



HP Series 6000 Models 335H, 670H/FL/XP and 1.34FL 5.25-inch Disk Storage Systems

Technical Data

**Low Cost
High Performance
Choice of Interfaces
Outstanding Reliability
Small Footprint Cabinets**



Features

- Controller flexibility with HP-FL, HP-IB Cache and HP-IB
- HP-FL models with 1.34 Gbytes or 670 Mbytes
- HP-IB Cache models with 670 Mbytes
- HP-IB models with 670 Mbytes or 335 Mbytes
- Controller upgrade kits
- Hewlett-Packard's high performance, highly reliable 5.25-inch Winchester disk mechanism
- Very low cost of ownership
- Space-efficient cabinets
- P-Bus only add-on drives for HP-FL configurations

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The HP Series 6000 Models 335H, 670H/FL/XP and 1.34FL offer formatted disk storage capacities from 335 megabytes to 1.34 gigabytes. They are supported on entry-level to large high-end multiuser systems, including the HP 1000, 3000 and 9000 systems. Based on Hewlett-Packard's high performance 5.25-inch disk drive, these disk storage systems set standards for price, performance, and reliability. These products have been designed as replacements for the HP 7959B, 7962/63B and 7936/37 families of disk drives.

Low Cost

This 5.25-inch based disk storage system offers unprecedented compactness with new cabinetry that provides up to eight times the megabytes per square foot over HP's previous offerings. Other savings include lower power consumption, a 30 to 50 percent reduction in cost per megabyte at purchase, and a reduction in service cost of greater than 50 percent.

Outstanding Reliability

The HP Series 6000 Models 335H, 670H/XP/FL and 1.34FL continue the HP tradition of high reliability. Mean Time Between Failure (MTBF) exceeds previous products by 30 to 50 percent. MTBF on Model 670H is 100,000 hours. Reliability is designed into these products at each stage of development, from conception to production. The result is the industry's most dependable disk storage systems available for HP systems.

Service and Support

System uptime and data recovery are critical to customer satisfaction. Hewlett-Packard's service organization is committed to satisfying this requirement. In the unlikely event of a disk problem, quick, efficient service is provided whenever and wherever required.

High Performance and Choice of Interfaces

This disk storage system family offers high performance at a low price. Significant performance improvements have been made in seek and latency of the disk mechanism. Actual performance varies depending upon the application. The new drives perform comparably to the HP 7936/37H, 7959 and 7962/63B disk drives.

With a choice of interfaces, users can select the right configuration for their needs. The HP-IB interface, available on the 335 and 670 megabyte models, is well suited for small to moderate system configurations. The Model 670XP is also available with a high speed disk controller cache that offers 2 megabytes of read cache and 4 kilobytes of write cache.

The 1.34 gigabyte and 670 megabyte FL models have a fiber-optic controller designed specifically for HP-PA systems which boasts a high speed data transfer rate of 5 megabytes per second. The fiber-optic cable, used to connect the CPU and the disk storage, is not affected by radiated noise. It can be as long as 500 meters, providing a high degree of flexibility in system configurations.

An added feature is the availability of a P-Bus only add-on drive to HP-FL configurations. The P-Bus is the standard interconnect between all add-on drives. An FL channel of more than two drives can utilize P-Bus add-ons. The second FL drive is recommended for configuration flexibility.

Specifications

Recording Characteristics

Formatted capacity: 335, 670 megabytes and 1.34 gigabytes
Number of platters: 4, 8 and 16, respectively
Bytes per track: 28,928
Bytes per sector: 256
Sectors per track: 113
Tracks per data head: 1,449
Data per surface: 41,916,672

Physical Characteristics

Dimensions:
Height (with feet):
132 mm (5.2 in.)
Width: 325 mm (12.8 in.)
Depth: 570 mm (22.5 in.)

Weight:
H/XP/670FL: 14 kg (31 lbs) net,
19.5 kg (43 lbs) shipping
1.34FL: 16.8 kg (37 lbs) net,
22 kg (49 lbs) shipping



Performance

	H	XP	FL
Average seek time	17.0 ms	17.0 ms	17.0 ms
Average rotational delay	7.5 ms	7.5 ms	7.5 ms
Average time to transfer			
1 kilobyte	1.0 ms	1.0 ms	0.54 ms
10 kilobytes	10.0 ms	—	5.4 ms
Average controller overhead	1.1 ms	1.4 ms	1.6 ms
Controller cache impact*	—	-13.4 ms	—
Total average transaction time (excludes system overhead)			
1 kilobyte	26.6 ms	13.5 ms	26.6 ms
10 kilobytes	35.6 ms	—	31.5 ms
Disk performance index** (I/Os per second)			
1 kilobyte	37.6	74.1	37.6
10 kilobytes	28.1	—	31.8
Full pipeline† (I/Os per second)			
1 kilobyte	—	—	39.9
10 kilobytes	—	—	33.4
Data transfer rate (megabytes per second)			
Average at full volume	1.40	1.40	1.40
Instantaneous	2.50	2.50	2.50
Average/track	1.84	1.84	1.84

*The reduction in time is due to the reduced number of seeks required for a drive with controller cache. The actual performance improvement will vary, depending on timing of I/Os and the specific environment. The listed values are based on maximum rates with a typical MPE V read hit rate of 75 percent and a read percentage of 74 percent.

**True I/O rates are application dependent and must take into account system overhead, individual system configuration specifications and data locality on the disk.

†Pipelining in the FL drive allows the overlapping of transaction processing so controller overhead can be masked on busy disks. The controller overhead in this case is zero.

Power Characteristics

	H	XP	670FL	1.34FL
Frequency	47.5 to 66 Hz	47.5 to 66 Hz	47.5 to 66 Hz	47.5 to 66 Hz
Phase	Single	Single	Single	Single
Power (watts)				
Typical	60	70	90	115
Maximum	90	105	135	175
Heat dissipation (Btu/hr)				
Typical	205	239	307	393
Maximum	307	359	461	598
Voltage settings	See note	See note	See note	See note

Note:

120V and 240V switch selectable (later products will use an auto ranging supply).

Overall Characteristics

- Electromagnetic emissions radiated and magnetic interference:
- For U.S. - compliant with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules.
- For Europe - compliant with EMI levels of CISPR22 and FTZ 1046/84. The Manufacturer's Declaration is provided in the owner's manual.

Environmental Requirements††

Operating:

Temperature: 0 to 50°C
(32 to 122°F)

Humidity: 8 to 80%

Shock: 2G at 11 ms, half sine

Nonoperating:

Temperature: -40 to 65°C
(-40 to 149°F)

Humidity: 5 to 80%

Shock: 24G at 11 ms, half sine

Vibration

Operating:

5 to 350 Hz: 0.0001 g²/Hz

350 to 500 Hz: -6 db/octave

At 500 Hz: 0.00005 g²/Hz

Nonoperating:

5 to 100 Hz: 0.015 g²/Hz

100 to 137 Hz: -6 db/octave

137 to 350 Hz: 0.008 g²/Hz

350 to 500 Hz: -6 db/octave

At 500 Hz: 0.00005 g²/Hz

Acoustic Emissions

Sound power level (maximum):
56 dB(A)

Safety

These products meet all application safety standards of the following:

- IEC 950, EN60950
- UL listed 478
- CSA C22.2 No. 220M

Service Characteristics

Mean Time To Repair (MTTR):
45 minutes

Service life: 5 years

††Refer to local sales office for recommended Site Environmental Specifications.

Ordering Information

HP Series	Product	Option	Description
6000 Model	335H	HP C2200A ✓	335 megabyte disk storage system with an HP-IB interface
		0D4	Delete installation
	670FL	HP C2201A* ✓	670 megabyte disk storage system with an HP-FL interface
		1BG	Add-on P-Bus only version
	670XP	HP C2202A ✓	670 megabyte disk storage system with a cache HP-IB interface
		0D4	Delete installation
	670H	HP C2203A ✓	670 megabyte disk storage system with an HP-IB interface
		0D4	Delete installation
	1.34FL	HP C2204A* ✓	1.34 gigabyte disk storage system with an HP-FL interface
		1BG	Add-on P-Bus only version
		HP C2205A*	HP-XP controller upgrade kit
		HP C2206A*	HP-FL controller upgrade kit

*Hewlett-Packard CE installation required on these products and is included in the factory base price.

New Cabinets**

Product	Option	Description
HP 92211Y		HP 92211R cabinet including four sets of rails, a power strip, power cords, and hardware for mounting four disk storage systems.
HP 46299A		19-inch EIA cabinet including eight shelves, PDU, power cords, and miscellaneous hardware for mounting eight disk storage systems.
	ABA	U.S.A. and Canada power
	ABB	Non-U.S.A./Canada power

**The new cabinets are supplied and supported by Direct Marketing Division (A500).

Adapter Kits for Existing Cabinets†

Product	Option	Description
HP 35199C		Shelf adapter kit for installing disk storage systems in a standard 19-inch EIA rack. It is necessary to follow the instruction/installation document included with this kit.
HP 92211Q		Rack adapter kit for installing disk storage systems in an HP 19514A cabinet.
HP 92211S		Adapter kit for installing disk storage systems in an HP 19511A cabinet.

†The HP 19511A (2-pack) cabinet, 19514A (8-pack) cabinet and 19512A rack mount kit are being discontinued. Adapter kits are available through Direct Marketing Division (A500) and Direct Marketing Operation (DMO) in Europe.

For more information, call your local HP sales office listed in your telephone directory or an HP regional office listed below for the location of your nearest sales office.

United States:

Hewlett-Packard Company
4 Choke Cherry Road
Rockville, MD 20850
(301) 670-4300

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(312) 255-9800

Hewlett-Packard Company
5161 Lankershim Blvd.
No. Hollywood, CA 91601
(818) 505-5600

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2015 South Park Place
Atlanta, GA 30339
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6877 Goreway Drive
Mississauga, Ontario L4V 1M8
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Australia/New Zealand:

Hewlett-Packard Australia Ltd.
31-41 Joseph Street,
Blackburn, Victoria 3130
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(61/3) 895-2895

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P.O. Box 999
NL-118 LN 15 Amstelveen
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Hewlett-Packard Asia Ltd.
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Printed in U.S.A. M1289

Part number 5952-1247