# Technical Information

*For PowerBook 160, 165 and 180*

## Specifications

### Processor

- *PowerBook 160:*
  68030
  25 MHz clock frequency
- *PowerBook 165*
  68030
  33 MHz clock frequency
- *PowerBook 180:*
  68030 with 68882 math coprocessor
  33 MHz clock frequency

### Memory

- 4 MB pseudostatic RAM; expandable to 14 MB
  1 MB ROM

### Disk drives

- *PowerBook 160/165*
  Internal 40 MB or larger hard disk drive
  Built-in 1.4 MB floppy disk drive
- *PowerBook 180:*
  Internal 80 or 120 MB hard disk drive
  Built-in 1.4 MB floppy disk drive

### Video display

- *PowerBook 160/165*
  640 x 400 backlit Supertwist (FSTN), 16 grays
- *PowerBook 180:*
  640 x 400 backlit active matrix, 16 grays
  (See "Active Matrix Displays" for additional information.)

### Main battery

- Rechargeable nickel-cadmium battery
  2–3 hours of operation

### Backup battery

- 30 mAh rechargeable lithium battery for clock chip

## Sound generator

■ 4-voice sound with 8-bit digital-analog conversion recording at 11 kHz or 22 kHz sample rate

## Interfaces

■ Apple Desktop Bus (ADB) port for keyboard, mouse, and other input devices using a low-speed, synchronous serial bus

■ Two serial ports for printers, modems, and other serial devices (RS-422)

■ SCSI port for hard disk drives, scanners, printers, and other devices (HDI-30 connector)
  These models also support SCSI disk mode.

■ Sound output port for external audio amplifier

■ Sound input port for monaural sound input

■ Video port (micro DB-15) for 8-bit/256-color video output to most Apple monitors, VGA monitors (640 x 480), and SVGA monitors (600 x 800); includes 512K VRAM to support external monitor, and cable with standard DB-15 connector

## Power adapter

■ Input: AC 100–240 V, 50/60 Hz

■ Output: DC 7.5 V, 2.0 A

❖ *Note:* The PowerBook 160/165/180 can be used at any input voltage within the range above, with no effect on performance. ❖

## Clock/calendar

■ CMOS custom chip with long-life lithium battery

## Keyboard

■ 3.0 mm travel keyboard
  18 mm vertical pitch, 18.63 mm horizontal pitch

## Trackball

■ 30 mm diameter

## Modem

■ Optional internal PowerBook Fax/Data Modem; 2400 bps data, 9600 bps send fax; MNP 4, MNP 5, V.42, V.42bis

■ Optional internal PowerBook Express Modem; 14,400 bps data, 9600 bps send/receive fax; MNP 2-5, V.32, V.32bis, V.42, V.42bis

■ Internal modem connector also supports modem cards from other manufacturers; installation by an authorized Apple dealer or service provider recommended.

## Weight

■ 3.1 kg (6.8 lb.)

## Dimensions

■ 286 mm x 236 mm x 57 mm (11.25" x 9.3" x 2.25")

## Apple Desktop Bus power requirements

- Maximum current draw for all ADB devices is 200 mA

- ❖ *Note:* The maximum number of ADB devices recommended in a daisy chain connected to the ADB port is three. ❖

## RAM configurations

All models come with 4 MB of RAM. Additional RAM can be installed on a memory expansion card. Installation of a memory expansion card by an authorized Apple dealer or service provider is recommended.

- *PowerBook 160:*
  Must use a card designed for this product; RAM chips must be rated at 100 ns access time or faster.

- *PowerBook 165/180:*
  Must use a card designed for this product; RAM chips must be rated at 85 ns access time or faster for processor to run at 33 MHz and 5 clocks per RAM access. If 100 ns RAM chips are used, processor will run at 33 MHz and 6 clocks per RAM access.

## Microphone/sound

- The internal microphone is an omnidirectional electret type. Microphone output voltage is 4 millivolts (mV) peak to peak at normal speaking volume. An external microphone can also be used with these computers.

- ❖ *Note:* You can also use adapters to input sound from audio equipment with line level outputs, but the line level signals must be attenuated before reaching the computer's sound input port. An attenuation of 500:1 is recommended when inputting line level signals. Appropriate attenuation cables and adapters are available from most electronics stores. ❖

## Environment

### Operating temperature
- 10° C to 40° C (50° F to 104° F)

### Storage temperature
- –25° C to 60° C (–13° F to 140° F)

### Relative humidity
- 20% to 80% noncondensing

### Altitude
- Operating: 3048 m (10,000 ft.) maximum
- Shipping (non-operating): 4572 m (15,000 ft.) maximum

## Active matrix displays

The PowerBook 180 has an active matrix liquid crystal display (LCD). This state-of-the-art technology provides the following advantages:

- very high contrast, yielding extremely crisp images
- fast video response, which prevents shadows or "tails" on moving images
- superior display of gray-scale images
- screen readability from almost any viewing angle
- uniform brightness across the screen.

Active matrix displays produce exceptionally crisp images because they have a transistor at each of the screen's 256,000 pixels (the tiny dots that make up the screen's images). Manufacture of active matrix displays is a complex and exacting process, similar to fabrication of integrated circuits. Consequently, some displays may have one or more inactive pixels—dots that remain white at all times or show an unexpected shade of gray within an image. To assure that the superior active matrix display remains affordable and available, Apple allows a very small number of inactive pixels in the PowerBook 180 display.

If your screen has any pixels that remain white, you can make them less noticeable by changing the computer's desktop pattern to one that contains a larger proportion of white.

## Options and accessories

The following are available as options and accessories for your PowerBook computer.

| Item | Part number |
| --- | --- |
| PowerBook 2 MB Memory Expansion Kit (100 ns) | M1032 |
| PowerBook 4 MB Memory Expansion Kit (100 ns) | M1033 |
| PowerBook 4 MB Memory Expansion Kit (85 ns) | M4664 |
| PowerBook Battery Recharger | M1027 |
| PowerBook Rechargeable Battery | M5545 |
| PowerBook AC Adapter | M4660 |
| PowerBook Express Modem Kit (for US, Canada, and Japan) | M1366 |
| PowerBook Express Modem Kit (for Europe, Australia, and some South American countries) | M1365 |
| PowerBook Fax/Data Modem (for US, Canada, and Japan) | M0970 |
| PowerBook Fax/Data Modem (for Europe, Australia, and some South American countries) | M0980 |
| Apple HDI-30 SCSI Disk Adapter | M2539 |
| Apple HDI-30 SCSI System Cable | M2538 |