



MICROCOMPUTER PERIPHERALS

LOWER CASE CHIP

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Apple II® Apple Computer, Inc.
Visicalc® Personal Software
Program Line Editor® Synergistic Software

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LOWER CASE CHIP WARRANTY REGISTRATION

Please print _____

Name _____

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Address _____

City _____ State _____ Zip _____

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Date purchased _____

Purchased from _____

How did you hear of the LOWER CASE CHIP?

How do you plan to use the LOWER CASE CHIP?

What is your Apple II configuration?

Memory size _____ VIDEOTERM _____

Integer _____ Micromodem II _____

Applesoft _____ Softcard _____

Pascal _____ Com. Card _____

Word processor _____

Printer type _____

Video monitor _____

Other _____

OVERVIEW

Introduction

Congratulations on your purchase of the VIDEX LOWER CASE CHIP. The LOWER CASE CHIP allows you to display the entire 96 displayable character set including lower case characters using a 5 x 8 character dot matrix size. These characters have been engineered by VIDEX for high readability and compatibility with existing software for the Apple II and Apple II Plus.

Any software that is written for Dan Paymar's lower case adapter will immediately work with the LOWER CASE CHIP. This includes Super-Text by MUSE, Inc., Program Line Editor by Synergistic Software and many others. Although Apple Writer is not compatible as it comes from Apple Computer, Inc., software 'patches' have been written and are included in this manual along with detailed instructions on incorporating them. A variety of software application examples are provided, including specifics on Apple BASIC and Pascal interaction with the LOWER CASE CHIP.

The remainder of this Overview chapter is devoted to features of the LOWER CASE CHIP and system prerequisites for its proper functioning.

If any difficulty with the chip arises, you should contact the store where you purchased the LOWER CASE CHIP. They should be able to determine if the fault lies with the LOWER CASE CHIP or not. If they cannot help you, please feel free to contact VIDEX directly so that the problem may be quickly corrected.

LOWER CASE CHIP features

- (1) All 96 displayable ASCII characters are available.
- (2) Improved character readability.
- (3) 5 x 8 character matrix.
- (4) Compatibility with all software written to be used with Dan Paymar's lower case adapter.
- (5) No interference with the Apple II's INVERSE, FLASHING, and GRAPHIC modes.
- (6) Software patches for Apple Writer and Pascal.
- (7) Simple and easy instillation that requires no soldering.
- (8) No excess current drawn from the Apple II power supply.

Apple II hardware prerequisites

To use the VIDEX LOWER CASE CHIP your Apple II must be of revision 7 or greater. The revision level can be identified by your dealer or by verifying the absence of the 4K / 16K memory configuration blocks on the Main board at locations D - 1, E - 1 and F - 1.

WARNING! INSTALLATION OF THE LOWER CASE CHIP IN AN APPLE II OF REVISION LESS THAN REVISION 7 WILL VOID THE WARRANTY OF THE LOWER CASE CHIP AND MAY DAMAGE THE APPLE II ITSELF!

INSTALLATION AND CHECKOUT

How to install the LOWER CASE CHIP

As the installation procedure for the LOWER CASE CHIP is different than that for other Apple II peripherals, you should read completely through this section before installing the LOWER CASE CHIP, and then follow the checklist at the end of this section.

VIDEX CAN ASSUME NO LIABILITY OR RESPONSIBILITY FOR DAMAGES CAUSED BY INCORRECT LOWER CASE CHIP INSTALLATION! So please double check installation BEFORE you power up the system.

In the following instructions, it is assumed that you are seated at your Apple II, with the keyboard directly in front of you as if you were about to type. You should clear the top of the Apple II so that you can easily open the computer case to install the LOWER CASE CHIP. You should also clear a work area immediately around the computer as you will need to completely open up the Apple II to have easy access to the main board.

- (1) Turn the POWER switch OFF. The POWER switch is located at the rear of the Apple II near the power cord connector. It is imperative that this be done; otherwise permanent damage may be done to the Apple II Main board and/or any of the other peripheral boards that may be plugged into the expansion bus at the time. You should also detach the power cord from the Apple II as it is necessary to turn the Apple II upside down to remove the bottom retaining screws.
- (2) Remove the cover from the Apple II. Grasp the cover under its rear lip, using one hand at

each corner, and pop the cover loose from its fasteners. Then pull the cover directly out toward the rear to avoid possible prying on the keyboard. When the cover is free, lift and remove it from the Apple II.

- (3) Inside, covering almost the entire bottom of the computer case, is the green PC main board of the Apple II. Across the rear of the main board is a row of 8 connectors or expansion slots. Remove ALL of your peripheral cards from these slots before proceeding further. If you are using an RF modulator, disconnect it from the four prong video output jack on the Apple II main board. Disconnect all cables from the back of the computer, including cassette and video wires.
- (4) Turn your Apple II over and remove the ten screws which hold the outer molded plastic top to the base plate of the Apple II. Three of these screws are located along each side and four along the front. Place the screws aside until time for reassembly. You will notice that the Apple II has a tendency to roll forward onto its keyboard during this procedure. You may wish to place a folded towel under the Apple II keyboard to keep the computer stable.
- (5) Holding the top and bottom together, turn your Apple II rightside up. Slowly raise the top about four inches. You will see that there is a ribbon cable attaching the keyboard to the Main board. Carefully remove the dip pin plug end of the cable from its socket on the main board by easing it slowly upward using a small flathead screwdriver. If you have an IC extractor such as that provided with the Apple language card, you should use it to remove the connector.

Carefully note the orientation of this cable so that you can reattach it in the same way later. You can now completely remove the top of the Apple II and place it to the side.

- (6) Using a flathead screwdriver or the IC extractor, gently remove the 24 pin chip located at board location A - 5, marked 2316, and set it aside. You will not need this chip as long as the lower case chip is installed.
- (7) Examine the LOWER CASE CHIP and ensure the notch is to the left when the label on the chip is read right side up; this is the correct orientation for installing the LOWER CASE CHIP in location A - 5. Position the chip above the socket at location A - 5 and make sure that all the pins are above a hole. It may be necessary to bend some of the pins inward to accomplish this. Do this carefully with a pair of long nose pliers, bending them at the already bent portion. Then firmly press the chip into its socket. Make sure that it is fully seated in the socket and that no pins are bent underneath.
- (8) Bring the top of the Apple II back over the base and lower it so that you can reattach the keyboard ribbon cable to board location A - 7 marked KEYBOARD.
- (9) Reattach your video display and power cord ONLY, as installation of other peripherals at this point is not necessary. Turn on the Apple II and while holding the CONTROL key down, press the RESET key, then the X key, then the B key, then the RETURN key. Now release the CONTROL key. You should be in BASIC. Type in the following program and RUN it.

```
10 CALL -936 : FOR I=160 TO 255 :  
    POKE 864 + I, I : NEXT I  
20 GOTO 20
```

If, at any time while you are typing this program, you see inconsistent characters, turn the Apple II off IMMEDIATELY and investigate installation of the LOWER CASE CHIP. The resultant display of the program is detailed below.

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
```

```
HIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
```

```
pqrstuvwxyz{!}~
```

- (10) Hold the top of the Apple II in place over the base, turn it over and replace the screws in the bottom. Turn the computer rightside up again and reinstall all of your Apple II peripherals. Reconnect your RF modulator, game paddles, cassette and/or video cables to their proper places. Replace the Apple II cover pressing down firmly on both rear corners of the lid to resecure it. Reattach the power cable and turn on the power switch located on the back of the Apple II.

Installation Checklist

To assist you in installation, you may wish to use the following outline as a checklist.

- (1) Turn off the power and unplug the power cord.
- (2) Remove the cover.
- (3) Remove all peripheral devices.
- (4) Turn the Apple II over. Detach the top by removing the screws holding it to the base.
- (5) Turn the Apple II rightside up and carefully remove the top, disconnecting the ribbon cable while removing it.
- (6) Remove chip located at A -5.
- (7) Install LOWER CASE CHIP at location A -5.
- (8) Bring the top of the Apple II over the bottom and reconnect the keyboard. Reconnect the power cord and video display.
- (9) Perform a preliminary checkout of the LOWER CASE CHIP to ensure correct performance.
- (10) Detach the power cord and video display. Reattach the top of the Apple II to its base. Reinstall all peripheral devices. Replace the cover of the Apple II and reattach the power cord.

SOFTWARE

Although you now have the ability to display lower case characters, some software may require changes to permit display of lower case characters. These changes are called software patches. We will discuss the changes by considering different languages and software on the Apple II.

Using lower case in BASIC

In the BASIC languages on a standard Apple II or Apple II Plus, upper and lower case display are fully supported. However, entry of lower case from the keyboard is not supported unless you use a utility program such as Program Line Editor (available from Synergistic Software).

An example of a useful method of entering upper and lower case is given in Program 2. Let's examine this program in detail. Line 5 starts by defining the ESC key (CHRS(27)) to be the shift key toggle. We also set the upper/lower case mode flag, UL = 1, indicating that all characters are to be interpreted as lower case. A value of 2 will indicate that we wish to have all upper case characters until we again type the ESC key.

Line 8 makes sure that UL will always be limited to the values 1, 2, or 3. Line 10 is used to obtain a keyboard character, and then the ASCII value of the character is assigned to the variable X.

In line 15, we test to see if we have received the ESC key entry. If we have, then we will go into shift mode (UL = 2). A second consecutive ESC entry places us in shift lock (UL = 3). Another ESC will put us in lower case again (UL = 4 → UL = 1). This functions very much like a normal typewriter.

As soon as we receive any other key entry, we will proceed to line 20. We jump to a location dependent on the current UL value. If in lower case mode, we will go to line 30. Here we take the value X and add 32 to it if the character is a letter, i.e., if its ASCII value exceeds 63. This converts the upper case alphabetic entry to lower case. We emphasize that this is only done when UL = 1.

If UL = 2, then we go to line 40, skipping the lower case conversion. Line 40 sets UL = 1 again, since the first ESC key was not followed immediately by another ESC. If UL = 3, we would proceed immediately to line 50 to print the character just obtained. Note that for any of the GOTOs we will execute all of the following instructions, until line 50 sends us back to line 10.

Now lets see how the program works using an example. Enter the program and save it. Now RUN it. Let's enter the proper combination of characters so that we will see

HELLO out There

displayed on the screen. Start by typing the ESC twice to enter the shift lock mode. Then type "HELLO". UL will now be equal to 3. Enter another ESC to exit the shift lock mode and type "OUT". The value of UL was changed to 4 and then to 1 before "OUT" was typed, so we will see the word displayed in lowercase. Finally, type the ESC key once and type "THERE". The program will display the "T" in upper case and the rest in lower case. UL was set equal to 2 for "T", and then back to 1 at line 40.

You might want to incorporate this technique into some of your own programs. The character string could be appended to another one until a full line is obtained.

Program listing #2

```
2  HOME
5  UL=1 : A$=CHR$ (27)
8  IF UL = 4 THEN UL = 1
10 GET X$ : X = ASC ( X$ )
15 IF X$ = A$ THEN UL = UL + 1 : GOTO 8
20 ON UL GOTO 30, 40, 50
30 X$ = CHR$ ( X+ (32 * ( X> 63)))
40 UL = 1
50 PRINT X$; : GOTO 10
```


Using lower case in Pascal

In order to display lower case characters when using the Pascal Language, you must make a one time change to your APPLE1 diskette, modifying the file SYSTEM.APPLE. Enter the LWRPATCH program listed as program #3 using the Pascal Editor, compile and run it. You will need to have APPLE1 in drive Volume 4 and it muSt not be write protected. After running it, you must reboot your system by typing an H.

Program listing #3

```
PROGRAM LWRPATCH;
{This program patches the SYSTEM.APPLE for displaying }
{lower case with the KEYBOARD & DISPLAY ENHANCER for }
{Pascal 1.1.                                     Darrell Aldrich 1/81 }

VAR BUF:PACKED ARRAY [0..31,0..511] OF 0..255;

F:FILE;
I:INTEGER;
BEGIN
  RESET(F,'#4: SYSTEM.APPLE');
  I:=BLOCKREAD (F,BUF,32);
  CLOSE (F)
  BUF[5,388]:=76;  BUF[5,389]:=156;  BUF[5,390]:=219;
  BUF[5,391]:=177;  BUF[5,392]:=240;  BUF[5,393]:=76;
  BUF[5,394]:=142;  BUF[5,395]:=219;  BUF[5,396]:=177;
  BUF[5,397]:=242;  BUF[5,598]:=72;   BUF[5,399]:=41;
  BUF[5,400]:=127;  BUF[5,401]:=201;  BUF[5,402]:=64;
  BUF[5,403]:=104;  BUF[5,404]:=144;  BUF[5,405]:=3;
  BUF[5,406]:=73;   BUF[5,407]:=160;  BUF[5,408]:=96;
  BUF[5,409]:=73;   BUF[5,410]:=128;  BUF[5,411]:=96;
  BUF[5,428]:=32;   BUF[5,429]:=135;  BUF[5,430]:=219;
  BUF[5,531]:=234;  BUF[5,448]:=32;   BUF[5,449]:=140;
  EUF[5,450]:=219;  BUF[5,451]:=234;  BUF[5,169]:=176;
  BUF[5,170]:=4;   BUF[5,171]:=234;  BUF[5,172]:=234;
  RESET(F,' #4 : SYSTEM . APPLE')
  I:=BLOCKWRITE(F,BUF,32);
  CLOSE (F)
END.
```

Using the LOWER CASE CHIP with Apple Writer

Unlike many word processors for the Apple II, Apple Writer does not use conventional characters for display; for instance, an exclamation mark is really a lower case A, but since an Apple II without a LOWER CASE CHIP displays differently, it appears as an exclamation mark.

To make Apple Writer not only display the correct characters but also display true upper and lower case characters instead of inverse video and upper case, make the changes that are summarized in listing 7. To make these changes, boot the Apple Writer disk and upon entering the editor, type Q to quit. Now type the following:

```
CALL-151 (CR)
```

Note the appearance of (CR) in the following listings indicates pressing the RETURN key. Enter the changes indicated for TEDITOR on page 3-6. Note that the asterisk on the left hand side of the listings is typed by the computer. You should not type the asterisk, just the information following it. Then save the changes by entering

```
BSAVE TEDITOR,A$803,L$1060 (CR)  
BLOAD PRINTER (CR)
```

and enter the changes indicated for PRINTER. Note that one of these changes is marked for both programs. Now save these changes by typing

```
BSAVE PRINTER,A$803,L$1060 (CR)
```

Program listing #4: Patches for Apple Writer

Patches for TEDITOR

*AE6:20 3B 18 (CR)
*1501:C9 90 90 (CR)
*1532:EA EA D0 DF 20 01 15 48 (CR)
*1549:20 35 18 (CR)

Patches to PRINTER

*10DD:20 35 18 (CR)
*10CA:EA EA (CR)

Patches for both TEDITOR and PRINTER

*1820:C9 E9 90 02 29 BF C9 C0 (CR)
*: 90 02 09 20 C9 40 B0 04 (CR)
*: 49 20 69 A0 60 20 20 18 (CR)
*: 4C F0 FD 20 20 18 91 28 (CR)
*: C8 60 (CR)

HARDWARE

Discussion of character display

There are three distinct character types for display on the Apple II, INVERSE, FLASHING, and NORMAL. Refer to character map 1 on page 4-2. Of the 256 display characters, 64 are allocated for INVERSE (00 - 3F), 64 for FLASHING (40 - 7F), and 128 for NORMAL (80 - FF).

Let's take a closer look at the characters available in the NORMAL mode. Characters 80 - BF are identical to characters C0 - FF. This means that the lower case characters (C0 - FF) are displayed as special characters and numbers. Also, the control characters (80 - 9F) are the same as the upper case characters.

Since room has been provided for lower case the LOWER CASE CHIP takes advantage of this (see character map 2). Some incompatibility is to be expected as the lower case characters are used to display special characters in some programs such as Apple Writer. This being the only known incompatibility, we decided to provide patches to correct and improve Apple Writer in this manual. Visicalc and Apple Pascal both use the control characters for upper case so we didn't bother with them.

As can be seen by the character map, it would not be possible to have INVERSE or FLASHING lower case characters unless you were to sacrifice the special characters. Because of this, when the cursor is placed on a lower case character in BASIC, it turns into a special character. A good way of correcting this problem is to test for this occurrence when creating a cursor, change the cursor into upper case and maybe even change it from FLASHING to INVERSE to indicate lower case.

Character map 1 (original Apple character map):

Video	HEX	ASCII
INVERSE	00 - 1F	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	20 - 3F	!"#\$%&'()*+,-./0123456789:;<=>?
FLASHING	40 - 5F	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	60 - 7F	!"#\$%&'()*+,-./0123456789:;<=>?
NORMAL	80 - 9F	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	A0 - BF	!"#\$%&'()*+,-./0123456789:;<=>?
	C0 - DF	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	E0 - FF	!"#\$%&'()*+,-./0123456789:;<=>?

Character map 2 (LOWER CASE CHIP character map):

Video	HEX	ASCII
INVERSE	00 - 1F	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	20 - 3F	!"#\$%&'()*+,-./0123456789:;<=>?
FLASHING	40 - 5F	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	60 - 7F	!"#\$%&'()*+,-./0123456789:;<=>?
NORMAL	80 - 9F	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	A0 - BF	!"#\$%&'()*+,-./0123456789:;<=>?
	C0 - DF	@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
	EG - FF	`abcdefghijklmnopqrstuvwxyz{ }~

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