Mr. Kaypro

By Charles B. Stafford

Regular Feature

Kaypro Support

Composite Video

BARRY COLE ROMs

Since we last conversed, in issue 74, (mea cullpa, mea culpa) there has been a great deal of excitement. I actually got to meet and talk with Barry Cole. For those of you to whom this doesn't mean anything, don't feel bad! Up until about a year ago I didn't know anything about Barry either.

Back in 1983, the dark ages, when the '84 series Kaypros were but a gleam in Andy Kay's eye. Barry was repairing about 20 K-IIs and K-4s a week and modifying quite a few of them. When the '84s came out he decided that since they had a larger monitor rom and the appropriate signals were close by, that booting from disk was for the birds and other computers. Reality was just a few short days (weeks) away with the birth of the Barry Cole Rom. He used a 27128 (16k), twice the size of the stock 2764 (8k), 4 times the size of the K-4s 2732 and 8 times the size of the 2716 in the original design (Kaycomps and K-IIs). The code included not only the bios (basic input/output system) and bdos (basic disk operating system) but also a CCP (console command processor) based on ZCPR 2. This meant that he was completely free of Digital Research's copyrights and patents, and the term "boot disk" became meaningless. In fact, according to Barry's promotional literature, a machine with his rom will boot with a piece of cardboard in the drive.

Barry has included a version of ZCPR, as well as bdos changes that will accomodate two 10meg hard drives or one 20meg hard drive. You'll still need to make the hardware changes, of course, but the support is there. The command set understood by the CCP has not only the original 6 embedded ones, (DIR, ERA, SAVE, USER, TYPE & REN) but also:

LIST (sends the file to the printer)
GO (re-executes a previously loaded program)
GET (loads a program at a specified address)
JUMP (executes a program at a specified address other than 0100h)
SAFE (parks a hard drive if installed)
DISK (a built-in copy, era etc utility)
D (a super directory clone)
BOOT (boots from a floppy in drive A)
NORM (initiates "protected" mode disabling most commands, for bbs or similar use) and
PASS (+ a password, undoes the effect of NORM).

The modifications also specifically report disk malfunctions and eliminate most resets (such as aborting a faulty disk write).

The bad news is that I haven't got the ROMs yet. The good news is that I expect to get them in the 1st quarter of 1996. Watch this space for notification.

ON TO MORE TANGIBLE STUFF

Herewith, the promised follow-up to the external composite video project we did in TCJ #74.

Our objective is to understand the project sufficiently to be able to modify it to fit all CP/M Kaypros, and use both composite and TTL monitors (DB-9 connections).

THEORY

The circuit actually consists of five stages; the input signals, the buffers, the mixer, a driver and the output signal(s). See figure 1.

In the last project we took the input signals as well as ground and 5V from the pins of U1, a 7406 that we removed and out in a wirewrap socket. This works very well for the '83 K-10s and all the '84 models, but not so well for the '83 K-IIs and K-IVs. These machines, however, have a row of test points, labeled E1-E6, just toward the front of the computer from the Centronics connector for the parallel port. They have all the signals we need with the exception that the vertical sync is inverted. If the solder in these test points were removed, (easily done with a small soldering iron and a "solder sucker" or wick), we could mount a six pin header, and use it to plug on a "daughter" board. To take care of the vertical sync the connections to pins 1 and 4 must be switched with the vertical sync signal from E4 going to pin 4 and pin 1 being tied "high". See Figure 2.

Since the '83 K-IIs & K-IVs use the same vertical and horizontal sync frequencies as standard composite (& close to TTL Monochrome, by the way) monitors, no tweaking or "monkeying around" is needed. We can now use this circuit in any CP/M Kaypro.

Our next trick is to adapt this circuit to TTL monitors using a DB-9 output connector so we can use "standard" external monitors. The advantage of this is that an EGA monitor will "sync"

right up to an '84 K-anything or an '83 K-10 without any tweaking, and a CGA monitor will "sync" right up to an '83 K-II or K-IV without tweaking. A monochrome monitor, though, may need a "Sync" adjustment, but the stock K-II or K-IV frequency should be within the monitor's range.

The 74ls00 that was used in the last circuit, has 4 inverting "nand" gates. Buffering a signal, and getting it right side up, requires the use of two gates. Since there are three signals involved (Horizontal sync, Vertical sync and video) six gates would be necessary, two more than are available. If, however, a 74ls86 is used, our problem is solved. A 74ls86 is a four section exclusive "or" gate, which, with one input tied "low" (to ground), becomes a non-inverting buffer. This means that signals can be picked up from either the 7406 (in the case of an '84 machine or an '83 K-10) or E1-E6 (in the case of the "83 K-IIs or K-IVs), run through one section each of the 74ls86 and then to the appropriate pin of a female DB-9 connector. Use of a jumper on the vertical buffer to select inverting or non-inverting provides for those monitors that expect inverted vertical sync. See Figure 3.

Which signal goes on which pin depends on the monitor the circuit is intended for.

Pin	Mono	CGA	EGA
1	gnd	gnd	gnd
2	gnd	gnd	open
3	-	open	open
4	-	open	open
5	-	open	open
6	open	video	open
7	video	open	video
8	Hsync	Hsync	Hsync
9	-Vsync	-Vsync	Vsync

Mixing and Matching choices of the input signal methods, buffering methods and output signal schema will result in an easily constructed circuit customized just for your machine, and will probably be the only one like in existance for miles around.

EXECUTION (or CONSTRUCTION, if you prefer)

After you have made the appropriate choices, and drawn or copied the a schematic diagram, a parts list can be compiled. Almost all the resulting parts lists will include a couple of 100 ohm resistors, an IC (74ls00 or 74ls86), at least one socket perhaps two, an output connector, some ribbon cable or coax, a six pin header and female connector or wire wrap socket, and a prototype printed circuit board to build it on. The same sort of prototype board that was used in the first project will work here as well.

Connector mounting can be a challenge. On the first project, a panel mount RCA socket was used. It was the type that is supposed to go into a hole from the front of the panel and have a nut put on from the rear. Flats were filed on two sides of the connector, so that it just fit in one of the ventilation slots on the back of the case. The slot could have been enlarged, but that would have involved cutting on the case and this solution seemed cleaner. Mounting a DB-9 female connector is a little more involved. If a slot is filed just a little wider, the DB-9 will fit just fine. A hole can be drilled just below the slot to accomodate one of the mounting screws, and a small piece of scrap metal can be fashioned and drilled to accomodate the other. A simpler solution is to find a standard "IBM" type slot cover which has been punched for a DB-9 connector, cut the ends off 3/8" outside the mounting holes, drill two more 3/16"holes (one at each end) and mount this adapter over a ventilation slot using screws and nuts with washers to bridge the slot on the inside.

CUTTING THE CASE

If you decide to file, drill or cut the case, the safest way is to remove all the electronics, modify the case, clean it of all chips and filings and then reinstall the electronics.

There is, however, an easier alternative which, if done carefully, is equally as effective. Using Duct Tape (two inch or three inch width), fasten two or more strips edge to edge about six inches long with a 1/4" overlap at the edges, sticky side up, on the workbench. This should result in a single piece about six inches by four or six inches. Stick one end on the inside of the case, parallel to the bottom of the case about an inch above the area to be cut, filed or drilled and the other end, also parallel to the bottom of the case about one inch below the area to be cut, filed or drilled. Now pinch the sides together, forming a tent over the work site, on the inside of the case. Cut, file or drill to your hearts content, and when you are satisfied with the result, smash the tent down on the inside of the case to pick up all the stray metal chips inside, and remove it carefully. Then inspect the area to insure that you didn't let any chips escape.

This procedure sounds complicated, and takes a lot longer to describe than do, but read it first and you'll see how simple it really is.

NEXT PROJECT

An internal modem (you pick the speed) for ALL the CP/M Kaypros.

A LITTLE COMMERCIAL

Recently I have been fortunate enough to find a limited supply of Kaypro monitors which include both the CRT and the Video board, as well as, mother boards (both '83 and '84 varieties) and a few WD1002-05 hard drive controllers. Monitors are $50.00 but the mother boards vary depending upon condition.

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Figure 1.

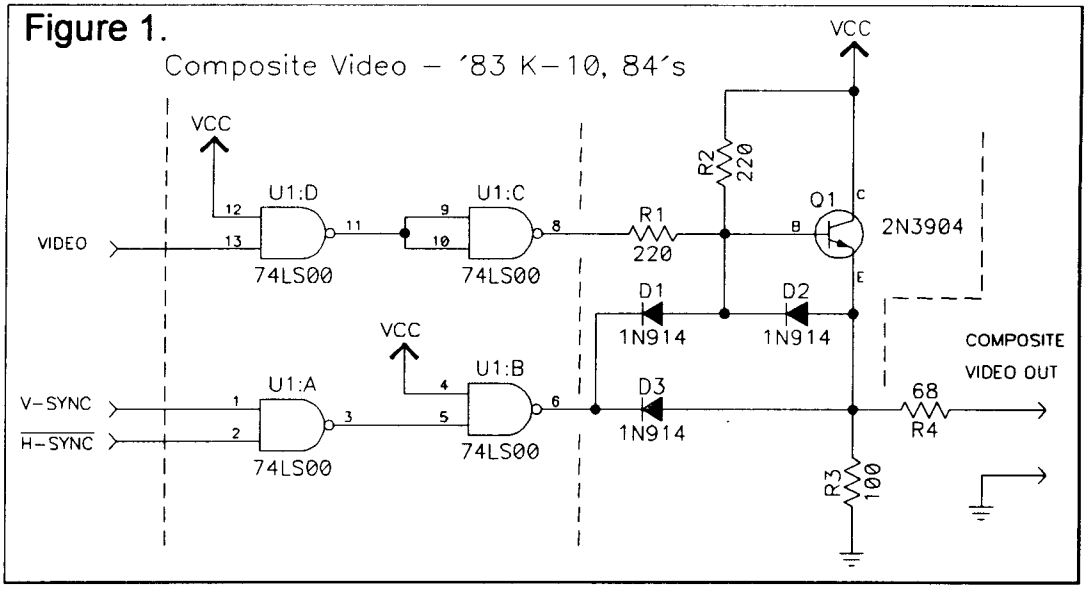

Figure 2.

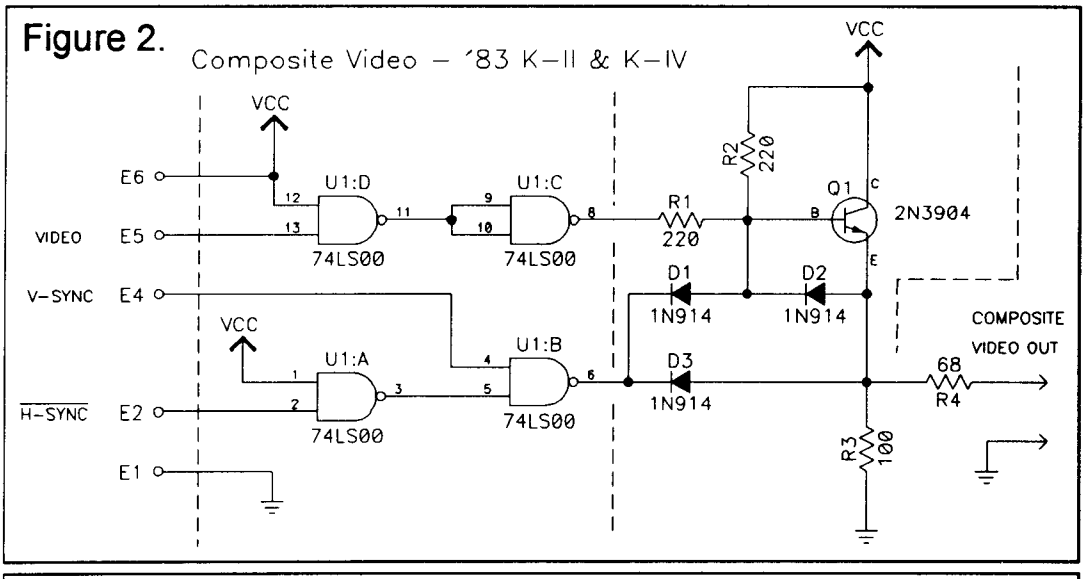

Figure 3.