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# Specifications

## HP 59970C Workstation

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The HP 5970B Mass Selective Detector, HP 5995C and 5988A GC/MS Systems are controlled by workstations using the HP 9000 Series 300 computers, a disc drive and an optional printer and/or plotter. There are many combinations of the systems possible, the individual component specifications are described below.

### Computers

The monochrome option includes an HP 9000 Series 300 Technical Computer based on the MC 68010 16-bit Motorola microprocessor with 32-bit internal architecture and 10 MHz clock rate. The SPU has a four-slot DIO cardcage. One slot contains the GPIO board. HP-IB, HP-HIL, GPIO, and RS-232-C hardware interfaces are included along with built-in tilt/swivel and extended keyboard. The computer provides one MByte of onboard RAM. Output may be directed either to the 12" CRT of the computer or to a printer (optional) or plotter (optional).

The color option includes the same as computer described above, but with color monitor and color display card which features high-quality color text and graphics capability suitable for desktop or lab bench use. Four planes provide 16 simultaneous colors selectable from a color palette of over 16 million hues. The board comes supplied with 2.4-meter RGB cables for use with the color monitor.

The monitors are 12" diagonally with 86 characters for each of 26 lines. The characters are 3.7 mm wide and 4.9 mm tall. The graphics resolution capability is 512 x 400. The ROM character set consists of 256 characters. The monochrome monitor has adjustable intensity up to 50 FL and a refresh rate of 60 Hz. The color monitor has adjustable intensity of up to 36 FL and a refresh rate of 60 Hz.

### Disc Drives

The first disc drive option provides the HP 9153A 10 MByte single 3.5" double-sided flexible disc drive. The capacity of a flexible disc is about 700 KBytes. Power cord and HP-IB cable are also included.

The second disc drive option provides the HP 9133H 20 MByte Winchester disc drive with a single 3.5" double-sided flexible disc drive. The capacity of a flexible disc is about 700 KBytes. Power cord and HP-IB cable are also included.

The third disc drive option provides the HP 7946A 55 MByte Winchester disc drive with a single CS-80 tape drive built in. The tape drive can use a 150-foot tape with a 16.7 MByte capacity or a 600-foot tape with a 66.9 MByte capacity. Power cord and HP-IB cable are included.

The fourth disc drive option provides the HP 7914P 132 MByte Winchester disc drive with a single CS-80 tape drive built in. The tape drive can use a 150-foot tape with a 16.7 MByte capacity or a 600-foot tape with a 66.9 MByte capacity. Power cord and HP-IB cable are included.

### Printers

The first printer option is the HP 2225A Thinkjet Printer. It has a printing speed of 150 cps, using a disposable inkjet print head cartridge. HP-IB cable, paper, a print head cartridge, and an acrylic paper tray are included.

The second printer option is the HP 2934A Office Impact Printer. Memo-quality printing speed is 200 cps, letter-quality speed is 67 cps, and increased letter quality speed is 40 cps. HP-IB cable and paper are included.



### Software and Data Handling

#### Tuning

MS-MSD operating software includes an automatic tuning program (AUTOTUNE). This program automatically optimizes lens voltages, sets gain settings and calibrates the mass axis using PFTBA as a calibration compound. The instruments can be tuned in an interactive Manual Tune, or the user can develop custom User Tune procedures for specific calibration compounds (such as DFTPP) or for particular operating conditions. The User Tune can be started at the touch of a button, replacing the normal AUTOTUNE if necessary.

#### Operating Parameters

Temperatures and other operating parameters for the HP 5995C, 5988A, and 5970B are entered into forms which appear on the screen. Entries are filled in via softkeys and using thumbwheel, tab or arrow keys. When the HP 5970B is connected to the HP 5790 or 5890 GC with communications interface, the GC setpoints and interface heater are controlled from the workstation.

When used with the HP 5995C or 5988A, additional heated zones and optional accessories such as a DIP are controlled from the workstation.

#### Data Acquisition

Data acquisition is performed in either scanning or selected ion monitoring modes. Three time-programmable scan ranges are allowed for each run. The detector monitors the GC effluent and mass spectra are automatically recorded onto the disc drive. Total ion abundance is reconstructed from these measured spectra. In selected ion monitoring, up to 10 groups of 20 ions may be monitored, switching as a function of run time. The data from each run are automatically stored onto the disc drive. Both scanning and SIM data may be displayed in real time on the CRT screen.

With the HP 5988A, LC/MS, PCI or NCI data also may be acquired. With this instrument, the mass range may be optionally extended to 2000 amu.

Data may be normalized to calibrate the ion abundance scale.

#### Data Editor

Data editor software provides post run treatment of the data using softkeys or via interactive commands in a Reverse Polish Notation (RPN) environment. RPN graphics commands provide multiple formats for displaying chromatographic or mass spectral data onto the CRT screen or the printer. An optional plotter may be used with the systems. An integrator operates to provide areas and heights of the peaks. Integrator parameters are selected from the softkeys and entered into a table for automated use.

Mass spectra may be background subtracted, searched against a user-created library, tabulated and averaged. Optional NBS Revision E Library Data Base contains over 38,000 compounds. The library data are abridged to the ten most significant peaks. Data editor, graphics, and library operations may be used interactively or automatically.

#### Reports

Calibration procedures report the data in standard GC methods including AREA%, NORM%, ESTD and ISTD. Multipoint calibration curves can be constructed (including averaging of points). The curves may be fit by means of linear, piecewise linear, log, exponential

power or second order polynomial calculations. Multiple internal standards can be used. The calibration tables can be recalibrated using new or averaged response factors, and the retention time information can also be updated.

Three report formats are provided. The calibration curves can be plotted onto the CRT, the printer, or the optional plotter.

Peak Qualification Procedures allow for peak identification prior to quantitation. Retention time windows are used as the first form of identification. Other mass channels (up to five) may be specified for confirmation. Each additional mass channel may have a targeted relative abundance which must be met within a specific tolerance. This relative abundance is referenced to the main quantitative peak channel.

#### Plotters

The first plotter option is the HP 7475A six-pen Graphics Plotter. Plotting pen speed is 54 cm/s. It has a choice of two paper sizes. Media options include paper and transparency. Power cord and HP-IB cable are included.

The second plotter option is the HP 7557A eight-pen Automatic Feed Plotter. Plotting pen speed is 80 cm/s. It has a choice of two paper sizes. Media options include paper and transparency. The plotter can use fiber-tip-paper or transparency pens, drafting pens and roller ball pens. Power cord and HP-IB cable are included.

### Dimensions, Weight and Power Requirements

#### SERIES 300 COMPUTERS

<b>SPU (HP 98561A)</b>		<b>KEYBOARD (HP 46020A)</b>	
Height	127 mm (5.0")	Height	40 cm (1.6")
Width	325 mm (12.8")	Width	452 mm (17.8")
Depth	376 mm (14.8")	Depth	219 mm (10.2")
	Allow 4" depth for interface cables	Weight	202 kg (4.75 lb)
Weight	10 kg (22 lb)		
Power	250V		
Line			
Frequency	48-66 Hz		

<b>BLACK/WHITE MONITOR (HP 35731A)</b>		<b>COLOR MONITOR (HP 35741A)</b>	
Height	332 mm (13.7")	Height	345 mm (13.6")
Width	340 mm (13.4")	Width	328 mm (12.9")
Depth	240 mm (9.05")	Depth	390 mm (15.4")
	Allow 4" depth for interface cables, 2.5" on left side for ventilation		Same allowances as HP 35731A
Weight	10 kg (22 lb)	Weight	13.9 kg (30.6 lb)
Power	108-132 VAC	Power	90-132 VAC or 185-264 VAC

#### DISC DRIVES

<b>HP 9153A</b>		<b>HP 9133H</b>	
Height	101 mm (4.1")	Height	125 mm (5.1")
Width	325 mm (13.3")	Width	325 mm (13.3")
Depth	285 mm (11.6")	Depth	285 mm (11.6")
Weight	9.1 kg (20 lb)	Weight	10 kg (22 lb)
Power	100, 115, 120V (86-127V) or 220, 240V (195-253V) Switch Selectable	Power	100, 115, 120V (86-127V) or 220, 240V (195-253V) Switch Selectable
Line		Line	
Frequency	48-66 Hz	Frequency	48-66 Hz

#### DISC DRIVES (cont'd)

<b>HP 7946A</b>		<b>HP 7914P</b>	
Height	208 mm (8.2")	Height	720 mm (28.4")
Width	325 mm (12.8")	Width	354 mm (14.0")
Depth	285 mm (11.3")	Depth	740 mm (29.1")
Weight	16 kg (35 lb)	Weight	86 kg (188 lb)
Power	100, 115, 120V (90-132V) or 220, 240V (180-246V) Switch Selectable	Power	110, 120, 220, 240V +5% / -10%
Line		Line	
Frequency	47.5-66 Hz	Frequency	48-66 Hz

#### PRINTERS

<b>HP 2225A</b>		<b>HP 2934A</b>	
Height	90 mm (3.5")	Height	185 mm (7.3")
Width	295 mm (11.5")	Width	600 mm (23.9")
Depth	205 mm (8.1")	Depth	365 mm (14.4")
Weight	2.8 kg (6 lb)	Weight	21 kg (45 lb)
Power	110, 120, 220, 240V Switch Selectable	Power	110, 120, 220, 240V +5% / -10% Switch Selectable
Line		Line	
Frequency	47.5-66 Hz	Frequency	47.5-66 Hz

#### PLOTTERS

<b>HP 7475A</b>		<b>HP 7550A</b>	
Height	127 mm (5.2")	Height	215 mm (8.5")
Width	225 mm (9.2")	Width	670 mm (26.4")
Depth	368 mm (15.0")	Depth	432 mm (17.0")
Weight	6 kg (13.5 lb)	Weight	17 kg (38 lb)
Power	100, 120, 220, 240V +5% / -10%	Power	100, 120, 220, 240V +5% / -10%
Line		Line	
Frequency	48-66 Hz	Frequency	48-66 Hz
±5-10%	±5-10%	±5-10%	±5-10%

### **Colorview (Optional)**

Colorview is an enhancement to the operating software. It simultaneously provides an overview of the entire data set. The main window in the middle gives a 2D colormap representation of the 3D data. The lower window displays the TIC and the Extracted Ion Profile in different colors. The top window displays the Mass Spectrum. Manipulation of the colormap may be done with the use of the cursor and the softkeys. A horizontal movement will be reflected in the Extracted Ion Profile and a vertical move will affect the Mass Spectrum. Other key features include the ability to zoom into sections of the colormap and the easy access to the mass of particular peaks.

### **Networking (Optional)**

The workstation may be interfaced to other computers in two ways. Using the RS-232-C connection, data may be uploaded from the workstation into the HP 1000 computer system, for manipulation by the optional RPN data environment.

For non-HP computers, the data file structure is documented. This would allow uploading of processed data into remote computers via the RS-232-C interface.

Terminal Emulator software allows the transmission of report information to compatible computers.

### **Diagnostics**

Diagnostic software allows the user to set and monitor various voltages during tuning to aid in troubleshooting and service. Various parts of the workstation hardware can be accessed by diagnostic software.

### **Automation**

The standard software provides a program called Run/Method, which allows the user to automate the data acquisition, data editor and reports programs for a single sample.

Macro programming is provided in the system to allow unattended operation of tuning, data processing or reporting.

Optional automation software called Sequencing may be purchased to provide unattended operation of the system, including the HP Automatic Liquid Samplers. It can be used for acquisition, setpoint loading, data processing, reporting or any combination of these. Different samples may be run under differing operating conditions using this software. It also provides automation when using certain valving or other automated injection systems such as headspace samplers.

*Specifications and descriptions in this publication are subject to change without notice.*



For more information, call your local HP sales office or call one of these regional offices: **USA:** 2 Choke Cherry Road, Rockville, MD 20850, (301) 644-5800; 1200 East Diehl Road, Naperville, IL 60566, (312) 357-8800; 2000 South Park Place, P.O. Box 105005, Atlanta, GA 30348, (404) 955-1500; Neely Sales Region, 3939 Lankershim Boulevard, North Hollywood, CA 91604, (818) 506-3700. • **IN EUROPE:** P.O. Box CH-1217, Meyrin 2, Geneva, Switzerland, (022) 83 12 12. • **IN JAPAN:** Yokogawa Hokushin Electric Corporation, P.O. Box 6044, 41, Nishi Shinjuku, 2-Chome, Shinjuku-Ku, Tokyo 160 (03) 349-0875 • **IN CANADA:** 6877 Goreway Drive, Mississauga, Ontario, L4V 1M8, (416) 678-9430. • **ELSEWHERE IN THE WORLD:** Hewlett-Packard Intercontinental, 3495 Deer Creek Road, Palo Alto, CA 94304, (415) 857-5037.