Apple IIe Enhancement Kit

Installation Guide

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Enhancement Kit

Contents

What the Apple IIe Enhancement Gives You...1

Flexibility and Convenience 2
Pictorial Characters 2
Pull-Down Menus and Windows..... 4
Speed 6
Software Compatibility..... 7
Apple II Pascal..... 7
Startup Drives..... 8
Video Enhancements..... 8
Applesoft 80-Column Support 8
Applesoft Lowercase Support..... 9
System Monitor Enhancements..... 9
Hardware Changes..... 9

Enhancement Kit Installation.....10

Opening Display 10
Chip Removal Procedure..... 13
Enhancement Chip Installation 15

Final Note!.....17

What the Apple IIe Enhancement Gives You

The Apple™ IIe enhancement kit gives your Apple IIe greater compatibility with the Apple //c and lets you run state-of-the-art software that's been designed to take advantage of your enhanced machine. Some features this new software may include are pull-down menus, pictorial characters, faster and smoother-looking graphics, and the ability to use the computer to work on one document while the printer is printing another. The enhancement kit involves replacing four integrated circuit chips in your Apple IIe with these more powerful chips:

- A character generator ROM, which makes it possible for your enhanced IIe to run software that uses pictorial characters and pull-down menus.
- Two new monitor ROMs, which allow your enhanced IIe to run software that incorporates features such as faster scrolling and smoother-looking graphics.
- A 65C02 microprocessor, which replaces the 6502 microprocessor and gives your IIe the ability to run most Apple //c software.

The IIe enhancement by itself does not automatically give you pictorial characters, pull-down menus, and speed. You'll get the full benefit of your enhanced IIe when you use software that takes advantage of its enhanced features.

Flexibility and Convenience

The IIe enhancement gives you more flexibility and convenience in several ways:

- If you write programs, you don't have to buy an assembler. You can write small machine-language programs with the new Mini-Assembler.
- You can type Applesoft BASIC and ProDOS programs and commands in uppercase or lowercase. This means that if you forget to press Caps Lock, you won't get a 'SYNTAX ERROR' message. Also, Applesoft now works in 80-column mode.
- The IIe enhancement also offers several programming benefits. For details about these benefits and about the Mini-Assembler, see About Your Enhanced Apple IIe: Programmer's Guide.

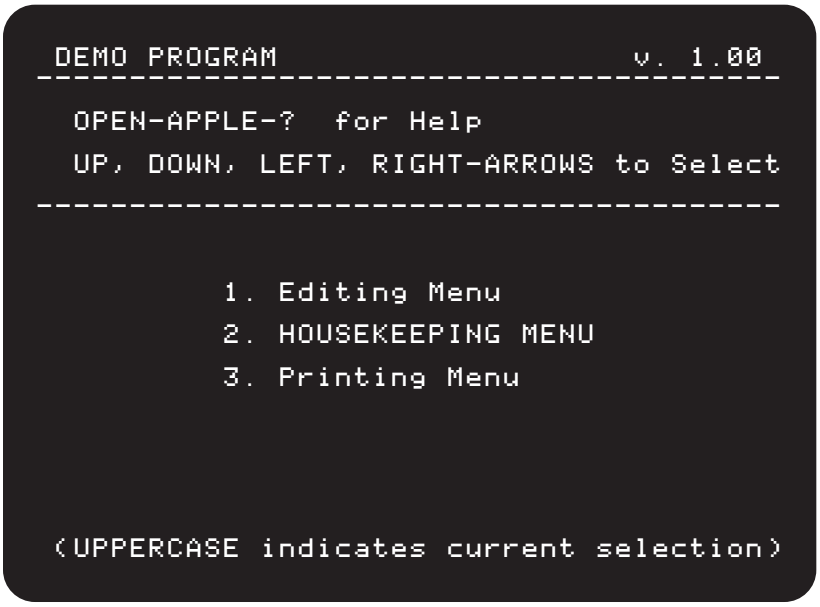
Pictorial Characters

The new character generator ROM not only generates all of the characters that you're used to seeing on your Apple IIe display, it also gives you pictorial characters that make learning intuitive and fun.

When you use software that takes advantage of this feature, you'll see that many of the keystrokes, commands, and concepts that used to be represented on the display in words are now represented in pictures. For example, with the Enhanced IIe and appropriate software, instead of seeing `'OPEN-APPLE'` on the screen you'll see .

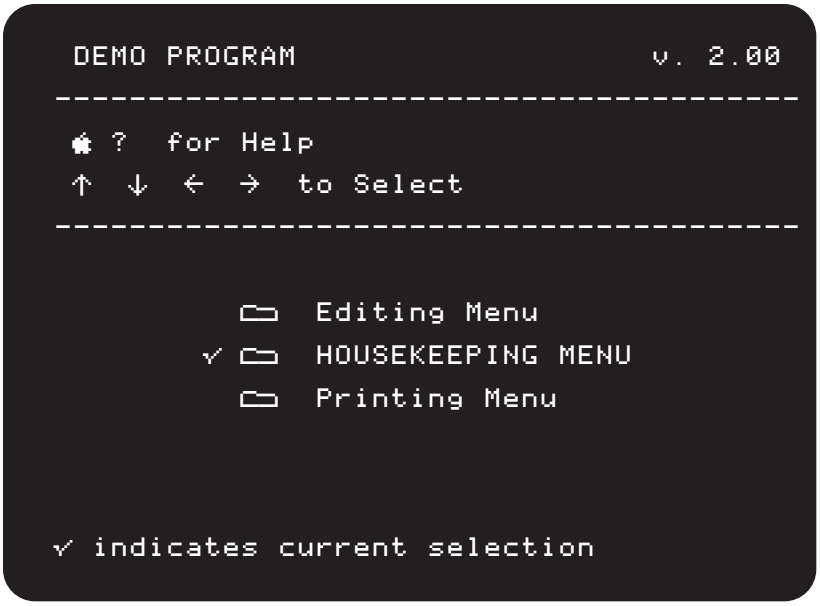
To see how pictorial characters can simplify the display and make it easier to read, compare Figure 1 (unehanced IIe display) with Figure 2 (the same display with many of the words replaced by pictorial characters).

Figure 1. Typical Display Without IIe Enhancement



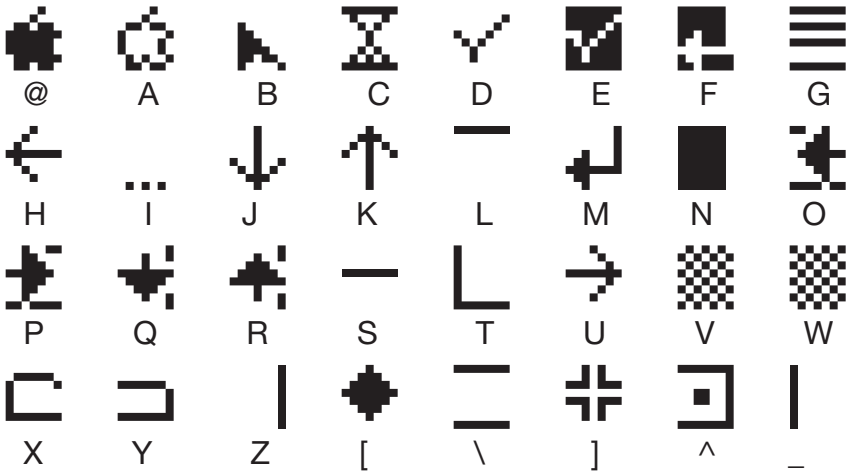
The unenhanced IIe displays the familiar alphanumeric characters and is without the ability to show pictorial characters that will be made available once the IIe enhancement kit has been installed as seen in Figure 2.

Figure 2. IIe Enhancement Capable Software



The pictorial characters included in the enhanced IIe and the more familiar alphanumeric characters they correspond to are shown in Figure 3. (Notice that some of the pictorial characters form a picture only when used side by side. For instance, the pictorial characters associated with the letters F and G form the image of a running man when they're put side by side. Those characters associated with X and Y form the image of a file folder.)

Figure 3. Pictorial Characters in IIe Enhancement



If you have an 80-column text card and want to display the pictorial character set on your own screen, you can do so by starting up ProDOS™ and then running this short **BASIC** program:

To find out how to run a **BASIC** program, see the chapter on programming in your *Apple IIe Owner's Manual.*

```
10 D$ = CHR$ (4): REM CONTROL-D
20 PRINT: PRINT D$; "PR#3" : REM TURN ON
   80-COLUMN CARD
30 INVERSE
40 PRINT CHR$ (27);
   "@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_";:
   REM PRINT ALTERNATE CHARACTER SET
50 PRINT CHR$ (24);: REM TURN OFF THE
   ALTERNATE CHARACTER SET
60 NORMAL : REM TURN OFF INVERSE
```

Pull-Down Menus and Windows

With the IIe enhancement you can also run software that uses pull-down menus and windows. Your IIe can give you these features because some of the new pictorial characters are line-drawing characters - characters that are specifically used to create crisp-looking comers and rectangular images.

FYI: It's possible to have pull-down menus and windows without the IIe enhancement however, they don't look as good, because they must be created with vertical bars (|) and underline characters (_) instead of pictorial characters.

The appeal of pull-down menus and windows is more than just cosmetic: they allow you to use a program without knowing its commands or the structure of its menus. Instead of memorizing commands and typing them, you can look at a menu and see what's available, then select what you want by pointing to it with the cursor.

To see an example of how pull-down menus and windows· can save you time and frustration, compare Figures 4 and 5. Figure 4 shows a typical way of saving a file: by typing the command (/S) followed by the name of the file and the number of the disk drive to save it to.

Here, you must memorize the command, the drive number abbreviation, and the syntax to put it all together.

Figure 4. Typing a Command

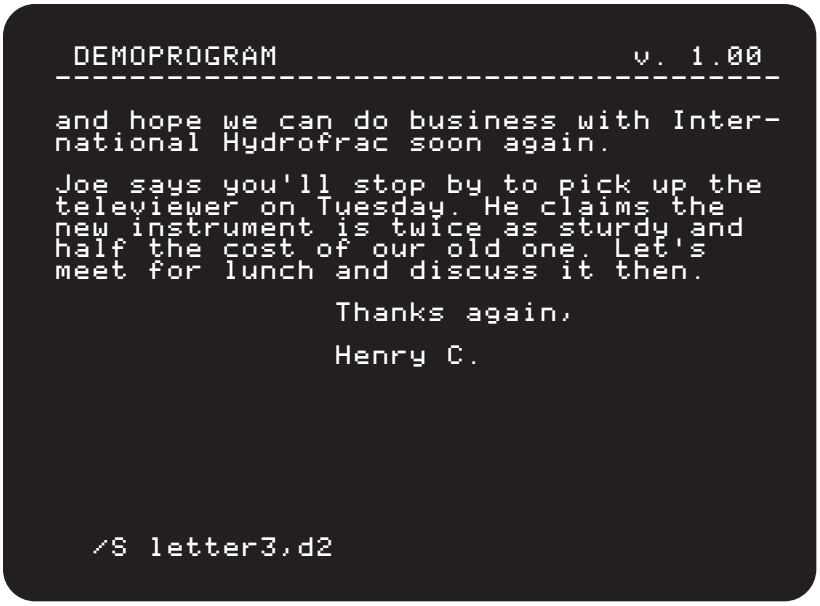
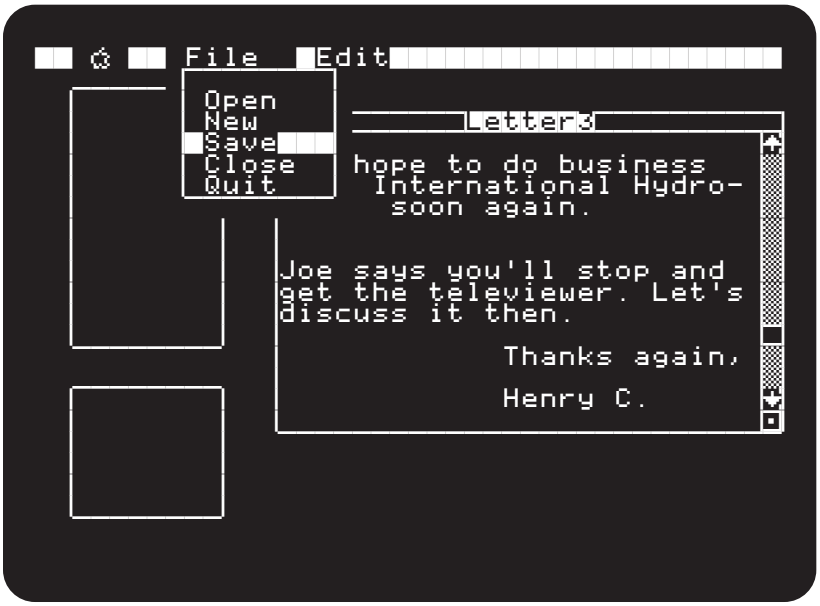


Figure 5 on the following page shows how to do the same thing using software that has pull-down menus and windows. You just point the cursor at the menu you want and pull it down to see the commands that are contained in it, then select the command you want with the cursor.

Figure 5. Selecting a Command From a Pull-Down Menu



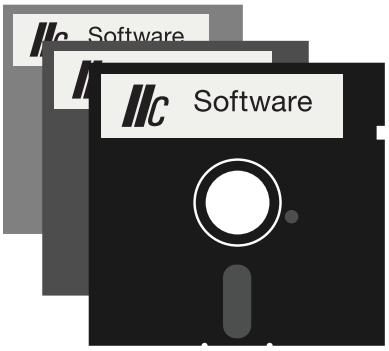
Speed

Your enhanced Apple IIe has the potential to run software a lot faster, so it can give you faster scrolling, smoother-looking graphics, and quicker mouse response. With the IIe enhancement and software that takes advantage of it, your Apple doesn't have to spend time checking each device every few moments to see if it needs attention. Instead, devices can now ask for the attention of the computer directly. Software that takes advantage of this ability to "interrupt" the computer can run up to 30% faster on an enhanced IIe than it would on a IIe that has not been enhanced.

The enhanced IIe's ability to handle interruptions also allows you to perform some time-dependent functions that were difficult or impossible to do before. For instance, with the enhanced IIe and appropriate software you could print one document while you're working on another — because your enhanced IIe can format pieces of one document and send them to the printer during the spare bits of time when you're editing the other.

Software Compatibility

With the IIe enhancement you can now run the new, easy-to-use software developed originally for the Apple IIe — and //c upgrades of old favorites as well. This means that you have access to a larger volume of software, and software that has a more consistent, intuitive interface.



The result: shorter learning time — *and more fun!*

Most IIe software will run just the same on an enhanced IIe as it does on a IIe without the enhancement. However, in a few cases software will behave differently. That's why it's a good idea to check all of your existing software right after you install the IIe enhancement kit. That way, if you have a piece of software that doesn't work properly, you'll know - and avoid the confusion of trying to track the problem later on.

Of the few programs that are affected by the IIe enhancement, most are only superficially affected: in some programs, highlighted uppercase characters are displayed as pictorial characters instead. Here's why: The original character generator ROM had two identical sets of highlighted uppercase characters.

The enhanced character generator ROM has only one set of highlighted uppercase characters, and replaces the other set with pictorial characters (the characters shown in Figure 3). Hence, programs that used the other set of highlighted uppercase characters now display pictorial characters in their place.

Apple II Pascal

Apple II Pascal'(version 1.2 and later) can now use a ProFile hard disk through the Pascal ProFile Manager.

The Pascal 1.1 firmware no longer supports the control character that switches from 80-column to 40-column operation. This control character is no longer supported because it can put Pascal in a condition where the exact memory configuration is not known.

Apple II Pascal versions 1.3 and later may start up from slots 4, 5, or 6 on a Disk II, ProFile, or other Apple II disk drive. Apple II Pascal versions 1.0 through 1.2 must start up from a Disk II in slot 6. DOS 3.3 may be started from a Disk II in any slot.

Startup Drives

You can use startup (boot) devices other than a Disk II to start up **ProDOS** on the enhanced Apple IIe.

ProDOS is the operating system for the Apple IIe that allows you to use both drives for flexible disks and mass storage devices (such as the ProFile disk drive).

When you turn on your enhanced Apple IIe, it searches for a disk drive controller to start up from, beginning with slot 7 and working down toward slot 1. As soon as a disk controller card is found, the Apple enhanced IIe will try to load and execute the operating system found on the disk. If the drive is not a Disk II, then the operating system of the startup volume must be either ProDOS or Apple II Pascal (version 1.3 or later). If it is a Disk II, then the startup volume may be any Apple II operating system.

Video Enhancements

The enhanced Apple IIe has improved 80-column firmware:

- The enhanced Apple IIe now supports lowercase input.
- Esc Control E passes most control characters to the screen.
- Esc Control D traps most control characters before they get to the screen.
- Esc R removed because uppercase characters are no longer required by Applesoft.

Both 80-column Pascal and 80-column mode Applesoft output are faster than before and scrolling is smoother. 40-column Pascal performance is unchanged. In the original Apple IIe, characters echoed to COUT1 during 80-column operation were printed in every other column; the enhanced Apple IIe firmware now prints the characters in each column.

Applesoft 80-Column Support

The following Applesoft routines now work in 80-column mode:

- HTAB
- TAB
- SPC
- Comma tabbing in PRINT statements.

Applesoft Lowercase Support

Applesoft now lets you do all your programming in lowercase. When you list your programs, all Applesoft keywords and variable names automatically are in uppercase characters; literal strings and the contents of DATA and REM statements are unchanged.

System Monitor Enhancements

Enhancements to the Apple IIe's built-in Monitor include the following:

- Lowercase input
- ASCII input mode
- Monitor Search command
- The Mini-Assembler

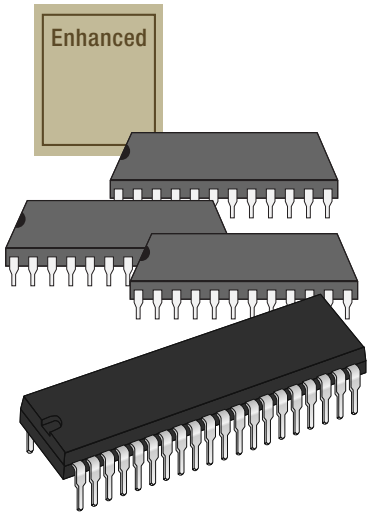
Hardware Changes

The enhanced Apple IIe includes the following changes from the original Apple IIe:

Opcode is short for *operation code* and is used to describe the basic instructions performed by the central processing unit of a computer.

- The 65C02 microprocessor, which is a new version of the 6502 uses less power, has 27 new **opcodes**, and runs at the same speed as the 6502.
- The identification byte at $FBC0 has been changed. ln the original Apple IIe it was $EA (decimal 234), in the enhanced Apple IIe it is $E0 (decimal 224).
- Interrupt handler support in the enhanced Apple IIe firmware now handles any Apple IIe memory configuration.

Enhancement Kit Installation



To upgrade your Apple IIe, you will be replacing four integrated circuit chips currently installed on the mainboard with four new chips from the Apple IIe Enhancement Kit as shown in Table 1.

Table 1. Apple IIe Enhancement Kit

Qty.	Chip Name
1	65C02 Microprocessor
1	CD Monitor ROM
1	EF Monitor ROM
1	Character Generator (Video) ROM
1	Keyboard Enhanced Label (Optional Installation)

Figure 6 shows the main logic board (motherboard) locations of the chips to be replaced on a U.S. (NTSC) main logic board; Figure 7 shows the same things on a European (PAL) main logic board.

Opening Display

Before installing the Enhancement kit, your Apple IIe will display the following at the top of the monitor screen when powered on:

```
Apple ]C
```

While your newly upgraded enhanced Apple IIe will display the following:

```
Apple //e
```

Figure 6. Chips on U.S. (NTSC) Main Logic Board

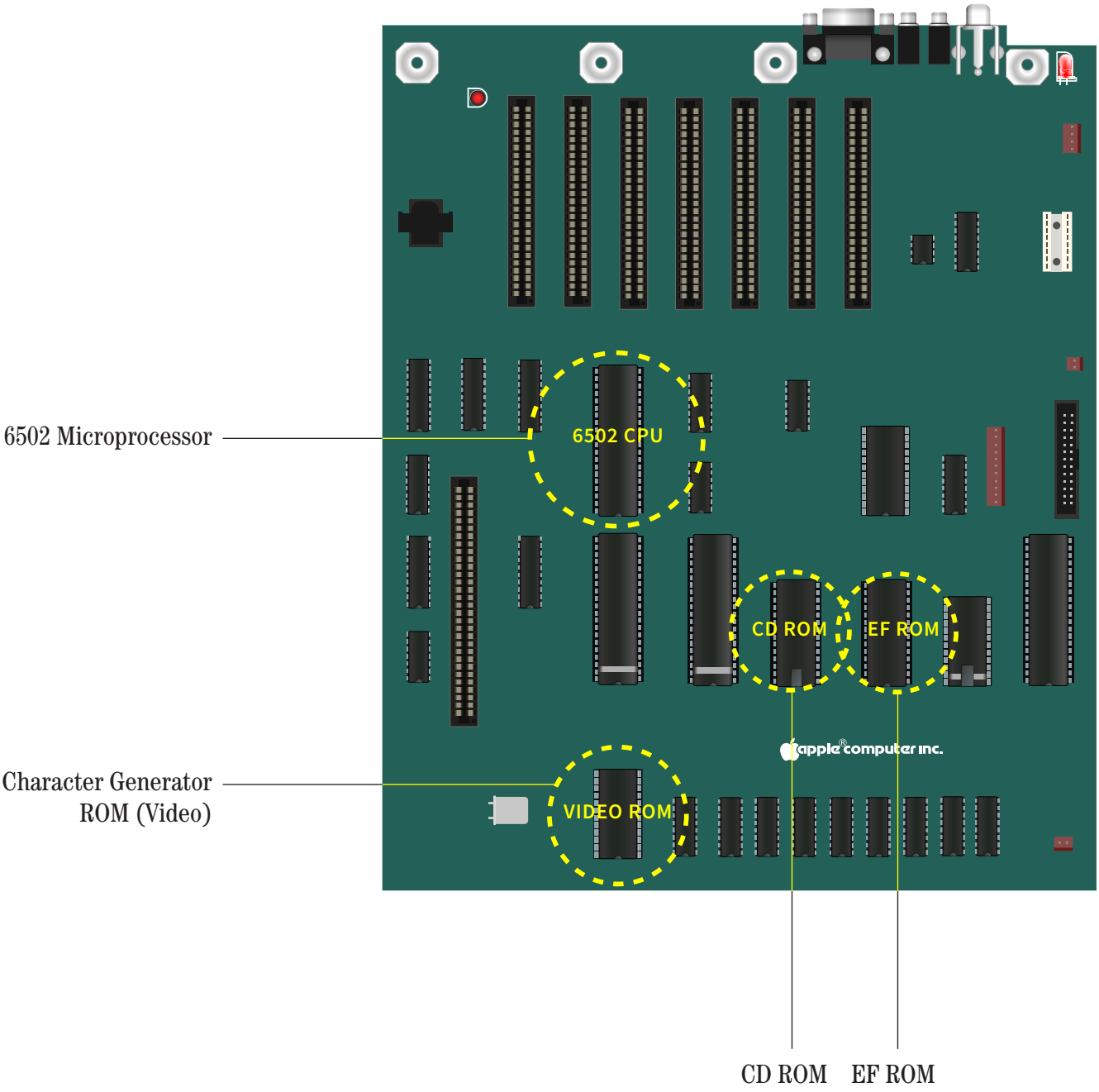
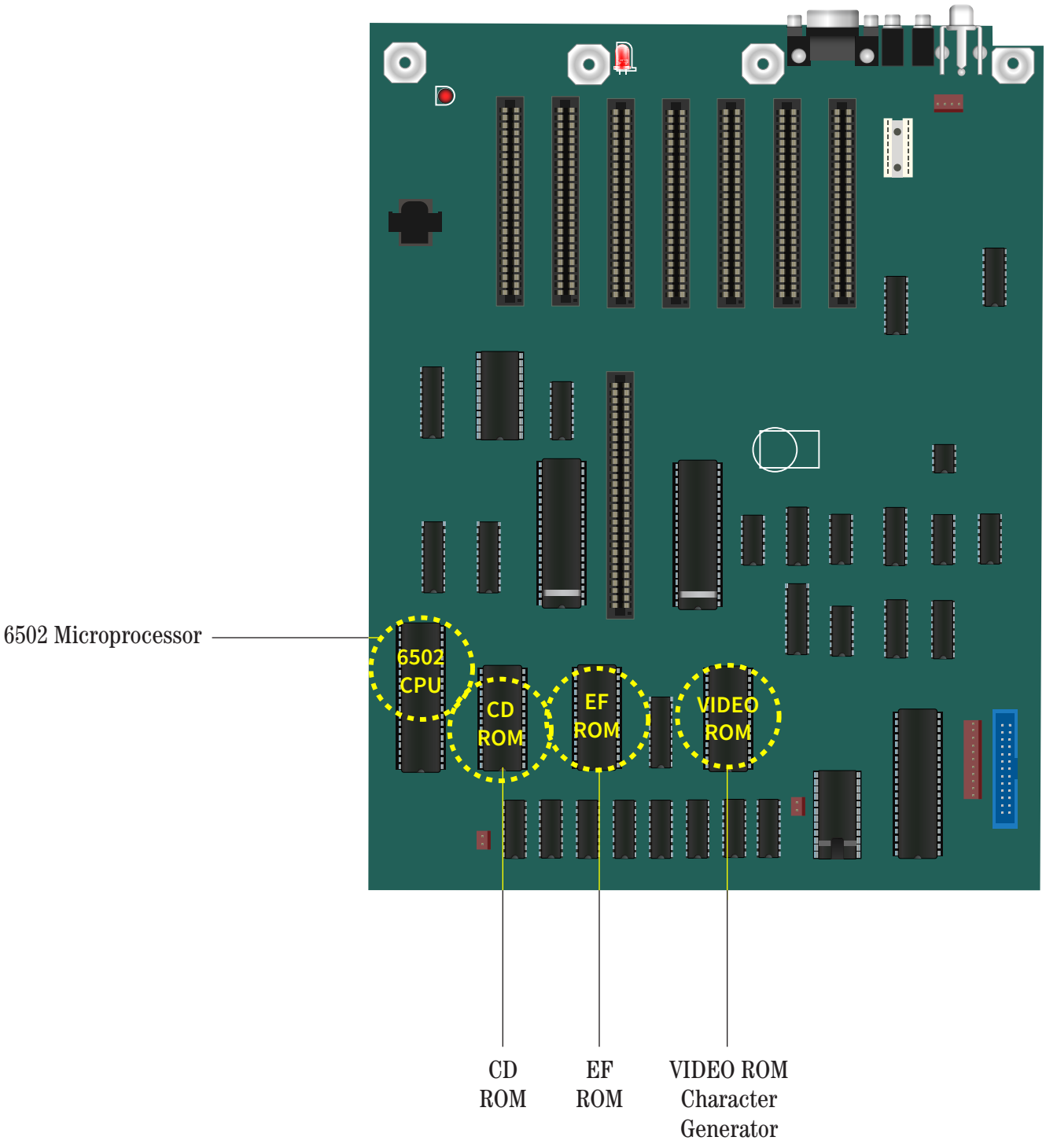


Figure 7. Chips on European (PAL) Main Logic Board

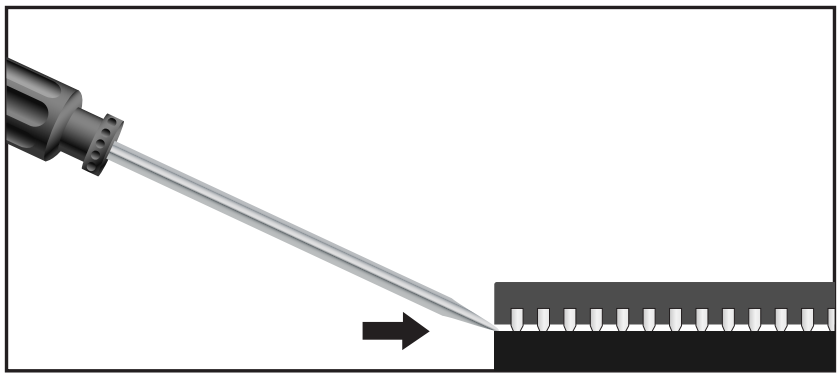


Chip Removal Procedure

Notice: You may need to remove interface cards to get to the chips.

1. Turn off the power switch but leave the computer plugged in, this will keep the computer grounded.
2. Remove the cover, then check to be sure the small red light inside the case is off.
3. Touch the power supply case to discharge any static electricity.
4. Locate the four chips to be replaced as shown in Figure 6 if you're changing the chips in a U.S. Apple IIe or Figure 7 if you're changing the chips in a European Apple IIe.
5. Using a small screwdriver with a narrow, flat blade, insert the flat end under the chip and not the socket as seen in Figure 8.

Figure 8. Inserting Screwdriver



6. Pry the chip from it's socket, it is very easy to accidentally pull up the socket along with each chip, be careful not to bend the leads.
7. Remove the chip at each end a little bit at a time as seen in Figure 9 and Figure 10, this will rock the chip out of the socket.

Figure 9. Raise the Chip

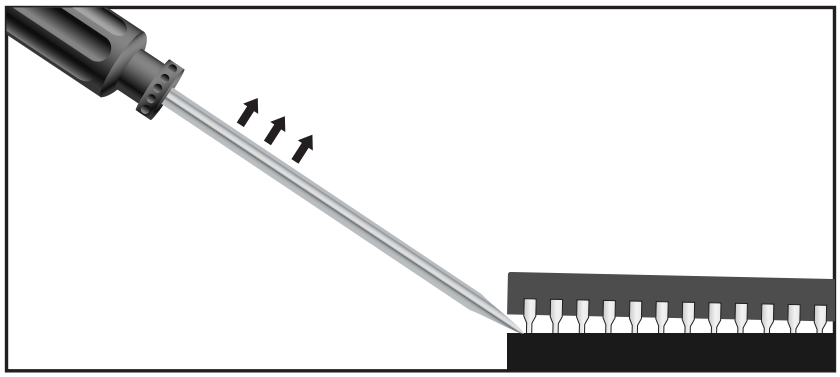
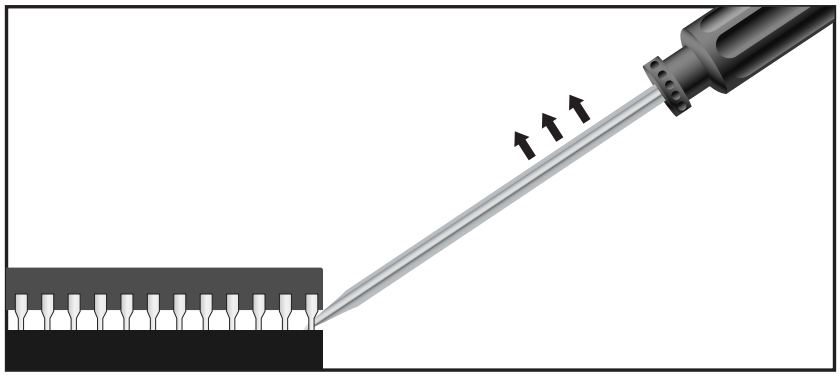
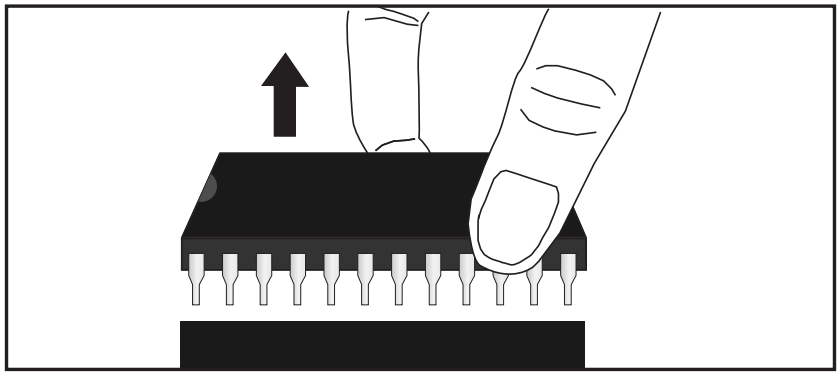


Figure 10. Raise the Chip (Both Ends)



8. Gently raise and remove each chip from its socket as seen in Figure 11. If the chip does not pull out easily, do not force it out, continue to carefully use the screwdriver at opposite ends until the chip is loose enough to remove with your fingers.

Figure 11. Remove the Chip



9. Repeat above steps untill all 4 chips have been removed from the mainboard, inspect the chips and sockets to make sure not leads have broken off inside any of the sockets, if by chance any lead has been broken off inside any of the socket holes, use tweezers to remove the lead.

Enhancement Chip Installation

Here is the installation procedure.

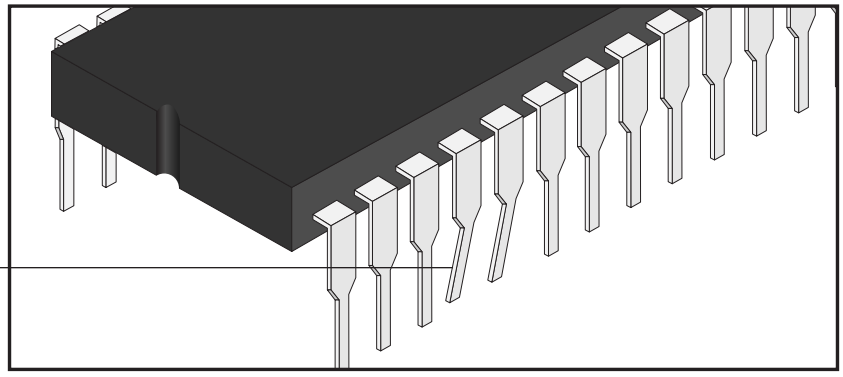
1. The Enhancement Kit as shown in Table 1 contains 4 chips that you will install, the monitor ROM CD, monitor ROM EF, and the 65C02 microprocessor.
2. Notice that there is a small notch on one end of each chip as seen in Figure 12. This notch should face the keyboard when the chip is in place.

Figure 12. Chip Notch

Proper orientation chip notch.

3. Before installing each chip check for any bent leads as seen in image Figure 13.

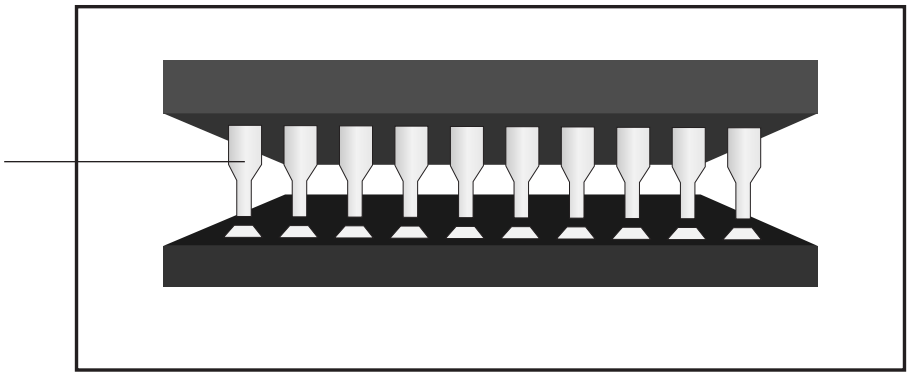
Figure 13. Chip Leads



Inspect each chip to make sure all the leads are straight and properly aligned before insertion.

4. When installing each chip make sure all the leads go in correctly as seen in Figure 12. Align all of the pins of a chip so that they will enter the sockets without bending. Press down evenly on the chip until it is in place.
5. Once you've installed all 4 chips, double check them all one more time to make sure everything is installed correctly.

Figure 14. Lead Alignment

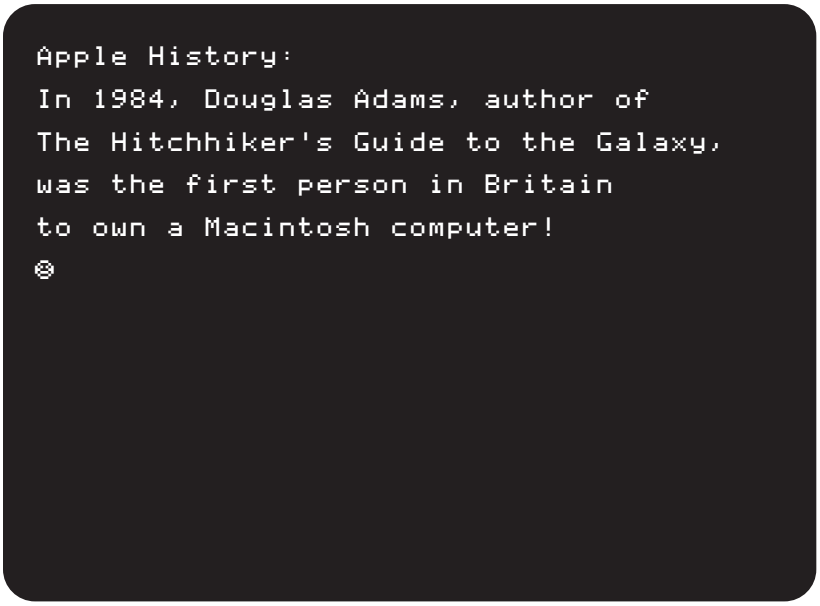


6. Replace any interface cards you may have removed and close the computer cover.
7. Turn on the computer and run a program to make sure the computer works properly.

Final Note!

Make sure to keep your original chips in a safe, static free bag and don't hesitate to contact ReActiveMicro if you have any questions or need to resolve any technical issues.

Thank you for your purchase of the Apple IIe Enhancement Kit from ReActiveMicro.



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