Kaypro Column

By David Thompson

Latest developments on the Kaypro front.

As of the first of October, Kaypro has been soldering in all the small ICs. That's nice for reliability but it means that you definitely need to have some experience working with PC boards before you do the speed up mod on a new board. Unsoldering IC pins is not for novices.

At the same time, Kaypro began shipping the Kaypro 4 ROM (a 2732A) on both the Kaypro II and Kaypro 4 so you shouldn't need a new monitor ROM to go 5 MHz. Also, all it should take to turn your Kaypro II into a Kaypro 4 are two double sided drives and a copy of someone's 4 system disk. Whooppee! (We're looking into this very closely.)

IC Pin Numbers

Many folks aren't sure which IC pins are which, so here goes. If you are looking at top of the IC (legs pointing away from you) and the notch end is at 12 O'Clock, then pin 1 is toward 11 O'Clock. The pins go in a circle counterclockwise from pin 1. So, if it is a 16-pin chip, pin 16 will lie toward 1 O'Clock.

If you are looking at the underside of the IC (or at the underside of the PC board), then the pins count up clockwise starting from the notch. Pin 16 is on the opposite side of the notch from pin 1.

Some ICs also have a tiny circle next to pin 1, but many don't. All ICs have the notch.

Speed

We've received a good deal of feedback about the 4 and 5 MHz mods on the Kaypro II and 4. In fact, some of the feedback is from manufacturers of other Kaypro add-ons. They have found that many of their customers have already done our speed-up mods. Most systems come up flying and never quit. A few have troubles. Only one person has called to say he'd screwed up his board.

Many people commented on my lack of specific directions on the speed up mod in issue #12. In my own fumbling way, I was trying to make sure that people had some knowledge of hardware before digging into their own systems.

The best option if you aren't already familiar with ICs (but want speed right away) is to locate (or start) a Kaypro user group (your dealer may know if there is one in your area) and then propose that the group hire an experienced technician (or lean on a heavyweight member) to make the mods all at once.

The difference between a fast Kaypro and a slow Kaypro is incredible. Those who make the change won't go back without a fight. It's like ZCPR (disk K9), you find something that makes things work better and you don't want to go back.

The Monitor ROM

The Kaypro 4 (and the newest Kaypro II) contain a 2732A ROM, which should run any speed you wish. However, if you have one of the older IIs you'll have to replace the monitor ROM.

The 2716 monitor ROM (U47) supplied on the older IIs will not run at 4 or 5 MHz. Even if you get one that will run cold, it will no doubt die as the system warms up. As chips get warmer, they get slower.

A 2716-1 (350 ns) will run at 4 or 5 MHz. You can copy the contents of your present ROM into a 2716-1 using a standard ROM programmer like a DATA-IO, or you can order our fancy new PRO-MONITOR ROM for the Kaypro. Besides being able to run fast, PRO-MONITOR does some other nice things: it ignores null characters, gives you six retries on a disk read error, gives you a non-blinking block cursor (like the big fancy terminals) and it gives you faster disk access.

You see, Kaypro had some drive problems (controller timing) which they initially tried to correct by adding additional writes and verifies. Rather than just getting a 512 byte block of data, using it, and then writing the modified data back after finishing with all 512 bytes, they write each 128 byte "pretend sector" back to the disk. Since disk reads and writes are slow, the more you do, the slower you get. They did a hardware correction (the timing fix in issue #11) for the drives, but they still have the slow code in the ROM.

The Processor

Another critical part is the Z80 processor. You need to replace the Z80 with a Z80B. The difference between the Z80, Z80A, and Z80B is speed. All three can come off the same silicon wafer, and they aren't separated until the final testing. If the chip will run at least 2.5 MHz, it is a Z80, if it will run at least 4 MHz, it is a Z80A, and if it will run at least 6 MHz, then it is a Z80B.

If you buy parts from a standard dealer, then you can be pretty sure that the Z80B you get will run at least 6 MHz. If the parts are from an outfit that handles surplus then it may not really be a Z80B. But, usually the part will be fine. It is safest to use a Z80B when doing speed ups.

If you have done the modification properly, you should have no problem booting right up. If you are one of about 5% of the folks who can't even get the thing to run at 4 MHz, then you need to read on.

The Clock

The final critical part of this mess is the system clock. You have modified this circuit so that the Z80B is receiving 4 or 5 MHz instead of 2.5 MHz. It sounds simple, and usually is.

ICs expect to receive signals that look like rectangles with nice square corners. The signal is either high (almost 5V) or low (ground) and doesn't loiter when switching from low to high (rising edge) or when switching from high to low (falling edge).

Of course it always takes a little time to make the change, and the Z80B expects to have the signal go from low to high (rise time) in 20 ns or less.

On a few systems, I've seen rise times as long as 50 ns. If you connect an oscilloscope (with at least a 50 MHz bandwidth) to pin 6 on the Z80 (use a X10 probe) you can see what your clock is doing.

Pull-Up Circuit

If the rise time is too long (the usual problem) then check to see if the 2N3906 (Q1) pull-up transistor is in place. If you have a newer Kaypro, it probably isn't.

So, purchase a plastic 2N3906 (50 cents) and a 50 pf (50 cents) ceramic capacitor (C6) and just solder them into the board. The transistor and capacitor are located at the pin-40 corner of the Z80B. The transistor's center pin (base) goes to the pad closest to R26's rear pad. The flat side of the transistor points toward the

drives. The collector and emitter leads drop right into their appropriate holes. C6 mounts parallel to R26, on the CRT side.

Finally,

If the clock is OK and you have the fast ROM and Z80B, but it still won't run dependably (even at 4MHz) then I'd seriously consider trying another Z80B and/or ROM. So far, we haven't had any problem with the Z80 PIOs. Remember, the Kaypro is not the best place to test old surplus parts.

More Drive Info

After reading issue 13 of Micro C, Bill McDonald, chief engineer at Kaypro, called with the latest info on drives (and other things).

He mentioned that Kaypro purchases its drives from Tandon fully aligned, and though they test them before installation, Kaypro doesn't do any alignment. It's Tandon's job to do the complete alignment process.

It also turns out that Kaypro is looking for other sources of hard and soft drives. They will be purchasing drives from three companies (including Tandon) so that they can compare the product from three makers over a large sample before settling on one or two manufacturers. (That's the way they selected their monitor and power supply.)

Meanwhile, I have received a release from Microscience stating that they have an $8,000,000 order from Kaypro for half-wide 5" winchesters. The first of the 3 lb drives were to be shipped September 26 with the rest of the order to be delivered over 10 months. Bill McDonald said he was quite impressed with Microscience's little drives. I guess he really was.

There is a little interface board mounted on the winchester housing (under the PC board). That board can be changed so that Kaypro can use the Xebec hard disk controller card as well as the Western Digital card. Nothing like keeping your options open.

Kaypro 10

Bill mentioned that the extra "telephone" connector on the back of the 10 is for a light pen. The video controller has a light pen input so they simply brought it out to the back panel. There doesn't appear to be any software that takes advantage of that facility. Yet. (What a neat idea for a super text editor, you'd just erase words, or move things around with the touch of a pen.)

He also affirmed my guess that the head on the winchester goes back to the safety area if the disk isn't accessed for a couple of seconds. In fact, any time the red "in use" light is not on, the head is in the safety area. So, there is no need to run the safety program—just wait for the access light to go out and you can turn off the machine.

Power Supplies

The Kaypro 10s have a 75 watt switching power supply. The IIs and 4s have had a smaller one, but since Kaypro is purchasing supplies in such quantity, the 75 watt units are now as cheap as the littler ones. Now there should be no more screen twitching when the drives fire up.

Morrow Goes After the 10 Market

An old-timer in the micro computer business, George Morrow is going after the Kaypro 10 market with his Morrow MD11. It is a 4 MHz Z80 based system with CP/M 3, 128K of RAM, and an 11 Mbyte winchester. Their products have been pretty good but I'm still waiting for them to come up with a decent terminal.

I received a release from them (I don't usually read releases for reasons that should soon be obvious) discussing their new controlled memory access (CMA) which improves data access speed.

It states, "The CMA controller differs from conventional controllers in that it uses the CPU to control memory access during disk operations."

Gee whiz. It sounds like they are bragging because they don't have a DMA (direct memory access) chip. It may also mean that they don't have a winchester controller card, which doesn't make sense. They also take exclusive credit for all the standard features of CP/M 3, so I shouldn't expect too much.

No doubt this same PR person would be able to explain to us why it's much better to run translated Z80 software on an 8088 even though it runs half as fast and takes twice as much memory space (but that's a different story).

Color Graphics

I have seen some really super full-color sprite graphics running on the Kaypro II and 4 (you 10s will have to wait). A group of engineers got together and

(continued next page)

formed a company called MicroSphere Inc. (They did it right here in Bend. Oh joy! oh joy!) Don Brittain did most of the hardware and software design, and he had a prototype running here during the SOG. When Bill McDonald saw it, he was absolutely delighted. (They are also doing a B&W composite video board which is advertised in this issue.)

Please assume that I'm biased about this company, both because I've been involved in helping it get started, and because I'm tickled with the way the color board works. Graphics, especially animated color graphics (have I got a PAC-MAN for you) are really exciting!

The color graphics board uses the 9918 and generates standard composite video. It just plugs into one of the PIO sockets, that's it. We plan to put together disks of color graphics software for this system as folks send us their applications.

Anyway, the assembled and tested board, complete with a menu driven screen editor (select your color, draw the shapes and go), a step-by-step course in writing your own software from scratch (with examples in SBASIC), and application programs will be $299.95.

It should be available in mid November (Murphy willing).

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8" Drives For The Kaypro

This is an interesting case of "now you see them, now you don't." I have just been notified by a disappointed subscriber that the Auburn Computer Center, in Auburn CA, wouldn't take his order for their 8" drive interface for the Kaypro. It appears that there are a lot of older Kaypros that don't match the one they used as a model. So, they have gone back to the drawing board. (I mentioned them in the issue #12 Kaypro column.)

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