Mr. Kaypro

By Charles B. Stafford

Regular Feature

Kaypro Support

Product Options

In The Meantime...

Much has happened since last we met, the price of new processors has been dropping steadily, electronics manufacturing has increased its migration back to the U.S., and the American Populace has spoken. This is still being written on a K-28, a model only manufactured here at Bullmoose Ironworks & Woodbutchers. Judging by the mail, there are several new readers who are still in the dark about Kaypro models and modification possibilities and difficulties. We will therefore pause in our continuing series of transmogrification construction projects and address the subject of what can be done, cost effectiveness and difficulty.

While Back at the Ranch...

As of last issue, the Personality/Decoder Board project was for the most part finished. Since then BI&W has built two more and it gets easier each time. Models have been done with both direct plug-in and ribbon cable connections, and perform equally well. For those who do not require a hard drive, but would like the option of multiple high capacity floppy drives, the decoder for the *MicroCornucopia* Rom is planned for the near future, in two versions, one on the mother-board and one outboard like the last project. BI&W would also like to hear from those who are either in progress, or who have finished the last project, especially if you have suggestions on how to make it easier. A side note, the prototype board and all the components for the Personality/Decoder board project were procured from HSC Electronics here in Sacramento. There must be other suppliers, but if there is enough demand, BI&W will package and ship "project parts kits".

When a Kaypro is not a Kaypro...

When the Kaypro was originally conceived, it was intended for technicians, who, it was thought, would take it into the "field" and would most probably want to modify it for their own special purposes. Thus it was born with the aluminum case, which has become a hallmark of sorts. There have been, over the years, basically three models; the "II/IV", a two floppy configuration; the "10", a hard drive version and the "16/16II", an MS-DOS (gasp) variation. Within these basic groups, there have several variations, mostly designated by year and/or the letter "x". All of the with the exception of the very early "KayComp" and the very early"K-II"s use a standard IEC power cord, and all except the "Robie" and the "K-4x" use standard double sided double density diskettes. The K-IIs however only wrote on one side of the diskette.

The early 2 floppy models, usually designated as 83s ran at 2.5 MHz, while the later ones (84s) run at 4.0MHz, thus suggesting a possible hardware "upgrade". The fourth model issued,(after the KayComp, the K-II, and the K-IV,) was the K-10, which had a 10 Mb hard drive, but with the exception of the hard drive interface, essentially the same motherboard, and processor, thus suggesting another hardware "upgrade". Wonder of wonders, this same model also included rudimentary "graphics"(perhaps another hardware "upgrade" ?) Then came the age of "Standardization" and several attempts at the "Universal" motherboard using which, any model could be built. Most of the 84 series is based on this concept, which explains the unused outlines and solder pads in many of your machines. There were also several attempts at a "universal" BIOS, resulting in CP/M 2.2d,f,2 versions of g,h, and u. There is an easy way to "standardize" if you have multiple machines of the same year, however.

More on that later.——

Meanwhile back at the firmware ranch, things were not standing still. Several very ingenious and talented people had discovered what they considered shortcomings in the original BIOS and were busily concocting, producing, and marketing new firmware (i.e. new EPROMs). Among these were Advent Products, *MicroCornucopia,* and Barry Cole to mention but a few. They issued "new and improved" versions of both the "monitor rom" and the "character rom". Perhaps the first was the *MicroCornucopia* character rom for the early K-IIs. The early computers, Kaypro included, had character sets thar lacked "true descenders", you know, those little tails on the lower case "y", "p", & "g". As issued, the entire character was "above the line" and this new rom fixed that. The Kaypro "as issued" also had a Greek character set in the character rom for scientific purposes, and the next new rom, as "screen blanking" became popular, substituted blank spaces which were called, to become a quick easy way to handle that little chore.

As you can see, the possibilities are limited only by your own ingenuity, and/or your pocketbook and are generally di-

vided into three categories; hardware, firmware, and software.

Hardware:

Reset button and brightness control

The most basic and easiest changes are to relocate the "reset" button and the brightness control to the front panel for easy access. Neither change requires any real electronics expertise, exceptional manual dexterity, or significant amount of money. The main ingredients are 1. a way to make a 3/8" hole, 2. a small amount of small stranded insulated wire (for the brightness control), 3. some duct tape to capture the metal shavings, and 4. a modicum of care.

K-II to K-IV conversion

The 83 K-IIs "as issued" stored data on single sided doudle density diskettes (190kb nominally 200kb hence the II designation), while the K-IV, essentially the same machine, used double sided double density diskettes (390kb nominally 400kb, hence the IV). It didn't take long to figure out that with diskettes at $1.00 each, a II to IV conversion would pay for itself in short order, if it could be done easily. Again *MicroCornucopia* to the rescue. This conversion has been further refined and is discussed at length with detailed instructions in Issue 63 of *TCJ*.

Again, no real expertise is needed, just a few IC sockets, some wire or Radio Shack test clips, and a K-IV monitor rom or suitable substitute (*MicroCornupia*, TurboRom, Barry Cole, etc).

Quad density drives

There are always those who can't get enough, and for them Quad density drives were invented. They mount in the same space as a 390kb half height drive and have a 794kb capacity. They also use about 1/3rd the power that the original 390kb full-height do, and four of the will fit into the same space as two of the originals, increasing the on-line storage capacity by a factor of four to 3.2mb and decreasing the power demand by 1/3rd. If it sounds like a great modification, that's because it is. Physical installation is easy, just measure carefully, use the duct tape, and make 8 small holes in the drive enclosure. Then add two more connectors to your drive ribbon cable (they're available from Radio Shack, if you have nowhere else to turn) and use 2 "Y" cables for the power. YOU WILL NEED A NEW MONITOR ROM AND A DECODER BOARD OR MODIFICATION to use these drives, however. The original BIOS in the monitor rom does not know about Quad density and there are only two drive select lines implemented in the Kaypro design. The new rom takes care of the former, and the decoder board or modification takes care of the latter.

Hard-drive Conversion

When the K-10 was issued with a 10mb hard drive (more power!), the more competitive folks with IIs and IVs started looking for ways to keep up with the Jonses, without throwing away their previous investment. Fortunately, there were several respondents to this need. Among them were MicroSphere in Oregon, Advent in southern California, SMT in Texas to mention just a few. One solution involved an outboard drive and enclosure with separate power supply that connected to the parallel port and allowed your printer to be connected as well. The Advent and MicroSphere solutions involve a "daughter" board which plugs in between the Z-80 and its original socket. These solutions allow you to keep the machine "portable" (luggable ?) as a single unit. The MicroSphere Winchester Connection, and the Advent Host Interface board are still currently available in limited quantities. Both require use of a Western Digital 1002-05 or 1002-HDO hard drive controller, also available in limited quantities. The Advent has a Real Time Clock option, the MicroSphere does not. Both allow booting from the hard drive if the monitor rom has that capability. The MicroSphere comes with drivers that allow booting from a floppy using the stock Kaypro rom, installing the drivers, and then accessing the hard drive. The Advent Host Interface board requires use of the Advent TurboRom. Installation is straight forward, the mother-board is removed to allow physical mounting of the controller to the side of the drive housing. A "Y" cable is used to split the power from one of the floppy drives for the controller, and another is used to power the hard drive itself. The hard drive is usually mounted in the space left empty when the original full-height floppies are removed and half-height drives installed.

Speed-ups

As other machines entered the market, and tinkerers became familiar with the inside of the Kaypro, there was a cry for "More Speed". Both Legacy and Advent responded with add-in boards and so did folks at MicroCornucopia. The products from Advent and Legacy, while elegant, were pricey. The modification designed by *MicroCornucopia*, in several variations, was fairly easy and cost practically nothing. It appeared in 4.0MHz, 5.0MHZ, and 7.0MHZ versions, and the 5.0MHZ has been re-engineered for ease of construction and installation and was published in *TCJ* issue 61.

External Monitors

When demonstrations of software and hardware modifications are conducted at User's Group meetings, or other gatherings, the Kaypro's screen size and location become very inconvenient. The ideal solution would be a large external monitor. There were commercial solutions, not now available. *MicroCornucopia* came through, however, and their solution is being examined for future re-engineering and publication.

Firmware:

This is an interesting term, used to describe software captured in permanent or semi-permanent memory (i.e. read-only memory, erasable read-only memory, or some variation thereof, includes GALs and PALs, etc. for you purists). Currently available options include the MicroConucopia Pro-8 Moni-

tor Rom, Pro-884, Pro-884 Max, and the Advent TurboRom in '83 and '84 versions.

MicroCornucopia

Pro-8 Monitor Rom

As you might guess, this rom allows use of Quad density drives, as well as blinking block cursor, user-definable screen dump character, selectable slow or fast step rate for each drive, automatically figures out what kind of drive you're using, ignores nulls on the command line, allows use of 1-4 drives of 191k, 390k, 784k in any combination. Use of 3 or 4 drives requires the 4-drive decoder board or modification.

Pro-884 Monitor Rom

All of the above, but for the '84 machines.

Pro-884 Max Monitor Rom

All of the above, for '84 machines, with ZCPR1 in rom to allow warm boots without a bootable disk mounted.

Advent TurboRom

This is the only one of these four that is "hard drive aware". It will find and boot from a hard drive if there is one installed. It will also allow cursor configuration, blinking or steady, line (varying widths) or block, user selectable screen-dump character, keyboard type ahead buffer and keyclick disable/enable, current hour and minute display on the 25th line if there is a clock installed, supports the Kaypro clock as well as others, drive deselect timing method and interval selection, automatic execution of preselected programs on boot (such as NZCOM, see software, below), selectable boot drive other than a:, and use of 1-4 drives of any capacity from 191k through 784k in any combination as well as a hard drive. NOTE use of 3 or 4 floppy drives requires the Advent Personality/Decoder board. (Construction project in the previous two issues of TCJ).

A note on standardization

All of the '84 Kaypros (except the Robie and 4x) will run CP/M 2.2f with the TurboBios when the TurboRom is installed. This is an easy way to standardize operating systems if you have multiple Kaypros.

All of these roms are compatible with both the MicroSphere and Advent hard drive installations, but only the TurboRom will boot from either installation. All of these roms allow up to 4 floppy drives of various capacities, and all will run at 4.0MHz or 5.0MHz.

Selection of firmware will depend on previous selections of hardware. If all you want is increased floppy capacity, the "biggest bang for the buck", is to use 2 or 3 quad density drives, 1 double density drive (for data interchange capability), one of the *MicroCornucopia* roms and the 4-drive decoder board or modification. On the other hand, if you have or want a hard drive installed, the Advent TurboRom is the way to go.

Software:

On the operating system front, unlike Bill Gates' minions Digital Research was firmly in control of CP/M 2.2 (courtesy of our copyright laws) and emphatically wasn't doing anything in the way of improvements. Fortunately, hackers being hackers, a fellow named Richard Conn came up with ZCPR (Z-80 Command Processor Replacement) and released the source code into the "Public Domain" which meant anyone could have it and use it for free. The first version was ZCPR, later dubbed ZCPR1, when ZCPR2 was released. ZCPR made the "user" command in CP/M obselete, moving between user areas was accomplished by issuing a command in the form "du:" return, where "d" is the drive letter, and "u" is the user number such as "b12:" return. ZCPR2 added additional embedded commands, and continued to evolve until, courtesy of Joe Wright and Jay Sage, the current version is NZCOM. The best part is that although previously the user had to edit source code and complie and overlay the CCP, it is now self-installing, and a lead-pipe cinch to customize.

NZCOM is available from Sage Systems East whose advertisement is in this issue and most others at a nominal cost and is without a doubt the most cost effective, best single upgrade available.

For those of you who are interested, the BI&W K-28 runs at 5.0MHz, sports 2 784k drives, 1 390k drive, and a 20mb hard drive, and runs NZCOM with named directories on boot. It also has provision for an external monitor for club demonstrations and an amber CRT.

Preview of Coming Attractions

As previously mentioned, next issue will resume the construction projects. In future issues, you will see both '83 and '64 external monitor connections and the *MicroCornucopia* decoder board and alternative mother-board modification. Another planned project is "The Beginners Guide to Trouble-shooting the Kaypro", which will probably be published one chapter at a time.

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WANTED

TCJ Needs an FTP site with
1 Gig or more space to
collect OLD BIOS source files
for possible CD-ROM.
Accessing same file space by regular
BBS is also very dersirable!
If you have the facilities and
would like to help continue
the computer restoration of
older systems, please contact:

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