The Kaypro Column

By David Thompson

It's interesting to compare the original Kaypro II and 4 with the new 84 versions. Of course, the new boards run faster (4 MHz vrs 2.5 MHz) and they are fancier (graphics and all). But the new boards have a problem.

You see, the new 84 boards have no buffers on the address and data lines, at least not until you get to the SASI (winchester) interface. There 11 inputs hanging directly on each data line on the original Kaypro 10 and 13 inputs on each line on the new 84 boards with the modem. The Z80 was not meant to drive that many inputs.

A little history on this subject: The original 8080 was designed to drive half of one TTL gate so manufacturers made special low drain buffers to hang directly on the outputs of the 8080. The newer 8080A (they sold for about $300 each when first released) could drive two or three standard TTL gates directly!

You can still spot those circuit designers who have been working with systems for a while. Without fail, they'll only connect one or two devices directly to the processor's data and address pins (and one of the devices will be a buffer). Everything else will be tied to the buffered address and data lines. Most buffers can drive a dozen LS inputs and a Mac Truck without breathing hard.

When a Z80 output has to drive too many devices, the signal rise time gets kinda long. When driving one or two devices, a Z80 will pull up the address line in 5 or 10ns (nano-seconds, which stands for billionths of a second). On the new 84 systems, the rise time is running between 30 and 40 ns. Most designers get nervous at 20 ns.

Kaypro technical support has been getting numerous calls about new systems going to lunch while auto-dialing or something like that. Their standard answer is that the customer should replace the Z80A with a Z80H (a version of the Z80 capable of running 8 MHz). Presumably the Z80H has stronger output drivers that can zip those lines up and down at great speeds, but the H chips are not cheap, nor are they available just anywhere. I called some of the outfits that advertise parts in the back of Byte and none of them had Z80Hs. (Plus, wholesalers in this area want over $30 each for them.)

However, when one of MicroSphere's systems flaked we found that it became very solid when we replaced the Z80A with a Z80B (rise time improved by 10 ns. But be forwarned that a Z80B is supposed to be identical to a Z80A except that when it was tested at the factory it ran a little faster. Z80Bs are available just about anywhere for $10 to $18. (You can even purchase them from Micro C for $12.00, postpaid.)

Aligning a Fickle Drive

Tandon drives have a reputation for being difficult to align. Sometimes the problem is that the drive is twisted out of alignment as it is bolted back into the cabinet but that is not the only cause of alignment headaches.

The stepper motor drives the read/write head via a pulley and a metal band (called a taut band). The taut band seems to work very well, but the pulley sometimes gets loose. If the pulley is loose, you may be able to align the drive down to a gnat's earlobe only to find that a short time later, it's out again. You may also find that you can't align the drive using the concentric screw on the rear of the drive (the pulley has slipped too far).

The pulley is held in place by a hose clamp (Dana's words) that's clamped by a small Allen screw. Tighten down the screw and then see if you can still align the drive using the concentric on the rear. (You'll have to remove the drive's circuit board to expose the clamp.) If the concentric won't adjust far enough, you'll have to loosen the clamp and then move the pulley slightly with respect to the stepper shaft. Then tighten down the clamp and try again.

Kaypro 10 and 84 drive problems

The system latch on the Kaypro 10 is tied directly to the drive interface which means that the drive select and side select lines are unbuffered (where have we heard this before). Well, the system latch is a 74LS244 and when it tries to pull down a line tied high with a 150 ohm terminating resistor, it has trouble. Too much trouble.

If your 10 or 84 system is having trouble reading, writing, or formatting disks, you should replace the 150 ohm terminating pack with something greater than 400 ohms. This little fix sure cleaned up the floppy problems on our old 10.

Kaypro 10 Schematic & Theory of Op

We've finally done it! The 24" by 36" single-sheet schematic (plus theory of operation) package for the current Kaypro 10 is finally ready! Eric Roby spent months working on the schematic, block diagrams, and theory of operation.

In the process, he came up with a package that rivals the very popular one that Dana did for the Kaypro II.

The theory of operation includes thorough coverage of the serial and parallel ports as well as the video section. Eric even included listings (in assembly language as well as a little Pascal) for those of you who want to write your own port or screen-graphics programs. And, like the original Kaypro II package, the theory of operation and the block diagrams are keyed to the schematic so you can follow a signal component by component.

This is the detailed information on the main processor board that Kaypro didn't put in its "service" manual for only $20.00!

Also, 84 Schematic Package

Because of popular demand (reader insistence) we're also scrambling to finish the new schematic package for the 84 processor boards (should be ready by mid August). This package will include everything in the Kaypro 10 package but it will cover the new II-84, 4-84, and 10-84 systems (you know, the IIs with the half-wide drives and the 4s and 10s with the built-in modems). Again, only $20.00 buys the package.

Morrow

Most of you probably remember the comments I made about the new Morrow MD11. You know, they use the Z80 to increment the address lines while they use little TTL ICs to transfer data between the drive (either hard or floppy) and memory.

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This gives them a very fast data transfer with very few parts (almost no big parts at all) because they don't have a floppy controller or a winchester controller in their new MD11.

The word I'm getting now is that MD11s are becoming famous for going to lunch before noon. This is reportedly due to the very critical timing between the TTL parts and the Z80 during data transfers.

Because Morrow is using the circuitry to do several tasks (controlling memory, controlling the floppy, and controlling the winchester) the company is faced with a major redesign if it wants to change any one of those tasks. An otherwise simple change to the winchester timing would have significant impact on the floppy or RAM timing.

It's almost like self-modifiable code, conceptually interesting but a nightmare to debug.

Morrow Power Supplies

Also, Morrow hard disk systems have been plagued with power supply problems, and at $400 per supply, users become very nervous people around warranty expiration time. The MD-11 belonging to the BAMDUA folks (they publish the Morrow Review Magazine) has gone through three supplies during the warranty period.

Morrow Company recently changed suppliers on the supply in hopes that the problems would go away, but the new supply (made in Japan) seems to have just as many failures, it's just that different components are failing.

Morrow doesn't even appear to have parts to fix the supplies. One repair facility that asked for parts, received instead, some defective supplies (of both types) from which to scrounge components.

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