



# Technical Information

*for the Workgroup Server 8150/110*

 Apple Computer, Inc.

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## Technical Information for the Workgroup Server 8150/110

This booklet contains the following technical information about your Workgroup Server 8150/110:

- Expanding your server
- Specifications

**WARNING** If you have a problem with your server and nothing in the manuals that came with the server solves the problem, consult the service and support information that came with your server for information on how to contact an Apple-authorized service provider or Apple for assistance.

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## Expanding your Workgroup Server 8150/110

Your Workgroup Server 8150/110 was designed to grow with your needs—you can add new capabilities or improve its performance as you wish. You can plug in a number of external devices into its ports. You or your dealer can also install a number of enhancements within the case that houses the computer.

Apple recommends that you have the following equipment installed by an Apple-authorized dealer:

- additional dynamic random-access memory (DRAM), up to a total of 264 megabytes (MB)
- any additional internal 3.5- or 5.25-inch device, such as a digital audio tape (DAT) drive or hard disk

You can install the following yourself:

- up to three NuBus™ cards, such as a specialized communications card
- a processor-direct slot (PDS) card, such as a specialized video card

### Choosing the right components

As explained in the next two sections, you must make sure each component you add is compatible with your server and does not exceed its maximum power allowance.

#### Compatibility

Your dealer or the manufacturer of a component can provide compatibility details. However, you might find these points useful:

- In general, NuBus cards designed for older Macintosh computers also work with the Workgroup Server 8150/110.
- The Workgroup Server 8150/110 uses 32-bit-wide, 72-pin random-access memory (RAM) Single Inline Memory Modules (SIMMs), which must be installed in matched pairs (for example, two 8 MB SIMMs). Your server's SIMMs are fast-paged mode, 80 nanosecond RAM access time or faster. SIMMs from older Macintosh computers may not be compatible. For more detailed information, see "RAM Configurations" later in this booklet.

### Power allowances

The Workgroup Server 8150/110 meets Apple's NuBus power specifications. Check the information that came with your expansion card to make sure the card does not exceed these specifications.

For more detailed information, see "Expansion Cards and Devices" later in this booklet.

## Specifications

This section lists the hardware specifications for the Workgroup Server 8150/110.

### Main unit

#### Processor

- PowerPC 601 at 110 megahertz (MHz)
- 32 kilobytes (KB) of on-chip cache

#### Memory

- A minimum of 16 MB of DRAM, expandable to a maximum of 264 MB (8 MB are soldered to the motherboard)
- 8 DRAM SIMM slots
- 4 MB read-only memory (ROM)
- 256 bytes of nonvolatile parameter memory
- 256 KB of static RAM used as a Level 2 cache for the PowerPC processor; an optional 1 MB available through special ordering

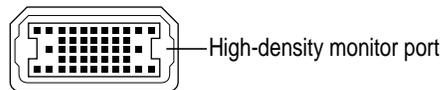
## Disk drives

- Apple SuperDrive 1.4 MB high-density floppy disk drive
- Internal Apple SCSI hard disk drive ( $\frac{1}{3}$ - or  $\frac{1}{2}$ -height)
- Internal 5.25-inch quadruple-speed CD-ROM player (600 KB-per-second transfer rate)
- Optional internal 3.5-inch DAT drive or second Apple SCSI hard disk drive ( $\frac{1}{3}$ - or  $\frac{1}{2}$ -height)

A combination of up to nine internal and external SCSI devices can be used.

## Monitors

Table 1 shows the image size for monitors connected to the high-density monitor port, along with the number of colors or grays supported.



**Table 1** Colors or grays supported\*

Monitor	Resolution	Colors or grays
12" Color	512 x 384	thousands
13" Color	640 x 480	thousands
15" Portrait	640 x 870	256
16" Color	832 x 624	256
VGA	640 x 480	256

\*Large monitors and additional colors can be supported with the addition of video RAM (VRAM), which can be added only by means of an expansion card.

## Audio system

- Custom sound circuitry, including stereo generator (D/A) capable of driving stereo miniplug headphones or audio equipment, and stereo sampling hardware (A/D) for recording samples
- 16-bit stereo in and out
- Sample rates of 44.1 and 22.05 kilohertz (kHz)
- *Input line level*: 2 volts peak-to-peak (V<sub>pp</sub>) nominal, into 6.5 kilohm (k $\Omega$ ) impedance
- *Output line level*: 2.2 V<sub>pp</sub> nominal, into 1 k $\Omega$  impedance
- *Input through output signal-to-noise ratio (SNR)*: > 86 decibels (dB) with no audible discrete tones
- *Bandwidth*: 10 hertz (Hz)–19 kHz (+/- 2 dB) at 44.100 kHz sample rate
- *Total harmonic distortion plus noise (THD+N)*: Less than 0.06%; measured 30 Hz–16 kHz with a 2-V<sub>pp</sub> sine wave input

## Interfaces

- One Apple Desktop Bus (ADB) port supports a keyboard, mouse, and other devices daisy-chained through a low-speed, synchronous serial bus (recommended maximum of three devices).
- High-density monitor port supports color and monochrome monitors of various sizes and resolutions. Apple AudioVision monitors are supported directly; other monitors require a monitor cable adapter (included with the server).
- Internal expansion slots support three NuBus expansion cards and one processor-direct slot (PDS) card.
- Two RS-232/RS-422 serial GeoPort ports, 230.4 Kilobit-per-second maximum (up to 2.048 Mbit-per-second if clocked externally).
- Built-in Apple Ethernet AAUI connector for connecting to high-speed Ethernet networks.
- Two SCSI buses support up to nine SCSI devices (internal and external). For more details, see “SCSI Bus Specifications” later in this booklet.
- Sound output port for stereo compact disc audio and stereo computer-generated sound.
- Sound input port for stereo sound input.

### A/C line input

- *Line voltage:* 100–240 volts AC, RMS single phase, automatically configured
- *Frequency:* 50–60 Hz
- *Power:* 454 watts maximum, not including monitor power

### A/C line output

- *Output receptacle:* 100–240 volts AC, RMS (determined by actual input voltage); 3 amperes (amps) maximum

### DC power

- 200 watts maximum

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Current type	Total
+5 V	26.1 A
+12 V	5.0 A
-12 V	0.75 A

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### Clock/Calendar

- CMOS custom circuitry with long-life lithium battery

### Keyboard

- Supports all Apple ADB keyboards

### Mouse

- Supports all models of the Apple ADB mouse

## SCSI bus specifications

The two SCSI buses can connect up to nine SCSI devices.

The internal SCSI bus (also known as *bus A*) is designed to connect no more than two internal hard disk drives to the server (CPU).

The external bus (bus B) is designed to connect an optional (built-in) DAT drive, the built-in CD-ROM drive, and up to five additional external SCSI devices to the server (CPU).

The following illustration shows all the server's default SCSI ID numbers as well as the five SCSI ID numbers available for you to use on the external bus.

SCSI ID #	0	1	2	3	4	5	6	7
<b>Internal SCSI bus (bus A)</b>	 Startup disk	 (Optional) Second internal hard disk drive*	Don't use	Don't use	Don't use	Don't use	Don't use	 Server CPU
<b>External SCSI bus (bus B)</b>	OK	OK	 (Optional) Internal DAT drive*	 CD-ROM drive	OK	OK	OK	 Server CPU

\*The Workgroup Server 8150 can accommodate either a second internal hard disk drive or an internal DAT drive, but not both.

## RAM configurations

RAM is provided in packages called Single Inline Memory Modules (SIMMs).

Your server can work with any of several DRAM configurations, depending on the density of the DRAM chips that are mounted on the SIMMs. The 72-pin SIMMs used in the Workgroup Server 8150/110 come in sizes of 4, 8, 16, and 32 MB.

**IMPORTANT** The SIMMs must be installed in matched pairs (for example, two 8 MB SIMMs) by an Apple-authorized service provider.

Your server can have a maximum of 264 MB of memory.

*Note:* 640K of DRAM is used for screen memory in place of video RAM (VRAM) to support monitors connected to the high-density monitor port. VRAM can be added only by means of an expansion card.

**IMPORTANT** The SIMMs should be 72-pin fast-paged mode 80-nanosecond (ns) RAM access time or faster. The slower 100 ns, 120 ns, and 150 ns SIMMs will not work reliably in the Workgroup Server 8150/110, and SIMMs from older Macintosh computers may not be compatible. Consult an Apple-authorized dealer or service provider for information and upgrades.

**WARNING** To avoid damage to your server, Apple Computer recommends that only an Apple-authorized dealer or service provider install additional RAM. If you attempt to install additional RAM yourself, any damage you may cause to your equipment will not be covered by the limited warranty on your server. See an Apple-authorized dealer or service provider for additional information about this or any other warranty question.

## Power requirements

### Apple Desktop Bus

- Maximum power draw for all ADB devices: 500 milliamperes (mA)
- Mouse draws up to 10 mA
- Keyboard draws 25–80 mA (varies with keyboard model used)

*Note:* It is recommended that you connect no more than three ADB devices to the Workgroup Server 8150/110.

### Audio and telecommunications devices

This table shows the power allowances for external devices connected to input ports.

Device	Voltage	Current	Power
Microphone	+5 V	20 mA	100 mW
GeoPort Telecom Adapter	+5 V	500 mA	2.5 W

### Expansion cards and devices

If you add an expansion card, or a 3.5- or 5.25-inch internal SCSI device to your server, make sure the component doesn't exceed its maximum power allowance from the different voltage sources. Follow these guidelines.

Device	Voltage	Current	Power
NuBus or PDS card (per slot)	+5 V	2.0 A	10.0 W
	+12 V	0.175 A	2.1 W
	-12 V	0.150 A	1.8 W
3.5-inch or 5.25-inch devices (per device—up to 3 allowed)	+5 V	0.8 A	4.0 W
	+12 V	1.0 A	12.0 W
	+12 V peak*	2.0 A	—

\*Peak power is for startup only and must not occur in normal operation.

## Size and weight

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Weight	Height	Width	Depth
<b>Main unit</b>			
11.3 kg*	360 mm	196 mm	396 mm
24 lb.*	14.25 in.	7.75 in.	16 in.
<b>Mouse</b>			
0.10 kg	33 mm	61.7 mm	107.3 mm
4 oz.	1.3 in.	2.4 in.	4.2 in.

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\*Exact weight varies depending on number and type of internal SCSI devices installed.

## Environment

### Operating temperature

- 10° C to 40° C (50° F to 104° F)

### Storage temperature

- -40° C to 47° C (-40° F to 116.6° F)

### Relative humidity

- 5% to 95% (noncondensing)

### Altitude

- 0 to 3048 m (0 to 10,000 ft.)



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