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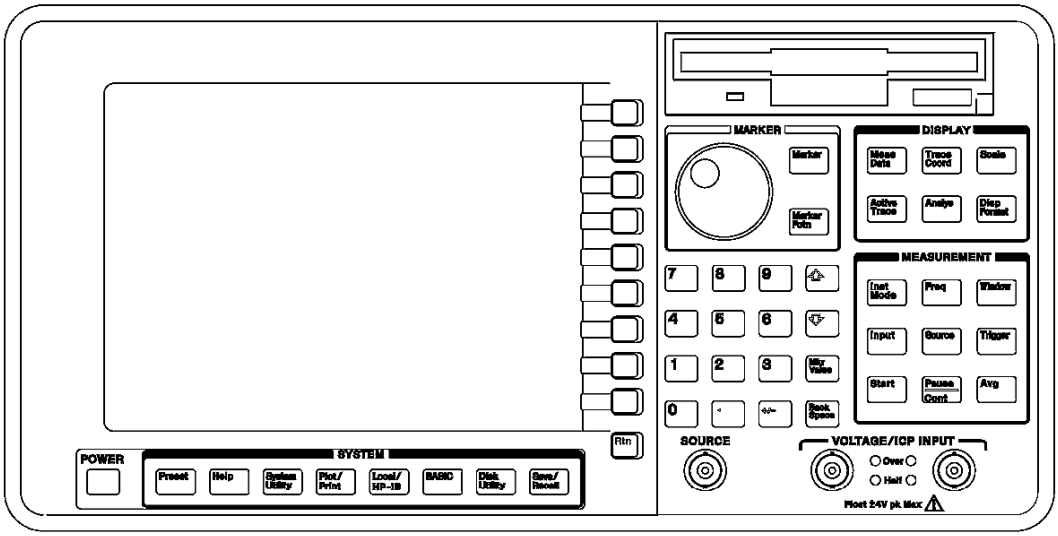
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Agilent 35670A Service Guide



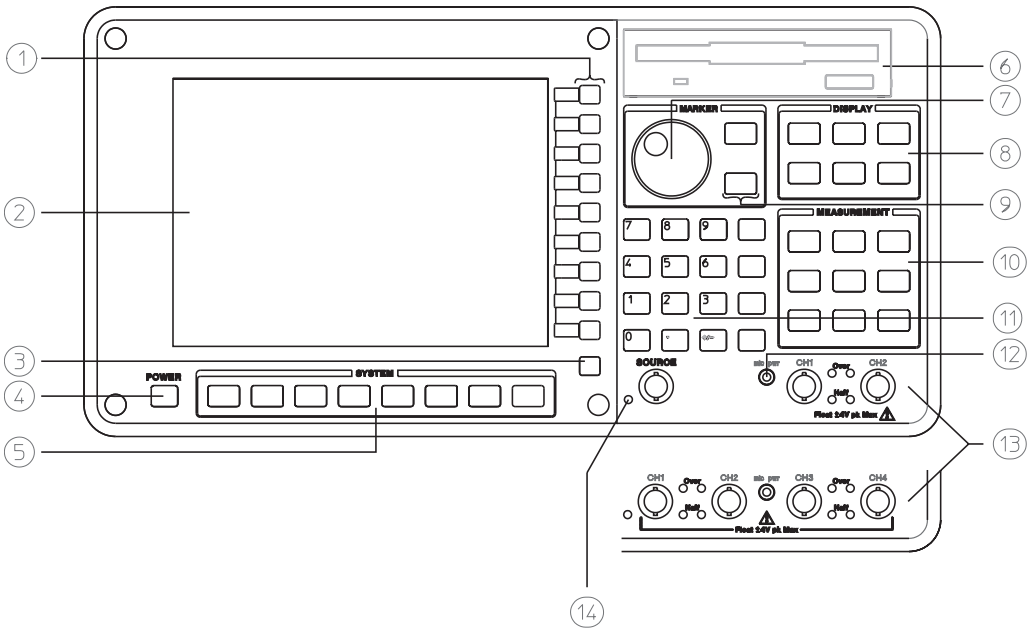
Agilent Technologies

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The Agilent 35670A at a Glance (Front Panel)



Agilent 35670A Front Panel

1-Use the softkeys to select items from the current menu. A softkey's function is indicated by a video label on the analyzer's screen. Throughout this book, softkeys are printed like this: [FFT ANALYSIS].

Hardkeys are front-panel buttons whose functions are always the same. They have a label printed directly on the key itself. Throughout this book, hardkeys are printed like this: [**Inst Mode**].

2-The analyzer's screen is divided into the menu area and the display area. The menu area displays video labels for the softkeys. The data area displays measurement data and information about the parameter settings.

3-The [**Rtn**] key returns the menu to the previous level.

4 -The POWER switch turns on the analyzer.

5 -Use the SYSTEM keys to control various system-level functions. These functions include saving files, plotting measurement data, and accessing online help.

6 -Use the disk drive to save your work on 3.5 inch flexible disks.

7-The knob moves the markers and the cursor. It also steps through numeric values and scrolls through online help.

8 -Use the DISPLAY keys to control what appears on the analyzer's traces. They only affect how data is displayed; DISPLAY keys do not change measurement parameters. *You can press keys in the DISPLAY menus without losing measurement parameters.*

9 -Use the MARKER keys to select a variety of marker features.

10-Use the MEASUREMENT keys to control the analyzer's source and inputs. They also control measurement parameters. *You must make a new measurement if you change a MEASUREMENT parameter.*

11-Use the numeric-entry keys to enter a numeric value.

12-The microphone power connector provides power (8 Vdc) for the Microphone Adapter Kit (Option UK4).

13-The connector area of the front panel has two different configurations. The standard analyzer has a source output connector and two input connectors. The 4-channel analyzer (Option AY6) has four input connectors.

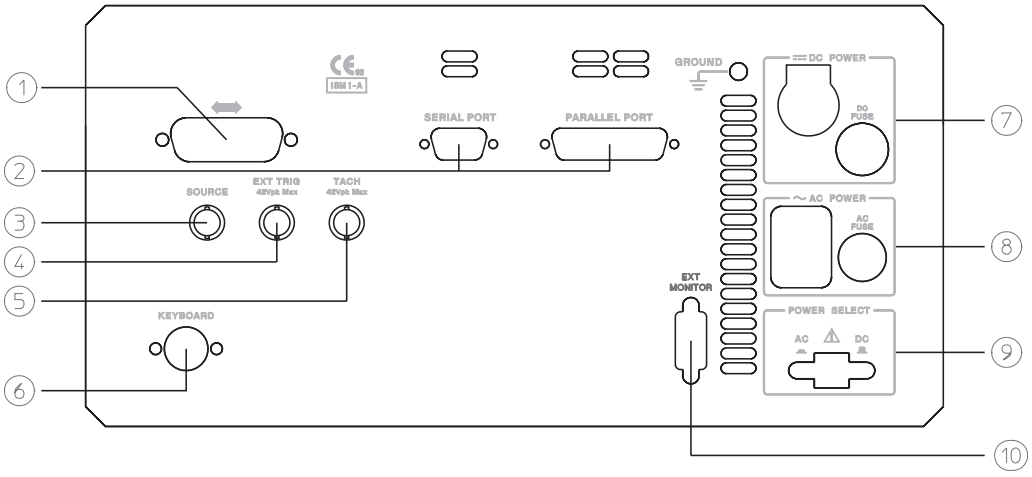
Range indicators are located next to each input connector. The upper LED is the over range indicator (the signal level exceeds the current range setting). The lower LED is the half range indicator (the signal level exceeds half the current range setting).

14-A source on/off indicator is located at the left edge of the connector area.

The standard Agilent 35670A (2 channel) has a source connector on the front panel.

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The Agilent 35670A at a Glance (Rear Panel)



Agilent 35670A Rear Panel

1-The GPIB connector links the Agilent 35670A to other GPIB devices. GPIB parameters are set in the [**Local/GPIB**] and [**Plot/Print**] menus.

2-The SERIAL PORT and the PARALLEL PORT link the analyzer to plotters and printers. These parameters are set in the [**Plot/Print**] menu.

3-The SOURCE connector outputs the analyzer's source signal. An LED on the front panel indicates if the source is on or off. The source parameters are set in the [Source] menu.

The standard Agilent 35670A (2 channel) also has a source connector on the front panel.

4-The EXT TRIG connector links the analyzer to an external trigger signal. The external trigger parameters are set in the **[**Trigger] menu.

5-The TACH connector links the analyzer to a tachometer. The tachometer parameters are set in the [Input] menu.

6-The KEYBOARD connector attaches an optional keyboard to the analyzer.

7-The DC POWER connector accepts DC power levels from 12 - 28 Vdc (nominal).

8-The AC POWER connector accept a wide range of ac voltage levels.

9-The POWER SELECT switch determines whether the analyzer is powered via the AC POWER connector or the DC POWER connector.

10-The EXT MONITOR port links the analyzer to multi-sync monitors.

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Safety Summary

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

GENERAL

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

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

ENVIRONMENTAL CONDITIONS

This instrument is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 4600 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

BEFORE APPLYING POWER

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

GROUND THE INSTRUMENT

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

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FUSES

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

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

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

DO NOT REMOVE THE INSTRUMENT COVER

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

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

WARNING

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

Caution

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

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Safety Symbols

 Warning, risk of electric shock

 Caution, refer to accompanying documents

 Alternating current

 Both direct and alternating current

 Earth (ground) terminal

 Protective earth (ground) terminal

 Frame or chassis terminal

 Terminal is at earth potential.

 Standby (supply). Units with this symbol are not completely disconnected from ac mains when this switch is off

Regulatory Markings

 N1014B	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework regulations under the terms of the Radio Communications Act of 1992
	The CE mark is a registered trademark of the European Community. ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.
	Contains one or more of the six hazardous substances above the maximum concentration value (MCV). 40 Year EPUP.
	The CSA mark is a registered trademark of the CSA International
	This instrument complies with the WEEE Directive (2002/96/EC) marketing requirement. The affixed product label indicates that you must not discard this electrical/electronic product in domestic household waste

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Accessories

The accessories listed in the following table are supplied with the Agilent 35670A.

Supplied Accessories	Part Number
Line Power Cable	See page 2-4
Standard Data Format Utilities	HP 5061-8042
Agilent 35670A Operator's Guide	Agilent 35670-90053
Agilent 35670A Quick Start	Agilent 35670-90056
Agilent 35670A Installation and Verification Guide	Agilent 35670-90054
Agilent 35670A GPIB Command Reference	Agilent 35670-90057
GPIB Programmer's Guide	Agilent 5960-5708
Agilent 35670A GPIB Commands: Quick Reference	Agilent 35670-90048

The accessories listed in the following table are available for the Agilent 35670A.

Available Accessories	Part Number
DC Power Cable, 3 meter	HP 35250A
DC Power Cable with Cigarette Lighter Adapter	HP 35251A
Box of ten 3.5-inch double-sided, double-density disks	HP 92192A
Using Instrument BASIC with the Agilent 35670A	Agilent 35670-90049
Instrument BASIC User's Handbook	HP E2083-90000
HP Thinkjet Printer	HP 2225A
HP Quietjet Printer	HP 2227A
HP Jet Paper, 2500 sheets	HP 92261N
GPIB Cable, 1 meter	HP 10833A
GPIB Cable, 2 meter	HP 10833B
GPIB Cable, 4 meter	HP 10833C
GPIB Cable, 0.5 meter	HP 10833D

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In This Book

This guide provides instructions for installing, verifying performance, and repairing the Agilent 35670A Dynamic Signal Analyzer.

Chapter 1, ''Specifications,'' lists the specifications for the Agilent 35670A and the specifications for the required test equipment.

Chapter 2, ''Preparing the Analyzer for Use,'' provides step-by-step instructions for getting the analyzer ready to use and instructions on cleaning the screen, storing, and transporting.

Chapter 3, ''Verifying Specifications,'' provides step-by-step instructions for installing and running the semiautomated performance test software. This chapter also provides illustrations that show the equipment set up for each test and a copy of the test records.

Chapter 4, ''Troubleshooting the Analyzer,'' provides step-by-step instructions for isolating most failures to the faulty assembly.

Chapter 5, ''Adjusting the Analyzer,'' provides step-by-step instructions for adjusting the analyzer.

Chapter 6, ''Replacing Assemblies,'' provides step-by-step instructions to follow before and after replacing an assembly. This chapter also provides step-by-step instructions for disassembling the analyzer.

Chapter 7, ''Replaceable Parts,'' provides ordering information and lists the replaceable parts.

Chapter 8, ''Circuit Descriptions,'' provides the overall instrument description and individual assembly descriptions.

Chapter 9, ''Voltages and Signals,'' shows where the signals and voltages are used in the analyzer and describes each signal.

Chapter 10, ''Internal Test Descriptions,'' describes the power-on test, calibration routine, fault log messages, and self tests.

Chapter 11, ''Backdating,'' provides information necessary to modify this manual for instruments that differ from those currently being produced.

Chapter 12, ''Quick Reference,'' shows assembly locations, cable connections, and all the block diagrams.

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Need Assistance?

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1

Specifications

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Specifications

This chapter contains the specifications for the Agilent 35670A Dynamic Signal Analyzer and the critical specifications for the equipment required to test the Agilent 35670A.

Instrument specifications apply after 15 minutes warm-up and within 2 hours of the last self-calibration. When the internal cooling fan has been turned OFF, specifications apply within 5 minutes of the last self-calibration. All specifications are with 400 line frequency resolution unless stated otherwise. Four channel instruments are unspecified in the one channel mode where alias protection filters are not connected.

Abbreviations

dBVrms = dB relative to 1 Volt rms.

dBfs = dB relative to full scale amplitude range. Full scale is approximately 2 dB below ADC overload.

FS or fs Full scale; synonymous with input range.

Real Time or Online = Refer to the collecting and displaying of information with no dropouts or missing information.

Rload = Load resistance connected to the analyzer's source.

Typical = Typical, non-warranted, performance specification included to provide general product information.

Vpk = Peak of the ac voltage.

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Frequency

Maximum range	
1 channel mode	102.4 kHz, 51.2 kHz (option AY6†)
2 channel mode	51.2 kHz
4 channel mode (option AY6 only)	25.6 kHz
Spans	
1 channel mode	195.3 mHz to 102.4 kHz
2 channel mode	97.7 mHz to 51.2 kHz
4 channel mode (option AY6 only)	48.8 mHz to 25.6 kHz
Minimum resolution	
1 channel mode	122 mHz (1600 line display)
2 channel mode	61 mHz (1600 line display)
4 channel mode (option AY6 only)	61 mHz (800 line display)
Maximum real-time bandwidth (FFT span for continuous data acquistion) (preset, fast averaging)	
1 channel mode	25.6 kHz
2 channel mode	12.8 kHz
4 channel mode (option AY6 only)	6.4 kHz
Measurement rate (typical) (preset, fast averaging)	
1 channel mode	≥70 averages/second (≥170 with 100 line display)
2 channel mode	≥33 averages/second
4 channel mode (option AY6 only)	≥15 averages/second
Display update rate (typical) (preset, fast average off)	5 updates/second 9 updates/second (single channel, single display, undisplayed traces set with static data: e.g., data register)
Accuracy	±30 ppm (±0.003%)

† Option AY6 single channel maximum range extends to 102.4 kHz without anti alias filter protection.

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Single Channel Amplitude

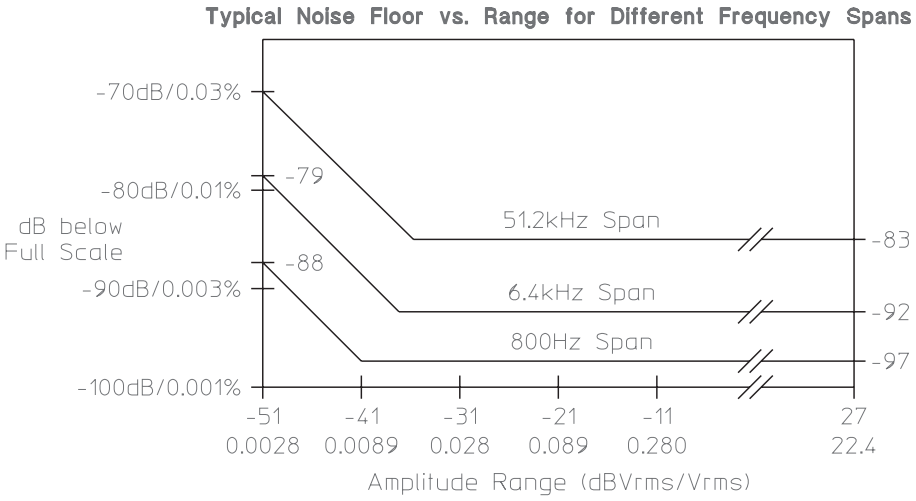
Absolute amplitude accuracy (FFT) (A combination of full scale accuracy, full scale flatness, and amplitude linearity.)	±2.92% (0.25 dB) of reading ±0.025% of full scale
FFT full scale accuracy at 1 kHz (0 dBfs)	±0.15 dB (1.74%)
FFT full scale flatness (0 dBfs) relative to 1 kHz	±0.2 dB (2.33%)
FFT amplitude linearity at 1 kHz Measured on +27 dBVrms range with time average, 0 to –80 dBfs.	±0.58% (0.05 dB) of reading ±0.025% of full scale
Amplitude resolution (16 bits less 2 dB over-range) with averaging	0.0019% of full scale (typical)
Residual dc response FFT mode frequency display (excludes A-weight filter)	<–30 dBfs or 0.5 mVdc (whichever is greater)

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FFT Dynamic Range

Spurious free dynamic range (Includes spurs, harmonic distortion, intermodulation distortion, alias products) Excludes alias responses at extremes of span. Source impedance = 50 Ω	<–80 dBfs (90 dB typical)

FFT noise floor (typical)
Flat top window, 64 RMS averages



Harmonic distortion Single tone (in band), ≤0 dBfs	<–80 dBfs
Post-filter harmonic distortion (alias responses) of a single tone ≤102.4 kHz, ≤0 dBfs	<–80 dBfs
Intermodulation distortion Two tones (in-band), each ≤–6.02 dBfs	<–80 dBfs
Spurious and residual responses Source impedance = 50 Ω	<–80 dBfs
Frequency alias responses Single tone (out of displayed range), ≤0 dBfs, ≤1 MHz (≤200 kHz with ICP on) 2.5% to 97.5% of the frequency span Lower and upper 2.5% of frequency span	 <–80 dBfs <–65 dBfs

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Input Noise

Input noise level
Flat top window, −51 dBVrms range, source impedance = 50 Ω, 32 rms averages

Above 1280 Hz	<−140 dBVrms/√Hz
160 Hz to 1.28 kHz (6.4 kHz span)	<−130 dBVrms/√Hz< % 0 >

Note: To calculate noise as dB below full scale:
Noise [dBfs] Noise [dBVrms/$\sqrt{Hz}$] + 10LOG(NEBW) Range [dBVrms].
See ''Window Parameters,'' below, for noise equivalent bandwidths (NEBW).

Window Parameters

	Uniform	Hann	Flat Top
−3 dB bandwidth †	0.125% of span	0.185% of span	0.450% of span
Noise equivalent bandwidth †	0.125% of span	0.1875% of span	0.4775% of span
Attenuation at ± 1/2 bin	4.0 dB	1.5 dB	0.01 dB
Shape factor (−60 dB BW/−3 dB BW)	716	9.1	2.6

† For 800 line displays. With 400, 200, or 100 line displays, multiply bandwidths by 2, 4, and 8, respectively. With 1600 line displays (only available in 1 or 2 channel mode), divide bandwidths by 2.

Single Channel Phase

Phase accuracy relative to external trigger 16 RMS averages, center of bin, dc coupled, 0 dBfs to −50 dBfs, 0 Hz < freq ≤ 10.24 kHz only	±4.0 degree

For Hann and flat top windows, phase is referenced to a cosine wave at the center of the time record. For the uniform, force, and exponential windows, phase is referenced to a cosine wave at the beginning of the time record.

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Cross Channel Amplitude

FFT cross channel gain accuracy
Frequency response mode, same amplitude range
(AC coupled, Peroidic Chirp, Uniform Window, < =4Hz)

At full scale: Tested with 10 rms averages on the –11 to +27 dBvrms ranges, and 100 rms averages on the –51 dBVrms range	±0.04 dB (0.46%)
At –20 dBfs: Tested with 200 rms averages on the –11 to +27 dBVrms ranges, and 2000 rms averages on the –51 dBVrms range	±0.08 dB (0.92%)

Cross Channel Phase

Cross channel phase accuracy (same conditions as cross-channel amplitude)	±0.5 degree

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Input

Input ranges (full scale) (auto-range capability)	+27 dBVrms (31.7 Vpk) to –51 dBVrms (3.99 mVpk) in 2 dB steps
Maximum input levels	42 Vpk
Input impedance	1 MΩ ±10%, 90 pF nominal
Low side to chassis impedance	
Floating mode Grounded mode	1 MΩ ±30%, <0.010 µF (typical) ≤100 Ω
AC coupling rolloff	<3 dB rolloff at 1 Hz
Common mode rejection ratio Single tone at or below 1 kHz	
–51 dBVrms to –11 dBVrms ranges –9 dBVrms to +9 dBVrms ranges +11 dBVrms to +27 dBVrms ranges	>75 dB typical >60 dB typical >40 dB typical
Note: CM dBfs = CM signal input [dBVrms] – CMRR [dB] – range [dBVrms]	
Common mode range (floating mode)	±4 Vpk
Amplitude over-range detection	+3 dB typical
ICP signal conditioning	
Current source Open circuit voltage	4.25 ±1.5 mA +26 to +32 Vdc
A-weight filter Conforms to ANSI Standard S1.4-1983; and to IEC 651-1979; 10 Hz to 25.6 kHz	Type 0 Tolerance
Crosstalk Between input channels, and source-to-input (receiving channel source impedance = 50 Ω)	<–135 dB below signal or <–80 dBfs of receiving channel, whichever response is greater in amplitude

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Time Domain

Specifications apply in histogram/time mode, unfiltered time display	
DC amplitude accuracy	±5.0 % fs
Rise time of –1 V to 0 V test pulse	<11.4 ms
Settling time of –1 V to 0 V test pulse	<16 ms to 1%
Pulse aberrations (peak overshoot) of –1 V to 0 V test pulse Peak aberration relative to the mode-to-mode difference (most common values)	<3 %
Sampling period	
1 channel mode 2 channel mode 4 channel mode (option AY6 only)	3.815 ms (1/262144 Hz) to 2 s in 2× steps 7.629 ms (1/131072 Hz) to 4 s in 2× steps 15.26 ms (1/65536 Hz) to 8 s in 2× steps

Trigger

Trigger modes	Internal trigger External trigger Source trigger GPIB trigger
Maximum trigger delay	
Post trigger Pre trigger No two channels can be further than ±7168 samples from each other.	8191 seconds 8191 sample periods
External trigger maximum input	±42 Vpk
External trigger range	
Low range High range	–2 V to +2 V –10 V to +10 V
External trigger resolution	
Low range High range	15.7 mV 78 mV

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Tachometer

Pulses per revolution	0.5 to 2048
RPM accuracy	±100 ppm (0.01%) (typical)
Tachometer level range	
Low range High range	–4 V to +4 V –20 V to +20 V
Tachometer level resolution	
Low range High range	100 mV 500 mV
Tachometer level accuracy (as a % of tachometer range setting)	±10% of range
Maximum tachometer input level	±42 Vpk
Minimum tachometer pulse width	600 ns
Maximum tachometer pulse rate	400 kHz

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Source Output

Source types	Sine, random noise, chirp, pink noise, burst random, burst chirp
Amplitude range	ac: ±5 V peak † dc: ±10 V † † Vac_{pk} + |Vdc| ≤10 V
AC amplitude resolution	
Voltage ≥ 0.2 Vrms Voltage < 0.2 Vrms	2.5 mVpk 0.25 mVpk
DC offset accuracy	±15 mV±3% of (|Vdc| +Vac_{pk}) settings
Pink noise adder	Add 600 mV typical when using pink noise
Output impedance	< 5 Ω
Maximum loading	
Current Capacitance	±20 mA peak 0.01 mF
Sine amplitude accuracy at 1 kHz Rload >250 Ω 0.1 Vpk to 5 Vpk	±4% (0.34 dB) of setting
Sine flatness (relative to 1 kHz) 0.1 V to 5 V peak, 0 Hz to 102.4 kHz	±1 dB
Harmonic and sub-harmonic distortion and spurious signals (in band) 0.1 Vpk to 5 Vpk sine wave	
Fundamental <30 kHz Fundamental ≥30 kHz	<–60 dBc <–40 dBc

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Digital Interfaces

External keyboard	Compatible with PC-style 101-key keyboard model number HP C1405A (#ABA) (DIN connector) and HP keyboard cable part number 5081-2249.
GPIB	Conforms to the following standards: IEEE 488.1 (SH1, AH1, T6, TEO, L4, LE0, RS1, RL1, PP0, DC1, DT1, C1, C2, C3, C12, E2) IEEE 488.2-1987 Complies with SCPI 1992 Factory set address: 11
Data transfer rate (REAL 64 Format)	<45 ms for a 401 point trace
Serial port (printing, plotting)	300 baud to 9600 baud
Parallel port (printing, plotting)	

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General Specifications

Safety Standards	IEC61010-1:2001/EN61010-1:2001 (2nd Edition) Canada: CAN/CSA-C22.2 No. 61010.1-2004 USA: ANSI/UL 61010-1:2004
EMC Standards	Canada: ICES-001:2004 IEC 61326-1:2005/EN61326-1:2006 Australia/New Zealand: AS/NZS CISPR11:2004
Acoustics	LpA <55 dB (cooling fan at high speed setting) LpA <45 dB (auto speed setting at 25 °C)

Fan speed setting of high, automatic, and off are available. The fan off setting can be enabled for a short period of time, except at higher ambient temperatures where the fan will stay on.

Environmental Operating Restrictions	Operating: Disk in Drive	Operating: No Disk in Drive	Storage and Transport
Ambient Temperature	4 °C to 45 °C	0 °C to 55 °C	–40 °C to 70 °C
Relative Humidity (non-condensing)			
Minimum	20%	15%	5%
Maximum	80% at 32 °C	95% at 40 °C	95% at 50 °C
Vibration (5 – 500 Hz)	0.6 Grms	2.1 Grms	3.41 Grms
Shock	5 G (10 ms 1/2 sine)	5 G (10 ms 1/2 sine)	40 G (3 ms 1/2 sine)
Maximum Altitude	4600 meters (15,000 feet)		
AC Power	100 Vrms to 240 Vrms (47 Hz to 440 Hz) 350 VA maximum		
DC Power	12 Vdc to 28 Vdc nominal 200 VA maximum		
DC Current at 12V (typical)	10 A (standard) 12 A (4 Channel, Option AY6)		
Warm-Up Time	15 minutes		
Weight	15 kg (33 lbs) net 29 kg (64 lbs) shipping		
Dimensions (excluding bail handle and impact cover)	Height: 190 mm (7.5 in) Width: 340 mm (13.4 in) Depth: 465 mm (18.3 in)		

IEC 801-3 (Radiated Immunity): Performance degradation may occur at Security Level 2.

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Order Tracking — Option 1D0

$$\frac{Max\ Order \times Max\ RPM}{60} \leq$$

Real time (online)	
1 channel mode	25,600 Hz
2 channel mode	12,800 Hz
4 channel mode	6,400 Hz
Capture playback †	
1 channel mode	102,400 Hz
2 channel mode	51,200 Hz
4 channel mode	25,600 Hz

Specified for
5 ≤ RPM ≤ 60,000 (online), 5 ≤ RPM ≤ 491,519 (capture playback); and
number of orders ≤ 200

† Signals are captured online and then postprocessed in capture playback mode.

Delta order	1/128 to 1/1
Resolution (maximum order)/(delta order)	≤200
Maximum RPM ramp rate 1000 to 10,000 RPM run up maximum order = 10 delta order = 0.1 RPM step = 30 (1 channel) = 60 (2 channel) = 120 (4 channel)	750 RPM/second (typical for real time)
Order track amplitude accuracy	±1 dB (typical)

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Swept Sine Measurements —Option 1D2

Dynamic range Default span: 51.2 Hz to 51.2 kHz Fast average ON, 101 point log sweep Tested with 11 dBVrms source level at 100 ms integration (approximately 60 second sweep)	130 dB typical

Arbitrary Waveform Source—Option 1D4

Amplitude Range	Arb: ±5 Vpk † dc: ±10 V † † V_{pk} +|Vdc| ≤10 V
Record Length Depends on measurement resolution (100, 200, 400, 800, and 1600 lines)	# of points = 2.56 x lines of resolution, or # of complex points = 1.28 x lines of resolution
Point spacing	Matches the measurement sample rate.
DAC Resolution	
0.2828 Vpk to 5 Vpk <0.2828 Vpk	2.5 mV 0.25 mV

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Real Time Octave Analysis — Option 1D1

Standards	Conforms to ANSI Standard S1.11 - 1986, Order 3, Type 1-D, Extended and Optional Frequency Ranges Conforms to IEC 651-1979 Type 0 Impulse, and ANSI S1.4

Frequency ranges (at centers)

Online (real time)

	1 channel	2 channel	4 channel
1/1 octave	0.063 Hz to 16 kHz	0.063 Hz to 8 kHz	0.063 Hz to 4 kHz
1/3 octave	0.08 Hz to 40 kHz	0.08 Hz to 20 kHz	0.08 Hz to 10 kHz
1/12 octave	0.0997 Hz to 12.338 kHz	0.0997 Hz to 6.169 kHz	0.0997 Hz to 3.084 kHz

Capture playback

	1 channel	2 channel	4 channel
1/1 octave	0.063 Hz to 16 kHz	0.063 Hz to 16 kHz	0.063 Hz to 16 kHz
1/3 octave	0.08 Hz to 31.5 kHz	0.08 Hz to 31.5 kHz	0.08 Hz to 31.5 kHz
1/12 octave	0.0997 Hz to 49.35 kHz	0.0997 Hz to 49.35 kHz	0.0997 Hz to 49.35 kHz

1 to 12 octaves can be measured and displayed.

1/1, 1/3, and 1/12 octave true center frequencies related by the formula:

$$\frac{f(i+1)}{f(i)} = 2^{1/n}; n = 1,\ 3 \text{ or } 12;$$

Where 1000 Hz is the reference for 1/1, 1/3 octave, and 1000 x$2^{(1/24)}$Hz is the reference for 1/12 octave. The marker returns the ANSI standard preferred frequencies.

Accuracy 1 second stable average single tone at band center	±0.2 dB

Readings are taken from the linear total power spectrum bin. It is derived from sum of each filter.

1/3 octave dynamic range 2 second stable average, limited by input noise level	>80 dB (typical) per ANSI S1.11 - 1986

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Recommended Test Equipment

The following table lists the recommended equipment needed to test the performance of the Agilent 35670A Dynamic Signal Analyzer. The table on page 1-20 lists additional equipment needed to adjust and troubleshoot the analyzer. Other equipment may be substituted for the recommended model if it meets or exceeds the listed critical specifications. When substitutions are made, you may have to modify the procedures to accommodate the different operating characteristics.

Recommended Test Equipment

Instrument	Critical Specifications	Recommended Model
AC Calibrator	10 Hz to 102.4 kHz; 1 mV to 10 V Amplitude Amplitude Accuracy: ±0.1% phase locking capability	Fluke 5700A † Alternate Fluke 5200A † Datron 4200, 4700, or 4708 ‡ HP 745A
Frequency Synthesizer	Frequency Range: 10 Hz to 1 MHz Frequency Accuracy: ≤5 ppm Amplitude Accuracy: 0.2 dB from 1 Hz to 100 kHz 1 dB from 100 kHz to 1 MHz Harmonic Distortion: ≤–70 dBc Spurious: ≤–70 dBc <±1 deg phase shift between output and sync	HP 3326A Alternate (2) HP 3325A/B Opt 001
Low Distortion Oscillator	Frequency Range: 10 Hz to 100 kHz Harmonic Distortion: ≤–93 dB, 10 Hz to 20 kHz	HP 339A †† Alternate HP 3326A with notch filter †† HP 3325A/B with notch filter††
Digital Multimeter	5 1/2 digit True rms ac Voltage: 30 Hz to 100 kHz; 0.1 to 500 V; ±0.1%; ≥1 MΩ input impedance dc Voltage: 1 V to 300 V; ±0.1%	HP 3458A Alternate HP 3456A , HP 3455A HP 3478A
Feedthrough Termination (2) (4 for option AY6)	50 Ω: ±2% at dc	Pomona Elect Model 4119-50 ‡‡ Alternate HP 11048C, HP 10100C

† John Fluke Manufacturing Co., Inc., PO Box C9090, Everett, WA 98206 U.S.A. (206) 347 6100
‡ Wavetek, 5808 Churchman Bypass, Indianapolis, IN 46203 U.S.A.
†† This equipment is not required for Operation Verification. The parts and schematic for the notch filter are shown on page 1 19.
‡‡ ITT Pomona Electronics, 1500 East Ninth Street, Pomona, CA 91769 U.S.A. (714) 469 2900 FAX (206) 629 3317

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Recommended Test Equipment (continued)

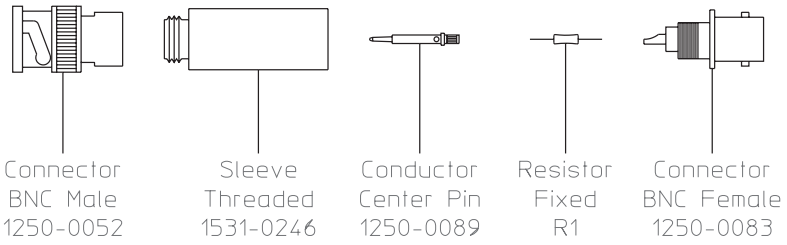
Instrument	Critical Specifications	Recommended Model
Cables	BNC-to-Dual Banana (6) BNC-to-BNC 30 cm BNC-to-BNC 122 cm	HP 11001-60001 HP 8120-1838 HP 8120-1840
Adapters	BNC(m)-to-Dual Banana Plug BNC(f)-to-Dual Banana Plug BNC(f)-to-BNC (f) (4) BNC Tee (m)(f)(f)	HP 10110B HP 1251-2277 HP 1250-0080 HP 1250-0781
Resistor (2)†	Value: 1 kΩ Accuracy: 1% Power: 0.25W	HP 0757-0280

† See the following for suggested assembly.

Suggested Assembly for Series Resistor

The following is a suggested assembly for the 1 kΩ series resistor. Two 1 kΩ series resistors are required for the Intermodulation Distortion performance test.

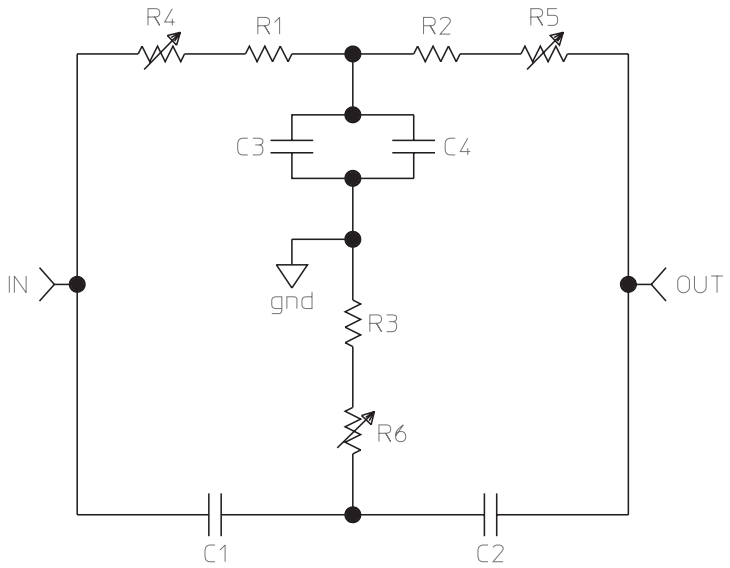
- **Cut resistor leads to 12 mm on each end.**
- **Solder one resistor lead to the center conductor of the BNC female connector.**
- **Solder the conductor center pin to the other lead of the resistor.**
- **Screw the sleeve and the BNC male connector into place. Tighten securely.**



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Schematic and Parts List for Notch Filter

The Harmonic Distortion performance test requires either an HP 339A or an HP 3326A or HP 3325A/B with notch filter. The following shows the schematic and parts list for the notch filter.



Reference	Description	Agilent Part Number
C1 - C4	0.025 µF ±2.5%, 100 V polypropelene-metalized	HP 0160-6809
R1 - R2	249 Ω ±1% metal film, 0.125 W	HP 0698-4421
R3	118 Ω ±1% metal film, 0.125 W	HP 0698-4407
R4 - R6	20 Ω trimmer, 1 turn	HP 2100-3409

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Additional Recommended Test Equipment

Instrument	Critical Specifications	Recommended Model
Frequency Counter	Frequency Range: 0 Hz to 100 MHz Frequency Accuracy: 7.5 ppm or better at 20 MHz	HP 5350B Alternate HP 5351B, HP 5335A
Oscilloscope	Bandwidth: >50 MHz Two Channel; External Trigger; 1 MΩ Input	HP 54111D Alternate HP 1980B, HP 1740
Oscilloscope Probe	Impedance: ≥1 MΩ Division Ratio: 10:1 Maximum Voltage: ≥20 Vdc	HP 10431A
Oscilloscope Probe	Impedance: ≥ 1 MΩ Division Ratio: 1:1	HP 10438A
Spectrum Analyzer	Frequency Range: 10 Hz to 100 kHz Dynamic Range: ≥70 dB	HP 3562A Alternate HP 3561A, HP 3585A/B
Logic Probe	TTL	HP 545A Alternate HP 5006A, HP5005A/B
Patch Cord	Minigrabber test clips	Pomona 3781-8-7
Cable	BNC(m)-to-SMB(f)	HP 03585-61616
Adapter	SMB(m)-to-SMB(m)	HP 1250-0669

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2

Preparing the Analyzer for Use

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This chapter contains instructions for inspecting and installing the Agilent 35670A Dynamic Signal Analyzer. This chapter also includes instructions for cleaning the screen, transporting and storing the analyzer.

DC Power Requirements

The analyzer can operate from a dc power source supplying a true range of 10.8 to 30.8 Vdc. With all options installed, power consumption is less than 200 VA. The following table shows typical current requirements at different operating voltages for the standard two-channel analyzer and for the optional four-channel analyzer.

Operating Voltage	**Typical Current**	
	Standard 2 channel Agilent 35670A	Optional 4 channel Agilent 35670A
12 Vdc	8.0 amps	11.0 amps
24 Vdc	4.0 amps	5.5 amps

AC Power Requirements

The analyzer can operate from a 47 to 440 Hz, single-phase, ac power source supplying 90 to 264 Vrms. With all options installed, power consumption is less than 350 VA.

Warning **Only a qualified service person, aware of the hazards involved, should measure the line voltage.**

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DC Power Cable and Grounding Requirements

The negative side of the dc input connector is not connected to chassis ground. In dc mode operation, the chassis will float. The chassis ground lug on the rear panel and the negative side of the dc input connector should both be connected to a known reference potential.

Two dc power cables are available the HP 35250A dc power cable and the HP 35251A dc power cable with cigarette lighter adapter. Both cables contain a 30 amp, 32 volt fuse (HP 2110-0920).

Warning **The tip of the cigarette lighter adapter may get hot during use. After unpluging the adapter, be careful of the heat from the adapter's tip.**

Caution Although shorter cables may reduce dc voltage loss, use the standard cables. The dc inrush current may pit the connector contacts in shorter cables.

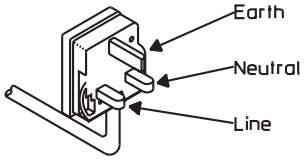
AC Power Cable and Grounding Requirements

On the GPIB connector, pin 12 and pins 18 through 24 are tied to chassis ground and the GPIB cable shield. The instrument frame, chassis, and covers are connected to chassis ground. The input BNCs are floating unless ground mode is selected.

The analyzer is equipped with a three-conductor power cord that grounds the analyzer when plugged into an appropriate receptacle. The type of power cable plug shipped with each analyzer depends on the country of destination. The following figure shows available power cables and plug configurations.

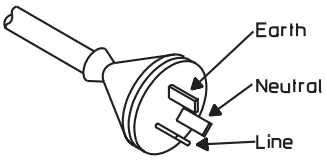
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United Kingdom
Option 900



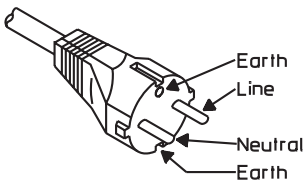
PLUG*: BS 1363A
CABLE*: HP 8120-1703
220V-5A
OPERATION

Australia/New Zealand
Option 901



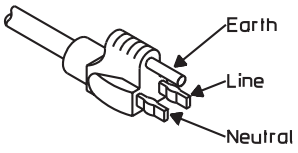
PLUG*: NZSS 198/AS C112
CABLE*: HP 8120-0696
220V-6A
OPERATION

Continental Europe
Option 902



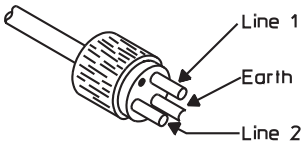
PLUG*: CEE7-V11
CABLE*: HP 8120-1692
220V-6A
OPERATION

North America
Option 903



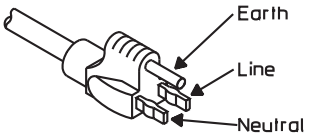
PLUG*: NEMA 5-15P
CABLE*: HP 8120-1521
125V-10A**
OPERATION

North America
Option 904



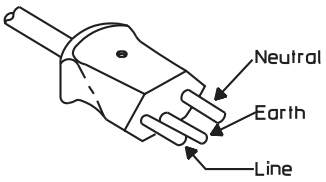
PLUG*: NEMA-G-15P
CABLE*: HP 8120-0698
250V-6A**
OPERATION

Japan
Option 918



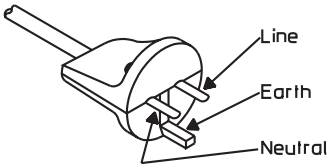
PLUG*: MITI 41-9692
CABLE*: HP 8120-4754
125V-12A
OPERATION

Switzerland
Option 906



PLUG*: SEV 1011.1959-24507
TYPE 12
CABLE*: HP 8120-2296
220V-6A
OPERATION

Denmark
Option 912



PLUG*: DHCR 107
CABLE*: HP 8120-2957
220V-6A
OPERATION

*The number shown for the plug is the industry identifier for the plug only, the number shown for the cable is an HP part number for a complete cable including the plug.

**UL listed for use in the United States of America.

Warning

The power cable plug must be inserted into an outlet provided with a protective earth terminal. Defeating the protection of the grounded analyzer cabinet can subject the operator to lethal voltages.

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To do the incoming inspection

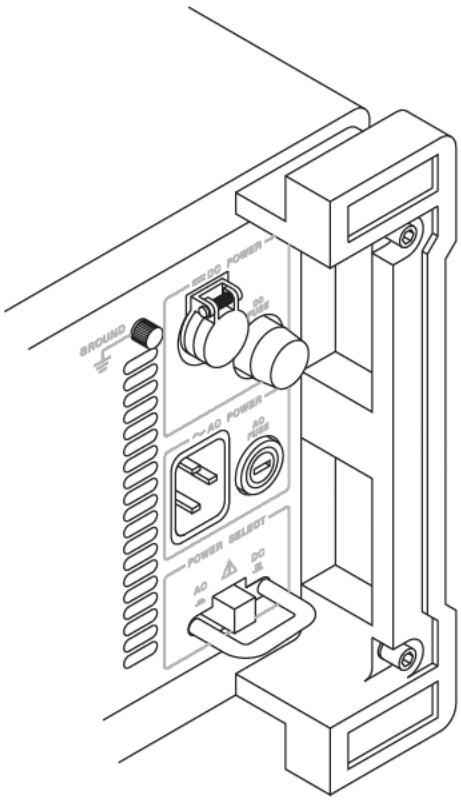
The Agilent 35670A Dynamic Signal Analyzer was carefully inspected both mechanically and electrically before shipment. It should be free of marks or scratches, and it should meet its published specifications upon receipt.

- Inspect the analyzer for physical damage incurred in transit. If the analyzer was damaged in transit, do the following:
- Save all packing materials.
- File a claim with the carrier.
- Call your Agilent Technologies sales and service office.

Warning If the analyzer is mechanically damaged, the integrity of the protective earth ground may be interrupted. Do not connect the analyzer to power if it is damaged.

- Check that the POWER SELECT switch on the analyzer's rear panel is set to the AC position.

The switch is in the AC position when in the ''in'' position.



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- **Check that the correct fuses are installed in the fuse holders.**

An 8 amp, 250 volt, normal blow fuse is required for ac operation. A 30 amp, 32 volt, normal blow fuse is required for dc operation. Both fuses are installed at the factory. For instructions on removing the fuses or fuse part numbers, see ''To change the fuses.''

- **Using the supplied power cord, connect the analyzer to an appropriate receptacle.**

The analyzer is shipped with a three-conductor power cord that grounds the analyzer when plugged into an appropriate receptacle. The type of power cable plug shipped with each analyzer depends on the country of destination.

- **Set the analyzer's power switch to on.**

Press the switch located on the analyzer's lower left-hand corner. The switch is in the on (|) position when in the ''in'' position. The analyzer requires about 20 seconds to complete its power-on routine.

- **Test the electrical performance of the analyzer using the operation verification or the performance tests in chapter 3, ''Verifying Specifications.''**

The operation verification tests verify the basic operating integrity of the analyzer; these tests take about 1½ hours to complete and are a subset of the performance tests. The performance tests verify that the analyzer meets all the performance specifications; these tests take about 2½ hours to complete.

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To install the analyzer

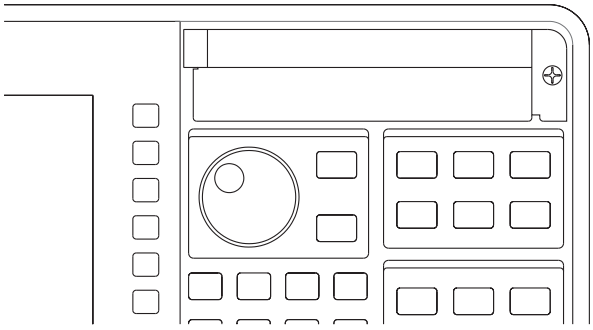
The analyzer is shipped with rubber feet and bail handle in place, ready for use as a portable or bench analyzer.

- Install the analyzer to allow free circulation of cooling air.
  Cooling air enters the analyzer through the right side and exhausts through the left side and rear panel.
- To install the analyzer in an equipment cabinet, follow the instructions shipped with the rack mount kit.

Warning **To prevent potential fire or shock hazard, do not expose the analyzer to rain or other excessive moisture.**

- Protect the analyzer from moisture and temperatures or temperature changes that cause condensation within the analyzer.
  The operating environment specifications for the analyzer are listed in chapter 1, ''Specifications.''
- Protect the analyzer's disk drive from dirt and dust.
  Remove the screw to the right of the disk drive and use it to attach the supplied disk drive cover. The disk drive cover is located inside the front-panel impact cover.

Caution Use of the equipment in an environment containing dirt, dust, or corrosive substances will drastically reduce the life of the disk drive and the flexible disks. To minimize damage, use the disk drive cover and store the flexible disks in a dry, static-free environment.



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To connect the analyzer to a dc power source

In applications requiring a portable dc power source, use a properly protected dc power system. The dc system should contain a deep cycle battery rather than a standard automobile battery. A standard automobile battery will fail prematurely if repeatedly discharged. Also, select a battery that provides the best compromise between operation time and portability.

- **Set the analyzer's power switch to off (O).**
- **Set the analyzer's POWER SELECT switch to the DC position.**

The switch is in the DC position when in the ''out'' position.

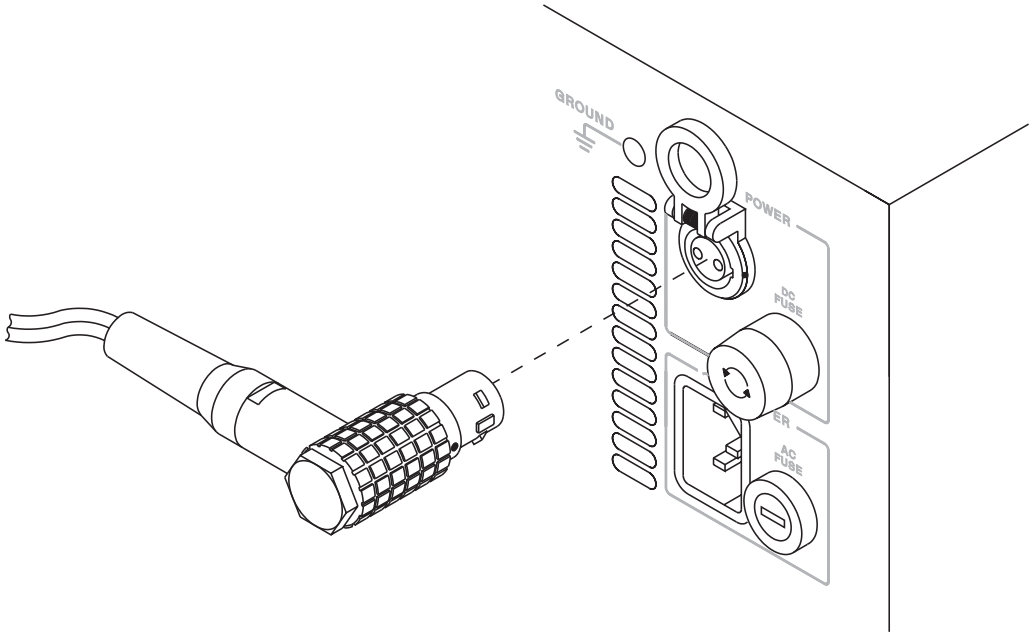
- **Connect the dc power cable to the dc power source.**

Using the dc power cable (HP 35250A), attach the black cable to the common terminal and the red cable to the positive terminal of the dc power source. Using the dc power cable with cigarette lighter adapter (HP 35251A), plug the cigarette lighter adapter into an automotive cigarette lighter receptacle.

- **Connect the analyzer's ground terminal to the same reference potential as the common terminal of the dc power source.**

Using a wire, connect the analyzer's GROUND terminal to the common terminal of the dc source. If you are using the dc power cable with cigarette lighter adapter, connect the GROUND terminal to the automobile chassis.

- **Plug the dc power cable into the analyzer's DC POWER receptacle. Make sure to align the red dot on the plug with the red dot on the receptacle.**



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- **Turn on the dc power source.**

If the dc power source is supplied by an automobile, start the automobile. The automobile must be running to provide adequate dc power.

Warning **The tip of the cigarette lighter adapter may get hot during use. After unpluging the adapter, be careful of the heat from the adapter's tip.**

- **Set the analyzer's power switch to on (|).**

If the analyzer will not power up or operates intermittently on dc power, see ''If the analyzer will not power up'' or ''If the analyzer operates intermittently on dc power'' at the end of this chapter.

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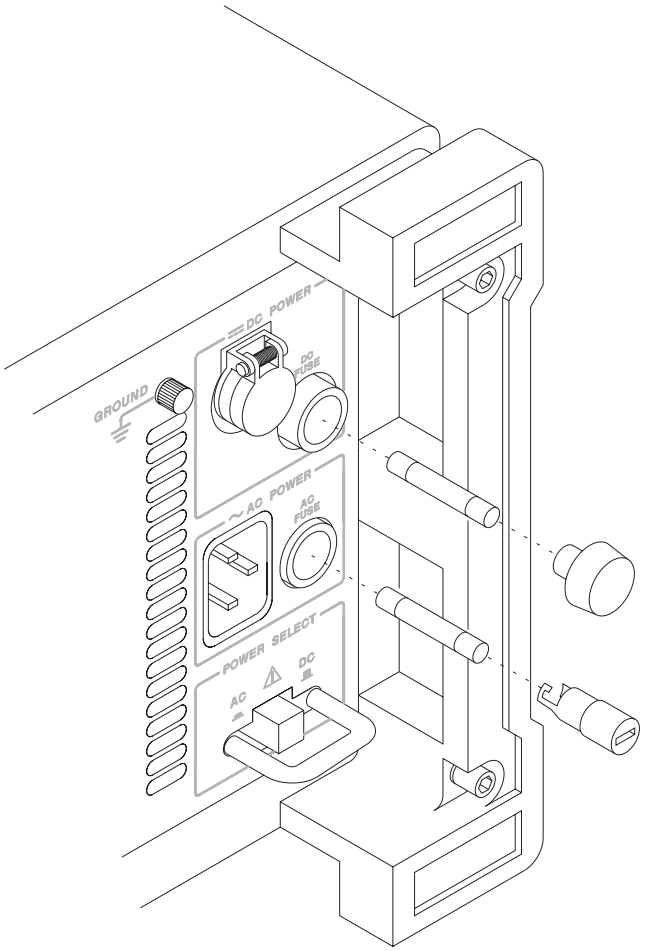
To change the fuses

Both fuses are installed at the factory.

- **Unplug the power cord from the analyzer.**
- **Press in and turn the appropriate fuse holder cap counter-clockwise (use a small screw driver for the ac fuse). Remove when the fuse cap is free from the housing.**
- **Pull the fuse from the fuse holder cap.**
- **To reinstall, select the proper fuse and place in the fuse holder cap.**

DC Fuse	AC Fuse
HP 2110-0920 30 A 32 V Normal Blow	HP 2110-0342 8 A 250 V Normal Blow

- **Place the fuse holder cap in the housing. Press in and turn clockwise.**



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To connect the analyzer to a serial device

The Serial Port is a 9-pin, EIA-574 port that is only available using option 1C2, Instrument Basic. The total allowable transmission path length is 50 feet.

- Connect the analyzer's rear panel SERIAL PORT to a serial device using a 9-pin female to 25-pin RS-232-C cable.

Part Number	Cable Description
HP 24542G	9-pin female to 25-pin male RS-232
HP 24542H	9-pin female to 25-pin female RS-232

For additional information, see chapter 9 in the *Agilent 35670A Service Guide*.

To connect the analyzer to a parallel device

The Parallel Port is a 25-pin, Centronics port. The Parallel Port can interface with PCL printers or HP-GL plotters.

- Connect the analyzer's rear panel PARALLEL PORT connector to a plotter or printer using a Centronics interface cable.

Part Number	Cable Description
HP 92284A	25-pin male to 36-pin male 2-meter Centronics
HP C2912B	25-pin male to 36-pin male 3-meter Centronics

For additional information, see chapter 9 in the *Agilent 35670A Service Guide*.

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To connect the analyzer to an GPIB device

The analyzer is compatible with the Agilent Technologies Interface Bus (GPIB). The GPIB is Agilent Technologies's implementation of IEEE Standard 488.1. Total allowable transmission path length is 2 meters times the number of devices or 20 meters, whichever is less. Operating distances can be extended using an GPIB Extender.

GPIB peripherals include HP-GL plotters, PCL printers, and SS-80 external disks.

- **Connect the analyzer's rear panel GPIB connector to an GPIB device using an GPIB interface cable.**

Caution

The analyzer contains metric threaded GPIB cable mounting studs as opposed to English threads. Use only metric threaded GPIB cable lockscrews to secure the cable to the analyzer. Metric threaded fasteners are black, while English threaded fasteners are silver.

For GPIB programming information, see the *Agilent 35670A GPIB Programming Reference*.

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To connect the analyzer to an external monitor

The External Monitor connector is a 9-pin D female miniature connector that can interface with an external, multisync monitor. The monitor must be compatible with the 24.8 kHz line rate, 55 Hz frame rate, and TTL signals provided by the Agilent 35670A. A SONY CPD-1302 monitor and a NEC Multisync 3D monitor with EZPIXpc† driver has been checked and found compatible with the Agilent 35670A external monitor mode operation.

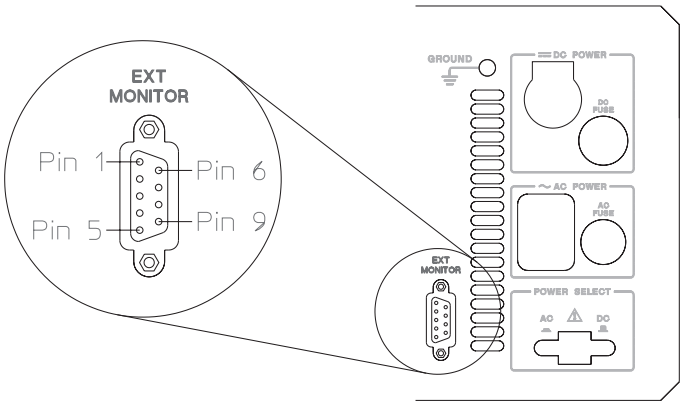
- **Set the analyzer's power switch to on (|).**
- **Set the monitor's power switch to on and configure the input and timing mode if necessary.**

See the manual supplied with the monitor for information on configuring the monitor's input and timing mode.

- **Connect the external monitor's input cable to the analyzer's rear panel EXT MONITOR connector.**

A cable with a 9-pin connector option or an adapter to a 9-pin connector is required to connect the monitor to the Agilent 35670A.

- **Press the following keys to enable external mode:**
  [Disp Format]
  [MORE]
  [MORE]
  [EXT MON ON OFF]



Pin Number	Signal Name
3	R
4	G
5	B

Pin Number	Signal Name
8	HSYNC
9	VSYNC
1, 2, 6	GND

† The EZPIXpc driver converts TTL video signals into RGB analog signals, drives 75 ohm coax cable, provides RGB composite sync or RGB sync on green, for monitors with RGB input capability. EZPIXpc, Covid, Inc., 1725 West 17th St, Tempe, Arizona 85281, 800 638 6104

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To connect the optional keyboard

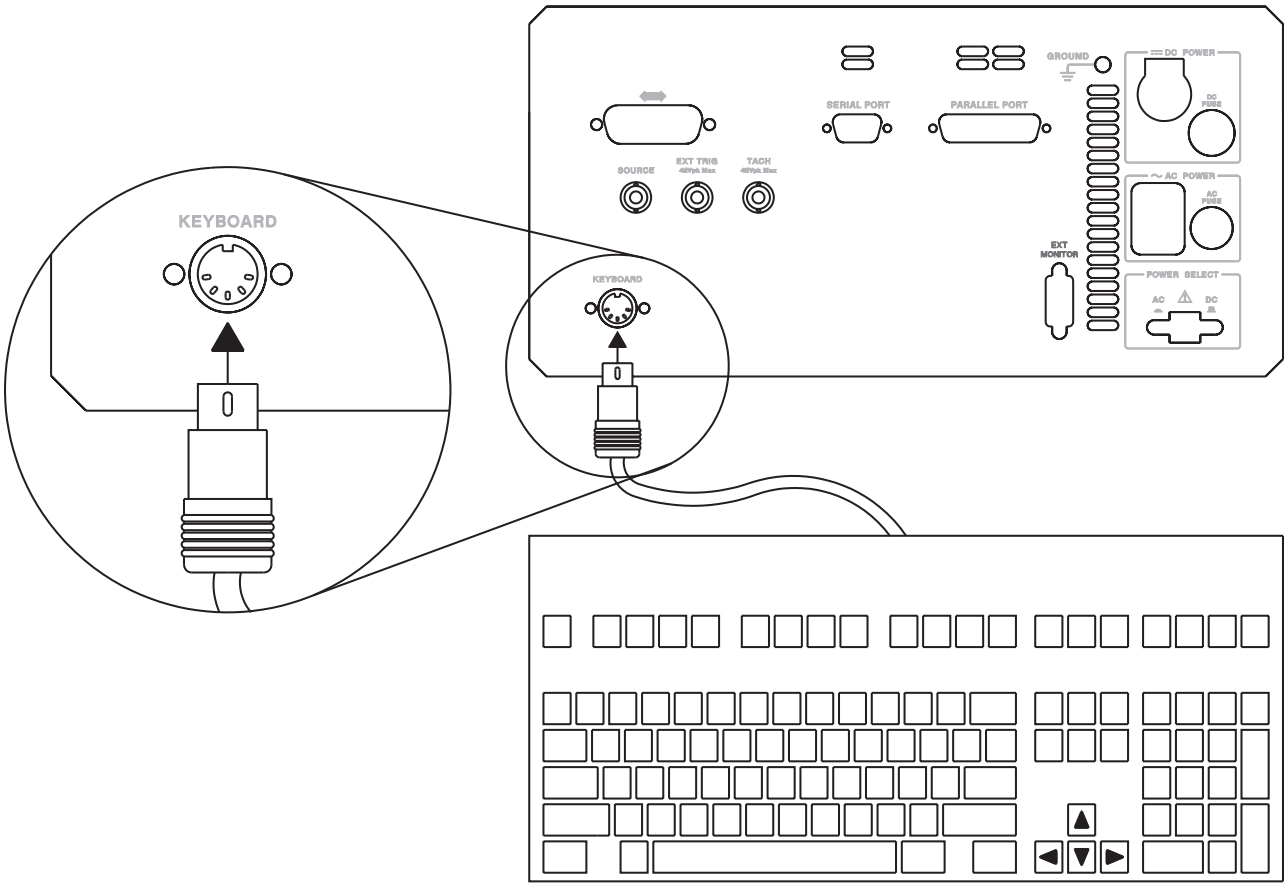
The analyzer may be connected to an optional external keyboard. The keyboard remains active even when the analyzer is not in alpha entry mode. This means that you can operate the analyzer using the external keyboard rather than the front panel. Pressing the appropriate keyboard key does the same thing as pressing a hardkey or a softkey on the analyzer's front panel.

- **Set the power switch to off (O).**

Caution

Do not connect or disconnect the keyboard cable with the line power turned on (I). Connecting or disconnecting the keyboard while power is applied may damage the keyboard or the analyzer.

- **Connect the round plug on the keyboard cable to the KEYBOARD connector on the analyzer's rear panel. Make sure to align the plug with the connector pins.**



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- **Connect the other end of the keyboard cable to the keyboard.**

Caution

In addition to the U.S. English keyboard, the Agilent 35670A Dynamic Signal Analyzer supports U.K. English, German, French, Italian, Spanish, and Swedish. Use only the Agilent Technologies approved keyboard for this product. Agilent Technologies does not warrant damage or performance loss caused by a non-approved keyboard. See the beginning of this guide for part numbers of approved Agilent Technologies keyboards.

- **To configure your analyzer for a keyboard other than U.S. English, press [System Utility] [KEYBOARD SETUP]. Then press the appropriate softkey to select the language.**

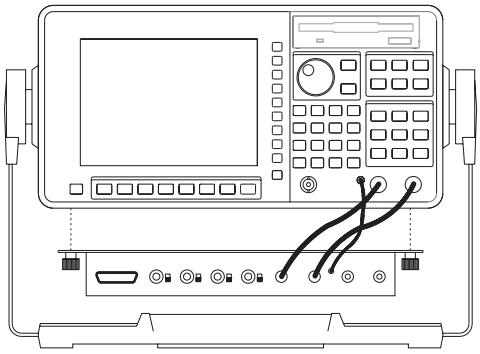
Configuring your analyzer to use a keyboard other than U.S. English only ensures that the analyzer recognizes the proper keys for that particular keyboard. Configuring your analyzer to use another keyboard *does not* localize the on-screen annotation or the analyzer's online HELP facility.

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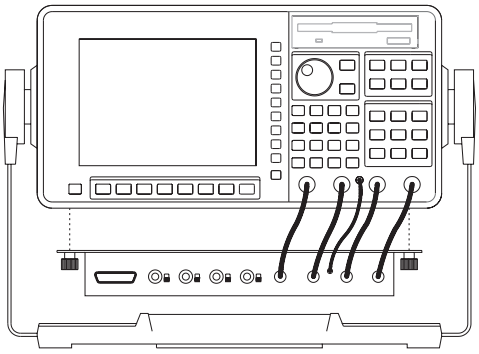
To connect the microphone adapter

The Microphone Adapter and Power Supply (option UK4) simplifies microphone connections. The mic connector on the analyzer's front panel provides 8 Vdc to power the adapter. The adapter's internal power supply uses a step-up converter to provide 28 V and 200 V on the seven-pin input connectors. The 28 V pins power the microphone pre-amplifiers. The 200 V pins polarize the condenser microphone cartridges.

- **Flip the bail handle down to support the front of the analyzer.**
- **Insert the threaded ends of the adapter's two knurled knobs into the standoffs on the bottom of the analyzer's case, then tighten the knobs with your fingers.**
- **Attach the adapter's mic cable to mic connector on the analyzer's front panel.**
- **Connect the adapter's BNCs to the corresponding BNCs on the analyzer's front panel.**



Standard 2 channel Agilent 35670A
Agilent 35670A



Optional 4 channel

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To clean the screen

The analyzer's display is covered with a plastic diffuser screen (this is not removable by the operator). Under normal operating conditions, the only cleaning required will be an occasional dusting. However, if a foreign material adheres itself to the screen, do the following:

- **Set the power switch to off (O).**
- **Remove the power cord.**
- **Dampen a soft, lint-free cloth with a mild detergent mixed in water.**
- **Carefully wipe the screen.**

Caution

Do not apply any water mixture directly to the screen or allow moisture to go behind the front panel. Moisture behind the front panel will severely damage the instrument.

To prevent damage to the screen, do not use cleaning solutions other than the above.

To store the analyzer

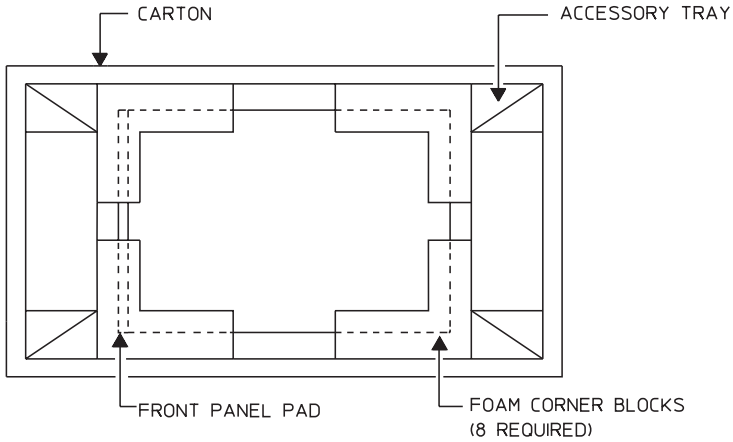
- **Store the analyzer in a clean, dry, and static free environment.**
  For other requirements, see environmental specifications in chapter 1, ''Specifications.''

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To transport the analyzer

- Package the analyzer using the original factory packaging or packaging identical to the factory packaging.

  Containers and materials identical to those used in factory packaging are available through Agilent Technologies offices.
- If returning the analyzer to Agilent Technologies for service, attach a tag describing the following:
  - Type of service required
  - Return address
  - Model number
  - Full Serial number
  - In any correspondence, refer to the analyzer by model number and full serial number
- Mark the container FRAGILE to ensure careful handling.
- If necessary to package the analyzer in a container other than original packaging, observe the following (use of other packaging is not recommended):
  - Snap the impact cover in place to protect the front panel.
  - Wrap the analyzer in heavy paper or anti-static plastic.
  - Use a double-wall carton made of at least 350-pound test material.
  - Cushion the analyzer to prevent damage.



Caution

Do not use styrene pellets in any shape as packing material for the analyzer. The pellets do not adequately cushion the analyzer and do not prevent the analyzer from shifting in the carton. In addition, the pellets create static electricity which can damage electronic components.

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If the analyzer will not power up

- ❑ Check that the power cord is connected to the Agilent 35670A and to a live power source.
- ❑ Check that the front-panel switch is on (|).
- ❑ Check that the rear-panel AC/DC power select switch is properly set.
- ❑ Check that the fuse is good.
  See ''To change the fuses'' on page 2-10.
- ❑ Check that the analyzer's air circulation is not blocked.
  Cooling air enters the analyzer through the right side and exhausts through the left side and rear panel. If the analyzer's air circulation is blocked, the analyzer powers down to prevent damage from excessive temperatures. The analyzer remains off until it cools down and its power switch is set to off (O) then to on (|).
- ❑ Obtain Agilent service, if necessary. See ''Need Assistance?'' at the end of this guide.

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If the analyzer operates intermittently on dc power

The analyzer powers down when operating on dc power if no measurement has been made within 30 minutes.

- ❑ Check that the dc power source can supply the required power.

  The dc power source must have a true range of 10.8 to 30.8 Vdc. At the minimum voltage of 10.8 Vdc, the dc power source must be able to supply approximately 8.7 amps for a two-channel analyzer and 12.2 amps for a four-channel analyzer. The voltage loss through an automotive cigarette lighter system can cause the dc voltage to go below 10.8 Vdc.
- ❑ Check that power transients are not causing the dc voltage to go below 10.8 Vdc.

  The dc voltage provided by an automobile is susceptible to power transients. For example, power transients may occur when lights or fans turn on or off, when power door locks engage or disengage, and when windshield wipers operate. If the dc supply voltage falls below 10.8 V, the analyzer automatically turns off. However, the analyzer is not affected by power transients that occur within the range of 10.8 to 30.8 Vdc.
- ❑ Check that the cable connections are not loose.
- ❑ Obtain Agilent service, if necessary. See ‘’Need Assistance?’’ at the end of this guide.

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3

Verifying Specifications

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Verifying Specifications

This chapter tells you how to use the *Agilent 35670A Semiautomated Performance Test Disk*. The performance test disk contains a program that semiautomates the operation verification tests and performance tests.

After you review this chapter, follow the directions in ''To load the program'' then continue with one of the following:

- ''To run the program in semiautomated mode''
- ''To run the program without a printer''
- ''To run the program in manual mode''

Caution

Before applying line power to the analyzer or testing its electrical performance, see chapter 2, ''Preparing the Analyzer for Use.''

Overview

The *Semiautomated Performance Test Disk* contains a program (ITM_35670A) and two procedure files (OP_VERIFY and PERFORMAN). ITM_35670A is the test manager program. OP_VERIFY is the operation verification procedure file and PERFORMAN is performance test procedure file. The procedure files contain an ordered list of tests, and each test contains one or more measurements. Since ITM_35670A reads the procedure files, the disk must remain in the disk drive during testing.

If you do not have a keyboard connected to the analyzer, use the numeric key pad and the alpha keys when the program prompts you to type in information. See the analyzer's help text for a description of the alpha keys.

If a test fails, contact your local Agilent Technologies sales and service office or have a qualified service technician see chapter 4, ''Troubleshooting the Analyzer,'' in the *Agilent 35670A Service Guide*.

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Features of the Program

- The program can automatically create a printout similar to the test records at the back of this chapter.
- The program can beep when equipment connections need to be changed.
- The program can start the test sequence at any test in the operation verification or performance test list.
- The program can stop after each measurement or alternatively, only if a failure occurs.
- The program can be run in manual mode.

Test Duration

In semiautomated mode, the operation verification tests require approximately 1½ hours and the performance tests require approximately 2½ hours.

Calibration Cycle

To verify the Agilent 35670A Dynamic Signal Analyzer is meeting its published specifications, do the performance tests every 12 months.

Recommended Test Equipment

The equipment needed for operation verification and performance tests is listed on page 1-18. Other equipment may be substituted for the recommended model if it meets or exceeds the listed critical specifications.

Also, if you want the test record to be automatically printed, you need an GPIB printer. If you want the printer to automatically leave top and bottom margins on every page, enable perforation skip mode (see your printer's manual for directions). If you do not have an GPIB printer you must record the results of each test in the test records. These test records may be reproduced without written permission of Agilent Technologies.

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Program Controlled Test Equipment

This program automatically controls the instruments listed in the following table using GPIB commands. If you use a test instrument other than those shown in the table, the program prompts you to set the instrument state during testing.

Test Equipment	Program Controlled Model
AC Calibrator	Fluke 5700A Alternate Fluke 5200A Datron 4200, 4707, 4708
Frequency Synthesizer	HP 3326A Alternate (2) HP 3325A/B
Digital Multimeter	HP 3458A Alternate HP 3455A HP 3456A HP 3478A

Measurement Uncertainty

A table starting on page 3-56 lists the measurement uncertainty and ratio for each performance test using the recommended test equipment. Except for the External Trigger test, the ratios listed for the recommended test equipment meet or exceed the measurement uncertainty ratio required by U.S. MIL-STD-45662A. The table also provides a place to record the measurement uncertainty and ratio for each performance test using equipment other than the recommended test equipment. The table may be reproduced without written permission of Agilent Technologies.

Operation Verification and Performance Tests

The operation verification tests give a high confidence level (>90%) that the Agilent 35670A Dynamic Signal Analyzer is operating properly and within specifications. The operation verification tests are a subset of the performance tests. The operation verification tests should be used for incoming and after-repair inspections. The performance tests provide the highest level of confidence and are used to verify that the Agilent 35670A Dynamic Signal Analyzer conforms to its published specifications. Some repairs require a performance test to be done after the repair (see chapter 6, ‘’Replacing Assemblies’’ in the *Agilent 35670A Service Guide* for this information). The following table lists the operation verification and performance tests.

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Operation Verification Tests	Performance Tests
Self Test	Self Test
DC Offset	DC Offset
Noise	Noise
Spurious Signals	Spurious Signals
Amplitude Accuracy	Amplitude Accuracy
Flatness	Flatness
Amplitude Linearity	Amplitude Linearity
A-Weight Filter	A-Weight Filter
Channel Match	Channel Match
Frequency Accuracy	Frequency Accuracy
Single Channel Phase Accuracy	Anti-Alias Filter
Tach Function	Input Coupling
ICP Supply	Harmonic Distortion
Source Amplitude Accuracy	Intermodulation Distortion
Source Flatness	Cross Talk
Source Distortion	Single Channel Phase Accuracy
	External Trigger
	Tach Function
	Input Resistance
	ICP Supply
	Source Amplitude Accuracy
	Source Output Resistance
	Source DC Offset
	Source Flatness
	Source Distortion

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Specifications and Performance Tests

The following table lists specifications and the performance test or tests that verify each specification.

Specification	Performance Test
Frequency	
Accuracy	Frequency Accuracy
Single Channel Amplitude	
Residual dc response	DC Offset
FFT full scale accuracy at 1 kHz	Amplitude Accuracy
FFT full scale flatness	Flatness
FFT amplitude linearity at 1 kHz	Amplitude Linearity
FFT Dynamic Range	
Frequency alias responses	Anti-Alias Filter
Harmonic distortion	Harmonic Distortion
Intermodulation distortion	Intermodulation Distortion
Spurious and residual responses	Spurious Signals
Input Noise	Noise
Single Channel Phase	Single Channel Phase Accuracy
Cross Channel Amplitude	Channel Match
Cross Channel Phase	Channel Match
Input	
ac coupling rolloff	Input Coupling
Cross talk	Cross Talk
Input impedance	Input Resistance
ICP signal conditioning	ICP Supply
A-weight filter	A-Weight Filter
Trigger	
External trigger	External Trigger
Tachometer	
Tachometer level accuracy	Tach Function
Source Output	
Sine flatness	Source Flatness
Harmonic and sub-harmonic distortion	Source Distortion
Sine amplitude accuracy at 1 kHz	Source Amplitude Accuracy
Resistance	Source Output Resistance
dc offset accuracy	Source DC Offset

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To load the program

For information about the program's softkeys, see the menu descriptions starting on page 3-51.

- **Set the Agilent 35670A Dynamic Signal Analyzer's power switch to off (O), then connect the analyzer, test instruments, and printer using GPIB cables.**
- **If you have the PC Style Keyboard, option 1CL, connect the keyboard to the analyzer using the keyboard cable (see ''To connect the optional keyboard'' in chapter 2).**
- **Insert the *Semiautomated Performance Test Disk* into the analyzer's disk drive, then set the power switch to on (I).**
- **After the analyzer finishes its power-up calibration routine, press the following keys:**

[**Local/GPIB**]
[SYSTEM CONTROLLR]
[**System Utility**]
[MEMORY USAGE]
[REMOVE WATERFALL]
[CONFIRM REMOVE]
[RETURN]
[MORE]
[SERVICE TESTS]
[PERFRMANC TEST]

- **Now go to one of the following procedures to continue:**
- ''To run the program in semiautomated mode''
- ''To run the program without a printer''
- ''To run the program in manual mode''

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To run the program in semiautomated mode

You must have an GPIB printer connected to your system to run the program in semiautomated mode. If you do not have a printer, see ''To run the program without a printer'' later in this chapter.

- **Press the following keys and when the program prompts you, type in the information for the title page of the test record and press [ENTER]:**

[TITLE PAGE]
[TEST FACILITY]
[FACILITY ADDRESS]
[TESTED BY]
[REPORT NUMBER]
[CUSTOMER]
[MORE]
[TEMP]
[HUMIDITY]
[LINE FREQUENCY]
[RETURN]

- **Press the following keys and when the program prompts you, type in the equipment configuration information:**

[EQUIP CONFIG]
[AC CALIBRATO]
[SYNTH. 1]
[SYNTH. 2] (If needed)
[LOW-D OSCILLATO] (If needed)
[MULTIMETER]
[RETURN]

The GPIB address is 100 x (interface select code) + (primary address). The interface select code for the test equipment and printer is 7 (for example, if the primary address is 8, the GPIB address is 708).

When entering the calibration due date, only four characters are displayed on the screen. However, you can enter up to nine characters and they will be printed.

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- **Press the following keys and type in the printer address when the program prompts you:**

[TEST CONFIG]
[PRINTER ADDRESS]
[PROCEDURE]
[OP VERIFY] or [PERFORMAN]
[STOP AFTER]
[LIMIT FAILURE] or [NONE]
[RETURN]

- **Press the following keys to start the test:**

[START TESTING]
[START BEGINNING]

When you select [START BEGINNING], the data is written to a file on the disk and printed only after all tests are done. When you select [START MIDDLE] or [ONE TEST], the data is printed immediately after each measurement.

- **Follow the directions on the display.**

Warning

During the test, the program prompts you to change the test equipment connections. Always turn the ac calibrator output to OFF or STANDBY before changing test equipment connections. The ac calibrator can produce output voltages that could result in injury to personnel.

The directions on the display briefly tell you how to connect test equipment. For detailed illustrations of equipment setup, see the setup illustrations starting on page 3-13.

If you want to pause the program and return the Agilent 35670A Dynamic Signal Analyzer to front panel control, press [**BASIC**]. To continue the program, press [**BASIC**] [DISPLAY SETUP] [LOWER] [RETURN] [CONTINUE]. If you changed any instrument setup states, press [RESTART TEST] instead of [CONTINUE]to ensure accurate measurement results.

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To run the program without a printer

Use this procedure if you do not have an GPIB printer connected to yout system.

- **Write in the information needed on the title page of the selected test record.**

The test records are located near the back of this chapter and may be copied without written permission of Agilent Technologies.

- **Press the following keys and when the program prompts you, type in the model number and GPIB address:**

[EQUIP CONFIG]
[AC CALIBRATO]
[SYNTH. 1]
[SYNTH. 2] (If needed)
[LOW-D OSCILLATO] (If needed)
[MULTIMETER]
[RETURN]

The GPIB addresses equals 100 ⟩(interface select code) + (primary address). The interface select code for the test equipment is 7 (for example, if the primary address is 8, the GPIB address is 708).

- **Press the following keys:**

[TEST CONFIG]
[PROCEDURE]
[OP VERIFY] or [PERFORMAN]
[STOP AFTER]
[EACH MEASUREMENT]
[RETURN]

- **Press the following keys to start the test:**

[START TESTING]
[START BEGINNING]

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- **Now follow the directions on the display and record every measurement result in the selected test record.**

Warning

During the test, the program prompts you to change the test equipment connections. Always turn the ac calibrator output to OFF or STANDBY before changing test equipment connections. The ac calibrator can produce output voltages that could result in injury to personnel.

The directions on the display briefly tell you how to connect test equipment. For detailed illustrations of equipment setup, see the setup illustrations starting on page 3-13.

If you want to pause the program and return the Agilent 35670A Dynamic Signal Analyzer to front panel control, press [**BASIC**]. To continue the program, press [**BASIC**] [DISPLAY SETUP] [LOWER] [RETURN] [CONTINUE]. If you changed any instrument setup states, press [RESTART TEST] instead of [CONTINUE] to ensure accurate measurement results.

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To run the program in manual mode

Use this procedure if you want to run the program in manual mode. You will be prompted to set up all test equipment and you can check the analyzer's setup state after each measurement.

- **Write in the information needed on the title page of the selected test record.**

The test records are located near the back of this chapter and may be copied without written permission of Agilent Technologies.

- **Press the following keys and when the program prompts you, set all GPIB addresses to 0:**

[EQUIP CONFIG]
[AC CALIBRATO]
[SYNTH. 1]
[SYNTH. 2] (If needed)
[LOW-D OSCILLATO] (If needed)
[MULTIMETER]
[RETURN]

- **Press the following keys:**

[TEST CONFIG]
[PROCEDURE]
[OP VERIFY] or [PERFORMAN]
[STOP AFTER]
[EACH MEASUREMENT]
[RETURN]

- **Press the following keys to start the test:**

[START TESTING]
[START BEGINNING]

- **Now follow the directions on the display and record the measurement result in the selected test record after every measurement.**

If you want to view the analyzer's setup state, press [**BASIC**] [**Disp Format**] [MEASURMNT STATE] or [INPUT STATE]. To continue the program, press [**BASIC**] [DISPLAY SETUP] [LOWER] [RETURN] [CONTINUE]. If you changed any instrument setup states, press [RESTART TEST] instead of [CONTINUE] to ensure accurate measurement results.

Warning

During the test, the program prompts you to change the test equipment connections. Always turn the ac calibrator output to OFF or STANDBY before changing test equipment connections. The ac calibrator can produce output voltages that could result in injury to personnel.

The directions on the display briefly tell you how to connect test equipment. For detailed illustrations of equipment setup, see the setup illustrations starting on the next page.

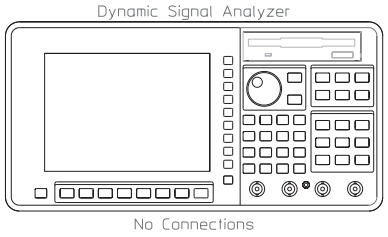
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To set up the self test

Performance Test and Operation Verification

This test checks the measurement hardware in the Agilent 35670A. No performance tests should be attempted until the analyzer passes this test. This test takes approximately one minute to complete, and requires no external equipment.

1



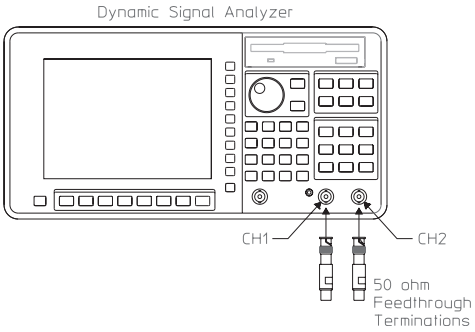
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To set up the dc offset test

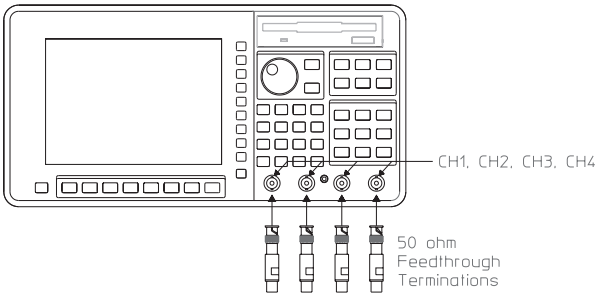
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its single channel amplitude specification for residual dc responses. In this test, the Agilent 35670A measures its internal residual dc offset at two amplitudes.

1 2 ch



1 4 ch



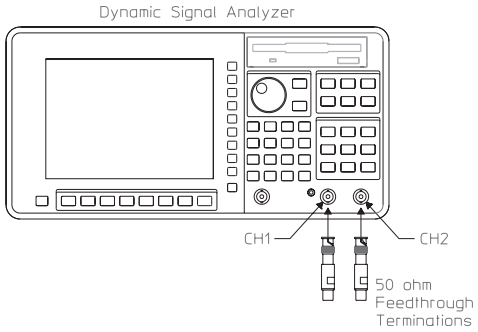
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To set up the noise test

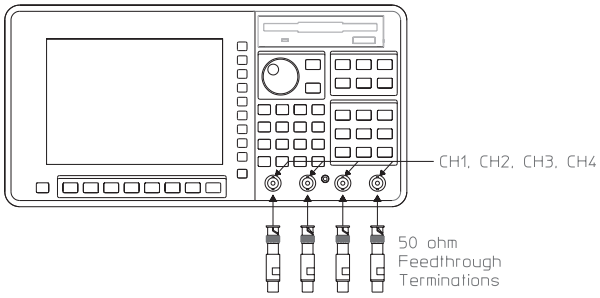
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its input noise specification. In this test, the Agilent 35670A measures its internal noise level.

1 2 ch



1 4 ch



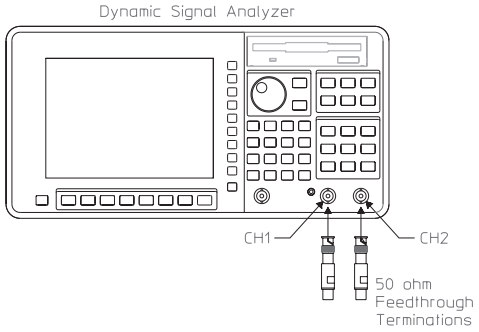
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To set up the spurious signals test

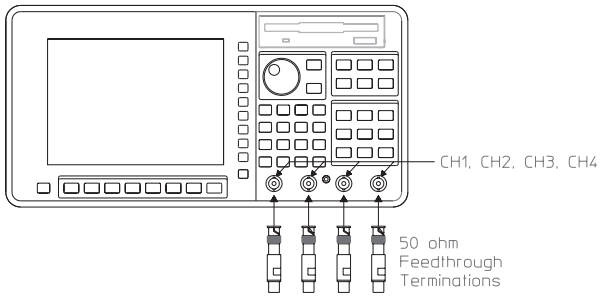
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its FFT dynamic range specification for spurious and residual responses. In this test, the Agilent 35670A measures its internal spurious signals. The test records at the end of this chapter list the frequencies that are checked.

1 2 ch



1 4 ch



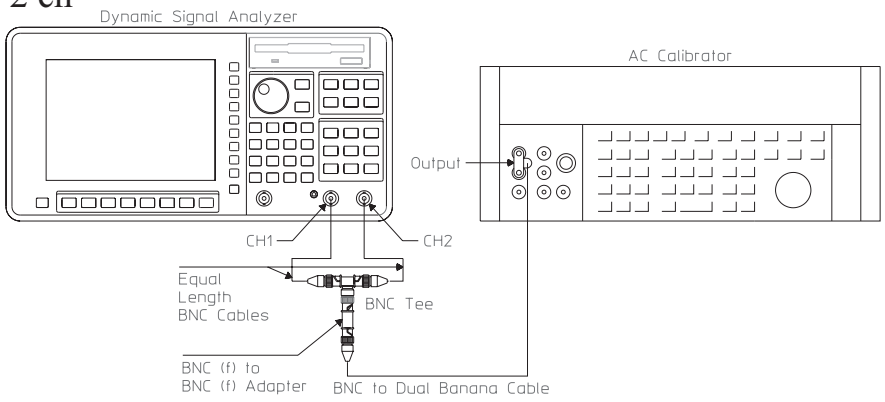
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To set up the amplitude accuracy test

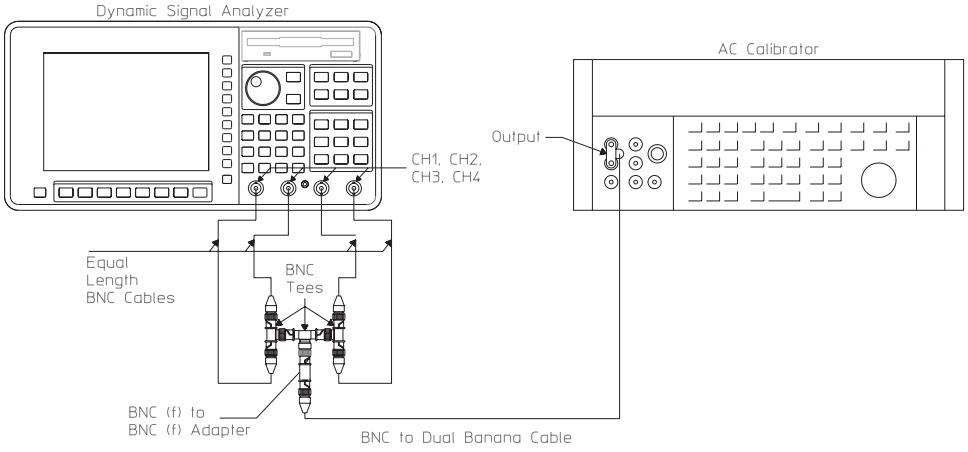
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its single channel amplitude specification for FFT full scale accuracy at 1 kHz. In this test, an ac calibrator outputs a 1 kHz signal with an exact amplitude to all channels. This test checks amplitude accuracy at 27, 19, 9, 1, –11, –27, –35, –43, and –51 dBVrms.

1 2 ch



1 4 ch



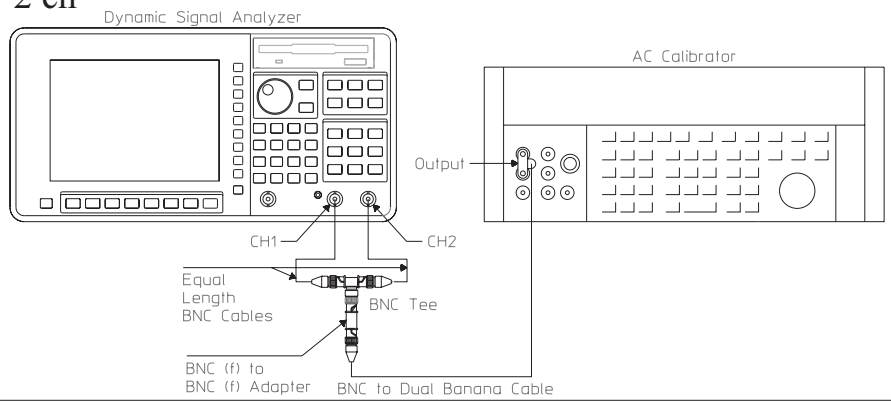
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To set up the flatness test

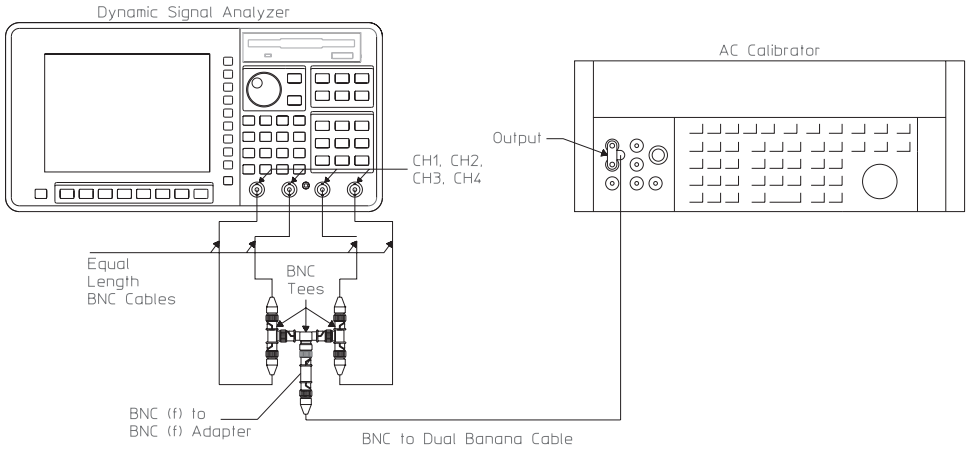
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its single channel amplitude specification for FFT full scale flatness relative to 1 kHz. In this test, the ac calibrator outputs a signal with an exact amplitude to all channels. The test records at the end of this chapter list the amplitudes and frequencies that are checked.

1 2 ch



1 4 ch



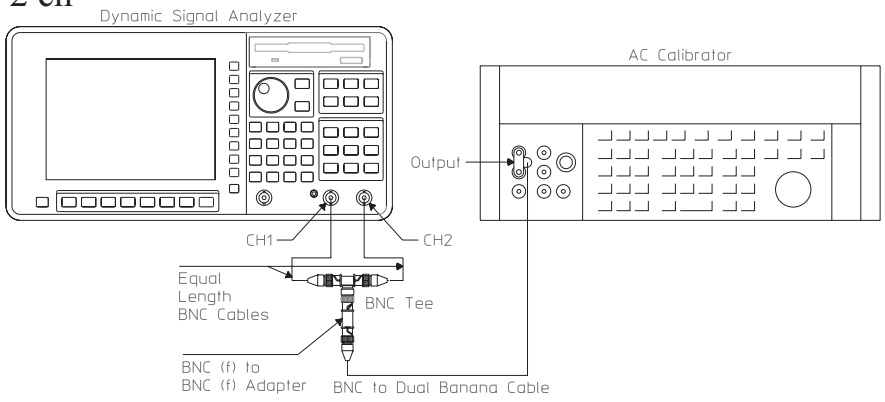
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To set up the amplitude linearity test

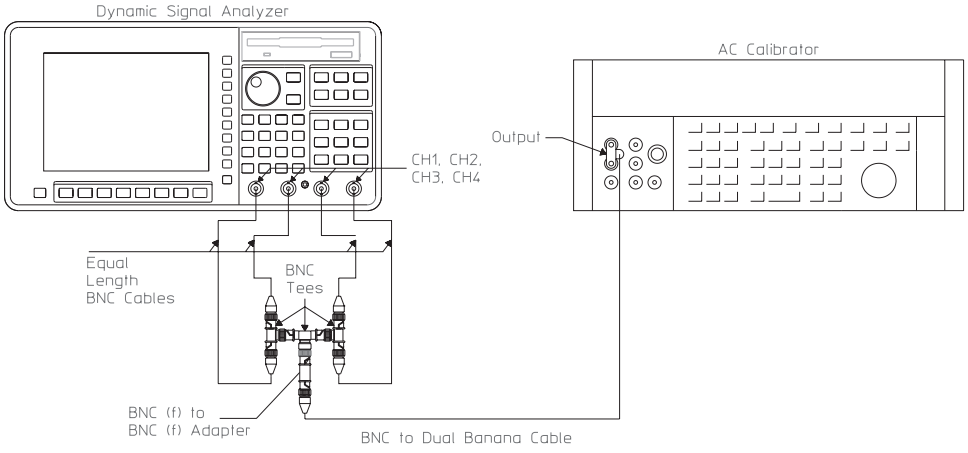
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its single channel amplitude specification for FFT amplitude linearity at 1 kHz. In this test, the ac calibrator outputs a 1 kHz signal with an an exact amplitude to all channels. This test checks amplitude linearity at 27, 13, –1, –15, –29, –43, and –53 dBVrms.

1 2 ch



1 4 ch



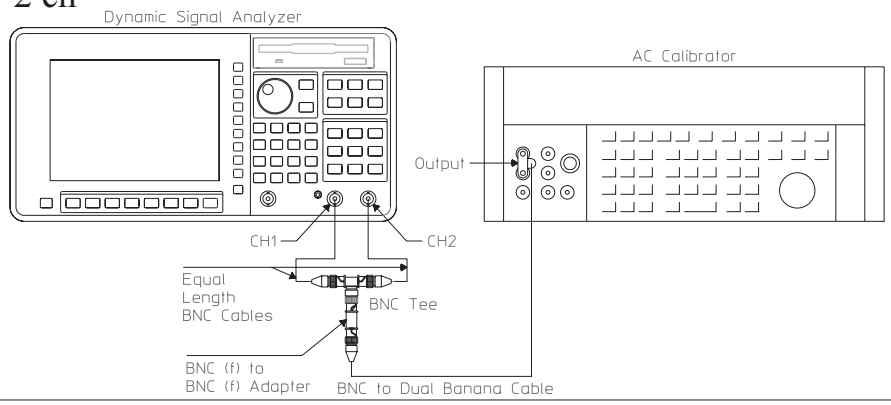
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To set up the A-weight filter test

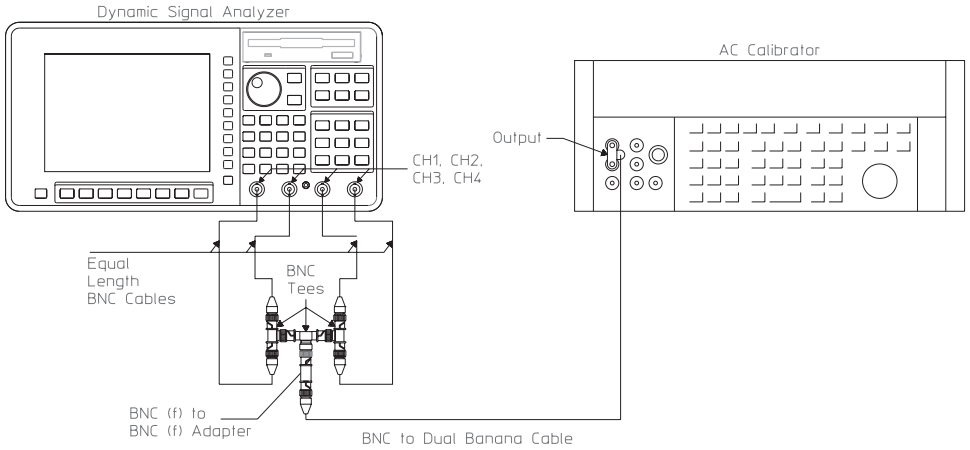
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its input specification for A-weight filter. In this test, an ac calibrator outputs a 1 dBVrms signal with an exact amplitude to all channels. The test records at the end of this chapter list the frequencies that are checked.

1 2 ch



1 4 ch



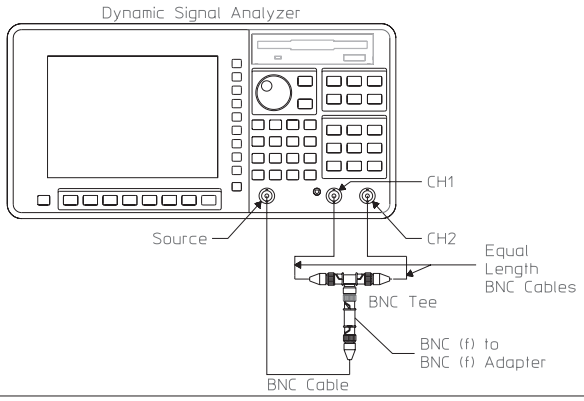
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To set up the channel match test

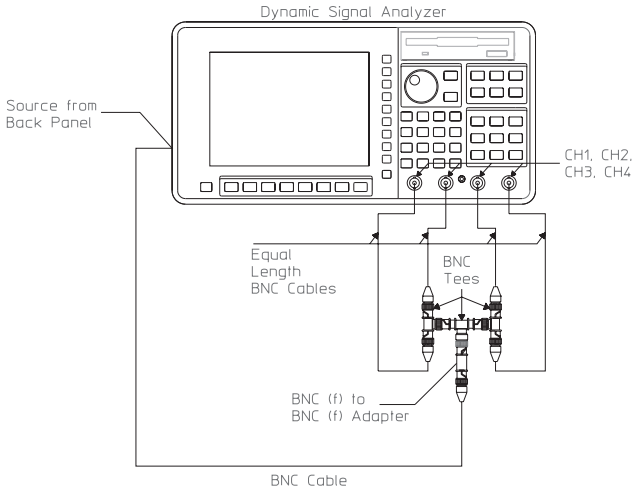
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its cross channel amplitude and cross channel phase specification. In this test, the Agilent 35670A's source outputs an identical signal to all channels. The Agilent 35670A measures the amplitude and phase of the signal and compares the values measured on one channel to the values measured on another channel.

1 2 ch



1 4 ch



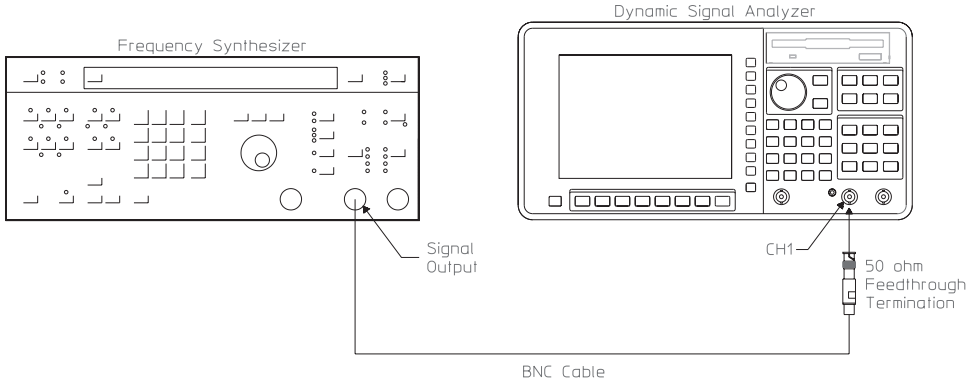
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To set up the frequency accuracy test

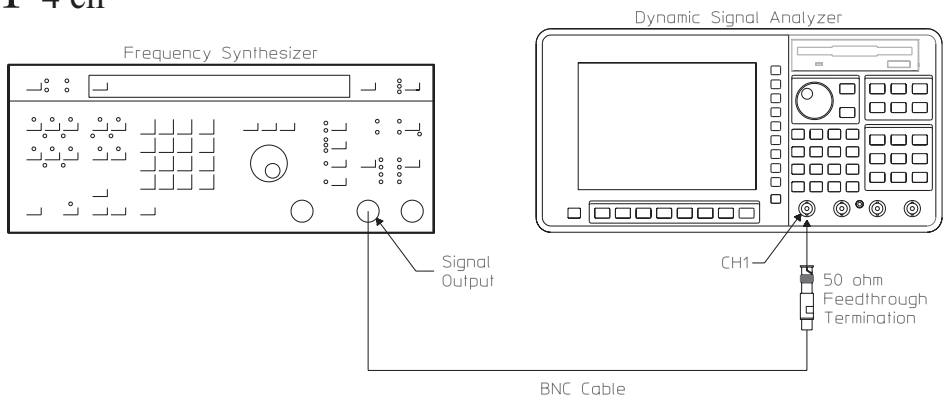
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its frequency accuracy specification. In this test, the analyzer measures the frequency of an accurate 50 kHz signal.

1 2 ch



1 4 ch



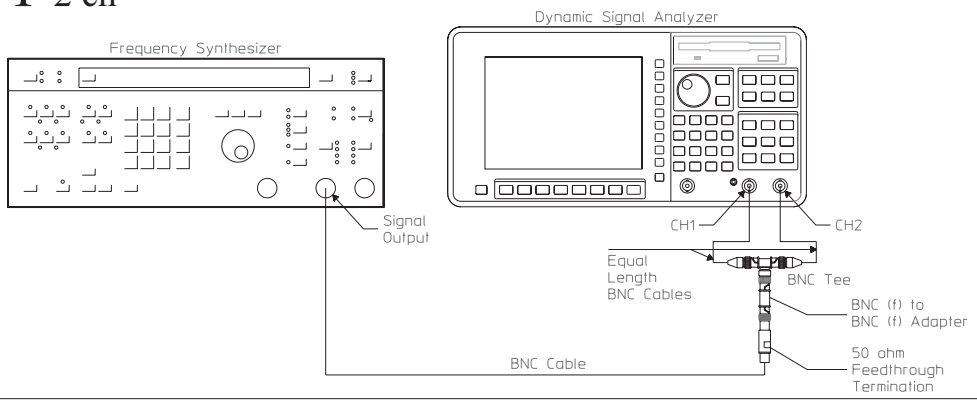
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To set up the anti-alias filter test

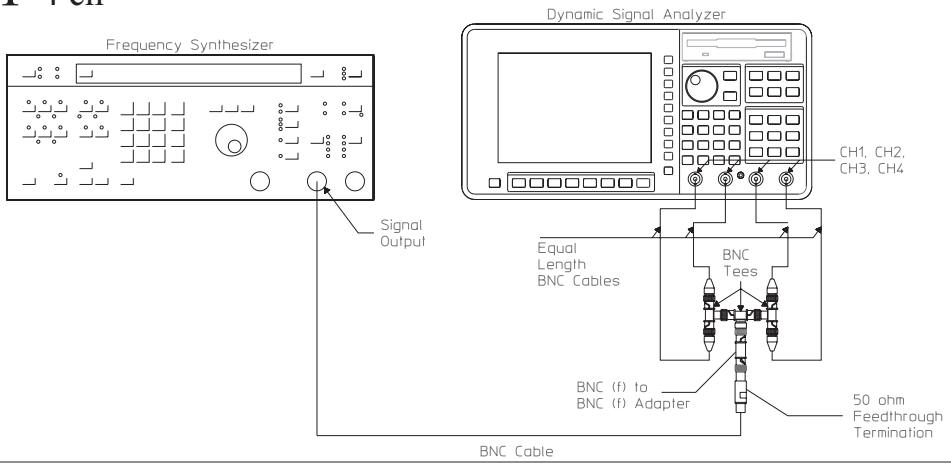
Performance Test only

This test verifies that the Agilent 35670A meets its FFT dynamic range specification for frequency alias responses. In this test, a frequency synthesizer outputs a –9 dBVrms signal known to cause an alias frequency to all channels. The Agilent 35670A then measures the alias frequency to determine how well the alias frequency was rejected. The test records at the end of this chapter list the frequencies that are checked.

1 2 ch



1 4 ch



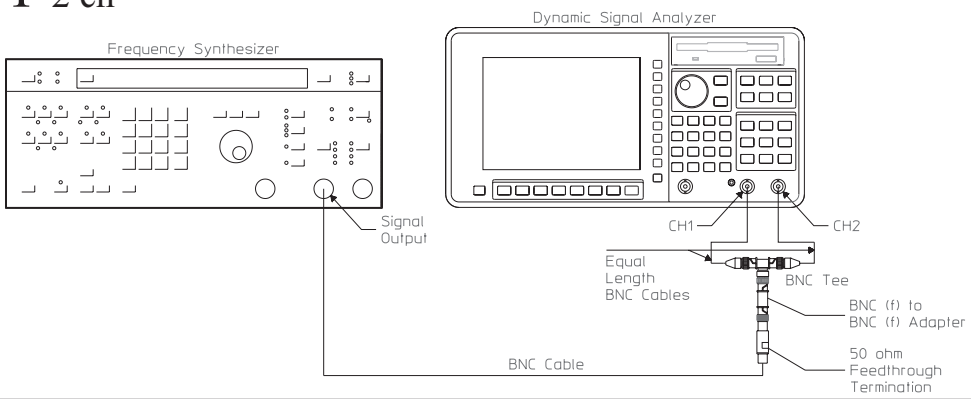
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To set up the input coupling test

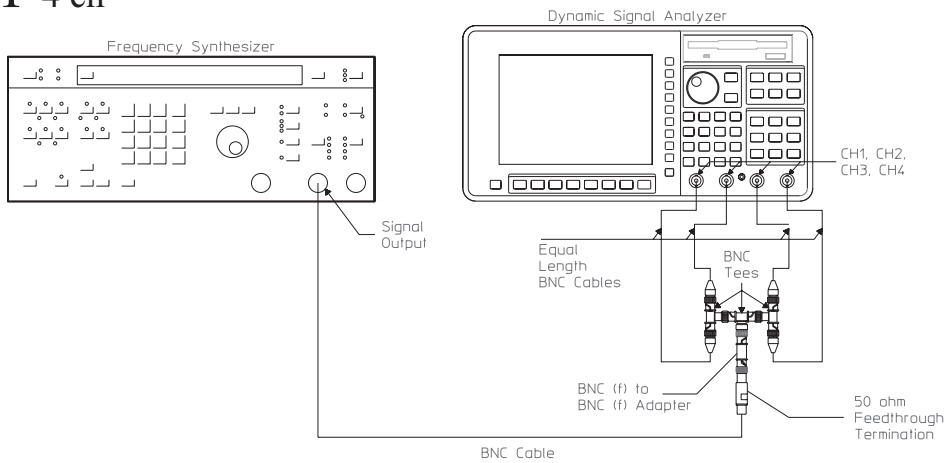
Performance Test only

This test verifies that the Agilent 35670A meets its input specification for ac coupling rolloff. In this test, a frequency synthesizer outputs a 1 Hz signal to all channels. The signal is measured in both ac and dc coupled modes. The value measured in ac coupled mode is subtracted from the value measured in dc coupled mode to determine the ac coupling rolloff.

1 2 ch



1 4 ch



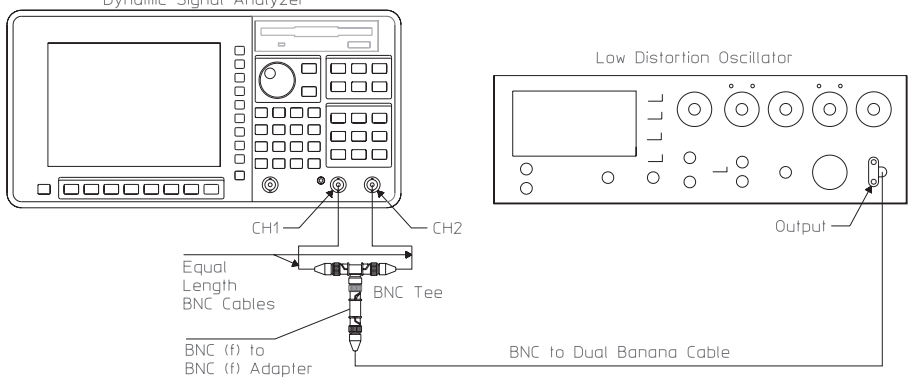
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To set up the harmonic distortion test

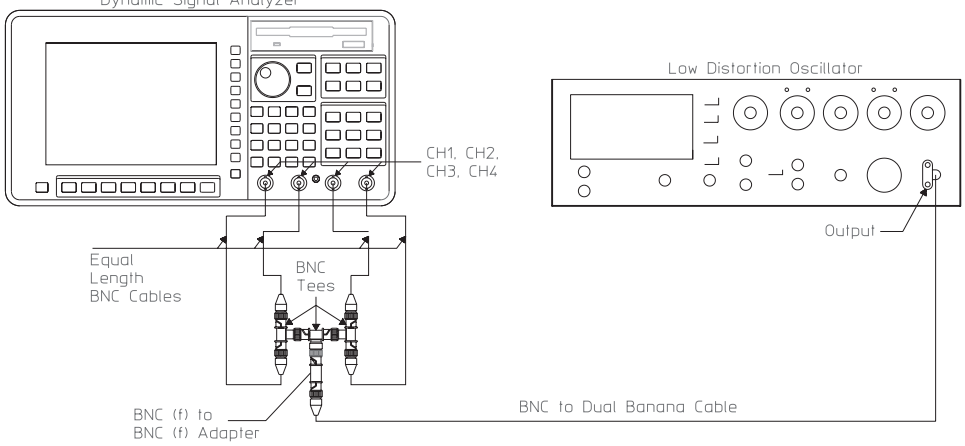
Performance Test only

This test verifies that the Agilent 35670A meets its FFT dynamic range specification for harmonic distortion. In this test, a low distortion oscillator or a frequency synthesizer and 24.5 kHz notch filter outputs a signal to all channels. The second, third, fourth, or fifth harmonic is then measured. If the harmonic falls outside the analyzer's frequency range, the analyzer measures the alias frequencies. The test records at the end of this chapter list the fundamental frequencies. If you are using the synthesizer and notch filter, the frequencies listed in the test record are approximate.

1 2 ch Using an HP339A

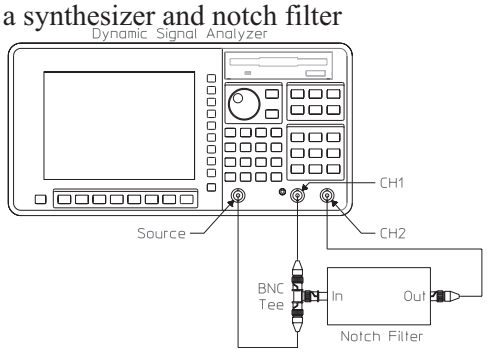


1 4 ch Using an HP 339A

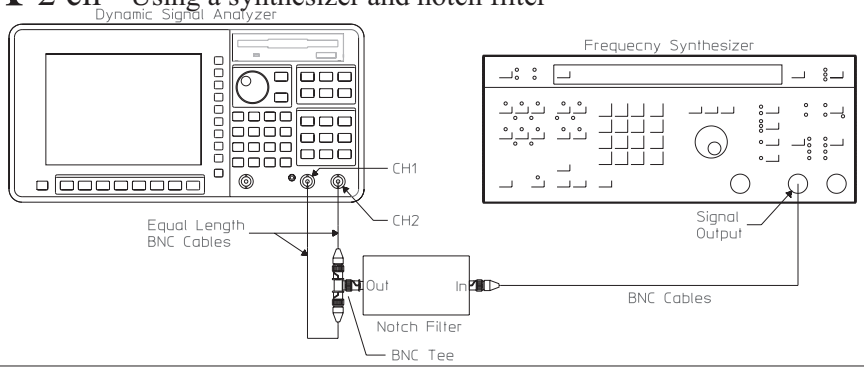


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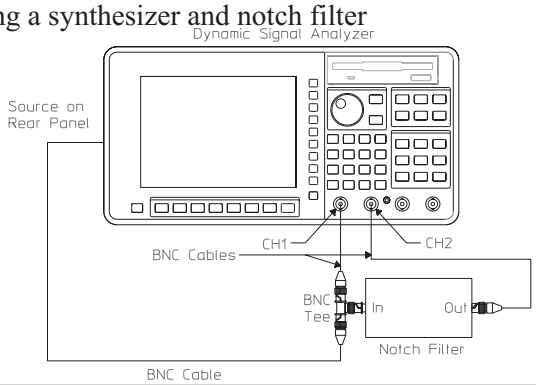
1A 2 ch Using a synthesizer and notch filter



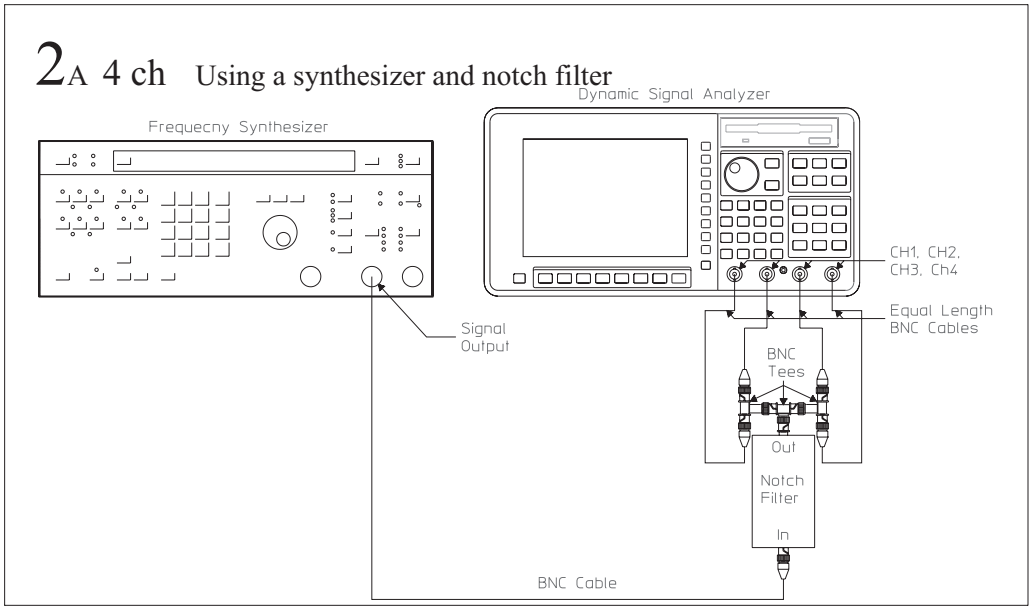
2A 2 ch Using a synthesizer and notch filter



1A 4 ch Using a synthesizer and notch filter



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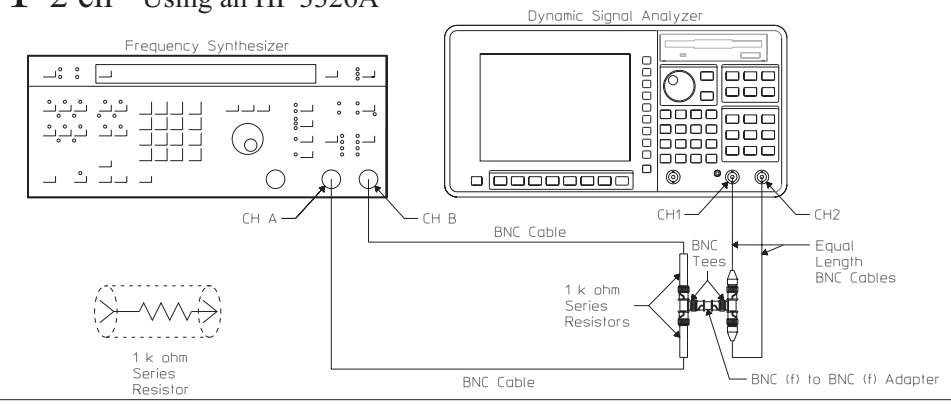
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To set up the intermodulation distortion test

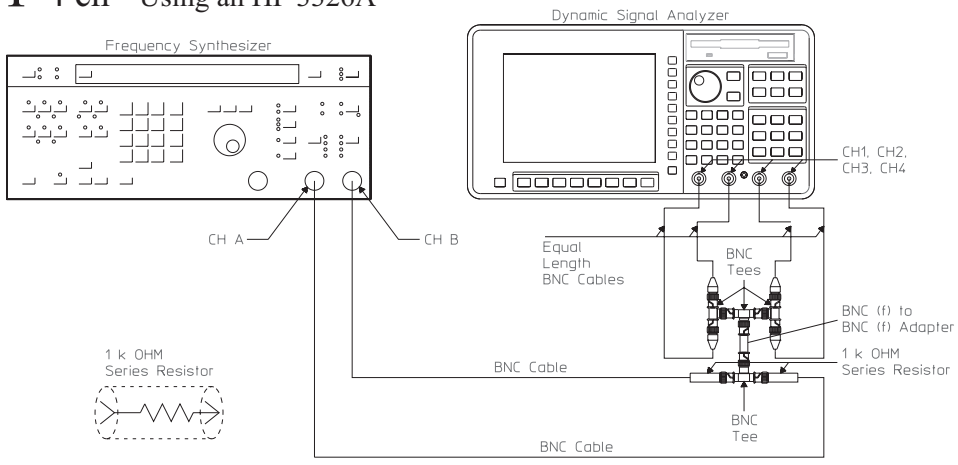
Performance Test only

This test verifies that the Agilent 35670A meets its FFT dynamic range specification for intermodulation distortion. In this test, two signals are combined to provide a composite signal to all channels. The intermodulation products are found at the sum (F1 + F2) and difference (F1 – 2F2) frequencies. The analyzer measures the amplitude of each intermodulation product.

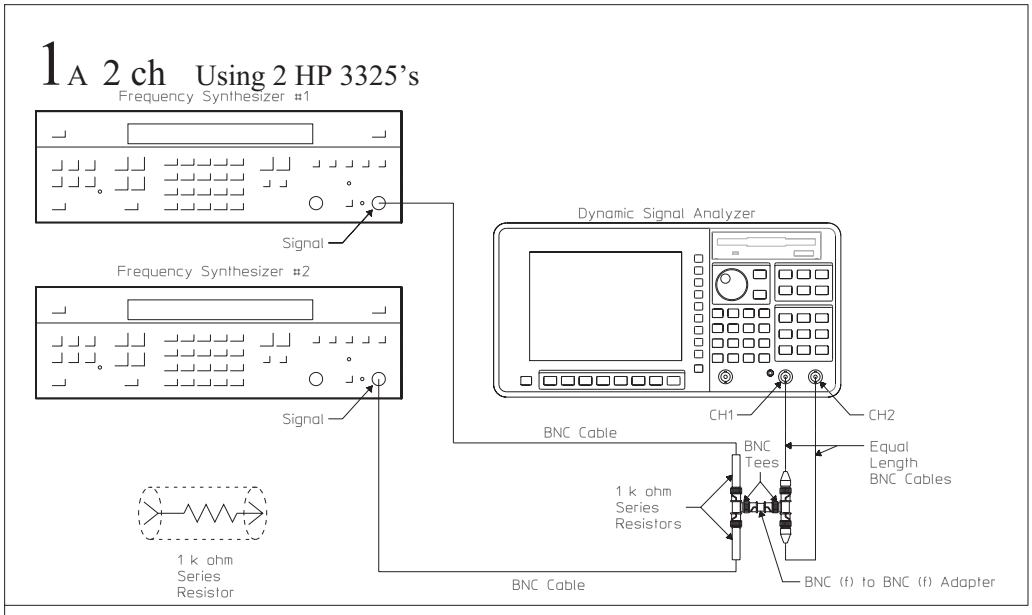
1 2 ch Using an HP 3326A

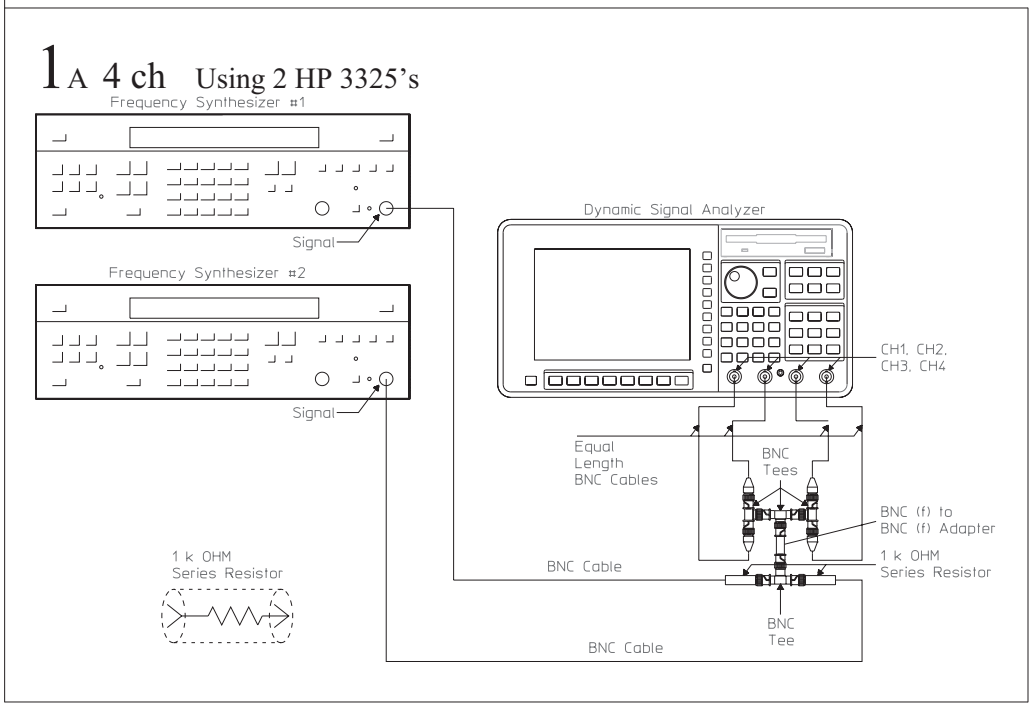


1 4 ch Using an HP 3326A



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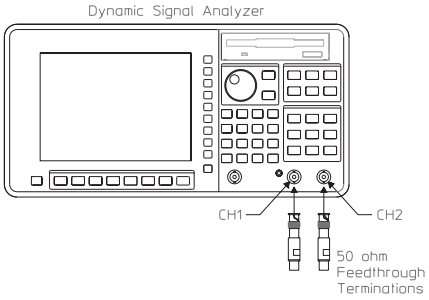
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To set up the cross talk test

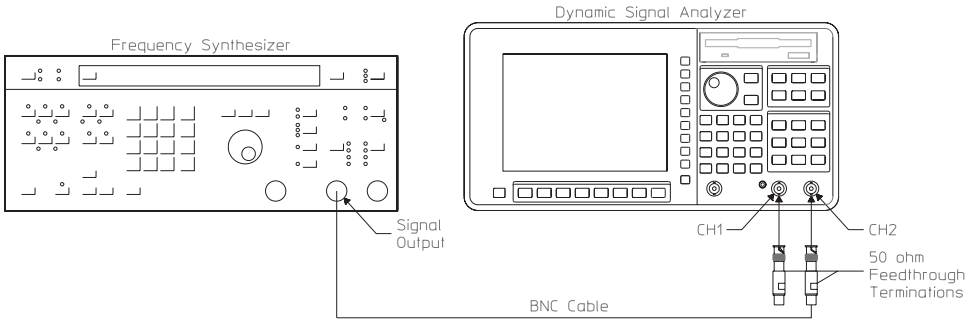
Performance Test only

This test verifies that the Agilent 35670A meets its input specification for channel-to-channel and channel-to-source cross talk. In this test, the Agilent 35670A measures the amount of energy induced from the source or input channel to another input channel. For source-to-channel crosstalk, the analyzer's source is set for 25.6 kHz, 9 dBVrms and the signal level at the input channels is measured. For channel-to-channel crosstalk, the frequency synthesizer outputs a 25.6 kHz or 51.2 kHz, 9 dBVrms signal to all but one input channel and the signal level at the unused input channel is measured.

1 2 ch

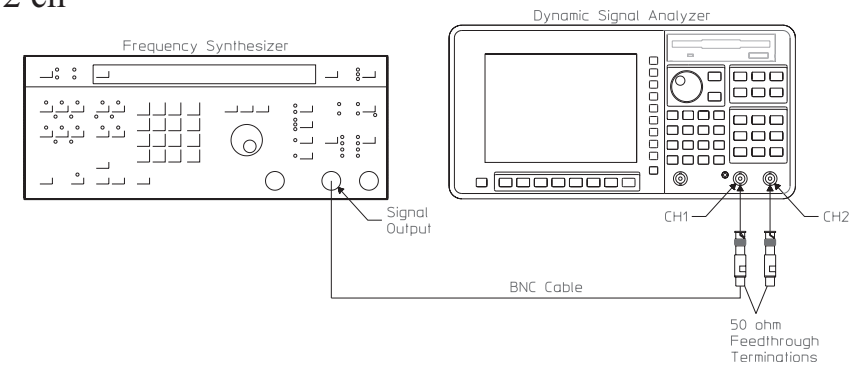


2 2 ch

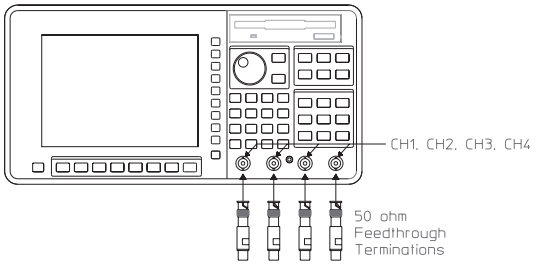


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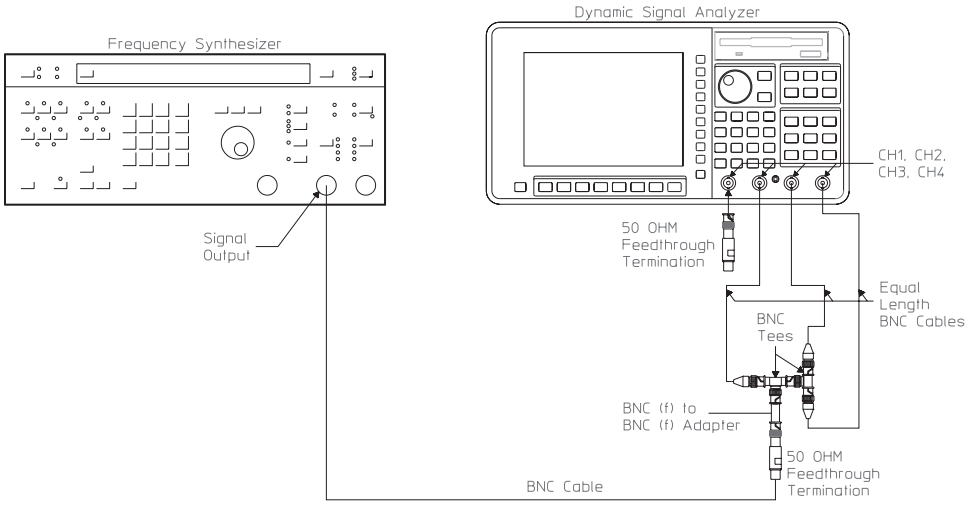
3 2 ch



1 4 ch

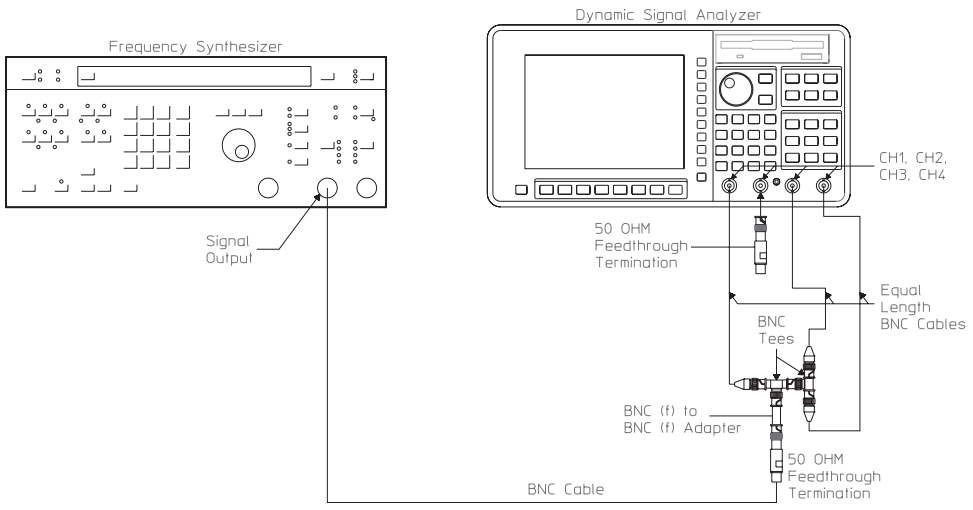


2 4 ch

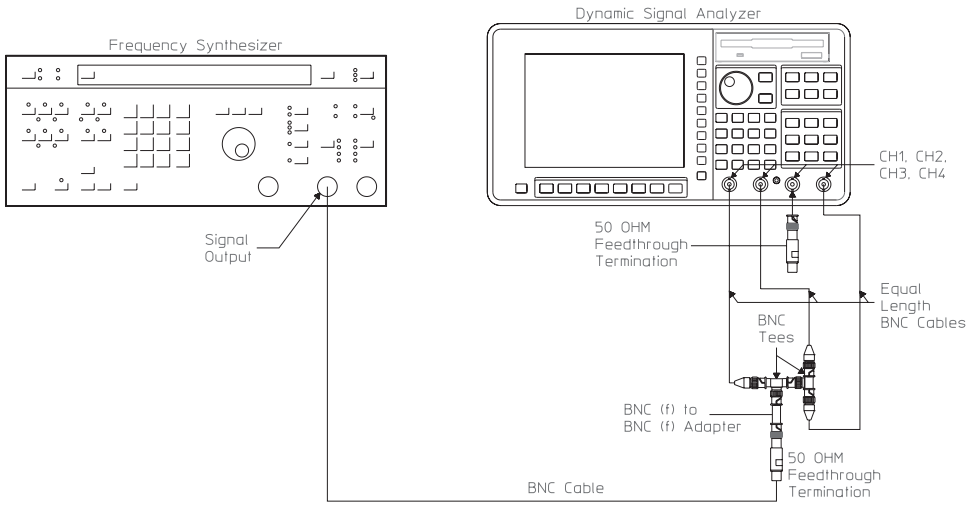


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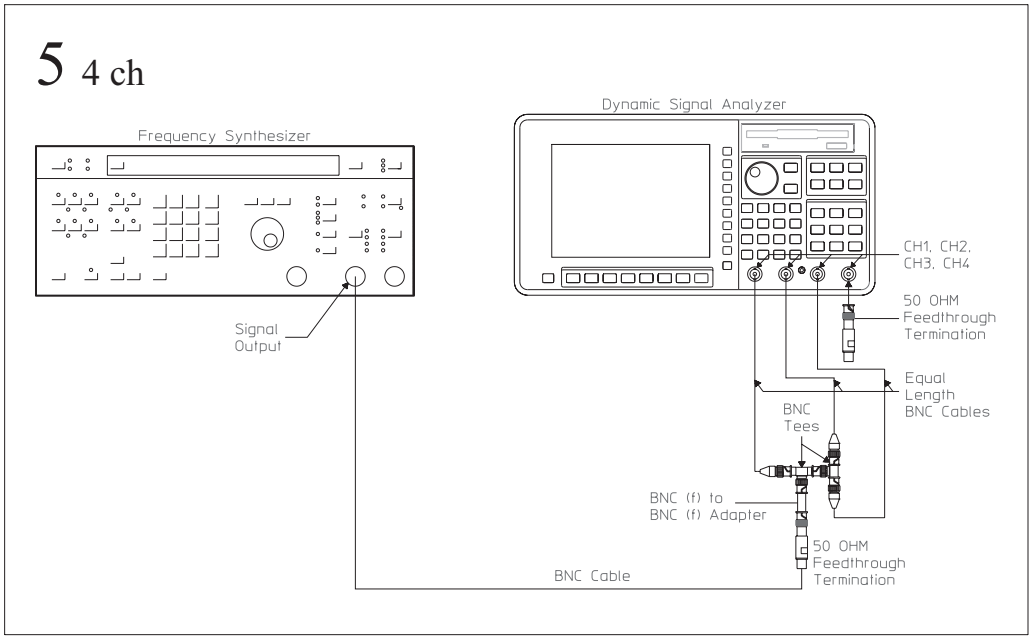
3 4 ch



4 4 ch



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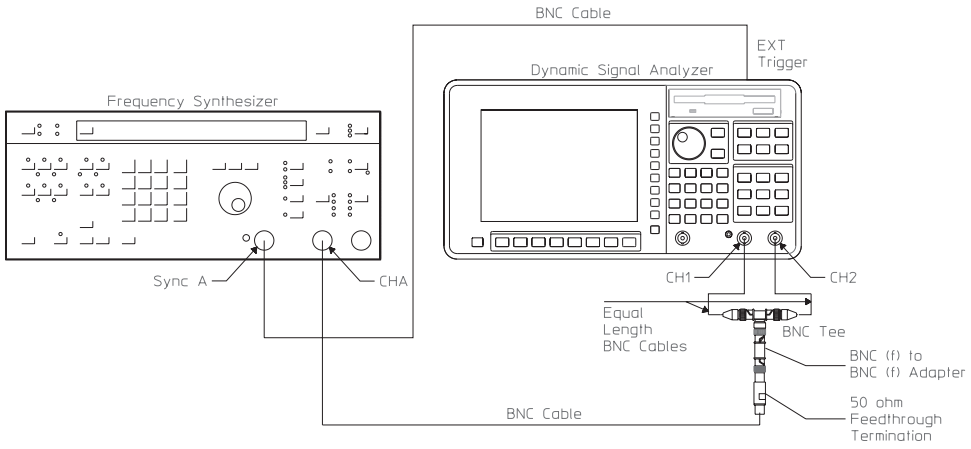
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To set up the single channel phase accuracy test

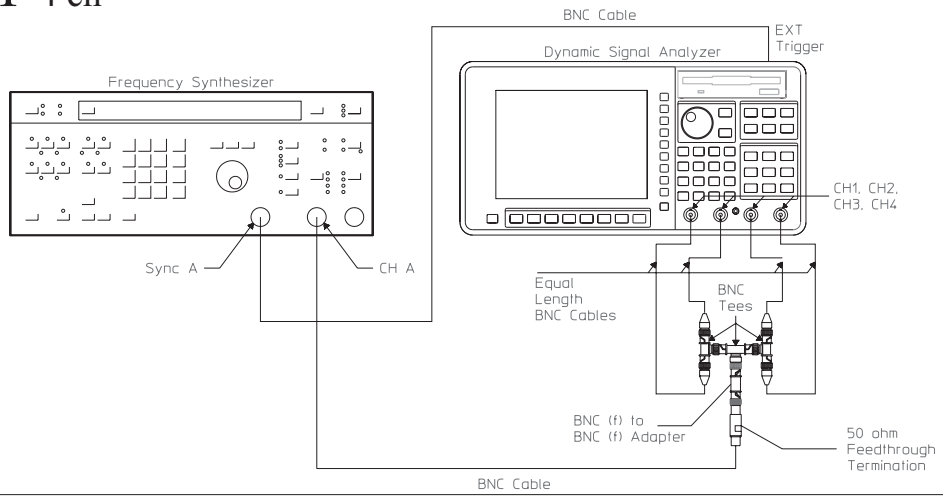
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its single channel phase accuracy specification. In this test, a frequency synthesizer outputs an identical square wave to all channels and a synchronized TTL-level signal to the trigger input. The phase difference between the trigger and each channel is measured to determine phase accuracy.

1 2 ch



1 4 ch



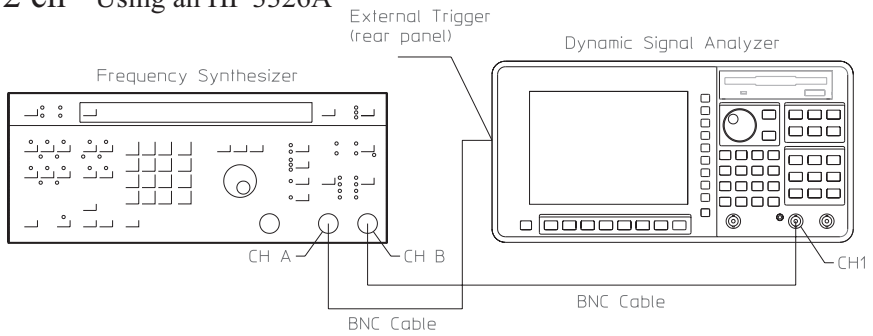
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To set up the external trigger test

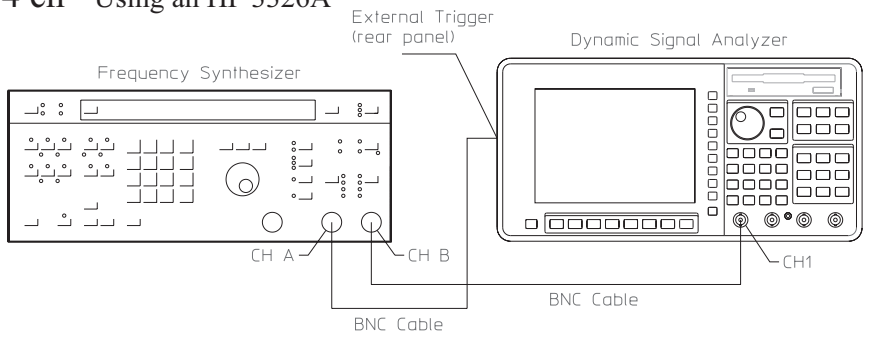
Performance Test only

This test verifies that the Agilent 35670A meets its trigger specification for external trigger level accuracy. In this test, a frequency synthesizer outputs a 1 kHz signal to the external trigger input and a 12.8 kHz signal to channel 1. The analyzer makes an accurate triggered measurement on channel 1 to verify the trigger level and slope.

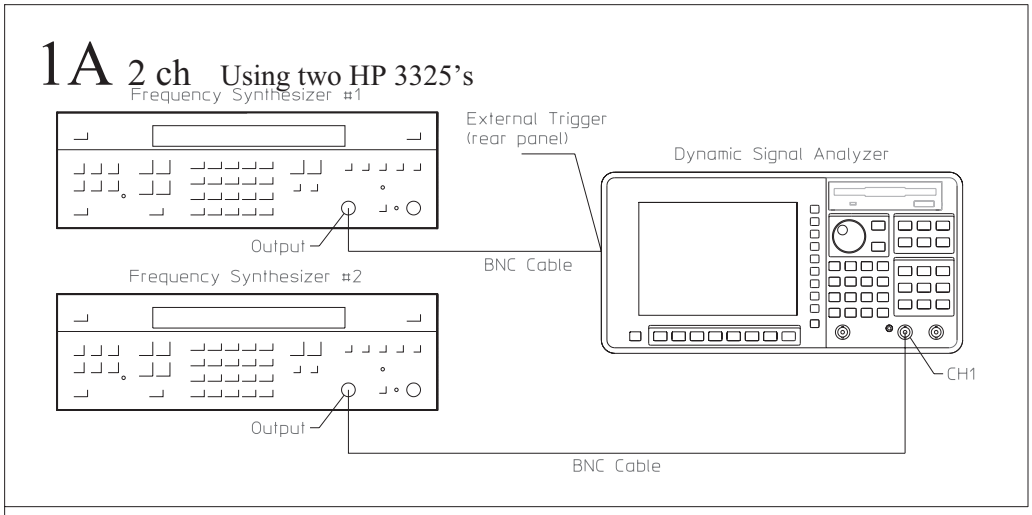
1 2 ch Using an HP 3326A

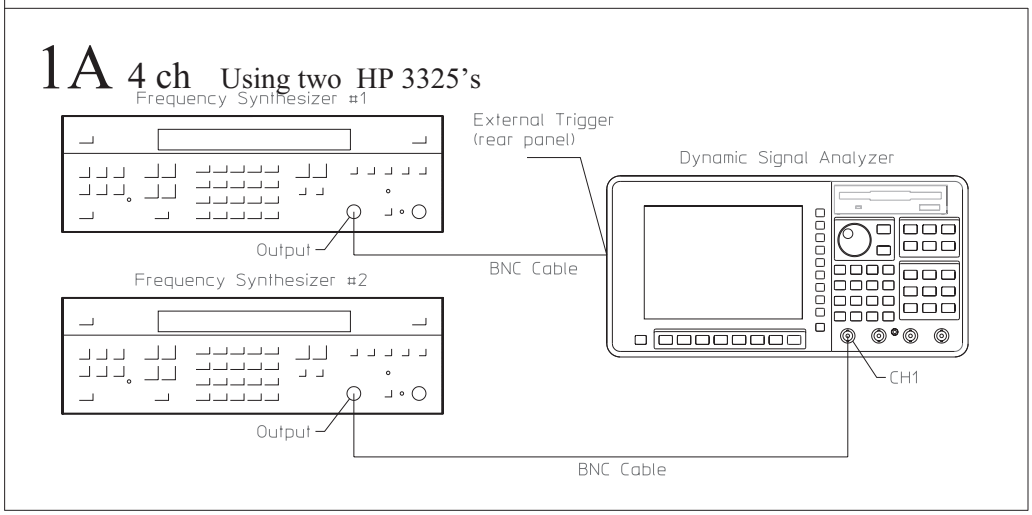


1 4 ch Using an HP 3326A



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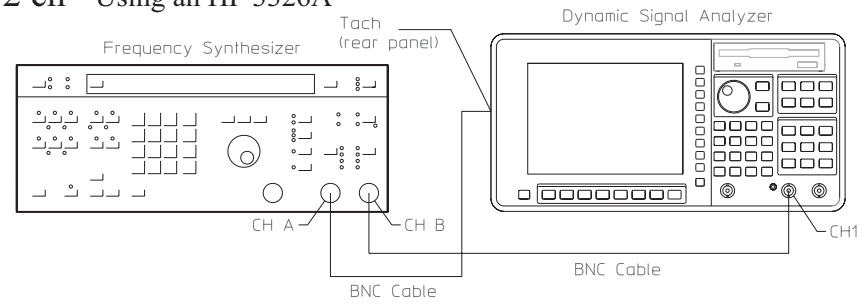
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To set up the tach function test

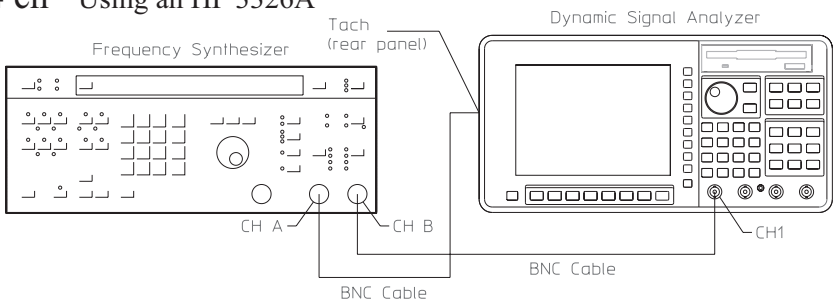
Performance Test and Operation Verification

This test is only for Agilent 35670A's with option 1D0, computed order tracking. This test verifies that the Agilent 35670A meets its tachometer specification for trigger level accuracy. In this test, a frequency synthesizer outputs a signal to the tachometer input and to channel 1. The analyzer makes an accurate order measurement on channel 1 to verify the trigger level and slope.

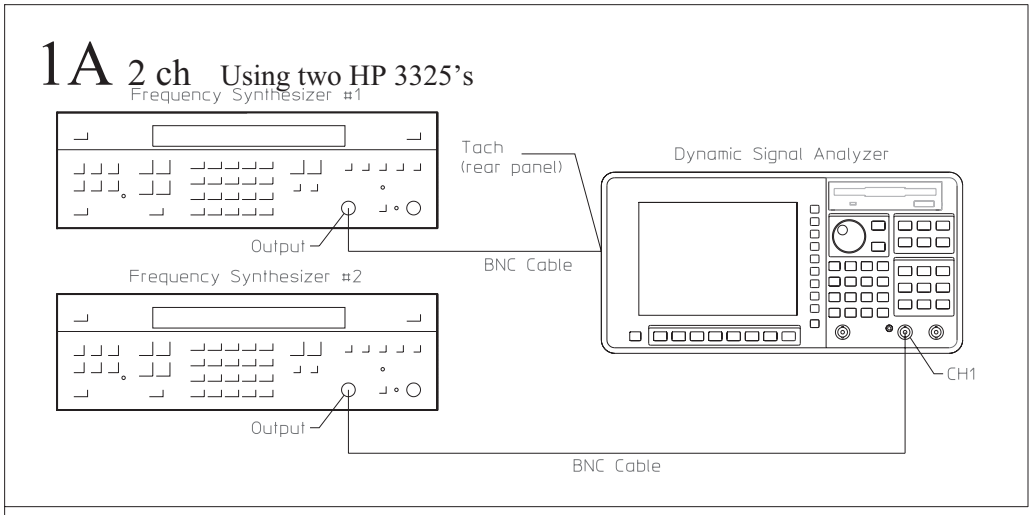
1 2 ch Using an HP 3326A

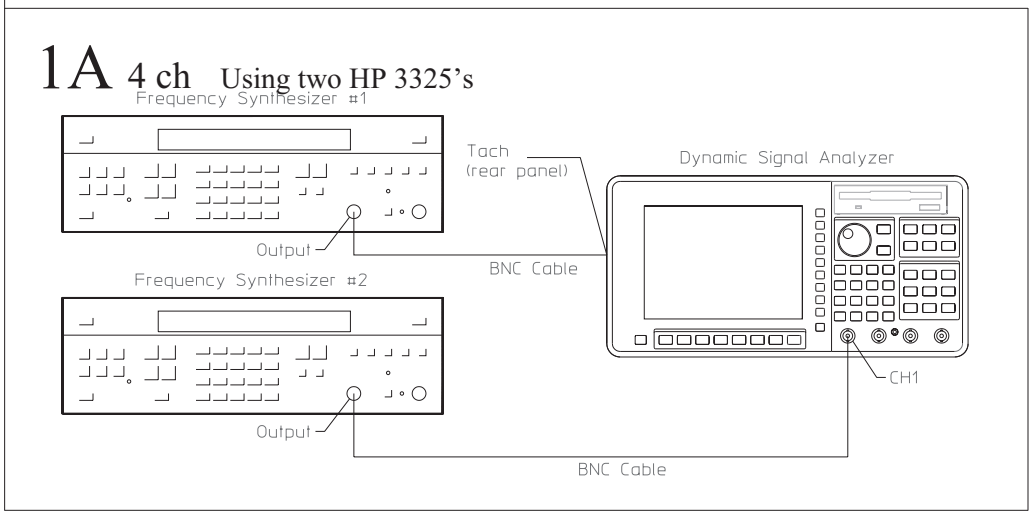


1 4 ch Using an HP 3326A



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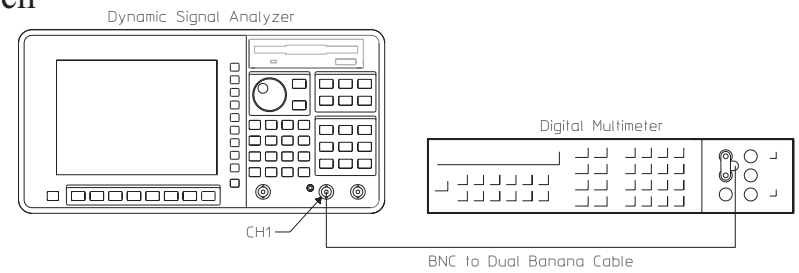
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To set up the input resistance test

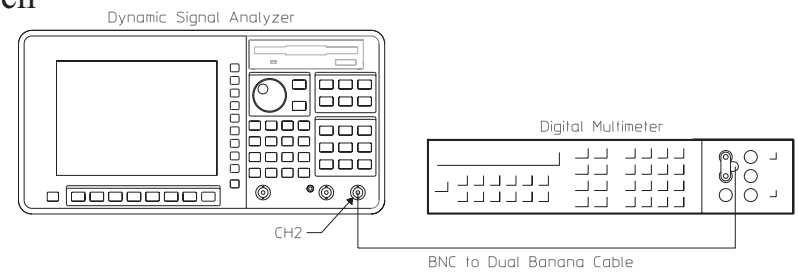
Performance Test only

This test verifies that the Agilent 35670A meets its input resistance specification. In this test, a digital multimeter directly measures the input resistance of each channel. The digital multimeter is set to the 1 MΩ range.

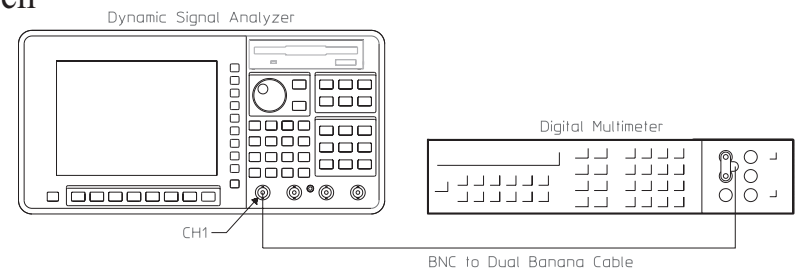
1 2 ch



2 2 ch

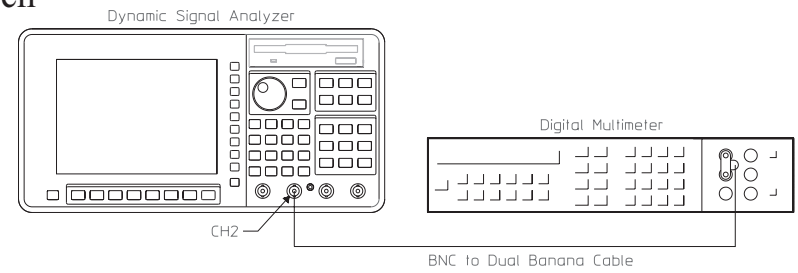


1 4 ch

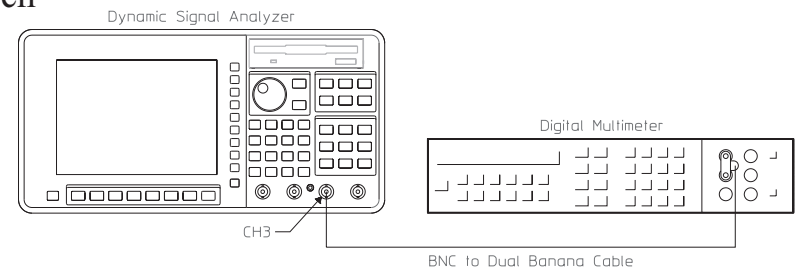


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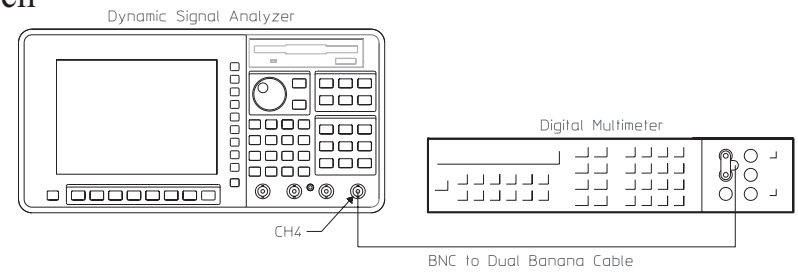
2 4 ch



3 4 ch



4 4 ch



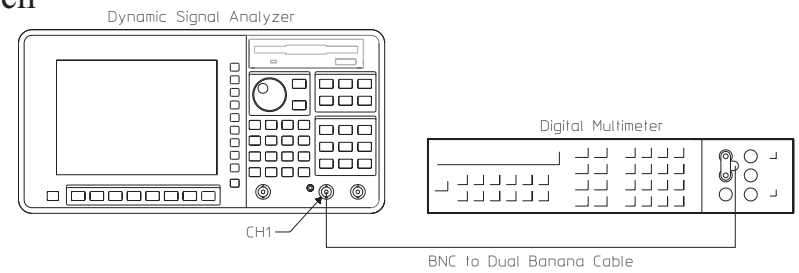
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To set up the ICP supply test

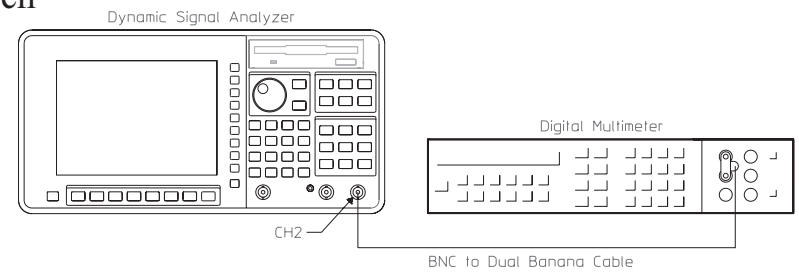
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its input specification for ICP signal conditioning. In this test, a digital multimeter directly measures the open circuit voltage of each channel. The digital multimeter measures the current souce of each channel by measuring the voltage across a 50 Ω feedthrough termination. The digital multimeter is set to the 100 V range to measure open circuit voltage and set to the 1 V range to measure the current source.

1 2 ch

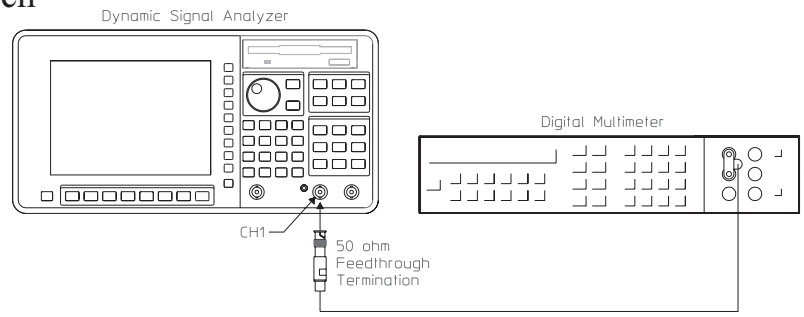


2 2 ch

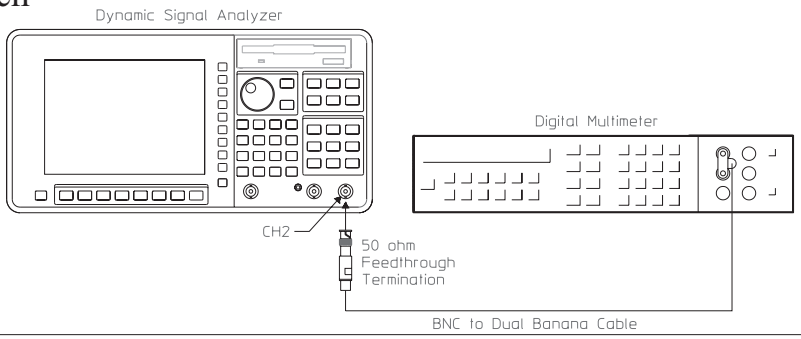


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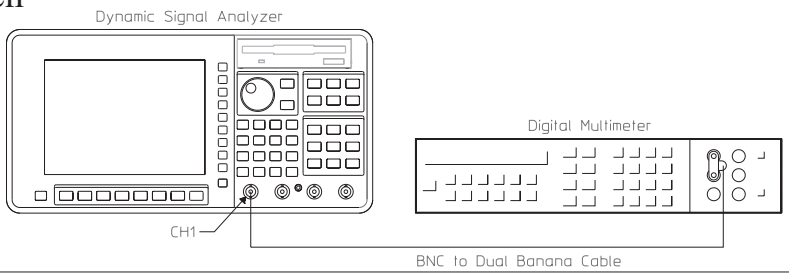
3 2 ch



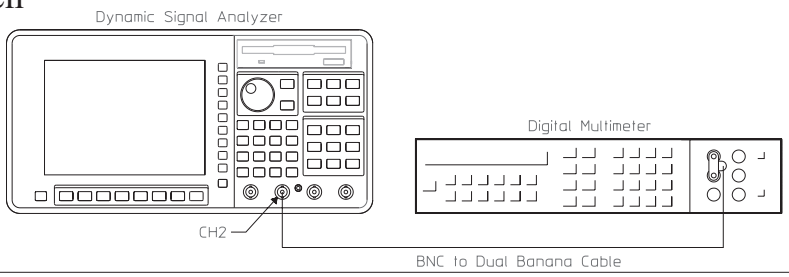
4 2 ch



1 4 ch

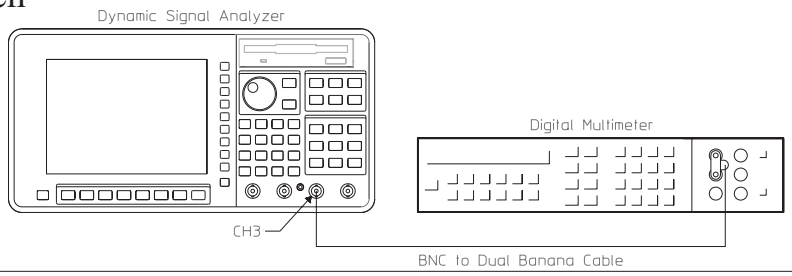


2 4 ch

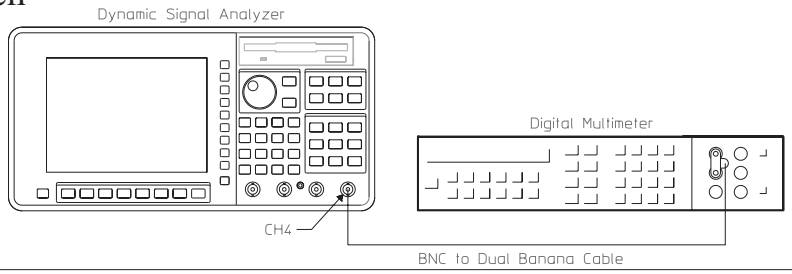


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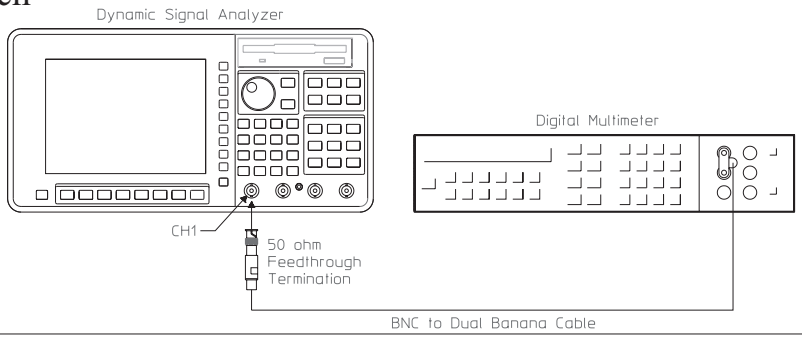
3 4 ch



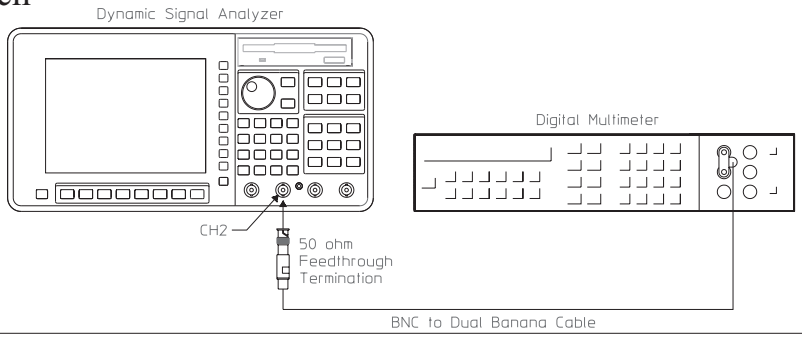
4 4 ch



5 4 ch

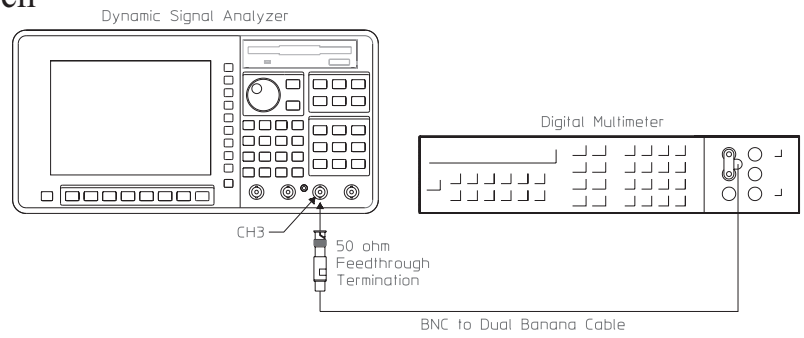


6 4 ch

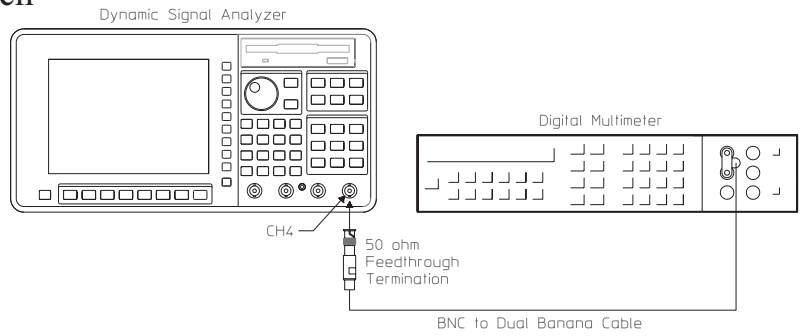


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7 4 ch



8 4 ch



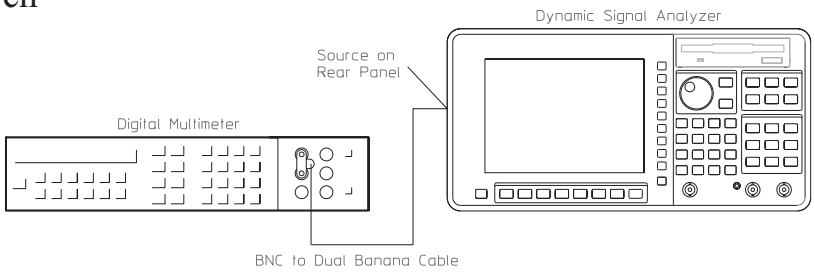
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To set up the source amplitude accuracy test

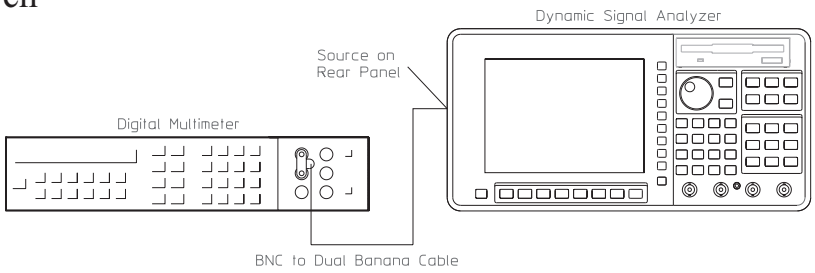
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its source output specification for sine amplitude accuracy at 1 kHz. In this test, a digital multimeter measures the amplitude accuracy of the source. Source amplitude accuracy is checked at 0.1 Vpk with the digital multimeter set to the 100 mVrms range and at 3.0 and 5.0 Vpk with the digital multimeter set to the 10 Vrms range. For the standard two channel analyzer, the digital multimeter is connected to the rear panel source connector instead of the front panel source connector. This is the only test that verifies the rear panel source port on the standard two channel analyzer.

1 2 ch



1 4 ch



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To set up the source output resistance test

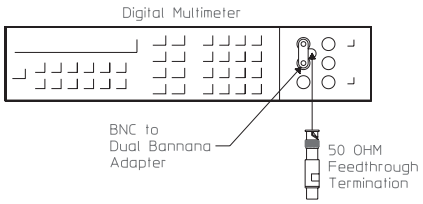
Performance Test only

This test verifies that the Agilent 35670A meets its source output specification for resistance. In this test, a digital multimeter measures the 50 Ω feedthrough termination. The channel 1 input then measures the source output across the feedthrough termination, then in an open circuit condition. The resistance is calculated using the following formula:

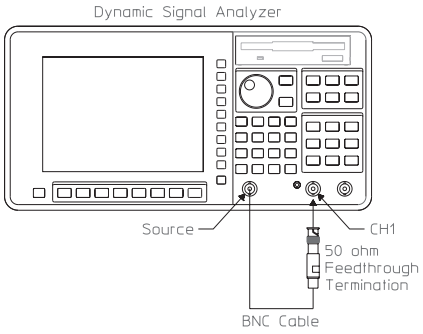
Rs = R1((Vopen - Vload)/Vload)

Note: Use the same 50 Ω feedthrough termination for steps 1 and 2.

1 2 ch

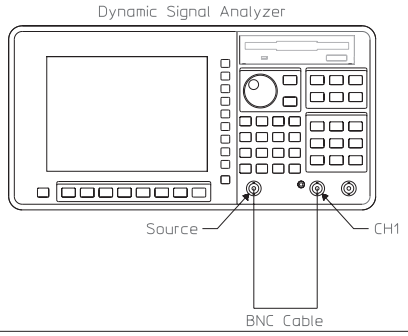


2 2 ch

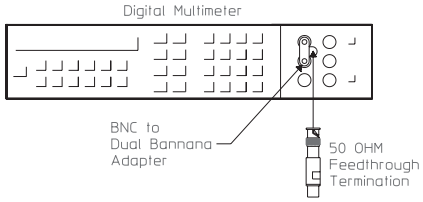


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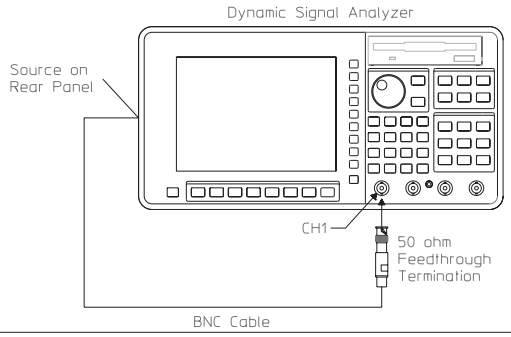
3 2 ch



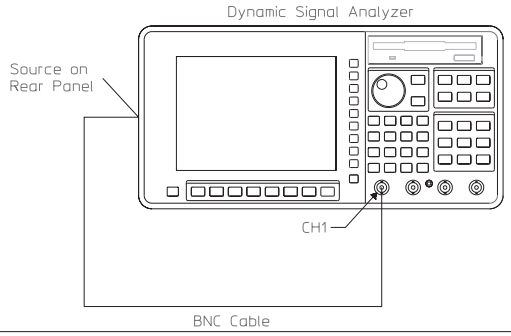
1 4 ch



2 4 ch



3 4 ch



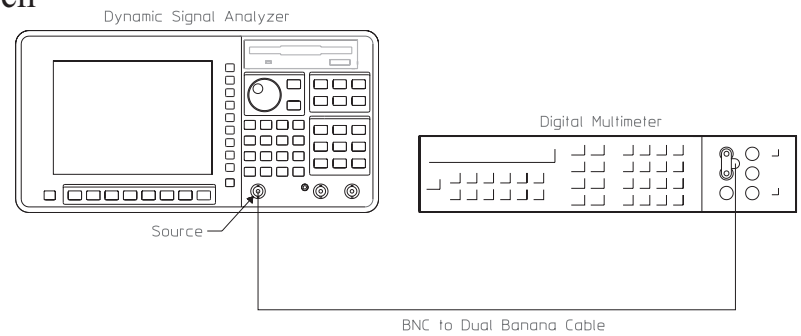
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To set up the source dc offset test

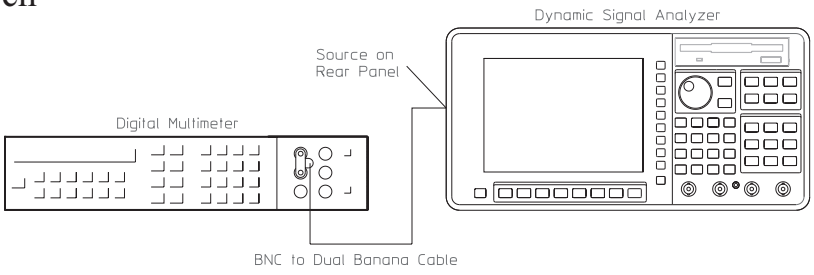
Performance Test only

This test verifies that the Agilent 35670A meets its source output specification for dc offset accuracy. In this test, a digital multimeter measures the dc offset voltage of the source with and without an ac component. The frequency of the ac component is 96 kHz. The test records at the end of this chapter list the voltages that are checked.

1 2 ch



1 4 ch



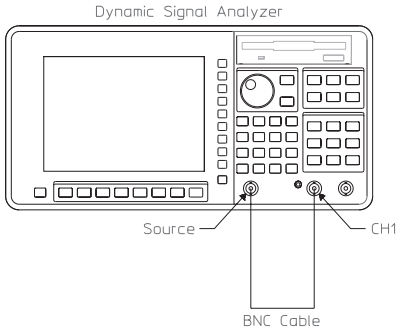
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To set up the source flatness test

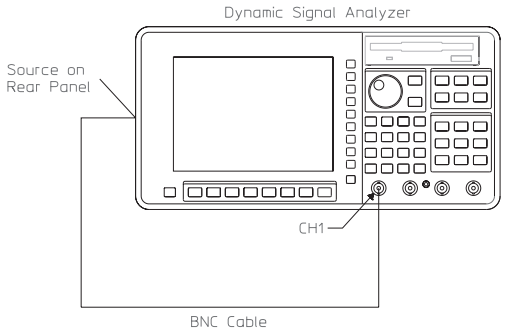
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its source output specification for sine flatness. In this test, the analyzer's channel 1 input measures the flatness of its source.

1 2 ch



1 4 ch



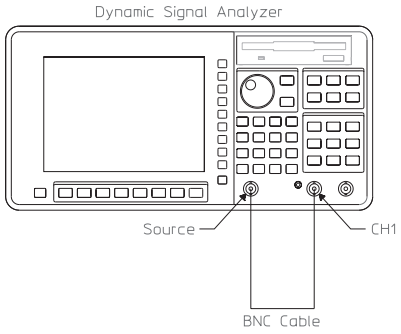
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To set up the source distortion test

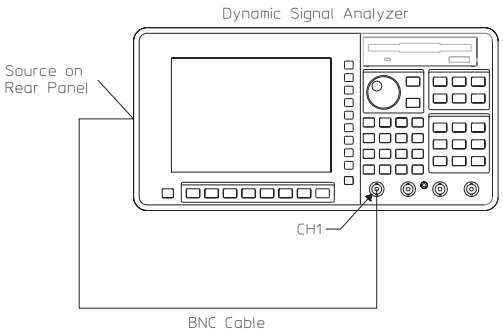
Performance Test and Operation Verification

This test verifies that the Agilent 35670A meets its source output specification for harmonic and sub-harmonic distortion and spurious signals. In this test, the analyzer's source is connected to its channel 1 input. The source is set for a maximum output level (5 Vpk) and the input range is set equal to the source level. The fundamental and harmonic is measured. The test records at the end of this chapter list the fundamental frequencies that are checked.

1 2 ch



1 4 ch



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ITM_35670A Main Menu Descriptions

If you do not have a keyboard connected to the analyzer, use the numeric key pad and the alpha keys to enter names or numbers. See the analyzer's help text for a description of the alpha keys.

Load and run the ITM 35670A program to display the following softkeys:

[START TESTING]

Displays a menu that allows you to start testing with any test or to select just one test in the list. Before pressing this softkey, use [TEST CONFIG] and [EQUIP CONFIG].

[TEST CONFIG]

Displays the test configuration and a menu that allows you to enter the procedure, stop conditions, beeper prompt, and GPIB address for the analyzer and printer.

[EQUIP CONFIG]

Displays the test equipment configuration and a menu that allows you to enter the model number, calibration due date, serial number, and GPIB address for each test instrument.

[TITLE PAGE]

Displays the test record title page information and a menu that allows you to enter information for the analyzer.

[STOP ITM]

Stops the ITM 35670A program.

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Start Testing Menu Descriptions

Press [START TESTING] to display the following softkeys:

[START BEGINNING]

Prints the test record title page information and starts the selected test procedure at the beginning. When you select [START BEGINNING], the data is written to a file on the disk and printed only after all tests are done.

[START MIDDLE]

Displays a list of all the tests in the selected procedure. Testing starts with the test you select and continues through the remainder of the tests in the list. When you select [START MIDDLE], the data is printed immediately after each measurement.

[ONE TEST]

Displays all the tests in the selected procedure. The test you select is the only test performed. When you select [ONE TEST], the data is printed immediately after each measurement.

[RETURN]

Returns to the ITM 35670A main menu.

Start a test to display the following softkeys:

[STOP TESTING]

Stops the test and returns to the ITM 35670A main menu.

[RESTART TEST]

Starts the current test over. Any connection prompts are repeated.

[RESTART MEAS]

Starts the current measurement over.

The following softkeys also appear when the program is waiting for you to press [CONTINUE]:

[STOP BEEPING]

Turns off the beeper prompt for the remainder of this measurement.

[CONTINUE]

Continues the test. Press this key after following the directions on the display.

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Test Configuration Menu Descriptions

Press [TEST CONFIG] to display the test configuration and the following softkeys:

[Agilent 35670A ADDRESS]

Prompts you to enter the GPIB address for the Agilent 35670A Dynamic Signal Analyzer.

The GPIB addresses equals 100 \ (interface select code) + (primary address). The interface select code for the printer and test equipment is 7 (for example, if the primary address is 8, the GPIB address is 708).

[PRINTER ADDRESS]

Prompts you to enter the GPIB address for the printer. To disable the printer, set the printer address to 0.

[PROCEDURE]

Prompts you to select the operation verification procedure (OP VERIFY) or the performance test procedure (PERFORMAN).

[BEEPER]

Toggles the beeper on and off. When the beeper is on, the program beeps approximately every 2 minutes while waiting for you to follow the directions on the display and press [CONTINUE].

[RETURN]

Returns to the ITM 35670A main menu.

[STOP AFTER]

Prompts you to select stop after limit failure, stop after each measurement, or do not stop after a limit failure or measurement. If [Limit Failure] is selected, the program stops after the failing measurement is displayed but before it is printed. At this point you can continue on and print the failing measurement or restart the measurement.

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Equipment Configuration Menu Descriptions

Press [EQUIP CONFIG] to display the test equipment configuration and the following softkeys:

[AC CALIBRATO]

Prompts you to enter the model, serial number, GPIB address, and calibration due date for the ac calibrator.

If you select [Other] for model, the program prompts you to type in a model, serial number, and calibration due date but not an GPIB address.

When entering the calibration due date, only four characters are displayed on the screen. However, you can enter up to nine characters and they will be printed.

[SYNTH. 1]

Prompts you to enter the model, serial number, GPIB address, and calibration due date for the synthesizer.

[SYNTH. 2]

Prompts you to enter the model, serial number, GPIB address, and calibration due date for the second synthesizer. If the first synthesizer is an Agilent 3326A or if you are only performing the operation verification tests, you do not need a second synthesizer.

[LOW-D. OSCILLATO]

Prompts you to enter the model, serial number, and calibration due date for the low-distortion oscillator. If you have a 24.5 kHz notch filter or if you are only performing the operation verification tests, you do not need a low-distortion oscillator.

[MULTIMETER]

Prompts you to enter the model, serial number, GPIB address, and calibration due date for the multimeter.

[SAVE SETUP]

Saves the current equipment configuration to a file for future recall.

[RECALL SETUP]

Recalls an equipment configuration that was previously saved using [SAVE SETUP].

[RETURN]

Returns to the ITM 35670A main menu.

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Title Page Menu Descriptions

Press [TITLE PAGE] to display the title page information and the following softkeys:

[TEST FACILITY]

Prompts you to enter the name or number of the testing entity.

[FACILITY ADDRESS]

Prompts you to enter the address of the testing entity.

[TESTED BY]

Prompts you to enter the name or number of the person performing the test.

[REPORT NUMBER]

Prompts you to enter the analyzer's report number.

[CUSTOMER]

Prompts you to enter the name or number of the person requesting the test.

[SERIAL NUMBER]

Prompts you to enter the analyzer's serial number.

[MORE]

Displays the next page.

[RETURN]

Returns to the ITM 35670A main menu.

[OPTIONS]

Prompts you to enter the analyzer's options.

[DATE]

Prompts you to enter the test date.

[TEMP]

Prompts you to enter the temperature of the environment during the test.

[HUMIDITY]

Prompts you to enter the humidity of the environment during the test.

[LINE FREQUENCY]

Prompts you to enter the power line frequency.

[MORE]

Displays the first page.

[RETURN]

Returns to the ITM 35670A main menu.

The title page information is printed at the beginning of the test procedure.

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Measurement Uncertainty

The following table lists the measurement uncertainty and ratio for each performance test using the recommended test equipment. Except for the External Trigger test, the ratios listed for the recommended test equipment meet or exceed the measurement uncertainty ratio required by U.S. MIL-STD-45662A.

- If you are using equipment other than the recommended test equipment, you may calculate and record the measurement uncertainty and ratio for each performance test. The table may be reproduced without written permission of Agilent Technologies.

Performance Test	Using Recommended Test Equipment		Using Other Test Equipment	
	Measurement Uncertainty	**Ratio**	**Measurement Uncertainty**	**Ratio**
Self Test	NA	NA	NA	NA
DC Offset	NA	NA	NA	NA
Noise	NA	NA	NA	NA
Spurious Signals	NA	NA	NA	NA
Amplitude Accuracy				
–51 dBVrms	±0.020 dB	7.7:1		
–43 dBVrms	±0.0084 dB	>10:1		
–35 dBVrms	±0.004 dB	>10:1		
–27 dBVrms	±0.003 dB	>10:1		
–11 dBVrms	±0.001 dB	>10:1		
1 dBVrms	±0.0008 dB	>10:1		
9 dBVrms	±0.001 dB	>10:1		
19 dBVrms	±0.00081 dB	>10:1		
27 dBVrms	±0.00117 dB			
Flatness				
25.6 kHz, 27 dBVrms	±0.01487 dB	>10:1		
25.6 kHz, 9 dBVrms	±0.01277 dB	>10:1		
25.6 kHz, –11 dBVrms	±0.01277 dB	>10:1		
51.2 kHz, 27 dBVrms	±0.02025 dB	10:1		
51.2 kHz, 9 dBVrms	±0.01460 dB	>10:1		
51.2 kHz, –11 dBVrms	±0.01583 dB	>10:1		
99.84 kHz, 27 dBVrms	±0.02025 dB	10:1		
99.84 kHz, 9 dBVrms	±0.01460 dB	>10:1		
99.84 kHz, –11 dBVrms	±0.01583 dB	>10:1		

NA (not applicable) internal test

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Performance Test	Using Recommended Test Equipment		Using Other Test Equipment	
	Measurement Uncertainty	Ratio	Measurement Uncertainty	Ratio
Amplitude Linearity 13 dBVrms –1 dBVrms –15 dBVrms –29 dBVrms –43 dBVrms –53 dBVrms	 ±0.0020 dB ±0.0020 dB ±0.0026 dB ±0.0046 dB ±0.0096 dB ±0.0255 dB	 >10:1 >10:1 >10:1 >10:1 >10:1 >10:1		
A-Weight Filter 10 Hz 31.62 Hz 100 Hz 1 kHz 10 kHz 25.120 kHz	 0.016 dB 0.012 dB 0.012 dB 0.011 dB 0.011 dB 0.012 dB	 >10:1 >10:1 >10:1 >10:1 >10:1 >10:1		
Channel Match magnitude phase	 ±0.00001 dB ±0.01 mdeg	 >10:1 >10:1		
Frequency Accuracy	±6.25 ppm	4.8:1		
Anti-Alias Filter <100 kHz <1 MHz	 ± 0.1 dB ± 0.3 dB	 >10:1 >10:1		
Input Coupling	± 0.001 dB	>10:1		
Harmonic Distortion using HP 339A using HP 3326A with filter	 ±0.184 dB ±0.92 dB	 4.46:1 10:1		
Intermodulation Distortion	±0.83 dB	10:1		
Cross Talk channel to channel source to input	 ± 0.1 dB ±1.34 dB	 >10:1 6:1		
Single Channel Phase Accuracy	± 0.25 deg †	>10:1		
External Trigger	280 mVpk	3.6:1 ‡		
Tach Function	330 mV	6:1		
Input Resistance	±17Ω	>10:1		
ICP Supply oven circuit voltage current	17Ω ±320 mV ±132<M > mA	 >10:1 >10:1		

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† The sync output to signal output phase error was determined to be less than 0.25 degrees.
‡ If measured value is within ⌠3% of specification, verify synthesizer level accuracy. Note: Without 50 Ω termination, observed levels are twice the setting into high impedance.

Performance Test	Using Recommended Test Equipment		Using Other Test Equipment	
	Measurement Uncertainty	Ratio	Measurement Uncertainty	Ratio
Source Amplitude Accuracy 0.1 Vpk 3.0 Vpk 5.0 Vpk	 ± 9.83 mVpk ± 492.9 mVpk ± 633.0 mVpk	 >10:1 >10:1 >10:1		
Source Output Resistance	±0.15 Ω	>10:1		
Source DC Offset 0 Vdc, 0 Vac-pk ±10 Vdc, 0 Vac-pk 0 Vdc, 5 Vac-pk ±5 Vdc, 5 Vac-pk	 ± 238 nV ± 84 mV ± 2.123 mV ± 43 mV	 >10:1 >10:1 >10:1 >10:1		
Source Flatness	± 0.2 dB	5.24:1		
Source Distortion fundamental <30 kHz fundamental ≥30 kHz	 ±0.5 dB ±0.5 dB	 6.3:1 >10:1		

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Performance Test Record - Two Channel

Test Facility _____

Facility Address _____

Tested By _____

Report Number_____

Customer Name_____

Serial Number_____

Installed Options _____

Date _____

Temperature_____

Humidity _____

Power Line Frequency _____

Test Instruments Used

Instrument	Model	ID or Serial Number	Calibration Due
AC Calibrator			
Synthesizer 1			
Synthesizer 2			
Low-D Oscillator			
Multimeter			

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Self Test

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Long Confidence				

DC Offset

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
–51 dBVrms, Ch 1		–15		
–51 dBVrms, Ch 2		–15		
–35 dBVrms, Ch 1		–30		
–35 dBVrms, Ch 2		–30		

Noise

Measurement	Lower Limit	Upper Limit ($^{dBV}/_{\sqrt{Hz}}$)	Measured Value ($^{dBV}/_{\sqrt{Hz}}$)	Pass/Fail
Two Ch, 6.4 kHz Span, Ch 1		–130		
Two Ch, 6.4 kHz Span, Ch 2		–130		
Two Ch, 51.2 kHz Span, Ch 1		–140		
Two Ch, 51.2 kHz Span, Ch 2		–140		
One Ch, 102.4 kHz Span, Ch 1		–140		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Spurious Signals

Two Ch, 0 Hz Start, Ch 1	–80
Two Ch, 0 Hz Start, Ch 2	–80
Two Ch, 200 Hz Start, Ch 1	–80
Two Ch, 200 Hz Start, Ch 2	–80
Two Ch, 400 Hz Start, Ch 1	–80
Two Ch, 400 Hz Start, Ch 2	–80
Two Ch, 600 Hz Start, Ch 1	–80
Two Ch, 600 Hz Start, Ch 2	–80
Two Ch, 800 Hz Start, Ch 1	–80
Two Ch, 800 Hz Start, Ch 2	–80
Two Ch, 1000 Hz Start, Ch 1	–80
Two Ch, 1000 Hz Start, Ch 2	–80
Two Ch, 1200 Hz Start, Ch 1	–80
Two Ch, 1200 Hz Start, Ch 2	–80
Two Ch, 1400 Hz Start, Ch 1	–80
Two Ch, 1400 Hz Start, Ch 2	–80
Two Ch, 1600 Hz Start, Ch 1	–80
Two Ch, 1600 Hz Start, Ch 2	–80
Two Ch, 3200 Hz Start, Ch 1	–80
Two Ch, 3200 Hz Start, Ch 2	–80
Two Ch, 4800 Hz Start, Ch 1	–80
Two Ch, 4800 Hz Start, Ch 2	–80
Two Ch, 6400 Hz Start, Ch 1	–80
Two Ch, 6400 Hz Start, Ch 2	–80
Two Ch, 8000 Hz Start, Ch 1	–80
Two Ch, 8000 Hz Start, Ch 2	–80
Two Ch, 9600 Hz Start, Ch 1	–80
Two Ch, 9600 Hz Start, Ch 2	–80
Two Ch, 11200 Hz Start, Ch 1	–80
Two Ch, 11200 Hz Start, Ch 2	–80
Two Ch, 12800 Hz Start, Ch 1	–80
Two Ch, 12800 Hz Start, Ch 2	–80
Two Ch, 14400 Hz Start, Ch 1	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Two Ch, 14400 Hz Start, Ch 2	–80
Two Ch, 16000 Hz Start, Ch 1	–80
Two Ch, 16000 Hz Start, Ch 2	–80
Two Ch, 17600 Hz Start, Ch 1	–80
Two Ch, 17600 Hz Start, Ch 2	–80
Two Ch, 19200 Hz Start, Ch 1	–80
Two Ch, 19200 Hz Start, Ch 2	–80
Two Ch, 20800 Hz Start, Ch 1	–80
Two Ch, 20800 Hz Start, Ch 2	–80
Two Ch, 22400 Hz Start, Ch 1	–80
Two Ch, 22400 Hz Start, Ch 2	–80
Two Ch, 24000 Hz Start, Ch 1	–80
Two Ch, 24000 Hz Start, Ch 2	–80
Two Ch, 25600 Hz Start, Ch 1	–80
Two Ch, 25600 Hz Start, Ch 2	–80
Two Ch, 27200 Hz Start, Ch 1	–80
Two Ch, 27200 Hz Start, Ch 2	–80
Two Ch, 28800 Hz Start, Ch 1	–80
Two Ch, 28800 Hz Start, Ch 2	–80
Two Ch, 30400 Hz Start, Ch 1	–80
Two Ch, 30400 Hz Start, Ch 2	–80
Two Ch, 32000 Hz Start, Ch 1	–80
Two Ch, 32000 Hz Start, Ch 2	–80
Two Ch, 33600 Hz Start, Ch 1	–80
Two Ch, 33600 Hz Start, Ch 2	–80
Two Ch, 35200 Hz Start, Ch 1	–80
Two Ch, 35200 Hz Start, Ch 2	–80
Two Ch, 36800 Hz Start, Ch 1	–80
Two Ch, 36800 Hz Start, Ch 2	–80
Two Ch, 38400 Hz Start, Ch 1	–80
Two Ch, 38400 Hz Start, Ch 2	–80
Two Ch, 40000 Hz Start, Ch 1	–80
Two Ch, 40000 Hz Start, Ch 2	–80
Two Ch, 41600 Hz Start, Ch 1	–80
Two Ch, 41600 Hz Start, Ch 2	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Two Ch, 43200 Hz Start, Ch 1	–80
Two Ch, 43200 Hz Start, Ch 2	–80
Two Ch, 44800 Hz Start, Ch 1	–80
Two Ch, 44800 Hz Start, Ch 2	–80
Two Ch, 46400 Hz Start, Ch 1	–80
Two Ch, 46400 Hz Start, Ch 2	–80
Two Ch, 48000 Hz Start, Ch 1	–80
Two Ch, 48000 Hz Start, Ch 2	–80
Two Ch, 49600 Hz Start, Ch 1	–80
Two Ch, 49600 Hz Start, Ch 2	–80
One Ch, 79200 Start, Ch 1	–80
One Ch, 80800 Start, Ch 1	–80
One Ch, 85600 Start, Ch 1	–80
One Ch, 87200 Start, Ch 1	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Spurious Signals (continued)

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
One Ch, 88800 Start, Ch 1		–80		
One Ch, 97000 Start, Ch 1		–80		
One Ch, 98600 Start, Ch 1		–80		
One Ch, 100200 Start, Ch 1		–80		
One Ch, 101800 Start, Ch 1		–80		

Amplitude Accuracy

Measurement	Lower Limit (dBVrms)	Upper Limit (dBVrms)	Measured Value (dBVrms)	Pass/Fail
–51 dBVrms, Ch 1	–51.15	–50.85		
–51 dBVrms, Ch 2	–51.15	–50.85		
–43 dBVrms, Ch 1	–43.15	–42.85		
–43 dBVrms, Ch 2	–43.15	–42.85		
–35 dBVrms, Ch 1	–35.15	–34.85		
–35 dBVrms, Ch 2	–35.15	–34.85		
–27 dBVrms, Ch 1	–27.15	–26.85		
–27 dBVrms, Ch 2	–27.15	–26.85		
–11 dBVrms, Ch 1	–11.15	–10.85		
–11 dBVrms, Ch 2	–11.15	–10.85		
1 dBVrms, Ch 1	0.85	1.15		
1 dBVrms, Ch 2	0.85	1.15		
9 dBVrms, Ch 1	8.85	9.15		
9 dBVrms, Ch 2	8.85	9.15		
19 dBVrms, Ch 1	18.85	19.15		
19 dBVrms, Ch 2	18.85	19.15		
27 dBVrms, Ch 1	26.85	27.15		
27 dBVrms, Ch 2	26.85	27.15		

Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
27 dBVrms, 99.84 kHz, One Ch, Ch 1	–0.2	0.2		
9 dBVrms, 99.84 kHz, One Ch, Ch 1	–0.2	0.2		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
–11 dBVrms, 99.84 kHz, One Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		

Amplitude Linearity

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
13 dBVrms, Ch 1	–0.0615	0.061		
13 dBVrms, Ch 2	–0.0615	0.061		
–1 dBVrms, Ch 1	–0.105	0.104		
–1 dBVrms, Ch 2	–0.105	0.104		
–15 dBVrms, Ch 1	–0.33	0.318		
–15 dBVrms, Ch 2	–0.33	0.318		
–29 dBVrms, Ch 1	–1.551	1.316		
–29 dBVrms, Ch 2	–1.551	1.316		
–43 dBVrms, Ch 1	–13.823	5.088		
–43 dBVrms, Ch 2	–13.823	5.088		
–53 dBVrms, Ch 1	–30.116	10.896		
–53 dBVrms, Ch 2	–30.116	10.896		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

A-Weight Filter

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
Ch 1, 10 Hz	–5	2		
Ch 2, 10 Hz	–5	2		
Ch 1, 31.62 Hz	–1	1		
Ch 2, 31.62 Hz	–1	1		
Ch 1, 100 Hz	–0.7	0.7		
Ch 2, 100 Hz	–0.7	0.7		
Ch 1, 1000 Hz	–0.7	0.7		
Ch 2, 1000 Hz	–0.7	0.7		
Ch 1, 10000 Hz	–3	2		
Ch 2, 10000 Hz	–3	2		
Ch 1, 25120 Hz	–4.5	2.4		
Ch 2, 25120 Hz	–4.5	2.4		

Channel Match

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Two Ch, 2/1, 7 dBV FS Mag	–0.04 dB	0.04 dB	dB	
Two Ch, 2/1, 7 dBV FS Phs	–0.5 deg	0.5 deg	deg	
Two Ch, 2/1, –13 dBV FS Mag	–0.04 dB	0.04 dB	dB	
Two Ch, 2/1, –13 dBV FS Phs	–0.5 deg	0.5 deg	deg	
Two Ch, 2/1, –33 dBV FS Mag	–0.04 dB	0.04 dB	dB	
Two Ch, 2/1, –33 dBV FS Phs	–0.5 deg	0.5 deg	deg	
Two Ch, 2/1, 7 dBV –20dBfs Mag	–0.08 dB	0.08 dB	dB	
Two Ch, 2/1, 7 dBV –20dBfs Phs	–0.5 deg	0.5 deg	deg	

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Frequency Accuracy

Measurement	Lower Limit (kHz)	Upper Limit (kHz)	Measured Value (kHz)	Pass/Fail
50 kHz	49.9985	50.0015		

Anti-Alias Filter

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
One Ch, Ch 1, 102.4 kHz		–80		
Two Ch, Ch 1, 51.2 kHz		–80		
Two Ch, Ch 2, 51.2 kHz		–80		

Input Coupling

Measurement	Lower Limit	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
dc - ac, Ch 1		3		
dc - ac, Ch 2		3		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Harmonic Distortion

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
Single, 12.25 kHz 2nd, Ch 1		–80		
Two Ch, 12.25 kHz 2nd, Ch 1		–80		
Two Ch, 12.25 kHz 2nd, Ch 2		–80		
Single, 8.167 kHz 3rd, Ch 1		–80		
Two Ch, 8.167 kHz 3rd, Ch 1		–80		
Two Ch, 8.167 kHz 3rd, Ch 2		–80		
Single, 6.125 kHz 4th, Ch 1		–80		
Two Ch, 6.125 kHz 4th, Ch 1		–80		
Two Ch, 6.125 kHz 4th, Ch 2		–80		
Single, 4.9 kHz 5th, Ch 1		–80		
Two Ch, 4.9 kHz 5th, Ch 1		–80		
Two Ch, 4.9 kHz 5th, Ch 2		–80		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Intermodulation Distortion

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
One Ch, F1+F2, 102.4 kHz, Ch 1		–80		
One Ch, F1+F2, 64.096 kHz, Ch 1		–80		
One Ch, F1-2F2, 99.096 kHz, Ch 1		–80		
Two Ch, F1+F2, 1952 Hz, Ch 1		–80		
Two Ch, F1+F2, 1952 Hz, Ch 2		–80		
Two Ch, F1-2F2, 1048 Hz, Ch 1		–80		
Two Ch, F1-2F2, 1048 Hz, Ch 2		–80		
Two Ch, F1+F2, 48.048 kHz, Ch 1		–80		
Two Ch, F1+F2, 48.048 kHz, Ch 2		–80		
Two Ch, F1+F2, 33.024 kHz, Ch 1		–80		
Two Ch, F1+F2, 33.024 kHz, Ch 2		–80		
Two Ch, F1-2F2, 49.096 kHz, Ch 1		–80		
Two Ch, F1-2F2, 49.096 kHz, Ch 2		–80		

Cross Talk

Measurement	Lower Limit	Upper Limit (dBVrms)	Measured Value (dBVrms)	Pass/Fail
Source-to-Ch 1		–126		
Source-to-Ch 2		–126		
Receiver Ch 1, Driver Ch 2		–126		
Receiver Ch 2, Driver Ch 1		–126		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Single Ch Phase Accuracy

Measurement	Lower Limit (deg)	Upper Limit (deg)	Measured Value (deg)	Pass/Fail
Positive slope, Ch 1	–4	4		
Positive slope, Ch 2	–4	4		
Negative slope, Ch 1	–4	4		
Negative slope, Ch 2	–4	4		

External Trigger

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
8 V Pos	–10	10		
8 V Neg	–10	10		
–8 V Pos	–10	10		
–8 V Neg	–10	10		

Tach Function (option D01 only)

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
Trigger level +8V Pos	–10	10		
Trigger level +8V Neg	–10	10		
Trigger level –8V Pos	–10	10		
Trigger level –8V Neg	–10	10		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Input Resistance

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
27 dBVrms, Ch 1	–10	10		
9 dBVrms, Ch 1	–10	10		
–11 dBVrms, Ch 1	–10	10		
27 dBVrms, Ch 2	–10	10		
9 dBVrms, Ch 2	–10	10		
–11 dBVrms, Ch 2	–10	10		

ICP Supply

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Ch 1 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 2 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 1 Current	2.75 mA	5.75 mA	mA	
Ch 2 Current	2.75 mA	5.75 mA	mA	

Source Amplitude Accuracy

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
1 kHz, 0.1 Vpk	–4	4		
1 kHz, 3.0 Vpk	–4	4		
1 kHz, 5.0 Vpk	–4	4		

Source Output Resistance

Measurement	Lower Limit	Upper Limit (ohm)	Measured Value (ohm)	Pass/Fail
Resistance		5		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Source DC Offset

Measurement	Lower Limit (mVdc)	Upper Limit (mVdc)	Measured Value (mVdc)	Pass/Fail
0 Vdc, 0 Vac(pk)	–15	15		
–10 Vdc, 0 Vac(pk)	–315	315		
+10 Vdc, 0 Vac(pk)	–315	315		
–5 Vdc, 5 Vac(pk)	–315	315		
+5 Vdc, 5 Vac(pk)	–315	315		
0 Vdc, 5 Vac(pk)	–165	165		

Source Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
12.8 kHz	–1	1		
25.6 kHz	–1	1		
51.2 kHz	–1	1		
102.4 kHz	–1	1		

Source Distortion

Measurement	Lower Limit	Upper Limit (dBc)	Measured Value (dBc)	Pass/Fail
12.8 kHz		–60		
51.2 kHz		–40		
102.4 kHz		–40		

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Performance Test Record - Four Channel

Test Facility _____

Facility Address _____

Tested By _____

Report Number_____

Customer Name_____

Serial Number_____

Installed Options _____

Date _____

Temperature_____

Humidity _____

Power Line Frequency _____

Test Instruments Used

Instrument	Model	ID or Serial Number	Calibration Due
AC Calibrator			
Synthesizer 1			
Synthesizer 2			
Low-D Oscillator			
Multimeter			

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Self Test

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Long Confidence				

DC Offset

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
–51 dBVrms, Ch 1		–15		
–51 dBVrms, Ch 2		–15		
–51 dBVrms, Ch 3		–15		
–51 dBVrms, Ch 4		–15		
–35 dBVrms, Ch 1		–30		
–35 dBVrms, Ch 2		–30		
–35 dBVrms, Ch 3		–30		
–35 dBVrms, Ch 4		–30		

Noise

Measurement	Lower Limit	Upper Limit ($^{dBV}/_{\sqrt{Hz}}$)	Measured Value ($^{dBV}/_{\sqrt{Hz}}$)	Pass/Fail
Four Ch, 6.4 kHz Span, Ch 1		–130		
Four Ch, 6.4 kHz Span, Ch 2		–130		
Four Ch, 6.4 kHz Span, Ch 3		–130		
Four Ch, 6.4 kHz Span, Ch 4		–130		
Four Ch, 25.6 kHz Span, Ch 1		–140		
Four Ch, 25.6 kHz Span, Ch 2		–140		
Four Ch, 25.6 kHz Span, Ch 3		–140		
Four Ch, 25.6 kHz Span, Ch 4		–140		
Two Ch, 51.2 kHz Span, Ch 1		–140		
Two Ch, 51.2 kHz Span, Ch 2		–140		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Spurious Signals

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
Four Ch, 0 Hz Start, Ch 1		–80		
Four Ch, 0 Hz Start, Ch 2		–80		
Four Ch, 0 Hz Start, Ch 3		–80		
Four Ch, 0 Hz Start, Ch 4		–80		
Four Ch, 200 Hz Start, Ch 1		–80		
Four Ch, 200 Hz Start, Ch 2		–80		
Four Ch, 200 Hz Start, Ch 3		–80		
Four Ch, 200 Hz Start, Ch 4		–80		
Four Ch, 400 Hz Start, Ch 1		–80		
Four Ch, 400 Hz Start, Ch 2		–80		
Four Ch, 400 Hz Start, Ch 3		–80		
Four Ch, 400 Hz Start, Ch 4		–80		
Four Ch, 600 Hz Start, Ch 1		–80		
Four Ch, 600 Hz Start, Ch 2		–80		
Four Ch, 600 Hz Start, Ch 3		–80		
Four Ch, 600 Hz Start, Ch 4		–80		
Four Ch, 800 Hz Start, Ch 1		–80		
Four Ch, 800 Hz Start, Ch 2		–80		
Four Ch, 800 Hz Start, Ch 3		–80		
Four Ch, 800 Hz Start, Ch 4		–80		
Four Ch, 1000 Hz Start, Ch 1		–80		
Four Ch, 1000 Hz Start, Ch 2		–80		
Four Ch, 1000 Hz Start, Ch 3		–80		
Four Ch, 1000 Hz Start, Ch 4		–80		
Four Ch, 1200 Hz Start, Ch 1		–80		
Four Ch, 1200 Hz Start, Ch 2		–80		
Four Ch, 1200 Hz Start, Ch 3		–80		
Four Ch, 1200 Hz Start, Ch 4		–80		

Spurious Signals (continued)

Four Ch, 1400 Hz Start, Ch 1		–80		
Four Ch, 1400 Hz Start, Ch 2		–80		
Four Ch, 1400 Hz Start, Ch 3		–80		
Four Ch, 1400 Hz Start, Ch 4		–80		

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Serial Number:_____Report Number:_____
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Four Ch, 1600 Hz Start, Ch 1	–80
Four Ch, 1600 Hz Start, Ch 2	–80
Four Ch, 1600 Hz Start, Ch 3	–80
Four Ch, 1600 Hz Start, Ch 4	–80
Four Ch, 3200 Hz Start, Ch 1	–80
Four Ch, 3200 Hz Start, Ch 2	–80
Four Ch, 3200 Hz Start, Ch 3	–80
Four Ch, 3200 Hz Start, Ch 4	–80
Four Ch, 4800 Hz Start, Ch 1	–80
Four Ch, 4800 Hz Start, Ch 2	–80
Four Ch, 4800 Hz Start, Ch 3	–80
Four Ch, 4800 Hz Start, Ch 4	–80
Four Ch, 6400 Hz Start, Ch 1	–80
Four Ch, 6400 Hz Start, Ch 2	–80
Four Ch, 6400 Hz Start, Ch 3	–80
Four Ch, 6400 Hz Start, Ch 4	–80
Four Ch, 8000 Hz Start, Ch 1	–80
Four Ch, 8000 Hz Start, Ch 2	–80
Four Ch, 8000 Hz Start, Ch 3	–80
Four Ch, 8000 Hz Start, Ch 4	–80
Four Ch, 9600 Hz Start, Ch 1	–80
Four Ch, 9600 Hz Start, Ch 2	–80
Four Ch, 9600 Hz Start, Ch 3	–80
Four Ch, 9600 Hz Start, Ch 4	–80
Four Ch, 11200 Hz Start, Ch 1	–80
Four Ch, 11200 Hz Start, Ch 2	–80
Four Ch, 11200 Hz Start, Ch 3	–80
Four Ch, 11200 Hz Start, Ch 4	–80
Four Ch, 12800 Hz Start, Ch 1	–80
Four Ch, 12800 Hz Start, Ch 2	–80
Four Ch, 12800 Hz Start, Ch 3	–80
Four Ch, 12800 Hz Start, Ch 4	–80
Four Ch, 14400 Hz Start, Ch 1	–80
Four Ch, 14400 Hz Start, Ch 2	–80

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Serial Number:_____Report Number:_____
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Four Ch, 14400 Hz Start, Ch 3	–80
Four Ch, 14400 Hz Start, Ch 4	–80
Four Ch, 16000 Hz Start, Ch 1	–80
Four Ch, 16000 Hz Start, Ch 2	–80
Four Ch, 16000 Hz Start, Ch 3	–80
Four Ch, 16000 Hz Start, Ch 4	–80
Four Ch, 17600 Hz Start, Ch 1	–80
Four Ch, 17600 Hz Start, Ch 2	–80
Four Ch, 17600 Hz Start, Ch 3	–80
Four Ch, 17600 Hz Start, Ch 4	–80
Four Ch, 19200 Hz Start, Ch 1	–80
Four Ch, 19200 Hz Start, Ch 2	–80
Four Ch, 19200 Hz Start, Ch 3	–80
Four Ch, 19200 Hz Start, Ch 4	–80
Four Ch, 20800 Hz Start, Ch 1	–80
Four Ch, 20800 Hz Start, Ch 2	–80

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Test Date:___/___/___

Spurious Signals (continued)

Four Ch, 20800 Hz Start, Ch 3	–80
Four Ch, 20800 Hz Start, Ch 4	–80
Four Ch, 22400 Hz Start, Ch 1	–80
Four Ch, 22400 Hz Start, Ch 2	–80
Four Ch, 22400 Hz Start, Ch 3	–80
Four Ch, 22400 Hz Start, Ch 4	–80
Four Ch, 24000 Hz Start, Ch 1	–80
Four Ch, 24000 Hz Start, Ch 2	–80
Four Ch, 24000 Hz Start, Ch 3	–80
Four Ch, 24000 Hz Start, Ch 4	–80
Two Ch, 25600 Hz Start, Ch 1	–80
Two Ch, 25600 Hz Start, Ch 2	–80
Two Ch, 27200 Hz Start, Ch 1	–80
Two Ch, 27200 Hz Start, Ch 2	–80
Two Ch, 28800 Hz Start, Ch 1	–80
Two Ch, 28800 Hz Start, Ch 2	–80
Two Ch, 30400 Hz Start, Ch 1	–80
Two Ch, 30400 Hz Start, Ch 2	–80
Two Ch, 32000 Hz Start, Ch 1	–80
Two Ch, 32000 Hz Start, Ch 2	–80
Two Ch, 33600 Hz Start, Ch 1	–80
Two Ch, 33600 Hz Start, Ch 2	–80
Two Ch, 35200 Hz Start, Ch 1	–80
Two Ch, 35200 Hz Start, Ch 2	–80
Two Ch, 36800 Hz Start, Ch 1	–80
Two Ch, 36800 Hz Start, Ch 2	–80
Two Ch, 38400 Hz Start, Ch 1	–80
Two Ch, 38400 Hz Start, Ch 2	–80
Two Ch, 40000 Hz Start, Ch 1	–80
Two Ch, 40000 Hz Start, Ch 2	–80
Two Ch, 41600 Hz Start, Ch 1	–80
Two Ch, 41600 Hz Start, Ch 2	–80
Two Ch, 43200 Hz Start, Ch 1	–80
Two Ch, 43200 Hz Start, Ch 2	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Two Ch, 44800 Hz Start, Ch 1	–80	
Two Ch, 44800 Hz Start, Ch 2	–80	
Two Ch, 46400 Hz Start, Ch 1	–80	
Two Ch, 46400 Hz Start, Ch 2	–80	
Two Ch, 48000 Hz Start, Ch 1	–80	
Two Ch, 48000 Hz Start, Ch 2	–80	
Two Ch, 49600 Hz Start, Ch 1	–80	
Two Ch, 49600 Hz Start, Ch 2	–80	

Amplitude Accuracy

Measurement	Lower Limit (dBVrms)	Upper Limit (dBVrms)	Measured Value (dBVrms)	Pass/Fail
–51 dBVrms, Ch 1	–51.15	–50.85		
–51 dBVrms, Ch 2	–51.15	–50.85		
–51 dBVrms, Ch 3	–51.15	–50.85		
–51 dBVrms, Ch 4	–51.15	–50.85		
–43 dBVrms, Ch 1	–43.15	–42.85		
–43 dBVrms, Ch 2	–43.15	–42.85		
–43 dBVrms, Ch 3	–43.15	–42.85		
–43 dBVrms, Ch 4	–43.15	–42.85		
–35 dBVrms, Ch 1	–35.15	–34.85		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Amplitude Accuracy (continued)

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
–35 dBVrms, Ch 2	–35.15	–34.85		
–35 dBVrms, Ch 3	–35.15	–34.85		
–35 dBVrms, Ch 4	–35.15	–34.85		
–27 dBVrms, Ch 1	–27.15	–26.85		
–27 dBVrms, Ch 2	–27.15	–26.85		
–27 dBVrms, Ch 3	–27.15	–26.85		
–27 dBVrms, Ch 4	–27.15	–26.85		
–11 dBVrms, Ch 1	–11.15	–10.85		
–11 dBVrms, Ch 2	–11.15	–10.85		
–11 dBVrms, Ch 3	–11.15	–10.85		
–11 dBVrms, Ch 4	–11.15	–10.85		
1 dBVrms, Ch 1	0.85	1.15		
1 dBVrms, Ch 2	0.85	1.15		
1 dBVrms, Ch 3	0.85	1.15		
1 dBVrms, Ch 4	0.85	1.15		
9 dBVrms, Ch 1	8.85	9.15		
9 dBVrms, Ch 2	8.85	9.15		
9 dBVrms, Ch 3	8.85	9.15		
9 dBVrms, Ch 4	8.85	9.15		
19 dBVrms, Ch 1	18.85	19.15		
19 dBVrms, Ch 2	18.85	19.15		
19 dBVrms, Ch 3	18.85	19.15		
19 dBVrms, Ch 4	18.85	19.15		
27 dBVrms, Ch 1	26.85	27.15		
27 dBVrms, Ch 2	26.85	27.15		
27 dBVrms, Ch 3	26.85	27.15		
27 dBVrms, Ch 4	26.85	27.15		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
27 dBVrms, 51.2 kHz, One Ch, Ch 1	–0.2	0.2		
9 dBVrms, 51.2 kHz, One Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 51.2 kHz, One Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 1	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 2	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 3	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 4	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 1	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 2	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 3	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 4	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 2	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 3	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 4	–0.2	0.2		

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Serial Number:_____Report Number:_____
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Amplitude Linearity

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
13 dBVrms, Ch 1	–0.0615	0.061		
13 dBVrms, Ch 2	–0.0615	0.061		
13 dBVrms, Ch 3	–0.0615	0.061		
13 dBVrms, Ch 4	–0.0615	0.061		
–1 dBVrms, Ch 1	–0.105	0.104		
–1 dBVrms, Ch 2	–0.105	0.104		
–1 dBVrms, Ch 3	–0.105	0.104		
–1 dBVrms, Ch 4	–0.105	0.104		
–15 dBVrms, Ch 1	–0.33	0.318		
–15 dBVrms, Ch 2	–0.33	0.318		
–15 dBVrms, Ch 3	–0.33	0.318		
–15 dBVrms, Ch 4	–0.33	0.318		
–29 dBVrms, Ch 1	–1.551	1.316		
–29 dBVrms, Ch 2	–1.551	1.316		
–29 dBVrms, Ch 3	–1.551	1.316		
–29 dBVrms, Ch 4	–1.551	1.316		
–43 dBVrms, Ch 1	–13.823	5.088		
–43 dBVrms, Ch 2	–13.823	5.088		
–43 dBVrms, Ch 3	–13.823	5.088		
–43 dBVrms, Ch 4	–13.823	5.088		
–53 dBVrms, Ch 1	–30.116	10.896		
–53 dBVrms, Ch 2	–30.116	10.896		
–53 dBVrms, Ch 3	–30.116	10.896		
–53 dBVrms, Ch 4	–30.116	10.896		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

A-Weight Filter

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
Ch 1, 10 Hz	–5	2		
Ch 2, 10 Hz	–5	2		
Ch 3, 10 Hz	–5	2		
Ch 4, 10 Hz	–5	2		
Ch 1, 31.62 Hz	–1	1		
Ch 2, 31.62 Hz	–1	1		
Ch 3, 31.62 Hz	–1	1		
Ch 4, 31.62 Hz	–1	1		
Ch 1, 100 Hz	–0.7	0.7		
Ch 2, 100 Hz	–0.7	0.7		
Ch 3, 100 Hz	–0.7	0.7		
Ch 4, 100 Hz	–0.7	0.7		
Ch 1, 1000 Hz	–0.7	0.7		
Ch 2, 1000 Hz	–0.7	0.7		
Ch 3, 1000 Hz	–0.7	0.7		
Ch 4, 1000 Hz	–0.7	0.7		
Ch 1, 10000 Hz	–3	2		
Ch 2, 10000 Hz	–3	2		
Ch 3, 10000 Hz	–3	2		
Ch 4, 10000 Hz	–3	2		
Ch 1, 25120 Hz	–4.5	2.4		
Ch 2, 25120 Hz	–4.5	2.4		
Ch 3, 25120 Hz	–4.5	2.4		
Ch 4, 25120 Hz	–4.5	2.4		

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Channel Match

Two Ch, 2/1, 7 dBV FS Mag	–0.04	0.04
Two Ch, 2/1, 7 dBV FS Phs	–0.5	0.5
Two Ch, 2/1, –13 dBV FS Mag	–0.04	0.04
Two Ch, 2/1, –13 dBV FS Phs	–0.5	0.5
Two Ch, 2/1, –33 dBV FS Mag	–0.04	0.04
Two Ch, 2/1, –33 dBV FS Phs	–0.5	0.5
Two Ch, 2/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Two Ch, 2/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 2/1, 7 dBV FS Mag	–0.04	0.04
Four Ch, 2/1, 7 dBV FS Phs	–0.5	0.5
Four Ch, 2/1, –13 dBV FS Mag	–0.04	0.04
Four Ch, 2/1, –13 dBV FS Phs	–0.5	0.5
Four Ch, 2/1, –33 dBV FS Mag	–0.04	0.04
Four Ch, 2/1, –33 dBV FS Phs	–0.5	0.5
Four Ch, 2/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 2/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 3/1, 7 dBV FS Mag	–0.04	0.04
Four Ch, 3/1, 7 dBV FS Phs	–0.5	0.5
Four Ch, 3/1, –13 dBV FS Mag	–0.04	0.04
Four Ch, 3/1, –13 dBV FS Phs	–0.5	0.5
Four Ch, 3/1, –33 dBV FS Mag	–0.04	0.04
Four Ch, 3/1, –33 dBV FS Phs	–0.5	0.5
Four Ch, 3/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 3/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 4/1, 7 dBV FS Mag	–0.04	0.04
Four Ch, 4/1, 7 dBV FS Phs	–0.5	0.5
Four Ch, 4/1, –13 dBV FS Mag	–0.04	0.04
Four Ch, 4/1, –13 dBV FS Phs	–0.5	0.5
Four Ch, 4/1, –33 dBV FS Mag	–0.04	0.04
Four Ch, 4/1, –33 dBV FS Phs	–0.5	0.5
Four Ch, 4/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 4/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 4/3, 7 dBV FS Mag	–0.04	0.04

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Four Ch, 4/3, 7 dBV FS Phs	–0.5	0.5
Four Ch, 4/3, –13 dBV FS Mag	–0.04	0.04
Four Ch, 4/3, –13 dBV FS Phs	–0.5	0.5
Four Ch, 4/3, –33 dBV FS Mag	–0.04	0.04
Four Ch, 4/3, –33 dBV FS Phs	–0.5	0.5
Four Ch, 4/3, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 4/3, 7 dBV –20 dBfs Phs	–0.5	0.5

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Frequency Accuracy

Measurement	Lower Limit (kHz)	Upper Limit (kHz)	Measured Value (kHz)	Pass/Fail
50 kHz	49.9985	50.0015		

Anti-Alias Filter

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
One Ch, Ch 1, 51.2 kHz		–80		
Two Ch, Ch 1, 51.2 kHz		–80		
Two Ch, Ch 2, 51.2 kHz		–80		
Four Ch, Ch 1, 25.6 kHz		–80		
Four Ch, Ch 2, 25.6 kHz		–80		
Four Ch, Ch 3, 25.6 kHz		–80		
Four Ch, Ch 4, 25.6 kHz		–80		

Input Coupling

Measurement	Lower Limit	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
dc - ac, Ch 1		3		
dc - ac, Ch 2		3		
dc - ac, Ch 3		3		
dc - ac, Ch 4		3		

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Harmonic Distortion

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
Two Ch, 12.25 kHz 2nd, Ch 1		–80		
Two Ch, 12.25 kHz 2nd, Ch 2		–80		
Four Ch, 12.25 kHz 2nd, Ch 1		–80		
Four Ch, 12.25 kHz 2nd, Ch 2		–80		
Four Ch, 12.25 kHz 2nd, Ch 3		–80		
Four Ch, 12.25 kHz 2nd, Ch 4		–80		
Two Ch, 8.167 kHz 3rd, Ch 1		–80		
Two Ch, 8.167 kHz 3rd, Ch 2		–80		
Four Ch, 8.167 kHz 3rd, Ch 1		–80		
Four Ch, 8.167 kHz 3rd, Ch 2		–80		
Four Ch, 8.167 kHz 3rd, Ch 3		–80		
Four Ch, 8.167 kHz 3rd, Ch 4		–80		
Two Ch, 6.125 kHz 4th, Ch 1		–80		
Two Ch, 6.125 kHz 4th, Ch 2		–80		
Four Ch, 6.125 kHz 4th, Ch 1		–80		
Four Ch, 6.125 kHz 4th, Ch 2		–80		
Four Ch, 6.125 kHz 4th, Ch 3		–80		
Four Ch, 6.125 kHz 4th, Ch 4		–80		
Two Ch, 4.9 kHz 5th, Ch 1		–80		
Two Ch, 4.9 kHz 5th, Ch 2		–80		
Four Ch, 4.9 kHz 5th, Ch 1		–80		
Four Ch, 4.9 kHz 5th, Ch 2		–80		
Four Ch, 4.9 kHz 5th, Ch 3		–80		
Four Ch, 4.9 kHz 5th, Ch 4		–80		

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Intermodulation Distortion

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
Two Ch, F1+F2, 1952 Hz, Ch 1		–80		
Two Ch, F1+F2, 1952 Hz, Ch 2		–80		
Two Ch, F1–2F2, 1048 Hz, Ch 1		–80		
Two Ch, F1–2F2, 1048 Hz, Ch 2		–80		
Two Ch, F1+F2, 48.048 kHz, Ch 1		–80		
Two Ch, F1+F2, 48.048 kHz, Ch 2		–80		
Two Ch, F1+F2, 33.024 kHz, Ch 1		–80		
Two Ch, F1+F2, 33.024 kHz, Ch 2		–80		
Two Ch, F1–2F2, 49.096 kHz, Ch 1		–80		
Two Ch, F1–2F2, 49.096 kHz, Ch 2		–80		
Four Ch, F1+F2, 1952 Hz, Ch 1		–80		
Four Ch, F1+F2, 1952 Hz, Ch 2		–80		
Four Ch, F1+F2, 1952 Hz, Ch 3		–80		
Four Ch, F1+F2, 1952 Hz, Ch 4		–80		
Four Ch, F1–2F2, 1048 Hz, Ch 1		–80		
Four Ch, F1–2F2, 1048 Hz, Ch 2		–80		
Four Ch, F1–2F2, 1048 Hz, Ch 3		–80		
Four Ch, F1–2F2, 1048 Hz, Ch 4		–80		
Four Ch, F1+F2, 24048 Hz, Ch 1		–80		
Four Ch, F1+F2, 24048 Hz, Ch 2		–80		
Four Ch, F1+F2, 24048 Hz, Ch 3		–80		
Four Ch, F1+F2, 24048 Hz, Ch 4		–80		
Four Ch, F1+F2, 17488 Hz, Ch 1		–80		
Four Ch, F1+F2, 17488 Hz, Ch 2		–80		
Four Ch, F1+F2, 17488 Hz, Ch 3		–80		
Four Ch, F1+F2, 17488 Hz, Ch 4		–80		
Four Ch, F1–2F2, 24096 Hz, Ch 1		–80		
Four Ch, F1–2F2, 24096 Hz, Ch 2		–80		
Four Ch, F1–2F2, 24096 Hz, Ch 3		–80		
Four Ch, F1–2F2, 24096 Hz, Ch 4		–80		

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Cross Talk

Measurement	Lower Limit	Upper Limit (dBVrms)	Measured Value (dBVrms)	Pass/Fail
Source-to-Ch 1		–126		
Source-to-Ch 2		–126		
Source-to-Ch 3		–126		
Source-to-Ch 4		–126		
Receiver Ch 1, Driver Ch 2, 3, 4		–126		
Receiver Ch 2, Driver Ch 1, 3, 4		–126		
Receiver Ch 3, Driver Ch 1, 2, 4		–126		
Receiver Ch 4, Driver Ch 1, 2, 3		–126		

Single Ch Phase Accuracy

Measurement	Lower Limit (deg)	Upper Limit (deg)	Measured Value (deg)	Pass/Fail
Positive slope, Ch 1	–4	4		
Positive slope, Ch 2	–4	4		
Positive slope, Ch 3	–4	4		
Positive slope, Ch 4	–4	4		
Negative slope, Ch 1	–4	4		
Negative slope, Ch 2	–4	4		
Negative slope, Ch 3	–4	4		
Negative slope, Ch 4	–4	4		

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External Trigger

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
8 V Pos	–10	10		
8 V Neg	–10	10		
–8 V Pos	–10	10		
–8 V Neg	–10	10		

Tach Function (option D01 only)

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
Trigger level +8V Pos	–10	10		
Trigger level +8V Neg	–10	10		
Trigger level –8V Pos	–10	10		
Trigger level –8V Neg	–10	10		

Input Resistance

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
27 dBVrms, Ch 1	–10	10		
9 dBVrms, Ch 1	–10	10		
–11 dBVrms, Ch 1	–10	10		
27 dBVrms, Ch 2	–10	10		
9 dBVrms, Ch 2	–10	10		
–11 dBVrms, Ch 2	–10	10		
27 dBVrms, Ch 3	–10	10		
9 dBVrms, Ch 3	–10	10		
–11 dBVrms, Ch 3	–10	10		
27 dBVrms, Ch 4	–10	10		
9 dBVrms, Ch 4	–10	10		
–11 dBVrms, Ch 4	–10	10		

ICP Supply

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Ch 1 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 2 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 31 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 4 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 1 Current	2.75 mA	5.75 mA	mA	

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Ch 2 Current	2.75 mA	5.75 mA	mA	
Ch 3 Current	2.75 mA	5.75 mA	mA	
Ch 4 Current	2.75 mA	5.75 mA	mA	

Source Amplitude Accuracy

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
1 kHz, 0.1 Vpk	–4	4		
1 kHz, 3.0 Vpk	–4	4		
1 kHz, 5.0 Vpk	–4	4		

Source Output Resistance

Measurement	Lower Limit	Upper Limit (ohm)	Measured Value (ohm)	Pass/Fail
Resistance		5		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Source DC Offset

Measurement	Lower Limit (mVdc)	Upper Limit (mVdc)	Measured Value (mVdc)	Pass/Fail
0 Vdc, 0 Vac(pk)	–15	15		
–10 Vdc, 0 Vac(pk)	–315	315		
+10 Vdc, 0 Vac(pk)	–315	315		
–5 Vdc, 5 Vac(pk)	–315	315		
+5 Vdc, 5 Vac(pk)	–315	315		
0 Vdc, 5 Vac(pk)	–165	165		

Source Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
12.8 kHz	–1	1		
25.6 kHz	–1	1		
51.2 kHz	–1	1		

Source Distortion

Measurement	Lower Limit	Upper Limit (dBc)	Measured Value (dBc)	Pass/Fail
12.8 kHz		–60		
51.2 kHz		–40		

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Operation Verification Test Record - Two Channel

Test Facility _____

Facility Address _____

Tested By _____

Report Number_____

Customer Name_____

Serial Number_____

Installed Options _____

Date _____

Temperature_____

Humidity _____

Power Line Frequency _____

Test Instruments Used

Instrument	Model	ID or Serial Number	Calibration Due
AC Calibrator			
Synthesizer 1			
Synthesizer 2			
Low-D Oscillator			
Multimeter			

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Self Test

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Long Confidence				

DC Offset

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
–51 dBVrms, Ch 1		–15		
–51 dBVrms, Ch 2		–15		
–35 dBVrms, Ch 1		–30		
–35 dBVrms, Ch 2		–30		

Noise

Measurement	Lower Limit	Upper Limit ($^{dBV}/_{\sqrt{Hz}}$)	Measured Value ($^{dBV}/_{\sqrt{Hz}}$)	Pass/Fail
Two Ch, 6.4 kHz Span, Ch 1		–130		
Two Ch, 6.4 kHz Span, Ch 2		–130		
Two Ch, 51.2 kHz Span, Ch 1		–140		
Two Ch, 51.2 kHz Span, Ch 2		–140		
One Ch, 102.4 kHz Span, Ch 1		–140		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Spurious Signals

Two Ch, 0 Hz Start, Ch 1	–80
Two Ch, 0 Hz Start, Ch 2	–80
Two Ch, 200 Hz Start, Ch 1	–80
Two Ch, 200 Hz Start, Ch 2	–80
Two Ch, 400 Hz Start, Ch 1	–80
Two Ch, 400 Hz Start, Ch 2	–80
Two Ch, 600 Hz Start, Ch 1	–80
Two Ch, 600 Hz Start, Ch 2	–80
Two Ch, 800 Hz Start, Ch 1	–80
Two Ch, 800 Hz Start, Ch 2	–80
Two Ch, 1000 Hz Start, Ch 1	–80
Two Ch, 1000 Hz Start, Ch 2	–80
Two Ch, 1200 Hz Start, Ch 1	–80
Two Ch, 1200 Hz Start, Ch 2	–80
Two Ch, 1400 Hz Start, Ch 1	–80
Two Ch, 1400 Hz Start, Ch 2	–80
Two Ch, 1600 Hz Start, Ch 1	–80
Two Ch, 1600 Hz Start, Ch 2	–80
Two Ch, 3200 Hz Start, Ch 1	–80
Two Ch, 3200 Hz Start, Ch 2	–80
Two Ch, 4800 Hz Start, Ch 1	–80
Two Ch, 4800 Hz Start, Ch 2	–80
Two Ch, 6400 Hz Start, Ch 1	–80
Two Ch, 6400 Hz Start, Ch 2	–80
Two Ch, 8000 Hz Start, Ch 1	–80
Two Ch, 8000 Hz Start, Ch 2	–80
Two Ch, 9600 Hz Start, Ch 1	–80
Two Ch, 9600 Hz Start, Ch 2	–80
Two Ch, 11200 Hz Start, Ch 1	–80
Two Ch, 11200 Hz Start, Ch 2	–80
Two Ch, 12800 Hz Start, Ch 1	–80
Two Ch, 12800 Hz Start, Ch 2	–80
Two Ch, 14400 Hz Start, Ch 1	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Two Ch, 14400 Hz Start, Ch 2	–80
Two Ch, 16000 Hz Start, Ch 1	–80
Two Ch, 16000 Hz Start, Ch 2	–80
Two Ch, 17600 Hz Start, Ch 1	–80
Two Ch, 17600 Hz Start, Ch 2	–80
Two Ch, 19200 Hz Start, Ch 1	–80
Two Ch, 19200 Hz Start, Ch 2	–80
Two Ch, 20800 Hz Start, Ch 1	–80
Two Ch, 20800 Hz Start, Ch 2	–80
Two Ch, 22400 Hz Start, Ch 1	–80
Two Ch, 22400 Hz Start, Ch 2	–80
Two Ch, 24000 Hz Start, Ch 1	–80
Two Ch, 24000 Hz Start, Ch 2	–80
Two Ch, 25600 Hz Start, Ch 1	–80
Two Ch, 25600 Hz Start, Ch 2	–80
Two Ch, 27200 Hz Start, Ch 1	–80
Two Ch, 27200 Hz Start, Ch 2	–80
Two Ch, 28800 Hz Start, Ch 1	–80
Two Ch, 28800 Hz Start, Ch 2	–80
Two Ch, 30400 Hz Start, Ch 1	–80
Two Ch, 30400 Hz Start, Ch 2	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Spurious Signals (continued)

Two Ch, 32000 Hz Start, Ch 1	–80
Two Ch, 32000 Hz Start, Ch 2	–80
Two Ch, 33600 Hz Start, Ch 1	–80
Two Ch, 33600 Hz Start, Ch 2	–80
Two Ch, 35200 Hz Start, Ch 1	–80
Two Ch, 35200 Hz Start, Ch 2	–80
Two Ch, 36800 Hz Start, Ch 1	–80
Two Ch, 36800 Hz Start, Ch 2	–80
Two Ch, 38400 Hz Start, Ch 1	–80
Two Ch, 38400 Hz Start, Ch 2	–80
Two Ch, 40000 Hz Start, Ch 1	–80
Two Ch, 40000 Hz Start, Ch 2	–80
Two Ch, 41600 Hz Start, Ch 1	–80
Two Ch, 41600 Hz Start, Ch 2	–80
Two Ch, 43200 Hz Start, Ch 1	–80
Two Ch, 43200 Hz Start, Ch 2	–80
Two Ch, 44800 Hz Start, Ch 1	–80
Two Ch, 44800 Hz Start, Ch 2	–80
Two Ch, 46400 Hz Start, Ch 1	–80
Two Ch, 46400 Hz Start, Ch 2	–80
Two Ch, 48000 Hz Start, Ch 1	–80
Two Ch, 48000 Hz Start, Ch 2	–80
Two Ch, 49600 Hz Start, Ch 1	–80
Two Ch, 49600 Hz Start, Ch 2	–80
One Ch, 79200 Start, Ch 1	–80
One Ch, 80800 Start, Ch 1	–80
One Ch, 85600 Start, Ch 1	–80
One Ch, 87200 Start, Ch 1	–80
One Ch, 88800 Start, Ch 1	–80
One Ch, 97000 Start, Ch 1	–80
One Ch, 98600 Start, Ch 1	–80
One Ch, 100200 Start, Ch 1	–80
One Ch, 101800 Start, Ch 1	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Amplitude Accuracy

Measurement	Lower Limit (dBVrms)	Upper Limit (dBVrms)	Measured Value (dBVrms)	Pass/Fail
–51 dBVrms, Ch 1	–51.15	–50.85		
–51 dBVrms, Ch 2	–51.15	–50.85		
–43 dBVrms, Ch 1	–43.15	–42.85		
–43 dBVrms, Ch 2	–43.15	–42.85		
–35 dBVrms, Ch 1	–35.15	–34.85		
–35 dBVrms, Ch 2	–35.15	–34.85		
–27 dBVrms, Ch 1	–27.15	–26.85		
–27 dBVrms, Ch 2	–27.15	–26.85		
–11 dBVrms, Ch 1	–11.15	–10.85		
–11 dBVrms, Ch 2	–11.15	–10.85		
1 dBVrms, Ch 1	0.85	1.15		
1 dBVrms, Ch 2	0.85	1.15		
9 dBVrms, Ch 1	8.85	9.15		
9 dBVrms, Ch 2	8.85	9.15		
19 dBVrms, Ch 1	18.85	19.15		
19 dBVrms, Ch 2	18.85	19.15		
27 dBVrms, Ch 1	26.85	27.15		
27 dBVrms, Ch 2	26.85	27.15		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
27 dBVrms, 99.84 kHz, One Ch, Ch 1	–0.2	0.2		
9 dBVrms, 99.84 kHz, One Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 99.84 kHz, One Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		

Amplitude Linearity

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
13 dBVrms, Ch 1	–0.0615	0.061		
13 dBVrms, Ch 2	–0.0615	0.061		
–1 dBVrms, Ch 1	–0.105	0.104		
–1 dBVrms, Ch 2	–0.105	0.104		
–15 dBVrms, Ch 1	–0.33	0.318		
–15 dBVrms, Ch 2	–0.33	0.318		
–29 dBVrms, Ch 1	–1.551	1.316		
–29 dBVrms, Ch 2	–1.551	1.316		
–43 dBVrms, Ch 1	–13.823	5.088		
–43 dBVrms, Ch 2	–13.823	5.088		
–53 dBVrms, Ch 1	–30.116	10.896		
–53 dBVrms, Ch 2	–30.116	10.896		

A Weight Filter

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
Ch 1, 10 Hz	–5	2		
Ch 2, 10 Hz	–5	2		
Ch 1, 31.62 Hz	–1	1		
Ch 2, 31.62 Hz	–1	1		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
Ch 1, 100 Hz	–0.7	0.7		
Ch 2, 100 Hz	–0.7	0.7		
Ch 1, 1000 Hz	–0.7	0.7		
Ch 2, 1000 Hz	–0.7	0.7		
Ch 1, 10000 Hz	–3	2		
Ch 2, 10000 Hz	–3	2		
Ch 1, 25120 Hz	–4.5	2.4		
Ch 2, 25120 Hz	–4.5	2.4		

Channel Match

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Two Ch, 2/1, 7 dBV FS Mag	–0.04 dB	0.04 dB	dB	
Two Ch, 2/1, 7 dBV FS Phs	–0.5 deg	0.5 deg	deg	
Two Ch, 2/1, –13 dBV FS Mag	–0.04 dB	0.04 dB	dB	
Two Ch, 2/1, –13 dBV FS Phs	–0.5 deg	0.5 deg	deg	
Two Ch, 2/1, –33 dBV FS Mag	–0.04 dB	0.04 dB	dB	
Two Ch, 2/1, –33 dBV FS Phs	–0.5 deg	0.5 deg	deg	
Two Ch, 2/1, 7 dBV –20dBfs Mag	–0.08 dB	0.08 dB	dB	
Two Ch, 2/1, 7 dBV –20dBfs Phs	–0.5 deg	0.5 deg	deg	

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Frequency Accuracy

Measurement	Lower Limit (kHz)	Upper Limit (kHz)	Measured Value (kHz)	Pass/Fail
50 kHz	49.9985	50.0015		

Single Ch Phase Accuracy

Measurement	Lower Limit (deg)	Upper Limit (deg)	Measured Value (deg)	Pass/Fail
Positive slope, Ch 1	–4	4		
Positive slope, Ch 2	–4	4		
Negative slope, Ch 1	–4	4		
Negative slope, Ch 2	–4	4		

Tach Function (option D01 only)

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
Trigger level +8V Pos	–10	10		
Trigger level +8V Neg	–10	10		
Trigger level –8V Pos	–10	10		
Trigger level –8V Neg	–10	10		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

ICP Supply

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Ch 1 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 2 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 1 Current	2.75 mA	5.75 mA	mA	
Ch 2 Current	2.75 mA	5.75 mA	mA	

Source Amplitude Accuracy

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
1 kHz, 0.1 Vpk	–4	4		
1 kHz, 3.0 Vpk	–4	4		
1 kHz, 5.0 Vpk	–4	4		

Source Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
12.8 kHz	–1	1		
25.6 kHz	–1	1		
51.2 kHz	–1	1		
102.4 kHz	–1	1		

Source Distortion

Measurement	Lower Limit	Upper Limit (dBc)	Measured Value (dBc)	Pass/Fail
12.8 kHz		–60		
51.2 kHz		–40		
102.4 kHz		–40		

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Operation Verification Test Record - Four Channel

Test Facility _____

Facility Address _____

Tested By _____

Report Number_____

Customer Name_____

Serial Number_____

Installed Options _____

Date _____

Temperature_____

Humidity _____

Power Line Frequency _____

Test Instruments Used

Instrument	Model	ID or Serial Number	Calibration Due
AC Calibrator			
Synthesizer 1			
Synthesizer 2			
Low-D Oscillator			
Multimeter			

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Self Test

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Long Confidence				

DC Offset

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
–51 dBVrms, Ch 1		–15		
–51 dBVrms, Ch 2		–15		
–51 dBVrms, Ch 3		–15		
–51 dBVrms, Ch 4		–15		
–35 dBVrms, Ch 1		–30		
–35 dBVrms, Ch 2		–30		
–35 dBVrms, Ch 3		–30		
–35 dBVrms, Ch 4		–30		

Noise

Measurement	Lower Limit	Upper Limit ($dBV/\sqrt{Hz}$)	Measured Value ($dBV/\sqrt{Hz}$)	Pass/Fail
Four Ch, 6.4 kHz Span, Ch 1		–130		
Four Ch, 6.4 kHz Span, Ch 2		–130		
Four Ch, 6.4 kHz Span, Ch 3		–130		
Four Ch, 6.4 kHz Span, Ch 4		–130		
Four Ch, 25.6 kHz Span, Ch 1		–140		
Four Ch, 25.6 kHz Span, Ch 2		–140		
Four Ch, 25.6 kHz Span, Ch 3		–140		
Four Ch, 25.6 kHz Span, Ch 4		–140		
Two Ch, 51.2 kHz Span, Ch 1		–140		
Two Ch, 51.2 kHz Span, Ch 2		–140		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Spurious Signals

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
Four Ch, 0 Hz Start, Ch 1		–80		
Four Ch, 0 Hz Start, Ch 2		–80		
Four Ch, 0 Hz Start, Ch 3		–80		
Four Ch, 0 Hz Start, Ch 4		–80		
Four Ch, 200 Hz Start, Ch 1		–80		
Four Ch, 200 Hz Start, Ch 2		–80		
Four Ch, 200 Hz Start, Ch 3		–80		
Four Ch, 200 Hz Start, Ch 4		–80		
Four Ch, 400 Hz Start, Ch 1		–80		
Four Ch, 400 Hz Start, Ch 2		–80		
Four Ch, 400 Hz Start, Ch 3		–80		
Four Ch, 400 Hz Start, Ch 4		–80		
Four Ch, 600 Hz Start, Ch 1		–80		
Four Ch, 600 Hz Start, Ch 2		–80		
Four Ch, 600 Hz Start, Ch 3		–80		
Four Ch, 600 Hz Start, Ch 4		–80		
Four Ch, 800 Hz Start, Ch 1		–80		
Four Ch, 800 Hz Start, Ch 2		–80		
Four Ch, 800 Hz Start, Ch 3		–80		
Four Ch, 800 Hz Start, Ch 4		–80		
Four Ch, 1000 Hz Start, Ch 1		–80		
Four Ch, 1000 Hz Start, Ch 2		–80		
Four Ch, 1000 Hz Start, Ch 3		–80		
Four Ch, 1000 Hz Start, Ch 4		–80		
Four Ch, 1200 Hz Start, Ch 1		–80		
Four Ch, 1200 Hz Start, Ch 2		–80		
Four Ch, 1200 Hz Start, Ch 3		–80		
Four Ch, 1200 Hz Start, Ch 4		–80		
Four Ch, 1400 Hz Start, Ch 1		–80		
Four Ch, 1400 Hz Start, Ch 2		–80		
Four Ch, 1400 Hz Start, Ch 3		–80		
Four Ch, 1400 Hz Start, Ch 4		–80		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Four Ch, 1600 Hz Start, Ch 1	–80
Four Ch, 1600 Hz Start, Ch 2	–80
Four Ch, 1600 Hz Start, Ch 3	–80
Four Ch, 1600 Hz Start, Ch 4	–80
Four Ch, 3200 Hz Start, Ch 1	–80
Four Ch, 3200 Hz Start, Ch 2	–80
Four Ch, 3200 Hz Start, Ch 3	–80
Four Ch, 3200 Hz Start, Ch 4	–80
Four Ch, 4800 Hz Start, Ch 1	–80
Four Ch, 4800 Hz Start, Ch 2	–80
Four Ch, 4800 Hz Start, Ch 3	–80
Four Ch, 4800 Hz Start, Ch 4	–80
Four Ch, 6400 Hz Start, Ch 1	–80
Four Ch, 6400 Hz Start, Ch 2	–80
Four Ch, 6400 Hz Start, Ch 3	–80
Four Ch, 6400 Hz Start, Ch 4	–80
Four Ch, 8000 Hz Start, Ch 1	–80
Four Ch, 8000 Hz Start, Ch 2	–80
Four Ch, 8000 Hz Start, Ch 3	–80
Four Ch, 8000 Hz Start, Ch 4	–80
Four Ch, 9600 Hz Start, Ch 1	–80
Four Ch, 9600 Hz Start, Ch 2	–80
Four Ch, 9600 Hz Start, Ch 3	–80
Four Ch, 9600 Hz Start, Ch 4	–80
Four Ch, 11200 Hz Start, Ch 1	–80
Four Ch, 11200 Hz Start, Ch 2	–80
Four Ch, 11200 Hz Start, Ch 3	–80
Four Ch, 11200 Hz Start, Ch 4	–80
Four Ch, 12800 Hz Start, Ch 1	–80
Four Ch, 12800 Hz Start, Ch 2	–80
Four Ch, 12800 Hz Start, Ch 3	–80
Four Ch, 12800 Hz Start, Ch 4	–80
Four Ch, 14400 Hz Start, Ch 1	–80
Four Ch, 14400 Hz Start, Ch 2	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Four Ch, 14400 Hz Start, Ch 3	–80
Four Ch, 14400 Hz Start, Ch 4	–80
Four Ch, 16000 Hz Start, Ch 1	–80
Four Ch, 16000 Hz Start, Ch 2	–80
Four Ch, 16000 Hz Start, Ch 3	–80
Four Ch, 16000 Hz Start, Ch 4	–80
Four Ch, 17600 Hz Start, Ch 1	–80
Four Ch, 17600 Hz Start, Ch 2	–80
Four Ch, 17600 Hz Start, Ch 3	–80
Four Ch, 17600 Hz Start, Ch 4	–80
Four Ch, 19200 Hz Start, Ch 1	–80
Four Ch, 19200 Hz Start, Ch 2	–80
Four Ch, 19200 Hz Start, Ch 3	–80
Four Ch, 19200 Hz Start, Ch 4	–80
Four Ch, 20800 Hz Start, Ch 1	–80
Four Ch, 20800 Hz Start, Ch 2	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Spurious Signals (continued)

Four Ch, 20800 Hz Start, Ch 3	–80
Four Ch, 20800 Hz Start, Ch 4	–80
Four Ch, 22400 Hz Start, Ch 1	–80
Four Ch, 22400 Hz Start, Ch 2	–80
Four Ch, 22400 Hz Start, Ch 3	–80
Four Ch, 22400 Hz Start, Ch 4	–80
Four Ch, 24000 Hz Start, Ch 1	–80
Four Ch, 24000 Hz Start, Ch 2	–80
Four Ch, 24000 Hz Start, Ch 3	–80
Four Ch, 24000 Hz Start, Ch 4	–80
Two Ch, 25600 Hz Start, Ch 1	–80
Two Ch, 25600 Hz Start, Ch 2	–80
Two Ch, 27200 Hz Start, Ch 1	–80
Two Ch, 27200 Hz Start, Ch 2	–80
Two Ch, 28800 Hz Start, Ch 1	–80
Two Ch, 28800 Hz Start, Ch 2	–80
Two Ch, 30400 Hz Start, Ch 1	–80
Two Ch, 30400 Hz Start, Ch 2	–80
Two Ch, 32000 Hz Start, Ch 1	–80
Two Ch, 32000 Hz Start, Ch 2	–80
Two Ch, 33600 Hz Start, Ch 1	–80
Two Ch, 33600 Hz Start, Ch 2	–80
Two Ch, 35200 Hz Start, Ch 1	–80
Two Ch, 35200 Hz Start, Ch 2	–80
Two Ch, 36800 Hz Start, Ch 1	–80
Two Ch, 36800 Hz Start, Ch 2	–80
Two Ch, 38400 Hz Start, Ch 1	–80
Two Ch, 38400 Hz Start, Ch 2	–80
Two Ch, 40000 Hz Start, Ch 1	–80
Two Ch, 40000 Hz Start, Ch 2	–80
Two Ch, 41600 Hz Start, Ch 1	–80
Two Ch, 41600 Hz Start, Ch 2	–80
Two Ch, 43200 Hz Start, Ch 1	–80
Two Ch, 43200 Hz Start, Ch 2	–80

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Two Ch, 44800 Hz Start, Ch 1	–80
Two Ch, 44800 Hz Start, Ch 2	–80
Two Ch, 46400 Hz Start, Ch 1	–80
Two Ch, 46400 Hz Start, Ch 2	–80
Two Ch, 48000 Hz Start, Ch 1	–80
Two Ch, 48000 Hz Start, Ch 2	–80
Two Ch, 49600 Hz Start, Ch 1	–80
Two Ch, 49600 Hz Start, Ch 2	–80

Amplitude Accuracy

Measurement	Lower Limit (dBVrms)	Upper Limit (dBVrms)	Measured Value (dBVrms)	Pass/Fail
–51 dBVrms, Ch 1	–51.15	–50.85		
–51 dBVrms, Ch 2	–51.15	–50.85		
–51 dBVrms, Ch 3	–51.15	–50.85		
–51 dBVrms, Ch 4	–51.15	–50.85		
–43 dBVrms, Ch 1	–43.15	–42.85		
–43 dBVrms, Ch 2	–43.15	–42.85		
–43 dBVrms, Ch 3	–43.15	–42.85		
–43 dBVrms, Ch 4	–43.15	–42.85		
–35 dBVrms, Ch 1	–35.15	–34.85		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Amplitude Accuracy (continued)

Measurement	Lower Limit	Upper Limit (dBfs)	Measured Value (dBfs)	Pass/Fail
–35 dBVrms, Ch 2	–35.15	–34.85		
–35 dBVrms, Ch 3	–35.15	–34.85		
–35 dBVrms, Ch 4	–35.15	–34.85		
–27 dBVrms, Ch 1	–27.15	–26.85		
–27 dBVrms, Ch 2	–27.15	–26.85		
–27 dBVrms, Ch 3	–27.15	–26.85		
–27 dBVrms, Ch 4	–27.15	–26.85		
–11 dBVrms, Ch 1	–11.15	–10.85		
–11 dBVrms, Ch 2	–11.15	–10.85		
–11 dBVrms, Ch 3	–11.15	–10.85		
–11 dBVrms, Ch 4	–11.15	–10.85		
1 dBVrms, Ch 1	0.85	1.15		
1 dBVrms, Ch 2	0.85	1.15		
1 dBVrms, Ch 3	0.85	1.15		
1 dBVrms, Ch 4	0.85	1.15		
9 dBVrms, Ch 1	8.85	9.15		
9 dBVrms, Ch 2	8.85	9.15		
9 dBVrms, Ch 3	8.85	9.15		
9 dBVrms, Ch 4	8.85	9.15		
19 dBVrms, Ch 1	18.85	19.15		
19 dBVrms, Ch 2	18.85	19.15		
19 dBVrms, Ch 3	18.85	19.15		
19 dBVrms, Ch 4	18.85	19.15		
27 dBVrms, Ch 1	26.85	27.15		
27 dBVrms, Ch 2	26.85	27.15		
27 dBVrms, Ch 3	26.85	27.15		
27 dBVrms, Ch 4	26.85	27.15		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
27 dBVrms, 51.2 kHz, One Ch, Ch 1	–0.2	0.2		
9 dBVrms, 51.2 kHz, One Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 51.2 kHz, One Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
27 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
9 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 51.2 kHz, Two Ch, Ch 2	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 1	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 2	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 3	–0.2	0.2		
27 dBVrms, 25.6 kHz, Four Ch, Ch 4	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 1	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 2	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 3	–0.2	0.2		
9 dBVrms, 25.6 kHz, Four Ch, Ch 4	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 1	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 2	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 3	–0.2	0.2		
–11 dBVrms, 25.6 kHz, Four Ch, Ch 4	–0.2	0.2		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Amplitude Linearity

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
13 dBVrms, Ch 1	–0.0615	0.061		
13 dBVrms, Ch 2	–0.0615	0.061		
13 dBVrms, Ch 3	–0.0615	0.061		
13 dBVrms, Ch 4	–0.0615	0.061		
–1 dBVrms, Ch 1	–0.105	0.104		
–1 dBVrms, Ch 2	–0.105	0.104		
–1 dBVrms, Ch 3	–0.105	0.104		
–1 dBVrms, Ch 4	–0.105	0.104		
–15 dBVrms, Ch 1	–0.33	0.318		
–15 dBVrms, Ch 2	–0.33	0.318		
–15 dBVrms, Ch 3	–0.33	0.318		
–15 dBVrms, Ch 4	–0.33	0.318		
–29 dBVrms, Ch 1	–1.551	1.316		
–29 dBVrms, Ch 2	–1.551	1.316		
–29 dBVrms, Ch 3	–1.551	1.316		
–29 dBVrms, Ch 4	–1.551	1.316		
–43 dBVrms, Ch 1	–13.823	5.088		
–43 dBVrms, Ch 2	–13.823	5.088		
–43 dBVrms, Ch 3	–13.823	5.088		
–43 dBVrms, Ch 4	–13.823	5.088		
–53 dBVrms, Ch 1	–30.116	10.896		
–53 dBVrms, Ch 2	–30.116	10.896		
–53 dBVrms, Ch 3	–30.116	10.896		
–53 dBVrms, Ch 4	–30.116	10.896		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

A Weight Filter

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
Ch 1, 10 Hz	–5	2		
Ch 2, 10 Hz	–5	2		
Ch 3, 10 Hz	–5	2		
Ch 4, 10 Hz	–5	2		
Ch 1, 31.62 Hz	–1	1		
Ch 2, 31.62 Hz	–1	1		
Ch 3, 31.62 Hz	–1	1		
Ch 4, 31.62 Hz	–1	1		
Ch 1, 100 Hz	–0.7	0.7		
Ch 2, 100 Hz	–0.7	0.7		
Ch 3, 100 Hz	–0.7	0.7		
Ch 4, 100 Hz	–0.7	0.7		
Ch 1, 1000 Hz	–0.7	0.7		
Ch 2, 1000 Hz	–0.7	0.7		
Ch 3, 1000 Hz	–0.7	0.7		
Ch 4, 1000 Hz	–0.7	0.7		
Ch 1, 10000 Hz	–3	2		
Ch 2, 10000 Hz	–3	2		
Ch 3, 10000 Hz	–3	2		
Ch 4, 10000 Hz	–3	2		
Ch 1, 25120 Hz	–4.5	2.4		
Ch 2, 25120 Hz	–4.5	2.4		
Ch 3, 25120 Hz	–4.5	2.4		
Ch 4, 25120 Hz	–4.5	2.4		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Channel Match

Two Ch, 2/1, 7 dBV FS Mag	–0.04	0.04
Two Ch, 2/1, 7 dBV FS Phs	–0.5	0.5
Two Ch, 2/1, –13 dBV FS Mag	–0.04	0.04
Two Ch, 2/1, –13 dBV FS Phs	–0.5	0.5
Two Ch, 2/1, –33 dBV FS Mag	–0.04	0.04
Two Ch, 2/1, –33 dBV FS Phs	–0.5	0.5
Two Ch, 2/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Two Ch, 2/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 2/1, 7 dBV FS Mag	–0.04	0.04
Four Ch, 2/1, 7 dBV FS Phs	–0.5	0.5
Four Ch, 2/1, –13 dBV FS Mag	–0.04	0.04
Four Ch, 2/1, –13 dBV FS Phs	–0.5	0.5
Four Ch, 2/1, –33 dBV FS Mag	–0.04	0.04
Four Ch, 2/1, –33 dBV FS Phs	–0.5	0.5
Four Ch, 2/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 2/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 3/1, 7 dBV FS Mag	–0.04	0.04
Four Ch, 3/1, 7 dBV FS Phs	–0.5	0.5
Four Ch, 3/1, –13 dBV FS Mag	–0.04	0.04
Four Ch, 3/1, –13 dBV FS Phs	–0.5	0.5
Four Ch, 3/1, –33 dBV FS Mag	–0.04	0.04
Four Ch, 3/1, –33 dBV FS Phs	–0.5	0.5
Four Ch, 3/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 3/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 4/1, 7 dBV FS Mag	–0.04	0.04
Four Ch, 4/1, 7 dBV FS Phs	–0.5	0.5
Four Ch, 4/1, –13 dBV FS Mag	–0.04	0.04
Four Ch, 4/1, –13 dBV FS Phs	–0.5	0.5
Four Ch, 4/1, –33 dBV FS Mag	–0.04	0.04
Four Ch, 4/1, –33 dBV FS Phs	–0.5	0.5
Four Ch, 4/1, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 4/1, 7 dBV –20 dBfs Phs	–0.5	0.5
Four Ch, 4/3, 7 dBV FS Mag	–0.04	0.04

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Four Ch, 4/3, 7 dBV FS Phs	–0.5	0.5
Four Ch, 4/3, –13 dBV FS Mag	–0.04	0.04
Four Ch, 4/3, –13 dBV FS Phs	–0.5	0.5
Four Ch, 4/3, –33 dBV FS Mag	–0.04	0.04
Four Ch, 4/3, –33 dBV FS Phs	–0.5	0.5
Four Ch, 4/3, 7 dBV –20 dBfs Mag	–0.08	0.08
Four Ch, 4/3, 7 dBV –20 dBfs Phs	–0.5	0.5

Frequency Accuracy

Measurement	Lower Limit (kHz)	Upper Limit (kHz)	Measured Value (kHz)	Pass/Fail
50 kHz	49.9985	50.0015		

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Single Ch Phase Accuracy

Measurement	Lower Limit (deg)	Upper Limit (deg)	Measured Value (deg)	Pass/Fail
Positive slope, Ch 1	–4	4		
Positive slope, Ch 2	–4	4		
Positive slope, Ch 3	–4	4		
Positive slope, Ch 4	–4	4		
Negative slope, Ch 1	–4	4		
Negative slope, Ch 2	–4	4		
Negative slope, Ch 3	–4	4		
Negative slope, Ch 4	–4	4		

Tach Function (option D01 only)

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
Trigger level +8V Pos	–10	10		
Trigger level +8V Neg	–10	10		
Trigger level –8V Pos	–10	10		
Trigger level –8V Neg	–10	10		

ICP Supply

Measurement	Lower Limit	Upper Limit	Measured Value	Pass/Fail
Ch 1 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 2 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 3 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 4 Open Circuit Voltage	26 Vdc	32 Vdc	Vdc	
Ch 1 Current	2.75 mA	5.75 mA	mA	
Ch 2 Current	2.75 mA	5.75 mA	mA	
Ch 3 Current	2.75 mA	5.75 mA	mA	
Ch 4 Current	2.75 mA	5.75 mA	mA	

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Serial Number:_____Report Number:_____
Test Date:___/___/___

Source Amplitude Accuracy

Measurement	Lower Limit (%)	Upper Limit (%)	Measured Value (%)	Pass/Fail
1 kHz, 0.1 Vpk	–4	4		
1 kHz, 3.0 Vpk	–4	4		
1 kHz, 5.0 Vpk	–4	4		

Source Flatness

Measurement	Lower Limit (dB)	Upper Limit (dB)	Measured Value (dB)	Pass/Fail
12.8 kHz	–1	1		
25.6 kHz	–1	1		
51.2 kHz	–1	1		

Source Distortion

Measurement	Lower Limit	Upper Limit (dBc)	Measured Value (dBc)	Pass/Fail
12.8 kHz		–60		
51.2 kHz		–40		

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4

Troubleshooting the Analyzer

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This chapter contains troubleshooting tests that can isolate most failures to the faulty assembly. The section ''How to troubleshoot the analyzer'' tells you which test to start with based on the failure. The test you start with will either isolate the faulty assembly or send you to another test to continue troubleshooting.

Safety Considerations

The Agilent 35670A Dynamic Signal Analyzer is a Safety Class 1 instrument (provided with a protective earth terminal). Although the instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings that must be followed to ensure safe operation and retain the instrument in safe operating condition. Service must be performed by trained service personnel who are aware of the hazards involved (such as fire and electrical shock).

Warning

Any interruption of the protective (grounding) conductor inside or outside the analyzer, or disconnection of the protective earth terminal can expose operators to potentially dangerous voltages.

Under no circumstances should an operator remove any covers, screws, shields or in any other way access the interior of the Agilent 35670A Dynamic Signal Analyzer. There are no operator controls inside the analyzer.

Only fuses with the required current rating and of the specified type should be used for replacement. The use of repaired fuses or short circuiting the fuse holder is not permitted. Whenever it is likely that the protection offered by the fuse has been impaired, the analyzer must be made inoperative and secured against any unintended operation.

When power is removed from the Agilent 35670A Dynamic Signal Analyzer, +225 volts are present in the display for approximately 5 seconds. Be extremely careful when working in proximity to this area during this time. The high voltage can cause serious personal injury if contacted.

Caution

Do not connect or disconnect ribbon cables with the power switch set to on (|). Power transients caused by connecting or disconnecting a cable can damage circuit assemblies.

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Equipment Required

See ''Recommended Test Equipment'' starting on page 1-17 for tables listing recommended equipment. Any equipment which meets the critical specifications given in the tables may be substituted for the recommended model.

Troubleshooting Hints

- Incorrect bias supply voltages can cause false diagnostic messages. In most troubleshooting procedures, the power supply voltages are not checked. If you suspect incorrect supply voltages to an assembly, use the ''Voltages and Signals'' chapter to check the voltages at the assembly.
- Cables can cause intermittent hardware failures.
- Noise or spikes in the power supply can cause the analyzer to fail.
- Measurements in this chapter are only approximate (usually ∫1 dB or 10%) unless stated otherwise.
- Use chassis ground for all measurements in this chapter unless stated otherwise.
- To determine your firmware version code, press [**System Utility**] [MORE] [S/N VERSION].
- Logic levels in this chapter are either TTL level high or TTL level low unless stated otherwise. Toggling signal levels continually change from one TTL level to the other.
- The troubleshooting tests in this chapter assume only one independent failure. Multiple failures can cause false results.
- The troubleshooting procedures do not isolate failures to cables or connectors. If you suspect a cable or connector failure, check the device for continuity.
- If you abort a self test before the self test is finished, the analyzer may fail its calibration routine. To prevent this from happening press [**Preset**] [DO PRESET] or cycle power after you abort the self test.

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How to troubleshoot the analyzer

- **Review ''Safety Considerations'' and ''Troubleshooting Hints.''**

Warning

Service must be performed by trained service personnel who are aware of the hazards involved (such as fire and electrical shock).

- **See chapter 6, ''Replacing Assemblies,'' to determine how to disassemble and assemble the analyzer.**
- **Determine initial test by comparing the analyzer's symptoms to the symptoms in the following table.**

Symptom	Troubleshooting Test
Screen blank † Screen defective After power up, >3 minutes before keys active No response when key is pressed Incorrect response when key is pressed	Initial verification, page 4-5
Keys are active and screen grid is displayed but screen is defective	Display, page 4-22
Error messages Calibration fails Performance test fails Intermittent failure GPIB fails Mic pwr fails Serial port fails Parallel port fails External monitor does not work	Self tests, page 4-31
External keyboard does not work	DIN connector, page 4-61
External trigger fails	Trigger, page 4-62
Nonvolatile states not saved after power cycled Date display is ''Date: 01-01-BL''	Memory battery, page 4-67

† If the analyzer is failing, the grid may not appear for two minutes. Wait two minutes before assuming that a low level failure occurred.

- **Follow the recommended troubleshooting test until you locate the faulty assembly.**
- **Replace the faulty assembly and follow the directions in ''What to do after replacing an assembly'' in chapter 6, ''Replacing Assemblies.''**

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To perform initial verification

Use this test to check signals that are vital to the operation of the analyzer.

❑ Step 1. Check the power select switch and fuse.

- **Check that the POWER SELECT switch on the rear of the analyzer is set to the AC position.**
- **Check that the correct line fuse is installed in the rear panel fuse holder.**

For information on the power select switch and line fuse, see ‘’To do the incoming inspection’’ on page 2-5 and ‘’To change the fuses’’ on page 2-10.

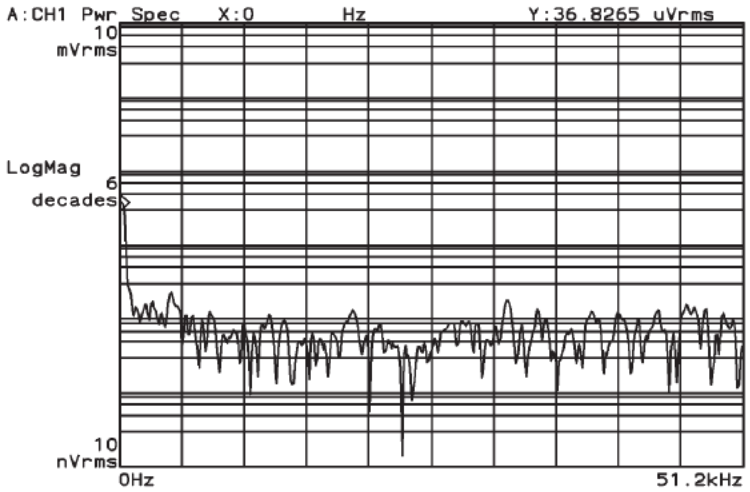
❑ Step 2. If the grid appears after power up but there is no response when keys are pressed, ckeck that the calibration routine is not locking up the analyzer.

- **Set the power switch to off (O).**
- **Set the power switch to on (l) and as soon as Booting System appears on the display, disable the calibration routine by holding [Preset] until Uncalibrated data appears.**
- **If the keys are now active, go to page 4-37, ‘’To troubleshoot self-test lockup failures.’’**

❑ Step 3. If the analyzer powers up with failure messages, then locks up, but the grid and lettering appear normal, go to page 4-15, ‘’To troubleshoot power-up failures.’’

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❑ Step 4. If the analyzer powers up normally with no error messages (see the following illustration), the screen is continually updating, but the analyzer does not respond to key presses, use the following table to determine the probable faulty assembly.



Symptom	Probable Faulty Assembly
SYSTEM keys function but MARKER, DISPLAY, MEASUREMENT, or number keys do not function correctly	A13 or A15 Primary Keypad
MARKER, DISPLAY, MEASUREMENT, and number keys function but SYSTEM keys do not function correctly	A14 Secondary Keypad
No keys function correctly	A11 Keyboard Controller

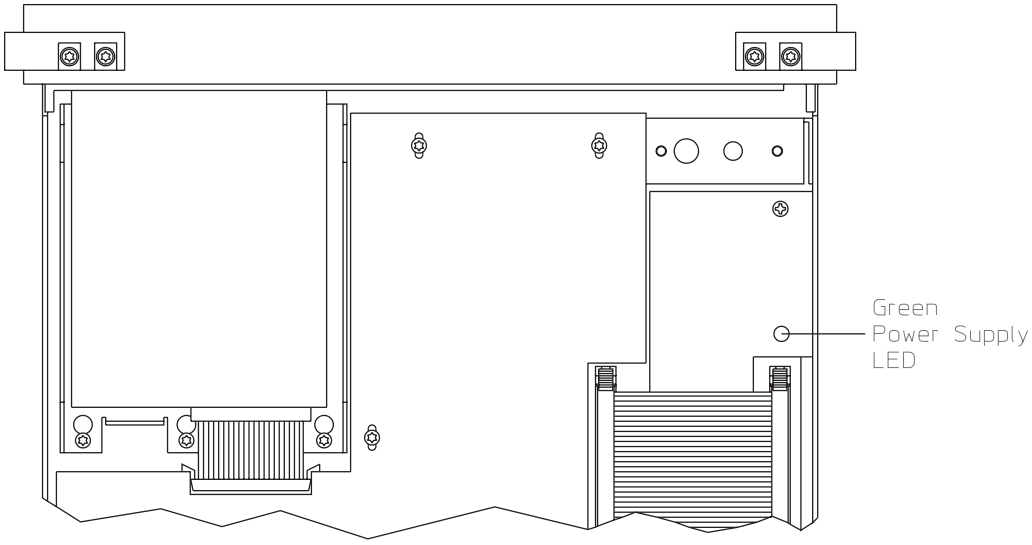
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❑ Step 5. Check the power supply LED and fan.

- **Set the power switch to off (O) and disconnect the power cord from the rear panel.**
- **Remove the cover.**

See ‘’To remove cover’’ on page 6-6.

- **Connect the power cord and set the power switch to on (I).**
- **If the green power supply LED is not lit, go to page 4-11, ‘’To troubleshoot the power supply.’’**



- **Check that the fan is turning at a moderate speed for normal room temperature.**

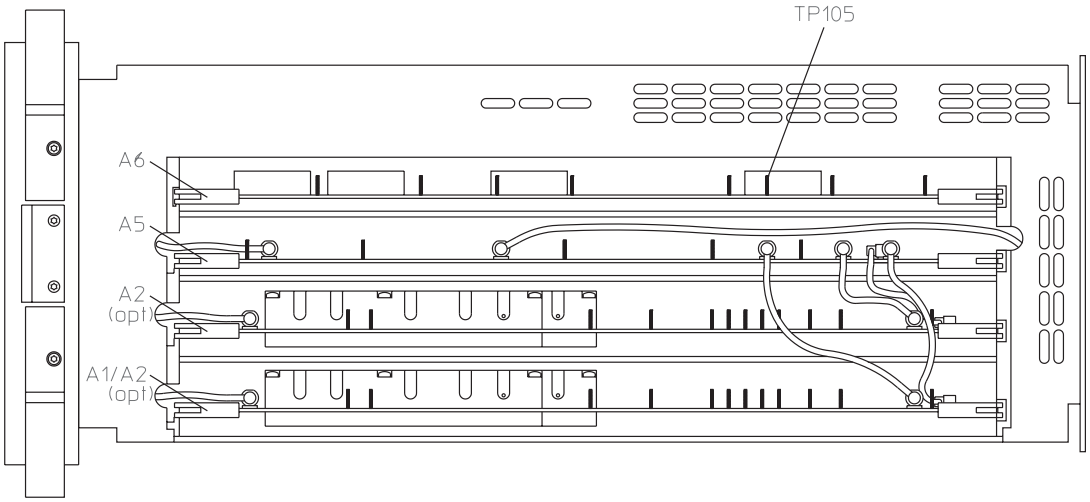
The fan is very quiet. Check air flow before determining that the fan is not turning.

- **If the fan is not turning, go to page 4-11, ‘’To troubleshoot the power supply.’’**

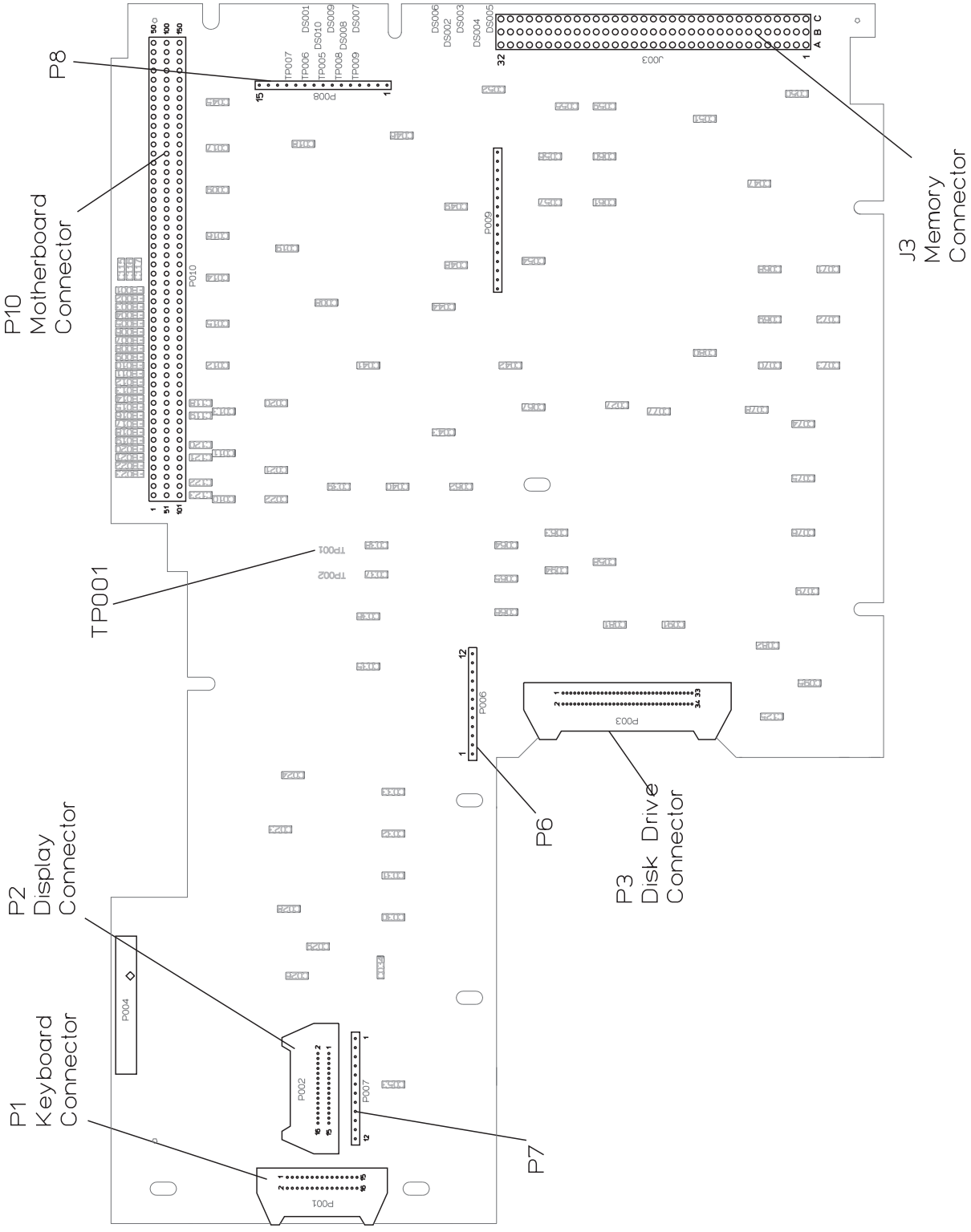
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❑ Step 6. Check the following TTL clock signals using an oscilloscope and a 1 MΩ 10:1 probe.

Signal Name	Test Location	Frequency	Probable Faulty Assembly
FREQ REF	A7 TP1	19.923 MHz	A7 CPU
G20MHz	A7 J3 pin 32C	19.923 MHz	A7 CPU
VCLK	A7 P2 pin 13	20 MHz	A7 CPU
SYSCLK	A6 TP105	10 MHz	A6 Digital



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A7 Component Locator, Circuit Side

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❑ Step 7. Check signals required for power up.

- **Using a logic probe, check the following signals.**

Signal Name	Test Location	TTL State	Probable Faulty Assembly
PVALID	A7 P8 pin 3	High	A98 Power Supply
RSTn	A7 P8 pin 5	High	A7 CPU
CASn	A7 P7 pin 3	Toggling	A7 CPU
RASn	A7 P7 pin 4	Toggling	A7 CPU
VDATA	A7 P7 pin 7	Toggling	A7 CPU
ASn	A7 P6 pin 10	Toggling	A7 CPU

- **Using a logic probe, check that the following TTL signals are toggling just after power up.**

The signals may stop toggling when the CPU assembly finishes the bootrom self tests.

Signal Name	Test Location
PASn	A7 P8 pin 7
PDSACK1n	A7 P8 pin 8
PDSACK0n	A7 P8 pin 9
PRW	A7 P8 pin 10
PDSn	A7 P8 pin 11
PA(26)	A7 P8 pin 12
PA(16)	A7 P8 pin 13

- **If the signals are not correct, the A7 CPU assembly is probably faulty.**
- **Using a logic probe, check that A7 P7 pin 2 (SCL) and A7 P7 pin 1 (SDA) toggle TTL states at least twice just after power up.**
- **If the signals are not correct, the A7 CPU assembly is probably faulty.**
- **If the signals are correct, go to page 4-15, ‘’To troubleshoot power-up failures.’’**

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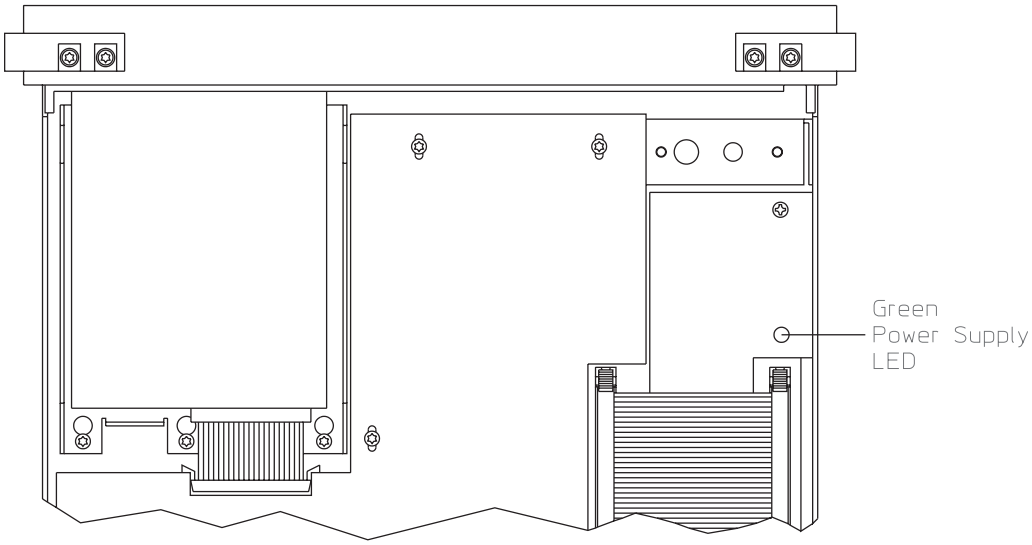
To troubleshoot the power supply

Use this test to check the Power Supply and Fan assemblies. This test can also isolate the assembly causing the Power Supply to shut down.

❑ Step 1. Check the power supply LED.

- **Set the power switch to off (O).**
- **Disconnect the ribbon cable from the A98 Power Supply assembly.**
- **Set the power switch to on (I).**
- **If the green power supply LED is not lit, the A98 Power Supply assembly is probably faulty.**
- **Set the power switch to off (O).**
- **Reconnect the ribbon cable to the Power Supply assembly.**
- **Set the power switch to on (I).**
- **If the power supply LED is on but the fan is not turning, go to Step 7.**

A thermistor on the A10 Rear Panel assembly controls the power to the A90 Fan assembly. As the analyzer's temperature increases, the fan speed increases. Since the fan is very quiet, check air flow before determining that the fan is not turning.



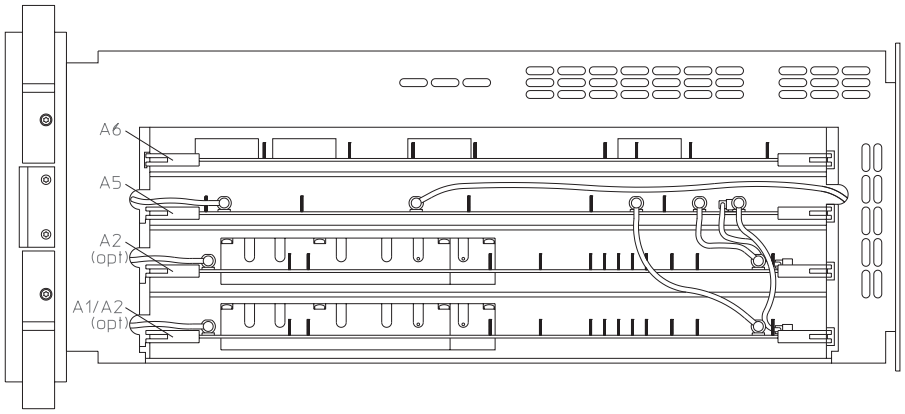
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❑ Step 2. Determine if the Digital, Analog, or Input assemblies are causing the Power Supply assembly to shut down.

- **Set the power switch to off (O).**
- **Pull the following assemblies out of the card nest about 1 inch:**

A6 Digital
A5 Analog
A2 Input (optional)
A1/A2 Input

- **Set the power switch to on (I).**
- **If the power supply LED is still off, set the power switch to off (O), reconnect the above assemblies, and go to Step 4.**



❑ Step 3. Repeat the following until the assembly causing the Power Supply assembly to shut down is located.

- **Set the power switch to off (O).**
- **Reconnect one assembly at a time in the following order.**

A6 Digital
A5 Analog
A2 Input (optional)
A1/A2 Input

- **Set the power switch to on (I).**
- **If the green power supply LED is off, the assembly just reconnected is probably faulty.**

The A5 Analog assembly provides over-temperature protection which shuts down the power supply if the analyzer's internal temperature becomes excessive. Before replacing the A5 Analog assembly, check that the fan is turning when the green power supply LED is on and that the air flow is not restricted (cooling air enters from the right side and exhausts through the left side and rear panel). Since the fan is very quiet, check air flow to determine that the fan is turning.

❑ Step 4. Determine if the CPU assembly or one of the assemblies connected to the CPU assembly is causing the power supply to shut down.

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- **Remove the A7 CPU assembly.**

See ''To remove CPU'' on page 6-11.

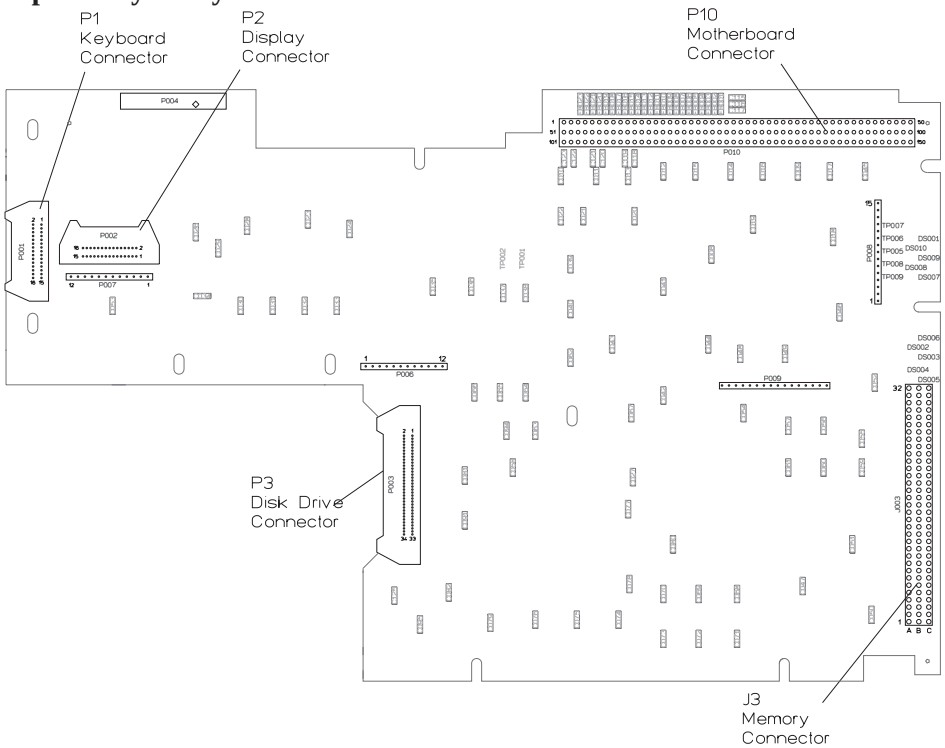
- **Set the power switch to on (I).**
- **If the power supply LED is still off, set the power switch to off (O), reconnect the CPU assembly, and go to Step 6.**

❑ Step 5. Repeat the following steps until the assembly causing the Power Supply assembly to shut down is located.

- **Set the power switch to off (O).**
- **Reconnect one assembly at a time in the following order:**

A7 CPU (A7 P10 to A99 J7)
A8 Memory (A8 P1 to A7 J3)
A102 DC-DC Converter (cable to A7 P2)
A11 Keyboard Controller (cable to A7 P1)
A100 Disk Drive (cable to A7 P3)

- **Set the power switch to on (I).**
- **If the green power supply LED is off, the assembly just reconnected is probably faulty.**



A7 Component Locator, Circuit Side

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❑ Step 6. Determine if the Motherboard, Fan, or Rear Panel assembly is causing the Power Supply to shut down.

- **Disconnect the fan cable from A99 P90.**
- **Set the power switch to on (|).**
- **If the power supply LED is now on, the A90 Fan assembly is probably faulty.**
- **Set the power switch to off (O).**
- **Reconnect the fan cable.**
- **Remove the rear panel and disconnect the cable from A10 P100.**

See ''To remove rear panel'' on page 6-7.

- **Set the power switch to on (|).**
- **If the power supply LED is now on, the A10 Rear Panel assembly is probably faulty.**
- **If the Fan or Rear Panel assembly is not causing the Power Supply assembly to shut down, then the A99 Motherboard is probably faulty.**

❑ Step 7. Check the Fan assembly.

- **Set the power switch to off (O).**
- **Remove the A7 CPU assembly.**

See ''To remove CPU'' on page 6-11.

- **Disconnect the fan power cable from A99 P90 (red and black cable).**
- **Connect 5 Vdc to the fan cable. The fan should be turning slowly.**
- **Increase the voltage to 10 Vdc. The fan should turn faster as the voltage increases.**
- **If the fan did not respond correctly, the A90 Fan assembly is probably faulty.**
- **If the fan responded correctly, the A10 Rear Panel assembly is probably faulty.**

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To troubleshoot power-up failures

Use this test when the screen is defective, when the analyzer does not respond correctly to the keyboard, or when it takes more than 3 minutes for the keyboard to become active. Any of the following conditions may cause a power-up failure:

- A defective CPU or Memory assembly.
- A defective assembly connected to the CPU assembly causing a bus failure.
- A defective cable between the CPU assembly and another assembly.
- A defective control line.

❑ Step 1. Compare the power-up failure messages to the following table.

- **Set the power switch to on (|).**
- **If the screen is blank or no power-up failure messages are displayed, go to Step 2.**
- **Determine the probable faulty assembly or next test by comparing the power-up test result to the following table.**

If the power-up failure messages match more than one entry in the table, use the entry closest to the beginning of the table.

Failing Power-up Message	Probable Faulty Assembly or Next Test
LEDs MC68030 Processor MC68882 Coprocessor Bootrom Display	A7 CPU
Main RAM Program ROM	CPU, memory, DSP, and buses failures, page 4-18
DSP	A7 CPU
Fast bus	IIC Bus failures, page 4-25
MFP	A7 CPU
GPIB keypress detected, booting to GPIB Monitor	A14 Secondary Keypad
Front Panel failure information: keyboard IIC chip fails: IIC: No Device Acknowledge key stuck: 32	A11 Keyboard Controller
Front Panel failure information: key stuck: *number* *where number is 13, 14, 16, 20, 21, 24, 33, 35, 36, 37, 38, 40, 43, 52, 53, or 54*	A14 Secondary Keypad
Front Panel failure information: key stuck: *number* *all other numbers not listed above*	A13 or A15 Primary Keypad

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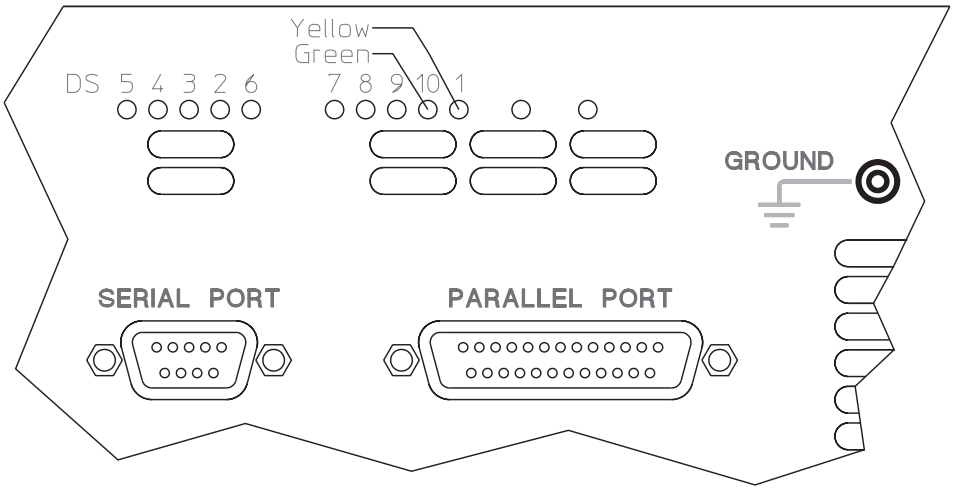
❑ Step 2. Determine if the power-on test passed or failed.

- **Set the power switch to off (O).**
- **Set the power switch to on (I) while watching the power-on LEDs.**

The power-on LEDs are on the A7 CPU assembly and are visible through the rear panel. To see the LEDs easier, remove the seven screws holding the rear panel to the analyzer and lean the rear panel back. This also gives you access to reset switch SW2.

- **If the power-on LEDs responded as follows, the power-on test passed.**

- All power-on LEDs are on momentarily.
- DS1 (yellow, +5 LED) remains on as long as power is applied to the assembly.
- DS10 (green, run LED) comes on just after DS1.
- DS5, DS4, DS3, DS2, DS6, DS7, DS8, and DS9 sequence through the codes listed in the following table.



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Binary (DS5) (DS9)	Hexa-decimal	~Time LEDs Visible	Description
1111 1111 0000 0000	FF 00	200 ms on 200 ms off	A7 flashes LEDs
0000 1000	08	†	starting A7 test
0000 0010	02	†	A8 RAM DSACK test
0001 0100	14	†	starting A8 RAM test
0001 0110	16	†	starting A8 refresh test
0001 1100	1C	4s	starting A8 program ROM test
0000 0000	00	4s	clear LEDs
1010 0000	A0	†	A7 MFP test
1010 0001	A1	†	starting A7 DSP test
1010 0010	A2	†	fast bus test
0101 1110	AE	200 ms	front panel test
1111 1111	FF	Remain on	

0 LED off
1 LED on
† When no failure occurs, these codes appear for only a very short time and probably won't be visible.

- **If the power-on LEDs display a code for more than 4 seconds, a failure occurred in the core assemblies or on the buses.**

  For additional information on the power-on test, see the ''Power-on Test Descriptions'' on page 10-3.

❑ Step 3. Determine the next step by comparing the power-on test results to the following table.

Power-on LEDs	Next Test
LEDs stop and display a fail code. A7 DS101 (green, run LED) is off.	CPU, memory, and buses, page 4-18
LEDs pass, but the screen is defective.	Display, 4-22
LEDs pass, but it takes more than 3 minutes before the keys are active. LEDs pass and screen appears normal, but keys do not function.	IIC Bus, page 4-25

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To troubleshoot CPU, memory, and buses failures

Use this test to isolate the failure when the power-on LEDs show a fail code or the analyzer locks up during the power-up tests.

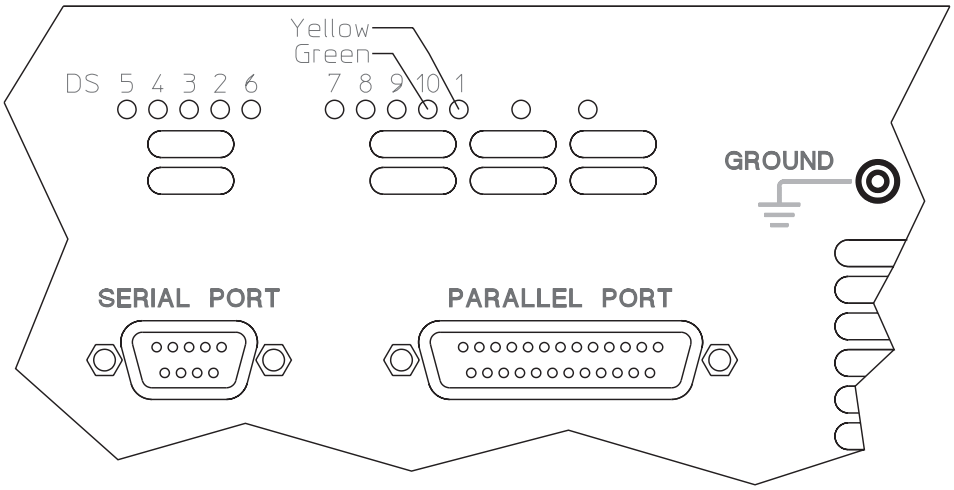
❑ Step 1. Compare the LED fail code to the following table.

- **Set the power switch to off (O).**
- **Set the power switch to on (I) while watching the power-on LEDs.**

The power-on LEDs are on the A7 CPU assembly and are visible through the rear panel. To see the LEDs easier, remove the seven screws holding the rear panel to the analyzer and lean the rear panel back. This also gives you access to reset switch SW2.

- **Determine the probable faulty assembly by comparing the power-on LEDs fail code to the following table.**

The power-on LEDs are showing a fail code when the LEDs display a code for more than 4 seconds.



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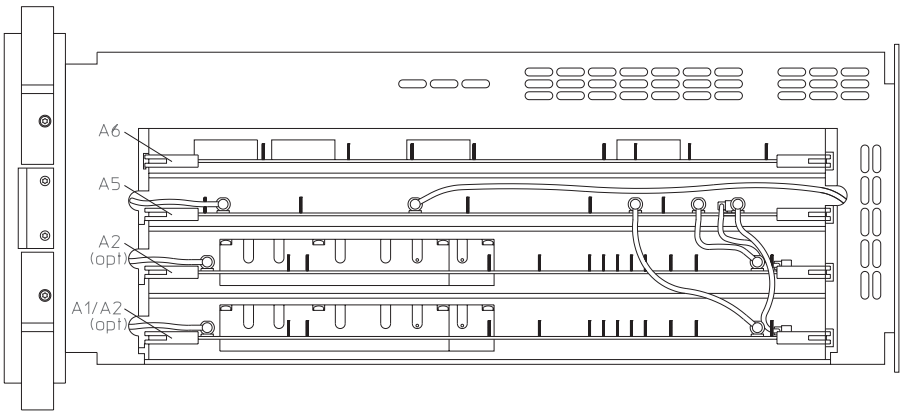
Binary (DS5) (DS9)	Hexadecimal	Probable Faulty Assembly
0000 0100	04	A7 CPU
1111 1111	FF	
0001 0011	13	
0000 0001	01	
0001 0111	17	
0001 1000	18	
0000 1001	09	
0000 1011	0B	
0001 1010	1A	
0001 1001	19	
0000 1000	08	
0001 0010	12	
1010 0000	A0	
0000 0010	02	A8 Memory
0001 1011	1B	
0001 0100	14	
0001 0110	16	
0001 1100	1C	

0 LED off
1 LED on

❑ Step 2. Determine if the CPU assembly is causing the failure.

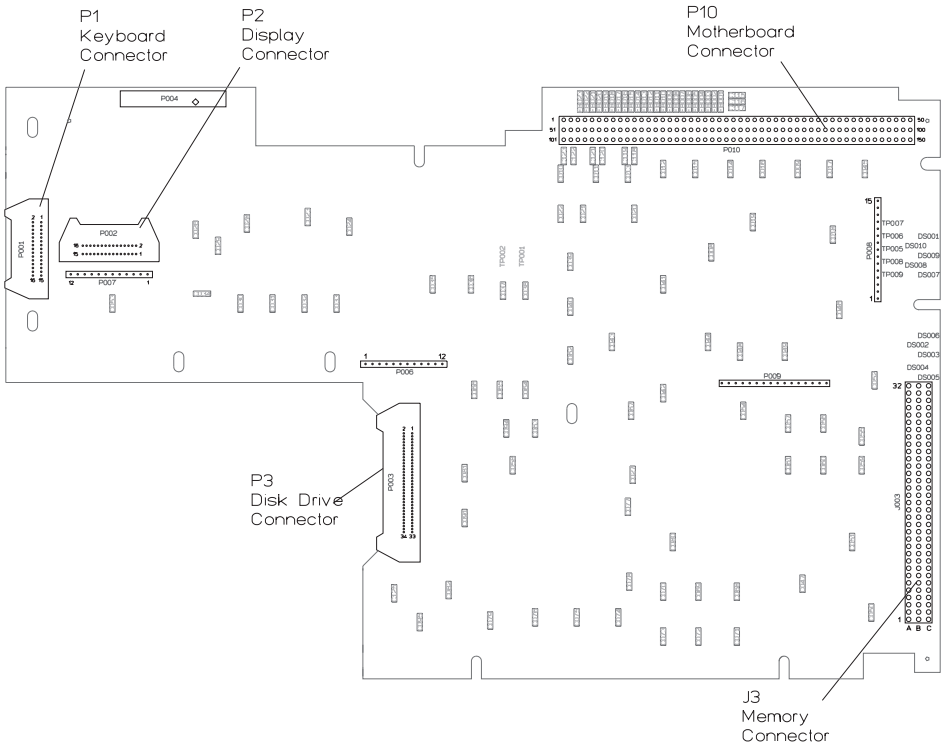
- **Set the power switch to off (O).**
- **Pull the following assemblies out of the card nest about 1 inch:**

A6 Digital
A5 Analog
A2 Input (optional)
A1 or A2 Input



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- **Disconnect the A7 CPU assembly from the Motherboard, Memory assembly, and cables.**
- **Reconnect the CPU assembly to the Motherboard (do not connect the Memory assembly or cables to the CPU assembly).**



A7 Component Locator, Circuit Side

- **Set the power switch to on (|) while watching the power-on LEDs.**
- **If the LEDs did not display hexadecimal FF (1111 1111) then hexadecimal 02 (0000 0010), the A7 CPU assembly is probably faulty.**

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❑ Step 3. Determine if the Memory or Display assembly is causing the failure.

- **Set the power switch to off (O).**
- **Reconnect the Memory assembly to the CPU assembly.**
- **Set the power switch to on (I) while watching the power-on LEDs.**

The LEDs should sequence through 00 (clear LEDs) with 00 remaining on the LEDs.

- **Set the power switch to off (O).**
- **Reconnect the display cable to A7 P2.**
- **Set the power switch to on (I) while watching the power-on LEDs.**

The LEDs should sequence through 00 (clear LEDs) with 00 remaining on the LEDs. The following is an example of the messages displayed when the CPU and memory power-on tests pass. The numbers in the messages will most likely be different in your analyzer.

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LEDs
MC68030 Processor
MC68882 Coprocessor
Bootrom revision A.01.17
Main RAM
Testing 8388608 bytes at 0x06c00000
Program ROM

Copyright 1991, 1992, 1993, Agilent Technologies Company

Booting System

- **If the screen is defective or blank, go to page 4-22, ‘’To troubleshoot display failures.’’**
- **If there is an error message, use the table on page 4-15 in the ‘’To troubleshoot power-up failures’’ procedure to determine the probable faulty assembly.**
- **If the failure still is not isolated, go to page 4-25, ‘’To troubleshoot IIC bus failures.’’**

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To troubleshoot display failures

Use this test to isolate display failures to the A101 Display assembly, A102 DC-DC Converter assembly, or A7 CPU assembly.

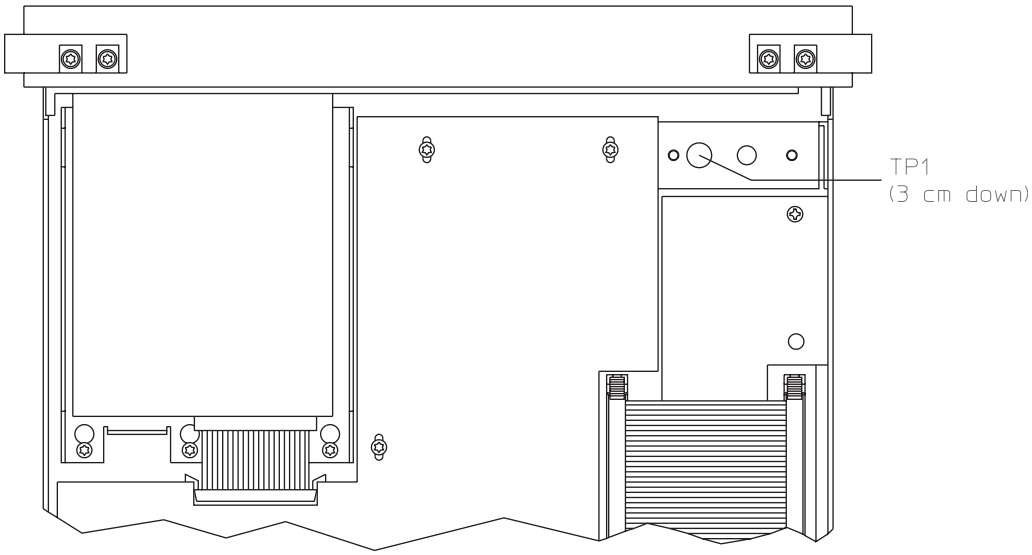
❑ Step 1. Check the DC-DC Converter assembly.

- **Set the power switch to off (O).**
- **Connect the voltmeter to A102 TP1.**
- **Set the power switch to on (I).**
- **Check that the voltage reads is 210 10 Vdc.**

Caution

The Display assembly will be damaged if the voltage is at or above 235 Vdc.

- **If the voltage is incorrect, the A102 DC-DC Converter assembly is probably faulty.**



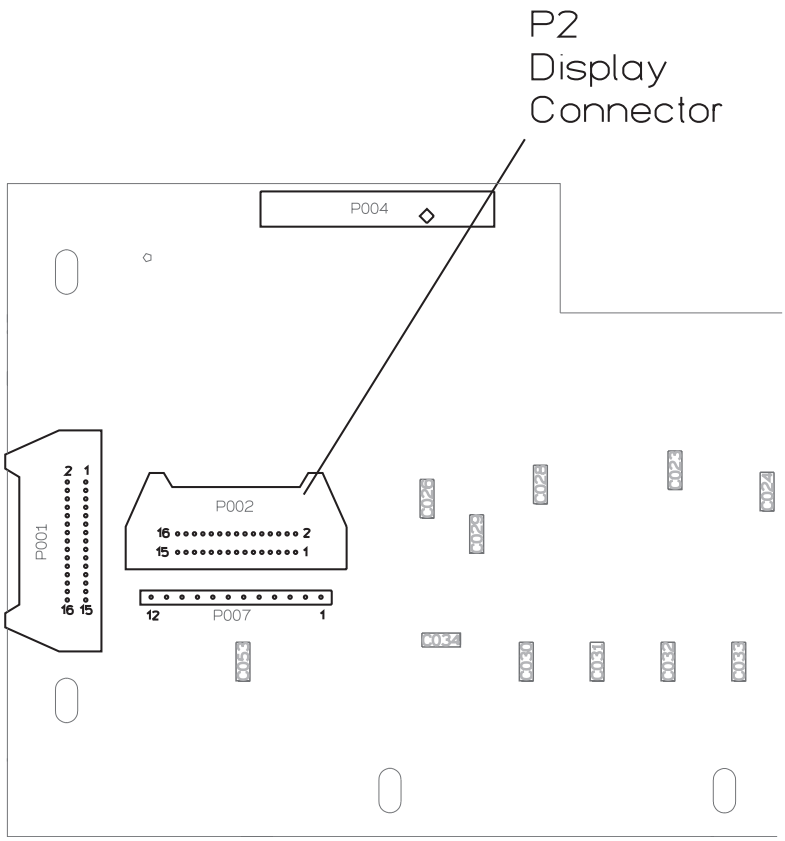
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❑ Step 2. Check the CPU signals to the Display assembly.

- **Set the power switch to on (|).**
- **Using a logic probe, check that the following TTL signals are toggling.**

Test Location	Signal Name	In/Out
A7 P2(9)	VSYNCEL	A7 Out
A7 P2(11)	HSYNCELn	A7 Out
A7 P2(13)	VCLK	A7 Out
A7 P2(15)	VID	A7 Out

- **If the signals are incorrect, do the following:**
- **Set the power switch to off (O).**
- **Disconnect the display cable from A7 P2.**
- **Set the power switch to on (|).**
- **Check the signals again.**
- **If the signals are now correct, the A101 Display assembly is probably faulty.**



A7 Component Locator, Circuit Side

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❑ Step 3. Determine the probable faulty assembly by comparing the analyzer's symptoms to the following table.

Symptom	Probable Faulty Assembly
Vertical and horizontal scanning is occurring Part of information is missing, for example only half letters Blocks of information are missing Information on the screen is scrambled or mixed up Vertical or horizontal stripes appear across the screen	CPU
Screen is blank Screen is tilted, compressed, or distorted Line across the screen	Display

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To troubleshoot IIC bus failures

Use this test to isolate IIC (Inter-IC) bus failures to one of the following assemblies:

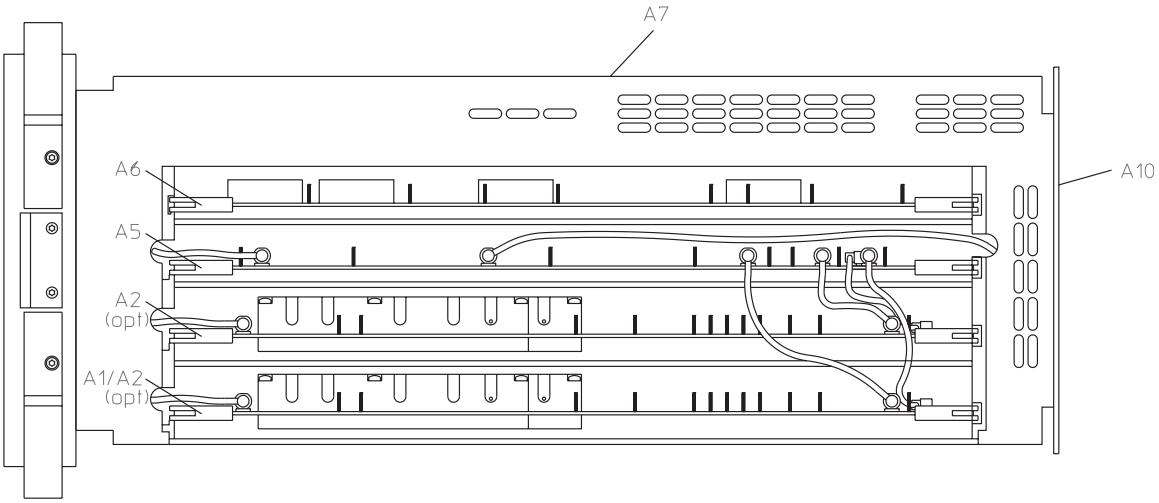
- A7 CPU
- A1/A2 Input
- A5 Analog
- A10 Rear Panel
- A11 Keyboard Controller

❑ Step 1. Disconnect all assemblies connected to the CPU assembly's IIC bus.

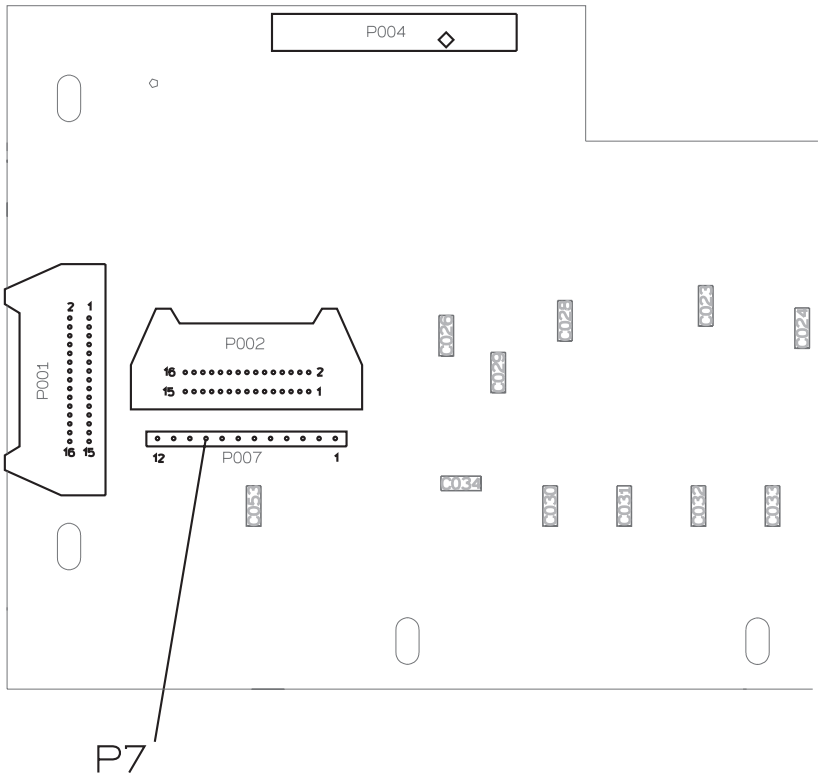
- **Set the power switch to off (O).**
- **Remove the rear panel and disconnect the cable from A10 P100.**
- **Pull the following assemblies out of the card nest about 1 inch:**

A5 Analog
A2 Input (optional)
A1/A2 Input

- **Disconnect the keyboard cable from A7 P1.**



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❑ Step 2. Check the serial clock (SCL).

- **Attach a logic probe to A7 P7 pin 2 (SCL).**
- **Set the power switch to on (|).**
- **Press SW2 (reset switch) while monitoring A7 P7 pin 2 (SCL), the power-on LEDs, and the display.**

The TTL logic level should toggle when 00 is displayed and toggle continuously when Booting System is displayed. The following failure message should be displayed after Booting System and the display grid should appear about 2 minutes after power up.

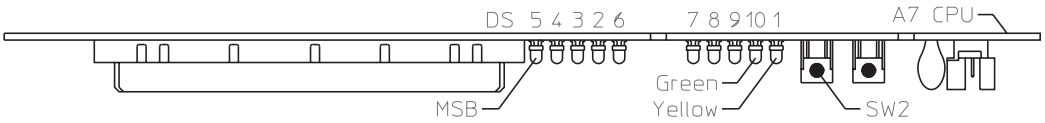
Front Panel failure information:
keyboard IIC chip fails:
IIC: No Device Acknowledge
key stuck: 32

A power-on test has failed. Refer servicing to qualified personnel.

Press Start key to attempt to continue power-up.

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- **If the signal does not toggle after SW2 is pressed, the A7 CPU assembly is probably faulty.**
- **If no error messages are displayed after Booting System or A7 DS101 (green run LED) is off, go to page 4-29, ''To troubleshoot fast bus failures.''**



❑ Step 3. Check the serial data line (SDA).

- **Attach the logic probe to A7 P7 pin 1 (SDA).**
- **Press SW2 while monitoring A7 P7 pin 1 (SDA), the power-on LEDs, and the display.**

The TTL logic level should toggle when 00 is displayed and toggle continuously when Booting System is displayed. The following failure message should be displayed after Booting System and the display grid should appear about 2 minutes after power up.

Front Panel failure information:
keyboard IIC chip fails:
IIC: No Device Acknowledge
key stuck: 32

A power-on test has failed. Refer servicing to qualified personnel.

Press Start key to attempt to continue power-up.

- **If the signal does not toggle after SW2 is pressed or the failure message is not displayed, the A7 CPU assembly is probably faulty.**

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❑ Step 4. Check the assemblies on the IIC bus by repeating the following steps for each assembly.

- **Set the power switch to off (O).**
- **Reconnect one assembly at a time in the following order.**

A11 Keyboard Controller (cable to A7 P1)
A10 Rear Panel (cable to A10 P100)
A5 Analog
A1/A2 Input (lower slot)
A2 Input (upper slot)

- **Set the power switch to on (I).**
- **After the softkey menu appears, (about one minute after power up) press any key.**
- **If the analyzer does not respond correctly, the assembly just reconnected is probably faulty.**

❑ Step 5. If the failure still is not isolated, go to page 4-29, ‘’To troubleshoot fast bus failures.’’

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To troubleshoot fast bus failures

Use this test to isolate Fast Bus failures to the A7 CPU assembly or A6 Digital assembly.

- **Set the power switch to off (O).**
- **Set the power switch to on (I) while holding in the [System Utility] key.**

The screen displays Fast Bus Diagnostic Test ... and the power-on LEDs are flashing.

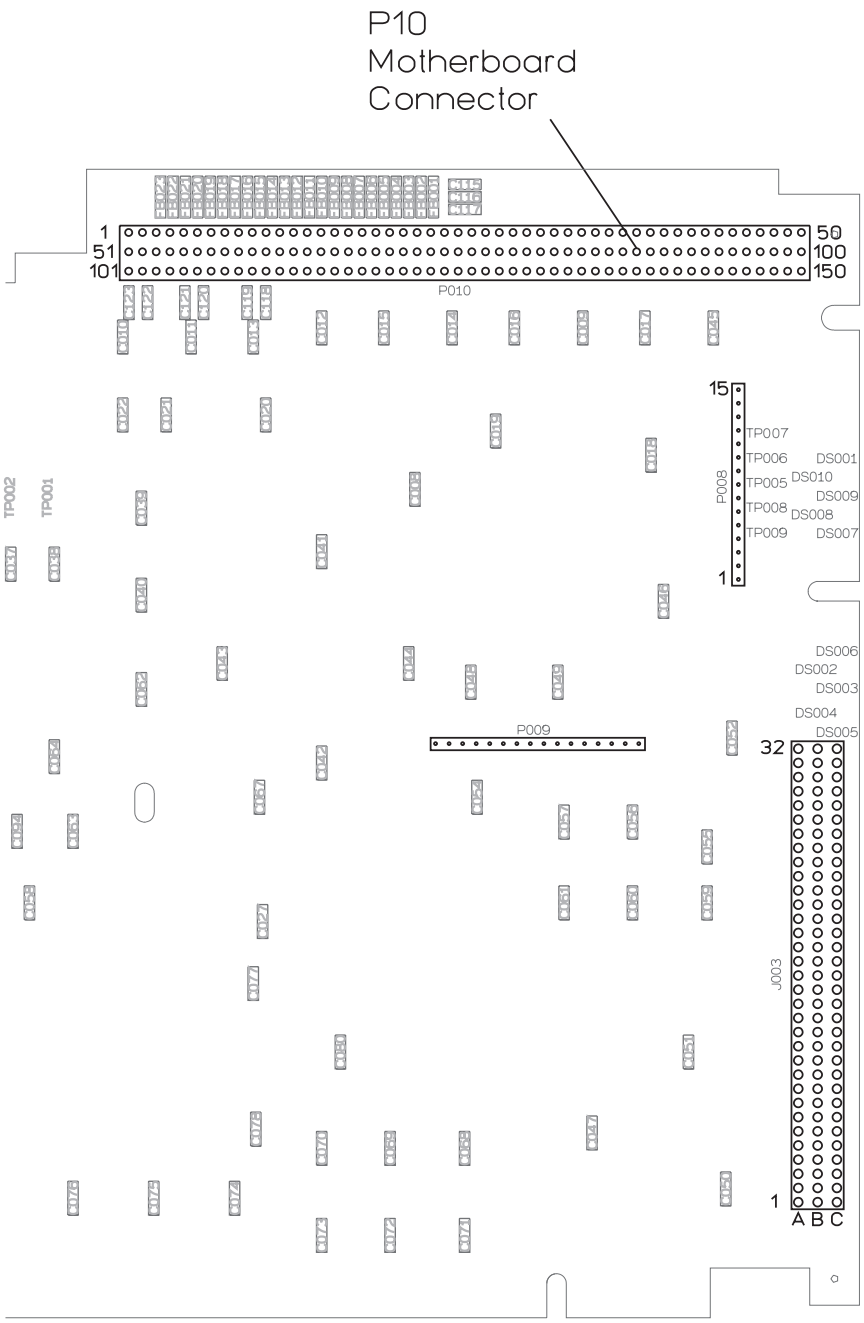
- **If the analyzer did not respond correctly, the A7 CPU assembly is probably faulty.**
- **Using a logic probe, check the following signals.**

A7 P10 Pin	Signal Name	TTL Logic State In Test Mode
64, 114, 65, 115, 66	FA1 to FA5	Toggling
72	ECLK	Toggling
74	FSELAn	Toggling
112	BRESETn	Low
119	FRW	Toggling
123	FIFOENn	High
124	FSELSn	Toggling
7-11, 21-45, 59, 71, 109, 118, 120, 122, 147, 149	GND	Low

- **If the signals are correct, the A6 Digital assembly is probably faulty.**
- **If any signal is incorrect, the A7 CPU assembly is probably faulty.**

This is only a partial check of the fast bus signals between the A7 CPU assembly and the A6 Digital assembly.

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To perform self tests

Use this test when one of the following occurs:

- Performance test fails
- Calibration fails
- Trigger fails
- GPIB fails
- Microphone power fails
- Serial port fails
- Parallel port fails
- Failure is intermittent

❑ Step 1. Run all the functional self tests.

- **Connect the rear panel SOURCE output to the rear panel TACH input using a BNC cable.**
- **Remove all cables from the front panel input connectors.**

Caution

The ICP self test outputs approximately 30 Vdc on the input connectors. Before starting the self tests, disconnect all devices connected to the input connectors. Devices left connected during the ICP self test may be damaged.

- **Set the power switch to on (|).**
- **After calibration is complete, press the following keys:**

[**Input**]
  [ALL CHANNELS]
  [CH* FIXED RANGE]
[**System Utility**]
  [CALIBRATN]
  [AUTO CAL **OFF**]
[**Rtn**]
  [MORE]
  [SELF TEST]
  [FUNCTIONL TESTS]
  [ALL]
  [CONTINUE]

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❑ Step 2. Compare the analyzer's self-test results to the following table.

- **When the tests have finished, press the following keys:**

[**Rtn**]
[TEST LOG]

- **Press the [PREVIOUS PAGE] softkey until the first page of test log is displayed.**

To print the test log to a GPIB printer, press the following keys:
[**Local/GPIB**]
[SYSTEM CONTROLLR]
[PRINTER ADDRESS]
(*printer address*)
[ENTER]
[**System Utility**]
[MORE]
[SELF TEST]
[TEST LOG]
[**Plot/Print**]
[<F"Times""P10 >PLOT/PRNT DEVICE]
(*device type*)
[**Rtn**]
[PLOT/PRNT DESTINATN]
[OUTPUT TO GPIB]
[**Rtn**]
[START PLOT/PRNT]

- **If the analyzer did not complete the tests (analyzer locks up), go to page 4-37 ''To troubleshoot self-test lockup failures.''**
- **If the failure is intermittent and the analyzer passed all self tests, go to page 4-40 ''To troubleshoot intermittent failures.''**
- **If the analyzer completed the tests, compare the analyzer's test log to the following table.**

If the analyzer's test log matches more than one entry on the table, use the entry closest to the beginning of the table. The table lists the probable faulty assembly or assemblies and any recommended adjustment or troubleshooting procedure to do before replacing the assembly. If both an adjustment and a test are recommended, do the adjustment first.

For additional information on the self tests, see ''Self-Test Descriptions'' on page 10-10.

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Self-Test Troubleshooting Guide

Failing Self Test	Probable Faulty Assembly	Adjustment	Troubleshooting Test
Interrupt	A7 CPU		CPU, Memory, and Buses, page 4-18.
Mult Fctn Peripheral	A7 CPU		
Front Panel	A11 Keyboard Controller		
GPIB	A10 Rear Panel		
Disk Controller	A7 CPU		
Disk FIFO	A7 CPU		
IIC Bus (If only one assembly is failing)	Assembly failing. See Test Log		
IIC Bus (If multiple assemblies are failing)	See Test Log		IIC bus, page 4-25
Fast Bus	A7 CPU A6 Digital		Fast bus, page 4-29
Trigger Gate Array	A6 Digital †		
LO Gate Array	A6 Digital		
Digital Filter Gate Array	A6 Digital		
FIFO	A6 Digital		
Baseband Zoom ADC Gate Array All other self tests pass	A5 Analog		
Baseband Zoom All other self tests pass	A6 Digital		
Baseband	A5 Analog A6 Digital		Source and calibrator, page 4-45
Zoom	A5 Analog A6 Digital		Source and calibrator, page 4-45
Source through DSP	A6 Digital		
Source LO	A6 Digital		
Source to CPU	A6 Digital		

† Analyers with firmware revision A.00.00 may fail the Trigger Gate Array test when the A1/A2 Input or A5 Analog assemblies fail. Go to page 4 45, ‘’To troubleshoot source and calibrator failures,’’ to determine the probable faulty assembly.

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Self-Test Troubleshooting Guide (continued)

Failing Self Test	Probable Faulty Assembly	Adjustment	Troubleshooting Test
Source With LO fails and Source Without LO passes	A6 Digital		
Source Without LO one channel	A1/A2 Input A5 Analog		Input and ADC, page 4-51 Four channel, page 4-54
Source Without LO channel 1 and 3 or channel 2 and 4	A2 Input		
Source With LO one channel	A1/A2 Input A5 Analog		Input and ADC, page 4-51 Four channel, page 4-54
Source With LO channel 1 and 3 or channel 2 and 4	A2 Input		
Input Offset one channel or channel 1 and 3 or channel 2 and 4	A1/A2 Input	Input dc offset, page 5-10	
ADC Gate Array	A5 Analog A6 Digital	ADC gain, offset, and reference, page 5-10	Source and calibrator, page 4-45
Source Without LO all channels	A5 Analog A6 Digital		Source and calibrator, page 4-45
Source With LO all channels	A5 Analog A6 Digital		Source and calibrator, page 4-45
Input Offset all channels	A5 Analog	ADC gain, offset, and reference, page 5-7	
Input Distortion one channel	A1/A2 Input A5 Analog		Input and ADC, page 4-51 Four channel, page 4-54
Input Distortion channel 1 and 3 or channel 2 and 4	A2 Input		
Input Distortion all channels	A5 Analog A6 Digital	ADC Gain, offset, and reference, page 5-7	Source and calibrator, page 4-45
Input Trigger one or more channels fail, but at least one channel passes	A5 Analog		
Input Trigger	A5 Analog A6 Digital		Trigger, page 4-62

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Self-Test Troubleshooting Guide (continued)

Failing Self Test	Probable Faulty Assembly	Adjustment	Troubleshooting Test
Input A-Wt Filter one channel or channel 1 and 3 or channel 2 and 4	A1/A2 Input		
Input A-Wt Filter all channels	A6 Digital		
Input AAF/Bypass one channel or channel 1 and 3 or channel 2 and 4	A1/A2 Input	Filter flatness, page 5-17	
Input AAF/Bypass all channels	A6 Digital		
Input ICP Source † one channel or channel 1 and 3 or channel 2 and 4	A1/A2 Input		
Tachometer ‡	A6 Digital A10 Rear Panel		Tachometer, page 4-24
Source Filter	A5 Analog		
Source DC	A5 Analog		
Quick Confidence	A1/A2 Input A5 Analog A6 Digital	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7 Filter flatness, page 5-17	Performance test, page 4-42
All self tests pass		Next Step	

† This test fails if a device is connected to the front panel input connectors.
‡ This test fails if the Source output is not connected to the Tachometer input.

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❑ Step 3. Determine the probable faulty assembly and next test by comparing the analyzer's symptoms to the following table.

Failure	Probable Faulty Assembly	Next Test
Disk drive	A100 Disk Drive Flexible disk Disk drive cable A7 CPU	Disk drive, page 4-57
GPIB	A10 Rear Panel †	
Serial port	A10 Rear Panel †	
Parallel	A10 Rear Panel †	
External trigger	A10 Rear Panel A5 Analog	Trigger failures, page 4-62
Tachometer	A10 Rear Panel A6 Digital	Tachometer, page 4-24
Source	A5 Analog A6 Digital	Source and calibrator, page 4-45
Autorange Overrange	A1/A2 Input A5 Analog	Auto-range, page 4-59
External keyboard	A10 F200 fuse External Keyboard A10 Rear Panel	DIN connector, page 4-61
External monitor	A7 CPU	
Microphone power Microphone adapter	A77 Microphone A5 Analog	Microphone power, page 4-69
Performance test		Performance test, page 4-42
Intermittent failure		Intermittent, page 4-40

† The circuits for the output ports are located on the A10 Rear Panel assembly except for a few output buffers on the A7 CPU assembly. If replacing the A10 Rear Panel assembly does not fix the failure, the A7 CPU assembly is probably faulty.

For additional information on the self tests, see ''Self Test Descriptions'' starting on page 10 10.

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To troubleshoot self-test lockup failures

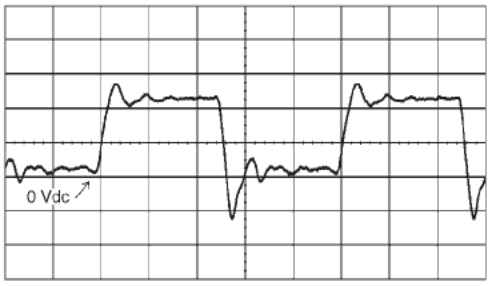
Use this test to continue troubleshooting if the analyzer locked up while running the functional test ALL.

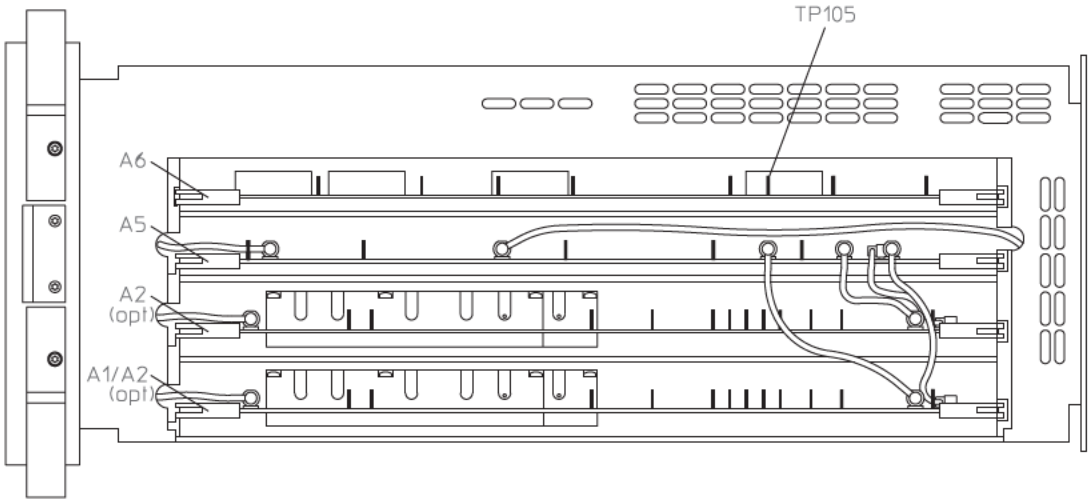
❑ Step 1. Check the clock signal.

- **Set the power switch to on (|).**
- **Using an oscilloscope and a 1 M 10:1 probe, check the following signal.**

Oscilloscope Setup	Parameters	Waveform
Connect CH1 to A6 TP105	Time Duty Cycle	

CH1 V/div	2.0 V/div
Input Impedance	1 MΩ
CH1 Coupling	dc
Probe Atten	10
Display Mode	Repetitive
Averaging	8
Time/div	20 ns/div
Trigger	Trg'd
Trig Src	Sweep Chan1





- **If the signal is incorrect, the A6 Digital assembly is probably faulty.**

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❑ Step 2. Run the IIC and fast bus self tests.

- **Press the following keys:**

[**System Utility**]
[CALIBRATN]
[AUTO CAL **OFF**]
[**Input**]
[ALL CHANNELS]
[CH* FIXED RANGE]
1
[Vpk]
[**System Utility**]
[MORE]
[SELF TEST]
[TEST LOG]
[**Rtn**]
[FUNCTIONL TESTS]
[I/O]
[IIC BUS]

- **If the keyboard is not active, or the analyzer locks up when a key is pressed, go to page 4-25, ‘’To troubleshoot IIC bus failures.’’**
- **Press the [FAST BUS] softkey.**
- **If the analyzer locks up or the digital processor failed the fast bus self test, go to page 4-29, ‘’To troubleshoot fast bus failures.’’**

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❑ Step 4. Run the remaining self tests.

- **Connect the rear panel SOURCE output to the rear panel TACH input using a BNC cable.**
- **Remove all cables from the front panel input connectors.**

Caution

The ICP self test outputs approximately 30 Vdc on the input connectors. Before starting the self tests, disconnect all devices connected to the input connectors. Devices left connected during the ICP self test may be damaged.

- **Until a test fails or the analyzer locks up, press the following keys allowing enough time for each test to complete before pressing the next key :**

[**Rtn**]
[OTHER]
[INTER RUPT]
[MULT FCTN PERIPHERL]
[MAIN RAM]
[CONTINUE]
[**Rtn**]
[DIGITAL PROCESSOR]
[ALL]
[**Rtn**]
[SOURCE]
[SOU RCE LO]
[SOURCE TO CPU]
[CONTINUE]
[**Rtn**]
[ADC GATE ARRAY]
[INPUTS]
[<F “Times”>Times"P10ALL]
[CONTINUE<| >]
[**Rtn**]
[TACHOMETR]
[CO NTINUE]

A failure may cause the self tests to run very slow. If the analyzer does not complete a self test within a few minutes (analyzer locks up during the test), consider it equivalent to displaying FAILS in the test log.

- **If any of these self tests fail, locate the test that failed in the ‘’Self-Test Troubleshooting Guide’’ on page 4-33.**
- **If the failure still is not isolated, go to page 4-45, ‘’To troubleshoot source and calibrator failures.’’**

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To troubleshoot intermittent failures

Use this test to isolate intermittent failures to the assembly.

- **Determine if your intermittent failure is caused by one of the following common causes.**

Common Reasons	Troubleshooting Procedure
Loose screws and cables	Check that the screws in the analyzer are tight and that the cables are firmly in their sockets. This is especially important since grounding for the analyzer depends on the cables and screws.
Motherboard connectors	Remove each assembly connected to the Motherboard and check the connectors for loose or bent pins.
Power supply voltages	Check for correct power-supply voltages. See ''To perform initial verification'' on page 4-5.
Out-of-adjustment	Do the adjustments for the analyzer in chapter 5.
Low level noise	Do ''To troubleshoot distortion failures'' on page 4-56.
Air flow restricted	Cooling air enters from the right side and exhausts through the left side and rear panel. Check that the air flow was not restricted in these areas when the failure occurred.
External voltage	Verify that the line voltage is within the electrical specification for the analyzer. See chapter 2.

- **Connect the rear panel SOURCE output to the rear panel TACH input using a BNC cable. Remove all cables from the front panel input connectors.**

Caution

The ICP self test outputs approximately 30 Vdc on the input connectors. Before starting the self tests, disconnect all devices connected to the input connectors. Devices left connected during the ICP self test may be damaged.

- **Set the power switch to on (|).**

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- **Press the following keys:**

[**Preset**]
  [DO PRESET]
[**System Utility**]
  [CALIBRATN]
  [AUTO CAL **OFF**]
[**Input**]
  [ALL CHANNELS]
  [CH* FIXED RANGE]
  ]
  [Vpk]
[**System Utility**]
  [MORE]
  [SELF TEST]
  [TEST LOG]
  [CLEAR TEST LOG]
[**Rtn**]
  [LOOP MODE **ON**]
  [FUNCTIONL TESTS]
  [ALL]
  [C ONTINUE]

- **After this test detects a failure, press the following keys:**

[**Rtn**]
  [LOOP MODE **OFF**]

- **Compare the analyzer's test log to the ''Self Test Troubleshooting Guide'' starting on page 4-33.**

If the analyzer's test log matches more than one entry in the table, use the entry closest to the beginning of the table. The table lists the probable faulty assembly or assemblies and any recommended adjustment or troubleshooting procedure to do before replacing the assembly. If both an adjustment and a test are recommended, do the adjustment first.

All pass and fail messages are displayed on the test log along with the number of times a test passes or fails. When loop mode is activated, the analyzer continually repeats a test until power is cycled or loop mode is aborted by pressing the [LOOP MODE **OFF**] softkey. During some tests, the keyboard is not active and loop mode cannot be turned off. If this occurs, wait for the test to finish.

If you abort a self test before the self test is finished, the analyzer may fail its calibration routine. To prevent this from happening, press [**Preset**] [DO PRESET] or cycle power after you abort a self test.

To run a specific self test in loop mode, press the keys listed in step 4 except select the specific self test instead of [ALL].

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To troubleshoot performance test failures

With the exception of the Quick Confidence test, all functional self tests must pass before the following table is valid.

❑ Step 1. If the analyzer failed a performance test, compare the failing performance test to the following table.

If more than one performance test is failing, use the entry that is closest to the beginning of the table. The table lists the probable faulty assembly or assemblies and any recommended adjustment or troubleshooting procedure to do before replacing the assembly. If both an adjustment and a test are recommended, do the adjustment first.

Failing Performance Test Troubleshooting Guide

Failing Performance Test	Probable Faulty Assembly (in order of probabilty)	Adjustment	Troubleshooting Test
DC offset one channel or channel 1 and 3 or channel 2 and 4	A1/A2 Input	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	
DC offset all channels	A5 Analog	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	
Amplitude accuracy one channel	A1/A2 Input A5 Analog	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	Input and ADC, page 4-51 Four channel, page 4-54
Amplitude accuracy channel 1 and 3 or channel 2 and 4	A2 Input	Input dc offset, page 5-10	
Amplitude accuracy all channels	A5 Analog	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	
Flatness one channel	A1/A2 Input A5 Analog	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	Input and ADC, page 4-51 Four channel, page 4-54
Flatness channel 1 and 3 or channel 2 and 4	A2 Input	Input dc offset, page 5-10	
Flatness all channels	A5 Analog	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	

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Failing Performance Test	Probable Faulty Assembly (in order of probabilty)	Adjustment	Troubleshooting Test
Amplitude linearity one channel	A1/A2 Input A5 Analog	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	Input and ADC, page 4-51 Four channel, page 4-54
Amplitude linearity channel 1 and 3 or channel 2 and 4	A2 Input	Input dc offset, page 5-10	
Amplitude linearity all channels	A5 Analog	Input dc offset, page 5-10 ADC gain, offset, and reference, page 5-7	
Amp_phase match	A1/A2 Input A5 Digital A6 Digital		Source and calibrator, page 4-45
A-weight filter	A1/A2 Input		
Anti-alias filter	A1/A2 Input	Filter flatness, page 5-17	
Frequency accuracy	A7 CPU	Frequency reference, page 5-5	
Input coupling	A1/A2 Input		
Single ch phase accuracy	A10 Rear Panel A5 Analog A6 Digital		Trigger, page 4-62
External trigger	A10 Rear Panel A5 Analog		Trigger, page 4-62
Input resistance	A1/A2 Input		
Input capacitance	A1/A2 Input		
Harmonic distortion one channel	A1/A2 Input A5 Analog		Input and ADC, page 4-51 Four channel, page 4-54
Harmonic distortion channel 1 and 3 or channel 2 and 4	A2 Input		
Harmonic distortion all channels	A5 Analog	ADC gain, offset, and reference, page 5-7	
Intermodulation distortion one channel	A1/A2 Input A5 Analog		Input and ADC, page 4-51 Four channel, page 4-54
Intermodulation distortion channel 1 and 3 or channel 2 and 4	A2 Input		
Intermodulation distortion all channels	A5 Analog	ADC gain, offset, and reference, page 5-7	

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Failing Performance Test Troubleshooting Guide

Failing Performance Test	Probable Faulty Assembly (in order of probabilty)	Adjustment	Troubleshooting Test
Spurious signals one channel	A1/A2 Input A5 Analog		Input and ADC, page 4-51 Four channel, page 4-54
Spurious signals channel 1 and 3 or channel 2 and 4	A2 Input		
Spurious signals all channels	A5 Analog mechanical A6 Digital	ADC gain, offset, and reference, page 5-7	Distortion, page 4-56
Noise one channel	A1/A2 Input A5 Analog		Input and ADC, page 4-51 Four channel, page 4-54
Noise channel 1 and 3 or channel 2 and 4	A2 Input		
Noise all channels	A5 Analog mechanical	ADC gain, offset, and reference, page 5-7	Distortion, page 4-56
Cross talk	A1/A2 Input		Distortion, page 4-56
ICP supply	A1/A2 Input		
Source dc offset	A5 Analog		
Source amplitude accuracy	A5 Analog		
Source flatness	A5 Analog		
Source distortion	A5 Analog		
Source output resistance	A5 Analog		

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To troubleshoot source and calibrator failures

Use this test to isolate source and calibrator failures to the A6 Digital assembly, the A5 Analog assembly, the A1/A2 Input assembly, the A12 BNC assembly, or the A10 Rear Panel assembly.

❑ Step 1. Check the sine wave output.

- **Set the power switch to on (|).**
- **Connect an oscilloscope to the analyzer's SOURCE connector using a BNC cable.**
- **Set the oscilloscope as follows:**

CH1 V/div	400 mV/div
Input Impedance	50 Ω
CH1 Coupling	dc
Probe Attenuation	1
Display Mode	Repetitive
Time/div	20 µs/div
Trigger	Trg'd Sweep
Trig Src	Chan1
Trigger Level	0 V

- **Press the following keys:**

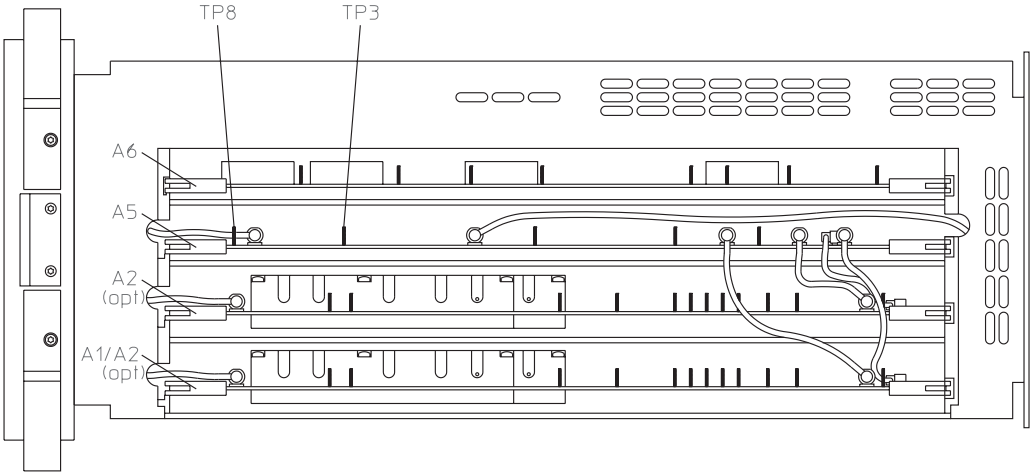
[**System Utility**]
[CALIBRATN]
[AUTO CAL **OFF**]
[**Source**]
[SOURCE **ON**]
[LEVEL]
1
[Vpk]

- **If the oscilloscope displays a 10.2 kHz, 2 Vp-p sine wave with no dc offset, go to Step 2.**

This is only a quick check of the source sine wave. If the source is suspected of failing at a specific frequency or amplitude, check the source sine wave at the failing frequency or amplitude.

- **Using an oscilloscope and a 1:1 probe, check that the signal at A5 TP8 is a 10.2 kHz, 2 Vp-p sine wave with no dc offset.**
- **If the signal is correct at A5 TP8 and incorrect at the analyzer's front panel SOURCE connector, the A12 BNC assembly is probably faulty.**
- **If the signal is correct at A5 TP8 and incorrect at the analyzer's rear panel SOURCE connector, the A10 Rear Panel assembly is probably faulty.**
- **If the signal is incorrect, the A5 Analog assembly is probably faulty.**

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❑ Step 2. Check the dc offset.

- **Connect the voltmeter to A5 TP3.**
- **Press the following keys:**

  [LEVEL]
  0
  [Vpk]
  [DC OFFSET]

- **Rotate the RPG knob while monitoring the voltmeter.**
- **If the voltmeter's voltage does not change from +2.3 to 2.3 as the dc offset value is varied between 10 and +10 Vdc, the A5 Analog assembly is probably faulty.**

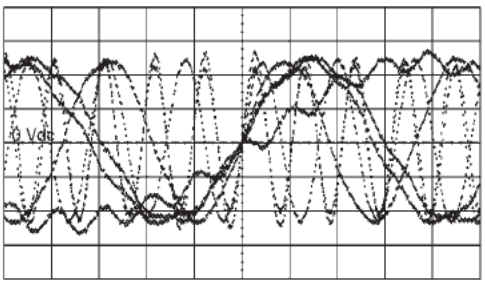
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❑ Step 3. Check the periodic chirp output.

- **Press the following keys:**

  [DC OFFSET]
  0
  [V]
  [LEVEL]
  1
  [Vpk]
  [PERIODIC CHIRP]

- **Using an an oscilloscope and a 1:1 probe, check the following signal.**

Oscilloscope Setup		Parameters	Waveform
Connect CH1 to A5 TP8		Amplitude Time Duty Cycle Pulse shape Time Relationship	
CH1 V/div	300 V/div		
Input Impedance	50 Ω		
CH1 Coupling	dc		
Probe Atten	1		
Display Mode	Repetitive		
Averaging	off		
Time/div	10 µs/div		
Trigger	Trg'd		
Trig Src	Sweep Chan1		

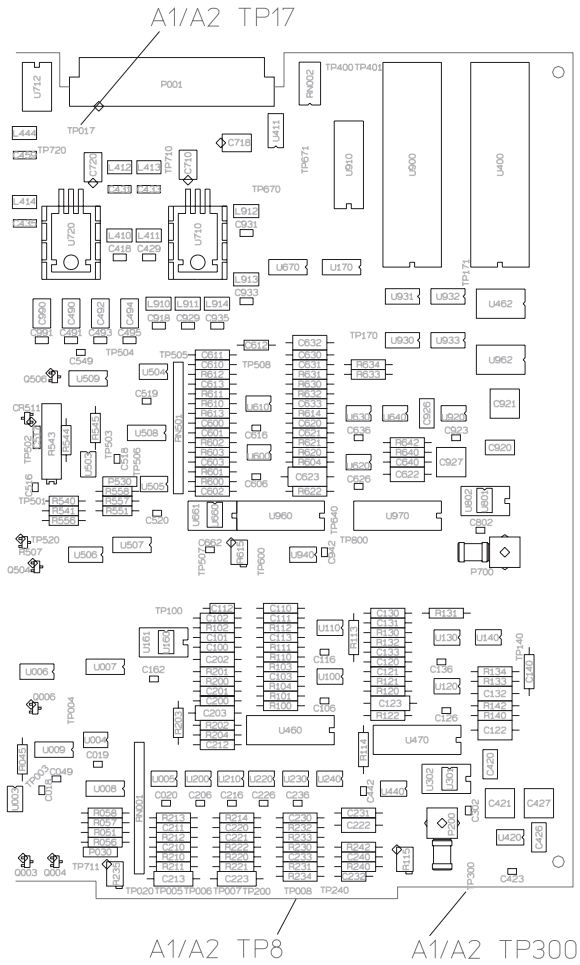
Periodic Chirp

- **If the signal is incorrect, the A5 Analog assembly is probably faulty.**

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❑ Step 4. Check the calibrator output.

- **Set the power switch to off (O).**
- **Remove the A1/A2 Input assembly and attach a test clip patch cord to TP 17. Connect a 10:1 oscilloscope probe to the patch cord and TP 8 (ground).**



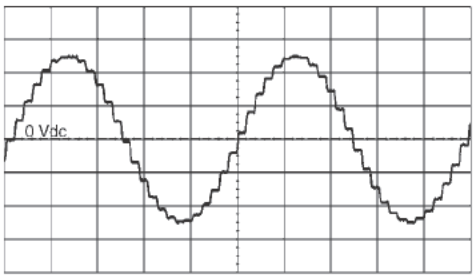
- **Reinstall the Input assembly in the card nest with patch cord and probe attacted.**
- **Set the power switch to on (I).**

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- Press the following keys:

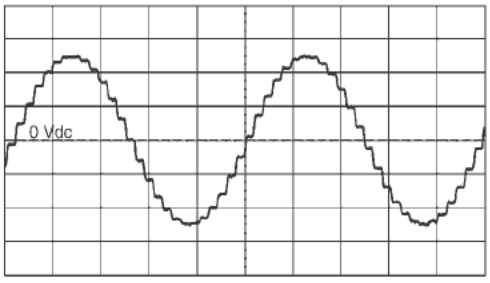
[**System Utility**]
[CALIBRATN]
[AUTO CAL **OFF**]
[**Input**]
[ALL CHANNELS]
[CH* FIXED RANGE]
]
[Vpk]
[**Source**]
[SOURCE **ON**]
[LEVEL]
1
[Vpk]
[**System Utility**]
[MORE]
[SERVICE TESTS]
[SPCL TEST MODES]
[HIGH LEVEL CAL]

- If the signal does not look like the following figure, the A5 Analog assembly is probably faulty.

Oscilloscope Setup		Parameters	Waveform
Connect CH1 to A1/A2 TP 17		Amplitude Time	
CH1 V/div	2 V/div		
Input Impedance	1 M Ω dc		
CH1 Coupling	10		
Probe Atten	Repetitive		
Display Mode	8		
Averaging	20 ms/div		
Time/div	Trg'd Sweep		
Trigger	Chan1		
Trig Src			

High Level Calibrator

- **Press [LOW LEVEL CAL].**
- If the signal does not look like the following figure, the A5 Analog assembly is probably faulty.

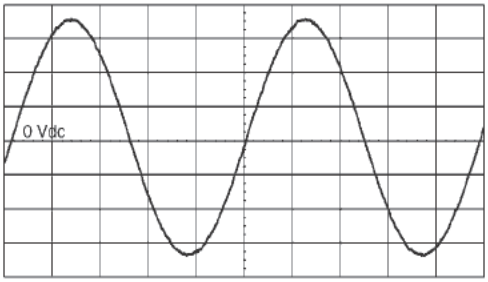
Oscilloscope Setup		Parameters	Waveform
Connect CH1 to A1/A2 TP 17		Amplitude Time	
CH1 V/div	200 mV/div		
Input Impedance	1 M Ω dc		
CH1 Coupling	10		
Probe Atten	Repetitive		
Display Mode	8		
Averaging	20 ms/div		
Time/div	Trg'd Sweep		
Trigger	Chan1		
Trig Src			

Low Level Calibrator

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❑ Step 5. Check the Input assembly.

- Using an oscilloscope and a 10:1 probe, check the following signal.

Oscilloscope Setup		Parameters	Waveform
Connect CH1 to A1/A2 TP 300		Amplitude Time Distortion	
CH1 V/div	200 mV/div		
Input Impedance	1 M Ω dc		
CH1 Coupling	10		
Probe Atten	Repetitive		
Display Mode	8		
Averaging	20 ms/div		
Time/div	Trg'd Sweep		
Trigger	Chan1		
Trig Src			

Channel 1 Output

- If the signal is incorrect, the A1/A2 Input assembly is probably faulty.

❑ Step 6. Compare the analyzer's self-test results to the following table.

- Press the following keys:

[**System Utility**]
[MORE]
[SELF TEST]
[FUNCTIONL TESTS]
[DIGITAL PROCESSOR]
[ALL]
[**Rtn**]
[ADC GATE ARRAY]

- Determine the probable faulty assembly by comparing the analyzer's self-test results to the following table.

Self-Test Results	Probable Faulty Assembly
Trigger Gate Array fails and ADC Gate Array passes	A6 Digital
Baseband fails, Zoom fails, and ADC Gate Array passes	A6 Digital
ADC Gate Array fails	A5 Analog
All self tests pass through the ADC Gate Array	A5 Analog

This test does not check all the signals from the A6 Digital assembly to the A5 Analog and A1/A2 Input assemblies. All the functions of the A6 Digital assembly are checked by the self tests except for a few output buffers. If replacing the A5 Analog assembly does not fix the failure, the A6 Digital assembly is probably faulty.

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To troubleshoot input and ADC failures

Use this test to isolate input failures in two channel analyzers to the A1 Input assembly, A5 Analog assembly, or A12 BNC assembly.

❑ Step 1. Check the input path.

- **Set the frequency synthesizer as follows:**

Frequency	10 kHz
Amplitude	2 Vp-p
Function	Sine Wave

- **Set the oscilloscope as follows:**

CH1 V/div	400 mV/div
Input Impedance	1 MΩ
CH1 coupling	dc
Time/div	20 ns/div
Probe Atten	1

- **Press the following keys:**

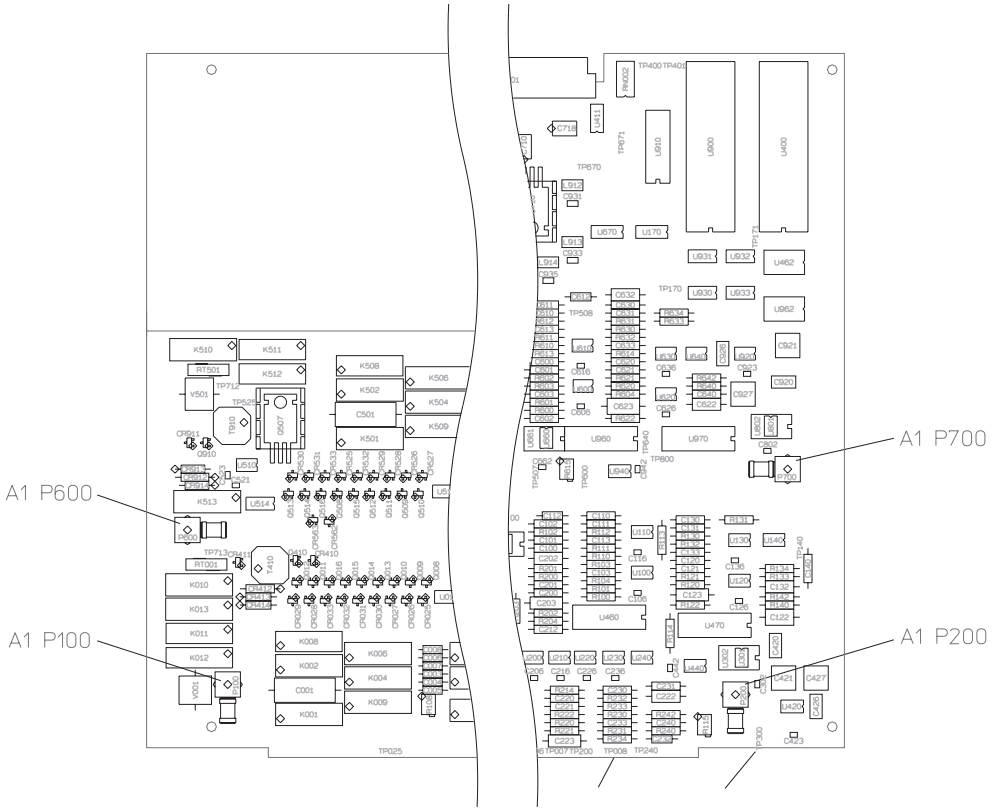
[**System Utility**]
  [CALIBRATN]
  [AUTO CAL **OFF**]
[**Input**]
  [ALL CHANNELS]
  [CH* FIXED RANGE]
  1
  [Vpk]

- **Connect the frequency synthesizer to the failing channel's input connector using a BNC cable.**
- **Using the oscilloscope, BNC-to-SMB cable, and SMB-to-SMB adapter, check the following signals for the failing channel:**

Test Location	Amplitude (10%)	Probable Faulty Assembly
Channel 1		
A12 P31 (connected to A1 P100)	2 Vp-p	A12 BNC
A1 P200	2.83 Vp-p	A1 Input
Channel 2		
A12 P41 (connected to A1 P600)	2 Vp-p	A12 BNC
A1 P700	2.83 Vp-p	A1 Input

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This is only a quick check of the Input assembly. If the Input assembly's amplitude is still suspected of failing, set the analyzer to the failing range, impedance, and frequency. Connect a signal equal to the range setting to the failing channel. When the input level equals the range level, A1 P200 (channel 1) or A1 P700 (channel 2) should be 2.83 ±0.28 Vp-p.



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❑ Step 2. Check the dc offset DAC.

- **Using the BNC-to-SMB cable, connect the oscilloscope to A1 P200 to check channel 1 or to A1 P700 to check channel 2.**

If you changed the input signal or range, set the input signal to 2 Vp-p and the range to 1 Vpk.

- **Set the oscilloscope to 700 mV/div.**
- **Press the following keys:**

[**System Utility**]
[MORE]
[SERVICE TESTS]
[SPCL TEST MODES]
[MORE SPCL MODES]
[CHANNEL 1 SPCL MODE] or [CHANNEL 2 SPCL MODE]
[OFFSET DAC]
0
[ENTER]

- **Note the dc offset voltage of the sine wave displayed on the oscilloscope.**
- **Enter numbers between 127 and +128.**

The sine wave dc offset voltage should change about 780 mV for a −127 entry and −780 mV for a +127 entry.

- **If the dc offset function is incorrect, the A1 Input assembly is probably faulty.**
- **If the dc offset function is correct, the A5 Analog assembly is probably faulty.**

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To troubleshoot input failures on four channel analyzers

Use this test to isolate the failure when one channel fails in a four channel analyzer.

❑ Step 1. Run the input and quick confidence self tests.

- **Set the power switch to on (|).**
- **When the power-up tests are completed, press the following keys:**

[**System Utility**]
[CALIBRATN]
[AUTO CAL **OFF**]
[**Input**]
[ALL CHANNELS]
[CH* FIXED RANGE]
1
[Vpk]
[**System Utility**]
[MORE]
[SELF TEST]
[TEST LOG]
[**Rtn**]
[FUNCTIONL TESTS]
[INPUTS]
[ALL]
[CONTINUE]
[**Rtn**]
[**Rtn**]
[QUICK CONF TEST]

- **If the self tests fail but do not lockup the analyzer, note the failure messages and go to Step 2.**
- **If the analyzer locks up on the Quick Confidence self test but not on the input self tests, note the failure messages and go to Step 2 but don't run the Quick Confidence self test.**
- **If the analyzer locks up on the input self tests, go to Step 2 to determine if exchanging the Input assemblies will allow the self tests to run.**

This is most likely to occur when channel 1 and 3 are failing.

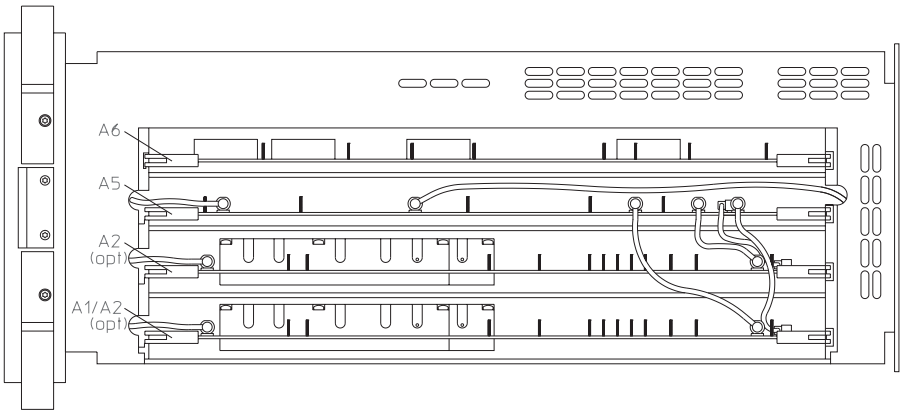
- **If the self tests pass, go to Step 2 but substitute the failure symptom for the self tests.**

If the exact failure symptom is not known, use the performance test procedures to isolate the failure symptom.

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❑ Step 2. Exchange the Input assemblies.

- **Set the power switch to off (O).**
- **Exchange the Input assembly in the lower slot with the Input assembly in the upper slot.**



- **Reconnect the cables to the A5 Analog assembly.**
- **Set the power switch to on (|).**
- **Press the following keys:**

[**System Utility**]
[CALIBRATN]
[AUTO CAL OFF]
[**Input**]
[ALL CHANNELS]
[CH* FIXED RANGE]
1
[Vpk]
[**System Utility**]
[MORE]
[SELF TEST]
[TEST LOG]
[**Rtn**]
[FUNCTIONL TESTS]
[INPUTS]
[ALL]
[CONTINUE]
[**Rtn**]
[**Rtn**]
[QUICK CONF TEST]

- **If the same channel fails as failed before the exchange, the A5 Analog assembly is probably faulty.**
- **If a different channel now fails, the A2 Input assembly for the failing channel is probably faulty.**

The Input assembly for channel 1 and 3 is in the lower slot. The Input assembly for channel 2 and 4 is in the upper slot.

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To troubleshoot distortion failures

Use this test to isolate distortion failures to the A1/A2 Input assembly, the A5 Analog assembly, or to mechanical failures.

❑ Step 1. Check mechanical ground connections.

- **Check that the Digital assembly, Input assembly, and Analog assembly are completely in the card nest and making good contact with the grounding guides at the sides of the card nest.**
- **Check that the screws in the sides, back, and top of the analyzer are tight.**

When grounding is inadequate, feedback from the line power frequency and internal clock frequencies may appear as distortion on the Input assemblies.

❑ Step 2. Check the analyzer's clock signals.

Noisy clock signals can cause noise or spurious signals in the analyzer. To check the analyzer's clocks, go to page 4-5 ''To perform initial verification'' and do Step 6.

❑ Step 3. Do the "Spurious signals" and ''Noise'' performance tests.

- **Run the "Spurious signals" and ''Noise'' performance tests in chapter 3, ''Verifying Specifications.''**
- **If all channels fail, the A5 Analog assembly is probably out of adjustment or faulty.**

Do the ''ADC gain, offset and reference'' adjustment on page 5-7 before replacing the assembly.

- **If only one channel, or channel 1 and 3, or channel 2 and 4 fails, the Input assembly that failed is probably faulty.**
- **If the ''Spurious signals'' and ''Noise'' performance tests pass, but the analyzer appears to power up with a high noise floor, an auto-range circuit may be failing.**

To check the auto-range function and isolate a failure, see ''To troubleshoot auto-range failures'' on page 4-59.

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To troubleshoot disk drive failures

This test isolates disk drive failures to the A7 CPU, the A100 Disk Drive assembly, or the flexible disk.

❑ Step 1. Check the disk controller on the A7 CPU assembly.

- **Press the following keys:**

[**System Utility**]
[MORE]
[SELF TEST]
[TEST LOG]
[**Rtn**]
[FUNCTIONL TESTS]
[I/O]
[INTERNAL DISK]
[DISK CONTROLLR]
[DISK FIFO]

- **If the disk controller test aborts and displays the message Mass Storage Unit not Present!!, the Disk Drive assembly, or the cable to the Disk Drive assembly is probably faulty. The A7 CPU assembly could also be faulty but it is less probable.**
- **If the disk controller or disk FIFO test fails, the A7 CPU assembly is probably faulty.**

❑ Step 2. Check the Disk Drive assembly.

- **Insert a formatted flexible disk into the Disk Drive assembly and press the following keys:**

[RESTORE]
[RANDOM SEEK]
[SEEK RECORD]
(*any number between 1 and 2771*)
[READ]
[READ/WRITE]

- **If any of the self tests failed, insert a new formatted disk and repeat the previous step.**
- **If the disk drive self tests still fail, the A100 Disk Drive assembly is probably faulty.**

If the self test aborts and displays the message Bad or unformatted media, the most likely cause of the failure is a bad flexible disk. The analyzer can use either LIF (Logical Interchange Format) or a DOS formatted flexible disk.

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❑ Step 3. Check that the Disk Drive assembly can read and write to all sectors of a flexible disk.

The read/write self test can take up to 40 minutes to complete if there are no failures.

- **Press the [READ/WRITE ALL] softkey.**
- **If the self test aborts and displays the message Bad or unformatted media, insert a new formatted disk and repeat the previous step.**
- **If the self test fails a second time, the Disk Drive assembly is probably faulty.**
- **If the self test passes, the Disk Drive assembly and flexible disk are functioning correctly.**

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To troubleshoot auto-range failures

Use this test to check the auto-range and overload detector circuits on the A1/A2 Input assembly. This test assumes that calibration and all self tests passed.

- **Set the power switch to on (|).**
- **Press the following keys:**

[**System Utility**]
[CALIBRATN]
[AUTO CAL **OFF**]
[**Inst Mode**]
[CHANNELS 4] or [CHANNELS 2]
[**Input**]
[ALL CHANNELS]
[CH* FIXED RANGE]
1
[dBVrms]
[**Source**]
[SOURCE **ON**]
[LEVEL]
1
[dBVrms]
[**System Utility**]
[MORE]
[SERVICE TESTS]
[SPCL TEST MODES]
[SOURCE LEVEL]

The Half range LEDs for all channels should be on and the Over range LEDs should be off.

- **Press the following keys:**

[**Source**]
[LEVEL]
5
[dBVrms]

The Half range and Over range LEDs for all channels should be on.

- **Press the following keys:**

[**Input**]
[CH* AUTO RANGE]

After the auto-range routine is finished, the Half range LEDs should be on and the Over range LEDs should be off.

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- **Press the following keys:**

  [CHANNEL 1]
  [CHANNEL 1 RANGE]

The range should be set to 5 dBVrms.

- **Press [Rtn].**
- **Repeat steps 5 and 6 for each channel.**
- **If only one channel, or channel 1 and 3, or channel 2 and 4 are failing, the A1/A2 Input assembly is probably faulty.**

In the two channel analyzer, the A1 Input assembly provides the circuits for channel 1 and 2. In the four channel analyzer, the A2 Input assembly in the lower slot provides the circuits for channel 1 and 3, and the A2 Input assembly in the upper slot provides the circuits for channel 2 and 4.

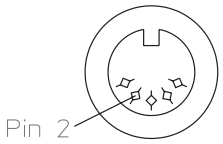
- **If all channels are failing, the A5 Analog assembly is probably faulty.**

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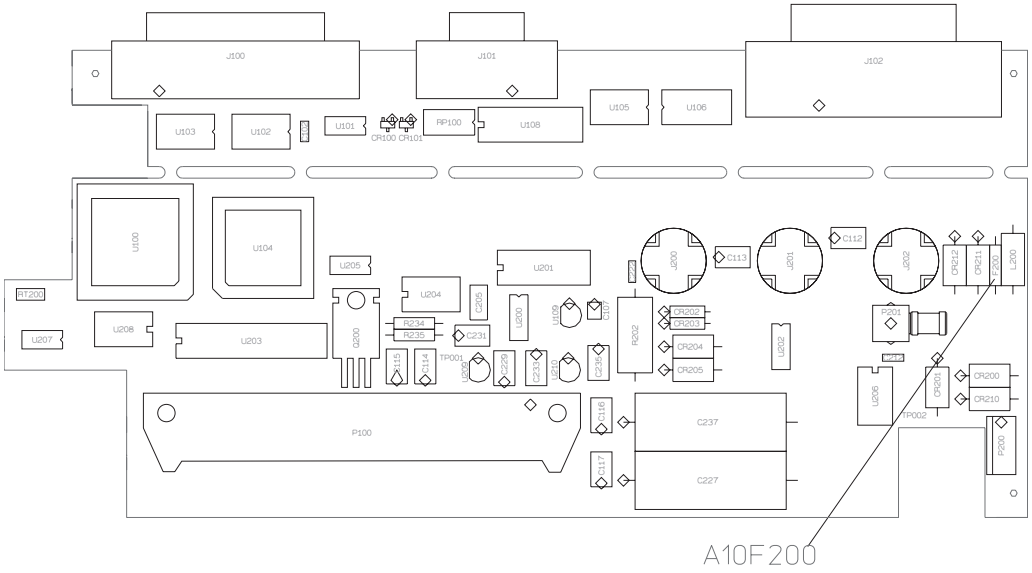
To troubleshoot DIN connector failures

Use this test to determine if the fuse for the DIN connector is failing before replacing the A10 Rear Panel assembly.

- **Set the power switch to on (|).**
- **Check the voltage on pin 2 of the DIN connector for +5V.**



- **If the voltage is correct, the A10 Rear Panel assembly is probably faulty.**
- **If the voltage is incorrect, replace A10 F200.**



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To troubleshoot trigger failures

Use this test when the trigger mode is suspected of failing or the Input Trigger self test fails on all channels.

❑ Step 1. Check trigger modes.

- **Set the power switch to on (|).**
- **Press the following keys:**

[System Utility]
  [CALIBRATN]
  [AUTO CAL OFF]
[**Input**]
  [ALL CHANNELS]
  [CH* FIXED RANGE]
  1
  [Vpk]
[**Source**]
  [SOURCE **ON**]
  [LEVEL]
  1
  [Vpk]
  [FIXED SINE]
  [1]
  [kHz]
[**Inst Mode**]
  [4 CHANNEL] or [2 CHANNEL]
  [ACTIVE TRACE]
  [A B C D] or [A B]
[**Meas Data**]
  [ALL CHANNELS]
  [TIME CHANNEL]
[**System Utility**]
  [MORE]
  [SERVICE TESTS]
  [SPCL TEST MODES]
  [SOURCE LEVEL]
[**Trigger**]
  [SOURCE TRIGGER]

- **If the analyzer is not triggering and the message WAITING FOR SOURCE TRIGGER is displayed, the A6 Digital assembly is probably faulty.**

Fixed sine wave source triggering occurs at a consistent (but not predictable) point within the time record.

- **Set the frequency synthesizer as follows:**

Frequency	1 kHz
Amplitude	6 Vp-p
Function	Square Wave

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- **Connect the frequency synthesizer to the analyzer's rear panel EXT TRIG connector using a BNC cable.**
- **Press the following keys allowing enough time for the analyzer to trigger before pressing the next key. Note which trigger modes are failing:**

[CHANNEL 1]
[CHANNEL 2]
[CHANNEL 3] (option AY6 only)
[CHANNEL 4] (option AY6 only)
[TRIGGER SETUP]
[CHANNEL LEVEL]
200
[mV]
[SLOPE NEG]
[ALL CHANNELS]
[CHANNEL DELAY]
100
[mS]
[0]
[S]
[**Rtn**]
[ARM SETUP]
[MANUAL ARM]
[**Rtn**]
[ARM]
[ARM SETUP]
[AUTOMATIC ARM]
[**Rtn**]
[EXTERNAL TRIGGER]
[TRIGGER SETUP]
[EXT LEVEL TTL]
[EXT LEVEL USER]
[USER EXT LEVEL]
200
[mV]
[EXT RANGE +/– 10]
[USER EXT LEVEL]
0
[V]

The message WAITING FOR mode TRIGGER is displayed when the analyzer is not triggering.

- **Change the frequency synthesizer's amplitude to 0.3 Vp-p.**
- **Press [EXT RANGE +/ 2].**

The analyzer should now trigger.

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❑ Step 2. Determine the probable faulty assembly or next step by comparing the trigger failure to the following table.

If the trigger failure matches more than one entry in the table, use the entry closest to the beginning of the table.

Trigger Mode Failing	**Probable Faulty Assembly or Next Step**
All channels and external trigger fail all trigger modes	Step 3
All channels trigger but external trigger fails all trigger modes	Step 4
At least one channel or external trigger functions correctly	A5 Analog
Channel level fails Arm fails External trigger fails user level or TTL level	A5 Analog
External trigger fails EXT RANGE	A10 Rear Panel
Trigger delay fails	A6 Digital

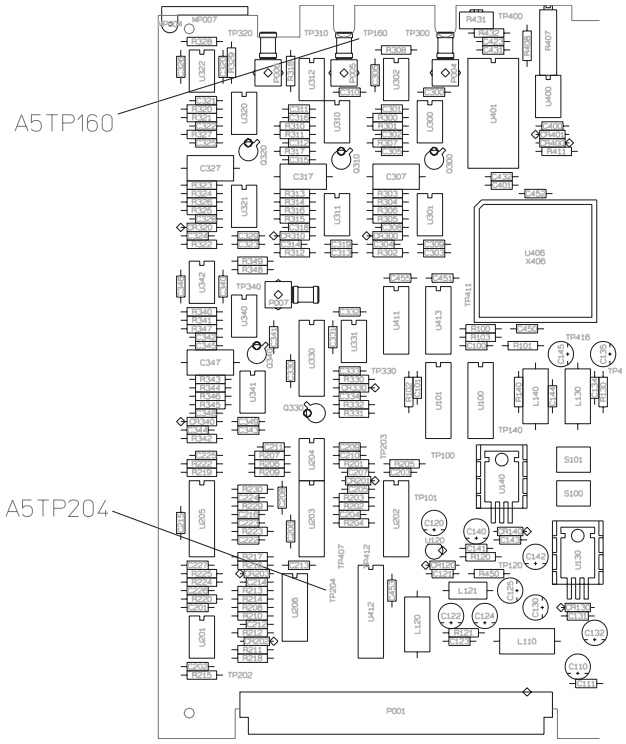
❑ Step 3. Check trigger signal to Digital assembly.

- **Set the power switch to off (O).**
- **Remove the A5 Analog assembly and attach a test clip patch cord to TP 204.**
- **Connect a logic probe to the patch cord and TP 160 (ground).**
- **Reinstall the Analog assembly in the card nest with patch cord and probe attached.**
- **Set the power switch to on (I).**
- **Press the following keys:**

[**System Utility**]
  [CALIBRATN]
  [AUTO CAL **OFF**]
[**Input**]
  [ALL CHANNELS]
  [CH* FIXED RANGE]
  1
  [Vpk]
[**Source**]
  [SOURCE ON]
  [LEVEL]
  [1]
  [Vpk]
[**System Utility**]
  [MORE]
  [SERVICE TESTS]
  [SPCL TEST MODES]
  [SOURCE LEVEL]
[**Trigger**]
  [CHANNEL 1]

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- **If the signal at A5 TP 204 is toggling, the A6 Digital assembly is probably faulty.**
- **If the signal at A5 TP 204 is not toggling, the A5 Analog assembly is probably faulty.**



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❑ Step 4. Check external trigger signal to the Analog assembly.

- **Set the power switch to off (O).**
- **Remove the seven screws holding the rear panel to the analyzer and lean the rear panel back until the A10 Rear Panel assembly is visible. Keep the cables connected.**
- **Set the power switch to on (I).**
- **Change the frequency synthesizer's amplitude to 2 Vp-p.**
- **Set the oscilloscope as follows:**

CH1 V/div	100 mV/div
Input Impedance	1 MΩ
CH1 Coupling	dc
Time/div	200 µs/div
Probe Atten	10

- **Connect the oscilloscope to A10 TP2 using a 10:1 probe.**
- **Press the following keys:**

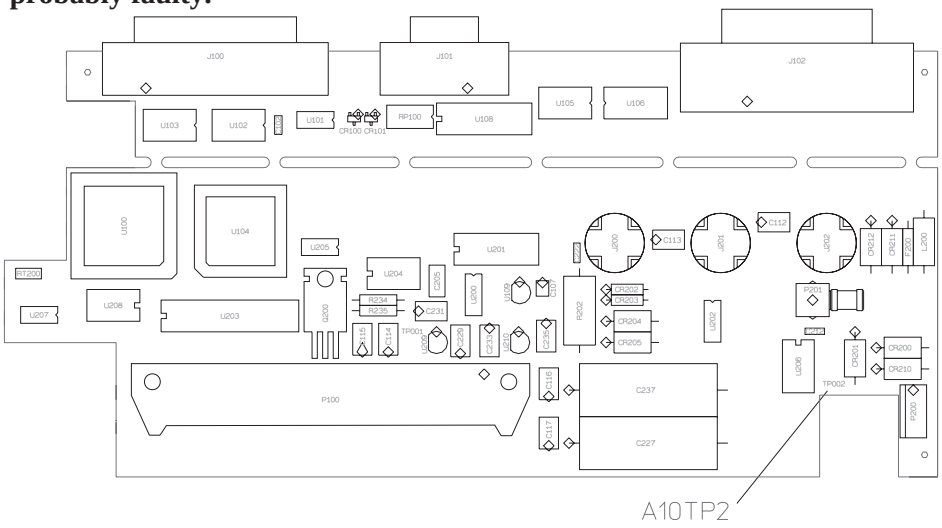
[**Trigger**]
[EXTERNAL TRIGGER]
[TRIGGER SETUP]
[EXT LEVEL USER]
[EXT RANGE +/– 10]

The oscilloscope should display a 370 ⁄ 40 mVp-p square wave.

- **If the signal is incorrect, the A10 Rear Panel assembly is probably faulty.**
- **Set the oscilloscope to 300 mV/div.**
- **Press [EXT RANGE +/ 2].**

The oscilloscope should display a 1.9 ⁄ 0.2 Vp-p square wave.

- **If the signal is incorrect, the A10 Rear Panel assembly is probably faulty.**
- **If the external trigger signals are correct, the A5 Analog assembly is probably faulty.**



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To troubleshoot memory battery failures

Use this test when battery-backed-up memory is suspected of failing. This test separates Memory assembly failures from memory battery failures.

- **Press the following keys:**

[**Preset**]
[DO PRESET]
[**System Utility**]
[CLOCK SETUP]
[DATE MMDDYY]
010101
[ENTER]

- **Set the power switch to off (O), then to on (I).**
- **Press the following keys:**

[**System Utility**]
[CLOCK SETUP]
[DATE MMDDYY]

- **If the date is 01-01-01, the battery-backed-up memory is functioning correctly. Enter the current date. Go to page 4-31, ''To perform self tests,'' to continue troubleshooting.**
- **If the date is incorrect, remove the Memory assembly.**

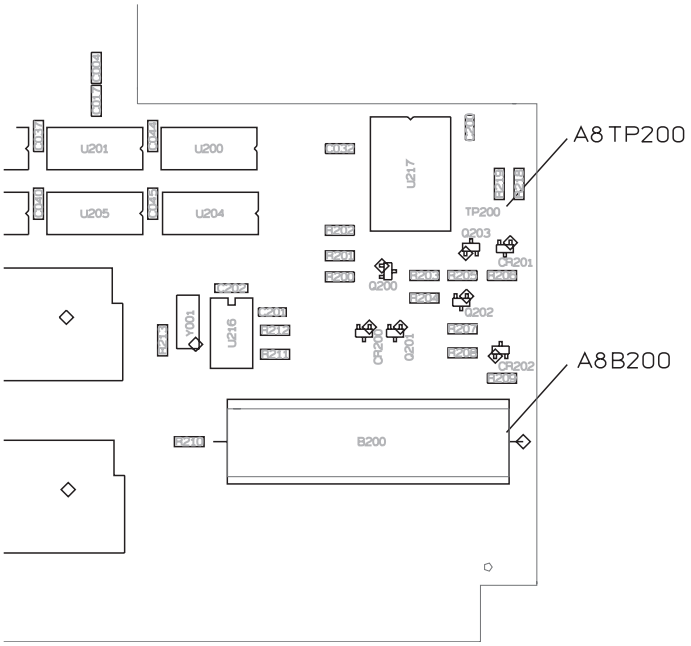
See ''To remove memory'' on page 6-13.

- **Check that the voltage at TP200 is 3.5 1V.**
- **If the voltage is correct, the Memory assembly is probably faulty.**
- **If the voltage is incorrect, replace the battery (B200).**

Caution

There is danger of explosion if battery is incorrectly replaced. Replace the battery with the same or an equivalent type listed on page 7-12. Discard used batteries according to the battery manufacturer's instructions.

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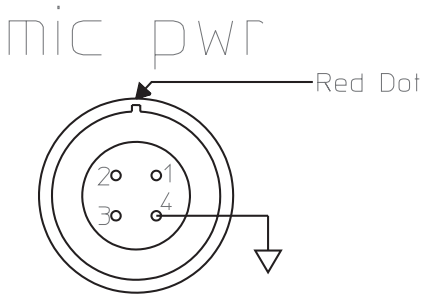
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To troubleshoot microphone power and adapter failures

Use this test to isolate Microphone failures to the A5 Analog assembly or option UK4, Microphone Adapter and Power Supply.

❑ Step 1. Check mic pwr on the analyzer's front panel.

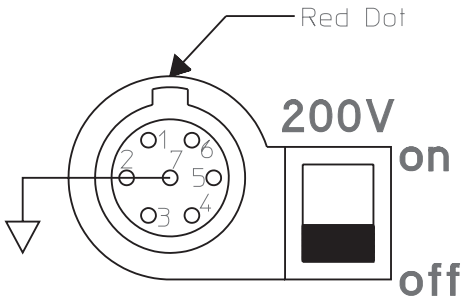
- **Set the power switch to on (|).**
- **Check the voltage on pin 2 of the mic pwr connector for +8 ±0.5 Vdc.**



- **If the voltage is incorrect, the A5 Analog assembly is probably faulty.**

❑ Step 2. Check the power from the Microphone Adapter and Power Supply.

- **Connect the mic cable to the analyzer's mic pwr connector.**
- **Check the voltage on pins 5 and 6 of each microphone connector for 28±2.8 Vdc.**



- **If the voltage is incorrect, the A77 Microphone assemby in the Microphone Adapter and Power Supply is probably faulty.**
- **Set the switch for each microphone connector to off.**
- **Check the voltage on pin 3 of each connector for 0 Vdc.**
- **Set the switch for each microphone connector to on.**
- **Check the voltage on pin 3 of each connector for 200 15 Vdc.**
- **If the voltage is incorrect, the A77 Microphone assembly in the Microphone Adapter and Power Supply is probably faulty.**

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To troubleshoot tachometer failures

Use this test to isolate tachometer failures to the A10 Rear Panel assembly or A6 Digital assembly.

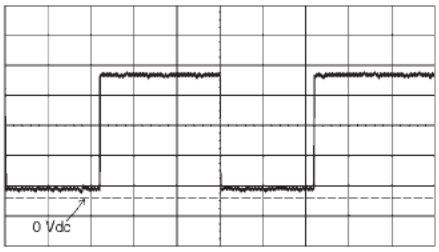
❑ Step 1. Check the rear panel tachometer input.

- **Set the power switch to off (O).**
- **Remove the seven screws holding the rear panel to the analyzer and lean the rear panel back until the A10 Rear panel assembly is visible. Keep the cables connected.**
- **Connect the SOURCE output to the TACH input on the rear panel using a BNC cable.**
- **Set the power switch to on (I).**
- **Press the following keys:**

[**System Utility**]
[CALIBRATN]
[AUTO CAL **OFF**]
[**Rtn**]
[MORE]
[SELF TEST]
[LOOP MODE **ON**]
[FUNCTIONL TESTS]
[TACHOMETR]
[CONTINUE]

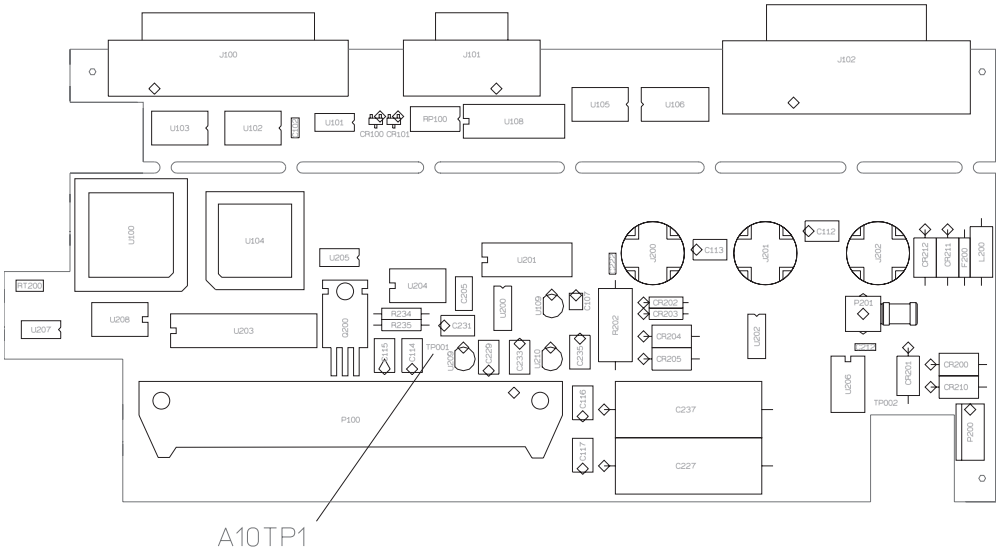
- **Using an oscilloscope and 1 M 10:1 probe, check the following signal.**

The signal should be displayed while the self test is running. Each time the self test restarts, the source output to the tachometer input will be interrupted.

Oscilloscope Setup		**Parameters**	Waveform
Connect CH1 to A10 TP1		Amplitude Time Duty Cycle Pulse shape	
CH1 V/div	1 V/div		
Input Impedance	1 M Ω		
CH1 Coupling	dc		
Probe Atten	10		
Display Mode	Real Time		
Time/div	2 ms/div		
Trigger	Auto		

- **If the signal is incorrect, the A10 Rear Panel assembly is probably faulty.**

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❑ Step 2. Check the tachometer range function.

- **Set the oscilloscope for 20 s/div.**
- **Press the following keys:**

[**Rtn**]
[LOOP MODE **OFF**]
[**Rtn**]
[SERVICE TESTS]
[SPCL TEST MODES]
[SOURCE LEVEL]
[**Source**]
[SOURCE **ON**]
[LEVEL]
500
[mVpk]
[**Trigger**]
[TACHOMETR SETUP]
[TRG RANGE +/– **20**]

- **Check that the oscilloscope displays a dc voltage of approximately 4 Vdc.**
- **Press [TRG RANGE +/ 4].**
- **Check that the oscilloscope displays a 4 0.4 Vp-p, 10.24 kHz sine wave, with 2 ±0.2 Vdc offset.**
- **If the signal is incorrect, the A10 Rear Panel assembly is probably faulty.**
- **If the signal is correct, the A6 Digital assembly is probably faulty.**

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5

Adjusting the Analyzer

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Adjusting the Analyzer

This chapter contains the adjustment procedures for the Agilent 35670A Dynamic Signal Analyzer. Use these adjustments if the analyzer does not meet its specifications or if instructed in chapter 4, ''Troubleshooting the Analyzer,'' or chapter 6, ''Replacing Assemblies,'' to perform these adjustments. These adjustments are not required for routine maintenance.

Allow the Agilent 35670A analyzer to warm up for an hour before doing any of the adjustments.

During many of these adjustment procedures, an adjustment message appears on the screen. The instructions on the screen are not as complete as the instructions in this guide. When an adjustment message appears on the screen, continue to follow the instructions in this guide. Failure to follow the instructions in this guide may result in an incorrect adjustment, which would appear as a hardware failure.

The following table shows the assembly and components adjusted during each adjustment procedure.

Adjustment	Assembly	Component
Frequency reference	A7 CPU	A7 C85
Source	A5 Analog	A5 R48 A5 R59
ADC gain, offset and reference	A5 Analog	A5 R407 A5 R405 A5 R431
Input dc offset	A1/A2 Input	A1/A2 R39 A1/A2 R539
Common mode rejection	A1/A2 Input	A1/A2 R43 A1/A2 R543
Filter flatness	A1/A2 Input	A1/A2 R115 A1/A2 R235 A1/A2 R615
Display voltage	A102 DC-DC Converter	A102 R25

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Safety Considerations

Although the Agilent 35670A analyzer is designed in accordance with international safety standards, this guide contains information, cautions, and warnings that must be followed to ensure safe operation and to keep the unit in safe condition. Adjustments in this chapter are performed with power applied and protective covers removed. These adjustments must be performed by trained service personnel who are aware of the hazards involved (such as fire and electrical shock).

Warning

Any interruption of the protective (grounding) conductor inside or outside the unit, or disconnection of the protective earth terminal can expose operators to potentially dangerous voltages.

Under no circumstances should an operator remove any covers, screws, shields or in any other way access the interior of the Agilent 35670A analyzer. There are no operator controls inside the analyzer.

Equipment Required

See chapter 1, ''Specifications,'' for tables listing recommended test equipment. Any equipment which meets the critical specifications given in the tables may be substituted for the recommended model.

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Remote Operation

Adjustments can be set up using the remote operation capability of the Agilent 35670A analyzer. The following table lists the adjustments and corresponding GPIB codes. See the *Agilent 35670A GPIB Programmer's Guide* for general information on remote operation.

Adjustment	GPIB Code
Source DC Offset	DIAG:SERV:ADJ:SOUR:OFFS
Source Filter DC Offset	DIAG:SERV:ADJ:SOUR:FILT:OFFS
ADC Second Pass Gain	DIAG:SERV:ADJ:ADC:GAIN
ADC Offset	DIAG:SERV:ADJ:ADC:OFFS
Channel 1 Offset	DIAG:SERV:ADJ:OFFS1
Channel 2 Offset	DIAG:SERV:ADJ:OFFS2
Channel 3 Offset (option AY6 only)	DIAG:SERV:ADJ:OFFS3
Channel 4 Offset (option AY6 only)	DIAG:SERV:ADJ:OFFS4
Channel 1 Common Mode Rejection	DIAG:SERV:ADJ:CMRR1
Channel 2 Common Mode Rejection	DIAG:SERV:ADJ:CMRR2
Channel 3 Common Mode Rejection (option AY6 only)	DIAG:SERV:ADJ:CMRR3
Channel 4 Common Mode Rejection (option AY6 only)	DIAG:SERV:ADJ:CMRR4
Channel 1 Flatness at 100 kHz	DIAG:SERV:ADJ:FLAT1:FULL
Channel 1 Flatness at 50 kHz (option AY6 only)	DIAG:SERV:ADJ:FLAT1:FULL
Channel 1 Flatness at 50 kHz	DIAG:SERV:ADJ:FLAT1:CENT
Channel 1 Flatness at 25 kHz (option AY6 only)	DIAG:SERV:ADJ:FLAT1:CENT
Channel 2 Flatness at 50 kHz	DIAG:SERV:ADJ:FLAT2:FULL
Channel 2 Flatness at 25 kHz (option AY6 only)	DIAG:SERV:ADJ:FLAT2:CENT
Channel 3 Flatness at 25 kHz (option AY6 only)	DIAG:SERV:ADJ:FLAT3:FULL
Channel 4 Flatness at 25 kHz (option AY6 only)	DIAG:SERV:ADJ:FLAT4:FULL
Preset	SYST:PRES

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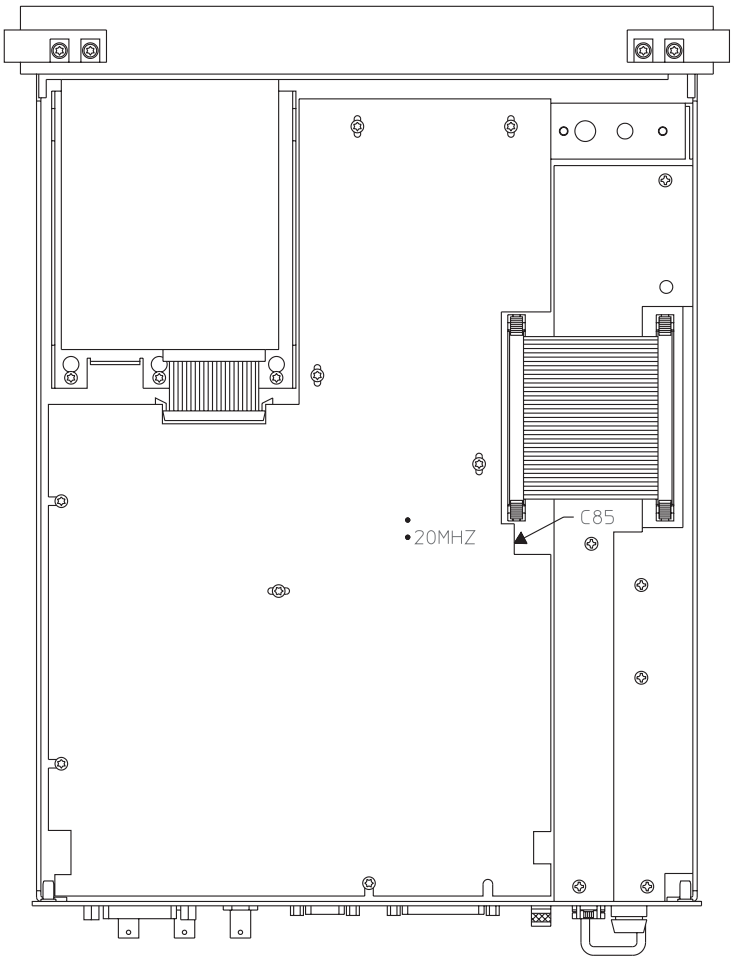
To adjust the frequency reference

This procedure adjusts the 19.923 MHz (or, to be exact, 19.922944 MHz) frequency reference circuit on the A7 CPU assembly. This circuit is the source of the timing reference for the A1/A2 Input and A5 Analog assemblies.

Equipment Required: Frequency Counter
10:1 Oscilloscope Probe

- **Set the power switch to off (O).**
- **Connect the counter to the 20 MHz test point on A7 using a 10:1 oscilloscope probe. Attach the probe ground clip to the instrument chassis (ground).**
- **Set the power switch to on (I).**
- **Adjust A7 C85 for a counter reading of 19.922944 MHz ±200 Hz.**

The analyzer may lock up if C85's plates touch each other during the adjustment. If the analyzer locks up, cycle power.



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To adjust the source

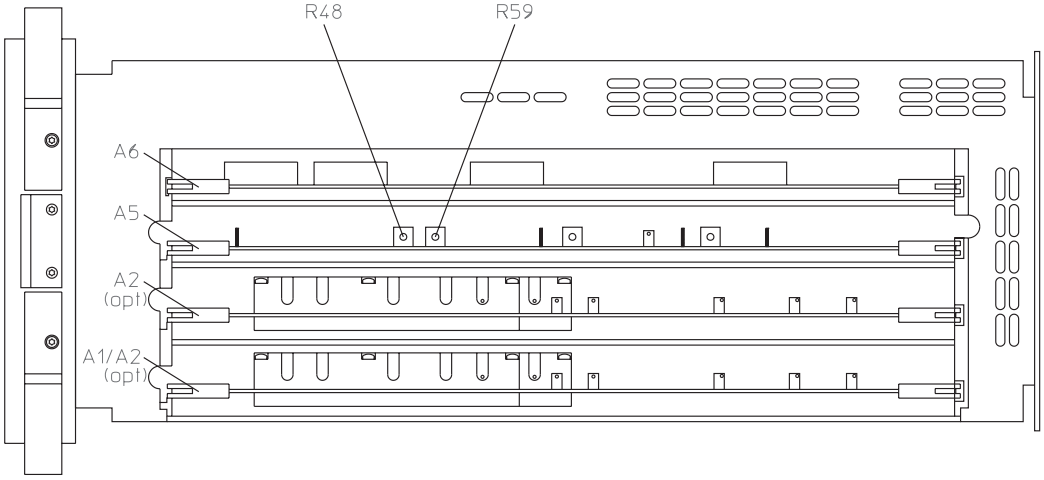
This procedure adjusts the source dc offset on the A5 Analog assembly.

Equipment Required: Multimeter
BNC-to-Dual Banana Cable

- **Connect the multimeter to the analyzer's rear-panel SOURCE connector.**
- **Press the following keys:**

[**System Utility**]
[MORE]
[SERVICE TESTS]
[ADJUSTMTS]
[SOURCE ADJUSTMNT]
[DC OFFSET]

- **Adjust A5 R48 for 0 Vdc±1 mV.**
- **Press the [FILTER DC OFFSET] softkey.**
- **Adjust A5 R59 for 0 Vdc ±1 mV.**



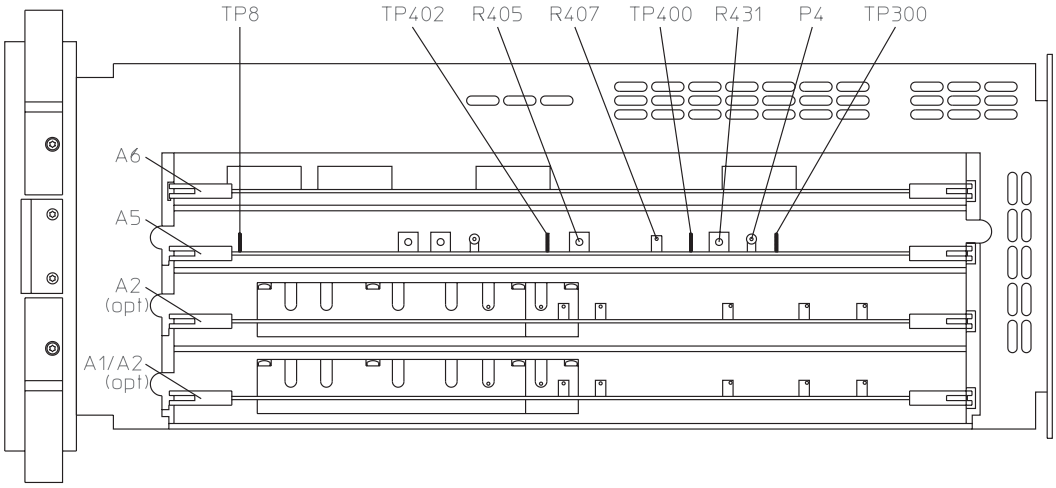
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To adjust the ADC gain, offset and reference

This procedure adjusts the second-pass gain, the first-pass offset, and the reference voltage for the ADC on the A5 Analog assembly. This prevents nonlinear Analog-to-Digital Converter (ADC) operation near the Digital-to-Analog Converter (DAC) transition levels.

Equipment Required: Oscilloscope
1:1 Oscilloscope Probe
Capacitive Load
BNC-to-BNC Cable

- **Set the power switch to off (O).**
- **Connect the capacitive load (from the service kit) to the oscilloscope input. Connect the 1:1 oscilloscope probe to the capacitive load. Attach the probe to A5 TP400 and the probe ground clip to the instrument chassis.**



- **Connect the oscilloscope's external trigger connector to the analyzer's SOURCE connector using a BNC cable.**

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- Set the oscilloscope as follows:

Channel 1	Volts/Div	20 mV/div
	Offset	0V
	Coupling	1 MΩ ac
Channel 2	Volts/Div	500 mV/div
	Offset	0V
	Coupling	1 MΩ ac
Time Base	Time/Div	1.0 ms/div
	Sweep	Triggered
Trigger	Source	Channel 2
	Level	500 mV
	Slope	Positive
	Mode	Edge
Display	Mode	Repetitive
	Averaging	On
	No. of Avg.	8
	Screen	Single

- Remove the cable from A5 P4. Connect a jumper from A5 TP8 to A5 TP300.
- **Press [Preset] while setting the power switch to on (I).**
- Press the following keys:

[System Utility]
[MORE]
[SERVICE TESTS]
[ADJUSTMTS]
[ADC ADJUSTMNT]
[SECOND PASS GAIN]

Wait for the analyzer to set up the adjustment. The analyzer is ready when the adjustment message appears on the screen.

- Adjust A5 R407 for a flat trace on the oscilloscope.
- **Set the power switch to off (O).**
- Disconnect the capacitive load and connect the 1:1 oscilloscope probe directly to the oscilloscope input. Attach the probe to A5 TP402 and the probe ground clip to the instrument chassis.
- Change the set up for the oscilloscope as follows:

Channel 1	Volts/Div	115 mV/div
	Coupling	1 MΩ dc
Channel 2	Coupling	1 MΩ dc
Time Base	Time/Div	500 ms/div
Display	Averaging	off
	Display time	2.00 s

- **Set the power switch to on (I).**

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