RANCHO TECHNOLOGY, INC.

USER MANUAL

for

RT1000B SCSI Host Adapter

Document Number 10052.UGM Rev.B

RANCHO TECHNOLOGY, INC.
Rancho Technology Center
8632 Archibald Avenue, Suite 109
RANCHO CUCAMONGA, CA 91730

FCC COMPLIANCE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The user is hereby cautioned that changes or modifications not expressly approved by Rancho Technology, Inc. could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and uses radio frequency energy, but could radiate this energy and cause harmful interference to radio communications if not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Table of Contents

1.0 Introduction

1.1 Overview

This user manual provides information about the RT1000B SCSI host adapter with RTBios ROM version 8.10 and later, including its installation with SCSI fixed hard disks*, SyQuest removable drives*, Insite and Iomega Floptical® drives*, and what to do if something goes wrong.

1.2 The RT1000B Host Adapter

The RT1000B host adapter is an 8-bit, single-ended, high-performance SCSI interface board for IBM XT/AT (8088/86, 80286/386/486), PS/1, PS/2 (Model 25 & 30), and compatible computers. It is designed to support up to seven (7) SCSI devices**.

1.3 Specifications

3.9 x 4.2 inches
5-volt power at approximately 1.5 amps
Single-ended SCSI
Up to 2.5 Mbyte/sec SCSI transfers
Two independent 128-byte data buffers
64-byte scratch pad RAM

* Designated devices.
** Of the 7, up to 5 designated devices are supported per system

2.0 Jumper Configurations

The possible jumper configurations for the RT1000B SCSI host adapter are summarized as follows:

1. **Jumpers J1, J2, J3** (ROM address selection)

   If the RT1000B is being added to a system with an existing hard disk drive other than an ST506 type, make sure the address of the RT1000B is at a higher setting than the disk controller already in the system. DC00h is the factory default address. Use the jumper settings of Fig. 1 to change to another address.

J3	J2	J1	Address Segment
ON	OFF	OFF	C800h
ON	OFF	ON	CC00h
ON	ON	OFF	D000h
ON	ON	ON	D400h
OFF	OFF	OFF	D800h
OFF	OFF	ON	DC00h (Default)
OFF	ON	OFF	E000h
OFF	ON	ON	E400h

Figure 1. ROM Address Jumpers

2. **Jumper J4** (Floptical® as Drive A)

   Install jumper to boot from the Floptical Drive and to assign Floptical drive as drive A. Remove jumper if you want DOS to assign drive letters to floppy drives first, then Floptical drives.

3. **Jumpers J6,J7,J8,J9** (Interrupts)

   The RTBios does not use interrupts. However, hardware interrupt jumper are provided for users who write their own software. Jumper headers J6, J7, J8, and J9 correspond to IRQ3, IRQ4, IRQ5, IRQ7, respectively. These jumpers are for specific applications. For example, interrupts are required when using device drivers such as our NOVELL Netware 2.1x driver (refer to NOVELL Netware driver manual). Leave all four interrupt jumpers OFF if you are not writing your own software as your computer may crash.

4. **Jumper J11** (External (remote) terminator power)

   The two-pin header at **J11** is provided for enabling (Jumper ON) or disabling (Jumper OFF) remote terminator power. Install the **J11** jumper only if you are using a remote terminator and no other SCSI device on the bus is providing terminator power.

5. **Jumpers J12 & J13** (Reserved)

3.0 Device Arrangement According to SCSI ID

3.1 Booting from SCSI Fixed Hard Disk

Devices should be arranged in the following order if the system is to boot from a SCSI fixed hard disk drive:

1. Fixed hard disks should have the lowest SCSI IDs. NOTE: The system will boot from the first bootable device it finds, even if the ID of that device is greater than 0.

2. SyQuest removable media drives (SQ555 or SQ5110) should have SCSI IDs greater than those for all other hard disks.

3. All other SCSI devices may have any unused ID.

For example, if you have two fixed disks, one SyQuest drive, one Floptical® drive, one scanner, and one tape drive, one possibility would be to assign SCSI target ID 1 to the first fixed disk, 2 to the Floptical drive, 3 to the second fixed disk, 4 to the SyQuest drive, 5 to the scanner, and 6 to the tape drive.

NOTE: **SCSI IDs range from 0 to 6. SCSI ID 7 is reserved for the RT1000B host adapter.**

3.2 Booting from SyQuest Drive

Devices should be arranged in the following order if the system is to boot from a SyQuest drive (SQ555 or SQ5110):

1. The SyQuest drive should have the lowest SCSI ID if the system is to boot from it. NOTE: The system will boot from the first bootable device it finds, even if the ID of that device is greater than 0.

2. All fixed hard disks should have SCSI IDs greater than that for the bootable SyQuest drive.

3. If additional SyQuest drives are used, they should have SCSI IDs greater than those for the hard disks.

4. All other SCSI devices may have any unused ID.

For example, if you have two fixed disks, two SyQuest drives, one Floptical® drive, one scanner, and one tape drive, one possibility would be to assign SCSI target ID 0 to the first SyQuest drive, 1 to first fixed disk, 2 to the scanner, 3 to the second fixed disk, 4 to the Floptical drive, 5 to the second SyQuest drive, and 6 to the tape drive.

NOTE: SCSI IDs range from 0 to 6. SCSI ID 7 is reserved for the RT1000B host adapter.

4.0 RT1000B and SCSI Hard Disk Installation

4.1 Getting Started

Read the following instructions carefully and verify that the system is powered down before attempting to install the RT1000B host adapter:

1. Remove the top cover from the system and retain the screws.

2. Set the SCSI ID of each device to a number other than seven. If more than one SCSI device is present, make sure each is set to a different number. See Section 3.0 for proper arrangement of devices. Remember, no two devices may have the same ID. Consult your SCSI device manual for ID settings.

3. If more than one SCSI device is present, remove the SCSI termination resistors from all devices except for the device that is farthest away from the RT1000B (assuming the RT1000B is at one end of the bus). Consult your SCSI device manual.

4. Remove the RT1000B from the antistatic bag. Observe static discharge precautions and do not touch the board components or edge connectors.

5. Set jumpers. See Section 2.0 for possible jumper configurations.

6. For internal devices, connect the cable to J10 prior to installing the RT1000B. NOTE: Pin 1 on J10 corresponds to pin 1 of the cable, which is sometimes indicated by a red stripe.

7. Install the RT1000B and replace the system cover.

4.2 Low-Level Formatting

Copy all files on the RT1000B Product Diskette to a bootable diskette. Use this diskette and save the original as a backup. Verify correct installation and turn the computer on.

Insert the bootable RT1000B diskette and type RTUTIL <Enter>. A menu will appear, displaying the following options:

S CSI System Information
L ow-Level Formatting
P artition The Hard Disk
Q uit The Program

Select the second option to begin setting parameters for a low-level format. This procedure will erase all data on your disk and will map out the bad sectors.

WARNING: **Once you low-level format your hard disk, there is no way to recover the data on it.**

The first menu you will see is a listing of all the fixed disk drives in the system. Select the drive that you wish to format the press <Enter> to continue. This will bring you to another screen, which will display some information about the drive you chose. It will show the drive's target ID number, logical unit number (LUN), and default interleave value (0).

At the bottom of the screen will be 3 options:

Option 1 - **Proceed with format** - will low-level format the selected drive.
Option 2 - **Change the values** - will allow the target ID, LUN and interleave values to be changed.
Option 3 - **Cancel the operation and return to main menu.**

To enter an interleave value, select option 2. Most drives support an interleave factor of 1, which signifies a 1:1 interleave--the fastest interleave at which a drive can operate. However, some drives do not allow you to enter the interleave factor. Those that do not will normally format with default interleave. If you enter a value of 0, the drive will use its default interleave value. Consult the applicable technical manual for your drive before using this feature.

4.3 Partitioning & High-Level Formatting

RTUTIL.EXE can be used to partition hard disks. Insert your bootable RT1000B diskette, type RTUTIL <Enter> and then P to select the partitioning option. This option will allow you to create, modify or delete DOS partitions on your fixed disk. A special feature of this partitioning software is that it displays the drive's SCSI target ID, model, and manufacturer information so you can see which drive it is that your are partitioning.

If you have just completed a low-level format, you will need to create an active, primary partition on your drive before DOS can use it. If you already have partitions on the drive, you can modify or delete current partitions.

Once partitioning is completed, use the DOS FORMAT command to high-level format your hard disk and put DOS on the primary partition, making it bootable. For instance, if you assigned drive letter C to your boot disk, type FORMAT C:\S <Enter>.

4.4 Reserving Memory for RT1000B

If you use Windows 3.x or an expanded memory manager, such as DOS 5.0 EMM386.EXE, exclude the ROM extension area reserved by the RT1000B host adapter. Fig. 2 shows the possible address segments at which the RT1000B can be located and the corresponding areas in memory to be excluded. For instance, with the RT1000B located at its default address segment of DC00h, add the following line:

(1) EMMEXCLUDE=DCOO-DFFF
in Windows SYSTEM.INI file under the [386 Enh] section, or

(2) DEVICE=C:\EMM386.EXE X=DC00-DFFF
in the CONFIG.SYS file.

Address Segment	EMM Exclude Addresses
C800h	C800-CBFF
CC00h	CC00-CFFF
D000h	D000-D3FF
D400h	D400-D7FF
D800h	D800-DBFF
DC00h	DC00-DFFF
E000h	E000-E3FF
E400h	E400-E7FF

Figure 2. EMM Exclude Addresses

4.5 SyQuest Drives (SQ555 & SQ5110)

When using SyQuest removable media drives, arrange the devices as shown in Section 3.0. To install the SyQuest driver, SYDRIVER.SYS, add the following line to your config.sys file:

device=sydriver.sys

Then use SYPREP.EXE to prepare your cartridge for use. Consult your SyQuest manual for detailed instructions.

NOTE: **Use SYDRIVER.SYS version 7.36 or later only. Earlier versions will not function properly.**

5.0 RT1000B and Floptical® Drive Installation

5.1 Assigning Drive Letters

All versions of the RT1000B support up to 4 Floptical drives with DOS 3.20 or later. However, combinations of a maximum of 4 floppy/Floptical drives are supported per system. DOS 3.x/4.x/5.x have different conventions for assigning drive letters to floppy/Floptical drives and fixed/removable hard disks.

Under DOS 3.x/4.x, hard disks are assigned letters following the letter assigned to the last floppy or Floptical drive. For instance, if there were two floppy drives, one Floptical drive, and two hard disks, the two floppy drives would be assigned A and B; the Floptical, C; the two hard disks, D and E (assuming that the J4 jumper is OFF).

Under DOS 5.x, hard disks always begin with drive letter C. Additional floppy and/or Floptical drives would be assigned letters following the letter assigned to the last hard disk. For instance, if there were two Floptical drives, two floppy drives, and two hard disks, the two Floptical drives would be assigned A and B; the two hard disks, C and D; the two floppy drives, E and F (assuming that the J4 jumper is ON).

Under all three versions of DOS , if only one floppy or Floptical drive is present, the hard disk will be assigned drive letter C. See Fig. 3 for tabulation of possible combinations.

a. Under DOS 3.x/4.x

Floppy/Floptical	Hard Disks
A	C, D, ...
A, B	C, D, ...
A, B, C	D, E, ...
A, B, C, D	E, F, ...

b. Under DOS 5.x

Floppy/Floptical	Hard Disks
A	C, D, ..
A, B	C, D, ..
A, B, F	C, D, E
A, B, F, G	C, D, E

Figure 3. Assignment of Drive Letters

5.2 Configuration and CMOS Setup

When Using 21-MB Floptical disk drives, arrange the devices as shown in Section 3.0. Configure the CMOS setup for the disk and floppy drives as if no Floptical drives were present in the system.

NOTE: **In CMOS setup, if only one floppy drive is present, it must be assigned drive letter A:**

The two-pin header, J4, is provided on the RT1000B to designate proper installation of Floptical drives. Put a jumper on J4 if Floptical drives are to be installed before floppy drives. Remove the jumper if floppy drives are to be installed before Floptical drives.

Jumper J4
OFF=> Floppy drives first, then Floptical drives,
ON => Floptical drives first, then floppy drives.

NOTE: **If no floppy drives are present in the system, jumper J4 must be on.**

5.3 Formatting Floptical® Diskettes

Included on the RT1000B Product Diskette is a Floptical diskette formatter, called FMTFLOPT.EXE, that will allow you to format 21-MB, 1.44-MB and 720-KB floppies in a Floptical drive. FMTFLOPT.EXE must be loaded every time you boot the system, if you have a Floptical drive in the system. If you use SMARTDRV, load FMTFLOPT before SMARTDRV. The command line is as follows:

FMTFLOPT [/D[+|-]] [/L[+|-]] [/T[+|-]] [/I[<interleave>]]

/D Reports/Changes the format type of the disk (bootable/not bootable)
/L Reports/Changes the forced low-level format flag
/T Reports/Changes the translation status of FMTFLOPT
/I Reports/Changes the interleave for low-level format
<interleave> is the new interleave value to set.

1. At the DOS prompt, load this executable file by typing FMTFLOPT <Enter>. This will automatically initialize the command line parameters to their default settings. A list of these settings will be displayed, as follows, when you type FMTFLOPT <Enter> any time after its initial installation:

   Low-Level Format status is OFF
   Translation Status is On
   Formatted disks are Bootable
   Current interleave is: 2

2. After FMTFLOPT is loaded, you may change the status of the parameters. For example, if you wish to low-level format your diskette, type FMTFLOPT /L+ <Enter>, and the low level format flag will be ON. If you wish to make your diskettes non-bootable, type FMTFLOPT /D- <Enter>, and your diskettes will not be bootable--and so forth. Changes to any one of these parameters will be reflected in the list of the parameter settings. Type FMTFLOPT <Enter> to make sure the parameters are set as required. See Appendix B for some application notes on these parameters.

3. After you have set the parameters accordingly, you may use DOS' FORMAT program to format all three densities of 3.5" diskettes. Under DOS 5.x, you do not need to specify the number of tracks or sectors. Under Dos 3.x/4.x, you do.

5.4 Copying & Comparing Floptical® Diskettes

Included on the RT1000B Product Diskette are two files that will replace DOS' DISKCOPY.COM and DISKCOMP.COM. In addition, they will allow you to copy and compare two 21-MB diskettes or two partitions of equal size on the same hard disk. They are called DISKCOPY.EXE and DISKCOMP.EXE, respectively. While DOS' DISKCOPY.COM and DISKCOMP.COM use only conventional memory, RTI's DISKCOPY.EXE and DISKCOMP.EXE use conventional memory, as well as extended and expanded memory (if present). Before executing these two commands, however, we recommend that you do the following:

(1) Rename DOS' DISKCOPY.COM and DISKCOMP.COM to DCOPY.COM and DCOMP.COM, or something similar in fashion.

(2) Load FMTFLOPT.EXE and set the command line parameters as required.

The command lines for DISKCOPY.EXE and DISKCOMP.EXE are the same as those for DOS' DISKCOPY.COM and DISKCOMP.COM. See Appendix B for some application notes on these commands.

6.0 Troubleshooting - What to do if something goes wrong.

Common errors that may be encountered and how to correct them are summarized below:

(1) You turn the computer on and the system does not recognize the RTBios. That is, the following lines do not appear on the screen:

```
RTBios V-8.10R (C) Copyright 1989-1992 Rancho Technology, Inc.
                        All rights reserved.

RT1000 Host Adapter Initializing...
```

There is a BIOS ROM address conflict. Make a note of all the ROM addresses of the peripheral controllers that use the ROM memory area (i.e. C000-DFFF). Use the ROM address Jumpering chart of Fig. 1 to move the RT1000B starting ROM address to an area that is not mapped to by other controllers.

Also, if you have a 16-bit VGA video adapter card, make sure it has the autosense or auto detect option ON. If not, the adapter must be set for forced 8-bit VGA. Check your video adapter manual for the proper settings.

(2) The system does not recognize the SCSI ID numbers of the devices during initialization of the RT1000B host adapter.

(a) Check cabling. Pin 1 on the RT1000B corresponds to pin 1 at the drive. Some flat-ribbon cables have a red stripe indicating pin 1.

(b) Verify proper termination of devices. SCSI termination resistors should be removed from all devices except for the ones at either end of the SCSI bus farthest away from the RT1000B.

(c) Verify correct assignment of SCSI IDs to the devices. No two devices may have the same SCSI ID (See Section 3.0).

(d) Verify power connection to the devices.

(3) The system does not boot from the drive intended.

(a) Make sure the SCSI ID of the device from which you want to boot is the lowest.

(b) To boot from Floptical drive, make sure that jumper J4 is set ON.

Appendix A

SCSI Connector Pin Assignments

TABLE A-1 SCSI Pin Assignments

External shielded connector (Apple DB-25)

Signal	Pin Number
-REQ	1
-MSG	2
-I/O	3
-RST	4
-ACK	5
-BSY	6
GROUND	7
-DB(0)	8
GROUND	9
-DB(3)	10
-DB(5)	11
-DB(6)	12
-DB(7)	13
GROUND	14
-C/D	15
GROUND	16
-ATN	17
GROUND	18
-SEL	19
-DB(P)	20
-DB(1)	21
-DB(2)	22
-DB(4)	23
GROUND	24
TERMPWR	25

TABLE A-2 SCSI Pin Assignments

Internal connector (Alternative 1)

Signal	Pin Number
-DB(0)	2
-DB(1)	4
-DB(2)	6
-DB(3)	8
-DB(4)	10
-DB(5)	12
-DB(6)	14
-DB(7)	16
-DB(P)	18
GROUND	20
GROUND	22
GROUND	24
TERMPWR	26
GROUND	28
GROUND	30
-ATN	32
GROUND	34
-BSY	36
-ACK	38
-RST	40
-MSG	42
-SEL	44
-C/D	46
-REQ	48
-I/0	50

NOTE: (1) All odd pins except pin 25 are connected to ground. Pin 25 is left open. Some products designed prior to the generation of this standard connected this pin to ground.

(2) The minus sign next to the signals indicates active low.

Appendix B

Application Notes

FMTFLOPT.EXE

1. Do not use Quick Format on very-high-density (VHD), or 21-MB, diskettes.

2. If you wish to format a VHD, you must have it in the drive before you type FORMAT (drive letter): <Enter>.

3. When you type FORMAT (drive letter): <Enter> to format a VHD, you may continue formatting VHDs, but not HDs or DDs. You must terminate the FORMAT procedure and type FORMAT (drive letter): <Enter> again if you wish to format HDs or DDs.

4. /L Low-level Format

   a. If FMTFLOPT notices that the diskette is not formatted, it will automatically force a low-level format.

   b. If you type FMTFLOPT /L+ <Enter> and type FORMAT (drive letter): <Enter> under DOS 3.x/4.x, your diskette will automatically be low-level formatted.

   c. If you type FMTFLOPT /L+ <Enter> and type FORMAT (drive letter): <Enter> under DOS 5.x, your diskette will not be automatically low-level formatted. You need to type FORMAT (drive letter): /U <Enter>.

   d. The low-level format prompt is not displayed under Windows 3.x or Windows 3.x DOS prompt.

5. /T Translation

   a. If you experience any problems with your applications, type FMTFLOPT /T- <Enter> to turn the translation status OFF and see if the problem goes away.

6. /D Format Disk Type

   a. Never use the switch (/s) to make a system diskette when you have already set the status of format type (/d) to be Bootable. Another words, never type FORMAT (drive letter): /S <Enter> when you have already typed FMTFLOPT /D- <Enter>.

7. /I Interleave

   a. The interleave is set at a default of 2, which has the ratio of 2:1, in order to optimize the data transfer speed of the Floptical drive.

   b. If you have an 80486 computer, we recommend that you set the interleave at a value of 1, which has the ratio of 1:1--the fastest interleave at which a drive can operate.

DISKCOPY.EXE

1. DISKCOPY will only format 5.25" DD (360K) and HD (1.2M) diskettes, and 3.5" DD (720K) and HD (1.44M) diskettes.

2. Under DOS 3.x, DISKCOPY will always format the target diskette.