

# A Mini-manual for the PCPI AppliCard, v1.0

(aka MicroPro StarCard, aka Franklin ACE-80 CPU)

*A quick-reference to get you up and running if you have one of these cards and the system disks, but are missing the manual.*

John D. Baker, 18 October 1993

## Before we begin:

This document assumes that you are familiar with the operation of the Apple ][-series of computers and Apple's DOS v3.3. Familiarity with Apple ProDOS 8, ProDOS 16, and/or GS/OS may be sufficient to allow you to follow many of the instructions related to making backup copies of the PCPI AppliCard system disks and transferring files between CP/M disks and those of the other Apple operating systems.

Furthermore, this document assumes that you are competent at installing accessory cards into the expansion slots of your Apple ][. If you are uncomfortable with opening your machine and handling any of the components inside, it may be wise to get comfortable with doing just that. As an absolute last resort, find someone who can install an accessory card for you.

This document also assumes that you have a working knowledge of CP/M. That is, you know how to run programs, copy files and are generally on friendly terms with the A> prompt. If you are new to CP/M, there are numerous books that can teach you everything you need to know (and more) for following the instructions in this document that relate to CP/M. Some noteworthy titles are:

- “The CP/M Handbook with MP/M” by Rodney Zaks, Sybex Books.
- “The Osborne CP/M Handbook” by Thom Hogan, Osborne-McGraw-Hill.
- “The CP/M Primer” by Steven Murtha and Mitchell Waite, Hayden Books.

This should suffice for an introduction. Now on with the show!

## Description:

The PCPI AppliCard (also known as the MicroPro StarCard or

Franklin ACE-80 CPU) is a co-processor accessory card that fits in one of the standard expansion slots of an Apple ][, ][+, //e or IIgs computer. An Apple ][ or ][+ MUST have AppleSoft in ROM for the system to operate although the AutoStart Monitor is not required.

The AppliCard contains a Zilog Z80 CPU running at a clock speed of either 4 or 6 MHz, 64K of DRAM, a bootstrap EPROM, logic and buffers to interface it with the Apple ][, and may optionally include a Z80 CTC (counter-timer chip) . Depending on the revision level of the board there may also be two dual-row header (male) connectors on the board, one with 10 pins, the other with 50 pins. These connectors are for RAM expansion and serial I/O boards which 'piggy-back' onto the AppliCard. Count yourself VERY fortunate if you have (or can find) these add-on boards.

If you've managed to obtain a complete AppliCard set-up, there will be an approximately 18" wire attached to a 16-pin chip socket on one end, the other end having a spring-loaded hook-type connector on it. This bit of hardware is the "single-wire SHIFT-key mod" and is used when installing the PCPI AppliCard into an Apple ][ or ][ + computer.

#### Backing up your system/other distribution disks:

Before doing anything else, make at least one copy (preferably two copies) of the disks that accompanied your AppliCard. This can be done with any DOS v3.3 or ProDOS utility that can make a verbatim disk copy (aka track copy, sector copy, etc.) such as Central Point Software's Copy II Plus, Locksmith, or even good old COPYA from the DOS v3.3 System Master Disk.

Whichever method you use to copy the disk, be aware that at least one, probably more, and possibly all of the 5.25" disks you received with your AppliCard are DOUBLE-SIDED. That is, the "back side" of the disk has data on it as well. To read the "flip side" of the disk, simply take the disk out of the drive, turn it over so that the 'bottom side' is up and reinstall it like that in your Disk ][-compatible disk drive.

If you wish to make double-sided disks of your own, you will have to cut a 'write-enable' notch on the edge of the disk jacket exactly opposite the one that is already there. There are disk-notcher devices available for this, or you can notch most disks effectively with a hand-held single-hole

paper punch.

However you wish to proceed, just be certain that you copy all disk sides and label them accordingly. Please put the original disks away in a safe place and only use the copies.

### Hardware Installation:

Please inspect the component (chip) side of your AppliCard. If your card is one of those which has the expansion connector headers on it, look at the long (50-pin) header and verify that there is a jumper (or shorting block) on the 13th (thirteenth) pair of pins (there should also be arrows printed on the circuit board pointing to these pins).

If there is not a jumper on the 13th pair of pins of the 50-pin connector, you must find one and install it. The AppliCard may be damaged if you attempt to operate it without this jumper installed.

If, on the other hand, you are lucky enough to have one of the RAM expansion boards for the AppliCard, the jumper just described should, of course be removed and your expansion board installed on the connectors.

(Caveat: At this point, the author cannot offer any further instruction regarding inspection and preparation of the AppliCard with respect to any expansion boards as he's not been able to find any for his own AppliCard. Be careful.)

Now that the jumper (or your expansion board) is installed on the AppliCard, you are ready to install it in one of your Apple's expansion slots.

Apple ][ and ][+ users: At this point, you should install the "Single-Wire SHIFT-key mod" if you do not already have this. The socket simply plugs into the game port socket as usual. The spring clip on the other end should hook onto the second pin from the right of the ][ or ][+ keyboard encoder board (as you peer into the case from over the keyboard) . If you do not have the socket-wire-clip hardware, then you may make a suitable replacement by running a wire from pin 4 of the gameport (PB2) to the pin on the encoder described above.

If you do not have the encoder board, you will have to remove your left-hand SHIFT key and solder this end of the wire to the solder-pad that is just to the right of the left SHIFT key.

The AppliCard can be installed in any available slot in an Apple ][ computer. It should be noted, however, that the system software expects to find at least one Disk ][-style disk drive installed at Slot 6, Drive 1.

If you have an 80-column text card in your Apple ][ it should be installed in Slot 3 so the system software will find it and use it.

Apple //e and IIgs users: The AppliCard may be installed in Slot 3 of a IIgs or //e (of course, 80-column display on the //e requires an 80-column card be installed in the AUX slot).

Apple IIgs users: It turns out that the Applicard is just a trifle long to fit inside the Apple IIgs case. Seems you're on your own as to figuring out a way to make it fit. Some people have trimmed the IIgs case near the slot where they plan to install the AppliCard.

The AppliCard will work just fine at high speed in your IIgs. Furthermore, if you have installed the AppliCard in Slot 3 of your IIgs, you may leave the Control Panel set at 'Internal' for Slot 3. If you install the AppliCard in a slot other than Slot 3, you should, of course, set the Control Panel to 'Your Card' initially. If you wish, you may experiment with this setting to see what you can get away with.

NOTE: The AppliCard has a small 'peg' or 'tang' hanging down from it near the 'front' of the board (under the DRAM array) . On some models of the Apple //e, (and perhaps on the IIgs as well) some components on the motherboard may interfere with this peg. Especially bothersome is the video ROM on the Extended-Keyboard model of the Apple //e (if you are installing the AppliCard in Slot 3). You may safely clip this 'peg' off of the AppliCard with a pair of wire cutters and file the rough edge off of the circuit board so long as you cut no higher than the component label 'C6' that is nearby.

If you lack sufficient courage to perform this surgery, try to select a slot in your Apple ][ where there will be no such obstructions to the AppliCard's support peg. If you still really want to install it in an obstructed slot, find someone who will carefully remove the support peg.

Once these precautions have been taken and you have selected which slot is to hold the AppliCard, use the usual care and install the card, making certain that it is well seated in its slot.

At this point, the card is installed and you're ready to power-up your system.

### **Starting the system for the first time:**

You should power-up your system the way you normally did before you installed the AppliCard. You should see no difference in its behavior

at all. If something out of the ordinary occurs, recheck your installation and IIgs users should check their Control Panel settings to see that they make sense with respect to the AppliCard's presence in the system.

You may boot up DOS 3.3, ProDOS, GS/OS or whatever you wish for the time being. This is just to make sure that your system is behaving itself.

Once you are satisfied that nothing is amiss with your equipment thus far,

you are ready to start the AppliCard. Take the disk labelled "System Boot Disk" and place it in your first 5.25" drive (which should correspond to Slot 6, Drive 1) and take whatever steps you require to boot the computer from that drive (i.e., go to BASIC and use PR#6, or 6^P<ret> from the Monitor, or whatever you need to do on your system).

Now, the moment of truth. Your computer should begin booting from the "System Boot Disk". After a few moments, your screen should clear and will be set in 40-column mode. You should shortly see the message:

### LOAD DRIVERS

appear near the top of the screen. After a few more moments the screen should clear again. If you have 80-column firmware or an 80-column text card in Slot 3 of your Apple ][, your screen should now be in 80-column mode and the message:

```
CP/M Ver 2.2
(C) Digital Research, Inc.
PCPI Ver 2.0
(C) Personal Computer Products, Inc.
```

will appear on your screen. Depending on which version of the system you have, this message may also include a note about "Rights Licensed to MicroPro International Corp." along with a date. You should then be presented with the CP/M Console Command Processor prompt, namely:

```
A>_
```

If you've reached this point--congratulations! You are now running CP/M on your Apple ][ computer! If something seems to have gone awry, you'll have to ask for help from a fellow AppliCard user, such as the author of this document (addresses at the end of the document).

To get the feel of things, press <return> a few times and try the command:

```
A> DIR
```

which should give you a listing of the files on drive A: (your 5.25" disk at Slot 6, Drive 1).

Apple //e (and possibly IIgs) users: If your display appears unkempt and seems to have characters missing where it's obvious that there should be some, you will have to make some customizations to the system to improve the video performance. This will be described later when discussing customization for your particular system.

Now that you have some idea of what the AppliCard boot process looks like, in the future, you may boot the AppliCard directly by simply booting the System Boot Disk from your first 5.25" drive. In the next section, we'll discuss customizing the system for your hardware setup and create a Custom Boot Disk tailored specifically for your system.

[**NOTE:** The majority of the remainder of this document assumes that you are competent in handling files under CP/M. If you are a newcomer to CP/M, you should try to find one of the many books which discuss it. Three examples are given at the beginning of this document.]

Unlike more 'traditional' CP/M systems, the PCPI AppliCard CP/M system does not require that a bootable disk remain in the A: drive. Any disk at all may be in the A: drive (of course there must be some sort of disk in the 'current' drive if A: is not the current drive). Furthermore, if you have the hardware to support a RAMDisk, the RAMDisk may be set up as drive A: which speeds up CP/M warm boots. This will be discussed in more detail when talking about customizing your system.

### **Customizing the PCPI system for your hardware:**

The OS and drivers on the System Boot Disk as supplied set up your system in a default manner much like this:

- 40x24 display mapped onto a 40-255 column virtual screen
- OR
- 80x24 display if 80-col. firmware detected/enabled
- OR
- 70x24 display drawn on the HiRes Graphics screen

if you boot the "Utilities" disk (may be useful if you don't have an 80-col. card).

Printer buffer allocated to all free Apple ][ memory (including that of the extended 80-col. card, if present in a //e or IIgs)

6 35-track, 16-sector disk drives at S6 D1,D2; S5 D1,D2; S4 D1,D2 respectively (increasing drive letter [A:,B:,C:,D:,E:,F:] with de-creasing slot/increasing drive numbers).

This will handle the vast majority of systems on initial startup (as above in "Starting the system for the first time"), but there are some optimizations that you can make, especially when you have additional hardware or other features you'd like to make available to the AppliCard system. There are a number of third-party or other after-market device drivers which may be added to the AppliCard system to support 3.5" disks and ProDOS hard disks under CP/M. PCPI has provided the tools for you to easily customize your OS and drivers to match your hardware.

The first thing you should do, is to format at least two 5.25" disks. Run the COPYFRMT.COM utility and choose option 'A' and follow the instructions carefully. When you are done you should have (at least) two disks freshly formatted for what you're going to do next.

You're going to create an 'Install Disk' which contains only those files that are necessary for installation of device drivers and configuration of the system for your hardware.

Copy the following files to one of the disks you just formatted:

INSTALL.COM

DLDRIVER.COM

PCPICPM (or STARCPM if your card is the MicroPro StarCard)

CONFIGSV.COM

\*.DVR (that is, all files with names ending in .DVR)

These files are located on the System Boot Disk and System Utility Disk. Once you've copied these files, label the disk as "PCPI Install Disk" or something to that effect. You're going to use the files on this

disk to make a custom boot disk from the other disk you formatted previously.

In the majority of cases, your screen display will be working properly as supplied. The console driver, SFTVIDEO.DVR, is capable of recognizing a number of different 80-column cards and can map the standard 40-column display into a 40-255 column virtual screen, if it cannot find an 80-column display device.

If it appears that SFTVIDEO is not properly handling your display, you need to use CONFIGSV.COM to verify and/or alter its control codes to properly handle your 80-column display. You may also enable/disable other features of the driver. The menus and descriptions should be helpful enough to let you get things set the way you'd like them.

NOTE: Terminal Software Definitions specify the control sequences that applications programs (i.e. Software) will send to the display for the purposes of cursor positioning, cursor movement, etc.

Terminal Hardware Definitions are the control sequences that your display device will actually respond to for doing cursor positioning, cursor movement, etc. SFTVIDEO.DVR translates the Software to the Hardware. In the vast majority of cases, you should leave the Software definitions set to "Teletext 920/950" and set the Hardware definition to that which matches your 80-column display device.

If your 80-column device is not among the choices, you should examine the control codes with the "Other" option and check them against the codes given in your 80-column device's manual. In most cases, "80-col. cards w/ inverse" will work properly for most Apple ] [ , ] [ + cards (Videx, AE, ALS, etc.) Apple //e and IIGs users should keep the default setting of "Apple IIe with 80-column card"

If you do NOT have an 80-column display, then you will want to make your settings in the sub-menu of "40-255 column display". Most of the menu choices and description of the section that CONFIGSV provides enough help to let you make the decisions you need to make on your settings.

Alternatively, You may opt for the 70-column display that SFTVIDEO can provide. An add-on driver, HIRESIO.DVR, works in conjunction with SFTVIDEO.DVR to do this (see Customizing..." below).

It would be recommended, in any case, to set the RUBOUT character to \$7F (ASCII 127).

Once you've decided that your settings for SFTVIDEO.DVR are the way you want them, choose the option to save SFTVIDEO.DVR and then exit CONFIGSV.

This is the only extra configuration step you might need to perform. All other system configuration and customization is accomplished with INSTALL .COM.

Now you are ready to build and configure the set of drivers that is tailored to your system's hardware. To begin, run [INSTALL.COM](#). You will then see a screen that looks like the beginning of a table with the message:

---

### NO DRIVERS RETRIEVED

---

A = Get a driver file  
B = Save DRIVERS and Write CP/M  
C = Save DRIVERS file  
D = Write CP/M to boot tracks  
E= Delete a driver  
F= Move a driver  
G= Change a device number  
H= Change number of devices  
I = Configure CP/M

followed by the list of menu choices shown. At this point, you should select the option to "Get a driver file". Do this for each driver that will need to be installed. At the absolute minimum, you should load:

SFTVIDEO[.DVR] (the .DVR extension is optional when loading drivers)

APLFLPY[.DVR]

If you have an 80-column Apple //e (or IIgs) you should also load

FAST2E80[.DVR]

since this will speed up the 80-column video display on the Apple //e (and will probably boost performance on a IIgs as well).

If you DO NOT have 80-column firmware or other 80-column display device, you may wish to use SFTVIDEO's 70-column display which it can generate on the HiRes graphics screen of the Apple ][. To use this you must load:

HIRESIO[.DVR]

If you have a serial printer, you MUST load one of the printer buffer drivers, either:

BUFFER[.DVR] (if your printer uses hardware handshaking)  
OR

ETXBUFF[.DVR] (if your printer requires ETX/ACK handshaking)

If you have a parallel printer, you do not need these drivers, unless you'd like to have a printer buffer. If so, use BUFFER.DVR.

It's generally a good idea to re-arrange the drivers so that all of the character I/O drivers (console, printer buffer, etc. all having Device Numbers of 16 or higher) come first in the list that INSTALL builds and displays. Also, it's a good idea to arrange all drivers in order of increasing Device number.

Apple //e and IIgs users: you MUST install FAST2E80 immediately following SFTVIDEO.DVR (which should be Driver #1, Device #16,

anyway) That is, "Fast IIe 80CLM" should appear as Driver #2, Device #19.

Likewise, people using the 70-column HiRes Graphics display MUST install HIRESIO immediately following SFTVIDEO.

Use the "Move a Driver" option to re-arrange the drivers to suit.

Customizing the block device drivers (i.e. floppy and hard disks) can free up some memory if you have fewer disk drives than any one driver supports.

If you have not already loaded APLFLPY.DVR, you should do so now. By default, the "Apple 16\*35 Flppy" driver places it's first device at Device Number 0. This corresponds to the A: drive. Also you will notice that this driver shows '6' in the Number of Devices column. By default, the driver can handle that many drives. This is where the savings can be gained through customizing.

Use the option to "Change Number of Devices" to set the number of devices equal to the number of Disk [[ -style drives you have--taking care that this is not greater than 6 and that subsequent pairs of them are installed in Slot 5, then Slot 4, if present at all.

This is the overall strategy with disk drivers. Customize them for the actual number of drives you have (or that you wish to have available) as long as that is not more than the driver can support.

Furthermore, you can control which drive-types show up at which CP/M drive letters by changing the "Device Number". The mapping for drive letters to Device Numbers is A:,0; B:,1; C:,2; etc.

Once you have the drivers set up the way you like, you should choose the option to "Save DRIVERS and write CP/M". When prompted for the drive, you should give the drive letter of the other blank disk. INSTALL will read the various .DVR files from your install disk and write a file called DRIVERS to the disk that will become your Custom Boot Disk. Then it will read the PCPICPM (or STARCPM) file and adjust a few system areas to

make sure that it has enough space reserved for data that it has to keep track of. Then it will write the system image to the boot tracks of your Custom Boot Disk.

If space permits, it might be wise to save a copy of the drivers file right on your INSTALL disk. Choose "Save Drivers" and give the drive letter (if necessary) and filename in which you would like to store your configured drivers file.

When next you need to run INSTALL, such as to install a driver for a new piece of equipment, you can simply load the DRIVERS file that you built earlier and make any changes you wish to it, rather than loading in all the separate drivers all over again.

By way of example, let's take an Apple //e with 128K, a Buffered Grappler+ printer card, a DuoDisk in Slot 6, and a pair of UniDisk 3.5 drives in Slot 5. INSTALL's final display might look like this:

```
1 = Soft Video Dvr      16   1  15 ! 4 = //e  RAMDisk      0   1   2
2 = FAST IIE    80 CLM 19   1   5 ! 5 = Apl  16*35 Flppy    1   2   6
3 = Grappler+ Drvr    17   1   2 ! 6 = Disk 3.5          3   2   4
```

Going down the list, the setup for this theoretical system is:

- Driver #1 is Softvideo, device #16, 1 device supported (console), version 15 of the driver.
- Driver #2 is FAST IIE 80 CLM, device #19 (slot 3 firmware), 1 device supported (//e video screen), version 5 of the driver.
- Driver #3 is Grappler+ Drvr, device #17 (card in Slot 1), 1 device supported (only one Grappler+), version #2 of the driver.
- Driver #4 is a block (disk) device. //e RAMDisk, Device #0 (Drive A:),

1 device supported (Extended 80-col. card in //e), version #2 of the driver. Driver #5 is Apl 16\*35 Flppy, starting at Device #1 (drive B:) and supporting 2 devices (drives B: and C:), version #6 of the driver. Driver #6 is Disk 3.5, starting at Device #3 (drive D:) and supporting 2 devices (drives D: and E:), version #4 of the driver.

Note: Grappler+ Drvr, //e RAMDisk, and Disk 3.5 are NOT part of the standard PCPI system distribution, but are after-market drivers that were developed after the PCPI System had been out a while. Many of these drivers are available on CP/M and Apple BBS systems or are available via anonymous FTP over the Internet.

This should give you a good idea of how to configure your system when you have the need to change some of its properties or to add/remove device drivers to/from the system.

NOTE: Be advised that if you make any alterations to DISK drivers, you MUST save out the drivers and write the new system image to your boot disk again as the memory requirements will change if you alter the number of devices on a driver or add a new disk device driver.

### **Miscellaneous topics:**

When using the [ADOSXFER.COM](http://ADOSXFER.COM) utility, you must use the CP/M drive letter to specify the drive holding the DOS 3.3 disk you want to see the directory of or to/from which you wish to transfer files.

You should generally install any software which uses the terminal control codes to produce its displays as if the console were a TeleVideo 920/950 or Soroc IQ 120/140 terminal. You can look at the control codes of each with the OTHER Software Definitions option under most of the CONFIGSV alteration modes.

The ALTER key is generally only useful for those systems which do not have an 80-column display or which cannot generate all the standard ASCII characters (like the Apple)[ or ][+). It is normally <Shift>ESC, except on Apple //e's where it is <open Apple>ESC, unless the ALTER MODE is disabled altogether.

If you have a ProDOS-compatible hard disk, there is a generic driver and configuration program available that will allow you to install a CP/M partition on your ProDOS hard disk and access it from the AppliCard's system. This driver/installer package is available from:

Steve Hirsch  
22 Briarwood Lane  
Burlington, Vermont 05401

GENie address: STEVE.HIRSCH  
Internet: [hirsch@uvm-gen.EMBA.UVM.EDU](mailto:hirsch@uvm-gen.EMBA.UVM.EDU)  
[steve.hirsch@genie.geis.com](mailto:steve.hirsch@genie.geis.com)

**Closing remarks:**

I hope this document has been of some help to you. The PCPI AppliCard system is truly one of the highest-performance Z80-based computing environments ever devised. It should serve you very well and faithfully for as long as you like. Should you ever decide to part with your AppliCard, for whatever reason, look me up. I'm always looking for another one. I'll find a good home for it if I can't use it myself.

If you find anything confusing in this document or you feel that there is some information that is in error, please contact me with your concerns, questions, suggestions, or just chat about Apple CP/M and the AppliCard in general. I am:

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