

3. SYSTEM SPECIFICATIONS

The specifications for the 5600 Series are listed in Table 2. Specifications for the

individual instruments in the system are listed in the individual O&M or owner's manuals.

Table 2. System Specifications

GENERAL

CHANNELS: Two channels (A&B) are used for programmed measurements between .01 and 26.5 GHz. Return loss is measured on channel A, and transmission (insertion) loss or gain and absolute power are measured on channel B. For measurements between 26.5 and 40 GHz, three channels are used. Detected samples of reflected, transmitted, and incident power are respectively displayed on channels A, B, and R.

DYNAMIC MEASUREMENT RANGE:

10 MHz to 18 GHz:*

A channel: 66 dB (+16 dBm to -50 dBm)

B channel: 66 dB (+16 dBm to -50 dBm)

18 GHz to 26.5 GHz:

A channel: 66 dB (+16 dBm to -50 dBm)

B channel: 66 dB (+16 dBm to -50 dBm)

R channel: 46 dB (+16 dBm to -30 dBm)

26.5 GHz to 40 GHz:

A, B, R Channels: Determined by user-selected waveguide detectors. WILTRON 560-7S50 Option 3 WSMA Detectors are specified over the 10 MHz to 34 GHz range.

*As seen by SWR Autotester's internal detector, typically 13 dB below input power.

AMPLITUDE RESOLUTION: 0.01 dB

FREQUENCY RESOLUTION: 1 MHz

DATA CORRECTION: System residuals, including the average of open and short reflections, are stored with 0.01 dB resolution for automatic subtraction from test data.

MEASUREMENT TIME: 100 msec for signals greater than -30 dBm, 270 msec for signals less than -30 dBm.

SMOOTHING FILTERS: Automatically switched in for signal levels below -30 dBm.

NETWORK ANALYZER CRT: 8 vertical by 10 horizontal divisions. One division = 1.22 cm. Single-beam standard persistence (P31) phosphor CRT with internal graticule.

CRT CAMERA: Compatible with Tektronix C5A, B and C.

OPERATION

SOFTWARE: A preprogrammed software cartridge is supplied which prompts the operator on the desktop controller screen for all required inputs. All measurements, data storage, accuracy enhancements, dwell time and filter selection, averaging of residuals, determination of scale divisions and limits, and data plots or tabulations are performed automatically. Refer to the Model 85, 560A, & 6600A manuals for custom programming guidance.

HARD-COPY OUTPUT: Curves and/or tabulations of return loss, transmission loss or gain, and absolute power are printed by desktop controller. Values for the Y-axis scale range limits, resolution, and data centerline are determined automatically to optimize data presentation. Operator-selected values may be substituted. Option 3 adds an HP 7225A Plotter.

MANUAL OPERATION: Via instrument front panel controls when instruments are returned to the local mode.

Table 2. System Specifications (Continued)

OPERATING TEMPERATURE RANGE: 0° C to +50° C (5° C to 40° C for Model 85 Controller).

SYSTEM POWER: 100V/120V/220V/240V +5%, -10%, 48-66 Hz, 350 watts maximum.

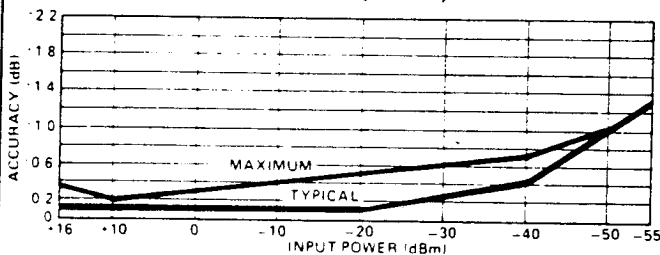
SYSTEM ACCURACY

OVERALL TRANSMISSION LOSS OR GAIN MEASUREMENT ACCURACY: Uncertainties resulting from frequency response of detectors, SWR Autotester, sweep generator and from other test system components are subtracted automatically from test data. Overall accuracy is then:

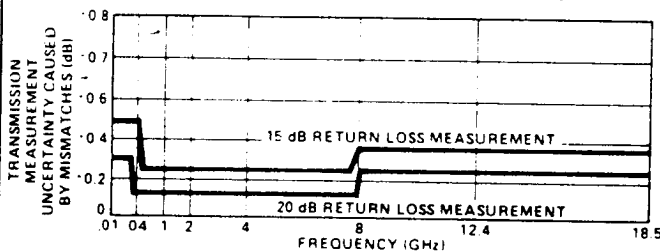
$$\text{TRANSMISSION LOSS OR GAIN ACCURACY} = \text{CHANNEL ACCURACY} + \text{MISMATCH UNCERTAINTY}^*$$

*Effects of sweep generator, test device, SWR Autotester and detector mismatch can be significant. This mismatch uncertainty is minimized by the exceptionally low reflection characteristics of the WILTRON detector, sweep generator and SWR Autotester.

CHANNEL ACCURACY (25° C):



MISMATCH UNCERTAINTY (TYPICAL):**



**Varies with the return loss of the detector, SWR Autotester, connecting cables, the source impedance of the sweep generator, and the value of the measured reflection.

OVERALL COAX RETURN LOSS MEASUREMENT ACCURACY: Uncertainties resulting from SWR Autotester and sweep generator frequency response and from system open and short characteristics are subtracted automatically from test data. Overall Accuracy is then:

$$\text{RETURN LOSS ACCURACY} = \text{SWR ACCURACY} + \text{CHANNEL ACCURACY}$$

SWR AUTOTESTER ACCURACY:

SYSTEM MODEL	TEST PORT CONNecTOR	SWR AUTOTESTER MODEL	DIRECTIVITY	ACCURACY*		
				10 MHz to 8 GHz	8 GHz to 18 GHz	18 GHz to 26.5 GHz
5617(M) 5637(M) 5647(M)	GPC 7	560-97A50-1	40 dB	0.01 ± 0.06 ρ'	0.01 ± 0.1 ρ'	N/A
Option 6	Type N Male	560-97N50-1	38 dB	0.013 ± 0.08 ρ'	0.013 ± 0.12 ρ'	N/A
Option 5 5653(M) 5659(M)	WSMA Male	560-93-50-1	35 dB	0.013 ± 0.1 ρ'	0.013 ± 0.1 ρ'	0.018 ± 0.12 ρ'
5609(M)	Type N Male	560-6N50	40 dB	1 MHz to 2 GHz 0.01 ± 0.06 ρ'		

*Where ρ is measured reflection coefficient of test device. Accuracy includes effects of test port reflection and directivity.

OVERALL WAVEGUIDE RETURN LOSS MEASUREMENT ACCURACY:

$$\text{RETURN LOSS ACCURACY} = \text{USER-SELECTED COUPLER ACCURACY} + \text{CHANNEL ACCURACY}$$

In addition, mismatch uncertainties of the detectors used in a waveguide reflectometer setup can be significant.

OVERALL ABSOLUTE POWER MEASUREMENT ACCURACY:

$$\text{ABSOLUTE POWER ACCURACY} = \text{CHANNEL ACCURACY} + \text{DETECTOR FREQUENCY RESPONSE}$$

DETECTOR FREQUENCY RESPONSE:

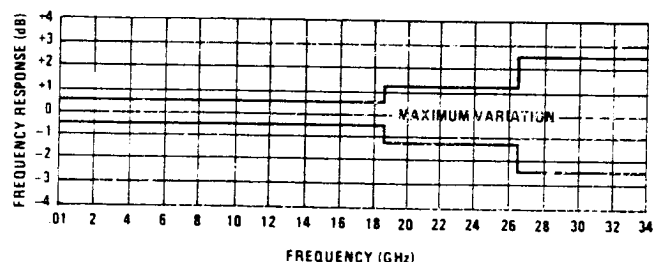


Table 2. System Specifications (Continued)

PHYSICAL

NETWORK ANALYZER AND SWEEP GENERATOR:

SIZE: Standard Locked Stack: 429 W x 500 D x 266 mm H + 10 mm for feet (16.9 W x 19.7 D x 10.5 in. H + 3/8 in. for feet).

WEIGHT: 28.7 kg (64 lbs)

RACK MOUNTING (Option 1): Units supplied with mounting ears and chassis track slides (90° tilt) installed. Units fit standard 19-inch rack.

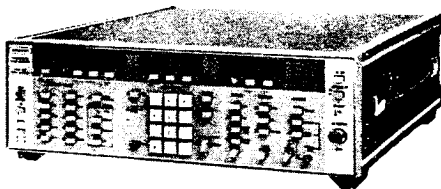
CONTROLLER:

SIZE: 419 W x 452 D x 159 mm H (16.5 W x 17.8 D x 6.3 in H)

WEIGHT: 9.06 kg (20 lbs)

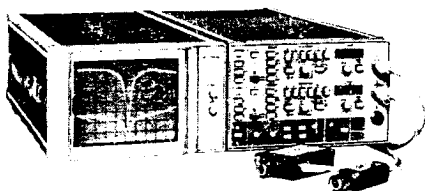
SYSTEM ELEMENTS

SWEEP GENERATOR:



A WILTRON 6600A Series Programmable Sweep Generator is the signal source for system measurements. The specifications and all related operation and maintenance data for the sweep generator are located in Part 3.

NETWORK ANALYZER:



The WILTRON 560A Scalar Network Analyzer is the measuring instrument in the system. It provides test data via the IEEE-488 (GPIB) Bus for the controller's CRT plot, hard-copy plot, and tabular printout. The 560A also provides a simultaneous display of return loss, transmission (insertion) loss or gain, and absolute power in either a refreshed or real time display mode. The specifications and all related operation and maintenance data for the network analyzer are located in Part 2.

DESKTOP CONTROLLER:



The Model 85 Desktop Controller and Preprogrammed Tape Cartridge provide GPIB control for programmed system measurements. The Preprogrammed Tape Cartridge provides programs for the following types of measurements:

- Transmission (insertion) Loss or Gain and Return Loss
- Power Sweep
- Absolute Power

Selected Specifications:

MEMORY: 32k bytes

CRT SIZE (Diagonal): 12.7 cm (5 in)

CRT CAPACITY: 32 characters by 16 lines

CRT GRAPHICS: 256 x 192-dot plotting area

THERMAL PRINTER LINE WIDTH: 32 characters

THERMAL PRINTER GRAPHICS: Dot-for-dot reproduction of controller CRT image.

INTERFACE: GPIB (IEEE-488), IEC-625

SWR AUTOTESTER:

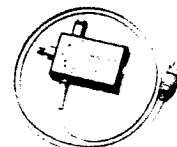
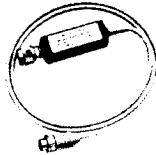


Table 2. System Specifications (Continued)

A WILTRON 560 Series SWR Autotester (refer to paragraph 4 to determine specific model) provides a combined bridge and detector for return loss measurements. The 560 Series SWR Autotesters integrate in one small package a broadband, high-directivity bridge, a detector, a low-reflection test port, a reference termination, and a connecting cable. The unit makes accurate return loss (SWR) measurements on channel A. The output is a detected signal, varying in proportion to reflections from the test device connected to the test port. Optional extender cables may be used without degradation in performance. An open/short termination is provided with each unit.

DETECTORS:



A WILTRON 560 Series Detector (refer to paragraph 4 to determine specific model) provides the detector for coax (or with a suitable adapter, waveguide) measurements of transmission (insertion) loss or gain and absolute power. The specifications and all related operation and maintenance data for the detectors are located in Part 2.

OPTIONAL GRAPHICS PLOTTER:

DESCRIPTION: HP 7225A Plotter, including the 17601A GPIB Personality Module.

PLOTTING AREA: Y-Axis: 203 mm (8 in); X-Axis: 285 mm (11.2 in); accepts up to ISO A4 or 8-1/2 x 11-in chart paper.

PLOTTING ACCURACY: ± 0.4 mm (0.016 in).

REPEATABILITY: 0.4 mm (0.016 in) from any given point.

SIZE: 140 H x 413 W x 379 mm D (5.5 H x 16.3 W x 14.9 in D)

WEIGHT: 8 kg (17.6 lbs)

PLOTTER SUPPLIES FURNISHED: One pad (50 sheets) 8-1/2 x 11-in blank paper, one package of 5 black pens, one 4-color pack (red, blue, green, black) of pens, 100 WILTRON 681-1 Preprinted Graph Forms.

OPTIONS

Option 1: Rack Mounting for 560A Network Analyzer and Sweep Generator (tilt sides included).

Option 2: Adds to sweep generator a 10 dB step attenuator with a 70 dB range. Not available on 5640.

For 5609, 5617, 5636, 5637, 5647, 5653, 5659.

Option 4: Adapts GPC-7 Test Ports to Type N or WSMA on 5617, 5637 or 5647.

Adds: 34AN50 Adapter, GPC-7/Type N Male
34ANF50 Adapter, GPC-7/Type N Female
34AS50 Adapter, GPC-7/WSMA Male
34ASF50 Adapter, GPC-7/WSMA Female

Option 5: WSMA Test Ports on 5617, 5637 or 5647.

Adds: 560-98S50-1 SWR Autotester, WSMA Male Test Port Connector with Option 1, 38 dB directivity
560-7S50 Detector, WSMA Male Connector
34SFSF50 Adapter, WSMA Female/Female
22SF Open/Short

Deletes: 560-97A50-1 GPC-7 SWR Autotester
560-7A50 GPC-7 Detector
560-22A Open/Short

Table 2. System Specifications (Continued)

<p>Option 6: Type N Test Ports on 5617, 5637 or 5647.</p> <p>Adds: 560-97N50-1 SWR Autotester, Type N Male Test Port Connector with Option 1, 38 dB directivity 560-7N50 Detector, Type N Male Connector 34N50 Adapter, Type N Female/Female 22NF Open/Short</p>	<p>Deletes: 560-97A50-1 GPC-7 SWR Autotester 560-7A50 GPC-7 Detector 560-22A Open/Short</p> <p>Option 8: Adds HP 7225A Plotter and WILTRON 2100-2 GPIB Cable, 2m.</p>
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4. EQUIPMENT AND ACCESSORIES SUPPLIED

Listings of the equipment and accessories

supplied with the various 5600 models are given in Tables 3 thru 10. Photographs of the equipment and accessories are given in Figure 2.

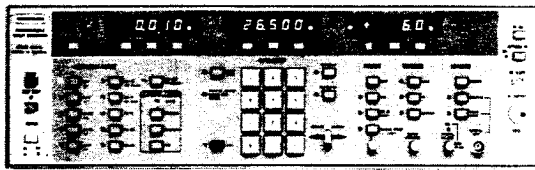
Table 3. Model 5609 System, Equipment and Accessories

MODEL OR PART NO.	DESCRIPTION
560A	Scalar Network Analyzer with Option 3, GPIB
6609A	Programmable Sweep Generator with Option 3, GPIB
85	Desktop Controller
	Microwave Components Kit, consisting of:
560-6N50	SWR Autotester, with N-male test port connector, 50-ohm impedance*
22NF	Open/Short Termination
560-71N50	RF Detector with N-Male connector
34NN50A	Adapter, N male-to-male, 50-ohm impedance*
34N50NF50	Adapter, N female-to-female, 50-ohm impedance*
2300-4	Software Cartridge for Model 85
2100-5	GPIB Interconnect Cable, 0.5 m
560-B-11359	Multiwire, 25-pin to 9-pin Interconnect Cable
5600X	Combiner Kit

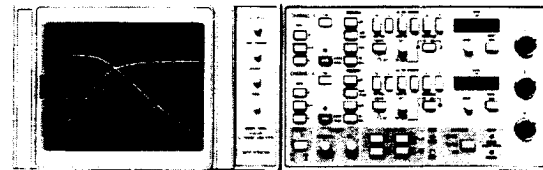
Table 4. Model 5617 System, Equipment and Accessories

MODEL OR PART NO.	DESCRIPTION
560A	Scalar Network Analyzer with Option 3, GPIB
6617A	Programmable Sweep Generator with Option 3, GPIB
85	Desktop Controller
	Microwave Components Kit, consisting of:
560-97A50-1	SWR Autotester with GPC-7 test port connector, 50-ohm impedance
22A	Open/Short Termination
560-7A50	RF Detector with GPC-7 connector, 50-ohm impedance
34NN50A	Adapter, N male-to-male
2300-4	Software Cartridge for Model 85
2100-5	GPIB Interconnect Cable, 0.5 m
560-B-11359	Multiwire, 25-pin to 9-pin Interconnect Cable
5600X	Combiner Kit

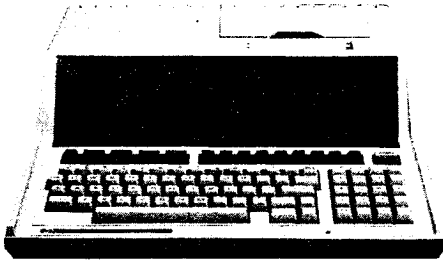
*75-ohm components are available; contact WILTRON



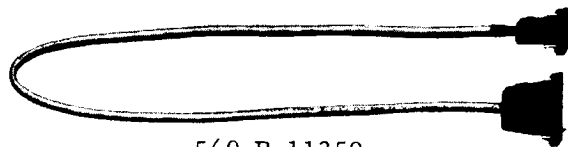
6600A SERIES SWEEP GENERATOR



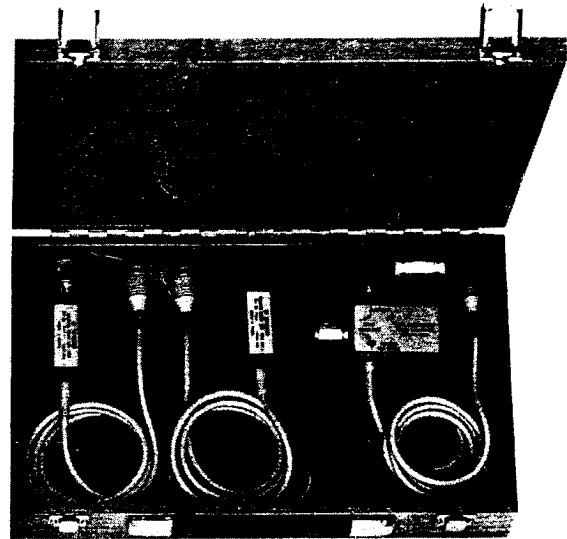
560A SCALAR NETWORK ANALYZER



MODEL 85 DESKTOP CONTROLLER



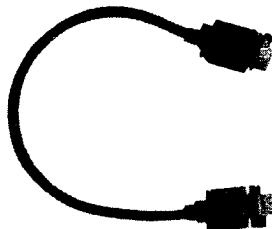
560-B-11359
INTERCONNECT CABLE



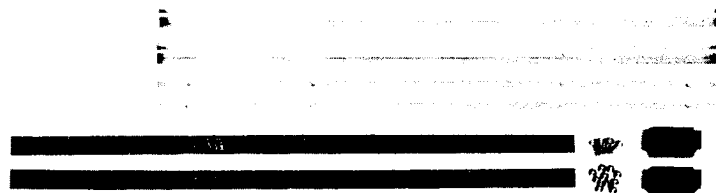
MICROWAVE COMPONENTS KIT



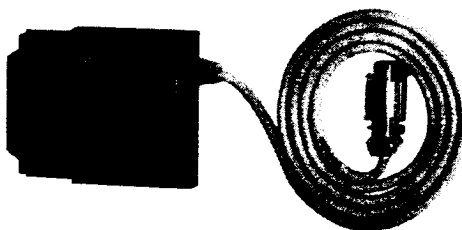
2300-4 SOFTWARE CARTRIDGE



2100-5 GPIB INTERFACE CABLE



5600X COMBINER KIT



GPIB INTERFACE FOR CONTROLLER



ROM DRAWER FOR CONTROLLER



82903A 16k MEMORY MODULE

Figure 2. 5600 System Equipment and Accessories

Table 5. Model 5636 System, Equipment and Accessories

MODEL OR PART NO.	DESCRIPTION
560A	Scalar Network Analyzer with Option 3, GPIB
6636A	Programmable Sweep Generator with Option 3, GPIB
85	Desktop Controller
560-7S50-2	RF Detector with WSMA-male connector (3 each)
2300-4	Software Cartridge for Model 85
2100-5	GPIB Interconnect Cable, 0.5 m
560-B-11359	Multiwire, 25-pin to 9-pin Interconnect Cable
5600X	Combiner Kit
	<u>NOTE</u>
	All required waveguide components must be supplied by the user.

Table 7. Model 5640 System, Equipment and Accessories

MODEL OR PART NO.	DESCRIPTION
560A	Scalar Network Analyzer with Option 3, GPIB
6640A	Programmable Sweep Generator with Option 3, GPIB
85	Desktop Controller
560-10BX	Adapter Cable (3 each)
2300-4	Software Cartridge for Model 85
2100-5	GPIB Interconnect Cable, 0.5 m
560-B-11359	Multiwire, 25-pin to 9-pin Interconnect Cable
5600X	Combiner Kit
	<u>NOTE</u>
	All required waveguide components must be supplied by the user.

Table 6. Model 5637 System, Equipment and Accessories

MODEL OR PART NO.	DESCRIPTION
560A	Scalar Network Analyzer with Option 3, GPIB
6637A	Programmable Sweep Generator with Option 3, GPIB
85	Desktop Controller
	Microwave Components Kit, consisting of:
560-97A50-1	SWR Autotester, with GPC-7 test port connector, 50-ohm impedance
22A	Open/Short Termination
560-7A50	RF Detector with GPC-7 connector, 50-ohm impedance
34NN50A	Adapter, N male-to-male
2300-4	Software Cartridge for Model 85
2100-5	GPIB Interconnect Cable, 0.5 m
560-B-11359	Multiwire, 25-pin to 9-pin Interconnect Cable
5600X	Combiner Kit

Table 8. Model 5647 System, Equipment and Accessories

MODEL OR PART NO.	DESCRIPTION
560A	Scalar Network Analyzer with Option 3, GPIB
6647A	Programmable Sweep Generator with Option 3, GPIB
85	Desktop Controller
	Microwave Components Kit, consisting of:
560-97A50-1	SWR Autotester with GPC-7 connector, 50-ohm impedance
22A	Open/Short Termination
560-7A50	RF Detector with GPC-7 connector, 50-ohm impedance
34NN50A	Adapter, N male-to-male
2300-4	Software Cartridge for Model 85
2100-5	GPIB Interconnect Cable, 0.5 m
560-B-11359	Multiwire, 25-pin to 9-pin Interconnect Cable
5600X	Combiner Kit