KEN-TON SCSI INTERFACE

Installation and Setup Manual

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Before You Do Anything Else....
READ THESE INSTRUCTIONS!
Setting up a hard drive IS NOT the easiest thing to do. reading this manual carefully will prevent a lot of frustration and headaches. You may even have some hair left after getting the thing up and running!

The SCSI Interface
The Ken-Ton interface is not a controller. It is an interface. What it does is convert the CoCo bus signals to a basic SCSI (Small Computer System Interface) standard bus. This is pretty much a standard bus for all computer systems, both large and small (the USAF 325 user Wang VS uses SCSI interfaces for hard drives). SCSI is somewhat like a parallel printer or serial port -- pretty much interchangeable between all computer systems.

Since the SCSI bus supports up to seven devices from a single connector, it is pretty versatile (the seventh device is the interface itself). It is not limited to hard drives -- it can communicate with any device that has a built-in controller (or a controller card may be used between the SCSI port and device). In fact, the compact Apple Macintosh models only have one internal processor upgrade slot. Rather than use a large case and multiple internal slots, Apple decided to use a SCSI port instead.

Choosing a Hard Drive
The best type hard drive to use with the Ken-Ton interface is an "embedded controller" type. ALL SCSI drives currently available are embedded controller drives. This means that the controller is built into the drive electronics, so all you need is a cable between the drive and KT interface.

Almost any brand name drive will work fine. There is one important thing to remember, however: the drive MUST have a parity enable/disable jumper. Most have a jumper that is removed to disable parity checking, but a few Conner models are known to require a jumper (usually marked "E" or "F") to be added to disable parity checking. Some of the newest drives DO NOT have this feature. If parity can't be disabled, the KT WILL NOT recognize the drive. Some Quantum and IBM drives won't be usable.

More Hard Drive Considerations
If you intend to use the 256 byte per sector drivers and/or RGB-DOS for Disk BASIC access, you will need to get a Seagate "N" series drive with ROM revision 105 or greater (drive model number ends with an N... such as ST296N). These drives are known to support 256 byte sectors and can be formatted to full capacity.

Most standard SCSI drives only support 512 byte or larger sectors. These CAN be used with the 256 byte drivers and/or RGB-DOS, but you will lose approximately half the capacity of the drive since only 256 bytes will be recognized per sector. If you are setting up a drive with a few (6-20) RGB-

DOS partitions and the remainder as OS-9, this won't be a big problem. Six RGB-DOS partitions take up about one megabyte of 512 byte sectors.

Using MFM/RLL Drives

It is possible to use the older MFM and RLL hard drives, but not recommended. These drives are getting harder to find and remanufactured units are currently on the high side when compared to SCSI drives. A separate controller board is also needed between the SCSI interface and drive, making the system much harder to package.

If you must use an MFM or RLL drive, you will need to find an Adaptec 4000A (MFM) or Adaptec 4070A (RLL) controller. These are the only ones guaranteed to work with the KT interface. Other 4xxx series Adaptec controllers may work, especially those that are basically the same as the ones above with the addition of a floppy controller on the board (the floppy controller won't be usable, however, unless one writes their own OS-9 drivers for it). The only known source at this time (April 1995) for 4000A and 4070A controllers is TimeLine (310-784-5488).

Connecting the KT to your System

One unique aspect of the KT interface is that a Multi-Pak or other port expander is not really needed. The KT is a true "open collector" design that doesn't load the delicate CoCo bus with excessive capacitance. A Y-cable works just fine with the KT, a Tandy or Disto Mini floppy controller, and a modified RS-232 Pak (the addressing of the RS-232 pak requires modification to work from a Y-cable... details in FARNA System's "Tandy's Little Wonder" book). Note that this is not the case with the Disto "Super Controller" series. The Super Controllers will not reliably work on a Y-cable on all CoCo 3 systems. Some do reportedly work fine with short Y-cables while others have consistent reliability problems. This is due to the high capacitance induced on the CoCo bus by the SC design and variations in components (which affect timing and capacitance) in the CoCo itself. There is no way to fix this problem. In defense of the SC series, they have an internal mini expansion bus and were never intended to be used with a Y-cable. If using a Y-cable, connect as illustrated below. Note the orientation of the Y-cable connectors.

The KT may also be used in a Multi-Pak. The standard configuration when using a hard drive interface in an MPI is to place the floppy controller in slot 4 (back) and the HD interface in slot two (second from front).
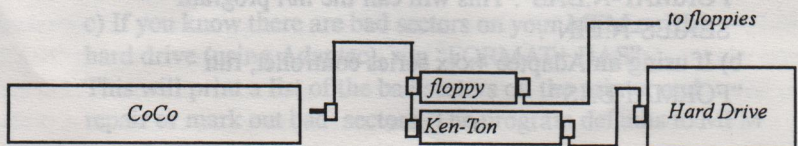
Software Set-up
RGB-DOS:

RGB-DOS is used for Disk BASIC access. This system is compatible with most DECB software, except those programs which use their own disk I/O routines instead of those contained in the DECB ROM (CoCo Max, Simply Better, and some other utility programs use their own disk I/O routines to squeeze the most memory out of the CoCo). Most games can be adapted to the hard drive, including machine language games. See the RGB-DOS manual for command instructions and helpful hints with getting programs up and running from the hard drive.

What RGB-DOS does is sets up many 157K partitions (the size of a 35 track single sided DECB disk... can't be changed!). DECB is then patched to allow up to 255 drive numbers (0-254). So the maximum size drive that can be used exclusively for DECB is approximately 65MB. A god bit of room is taken up on the drive by the information necessary to emulate the 35 track drive, that's why the apparent size discrepancy.

To customize RGB-DOS for the number of DECB partitions you want, first BACKUP YOUR ORIGINAL DISK! From the backup:

1) Have the following information ready about your drive:
     a) Number of heads (sides)
     b) Number of cylinders (total tracks divided by heads)
     c) Drive type

2) Run "OFFSET-9.BAS". This reports the number of possible DECB drives, OS-9 offset. If setting up to support OS-9 and RGB-DOS, write the dmode information down. Follow the prompts to setup RGB-DOS for burning into ROM. If you later decide to change the number of DECB partitions, you must re-run this program and burn a new ROM.

3) Get the ROM burned! Two sources for burning ROMs:

Dr. Marty Goodman	Robert Gault
1633 Bayo Vista Ave.	832 N. Renaud
San Pablo, CA 94806	Grosse Pointe Woods,
	MI 48236

Cost is $15-$20, write and ask for details.

4) While waiting on your ROM, you need to low-level format the hard drive. There are four format programs:
     a) If you are using a Seagate "N" series drive, run "FORMAT-N.BAS". This will call the m/l program "SERIES-N.BIN".
     b) If using an Adaptec 4xxx series controller, run "FORMAT.BAS".

c) If you know there are bad sectors on your MFM or RLL hard drive (using Adaptec), run "FORMAT+.BAS". This will print a list of the bad sectors on the printer and repair or mark out bad sectors. The program defaults to MFM drive type and 2400 baud printer. Modify the well commented BASIC listing to change.

d) The "USE_LIST.BAS" program is also for Adaptec controllers. It allows one to enter the hard drive info and defect map.

Once the ROM is installed in your floppy controller, you are ready to use your system. It should be ready to use as soon as you turn it on. If all components are turned on at the same time, the hard drive may not have time to spin up to speed. If you get a "drive not found" message, hold <CTRL> and <ALT> down while pressing the RESET button, then press RESET again. This time the hard drive should be ready to use. Refer to the RGB-DOS manual for more info.

OS-9: Required DECB Preparation
If you plan on using OS-9 and RGB-DOS together, setup for RGB-DOS first. You can then skip the first section.

Using the RGB 256 Byte Sector Drivers
If you are only going to use the hard drive for OS-9, and are using the RGB 256 byte sector drivers, you need to do the following under DECB:

1) Have the following information ready about your drive:
   a) Number of heads (sides)
   b) Number of cylinders (total tracks divided by heads)
   c) Drive type

2) Run "OFFSET-9.BAS". This reports the number of possible DECB drives, OS-9 offset. If setting up to support OS-9 only, specify 0 DECB drives and write the dmode information down.

3) Now low-level format the hard drive. There are four format programs:
   a) If you are using a Seagate "N" series drive, run "FORMAT-N.BAS". This will call the m/l program "SERIES-N.BIN".
   b) If using an Adaptec 4xxx series controller, run "FORMAT.BAS".
   c) If you know there are bad sectors on your MFM or RLL hard drive (using Adaptec), run "FORMAT+.BAS". This will print a list of the bad sectors on the printer and repair or mark out bad sectors. The program defaults to MFM

repair or mark out bad sectors. The program defaults to MFM drive type and 2400 baud printer. Modify the program to change.
d) The "USE_LIST.BAS" program is also for Adaptec controllers. It allows one to enter the hard drive info and defect map.

5) Now you need to make a hard drive boot disk.
a) Backup your current boot disk. You will need to add hdisk.dr, h0, and h0.dd to your boot. You may want to go ahead and add h1 also. The 256 byte driver is compiled to support up to four hard drives.
b) Run dmode on the device desciptor(s). Use the information supplied by OFFSET-9.BAS. You MUST use the (patched) version of dmode supplied with your driver! This version allows changing the interface address and entering information in decimal rather than hex. Hex numbers require a preceding "$" to be entered with this version. A report will still give hex numbers, however.
As they come, the descriptors are zeroed out. You will need to change ADR (address; $FF74), DRV (SCSI drive ID #), CYL (# cylinders), SID (# heads), SCT (# sectors/track), TOS (#sectors track 0, usually same as SCT), and SAS (segment allocation size).

NOTE ON SAS: The segment allocation size is the number of sectors initially assigned to an open file. The default is 32 ($20). Sectors that aren't used are returned to the system for later use when the file is closed. The exception is directories, which keep the assigned sectors to allow for later expansion without fragmenting the directory files. If you have a lot of directories, you may want to reduce this number to save space.

6) Alternately, you may be able to merge hdisk.dr, h0, and h0.dd into one file. Then load the merged file and iniz /h0. I tried this on one system and ran out of system RAM, so it wouldn't work.

7) Once you have booted the system with a hard drive boot or loaded the driver and descriptors, try reading a directory from the hard drive (dir /h0). You should get a device not ready error, but the access light should have flashed, indicating that the system is talking to the drive.

8) Format the drive using the normal OS-9 format command. When asked if you want to do a PHYSICAL and LOGICAL format, answer with a "NO"! You have already physically formatted the drive (low-level and physical are the same) with DECB. Doing so now is unnecessary and could cause problems later. A logical format only writes logical sector number 0 and the file

allocation map. Unless you ask format to verify the drive (not a bad idea for the first time!), this shouldn't take long.

9) Follow the instructions that came with the RGB OS-9 drivers to make a bootable RGB-DOS hard drive partition. You can make more than one of the partitions bootable under RGB-DOS.

No clear instructions have been given on how to make an OS-9 boot disk with the drivers and descriptors added. Check your OS-9 manual for help. If you wish, send $20 and a backup of the OS-9 Level II System Master disk to FARNA Systems and you will receive a 40 track double sided boot disk with the drivers and descriptors added. These will still need to be modified with dmode to suit your hard drive. This disk will be set up with /d0 and /d1 as 40 track double sided drives and /d2 as an 80 track double sided drive. It will also be patched to read and write DECB and MS-DOS disks, as well as have all the patches from "Patch OS-9" included. You will also receive a copy of FARNA's "OS-9 Quick Reference Guide" and the "Patch OS-9" disks. A super deal! One should have no problems as long as /d0 is a double sided 40 track disk. If the other drives don't match your system, simply use dmode to change the descriptors.

Using SCSI.SYS 512 Byte Sector Drivers

Unless the RGB 256 byte sector drivers are requested, the shareware version of Matt Thompson's SCSI.SYS 512 byte sector drivers is included with the KT interface (this driver supports 256 byte sectors also). Follow the instructions included with these drivers. There is no need to follow any other setup instructions unless using RGB-DOS also. The shareware version works, but the commercial version ($25 from Northern Xposure, 7 Greensboro Cres, Ottawa, ON K1T 1W6, CANADA) supports a fast cache (fastest hard drive drivers available!) and partitioning of the drive into two or more logical drives. Well worth the extra money!

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