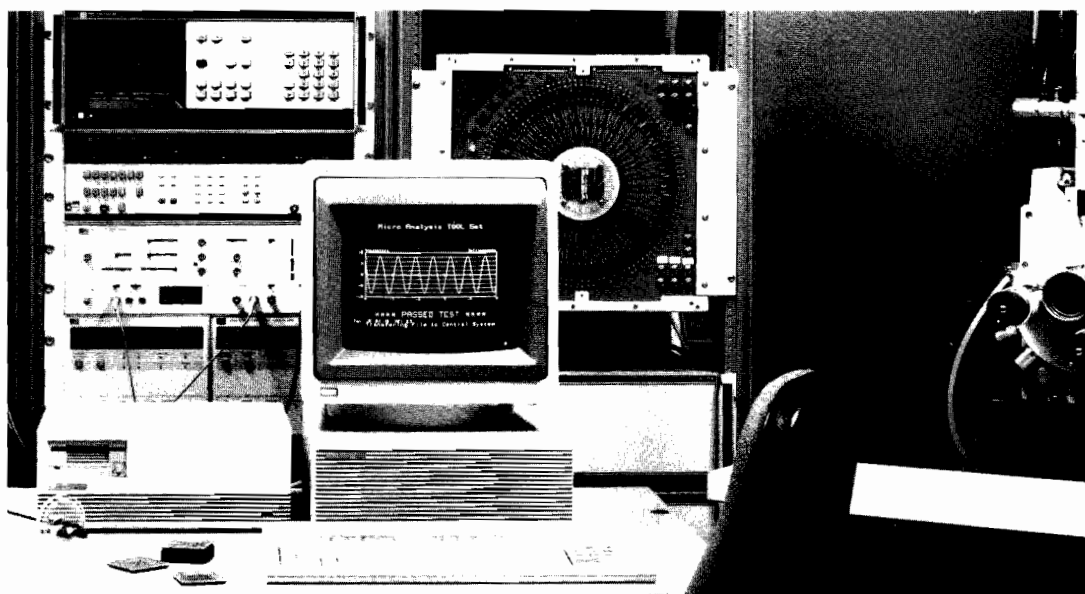

Series 300 Model 332 Instrument Controllers

Technical Data*



Introduction

The Model 332 provides very high performance in a low-cost package ideal for measurement automation applications. The CPU performance is based on a MC68030 processor operating at 16.7 MHz. A MMU (Memory Management Unit), 256 byte data cache, and 256 byte instruction cache are all included on the MC68030 processor chip. RAM access is optimized by use of 32-bit data and address buses. I/O is via the DIO backplane, featuring a 16-bit bi-directional data bus, 24-bit address bus, and

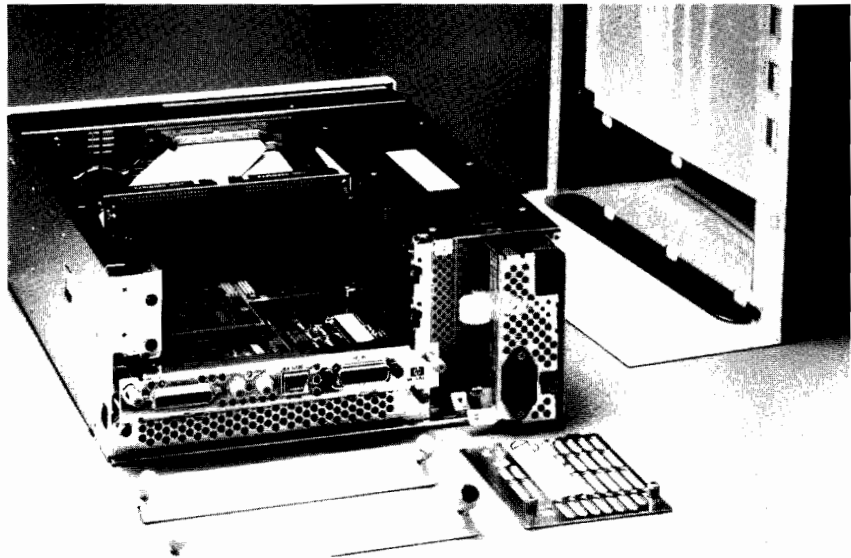
bus arbitration logic to permit multiple bus masters. The transfer rate achieved is 1.5 Mwords (3.0 Mbytes) per second. The Models 332MMA and CMA are supplied with the HP BASIC Language System, while the Models 332MMAX and CMAX are supplied with HP BASIC/UX.

* Data subject to change without notice.

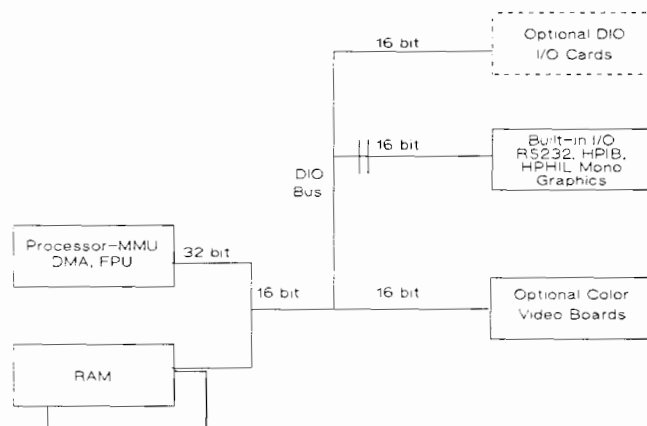
Standard on the CPU board are HP-IB, RS-232C with DB25 connector, HP-HIL, and system and user timers. Two-channel DMA controller logic is also included. Floating-point math performance may be enhanced with an optional MC68882 co-processor, which is installed in a socket on the CPU board. Several graphics options are available. Standard is 512 x 400 resolution monochrome, implemented through logic on the CPU board. The medium resolution may be replaced with 1024 x 768 monochrome logic through either a factory- or field-installed option. The CPU board is also available without graphics, allowing any of the available DIO graphics cards to be installed in the SPU's remaining system slot.

Two connectors are provided on the CPU board for installation of RAM "daughter" boards. The parity-checking RAM is available in sizes of 1 or 4 Mbytes, thus allowing total memory of 1, 2, 4, 5, or 8 Mbytes.

Interface cards are connected to the CPU through a DIO backplane. The Model 332 has four available accessory slots. These may be increased through use of an expander. Due to the cover plates used with DIO interface cards, one interface card may be used in each pair of DIO accessory slots. The remaining slots may be used for accessory cards such as a breadboard interface or a DOS co-processor card.



Model 332 SPU Configuration



Functionality diagram of Model 332

In addition to HP BASIC, the Model 332 is also available with HP-UX, (including HP BASIC/UX) and all the SPU accessories necessary to configure a complete system. This provides a powerful HP-UX

platform that offers low cost, expandability and extremely high performance in measurement automation applications.

Technical Specifications

System Processing Unit

Model 332	
Central Processor	MC68030
Clock	16.7 MHz
Wait states	0
Floating Point	MC68882 (optional)
Clock frequency	16.7 MHz
Accelerator	N/A
Memory Management Unit	
Type	On chip
Virtual memory (HP-UX only)	4 Gbyte/process
Contexts	84 default user-settable
Cache Memory	
Type	Instruction cache and data cache on CPU chip
Size	512 bytes
Main Memory	
Type	Byte parity error checking
RAM	1, 2, 4, 5, or 8 Mbyte via daughter boards
Bus width	32b address, 32b data
System RAM access time	80 nsec min. 200 nsec max. (worst case)
Additional Memory	
Maximum Memory	8 Mbytes

Standard System Interfaces and Features

Interface	DIO Equivalent	Model 332
HP-IB	98624A	Yes
RS-232C	98644A	Yes
HP-HIL	—	Yes
RS-422	98628A	No
LAN	98643A	Optional*
DMA	98620B	Yes
High-speed HP-IB disk	98625B	Optional
SCSI	98658A	Optional
System timer	—	Yes
User timer	—	Yes
Battery-backed real-time clock	—	Yes
DOS software compatibility	98286A†	Yes*

Physical and Environmental Specifications

Source Consumption	5.0A @ 90 – 132V, switch selectable 3.0A @ 180 – 250V, switch selectable
Line Frequency	48 – 66 Hz
Power Consumption:	
Watts maximum	250
BTU/hour	853
Kcal/hour	250
Power Availability:	
Power supply maximum:	150 Watts
At + 5 volts	20 Amps
At + 12 volts	3.6 Amps
At - 12 volts	1.1 Amps
DIO Backplane Power:	
At + 5 volts	—
At + 12 volts	—
At - 12 volts	—
DIO II Backplane Power:	
At + 5 volts	N/A
At + 12 volts	N/A
At - 12 volts	N/A

Physical Dimensions

Model 332	
Height	130 mm (5.12 in.)
Width	325 mm (12.8 in.)
Depth	376 mm (14.8 in.) Additional 4 inches in depth should be allowed for interface cables
Net weight	11.8 kg (26 lbs.)

Environmental Range

Operating temperature	0°C to +55°C to 2286m (7500 ft.)
Storage temperature	-40°C to +70°C
Maximum wet-bulb temperature	40°C
Humidity:	
Operating	40°C 15% to 95% R.H.
Non-operating	65°C @90% R.H.
Altitude:	
Operating	4,570m (15,000 ft.) to 47C
Non-operating	15,240m (50,000 ft.)
EMI	Conducted and radiated interference meets FCC Class A, VCCI Class 1; VDE 1046/84 Level B
Regulatory Compliance	UL 478, 5th edition; CSA 22.2 No. 220, M-1986; IEC 950, 1st edition 1986

Clock and Timers

Real-time Clock	
Resolution	10 milliseconds
Accuracy	+5 seconds/day
Battery backup	Lithium, expected life= 1 year
Expected run time after power loss	12 hours
Timers	
Match interrupt	Match on time of day 0.00 to 84600.00 sec.
Delay interrupt	10 msec. to 1.94 days
Cyclical interrupt	10 msec. to 1.94 days
System timer	4msec. resolution accurate to 25 ppm

Audio

Three independent tone generators controllable over 30 db.	
Frequency range	81.46 Hz to 83.3 KHz
Resolution	Capable of approximate chromatic scale over five octaves
Duration	01 sec. to 2.55 second/tone

* Not supported on HP BASIC.

† Also requires 98531A DOS Co-processor software.

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

Model 332MMA

The HP 98580C Model 332MMA is a pre-configured Series 300 computer that includes the following:

- Model 332 SPU with 1 Mbyte RAM
- 12-inch medium-resolution monochrome monitor (512 x 400)
- HP BASIC Language System software on 3 1/2-inch single-sided disks
- Keyboard

Options

- Opt. 008 – 98546A display compatibility interface
- Opt. 102 – 1 Mbyte RAM (for total of 2 Mbytes)
- Opt. 104 – Substitute 4 Mbyte RAM board for 1 Mbyte RAM board for total of 4 Mbytes
- Opt. 618 – HP BASIC Compiler, including disk and manual
- Opt. 882 – 98284A MC68882 floating point co-processor

Accessories

There are many accessories that you can purchase to enhance your Model 332MMA controller. These include:

General

- HP 98269A 1 Mbyte parity RAM daughterboard
- HP 98269B 4 Mbyte parity RAM daughterboard
- HP 98568A 8-slot DIO expander
- HP 9888A 16-slot DIO expander
- HP 46060A HP-HIL 2-button mouse
- HP 46084A HP-HIL ID module
- HP 98253A EPROM programmer

Interfaces

- HP 98624A HP-IB interface
- HP 98628A Datacomm interface
- HP 98644A RS-232 interface
- HP 98646A VME connection
- HP 98622A GPIO interface
- HP 98623A BCD interface
- HP 98629A Shared Resource Manager interface
- HP 98640A analog input, 7-channel A to D interface

Rack Mounting

- HP 19500B SPU rack mount kit
- HP12131A keyboard rack kit
- HP 98567A rack adapter for mono monitor

Suggested Peripherals

- HP 9122C dual 3 1/2-inch flexible disk drive
- HP 9153C 10-40 Mbyte fixed hard disk (with or without built-in 3 1/2-inch flexible disk drive)
- HP 2225A ThinkJet printer
- HP 7475A plotter

Model 332CMA

The HP 98581C Model 332CMA is a pre-configured Series 300 computer that includes the following:

- Model 332 SPU with 1 Mbyte RAM
- 12-inch medium-resolution color monitor (512 x 400)
- HP BASIC Language System software on 3 1/2-inch single-sided disks
- Keyboard

Options

- Opt. 008 – 98546A display compatibility interface
- Opt. 102 – 1 Mbyte RAM (for total of 2 Mbytes)
- Opt. 104 – Substitute 4 Mbyte RAM board for 1 Mbyte RAM board for total of 4 Mbytes
- Opt. 618 – HP BASIC 5X Compiler, including disk and manual
- Opt. 882 – 98284A MC68882 floating point co-processor

Accessories

There are many accessories that you can purchase to enhance your Model 332CMA controller. These include:

General

- HP 98269A 1 Mbyte parity RAM daughterboard
- HP 98269B 4 Mbyte parity RAM daughterboard
- HP 98568A 8-slot DIO expander
- HP 9888A 16-slot DIO expander
- HP 46060A HP-HIL 2-button mouse
- HP 46084A HP-HIL ID module
- HP 98253A EPROM programmer

Interfaces

- HP 98624A HP-IB interface
- HP 98628A Datacomm interface
- HP 98644A RS-232 interface
- HP 98646A VME connection
- HP 98622A GPIO interface
- HP 98623A BCD interface
- HP 98629A Shared Resource Manager interface
- HP 98640A analog input, 7-channel A to D interface

Rack Mounting

- HP 19500B SPU rack mount kit
- HP12131A keyboard rack kit
- HP 98567A rack adapter for color monitor

Suggested Peripherals

- HP 9122C dual 3 1/2-inch flexible disk drive
 - HP 9153C 10-40 Mbyte fixed hard disk (with or without built-in 3 1/2-inch flexible disk drive)
 - HP 2225A ThinkJet printer
 - HP 7475A plotter
-

Model 332MMAX

The HP 98580CX Model 332MMAX is a pre-configured Series 300 computer that includes the following:

- Model 332 SPU with 4 Mbytes RAM
- 17-inch high-resolution monochrome monitor (1024 x 768)
- HP-UX license-to-use, media and manuals, with HP BASIC/UX, NS-ARPA, NFS Services/300, and X11
- Keyboard
- HP-HIL two-button mouse
- HP-HIL ID module

Options

- Opt. 108 – 4 Mbyte RAM (for total of 8 Mbytes)
- Opt. 402 – 7958B 152 Mbyte hard disk subsystem with all system software pre-installed
- Opt. 403 – 7959B 304 Mbyte hard disk subsystem with all system software pre-installed

Accessories

There are many accessories that you can purchase to enhance your Model 332MMAX controller. These include:

General

- HP 98269A 1 Mbyte parity RAM daughterboard
- HP 98269B 4 Mbyte parity RAM daughterboard
- HP 98568A 8-slot DIO expander
- HP 9888A 16-slot DIO expander

Interfaces

- HP 98624A HP-IB interface
- HP 98628A Datacomm interface
- HP 98644A RS-232 interface
- HP 98646A VME connection
- HP 98622A GPIO interface
- HP 98629A Shared Resource Manager interface

Rack Mounting

- HP 19500B SPU rack mount kit
- HP12131A keyboard rack kit

Suggested Peripherals

- HP 9145A cartridge tape subsystem
 - HP 33440A LaserJet Printer
 - HP 7550 plotter
-

Model 332CMAX

The HP 98581CX Model 332CMAX is a pre-configured Series 300 computer that includes the following:

- Model 332 SPU with 4 Mbytes RAM
- 16-inch high-resolution color monitor (1024 x 768)
- HP-UX license-to-use, media and manuals, with HP BASIC/UX, NS-ARPA, NFS Services/300, and X11
- Keyboard
- HP-HIL two-button mouse
- HP-HIL ID module
- HP-HIL buffer box with speaker

Options

- Opt. 108 – 4 Mbyte RAM (for total of 8 Mbytes)
- Opt. 402 – 7958B 152 Mbyte hard disk subsystem with all system software pre-installed
- Opt. 403 – 7959B 304 Mbyte hard disk subsystem with all system software pre-installed

Accessories

There are many accessories that you can purchase to enhance your Model 332CMAX controller. These include:

General

- HP 98269A 1 Mbyte parity RAM daughterboard
- HP 98269B 4 Mbyte parity RAM daughterboard
- HP 98568A 8-slot DIO expander
- HP 9888A DIO 16-slot expander

Interfaces

- HP 98624A HP-IB interface
- HP 98628A Datacomm interface
- HP 98644A RS-232 interface
- HP 98646A VME connection
- HP 98622A GPIO interface
- HP 98629A Shared Resource Manager interface

Rack Mounting

- HP 19500B SPU rack mount kit
- HP12131A keyboard rack kit

Suggested Peripherals

- HP 9145A cartridge tape subsystem
- HP 33440A LaserJet printer
- HP 7550 plotter