# ACARD ATA-133 RAID AEC-6880M

# PCI-to-IDE ATA-133 RAID Controller for Macintosh

User's Manual





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# **Chapter 1 Introduction**

#### 1.1 Introduction

ACARD AEC-6880M is a high-performance Hardware RAID Ultra ATA-133 adapter for PCI PowerMac. Its on-board Open Firmware supports booting from IDE disks configured as RAID.

AEC-6880M supports all models of PowerMac which have a PCI slot, including PowerMac G3, G4. For PowerMac older than G4, ACARD AEC-6880M can boost the disk better. The performance can further be improved by using a 7200rpm big capacity drive. Compared with the original G4, the improvement can be as high as 300%. For PowerMac G4, ACARD AEC-6880M allows Mac to add more IDE drives or to use Hardware RAID by adjusting the easy RAID DIP Switch setting.

ACARD AEC-6880M adapter is the first Mac add-on card to support ANSI X3T9.2 CAM ATA4/ATA5. The data transfer rate is up to 133 MB/sec per channel, and meets the demand of multimedia, real time video.

ACARD AEC-6880M supports the true PnP function in Mac OS 8.5, OS 9.x and OS X. **No software driver is needed** for connecting an Ultra ATA 66/100/133 HDD. With the advanced function, the adapter is really user-friendly. It coexists with the on-board IDE controller. The on-board BIOS lets the system boot from ATA HDD.

# 1.2 Feature

- A standalone PCI-to-IDE RAID controller
- Supports RAID 0(Striping Mode) and RAID 1(Mirroring Mode)
- At a normal mode as IDE devices extension
- Supports Ultra ATA 66/100/133 HDD
- Supports OS: Mac OS 8.5, OS 9.x and OS X
- Cost-effective and high-performance

#### **1.3 Specification**

#### 1.3.1 Packing List

When you open the ACARD AEC-6880M cabinet, please check the following things.

- One ACARD AEC-6880M
- Two ATA-133 Cables
- One Y-splitter Power Cord
- Two hard disk mounting kits and eight screws
- One User's Manual

# 1.3.2 Parts Specification

Power requirement - voltage : 3.3VB+/- 2% current : 0.5A Max.

Environment -	Temperature Operating 0 °C to 70 °C Storage -20 °C to 85 °C
Humidity -	15% to 90%
Dimentions -	Model: AEC-6880M Width: 14 cm Height: 4.7 cm
Connectors -	Dual 40-pin IDE internal connectors

# Chapter 2 Hardware Installation

The hardware installation is a simple RAID host adapter installation. Please follow the instructions given below.

Before installing an IDE device into the *ACARD AEC-6880M*, the IDE device should be adjusted as "Master" or "Slave" mode through the jumper setting. Since the hard drive may contain some data that might cause the Mac OS installation difficult under **striping mode**, please adjust *ACARD AEC-6880M* DIP Switch to a **normal mode** at first.

When attaching an IDE hard drive to ACARD AEC-6880M, which already contains data or any version of Mac OS, it is strongly recommended to back up the old data before installating the adapter. The hard drive must be initialized first under the **normal mode** of ACARD AEC-6880M. After doing "initialize" under **normal mode**, adjust AEC-6880M DIP Switch to **striping mode** or **mirroring mode** to "initialize" drive again.

#### 2.1 Quick hardware installation

- 1. Open the Mac case (please refer to Mac's manual).
- 2. Choose an empty PCI slot and plug in ACARD AEC-6880M.
- 3. Install the hard drive into the Mac.
- 4. Connect the adapter and the hard drive with an ATA-133 cable.
- 5. Close the Mac case.

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Connect 2 hard drives in the same channel, check the Master / Slave jumper.

Set ACARD AEC-6880M adapter DIP Switch to normal mode as an IDE extension port.

# **Board Layout:**

CN1 (IDE1): The Primary IDE port CN2 (IDE2): The Secondary IDE port



#### ATA-133 Cable Layout:



For the hard drive's Jumper setting (Master / Slave), refer to hard drive's Manual

# 2.2 ACARD AEC-6880M adapter compatibility

ACARD AEC-6880M is designed specifically for DMA hard drive, and has been fully tested with many kinds of hard drives. AEC-6880M supports many ATA 66/100/133 hard drives produced by the following manufacturers:

- FUJITSU
  IBM
- MAXTOR
- QUANTUM
- SEAGATE
- WESTERN DIGITAL

#### 2.3 What you should know before the installation

Before installing the *ACARD AEC-6880M*, please follow the instructions below to get the best performance:

#### Striping Mode

- If two hard drives are in different storage capacity, ACARD AEC-6880M will treat the smaller one as standard capacity, and double the standard capacity as total disk capacity.
- For one pair of striping connection using 2 HDDs, the jumper setting on each hard drive must be set as the same mode; that is, either "Master" or "Slave". The two hard drives must connect with two independent ATA-133 cables on ACARD AEC-6880M.
- For two pairs of striping connection using 4 HDDs, the jumper setting on every 2 hard drives must be set as "Master" and "Slave" on each IDE port (see Figure 1).

- For two pairs striping with 4 hard drives, the Jumper setting can not be set as both "Master" or both "Slave" in same connector cable.
- In order to get a better performance, use Ultra ATA 66, 100 or 133 hard drive in same model.

#### **Mirroring Mode**

- If two hard drives are in different storage capacity, ACARD AEC-6880M will treat the smaller one as standard capacity, and double it as total available disk capacity.
- For one pair of mirroring connection using 2 HDDs, the jumper setting on the hard drives must be set as the same "Master" or "Slave" mode. The two hard drives must connect with two independent ATA-133 cables on ACARD AEC-6880M.
- For two pairs of mirroring connection using 4 HDDs, the jumper setting on every 2 hard drives must be set as "Master" and "Slave" on each IDE port.

# Normal Mode

- Two IDE connectors of ACARD AEC-6880M can be regarded as normal IDE port extension.
- When using two hard drives to connect to ACARD AEC-6880M at the same IDE port (on the same cable), the hard drives' Jumper setting must be set as one "Master" and one "Slave" positions. The two hard drives cannot be set as "Master" or "Slave" at the same time on the same cable.
- In order to get a better performance, use Ultra ATA 66, Ultra ATA 100 or Ultra ATA 133 hard drives.

# 2.4 *ACARD AEC-6880M* cable & power installation The cable connection methods:

Step 1. Find out pin 1 of the IDE connector on the IDE hard drive.

- Step 2. Find out a color line of the internal IDE cable indicating pin 1of the connector.
- Step 3. Connect the internal IDE cable to the IDE hard drive aligning with pin-1 to pin-1.
- Step 4. Connect the 4-pin power cord to IDE the hard drive.



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# **2.5 Configuring** *ACARD AEC-6880M* (Jumper Setting)

# **RAID DIP Switch Setting**

RAID configurations must be set up on *ACARD AEC-6880M*. Set RAID Mode by adjusting ON/OFF DIP Switch.



Please follow the instructions below and decide a suitable RAID DIP Switch setting.

- 1. Normal Mode. When using the RAID adapter card as an IDE extension port to connect the IDE hard drive, set the DIP Switch 1 and 2 as OFF. The default is OFF.
- 2. Striping Mode (RAID 0). RAID 0 is dedicated as a pair of hard drives that store striping data, but appears as a single drive on the computer. Set the DIP Switch 1 as OFF and 2 as ON, and the RAID 0 mode will be activated.

# 3. Mirroring Mode (RAID 1).

RAID 1 is a pair of hard drives that store mirroring data, and is regarded as a single drive. Sett the DIP Switch 1 as ON and 2 as OFF, and the RAID 1 mode will be activated.



Normal Striping Mirroring Mode Mode Mode (Default setting)

# **Chapter 3 System Installation**

## 3.1 Normal Mode Installation

# 3.1.1 Mac OS 9.x installation

- 1. Be sure the hardware is installed correctly.
- 2. Insert Mac OS CD-ROM to Macintosh.
- 3. Power on Macintosh and press 'C' key.
- 4. Wait for Mac OS and the appearance of Mac OS CD window.
- 5. Double click on "Utilities".



6. Double click on "Driver Setup".



 Choose the hard drive connected to ACARD AEC-6880M, then press "Initialize" button. For more detailed information of "Drive Setup", refer to Mac OS manual.

List of Drives				
Yolume Name(s)	Туре	Bus	ID L	.UN
Mac OS 9	ATAPI	0	0	0
<not initialized=""></not>	SCS1	0	0	0
This disk can be initialized.				
		Initi	aliz	e

8. Start to install a new OS on the hard drive.

# 3.1.2 Mac OS X installation

- 1. Be sure your hardware is install correctly.
- 2. Insert Mac OS X CD-ROM into your Macintosh.
- 3. Power on your Macintosh and press 'C' key.
- 4. After Mac OS X boots up, select "Installer" from the top selection tools.
- 5. Select "Open Disk Utility ..." to open it.
- 6. Select the hard drive which you want to initialize and choose "**Partition**" to decide the number of partitions you need.



7. After partitioning or erasing the volume, quit Utilities and begin the OS X installation.

=# <b>*</b>	Select disk to initialize:	
First Aid	/dev/disk0	0
		Info Partition Log
Drive Setup	Volumes:	Current
		Partition Scheme   Partition  Partition
		Partition Info: 3 Partitions
		Name: U 4 Partitions
		5 Partitions
	Land and the second sec	- 7 Partitions
	Unitied	Size: 28 8 Partitions
		C Locked
		Split
	a	Delete Revert Partition

8. Update your driver to version 1.5.1, which is on the support CD.



Note: For more information about Mac OS X installation guide, please refer to Mac OS X installation manual.

# 3.1.3 Verify System Profiler

#### For Mac OS 9 Environment

Make sure that the computer "**initialize**" the hard drive successfully. When you initialize the hard drive successfully, on the Mac window a new "**Un-titled**" hard drive icon will appear.



For advanced Mac users, find the system information under the Apple Logo pop up. Then choose "**Apple System Profiler**" to find the information. Check the information and see the computer system status. Follow the instructions below to check the system information.

Step 1. Click on Apple Logo and choose "**Apple System Profiler**" to show hard drive information.



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Step 2. Under the "Apple System Profiler", you will see the "System Profiler". Choose "Devices and Volumes" to see the devices status.

Step 3. Under "**Devices and Volumes**", please choose "**PCI**" item. You will find the SCSI card installation status.

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/ System Pratis	le Devices and Yohmes Contra Manels Cohera into Applications Cop Bits = g   Hard drive   b   HARD	den Fallera
Internal ATA D	b in = 0 CO-RV No resulted to	elia interted
SCSIBLE D	▼  0 = 0     And drive     order version:     Rot available       Price Version:     Rot available     Wolkers formal       Prindext ID:     No     Version:       Prindext ID:     Marker ST020H2       British analyse:     Rot available       Prindext ID:     Marker ST020H2       British analyse:     Rot available       British analyse:     Rot available       Prived version:     Rot available       Priver version:     Rot	ed t: Hao 03 Extended (HFS+) 19 08 0 0 c 19 08 arred Ne ed t: Hao 03 Extended (HFS+) 25 62 08 20 61 69 0 0 c 19 08 19 08
PCI	Display and Display	
	SLOT-4 V SCR send Card type : scol Card type : scol Card type : ACARD_SCROP1 Card type : ACARD_SCROP1 Card type : Not send type : Card type : Not send type : Card type : 2 Card type : 2 Card type : 1001	

# For Mac OS X Environment

Make sure that the computer "**initialize**" the hard drive successfully. When you initialize the hard drive successfully, on the Mac window a new "**Un-titled**" hard drive icon will appear.



For advanced Mac users, find the system information under the Apple Logo pop up. Then choose "**Apple System Profiler**" to find the information. Check the information and see the computer system status. Follow the instruction below to check the system information.

Step 1. Please find the "Finder" at the bottom of the Mac OS Screen, then click it.





Step 2. Find the "Application" sign on the top of the screen and click it.

Step 3. Under the "Application", find out the "Utilities" item and click it.



Step 4. Under the "**Utilities**", you will see the "**Apple System Profiler**". Click on "**Apple System Profiler**" to see the devices status.



Step 5. Under "**Devices and Volumes**", please choose "**PCI**" item. You will find the SCSI card installation status.



# 3.2 Striping Mode (RAID 0) / Mirroring Mode (RAID 1) Installation

Use clean hard drives for the *ACARD AEC-6880M* striping mode. Before doing the striping mode/ mirroring mode installation, do the "**initialize**" under **normal mode** first, then turn off the computer to set the DIP Switch as striping mode.

# 3.2.1 Mac OS 9.x installation:

- 1. Be sure the hardware is installed correctly.
- 2. Insert Mac OS CD-ROM to Macintosh.
- 3. Power on Macintosh and press 'C'.
- 4. Wait for Mac OS and the appearance of Mac OS CD window.
- 5. Double Click on "Utilities"



6. Double click on "Driver Setup".



 Choose the hard drive connected to ACARD AEC-6880M, then press "Initialize" button. For more detailed information of "Drive Setup", refer to Mac OS manual

ist of brites			<b>N</b>		
Yolume Name(s)	Type	Bus	ID	LUN	
1ACHDD	ATA	2	0	0	
(CD-ROM drive>	ATAPI	0	0	0	
(not initialized)	SCS1	0	0	0	
Unrecognized driver or this di	sk is protected	iby se	cur	ity	Ŧ
software.					

8. Start to install a new OS on the hard drive.

# 3.2.2 Mac OS X installation

- 1. Be sure the hardware is installed correctly.
- 2. Insert Mac OS X CD-ROM to Macintosh.
- Power on your Macintosh and press 'Option' key. (Don't skip the step otherwise RAID mode will be wrongly detected.)
- 4. After Mac OS X Boot up, select "Installer" from the top selection tools.
- 5. Select "Open Disk Utility ...", and open it.
- 6. Select the hard drive which you want to initialize and choose "**Partition**" to decide the number of partitions you need.



7. After partitioning or erasing the volume, quit the Utilities and begin the OS installation.



8. Update your driver to version 1.5.1, which is on the support CD.



Note: For more information about Mac OS X installation, please refer to Mac OS X installation manual.

# 3.2.3 Verify System Profiler

# For Mac OS 9.x Environment

Make sure the computer "**initialize**" hard drive successfully. When you initialize the hard drive successfully, on the Mac window a new "**Untitled**" hard drive icon will appear.



For advanced Mac users, find the system information under the Apple Logo. Then choose "**Apple System Profiler**" to find the information. Check the information and see the computer system status. Follow the instructions below to check the system information.

Step 1. Click on Apple Logo and choose "**Apple System Profiler**" to show hard drives information.



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Step 3. Under "**Devices and Volumes**", please choose "**PCI**". You will find the SCSI card installation status.

Apple System Profiler	DE
System Prefile Devices and Volumes Control Parels Distancions Applications System	an Fallera \
USB D No devises faued on this loss 1.4.9 Production Apple Defended USB Endeard 1.4.9 Product Gas Is Defended USB Endeard 1.4.9 Product Gas Is Defended USB Endeard 2.6 Product Region Faued on this loss 2.6 Product Region Faued on this loss 2.6 Product Region Re	Sill Hause)
htema ATA 2 D ID = 0 Hand drive D TACHD	10
Internal ATA D     (0) = 0     CD-RV     He maanted med       60518be D     (0) = 0     And drive     (0) = 0       Allor drive     (0) = 0     (0) = 0     (0) = 0       Allor drive     (0) = 0     (0) = 0       Berlin drive     (0) = 0     (0) = 0       Berlin drive     (0) = 0     (0) = 0       Berlin drive     (0) = 0     (0) = 0	Ex isovited 4 His 02 Extended (MFS+) 56.16 05 0 0 1: Mis red :Mi
PCI SUDT-1 (ADP)    Bitplay and	
	4 10 10

# For Mac OS X Environment

Make sure the computer "**initialize**" hard drive successfully. When you initialize the hard drive successfully, on the Mac window a new "**Untitled**" hard drive icon will appear.

For advanced Mac users, find the system information under the Apple Logo. Then choose "**Apple System Profiler**" to find the information. Check the information and see the computer system status. Follow the instruction below to check the system information.

Step 1. Please find the "Finder" at the bottom of the Mac OS Screen, then click it.



Step 2. Find the "Application" on the top of the screen and click it.



Step 3. Under the "Application", find out the "Utilities" and click it.

Step 4. Under the "**Utilities**", you will see the "**Apple System Profiler**". Click on it to see the devices status.



Step 5. Under "**Devices and Volumes**", please choose "**PCI**". You will find the SCSI card installation status.

0	Apple System Profiler			
	System Profile Devices and Volumes	Framewo	rks Extensions Applications	
8.01-9	ECR send     Event type: accel     Control type: Accelor, accel     Control type: Accelor, accelor     Control model: Accelor, accelor     Control model: Accelor, accelor     Control model: Accelor, accelor     Control model: Accelor     Control model: Accelor     Control model: Accelor			
	In ApplePartitionScheme		MACHED	
	IO Apple Partition Subware		9051	
	▶  0 ApplePartitionScheme		ADC-605001	
			Volume fummer: Plac 03 Extended (HFD+) Cepter Ry: S0.16 DB Available: 20.15 DD Percent RHI: D Write portacted: Ne Is being RHI shared: Ne Where:	

# 3.3 AEC-6880M RAID Utility Installation

AEC-6880M RAID Utility lets you read the information of the hard drives connected to *ACARD AEC-6880M*, and RAID volume status in Mac OS 9.x. This program monitors the RAID volume status. A message will appear to inform you.

AEC-6880M RAID Utility must be used together with AEC-6880M firmware Ver. 2.42 or later. You may find them in ACARD Support CD.



# **Delete Array**

When a disk failes in disk array under RAID 1 (Mirror Mode), please replace it with a new one, then delete the original array setting. Then restart the computer to detect the new disk, and reset RAID mode.

A	CARD 6880M BAID Utility
Select Adapter	Bus 0 - AEC-6880M V2.41 0
	ARRAY
AEC-6880M	IDE 1 Master
Mirror Mode	IDE 2 Master
Na	me: ATA ACARD Mirror HD0
s	ize: 19595.9 MB
Sta	bus: Himar BK
H	lint:
Delete Array	Quick Erase Rebuild Quit

# Rebuild

Copy data from an existing data disk in the array into a blank drive. When a failed drive has been replaced with a new one as part of a mirror array, the operation will be resumed.

,	CARD 6880M RAID Utility
Select Adapter	Bus 0 - AEC-6880M V2.41 \$
世出	ARRAY 0
AEC-6880M	iDE I Moster
Mirror Mode	IDE 2 Master
Na	me: ATA MANTOR 6L020J1
3	itze: 19595.9118
Sta	tus: DK
	ant
Delete Array	Quick Erose Bebuild Quit

## **Quick Erase**

It can erase the data on hard drive content quickly. Please beware that the data and the partitions will be completely erased.

,	CARD 6880M RAID Utility
Select Adapter	Bus 0 - AEC-6880M V2.41 0
西马	ABRAY 0
AEC-6880M	iDE 1 Master
Mirror Mode	IDE 2 Master
Na	me: ATA ACARD Mirror HDO
5	ize: 19595.9 MB
Sta	tus: Array Deleted
	fint: Quick enase completel
Delete Array	Quick Erase Robuild Quit

# Chapter 4 Troubleshooting

After installation, if *ACARD AEC-6880M* cannot work properly, please follow the troubleshooting below.

#### 1. Check power supply.

Whenever the device is malfunctioned, check the power status(ON/OFF)first.

#### 2. Verify the IDE device.

Always let the IDE device function in proper mode before installing *ACARD AEC-6880M*.

#### 3. Check host adapter.

Verify if the adapter is firmly inserted into the slot on the motherboard.

#### 4. Check all connectors and cables.

Check if internal IDE connector, device power connector, and cables are connected well. Cables are easily damaged because of improper folding. Try a new cable, and make sure that no connector pins are bent. Pin 1 on the cable must be aligned with pin 1 on the hard drive and host adapter.

#### 5. Verify the DIP switch setting.

Check if the RAID DIP switch setting on ACARD AEC-6880M is correct.

#### 6. PCI Slot Position.

When you install *ACARD AEC-6880M* in Mac Clone computer that is not manufactured by Apple, you need to change the PCI slot for proper operation.

# Appendix 1 Technical Support Form Email: support@acard.com http://www.acard.com

Model:	AEC-6880	OM <b>F/W V</b> e	ersion:
System Configuration			
Compute	r		
CPU			
Memory			
SCSI adapter			
Other I/O	card		
Other Sto	orage Device		
MAC OS	version		
Hard Dis	k Configuratio	n	
Model			
Туре			
Manufac	cturer		
Firmwar	e Rev		
Problem	Description		
		M	ALAEC6880ME20-0