HARD TALK

BY JEFFREY MAZUR

When most of us bought our Apples we could hardly wait to start filling up those empty slots within the computer. A few disk drives, RAM cards, and interfaces later, it began to look like those eight slots just might not be enough. For those of you in such a situation, or hoping to avoid it, multifunction boards may be the answer. They offer several advantages over individual cards but also have their drawbacks.

Can the Whole Be Greater Than the Sum of Its Parts? The purpose of a multifunction board is to combine the hardware from several peripherals onto one circuit board. This has numerous advantages because many of the components can be shared by more than one function. Only one circuit board is required (a major cost in any peripheral) and only one slot is used up. For what it offers, a multifunction board will usually consume less power, generate less heat, and cost significantly less than a comparable collection of separate interface boards.

While putting several functions on one board may seem like a good idea, there is the problem of how to access all of them. Most peripherals for the Apple interface through the *IN#* and *PR#* hooks designed for this purpose. This makes it very easy to use them from Basic and only requires that you know which slot the peripheral board is in. With multifunction boards however, there are several input and output devices but only one set of hooks to the slot in which the multicard is placed. This problem has been dealt with by using special hardware or software that makes each device appear to be in different "phantom" slots.

Mountain Computer CPS MultiFunction Card

The CPS card (Clock/Parallel/Serial) was probably the first multifunction board to become popular. As its name implies, it combines a real-time clock/calendar, a parallel port, and a serial interface. Another unique feature of this board is the fact that many of the configuration parameters necessary for its operation are stored in low-power memory on the board, maintained even when the computer is turned off by having its own battery.

Installation of the CPS board requires placing one chip from the Apple's motherboard on a header and running a short cable from it to the card itself. The board can be placed in any slot except zero. The next step is to run the *Setup* program supplied to configure the card to your system. Figure 1 shows the options available with this program.

```
#    OPTION
-    ------
0 — CATALOG
1 — LOAD SETUP FILE
2 — SAVE SETUP FILE
3 — SET DEVICE PARAMETERS
4 — SET SLOT ASSIGNMENTS
5 — SET THE TIME
6 — SET THE DEFAULT INPUT DEVICE
7 — SET THE DEFAULT OUTPUT DEVICE
8 — DISPLAY OR PRINT PARAMETERS
9 — EXIT
```

Figure 1. Setup progrom primory menu

Options 1 and 2 are used to load and save files that contain a complete set of configuration parameters. For example, if the CPS card is to be used with a Novation CAT modem, the file Modem can be loaded; this will set up the I/O default parameters to work with this device. If you are using some other device, then you will probably use option 3 to set up the proper information as necessary. This option lets you determine the clock data format, serial input and output parameters, and parallel output specifications. In particular, the clock data input can be in one of two formats. Format 1 looks like the Mountain Computer Apple Clock with month/day and hour/minutes/seconds information. Following the seconds are three zeros to represent milliseconds. This is simply for compatibility, since the CPS card does not keep track of milliseconds. In format number 2 the input string includes a day-of-the-week digit and the year.

Serial input and output parameters include setting of the baud rate, parity, word length, and stop bits. Conversion of lower-case letters to upper case is also allowed, as well as setting line length, page length, high bit on/off, and auto line feed for serial output. Similar parameters can also be set for the parallel output device.

Option 4 sets the actual slot assignments for each of the three devices. Except for slot 0 and the boot disk controller slot, any of the CPS devices can be assigned to any one or more slots. If there is already another card in the slot selected, then the CPS "phantom" slot selection will take precedence. Thus, to access the actual board in that slot requires that the phantom slot operation be disabled. Assuming you set up the slots once and don't change things, this technique seems to work adequately. If you often engage in card swapping, however, the phantom slot settings can be an invitation to disaster (it is even possible to make your system incapable of booting!).

The next *Setup* option, of course, is used to set the clock to the correct local time. The next two are then an extension of the slot assignments, in that they determine what device will be accessed when the actual CPS slot is addressed for input or output.

When all information has been entered, a detailed listing of the setup can be printed through option 8. If desired, you can save arrangement to disk; and, finally, when option 9 is executed, the *Setup* program leaves all the parameters set into the battery-backed memory.

Aside from the usual *IN#* and *PR#* commands to initialize the input or output devices, the CPS card also recognizes several further command sequences. These commands are used to change temporarily the default input/output devices or to enable/disable the phantom slots. Whenever the CPS card is selected for output (by the *PR#* command) a special command sequence can be initiated by sending a control-W. This can be accomplished from the keyboard, from within a program, or even from another input device. After the card has received the control-W, one or more of the following letters may be sent to indicate what action the card is to take:

S—stops processing commond sequences (for exomple, to ollow ou t of the control-W chorocter).

A—selects the clock os the current input device ond ollows output through the CPS boord.

C—selects the clock os the current input device ond suppresses output from the CPS boord.

Put the missing piece back in your apple...

SMARTERM™

The Intelligent 80 Column Video Board for Apple II™ and Apple II Plus™.

Double the Apple text display to 80 columns. Smarterm is the solution—the **best** 80 column video board available.

Standard SMARTERM with 5x7 dot matrix includes all ASCII keys, 160x72 graphics mode, true shift-key operation, automatic video source selection and more.

The Enhanced Character set option provides all the above, plus 7x11 dot matrix, full descenders, an improved key layout for special characters, inverse video mode and 160x96 graphics mode. No additional hardware or firmware required.

Easiest to install. Just plug SMARTERM into your Apple and receive a crisp, easy to read display. Switching from 40 to 80 column display is automatic from the keyboard—no switches needed.

Fully compatible with Apple DOS, Pascal, and CP/M application programs. Most popular word processors are supported.

Put the missing piece back in your Apple today with the affordable, full-feature SMARTERM. See your Apple dealer today. For more information, call **800-538-8177**. In California call **408-730-0306**.

NEW

OPTIONAL ENHANCED CHARACTER SET WITH TRUE DESCENDERS.

als Advanced Logic Systems

1195 E. Arques Avenue, Sunnyvale, CA 94086

I—selects the serial part as the current input device.
O—selects the serial part as the current output device.
P—selects the parallel part as the current output device.
D—disables the currently established phantam slots.
E—enables the currently established phantam slats.

These extra commands make the board easy to use under special circumstances. Instead of going through the entire procedure of the *Setup* program, you can make simple changes through a few keystrokes.

When the serial or parallel port is being used, a number of escape codes are also recognized. These codes are not actually invoked via the escape key; instead they use a control-I (or alternatively, control-A) as a lead-in character. This is similar to the standard schemes used by other Apple I/O interfaces. Figure 2 shows the complete list of escape codes. Note that most of these commands do not conform to the Apple de facto standards; other commands, such as the control-IxxN to set line length, are not recognized at all. This should not pose much of a problem but one can only wonder why a more standard set of codes was not chosen.

C—clears high arder bit.
S—sets high arder bit.
E—enables auta line feed after carriage return.
K—disables auta line feed after carriage return.
F—enters full duplex terminal made.
H—enters half duplex terminal mode.
L—passes lawer-case letters unmadified.
N—ignared.
U—canverts lawer case ta upper case.
R—selects regular videa display.
D—selects special inverse videa display mode.
O—turns aff videa autput.
V—turns an videa autput.
T—enables absalute tabbing.
B—returns ta regular tabbing.
Cantral-A—changes escape character ta cantral-A.
Control-I—changes escape character ta cantrol-I.

Figure 2.

Most of these functions are self-explanatory, but a couple are unique to the CPS card. The special inverse display mode, for example, prints lower-case letters as normal capital letters and prints upper-case letters in inverse. This can sometimes be useful to those who do not own a lower-case adapter. In the normal display mode, lower-case letters will usually appear as garbage (this is why there is another command to convert lower case into upper case). Another feature of the CPS card is that it offers two types of horizontal tabbing. This is handy because it allows absolute positioning with the Applesoft *tab* function in lines longer than forty characters.

Another feature of the CPS board is its ability to emulate a dumb terminal. This provides a simple means for using the Apple with other computer systems, usually via a modem. Finally the CPS board system disk is a utility program called the *CPS Lister,* which makes use of both the clock and printer port of the CPS card. It allows you to make formatted listings of Applesoft programs with optional time and date stamping at the top of each page as well as sequential page numbering. This can be quite useful when you are working on a program and generating several listings at various stages of development. By glancing at the time stamp on the printout, you can easily determine which listing you're looking at.

As you can tell from the preceding discussion, the CPS MultiFunction Card is a sophisticated device. In fact, in some respects it's a bit too formal. For example, when connecting to the serial port you must provide all the signals specified in the RS-232 standard. This includes all the modem control lines that are normally not used, especially when hooking up a printer. What this means is that you may have to take apart your cable to add some jumper wires to get things to work. Unfortunately, this information is not described in much detail in the manual. The manual leaves much to be desired. There is very little said about hooking up the card to other devices; Three examples are given but they do not provide much insight.

Compatibility Problems. On the first page of its operating manual, Mountain Computer claims that any Basic or machine language software for the Apple II, including *VisiCalc* and software written for the Mountain Computer Apple Clock, will work with the CPS Card. We tried the board with all programs that came on the Apple Clock system disk. None of them worked, because they did not recognize the CPS card as a clock. Digging through the manual, we discovered that a new slot-finding routine was needed. Fortunately, the programs were in Basic so it wasn't too hard to make the necessary modification.

Next we tried *VisiCalc* and *VisiDex.* Although the printer port functioned correctly, the clock did not work with *VisiDex.* This was caused by the CPS card's lack of interrupt-generating capabilities. Also because of this, the clock would also not work with the Mountain Computer Introl X-10 system. So far, the manufacturer's claim seemed considerably overstated.

Further compatibility problems have arisen with the CPS board and other software/hardware combinations. Many of the difficulties reported were due to a design problem in the early versions of the board.

Mountain Computer's technical service department confirmed that there had been a hardware bug but said this problem had been fixed. Many of the bad boards were fixed in the field, and those still experiencing difficulty can have their boards updated if necessary. The other problems concerning software compatibility still seem to exist. Some software manufacturers have been able to modify their programs to work with the board, but others are still incompatible.

Contrary to their advertising, there are several more disappointments with the CPS card. Although the phantom slot idea seems like a novel approach to regain some more slots, it does not truly release any of them. There still are only seven *PR#* and *IN#* hooks that can be used, and any boards in the CPS's phantom slots become more restricted. Another claim is that the clock gives the day of week and year and is compatible with the Apple Clock. While both of these claims individually are correct, they don't tell you that you can't have both formats at the same time. If you plan on using the clock with any existing software, you must configure it to emulate the Apple Clock. In this mode, the day and year information are not available. Even if you wanted to write your own programs to use the other format, you would have to keep running the *Setup* program to change formats between programs.

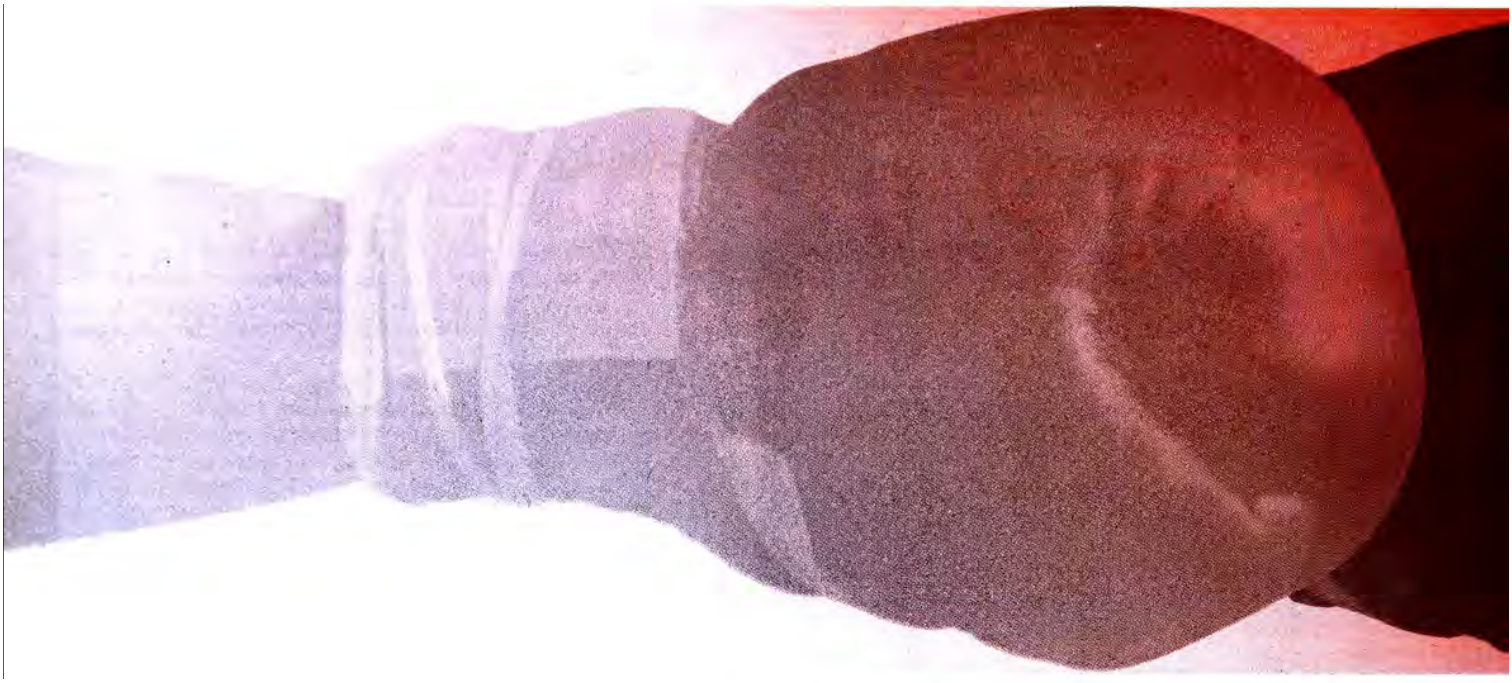
The CPS MultiFunction Card sells for $239. Pascal and CP/M software add another $20 each. Cables for the parallel or serial port are $25.

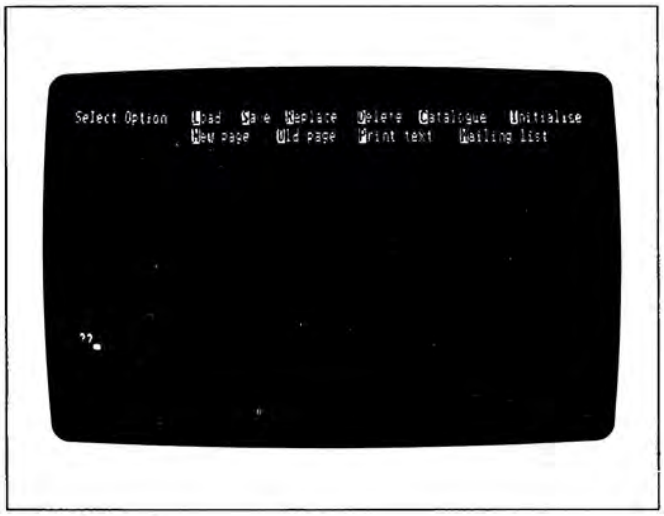
Spies Laboratories Synergy-Card

The Synergy-Card combines on one board 16K or 64K of RAM, a serial port, a parallel port, a clock/calendar, two timers, and a BSR ultrasonic control. In case you don't need all of those functions, the board is available in several reduced forms. In fact, you can buy the Synergy-Card with just the 16K or 64K of RAM. Then as your needs expand, you can add the other functions. Installation in slot 0 is just as with other RAM boards—one RAM chip is transferred from the motherboard and replaced with a jumper plug.

As a RAM board, the Synergy-Card performs as expected, holding the alternate Basic, Pascal, or extra memory for *VisiCalc* or CP/M. With the 64K version, the board appears as four 16K boards that are bank-selectable through a control address. The real power of this board, however, is through the special DOS drivers that get loaded into the normally unused "second 4K bank" of RAM. When any of the optional functions are ordered, special software is included to use the options from DOS, Pascal, and CP/M.

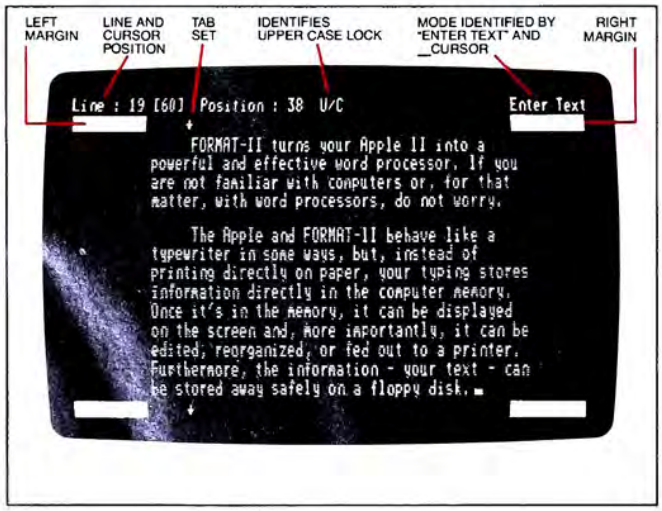
The Synergy-Card and DOS. Most of the expanded features of the Synergy-Card are easily reached through simple DOS commands. For example, operation of the parallel port is specified by the command *PR#8* (preceded by the usual control-D of course). Although this would normally give a range error in DOS, the special Synergy DOS interprets this as a command to





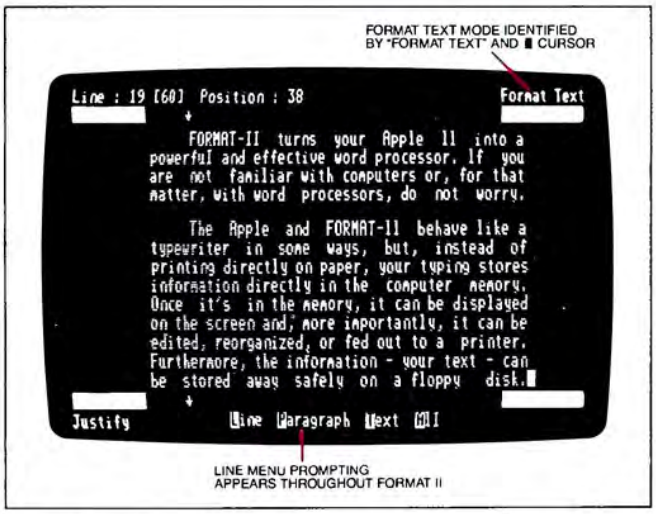
The Main Menu

Commands for the Main Menu, as in all modes of the system, are mnemonic. For example, to create a *New Page,* just touch [N]. To *Print Text* touch [P], and so forth.



Entering Text...Easier Than a Typewriter

Enter text quickly and a few commands does it all. As on a typewriter, you access upper case letters with the SHIFT key. But Format-II is better than a typewriter since there is no need to press RETURN at the end of each line. Format-II wraps text from line to line for you.



Effortless Formatting

Touch the [ESC] key and you're in "Format Text" mode to edit and manipulate. Again, all commands are mnemonic and are brought up by one key. No complicated CTRL functions! For example:

[A]lign...a column of numbers
[B]lank...out text.
[C]enter...text.
[D]elete...text.
[E]dit...text.
[F]ind...text on the page.

Illustrated is [J]ustify...text. (Throughout, bottom-of-screen prompting keeps you on track.) The justification on the screen is an exact replica of the printout.

Format-II Knocks Wordstar Right off The Apple

Format-II gives you everything that Wordstar® offers, and it does more! It does it faster! It does it simpler! All at a lower cost!

Format-II is a machine code program. An immediate benefit is speed—response to commands is instantaneous. Also, Format-II loads entirely at once including the Mailing List. Remove the program disk, you won't need it anymore. Only one disk drive is required!

The Mailing List: Powerful, Versatile

Format-II's sophisticated Mailing List rivals the best database management systems. Entries are in a card file format. Each entry reserves a 16 field card, and 442 cards fit on each Mailing List disk. You can add new entries, flip through entries, find particular entries, alter existing entries, and much more.

Maintain your lists in any order you like, by zip code, company name, city, state...your choice. In this example the entries have been sorted by zip code. A full list can be sorted in less than 1 minute.

Format-II's powerful logic allows you to target entries from your list to be merged with specified letters. To send a letter to all "Program City" stores on your list except those in California, set Format-II's logic for "Program City" ANDNOT "California".

With the logic set for "lawyers"OR"accountants" AND"California", Format-II will print a letter to only those lawyers and accountants who live in California.

A complete range of selections in your hands.

Other Knockout features:

- ☐ Format-II works with any printer that connects to the Apple.
- ☐ For transmission of text over the telephone, Format-II will create DOS 3.3 Text files for any available communications programs.
- ☐ Use Format-II to incorporate and edit files created with other programs such as Visicalc® spread sheets.
- ☐ A Quick Guide manual that will have you running most features in two hours, and a full Reference Manual for that weekend to explore all the championship qualities of Format-II Word Processing.

THE SCORECARD

	Format-II	Wordstar
Basic Program	$375	$375
CP/M®	Not required	399 (Softcard®)
Mailing List	Included	125 (Mailmerge®)
Sorting Program	Included	200 (Supersort®)

Prices shown are list.

Go with the best. Ask for a complete demonstration of Format-II at your local dealer. You too will be a winner.

FORMAT-II® The Best on the Apple

KENSINGTON MICROWARE

Kensington Microware Ltd.
300 East 54 Street, Suite 3L
NY 10022 (212) 490-7691

turn on the parallel port. No control commands are supported by this port, so you must first set up the proper parameters, such as line length, by using a configuration program. A built-in graphics dump routine allows printout of either hi-res screen, plus inverted and/or double size options. A double hi-res dump is also provided, for those with either an Apple III or the Double Hi-Res board manufactured by Spies.

The serial port is selected with the *PR#9* command. This will allow output to a printer, modem, or other serial device. Unfortunately, no similar command is available to use the serial port for input; this can be accomplished from machine language, however. A sample program is included to turn the Apple into a dumb terminal at 300 baud. The port itself is a simple four-wire interface with data in, data out, common, and one extra handshake line. This last line, however, does not conform to the RS-232 signal levels (the manual says this requires adding a 3K resistor but does not describe how). When the serial port is used to drive a printer, this handshake line can be used to detect ready/busy status if the printer has such capability. When used to interface with a modem, this signal would probably indicate connect status.

To call the clock/calendar, two commands are available. The first is *IN#10,* which returns a string of the form:

```
W MO/DD/YY HH;MN;SS.XXX
```

This gives day of week, month, day, year, hour, minutes, seconds, and milliseconds. Another format, more compatible with the Mountain Computer Apple Clock, is available with the command *IN#11.* This returns a string in the format:

```
MO/DD HH;MN;SS.XXX
```

If you do not want the time printed on the screen while it's being read, a *PR#10* or *PR#11* can be used to suppress output. Since the clock chip used on the Synergy-Card only times down to the second, resolving milliseconds is accomplished through an ingenious scheme. One of the two on-board timers is used to count the 1024 Hz signal from the clock chip. This is converted in software to milliseconds and automatically aligned with the clock's seconds counter. Because of this procedure, whenever the reset key is pressed or DOS is restarted (via 3D0G) there is a short delay of up to one second. Another handy feature of the clock is that it can automatically stamp files stored on the disk with time and date. This feature is similar to that found on other clocks, except that the Synergy-Card stores the creation date of any file. This means that if you update a file or store a later version, the original date remains intact.

The two programmable interval timers are called solely through machine language and can be used for real-time programming or for generating interrupts. Each timer represents a sixteen-bit counter clocked by the Apple's 1.0205 MHz crystal-controlled signal. This gives them a range from about one microsecond to more than sixty-four milliseconds. Timer 2 can also be set to count the 1024 Hz signal from the clock giving it an additional range up to sixty-four seconds. Under normal conditions, timer 1 is used for operating the serial ports and timer 2 is dedicated for use with the clock/calendar. Therefore these timers are not really available unless you are willing to give up one of the other features.

Last but not least, there is the BSR ultrasonic controller interface. This port connects to a small microphone that acts as a transmitter to send signals to the BSR command console. To accomplish this, the microphone is first connected to a small plug on the Synergy-Card. Then it is placed in front of the command console so that the ultrasonic signals can activate the BSR system. Sending these commands is accomplished by first selecting the BSR port through a *PR#12* command. Then the desired commands are sent by printing a string of characters, as shown in table 1.

ASCII Character:	Cansale Command:
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
:	10
;	11
<	12
=	13
>	14
?	15
'	16
A	ALL ON
B	BRIGHT
C	ALL OFF
D	DIM
E	ON
F	OFF

Table 1.

These characters were chosen to be compatible with the Mountain Computer Introl/X-10 system. Although the Introl system allows for only four brightness levels, two more commands have been added to the Synergy-Card BSR control. These are the *G* and *H* commands, which send a single bright or dim signal respectively. With these two commands any brightness level can be achieved.

Since there is no PROM firmware on the Synergy-Card, all of the I/O drivers for the various functions are stored in part of the on-board RAM. These drivers are linked into the system through the modified Synergy DOS. Because they are in RAM, it is very easy to change certain parameters within them. Setting up these parameters is the function of the *Config* program. The parallel and serial port parameter selections are fairly standard.

The clock offers MM/DD/YY HH;MM for DOS autodating. This allows you to specify how much of the time string to store in the catalog (starting from the left). For example, selecting eight characters will log only the date for each file.

Here's another handy little trick: Assign *PR#1* to 8 or 9. Many programs assume that a printer card is installed in slot 1. This option allows you to reassign the *PR#1* command to another slot, particularly 8 or 9 for use with the Synergy-Card parallel or serial ports. Of course, you can also leave *PR#1* as a *PR#1,* in case you have another board in slot one.

The Synergy-Card and Pascal. Software is provided to operate the parallel port from Pascal. This is accomplished through Pascal's Attach BIOS protocol, which links the driver directly into the operating system. This driver will work with some printers, such as the Epson MX series, but may require modification for others. This modification requires knowledge of assembly language but is not too difficult.

No attempt has been made to interface with the serial port, nor is there any easy access to the clock. A sample program demonstrating use of the clock is provided, but it is quite messy. The biggest disappointment is that even with the clock/calendar in the Apple, you still have to set the date manually every time you boot.

The Synergy-Card and CP/M. Both the parallel and serial ports are accessible from CP/M. They are assigned the physical devices LPT and UL1 respectively. Either port can be assigned as the printer or the logical device LST. This is done through the CP/M STAT command. For example, *STAT LST:=LPT* would designate the parallel port as the printer interface. If you need to change any of the parallel or serial interface parameters, you must do it under DOS, using the *Config* program. These changes can then be incorporated into CP/M by immediately booting up CP/M and saving the driver file with the command, *Save 17 S.COM.* Installing the Synergy-Card drivers into CP/M is then accomplished by simply

typing S. No provisions are provided for calling the clock from CP/M.

The Synergy-Card is quite a package. Besides the large number of functions it offers, there is plenty of software to back it up. Another plus is that assembly language source code is supplied for much of the software. This might be of considerable help in customizing the board for a given program or application.

The biggest drawback to this board is its lack of firmware. While this may be of little consequence to some users, it does present a big problem to anyone running canned programs (especially those with a special DOS). Neither *VisiCalc, VisiDex,* nor *DB Master,* for example, will work directly with the Synergy-Card. For this reason, Spies suggests that the board is geared more toward the OEM (original equipment manufacturer) than the average "plug-and-go" user. Depending upon your needs and compatibility requirements, however, this board can be a powerful addition to your computer.

The 16K Synergy-Card sells for $195. The 64K version goes for $349. Option 1 adds the parallel port, serial port, and timers for $59. Option 2 requires option 1 and adds the clock/calendar for another $49. Option 3 requires the other two and adds BSR X-10 control for an additional $39. No cables are included but they are available for $30 (parallel) or $20 (serial).

Good News, Bad News. Both of the boards reviewed exemplify the problems of multifunction cards. They seem to offer a lot for your money, but they also represent a compromise in usefulness. The CPS Card is quite a bargain if all you need is a simple clock, a parallel interface, and a serial interface. There is no question that three separate interface boards to accomplish the same functions would cost more, draw more power, and take up two extra slots. But this assumes that you really need all three functions; it might be possible to find a better buy if you only needed a clock and printer interface.

More important, with separate boards you can have all the features that you want instead of settling for what's available on the multicard. For example, you might want a parallel interface with on-board buffering so that you can regain use of the computer while you are printing. Or how about built-in firmware to do text formatting or screen dumps? Perhaps you would like automatic date setting in Pascal or interrupt capabilities or full 256-device BSR control with security lockout against unauthorized use. These features are available on other top-of-the-line boards but currently are not possible with most multicards. if you later decide that you want such features, you will probably have to buy another board.

The Spies Laboratories Synergy-Card probably offers the most on one board in terms of hardware. The software supplied is also quite elaborate, although it raises a serious question of compatibility. Since it requires its own special DOS, it immediately becomes useless for much of the software currently on the market. While this may only reflect the poor state of affairs in software standards (brought about by the need to devise copy protection techniques) it does present a real problem to the potential end user.

If you are contemplating the purchase of a multifunction card, the key word to remember is *caution.* Make sure you know exactly what you are getting, what software it will work with and what problems, if any, it may cause. Also be sure you will be satisfied, now and in the future, with the features it offers. If there are no major sacrifices, or you are just plain running out of slots, then multifunction cards can be a worthwhile way to expand the capabilities of your computer. ■

Mountain Computer, 300 El Pueblo Drive, Scotts Valley, CA 95066; (408) 438-6650. Spies Laboratories, Box 336, Lawndale, CA 90260; (213) 644-0056.