INSTRUCTION MANUAL

FOR THE MAGNUM-80

80 COLUMN VIDEO DISPLAY BOARD

FOR

APPLE II, II+ and FRANKLIN
MICROCOMPUTERS

CAUTION: PLEASE READ THIS INSTRUCTION MANUAL COMPLETELY
BEFORE ATTEMPTING INSTALLATION OF THE MAGNUM-80.
FAILURE TO DO THIS MAY RESULT IN DAMAGE TO BOTH
THE MAGNUM-80 AND TO YOUR APPLE COMPUTER.

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MAGNUM-80ME	80 Column Video with 64K Memory Card

Call Microtek Sales (619) 569-0900 or your dealer for new product details.

INTRODUCTION

What is an 80-column board?

The Apple II normally displays a 24 x 40 upper case only screen. There are many products on the market that improve this rather simple arrangement. One of the simplest is a lower case adapter that simply improves the 24 x 40 Apple II screen to include both upper and lower case. These products always have some sort of software patch to get around another Apple weakness, the upper case only keyboard. Some word processors on the market make use of the Apple hi-resolution screen to attain upper and lower case as well as expanding the width of the screen to 70 columns. Some drawbacks to this method are that the characters are not very pleasing because of the small matrix used, scrolling is very slow, and the 70 column screen is available only under the word processor. The one product that has all the features but none of the drawbacks is an 80 column board.

The MAGNUM-80 is such a product. It provides the Apple II user with a 24 x 80 screen. It has a full 128 character ASCII upper and lower case character set (both NORMAL and INVERSE) in a very pleasing 7 x 9 character matrix. It supports the one-wire shift key mod for upper and lower case operation with the shift key. It supports software switching of the 40 and 80 column screens. It supports all ESC cursor editing features of the Apple II including IJKM. It is fully compatible with most word processors that support or require an 80-column board including Wordstar, Apple PIE, Easywriter Professional, Letter Perfect and many others. It is fully compatible with all versions of CP/M and Pascal and supports Keypress, Type ahead and System Break in Pascal 1.1.

The MAGNUM-80 was designed for the professional Apple II user and we at Microtek feel it will satisfy his or her most discriminating needs.

INSTALLATION

At every step in the design of the MAGNUM-80 the user was kept in mind. This includes the ease of installation. Pulling of motherboard chips, extra boards and wires were not considered a benefit so they were left out. As a result you will find the MAGNUM-80 extremely easy to install. It is assumed the user has a video monitor with a cable terminating to an RCA male connector attached. If you don't already have this setup, you will have to acquire it.

Installation of the MAGNUM-80 is very simple and straightforward. Just follow these simple steps!

1)   Inspect the Microtek box, the card and the cable.   If there
     appears to be any PHYSICAL damage at all, contact your dealer
     or the Service Department at Microtek immediately.   DO   NOT
     ATTEMPT ' TO INSTALL ANY ELECTRONIC COMPONENT   THAT   IS
     PHYSICALLY DAMAGED!   IT COULD CAUSE ADDITIONAL DAMAGE TO YOUR
     COMPUTER!

2)   Turn the power to the Apple II and monitor OFF.   Whenever
     removing or inserting cards into the Apple II the power
     should be off to prevent damage to the Apple II or the
     circuit card.

3)   Remove the lid by pulling up on the rear until each side
     pops, then slide it back and lift it off.

4)   Notice that there are 8 edge card connectors of "slots" at
     the rear of the Apple II. They are numbered from 0 to 7 from
     left to right with the keyboard nearest you.   The MAGNUM-80
     can be installed in any slot except 0 but we recommend that
     slot 3 be chosen as this is the slot that CP/M and Pascal
     have reserved for the system console and many word processors
     expect to see the 80-column board in this slot also.   All
     examples given in this manual will assume that the MAGNUM-80
     is installed in slot 3.   Once you have decided on a slot,
     insert the MAGNUM-80 into the edge card connector by pushing
     gently and firmly until it is fully seated.

5)   Connect the cable nearest the bottom of the MAGNUM-80 (marked
     E4 on the circuit card) to the Apple II video out jack on the
     back of the Apple II.

6)   Connect the cable nearest the top of the MAGNUM-80 (marked E1
     on the circuit card) to the free end of the cable connected
     to the video monitor.   Make sure that both cables are led
     neatly out of the Apple II through one of the rear openings
     and that they don't interfere with any other board installed
     in the Apple II.

7)   Double check all installation steps for extra safety.

8)   Reinstall the Apple II cover and arrange your machine as it
     was before.

9)   Turn the power to the Apple II and the monitor ON.

10) The MAGNUM-80 is now installed and ready for use.
                       ADJUSTMENT PROCEDURE

The MAGNUM-80 interfaces to most video monitors.   The only
operator adjustment necessary should be the vertical, horizontal,
brightness and contrast controls on the video monitor. Any other
adjustments required indicate a fault in the monitor. Follow the

steps below to optimally adjust the video monitor to provide an
acceptable display on both the Apple II 40 column and the MAGNUM-
80 display.

1) Turn the Apple II ON and boot DOS into APPLESOFT BASIC.   The
    Apple II 40 column screen should be active.   Adjust the
    vertical and horizontal hold controls on the monitor to
    produce   the optimum video picture.   Then adjust   the
    brightness control so that it is at its maximum without
    creating a background video signal.   The contrast control
    should then be adjusted to its maximum without causing
    character bloom.

2) Type PR#3 and the RETURN to turn on the MAGNUM-80.

3) Type this program in and then type RUN and then RETURN.

```
NEW <return>
100 PRINT CHR$(12)
110 NORMAL
120 FOR I=32 TO 127
130 PRINT CHR$(I);
140 NEXT I
150 PRINT:PRINT
200 INVERSE
210 FOR I=32 TO 127
220 PRINT CHR$(I);
230 NEXT I
240 PRINT
250 END
```

    Now adjust the monitor again as you did in step 1 above to
    obtain an acceptable video picture.   This should not entail
    moving the monitor controls very far as they should be very
    close from the adjustment performed in step 1.

4) Now type CTRL-Z and then 1.   The display should switch to
    Apple 40 column video.   Press RETURN now and a SYNTAX ERROR
    should result (this is normal). Inspect the display and
    readjust the monitor if it needs it. Now return to 80 column
    video by typing PR#3 and then RETURN.   You may have to
    alternate between 40 and 80 column video and readjust the
    monitor until the display is good under both modes.

5) If a video signal cannot be seen at all, refer to Appendix A,
    "Troubleshooting".

OPERATION

The MAGNUM-80 will always default to the Apple II 40 column
screen at power up and RESET.   To activate the MAGNUM-80 type
PR#3 or IN#3 and then RETURN.   To return to 40 column video type
CTRL-Z then 1 then RETURN.   A SYNTAX ERROR will always follow
this and is normal.   This section will contain detailed

explanations on how to use the input and output features of the
MAGNUM-80.

INPUT FEATURES

The MAGNUM-80 supports keyboard entry of the entire 128 character
ASCII set. Shift key support for upper and lower case depends on
whether the one wire shift key mod is installed.   This
modification is detailed in Appendix B, "Shift Key Mod". If this
modification is made (it is very simple and is highly
recommended) then the Apple II keyboard will be transformed into
a true typewriter keyboard with the shift key actually
determining upper and lower case. If this modification is chosen
not to be made, then upper and lower case operation is still
retained using a software shift method.   Both of these methods
will be explained.

Upper and lower case operation
With shift key mod:

Upon initialization the MAGNUM-80 defaults to CAPS lock mode.
This means that the keyboard is shift-locked for alphabetic
characters only.   The keycode to toggle between CAPS lock and
upper/lower case mode is CTRL-A.   To get into upper/lower case
mode type CTRL-A.   Now, if an alphabetic character is pressed it
will be lower case, but if the shift key is pressed at the same
time then it will be upper case. Note that to get , @ and] the
MAGNUM-80 must be in CAPS lock mode. To return to CAPS lock mode
type another CTRL-A.

Upper and lower case operation
Without shift key mod:

Upon initialization the MAGNUM-80 defaults to the upper case only
mode. The keycode that will be used as both a software shift and
a shift lock is CTRL-A.   To go into lower case mode from upper
case mode type CTRL-A. Now if an alphabetic character is pressed
it will be lower case.   To capitalize the next alphabetic
character type CTRL-A and then the character. To return to upper
case mode type CTRL-A twice in a row.

A note about the shift mod support:

On initialization, the MAGNUM-80 attempts to determine if a shift
mod is installed.   This determines the function of CTRL-A as
described above.   However, if a game paddle set is not installed
on the game I/O port, the MAGNUM-80 will think that a shift mod
is installed even if this modification is not present.   This
means that if you don't have the shift mod installed then your
only access to upper and lower case will be the CAPS lock toggle.
If this occurs a simple POKE will fix things.

To tell the MAGNUM-80 that a shift mod IS installed:POKE 2043, 98

To tell the MAGNUM-80 that a shift mod IS NOT installed:POKE 2043, 66

Remember that all examples given in this document assume that the MAGNUM-80 is installed in slot 3.

Extra Characters

There are a number of ASCII keycodes that are not normally available on an Apple II keyboard. A facility is provided that allows entry of these normally untypeable characters. They are accessed by first typing ESC and then a key on the keyboard which is closely related to the untypeable character. Below is a table which explains this extra character function.

TYPE THIS	TO GET THIS	
Shift M	]	When in UPPER case
CTRL Shift K	[	
ESC (	{	
ESC)	}	
ESC -	_	
ESC !	⌐	
ESC /	\	
ESC '	`	
ESC	~	
ESC #		
ESC CTRL-A	CTRL-A	

SCREEN EDITING

The MAGNUM-80 was designed to be as easy to use as possible so all the screen editing functions of the Apple II+ were duplicated exactly. These are performed by first typing ESC and then the screen edit function desired. These are listed and explained below:

    ESC-@: Home cursor and clear screen.
    ESC-A: Move cursor right.
    ESC-B: Move cursor left.
    ESC-C: Move cursor down.
    ESC-D: Move cursor up.
    ESC-E: Erase to end of line.
    ESC-F: Erase to end of page.

The above codes need to be preceded by an ESC for each occurrence.

    ESC-I: Move cursor up.
    ESC-J: Move cursor left.
    ESC-K: Move cursor right.
    ESC-M: Move cursor down.

The above codes need to be preceded by only one ESC and can then

be typed indefinitely.   For example, to move the cursor right 4
columns, up 6 lines, left 4 columns and down 6 lines type:

    ESC KKKKIIIIIIJJJJMMMMMM

To get out of this mode simply type any key but I,J,K, or M.

The left and right arrow keys perform the same functions as they
normally did.   The left arrow key or backspace key simply backs
up the cursor to correct a mistake typed earlier in the input
line.   The right arrow key will take whatever is currently under
the cursor and send it to the input buffer.   The ESC functions
and left and right arrow keys together with the REPT key make for
very quick and easy screen editing.

OUTPUT FEATURES

The MAGNUM-80 has a set of control codes and character sequences
that perform various display terminal functions such as clear
screen, home cursor, erase to end of line and many others.   For
the most part these codes mimic the Datamedia terminal sequences
as this is the protocol that Pascal must have.   This insures that
the MAGNUM-80 will be fully compatible with the Pascal operating
system and any future operating system on the Apple II.   An
explanation of these control codes and code sequences follows
that gives the hexadecimal value preceded by a $, the decimal
equivalent in parentheses and the action taken by the MAGNUM-80
upon receiving this value.   To perform these functions you can
use the CHR$(X) function in APPLESOFT BASIC in PRINT statements
or from Assembly language send the hexadecimal value in the
Accumulator to COUT after a PR#3.

$07 (07): BELL.   This will cause the MAGNUM-80 to activate the
speaker for a short time at a tone lower than that usually heard
on the Apple II.   This difference in tone helps remind you that
the MAGNUM-80 is active.

$08 (08): BACKSPACE. This will cause the cursor to move left one
column without destroying the character it moves over.

$0A (10): LINEFEED. This will cause the cursor to move down one
line without changing column position.   This will cause the
screen to scroll if the cursor is currently on the bottom line.

$0B (11): CLEAR TO END OF SCREEN.   This will clear the screen
from the present cursor position to the end of the screen.   The
cursor position will not change.

$0C (12): FORMFEED.   This will home the cursor and clear the
entire screen.

$0D (13): CARRIAGE RETURN.   This will cause the screen to clear
from the current cursor position to the end of the line and
return the cursor to the left edge of the screen.   This is the

code Pascal and CP/M send to the MAGNUM-80 as they add their own
linefeeds to carriage returns.

$8D (141): CARRIAGE RETURN + LINEFEED.   This will cause the
screen to clear from the current cursor position to the end of
the line,   return the cursor to the left edge of the screen and
perform a linefeed.   This is the code Integer and Applesoft BASIC
send the MAGNUM-80 as they expect devices to add their own
linefeeds to carriage returns.

$19 (25): HOME CURSOR.   This will cause the cursor to return to
the top left edge of the screen without destroying any screen
information.

$1A (26): LEAD-IN CODE.   This character is the lead-in code for
the following functions.   Precede the following codes with this
code to perform these functions:

$30 (48): INITIALIZE BOARD.   Clears screen and sets default
parameters such as CAPS lock, shift key status, etc.

$31 (49): EXIT MAGNUM-80. Returns to Apple II default input and
output devices.   This means that a PR#0 and IN#0 are performed
and the 40 column screen is switched in.   Do not try and exit
MAGNUM-80 with a PR#0 as the output routine will be 40 column but
the soft video switch will still show 80 column and you will be
blind.   If this happens hit RESET and you will also return to
Apple II 40 column video.

$32 (50): NORMAL VIDEO.   Select normal video for all subsequent
characters.

$33 (51):   INVERSE VIDEO.   Selects inverse video for all
subsequent characters.

$00 to $1F (00 to 31):   SHOW CONTROL.   Displays a small
representation of each of the control characters.

Remember the above codes must be preceded by $1A (26) to work
properly.

$1C (28): FORWARD SPACE.   This will cause the cursor to move
right by one column without destroying the character it passes
over.

$1D (29): CLEAR TO END OF LINE.   This will erase the characters
from the current cursor position to the end of the line without
changing the cursor position.

$1E (30): CURSOR POSITIONING.   This operation will force the
MAGNUM-80 to position the cursor according to the next two
characters it is sent.   The character after $1E (30) is
interpreted as the X value starting from a base of $20 (32).   The
next character is interpreted as the Y value again starting from

a base of $20 (32).

As an example in Applesoft BASIC follows below to demonstrate the use of the cursor positioning function. It is a cursor positioning subroutine that accepts as input X and Y as the cursor coordinates. Remember that the top left edge of the screen is 0,0.

```
1000 PRINT CHR$(30) CHR$(32+X) CHR$(32+Y);
1010 RETURN
```

$1F (31): REVERSE LINEFEED. This will cause the cursor to move up one line without changing the column position.

SOFTWARE INTERACTION

The MAGNUM-80 was designed to be as transparent to the user as possible. There are some commands in both Integer and Applesoft BASIC that the MAGNUM-80 will not respond to. In most cases there is an equivalent function in the MAGNUM-80 that will duplicate these commands. This section will deal with these discrepancies and provide examples for their solution.

HOME
CALL-936

The HOME command in Applesoft of CALL-936 in Integer clear the screen and home the cursor. To copy this command on the MAGNUM-80 simply replace all occurrences of HOME or CALL-936 with a PRINT CHR$(12);. This will clear the MAGNUM-80 screen and home the cursor.

GR
HGR
HGR2

There is also the problem of graphics commands such as GR, HGR and HGR2. These commands flip various Apple soft switches to turn the text screen into low or high resolution graphics screens. The problem is that when the MAGNUM-80 is active the Apple 40 column video signal (which includes both text and graphics screens) is replaced with the 80 column video signal. The answer to this problem is to take advantage of the soft video switch on board the MAGNUM-80. If you want to display the graphics screens then precede all instances of graphics routines with a POKE 49282 + SLOT * 16, 0. This will flip the switch to display the Apple video signal. Any subsequent output to the MAGNUM-80 will automatically flip the switch to display 80 column video. The program below will demonstrate this technique:

```
NEW <RETURN>
100 SLOT = 3
110 D$ = CHR$(13) + CHR$(4) : REM DEFINE DOS STRING
120 PRINT D$ "PR#" SLOT : REM SELECT MAGNUM-80
130 PRINT CHR$(12) : REM CLEAR SCREEN
140 VTAB 12
150 HTAB 24
160 PRINT "HELLO FROM THE 80 COLUMN SCREEN"
170 REM DELAY A FEW SECONDS
180 FOR I = 1 TO 2000
190 NEXT
200 REM SELECT FULL SCREEN GRAPHICS
210 HGR
220 POKE - 16302,0
230 REM SELECT APPLE VIDEO
240 POKE 49282 + SLOT * 16,0
250 REM DRAW AN X ON THE HI-RES SCREEN
260 HPLOT 0,0 TO 277,191
270 HPLOT 277,0 TO 0,191
280 REM DELAY A FEW SECONDS
290 FOR I = 1 TO 2000
300 NEXT
310 REM NEXT OUTPUT SWITCHES BACK TO 80 COLUMN VIDEO
320 PRINT
330 HTAB 24
340 PRINT "WERE BACK TO 80 COLUMN VIDEO"
350 END
```

FLASH

The FLASH command will have no effect on the MAGNUM-80 and there
is no equivalent.

APPENDIX A

TROUBLESHOOTING

This section is included to help the user if he cannot get the MAGNUM-80 to operate at all or if the video image is very poor. If the problem cannot be solved then the board should be returned to the dealer for replacement. Of course, if there is a problem with the product it is fully covered during the warranty period. If the problem falls under any of the categories below then follow the steps to correct it.

No Video Signal

This problem is probably the worst of all because it can be a number of things. Check these simple things first:

Is the Apple II plugged in and turned on?

Is the video monitor plugged in and turned on?

Are all of the cables correctly attached and seated firmly into each other?

Are the brightness and contrast controls turned to maximum?

Is the video level pot on the MAGNUM-80 circuit board (marked R5 and located near the cable side and top edge of the card) turned to maximum (fully counter-clockwise)?

Is the Apple video level pot (near the game I/O port) turned to maximum (fully clockwise)?

Weak Video Signal

Again, the problem is probably with the video level pots on the MAGNUM-80 or the Apple II. Make sure that they are adjusted for near maximum output if the display is weak. Also check the brightness and contrast controls on the video monitor. Suggested setting for these controls is near maximum on the brightness and just enough of the contrast control to produce a sharp image.

Unstable Display

This problem is usually caused by the vertical and horizontal controls not adjusted properly. Adjust each one separately until an acceptable display is attained.

Non Rectangular Display

This is usually caused by an improper adjustment of the horizontal hold control on the monitor. It can also be caused by

a weak video signal so check the video level pot on the MAGNUM-80. To adjust the horizontal hold, put up a screenful of characters and adjust the control until the left edge is completely straight. This is a very fine adjustment so turn the control very slowly.

Apple Video Only

Are you sure the MAGNUM-80 is installed correctly? Is it in the slot you think it is? Double check the slot number and insure that you are typing the PR#N correctly (PR#3 for slot 3). If you feel confident enough, turn off the Apple II and remove the MAGNUM-80. Check all I.C.s and make sure that each is firmly seated in its socket. Check the gold fingers on the card. If they are dirty they can be cleaned with a new pencil eraser to insure good contact. Reinstall the MAGNUM-80 board and seat it firmly.

APPENDIX B

SHIFT KEY MOD

The one wire shift key mod is the oldest and simplest fix that can be made to the Apple II to get true upper and lower case operation with the shift key. Most good word processors have input routines that check the PB2 input on the game I/O port to determine if the shift key is being pressed. Some programs that have these routines are Wordstar, Write-on, Apple Pascal 1.1 and many others. It is highly recommended that this modification be made as you will find it very valuable not only for the MAGNUM-80 but for many other applications as well. Simply follow these simple steps below to install the shift mod:

Parts needed:

2 mini-grabette clips from Radio Shack, PN 270-370
1 15 inch piece of small gauge wire

1) Solder both ends of the wire to the mini-grabette clips.

2) You have just completed assembly of the "shift mod wiring harness". Now it must be installed on the Apple II.

3) Turn the Apple II off and remove the cover.

4) Attach one mini-grabette clip to pin 24 of the keyboard encoder connector. This connector is located inside the Apple directly underneath the RESET key. Pin 1 is nearest the power supply and pin 25 is nearest the right edge of the Apple II. Use the grabette clip to attach to standoff pin 24.

5) Connect the other mini-grabette clip to pin 1 of the chip located at F-15 (74LS251). This chip is one toward the keyboard and directly in front of the game I/O port. Pin 1 is the leg next to the white dot on the main computer board.

6) Replace the Apple II cover and the SHIFT key is ready for its new job.

WARRANTY

MICROTEK, INC. warrants this Slotware(TM) to be free from defects in material and workmanship for a period of TWO (2) YEARS from date of purchase. During the warranty period, MICROTEK will, at its option, repair or replace, at no charge, any defective components, provided that the defective board is returned freight prepaid to MICROTEK Customer Service at 5555-H Magnatron Blvd., San Diego, California 92111. ALL returned items MUST have an R.A. (RETURN AUTHORIZATION) NUMBER ON THE OUTSIDE OF THE SHIPPING CARTON. This number may be obtained by calling MICROTEK's Customer Service Department at (619) 569-0900, between 9AM and 5PM (PST) Monday thru Friday. Unless the warranty has been registered with MICROTEK, a dated proof of purchase must be included with the defective board. This warranty does not cover damage caused by accident, misuse, misapplication, or unauthorized service or modification.