

Advent Products, Inc.

TurboROM

USER'S MANUAL

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Chapter 1

TurboROM Overview

1.1. Introduction

The TurboROM is a replacement EPROM for use in all Kaypro computers that use the CP/M operating system. A complete set of software utilities and this manual are included with the TurboROM. The TurboROM provides the following major benefits to your Kaypro:

1. Disk Speed Improvements:

2X to 4X speed improvements on all disk writes (both hard and floppy disk drives). Optional disk formats are supported that provide significant improvements in disk read, disk write, random file access, and additional directory entries.

2. Kaypro 10 CP/M System Size and Hard Disk Capacity:

CP/M size increase from the standard 60K to over 63K. Formatted hard disk capacity increase from 9 megabytes to over 11 megabytes, depending on the format used to reformat the drive.

3. New features:

- Type-ahead keyboard buffer
- Built-in screen-dump
- Cursor configuration (e.g. block, line, flashing, nonflashing)
- Video screen blanking after approximately 10 minutes of nonuse (screen saver).
- On-screen time display on '84 machines with clocks (Kaypro and most of the add-on clocks supported.)
- Auto detection of several floppy disk formats (including Micro Cornucopia 96TPI).
- Support for nearly all CP/M diskette formats (requires Plu*Perfect Systems MULTICOPY program).
- Time and date stamping of files (requires Plu*Perfect Systems K6-B DateStamper, does not require Plu*Perfect Systems CP/M Enhancements).

4. Hardware extensions:

- Hard disk upgrades for all Kaypros (up to 112Mb supported).
- Support for up to four floppy disk drives and 96 TPI drives
- Support for Advent RAM Disk
- Support for built-in and add on clocks

1.2. How to Use This Manual

If you are installing the TurboROM on a non-Kaypro 10 computer, follow the installation instructions in Chapter 2. If the installation is on a Kaypro 10, please refer to Chapter 3.

Once the installation is completed please read Chapter 4. This chapter describes the utility software. Please pay close attention to the description of the TURBOCFG utility. You may need to use TURBOCFG to set up the TurboROM system for your printer.

Chapter 5 provides information on how the TurboROM system may differ from the original Kaypro system that you have been using. A quick scan of this chapter is recommended.

Chapter 6 provides information on the use of the K10FMT program. This chapter is only applicable to Kaypro 10 users.

The appendices are provided primarily for reference information on hardware modifications. The installation chapters (2 and 3) will direct you to the appropriate appendix.

1.3. Product Compatibility

There are several versions of the TurboROM product, the '83 TurboROM, the '84 TurboROM, K10 TurboROM, and a version for '83 machines using the ProGRAPHICS video system. These TurboROM versions are designed to replace the monitor ROMs in all versions of the Z80 based Kaypro computers with the exception of the ROBIE.

1.3.1. Compatibility, '83 TurboROM

This product is a 4K EPROM. This version of the TurboROM is designed for the Kaypro II and Kaypro 4 computers. These products can be identified by the two full size floppy disk drives and by the presence of one serial I/O port on the back.

For installation on early Kaypro II computers, an adapter kit or circuit modifications are required for installation. The TurboROM Adapter Kit is available for this application from Advent Products. Please refer to Chapter 2 in this manual for further information.

1.3.2. Compatibility, ProGRAPHICS TurboROM

This version of the TurboROM is designed for the Kaypro II and Kaypro 4 products that are using the Advent Products ProGRAPHICS video enhancement. This version of the TurboROM adds screen dump capability to the ProGRAPHICS system.

For installation on early Kaypro II computers, an adapter kit or circuit modifications are required for installation. The TurboROM Adapter Kit is available for this application from Advent Products. Please refer to Chapter 2 in this manual for further information.

1.3.3. Compatibility, '84 TurboROM

This product is an 8K EPROM. This version of the TurboROM is designed for the newer Kaypro products including the Kaypro 1, 2X, 4X, and 4'84. These products can be identified by half height floppy disk drives and the presence of two serial I/O ports on the back.

1.3.4. Compatibility, 10 TurboROM

This version of the TurboROM is designed for the Kaypro 10. The actual TurboROM is the same as is used in the '84 TurboROM product, however the software portion of the product is slightly different, to fit the needs of the Kaypro 10.

This product may require the TurboROM Adapter Kit, available from Advent Products, or circuit modifications for installation on early Kaypro 10 computers, where the 50 conductor, flat ribbon hard disk cable attaches near the center of the main circuit board. Please refer to Chapter 3 in this manual for further information.

1.3.5. Compatibility, Universal ROM

The latest version of the Kaypros are shipped with the Universal ROM. The TurboROM can be used to replace the Universal ROM, however there are some compatibility issues:

1. Kaypro 10
The TurboROM is directly compatible with the "pre-Universal ROM" Kaypro 10. The "Universal ROM" Kaypro 10 hard disk drive must be re-formatted to either the early Kaypro 10 format or one of the Advent Hard disk formats.
2. Application Software
The TurboROM follows Kaypro's early treatment and usage of the arrow and keypad keys. Several of the Universal ROM application programs are specific to the Universal ROM. We have provided patches for WordStar and are working on patches for other Universal ROM application software. The simplest solution to bundled software compatibility would be to use pre-Universal ROM software.

1.4. Support Software

The TurboROM system includes a full complement of software utilities on diskette. These utilities are designed to replace corresponding utilities supplied by Kaypro. The TurboROM Support Software is described in detail in Chapter 4 of this manual.

The Kaypro 10 version of the TurboROM includes the K10FMT.COM program which can be used to re-format the Kaypro 10 hard disk drive. The K10FMT.COM program is a limited hard disk formatter which will format a single physical Kaypro 10 hard disk.

1.5. Notation and conventions

The following conventions are used throughout this manual to help clarify software usage:

1. Characters entered at the keyboard are shown in **boldface**.
2. The <cr> symbol is used to indicate the pressing of the RETURN key on the keyboard.
3. The <^C> symbol is used to indicate the simultaneous pressing of the CTRL key and the C key.

1.6. Trademarks

TurboROM - Plu*Perfect Systems and Advent Products, Inc.; The Backgrounder, DateStamper - Plu*Perfect Systems; CP/M - Digital Research; Kaypro - Kaypro Corporation; Z80 - Zilog Corporation; WD1002 - Western Digital Corporation; WordStar - MicroPro; Smart Key - Software Research Technologies.

Chapter 2

TurboROM Installation, NON-Kaypro 10

2.1. General Points

The installation of the TurboROM involves both hardware and software. The order of installation is:

1. Make backup copies of the TurboROM Support Software diskette.
2. Make a diskette that will boot with the TurboROM.
3. Install the TurboROM
4. Optimize the CP/M system size.

2.2. TurboROM Diskette Backup, Non-Kaypro 10s

The TurboROM Support Software diskette is a single sided (Kaypro II) diskette and does not have a copy of the CP/M operating system on it. This diskette can not be booted.

1. Two self-adhesive labels are included with the TurboROM. Attach each label to a blank diskette. The names on the labels will be used to identify the diskettes. Format each of the blank diskettes using one of the following utilities:

FASTCOPY.COM (P*PS CP/M Enhancements users)

COPY.COM (Most Kaypro users)

FORMAT.COM (Some Kaypro II users)

2. Place a bootable Kaypro CP/M Master diskette that has the programs PIP.COM and SYSGEN.COM in the A drive. Place the formatted diskette labeled Backup Copy in drive B. Press RESET and re-boot the computer.
3. Copy the CP/M operating system to the Backup Copy diskette using the SYSGEN program. The figure on the following page shows the details.

```

A><^C>
Warm Boot
A>SYSGEN<cr>
KAYPRO SYSGEN VER 2.2
SOURCE DRIVE NAME (OR RETURN TO SKIP)A
SOURCE ON A, THEN TYPE RETURN<cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)B
DESTINATION ON B, THEN TYPE RETURN<cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME OR RETURN TO REBOOT)<cr>

```

Fig. 2-1: Sysgen, Non-Kaypro 10

4. Copy the program PIP.COM to the Backup Copy diskette:

```
A>PIP B:=A:PIP.COM<cr>
```

5. Remove the diskette from drive A. Place the diskette labeled Backup Copy in drive A. Place the TurboROM Support Software diskette in drive B. RESET the computer and copy all of the files from the TurboROM Support Software diskette to the Backup Copy diskette:

```
A>PIP A:=B:*. * <cr>
```

6. Remove the diskette labeled TurboROM Support Software diskette from drive B. Place the diskette labeled Working Copy in drive B. Type <^c> to warm boot the computer and copy all of the files from the Backup Copy diskette to the Working Copy diskette:

```
A><^C>
```

Warm Boot

```
A>PIP B:=A:*. * <cr>
```

7. Remove both diskettes.

2.3. TurboROM System, Non-Kaypro 10

Kaypro computers have been shipped with many different monitor EPROMS and many different versions of the CP/M operating system. To overcome the differences created by the various EPROMS and operating systems, the TurboROM builds its own version of the CP/M operating system.

To build the TurboROM system, either the CPME.PRL file (for Plu*Perfect Systems users), or the file MOVCPM.COM, is required on the disk in drive A. The disk in drive A must be a bootable system diskette. If your computer is one of those few which were shipped from Kaypro without a copy of MOVCPM.COM, please contact a Kaypro dealer or Kaypro Corporation to obtain a copy of this file. You will not be able to build the TurboROM system without it. Due to the way MAKTURBO.COM constructs the TurboROM system, ANY copy of MOVCPM.COM for any Kaypro will serve the required function.

This section describes how to make a bootable diskette for use after the TurboROM is installed. The following files will be created on the Working Copy diskette:

TURBOSYS.PRL	Relocatable TurboROM operating system
TURB5600.SYS	56K TurboROM operating system

If you are using the Plu*Perfect Systems CP/M Enhancements, place the Plu*Perfect Systems Utility Disk, WORKING COPY, containing the file CPME.PRL, in drive A otherwise place the original, bootable CP/M diskette from Kaypro, with the file MOVCPM.COM, in drive A. Place the TurboROM Working Copy diskette in drive B. RESET the computer. Log onto drive B and build the TurboROM operating system:

```
A>B:<cr>
B>MAKTURBO<cr>
```

```
MAKTURBO v1.0 -- (c) 1985, Plu*Perfect Systems
Warm Boot
B>MOVTURBO 56.00<cr>
```

```
MOVTURBO v1.2 -- (c) 1985, Plu*Perfect Systems
Relocation can take up to a minute to run.
Warm Boot
```

```

B>TURBOGEN  TURB5600.sys<cr>
TURBOGEN -- VER 3.2
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)B
DESTINATION ON B, THEN TYPE RETURN<cr>

FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)<cr>

```

Fig. 2-3: Non-Kaypro 10, Writing the TurboROM System

2.4. Installing the TurboROM, Non Kaypro 10

At this point in the procedure, the TurboROM Working Copy diskette has been prepared and will be used to boot the computer after the TurboROM has been installed. To confirm that the TurboROM Working Copy has the TurboROM operating system on it, place the TurboROM Working Copy in drive A and press the RESET button. The screen should clear, the keyboard should beep, and the message "REQUIRES TURBOROM" should appear on the screen.

The following sections detail the physical installation of the TurboROM.

2.4.1. Installation Notes, '83 TurboROM

The '83 TurboROM is a 4K (2732A) EPROM. The TurboROM can be plugged directly into Kaypro 4 computers.

Late model Kaypro II computers were shipped with the Kaypro 4 main board and do not require any changes for use with the TurboROM. The late model Kaypro IIs can be distinguished by having PC81-240A silk screened on the front right corner of the main circuit board. The monitor EPROM at location U47 (silk-screened on the main circuit board) will be labeled 81-232. The TurboROM will plug directly into this main board.

Early Kaypro IIs do not have any number silk screened on the front right corner of the main circuit board. The monitor EPROM at location U47 is labeled 81-149. These early Kaypro IIs must be adapted for use with the TurboROM. If you have an early Kaypro II and have not purchased the TurboROM Adapter Kit, there are two options. Either order the TurboROM Adapter Kit from Advent Products, or refer to Appendix A of this manual for notes on how to adapt the Kaypro II main circuit board for use with the TurboROM.

2.4.2. Installation Notes, ProGRAPHICS TurboROM

The ProGRAPHICS TurboROM is a 4K EPROM. Installation of this version of the TurboROM is identical to the installation of the '83 TurboROM. Early Kaypro II computers may require either the TurboROM Adapter Kit or circuit modifications for use with the TurboROM. Please refer to the previous section to determine if you have an early Kaypro II.

2.4.3. Installation Notes, '84 TurboROM

The '84 TurboROM is an 8K (2764) EPROM. The '84 TurboROM can be installed without modifications to the '84 Kaypro main board.

2.4.4. TurboROM Installation, Non-Kaypro 10

This section details the physical installation of the TurboROM for all Kaypro models.

1. Kaypro Cover Removal

Turn the Kaypro OFF.

Unplug the Kaypro from the power source.

Using a medium sized Phillips screwdriver, remove the four screws on each side and the two screws on the top of the cover. Remove the cover and set it aside.

2. Kaypro II Update

If you are installing the TurboROM on an early Kaypro II, the modifications detailed in Kaypro's Field Service Bulletin #4 must be performed before proceeding. Your Kaypro Dealer should be consulted for this no cost update. If this modification has been installed you will observe several wires soldered directly to the IC at location U87. The modifications involved in Field Service Bulletin #4 are contained in Appendix C of this manual. Performing this modification requires soldering wires to the IC at location U87.

3. Locating the Monitor EPROM

The monitor EPROM for '83 machines is a 24 pin chip at location U47 on the main Kaypro circuit board. In most cases the EPROM is labeled either 81-149 or 81-232.

The monitor EPROM for '84 machines is a 24 pin chip at location U34 on the main Kaypro circuit board. In most cases the EPROM is labeled 81-292. If the EPROM has 28 pins and is labeled 81-478, this is the Universal ROM.

4. Removal of the Monitor EPROM

Remove the monitor EPROM from its socket using a small flat-blade screwdriver. Pry very gently with the screwdriver. Pry on each end of the EPROM so as to insure that neither the socket nor the EPROM is damaged.

5. Installation of the TurboROM

If you are installing the TurboROM in an early Kaypro II and are using the Advent Products TurboROM Adapter Kit, please refer to the instructions included with that product.

Plug the TurboROM into the empty monitor EPROM socket. Take care to insure that all of the TurboROM leads enter the socket correctly and that pin 1 on the TurboROM is aligned with pin 1 on the socket.

6. Check Out

Connect the Kaypro to the proper power source.

Turn ON the Kaypro power switch.

The "POWER" LED will light. The TurboROM will erase the screen, then post a sign-on message within a few seconds. If this is not the case, turn OFF the computer, disconnect the power cord and carefully review the entire installation procedure.

Place the Working Copy diskette in drive A, push the RESET button and boot the computer. Verify that the keyboard works. If the computer does not work properly, remove the diskette(s), turn the computer OFF, disconnect the power cord, and double check the installation.

When the installation is successful, turn the Kaypro OFF. Unplug the Kaypro from the power source. Re-install the cover.

2.5. Optimizing the System Size

The Working Copy diskette has a very small (56K) CP/M system on it. This small system is used, ONLY, to check out the TurboROM installation. Many application programs (data bases, spread sheets, word processors...) require a larger system to run correctly. After the TurboROM has been installed and tested, the system size should be increased (optimized), as follows:

1. Place the Working Copy diskette in drive A, push the RESET button and boot the computer. The Working Copy diskette has a small (56K) TurboROM system.
2. The PEEK.COM utility should be run to determine the maximum CP/M system size that the TurboROM can support in your computer:

```
A>PEEK<cr>
```

The PEEK utility will display a screen of data. The last line displayed by PEEK is the maximum system size that can be supported with the current number and type of disk drives:

```
Max System Size: 63.00 K (1024 byte format)
```

Notes:

Any change to the number or type of disk drives attached to the Kaypro will affect the maximum TurboROM system size that can be used. When changing disk drives, always start with the 56.00K system and use PEEK to re-optimize the system.

Datestamper Users: Real time clocks, supported by Plu*Perfect Systems' Datestamper, that use the OKI clock chip require a system size that is 0.25K less than is indicated by the PEEK utility. Example: 63.00 K - 0.25 K = 62.75 K

3. Use the MOVTURBO utility to generate a new CP/M system of the size specified by PEEK. In this example MOVTURBO will generate a 63K system and produce the file TURB6300.SYS on the floppy disk:

```
A>MOVTURBO 63.00<cr>
```

4. Place the Backup Copy diskette in drive B. Use TURBOGEN to write the new 63K system, in the file TURB6300.SYS, on the Backup Copy diskette:

```
A>TURBOGEN TURB6300.SYS<cr>
TURBOGEN -- VER 3.2
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) B
DESTINATION ON B, THEN TYPE RETURN<cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) <cr>
```

Fig. 2-4: Writing the Optimized System to disk

5. Place the Backup Copy diskette in drive A. Press RESET and verify that the computer works with the optimized system. If everything checks out OK, use the TURBOGEN utility to copy the optimized system to the diskettes that you will be using in drive A.

2.6. Floppy Disk System Notes

This section provides a series of very important reminders on the use floppy disks with the TurboROM.

1. **ALWAYS** warm boot the computer (by entering a <^c> when you are at the CP/M prompt) after inserting a new disk when you plan to write to the disk, or if you are inserting a disk of a different format. Failure to perform the warm boot may result in the loss of data on both the disk just removed and the destruction of data on the diskette just inserted. The reasons for performing the warm boot are partly historic and partly TurboROM:

The warm boot is required by CP/M so that it can correctly write on a new diskette. Failure to perform the warm boot before changing diskettes is the usual cause of the error message:

BDOS ERROR ON B: R/O

The TurboROM automatically determines and uses several different floppy disk formats (see 5.3 for details). The TurboROM determines diskette format immediately after a warm or cold boot.

2. The TurboROM automatically de-selects the floppy disk drives after several seconds of non-use. Because floppy disks can be removed, the TurboROM may write to the disks just before it deselects the floppy drives; this is done in an attempt to minimize the the possibility of losing data. Always wait until the the lights on the floppy drives have gone out before removing a diskette.
3. Use TURBOGEN to copy the optimized (usually 63K) system onto all of the diskettes that you are going to use in drive A.
4. Do not put the optimized (usually 63K) system on the Working Copy; the small (56K) system should be left on this diskette in the event that you add or change the number or type of drives connected to the Kaypro. A 56K system is small enough to boot with any imaginable combination of floppy, hard and RAM disks.
5. Please read Chapter 4, TurboROM Utilities, and acquaint yourself with the new programs you will use to format floppies, configure the system, and make bootable diskettes.

Chapter 3.

TurboROM INSTALLATION, Kaypro 10

3.1. General Points

The installation of the TurboROM involves both hardware and software. The order of installation is:

1. Make backup copies of the TurboROM Support Software diskette: one that boots with the TurboROM, one that boots with the original Kaypro 81-302 ROM.
2. Install the TurboROM
3. Place the TurboROM Operating system on the hard disk.
4. Optimize the system size.

3.2. TurboROM Diskette Backup, Kaypro 10s

The backup procedure for the Kaypro 10s is a bit different then the other Kaypro models. The following procedure details the required steps:

1. Two self-adhesive labels are included with the TurboROM. Attach each label to a blank diskette. The names on the labels will be used to identify the diskettes. Format each of the blank diskettes using one of the following utilities:

FLPYFMT.COM (Most Kaypro 10 users)

FASTCOPY.COM (P*PS CP/M Enhancements users)

2. Place the Master K10 TurboROM Support Software diskette in the floppy disk drive and copy all of its files to an unused USER area on the hard disk (USER 14 in the following example):

```
A>USER 14<cr>
A14>PIP A:=C:*. *[G0]<cr>
A14>USER 0<cr>
```

3. Remove the K10 TurboROM Support Software diskette from the floppy disk drive. Place the diskette labeled Working Copy in the floppy disk drive. Warm boot the computer and copy the files from the hard disk to the Working Copy diskette:

```
A><^C>
Warm Boot
A>PIP C:=A:*. *[G14]<cr>
```

4. Remove the Working Copy diskette. Place the diskette labeled Backup Copy in the floppy disk drive and copy the same files from the hard disk (in this case USER 14) to the floppy diskette:

```
A><^C>
Warm Boot
A>PIP C:=A:*. *[G14]<cr>
```

5. Copy the PUTOVLCOM and PUTSYS.COM programs to the Backup Copy diskette. These files usually reside on drive A, USER 0 (the hard disk).

```
A>PIP C:=A:PUTOVLCOM<cr>
A>PIP C:=A:PUTSYS.COM<cr>
```

6. Write the current Kaypro 10 operating system to the Backup Copy diskette using the Kaypro GENFLPY program, usually found on drive A, USER 0:

```
A><^C>
Warm Boot
A>GENFLPY<cr>
Kaypro 10 Floppy Generation Utility
Version 3.01H
Insert a formatted diskette into drive C
Press ESC to return to CP/M
Or press RETURN to copy the system <cr>
```

Fig. 3-1: Kaypro 10 Turbogen

7. Leave the Backup Copy diskette in the disk drive.

Press the RESET button and verify the Kaypro 10 will boot the stock operating system from the Backup Copy diskette.

Remove the Backup Copy diskette from the disk drive and store it in a safe place. This diskette can be used to boot the Kaypro 10 from the floppy disk drive if the original Kaypro monitor ROM (81-302) is re-installed. Chapter 6 has information on using the Backup Copy diskette to restore the Kaypro 10 to stock operation.

3.3. TurboROM System, Kaypro 10

Remove any diskette that may be in the disk drive. Press the RESET button and re-boot from the hard disk drive.

If you are using the Plu*Perfect Systems CP/M Enhancements, verify that the file CPME.PRL is on drive A, USER 0:

```
A>DIR CPME.PRL<cr>
```

If you are using the Kaypro version of CP/M, verify that the file MOVCPM.COM is on drive A, USER 0:

```
A>DIR MOVCPM.COM<cr>
```

MOVCPM.COM is on one of the Autoload diskettes that came with the Kaypro 10. If it is not on the hard disk drive A, USER 0, you will have to copy it from the Autoload diskette.

Place the TurboROM Working Copy diskette in drive C. Log onto drive C and build the TurboROM operating system:

```
A>C:<cr>
C>MAKTURBO<cr>
MAKTURBO v1.0 -- (c) 1985, Plu*Perfect Systems
Warm Boot
C>MOVTURBO 56.00<cr>
MOVTURBO v1.2 -- (c) 1985, Plu*Perfect Systems
Relocation can take up to a minute to run.
Warm Boot
C>TURBOGEN TURB5600.sys<cr>
TURBOGEN -- VER 3.2
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)C
DESTINATION ON C, THEN TYPE RETURN<cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)<cr>
```

Fig. 3-2: Making the TurboROM System, Kaypro 10

This procedure has placed a copy of the TurboROM operating system on the TurboROM Working Copy diskette. This diskette will be used to boot the computer after installing the TurboROM.

3.4. Installing the TurboROM, Kaypro 10

At this point in the procedure the TurboROM Working Copy diskette has been prepared and will be used to boot the computer after the TurboROM has been installed. To verify that the TurboROM operating system is on the Working Copy, place the Working Copy in the floppy drive and RESET the computer. The screen should clear, the keyboard should beep, and the message "REQUIRES TURBOROM" should appear.

The K10 TurboROM is an 8K (2764) EPROM. The K10 TurboROM can be plugged directly into all of the Kaypro 10 computers except for the early versions. The TurboROM must be adapted to fit these early Kaypro 10s.

Early Kaypro 10s can be distinguished by the location of the 50 conductor ribbon cable (approximately 2 1/2" wide) leading to the hard disk controller. If the ribbon cable attaches near the middle of the main circuit board, this is an early Kaypro 10 (10'83). If the ribbon cable attaches to the edge of the main circuit board, then this is a late model Kaypro 10 (10'84).

If you have an early Kaypro 10 (10'83) and have not purchased the TurboROM Adapter Kit, please refer to Appendix D for notes on how to make the TurboROM fit.

1. Kaypro Cover Removal

Turn the Kaypro OFF.

Unplug the Kaypro from the power source.

Using a medium sized Phillips screwdriver, remove the four screws on each side and the two screws on the top of the cover. Remove the cover and set it aside.

2. Locating the Monitor EPROM

The monitor EPROM for most late model Kaypro 10s is a 24 pin chip at location U34 on the main Kaypro circuit board. In most cases the EPROM is labeled 81-302. If the EPROM has 28 pins and is labeled 81-478 this is the Universal ROM.

The monitor EPROM for Kaypro 10'83 machines is a 24 pin IC (integrated circuit) located in front of the 50 conductor, hard disk controller ribbon cable. The EPROM is generally labeled 81-302 and its location is marked U42 on the main circuit board.

If the EPROM at location U42 is labeled 81-188 then your Kaypro 10 has not been updated to the current revision. Please refer to appendix H for additional information about updating your Kaypro 10.

3. Removal of the Monitor EPROM

Remove the monitor EPROM from its socket using a small flat-bladed screwdriver. Pry very gently with the screwdriver. Pry on each end of the EPROM so as to insure that neither the socket nor the EPROM is damaged.

4. Installation of the TurboROM

If you are installing the TurboROM in a Kaypro 10'83 and are using the Advent Products TurboROM Adapter Kit, please refer to the instructions included with that product. Additionally, refer to Appendix D in this manual for installation details for the 10'83.

Plug the TurboROM into the empty monitor EPROM socket. Take care to insure that the TurboROM leads enter the socket correctly and that pin 1 on the TurboROM is aligned with pin 1 on the socket.

5. Check Out

Connect the Kaypro to the proper power source.

Turn ON the Kaypro power switch.

The "POWER" LED will light. The TurboROM will erase the screen, then post a sign-on message within a few seconds. If this is not the case, turn OFF the computer, disconnect the power cord and carefully review the entire installation procedure.

Place the Working Copy diskette in the floppy drive, push the RESET button and boot the computer. Verify that the keyboard works. If the computer does not work properly, remove the diskette, turn the computer OFF, disconnect the power cord, and double check the installation.

After the installation is successful, turn the Kaypro OFF. Unplug the Kaypro from the power source, and re-install the cover.

3.5. Writing CP/M to the Hard Disk

A copy of the TurboROM operating system must be written to the Kaypro 10 hard disk drive before the Kaypro 10 can boot from the hard disk. If the Kaypro 10 was using the Universal ROM, the hard disk must be re-formatted with either the K10FMT or ADVFMT program before proceeding (see Chapter 6).

The following is a procedure for writing a copy of the TurboROM operating system to the hard disk drive.

1. Place the Working Copy diskette in the floppy drive, push the RESET button and boot the computer.
2. Use TURBOGEN to copy the operating system from the floppy to the hard disk drive.

```
A>TURBOGEN TURB5600.SYS<cr>
TURBOGEN -- VER 3.2
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)B
DESTINATION ON B, THEN TYPE RETURN<cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)<CR>
```

Fig. 3-3: Writing CP/M to the Hard Disk System Tracks

3. Remove the diskette from the floppy drive, press RESET and verify that the computer boots from the hard disk drive.

3.6. Optimizing the System Size

The previous step placed a 56K CP/M system on the Hard disk drive. This is a very small system used only to check out the TurboROM installation. Any change to the number or type of disk drives attached to the Kaypro, or re-formatting the hard disk to one of the Advent formats will affect the maximum TurboROM system size that can be used.

After the 56 K TurboROM system has been installed and is working, the system size can be optimized. The following is a brief outline of the optimization steps:

1. Place the Working Copy diskette into the disk drive. Press RESET and boot the system from the floppy. This should be a small (56 K) system.
2. The PEEK.COM utility should be used to determine the maximum CP/M system size that can be supported by the TurboROM:

```
A>PEEK<cr>
```

Note the last two lines of information provided by the PEEK utility:

```
Max System Size: 63.25 K (512 byte format)
Max System Size: 62.75 K (1024 byte format)
```

These lines indicate the maximum system size possible for the existing hardware. The largest size, 63.25 K, is a special case for the Kaypro 10 TurboROM that allows for a very large system size, but can not support the Advent 1024 byte floppy disk formats and is available only with the stock Kaypro 10 hard disk format.

The second size, 62.75 K, is the maximum system size that can be supported without imposing restrictions on the floppy disk formats.

The real time clocks supported by Plu*Perfect Systems' Datestamper that use the OKI clock chip, require 0.25 K more space than is calculated by PEEK. More space for these clocks is generated by using a smaller "K" number, such as 62.50 K instead of 62.75 K.

3. Use the MOVTURBO utility to generate a new CP/M system of the size specified by PEEK. In this example we will generate a 62.75 K system:

```
A>MOVTURBO 62.75<cr>
```

This will produce the file TURB6275.SYS on the floppy disk.

4. Use TURBOGEN to write the new 62.75 K system on the hard disk. The following figure details the use of TURBOGEN.

```
A>TURBOGEN TURB6275.SYS<cr>
TURBOGEN -- VER 3.2
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) B
DESTINATION ON B, THEN TYPE RETURN<cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) <CR>
```

Fig. 3-4: Writing the Optimized CP/M to the Hard Disk

3.7. Kaypro 10 Hard Disk Notes

1. ALWAYS warm boot the computer (by entering a <^c> when you are at the CP/M prompt) after inserting a new disk when you plan to write to the disk, or if you are inserting a disk of a different format. Failure to perform the warm boot may result in the loss of data on both the disk just removed and the destruction of data on the diskette just inserted. The reasons for performing the warm boot are partly historic and partly TurboROM:

The warm boot is required by CP/M so that it can correctly write on a new diskette. Failure to perform the warm boot before changing diskettes is the usual cause of the error message:

BDOS ERROR ON C: R/O

The TurboROM can automatically determine and use several different floppy disk formats (see 5.3 for details). The TurboROM determines diskette format immediately after a warm or cold boot.

2. The TurboROM automatically de-selects the disk drives after several seconds of non-use. Because floppy disks can be removed, the TurboROM may write to the disks just before it deselects the floppy drives. This is done in an attempt to minimize the possibility of losing data. Always wait until the lights on the floppy drives have gone out before removing a diskette.
3. The TurboROM automatically de-selects the hard disk drives and moves the heads to the innermost cylinder. The use of the Kaypro 10 SAFETY program is neither needed nor recommended. Always wait until the drive activity light has gone out before turning OFF the computer.
4. The Kaypro utility, PUTOVL.COM, must NOT be used if the Kaypro 10 hard disk has been reformatted with one of the Advent formats by the K10FMT or ADVFMT programs. The use of Kaypro's PUTOVL.COM will result in the corruption of the data on the hard disk and may require the complete reformatting of the hard disk drive.
5. Do not put the optimized (62.75 K) system on the Working Copy diskette; the small (56 K) system should be left on this diskette in the event that you add or change the number or type of drives connected to the Kaypro. A 56 K system is small enough to boot with any imaginable combination of floppy, hard and RAM disks.
6. The pre Universal ROM Kaypro 10 hard disk format is recognized and used by the TurboROM directly and does not need to be re-formatted.

The hard disk format used on the Universal ROM Kaypro 10 is NOT supported by the TurboROM. The Universal ROM hard disk MUST be re-formatted. See Chapter 6 for details on the use of K10FMT.

7. The TurboROM also supports two Advent hard disk formats which provide the following features, as indicated in Chapter 6:
- Automatic bad track mapping.
 - Increased hard disk capacity (up to 11 Megabytes total) on the original Kaypro 10 hard disk drive.
 - Flexible partitioning of the hard disk. The hard disk capacity can be divided into as many as 7 CP/M logical drives.
 - User selectable block size.
 - User selectable number of directory entries.
 - Disk writing is faster by a factor of 2.
8. The K10FMT program can be used to format the Kaypro 10 hard disk drive with one of the Advent formats. The following table summarizes the capacity that may be realized by re-formatting. The actual capacity depends on the specific disk drive (please refer to Chapter 6):

Hard Disk Format	Total K
Advent 1024	11,008
Advent 512	10,390
Kaypro 10	9,008

Table 3-1: Kaypro 10 Hard Disk Capacity

9. The TurboROM can support two physical hard disk drives on the Kaypro 10. However, both hard disks must be formatted to an Advent Format using the ADVFMT hard disk formatter. The K10FMT program is not capable of formatting the second hard disk drive. When adding a second hard disk or replacing the original disk with a larger capacity drive, the ADVFMT program must be used to format the hard disk drive(s). This program is available from Advent Products.

10. If you are installing two hard disk drives on a Kaypro, the drive that takes the longest time to become ready, must be installed as the first drive in order to insure that the TurboROM will correctly detect the presence of both hard disk drives.

When power is first turned on, the TurboROM will test for the presence of a hard disk controller board. If the hard disk controller is detected, then the TurboROM will then wait up to 25 seconds for the first hard disk drive to become "ready". After the first hard disk drive has become ready the TurboROM will wait 5 seconds to determine the presence of a second hard disk drive.

11. Please read Chapter 4, TurboROM Utilities, and acquaint yourself with the new programs you will use to format floppies, configure the system, and make bootable diskettes.

Chapter 4.

TurboROM UTILITIES

The TurboROM is shipped with a complete set of utility programs to maintain the system and make it easy for users to tailor their system to their needs. This section describes the function and the usage of the TurboROM utilities provided on the TurboROM Software Support diskette. When there is a Kaypro utility program that corresponds to a TurboROM utility program, you must replace the Kaypro utility with the TurboROM utility. This will avoid corrupting the TurboROM operating system with an incompatible utility.

4.1. MAKTURBO.COM

Utility to build a relocatable version TurboROM operating system image. This utility produces the file TURBOSYS.PRL.

MAKTURBO requires the following files to be on the currently logged drive and user:

TURBO-BS.REL	Relocatable version of the Turbo BIOS
ZCPR1.REL	Replacement for CCP portion of CP/M; used only if Plu*Perfect Systems 2.2E is not being used (the file CPME.PRL is not present on drive A, user 0).

One of following files must be on drive A, in the current user area:

CPME.PRL	Relocatable version of Plu*Perfect Systems CP/M enhancements.
MOVCPM.COM	CP/M system relocater from Digital Research

Additionally, the disk (floppy or hard) must contain a valid copy of the CP/M operating system as supplied by Kaypro.

Usage of MAKTURBO:

```
A>MAKTURBO<cr>
```

4.2. MOVTURBO.COM

This utility is a replacement for the MOVCPM.COM program. MOVTURBO is used to produce operating systems of fixed sizes for use with TURBOGEN. MOVTURBO uses a file named TURBOSYS.PRL (produced by MAKTURBO.COM) or the file named TURB-DS.PRL (produced by the Date*Stamper utility INSTALDS.COM) to build the file TURBxxxy.SYS where "xxxy" is the system size (e.g. TURB6250.SYS is a 62.5K TurboROM system). The usage of MOVTURBO is as follows:

```
A>MOVTURBO xx[.yy]<cr>
```

Where "xx" are decimal digits specifying the system size in kilobytes (K) and the optional ".yy" is .00, .25, .50, or .75. The TurboROM installation chapters 2 and 3 have several examples of the usage of MOVTURBO.

4.3. PEEK.COM

This utility is used to inspect a running TurboROM system. Peek provides the information necessary to determine the maximum system size available for a given hardware configuration. PEEK is invoked by:

```
A>PEEK<cr>
```

The following figure is typical of the information provided by the PEEK utility:

```
Advent Turbo ROM Peek Utility    10/6/85
BIOS Base: F200 H
BDOS Base: E406 H
CP/M Size: 62.00 K
TPA Size: 56.75 K
CP/M 2.2E: Not installed
Turbo ROM: Installed
Turbo BIOS: Installed
Bios Interrupts: Enabled
Machine: 84 (Kaypro 10)
Version: 3.0
Host Buffer: 1024 Bytes
BIOS Length: 0242 H
Top of BIOS: F442 H
First Scratch: F7AE H
Max System Size: 63.25 K (512 byte format)
Max System Size: 62.75 K (1024 byte format)
```

Fig. 4-1: PEEK Display

The memory layout figure below is a graphical representation of the information returned by the PEEK utility.

Scratch	<-- 0FFFFH Top of Memory
Free Memory	<-- 0F7AEH First Scratch
BIOS	<-- 0F442H Top BIOS
BDOS	<-- 0F200H BIOS Base
TPA	<-- 0E406H BDOS Base
System Parameters	<-- 00100H Start of TPA
	<-- 00000H Bottom of Memory

Fig. 4-2: TurboROM Memory Layout (Usage)

Note:

The addresses shown are typical. The PEEK utility should be used to determine the exact addresses for your TurboROM system.

The following is a description of each of the distinct memory regions shown in the preceding TurboROM memory layout figure.

1. Scratch

This memory is used by the TurboROM, BIOS and BDOS. The scratch area always starts at the absolute top of memory (0FFFFH) and extends downwards. The size of the scratch area is variable and depends on the number and type of floppy drives, hard disk drives, and RAM disk drives attached to the computer.

2. Free Memory

This memory is unused. This memory space is determined by the size of scratch area and the top of the BIOS. The free memory area can be used to load specialized software such as drivers for network interfaces. The maximum system size reported by the PEEK utility is based on minimizing the free memory area.

3. BIOS

The BIOS (Basic I/O System) is the software that provides the interface between the CP/M BDOS and the hardware of the computer. The MOVTURBO utility is used to relocate the BIOS (and the BDOS).

4. BDOS

The BDOS (Basic Disk Operating System) is the core of the CP/M operating system. This software manages the system resources (disk drives, printers, etc.) and provides the interface between application programs and the BIOS. The MOVTURBO utility is used to relocate the BDOS (and the BIOS).

5. TPA

The TPA (Transient Program Area) is the memory area that is available to application programs. The TPA starts at address 0100H and extends to the base of the BDOS. The use of the maximum CP/M system size (determined by the PEEK utility) is recommended to insure that the maximum TPA is available for use by your application programs.

6. System Parameters

The system parameter area is required by the CP/M operating system and always occupies addresses 0000H through 00FFH. This area is used as a standardized means for application programs to interface with the BDOS and the BIOS without requiring the application program to know exactly where in memory the BDOS and the BIOS reside.

4.4. TURBOCFG.COM

The TURBOCFG utility is supplied with the Advent TurboROM to enable many of the features of the ROM to be customized to suit your individual needs. The program will only work with the TURBO BIOS.

If you were previously running Plu*Perfect Systems CP/M Enhancements then this completely replaces CPMCONFIG. If you were using a standard Kaypro system then TURBOCFG replaces the CONFIG program. You should use ONLY TURBOCFG to configure your system.

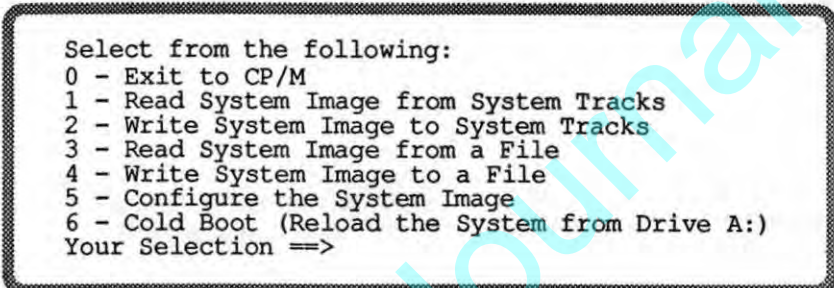
TURBOCFG is fully menu driven and requires very little actual instruction in how to use it. However, some of the TURBOCFG options may be unfamiliar so we will explain the features here.

4.4.1. Main Menu

To run TURBOCFG enter:

```
A>TURBOCFG<cr>
```

The following figure is typical of TURBOCFG's main menu display:

A screenshot of the TURBOCFG main menu display, enclosed in a rectangular box with a dotted border. The text inside the box is as follows:

```
Select from the following:  
0 - Exit to CP/M  
1 - Read System Image from System Tracks  
2 - Write System Image to System Tracks  
3 - Read System Image from a File  
4 - Write System Image to a File  
5 - Configure the System Image  
6 - Cold Boot (Reload the System from Drive A:)  
Your Selection ==>
```

Fig. 4-3: TURBOCFG Main Menu Display

The following is a brief description of each of the TURBOCFG main menu options:

0 - Exit to CP/M

Exits to CP/M. This option does not force a cold boot. Any configuration changes will not become active unless they are written to disk and a cold boot on that disk is performed. Use this option if you do not want to use any changes you may have made in the configuration.

1 - Read System Image from System Tracks

Reads a copy of the operating system from the the system tracks of a disk into memory so that it may be configured, or written to a disk or a file. This option is usually the first step in configuring your system.

2 - Write System Image to System Tracks

Writes a copy of the operating system from memory to the system tracks of a disk. Use this option to write the configuration to the system tracks of a disk. The drive name will be requested. This option performs the same function as TURBOGEN.COM.

3 - Read System Image from a File

Reads a copy of the operating system from a CP/M file that was created by MOVTURBO (or TURBOCFG option 4) into memory. Use this option to check or set the configuration of a TURBxxx.SYS file.

4 - Write System Image to a File

Writes a copy of the operating system from memory to a file. Use this option to record your configuration in a disk file that can be used with TURBOGEN.

5 - Configure the System Image

Takes you to the Configuration Menu. This menu allows the inspection and modification of the operating system. Use this option to begin configuring the system, after reading the system from a disk using option 1 from this menu.

6 - Cold Boot

Exits from TURBOCFG and forces a cold boot. This option would be used if you had just reconfigured the system on drive A and wished to have the new configuration active immediately.

4.4.2. Configuration Menu

The Configuration Menu is reached by selecting option 5 from the main menu. The configuration menu has nine topics for configuration. We will go through each of them and give a brief explanation of what features are involved.

0 - Return to main menu

Exits the Configuration Menu level and returns you to the TURBOCFG main menu level. Use this option when you are finished configuring the system.

1 - Serial Port(s) Parameters

The serial data port(s) may (each) have the following parameters set.

1. Baud Rate -- 50 through 19200 baud. Some Kaypros are not capable of some of the more obscure baud rates, there is no way to determine this except by experimentation.
2. Number of data bits -- may be set to 7 or 8.
3. Number of stop bits -- may be 1 or 2.
4. Parity -- ODD, EVEN or NONE.
5. Handshaking -- Enable transmitting only when the CTS (Clear to Send) input at the serial port is active (+12 volts). To use this option you must have an appropriately wired serial cable.

2 - Console & Printer Selection

The CP/M IOBYTE allows assignment of different physical devices to the logical console (CON:) and list (LST:) devices. The TurboROM fully supports the list device and partially supports the console device.

1. Console -- Normally the console is the keyboard and the built-in video screen. It is possible to connect an external terminal to your Kaypro and use it as the console device by connecting the external terminal to serial port and then assigning the Console to TTY: either with TURBOCFG or STAT. You may run your Kaypro from this external terminal.

2. Printer -- the list device may be one of four logical devices:

1. TTY: the serial data port
2. CRT: the video screen built-in the Kaypro
3. LPT: the centronics parallel port
4. UL1: the serial printer port on Kaypro 10s and '84 machines

The cabling and serial port parameters must match your printer (or MODEM) if the serial ports are to be used.

NOTE:

Kaypro used the name TTY: on Kaypro 10'84 machines to refer to the serial printer port and did not support the serial data port at the operating system level. We feel the usage indicated above is more logical and consistent.

3 - Numeric & Arrow Keys

The 18 arrow and number keys on the Kaypro key pad normally send the character engraved on the keycap. These may be configured to send any other single character. This change is performed at bootup and is more useful on a floppy based system where different systems with different definitions can be easily booted. For more complex key definitions see Appendix F concerning WordStar function key patches. A more general and dynamic keyboard re-definition product is the Plu*Perfect Systems' Backgrounder which is compatible with the TurboROM.

TURBOCFG allows each of the keys to be given a new value in a simple manner. For printable characters or control characters, simply press the function key and then the MAIN keyboard key whose value you wish to attach. To terminate the session press Ctrl-G. For more complex uses where a character with the high bit set is desired, the definition process may be switched into Hexadecimal mode by pressing Ctrl-H. It can be toggled back to regular mode with another press of Ctrl-H.

4 - Cursor Type

The default cursor type may be changed to suit your taste. When your choice is made it will immediately be reflected in the cursor that is displayed. This is different from ALL other changes made in TURBOCFG which only become effective after the next cold boot. This exception was made for convenience in choosing a visually acceptable cursor. For the cursor to appear as chosen after bootup, the configured system must be written to the system tracks of the boot disk using option 2 at the top level menu.

5 - Keyboard Type-Ahead & Key Click Disable

1. Type-Ahead — With a standard Kaypro ROM the keyboard will drop characters if you keep typing during disk, video, and printer activity. The TurboROM samples the keyboard repeatedly during disk activity and video activity to reduce the possibility of dropping a typed character. This method is NOT interrupt-driven to avoid interactions with the programs that do not handle interrupts correctly.

The type-ahead buffer is 32 characters long and in general can not be overflowed. However, some programs will abort if any key is pressed while they are running. The built-in directory program, DIR, is a good example.

The main benefits of the type-ahead feature are in word-processing programs and when you wish to start typing the next CP/M command during the Warm Boot process.

The type-ahead buffer is enabled by default. Some programs (certain versions of Smartkey, for example) will by-pass the operating system and go directly to the keyboard hardware. If you are using programs that violate CP/M conventions such as this you should disable the type-ahead buffer for compatibility with these programs.

2. Key Clicks — Kaypro has shipped several different models of keyboard with its CP/M computers. This option will disable the key click on most of the Keyboards.

6 - Screen Dump Enable (& 84 Clock Display)

1. **Screen Dump** -- The TurboROM has an entry point which will return the characters on the screen. The TURBO BIOS can be configured to use this and send the contents of the screen to the currently assigned list device.

To initiate a screen dump, a trigger character must be selected. The trigger character should be a character that none of your programs ever use because once it is dedicated to this task it becomes unavailable for other uses.

The only character that may not be used is the <NUL> or "Ctrl @", this character is chosen to disable the screen dump. The chosen trigger character **MUST** be entered in Hexadecimal.

You can use a character that is defined on the function arrow keys, because the screen dump is trapped upstream of the function key decoding. For example, you could select the <LINE FEED> key as your screen dump trigger and still have the line feed available on the <DOWN ARROW>.

If you wish to dedicate one of the arrow/number keys as a screen dump character you must enter the raw hexadecimal value for these keys (80H - 91H) as indicated in the table below.

FUNCTION	KEY	HEX	FUNCTION	KEY	HEX
UP ARROW		80	5		89
DN ARROW		81	6		8A
<-		82	7		8B
->		83	8		8C
0		84	9		8D
1		85	-		8E
2		86	,		8F
3		87	ENTER		90
4		88	.		91

Table 4-1: Raw Function Key Codes

**THIS PAGE REPLACES THE LAST PARAGRAPH
ON PAGE 4-11.**

Option "1" under the Disk De-Select Timing Method menu toggles between the standard (non-interrupt timer) and the alternative (interrupt driven timer).

Option "2" under this menu allows you to set the time delay for the disk drives. The time delay is set by specifying a two digit hexadecimal number in the range of 01 to FF. The larger the value the longer the time delay will be. Specifying a value of 00 will result in the disk drives never de-selecting.

Since the exact time delay is affected by the deselect method, application program, and the CPU speed, it is not possible to provide exact values for the drive de-select time. The following table is provided as a starting point for optimizing the disk de-select delay for your tastes:

	Hexadecimal Time Delay			
	FF	80	40	20
Interrupt Timer	9	4.5	2.2	1.1
Non-Interrupt Timer (4.0 MHz)	18	9	4.5	2.2
Non-Interrupt Timer (2.5 MHz)	24	12	6	3

Table 4-2: Approximate Disk De-Select Timing in Seconds

2. Machine Clock Display -- With the '84 and Kaypro 10 TurboROMs, the current hour and minute may be displayed on the 25th line. The ROM supports the built in Kaypro clock, the Advent Products Clock and others. The clock must be present or the TurboROM may display random characters on the 25th line.

The clock will not be displayed if the 25th line is being used for something else. The clock display can be temporarily disabled by using a video escape sequence. Please refer to Appendix G.

7 - Disk De-Select Timing Method

The TurboROM de-selects the floppy and hard disk drives after they have not been accessed for some period of time. The TurboROM insures that any data waiting to be written to the disks is written before the drives are de-selected. Floppy disk drives will be de-selected and their motors turned off. The read/write heads on any hard disk drives will be positioned over the inside-most cylinder and the hard disk drives will be de-selected.

Two methods of de-select timing are available:

1. Most Kaypros count the number of times a program checks the keyboard for a keypress. After counting these checks to some large number, the de-selection process described above takes place. The disadvantage of this method is that some programs seldom check the keyboard and the disk de-select times are thus unpredictable.
2. The alternative method uses an interrupt driven timer which sends a dummy character out to the keyboard 30 times a second and after counting to a preset number of characters, deselects the drives. The advantage of this method is that much more predictable timing is assured. The disadvantage is that some programs are very intolerant of running in an interrupt driven system.

The timing interval is set by specifying a hexadecimal number in the range 00H to 0FFH. The maximum time interval (using 0FFH) is about 8 seconds. Minimum time to deselect a drive is accomplished using a value of 01H. Specifying 00H will result in never deselecting the drives.

8 - Automatic Cold Boot Command

This option in TURBOCFG allows you to specify the Automatic Cold boot command (if any is desired). You may specify a single command that will automatically execute when the computer is reset or the power turned on. This command is equivalent to entering it at the CP/M prompt "A>". The use of SUBMIT or other batch processors (e.g. EX.COM) allows for extending this automatic cold boot command to perform a series of commands.

9 - Advanced Options

Advanced options are provided for those who want to fine tune their system. These options are intended to be used at your own risk.

An option is available to let you specify a drive other than A: for the warm boot. The designated drive MUST have a valid, bootable copy of the operating system.

In addition you may fine tune the timing of the floppy disk system. The TurboROM default values will accommodate almost any floppy drive available. However, many drives can perform considerably faster than the default values and system performance can be improved by a bit of fine tuning.

The head load delay can be eliminated for those drives which do not have a head load solenoid. Some drives will step reliably at a much faster rate than the 6 millisecond default. The step rate variable is only used by the TurboROM if the fast seek hardware modification is used. This modification is part of Advent's Personality/Decoder Module. Please refer to Appendix E.

4.5. TURBOCOPY.COM

The TURBOCOPY utility supplied with the TurboROM allows the formatting and copying in 5 different floppy disk formats on the Kaypro. TURBOCOPY makes extensive use of the facilities of the TurboROM to determine the number and types of floppy disk drives installed.

TURBOCOPY is a menu driven program. The main menu leads to three sub-menus:

1. Each time that TURBOCOPY is run, the format to be used must be selected.
2. The source and destination drives must be set up if they differ from the default values.
3. The FORMAT, COPY or VERIFY function can then be chosen. The FORMAT and COPY operations request confirmation before they write on the destination drive.

TURBOCOPY is fast and reliable. If you are interested in handling other 5.25 floppy disk formats you may wish to consider the Plu*Perfect Systems' MULTI-COPY software. It also contains a program called TURBOSET which allows your TurboROM to read and write any soft-sectored CP/M format. TURBOSET and MULTICOPY are considerably faster and more convenient than other packages such as UNIFORM and MEDIA MASTER, as it takes up no extra memory and uses the built-in features of the TurboROM.

4.6. TURBOGEN.COM

SYSGEN.COM replacement. This utility is used to copy operating system images. This utility works with all of the TurboROM floppy formats, all of the hard disk formats including the stock Kaypro 10 format, and the Advent RAM Disk.

Please refer to section 1.6.6 in the "CP/M Operating System Manual" for details on SYSGEN, as TURBOGEN functions identically.

4.7. TURBOMAP.COM

TURBOMAP is a utility provided with the Advent Products TurboROM which allows complete flexibility in the logical/physical arrangement of disk drives.

4.7.1. Logical Drive Names

CP/M allows a maximum of 16 logical drives which are designated with the letters "A" through "P". In small computer systems each of the letters were often associated solely with a physical device such as a specific floppy disk drive. When hard drives are used, the single physical hard disk drive is often broken up into several logical drives, e.g. the Kaypro 10 splits its 9 Megabyte hard drive into two logical drives of 4.5 Mb each. However, when many possible combinations of logical and physical drives exist it becomes necessary to be very careful of the terms used in describing and naming the drives.

4.7.2. TurboROM Drive Nomenclature

Because of the large number of possible disk drive combinations that can be used with the TurboROM, we have had to decide on an unambiguous method of identifying the various drives. The TurboROM system detects the physical presence, number and type of drives connected to the computer. It then assigns a 3 character physical name to each floppy drive, RAM Disk, and hard disk partition. CP/M sees each of these units as a logical device and assigns each logical drive a single letter name in the range A: through P:. This drive letter name is arbitrary and can be changed using TURBOMAP.

Floppy Disk Drives

The TurboROM supports a maximum of 4 floppy disk drives. The physical names FD1, FD2, FD3 and FD4 are used to describe them. FD1 corresponds to the drive which has its select jumper set to DS1, and FD4 corresponds to the drive which has its select jumper set to DS4. Some floppy drives use a different numbering system which starts at 0 and counts to 3 to identify the drive select. In that case, FD1 would correspond to DS0, FD2 corresponds to DS1, etc.

Advent RAMDISK

This is simply designated as "RAM", the TurboROM can support a single Advent RAM Disk (up to 2 Megabytes).

Kaypro 10 Format Hard Disk

If the original Kaypro 10 hard disk format is preserved, only the original single hard disk will be recognized by the TurboROM. The 2 logical drives contained on it are designated as K10 for the first logical drive and K11 for the second logical drive. The K indicates Kaypro format, the 1 as the second character indicates the first (only) hard disk drive, the third character 0 or 1 indicates the respective partition number of the hard disk drive.

Advent Format Hard Disk(s)

Up to 2 physical drives may be present and they may be divided into as many as 7 logical partitions. The naming of these drives follows the pattern Hxy where:

- H - specifies Advent format
- x - can be 1 or 2 (physical drive)
- y - can be 0 through 6 (logical partition)

An example would be H13 for an Advent format, physical drive number 1, partition number 3.

Note:

The first physical drive must have its drive select logic jumpered as DS2 and is connected to J2 on the WD1002 hard disk controller. The second physical drive must have its drive select logic jumpered as DS3 and is connected to J3 on the WD1002 hard disk controller. Please refer to the hard disk manufacturer's documentation for information concerning drive select jumpering, and recommended drive termination.

4.7.3. Using TURBOMAP

TURBOMAP can be used in three different ways.

A>TURBOMAP V<cr>

Displays the current logical/physical drive mapping in use by the TurboROM.

A>TURBOMAP<cr>

Displays the current logical/physical mapping and allows for interactively changing the current mapping. Care must be taken not to exit the program without assigning one drive as A. The A drive must have a valid operating system on the system tracks. Care should be taken to not double map a logical drive or some of the physical devices will become inaccessible until the next cold boot.

A>TURBOMAP nnn=x[,nnn=x]<cr>

This method will scan the command line and assign physical device nnn to logical drive letter x exactly as if the same command had been given in the interactive mode. If any errors are found on the command line the program will immediately enter the interactive mode, making none of the changes specified on the faulty command line.

When changing drive assignments, the logical drives alphabetically later in the sequence than the one you are assigning, will move toward the end of the alphabet to make space in the table. The table of assignable drive letter names starts at A and ends at P so be very careful when you have a drive defined as P (the final CP/M drive) as the drive which was originally assigned as P will be left out of the drive mapping and become inaccessible until the next cold boot.

As an example, consider a Kaypro 4 with 2 floppies, and an external enclosure which contains an Advent RAM Disk and a 20Mb hard disk with 3 partitions. If the system boots from the hard disk, the following drive map will be in use at power up:

A:	H10	-----		
B:	H11	-----		-- Advent format hard disk
C:	H12	-----		
D:	FD1	-----		-- Two floppies
E:	FD2	-----		
F:	RAM	-----		-- Advent RAM Disk

Now, suppose the desire is to make the RAM Disk the A disk drive. After using TURBOGEN to write the operating system on the RAM Disk, making it possible to warm boot from that device, and after using PIP to copy the desired files into the RAM Disk, the following command would be typed:

A>TURBOMAP RAM=A<cr>

This command will change the previous drive map to the following drive map:

```
A:  RAM -----|-- Advent RAM Disk
B:  H10 -----|
C:  H11 -----|-- Advent format hard disk
D:  H12 -----|
E:  FD1 -----|-- Two floppies
F:  FD2 -----|
```

Further variations in mapping the drives to specified configurations are left to the user's experimentation. Please heed the warnings concerning the existence of an A drive, and be sure whatever drive is assigned as A has a bootable operating system.

Chapter 5

TurboROM NOTES

This section is intended to supply information about the features and functions of the TurboROM and its operating system.

5.1. ZCPR1

ZCPR1 is a public domain replacement for Digital Research's Console Command Processor (CCP). The CCP is the program that presents the A> message, and interprets keyboard commands. The MAKTURBO utility detects if the present operating system is using Plu*Perfect Systems' CP/M enhancements. If the enhancements are not being used, MAKTURBO replaces the CCP with a copy of ZCPR1 while building the TurboROM system. The reason for this replacement is two fold.

1. ZCPR is a considerable improvement over the original CCP.
2. Kaypro has shipped a number of different patches in their CCP, some of which contained bugs.

ZCPR stands for Z80 Command Processor Replacement. It was developed by Richard Conn, Frank Wancho, Keith Peterson, Ron Fowler and generously contributed to the public domain. Subsequently, Richard Conn has developed ZCPR2 and ZCPR3 which are bigger more sophisticated versions.

We have selected ZCPR1 because it is clearly in the public domain and because it behaves, in general, very much like the original CCP with some improvements.

For those of you who wish to incorporate ZCPR2 or ZCPR3 with the TurboROM, the BIOS source code, TURBO-BS.ASM is supplied on the TurboROM Software Support diskette. The code can be assembled with the CDL ZASM Z80 Macro Assembler. Turn-key versions of ZCPR3 are available from Echelon, Inc., 101 First St., Suite 427, Los Altos, CA 94022.

5.1.1. Changes to CCP Commands

ZCPR1 is a replacement for the Digital Research's CCP. The two programs are nearly interchangeable. Most CP/M user's will have very little difficulty with the transition. The main differences (improvements) of ZCPR1 over the standard Digital Research CCP commands are documented in the following pages.

TYPE

The TYPE command now defaults to pausing at each displayed screen. To type continuously as before place a P after the filename:

```
A>TYPE file P<cr>
```

DIR

The DIR command will display system files (this was not previously possible with the CP/M's built in DIR command). To display the system files place an S after the file specification:

```
A>DIR *.* S<cr>
```

To display all files including System files use an A:

```
A>DIR *.* A<cr>
```

ERA

The ERA command now displays the names of the files it is erasing.

REN

The REN command queries if the destination file already exists.

SAVE

The SAVE command queries if the destination file already exists. Also, the numeric argument can be in HEX and can specify sectors in place of pages. The numeric argument can be followed by H to specify hexadecimal:

```
A>SAVE 2BH file<cr>
```

If S is placed on the command line after the filename, 128 byte sectors rather than 256 byte pages will be saved:

```
A>SAVE 128 file S<cr>
```

5.1.2. New CCP Commands

ZCPR1 adds some additional commands not found in Digital Research's CCP. The following subsections document the new commands.

LIST

The LIST command sends a file to the printer:

```
A>LIST file<cr>
```

GO

The GO command will re-execute the program currently in memory at addresses 0100H (the standard start address of Transient Program Area). It is assumed that the program currently in memory at 0100H is re-executable.

```
A>GO<cr>
```

GET

The GET command loads a file into memory at an address specified in hexadecimal digits (xxxx):

```
A>GET file xxxx<cr>
```

JUMP

The JUMP command calls a program at a specified hexadecimal address:

```
A>JUMP xxxx<cr>
```

DFU

The DFU command changes the default user number for the ZCPR1's COM file search (see Command Search Path below):

```
A>DFU 2<cr>
```

5.1.3. Command Search Path

This feature is probably the single most useful command, of ZCPR. It means that you can be logged into drive B (B>) and when you issue a command such as:

```
B>PIP<cr>
```

You do not need a copy of PIP.COM on drive B. It works in the following manner:

1. The command is first examined to see if it is a CCP (built-in) command, as described in section 5.1.1.
2. If not found, drive B (the currently logged drive) is searched for the file PIP.COM in the currently logged user number.
3. If not found, the Default User number on drive B is searched for the file PIP.COM (usually user 0, but may be changed with the DFU command).
4. If not found, the Default User number on drive A is searched for the file PIP.COM.

This means you can keep most of your programs on drive A and they will be found automatically. Note that some programs require auxiliary overlay or data files and they may or may not be found. However, many popular programs such as WordStar and Perfect Writer will perform a similar search for their auxiliary files, while some others, such as dBase II, do not.

ZCPR has a number of customization options, and we have chosen the following:

1. When a command can not be recognized, it is echoed literally without filtering of control characters. This is identical to the original CCP and is used by some people to send control sequences to printers and the video.
2. The current user number is included in the prompt (e.g. user 5, drive C, shows as: C5>).
3. The screen is cleared before the first page of a TYPE command.

5.2. CP/M Logical Names

When RESET is pressed and the TurboROM system performs a cold boot, all of the drives (floppy, hard, and RAM disk) are assigned CP/M logical names starting with A.

When a TurboROM system is cold booted from floppy, the floppy disk(s) are assigned the first logical drive name(s), followed by the hard disk partition(s) (if hard disk drive(s) are present), and finally the RAM disk (if present) is assigned as the last logical name. For a Kaypro 10 with a RAM Disk, booted from the floppy, the following assignments will be made:

A:	FD1	First floppy disk drive
B:	K10	Kaypro 10 Hard disk partition 0
C:	K11	Kaypro 10 Hard disk partition 1
D:	RAM	RAM Disk

When the TurboROM system cold boots from hard disk, the hard disk drives are assigned first, floppies second and the RAM disk (if present) last. For a Kaypro 10 with a RAM Disk, booted from the hard disk, the following assignments will be made:

A:	K10	Kaypro 10 Hard disk partition 0
B:	K11	Kaypro 10 Hard disk partition 1
C:	FD1	First floppy disk drive
D:	RAM	RAM Disk

The TURBOMAP utility can be used to inspect and change the TurboROM's assignment of the CP/M logical drive names.

5.3. Floppy Disk Drives

The TurboROM can support up to 4 floppy disk drives and can support any combination of 48 and 96 TPI floppy drives.

The addition of extra floppy disk drives or 96 TPI drives requires the installation of the Advent Personality/Decoder Board. Please refer to Appendix E for notes on the Personality/Decoder Board. It is the user's responsibility to determine the suitability, mechanical requirements, and power requirements when adding or changing floppy disk drives.

5.3.1. Floppy Disk Formats

The TurboROM will recognize and can directly use several floppy disk formats. In fact, you can use TURBOGEN to copy the TurboROM operating system onto most disk formats (including several non-Kaypro formats) so that the disks can be used directly in the A drive.

The following table summarizes the capabilities of the '83 and '84 TurboROMs. All Kaypro 10s use the '84 TurboROM; the ProGRAPHICS version is considered an '83 TurboROM.

Floppy Disk Format	TurboROM		Total K	Directory Entries	Block Size
	'83	'84			
Kaypro SSDD	X	X	195	64	1K
Kaypro DSDD	X	X	394	64	2K
Advent SSDD	X	X	185	64	1K
Advent DSDD 48	X	X	390	256	2K
Advent DSDD 96	X	X	782	256	2K
Micro Cornucopia 96	X	X	788	96	4K
Epson QX-10 DSDD 48	X	X	380	128	2K
Osborne SSDD	X	X	92	64	1K
Osborne SSDD	X	X	185	64	1K
Xerox 820-1 SSDD	X	X	83	32	1K
TURBOSET Formats	X	X	---	--	--

Table 5-1: TurboROM Floppy Formats

Notes:

X = format supported

The TURBOSET Formats require the TURBOSET program.

5.3.2. Advent Floppy Formats

The three Advent floppy formats provide the following benefits over the Kaypro and the Micro Cornucopia formats:

1. Faster disk read and write (optimized sector skew)
2. More directory entries on double sided formats
3. Better tolerance for disk drive spindle speed variations.

The Advent floppy formats have one limitation: these formats can only be used with TurboROM equipped Kaypro computers.

5.3.3. TURBOSET Floppy Formats

Nearly any other CP/M 5.25" soft sector format may be set up using the TURBOSET program which is available as part of the Plu*Perfect Systems MULTICOPY package.

5.3.4. Adding Floppy Disk Drives

The TurboROM Supports up to 4 floppy disk drives on any Kaypro. These can be any combination of DSDD 48 TPI drives and DSDD 96 TPI floppy drives. The addition of extra floppy disk drives or 96 TPI drives requires the installation of the Advent Personality/Decoder Board. Please refer to Appendix E for notes on the Personality/Decoder Board.

Software support for additional floppy disk drives is provided by the TurboROM. It is, however, the user's responsibility to determine the suitability, mechanical requirements, and power requirements when adding or changing floppy disk drives.

5.3.5. Fast Seek Option

A Fast Seek option is available for floppy disk drives which are capable of stepping faster than 6 ms/track. Use of the fast seek option can provide significant speed improvements and noise reduction when used with floppy drives capable of fast step rates. Installation of this option is a two step process:

1. The Floppy Disk Controller chip is modified according to the instructions for installing the Personality Decoder Board, using the Fast Seek option. Refer to Appendix E.8.
2. The TURBOCFG utility program is used to specify the appropriate Step Rates in the Advanced Options Menu choice.

The Fast Seek option works only with the TurboROM. This option is not compatible with any other ROM (including the original Kaypro ROM). The option is NOT COMPATIBLE with commercial programs that directly access the Floppy Disk Controller chip (e.g. Uniform, Media Master, Fastback ...). Please refer to Appendix E for further information concerning the fast seek option.

5.4. Hard Disk Drives

The TurboROM provides the software support for hard disk drives. The TurboROM automatically detects the presence of the hard disk drive(s) and can boot directly from the hard disk drive. If a diskette is detected in the first floppy disk drive, the TurboROM will attempt to boot from the floppy drive.

The TurboROM can support two physical hard disk drives on any model Kaypro. Each hard disk drive may provide 56 Mb of storage. The ADVFMT hard disk formatter is required for formatting any hard disk drive other than the 10 Mb drive in a Kaypro 10. The Kaypro 10 TurboROM product provides a formatting utility that can be used to reformat the (single, 10 Mb) hard disk. Three formats are supported, which are:

1. Original Kaypro 10 (not the U-ROM format)
2. Advent Format, 512 bytes per sector
3. Advent Format, 1024 bytes per sector

5.4.1. Adding Hard Drives

The installation of a hard disk drive on a non-Kaypro 10 requires the installation of a Western Digital WD1002-HDO hard disk controller board and the Advent Host Adapter to connect the Kaypro main board to the hard disk controller.

The ADVFMT Hard Disk Formatter software is required to prepare a hard disk drive for use on a non-Kaypro 10, or for the addition of a second drive or larger capacity drive to a Kaypro 10.

It is the user's responsibility to determine the suitability, mechanical requirements, and power requirements when adding or changing hard disk drives.

Note:

The WD1002-HDO hard disk controller board was designed to control hard disk drives with the ST506 interface. Some new hard disk drives use the more modern ST412 interface. Please be aware that the ST506 and ST412 interface standards are NOT the same.

5.4.2. K10FMT Kaypro 10 Hard Disk Formatter

The K10FMT.COM program can be used only on the Kaypro 10 to re-format the hard disk to support one of the Advent Hard disk formats. Please refer to Chapter 6 for more details.

5.4.3. ADVFMT Hard Disk Formatter

The ADVFMT Hard Disk Formatter is a program designed to prepare 5 1/4" hard disk drives for use with the TurboROM. This program is available through Advent Products, Inc.

ADVFMT is designed to accommodate nearly all hard disk drives that are compatible with the ST506 interface. ADVFMT will support drives with a maximum of 8 read/write heads and 1024 cylinders. ADVFMT is designed to work with drives capable of buffered seek, or fixed step rate seek schemes.

The ADVFMT Formatter provides automatic detection of hard and soft errors during the format operation. The bad spots are locked out before the operating system or any file can be written on the hard disk.

The Formatter, in addition to writing the disk drive format, provides the capability of dividing each physical disk drive into as many as seven CP/M partitions. The capacity, CP/M block size and the number of directory entries for each partition is determined by the user and is constrained only by the limits of the CP/M operating system.

The following table summarizes the hard disk capabilities of the '83 and '84 TurboROMs:

Hard Disk Format	TurboROM		Number of Drives
	'83	'84	
Advent 1024	X	X	2
Advent 512		X	2
Kaypro 10		X	1

Table 5-2: TurboROM Hard Disk Format Capability

Note: X = format supported

5.5. RAM Disk Support

The TurboROM provides automatic support for the Advent Products RAMDisk. No additional software is required. The TurboROM automatically detects the presence of the RAMDisk and assigns it the next CP/M logical drive name after all of the floppy and hard disks have been assigned.

As an example, a Kaypro with 2 floppy drives and RAMDisk will have this drive map after a cold boot:

```
A:  FD1   First floppy disk drive
B:  FD2   Second floppy disk drive
C:  RAM   RAMDisk
```

The RAMDisk can be made the default drive (A); this requires two steps:

1. Use TURBOGEN to copy the operating system to the RAMDisk.
2. Use TURBOMAP to make the RAMDisk drive A.

```
A>TURBOMAP RAM A<cr>
```

Now, the Kaypro with 2 floppy drives and RAMDisk will have this drive map, after using TURBOGEN and TURBOMAP:

```
A:  RAM   RAMDisk
B:  FD1   First floppy disk drive
C:  FD2   Second floppy disk drive
```

5.6. TurboROM Video Features

Compared to the standard Kaypro ROM, some changes to the behavior of the video have been made. These changes have been made for general consistency and to correct bugs in the original Kaypro video implementation.

Please refer to Appendix G for a complete listing of TurboROM video sequences.

5.6.1. Video Control Codes and Escape Sequences

1. Control Characters that are not used by the video are now thrown away rather than generating Greek characters or Fine Line graphics.
2. On '83 machines, true underline characters on the screen are no longer destroyed when the underline cursor is moved through their position.
3. On '84 machines the ESC G / ESC A sequences are implemented identically to the '83 machines. That is, the 32 lower case characters from the grave accent (60 Hex) through the DELEte (7F Hex) will produce the corresponding graphic character if the video sequence ESC G has been received. When the sequence ESC A is received, the lower case characters produce themselves.

On the '83 model character ROMs, these 32 characters produced following the ESC G sequence are normally Greek and mathematical symbols. On the '84 model character ROMs, these characters are normally the Fine Line graphic set. On Foreign Language Kaypros these characters are selected european characters.

4. On '84 machines the Status Line ON sequence, ESC B7, and the Status Line OFF sequence, ESC C7, have been changed slightly. Kaypro defaulted to a 24 line scrolling window with the 25th line also scrolling. The TurboROM defaults to a 24 line scrolling display with the 25th line locked (Status Line ON). The Turbo Status Line OFF sequence changes the display to a 25 line scrolling screen.

The difference in the status line behavior is small, however it may effect some user-written software that accesses the status line. To erase the status line, position the cursor at the start of the 25th line using the direct cursor positioning sequence then use the erase to end of line sequence.

The 25 line scrolling screen is faster than the 24 line scrolling screen. This extra speed can be exploited when using the Kaypro for terminal emulation. You may also want to re-configure some of your application programs, such as WordStar, to make use of the 25 line screen. A patched version of MASMENU.COM which cleans up it's video behavior, is available from Advent Products.

5.6.2. New Video Features:

1. Hard Tabulations

The standard Kaypro video ignored the tabulation character, ^I. The '83, '84, and K10 TurboROM's expand this character to 8 column fixed tabs. This is of use mostly to user's of Plu*Perfect Systems' NOTEPAD module of the Backgrounder, as most programs expand tabs in software.

The Prographics version of the TurboROM does not expand tabs.

2. Insert and Delete Character

Two new control codes are now interpreted to insert and delete characters. ^A will cause the next character received to be inserted at the current cursor position. ^B will delete the character currently at the cursor position. Both of these controls are limited to the current line, i.e., inserting characters will move the characters to the right of the cursor but will not cause any that are displaced past the end of the line to wrap. These new features are of interest to users of Plu*Perfect Systems' NOTEPAD module of the Backgrounder.

The Prographics version of the TurboROM uses the ESC Q and ESC W for the insert and delete character sequences.

3. Programmable Cursor — K10s & '84s only

The TurboROM provides a method of dynamically modifying the type of cursor used. The default cursor is most easily set using the TURBOCFG utility.

ESC Un will modify the cursor appearance, where n specifies a bit pattern that determines the cursor characteristics. The following figure details the the bit pattern specified with n.

Set Cursor Type: ESC Un

n BIT POSITIONS: D7 D6 D5 D4 D3 D2 D1 D0
 zz B1 B0 zz S3 S2 S1 S0

where:

zz always 0

B1,B0 determine cursor behavior

00 - no blinking

01 - no cursor

10 - fast blinking

11 - slow blinking

S3,S2,S1,S0 determine size of displayed cursor

0000 - full block cursor (16 scan lines)

0001 - block cursor (15 scan lines)

...

1110 - underline cursor (2 scan lines)

1111 - underline cursor (1 scan line)

Fig. 5-1: Set Cursor Type Bit Pattern

4. Disable On-screen Clock Display

On '84 and K10 machines which have either a built-in Kaypro clock or Advent Products' Real Time Clock/Calendar, the on-screen time display may be temporarily disabled with:

ESC C8 and re-enabled with ESC B8

Note that the clock display is automatically disabled if a 25 line scrolling screen is selected.

5. Switch character generators

On '84 machines which are correctly wired to accept an 8K character generator, an alternate character set may be chosen with the following command:

ESC B9

reselect the original character set with:

ESC C9

This additional character set would normally reside in the other half of a 8K character ROM. '84 machines were designed to accept an 8K ROM but Kaypro failed to wire the main board circuit correctly and a minor modification is required. On older Kaypro 10's a small circuit modification is required, please contact Advent Products if you wish to make use of this feature of the TurboROM.

5.7. Screen Blanking

The TurboROM is designed to blank the display on the built-in CRT monitor after 8 to 12 minutes of keyboard inactivity. Pressing any key on the keyboard will bring the display back.

5.7.1. Screen Blanking, '84 TurboROM

The screen blanking is automatic on the '84 model Kaypros. The '84 models use a CRT controller chip in the video logic, and the TurboROM simply re-programs the CRT controller to blank the screen.

Any key that is pressed to restore the screen is discarded and will not affect the program that was running when the screen was blanked.

The screen blanking can be inhibited by poking a data pattern into a specific memory location. Please contact Advent Products, Inc., for this information.

5.7.2. Screen Blanking, '83 TurboROM

The '83 models do not have a built-in method to blank the screen. The Turborom does, however, provide for screen blanking on the '83 models by making U70 pin 25 go LOW to enable a modified character generator to perform the blanking.

After blanking, pressing any key on the keyboard will make U70 pin 25 go HIGH and thus restore the display. Note that the key that was pressed to restore the screen is not discarded and may affect the program that was running when the screen was blanked.

The following is a procedure to implement screen blanking on '83 machines with the TurboROM:

Screen Blanking Character Generator ROM

The '83 Screen Blanking ROM is available from Advent Products, or you can make your own if you have access to the proper equipment.

The '83 Character generator is located at U43 and is generally labeled 81-146. The character generator is a 2K (2716) EPROM. Remove this IC.

If you have access to EPROM programming equipment. The file BLK83.HEX on the TurboROM Support Software disk contains the data to be programmed into 4K (2732A) EPROM.

Installing the Character Generator

If you have made your own Screen Blanking ROM, bend pin 21 on the ROM out from the body of the chip and plug the chip into the socket at U43.

Connect a wire from the pin 21 of the Screen Blanking ROM to U70 pin 25. If the ROM is purchased from Advent Products, the wire is already attached to pin 21.

Note:

The feed-thru solder pad labeled E24 is connected to U70 pin 25 and can be used for connecting the wire from the ROM.

5.7.3. Screen Blanking, ProGRAPHICS TurboROM

The original Prographics System did not have a mechanism to blank the video screen after a period of non-use. The Turborom does, however, provide for screen blanking by making U70 pin 25 go LOW to blank the screen.

Pressing any key on the keyboard will make U70 pin 25 go HIGH to restore the display. Note that the key that was pressed to restore the screen is not discarded and may affect the program that was running when the screen was blanked.

To implement screen blanking with the ProGRAPHICS system, the following changes must be made:

1. Remove IC U2 on the ProGRAPHICS main board. Bend U2 pin 1 out from the body of the integrated circuit. Re-install U2 in the socket (all leads except pin 1 are to go back into the socket).
2. Connect a wire from U2 pin 1 on the ProGRAPHICS main board to U70 pin 25 on the main Kaypro circuit board.

5.8. Keypad and Arrow Keys

The TurboROM treats the keypad and arrow keys in the exact same manner as Kaypro did on their '83 machines and on the early '84 machines before the introduction of the Universal ROM. The TUBROCFG program allows simple remapping of the keypad and arrow keys. See Appendix F for notes on WordStar patches.

5.9. Screen Dump, Prographics

Screen dump capability for the ProGRAPHICS System is made possible by having the TurboROM maintain a duplicate image of the Prographics screen in the original video memory of the Kaypro. It is the Kaypro video memory that is dumped by the TurboROM and by other screen dump programs (e.g. Plu*Perfect System's Backgrounder).

The image maintained by the TurboROM is an attempt to emulate the behavior of the ProGRAPHICS hardware. The emulation has the following limitations:

1. The Prographics system displays 25 lines of characters; the Kaypro supports only a 24 line display, therefore, the 25th line on the ProGRAPHICS display is not emulated and cannot be dumped.

2. The Prographics system supports a graphics character set; these characters are not emulated and cannot be dumped.
3. Some of the complex escape sequences recognized by the ProGRAPHICS System are not emulated (e.g. setting the time, changing the screen fill character, etc.).

Despite these limitations the screen dump capability is quite usable. Most of the software than runs on your Kaypro will not stumble into these limitations.

The emulation of the ProGRAPHICS hardware has two additional effects:

1. The emulation slows down the video display rate of the ProGRAPHICS system. To allow the ProGRAPHICS System to run at its maximum speed a video escape sequence has been added to disable the emulation:

ESC X

To re-enable the emulation the video driver must be re-started and the screens must be re-synchronized. This is a bit tricky, so a utility program, EMULATE.COM has been included with the ProGRAPHICS version of the TurboROM to control the video emulation.

To disable video emulation, at the CP/M prompt enter:

A>EMULATE OFF<cr>

To re-enable video emulation, at the CP/M prompt enter:

A>EMULATE ON<cr>

2. Because a copy of the ProGRAPHICS screen is maintained by the TurboROM in the screen memory of the Kaypro, customers with the ProGRAPHICS video switch hardware can select either the internal video display or the ProGRAPHICS video display.

Chapter 6

K10FMT

The K10FMT program is designed to re-format the Kaypro 10 hard disk drive for faster access and increased storage capacity when used with the Advent Products TurboROM. In the majority of cases, the Kaypro 10 hard disk drive does not need to be re-formatted for use with the TurboROM. The TurboROM, however, can not correctly access the hard disk on the Universal ROM Kaypro 10s unless it is re-formatted with the K10FMT program.

The K10FMT program in addition to writing the disk drive format, allows the user tremendous flexibility in how the capacity of the Kaypro 10 hard disk drive is partitioned for CP/M. The K10FMT program provides bad track mapping during the format operation to ensure that defective hard disk areas are never used to store data.

The K10FMT program is capable of re-formatting the hard disk to the original Kaypro 10 format (pre-Universal ROM).

6.1. Main Menu Display

Several of the operations performed by the K10FMT program are destructive and will permanently erase any and all data stored on the Kaypro 10 hard disk drive. Back up all needed files to floppy disk before using the formatter program.

Place the TurboROM WORKING COPY diskette in the floppy drive and press RESET to boot the Kaypro 10 from floppy. To start the formatter program, enter the following command:

```
A>K10FMT<cr>
```

The Formatter will test and verify the presence of a working hard disk controller. If the hard disk controller is functional, the Main menu will be presented. The figure on the next page represents the choices available at the Main Menu level.

```

Advent Hard Disk Initialization Main Menu
[ 0] Initialize Hard Disk with 1024 Byte Advent Format
[ 1] Initialize Hard Disk with 512 Byte Advent Format
[ 2] Initialize Hard Disk with Kaypro Format
[ 3] Advanced Option Menu
[ 4] Exit to CP/M
Enter menu choice number (0 - 4):

```

Fig. 6-1: Main Menu Display

The five choices presented by the Formatter at the Main Menu are summarized as follows:

0 - Initialize Hard Disk with 1024 Byte Advent Format

This option prepares a hard disk for use with the TurboROM. This format uses 1024 byte sectors. The formatted capacity for a Kaypro 10 drive will be approximately 11,000 K (11 Mb).

Kaypro has used several different brands of hard disk drives in Kaypro 10s. MICROSCIENCE HH612 drives do not work reliably when formatted with 1024 byte sectors. This model drive should use the 512 byte Advent format.

1 - Initialize Hard Disk with 512 Byte Advent Format

This option prepares a hard disk for use with the TurboROM. This format uses 512 byte sectors. The formatted capacity for a Kaypro 10 drive will be approximately 10,390 K. While this format may be used for any drive, it is recommended for the MICROSCIENCE model HH612.

2 - Initialize Hard Disk with Kaypro Format

This option formats and initializes the Kaypro 10 hard disk with the Kaypro format. This format is the same as is used on all Kaypro 10s before the introduction of Kaypro's Universal ROM. The formatted capacity will be approximately 9,008 K.

3 - Advanced Option Menu

This choice presents a menu of options that are available after a hard disk drive has been successfully initialized with either of the two Advent hard disk formats. Please refer to 6.4. in this chapter for more details on this option.

4 - Exit to CP/M

This choice exits to the CP/M operating system.

6.2. Advent Hard Disk Formats

At the main menu level select either choice 0 or 1 and enter a carriage return. The formatter program will prompt you for input, and, when there is a default value available, the formatter program will enclose the default in square brackets []. Press only a RETURN at the prompt to use the default value.

All examples and screens that follow are based on choice 0 (1024 Byte Format).

6.2.1. Sector Skew

The Formatter program will prompt for a sector skew factor. Sector skew is the number of physical sectors between any two consecutive logical sectors.

Press the RETURN key at the prompt for the default (recommended) skew of one:

```
Desired sector skew ([1] - 8): <cr>1
```

6.2.2. Starting the Format Operation

The format operation will erase all data that may have been stored on the disk. The formatter will prompt twice for confirmation before proceeding. The format operation will take about 5 minutes and will update the screen about once each second with the current track number.

6.2.3. Manufacturer's Flaw Map

Most hard disk drives have one or more defective areas that cannot be used for data storage. Hard disk manufacturers test the drives and provide a report of the defective areas in the form of a flaw map. The flaw map is often attached to the sheet metal inside the Kaypro 10. The K10FMT program can use the flaw map information (if it's available) to insure that the known defective areas are not used.

If you do not have a copy of the manufacturer's flaw map, enter N<cr> at the prompt:

```
Do you want to mark any tracks as "bad" ([Y]/N): N<cr>
```

If you have a copy of the manufacturer's flaw map, you should enter <cr> in response to the prompt:

```
Do you want to mark any tracks as "bad" ([Y]/N): <cr>Y
```

The formatter will prompt for cylinder and head numbers to be locked out. In the following screen, cylinder 129, head 1 is marked as flawed and will not be used:

```
Bad Track Lock Out
Enter the Cylinder or Head number followed
by a RETURN in response to each prompt.
Enter only a RETURN at the prompt to quit.
Bad track #1
  Cylinder number (0 - 305): 129<cr>
  Head number (0 - 3): 1<cr>
Bad track #2
  Cylinder number (0 - 305): <cr>
```

Fig. 6-2: Bad Track Lock Out Display

6.2.4. Verify and Test Operation

The Formatter will perform a series of tests on the hard disk drive to check for additional flawed areas. Defective areas are reported and logged. At the prompt enter a <cr>:

Do you want to VERIFY and TEST the drive now ([Y]/N): <cr>Y

The verify and test operation takes about 30 minutes. In the following example an additional flawed area was detected at Cylinder 51 head 1 by the read/write tests:

```
Hard Disk Read/Write Tests
Controller Read/Write Check: OK
000h pattern
Pass: 1 Verifying track: 205 Hard Error at Cyl:51 Head:1
Pass: 1 Verifying track: 1223 Verify Complete
Pass: 2 Verifying track: 1223 Verify Complete
OFFh pattern
Writing track: 1223 Write Complete
Pass: 1 Verifying track: 1223 Verify Complete
Pass: 2 Verifying track: 1223 Verify Complete
Worst Case Read
Writing track: 1223 Write Complete
Pass: 1 Verifying track: 1223 Verify Complete
Pass: 2 Verifying track: 1223 Verify Complete
Read/Write Tests Complete
```

Fig. 6-3: Test / Verify Display

At the completion of the read/write tests you will be prompted to continue.

6.2.5. Bad Track Report

An accumulative bad track report will be displayed. This report will include all of the tracks manually entered from the manufacturer's flaw map and any additional tracks found during the read/write tests.

Look at the bad track report. If more than ten errors are reported, you may have a serious drive or controller problem. If you are using the 1024 byte format and a large number of errors are reported, as would be the case with the MICROSCIENCE HH612 drive, try re-formatting using the 512 byte format.

6.2.6. Drive Partitioning

At this point in the procedure, the hard disk has been formatted and has been tested for flaws. The next operation is to partition the drive for use with CP/M.

Enter a RETURN at the prompt:

Do you want to partition the drive now ([Y]/N): <cr>Y

6.2.7. Landing Zone

Enter <cr> at the the prompt for a head landing zone:

Do you want a dedicated head landing zone (Y/[N]): <cr>N

The TurboROM automatically positions the read/write heads over the innermost cylinder of the hard disk drive after several seconds of non-use. When power is removed from the Kaypro 10 hard disk, the platters stop spinning and the read/write heads land on the surface of the platters. The read/write heads and the platter surfaces are designed to tolerate this landing without damage to either the heads or the platters.

Kaypro reserves the last 50 cylinders on the hard disk drive for a landing zone. These cylinders are not used for data storage. These unused cylinders represent a loss of about 1,800 K of drive capacity. It is Advent's opinion that the use of a reserved area will not result in any improvement in hard disk reliability. However, the Formatter does allow you to reserve a landing zone if desired.

To reserve a landing zone area, enter Y<cr> at the previous prompt. The Formatter will then request the number of cylinders to reserve:

How many cylinders do you want to reserve (0 - 100): 50<cr>

6.2.8. Partition Description

The standard Kaypro 10 format has two partitions (drive A and B) of about 4500 K each, with total drive capacity of about 9000 K. When re-formatted with the 1024 byte format the total drive capacity will be about 11,000 K. The Formatter can divide this capacity into as many as seven CP/M partitions (e.g., A, B, C, D, E, F, G). The largest partition size allowed by CP/M is 8,192 K.

The Formatter will prompt for the desired number of partitions (the default is two):

How many partitions do you want (1 - 7 [2]): <cr>2

For each partition, the the formatter will prompt for the following information:

1. CP/M Block Size

CP/M allocates disk space in multiples of the block size. Any file will occupy at least one block. If you maintain many small files, you may want to request a small CP/M block size (2 or 4 K) for efficient use of the disk capacity. Conversely, if you are maintaining only a few very LARGE files you may want to select a large block size (8 or 16K) as this will speed up CP/M's access to your data.

The default block size is shown in square brackets, e.g. [4].

2. Partition Size

The Formatter will display the capacity remaining on the hard disk drive, and then will prompt for the desired partition size in K. The default size will be shown in square brackets.

3. Directory Entries

The Formatter will prompt for the number of directory entries for the partition.

The default number of entries is shown in square brackets.

After answering the CP/M block size, partition capacity, and directory entry questions the Formatter will juggle these values and then will display the Single Partition Description. The Formatter will then prompt for confirmation. This cycle will continue until there is no formatted space left on the disk.

6.2.9. Total Partition Description

After describing each partition, the Formatter will display the description of all of the drive partitions as a Total Partition Description. The Formatter will then prompt for confirmation. If you want to change the description of any partition, enter N<cr> and the formatter will discard the description and prompt for a new set of parameters for each partition.

6.2.10. CP/M Directory Initialization

The initialization (erasure) of the CP/M directory areas is performed automatically by the Formatter after the hard disk has been successfully partitioned. The Formatter will display the progress of the CP/M directory initialization.

6.2.11. Parameter Sector Write

The last initialization step is to write the parameter sector on the hard disk drive. The Formatter performs this step automatically, following the initialization of the CP/M directory area. The parameter sector is used by the TurboROM to determine the hard disk drive characteristics, CP/M partition descriptions, and bad track information.

If the Formatter was successful in completing the initialization it will display the message:

Advent Hard Disk Initialization complete

And wait for confirmation:

Press any key to continue...<cr>

6.2.12. Writing CP/M to the System Tracks, TurboROM System

The formatting operation does not place a copy of the CP/M operating system on the hard disk. Please refer to the instructions in section 3.5 (chapter 3) in this manual on how to write a copy of CP/M to the newly formatted hard disk drive.

6.3. Kaypro 10 Hard Disk Format

This section of the manual describes the use of the K10FMT program to generate the original Kaypro 10 hard disk format. The Kaypro 10 format is supported by the Formatter only as a convenience for those who may want to reformat a drive for use on a standard Kaypro 10. This format is not the same as the one used with Kaypro's Universal ROM. The Kaypro 10 format is choice 2 at the main menu of K10FMT.

6.3.1. Formatting the Drive

The format operation will erase all data that may have been stored on the disk. The formatting operation will take about 10 minutes to complete. The following screen will be displayed if no formatting or verification errors are encountered:

```
Hard Disk Formatting Procedure
Formatting track: 1223 Format Complete
Erasing drive
Writing track: 1223 Write Complete
Verifying track: 1223 Verify Complete
Hard Disk Initialization complete (Kaypro format)
```

Fig. 6-4: Kaypro 10 Format Display

6.3.2. Writing CP/M to the System Tracks, Kaypro System

The formatting operation does not place a copy of the CP/M operating system on the hard disk. The procedure for placing the CP/M system on the hard disk depends upon which monitor EPROM is to be used with the re-formatted hard disk drive. If you are using the TurboROM, please refer to the procedure at 3.5. (chapter 3). If you are going to re-install the Kaypro 81-302 monitor ROM use the following procedure:

1. Re-install the 81-302 ROM.
2. Re-boot the Kaypro 10 from the BACKUP COPY diskette
3. Run the PUTSYS.COM utility.
4. Run the PUTOVL.COM utility.
5. Remove the floppy disk and re-boot from the hard disk drive.

6.4. Advanced Option Menu

The Advanced Option Menu provides a series of functions that can be performed on a hard disk drive after it has been successfully formatted using one of the Advent hard disk formats. At the Main menu prompt select 3 for the Advanced Option Menu.

Brief descriptions of the major functions available through the Advanced Option Menu are as follows:

0 - Display Parameter Sector information

A single sector is used by the Advent Hard Disk Formats to preserve information about the hard disk drive. This sector is always the last sector on cylinder 0, head 0. This sector contains the following information:

1. Physical drive description
2. CP/M partition description
3. Bad track map

This option will allow you to examine the parameter sector and optionally print this information.

1 - Change Drive Partitions

This option allows you to change the number and description of the CP/M partitions without having to re-format and test the hard disk drive. The bad track map and the Physical drive description are not changed by this option.

This option will erase all files from the entire physical hard disk. This erasure is permanent; the files can never be restored.

2 - Change Sector Skew

This option allows you to experiment with the sector skew (interleave) used by the hard disk drive. This option:

1. Reads all the data from a single track
2. Re-formats that track with a new sector skew factor
3. Writes the data back to that track
4. Advances to the next track, and repeats the process until all of the tracks have been converted.

The option attempts to not destroy any data on the hard disk drive, but any read or write error during the procedure is fatal and will result in the loss of data. Use this option with care.

3 - Initialize (erase) CP/M directories

This option simply erases all files from the entire physical hard disk. This erasure is permanent; the files can never be restored.

4 - Copy: Parameter Sector --> CP/M file

This option allows you to copy the parameter sector to a CP/M file so that the parameter sector can be examined with software tools such as DDT.COM. This option is recommended for writing a copy of the parameter sector to your Working Copy floppy disk. In the event of a crash of the hard disk(s), recovery may be possible using the information in the parameter sector file.

Appendix A

Early Kaypro II, 4K EPROM Modification

This appendix provides instructions on how to modify an early Kaypro II main board to accept the '83 TurboROM. An adapter kit is available from Advent Products, Inc., to perform this same modification without soldering or permanently modifying the main board.

The TurboROM for the '83 and the ProGRAPHICS Kaypros is a 4K (2732A) EPROM. Late model Kaypro II computers were shipped with the Kaypro 4 main board and do not require any changes for use with the TurboROM. The late model Kaypro IIs can be distinguished by having PC81-240A silk screened on the front right corner of the main circuit board and the monitor EPROM at U47 will be marked 81-232.

Early Kaypro IIs do not have any number silk-screened on the front right corner of the main circuit board and are not designed to accept a 4K EPROM. The monitor EPROM at U47 is labeled 81-149.

If the Early Kaypro II has been previously (and successfully) modified to accept a 4K EPROM, the changes indicated in this Appendix are not required.

A.1. TurboROM Adapter Kit, Early Kaypro II

The TurboROM Adapter Kit consists of a jumper wire with special clips and a modified integrated circuit chip for replacing the IC at U60 on the main board.

1. Turn the Kaypro OFF, and unplug the Kaypro from the power source.
2. Using a medium sized Phillips screwdriver, remove the four screws on each side and the two screws on the top of the cover. Remove the cover and set it aside.
3. Remove the monitor EPROM from its socket at U47 using a small flat-bladed screwdriver. Pry very gently with the screwdriver. Pry on each end of the EPROM so that neither the socket nor the EPROM are damaged.

4. Locate pin 21 on the TurboROM and gently bend this pin away from the body of the the part. Insert the TurboROM at U47, aligning pin 1 of the TurboROM with pin 1 of the socket. The notched end will be pointed away from the disk drives.
5. Use the jumper wire from the adapter kit to connect pin 21 of the TurboROM to pin 6 of the IC at U33.
6. Replace U60 with the modified integrated circuit from the adapter kit.

A.2. Early Kaypro II, 4K EPROM Modification

This section details how to modify the early Kaypro II main boards to accept 4K EPROMs in the event that the TurboROM Adapter Kit is not available.

1. Turn the Kaypro OFF, and unplug the Kaypro from the power source.
2. Using a medium sized Phillips screwdriver, remove the four screws on each side and the two screws on the top of the cover. Remove the cover and set it aside.
3. Locate pin 21 on the TurboROM and gently bend this pin away from the body of the the part. Replace the Kaypro EPROM at U47 with the TurboROM.
4. Solder a wire between pin 21 of the TurboROM and U33 pin 6.
5. Remove U60 from its socket. Bend pin 1 out from the body of the IC and solder a wire from pin 1 to pin 8.
6. Re-install U60, leaving pin 1 out of the socket.

Appendix B

Early Kaypro II, Double Sided Drives

Early Kaypro II computers do not support the side select logic required for double sided floppy disk drives. Late model Kaypro II computers were shipped with the Kaypro 4 main board and do not require any changes for use with double sided floppy disk drives. The late model Kaypro IIs can be distinguished by having PC81-240A silk screened on the front right corner of the main circuit board. The monitor EPROM at U47 will be marked 81-232.

Early Kaypro IIs do not have any number silk screened on the front right corner. The monitor EPROM at U47 may be labeled 81-149.

This appendix details how to modify the early Kaypro II main boards to generate the side select logic. The Personality/Decoder Module is available from Advent Products, Inc., to perform this same modification without soldering or permanently modifying the main board.

B.1. Main Board Removal

1. Turn the Kaypro OFF.
2. Unplug the Kaypro from the power source.
3. Using a medium sized Phillips screwdriver, remove the four screws on each side and the two screws on the top of the cover. Remove the cover and set it aside.
4. Carefully disconnect the four cables attached to the main Kaypro circuit board. Remove the two screws holding the front edge of the main board to the white plastic stand-offs. Remove the screws and fasteners that hold the back edge of the board to the metal cabinet.
5. Remove the main Kaypro II circuit board from the computer.

B.2. Main Board Modification

1. Locate U73 and remove it.
2. Purchase a 74S04 integrated circuit to replace U73.
3. Bend pin 5 of the 74S04 out from the body of the chip. Remove the IC at U73 and install the modified 74S04 in the socket at U73. Pin 5 does not go back into the socket.
4. Add a wire on the component side of the board, connecting U73 pin 5 and the feed thru solder pad labeled E40.
5. Add a wire, on the component side of the board, connecting U73 pin 6 to J6 pin 32 (J6 is the floppy disk drive cable connector).

Appendix C

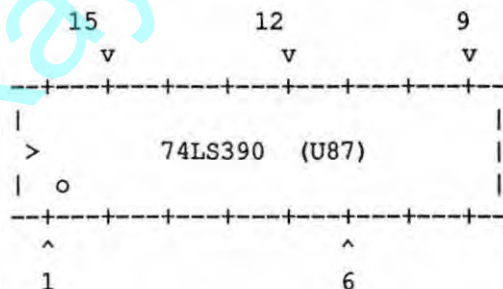
Early Kaypro II

Field Service Bulletin #4

Early Kaypro IIs have a circuit design problem that can cause the corruption of data on the floppy disks. This design problem was corrected on later versions of the Kaypro II. Kaypro issued Field Service Bulletin #4 to detail how to fix the problem with Kaypro IIs in the field.

The information in this appendix applies only to Kaypro II models WITHOUT the main circuit board identified as PC81-240A in the front right corner. Check the integrated circuit identified as U87 in the front right corner of the circuit board. It should have two small wires connecting its pins to each other, one wire on each side of the chip. If it does not have these wires, they will have to be installed according to the following instructions:

1. Remove IC U87 from its socket.
2. Bend pin 1 of the IC out from the body of the IC.
3. Cut off pin 9 of the IC near the body.
4. Solder a wire from pin 1 to pin 6 of the IC.
5. Solder a wire from pin 12 to pin 15 of the IC.
6. Reinstall the IC, leaving pin 1 out of the socket.



PIN NUMBER ID. IS DETERMINED BY THE NOTCHED END

Appendix D

Early Kaypro 10, 8K EPROM Modification

The TurboROM for the Kaypro 10 is an 8K (2764) EPROM. The TurboROM can be plugged into all Kaypro 10s except for the early versions. Early Kaypro 10s can be distinguished by the position of the 50 conductor (approximately 2 1/2" wide) ribbon cable. The ribbon cable attaches near the middle of the main circuit board on early Kaypro 10s, not to the edge of the main circuit board as in late model Kaypro 10s.

This appendix details how to modify the early Kaypro 10s to accept the TurboROM, in the event that the TurboROM Adapter Kit is not available. This adapter is available from Advent Products, Inc., to perform this same modification without soldering or permanently modifying the main board. When using the TurboROM Adapter Kit to install the TurboROM in a Kaypro 10, the 16 pin IC, also contained in the Adapter Kit, is not used.

The Adapter Kit provides a jumper wire for connecting pin 2 of the TurboROM to pin 2 of the Z80 CPU which is the 40 pin IC at position U28. If the TurboROM Adapter Kit is not available, the instructions below will duplicate the installation of the adapter.

D.1. Cover Removal

1. Turn the Kaypro OFF.
2. Unplug the Kaypro from the power source.
3. Using a medium sized Phillips screwdriver, remove the four screws on each side and the two screws on the top of the cover. Remove the cover and set it aside.

D.2. Main Board Modification

1. Solder a 6" length of 30 ga. solid kynar insulated wire to pin 2 of the TurboROM.
2. Remove the Kaypro EPROM at location U42.

3. Install the TurboROM into the socket at location U42 on the main Kaypro circuit board. Pins 1, 2, 27, and 28 overhang the 24 pin socket on the end away from the disk drives. Pin 3 of the TurboROM is installed into pin 1 of the 24 pin socket.
4. Solder the free end of the wire extending from the TurboROM to U28 pin 2 (Z80 CPU).

KayproJournal

Appendix E

Personality/Decoder Board

E.1. Product Description

The Personality/Decoder Board is used in conjunction with the TurboROM to expand the capabilities of the Kaypro floppy disk system. The TurboROM MUST detect the presence of the Personality/Decoder Board before it will support additional floppies or any 96 TPI floppies.

The Decoder Board adds the following capabilities to the TurboROM equipped Kaypro computer:

1. Logic to support double sided disk drives on Kaypro II computers, without permanently modifying the main Kaypro circuit board.
2. Drive select logic for 4 floppy disk drives.
3. Support for 96 TPI (quad density) disk drives.
4. Fast Seek option.

The Personality/Decoder Board simply plugs into the Kaypro. No soldering or permanent changes to the Kaypro main board are required for installation.

E.2. Product Compatibility, Personality Decoder Board

Two different Personality/Decoders are available, one for use with Kaypros which have one serial port ('83 models), and the other for use with Kaypros which have two serial ports (10'83 & '84 models).

The Personality/Decoder can be used with the Kaypro 10 and the TurboROM to allow the installation of a second floppy drive or the use of 96 TPI drives. Please refer to the section on Kaypro 10s in this appendix.

E.3. Status Switch

The Personality/Decoder Board has a status switch that is read by the TurboROM. The status switch is required for the TurboROM to support additional or 96 TPI floppy disk drives.

E.4. Status Switch Usage

The Personality/Decoder board has a bank of 8 switches. These switches are used by the TurboROM to determine how many floppy disk drives are installed. Additionally, the switches are used to identify which (if any) of the floppy disk drives are 96 TPI drives. The switches are numbered as shown in figure E-1.

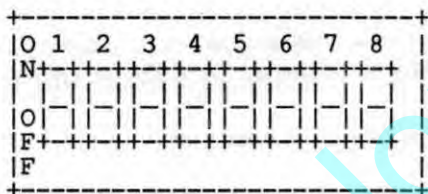


Fig. E-1: Status Switch

Depressing the end of the white paddle nearest the ON marking will turn that switch ON. Conversely, depressing the end of the white paddle nearest the OFF marking will turn that switch OFF. The status switches have the following assignments:

Status Switch	Drive #	Switch "ON"	Switch "OFF"
1	1	INSTALLED	INSTALLED
2	1	96TPI	48TPI
3	2	INSTALLED	NO DRIVE
4	2	96TPI	48TPI
5	3	INSTALLED	NO DRIVE
6	3	96TPI	48TPI
7	4	INSTALLED	NO DRIVE
8	4	96TPI	48TPI

Table E-1: Status Switch Settings

Note:

The schematic diagram at the end of this appendix is not in error: Status Switch 1 is not connected. The switch is wired always OFF.

In the following example the status switch has been set for a 3 drive system. Drives 1 and 2 are normal 48 TPI drives; the 3rd drive is a 96 TPI drive:

Status Switch	Drive #	Switch Position	Switch Assignment
1	1	ON	INSTALLED
2	1	OFF	48TPI
3	2	ON	INSTALLED
4	2	OFF	48TPI
5	3	ON	INSTALLED
6	3	ON	96TPI
7	4	OFF	NO DRIVE
8	4	OFF	*****

Table E-2: Status Switch Example

Notes:

Drives 1 and 2 correspond to the Kaypro A: and B: drives. The TurboROM is required before drives 3 and 4 can be accessed or any of the drives can be 96 TPI.

E.5. Disk Drive Requirements

If additional (or different) floppy disk drives are to be installed, please observe the following items:

1. Only one floppy disk drive can have the terminating resistors installed. It is recommended that the one at the end of the drive cable be the only drive that is terminated.
2. The drives must be configured so that the drive spindle motor turns whenever the MOTOR ON- signal is active (independent of drive select).

3. If the disk drive has a head load solenoid, the solenoid must "load" whenever the drive is selected and the MOTOR ON- signal is active.

E.6. Kaypro 10 Compatibility

The Personality/Decoder Board is available in two versions: '83 and '84. Both versions will work with Kaypro 10s, however they are mechanically different. The '83 version is recommended for use when an Advent RAM disk has been installed. The '84 version of the Personality/Decoder Board is recommended for all other Kaypro 10 installations.

Before the Personality/Decoder Board can be installed on Kaypro 10 computers, the Decoder Board must be modified. On the Kaypro 10, the signal that other Kaypros use to select the second floppy disk drive, is used to reset the hard disk controller. The modification for avoiding unwanted hard disk controller resets is detailed in the following section.

E.7. Modifications for the Kaypro 10

The Personality/Decoder Board must be modified for use in the Kaypro 10, as explained above. Please refer to the schematic diagram at the end of this appendix. The modification detailed here avoids unwanted hard disk controller resets while allowing the installation of a maximum of two floppy drives on the Kaypro 10 (either or both drives can be 96 TPI).

A circuit trace must be cut on the solder side of the Personality/Decoder Board. The J1 connector, which attaches to the Kaypro main board, carries the DRV B- select signal on pin 12. This trace must be cut between J1 pin 12 and the pull-up resistor RN2 pin 2.

If you intend adding a second floppy drive to your Kaypro 10, you will need to configure the Drive Select Jumpers on that floppy drive so that it is identified as DS3 (or the third drive select position available). If the second floppy will be attached at the end of the floppy data cable, it must also have the termination resistors installed. In the following example, the Personality/Decoder status switch has been set for a Kaypro 10 with two floppy disk drives. The second drive is a 96 TPI drive:

Status Switch	Drive #	Switch Position	Switch Assignment
1	1	ON	INSTALLED
2	1	OFF	48TPI
3	*	*	*
4	*	*	*
5	3	ON	INSTALLED
6	3	ON	96TPI
7	*	*	*
8	*	*	*

Table E-3: Kaypro 10 Status Switch Example

NOTE: * = doesn't matter, not used

E.8. Fast Seek Option

A Fast Seek option is available for floppy disk drives which are capable of stepping faster than 6 ms/track. Use of the fast seek option can provide significant speed improvements and noise reduction when used with floppy drives capable of fast step rates. Installation of this option is a two step process:

1. The Floppy Disk Controller chip must be removed, pin 22 must be bent out from the body of the chip, then re-install the chip. A wire must then be connected from pin 22 to ground to complete the circuit.
2. The TURBOCFG utility program is used to specify the appropriate Step Rates in the Advanced Options Menu choice.

A blue wire with a special connector is provided with the Personality/Decoder Board for connection to the Floppy Disk Controller chip pin 22, to facilitate the Fast Seek Option without requiring any soldering.

The Fast Seek option works ONLY with the TurboROM. This option is NOT COMPATIBLE with any other ROM (including the original Kaypro ROM). The option is NOT COMPATIBLE with commercial programs that directly access the Floppy Disk Controller chip (e.g. Uniform, Media Master, Fastback...). Please refer to Note 6 at E.9. in this Appendix.

E.9. Personality/Decoder Board Notes

Please note the following items:

1. Personality/Decoder boards for '84 model Kaypros have NO WIRE attached to point P1. This wire is part of the side select circuit for Kaypro II'83 models.
2. Personality/Decoder boards for '83 model Kaypros have a white wire attached at point P1, for implementing a side select circuit. On a Kaypro II that has NOT already been modified to use double sided drives, the circuit trace identified as J3 in the schematic must be cut. This trace is located on the solder side of the Personality/Decoder Board, between pins 4 and 11 of IC1. After cutting this trace, the white wire at P1 must be attached to U72 pin 13 on the main Kaypro board to complete the side select circuit.
3. The Floppy Disk Controller IC is removed during the installation of the Personality/Decoder Board and pin 32 is bent out from its body. This chip is then reinstalled. The white wire that originates at P2 of the Personality/Decoder Board is connected to pin 32 of the Floppy Disk Controller IC. This connection enables the TurboROM to read the status switch. The location of the IC depends on the model of Kaypro. Please refer to the following table.

IC	Model	Identification
U82	'83 Models	(one serial port)
U44	'84 Models	(two serial ports)
U74	10'83 Models	(2 1/2" flat cable in center of board)

Table E-4: Floppy Disk Controller IC Locations

4. Each version of the Personality/Decoder Board must be connected to a source of +5 volt power. The red wire originating at P3 on the Personality/Decoder Board is the power connection and should be hooked to the particular IC and pin as indicated in the following table.

IC	PIN	Model	Identification
U86	14	'83 Models	(one serial port)
U72	14	'84 Models	(two serial ports)
U32	16	10'83 Models	(2 1/2" flat cable in center of board)

Table E-5: Personality/Decoder Power connection

5. A Fast Seek option is available for floppy disk drives which are capable of stepping faster than 6 ms/track. The option is a two step process, as described in E.8. of this appendix.

The blue wire originating at IC 1, pin 7, on the Personality/Decoder Board is provided for connection to the Floppy Disk Controller IC pin 22. (Refer to Table E-4)

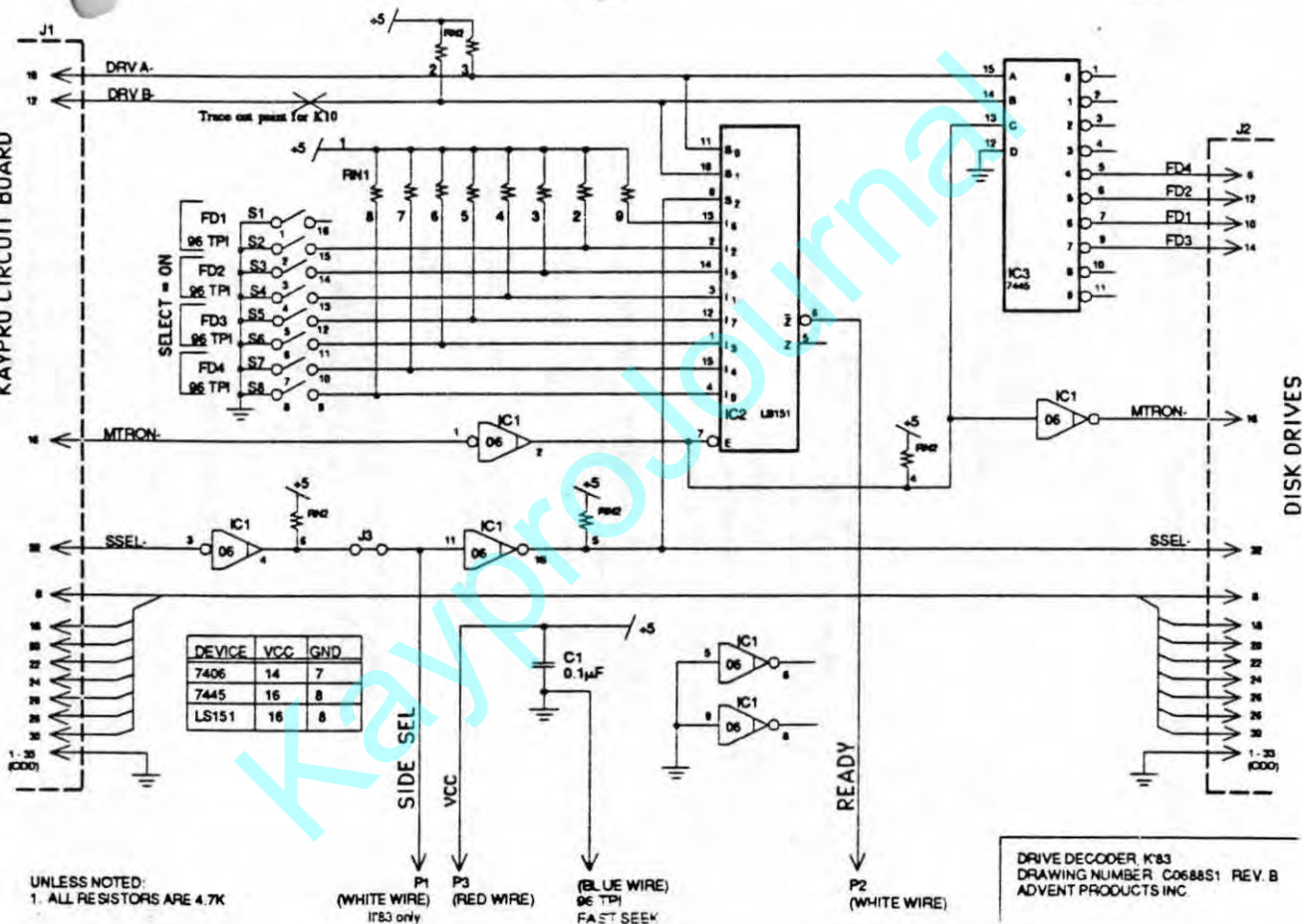
Second, the TURBOCFG utility program is used to specify the appropriate Step Rates in the Advanced Options Menu choice. Please refer to the TURBOCFG section in Chapter 4.

6. If you use step rates faster than 6ms, as detailed in E.9.5. above, there is a way to provide compatibility with hardware specific programs such as Uniform, Fastback, etc. A switch can be used to connect pin 22 of the floppy disk controller IC to ground (for step rates faster than 6ms), or to +5v (for step rates of 6ms or slower). If you have set the step rate faster than 6ms through the TURBOCFG.COM utility, the fast step rate will be used when the switch is connecting pin 22 of the floppy disk controller IC to ground. When the switch is connecting pin 22 to +5v, the step rate used will be 6ms, which is the normal hardware limit of the floppy disk controller IC.

E.10. Personality/Decoder Board Schematic

The schematic diagram for the Advent Products, Inc., Personality/Decoder Board is included in this document for reference.

KAYPRO CIRCUIT BOARD



Appendix F

Wordstar Enhancements

This appendix describes how to modify WordStar versions 3.0 and 3.3 so that the Kaypro keypad and arrow keys can be re-defined. These modifications are NOT REQUIRED for the versions of WordStar bundled with the with early '83 and '84 Kaypros. Those versions were compatible with the '83 Kaypro keypad and arrow key definitions and are therefore compatible with the TurboROM.

WordStar bundled with Universal ROM Kaypros MUST be modified to work properly with the TurboROM.

These modifications are provided on an "as is" basis and are not warranted to work in all cases. These modifications will probably not work with versions of WordStar that have been patched by other commercial or public domain programs to support specialized menus, printers or features such as built-in thesaurus utilities.

F.1. Modifying WordStar

Locate a disk with the program DDT.COM. The master CP/M disk will have DDT.COM.

1. Make a copy of your WordStar disk, TURBOGEN it with the TurboROM operating system, then PIP DDT.COM onto the disk.
2. Determine which version of WordStar that you have by reading the WordStar sign-on message. WordStar version 3.3 was shipped on most Kaypros. Wordstar 3.0 was shipped with some early Kaypro IIs.
3. If you have WordStar version 3.0, copy the file WSKEY30.HEX to your copy of the WordStar diskette, from the TurboROM Working Copy disk. If you have version 3.3, copy the file WSKEY33.HEX to your copy of the WordStar diskette from the TurboROM Working Copy disk.

4. Place the copy of the WordStar diskette with DDT.COM into a disk drive and log onto the disk. In the following example the diskette in drive B:

```
B>DDT WS.COM<cr>
DDT VERS 2.2
NEXT PC
xxxx 0100 (xxxx depends on WS version)
-IWSKEY33.HEX<cr> (WSKEY30.HEX for vers. 3.0)
-R<cr>
NEXT PC
xxxx 0100
-^C (Ctrl-C)
Warm Boot
B>SAVE 72 WS.COM<cr> (SAVE 73 WS.COM<cr>for vers 3.0)
DELETE FILE?Y
B>
```

Figure F-1: WordStar patching

On a Kaypro 10, you should place WSKEY33.HEX and WS.COM into the same user area, making sure you have a back-up copy, elsewhere, of the original WS.COM. DDT.COM should be on drive A, user area 0. Then follow step 4.

Note:

If you are installing the Backgrounder WordStar redraw screen patches on WordStar version 3.0, you must do the Backgrounder patches first. The order of the patches is not critical for WordStar version 3.3.

F.2. Defining the Function Keys

The WSCONFIG.COM program is used to create and modify the function key definitions. The default definitions for the WordStar arrow keys are listed in the following table. The keypad defaults to what is engraved on the keytop.

Arrow Key	Control Character	WordStar Function
<up>	<^E>	up one line
<down>	<^X>	down one line
<left>	<^S>	back one character
<right>	<^D>	forward one character

Table F-1: WordStar Arrow Key Defaults

To use the WSCONFIG program, your patched WordStar disk should be in the logged-in drive and enter:

A>WSCONFIG<cr>

The WSCONFIG program provides on-screen instructions for its use. The program will then present a list of keypad and arrow keys capable of being re-defined.

Press the key to be defined, then enter either text or a WordStar command. The maximum number of characters that you can attach to any key must fit on the display line. The total number of characters available for definition is about 90. You can put a carriage return into your definition by pressing the <RETURN> key; this will be symbolized as ^M on the screen display.

There is no editing capability during the key definition, so if you make a mistake you must terminate the definition by entering <^@> and start over. Only when you exit the program with a <^G> will the definitions be written to WordStar.

These definitions will remain active every time you use WordStar. WSCONFIG can be used to change the definitions at any time.

Appendix G

TurboROM Video Control Commands

This appendix lists all of the video sequences recognized by the TurboROM. It is intended as a reference and not as a tutorial. The TurboROM video driver responds to the control characters listed in the following table. All other control characters are ignored and are not displayed on the video screen.

FUNCTION	CHAR	HEX	NOTES
LEAD-IN CHARACTER	ESC	1B	
CURSOR HOME	CTRL ^	1E	
INSERT CHARACTER	CTRL A	01	1, 2
DELETE CHARACTER	CTRL B	02	1, 2
BELL	CTRL G	07	
CURSOR LEFT	CTRL H	08	
TAB	CTRL I	09	1, 2
LINE FEED	CTRL J	0A	
CURSOR UP	CTRL K	0B	
CURSOR RIGHT	CTRL L	0C	
CARRIAGE RETURN	CTRL M	0D	
ERASE EOS	CTRL W	17	
ERASE EOL	CTRL X	18	
ERASE SCREEN	CTRL Z	1A	

Table G-1: TurboROM Control Codes

NOTES:

1. New feature added by TurboROM.
2. ProGRAPHICS TurboROM does not recognize these control codes. Refer to the ProGRAPHICS manual for equivalent escape sequences.

The TurboROM video driver responds to the escape sequences listed in the following table. The ASCII/GREEK sequences are supported in the '83, '84, and Kaypro 10 versions of the TurboROM. These sequences determine how lower case ASCII characters are displayed.

FUNCTION	SEQUENCE	NOTES
DISPLAY ASCII	ESC A	2, 3
DISPLAY GREEK	ESC G	2, 3
INSERT LINE	ESC E	
DELETE LINE	ESC R	
SET CURSOR	ESC U<N>	1, 3, 4
POSITION CURSOR	ESC =<Y><X>	

Table G-2: TurboROM ESCAPE SEQUENCES

NOTES:

1. New feature added by TurboROM.
2. Displays thin line graphics on '84 ROMs.
3. ProGRAPHICS version does not recognize this escape sequence.
4. '84 computers (two serial ports) only

<Y> represents row number + 32 decimal.

<X> represents column number + 32 decimal.

The following escape sequence is unique to the ProGRAPHICS version of the TurboROM. This sequence is used to disable the emulation of the ProGRAPHICS screen by the TurboROM.

FUNCTION	SEQUENCE	NOTES
DISABLE EMULATION	ESC X	1

Table G-3: ProGRAPHICS TurboROM ESCAPE SEQUENCES

NOTES:

1. New feature added by TurboROM.

The escape sequences listed in the following tables are supported by the '84 and Kaypro 10 version of the TurboROM.

FUNCTION	SEQUENCE	NOTES
WRITE PIXEL	ESC *<V1><H1>	
ERASE PIXEL	ESC < ><V1><H1>	
DRAW LINE	ESC L<V1><H1><V2><H2>	
DELETE LINE	ESC D<V1><H1><V2><H2>	
INVERSE VIDEO ON	ESC B0	
INVERSE VIDEO OFF	ESC C0	
LOW INTENSITY ON	ESC B1	
LOW INTENSITY OFF	ESC C1	
BLINKING ON	ESC B2	
BLINKING OFF	ESC C2	
UNDERLINE ON	ESC B3	
UNDERLINE OFF	ESC C3	
CURSOR ON	ESC B4	
CURSOR OFF	ESC C4	
GRAPHICS MODE ON	ESC B5	2
GRAPHICS MODE OFF	ESC C5	2
SAVE CURSOR	ESC B6	3
RESTORE CURSOR	ESC C6	3
STATUS LINE ON	ESC B7	3
STATUS LINE OFF	ESC C7	3
CLOCK DISPLAY ON	ESC B8	1
CLOCK DISPLAY OFF	ESC C8	1
ALT CHAR GEN ON	ESC B9	1
ALT CHAR GEN OFF	ESC C9	1

Table G-4: '84, and K10 TurboROM ESCAPE SEQUENCES

NOTES:

1. New feature added by TurboROM.
2. Sequence is ignored by the TurboROM (same as Kaypro).
3. Sequence is different than Kaypro usage (see text).

<V1> represents vertical pixel position + 32 decimal.

<H1> represents horizontal pixel position + 32 decimal.

<V2> represents vertical pixel position + 32 decimal.

<H2> represents horizontal pixel position + 32 decimal.

The video code used by the TurboROM has corrected several errors that were present in the Kaypro implementation. The most significant improvements are:

1. The SAVE and RESTORE CURSOR sequences now correctly save and restore not only the cursor location but also the video attributes that were active when the cursor was saved.
2. The INSERT and DELETE LINE (text) sequences now actually work.
3. A more consistent treatment regarding the use of the 25th line.
4. A number of bugs were resolved in the line drawing and pixel graphics routines.

Appendix H

Early Kaypro 10, Field Upgrade 81-303

This appendix describes a modification to enable the use of the TurboROM with Kaypro 10s that use the 81-188 monitor EPROM. This modification requires circuitry changes that will make the 81-188 EPROM unuseable and is therefore not easily reversible. After these modifications have been made, the Kaypro 10 will have been upgraded to work with the TurboROM or the Kaypro 81-302 ROM.

Kaypro 10 computers have a small circuit board that is used as an adapter between the main Kaypro circuit board and the hard disk controller board. Kaypro has shipped at least two different versions of this small circuit board; the TurboROM is not compatible with the early version.

Kaypro issued Field Upgrade 81-303 to retro-fit the early Kaypro 10s with the latest version of the small circuit board and to update the monitor EPROM to the 81-302 version. The upgrade was performed by Kaypro dealers at no charge.

H.1. Identifying an Early Kaypro 10

For the purpose of this appendix, early Kaypro 10 main boards can be identified by the label on the EPROM at IC position U42. If the label specifies an 81-302 EPROM, you should not make, nor do you require the changes identified in this appendix. If the EPROM label specifies 81-188, this appendix identifies a way to make your computer compatible with the TurboROM. The alternative is to have your Kaypro dealer perform the upgrade identified in Kaypro literature as Field Upgrade 81-303.

Kaypro's Field Upgrade 81-303 requires the following steps:

1. Replace the early version of the small circuit board with a later model.
2. Replace the 81-188 monitor EPROM with the 81-302 monitor EPROM.

The remainder of this appendix describes how to modify the early version of the small circuit board to be functionally equivalent to the later version. The computer will then be compatible with and ready for installation of the TurboROM. (Or the Kaypro 81-302 EPROM)

H.2. Making the Upgrade for the TurboROM

1. Make the TurboROM Boot Disk

You must have a bootable floppy disk prepared for the TurboROM. Follow the instructions in chapter 3 of this manual on making a bootable TurboROM Diskette.

2. Remove the Kaypro Cover

Turn the Kaypro OFF.

Unplug the Kaypro from the power source.

Using a medium sized Phillips screwdriver, remove the four screws on each side and the two screws on the top of the cover. Remove the cover and set it aside.

3. Remove the Main Board

Carefully disconnect the five cables connected to the Kaypro main board.

Remove the screws that secure the back edge of the main circuit board to the Kaypro case.

Remove the two screws that secure the front edge of the main circuit board to the two plastic standoffs.

Remove the main circuit board and set it aside.

4. Remove the Small Circuit Board

Locate the small circuit board mounted on the CRT side of the sheet metal bracket that encloses the hard disk drive.

Disconnect the two ribbon cables that are attached to the small circuit board.

Remove the four screws that secure the small circuit board to the sheet metal.

5. Modify the Small Circuit Board

Make the following changes to the small circuit board. Keep the wiring short and as neat as possible. The set of 50 pins will be referred to as J1; the set of 40 pins will be referred to as J2. On the solder side of the circuit board, a square solder pad identifies pin 1 of each set of pins. All pins in the row with pin 1 are the odd numbered pins, all pins in the other row are even numbered pins. Refer to Appendix E for basic information concerning the pin numbering of ICs. Wires should be installed on the solder side of the circuit board.

1. Cut the trace that runs from J1 pin 45 to J2 pin 39.
2. Cut the trace that runs from U1 pin 7 to U1 pin 2.
3. Add a wire from U1 pin 1 to J1 pin 45.
4. Add a wire from U1 pin 3 to J2 pin 39.
5. Add a wire from U1 pin 2 to U1 pin 14.

6. Re-install the Small Circuit Board

Re-connect the two ribbon cables to the small circuit board.

Install the four screws that secure the small circuit board to the sheet metal.

7. Re-install the Main Circuit Board

Set the main circuit board in place.

Re-install the screws that secure the back edge of the main circuit board to the Kaypro case.

Re-install the two screws that secure the front edge of the main circuit board to the two plastic standoffs.

Carefully re-connect the five cables to the Kaypro main board.

8. Installation of the Monitor EPROM

Carefully remove the 81-188 EPROM installed in the socket at location U42 on the main circuit board.

Install the TurboROM and the adapter kit. Please refer to the instructions in chapter 3 for the proper installation of the TurboROM, and Appendix D for installation of the adapter. The 81-302 EPROM can be plugged directly into the socket at U42 without using an adapter.

9. Check-Out

With the cover removed, test the machine as indicated in 3.4.5., in chapter 3 of this manual. If all goes well, replace the cover. Then continue with the instructions in chapter 3.

H.3. Early Kaypro 10 Upgrade 81-303, Explanation

The two versions of the small circuit board differ primarily in how they generate the master reset signal for the hard disk controller board. The early version connected the second floppy disk drive select signal directly to the hard disk controller master reset. The later version of the small circuit board uses the inverted second floppy disk drive select line for connection to the hard disk controller master reset.

The modification to the early version of the small circuit board detailed in this appendix inserts an inverter into the master reset logic for the hard disk controller. The addition of the inverter makes the early board functionally equivalent to the later version.

Note: The original Kaypro utilities PUTSYS.COM, PUTOVL.COM and FMT305.COM, which were provided with the computer should not be used after these modifications. If you are inserting the Kaypro 81-302 ROM, replace these system utilities with versions from a later model Kaypro 10. If you are inserting the TurboROM, the utilities TURBOGEN.COM and K10FMT.COM, provided on the TurboROM Support Software Diskette, should be used.

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