mecc

computer inspector

a diagnostic tool for use with the apple® II computer

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computer
inspector

a diagnostic tool for use
with the **apple®** II computer

This manual is compatible

with

the *Computer Inspector* diskette

Version 1.x

Table of Contents

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About the Manual

The *Computer Inspector* manual contains the following information and instructions:

Section 1.0, "Understanding *Computer Inspector*," provides an introduction and description of *Computer Inspector*, a list of the equipment it will test, and the tests it will conduct.

Section 1.1, "How to Use *Computer Inspector*," shows you how to test and itemize computer equipment and how to file and organize test-result information.

Section 1.2, "Hints and Pointers," includes start-up procedures and important additional information about your computer equipment and using *Computer Inspector*.

Section 2.0, "Conducting Tests with *Computer Inspector*," describes each of the tests and the step-by-step instructions for conducting them. Information on how to correct problems and warnings associated with specific pieces of equipment are also given.

Section 3.0, "Questions? Problems? Look Here" contains information about specific questions or problems that you may encounter while conducting tests. This section also includes service recommendations that may be given by the tests, plus warnings and cautions you will need to be aware of while conducting the tests or while handling your computer equipment.

Credits lists the names of those involved in the production and testing of *Computer Inspector*.

Forms includes blank forms for Lab Technicians* to use in organizing and filing information gathered from the tests conducted on their computers. Additional forms included are a troubleshooting tip sheet and an equipment inventory roster.

*There are many different titles for those who manage and coordinate computer labs, i.e., Computer Coordinator, Lab Manager, Lab Technician, Computer Specialist, System Manager, District Computer Coordinator, and Lab Assistant. Throughout this manual, the user of *Computer Inspector* is referred to as a Lab Technician.

Printer Control Codes

Printer Control Codes is a chart that lists codes for the Apple DMP® and ImageWriter® printers and some popular Apple-compatible printers.

Glossary

Glossary contains pertinent terms useful for understanding *Computer Inspector*. Terms that are included in the glossary are italicized the first time they are mentioned in the manual.

MECC Services

MECC Services lists other products and services available from MECC and where to write or call for help.

For the user

Computer Inspector was developed for computer users of all levels, from novices to experts. If you are an experienced computer user, *Computer Inspector* is designed so that you can start using it immediately and refer to this manual as questions arise.

If you are a new computer user or are unfamiliar with certain aspects of computer use, refer to the beginning sections of this manual (Sections 1.0-1.2). These sections will tell you about *Computer Inspector* and how to use it. Section 2.0 will guide you through conducting the tests.

Getting the most from this manual

The *Computer Inspector* manual has been designed with ease of use in mind. The wide outside margins in the main body of the manual permit the listing of brief topic headings. These are included so that you can flip through the manual quickly, scanning the margins in search of answers to questions you may have about using *Computer Inspector*. An ideal way to learn how to use *Computer Inspector* is to read through the manual thoroughly before or while running the program.

Several important symbols also appear in this manual:

This symbol is used to warn you of a situation that could be **physically harmful or fatal**. The best advice is for you to avoid this procedure unless you are **absolutely sure** of what you are doing.

This symbol is used to warn you about steps that will result in the permanent deletion or alteration of data. When you see this symbol, be very sure that you understand the consequences of the current operation.

This symbol is used to inform and alert you about important steps or concepts relevant to *Computer Inspector*.

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This symbol is used to draw your attention to tips or shortcuts that might make *Computer Inspector* easier for you to use.

This symbol is used to remind you of common instructions throughout the *Computer Inspector* program and this manual.

This symbol directs you to the service recommendations presented by the tests when a problem is detected.

NOTES

Section 1.0
Understanding *Computer Inspector*

Understanding
Computer Inspector

Computer Inspector is a utility that conducts a variety of tests to determine a computer's configuration and to check its performance and that of its peripherals.

Computer Inspector can look inside a computer and retrieve information about its *memory* size, the *interface cards* that are in each *slot,* and whether the computer has been enhanced. Other capabilities of *Computer Inspector* allow you to conduct tests on the basic operation of your printer and *disk drives*, check your computer's memory for errors, and allow you to adjust the color and quality of your *monitor* or projection system.

Reminder: Terms that are included in the glossary are italicized the first time they appear in this manual.

Computer Inspector can be used by Instructors or Lab Technicians as a utility to itemize computers and their contents and to test the quality of computer performance.

Some *Computer Inspector* tests, such as checking for single-bit memory errors, previously required the services of a technician. Other tests allow you to check and adjust the quality of your *input* and *output hardware*. Regular maintenance of your equipment should alert you to any defects and avoid untimely breakdowns or information losses. Most of all, *Computer Inspector* will give your users the best quality performance from your computer equipment.

Computer Inspector also includes information about performing limited repairs, plus an appendix section containing forms for recording and filing test-result information and organizing computer repair histories.

*What is
Computer
Inspector?*

*Why use
Computer
Inspector?*

Which equipment will Computer Inspector test?

Computer Inspector will test:

- the Apple II family of computers with a minimum of 48K of memory;

- Apple Disk II drives;

- monochrome, color, and Apple IIGS monitors;

- *joysticks*, game paddles, or similar devices; and

- Apple Dot Matrix, ImageWriter, and other Apple-compatible printers.

What types of tests will Computer Inspector conduct?

Computer Inspector can:

- test for and identify the contents of the slots or ports that are occupied;

- check the amount of *main* and *auxiliary memory* in a computer;

- determine whether a computer is enhanced and the amount of its additional memory;

- test a monitor's picture quality in the appropriate graphics mode;

- test a printer's quality using normal text and printer control codes;

- test and adjust printer margins;

- test the speed of a disk drive, conduct a general operations test of the drive, and identify the current position of the write-protect switch and test it in the opposite position;

- conduct a test of main, auxiliary, and extended memory; and

- test buttons and the current position and range of specific game input devices.

Section 1.1
How to Use *Computer Inspector*

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How to Use *Computer Inspector*

Computer Inspector was designed to assist Lab Technicians and Computer Lab Instructors in maintaining and coordinating their computers and peripheral equipment. *Computer Inspector* will check the performance of specific computer equipment. To help you record and file your test-result information, blank forms are provided in the back of the manual.

The tests included in *Computer Inspector* can assist in determining and keeping an inventory of the contents of each computer in the lab. For example, the Machine Identification Test will give the location of interface cards and the amount of memory in each computer. The Memory Test will check a computer's main and auxiliary memory for single-bit errors. If it finds an error, it will locate the bad *chip* and give you its address or location.

Other tests will check the performance of the hardware (such as printers, monitors, disk drives, and game input devices) and in certain instances the capabilities of the hardware (the control codes your printer is capable of using). The "Appendices" section contains forms designed for recording computer repair information and filing test results.

On the Apple II, II Plus, //e, or //c, the program can be started (or "booted") by placing the program *diskette* in the drive and turning on the computer. If the computer is already on, the program can be booted by simultaneously pressing Control-Reset (hold down the Control Key and press the Reset Key) and typing PR#6 (with 6 representing the slot the disk drive card is in; use the appropriate slot number for your computer). If the computer is prompting you for a different program diskette to boot, insert the new program diskette and press the Space Bar.

To start the program on an Apple IIGS computer, press and hold Control-⌂ (hold down the Control Key and press the Open-Apple Key), then press and release the Reset Key, then release the other keys to boot your computer. The MECC logo screen will appear and then be replaced by the main menu screen containing the options for *Computer Inspector*.

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When booting the IIGS, *Computer Inspector* checks and records the computer's current configuration. If changes are made to the configuration after booting, the machine must be re-booted in order for *Computer Inspector* to identify these changes.

A look at the screen displays

Figure 1 shows each of the major elements and interface keys shared by the majority of screens.

The screen title   The content region

```
        Monitor Adjustment
  _____


       1.  Normal text and graphics
       2.  Super-high resolution
       3.  80-column text




  _____
  Use arrows to move, then press Return.
  Escape: Main Menu              ? - Help
```

The instruction line   The escape function   Help
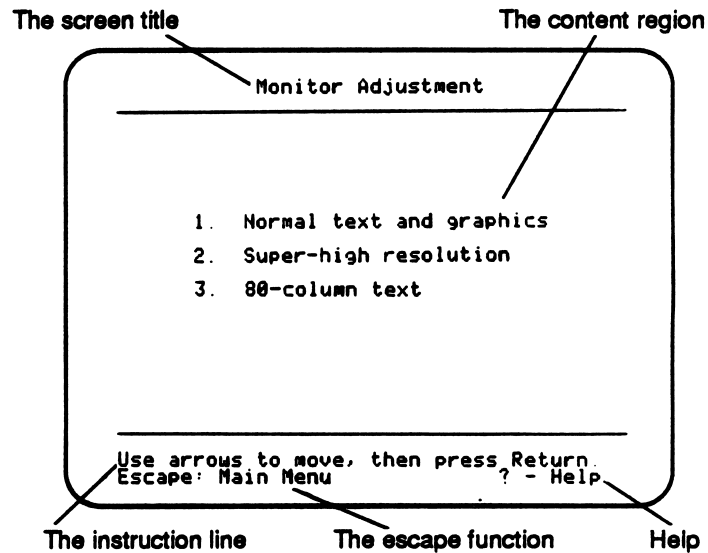
Figure 1

- **The screen title** shows where you are in the program or with which test you are working.

- **The content region** is the working area of the screen. This is where the main menu and the different test menus are presented, and where you make your menu selections.

- **The instruction line** indicates what you can do on this screen and what effect pressing the Return Key will have.

- **The escape function** shows you what effect pressing the Escape (Esc) Key will have.

- **Help** is available when "? - Help" is displayed.

Figure 2 shows the main menu for *Computer Inspector*.

```
┌─────────────────────────────────────────┐
│                                          │
│          Computer Inspector              │
│      ───────────────────────────         │
│                                          │
│      1.  Machine Identification          │
│      2.  Monitor Adjustment              │
│      3.  Printer Test                    │
│      4.  Disk Drive Test                 │
│      5.  RAM Memory Test                 │
│      6.  Joystick/Paddle Test            │
│      7.  Information                      │
│      8.  Quit                            │
│                                          │
│      ───────────────────────────         │
│  Use arrows to move, then press Return.  │
│                                          │
└─────────────────────────────────────────┘
```
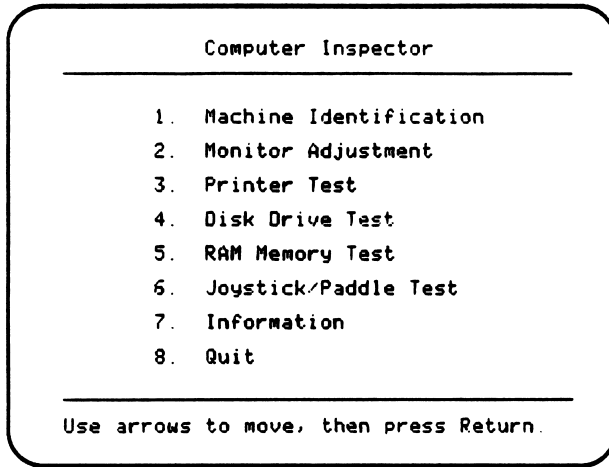
Figure 2

Certain selections that you make on the main menu will present what is called a test menu. Test menus are designed to be used in the same manner as the main menu. The use of test menus is explained at the bottom of each screen and in the following paragraphs of this manual.

The arrow keys move you through the options. The Left-Arrow Key works the same as the Up-Arrow Key, and the Right-Arrow Key works the same as the Down-Arrow Key. You may also press a number key for the option you would like to select.

The Space Bar and the Escape Key will move you through *Computer Inspector*.

Space Bar: The Space Bar moves you forward through the screens one at a time. The Space Bar is also used to begin conducting tests, and, in certain instances, it returns you to the appropriate menu when you have finished with a test.

Escape Key: The Escape Key allows you to return to the previous menu, where you may choose another option. For example, if you are in the Disk Drive Test, the Printer Test, or the Monitor Adjustment Test, you can return to the main menu by pressing the Escape Key twice. If you have a test set up to run or if you are running certain tests (the Disk Drive Test, Continuous *RAM* Memory Test, Printer Test, or Monitor Adjustment Test), the Escape Key will stop the test and return you to the previous menu.

For more information about the Escape Key, see "Using the Escape Key" on page 17.

Using the forms

Included in the back of this manual are forms that can be used to record the results of the tests *Computer Inspector* will conduct. You may duplicate the forms as necessary and use them to organize information about each computer and its test results.

Other forms allow you to:

- record computer breakdowns;

- keep a repair history for each computer;

- suggest trouble-shooting procedures to use in identifying a problem; and

- maintain an equipment inventory of your entire lab and of each individual computer station.

Section 1.2
Hints and Pointers

Hints and Pointers

General Information screens are provided as a brief reference to the utilities options. The screens list tests and give a description of the options that can be chosen within each test. Included in this section is the MECC Information screen, which contains the address and telephone number for MECC Services and the Help Line.

At the lower left-hand corner of the screen is a command that will allow you to escape from the test you are conducting or to move to a previous menu. Each screen lists where the Escape Key will take you (see Figure 1 on page 12).

The Quit option allows you to quit *Computer Inspector.* Using the Quit option stops the program and prepares the computer for another program.

Choosing the Quit option allows you to exit from the program. At this point, you may turn your computer off or you may insert another diskette. Pressing the Space Bar will boot the diskette; pressing the Escape Key will return you to the main menu if you are not ready to quit.

Quitting Computer Inspector

As specific tests are conducted or as the results are presented, you may receive messages indicating that problems have been found and what needs to be corrected. Listed in Section 3.0 on page 45 are the service recommendations that may be presented by the tests and an explanation of each. Refer to "Fix It Yourself or Call for Service?" on page 47 for additional information about handling problems. Also refer to the "Guide to Service and Support" manual, which came with your computer.

Service recommendation messages

Apple Computer, Inc., has included a built-in test for the Apple //e computer that checks for defective RAM chips. The test can be run by pressing the Closed-Apple Key (⚫) together with the Control and Reset Keys.

Using the //e self-test

While the test is being conducted, a number of different visual patterns appear on the screen. The end of the test will be signaled with a message of "Kernal OK" or "System OK." If the test finds any defective chips, it will give a specific error message with the location of the problem chip on the *motherboard*.

To run the test on the new platinum //e (with a built-in numeric keypad), press the Control, Option, and Reset Keys.

Static electricity

Warning! Static electricity can cause damage to the interior components of your computer. Before making contact with any interior parts of your computer, release or discharge any static electricity that may be present by touching a large metal object (such as your desk frame) or a grounded metal object (such as the *power supply* of the computer). Leaving the computer plugged in will provide a ground on the power supply. Static electricity released inside your computer can create a power surge that can cause damage to the chips located inside the computer and on the attached interface cards.

Your computer warranty

Any modifications, adjustments, or changes to your computer hardware or its peripherals without written permission by Apple Computer will **void** the warranty of your computer. Check your warranty for specifications before you attempt any modifications, or call your Apple service technician to handle the repairs and avoid forfeiting your computer warranty.

Section 2.0
Conducting Tests with *Computer Inspector*

Conducting Tests with
Computer Inspector

While you can usually identify the type of a computer by looking at its exterior, there is important information about the computer's interior that you will need to know before you can run certain programs and applications. The Machine Identification Test in *Computer Inspector* will look into the interior of the machine, retrieve the information, and present it on the computer screen. This can be done without opening the cover of the computer, avoiding the risk of damaging the interior of the computer or its cards.

The Machine Identification Test will report:

- the model of computer;

- the amount of main memory;

- if the computer is enhanced and the amount of auxiliary memory; and

- if a slot or port is occupied, and, if it is, which type of card or device is installed.

After choosing this option from the main menu and pressing Return, the next screen you will see contains the results of your test (see Figure 3 on page 22).

The model name of the computer, the amount of memory, and whether the computer has been enhanced (A) is displayed at the top of the screen. Below that is a table with a line for each slot or port number (B) and the name of the card (C) that occupies the slot or port number. The slots or ports that are vacant have a dash (D) after the slot or port number.

Additional information is marked by an asterisk (E) before the slot number (this appears only on a //e). The asterisk marks an *auxiliary slot*. If your computer has extended memory (F), a message appears above the instruction line showing the amount of extended memory contained in your computer.

Machine Identification Test

```
                          A
                          |
        ┌─────────────────────────────────────────────┐
        │            Machine Identification            │
        │  ───────────────────────────────────────────  │
        │  Apple //e with 128K of memory.              │
 B      │                                              │    C
        │  Slot           Device installed             │
        │  ───────────────────────────────────────────  │
        │      1   Print-it                            │
        │      2   Mouse or similar device             │
 D      │     *3   Extended 80 column                  │
        │      4   Disk II                             │
        │      5   -                                   │
        │      6   -                                   │
 E      │      7   Corvus Transporter                  │
        │   (* - or auxiliary slot)                    │
        │                                              │
        │      ___ Press Space Bar to continue ___     │
 F      │                                              │
        │  Escape: Main Menu                           │
        └─────────────────────────────────────────────┘
```
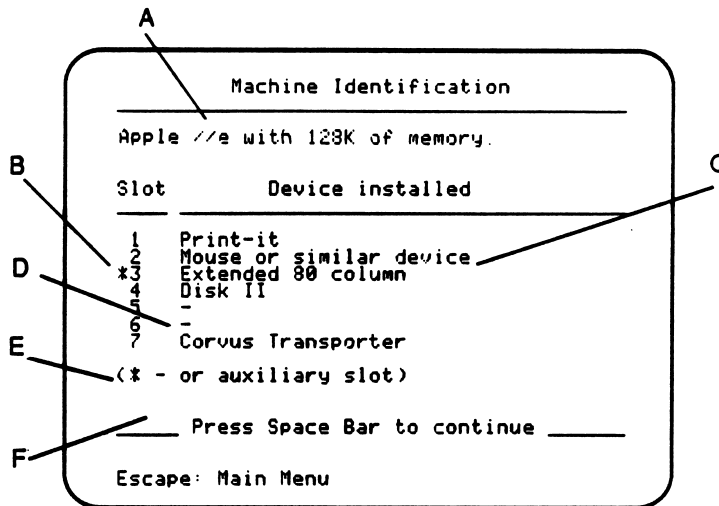
Figure 3

Interface cards and devices *Computer Inspector* can identify

Below is a list of the cards and devices *Computer Inspector* can identify:

- AppleTalk™ interface
- Clock
- Communications
- Corvus™ flat cable
- Corvus™ transporter
- Disk II™ card
- 80-column display
- Extended 80-column display
- Extended 80-column display with "nK"
    (This is a memory card that sits in slot 3 and also functions as an extended 80-column card. The "nK" is how much memory is on the card, with "n" indicating the number of kilobytes.)
- FingerPrint™
- Floating point BASIC *ROM*
- Integer BASIC ROM
- Language card
- Mass storage device
- Memory expansion
- Modem
- Mouse or similar device
- Network or bus interface
- Parallel interface
- Printer interface
- Print-it!™

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- ProDOS® block device
  (When *Computer Inspector* finds a card with a SmartPort interface but without any active device attached, it identifies it as a ProDOS block device. If it finds one or more active devices, it will display the name of the first device. These devices' names will always be in upper case letters. Most of the time these names will make sense—as in "DISK 3.5"—but sometimes they may look like gibberish.)
- Profile™ disk interface
- Serial or parallel I/O card
- Special purpose device
- Speech or sound device
- Super Serial card
- Unknown
  (Devices listed as "Unknown" do not have the correct ROM signature bytes to properly identify them.)

Slots 1 and 2 are typically used for serial and parallel I/O devices.

Slot 3* is used by the 80-column card and/or an accelerator card.

Slots 4-7 are typically used for disk drives, but can be used for almost any card.

Slot 6 is usually a disk drive.

Typical interface slots for cards and devices

*On the Apple //e, the auxiliary slot acts as an extension of slot 3. In certain situations, the card in the auxiliary slot is identified and the card in slot 3 may be hidden or misidentified. We suggest looking into the machine to double-check the contents of the slot in case there are cards in both slots and only one card is identified.

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The Machine Identification Test uses different test-result screen setups to compensate for the differences in slot or port variations of different computer models. Below are representations of the test-result screen setups for different computer models.

```
                Machine Identification

            Apple //e with 128K of memory
    Slot   Device installed
      1    FingerPrint
      2    —
    * 3    Extended 80-column
      4    —
      5    —
      6    Disk II card
      7    —
    (* or auxiliary slot)

              Press Space Bar to continue
    Escape:  Main Menu
```

Figure 4 – Apple //e

```
                Machine Identification

            Apple II+ with 64K of memory
    Slot   Device installed
      0    Language
      1    Super Serial
      2    —
      3    —
      4    —
      5    —
      6    Disk II card
      7    —

              Press Space Bar to continue
    Escape:  Main Menu
```

Figure 5 – Apple II Plus

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```
                    Machine Identification
    _____

              Apple //c with 128K of memory
     Port   Device installed
       1    Super Serial
       2    Super Serial
       3    Extended 80-column
       4    Mouse or similar device
       5    ProDOS Block device
       6    Disk II card
       7    Network or bus interface
    _____

                 Press Space Bar to continue
     Escape:  Main Menu
```

Figure 6 – Apple //c

```
                    Machine Identification
    _____

              Apple IIGS with 768K of memory
     Slot   Device installed
       1    Super Serial
       2    —
       3    Extended 80-column
       4    Mouse or similar device
       5    —
       6    Disk II card
       7    —
     Extended memory = 512K
    _____

                 Press Space Bar to continue
     Escape:  Main Menu
```

Figure 7 – Apple IIGS

Warning! Power off! Never repair or remove anything from the inside of a computer with the power turned on! On the //e, check for the red LED light on the circuit board of your computer. If the red light is on, turn the computer off before removing cards or game devices. Removing a card with the power on can cause a power surge and damage a chip on the card you are pulling or on the motherboard of your computer.

Never touch the metal contacts of an interface card. Dirt and oil from your fingers can cause a poor connection between the card and your computer.

If you have original Apple equipment and find it necessary to clean dirt or corrosion from an interface card caused by the metal contacts, use a liquid contact cleaner and an anti-static cloth. A clean pencil eraser may also work if liquid cleaner and a cloth are not available.

Monitor Adjustment Test

The Monitor Adjustment Test includes text and graphic screens that can be used when adjusting the color or linearity (accuracy and focus) of your monitor. This test brings up a second menu screen, which allows you to access the three monitor test screens.

One screen, "Normal Text and Graphics," displays labeled color bars for adjusting the color level and tint. Text, lines, and congruent circles are used to test the vertical height and linearity of the monitor.

Another screen, "Super-High Resolution," can be displayed only on an Apple IIGS computer. This screen allows you to test the colors and adjust the brightness and contrast.

Because the colors on the Apple IIGS are adjusted by the manufacturer, you cannot adjust them yourself. Call your Apple technician for assistance if you have problems with the colors displayed by your monitor.

Another screen, "80-Column Text," appears only if your computer contains an 80-column card. It displays a screen full of 80-column text, allowing you to adjust the picture quality on your monitor or projection screen.

Reminder: Use the Space Bar to move forward through the screens and to start the tests. Use the Escape Key to stop a test or to return to the previous menu when you have finished conducting a test.

Warning! High Voltage! Before you begin adjusting the monitor there is one caution you need to be aware of. Inside the monitor is the anode of the CRT. This anode contains enough voltage (12,000 volts or greater) to be fatal if contacted. This high voltage can be present even if the monitor or TV is unplugged. **Do not** attempt to adjust the monitor internally if you are unsure of what you are doing. **An accident could be physically harmful or fatal.**

The monitor controls are located in a variety of places on different models of monitors. The adjustable aspects of monitors are common to most types, however. Most monitors allow you to control the vertical and horizontal hold, vertical size, color, brightness, contrast, and tint.

Your first option is to test the normal text and graphics of your monitor(s). This test presents color bars that you can use to adjust the color controls (color, tint, brightness, and contrast). Adjust the color control to match the correct color, then adjust the remainder of the controls (tint, brightness, and contrast) to obtain the quality that you prefer (see Figure 8).
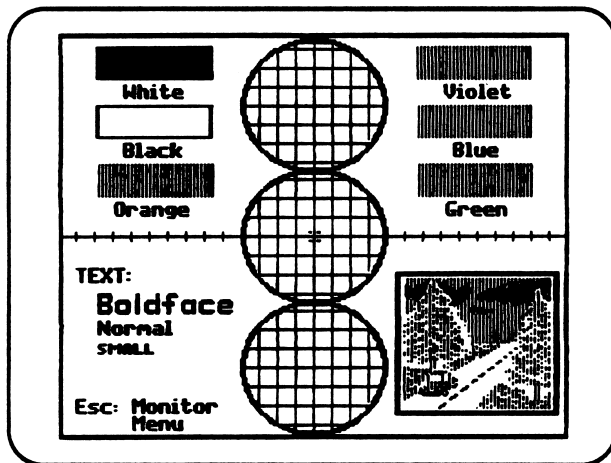
Figure 8

A small graphic is included containing objects that represent the colors displayed by the monitor (green trees, blue sky, white clouds, etc.). This can be used to double-check color accuracy.

A variety of text and three congruent circles can be used to adjust the vertical height and linearity of your monitor. The vertical-size button adjusts the picture height. The control button adjusts the focus and clarity of the text. Adjust the circles with the control button until they appear to be perfect or until the text is focused to your preference. If the congruent "circles" look like ovals, the screen is not set correctly.

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Super-High Resolution

The Super-High Resolution screen is displayed only if you have an Apple IIGS computer (see Figure 9). This screen allows you to see how accurate your monitor's color display is. A IIGS monitor has two control buttons—one for brightness and one for contrast.
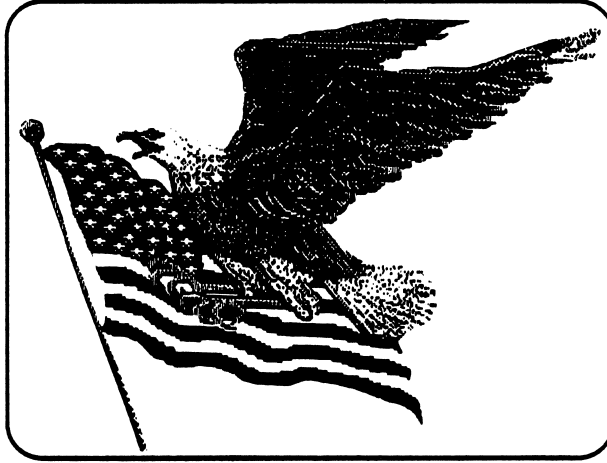
Figure 9
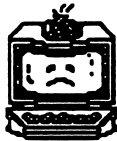
The colors on your monitor were set during manufacturing. Call your Apple technician if you have any color or hold problems with your IIGS monitor.

80-Column Text

The 80-Column Text screen is mainly for green screen monitors or for monitors capable of displaying 80-column text. The screen fills with text (see Figure 10), which you can use to adjust the focus and picture quality of your monitor or your projection system. If you do not have an 80-column card, this screen is not displayed.

Figure 10

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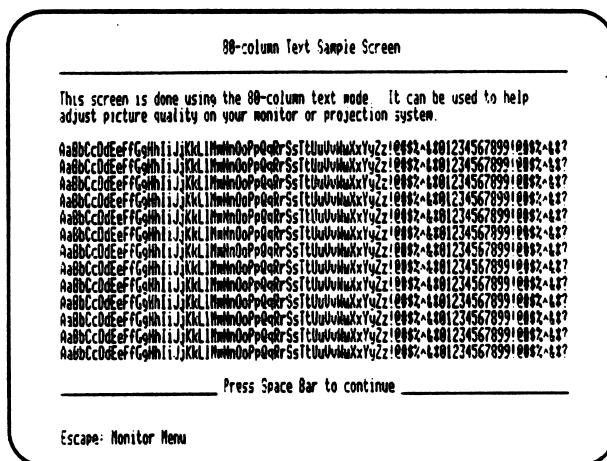
The monitor menu also gives you the option of using a Help screen. Use the Question Mark (?) Key to access the Help screen, which contains information about the three monitor test screens and how to use them (see Figure 11).

```
        Help for Monitor Adjustment
 _____


 The "Normal text and graphics" screen
 provides visual support to adjust the
 color level and tint. Three congruent
 circles aid you in setting the vertical
 height and linearity.

 The "Super-high resolution" screen is
 for adjusting an Apple //gs monitor.

 The "80-column text" screen will appear
 only if your computer can produce this
 mode.


 _____ Press Space Bar to continue _____

 Escape: Monitor Menu
```

Figure 11

The Printer Test allows you to check your printer's ability to print normal text and to print using printer control codes, with options to change the margin in either of these modes. It allows you to see the different printing styles (such as bold, italic, and underline) that your printer can produce.

After choosing the Printer Test option, you will be given a second menu, called the Printer Test menu. This menu contains the options of printing normal text and printing with control codes.

Remember: Use the Space Bar to move forward through the screens and to start the tests. Use the Escape Key to stop a test or to return to the previous menu when you have finished conducting a test.

If you have more than one printer available, a message will appear to show you which printer (designated by the slot number of the printer) the program has chosen to test. If you would like to test another printer, press the Escape Key to return to the Printer Test menu and follow the same procedure when choosing the other printer.

The first printer test checks your printer's capability to print normal text. Normal Text prints a sample line of text containing 80 characters per line. You are asked if you would like to change the line width. Use the Arrow Keys to select "Yes" or "No," and press the Return Key. To change the line width, input your choice. The range of characters per line is 30 to 255, but not all printers are capable of printing 255 characters per line. This test allows you to see the line width your printer is capable of printing.

Prepare your printer by turning it on and adjusting the beginning end of the paper with the print head. Press the Space Bar when you are ready to test the printer.

The test prints a line or a number of lines appropriate to the margin selected (see Figure 12) containing each character from the keyboard (A). It also prints the test name (B) and the number of characters per line that you selected (C).
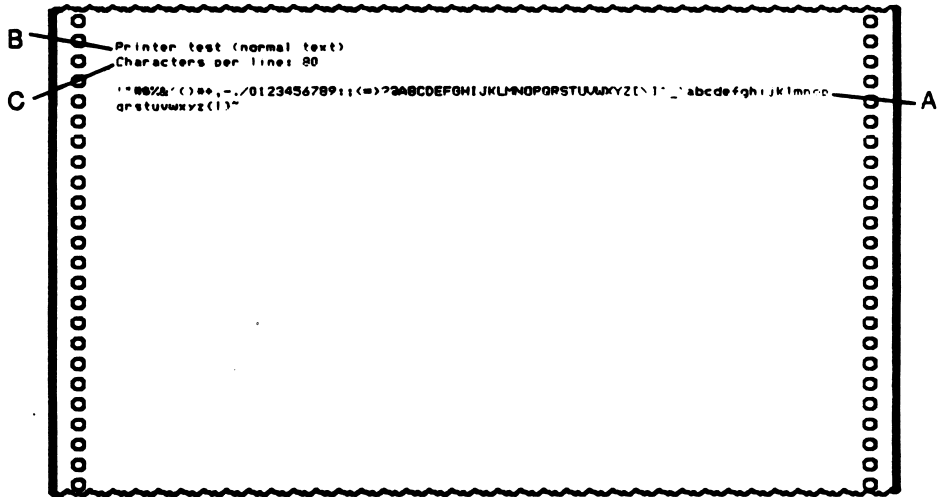
Figure 12

The message "Printer test completed" appears when the test is finished.

Printing with Control Codes

Printing with Control Codes prints a sample line containing 80 characters per line unless you choose to change the line width (see Figure 13). After you have made your choice, press the Return Key to continue.

The next screen asks you for the control code that you would like to test. If you have more than one code that you would like to test, you may enter all the codes. Each code will be tested, but only the last code used will appear on the printout.

When you have typed in the control code you want to test, type the caret (^) symbol to signal completion (on the Apple //e, //c, and IIGs, use Shift-6; on the Apple II and II Plus, use Shift-8). This will bring up the question "Are these commands correct?" Answer "Yes" to continue or "No" if you've made a mistake in your entry.

From the Printer menu, you can repeat this test using additional control codes.

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```
                Printing with control codes
    _____

    Please enter the control code you wish
    to test with your printer:

     Escape Q Escape !



    Are these commands correct?  Yes  No



    _____

    Use arrows to move, then press Return.
    Escape: Printer Menu
```
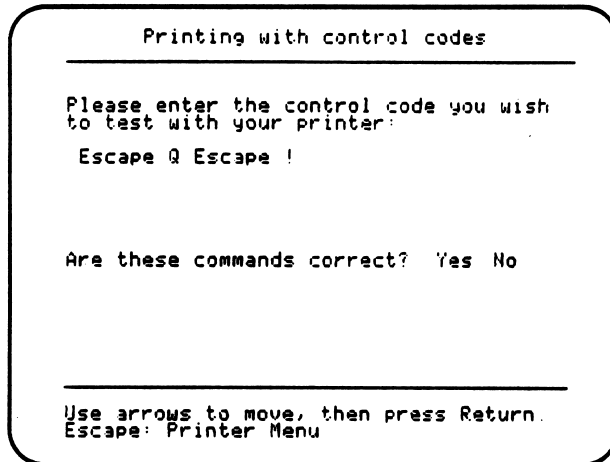
Figure 13

See "Printer Control Codes" beginning on page 61 for a chart
containing some popular control codes for the Apple DMP,
ImageWriter, and some common Apple-compatible printers.

Note: Your printer will stay active with the last control code(s) used
until you set it back to normal. Use the undo command to clear single
settings and, to clear your printer of all control codes, turn the printer
off and back on. By default, this will set your printer to normal text.

Disk Drive Test

The Disk Drive Test gives you three options, which appear on the
menu screen.

The first test listed, Drive Speed, allows you to test all of the drives
that are connected to your computer through a Disk II interface card
or the internal and external drive of the Apple //c. The screen tells you
the optimal drive speed and a recommended range that gives
satisfactory results. While the test is being conducted, the current
operating speed of the drive is displayed on the screen and, when
required, a recommendation for servicing your drive.

The General Operation test checks the ability of the disk drive to
accurately read, write, and locate data on the diskette. The test is
conducted using a blank or used diskette in the drive that is to be
tested. A service recommendation appears if any problems are found.

The Write-Protect Switch test determines the current position of the
write-protect switch and gives you the option of "flipping" the switch
by placing a write-protect tab over the diskette and re-running the test.
This tests the ability of the drive to detect the tab and disable the
switch to its write-protect position. If problems in the operation of the
disk drive are detected, a message to "Consult your dealer or service
center" is displayed.

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Drive Speed

Remember: Use the Space Bar to move forward through the screens and to start the tests. Use the Escape Key to stop a test or to return to the previous menu when you have finished conducting a test.

Drive Speed checks the operating speed of the drive.

It is suggested that the drive speed be checked every 3 to 4 months or with every 40 hours of use.

A screen displays all the drives linked to your computer. Use the Arrow Keys to select the drive that you would like to test and then press the Return Key. Then insert a blank or used diskette in the selected drive as prompted.

Warning: Be sure the information on this diskette is no longer needed. It will be erased!

Press the Space Bar when you are ready to begin the test, or press the Escape Key if you do not want to conduct the test.

The testing screen displays the recommended drive speed and the range of speeds that is satisfactory (see Figure 14). It reports the current speed in rpm (revolutions per minute) as it is conducting the test. Press the Escape Key to end the test.

```
                     Drive Speed
    _____

    The recommended disk drive speed is
    299 rpm. However, speeds between 296
    and 302 rpm should give satisfactory
    results.


             Current speed = 300 rpm


    (Note: To adjust the drive speed check
           the manual or consult your dealer
           or service center.)

    _____

    Escape: Disk Drive Menu
```
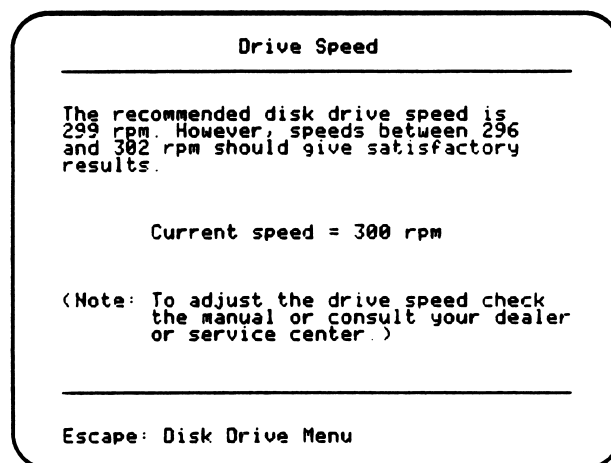
Figure 14

If your drive is currently operating at an unsatisfactory speed, you will get a message to "Check the manual or consult your dealer or service center to adjust the speed."

If this test displays a drive speed of about 600 rpm or if it fluctuates between many speeds, the problem may not be with your drive. Re-run the test and check the following as possible causes for the varying speed problem: make sure there is a diskette in the drive you are testing, the diskette door is shut, and the diskette is not write-protected. Also check "Fix It Yourself or Call for Service?" on page 47 for additional information.
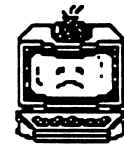
Apple Disk II – The Apple Disk II drive is a metal case with a black front face. This drive is connected to the *drive controller card* inside the //e and the IIGS with a ribbon cable that extends from the rear of the drive. The Disk II drives will not work with the Unidisk controller cards or Unidisk drives. The Disk II is not compatible with daisy-chain drive connections (a combination of drives).
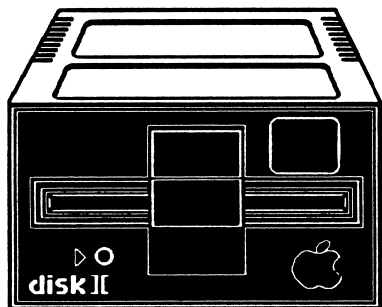
Apple 5.25 or Unidisk – The Apple 5.25 or Unidisk drive is tan or platinum in color. This drive connects to the //e controller card by a round cable that extends from the outside of the Unidisk, connects to the D-shaped connector that extends from the controller card, and is fastened to the //e case. To build a two-drive system, a second Unidisk or Apple 5.25 drive can be connected to the connector on the back of the first drive. It is also possible to connect a combination of 5.25 drives and 3.5 drives to your computer. This is referred to as a daisy-chain connection. This drive is compatible with the Apple II, II Plus, //e, //c, and IIGS. Refer to your Apple 5.25 owner's manual for further instructions.

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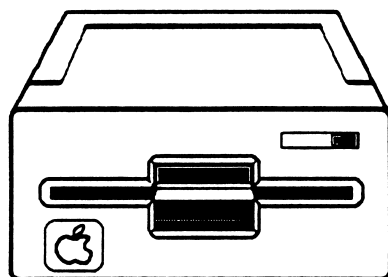
Each type of drive must be plugged into the correct type of controller card or you could permanently damage your drive.

Apple Duodisk – The Apple Duodisk drive has two disk drives in one case, both of which are connected and controlled by the same circuit board. The Duodisk also has a cable extension that connects to the D-shaped connector for use with a Unidisk controller card. If you are using a Duodisk with a daisy-chain drive connection, the Duodisk must be the last on the chain since it does not have a daisy-chain port.
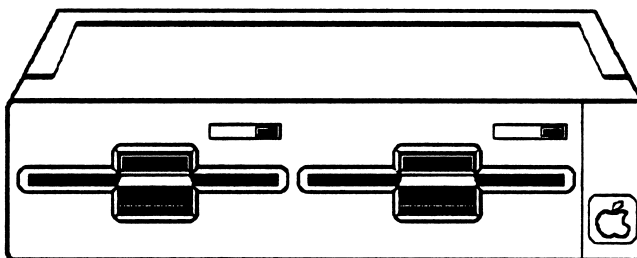
Apple //c External Drive – The //c external drive must be the last drive on a daisy-chain connection because it does not have a daisy-chain port.
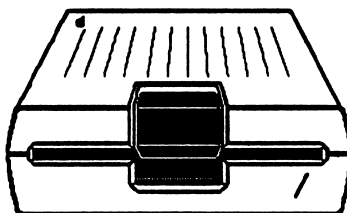
Do not remove your Apple 5.25 or Unidisk drive's outer casing. Removing the case will **void** your warranty. For Disk II owners, check your owner's guide for warranty information before attempting to adjust your drive. Also refer to "Your Computer Warranty" on page 18 before making adjustments.

Drive speed adjustment

The drive speed adjustment procedure is relatively easy to do on the Disk II. There are four screws on the bottom to remove before you can remove the metal casing of the drive. The speed adjustment trimmer is located inside the drive on right rear (refer to the diagram on page 36). A small non-metallic screwdriver or alignment tool can be inserted here to adjust the speed of the drive.

On very few Disk II drives and the 5.25 or Unidisk drive, you will not need to remove the outer casing. The Disk II drive (at the bottom right

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in the rear) and the 5.25 drive (at the bottom right in the front, next to the foot) have openings that will allow you to access the speed adjustment trimmer.

On the Apple //c computer, the internal drive speed can be adjusted through the small opening on the bottom right in the rear of the computer. An external drive can be adjusted through the opening on the bottom of the drive.

Use a non-metallic or a non-conducting adjustment tool. Any magnetic field that a metal tool can produce could influence the adjustments you are making. Also, be careful not to jar any of the connectors loose when you are making adjustments. Plus, never lubricate any of the parts of your drive. Lubricants will attract dust and dirt, which can affect the proper functioning of your drive.

Adjusting the speed adjustment trimmer counter-clockwise will decrease the speed of your drive; turning the screw clockwise will increase the speed.

Repeat the drive test to check the adjustment you have made. Continue this procedure until the proper speed is reached.

A slower diskette speed can be better than one that is too fast. A speed that is too fast can overwrite information that is already on your diskette.

Drive speed adjustment locations

Apple Disk II – The speed adjustment trimmer can be located in one of three places on the Disk II drive. The two most common locations are diagrammed on the following page. The diagram shows the Disk II drive with the outer metal casing removed. As the drive faces you, turn it to look at its right side. The enlarged diagram shows only the rear portion of the drive.

A third possible location is similar to the location on the 5.25 drive, where you access the adjustment screw through a hole in the bottom of the drive's outer casing. Before removing the outer casing on the Disk II drive, look at the bottom right in the rear of your drive for a possible opening.

Apple 5.25 – The speed adjustment screw for the 5.25 drive is located at the bottom right in the front, just inside of the right front foot. With your adjustment tool, reach in and make your adjustment.

Common Locations of Apple Disk II Speed Adjustment Trimmers
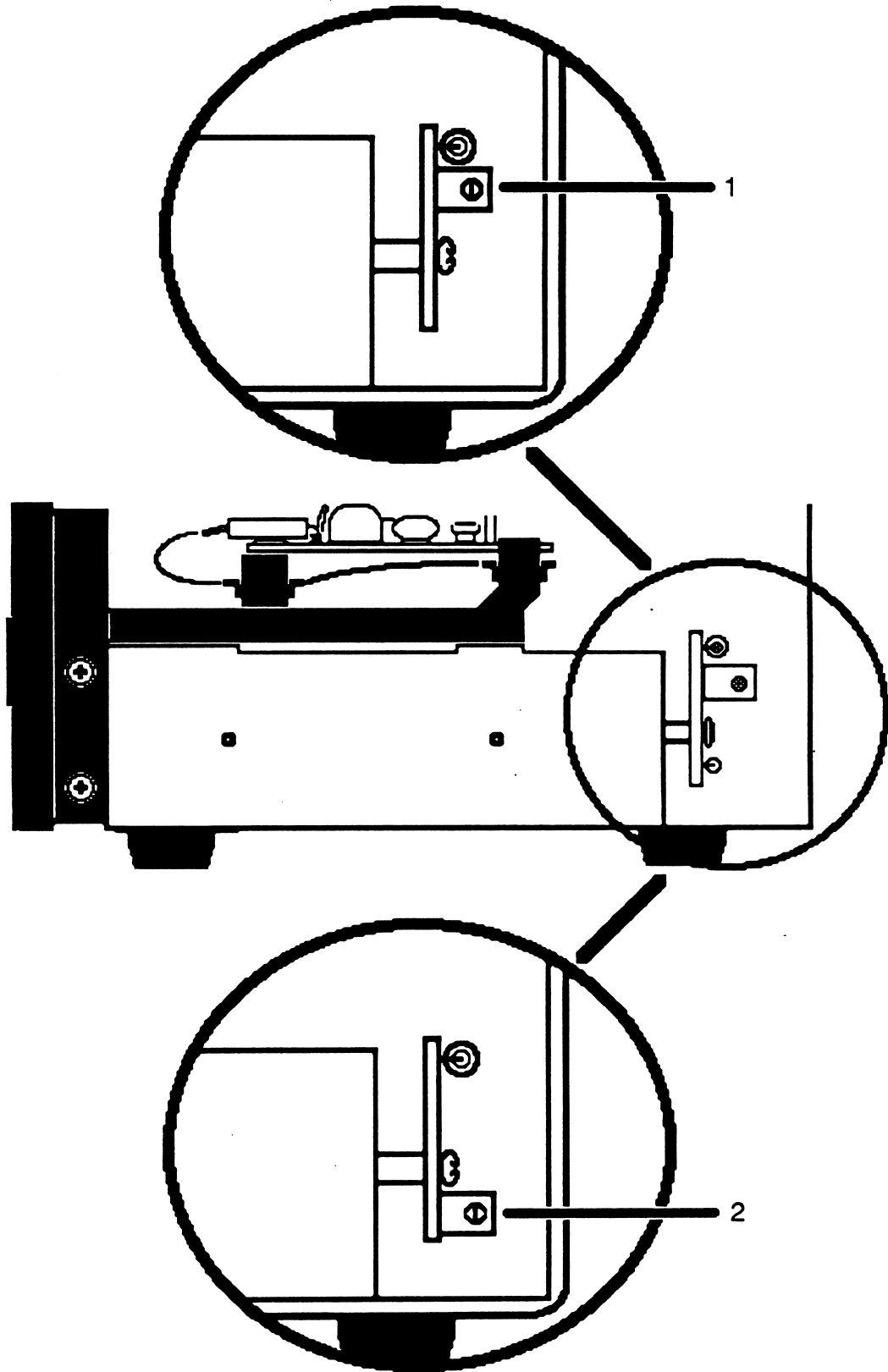
General Operation will check the ability of the disk drive to accurately read, write, and locate data on the diskette (Figure 15).

```
┌─────────────────────────────────────────┐
│         General Operation                │
│  ─────────────────────────────────────   │
│                                          │
│  This test is checking the ability of    │
│  the disk drive to accurately read,      │
│  write, and locate data on the diskette. │
│  Insert a blank or used disk in:         │
│                                          │
│            Slot 4, Drive 1               │
│                                          │
│  WARNING: Be sure the information on      │
│  this diskette is no longer needed. It    │
│  will be erased.                          │
│                                          │
│                                          │
│  _____ Press Space Bar to continue _____ │
│                                          │
│  Escape: Disk Drive Menu                 │
└─────────────────────────────────────────┘
```
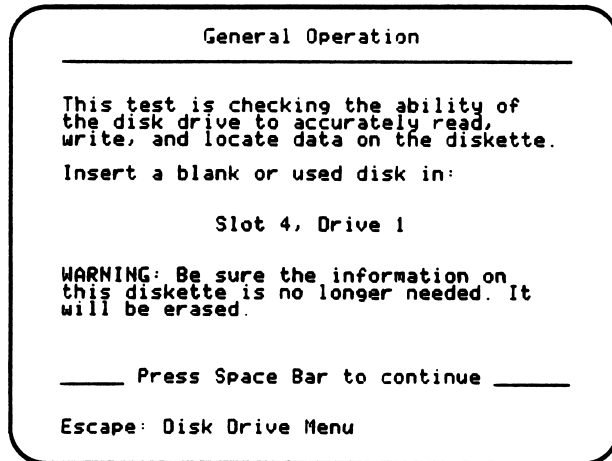
Figure 15

If the test senses an error, it will give you a message to service your diskette.

Before you call for service, repeat the test and check your steps for possible errors. An error may occur because the appropriate drive to be tested was not selected, the drive door was not shut, the diskette was write-protected, or, if you used an initialized diskette, it was not initialized correctly (and may contain a bad sector). Repeat the test and check for all possible errors before calling for service. This may save time and money from an unnecessary service call.

Refer to "Fix It Yourself or Call for Service?" on page 47.

Any repair work should be done by an Apple technician to avoid forfeiting your computer warranty.

The best way to clean your drive head is with a Head Cleaning Diskette, available from your computer dealer. Head cleaning usually takes about 30 seconds per drive. Follow the manufacturer's instructions included with the cleaning kit.

A cleaning diskette is good for several cleanings. If the white diskette jacket begins to look discolored, it is time to replace it.

In your computer environment, avoid cigarette smoke. Smoke may cause damage to your disk drive. Also, keep your diskettes clean and dust-free. Dust and debris will be carried to your drive head from a dirty diskette.
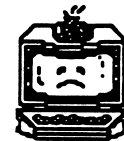
Never lubricate any of the parts of your drive. Lubricants will attract dust and dirt, which may affect the proper functioning of your drive.

Write-Protect Switch

The Write-Protect Switch test checks the current position of the switch. It returns with a message telling you whether the switch is off or "disabled" (writing cannot take place) or on or "enabled" (writing can take place).

The write-protect switch is a mechanical switch located at the left front of the drive. The switch detects if the diskette is write-protected by falling into the notch if it is open (write-enabled) or by stopping if the notch is covered (write-disabled). There are no mechanical parts to adjust in the Duodisk. The "switch" in the Duodisk is an infrared light. A write-protect tab on the diskette will prevent the light from reaching the sensing LED.

Because of this light-sensing LED system, clear tape over the notch will **not** write-protect the diskette.

After conducting the first part of the test, you are instructed to place a write-protect tab over the notch on the diskette if there is not one already there, or to remove the one that is on the diskette and repeat the test (Figure 16). (If you do not have a write-protect tab, flipping the diskette over may also work if the diskette does not have a notch on both edges.) This will "flip" the switch and test its capabilities in the opposite position.

```
                    Write-protect Switch
         _____


         The write-protect switch is currently
         off (writing can take place).


         Place a write-protect tab over the
         notch on your diskette and insert it
         back into the drive.



         _____ Press Space Bar to continue _____

         Escape: Disk Drive Menu
```
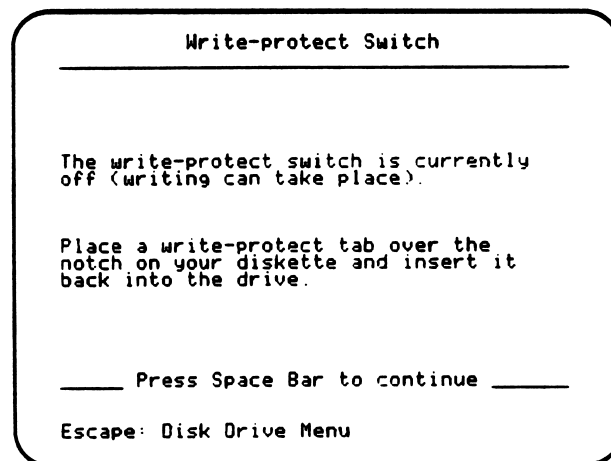
Figure 16

If *Computer Inspector* has any problems while conducting the test, it will display a message and instruct you to consult your dealer.

Before you call for service, repeat the test and check your steps for possible errors. An error may occur because the appropriate drive to be tested was not selected or the drive door was not shut. Repeat the test and check for all possible errors before calling for service. Again, this may save time and money from an unnecessary service call.

Before calling for service, refer to "Fix It Yourself or Call for Service?" on page 47.

RAM Memory Test

The RAM Memory Test examines the main memory and the auxiliary memory of your computer for defects. The test first checks the main memory for bad chips, then tests the auxiliary memory and any existing extended memory. It also has the option of running a continuous test until an error is detected or until the Escape Key is pressed.

The testing begins when you press the Return Key. *Computer Inspector* conducts the first test on the main 48K or 64K of RAM (on the Apple II and II Plus, this includes testing of the language card) and displays the results, then immediately tests the auxiliary memory and displays those results.

Reminder: Use the Space Bar to move forward through the screens and to start the tests. Use the Escape Key to stop a test or to return to the previous menu when you have finished conducting a test.

The test results are displayed along with the name of the memory tested. If no problems in the memory are found, the results will be stated as "OK" (see Figure 17).
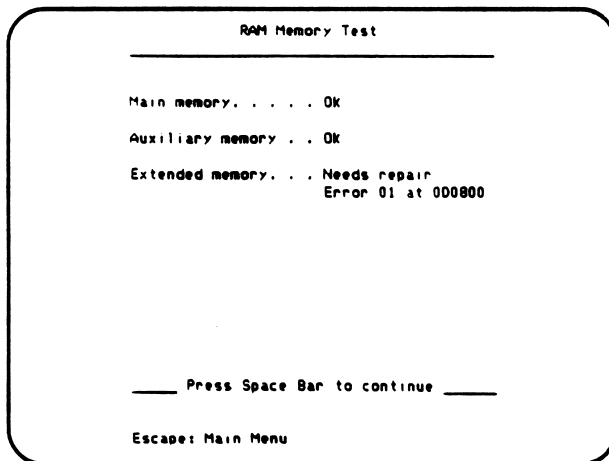
```
                    RAM Memory Test
        _____

        Main memory. . . . . Ok

        Auxiliary memory . . Ok

        Extended memory. . . Needs repair
                             Error 01 at 000800




        _____ Press Space Bar to continue _____

        Escape: Main Menu
```

Figure 17

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When *Computer Inspector* reports memory errors, it displays the bits that were in error and the address of the error in memory. For example:

"Error nn at xxxxxx"

The hexadecimal number 'nn' represents the one or more bits that were found to be faulty. Convert 'nn' to a binary number and every bit that is set (1) is a faulty bit. The hexadecimal number 'xxxxxx' represents the 24-bit address in memory where the error occurred.

The address is information that you can relate to your Apple technician when reporting a computer in need of repair.

You have the option of running a continuous test by pressing the C Key. This test will continuously test the entire range of 48K or 64K RAM until an error is detected or until the test is stopped by pressing the Escape Key or Space Bar.
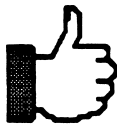
The continuous test may be used to test new equipment or equipment suspected of having defects. The test is best conducted for a long period of time—overnight, for example. If the test is still running the next day without being interrupted by an error detection, the suspected problem may not be in the memory of the computer.

IIGS Bit Decay

Some third-party RAM chips have an incompatible refresh rate that causes the memory to decay (or change value) over time. The IIGS Bit Decay test checks for these incompatible RAM chips and reports their locations. If you add RAM chips to your IIGS memory expansion card, they should have the following attributes:

- 150 nanosecond access time
- 256K bits organized as 256K by 1 bit
- "CAS before RAS" refresh
    "CAS" stands for "Column Address Strobe"
    "RAS" stands for "Row Address Strobe"

Joystick/Paddle Test

If you have a game device attached to your computer, the Joystick/Paddle Test determines the value ranges the device can cover, tests the position of the buttons, and gives the current (x,y) position of the device.

In the case that you do not have a device attached, you will be given a reminder screen telling you that no device is attached.

Reminder: Use the Space Bar to move forward through the screens and to start the tests. Use the Escape Key to stop a test or to return to the previous menu when you have finished conducting a test.

Computer Inspector will test the following devices:

- Koala Pad™
- Joystick
- Game Paddles
- Muppet Learning Keys™

To conduct the test on the push buttons, push each of the buttons. While the buttons are pushed, the screen result should show the button as being "On," and while they are not pushed (in the up position), the screen result should show "Off" (see Figure 18).

```
                              X→
                            Y ↑+┌─────────┬─────────┐
   Value ranges:           ↓   │         │         │
     X- 0 to 255                │         │         │
     Y- 0 to 255                │         │         │
                                │         │         │
   Center (x,y):                ├─────────┼─────────┤
     (128,128)                  │         │         │
                                │         │         │
  ──────────────────           │         │         │
                                │         │         │
   Pushbutton test:            └─────────┴─────────┘
   Button 1  Button 2      Current (x,y)=
    (OFF)     (Off)          (  6,   6)

   Escape: Main Menu
```
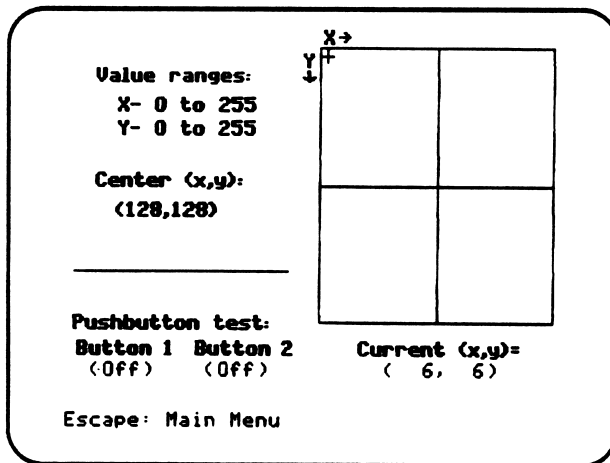
Figure 18

As you move or rotate the game device, the current reading of the position of the device along the x and y axis should change according to your movement. While you are moving the device, check the position of the center of the screen and the ranges on the screen that the device can cover.

To check the center position, center the game device and compare the reading to the stated correct center of the screen: (128, 128). This means an x-axis reading of 128 and a y-axis reading of 128.

The next test is to check the range of the game device. Move the game device to each of the corners of the box on the screen. The readings for each corner should be as follows:

- upper left corner = (0, 0)
- upper right corner = (255, 0)
- lower right corner = (255, 255)
- lower left corner = (0, 255)

You can check the stability of your game device by allowing it to remain motionless. Watch the screen for any *drift*. This is a gain or loss in the amount of resistance of the device. It is ideal for the device to remain steady, but a drift of up to ± 2 is common.

Adjusting the game device

If the positioning of the joystick or game paddle does not match the recommended readings, check your owner's manual for the suggested method of adjusting or repairing your game device.

Section 3.0
Questions? Problems? Look Here

Questions? Problems? Look Here

Disk Drive Speed Test

Message: (Note: To adjust the drive speed, check the manual or
           consult your dealer or service center.)

This message appears if your tested drive speed is above or below the
recommended range of speed (rpm = revolutions per minute). Consult
your dealer or service center to adjust the speed or refer to "Drive
Speed Adjustment" on page 34.

Disk Drive General Operation Test

Message: The disk drive appears to be having problems. Try
           testing with a different diskette. If the problem persists,
           consult your dealer or service center.

This message appears if the drive you tested is not working properly.
Follow the suggested instructions and test with a different diskette in
case the diskette is the cause of the error.

Disk Drive Write-Protect Switch Test

Message: The disk drive appears to be having problems. Try
           testing with a different diskette. If the problem persists,
           consult your dealer or service center.

You are given this message if the test conducted detects any problems
while checking and "flipping" the write-protect switch. Repeat the test
as recommended and, if the problem persists, call your Apple
technician.

*Service
recommendation
messages*

RAM Memory Test

```
┌─────────────────────────────────────────────────┐
│                  RAM Memory Test                  │
│         ─────────────────────────────────         │
│                                                   │
│         Main memory. . . . . Ok                   │
│                                                   │
│         Auxiliary memory . . Ok                   │
│                                                   │
│         Extended memory. . . Needs repair         │
│                             Error 01 at 000800    │
│                                                   │
│                                                   │
│                                                   │
│                                                   │
│                                                   │
│         _____ Press Space Bar to continue _____   │
│                                                   │
│         Escape: Main Menu                         │
└─────────────────────────────────────────────────┘
```
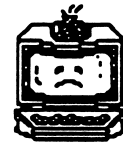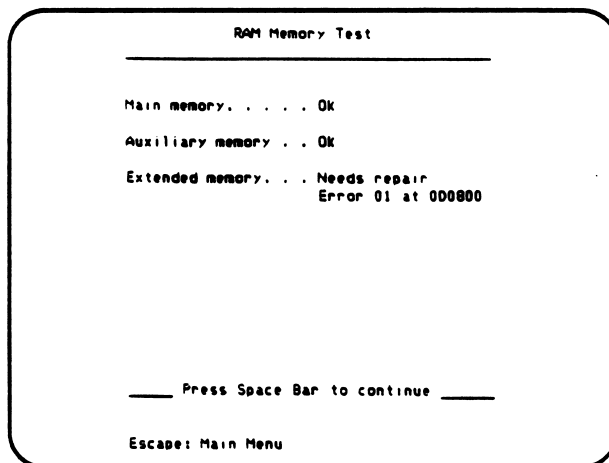
Figure 19

If the RAM Memory Test detects any problems with your computer's memory, it returns with an error number and the address or location of the faulty chip (see Figure 19). You can relate this information to your Apple technician when reporting a computer in need of repair.

Warning messages

Warning! Power off! Never repair or remove anything from the inside of a computer with the power turned on! On the //e, check for a red LED light on the circuit board of your computer. If the red light is on, turn the computer off before repairing or removing cards or game devices. Removing a card with the power on can cause a power surge and damage a chip on the card you are pulling or on the logic board of the interface item you are pulling out, or on the motherboard of your computer.

Before you begin adjusting the monitor there is one caution you need to be aware of. Inside of the monitor is the anode of the CRT. This anode contains enough voltage (12,000 or greater) to be fatal if contacted. This high voltage can be present even if the monitor or TV is unplugged. **Do not** attempt to make internal adjustments to the monitor if you are unsure of what you are doing. **An accident could be physically harmful or fatal.**

Should you receive a message to service the hardware that you are testing, your first move may be to do some troubleshooting on your own, rather than call for service as the test recommends. This may save you time and money by preventing a service call to your location.

Your first step should be to repeat the testing procedure and double-check your steps in conducting the test. Check all the possibilities for errors.

For example, if you were testing the drive speed of drive number 2 and you had not moved the diskette that you used for the previous test from drive 1 to drive 2, you were testing the speed of an empty drive. The test results would state a drive speed of over 600 rpm and the message to consult your dealer or service center. By repeating the procedure you would find the error of having no diskette in your second drive.

Other problems may be due to a bad diskette or a diskette that is write-protected. The diskettes used in conducting the Drive Speed and General Operation tests must not be write-protected. If an initialized diskette is used, it may contain a bad sector. Any problem caused by a faulty diskette will bring an error message from the test. Repeating the test with a different diskette could correct the error.

Fix it yourself or call for service?
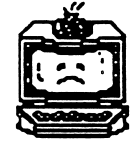
NOTES

Appendices

Credits

Computer Inspector was produced by Diane Portner, Craig Solomonson, Michael Stein, and James Thompson, with special thanks to those Computer Coordinators/Lab Supervisors who answered our questionnaire and gave us the help we needed in creating this product. Special recognition goes to the following people for including their forms, which helped us to create the forms for *Computer Inspector*:

> Willis Binnard
> Palo Verdes USD
> Palos Verdes, California
>
> Rita Hartert
> Spring Valley Elementary School
> Spring Valley, Minnesota
>
> The Computer Staff of Plainview Community School
> Plainview, Minnesota

This manual includes references to the following books and manuals:

Apple 5.25 Drive Owner's Guide. Apple Computer, Inc., 1986.

East, Fred B. and East, Mary Lou. *Programmers' Handbook of Computer Printer Commands – II*, 1986.

East, Fred B. and East, Mary Lou. *Programmers' Handbook of Computer Printer Commands – III*, 1987.

Black, B.R., Hurst, Ward, and Barber, John. *Troubleshooting Microcomputers*.

TO THE READER:

MECC has made every effort to ensure the instructional quality of this courseware package. Your comments—as user or reviewer—are valued and will be considered for inclusion in any future version of the product. Please address comments to:

Machine Identification Form

Model of computer: Apple_____

Amount of memory: _____K of memory

Enhanced? ☐ Yes ☐ No

SLOT/PORT   Type of card or device installed

0   _____

1   _____

2   _____

3   _____

4   _____

5   _____

6   _____

7   _____

Place an asterisk (*) by the slot number to mark an auxiliary slot.

If extended memory: _____ K of memory.

Computer Repair Order

_____ School

Date Reported	Item: (C)omputer (D)isk Drive (P)rinter or Other	Equip-ment Number	Symptoms/Solutions	Date Repaired	Repaired By

(Use C, D, or P to
designate which item.
If other, name the item.)   **Signed:** _____

mecc

Computer Repair History

Item	Model	Serial #	Problem	Solution	Repaired by	Date Reported	Date Repaired	Cost

Equipment Inventory — Station # _____

Computer model: _____ Memory size: _____

Monitor style: _____

Disk Drive #1:　　　☐ 5.25　　　☐ 3.5

Disk Drive #2:　　　☐ 5.25　　　☐ 3.5

Additional Drive:　　☐ 5.25　　　☐ 3.5

Printer:　　　　☐ Yes　　　　☐ No　　Style: _____

Additional Utilities (circle):　　　**Mouse**　　　**Koala Pad**　　　**Graphics Tablet**

　　　Joystick　　　**Mouse pad**　　　**Modem**　　　**FingerPrint™ Card**

_____　　　_____　　　_____

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- -

Equipment Inventory — Station # _____

Computer model: _____ Memory size: _____

Monitor style: _____

Disk Drive #1:　　　☐ 5.25　　　☐ 3.5

Disk Drive #2:　　　☐ 5.25　　　☐ 3.5

Additional Drive:　　☐ 5.25　　　☐ 3.5

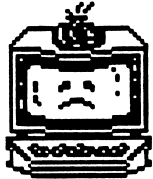Printer:　　　　☐ Yes　　　　☐ No　　Style: _____

Additional Utilities (circle):　　　**Mouse**　　　**Koala Pad**　　　**Graphics Tablet**

　　　Joystick　　　**Mouse pad**　　　**Modem**　　　**FingerPrint™ Card**

_____　　　_____　　　_____

≣mecc

Out
of
Order

Do Not Use

This
equipment
in
need
of
repair

Do Not Use

Service called: _____

Date: _____

Time: _____

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Help List (Troubleshooting Tip Sheet)
What to check at the first sign of a problem

No power to your equipment

- Is the power cord plugged firmly into the electrical outlet?
- Is the cord plugged firmly into the base unit?
- Try an alternative power cord to test if the problem is with the original cord.
- If you are using a power strip, is the strip turned on? Are all cords plugged into the strip? Is the strip plugged into the electrical outlet?
- If your power strip contains a fuse, check the fuse.

Problems with your monitor

Blank screen

- Is your monitor plugged into the electrical outlet?
- Is the video cable connected firmly and correctly with the "video out" (computer) and the "video in" (monitor) connections? Is the cable in need of repair?
- Are the monitor output controls (brightness and contrast) adjusted properly?

Output is distorted, too light, too dark, or flickering, or letters are too small or out of focus
- Check the video cable connections between your monitor and the computer.
- Adjust the vertical and horizontal hold and picture height and width.
- Adjust the brightness and contrast to lighten or darken your screen
- Check to see if the program you are using requires 40- or 80-column screen display.
- Check the condition of the cable; it may be bad.

Disk drive problems

Power is on but drive does not start up
- **Turn off the computer before checking!**
- Check if the interface card is inserted in the proper slot and is seated correctly.
- Is the interface ribbon properly plugged into the card?

Drive will not stop spinning
- Is there a diskette in the drive?
- Is the drive door shut?
- Is the diskette in the drive properly initialized?
- Is the diskette inserted in the drive properly?
- Check to see that the diskette is not damaged.
- Check the alignment and speed of the drive.

Problems with the printer

- Check both ends of the power cord—the connection to the electrical outlet and to the printer.
- Is the select/on-line light on?
- Is the printer cable properly connected to the printer and the computer?
- Is the printer interface card in the correct slot and properly seated in the slot?
- Is the applications program you are using compatible with your printer type?
- Is the program set up to send the proper signals to your printer?
- Is the paper properly loaded?
- Are the print control codes set correctly? (Previous codes may still be active.)

Computer Equipment Inventory

Item	Model	Serial #	Location

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Printer Control Codes

This section contains a chart of some common printer control codes for certain Apple-compatible printers. The type style options available are:

- elite
- pica
- bold or double-strike
- compressed
- ultra-compressed
- enlarged or headline
- letter quality
- underline
- italic

The headings at the top of the columns name some common type styles used on printers. Different brands of printers designate different names for each of these styles; at the heading of these columns are a variety of names for these similiar styles.

The first two columns on the left contain the make and model of the printer. The remainder of the columns contain the control code active on each printer used to print in the styles at the top of the column.

Control codes that contain a hyphen between characters indicate that those keys should be pressed simultaneously; any other control code will need to be pressed in succession. For example, "Esc B 1" means you should first press the Escape Key, then the B Key, and then the 1 Key. "Ctrl-R" means you should hold down the Control Key while pressing the R Key. Commands that follow in italics are the undo command for the previous command. Additional information about the character per inch that will be printed in that particular style is given in brackets.

Reminder: Your printer will stay active with the last control code(s) used until you set it back to normal. Use the undo command to clear single settings and, to clear your printer of all control codes, turn the printer off and back on. By default, this will set your printer to normal text.

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Company	Model	Elite [12] Undo	Pica [10]	Bold Double-strike Emphasize Undo	Compressed Condensed Undo	Ultra-condensed	Double-wide Enlarged Headline Extended Undo	NLQ LQ Undo	Underline Undo	Italics Undo
Apple Computer, Inc.	DMP ImageWriter	Esc E	Esc N	Esc ! Esc "	Esc q [15]	Esc Q [17]	Ctrl-N Ctrl-O Esc n		Esc X Esc Y	
C. Itoh Electronics, Inc.	1550 8510A 8510B	Esc E	Esc N	Esc ! Esc "		Esc Q [17]	Ctrl-N Ctrl-O		Esc X Esc Y	
	8510 S/SC	Esc E	Esc N	Esc ! Esc "		Esc Q [17]	Ctrl-N Ctrl-O		Esc X Esc Y	Esc i 1 Esc i 0
Centronics Data Computer Corp.	150-1 150-2 150-3 150-4					Ctrl-T [16.36]	Ctrl-N			
Diablo Systems, Inc.	S11 S37		Esc 73		Esc 75 [16.7]		Esc 85 Esc 86		Ctrl-R Ctrl-T	
	S32		Esc 73		Esc 75 [16.7]		Esc ! (double-height)		Ctrl-R Ctrl-T	Esc 56 Esc 57
	620 630 API 630 ESC 36 API			Esc O Esc &					Esc E Esc R	

Company	Model	Elite [12] *Undo*	Pica [10]	Bold Double-strike Emphasize *Undo*	Compressed Condensed *Undo*	Ultra-condensed	Double-wide Enlarged Headline Extended *Undo*	NLQ LQ *Undo*	Underline *Undo*	Italics *Undo*
Diablo Systems, Inc. (continued)	P11 P31 P32 P38				Esc C		Ctrl-N (elongated) *Ctrl-O*		Esc U *Esc T*	Esc I *Esc N*
Epson America, Inc.	MX-80			Esc E *Esc F* Esc G *Esc H*	Ctrl-O *Ctrl-R*		Ctrl-N *Ctrl-T* Esc W 1 *Esc W 0*			
	MX-80 III			Esc E *Esc F* Esc G *Esc H*	Ctrl-O *Ctrl-R*		Ctrl-N *Ctrl-T* Esc W 1 *Esc W 0*		Esc 1 Esc 0	Esc 4 *Esc 5*
	MX-80 with Graftrax			Esc E *Esc F* Esc G *Esc H*	Ctrl-O *Ctrl-R* Esc P [16.5] *Esc Q*		Ctrl-N *Ctrl-T* Esc S (expanded)[5] *Esc T*			Esc 4 *Esc 5*
	RX+ series LQ1500 JX-80 Color Printer LX-80 Spectrum	Esc M *Esc P*		Esc E *Esc F* Esc G *Esc H*	Ctrl-O *Ctrl-R*		Ctrl-N *Ctrl-T* Esc W 1 (expanded) *Esc W 2*			Esc 4 *Esc 5*
	P-80X P-80			Esc E *Esc F* Esc G *Esc H*	Ctrl-O *Ctrl-R*		Esc W 1 (expanded) *Esc W 2*			Esc 4 *Esc 5*
Integral Data Systems, Inc.	IDS-480 P80 P132	Ctrl-^	Ctrl-]		Ctrl-Shift-Hyphen† Ctrl-Underscore††		Ctrl-A			

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Company	Model	Elite [12] *Undo*	Pica [10]	Bold Double-strike Emphasize *Undo*	Compressed Condensed *Undo*	Ultra-condensed	Double-wide Enlarged Headline Extended *Undo*	NLQ LQ *Undo*	Underline *Undo*	Italics *Undo*
NEC Information Systems, Inc.	3510 3520 3530 3500R			Esc * *Esc Comma*					Esc Hyphen *EscApostrophe*	
	3515 3525			Esc O *Esc &*					Esc E *Esc R*	
	P6/P7 series	Esc M	Esc P	Esc E *Esc F* Esc G *Esc H*	Esc g [15]	Ctrl-O [17 or 20] *Ctrl-R*	Ctrl-N *Ctrl-T* Esc W 1 *Esc W 0*	Esc X 1 *Esc X 0*	Esc Hyphen 1 *Esc Hyphen 0*	Esc 4 *Esc 5*
Okidata	ML93 ML92 ML84 Step 2	Ctrl-\	Ctrl-^	Esc H Esc T *Esc I*		Ctrl-] [17]	Ctrl-Shift-Hyphen† Ctrl-Underscore††	Esc 1	Esc C *Esc D*	
	Okimate 20 Color Printer (Apple Mode)	Ctrl-\	Esc N			Esc Q [17.1]	Ctrl-N *Ctrl-O*	Esc m	Esc X *Esc Y*	Esc @ / *Esc @ ***
	ML82A ML83A		Ctrl-^				Ctrl-Shift-Hyphen† Ctrl-Underscore††			

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Company	Model	Elite [12] *Undo*	Pica [10]	Bold Double-strike Emphasize *Undo*	Compressed Condensed *Undo*	Ultra-condensed	Double-wide Enlarged Headline Extended *Undo*	NLQ LQ *Undo*	Underline *Undo*	Italics *Undo*
Panasonic Industrial Co.	KX-P1091 KX-P1092	Esc M *Esc P*		Esc E *Esc F* Esc G *Esc H*	Ctrl-O *Ctrl-R*		Ctrl-N *Ctrl-T* (expanded) Esc W 1 *Esc W 0*	Esc n	Esc Hyphen 1 *Esc Hyphen 0*	Esc 4 *Esc 5*
Star Micronics, Inc.	Gemini 10X	Esc B 2	Esc B 1	Esc E *Esc F* Esc G *Esc H*	Ctrl-O	Esc B 3 [17]	Ctrl-N *Ctrl-T* Esc W 1 *Esc W 0*		Esc Hyphen 1 *Esc Hyphen 0*	Esc 4 *Esc 5*

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† Control code for the Apple II and II Plus computers.
†† Control code for the Apple //e and IIGs computers.

NOTES

Numbers in brackets [ ] indicate characters per inch.

Commands in *italics* undo the immediately preceding command.

A hyphen between characters indicates that those keys should be pressed simultaneously. For example, "Ctrl-N" means you should hold down the Control Key while pressing the N Key. This is generally the case with Control Key commands.

Otherwise, keys should be pressed in succession. For instance, "Esc 73" means you should first press the Escape Key, then the 7 Key, and finally the 3 Key. This is generally the case with Escape Key commands.

Glossary

The slot specifically designated for the Apple 80-Column Text Card, Extended 80-Column Card, or other compatible third-party cards.	**Auxiliary slot**
A "pluggable" board or unit for the interior of a computer, used for printed-circuit wiring and components.	**Card**
Small rectangular pieces inside a microcomputer, which are made of a semiconducting material and which contain electrical circuits.	**Chips**
Cathode-ray tube.	**CRT**
A card which operates the disk drive, usually placed in Slot 6 on the main circuit board of the Apple II.	**Disk controller**
A mechanical device capable of reading and writing information on a diskette.	**Disk drive**
Thin plastic disks, hard- or soft-encased, used by computers to store information (soft-encased diskettes are also known as floppy disks).	**Diskettes**
Fluctuations or changes in information due to environmental conditions.	**Drift**
An accessory to the Apple II containing two units, each with a button and a knob, used to control action in game programs.	**Game controls**
The physical pieces of a computer.	**Hardware**
High Graphics Resolution screen, a 280-by-180-dot screen that can be used to draw shapes.	**HGR**
Information put into a computer system.	**Input**
Circuits that adapt and convey signals between the computer and a peripheral device connected to the computer.	**Interfaces**
A circuit board used to connect the Apple II computer to peripheral devices (such as a printer or disk drive).	**Interface card**

Joystick	A computer input device with a button and movable "stick" used to control action in game programs.
K	Symbol meaning "kilobyte," or 1,024 bytes.
Main logic board	The main circuit board containing the chips that make the computer work and into which various peripheral cards can be inserted. Also called "motherboard."
Main memory	The part of the computer system where information is stored.
Memory	Chips inside a computer with the capacity to store information for later retrieval.
Microprocessor	The central unit of a microcomputer, which controls the flow of all information going into and coming out of the system, and which performs mathematical operations. Also called the "controller" or "CPU" (Central Processing Unit).
Monitor	The video display unit (similar to a television) used as a means of displaying output.
Motherboard	See "main logic board."
Output	Information sent out from the computer to the monitor, printer, or storage via the disk drive.
Peripheral	A hardware attachment to a computer that allows for capabilities beyond processing. Peripherals include printers, disk drives, monitors, modems, etc.
Port	A place of access to a system or a circuit board.
Power Supply	A large metal box located inside the Apple II that accepts the current from an electrical outlet.
RAM	Acronym for "random-access memory," memory that "remembers" the current program. The contents of this memory change each time a different program is run. (It is erasable, like a chalkboard.)
ROM	Acronym for "read-only memory," memory that is built into the machine and cannot be changed. It is used to remember the BASIC language, for example.
RPM	Revolutions per minute.
Slot	A place of access to a system or circuit board.
Software	The programs used by a computer.

MECC SERVICES

MECC is an organization established in 1973 to assist Minnesota schools in implementing educational computing. MECC provides a variety of services to education, including 1) development and distribution of instructional computing courseware; 2) in-service training for educators and development of materials for conducting training; and 3) educational computing assistance through newsletters and equipment purchase contracts. MECC's knowledge and expertise in the educational computing field comes from more than fifteen years of working with and providing leadership for thousands of educators on a daily basis.

- *MECC Educational Computing Catalog*
  A catalog containing descriptions of instructional computing courseware as well as training and planning materials is published annually and distributed at no charge. To request a catalog, write or call MECC Customer Services.

- **MECC Memberships**
  Educational institutions may become MECC Members, which qualifies them to obtain MECC courseware and training at specially reduced prices. To learn more about MECC Memberships, write or call MECC Marketing.

- **Training Programs**
  MECC conducts educational computing workshops for educators throughout the United States. For information on workshop schedules or to arrange a special training activity, write or call MECC Training Services.

- *MECC Network* **Newsletter**
  Published regularly throughout the school year, MECC's newsletter focuses on MECC activities, services, and products. To obtain, write or call indicating your interest in the *MECC Network* newsletter.

For information on all the above items, use the MECC General Information telephone number: 612/481-3500.

- **Help Line**
  If you have any problems using MECC software:
  1) make note of the *name* and *version number* of the product;
  2) note the *brand* and *model* of the equipment involved, as well as the type of *printer card* used if the problem concerns a printer;
  3) write or call the Help Line to describe the problem (**612/481-3660**).

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