 50 mV.*
DC Coupled Offset: *<50 mV.*

Audio Analyzer Specifications

Frequency Measurement

Range: 20 Hz to 400 kHz.
Accuracy: ±(0.02% + 1 count + reference accuracy).
External Input: 20 mV_{rms} to 30 V_{rms}
Supplemental Characteristics
Minimum Resolution: *f < 10 kHz: 0.01 Hz. f < 100 kHz: 0.1 Hz. f ≥ 100 kHz: 1 Hz.*

AC Voltage Measurement

Voltage Range: 0 to 30 V_{rms}
Accuracy (20 Hz to 15 kHz, input >1 mV_{rms}): ±3% of reading.
Residual Noise + THD (15 kHz BW): 175 µV.
Supplemental Characteristics
3 dB Bandwidth: *2 Hz to 100 kHz.*
Input Impedance: *1 MΩ 145 pF at AUDIO IN.*
Minimum Resolution: *4 digits for inputs ≥100 mV. 3 digits for inputs <100 mV.*

DC Voltage Measurement

Voltage Range: 100 mV to 42 V.
Accuracy: ±(1.0% of reading + DC Offset).
DC Offset: ±45 mV.
Supplemental Characteristics
Minimum Resolution: *1 mV.*

Distortion Measurement

Fundamental Frequency: 1 kHz ± 5 Hz.
Input Level Range: 30 mV_{rms} to 30 V_{rms}.
Display Range: 0.1% to 100%.
Accuracy: ±1 dB (0.5 to 100% distortion).
Residual THD+Noise (15 kHz BW): the greater of -60 dB or 175 µV.
Supplemental Characteristics
Minimum Resolution: *0.01% Distortion.*

Audio Filters

50 Hz HPF	300 Hz HPF
300 Hz LPF	3 kHz LPF
15 kHz LPF	750 µs deemphasis
1 kHz notch.	

Audio Detectors

RMS	Pk+	Pk-
Pk+hold	Pk-hold	Pk±/2
Pk±/2 hold	Pk±max	Pk±max hold.

Oscilloscope Specifications

Frequency Range (3 dB): 2 Hz to 50 kHz.
Scale/Division: 10 mV to 10 V in 1, 2, 5, 10 steps.
Amplitude Accuracy (20 Hz to 10 kHz): ±1.5% of reading ± 0.1 division.
Time/Division: 10 µs to 100 ms in 1, 2, 5, 10 steps.
External Trigger Level: TTL.
Supplemental Characteristics
3 dB Bandwidth: *Typically >100 kHz.*
Internal DC Offset: ≤0.1 division for ≥50 µV/div sensitivity.
Maximum Voltage:
Scope In: 5 V_{pk}
Audio In: 30 V_{rms}

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Remote Programming

HP-IB: Hewlett Packard's implementation of IEEE Standard 488.2.

Functions Implemented: SH1, AH1, T6, L4, SR1, RL1, LE0, TE0, PP0, DC1, DT1, C4, C11 ,E2.

RS-232: 3-wire RJ-11 connector used for serial data in and out.

Baud Rates: 300, 1200, 2400, 4800, 9600, and 19200 selectable.

General Specifications

Size: 177H x 426W x 574D mm. (7 x 16.75 x 23 in).

Weight: 32 kg, 70 lbs.

Operating Temperature: 0° to +55°C.

Storage Temperature: -40° to +75°C.

Power: 100, 120, 220, 240 Vac, 48 to 440 Hz, ±10% of line voltage, approximately 450 VA.

EMI: Conducted and radiated interference meets FTZ 1046, FTZ 526/527, and MIL STD 461B RE02, CE03 narrowband, and CE03 broadband above 200 kHz. Conducted susceptibility meets MIL 461B CS01 and CS02. Radiated susceptibility meets IEC 801-3 RS1.

Supplemental Characteristics

Leakage: *At RF Generator output levels <-40 dBm, typical leakage is <1 µV induced in a resonant dipole antenna 1 inch away from any surface except the rear panel. Spurious leakage levels are typically <5 µV in a resonant dipole antenna 1 inch away from any surface except the rear panel.*

Reference Specifications

(The accuracy needs for testing GSM radios require the unit to be operated with the High Stability Reference (Opt. 001) or an external high stability reference.)

Accuracy (after warm up): ±[(Time since calibration x Aging Rate) + Temperature Effects + Accuracy of calibration]

External Reference Input

Frequency: 13, 10, 5, 2, or 1 MHz, ±30 ppm.

Level: 0 to +10 dBm.

Nominal Impedance: *50 Ω.*

Supplemental Characteristics

10 MHz OUT *(rear panel BNC)*

Level: *+8 dBm nominal.*

Impedance: *50 Ω nominal.*

13 MHz OUT *(rear panel BNC)*

Level: *+8 dBm nominal.*

Impedance: *50 Ω nominal.*

Fixed Reference Mode

Aging: <2 ppm/year.

Temperature Stability: ±1 ppm (0° to +55°C).

Warm-up Time: <30 seconds, ±2 ppm of final frequency.

Tunable Reference Mode

Allows offsetting the internal reference by a selected amount relative to the High Stability Reference (Opt. 001) or an External Reference.

Required External Reference

Accuracy: ±0.5 ppm.

Tune Range: ±30 ppm.

Reference Accuracy (after calibration): ±1 ppm + accuracy of External Reference or High Stability Reference (Opt 001).

Temperature Stability (after calibration, 0° to 55°C): ≤4 ppm, for selected offsets of up to ±30 ppm.

High Stability Reference (Option 001)

Aging: $<5\times10^{-4}$ ppm/day after 24 hour warm-up.
<0.1 ppm/year for continuous operation.

Temperature Stability: $<2.5\times10^{-8}$ ppm/°C (0°- +55°C).

Warm up time: Within 5×10^{-4} ppm of final value 10 min. after turn on, at 25°C.

Supplemental Characteristics

Opt 001 Ref Out *(rear panel BNC to be connected to Ref In)*

Frequency: *10 MHz nominally.*

Level: *+7.5 dBm nominally.*

Transit Protection (Option 002)

Option 002 adds accessories which protect the HP 8922G during handling and transport. This option adds a rugged front panel cover, extended rear feet and an accessory pouch. The snap-on front cover protects the CRT and front panel from impact damage. The extended rear feet allow the unit to stand vertically with cables attached to the rear panel.

Protocol Logging (Option 003)

With Option 003, the HP 8922G copies protocol messages sent and received while maintaining a simulated mobile to base station link and sends them to the PT-300/500 via the data output port. Once received, protocol messages are logged by the PT-300/500 for verification and further analysis.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering Information

HP 8922G GSM MS Test Set

Option 001 High Stability Reference.
Option 002 Transit Protection (Provides front panel cover, and extended rear feet).
Option 003 Protocol Logging (adds data output port and firmware for use with HP IDACOM PT-300 or PT-500 Protocol Analyzers.
Option 910 Provides a total of two sets of Operation Manuals (08922-90011) and Service Manuals (08922-90006).
Option 913 Rack Mount Flange Kit (5062-4072).
Option 915 Adds Service Manual (08922-90006).

Associated Equipment

HP 83210A Service Kit includes extender boards and cables, diagnostic software, and assembly level repair manual, (08922-90006).

HP 85700A 32 Kbytes static RAM memory card.
HP 85702A 128 Kbytes static RAM memory card.
HP 85704A 256 Kbytes static RAM memory card.
HP 85705A 512 Kbytes static RAM memory card.
HP 85701A 128 Kbytes OTP ROM memory card.
HP 85703A 256 Kbytes OTP ROM memory card.

08922-61062 High Stability Reference (Option 001) retrofit kit.

08922-61070 Transit Protection (Option 002) retrofit kit.

08922-61079 Protocol Logging (Option 003) retrofit kit.

9211-2662 Transit Case.

9211-1303 Operating Case (6.75" height to accommodate weight).

External Monitor: The HP 8922G external CRT output requires a multisync monitor capable of locking to a horizontal scanning frequency of 19.2 kHz.

HP Systems Engineering Assistance

Extra assistance from Hewlett-Packard in the form system installation, productivity assistance, programmer or user training, or solution consulting are available on a consulting basis. Call Hewlett-Packard for a quote.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Index

1

15kHz low pass filter
  AF Analyzer, 4-38

2

<20Hz high pass filter
  AF Analyzer, 4-38

3

300Hz high pass filter
  AF Analyzer, 4-38
300Hz low pass filter
  AF Analyzer, 4-38
3kHz low pass filter
  AF Analyzer, 4-38

5

50Hz high pass filter
  AF Analyzer, 4-38

7

750 μs de-emphasis filter, 4-37

9

99kHz low pass filter
  AF Analyzer, 4-38

A

absolute radio frequency channel number, 4-10, 4-11, 4-16
absoute radio frequency channel number, 4-74
access burst, 4-45
ac coupling
  AF generator, 4-107
AC Level
  AF analyzer, 4-35
Activated
  Cell Configuration, 4-9
activated state of HP 8922G
  settling time, 7-157
address
  external disk, 4-29
Address
  Hop Control (RF Analyzer), 4-65
  Hop Control (RF Generator), 4-68
adjacent cell, 4-16
adjacent timeslot pulse mode, 4-4
Adj Cell
  Cell Control, 4-16
Adj TS
  Bit Error Test, 4-4
Adjust Mode
  Digital Demod, 4-44
AF analyzer input, 4-35
AF analyzer subsystem, 7-8
AF Anl In
  AF Analyzer, 4-35
AF Cnt Gate
  AF Analyzer, 4-36
AF Freq
  AF Analyzer, 4-36
AF Frequency measurement selection, 4-36
AF generator, 4-107
AF generator subsystem, 7-11
AGC
  RF analyzer, 4-108
AGC Mode
  RF Analyzer, 4-108
AllFS, 4-8
AM input
  connector, 6-12
AM Mod
  AF Analyzer, 4-35
Ampl1—12
  DSP Analyzer (Ampl Main View), 4-47
amplitude
  negative peak, 4-48
  positive peak, 4-48
  RF generator, 4-5, 4-10, 4-16
Amplitude
  AF Generator, 4-107
  Bit Error Test, 4-5, 4-10, 4-16
  CW Meas, 4-41
  DSP Analyzer (Ampl Fall View), 4-54
  DSP Analyzer (Ampl Main View), 4-47
  DSP Analyzer (Ampl Mid View), 4-52
  DSP Analyzer (Ampl Rise View), 4-50
  DSP Analyzer (PhaseMain View), 4-58
  Fast TX Carrier Power, 4-62
  Output RF Spectrum (Main View), 4-92

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Output RF Spectrum (Trace View), 4-95
Pulse On/Off Ratio (Fall View), 4-104
Pulse On/Off Ratio (Main View), 4-98
Pulse On/Off Ratio (Rise View), 4-101
RF Analyzer, 4-108
RF Generator, 4-111
Spectrum Analyzer (RF Gen Controls), 4-118
amplitude measurement, 2-33, 2-35, 2-39
analog meter, 5-5
analyzing GSM signal, 2-17
AnqAck, 10-6
ANSI Terminal, Configuring, 10-6
ARFCN, 4-11
Cell Configuration, 4-10
Cell Control, 4-16
Measurement Sync, 4-74
arming, 4-45
digital demodulation, 4-63
arming measurements
settling time, 7-159
Atten Hold
Bit Error Test, 4-5
RF Generator, 4-111
audio frequency commands
measure subsystem, 7-51
audio frequency generator, 4-107
Audio In
AF Analyzer, 4-35
Audio In Lo
AF Analyzer, 4-36
audio input
floating, 4-36
grounded, 4-36
Audio Out
AF Analyzer, 4-35
audio speech configurations
settling time, 7-158
Auto
Bit Error Test, 4-5
auto all
range hold, 4-32
automatic gain control
RF analyzer, 4-108
automatic level control
speaker, 4-40
Auto/Norm
Oscilloscope (Trigger Controls), 4-88
Aux BCCH
Cell Configuration, 4-11
Aux RF In
Configure, 4-28
Aux RF Out
Configure, 4-29
average transmitted power, 4-51, 4-53, 4-55
averaging
measurements, 5-2
Avg TX Pwr
DSP Analyzer (Ampl Mid View), 4-53, 4-55
DSP Analyzer (Ampl Rise View), 4-51

B

BA
Cell Configuration, 4-11
backing up
memory card files, 10-23
bad sync message, 9-3
Bad Syncs
Cell Control, 4-17
base station allocation, 4-11
base station identity code, 4-15
battery
discarding, 10-24
in SRAM memory cards, 10-23
replacing on memory cards, 10-24
warning, 10-24
battery holder, 10-24
baud rate, 4-33
EMMI, 8-3
BCC
Cell Configuration, 4-12
BE Count
Bit Error Test, 4-5
Beeper
Configure, 4-29
beeper loud, 4-29
beeper off, 4-29
beeper quiet, 4-29
BE Ratio
Bit Error Test, 4-5
bit error test
programming example, 7-132
settling time, 7-158
bit error test commands
measure subsystem, 7-54
bit error test subsystem, 7-12
Bits Tested
Bit Error Test, 4-5
Bits to Test
Bit Error Test, 4-6
brightness
screen. *See* intensity, Configure
Burst Length
Measurement Sync, 4-74
Burst Number
Measurement Sync, 4-75
Burst Sel
Digital Demod, 4-44
Measurement Sync, 4-75
burst selection
measurement synchronization, 4-75

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

burst type
FCH, 4-45
frequency channel, 4-45
RACH, 4-45
SCH, 4-45
training sequence codes, 4-45
TSC (digital demodulation), 4-45
user defined, 4-45
Burst Type
Digital Demod, 4-45
Measurement Sync, 4-75, 4-76
Burst Used
Measurement Sync, 4-76

C

CA
Cell Configuration, 4-12
Calibrate
Output RF Spectrum (Main View), 4-93
Pulse On/Off Ratio (Main View), 4-99
call count
reset, 4-23
call counts
frame errors, 4-18
pages, 4-21
RACHs, 4-22
Caller
Cell Control, 4-17
calls
originating and receiving, 2-11
Call Status
Cell Control, 4-17
camp on, 2-5
programming example, 7-114
carrier power
measuring, 2-35, 2-39
carrier power measurement, 2-33
cell allocation, 4-12
cell configuration subsystem, 7-13
cell control subsystem, 7-17
Center Freq
Spectrum Analyzer (Main Controls), 4-116
Center Freq (Marker To)
Spectrum Analyzer (Marker Controls), 4-120
center frequency
spectrum analyzer, 4-116, 4-120
Clear Log
Logging, 4-72
Clear to End
Hop Control (RF Generator), 4-69
Clear To End
Hop Control (RF Analyzer), 4-65
clock input
connector, 6-3
clock input selection, 4-11
clock output
connector, 6-3
closed-loop AGC
RF analyzer, 4-108
Code files, 10-2
Code Files, 10-38
colour code, 4-12
command line, 10-14
comments
for the Output Heading field, 10-32
communication failure message, 9-1
completed bits tested
Bit Error Test, 4-5
condensing command statements, 7-3
CONFIGURE, 10-4
CONFIGURE Screen
Aux RF Out, 4-29
configure subsystem, 7-26
Connect
Cell Control, 4-18
connectors
10 MHz output, 6-12
13 MHz output, 6-12
AM IN, 6-12
AM input, 6-12
AM/Speech input, 6-5
audio input (high), 6-5
audio input (low), 6-5
audio output, 6-7
AUX IF IN, 6-13
auxiliary RF input, 6-1
auxiliary RF output, 6-2
clock, 6-3
clock output, 6-2
data input/output, 6-6
data output, 6-4
EMMI bus, 6-13
FM output, 6-4
HP-IB, 6-15
LO IN, 6-16
LO OUT, 6-16
monitor, 6-7
MONITOR OUT, 6-16.1
opt 001 reference output, 6-16.1
oscilloscope input, 6-9
PCN Interface, 6-16.2
protocol interface, 6-16.2
pulse modulation, 6-8
pulse output, 6-7
reference input, 6-16.2
reference output, 6-16.1
RF input/output, 6-8
serial port, 6-16.3
speech, 6-7
system bus, 6-16.3

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

trigger input, 6-9
valid data, 6-10
video output, 6-16.3
Control
Fast TX Carrier Power, 4-63
RF Analyzer, 4-109
Control Ch
Cell Config, 4-12
control channel, 4-12
Control mode, 4-30
Controls
Oscilloscope, 4-86
Spectrum Analyzer (Auxiliary Controls), 4-122
Spectrum Analyzer (Main Controls), 4-115
Spectrum Analyzer (Marker Controls), 4-120
Spectrum Analyzer (RF Gen Controls), 4-118
Cont/Single
Oscilloscope (Trigger Controls), 4-88
COPY_PL program, 10-21
COPY_PL program
how to run, 10-23
country code, 4-14, 4-15
Coupling
AF Generator, 4-107
Creating A Library, 10-46
Creating A Procedure, 10-46
CRT
for showing test results, 10-32
CW commands
measure subsystem, 7-61
CW Freq
CW Meas, 4-42
CWFreqErr
CW Meas, 4-42
CW Power
CW Meas, 4-42
CW subsystem, 7-32
cyclic-redundancy-check, 4-6

D

data bits, 4-56
data bits measurement, 2-33, 2-47
Data Collection, 10-37
record size, 10-37
data input selection, 4-11
Data Length, 10-6
Configure, 4-29
Date
Configure, 4-29
DC AM
RF Generator, 4-111, 4-112
dc coupling
AF generator, 4-107
DC Level
AF Analyzer, 4-36
dc level measurement
selection, 4-36
DCS1800
input attenuation, 4-123
De-Emp Gain
AF Analyzer, 4-37
De-Emphasis
AF Analyzer, 4-37
de-emphasis filter
setting gain, 4-37
Delete
Hop Control (RF Analyzer), 4-66
Hop Control (RF Generator), 4-69
demodulation, 2-59
digital, 2-32, 2-34
detector
average peak hold, 4-37
maximum peak, 4-37
maximum peak hold, 4-37
negative peak, 4-37
negative peak hold, 4-37
peak average, 4-37
positive peak, 4-37
positive peak hold, 4-37
rms, 4-37
Detector
AF Analyzer, 4-37
detector selection, 4-37
device programmer, 10-23
digital demodulation, 2-32, 2-34, 2-59, 4-44, 4-45
arming, 4-45, 4-63
burst selection, 4-44
burst type, 4-45
trigger source, 4-46
digital demodulation subsystem, 7-33
digital signal processing, 4-47
discontinuous transmission, 4-19
disk address, 4-29
display subsystem, 7-34
Distn
AF Analyzer, 4-37
distortion measurement
selection, 4-37
Do Open Cal
RF Analyzer, 4-109
Download A Program, 10-9
download code files, 10-23
DRX
Cell Control, 4-19
DSP Analyzer
Ampl Main, 4-47
DSP analyzer commands
measure subsystem, 7-62

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP analyzer measurement
programming example, 7-151
DSP analyzer subsystem, 7-37
DTX
Cell Control, 4-19

E

echo, 4-30
Echo Delay
Cell Control, 4-19
electrical man machine interface, 8-1
electrical man-machine interface subsystem, 7-39
EMMI, 8-1
baud rate, 8-3, 8-4
data, 8-4
reset, 8-3
status event, 8-2
timeout mobile station response, 8-6
timeout mobile station XON, 8-7
ending a call
programming example, 7-128
settling time, 7-157
equipment supplied, 1-1
ERROR 85, 10-21
error message
what to do, 2-63
Execute
Cell Control, 4-19
external disk specification
Configure, 4-29
external load resistance, 4-38
Ext Load R
AF Analyzer, 4-38

F

Fall Pos
Pulse On/Off Ratio (Fall View), 4-104
Pulse On/Off Ratio (Main View), 4-99
fast transmitter carrier power measurement, 2-33, 2-39
fast TX carrier power
measure subsystem, 7-71
trigger source, 4-64
File Descriptions, 10-38
Filter 1
AF Analyzer, 4-38
Filter 2
AF Analyzer, 4-38
Firmware
Configure, 4-29
firmware revision date, 4-29
First bit
Measurement Sync, 4-76
First Bit
DSP Analyzer (Data Bits), 4-56
Flatness
DSP Analyzer (Ampl Main View), 4-48
Flush Log
Logging, 4-72
FM Demod
AF Analyzer, 4-35
FM error message, 9-3
FM Errors
DSP Analyzer (Data Bits), 4-56
Measurement Sync, 4-76
form feed
for test results printout, 10-37
frame erasure, 4-6
frame errors
call counts, 4-18
Frame Errors
Cell Control, 4-18
Freq
Spectrum Analyzer (Auxiliary Controls), 4-122
Spectrum Analyzer (Main Controls), 4-116
Spectrum Analyzer (Marker Controls), 4-120
Freq Offs
Output RF Spectrum (Main View), 4-93, 4-96
frequency
CW, 4-42
Spectrum Analyzer (RF Gen Controls), 4-118
Frequency
AF Generator, 4-107
CW Meas, 4-43
Hop Control (RF Analyzer), 4-67
Hop Control (RF Generator), 4-70
RF Analyzer, 4-109
RF Generator, 4-112
Spectrum Analyzer (RF Gen Controls), 4-119
frequency analyzer test, 3-6
frequency correction burst, 4-45
frequency error
continuous wave, 4-42
Frequency Error
DSP Analyzer (PhaseMain View), 4-58
frequency error measurement, 2-33, 2-43
frequency generator test, 3-6
frequency, non-hopped
CW Meas, 4-43
frequency offset
output RF spectrum, 4-93, 4-96
spectrum analyzer, 4-116
frequency span
spectrum analyzer, 4-117
fuse, 1-4
FW Revision
Configure, 4-29

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

G

Gain Cntl
  AF Analyzer, 4-38
gain control, 4-38
gate time
  AF analyzer, 4-36
  frequency counter, 4-36
  RF Analyzer, 4-43
global keys, 5-10
GMSK
  RF Generator, 4-112
GMSK modulation test
  RF analyzer, 3-8
  signal generator, 3-5
GSM 11.10 Aspect III, 8-1
GSM900
  input attenuation, 4-123
GSM signal
  analysis, 2-17
GSM signal requirements, 2-26

H

high limit
  setting, 5-3
  turn off, 5-3
high pass filter
  AF Analyzer, 4-38
high-pass filter
  AF Analyzer, 4-38
high stability time base
  option 001, 4-30
hold all
  range hold, 4-32
hop
  large, 4-67
  normal, 4-67
  sequence, 4-66, 4-70
hop address, 4-65, 4-68
  adding, 4-66
  inserting, 4-70
  reset, 4-66
  resetting, 4-70
hop control subsystem, 7-42
hop frequency
  deleting, 4-66, 4-69
Hop Meas Freq
  RF Analyzer, 4-109
Hop Mode
  Hop Control (RF Analyzer), 4-66
  Hop Control (RF Generator), 4-69
  RF Analyzer, 4-109
  RF Generator, 4-112
Hop Offset
  CW Meas, 4-43
  RF Analyzer, 4-109
  Spectrum Analyzer (Main Controls), 4-116
hop source, 4-67, 4-71
hop table, 4-65, 4-68
  clearing, 4-65, 4-69
Hop Trig
  Hop Control (RF Analyzer), 4-66
  Hop Control (RF Generator), 4-69
  RF Analyzer, 4-110
  RF Generator, 4-112
hop trigger
  arming, 4-66, 4-69
HP AdvanceLink, 10-6
HP-IB
  address, 10-37
  EMMI subsystem, 8-3
  instruments on the "700" bus, 10-37
  status subsystem, 8-2
HP-IB address, 3-3
  selecting, 4-30
HP-IB Adrs, 10-4
  Configure, 4-30
HP-IB commands
  abbreviations, 7-2
  angle brackets, 7-3
  AVG, 7-6
  colon, 7-3
  comma, 7-3
  comment lines, 7-7
  condensing statements, 7-3
  FNUM, 7-4
  FNUM_MOD, 7-4
  INUM, 7-4
  MET, 7-6
  MM, 7-4
  MM_MOD, 7-6
  multiple entries, 7-3
  optional commands, 7-4
  optional parameters, 7-2
  pound sign, 7-7
  query, 7-2
  question mark, 7-2
  quotation mark, 7-2
  semicolon, 7-3
  separator, 7-3
  square brackets, 7-2
  string entries, 7-2
  units of measure, 7-3
  variable choices, 7-3
  vertical bar, 7-2
HP-IB command syntax, 10-3
HP-IB connector, 6-17, 6-30
  pin number overview, 6-17, 6-30
HP-IB Mode, Control, 10-3
HP-IB Mode, Talk&Listen, 10-3

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

HP-IB port, 10-4
HP-IB printer, 10-32
HP-IB program examples, 7-113
HP-IB programming, 7-1

I

IBASIC computer
  initializing memory cards, 10-21
  to configure external instruments, 10-37
IBASIC computer
  may be programmed, **10-29**
IBASIC Echo, 10-6, 10-8
  Configure, 4-30
IBASIC programming-language code, 10-29
IBASIC programs
  file structures, 10-29
  HP 11807A, 10-29
  user written, 10-29
IEEE 488.2 common commands, 7-46
IF input
  auxiliary connector, 6-13
IMEI request
  settling time, 7-159
initializing memory cards, 10-21
input amplitude
  CW Meas, 4-41
Input Atten
  Spectrum Analyzer (Auxiliary Controls), 4-123
input attenuation
  DCS1800 radio, 4-123
  GSM900 radio, 4-123
input attenuator
  spectrum analyzer, 4-123
Input Gain
  AF Analyzer, 4-38
Insert
  Hop Control (RF Analyzer), 4-66
  Hop Control (RF Generator), 4-70
installation
  overview, 1-2
installing software, 3-2
Inst Echo, 10-6, 10-8
  Configure, 4-30
instrument setup
  recall, 5-6
  save, 5-8
Intensity
  Configure, 4-30
interfacing techniques, 10-29
internal control bus, 10-3

K

keys, 5-1
  assign, 5-2
  average, 5-2
  cancel, 5-2
  cell configuration screen, 5-2
  cell control screen, 5-2
  end call, 5-3
  G1, 5-10
  G2, 5-10
  G3, 5-10
  global (G1, G2, G3), 5-2
  high limit, 5-3
  hold, 5-3
  HP-IB address, 5-2
  increment, 5-3
  L1, 5-9
  L2, 5-9
  local (L1, L2), 5-2
  low limit, 5-4
  measurement arming, 5-4
  measurement synchroniztion screen, 5-5
  message screen, 5-5
  meter, 5-5
  mobile station information screen, 5-5
  no, 5-5
  on/off, 5-5
  originate call, 5-5
  previous, 5-5
  print, 5-6
  recall, 5-6
  receive call, 5-6
  reference set, 5-7
  release, 5-7
  RF analyzer screen, 5-8
  RF generator screen, 5-8
  save, 5-8
  tests screen, 5-8
  use memory, 5-8
  yes, 5-8

L

LAC
  Cell Config, 4-13
LAI
  Cell Config, 4-14
level
  oscilloscope, 4-86
Level (div)
  Oscilloscope (Trigger Controls), 4-89
level late message, 9-3
level short message, 9-3
level test
  RF Analyzer, 3-7

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Signal Generator, 3-4
Library files, 10-2
Library Files, 10-38
Limit
Cell Control, 4-19
line voltage, 1-4
Loading A Program, 10-9
local keys, 5-9
location area code, 4-13
location area identification, 4-14
logging subsystem, 7-49
Log/Pause
Logging, 4-73
LO input
connector, 6-16
Loopback
Bit Error Test, 4-6
Cell Control, 4-19
loopback functions
settling time, 7-158
Loop Delay Speech Frames
Bit Error Test, 4-7
LO output
connector, 6-16
low level message, 9-3
low limit
setting, 5-4
turn off, 5-4
Lvl
Oscilloscope (Main Controls), 4-86
Oscilloscope (Marker Controls), 4-90
Oscilloscope (Trigger Controls), 4-89
Output RF Spectrum (Trace View), 4-96
Pulse On/Off Ratio (Fall View), 4-105
Pulse On/Off Ratio (Rise View), 4-101
Spectrum Analyzer (Auxiliary Controls), 4-123
Spectrum Analyzer (Main Controls), 4-116
Spectrum Analyzer (Marker Controls), 4-120
Spectrum Analyzer (RF Gen Controls), 4-119

M

MA1
Cell Configuration, 4-13
Cell Control, 4-19
MA2
Cell Configuration, 4-13
MAIO1
Cell Configuration, 4-14
MAIO2
Cell Configuration, 4-14
man machine interface, 8-1
Manual
Bit Error Test, 4-7
Marker
DSP Analyzer (Ampl Fall View), 4-54
DSP Analyzer (Ampl Mid View), 4-52
DSP Analyzer (Ampl Rise View), 4-50
Marker Pos
DSP Analyzer (Ampl Fall View), 4-54
DSP Analyzer (Ampl Mid View), 4-52
DSP Analyzer (Ampl Rise View), 4-50
DSP Analyzer (Phase Err View), 4-60
Output RF Spectrum (Trace View), 4-96
MarkerPos
Pulse On/Off Ratio (Fall View), 4-105
Pulse On/Off Ratio (Rise View), 4-102
marker position, 4-52, 4-54
DSP Analyzer, 4-60
pulse on/off ratio, 4-102, 4-105
Marker To Peak+
Oscilloscope (Marker Controls), 4-90
Marker To Peak−
Oscilloscope (Marker Controls), 4-90
Marker To, Ref Level
Spectrum Analyzer (Marker Controls), 4-121
Mask
DSP Analyzer (Ampl Rise View), 4-51, 4-53, 4-55
MCC
Cell Config, 4-14
Meas Cntl
Bit Error Test, 4-8
Meas Mode
Output RF Spectrum (Trace View), 4-96
Meas Num
Bit Error Test, 4-7
Meas Reset
AF Analyzer, 4-39
Configure, 4-30
Oscilloscope (Main Controls), 4-87
Oscilloscope (Marker Controls), 4-91
Oscilloscope (Trigger Controls), 4-89
Spectrum Analyzer (Auxiliary Controls), 4-124
Spectrum Analyzer (Main Controls), 4-116
Spectrum Analyzer (Marker Controls), 4-121
Spectrum Analyzer (RF Gen Controls), 4-119
Measurement
Bit Error Test, 4-7
measurement averaging, 5-2
measurement control, 4-8
measurement setup, 2-27
Measurement Summary
DSP Analyzer (Ampl Main View), 4-48
measurement summary message, 9-2
measurement synchronization, 4-74
measurement synchronization subsystem, 7-85
measure subsystem, 7-50
memory cards

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

backing up programs, 10-23
batteries, 10-24
COPY_PL program, 10-23
initializing, 10-21
inserting and removing, 10-19
SRAM and OPT part numbers, 10-20
write-protect switch, 10-22
messages, 9-1
bad sync, 9-3
Communication Failures, 9-1
FM error, 9-3
level late, 9-3
level short, 9-3
low level, 9-3
measurement summary, 9-2
no error, 9-3
protocol errors, 9-4
RF overload, 9-3
short burst, 9-3
sync status, 9-3
Midamble
Measurement Sync, 4-77
Midamble Start Bit Position
Measurement Sync, 4-77
MM
Cell Control, 4-20
MNC
Cell Config, 4-14
mobile allocation index offset 1, 4-14
mobile allocation index offset 2, 4-14
mobile allocation number, 4-19
mobile allocation number 1, 4-13
mobile allocation number 2, 4-13
mobile country code, 4-14
mobile network code, 4-14
mobile station camp on
programming example, 7-114
mobile station commands
measure subsystem, 7-59
mobile station information, 4-82
mobile station originated call
programming example, 7-121
mobile station timing error, 4-22
mobility management, 4-20
Mode
Cell Control, 4-20
Configure, 4-30
Output RF Spectrum (Main View), 4-93
Mode field, 10-4
modulation
output RF spectrum power, 4-93, 4-96
monitor output
connector, 6-16.1
MS information sybsystem, 7-81
MS TX power level
settling time, 7-159

N

NCC
Cell Configuration, 4-15
Next
Hop Control (RF Analyzer), 4-66
Hop Control (RF Generator), 4-70
Next Peak (Marker To)
Spectrum Analyzer (Marker Controls), 4-121
no error message, 9-3
Norm
Cell Control, 4-21
normal burst, 4-45
Notch Gain
AF Analyzer, 4-39

O

Off, 4-8
Offset
Configure, 4-30
One-Time Programmable
OTP memory cards, 10-20
On UUT Failure
continue or stop, 10-30
Open/Auto DAC Value
RF Analyzer, 4-110
open-loop AGC
RF analyzer, 4-108
open loop AGC calibration
RF analyzer, 4-109
operating environment, 1-6
Opt 001 Ref Out, 4-30
options, 1-6
originating a call
programming example, 7-118, 7-121
settling time, 7-157
originating calls, 2-11
oscilloscope, 4-86
arming, 4-88
measurement point, 4-39
triggering, 4-88
trigger level, 4-89
oscilloscope commands
measure subsystem, 7-74
oscilloscope subsystem, 7-87
oscilloscope test, 3-7
Output Destination
CRT or Printer, 10-32
Output Heading comments, 10-32
Output Results
All or Failures, 10-31
Output RF Spectrum
Output RF Spectrum (Main View), 4-93
output RF spectrum commands

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

measure subsystem, 7-72
output RF spectrum measurement, 2-34, 2-55
output RF spectrum subsystem, 7-91
OutRFSpec
Output RF Spectrum (Trace View), 4-97

P

pages
call counts, 4-21
Pages
Cell Control, 4-21
Paging
Cell Control, 4-21
parameters
enter into Test Executive, 10-36
Parity, 10-6
Configure, 4-31
Pass Filter
Logging, 4-73
PCN interface
connector, 6-16.2
peak detector
with de-emphasis, 4-39
Peak (Marker To)
Spectrum Analyzer (Marker Controls), 4-121
Peak Phase Error
DSP Analyzer (PhaseMain View), 4-59
peak transmitted power, 4-48
peak transmitter carrier power measurement, 2-33, 2-35
performance tests, 3-1
performance test software, 3-2
performance verification, 3-1
phase error, 4-60
phase error measurement, 2-33, 2-43
Pk Det To
AF Analyzer, 4-39
Pk TX Pwr
DSP Analyzer (Ampl Main View), 4-48
Pls Demod
AF Analyzer, 4-35
Polarity
DSP Analyzer (Data Bits), 4-57
POnOffFall
Pulse On/Off Ratio (Fall View), 4-105
POnOffRise
Pulse On/Off Ratio (Rise View), 4-102
Position
Oscilloscope (Marker Controls), 4-91
Spectrum Analyzer (Marker Controls), 4-121
Pos/Neg
Oscilloscope (Trigger Controls), 4-89
power
continuous wave, 4-42
power cord, 1-4
power measurement, 2-35, 2-39
power meter
zeroing, 4-43, 4-49, 4-64
power supply
configure to HP-IB, 10-37
ppm, 4-7
PRBS, 4-21
PRBS Pattrn, 4-21
preset (*RST)
settling time, 7-158
Pre-Trig
Oscilloscope (Trigger Controls), 4-89
Print
Configure, 4-31
print address
selecting, 4-31
Print Adrs, 10-4
Configure, 4-31
printer
configure to HP-IB, 10-37
for showing test results, 10-32
options, 10-37
RS-232 or HP-IB, 10-32
printouts
for the test results, 10-31
Print Title
Configure, 4-31
Print To, 10-4
Configure, 4-31
problem solving, 2-63
Procedure files, 10-2
Procedure Files, 10-26
Program Development Tools disk, 10-14
Program Example, 10-38
program examples, 7-113
PROGram Interface Commands, 10-14
Program Listing Explanation, 10-43
programming
HP-IB, 7-1
programming example
bit error test, 7-132
DSP analyzer measurement, 7-151
ending a call, 7-128
HP 8922G originated call, 7-118
mobile station camp on, 7-114
mobile station originated call, 7-121
pulse on/off, 7-146
programming techniques, 10-29
programs
IBASIC file structures, 10-29
user written or HP 11807A, 10-29
program status
run indicators, 10-29
Program Structure, 10-38
protocol error messages, 9-4

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

protocol interface, 6-16.2
Pseudo-Random Bit Sequence, 4-21
pulse
  adjacent timeslot, 4-4
Pulse
  RF Generator, 4-113
pulse demodulation test
  RF analyzer, 3-8
pulse measurement, 2-34, 2-51
pulse modulation
  RF generator, 4-113
pulse modulation test, 3-5
Pulse On/Off Fall
  Pulse On/Off Ratio (Main View), 4-99
pulse on/off measurement
  programming example, 7-146
pulse on/off ratio, 4-98
pulse on/off ratio commands
  measure subsystem, 7-76
pulse on/off ratio measurement, 2-34, 2-51
pulse on/off ratio subsystem, 7-92
Pulse On/Off Rise
  Pulse On/Off Ratio (Main View), 4-99

Q

query measurements
  settling time, 7-158

R

RACHs
  call counts, 4-22
  Cell Control, 4-22
radio frequency analyzer, 4-108
radio frequency generator, 4-111
radio specifications, 10-35
radio tests
  reduce testing time, 10-34
  selecting, 10-33
ramping
  output RF spectrum power, 4-93, 4-96
Range Hold
  Configure, 4-32
Rcv Pace, 10-6
  Configure, 4-32
read-only setting
  on the memory card, 10-22
read-write setting
  on the memory card, 10-22
receive pacing
  setting, 4-32
Receive/Transmit Pacing, 10-6
receiving calls, 2-11
record size
  for data collection, 10-37
reference
  setting, 5-7
Reference
  Bit Error Test, 4-7
  Configure, 4-32
reference level
  RF input, 4-119, 4-121, 4-124
  RF Input, 4-117
  RF output, 4-119
reference oscillator calibration
  settling time, 7-159
reference output
  option 001, 4-30
Ref Level
  Spectrum Analyzer (Auxiliary Controls), 4-124
  Spectrum Analyzer (Main Controls), 4-117
  Spectrum Analyzer (Marker Controls), 4-121
  Spectrum Analyzer (RF Gen Controls), 4-119
Ref Level (Marker To)
  Spectrum Analyzer (Marker Controls), 4-121
Relative MS Timing Err
  Cell Control, 4-22
ResAllFS, 4-8
reset
  call count, 4-23
  measurement, 4-30, 4-87, 4-89
  SACCH Meas, 4-23
Reset
  Cell Control, 4-23
  Oscilloscope (Trigger Controls), 4-89
Reset Address
  Hop Control (RF Generator), 4-70
Reset Adrs
  Hop Control (RF Analyzer), 4-66
ResTypeI, 4-8
ResTypeIA, 4-8
ResTypeIB, 4-8
ResTypeII, 4-8
RF analyzer, 4-108
RF analyzer subsystem, 7-94
RF Anl Ampl Control
  Cell Control, 4-23
RF Cnt Gate
  CW Meas, 4-43
RF generator, 4-111
  amplitude, 4-5, 4-10, 4-16
RF generator subsystem, 7-96
RFGen Volts
  Configure, 4-32
RF In/Out
  Configure, 4-33
RF Input
  CW Meas, 4-43
  RF Analyzer, 4-110

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Spectrum Analyzer (Auxiliary Controls), 4-124
RF Level Offset
Configure, 4-33
RF Output
RF Generator, 4-113
Spectrum Analyzer (RF Gen Controls), 4-119
RF ovrload message, 9-3
RF spectrum measurement, 2-34, 2-55
Rise Pos
Pulse On/Off Ratio (Main View), 4-99
Pulse On/Off Ratio (Rise View), 4-102
RJ-11/RS-232 adapter, 10-5
RMS Phase Error
DSP Analyzer (PhaseMain View), 4-59
RS-232 printer, 10-32
RS-232 Serial port, 10-4
*RST
settling time, 7-158
Run Mode
Continuous or Single Step, 10-31
running tests, 2-17
Run/Stop
Meas Cntl, 4-8
Run Test, 10-13

S

SACCH Meas
Cell Control, 4-24
Save Programs On Memory Cards, 10-9
scope. *See* oscilloscope
Scope In
AF Analyzer, 4-35
Scope Lvl
Oscilloscope (Trigger Controls), 4-89
Scope To
AF Analyzer, 4-39
screens
AF Analyzer, 4-35
Bit Error Test, 4-4
Cell Configuration, 4-9
Cell Control, 4-16
Configure, 4-28
CW Meas, 4-41
Digital Demod, 4-44
DSP Analyzer, 4-47
DSP Analyzer:Ampl Fall, 4-54
DSP Analyzer:Ampl Mid, 4-52
DSP Analyzer:Ampl Rise, 4-50
DSP Analyzer:Data Bits, 4-56
DSP Analyzer:Phase Err, 4-60
DSP Analyzer:PhaseMain, 4-58
Fast TX Carrier Power, 4-62
Hop Control (RF Analyzer), 4-65
Hop Control (RF Generator), 4-68
Logging, 4-72
Measurement Sync, 4-74
Message, 4-81
MS Information / Signaling, 4-82
Oscilloscope, Main Controls, 4-86
Oscilloscope (Marker Controls), 4-90
Oscilloscope, Trigger Controls, 4-88
Output RF Spectrum (Main View), 4-92
Output RF Spectrum (Trace View), 4-95
Pulse On/Off Ratio (Fall View), 4-104
Pulse On/Off Ratio (Main View), 4-98
Pulse On/Off Ratio (Rise View), 4-101
RF Generator / RF Analyzer (AF Gen), 4-107
RF Generator / RF Analyzer (RF Analyzer), 4-108
RF Generator / RF Analyzer (RF Gen), 4-111
Service, 4-114
Spectrum Analyzer (Auxiliary Controls), 4-122
Spectrum Analyzer (Main Controls), 4-115
Spectrum Analyzer (Marker Controls), 4-120
Spectrum Analyzer (RF Gen Controls), 4-118
SD/4, 4-12
SD/8, 4-12
Serial Baud, 10-6
Configure, 4-33
Serial In
Configure, 4-34
Serial In Field, 10-6
serial input port
control, 4-34
serial interface
pin numbers, 6-16.3
Serial Port, 10-5
Serial Port Connections, 10-5
serial word length, 4-29
Service
Configure, 4-34
serving cell, 4-15
Settable
CellConfiguration, 4-15
settable state of HP 8922G
settling time, 7-157
setting high limit, 5-3
setting low limit, 5-4
setting reference, 5-7
Settling
AF Analyzer, 4-40
Hop Control (RF Analyzer), 4-67
Hop Control (RF Generator), 4-70
settling time
actived state of HP 8922G, 7-157
arming measurements, 7-159

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

between HP-IB commands, 7-158
between IBASIC commands, 7-158
bit error test, 7-158
changing audio speech configurations, 7-158
ending a call, 7-157
IMEI request, 7-159
loopback functions, 7-158
MS TX power level, setting, 7-159
originating a call, 7-157
preset (*RST), 7-158
query measurements, 7-158
reference oscillator calibration, 7-159
settable state of HP 8922G, 7-157
TMSI reallocation, 7-159
set up
measurment, 2-27
ShortBurst message, 9-3
signaling, 4-82
signal requirements
GSM, 2-26
SINAD
AF Analyzer, 4-40
SINAD measurement
selecting, 4-40
Single/Cont
Meas Cntl, 4-8
Measurement Sync, 4-77
slow associated control channel, 4-24
Source
Hop Control (RF Analyzer), 4-67
Hop Control (RF Generator), 4-71
Span
Spectrum Analyzer (Main Controls), 4-117
speaker
off, 4-40
volume control, 4-40
Speaker ALC, 4-40
Speaker Vol
AF Analyzer, 4-40
specifications
enter into Test Executive, 10-35
spectral purity test, 3-4
spectrum analyzer
calibrating, 4-93, 4-99
spectrum analyzer commands
measure subsystem, 7-80
spectrum analyzer subsystem, 7-99
spectrum analyzer test, 3-9
Speech
Cell Control, 4-25
speech configuration
settling time, 7-158
Speech Gain
Cell Control, 4-26
SRAM memory cards
contain a battery, 10-23
initializing, 10-21
write protection, 10-22
State
Digital Demod, 4-45
Fast TX Carrier Power, 4-63
Static Random-Access Memory
SRAM memory cards, 10-20
Status
Digital Demod, 4-45, 4-78
status subsystem, 7-101
Stop Length, 10-6
Configure, 4-34
sweep time
oscilloscope, 4-87
sweep trigger
arming, 4-89
synchronization burst, 4-45
synchronization errors
digital demodulation, 4-45
DSP Analyzer, 4-48, 4-51, 4-53, 4-55, 4-57, 4-59, 4-61
measurement synchronization, 4-79
output RF spectrum, 4-94
Output RF Spectrum (Trace View), 4-97
pulse on/off ratio, 4-100, 4-102, 4-105
synchronization mode
measurement synchronization, 4-78
Sync Mode
Measurement Sync, 4-78
Sync Pattern Start Position
Measurement Sync, 4-77, 4-78
Sync Status
Digital Demod, 4-45
DSP Analyzer (Ampl Fall View), 4-55
DSP Analyzer (Ampl Main View), 4-48
DSP Analyzer (Ampl Mid View), 4-53
DSP Analyzer (Ampl Rise View), 4-51
DSP Analyzer (Data Bits), 4-57
DSP Analyzer (Phase Err View), 4-61
DSP Analyzer (PhaseMain View), 4-59
Measurement Sync, 4-79
Output RF Spectrum (Main View), 4-94
Output RF Spectrum (Trace View), 4-97
Pulse On/Off Ratio (Fall View), 4-105
Pulse On/Off Ratio (Main View), 4-100
Pulse On/Off Ratio (Rise View), 4-102
sync status message, 9-3
sync staus message
what to do, 2-63
system bus, 6-18
pin number overview, 6-28
signal descriptions, 6-18
system subsystem, 7-107

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

T
Talk&Listn mode, 4-30
TCH Control
  Cell Control, 4-26
TCH parameters, 4-26
TCH Parms
  Cell Control, 4-26
Test
  Cell Control, 4-27
test equipment, 3-2
Test Execution Conditions, 10-30
Test Executive
  parameters, 10-36
  specifications, 10-35
  test sequence, 10-33
testing the radio, 10-13
testing time
  how to reduce, 10-34
Test Library files
  backing up, 10-23
Test Parameters, 10-36
Test Procedure files
  backing up, 10-23
tests
  for radios, 10-33
Test Sequence
  running a, 10-13
Test Sequence menu, 10-33
Test Specifications, 10-35
TESTS Subsystem, 10-1
Time
  Configure, 4-34
  DSP Analyzer (Phase Err View), 4-61
  Oscilloscope (Main Controls), 4-87
  Oscilloscope (Marker Controls), 4-91
  Oscilloscope (Trigger Controls), 4-89
  Output RF Spectrum (Trace View), 4-97
  Pulse On/Off Ratio (Fall View), 4-105
  Pulse On/Off Ratio (Rise View), 4-103
Time1-12
  DSP Analyzer (Ampl Main View), 4-49
Time/div
  Oscilloscope (Main Controls), 4-87
Timeslot
  Cell Control, 4-27
Timing Advance
  Cell Control, 4-27
timing error
  mobile station, 4-22
TMSI reallocation
  settling time, 7-159
traffic channel control, 4-26
training sequence codes, 4-45
transient settling times, 7-157
transmit pacing
  setting, 4-34
transmitter power, 4-27
transmitter power measurement, 2-33
Trig Delay
  Digital Demod, 4-46
  DSP Analyzer (Ampl Fall View), 4-55
  DSP Analyzer (Ampl Main View), 4-49
  DSP Analyzer (Ampl Mid View), 4-53
  DSP Analyzer (Ampl Rise View), 4-51
  DSP Analyzer (Data Bits), 4-57
  DSP Analyzer (Phase Err View), 4-61
  DSP Analyzer (PhaseMain View), 4-59
  Fast TX Carrier Power, 4-63
  Measurement Sync, 4-79
  Output RF Spectrum (Main View), 4-94
  Output RF Spectrum (Trace View), 4-97
  Pulse On/Off Ratio (Fall View), 4-106
  Pulse On/Off Ratio (Main View), 4-100
  Pulse On/Off Ratio (Rise View), 4-103
trigger delay
  digital demodulation, 4-46
  DSP Analyzer, 4-49, 4-51, 4-53, 4-55, 4-57, 4-59
  fast TX carrier power, 4-63
  measurement synchronization, 4-79
  output RF spectrum, 4-97
  pulse on/off ratio, 4-100, 4-103, 4-106
trigger qualifier
  digital demodulation, 4-46
  measurement synchronization, 4-79
trigger source
  measurement synchronization, 4-79
  oscilloscope, 4-89
trigger subsystem, 7-108
Trig Qual
  Digital Demod, 4-46
  Measurement Sync, 4-79
Trig Source
  Digital Demod, 4-46
  Fast TX Carrier Power, 4-64
  Measurement Sync, 4-79
tuning mode
  Configure, 4-32
TX Carrier Power, 4-64
TX Level
  Fast TX Carrier Power, 4-64
Type
  Cell Control, 4-27
TypeI, 4-8
TypeIA, 4-8
TypeIB, 4-8
TypeII, 4-8

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

U

units keys, 5-10
user defined burst, 4-45
Using the Knob, 10-14

V

verifying performance, 3-1
Vert/div
  Oscilloscope (Main Controls), 4-87
vertical offset
  oscilloscope, 4-87
vertical sensitivity
  oscilloscope, 4-87
Vert Offset
  Oscilloscope (Main Controls), 4-87
video bandwidth
  spectrum analyzer, 4-117
Video BW
  Spectrum Analyzer (Main Controls), 4-117
View
  DSP Analyzer, 4-49
  Output RF Spectrum (Main View), 4-94
volume
  speaker, 4-40

W

wait times, 7-157
write-protect switch
  setting, 10-22

X

Xmt Pace, 10-6
  Configure, 4-34
Xon/Xoff, 4-32, 4-34

Z

Zero Power
  CW Meas, 4-43
  DSP Analyzer (Ampl Main View), 4-49
  Fast TX Carrier Power, 4-64

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4

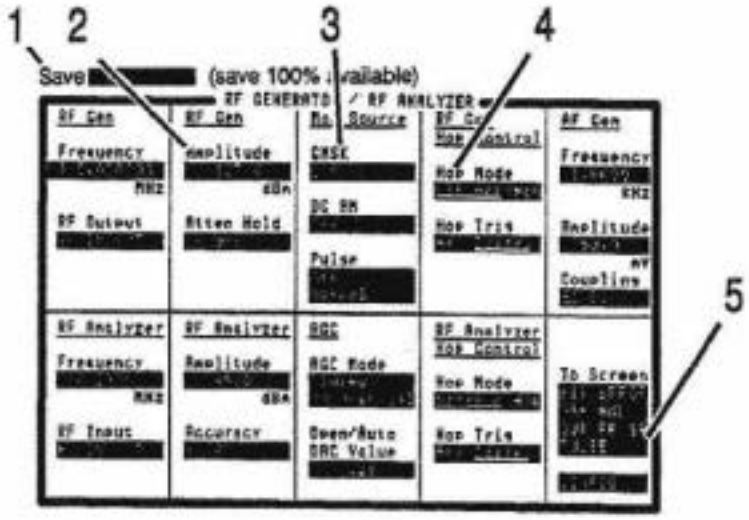
Screens

Contents

Field Types ..... page 4—2
Bit Error Test ..... page 4—4
Cell Configuration ..... page 4—9
Cell Control ..... page 4—16
Configure ..... page 4—28
CW Meas/AF Analyzer (AF Analyzer) ..... page 4—35
CW Meas/AF Analyzer (CW Meas) ..... page 4—41
Digital Demod ..... page 4—44
DSP Analyzer: Amplitude, Ampl Main View ..... page 4—47
DSP Analyzer: Amplitude, Ampl Rise View ..... page 4—50
DSP Analyzer: Amplitude, Ampl Mid View ..... page 4—52
DSP Analyzer: Amplitude, Ampl Fall View ..... page 4—54
DSP Analyzer: Data Bits ..... page 4—56
DSP Analyzer: Phase, PhaseMain View ..... page 4—58
DSP Analyzer: Phase, Phase Err View ..... page 4—60
Fast TX Carrier Power ..... page 4—62
Hop Control (RF Analyzer) ..... page 4—65
Hop Control (RF Generator) ..... page 4—68
Logging ..... page 4—72
Measurement Sync: Manual Meas Cntl ..... page 4—74
Message ..... page 4—81
MS Information ..... page 4—82
Oscilloscope, Main Controls ..... page 4—86
Oscilloscope, Trigger Controls ..... page 4—88
Oscilloscope, Marker Controls ..... page 4—90
Output RF Spectrum, Main View ..... page 4—92
Output RF Spectrum, Trace View ..... page 4—95
Pulse On/Off Ratio, Main View ..... page 4—98
Pulse On/Off Ratio, Rise View ..... page 4—101
Pulse On/Off Ratio, Fall ..... page 4—104
RF Generator/RF Analyzer (AF Generator) ..... page 4—107
RF Generator/RF Analyzer (RF Analyzer) ..... page 4—108
RF Generator/RF Analyzer (RF Generator) ..... page 4—111
Service (documented in the service manual) ..... page 4—114
Spectrum Analyzer, Main Controls ..... page 4—115
Spectrum Analyzer, RF Gen Controls ..... page 4—118
Spectrum Analyzer, Marker Controls ..... page 4—120
Spectrum Analyzer, Auxiliary Controls ..... page 4—122
Tests (refer to chapter 10) ..... page 4—125

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Field Types



1. Alphanumeric This field type allows entry of names or titles.

To enter, position the cursor next to a character or edit function, then push the knob to select it. (A list of character and function choices appears in the bottom-right corner of the screen.)

2. Data Entry This field type allows entry of numeric values.

To enter a numeric value, position the cursor next to the field and change the value in one of two ways:

- Key in the value using the DATA keys.
- Push the knob then, turn it to increment or decrement the value.

3. List of Choices This field type allows selection from a list of choices.

To make a selection, position the cursor next to the field and push the knob. A list of choices will appear in the bottom-right corner of the screen. Position the cursor and then push the knob to choose.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

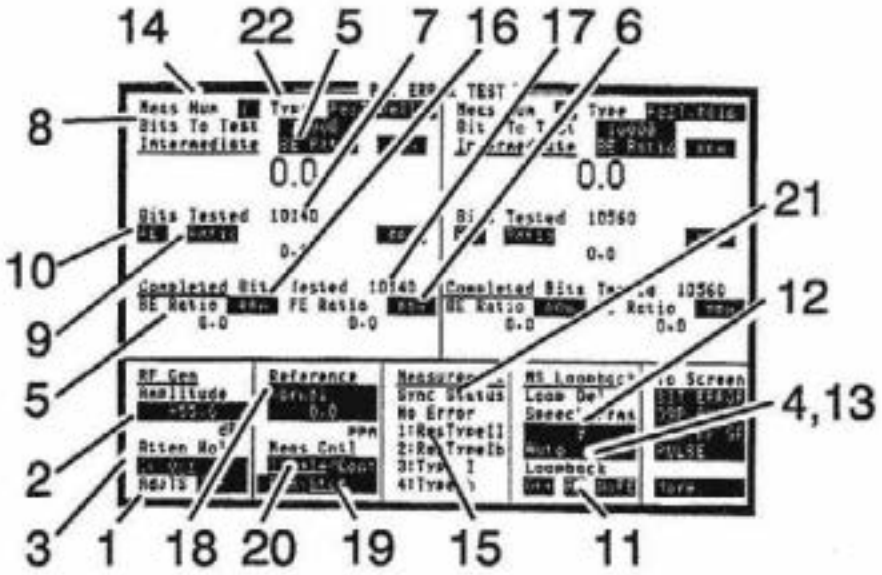
4. Underlined Entry This type of field allows selection between the two labels in the field separated by a slash (/).

To make a selection, position the cursor next to the field and push the knob. The underlined choice is activated.

5. To Screen List This field allows selection of alternate screens. Position the

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Bit Error Test



Each time the Bit Error Test is run, four measurements are made (see Meas Num). Because of limited screen space, only two measurements are displayed at one time. The upper left side of the screen will display measurement 1 or 3, and the upper right side will display measurement 2 or 4. For further information, read the field description for Meas Num.

The test results display area is separated into Intermediate results, which are results obtained during a test, and Completed results, which are results from the last completed test.

1. Adj TS This field selects automatic pulse modulation for the adjacent timeslots.

Choices

- **+30 dB** automatically pulses the adjacent timeslots 30 dB higher than the RF generator amplitude setting.

  The entire preceding timeslot is 30 dB higher. The first few bits of the following timeslot are 30 dB higher. The remainder of the following timeslot is pulsed off.
- **Off** makes all timeslots the same amplitude.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. Amplitude

This field changes the RF generator amplitude. It is a duplicate of the RF generator's Amplitude field on the RF Generator/RF Analyzer screen.

See Also

Screens: RF Generator/RF Analyzer.

3. Atten Hold

This field turns the RF generator's attenuator-hold off or on.

See Also

Screen: RF Generator/RF Analyzer

4. Auto

This field sets the loop delay automatically whenever a bit error test is started.

See also

Screens: Bit Error Test (Speech Frms)

5. BE

These fields select how bit errors will be displayed for both the Intermediate and Completed results.

Choices

- **BE Count** displays the total number of bit errors.
- **BE Ratio** calculates and displays the ratio of bit errors counted to the total number of bits measured (depends on measurement type).

6. Bits Tested (Completed)

This field displays the number of bits that were tested during the last fully completed test.

Bit error tests may extend beyond the number entered in the Bits To Test field so that the last speech frame may be completed.

7. Bits Tested (Intermediate)

This field displays the number of bits that have been tested during a measurement that is currently running. This number includes only bits that are tested by the selected measurement type.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8. Bits To Test

This field selects the number of bits which will be tested. This number includes only bits that are tested by the selected measurement type.

9. Count or Ratio

This field determines how the frame erasures or cyclic-redundancy-check (CRC) errors will be displayed.

Choices

- **Count** displays the number of frame erasures or cyclic-redundancy-check (CRC) errors.
- **Ratio** displays the ratio of frame erasures or cyclic-redundancy-check (CRC) errors to total frames.

See Also

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

10. CRC or FE

These fields determine what data will be displayed.

Choices

- **CRC** displays cyclic-redundancy-check (CRC) errors.
- **FE** displays frame erasures.

See Also

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

11. Loopback

These fields select the loopback mode for the mobile station. When one of these fields is selected, the HP 8922G will attempt to put the mobile station in the described loopback mode.

Choices

- **Off** turns loopback mode off.
- **No FE** turns off frame erasure.
- **FE** selects loopback mode and turns on frame erasure.

See Also

Screens: Cell Control

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

12. Loop Delay Speech Frms

This field is used to enter or display amount of delay (expressed in number of speech frames), before bits are compared. The HP 8922G uses this value to synchronize to the correct received PRBS speech frame. The correct number of speech frames can be determined automatically by making a Bit Error Test using Auto Mode when the bit error ratio is ≈<20% (Bit Error Test Type = All FS). Then, if faster measurements are desired or if the bit error ratio exceeds 20%, change the mode to manual.

See Also

Screens: Bit Error Test (Manual, Auto)

13. Manual

This field allows you to set the loop delay in the upper field.

See Also

Screens: Bit Error (Speech Frms)

14. Meas Num

Use this field to define and display measurements 1 or 3. The right side of the screen allows access to measurements 2 or 4.

15. Measurement 1—4

These fields display a summary of the measurement Type definitions for all measurements 1—4. To change these fields, use the Meas Num and Type fields.

16. %, ppm (BE ratios)

These fields select the units (ppm or %) for BE Ratios. When BE Count is selected, these fields are blank.

See also

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

17. %, ppm (FE or CRC ratios)

These fields allow selection of units for FE or CRC ratios. When FE or CRC count is selected, these fields are blank.

18. Reference

This field selects the HP 8922G internal reference's tuning mode. It is a duplicate of the field found on the Configure screen.

See Also

Screens: Configure

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

19. Run/Stop (Meas Cntl)

Run starts a bit error test. The Speech field in the Cell Control screen will automatically be set to PRBS. Digital Demod will automatically be armed if it was disarmed.

Stop discontinues the bit error test in progress.

20. Single/Cont (Meas Cntl)

Single allows one test to be performed. Cont allows testing to automatically repeat (until Stop is selected).

21. Sync Status

This field displays any errors that occurred while trying to synchronize to the midamble of demodulated data.

- **Bad Sync** appears if a synchronization error happened since the last Demodulation Arm (when Adjust Mode is disabled) or since the last change to Trig Delay (when Adjust Mode is enabled with Demod Arm already selected).

  Possible causes of Bad Sync are:
  - Power was too low.
  - Demodulation trigger too early or too late.
  - FM (bit) errors found while synchronizing to desired midamble.
  - RF overload (increase RF Analyzer Amplitude setting).
- **No Error** appears when no synchronization error occurred.

22. Type

This field selects the type of bit error test results to display. (Res means residual).

Choices

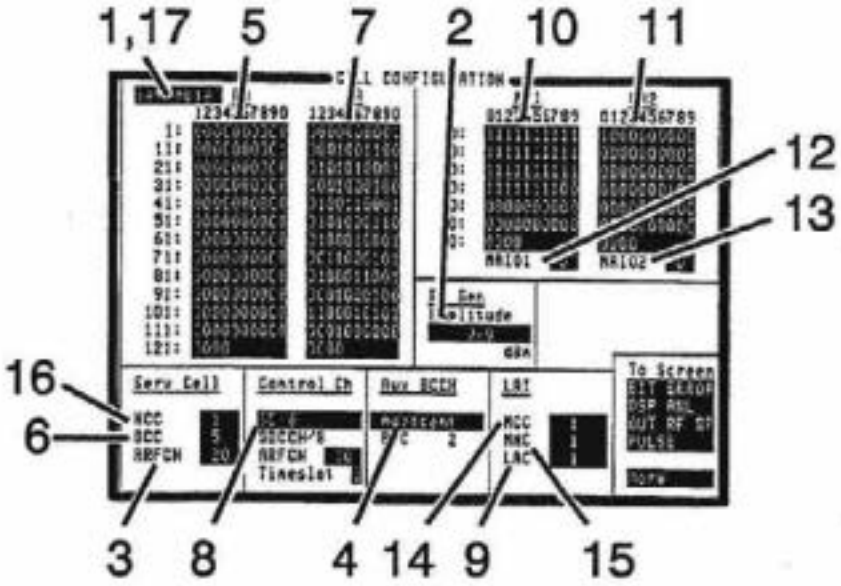
- **TypeIA**
- **ResTypeIA**
- **TypeIB**
- **ResTypeIB**
- **TypeII**
- **ResTypeII**
- **TypeI**
- **ResTypeI**
- **AllFS**
- **ResAllFS**
- **Off**

Note

Intermediate results for measurement type "Off" will return zeros.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cell Configuration



1. Activated When Activated is displayed, the HP 8922G is operating as a base station simulator, and calls can be attempted.

Most settings affecting cell configuration are not settable (cannot be changed) while Activated.

Choices

- **Activated** means that all of the Cell Configuration screen's settings are in use (activated) and cannot be changed. Also, the Hop Control screen functions cannot be changed.
- **Settable** means that most of the settings on this screen can be set. When Settable, the operating state of the HP 8922G is equal to the HP 8922A.

  When the HP 8922G operating state is changed from Settable to Activated, some fields are automatically changed or overwritten. Use the following table to locate the fields that might affect your setup.

Note Some fields are displayed on more than one screen. This list will not show all field locations.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Screen	Field	State
Hop Control	RF Gen, Hop Trig	Arm
Hop Control	RF Anl, Hop Trig	check setting
Hop Control	Hop Address, Address Source	Seq
Hop Control	RF Gen, Settling	Normal
Hop Control	RF Analyzer, Settling	Normal
Hop Control	RF Gen, Hop Mode	Hop
Hop Control	RF Analyzer, Hop Mode	check setting
Hop Control	RF Analyzer, Hop Frequencies Address	0
Hop Control	RF Generator, Hop Frequencies Address	0
Hop Control	Hop Address	0
Hop Control	Hop Address Next	check setting
Digital Demod	Burst Num 0 Burst Type	Depends on Serv Cell BCC
Digital Demod	Burst Num 1 Burst Type	RACH
Digital Demod	Burst Num 2 Burst Type	Depends on Serv Cell BCC
Digital Demod	Burst Num 3 Burst Type	RACH
Digital Demod	Burst Num 0 Trig Qual	RF Power
Digital Demod	Burst Num 1 Trig Qual	RF Power
Digital Demod	Burst Num 2 Trig Qual	Normal
Digital Demod	Burst Num 3 Trig Qual	Normal
Digital Demod	Demod Sync, Burst Sel	Ext
Digital Demod	Demod Trig, Trig Source	Ext Demod
Digital Demod	Demod Arm, State	Arm
Measurement Sync	Meas Sync, Sync Mode	Midamble
Measurement Sync	Meas Sync, Burst Sel	Ext

See Also

Screens: Cell Configuration (`Settable`)

2. Amplitude This field changes the RF generator amplitude. It is a duplicate of the RF Gen Amplitude field on the RF Generator/RF Analyzer screen.

See Also

Screens: RF Generator/RF Analyzer.

3. ARFCN This field sets the absolute RF channel number for the serving cell Broadcast Channel.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Aux BCCH This field allows selection of data and clock outputs.

Choices

- **Off** causes the front-panel MODULATION IN/OUT DATA and CLOCK connectors to be inputs.
- **Adjacent** causes data and clock signals to be output on the front-panel MODUALTION IN/OUT DATA and CLOCK connectors. These signals can be connected to a 0.3 GMSK generator (HP 8657A/B Option 022.) A mobile station should be able to camp on to the Aux BCCH.

  The BCC (Base Station Colour Code) is displayed in this field and has a number plus 1 modulo 4 relationship with Serv Cell BCC.

Note



The data output includes a midamble, which will result in discrete sidebands. If random data is desired, use an HP 8904A Option 001 or 002 to generate random data and clock signals to the 0.3 GMSK generator.

See Also

Connectors and Timing Diagrams: CLOCK (MODULATION)
Connectors and Timing Diagrams: IN/OUT DATA (MODULATION)

5. BA This field is a 124-element Boolean array defining which ARFCNs are in the base station allocation. The serving cell ARFCN does not have to be set to a 1 in this table.

Choices

- **Done** exits the choices menu.
- **Position** moves the cursor to the desired position in the array.
- **0** means the ARFCN is not selected.
- **1** means the ARFCN is selected.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6. BCC This field sets the base-station colour-code portion of the BSIC (base station identity code for the serving cell).

Range

0—7

7. CA This field is a 124-element Boolean array defining which ARFCNs are in the cell allocation table. It is used to define the ARFCNs used in the TCH hop sequence.

Choices

- **Done** exits the choices menu.
- **Position** moves the cursor to the desired position in the array.
- **0** means the ARFCN is not selected.
- **1** means the ARFCN is selected.

8. Control Ch This field selects the control channel organization.

Choices

- **SD/4** selects a broadcast channel with a BCCH + CCCH + SDCCH/4 channel organization. The broadcast channel will be on the physical channel defined under the Serv Cell ARFCN field, timeslot 0.
- **SD/8** selects a broadcast channel with a BCCH + CCCH organization. The SDCCH/8 control channel is defined by the following 2 fields.
  a. SDCCH/8 ARFCN
  b. SDCCH/8 Timeslot
- **FA** (fast associated) sets the control channel to use stolen FACCH frames on the TCH selected on the Cell Control screen. When this choice is made, the BCH will have a BCCH + CCCH channel organization. All call signaling is done on FACCH channels on the TCH.
- **SD/4+FA** selects a BCCH + CCCH + 4 SDCCH/4 broadcast channel. All call signaling is done on FACCH channels on the TCH.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

9. LAC This field is the location-area-code (LAC) portion of the location area identity (LAI).

Range

0—65535

10. MA1 This field is a 64-element Boolean array that defines which cell-allocation absolute radio frequency channel numbers (CA ARFCNs) will be in mobile allocation number 1 (MA1). MA1 defines which of the first 64 entries of 1s in the CA will be part of the sequential hop sequence for MA1.

Choices

- **Done** exits the choices menu.
- **Position** moves the cursor to the desired position in the array.
- **0** does not select an ARFCN from the CA table.
- **1** selects an ARFCN from the CA table.

11. MA2 This field is a 64-element Boolean array that defines which cell-allocation absolute radio frequency channel numbers (CA ARFCNs) will be in mobile allocation number 2 (MA2). MA2 defines which of the first 64 entries of 1s in the CA will be part of the sequential hop sequence for MA2.

Choices

- **Done** exits the choices menu.
- **Position** moves the cursor to the desired position in the array.
- **0** does not select an ARFCN from the CA table.
- **1** selects an ARFCN from the CA table.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

12. MAIO1 This field is the integer mobile-allocation index offset 1 (MAIO1). It offsets the cyclic hop-sequence by the specified number of TDMA frames.

Range

0 through 63

13. MAIO2 This field is the integer mobile-allocation index offset 2 (MAIO2). It offsets the cyclic hop-sequence by the specified number of TDMA frames.

Range

0 through 63

14. MCC This field is the mobile country-code (MCC) portion of the location area identity (LAI).

Range

0—999

15. MNC This field is the mobile network-code (MNC) portion of the location area identity (LAI).

Range

0—99

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

16. NCC This field sets the NCC: PLMN Colour Code portion of the base station identity code (BSIC) for the serving cell.

Range

0 through 7

17. Settable This field, when Settable is displayed, indicates that all Cell Configuration settings can be set or modified.

When the HP 8922G Cell Configuration is changed from Activated to Settable, some fields are automatically changed or overwritten. Use the following table to locate the fields that might affect your setup.

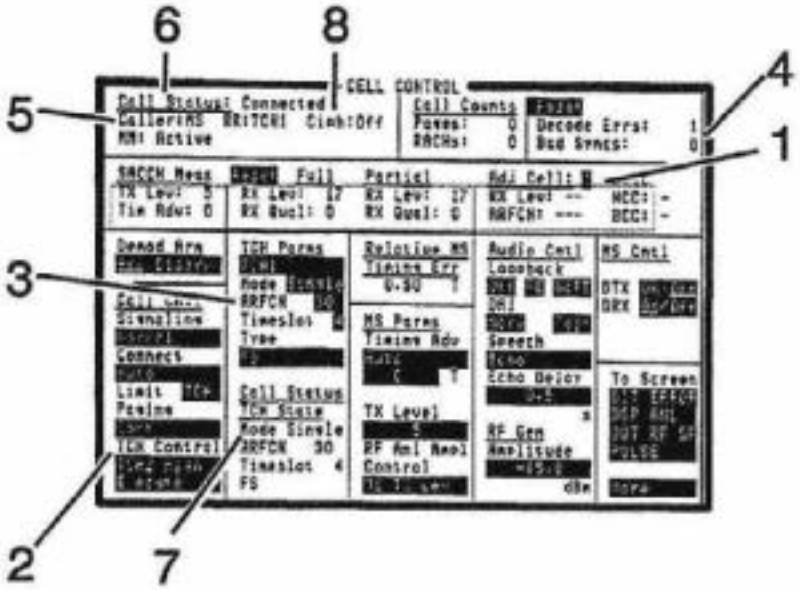
Note 

Some fields are displayed on more than one screen. This list will not show all field locations.

Screen	Field	State
Digital Demod	Demod Arm State	Disarm
Hop Control	RF Gen Hop Trig	Disarm
Hop Control	RF Anl Hop Trig	Disarm
Hop Control	RF Gen Hop Mode	Non-Hop
Hop Control	RF Analyzer Hop Mode	Non-Hop

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cell Control



1. Adj Cell This field selects which adjacent cell SACCH measurement result to display. The adjacent cells are prioritized by power level. 1 is the largest signal.

Range

1 to 6

2. Amplitude This field changes the RF generator amplitude. It is a duplicate of the RF generator Amplitude field on the RF Generator/RF Analyzer screen.

See Also

Screens: RF Generator/RF Analyzer.

3. ARFCN This field selects the ARFCN for TCH1 or TCH2 when the Mode field is set to Single.

Other Settings

- MA1 or MA2 appears in this field when Mode is set to Hopped.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Bad Syncs This field is a count of bad synchronization occurrences during the current call, or since the last reset.

5. Caller This field indicates who initiated the current call.

- MS indicates mobile station initiation.
- BS indicates base station initiation.
- — — indicates status call status is inactive.

6. Call Status This field indicates the state of the current call.

- Inactive
- Setup Request
- Alerting
- Connected
- Disconnect
- Proceeding

7. Call Status TCH State

These fields give information about the current TCH. (If the HP 8922G is not on a TCH yet, these will be blank.)

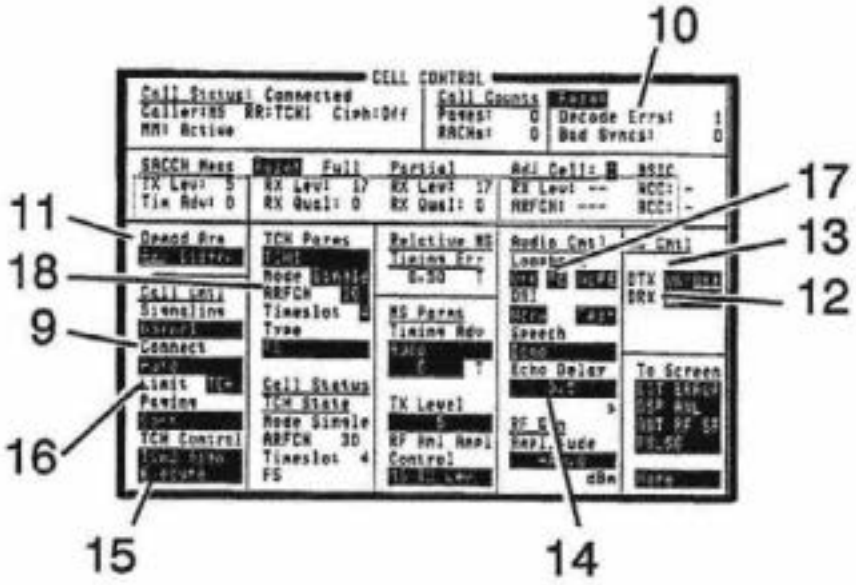
- Mode (Hopped or Single)
- ARFCN (this will be an integer if TCH Mode is single, otherwise MA1 or MA2)
- Timeslot

8. Ciph: This field displays the current Ciphering mode of the mobile station. If Option 005 is installed in the HP 8922G, the Ciphering Mode can be changed using the Ciphering field on the MS INFORMATION/SIGNALING screen.

Choices

- Off (disabled)
- On (enabled)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



9. Connect This field selects how an MS originated call will be connected.

Choices

- **Manual** connection means that a mobile-initiated call must be answered manually using the RCV CALL key.
- **Auto** connection means that a mobile-initiated call will be answered automatically.

10. Decode Errors This field indicates the number of decode errors during the current call or since the last Reset.

11. Demod Arm This field arms or disarms triggering for digital demodulation. It is identical to the Demod Arm State field on the Digital Demod screen.

Important

This field is set to Disarm whenever a measurement screen (DSP Analyzer, Output RF Spectrum, or Pulse) is accessed. When Demod Arm is disarmed, the HP 8922G cannot display information about the uplink. When Demod Arm is re-armed, Cell Control fields that display information about the uplink will resume normal operation.

When Demod Arm is re-armed, measurement results (DSP Analyzer, Output RF Spectrum, Pulse) are lost.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

12. DRX This field turns the discontinuous reception (DRX) mode of the mobile station on or off.

13. DTX This field turns the discontinuous transmission (DTX) mode of the mobile station on or off.

14. Echo Delay This field sets the echo delay when the Speech field is set to Echo mode.

15. Execute This field executes the function selected in the TCH Control field.

16. Limit This field selects what signaling state a call will be limited to.

Choices

- BCCH is the broadcast channel. The instrument will not respond to RACHs.
- DCCH is the dedicated control channel. The instrument will not assign to a TCH.
- TCH is the traffic channel. This is the normal operating mode.

17. Loopback These fields select the loopback mode for the mobile station. When one of these fields is selected, the HP 8922G will attempt to put the mobile station in the described loopback mode.

Choices

- **Off** turns loopback mode off.
- **No FE** turns on loopback with no frame erasure.
- **FE** turns on loopback with frame erasure.

18. MA1, MA2 This field selects which MA table on the Cell Config screen will be used by the TCH selected when the Mode field is set to Hopped.

Choices

- MA1 selects the MA1 table for frequency hopping.
- MA2 selects the MA2 table for frequency hopping.

Other Settings

- ARFCN appears in this field when Mode is set to Single.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



19. MM This field displays the latest events from the Mobility Management sublayer.

- **Loc Upd**
- **Ident**
- **Auth**
- **TMSI**
- **Inactive**
- **Active**

20. Mode This field selects the mode for the traffic control channel selected in the TCH Parms field.

Choices

- **Single** selects a single ARFCN.
- **Hopped** selects a hopped traffic control channel using an MA table.

See Also

Screens: Cell Config (**MA1**)
Screens: Cell Config (**MA2**)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

21. Norm

This field uses the digital-audio interface (DAI) to select the normal operating mode for the mobile station.

22. Pages

This field indicates the number of pages made since the last Reset.

23. Paging

This field selects the paging mode.

Choices

- **Single** pages just once when attempting to make a call.
- **Cont** pages continuously until a connection is made.

24. PRBS Pattrn

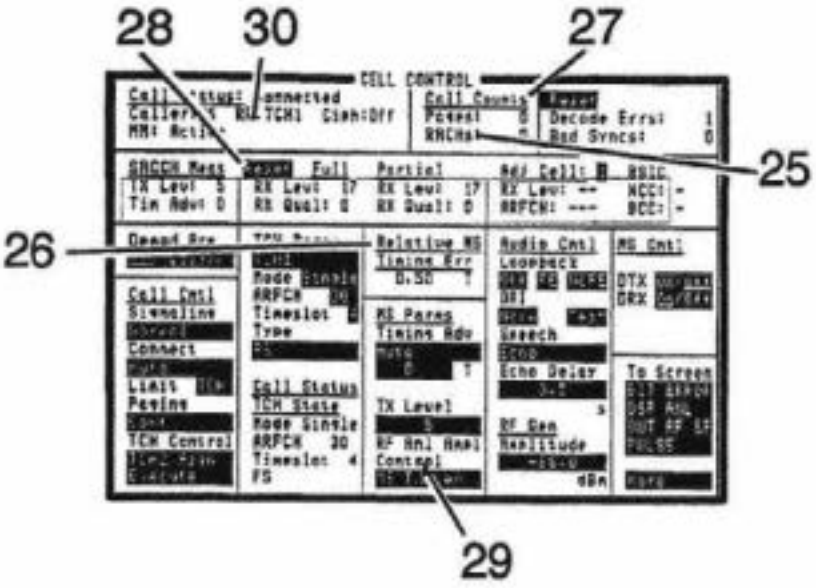
This field allows you to choose from 6 different bit patterns. The HP 8922G will send the selected sequence to a mobile station. The mobile station must be in loopback mode (see Loopback field description) to return the bit sequence for bit error testing.

This field is displayed only when PRBS is selected in the Speech field.

Choices

- **CCITT-15** ($2^{15} - 1$ bit pseudo-random pattern, see CCITT Rec. 0.151)
- **CCITT-23** ($2^{23} - 1$ bit pseudo-random pattern, see CCITT Rec. 0.151)
- **0** (all zeros)
- **1** (all ones)
- **01** (alternating 0,1)
- **10** (alternating 1,0)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



25. RACHs This field indicates the number of RACHs received during the current call or since the last Reset.

26. Relative MS Timing Err

This field displays the length of time between when the HP 8922G expected the uplink burst to arrive and the time it actually arrived.

Timing error measurements on the uplink burst are made from the center of bit 0, and are relative to the default trigger delay value of 473.4 T (see Measurement Sync, Trigger Delay).

The HP 8922G normally expects the uplink burst 468.75 bit periods after the beginning of the downlink burst. The trigger delay's default value of 473.4 T reflects an additional HP 8922G delay of 4.65 T (468.75 + 4.65 = 473.4 T).

The accuracy of this measurement is ±0.25 T. For more accurate measurements, refer to DSP Analyzer, Data Bits, First Bit.

See Also

Screens: DSP Analyzer: Data Bits (First Bit)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

27. Reset (Call Counts)

This field clears out the counts of pages, RACHs, synchronization, and decode errors detected.

28. Reset (SACCH Meas)

This field clears-out all of the SACCH measurements.

29. RF Anl Ampl Control

This field selects control of the RF analyzer's amplitude setting field.

Choices

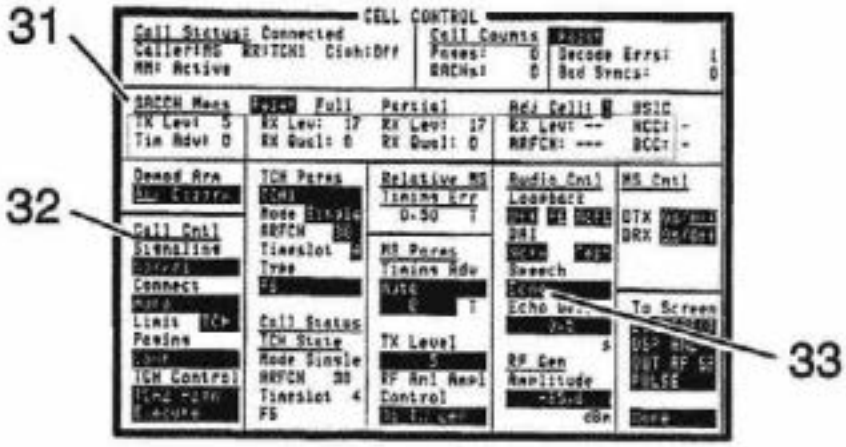
- **MS TX Lev** automatically sets the RF analyzer's amplitude setting based on the TX Level field.
- **Manual** requires manual setting of the RF analyzer's amplitude.

30. RR

This field displays the currently established logical channel as indicated by the Radio Resource sublayer.

- **BCCH** indicates that a broadcast channel is being transmitted, and the HP 8922G is ready to receive a RACH.
- **DCCH** indicates that a control channel is established. The physical channel organization depends on the Control Channel setting (see Cell Configuration screen).
- **TCH1** indicates that a traffic channel is established using the parameters from a TCH1 setup (see TCH Parms, Cell Control screen).
- **TCH2** indicates that a traffic channel is established using the parameters from a TCH2 setup (see TCH Parms, Cell Control screen).
- **None** is displayed when the instrument mode is Settable (see Cell Configuration screen).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



31. SACCH Meas These fields indicate the measurement results of a slow associated control channel measurement.

- TX Lev indicates the mobile station's reported transmitter power level.
- Tim Adv is the mobile station's reported timing advance.
- **Full** RX Lev is the mobile station's received level of power from the serving cell using the Full measurement method.
- **Full** RX Qual is the mobile station's received quality of signal from the serving cell using the Full measurement method.
- **Partial** RX Lev is the mobile station's level of power from the serving cell using the Partial measurement method.
- **Partial** RX Qual is the mobile station's received quality of signal from the serving cell using the Partial measurement method.
- **Adj Cell** RX Lev is the reported level of power of the adjacent cell selected in the Adj Cell field.
- **Adj Cell** ARFCN is the absolute radio frequency channel number of the adjacent cell selected in the Adj Cell field.
- **BSIC** NCC reads the NCC: PLMN Colour-Code portion of the base station identity code (BSIC) of the adjacent cell selected in the Adj Cell field.
- **BSIC** BCC reads the BCC: Base Station Colour-Code portion of the base station identity code (BSIC) of the adjacent cell selected in the Adj Cell field.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

32. Signaling

Choices

- **Normal** will cause the call to follow the normal GSM recommended signaling to make a call.
- **Limited** will eliminate normal call signaling and force an immediate transition to the final channel configuration permitted by the Limit field.

33. Speech

This field selects the speech mode.

Choices

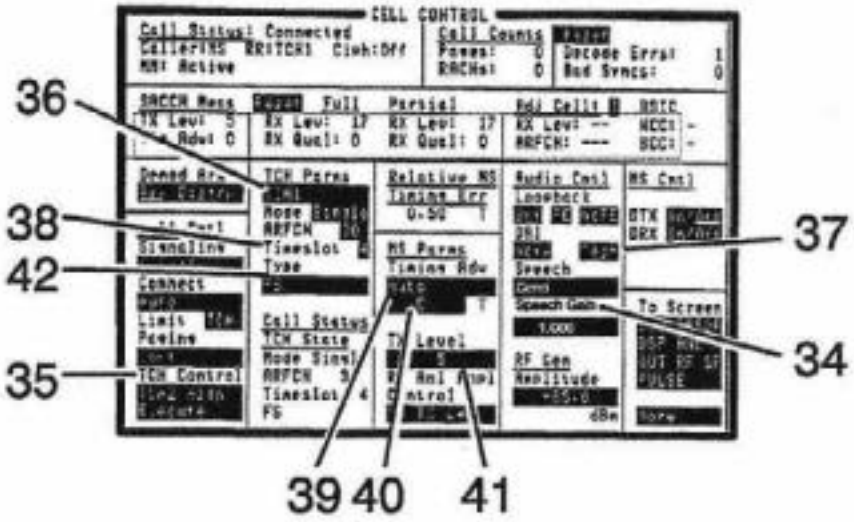
- **None**
- **Uncond** (unconditioned) activates the MODULATION IN AM/SPEECH connector on the front panel, but the speech signal is not conditioned by filters, and no gain control is provided.
- **Cond** (conditioned) activates the MODULATION IN AM/SPEECH connector on the front panel and conditions speech through filters. Gain control is available in the Speech Gain field.

  DCAM must be off when Cond is selected. See Screens, RF Generator/RF Analyzer.

  To hear the demodulated audio from the mobile station, go to the CW Meas/AF Analyzer screen. Under AF Analyzer In, select SpeechOut. The audio signal will also be available at the Demodulation Out Mon/Speech Out connector.
- **Echo** causes the HP 8922G to send back to the mobile station the speech that the HP 8922G receives. The echo delay is the additional delay the HP 8922G inserts before sending back speech to a mobile station.
- **PRBS** generates a pseudo random bit sequence which is used for making bit error tests. When selected, a field called PRBS Pattrn is displayed (refer to PRBS Pattrn field description).

  PRBS is selected automatically when Run is selected on the Bit Error Test screen.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



34. Speech Gain This field sets the amplification of the Cond speech mode.

35. TCH Control This field selects traffic-channel control type.

Choices

- **TCH1 HO** selects an intercell handover based on the TCH1 parameter selections.
- **TCH2 HO** selects an intercell handover based on the TCH2 parameter selections.
- **TCH1 Asgn** selects a traffic channel assignment based on the TCH1 parameter selections.
- **TCH2 Asgn** selects a traffic channel assignment based on the TCH2 parameter selections.

36. TCH Parms This field selects which traffic channel parameter settings to display.

Choices

- **TCH1** displays traffic channel 1 settings.
- **TCH2** displays traffic channel 2 settings.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

37. Test

This field tells the mobile station to select the "Test of acoustic devices and A/D and D/A" mode. This is done over the digital-audio interface (DAI).

38. Timeslot

This field selects the timeslot for the traffic channel selected in the TCH Parms field.

Range

2 through 6

39. Timing Advance (mode)

This field selects the timing advance mode.

Choices

- **Manual** allows manual setting of the MS timing advance.

  When Manual is selected, the mobile station's timing advance can be changed by entering a number in the Timing Advance (number) field. The mobile station's current timing advance, displayed in the SACCH Meas Tim Adv field, should match the Timing Advance number.
- **Auto** automatically calculates and sets MS timing advance.

40. Timing Advance (number)

This field sets the MS's timing advance.

Range

0 through 63

41. TX Level

This field selects the transmitter power for the mobile station to use.

Range

0 through 15

42. Type

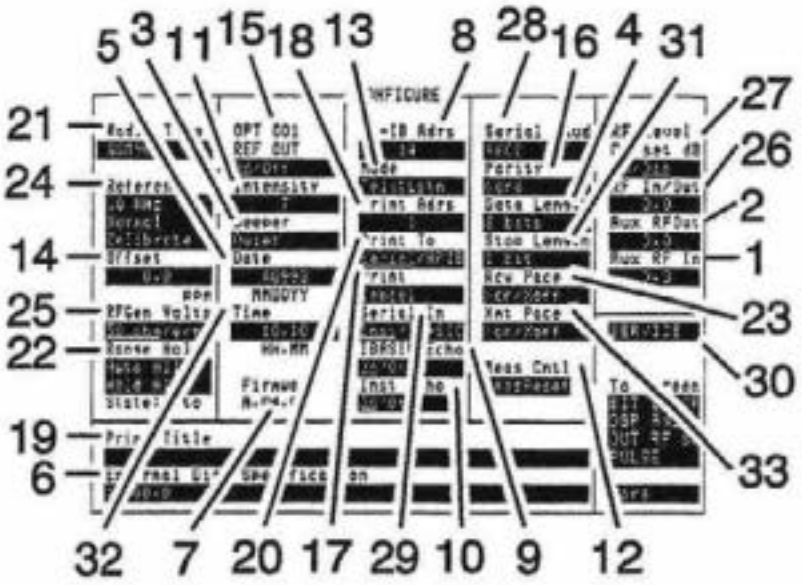
This field selects the traffic channel type for the TCH selected in TCH Parms.

Choices

- FS Full rate speech.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Configure



1. Aux RF In This field is used to indicate losses or gains between the AUX RF IN port and the device under test.

Enter a **positive** value to indicate a gain (such as an amplifier). The Spectrum Analyzer Marker Level (`Lvl`), CW Power, PK TX Power and Fast TX Carrier Power measurements are automatically reduced. (The Spectrum Analyzer `Ref Level` is automatically decreased, so the trace position does not appear to change.)

Enter a **negative** value to indicate a loss (such as cable loss). The Spectrum Analyzer Marker Level (`Lvl`), CW Power, PK TX Power and Fast TX Carrier Power measurements are automatically increased. (The Spectrum Analyzer `Ref Level` is automatically increased, so the trace position does not appear to change.)

This field is only used when the `RF Level Offset` field is set to `On`.

See Also

`RF Level Offset`

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. Aux RF Out

This field is used to indicate losses or gains between the AUX RF OUT port and the device under test.

- Enter a **positive** value to indicate a gain (such as an amplifier gain). The RF Generator level is automatically set that amount *below* what is indicated in the RF Generator's `Amplitude` field. (Example; if this value is 10 dB, and the `Amplitude` field shows 0 dBm, the actual level out this port is −10 dBm.) The value at the output of the external amplifier should then be at the level indicated in the `Amplitude` field.
- Enter a **negative** value to indicate a loss (such as cable loss). The RF Generator level is automatically set that amount *above* what is indicated in the RF Generator's `Amplitude` field to compensate. The value at the opposite end of the cable (loss) should then be at the level indicated in the `Amplitude` field; unless the resulting RF Generator setting exceeds the maximum output level, then an error occurs - `Input value out of range.` In that case, reduce the `Aux RF In` setting, or decrease the `Aux RF Out` value.

This field is only used when the `RF Level Offset` field is set to `On`.

3. Beeper

This field controls the beeper volume.

Choices

- Off
- Quiet
- Loud

4. Data Length

This field sets the Serial Port word length.

Choices

- 7 bits
- 8 bits

5. Date

This field sets the date for the internal calendar. The Date can be read by a controller using HP-IB, then printed on test results.

6. External Disk Specification

This field sets the external disk address used by the Tests screen's Location field when it is set to Disk.

See Also

Keys: Tests

7. Firmware

This field displays the firmware revision number for the current firmware.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8. HP-IB Adrs This is the HP-IB address entry field.

Range

0 to 30.

9. IBASIC Echo This field turns IBASIC echo on or off. When IBASIC Echo is on, non-graphic characters printed to the HP 8922G display during a "Print-to-Screen" operation, will also be printed to a PC terminal.

10. Inst Echo This field turns instrument echo on or off. When Inst Echo is set to on, IBASIC commands entered into the HP 8922G through a computer

or ASCII RS-232 terminal will appear on both the HP 8922G screen and the terminal.

11. Intensity This is the CRT intensity adjustment field.

Range

1 to 8.

12. Meas Reset (Meas Cntl)

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

- HI LIMIT
- LO LIMIT
- AVG

See Also

Keys: HI LIMIT, LO LIMIT, AVG

13. Mode This field selects the remote, HP-IB operation mode.

Choices

- **Talk&Lstn** sets the instrument to normal HP-IB operation.
- **Control** turns the instrument into the HP-IB controller.

14. Offset This field sets the reference frequency offset in parts-per-million (ppm).

15. OPT 001 REF OUT This field turns the optional high stability timebase on or off (when installed).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

16. Parity

This field selects parity for the rear panel serial port.

Choices

- None
- Odd
- Even
- Always 1
- Always 0

17. Print

This field cancels printing.

See Also

Keys: Print

18. Print Adrs

This field sets the HP-IB print address.

Range

0 to 30

19. Print Title

This field is used to enter a title, up to 50 characters, to be printed at the top of all screen printouts.

Choices

- **Done**
- **Position** moves the cursor to any position in the title block.
- **Over/Ins** When the cursor is blinking, you are in insert mode.

  when the cursor is not blinking, you are in typeover mode.
- **Delete** erases the character at the cursor.
- **Del End** erases all the characters from the cursor position to the end of the string (including the character at the cursor).
- **Bk Space** erases the characters in the space previous to the cursor.
- Upper and lower case letters: A through Z.
- Numerals: 0 through 9
- Special characters: space _ " # $ % & ' ( ) * + , - . / : ; < = > ? @ [\ ] ^ ` { | } ~

20. Print To

This field selects the printer port bus to print to, either serial or HP-IB.

21. Radio Type

This field selects the type of radio to be tested.

Choices

- GSM900
- DCS1800

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

22. Range Hold

This field selects the ranging mode for the AF analyzer and the spectrum analyzer.

Choices

- **Auto All** selects auto ranging.
- **Hold All** selects range hold, allowing manual setting of spectrum analyzer input attenuation and AF Analyzer gain control.

See Also

Screens: Spectrum Analyzer (`Input Atten`)
Screens: CW Meas/AF Analyzer (`Gain Cntl`)

23. Rcv Pace

This field is used to select if data will be paced through the serial port.

Choices

- **None** disables the Xon/Xoff function
- **Xon/Xoff** sets ASCII control codes Xon and Xoff to start and stop data transmission from the computer to the instrument.

24. Reference

This field selects the external reference frequency that the instrument locks to, and sets the reference tuning mode.

Choices

- 13 MHz
- 10 MHz
- 5 MHz
- 2 MHz
- 1 MHz
- **Normal** locks the instrument to the external reference frequency selected.
- **Tunable** enables the instrument to adjust its internal frequency reference. Frequency adjustment is relative to an external reference which the internal reference is calibrated to.
- **Calibrate** calibrates the internal reference to the external reference for use in Tunable mode.

25. RFGen Volts

This field selects between 50 ohm and emf voltage units for the RF generator amplitude settings.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

26. RF IN/Out

This field is used to indicate losses or gains between the RF IN/OUT port and the device under test.

- Enter a **positive** value to indicate a gain (such as an amplifier gain). When the RF IN/OUT port is used as an output, the RF Generator level is automatically set that amount *below* what is indicated in the RF Generator's `Amplitude` field. (Example; if this value is 10 dB, and the `Amplitude` field shows 0 dBm, the actual level out this port is −10 dBm.)

  When this port is used as an input, the CW Power, PK TX Power, Fast TX Carrier Power measurements, and Spectrum Analyzer Marker Level (`Lvl`), are automatically *reduced*.

- Enter a **negative** value to indicate a loss (such as cable loss). The RF Generator level out this port is automatically set that amount *above* what is indicated in the RF Generator's `Amplitude` field to compensate.

  When used as an input, the CW Power, PK TX Power, Fast TX Carrier Power measurements, and Spectrum Analyzer Marker (`Lvl`), are *increased*.

This field is only used when the `RF Level Offset` field is set to `On`.

27. RF Level Offset

This field enables/disables the effects of the `RF In/Out`, `Aux RFOut`, and `Aux RF In` fields below it.

- When set to `Yes`, the RF Generator amplitude and RF Analyzer power measurement are offset by the values entered in these fields.
- When set to `Off`, the values in these fields are ignored.

See Also

`Aux RF In`
`Aux RFOut`
`RF In/Out`

28. Serial Baud

This field sets the baud rate for serial port.

Choices

- 300
- 600
- 1200
- 2400
- 4800
- 9600
- 19200

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

29. Serial In This field configures the serial port (Inst) communication to the serial input port or IBASIC control of the serial input port.

- **Inst** configures the serial port to connect to an external ASCII RS-232 terminal or computer.
- **IBASIC** allows the IBASIC controller to read the serial port.

30. SERVICE This field in the To Screen list is only present on the Configure screen. It allows access to the Service screen.

31. Stop Length This field sets the number of stop bits used for serial communication.

Choices

- 1 bits
- 1.5 bits
- 2 bits

32. Time This field sets the internal instrument clock.

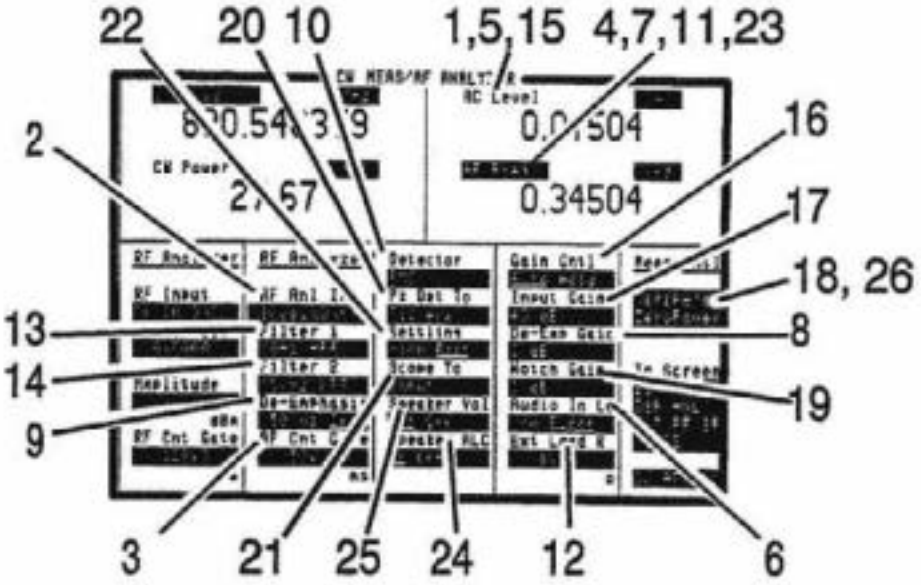
33. Xmt Pace This field is used to select if data will be paced through the serial port.

Choices

- **None** disables the Xon/Xoff function.
- **Xon/Xoff** sets ASCII control codes Xon and Xoff to start and stop the instrument from transmitting to the computer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CW Meas/AF Analyzer (AF Analyzer)



1. AC Level This field displays the measured ac level of the AF analyzer input (AF Anl In) when Audio Out, Pls Demod, Audio In, Speech In, Speech Out, or Scope In is selected as the input.

See Also

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

2. AF Anl In This field selects the AF analyzer input.

Choices

- **Scope In** selects the SCOPE IN (MEASURE) front-panel connector.
- **Speech Out** selects the signal going to the MON/SPEECH (DEMODULATION OUT) front-panel connector.
- **AM Mod In** selects the IN AM/SPEECH (MODULATION) front-panel connector.
- **Speech In** selects the IN AM/SPEECH (MODULATION) front-panel connector.
- **FM Demod** selects the FM demodulation discriminator.
- **Pls Demod** selects the pulse demodulation detector.
- **Audio In** selects the IN (AUDIO) front-panel connector.
- **Audio Out** selects the signal going to the AUDIO OUT front-panel connector.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. AF Cnt Gate

This field sets the frequency counter's gate time.

Range

0.01 seconds to 1 second.

4. AF Freq

This field selects the type of measurement to be made on the input signal. The input signal to be measured is selected in the AF Anl In field.

Choices

- **AF Freq** measures the audio frequency.
- **DC Level** measures the dc level.
- **Distn** measures the distortion.
- **SINAD** measures SINAD.

See Also

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

5. AM Depth

This field displays the measured AM depth of the AF analyzer input (AF Anl In) when AM Mod In is selected as the input.

6. Audio In Lo

This field sets the reference for the Audio In Lo BNC connector. The choices are Float or Gnd.

7. DC Level

This field selects the type of measurement to be made on the input signal. The input signal to be measured is selected in the AF Anl In field.

Choices

- **AF Freq** measures the audio frequency.
- **DC Level** measures the dc level.
- **Distn** measures the distortion.
- **SINAD** measures SINAD.

See Also

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8. De-Emp Gain

This field sets the gain of the AF analyzer de-emphasis filter. If Gain Cntl is set to Auto, the value selected in this field may be overwritten.

Choices

- 0 dB
- 10 dB
- 20 dB
- 30 dB

9. De-Emphasis

This field selects the 750 μs de-emphasis filter or turns off de-emphasis.

10. Detector

This field selects the Detector used for AF analyzer measurements.

Choices

- **RMS** selects the root-mean-square detector.
- **Pk+** selects the positive peak detector.
- **Pk–** selects the negative peak detector.
- **Pk+–/2** selects the peak average detector.
- **Pk+–Max** selects the maximum peak detector.
- **Pk+ Hold** selects the positive peak hold detector.
- **Pk– Hold** selects the negative peak hold detector.
- **Pk+–/2 Hd** selects the average peak hold detector.
- **Pk+–Mx Hd** selects the maximum peak hold detector.

11. Distn

This field selects the type of measurement to be made on the input signal. The input signal to be measured is selected in the AF Anl In field.

Choices

- **AF Freq** measures the audio frequency.
- **DC Level** measures the dc level.
- **Distn** measures the distortion.
- **SINAD** measures SINAD.

See Also

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

12. Ext Load R This field sets the AF analyzer external load resistance for displaying AF analyzer measurement results in Watts.

Range

0.1 ohm to 1 megohm.

13. Filter 1 This field selects the high-pass filter at the AF analyzer input.

Choices

- <20Hz HPF
- 50Hz HPF
- 300Hz HPF

14. Filter 2 This field selects the low-pass filter at the AF analyzer input.

Choices

- 300Hz LPF
- 3kHz LPF
- 15kHz LPF
- >99kHz LP

15. FM Deviation This field displays the measured FM deviation of the AF analyzer input (AF Anl In) when FM Demod is selected as the input.

16. Gain Cntl This field selects the AF analyzer gain control. When Auto is selected, gain is set automatically, based on audio level. When Hold is selected, gain values can be set manually.

17. Input Gain This field sets the gain of the AF analyzer input when Gain Cntl is set to Hold. If Gain Cntl is set to Auto, the value selected in this field may be overwritten.

Choices

- 0 dB
- 20 dB
- 40 dB

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

18. Meas Reset (Meas Cntl)

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

- HI LIMIT
- LO LIMIT
- AVG

This field resets the AF Analyzer measurements.

See Also

Keys: HIGH LIMIT, LO LIMIT, AVG

19. Notch Gain

This field sets the gain of the AF analyzer notch when Gain Cntl is set to Hold. If Gain Cntl is set to Auto, the value selected in this field may be overwritten.

Choices

- 0 dB
- 10 dB
- 20 dB
- 30 dB
- 40 dB

20. Pk Det To

This field selects whether the de-emphasis filter is used when making measurements using a peak detector.

Choices

- **De-Emp** Places the de-emphasis filter in the signal path for peak-detected measurements.
- **Filters** Measurements are made without the de-emphasis filter.

21. Scope To

This field selects the oscilloscope measurement point. It allows you to look at the signal at different points in the AF analyzer signal path. Except for the Input setting, all Scope To choices are

ac-coupled. Use the **Input** setting to provide dc-coupling if the signal to be measured is $\leq$20 Hz.

Choices

- **Input** selects the analyzer input.
- **Filters** selects a point immediately following the filters.
- **De-Emp** selects a point immediately following the de-emphasis filter.
- **Notch** selects a point immediately following the notch filter.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

22. Settling This field selects the AF analyzer detector Settling. Slow is used for low-frequency audio measurements ≤200 Hz. Fast is used for higher-frequency audio measurements >200 Hz.

23. SINAD This field selects the type of measurement to be made on the input signal. The input signal to be measured is selected in the AF Anl In field.

Choices

- **AF Freq** measures the audio frequency.
- **DC Level** measures the dc level.
- **Distn** measures the distortion.
- **SINAD** measures SINAD.

See Also

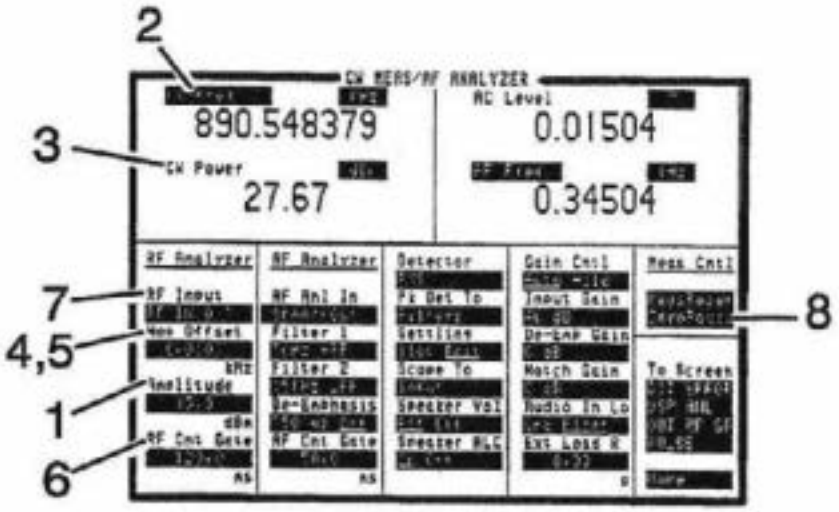
Keys: ON/OFF, HI LIMIT, LO LIMIT, REF SET, AVG, METER, Units

24. Speaker ALC This field selects the Speaker ALC mode. On maintains the speaker output at a constant amplitude for audio signals/tones of different levels. Off allows the audio signal/tone level to determine the speaker output.

25. Speaker Vol This field turns the Speaker Volume off or directs control to the front-panel volume control. Pot selects front-panel volume control knob. Off turns the speaker off.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CW Meas/AF Analyzer (CW Meas)



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

Range

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

See Also

Screens: RF Analyzer/RF Generator

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. CW Freq, CWFreqErr

This field selects the type of measurement to be made on the signal at the RF input. This measurement is valid only for non-pulsed signals.

Choices

- **CW Freq** displays the measured frequency.
- **CWFreqErr** displays the measured frequency error relative to the continuous wave frequency set in the RF Analyzer's Frequency field.

See Also

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

3. CW Power

This field displays the measured CW power. This measurement is valid only for non-pulsed signals at the front-panel RF IN/OUT connector. This measurement is made at the frequency entered in the Frequency field.

See Also

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Frequency

This field sets the RF analyzer's input frequency when the RF analyzer's Hop Mode is Non-Hop. This field is displayed only when the RF analyzer's Hop Mode is Non-Hop.

Range

10.0 to 1015.0 MHz.

5. Hop Offset

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

Range

−50.000 to +50.000 kHz.

6. RF Cnt Gate

This field sets the frequency counter's gate time.

Range

0.11 seconds to 1 second.

7. RF Input

This field selects the front-panel RF input for the RF analyzer.

Choices

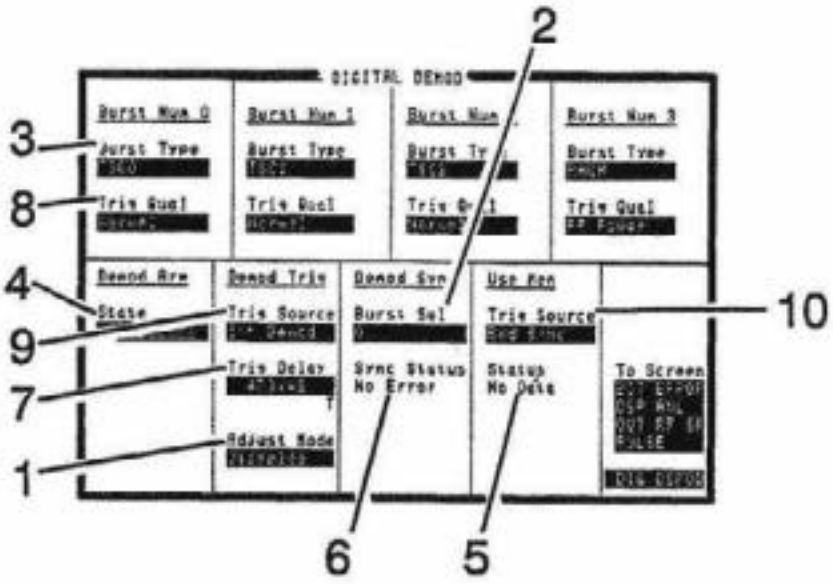
- RF IN/OUT
- AUX RF IN

8. ZeroPower (Meas Cntl)

This field zeros the power meter. RF power must be disconnected from the RF IN/OUT port when executing this function.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital Demod



1. Adjust Mode The field enables or disables adjust mode.

Choices

- **Enabled** allows Trig Delay to be changed even while digital demodulation is armed. Some demodulation triggers may be missed when changing Trig Delay with Adjust Mode enabled.
- **Disabled** allows Trig Delay to be changed only when State is set to Disarm.

2. Burst Sel This field selects the burst number that digital demodulation will synchronize to. This field cannot be changed when State is set to Arm.

Choices

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

See Also

Connectors: System Bus

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Burst Type

This field selects the burst type for demodulation synchronization.

This field cannot be changed when State is set to arm.

Choices

- **TSC0** through **TSC7**, training sequence codes, are used for normal bursts.
- **RACH**, random access channel, is used for access bursts.
- **SCH**, synchronization channel, is used for synchronization bursts.
- **FCH**, frequency channel, is used for frequency correction bursts. *This burst type is not supported at this time.*
- **User Def**, user defined, is used for user defined bursts. *This burst type is not supported at this time.*

4. State

This field arms or disarms triggering for digital demodulation.

5. Status (Use Mem)

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

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

See Also

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

6. Sync Status

This field shows if a synchronization error happened since the last demodulation arm (when Adjust Mode is disabled) or since the last change to Trig Delay (when Adjust Mode is enabled with demodulation arm already selected).

See Also

Making Measurements: If You Have Problems with a Measurement

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7. Trig Delay

This field sets the time delay between a valid trigger event and the digital demodulation.

Trig Delay can only be changed under the following conditions:

1. State is set to Disarm.
2. Adjust Mode is set to Enabled.

Range

0 to 5000.000000 μs.

8. Trig Qual

This field selects the type of trigger qualifier the digital demodulator will use.

Choices

- **Normal,** no trigger qualifier is used.
- **RF Power,** trigger events will only be valid when RF power is detected at the selected input.

9. Trig Source (Demod Trig)

This field selects the source of the trigger for digital demodulation. This field cannot be changed when State is set to Arm. When Activated (see Screens: Cell Configuration), triggers for digital demodulation are generated internally.

Choices

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

10. Trig Source (Use Mem)

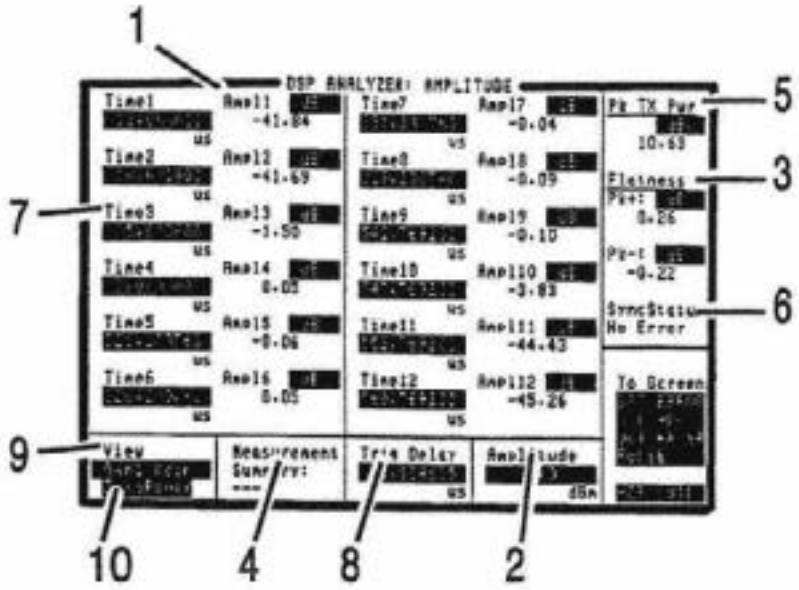
This field selects the source of the trigger for Use Mem. When Use Mem is triggered, demodulated data is captured in memory.

Choices

- **Bad Sync** causes demodulated data to be stored when Sync Status becomes Bad Sync.
- **External** causes demodulated data to be stored using the rear-panel system bus connector. USE_MEM_EXT_TRIG is high and a valid demodulation trigger is received.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP Analyzer: Amplitude, Ampl Main View



1. Ampl1—12 These fields display the amplitude measured on the amplitude envelope at the corresponding time set in the Time1-12 field.

See Also

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

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

Range

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

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Flatness

This field displays the positive and negative amplitude peaks relative to the average power over the useful bits in the measured burst.

- Pk+ is the positive amplitude peak, relative to the average power.
- Pk– is the negative amplitude peak, relative to the average power.

See Also

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

4. Measurement Summary

This field displays whether HI/LO limits set for the measurement display fields, (Ampl1-12 and flatness) were exceeded in the last measurement.

See Also

Making Measurements: Solving Problems, Messages

5. Pk TX Pwr

This field displays the average transmitted power over the useful bits in the measured burst. It is measured from the center of the first useful bit to the center of the last useful bit. This measurement is only available when using the RF IN/OUT port.

See Also

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

6. SyncStatus

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

See Also

Making Measurements: Solving Problems
Messages

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7. Time1-12

These fields select the time (relative to the center of bit zero) the amplitude will be measured on the amplitude envelope. Bit zero is the first useful bit in the measured burst.

Range

−50.0 to +593.0 μs.

8. Trig Delay

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

Range

0 to 5000.000000 μs.

9. View

This field selects alternate views of the measurement.

Choices

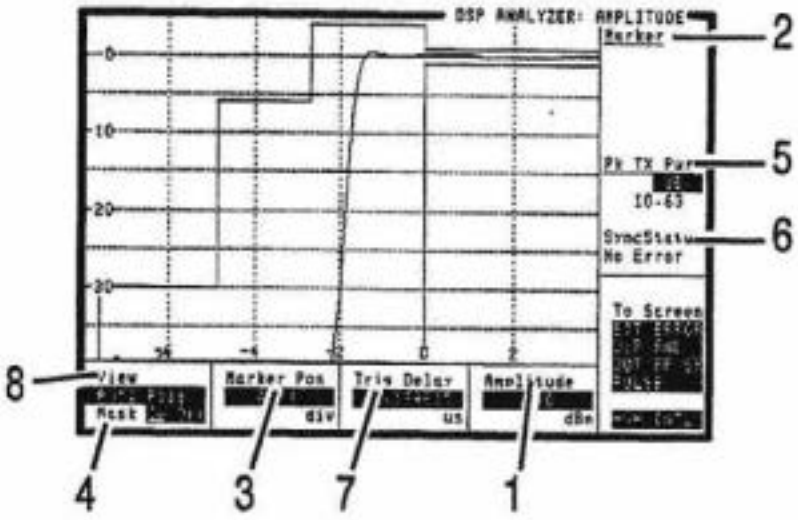
- Phase Main
- Phase Err
- Ampl Main
- Ampl Rise
- Ampl Mid
- Ampl Fall
- Data Bits

10. ZeroPower

This field zeros the power meter. RF power must be disconnected from the RF IN/OUT port when executing this function.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP Analyzer: Amplitude, Ampl Rise View



This view displays the rising portion of the amplitude envelope with the amplitude mask superimposed. The vertical range is −40 to +5 dB. The horizontal range is −8 to +4 bit periods.

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

Range

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

See Also

Screens: RF Generator/RF Analyzer RF Analyzer

2. Marker These fields display the time and level at the current marker position.

3. Marker Pos This field sets the marker position. The marker position is settable in units of division (div) only.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Mask This field turns the amplitude mask on or off.

5. Pk TX Pwr This field displays the average power over the useful bits in the measured burst. It is measured from the center of the first useful bit to the center of the last useful bit.

See Also

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

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

See Also

Making Measurements: Solving Problems, Messages

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

Range

0 to 5000.000000 μs.

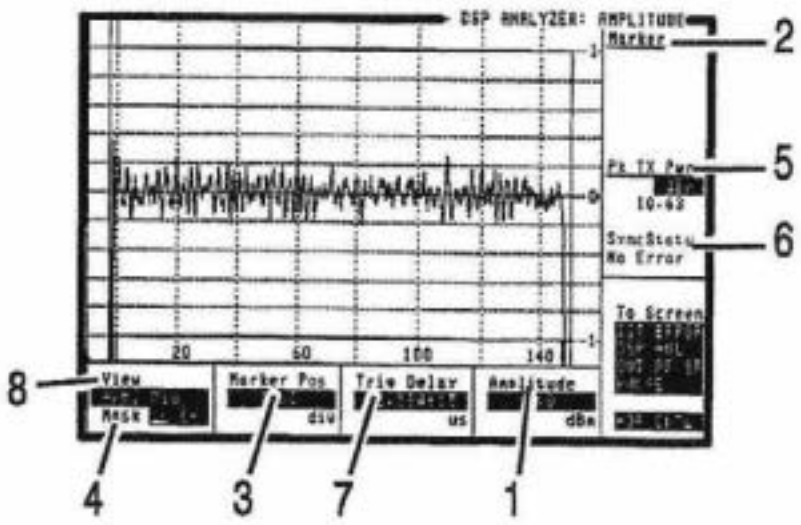
8. View This field selects alternate views of the measurement.

Choices

- Phase Main
- Phase Err
- Ampl Main
- Ampl Rise
- Ampl Mid
- Ampl Fall
- Data Bits

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP Analyzer: Amplitude, Ampl Mid View



This view displays the middle portion of the amplitude envelope with the amplitude mask superimposed. The vertical range is −1.2 to +1.2 dB. The horizontal range is −10 to +160 or −6 to +96 bit periods depending on the burst type.

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

Range

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

See Also

Screens: RF Generator/RF Analyzer (RF Analyzer)

2. Marker These fields display the time and level at the current marker position.

3. Marker Pos This field sets the marker position. The marker position is settable in units of division (div) only.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Mask This field turns the amplitude mask on or off.

5. Pk TX Pwr This field displays the average power over the useful bits in the measured burst. It is measured from the center of the first useful bit to the center of the last useful bit. This measurement is only available when using the RF IN/OUT port.

See Also

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

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

See Also

Making Measurements: Solving Problems
Messages

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

Range

0 to 5000.000000 μs.

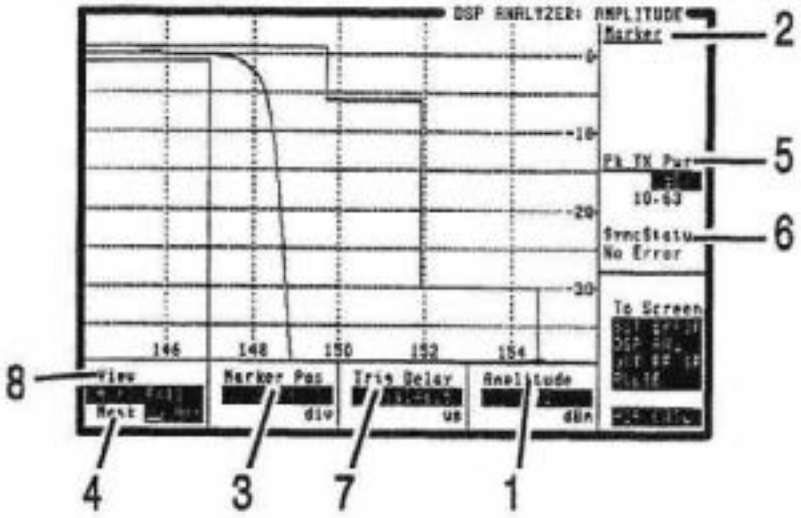
8. View This field selects alternate views of the measurement.

Choices

- Phase Main
- Phase Err
- Ampl Main
- Ampl Rise
- Ampl Mid
- Ampl Fall
- Data Bits

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP Analyzer: Amplitude, Ampl Fall View



This view displays the falling portion of the amplitude envelope with the amplitude mask superimposed. The vertical range is −40 to +5 dBm. The horizontal range is +144 to +156 or +84 to +96 bit periods depending on the burst type.

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

Range

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

See Also

Screens: RF Generator/RF Analyzer RF Analyzer

2. Marker These fields display the time and level at the current marker position.

3. Marker Pos This field sets the marker position. The marker position is settable in units of division (div) only.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Mask This field turns the amplitude mask on or off.

5. Pk TX Pwr This field displays the average power over the useful bits in the measured burst. It is measured from the center of the first useful bit to the center of the last useful bit. This measurement is only available when using the RF IN/OUT port.

See Also

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

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

See Also

Making Measurements: Solving Problems
Messages

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

Range

0 to 5000.000000 μs.

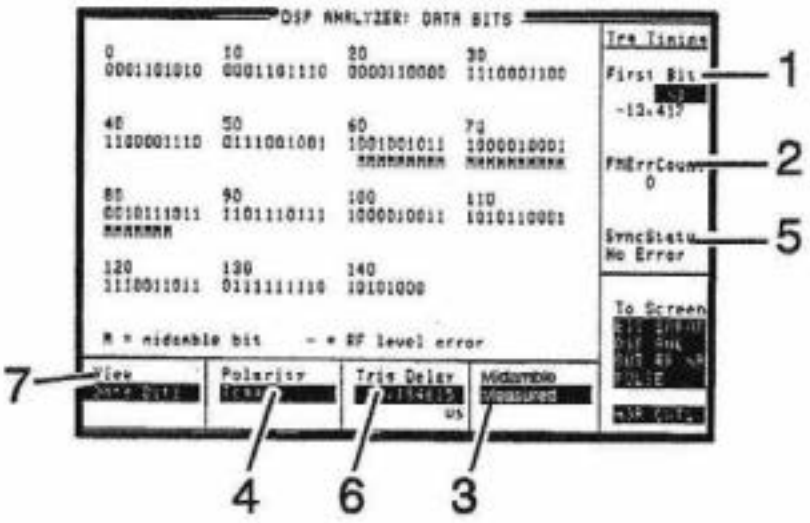
8. View This field selects alternate views of the measurement.

Choices

- Phase Main
- Phase Err
- Ampl Main
- Ampl Rise
- Ampl Mid
- Ampl Fall
- Data Bits

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP Analyzer: Data Bits



This screen displays the measured demodulated data bits and tags indicating how each bit was interpreted by the measurement.

1. First Bit This field displays the position in time of the first useful bit relative to the delayed measurement trigger.

See Also

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

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

See Also

Screens: Measurement Sync (Sync Mode)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Midamble

This field provides the option of specifying the bits used for calculating an ideal phase trajectory. (The DSP Analyzer calculates the ideal phase trajectory, then compares it with the transmitted signal's phase trajectory to determine phase and frequency error).

Choices

- **Expected** causes the DSP Analyzer to calculate the ideal phase trajectory using the bits displayed on the Meas Sync screen. This field is called Midamble or User Defined Sync Pattern, depending on which Burst Type is chosen.
- **Measured** causes the DSP Analyzer to calculate the ideal phase trajectory based entirely on demodulated data bits.

Note



When measuring noisy signals (approx 10 deg rms), define your entire burst as a User Defined Sync Pattern, and select Expected. This will eliminate the problem of bit errors causing gross peak phase errors.

See Also

Screens: Measurement Sync

4. Polarity

This field toggles the polarity of the displayed bits.

5. SyncStatus

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

See Also

Making Measurements: Solving Problems
Messages

6. Trig Delay

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

Range

0 to 5000.000000 μs.

7. View

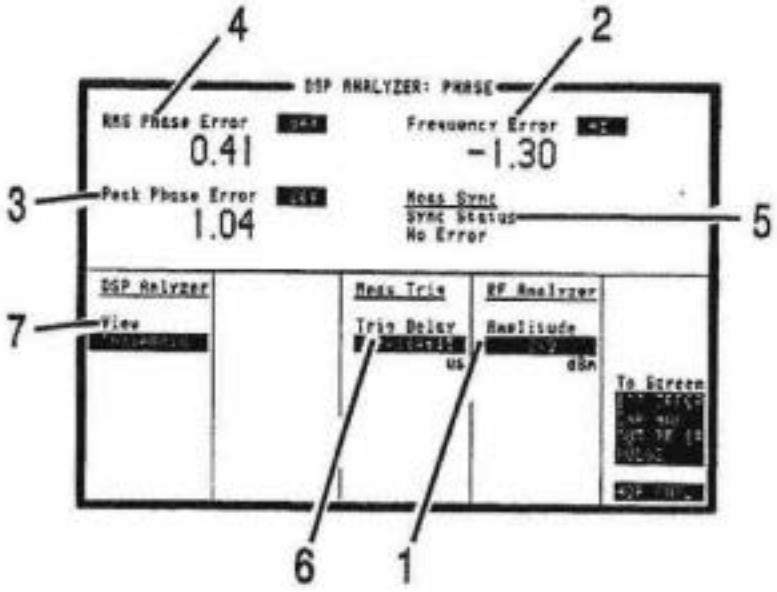
This field selects alternate views of the measurement.

Choices

- Phase Main
- Phase Err
- Ampl Main
- Ampl Rise
- Ampl Mid
- Ampl Fall
- Data Bits

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP Analyzer: Phase, PhaseMain View



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

Range

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

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

2. Frequency Error This field displays the derived Frequency Error over the useful bits in the measured burst.

See Also

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Peak Phase Error

This field displays the measured Peak Phase Error over the useful bits in the measured burst.

See Also

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

4. RMS Phase Error

This field displays the measured RMS Phase Error over the useful bits in the measured burst.

See Also

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

5. Sync Status

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

See Also

Making Measurements: Solving Problems
Messages

6. Trig Delay

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

Range

0 to 5000.000000 μs.

7. View

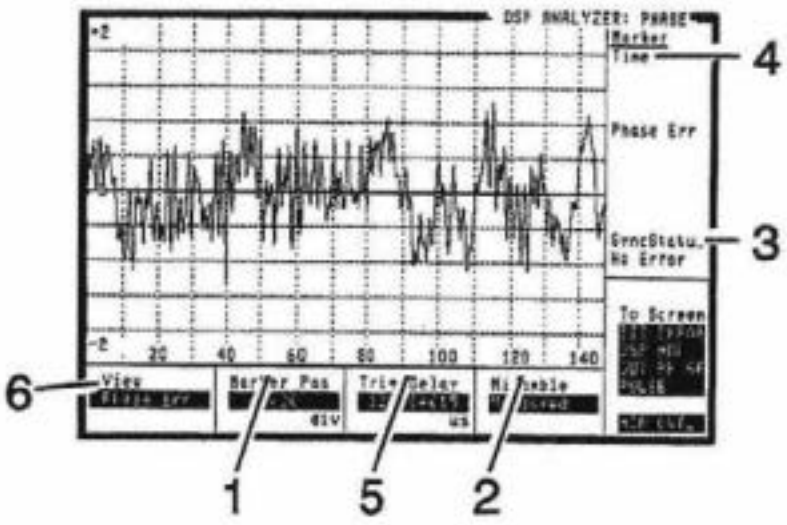
This field selects alternate views of the measurement.

Choices

- Phase Main
- Phase Err
- Ampl Main
- Ampl Rise
- Ampl Mid
- Ampl Fall
- Data Bits

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DSP Analyzer: Phase, Phase Err View



This view displays phase error versus time. The vertical range is scaled to the measurement. The horizontal range is 0 to 147 or 0 to 87 bit periods depending on the burst type.

1. Marker Pos This field sets the position on the trace that phase error will be measured and displayed. The marker position is settable in units of division (div) only.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. Midamble

This field provides the option of specifying the bits used for calculating an ideal phase trajectory. (The DSP Analyzer calculates the ideal phase trajectory, then compares it with the transmitted signal's phase trajectory to determine phase and frequency error).

Choices

- **Expected** causes the DSP Analyzer to calculate the ideal phase trajectory using the bits displayed on the Meas Sync screen. This field is called Midamble or User Defined Sync Pattern, depending on which Burst Type is chosen.
- **Measured** causes the DSP Analyzer to calculate the ideal phase trajectory based entirely on demodulated data bits.

Note

When measuring noisy signals (approx 10 deg rms), define your entire burst as a User Defined Sync Pattern, and select Expected. This will eliminate the problem of bit errors causing gross peak phase errors.

See Also

Screens: Measurement Sync

3. SyncStatus

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

See Also

Making Measurements: Solving Problems
Messages

4. Time

This field displays the marker position in time relative to bit 0 of the received burst.

5. Trig Delay

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

Range

0 to 5000.000000 μs.

6. View

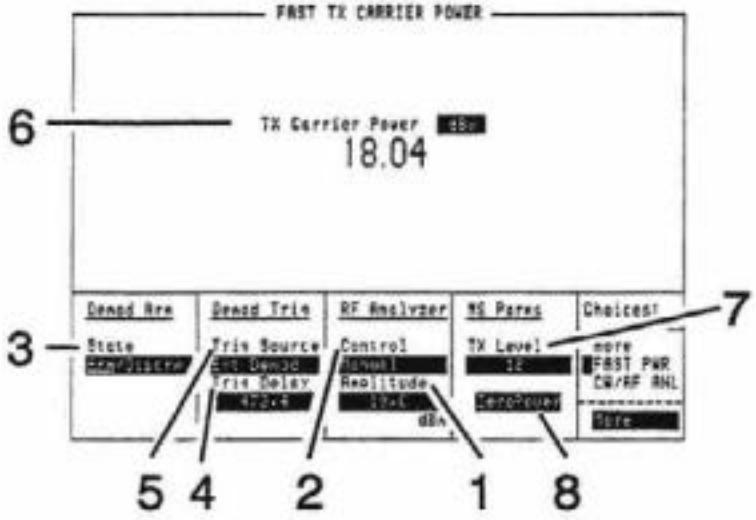
This field selects alternate views of the measurement.

Choices

- Phase Main
- Phase Err
- Ampl Main
- Ampl Rise
- Ampl Mid
- Ampl Fall
- Data Bits

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Fast TX Carrier Power



Note

The Fast TX Carrier Power measurement assumes that the burst conforms to the GSM recommended amplitude mask. Deviation from the recommended amplitude mask may cause erroneous results.

1. Amplitude

This field, which may be adjusted when in `Manual` control mode, sets the expected input level of the RF Analyzer on the RF IN/OUT port. This level must be within ±3 dB of the actual level in order that fully calibrated measurements may be made.

Range

GSM900: −21.9 to +45.0 dBm.
DCS1800: −47.9 to +32.0 dBm.

See Also

Screens: RF Generator/RF Analyzer, RF Analyzer

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. Control

This field toggles between manual setting of the expected input level or having the expected input level set automatically.

Choices

- **Manual (Default)** allows the Amplitude field to be adjusted.
- **MS TX Lev** automatically sets the input level to the RF Analyzer according to the TX Level field.

3. State

This field arms or disarms triggering for digital demodulation. The State field must be set to Arm to make fast TX Carrier Power measurements. In most situations, this field is automatically set to ARM when the

Fast TX Carrier Power measurements screen is accessed. However, if no measurement results are displayed, check this field and arm digital demod if necessary.

4. Trig Delay

This field sets the time delay between a valid trigger event and the beginning of a measurement. This field cannot be changed when the State field is set to Arm. It will be necessary to re-arm digital demod after changing this field to allow the measurement to resume.

Choices

- **0 T** is normally set when the Trig Source field is set to RF Rise.
- **473.4 T (Default)** is normally set when the Trig Source field is set to Ext Demod.
- A user determined value can be set when the Trig Source field is set to Ext Meas.

Range

0 to 5000.000000 μs
or
0 to 1354.2 T

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. Trig Source

This field selects the source of the trigger for digital demodulation, and fast TX power measurement. It cannot be changed when the State field is set to Arm. It will be necessary to re-arm the State field after changing this field to allow the measurement to resume. When activated (See Screens: Cell Configuration), triggers are generated internally.

Choices

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

6. TX Carrier Power

This field displays the measured TX carrier power. The fast power measurement requires that digital demod be armed for the measurement to run.

Note

The measurement display will *not* update if digital demod is set to Disarm.

The measurement display will *not* update if there is no signal to measure. This includes the case where the expected input level has been set much too high.

---

7. TX Level

This field is used to command the mobile station to transmit at the specified level. This field may be coupled to the "RF Analyzer Amplitude" field by the "RF Analyzer Control" field.

Range

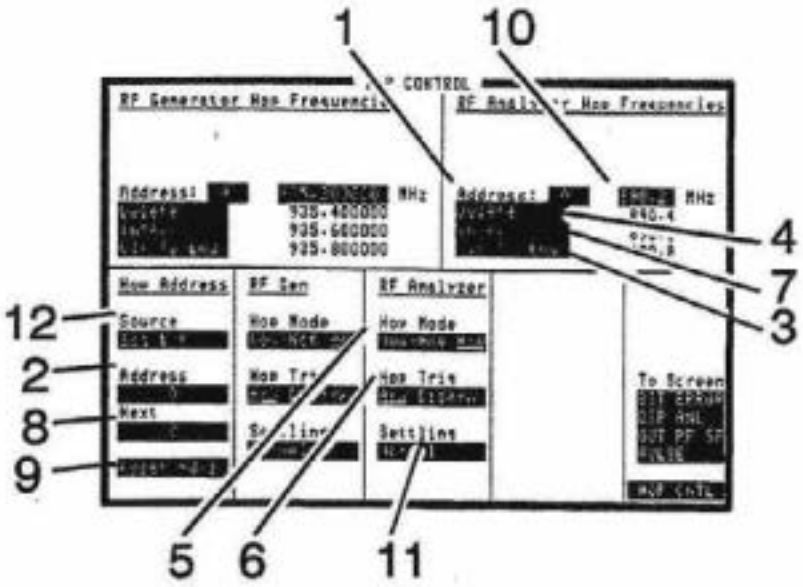
GSM900:	0 to 15
DCS1800:	0 to 13

8. ZeroPower

This field zeros the power meter. RF power must be disconnected from the RF IN/OUT port when executing this function.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Hop Control (RF Analyzer)



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

Range

0 to 2047.

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

Range

0 to 2047.

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

If Source is set to Seq, this field is not displayed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP