IIc SYSTEM CLOCK

USER MANUAL

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2.0

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CONGRATULATIONS!

You now own APPLIED ENGINEERING's Apple //c System Clock. Because of the time and care taken in the design, manufacture, and programming of your Clock, we are sure that you will enjoy the use of it for many years to come.

This manual was written with WordStar using an Apple //c equipped with an Applied Engineering Z-RAM.

dcj rev 2.Ø

INSTALLING BATTERIES IN YOUR //c SYSTEM CLOCK

You will need a small Phillips screwdriver to open the cabinet of the //c System Clock. Unscrew the 4 screws recessed in the bottom of the clock's cabinet. You do NOT need to unscrew the printed circuit board from the top half of the cabinet. Install 3 AA Alkaline batteries in the battery case. Be sure to note the positive (+) indicators and the battery outlines molded into the case. The middle battery MUST be installed in the opposite orientation as the outer two batteries! Reassemble the clock's cabinet, being sure that the wires leading from the batteries are safely tucked inside and that the external cable is properly seated in the opening in the cabinet.

Push the 'Battery' button. If the red light on the front of the cabinet lights, the batteries are good, and you may screw the cabinet back together. Alkaline batteries in the //c System Clock should last one to two years. If the red light fails to light, check the installation of the batteries and, if necessary, try again with another set of batteries.

CONNECTING THE //c SYSTEM CLOCK TO YOUR APPLE

The //c System Clock simply plugs into one of the two serial ports on the back of the Apple //c. The plug on the //c System Clock is a 5 pin DIN type male connector. The top is indicated by a dent in the metal on the opposite side of the plug as the pins. Plugging in the //c System Clock is really as easy as plugging an ordinary clock into an AC outlet (or adding an extension cord between a clock and an AC outlet)! Care must be exercised however, so follow these instructions exactly.

1) TURN OFF THE APPLE'S POWER SWITCH. This is VERY important to prevent damaging the computer as well as your //c System Clock.

2) Check that the 'power' light mounted near the upper right of the keyboard is not glowing. If it is, this means that the power is STILL ON. If it is, turn the power off BEFORE proceeding.

3) Plug the //c System Clock into the modem or printer serial port of your Apple //c. The modem port is recommended. If you plan to use the utility CLOCKWORKS(tm) to patch AppleWorks to use the //c System Clock, you MUST use the modem port.

4) Slide the 'Protect/Time Set' switch to the Protect position.

5) Plug any peripheral (modem or printer), that was already installed in the Apple //c's serial port, into the pass through serial port on the //c System Clock. If you should ever have any trouble with a device that is plugged into the //c System Clock, you can disconnect the clock by sliding

the 'Clock/ Disconnect' switch to the 'Disconnect' position. Slide it to the 'Clock' position now.

6) Your //c System Clock now ready to be used.

USING THE //c SYSTEM CLOCK WITH ProDOS

NOTE: Some software that has been converted from DOS 3.3 to ProDOS may not be able to take advantage of the clock for date and time stamping.

To use the //c System Clock for time and date stamping of ProDOS files, the file 'CLOCK.SYSTEM' must have been installed on the disk that you boot up on. This program teaches ProDOS how to use your //c System Clock. Once this is done, ProDOS will automatically stamp files with the current date and time. Additionally, any program that accesses ProDOS to get the date and time will use the current setting of the //c System Clock.

First copy the //c System Clock Utilities Disk, and also copy the ProDOS boot disk that you wish to modify, onto non-write protected disks. Use the copy routines on your ProDOS User's Disk, //c System Utilities Disk, or another suitable copy program. The //c System Clock Utilities Disk is shipped on a permanently write protected disk that will not boot until it has been copied onto a non-write protected disk, so do it now and put your original away! Do not defeat this by carving a notch into your original //c System Clock Utilities Disk.

After copying the //c System Clock Utilities Disk, simply boot the copy, and select option one (1), Clock Utilities.

NOTE: If the message 'Current year is: 1985 Change it? (Y/N)' appears, please refer to the 'CLOCK.SYSTEM' section of this manual (item 4).

The menu of the Install Utility allows you to exit to a new program, install CLOCK.SYSTEM, or set the date & time. Use the arrow keys or space bar to move the cursor to the option you want, then press the return key. If you just installed the batteries and connected the clock, you should select the set date & time option by pressing the up arrow and return keys, and adjust the clock to your local time according to your watch, alarm clock, or TIMEMASTER II H.O. Refer to the setting the date and time section of this manual.

Exit to a new program:

You may choose to exit the Install Utility and startup a new program. The program will ask if you really wish to quit. Press 'Y' if you do, any other key if you do not. The prefix of the disk currently in the computer will be displayed. Either accept by pressing return or enter your own prefix. Next, enter the pathname of the program that you want to load. If you just want

to boot a new disk, Control-Open-Apple-RESET is easier to type.

Install CLOCK.SYSTEM:

NOTE:It is common practice to use a backup copy for ANY disk modification. By doing so, you insure that your original will always be safe.

ProDOS does not know how to read the date and time from the //c System Clock. Adding CLOCK.SYSTEM to your disks teaches ProDOS how. The //c System Clock Utilities Disk has CLOCK.SYSTEM already installed on it. Insert the disk that you want to add CLOCK.SYSTEM to into any disk drive and press return. The install program will search all drives and list the volumes found. Two that may be displayed are RAM and INSTALL. RAM is any RAM disk, such as PRODRIVE for Z-RAM, that was found and INSTALL is the //c System Clock Utilities Disk itself. The name of the disk to be modified should also be displayed. Choose the letter for the volume that you want to add the clock driver to and press return. The program will then ask you to confirm your choice by entering a 'Y' for yes or a 'N' for no. If you choose 'Y', the program will then modify your ProDOS disk.

NOTE:Do NOT turn off power, open the disk drive door, press RESET, or in any other way interrupt the program while it is performing the installation. Doing so may damage your disk.

You may only install CLOCK.SYSTEM on a ProDOS volume that:

Does not already have CLOCK.SYSTEM installed on it.
Is a BOOTABLE ProDOS volume.
Has at least five free blocks.
Has less than 51 files in the volume directory.
It is not write protected or copy protected.

After installing CLOCK.SYSTEM, you may either perform the installation on another disk, exit to another program, or turn off your computer.

Set the date and time:

The batteries should keep the clock set to the correct time. However, after changing the batteries, or when springing forward or falling back at government decree, you may have to set the clock. Use the arrow keys to adjust the indicated component of the date/time display at the top of the screen to the desired setting, then press the return key. Repeat for each component. Push the 'Time Set/Protect' switch to the 'Set' position and press return. At the exact time you have set, press return. Finally, put the 'Time Set/Protect' switch back in the 'Protect' position.

NOTE:Do NOT manipulate the 'Time Set/Protect' switch while the computer is turned on, except when setting the clock. Doing so may cause the clock to lose its setting.

THE CLOCK.SYSTEM PROGRAM

When you boot a ProDOS volume on which you have installed CLOCK.SYSTEM, you will see the following message:

"Install Clock Driver 2AE"
"Copyright (c) 1985 CPU, Inc. & Applied Engineering."

Once this message has appeared, one of the following will occur:

1) It will tell you that the clock driver has been installed and will run the next ".SYSTEM" program.

2) It will tell you that a clock cannot be found, and will run the next ".SYSTEM" program. This will also happen if the 'Clock/Disconnect' switch is in the 'Disconnect' position.

3) It will simply run the next ".SYSTEM" program if a clock driver is already in use. This will happen if you boot on an Apple][+ or //e that has a clock such as a TIMEMASTER II H.O. installed.

4) It will display the year and ask you if you want to change it. If you do want to change it, press 'Y' and type the last two digits of the year. If the year is correct or you don't want to change it, press 'N'. You can force this prompt to appear by pressing any key while booting.

5) It will say 'Disk error! Unable to continue...'. This will happen if your disk is write protected, if the disk is not a bootable volume, or if your disk has been damaged. If this happens, you will need to reboot.

USING THE CLOCKWORKS(tm) PROGRAM

NOTE: The CLOCKWORKS(tm) program will only access the //c System Clock when it is plugged into the modem port. If you have it plugged into the printer port, you'll have to move it.

ALSO: If you are planning on using Applied Engineering's Super AppleWorks Desktop Expander Software, you must use it prior to using CLOCKWORKS(tm).

When using the //c System Clock, you have the ability to make a patch to the AppleWorks program to allow the time and date to be used in ways that are not normally available through AppleWorks. Specifically, the date and time will be displayed in the lower right corner of the screen when AppleWorks isn't displaying other information there. The Open Apple question mark prompt will also be replaced by the date and time. Additionally, if you have database categories DATE & TIME and enter a commercial at sign (@), the current date or time will be substituted. To make the patches necessary for these features, first make a copy of your AppleWorks Startup Disk and Program

Disk. Once this has been done, boot the //c System Clock Utilities Disk and select option two (2), Install CLOCKWORKS(tm). This will run a program that will prompt you to insert the Startup Disk into the internal drive. Once the disk has been modified, it will prompt you to remove the Startup Disk and insert the Program Disk into the drive. It will then make the necessary modifications to that disk. The next time AppleWorks is run, it will contain the programming to allow it to use the //c System Clock.

NOTE: The CLOCKWORKS(tm) program does not configure your AppleWorks disks for date and time stamping. To do this, use the "Install CLOCK.SYSTEM" procedure described earlier.

SIGH: The CLOCKWORKS(tm) program does not provide a facility for keeping track of changes of the year. It is shipped 'hard coded' for 1985. Come January, you will need to run the program FIX.YEAR that is included on the //c System Clock Utilities Disk.

USING THE //c SYSTEM CLOCK IN YOUR OWN PROGRAMS

NOTE: The following information assumes that you have a basic understanding of ProDOS and Applesoft BASIC.

Before attempting to access the //c System Clock, your program should determine if it is executing in a Apple //c and if CLOCK.SYSTEM installed its driver for the //c System Clock into ProDOS. The MACHID byte ($BF98 or 49048) contains this information. Bits 3 & 7 will be set and bit 6 will be clear if the machine is an Apple //c. Bit 0 will be set if CLOCK.SYSTEM's ProDOS driver has been installed.

To get the time from BASIC, you will need the file called AE.BT (Applied Enginering's BASIC Time program) on your //c System Clock Utilities Disk.

AE.BT moves BASIC's HIMEM down by 256 bytes and installs itself under BASIC.SYSTEM. When run, it destroys locations $249 - $3CF but after running only requires $3B1 - $3CF. AE.BT will work with the //c System Clock plugged into either the printer port or the modem port and will pick up the year as maintained by CLOCK.SYSTEM. It assumes that CLOCK.SYSTEM installed its driver for the //c System Clock into ProDOS.

Applesoft Programmers:

To read the //c System Clock from BASIC, perform the following steps, as demonstrated by this little program:

```
 0  REM PLAIN.TIME
10  PRINT CHR$(4)"-AE.BT"
20  CALL 970,T$
30  PRINT T$: REM or whatever
```

You may use ANY string, simple or array, that you like. The string returned by AE.BT contains the date and time in the following format:

"D MO/DD/YY HH:MM:SS"

"D" is the day of the week (0-6) starting with Sunday, "MO" is the month (01-12), "DD" is the day of the month (01-31), "YY" is the year (80-89), "HH" is the hour of the day (00-23), "MM" is the minutes after the hour (00-59), and "SS" is the seconds within a minute (00-59). The spaces, slashes, and colons will be in the positions shown. If the //c System Clock has been 'Disconnect'ed, all digits (except the year) will be zero. Testing if the month (or day of the month) is zero will suffice.

Assembly Language Programmers!:

NOTE:This information assumes that you have a good understanding of what is really going on inside your computer!

Do a JSR $3CD! Afterwards, the data (with the hi bit clear) can be found at the following addresses:

$3B6	Day of Week	$3C0	Space
$3B7	Space	$3C1	10's Hours
$3B8	10's Months	$3C2	1's Hours
$3B9	1's Months	$3C3	Colon
$3BA	Slash	$3C4	10's Minutes
$3BB	10's Days	$3C5	1's Minutes
$3BC	1's Days	$3C6	Colon
$3BD	Slash	$3C7	10's Seconds
$3BE	10's Years (8)	$3C8	1's Seconds
$3BF	1's Years	$3C9	Return chr ($8D!)

NOTE:There MUST be at least 13 ms between JSR $3CD's.

Another technique is to call the driver that ProDOS uses. However, since ProDOS doesn't use seconds or day of week, you won't get 'em this way. The ProDOS driver is installed inside ProDOS by CLOCK.SYSTEM ($D742/LC bank 1 under ProDOS 1.1.1). You should call the entry point DATETIME ($BF06) on the ProDOS Global Page. When DATETIME is called, Language Card Bank 1 must be read enabled. This means that you can't just call it from Applesoft. After it returns, the date & time (month day year hours minutes) is stored in a packed format in locations DATE & TIME ($BF90-1 & $BF92-3) on the ProDOS Global Page. DATE bits 15-9 contain the year (less 1900), bits 8-5 contain the month, and bits 4-0 contain the day. TIME bits 12-8 contain the hour, and bits 5-0 contain minutes.

Accessing the //c System Clock directly from your own program should be avoided if at all possible. The clock must be accessed using very carefully timed machine language code. Those who are not put off by such requirements are invited to study the (object code) programs described in this manual.

A BASIC EXAMPLE

Here is another BASIC program that shows how to read the clock. It manipulates the components of the date and time to display a prettier format.

```
100  REM PRETTY.TIME - 8/13/85 Applied Engineering/dcj
101  IF PEEK(49048)<>187 THEN PRINT "no can do":STOP
110  PRINT CHR$(4)"-AE.BT"
120  CALL 970,T$
130  REM print day_of_week (text)
140  X$=MID$("Sunday   Monday   Tuesday  WednesdayThursday Fr
     iday   Saturday ",9*VAL(LEFT(T$,1))+1,9)
150  IF RIGHT$(X$,1)=" " THEN X$=LEFT$(X$,LEN(X$)-1):GOTO 150
160  PRINT X$", ";
170  REM print month (text)
180  X$=MID$("January  February March    April    May      Ju
     ne     July     August   SeptemberOctober  November Dece
     mber ",9*VAL(MID$(T$,3,2))-8,9)
190  IF RIGHT$(X$,1)=" " THEN X$=LEFT$(X$,LEN(X$)-1):GOTO 190
200  PRINT X$" ";
210  REM print day_of_month (digits)
220  PRINT VAL(MID$(T$,6,2))", "
230  PRINT "19"MID$(T$,9,2)". ";:REM print year $#*
240  REM print hours in 12 hour format (digits)
250  H%=VAL(MID$(T$,12,2))
260  M$="A": IF H%>11 THEN H%=H%-12: M$="P"
270  IF NOT H% THEN H%=12
280  PRINT H%":";
290  REM print minutes and seconds (digits)
300  PRINT MID$(T$,15,2)":"MID$(T$,18,2)" ";
310  REM print AM or PM per hours
320  PRINT M$"M"
330  CALL 947: REM $3B3 SCRAP.IT
```

The BASIC example files are stored on the //c System Clock Utilities Disk.

DISCONNECTING THE //c SYSTEM CLOCK

The 'Disconnect' switch on the //c System Clock can be used to disable the reading of the date & time by ProDOS. ProDOS will then not change existing dates and times, and stamp new files with "<NO DATE>".

NOTE:The following information is for programmers ONLY!

The Date/Time stamping of ProDOS files may be disabled from a program by storing a RTS opcode ($60 or 96) at DATETIME ($BF06 or 48902). ProDOS will then use the last data read from the clock to stamp files. If a program also stores zeros at DATE and TIME ($BF90 - $BF93 or 49040 - 49044), ProDOS will use "<NO DATE>" for for new files and will not change existing dates and times.

Disconnecting the AE.BT program can get more complicated. AE.BT uses BASIC.SYSTEM's GETBUFR routine ($BEF5) to create a 256 byte hole above BASIC.SYSTEM's file buffers and then relocates part of itself into the hole. It also sets a bit in ProDOS's BITMAP ($BF58 - $BF6F). You may undo this with a call to location 947 (decimal) or a JSR $03B3. This routine (called SCRAP.IT) clears the bit in ProDOS's BITMAP and calls BASIC.SYSTEM's FREBUFR routine ($BEF8) to reuse ALL holes created with GETBUFR as file buffers.

The fact the FREBUFR removes ALL routines installed under BASIC.SYSTEM creates problems when more than one program is installed this way. Hence, you should NOT invoke AE.BT twice (or more) without calling SCRAP.IT, and should NOT use SCRAP.IT to remove multiple programs that were installed via GETBUFR. Using a routine that is part of some other GETBUFR installed program will probably NOT work either. Ignoring these warnings will result in bits in ProDOS's BITMAP not being cleared, which will result in ProDOS not wanting to use BASIC.SYSTEM's buffers!

The solution to this problem is to write a routine (not supplied) that handles any special disconnection requirements of the other programs to be installed simultaneously with AE.BT, such as disabling interrupts and deallocating interrupt handlers etc., clears ALL bits in ProDOS's BITMAP for pages less than $9A (the first page of BASIC.SYSTEM), and then calls FREBUFR.

USING THE //c SYSTEM CLOCK WITH CATALYST

For users of Catalyst and a hard disk, we have included a file on the //c System Clock Utilities disk called CAT.CLOCK. Copy CAT.CLOCK to your Catalyst boot disk using the ProDOS FILER program and then install CLOCK.SYSTEM onto the same disk.

Criticism of this manual is welcomed at all times. Welcomed are any comments which will enhance the content or format. Individuals that wish to contribute software are encouraged to do so.

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