



KC-486

USER MANUAL



KC-486

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TABLE OF CONTENTS

INTRODUCTION	2
1. WHAT DO YOU HAVE	3
2. KEYBOARD COMPUTER UNIT	3
Fig. 1	4
3. MAIN BOARD	5
3.1 Central Processor	5
3.2 486DX, 486SX, 487SX & 486DX2 CPU	5
3.3 VLSI 82C486 - Single 486 AT Chip	6
3.4 ROM/EPROM	6
3.5 DRAM	6
3.6 System Interupts	7
3.7 System DMA Channels	7
3.8 I/O Address MAP on KC486	8
3.9 On Board Serial Ports	8
3.10 On Board Parallel Ports	9
3.11 On Board Game Port	9
3.12 On Board Floppy Disk Controller	9
3.13 On Board Hard Disk Controller	9
3.14 On Board SVGA	9
3.15 Interface to TV (Optional)	10
4.0 EXTERNAL POWER SUPPLY	10
5.0 INSTALLATION	11
5.1.1 Procedure for Power On a Keyboard Computer	11
5.1.2 Power Off Seqerence.	11
5.2 Openning/Restoring Keyboard Computer	11-12
5.3 Installing Components to Keyboard Computer	12
5.3.1 Upgrading CPU	12
5.3.2 Changing Memory	12
5.3.3 Changing Jumpers	12
5.3.4 Installing FDD/HDD Drives	13
5.3.5 Installing Add-On Card	13
Fig. 2	13
Appendix 1	14-17
Appendix 2	18-22
Board Layout	23

*
* NOTE : This equipment has been tested and found to *
* comply with the limits for a Class A digital device, *
* pursuant to part 15 of the FCC Rules. These limits *
* are designed to provide reasonable protection against *
* harmful interference when the equipment is operated *
* in a commercial environment. This equipment generates, *
* uses, and can radiate radio frequency energy and, if *
* not installed and used in accordance with the instruc- *
* tion manual, may cause harmful interference to radio *
* communications. Operation of this equipment in a *
* residential area is likely to cause harmful interfer- *
* ence in which case the user will be required to *
* correct the interference at his own expense. *
*

INTRODUCTION

Keyboard Computer takes advantages latest semi-conductor technology, shrink a desk-top computer into the size of a keyboard. It maintains compatibility with PC XT/AT, this allows keyboard computer to access vast software resources in PC world. It remains flexible by offering user a standard AT slot for general expansion purpose. A Keyboard Computer can be turned into a network station, fax-machine or intelligent modem by using readily available PC XT/AT add-on cards in the market. Applications of Keyboard Computer is limited only to your imagination.

1) What Do You Have ?

When you open the Keyboard Computer packing, you will find following,

- A) Keyboard Computer Unit
- B) External Power Supply
- C) AC cord for connection between wall outlet to External Power Supply
- D) "Keyboard Computer Operation Manual"

("SVGA CARD User's Manual" will be included if SVGA is included in your order.)

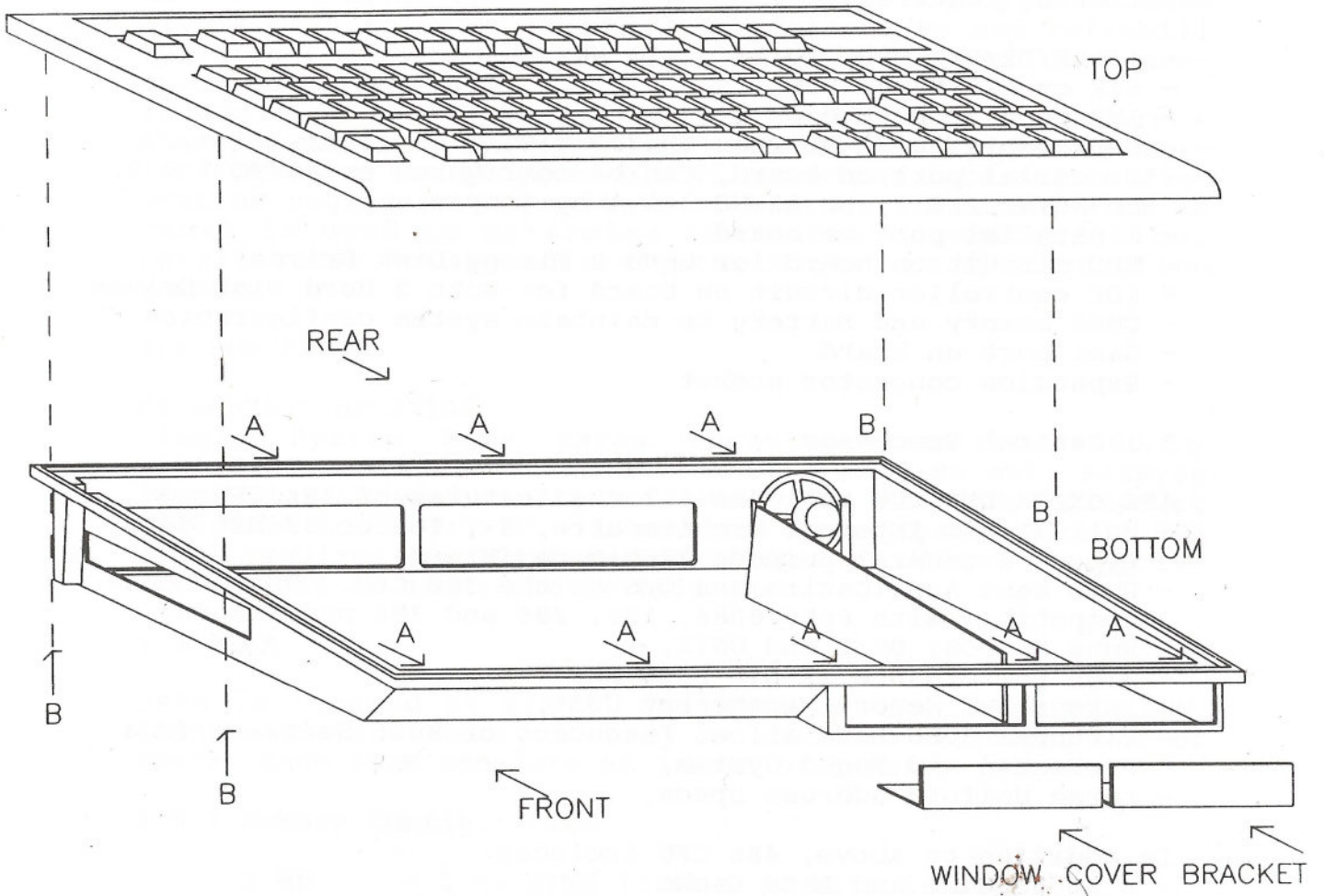
2) Keyboard Computer Unit

It has the size of a 101 key keyboard. With two 3.5" drives space on right side of the front. A highly populated main board inside the unit. All connectors are accessible from the rear. There is an expansion card window on the left side for user's expansion card (refer to Fig. 1).

The Drive Windows are covered by bracket if no drives installed. Maximum two drives can be installed. They can be two Floppy Disk Drives (720KB, 1.44MB or mix) or two IDE Hard Disk Drives (any capacity, but height must limited to 1 inch or less), or one Floppy and one Hard disk drives. User must aware that the total power consumption of the Keyboard Computer should not exceed the capacity of the External Power Supply, or the Power Supply would be damaged and cause the system to malfunction. User should acquire a larger capacity power supply if he found that is necessary.

The standard configuration of the Keyboard Computer will include cables for one Floppy disk and one Hard disk drives. If more or less connectors are required, user should specify in his order.

FIG. 1 Keyboard Computer Assembly



A: Snap Position
B: Top & Bottom Mounting Screws Position

3) Main Board

KC486 main board is a VLSI 82C486 based AT system, it has following features:

- 486SX/DX/DX2 CPU, 20,25 or 33 MHz
- 64K or 128 KByte ROM
- 1MB to 8 MB DRAM 0 or 1 wait state
- Expandable to 32 MB when 4Mx32Bit SIMM available
- 2 serial port on board, can be configured as ASYNC 1 & 2, or ASYNC 2 & 3, or ASYNC 3 & 4 by jumper
- 1 parallel port on board
- FDC circuit on board for upto 2 Floppy Disk Drives
- IDE controller circuit on board for upto 2 Hard Disk Drives
- CMOS memory and Battery to maintain system configuration
- Game port on board
- Expansion connector socket

3.1 Central Processor

486/SX/DX/DX2 CPU includes all the features of 386 CPU:

- Full 32-Bit Internal Architecture, 8-, 16- or 32-bit data type. 8 general purpose 32-bit registers,
- Runs same Application and O/S as the 386 CPU. Object code compatible with 8088/8086, 186, 286 and 386 processors,
- Runs MS-DOS, OS/2 and UNIX,
- High Performance 32-Bit Data Bus,
- Integrated Memory Management Unit,
- Virtual 8086 Mode allows Execution of 8086 Software in a Protected and Paged System,
- Large Uniform address Space,

In addition to above, 486 CPU includes:

- 8 Kbyte Code and Data Cache
- Floating Point Unit (486DX/487SX/486DX2 only)
- Paged, Virtual Memory Management
- Frequent Instructions Execute in One clock

3.2 486DX,486SX, 487SX & 486DX2 CPU:

The major different between 486DX/DX2/487SX and with 486SX CPU is that 486DX/DX2/487SX has Floating Point Unit built-in while 486SX does not. 486DX2 runs two instruction per each clock cycle while 486DX/SX only runs one instruction. With 486DX2 CPU (as well as other new series CPU compatible with Intel Upgrade Socket Specification), KC486 can significantly enhance its performance.

3.3 VLSI 82C486 - Single 486 AT Chip

The VLSI 82C486, a PC/AT compatible chip, supports the 486 CPU at clock speeds upto 33MHz. This highly integrated single chip solution offers high performance and reliability, with low cost, minimal power consumption, and low board-space requirements.

In addition to its compatibility with PC/AT, it supports Shadow memory for System and Video BIOS. The 82C486 Controller functions are programmable via a set of internal configuration registers. The state of various interface pins on reset is used to determine the default configuration. Detail refer to Appendix "System Registers Configuration Summary".

3.4 ROM/EPROM

U1 - 27512 or 271000

Single System Bios takes location from F000:0000 to F000:FFFF. A system without VGA will require only 64KByte (one 27512 or equivalent) ROM/EPROM. VGA Bios is located at C000:0000 to C000:7FFF. A combined Bios (System Bios + VGA Bios) requires one 128KByte ROM/EPROM. One 271000 (or equivalent) will be installed in this case.

3.5 DRAM

DRAM is located at SIMM1 and SIMM2. High density SIMM (Single In-line Memory Module) is used for efficient use of space. Each SIMM consists of 2 Bank of memory.

3.5.1 Memory Configuration

1 MB	= 1 MB SIMM (256K x 32 Bit) in SIMM1
2 MB	= 1 MB SIMM in SIMM1 and SIMM2
4 MB	= 4 MB SIMM (1M x 32 Bit) in SIMM1
8 MB	= 4 MB SIMM in SIMM1 and SIMM2
16 MB	=16 MB SIMM (4M x 32 Bit) in SIMM1
32 MB	=16 MB SIMM in SIMM1 and SIMM2

3.6 System Interrupts

There are 16 levels of interrupts provided in the system board,

Level of priority	Description
1. NMI	NMI or I/O Channel Check
2. IRQ0	Timer Output 0
3. IRQ1	Keyboard
IRQ2	Interrupt from CTRL2
4. IRQ8	Real Time Clock Interrupt
5. IRQ9	Software redirected to INT 0Ah (IRQ2), not used in system board, accessible by user
6. IRQ10	Reserved, not accessible by user
7. IRQ11	Reserved, not accessible by user
8. IRQ12	Reserved, not accessible by user
9. IRQ13	Coprocessor
10. IRQ14	Hard Disk Controller
11. IRQ15	Reserved, not accessible by user
12. IRQ3	Serial Port 2
13. IRQ4	Serial Port 1
14. IRQ5	Not used on System Board, accessible by user
15. IRQ6	Floppy Disk Controller
16. IRQ7	Parallel Port 1

3.7 System DMA Channels

There are 7 DMA channels available in the system board, however only 8-Bit channels are accessible to user limited by 8-Bit Expansion connector.

Channel	I/O Address	Transfer Size (BIT)	Block Size (MAX)	Description
CH0	087H	8 to 8/16	64Kbyte	Not accessible by user
CH1	083H	8 to 8/16	64Kbyte	Not used, accessible by user
CH2	081H	8 to 8/16	64Kbyte	Diskette
CH3	082H	8 to 8/16	64Kbyte	not used, accessible by user

CH4 to CH7 are not accessible by user.

3.8 I/O Address Map on Main Board

Hex Range	Device
000-01F	DMA Controller 1
020-03F	Interrupt Controller 1
040-05F	Timer
060,062-06F	Keyboard Controller
061	Port B Register, PPI
070-07F	Real Time Clock
080-08F	DMA Page Register
090-09F	Reserved
0A0-0BF	Interrupt Controller 2
0C0-0DF	DMA Controller 2
0EC-0EF	VLSI 311 Control Register Detail refer to Appendix 2
0F4-0FB	VLSI 82C486 Control Register Detail refer to Appendix 2
1F0-1F8	Hard Disk Controller
200-207	Game I/O
2E8-2EF	Serial Port 4 (COM4)
2F8-2FF	Serial Port 2 (COM2)
378-37F	Parallel Printer Port 1
3E8-3EF	Serial Port 3 (COM3)
3F0-3F7	Floppy Disk Controller
3F8-3FF	Serial Port 1 (COM1)

3.9 On Board Serial Ports

There are two Serial Ports available on board. They can not be disabled, but can be configured as COM1, COM2, COM3 or COM4 by jumper during power on.

JUMPER		CONNECTOR	
J1	J2	Async 1	Async 2
Open	Open	COM1 (3F8-3FF)	COM2 (2F8-2FF)
Short	Open	COM1 (3F8-3FF)	COM4 (2E8-2EF)
Open	Short	COM3 (2F8-2FF)	COM2 (2F8-2FF)
Short	Short	COM3 (2F8-2FF)	COM4 (2E8-2EF)
IRQ	:	IRQ4	IRQ3
CONNECTOR	:	9 Pin DSUB Male	

3.10 On Board Parallel Port

There is one Parallel Port available on board.

Port Address: 378H - 37FH (Parallel Port 1)

IRQ : IRQ 7

Connector : 25 Pin DSUB Female

3.11 On Board Game Port

Port Address: 201H

Connector : 15 Pin DSUB Female

3.12 On board Floppy Disk Controller

Port Address: 3F0H-3F7H

IRQ : IRQ 6

DMA : DMA 2

Connector : FDD CONNECTOR, 34 Pin Header

3.13 On Board Hard Disk Controller

Port Address: 1F0H-1F8H, 3F6H-3F7H

IRQ : IRQ 14

Connector : IDE HDD CONNECTOR, 40 Pin Header

3.14 On Board Super VGA

On board Super VGA circuit is based on REALTEK RTVGA single chip VGA controller (3106). It is fully hardware compatible with all IBM VGA display modes. It is also hardware register level downward compatible with EGA, CGA, MDA and Hercules Monochrom Graphic Adaptor. It supports high resolution up to 1280x1024 with 16 out of 256 colors and 1024x768 (inter-lace or non-interlace) 256 out of 256K colors. With optional 64K Color RAM DAC, it supports 64K true color in 800x600 mode. With monochrome VGA monitor, 16 grey scale is available in 800x600 mode.

Drivers for popular softwares in high resolution modes are available such as AutoCad, Lotus 1-2-3, Microsoft Window, Ventura, GEM, Framework, Word Perfect, Word Star, etc.

Special Window Function is built-in to ensure high performance in Window Application. Performance in Window can be further enhanced if optional Window acceleration VGA chip (3107) is used.

Further detail on SVGA is available from SVGA USER MANUAL.

Bios Address	At C000:0000, incorporated with System Bios
Connector	VGA connector, 10 Pin Header
Memory	Standard = 512 Kbyte
	44256x4 (U17 to U20)
	Maximum = 1 MB
	44256x8 (U17 to U24)
J5	Open = Interlace (for 1024x768 only)
	Short = Non-interlace

3.15 Interface to TV (Optional)

Keyboard Computer can directly connect to Video Input of a television set by using an optional interface card (KBTV). This interface card has a 10 pin header socket on one end, a 15 pin standard VGA connector on the other. This card is directly plug into VGA CONNECTOR of the mother board through the 10 pin header socket. The 15 pin Standard VGA Connector is mounted on the rear panel of the Keyboard Computer. The composite Video display signal for the TV is provided from a BNC connector, which is also mounted on the rear panel.

Two version of KBTV is available, PAL or NTSC. Users must specify the TV system when place order.

In general, Television set display resolution is much lower than VGA monitor. The adequate display resolution of a TV set is 320x200 with 256 colors. Due to limitation of the television set, one should not expect the display quality is equivalent to a VGA Monitor.

4.0 External Power Supply

There is a Cable from External Power Supply for connecting to Keyboard Computer. An AC CORD is provided for connection of External Power Supply to Wall AC Outlet.

Electrical Specification:

Input:	90 - 250V, 47 - 63Hz
Output:	+5V : 3A
	+12V: 2A
	-12V: 0.2A

5.0 Installation

5.1.1 Procedure for Power On a Keyboard Computer:

1. Make sure the Power Switch of the Keyboard Computer is OFF before plug in (or pull out) any cable.
2. Plug in External Power Supply Cable into Keyboard Computer.
3. Make sure the Monitor is off before connecting its cable to Keyboard Computer.
4. If there is any other device need to be connected, make sure they are power off before making any connection.
5. Connect the AC CORD of the External Power Supply to Wall AC Outlet.
6. Turn on Monitor and all devices connected to Keyboard Computer.
7. Turn on the power of the Keyboard Computer. System should boot automatically.

5.1.2 Power Off Sequence :

Following steps must be followed for Power Off Sequence:

1. Turn off the Keyboard Computer
2. Turn off the Monitor
3. Turn off the AC wall outlet power switch (if there is any)

Keyboard Computer must be turned off before the AC wall outlet power switch turned off. It would cause CMOS or other system error if the sequence is incorrect.

5.2 Openning/Restoring Keyboard Computer

It might be necessary to open the Keyboard Computer for installing components or changing jumpers. User should be very careful to avoid break the case, and should follow proceduces below:

1. Remove the 4 Screws (which holding the top and the base) from the bottom of the Keyboard Computer. Two screws on each side. (Refer to Fig. 1)
2. Push the top from rear to front. Front of the top should spring out from the base.
3. Lift the front of the top (including keyboard) and remove the top from the base in the back.
4. Disconnect the cable between the keyboard and the main board. The top (including the keyboard) now is free from the base.

Keyboard Computer is required to be restored after installation of an add-on card. Procedures below should be followed:

1. Connect the keyboard connector to the main board. One should EXTREMELY CARE NOT TO REVERSE CONNECTOR'S POLARITY, OR IT WILL DAMAGE THE KEYBOARD. Pin 1 of the connector should match with the cable.
2. Place the keyboard on top of the base.
3. Put the front of the top cover in place with the front of the base.
4. Press the rear of the top cover to snap into the base.
5. Fasten the 4 screws from the bottom of the base.

5.3 Installing Components to Keyboard Computer

DURING INSTALLATION, ALWAYS SHOULD AWARE FOLLOWING:

- POWER MUST OFF
- POLARITY OF THE CONNECTOR/CABLE MUST BE CORRECT
- DIRECTION AND LOCATION OF ICs MUST BE CORRECT
- CONNECTION MUST BE PROPER, ALL PINS MUST BE IN THE SOCKET
- Re-setup the system during power up

5.3.1 Upgrading CPU

CPU socket (132 Pin PGA) located at U28. It meets the Specification of Intel Upgrade Socket. User can replace the CPU by more powerful processor if he found it is necessary. Jumper DX-SX should be installed according to CPU type.

5.3.2 Changing Memory

DRAMs are located at SIMM1 and SIMM2.

5.3.3 Changing Jumpers

J1 & J2: Located near to U7 and Serial Port 2 connector. Short or Open of these two Jumpers will determine the Base address of Serial Port 2 and 1 respectively

J5 : Located near to U20 and U24. Short or Open this Jumper will force SVGA to run 1024x768 mode with Non-interlace or Interlace.

J6 : Located next to U26. It selects CGA or MGA display adaptor. This Jumper will be ignored if SVGA is installed.

DX-SX : Located near to U28 (CPU Socket).
 Jumper direction should be followed when
 CPU is replaced. 486DX/DX2 should
 follow the direction of "DX".

5.3.4 Installing FDD/HDD drives

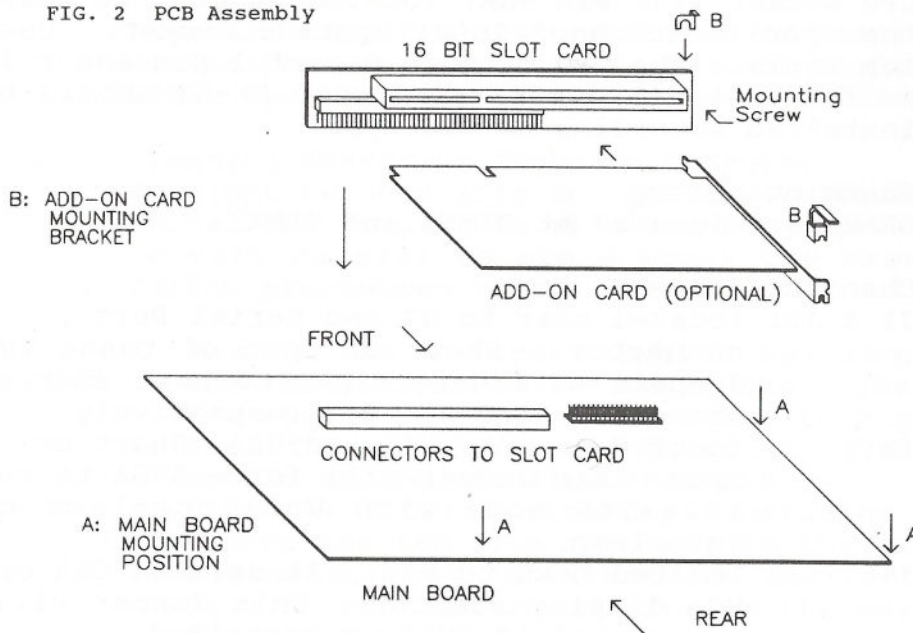
1. Remove the Cover Bracket of Drive Window
2. Install drive and fasten the screws from the bottom of the base
3. Connect the drive power and signal cable to main board

5.3.5 Installing Add-On Card

Refer to Figure 2 for Following procedures:

1. Unplug the 16 Bit Slot Card from the main board.
2. Remove the Add-On card's window covering bracket.
3. Install the Add-On card to the slot of 16 Bit Slot Card.
4. Put the Mounting Bracket on the bracket of the Add-On card.
5. Install the 16 Bit Slot Card back to the main board. Make sure the mounting bracket is in proper position.

FIG. 2 PCB Assembly



Appendix 1 Connector and Jumper Summary

Jumpers

- J1 = ASYNC 2 Port Address Selection
 - Open = COM2
 - Short = COM4
- J2 = ASYNC 1 Port Address Selection
 - Open = COM1
 - Short = COM3
- J3 = Not used
- J4 = Not used
- J5 = VGA Interlace/Non Interlace selection
 - For 1023 x 768 only.
 - Open = Interlace (Standard VGA Monitor, Hsync = 31KHz)
 - Short = Non Interlace (Hsync = 50KHz)
- J6 = CGA/MGA Display Card Selection
 - Open = Monochrome Adapter
 - Short = Color Graphic Adapter
 - J6 is ignored if VGA is installed

DX-SX = Jumper for selection of CPU. 486DX/486DX2 should follow the direction of "DX"

Connectors

EXP1, EXP2 & EXP3 - 16 Bit Slot Card expansion Connectors

	EXP1		
-12V	1	2	+12V
SD7	3	4	RSTDRV
SD5	5	6	SD6
SD3	7	8	SD4
SD1	9	10	SD2
-REFRESH	11	12	SD0
SA18	13	14	SA19
SA16	15	16	SA17
SA14	17	18	SA15
SA12	19	20	SA13
SA10	21	22	SA11
SA8	23	24	SA9
SA6	25	26	SA7
SA4	27	28	SA5
SA2	29	30	SA3
SA0	31	32	SA1
AEN	33	34	IOCHRDY

EXP2			
SD15	1	2	SD14
SD13	3	4	SD12
SD11	5	6	SD10
SD9	7	8	SD8
+5V	9	10	+5V
GND	11	12	GND
-MEMW	13	14	-MEMR
LA17	15	16	LA18
LA19	17	18	LA20
LA21	19	20	LA22
LA23	21	22	-SBHE
-MEMCS16	23	24	-IOCS16
-IOCHCK	25	26	OVS
SYSCLK	27	28	OSC (14.318MHz)
BALE	29	30	+5V
-SIOR	31	32	-SIOW
-SMEMR	33	34	-SMEMW

EXP3			
-MASTER	1	2	DRQ7
DRQ6	3	4	DRQ5
DRQ0	5	6	IRQ14
IRQ15	7	8	IRQ12
IRQ11	9	10	IRQ10
DACK7	11	12	DACK6
DACK5	13	14	DACK0
IRQ3	15	16	DACK2
IRQ5	17	18	IRQ4
IRQ7	19	20	IRQ6
DRQ1	21	22	DRQ3
DRQ2	23	24	DACK3
IRQ9	25	26	DACK1

Floppy Disk Drive Connector

FDD CONNECTOR			
GND	1	2	Write Compensation
GND	3	4	Not used
GND	5	6	Not used
GND	7	8	Index
GND	9	10	Motor Enable 1
GND	11	12	Drive Select 2
GND	13	14	Drive Select 1
GND	15	16	Motor Enable 2
GND	17	18	Direction
GND	19	20	Step
GND	21	22	Write Data
GND	23	24	Write Enable
GND	25	26	Track 0
GND	27	28	Write Protect
GND	29	30	Read Data
GND	31	32	Select Head
GND	32	34	Diskette Change

Hard Disk Drive Connector

IDE HDD CONNECTOR							
Reserved	21	22	GND	-HRESET	1	2	GND
-HIOW	23	24	GND	HDATA 7	3	4	HDATA 8
-HIOR	25	26	GND	HDATA 6	5	6	HDATA 9
Reserved	27	28	Hale	HDATA 5	7	8	HDATA 10
Reserved	29	30	GND	HDATA 4	9	10	HDATA 11
HIRQ14	31	32	-HIO16	HDATA 3	11	12	HDATA 12
HADDR1	33	34	-H DIAG	HDATA 2	13	14	HDATA 13
HADDR0	35	36	HADDR2	HDATA 1	15	16	HDATA 14
-HCS0	37	38	-HCS1	HDATA 0	17	18	HDATA 15
-H ALV/ACT	39	40	GND	GND	19	20	Not used

Async 1 & Async 2 Connector

DSUB 9 Pin Male Connector

RLSD	1	6	DSR
RX	2	7	RTS
TX	3	8	CTS
DTR	4	9	RI
GND	5		

Parallel Port Connector

DSUB 25 Pin Female Connector

Strobe	1	14	-Auto feed
Data 0	2	15	-Error
Data 1	3	16	-Init
Data 2	5	17	-Slct
Data 3	7	18	GND
Data 4	8	19	GND
DATA 5	9	20	GND
DATA 6	10	21	GND
DATA 7	11	22	GND
-ACK	12	23	GND
BUSY	13	24	GND
PE	14	25	GND
SLCT	15		

GAME Connector

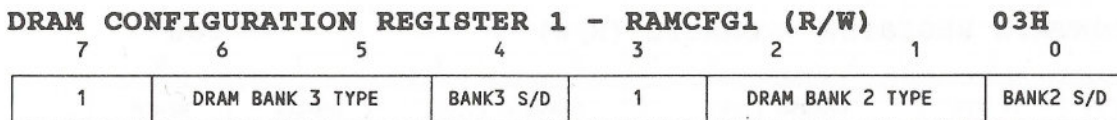
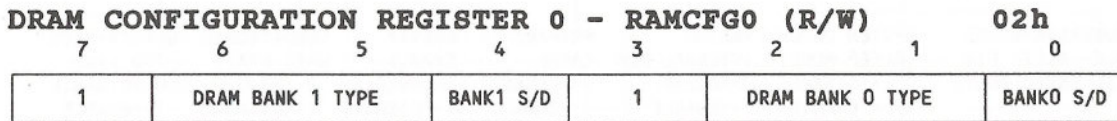
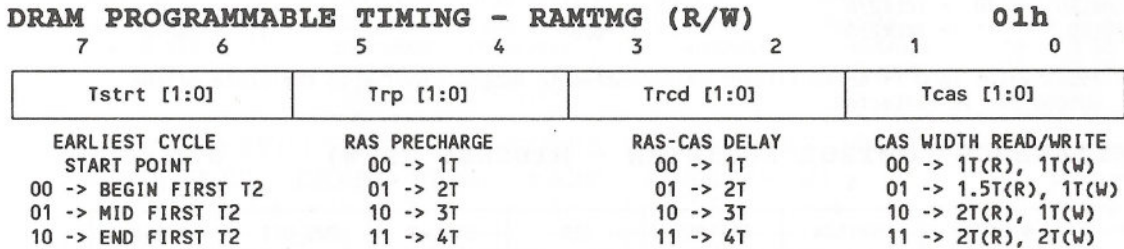
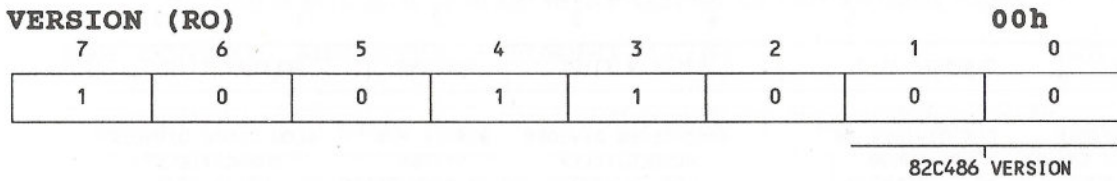
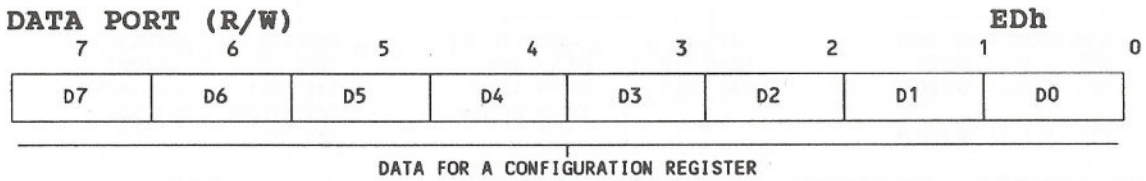
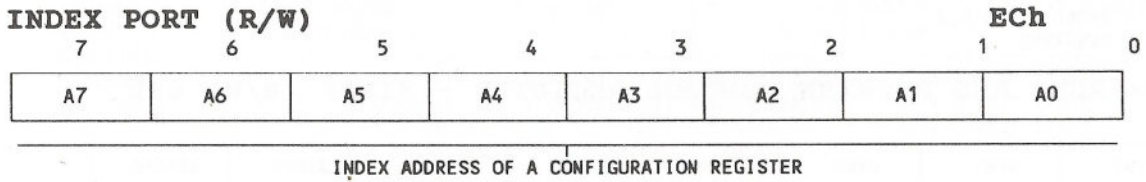
DSUB 15 Pin Female Connector

VCC	1	9	VCC
BIT 4	2	10	BIT 6
PO0	3	11	PO2
GND	4	12	GND
GND	5	13	PO3
PO1	6	14	BIT 7
BIT 5	7	15	VCC
VCC	8		

APPENDIX 2 - System Registers Configuration Summary

INDEXED CONFIGURATION REGISTERS FORMAT

The following diagrams show the indexed configuration register formats.



DRAM BANK TYPE
 00 -> NONE
 01 -> 256K
 10 -> 1M
 11 -> 4M

SIMM TYPE
 0->SINGLE SIDED
 1->DOUBLE SIDED

DRAM CONTROL REGISTER - RAMSET (R/W)

04h

7	6	5	4	3	2	1	0
INTLV [2:0]			RTODIS	COEB	RAMDRV [1:0]		PGMD
INTERLEAVE SELCT			RAS TIME OUT	DRAM BANK	MA[0:1] & RAMW#		PAGE MODE
000 -> NO INTERLEAVE			DISABLE	WITH NK	00 -> 12mA		0 -> ENABLE
001 -> BANKS 0,1			0 -> ENABLED	0 = 32BIT	01 -> 24mA		1 -> BURST ONLY
010 -> BANKS 0,3			1 -> DISABLED	1 = 64BIT	10 -> 36mA		
011 -> BANKS 1,2					11 -> 48mA		
100 -> BANKS 2,3							
101 -> BANKS 0,1 & 2,3							
110 -> BANKS 0,3 & 1,2							
111 -> RESERVED							

NON-TURBO AND REFRESH CONTROL REGISTER - NIREF (R/W) 05h

7	6	5	4	3	2	1	0
NTB2	NTB1	NTB0	TURBO	REFMD1	REFMD0	CASREF	REFSPD
NON TURBO MODE SPEED			STATE OF TURBO PIN	REFRESH MODE		REFRESH TYPE	REFRESH PERIOD
000 -> FULL SPEED			READ ONLY	00 -> SYNC		0=RAS ONLY	0=15.625us
001 -> FULL SPEED/2				01 -> ASYNC		1=CAS BEFORE RAS	1=125us
111 -> FULL SPEED/8				1X -> DECOUPLED			

CLOCK CONTROL REGISTER - CLKCTL (R/W)

06h

7	6	5	4	3	2	1	0
FNEN	CLK2DOV [1:0]		FCLKDIV [1:0]		BOSCSNS	SCLKDIV [1:0]	
ENABLE SYSCLK FREQUENCY CHANGE	CLK DIVIDER IN NON-TURBO		FAST CLOCK DIVIDER BUSOCS/TCLK2		BUSCLK PIN STATUS	SLOW CLOCK DIVIDER BUSOCS/TCLK2	
IN FAST BUS	00 -> TCLK2/2		00 -> /2/2		0 -> SLOW CLOCK	00 -> /2/4	
CLOCK REGION	01 -> TCLK2/4		01 -> /4/4		1 -> FAST CLOCK	01 -> /4/6	
0 -> DISABLED	10 -> TCLK2/6		10 -> /6/6			10 -> /6/8	
1 -> ENABLED	11 -> TCLK2/8		11 -> /8/8			11 -> /8/12	

Note 1 : Reset value is 0 if an oscillator is connected to BUSOSC pin, else the state of the BUSOSC pin is reflected.

MISCELLANEOUS CONTROL REGISTER - MISCSET (R/W)

07h

7	6	5	4	3	2	1	0
SLP	SLPSTS	ENSYSC	FASTRC	CEN	ENPAR#	CWS_OFF	IRQIN
SLEEP MODE	STATUS OF SLEEP PIN	SYSTEM CLOCK (SLEEP MODE)	FAST INTERNAL RC#	PRIMARY CACHE	PARITY ENABLE	CONDITIONAL WAIT STATE	GLITCH-FREE IRQ LINE
0->DISABLE	READ ONLY	0 -> DISABLE	0->DISABLE	0->DISABLE	0->ENABLE	0->ENABLE	0->DISABLE
1->ENABLE		1 -> ENABLE	1->ENABLE	1->ENABLE	1->DISABLE	1->DISABLE	1->ENABLE

DMA CONTROL REGISTER - DMACTL (R/W)

08h

7	6	5	4	3	2	1	0
ENABLE FF	FF PTR	DMAWS8 [1:0]		DMAWS16 [1:0]		DMACLK	MEMTM
ENABLE EXTENDED DMA ADDRESS	ENABLE ACCESS TO UPPER PAGE REGISTERS	8 BIT DMA WAIT STATES		16 BIT DMA WAIT STATES		DMA CLOCK	DMA MEMR# DELAY
0->DISABLE	0->LOWER	00 -> 2 WS		00 -> 2 WS		0->SYSCLK/2	0 -> PC/AT COMPATIBLE
1->ENABLE	1->UPPER	01 -> 4 WS		01 -> 4 WS		1->SYSCLK	1 -> 1 DMACLK EARLY
		10 -> 3 WS		10 -> 3 WS			
		11 -> 3 WS		11 -> 3 WS			

BUS CONTROL REGISTER - BUSCTL (R/W)

09h

7	6	5	4	3	2	1	0
VSF#	10/16 IO	SLDRV	DSKTMG	CMDLY2	CMDLY1	16 WS	8 WS
VLSI-SPECIAL FEATURE (ENABLE IO SPACE EEh-Ffh) 0=ENABLE 1=DISABLE	10/16 BIT I/O ADDRESS DECODE 0=16 BIT DECODE 1=10 BIT DECODE	SLOT DRIVE CURRENT 0 -> 12 mA 1 -> 24 mA	DISK I/O TIMING 0 -> SLOW 1 -> FAST	COMMAND DELAY FOR 8/16 BIT I/O AND 8 BIT MEMORY CYCLES 0 -> 0 SYSCLK 1 -> 1 SYSCLK	COMMAND DELAY FOR 16 BIT MEMORY CYCLES 0 -> 0 SYSCLK 1 -> 1 SYSCLK	16-BIT WAIT STATES 0 -> 0 WAIT STATE 1 -> 1 WAIT STATE	8-BIT WAIT STATE 0 -> 4 WAIT STATE 1 -> 5 WAIT STATE

FAST BUS CLOCK REGION - FBKR (R/W)

0Bh

7	6	5	4	3	2	1	0
A23	A22	A21	A20	A19	A18	A17	A16

ADDRESS BITS 23-16 OF MEMORY REGION SELECTED FOR FAST BUS BLOCK ACCESS

ROM CONTROL REGISTER - ROMSET (R/W)

0Ch

7	6	5	4	3	2	1	0
ROMWID	ROMMOV [2:0]		MBIOS	PRG	ROMWS1	ROMWS0	
BIOS ROM WIDTH READ ONLY 0 -> 8 BIT 1 -> 16 BIT	SYSTEM ROM LOCATION CODE 101 -> F000:0000 - F000:FFFF 110 -> F000:0000 - F000:FFFF, C000:0000 - C000:7FFF 111 -> F000:0000 - F000:FFFF, C000:0000 - C000:FFFF		MID BIOS ENABLE 0->ENABLE 1->DISABLE	FLASH MEMORY PROGRAM 0->DISABLE 1->ENABLE	ROM WAIT STATES 00 -> 3 WS 01 -> 1 WS 10 -> 2 WS 11 -> 3 WS		

A0000h-FFFFFFh SEGMENT ACCESS CONTROL REGISTERS

AAXS, BAXS, CAXS, DAXS, EAXS, FAXS (R/W)

0Dh-12h

7	6	5	4	3	2	1	0
AC000 ACCESS	A8000 ACCESS	A4000 ACCESS	A0000 ACCESS	BC000 ACCESS	B8000 ACCESS	B4000 ACCESS	B0000 ACCESS
CC000 ACCESS	C8000 ACCESS	C4000 ACCESS	C0000 ACCESS	DC000 ACCESS	D8000 ACCESS	D4000 ACCESS	D0000 ACCESS
EC000 ACCESS	E8000 ACCESS	E4000 ACCESS	E0000 ACCESS	FC000 ACCESS	F8000 ACCESS	F4000 ACCESS	F0000 ACCESS

00 -> READ/WRITE SLOT BUS
 01 -> READ SLOT, WRITE SYSTEM BOARD
 10 -> READ SYSTEM BOARD, WRITE SLOT BUS
 11 -> READ/WRITE SYSTEM BOARD

A0000h-FFFFh SEGMENT CACHEABILITY CONTROL REGISTERS
ACBL, BCBL, CCBL, DCBL, ECBL, FCBL (R/W) 13h-18h

7	6	5	4	3	2	1	0
AC000 ACCESS	A8000 ACCESS	A4000 ACCESS	A0000 ACCESS	BC000 ACCESS	B8000 ACCESS	B4000 ACCESS	B0000 ACCESS
CC000 ACCESS	C8000 ACCESS	C4000 ACCESS	C0000 ACCESS	DC000 ACCESS	D8000 ACCESS	D4000 ACCESS	D0000 ACCESS
EC000 ACCESS	E8000 ACCESS	E4000 ACCESS	E0000 ACCESS	FC000 ACCESS	F8000 ACCESS	F4000 ACCESS	F0000 ACCESS

00 -> NOT WRITE PROTECTED, CACHEABLE
 01 -> NOT WRITE PROTECTED, NOT CACHEABLE
 10 -> WRITE PROTECTED, CACHEABLE
 11 -> WRITE PROTECTED, NOT CACHEABLE

PROGRAMMED MEMORY REGION REGISTER 1 - PMRA1 (R/W) 20h

7	6	5	4	3	2	1	0
LBA_ISA	KCBL	AX5	AX4	AX3	AX2	AX1	AX0

SELECT BUS SELECT CACHEABILITY START ADDRESS AND MEMORY REGION SIZE
 0->ISA BUS 0->CACHEABLE 0 A23 A22 A21 A20 A19 -> START ADDRESS OF A 512KB REGION
 1->LOCAL BUS 1->NON-CACHEABLE IN LOWER 16MB MEMORY
 1 0 A26 A25 A24 A23 -> START ADDRESS OF AN 8MB REGION
 IN LOWER 128MB MEMORY
 1 1 A17 A16 A15 A14 -> START ADDRESS OF A 16KB REGION
 IN RANGE C0000h TO FFFFFh

MEMORY REGION ENABLE REGISTER 1 - PMRE1 (R/W) 21h

RE7	RE6	RE5	RE4	RE3	RE2	RE1	RE0
-----	-----	-----	-----	-----	-----	-----	-----

SUB-REGION ENABLES FOR REMAPPING AND/OR CACHEABILITY
 0 -> DEFAULT MAPPING/CACHEABILITY
 1 -> MAPPING AND CACHEABILITY DEFINED BY MRA

PROGRAMMED MEMORY REGION REGISTER 2 - PMRA2 (R/W) 22h

7	6	5	4	3	2	1	0
LBA_ISA	KCBL	AX5	AX4	AX3	AX2	AX1	AX0

MEMORY REGION ENABLE REGISTER 2 - PMRE2 (R/W) 23h

RE7	RE6	RE5	RE4	RE3	RE2	RE1	RE0
-----	-----	-----	-----	-----	-----	-----	-----

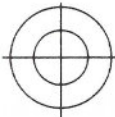
DEDICATED IO CONTROL REGISTERS

PORT ADDRESS	NAME	ACCESS	FUNCTION
61H	PORT B	R/W	MICELLANEOUS CONTROL BITS
92H	PORT A	R/W	FAST A20 AND RESET CONTROL
ECH	INDEX REGISTER	R/W	CONTAINS THE ADDRESS OF ONE OF THE CONFIGURATIONS REGISTERS
EDH	DATA REGISTER	R/W	CONTAINS THE DATA WRITTEN TO THE CONFIGURATION REGISTER SELECTED BY THE CONFIGURATION INDEX REGISRER
EEH**	FAST A20 REGITER	R/W	A DUMMY READ ENABLES FAST A20, A DUMMY WRITE DISABLES FAST A20
EFH**	FAST CPU RESET REGISTER	R	A DUMMY READ RESETS THE CPU
FOH	COPROCESSOR BUSY REGISTER	W	A DUMMY WRITE CLEARS IRQ13 AND SETS IGNE#
F1H	COPROCESSOR RESET REGISTER	W	A DUMMY WRITE CLEARS IRQ13 AND SETS IGNE#
F4H+	SLOW CPU REGISTER	W	A DUMMY WRITE ENABLES SLOW CLOCK AND NON-TURBO MODE FOR CPU
F5H+	FAST CPU REGISTER	W	A DUMMY WRITE ENABLES FAST CLOCK AND TURBO MODE FOR CPU
F9H+	CONFIGURATION DISABLE REGISTER	W	A DUMMY WRITE DISABLES ACCESS TO THE CONFIGURATION REGS.
FBH+	CONFIGURATION ENABLE REGISTER	W	A DUMMY WRITE ENABLES ACCESS TO THE CONFIGURATION REGS.

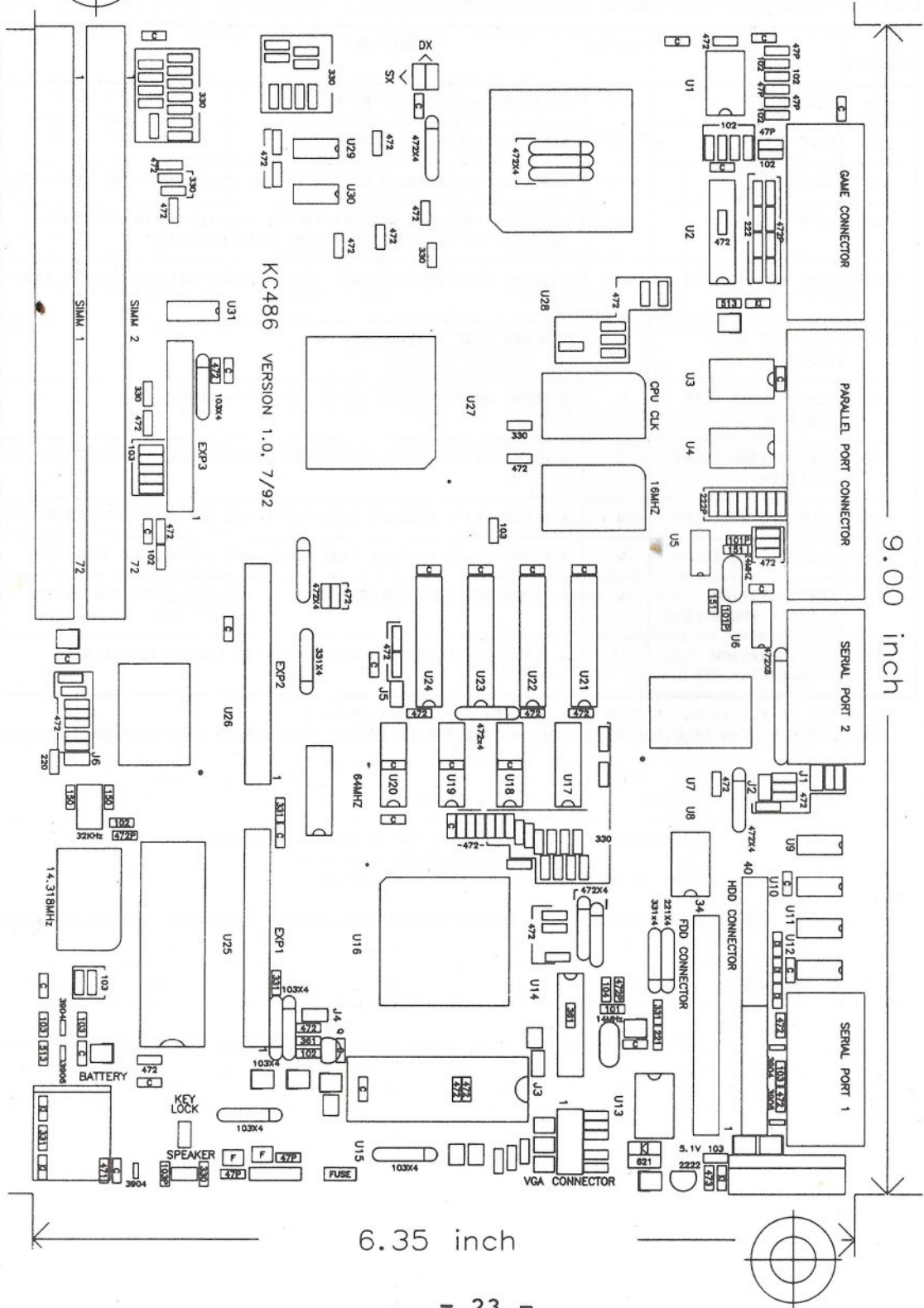
* ALSO CAN BE ACTIVATED THROUGH PORT 92H FOR PS/2 COMPATIBILITY.

+ THESE DECODES CAN BE DISABLED BY SETTING THE MSB OF BUSCTL REGISTER IN CASE OF CONFLICT.

Board Layout



KC486, version 1.0, 7/1992
ORICOM DATA SYSTEMS, LTD



6.35 inch

9.00 inch



SVGA USER MANUAL

FCC Compliance Statement

Warning: changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This equipment has been tested and found to comply with the limits for for 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, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

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 off and on, 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 needed.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio/TV Interference Problems". This booklet is available from the US Government Printing Office, Washington, D. C. 20402. Stock No. 004-000-00345-4.

The use of shielded cables for connection of the monitor to the card is required to assure compliance with FCC regulations.

DOC Compliance Statement

This digital apparatus does not exceed the class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

En Fran~ais

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicable aux appareils numeriques de la Classe B prescrites dans le Reglement sur le brouillage radioelectriques edicte par le ministre des Communications du Canada.

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TABLE OF CONTENTS

SECTION 1: INTRODUCTION

- 1.1 Features.....
- 1.2 Check List.....

SECTION 2: CONFIGURATION OF RTVGA-3106

- 2.1 Hardware Configuration.....
- 2.2 JUMPER Settings.....

SECTION 3: HARDWARE INSTALLATION

- 3.1 Connecting the monitor.....
 - 3.1.1 Cabling Your Monitor.....
 - 3.1.2 Monitor Support For Enhanced VGA Modes.....
 - 3.1.3 Monitor Support For Other Graphics Modes.....

SECTION 4: SOFTWARE UTILITY

- 4.1 RTVGA-3106 Utilities.....
- 4.2 Switching Video Modes With VMODE.EXE.....
 - 4.2.1 How To Use VMODE.EXE.....
 - 4.2.2 Example: Switching To Hercules with VMODE.....
- 4.3 Boosting system performance with RTVGA RAM BIOS.....
- 4.4 Using RTANSI Standard Console Driver.....
- 4.5 New program for CHINESE ET users.....

SECTION 5: SOFTWARE DRIVERS INSTALLATION

- 5.1 Configuring AUTOCAD.....
- 5.2 Configuring AUTOSHADE.....
- 5.3 Configuring 3D-STUDIO.....
- 5.4 Configuring CADKEY.....
- 5.5 Configuring FRAMEWORK.....
- 5.6 Configuring GEM.....
- 5.7 Configuring LOTUS 123 And SYMPHONY.....
- 5.8 Configuring PCAD.....
- 5.9 Configuring VENTURA.....
- 5.10 Configuring VERSACAD.....
- 5.11 Configuring WINDOWS.....
- 5.12 Configuring WORDPERFECT.....
- 5.13 Configuring WORDSTAR.....
- 5.14 Configuring EASYCAD2.....
- 5.15 OTHERS.....

SECTION 6: ADVANCED TOPICS

- 6.1 Standard VGA Mode.....
- 6.2 Extended VGA Mode.....

APPENDIX: PIN OUT AND SYNC FREQUENCIES

- A.1 Analog Color Display Pinouts.....
- A.2 Sync Signals For PS/2 Monitors.....

SECTION 1 INTRODUCTION

1.1 Features

The RTVGA-3106 is based on REALTEK's RTG3106 which works with your high-resolution color monitor to bring you crispy video, splendid color, functions and features far beyond the IBM VGA standard. The RTVGA-3106 can be configured to perform as EGA, CGA, MDA or Hercules Display Standard by set mode utility.

* The RTVGA-3106 Fully Supports:

- # All IBM VGA modes to the register level.
- # IBM EGA, CGA, MDA and Hercules modes to register level.
- # Multisync monitors (analog).
- # PS/2 monitors (8503, 8512, 8513, 8514).
- # 16 Bit wide memory bus.

* Extended Text modes

- # 80-column in 30, 43 and 60 rows
- # 132-column in 25, 30, 43 and 60 rows

* Extended Graphics modes

- # 4-color in 1024x768.
- # 16-color in 800x600, 960x720, 768x1024, 1024x768, and 1280x1024.
- # 256-color in 512x512, 640x400, 640x480, 800x600, 1024x768, and 1024x1024.
- # 64K-color in 320x200, 512x512, 640x400, 640x480 and 800x600.

1.2 Check List

Check your packing to ensure that it contains the following items besides this User's Manual:

RTVGA-3106 Utility Diskettes

If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

NOTE: Make sure you keep all the packaging materials, in case you ever need to return the product for any reason.

SECTION 2
 CONFIGURATION OF RTVGA-3106

2.1 Hardware Configuration

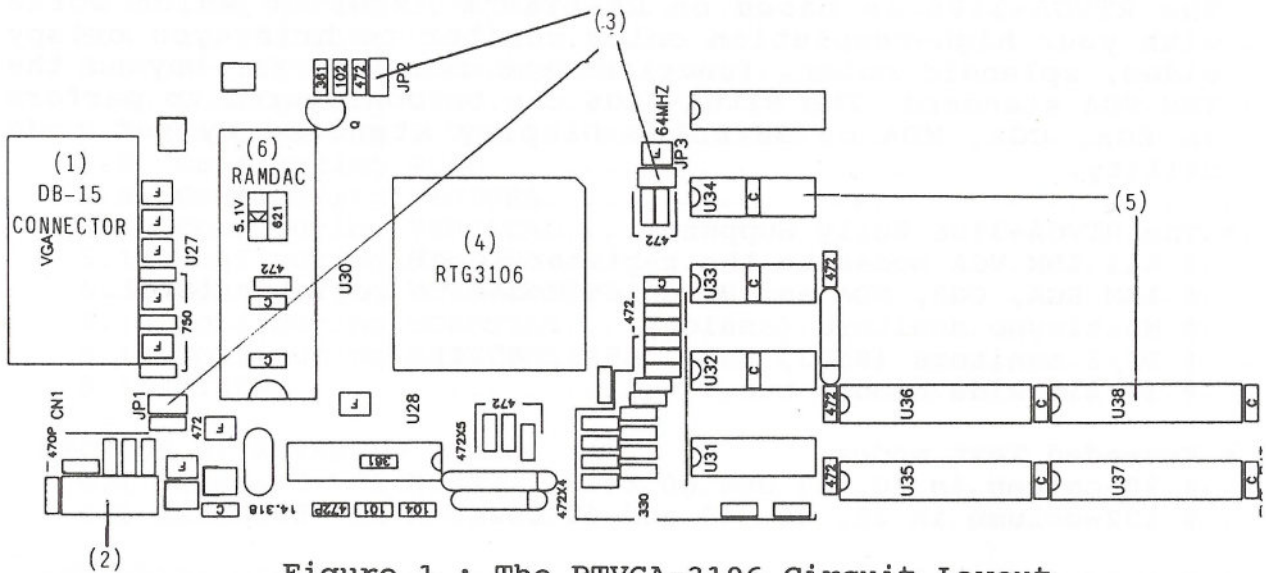


Figure 1 : The RTVGA-3106 Circuit Layout

Features in Figure 1 are as follows:

1. DB-15 connector: For analog monitors, use in Workstation Case
2. 10 Pin Header: For analog monitors, use in Standard Case. A cable is needed to connector the 10 pin header to a DB-15 connecntnr.
3. Jumpers JP1, JP2 and JP3.
4. RTG3106 Chip: VGA Graphics chip.
5. Video DRAM: 1M or 512K
6. Color Look-up Table (RAMDAC)

2.2 Jumper Setting

You can adapt the RTVGA-3106 for special hardware configurations using the two two-pin jumpers JP2 and JP3 on board. JP1 is not used.

Table 1: JP2 Setting for Interlaced/Non-interlaced

JP2	Off	: 1024x768 Interlaced Mode. (default)
	On	: 1024x768 Non-interlaced Mode.

Table 2: JP3 Setting for Enable/Disable RTVGA-3106

JP3	Off	: Disable RTVGA-3106
	On	: Enable RTVGA-3106

SECTION 3
INSTALLATION

3.1 Connecting the monitor

The RTVGA-3106 has an analog video connector. If you have IBM 8503, 8512, 8513, 8514, Multisync analog display or compatible, choose the 15-pin analog video connector and a 15-pin cable to connect your monitor to your system.

Table 3: Monitor and Connector Types

Monitor Type	Connector Type
8514	15-pin
8513	15-pin
8512	15-pin
8503	15-pin
Multisync Analog	15-pin

3.1.1 Cabling Your Monitor

When you connect your monitor to the RTVGA Graphics Adapter, be sure you have the right cable and connector for your monitor type. Fixed-frequency analog monitors such as the IBM 85xx or compatible come equipped with a 15-pin connector standard. For variable frequency analog monitors, you will need a 9-to-15-pin cable connector.

Once you've selected the proper cable and connectors, make sure you also set your monitor for the appropriate mode of operation.

3.1.2 Monitor Support for Enhanced VGA Modes

Your monitor must be capable of displaying the resolution and text mode you choose. Table 4 lists all VGA display modes available with the RTVGA-3106 and the monitors which support them.

Table 4: Display Modes and Supporting Monitors

Mode (hex)	Type Format	Alpha Size	Screen Size	Hsync (KHz)	Vsync (Hz)	8503	8512	8513	8514	Mutisync
0,1	text	40x25	320x200	31.5	70	Yes	Yes	Yes	Yes	Yes
2,3	text	80x25	640x200	31.5	70	Yes	Yes	Yes	Yes	Yes
0*,1*	text	40x25	320x350	31.5	70	Yes	Yes	Yes	Yes	Yes
2*,3*	text	80x25	640x350	31.5	70	Yes	Yes	Yes	Yes	Yes
0+,1+	text	40x25	360x400	31.5	70	Yes	Yes	Yes	Yes	Yes
2+,3+	text	80x25	720x400	31.5	70	Yes	Yes	Yes	Yes	Yes
4,5	graph	40x25	320x200	31.5	70	Yes	Yes	Yes	Yes	Yes

6	graph	80x25	640x200	31.5	70	Yes	Yes	Yes	Yes	Yes
7	text	80x25	720x350	31.5	70	Yes	Yes	Yes	Yes	Yes
7+	text	80x25	720x400	31.5	70	Yes	Yes	Yes	Yes	Yes
D	graph	40x25	320x200	31.5	70	Yes	Yes	Yes	Yes	Yes
E	graph	80x25	640x200	31.5	70	Yes	Yes	Yes	Yes	Yes
F	graph	80x25	640x350	31.5	70	Yes	Yes	Yes	Yes	Yes
10	graph	80x25	640x350	31.5	70	Yes	Yes	Yes	Yes	Yes
11	graph	80x30	640x480	31.5	60	Yes	Yes	Yes	Yes	Yes
12	graph	80x30	640x480	31.5	60	Yes	Yes	Yes	Yes	Yes
13	graph	40x25	320x200	31.5	70	Yes	Yes	Yes	Yes	Yes
18	text	80x30	720x480	31.5	60	Yes	Yes	Yes	Yes	Yes
19	text	80x43	720x473	31.5	70	Yes	Yes	Yes	Yes	Yes
1A	text	80x60	720x480	31.5	60	Yes	Yes	Yes	Yes	Yes
1B	text	132x25	1188x350	31.2	70	Yes	Yes	Yes	Yes	Yes
1C	text	132x30	1188x480	31.2	60	Yes	Yes	Yes	Yes	Yes
1D	text	132x43	1188x473	31.2	72	Yes	Yes	Yes	Yes	Yes
1E	text	132x60	1188x480	31.2	60	Yes	Yes	Yes	Yes	Yes
1F	graph	100x75	800x600	35.5	70	No	No	No	No	Yes
1FV	graph	100x75	800x600	48.0	70	No	No	No	No	Yes
20	graph	120x45	960x720	35.5	45/90	No	No	No	Yes	Yes
21	graph	128x48	1024x768	35.5	43/86	No	No	No	Yes	Yes
21NI	graph	128x48	1024x768	49.0	60	No	No	No	No	Yes
21V	graph	128x48	1024x768	56.5	70	No	No	No	No	Yes
22	graph	96x64	768x1024	38	35/70	No	No	No	No	No**
23	graph	128x48	1024x768	35.5	43/86	No	No	No	Yes	Yes
24	graph	64x32	512x512	35.5	60	Yes	Yes	Yes	Yes	Yes
25	graph	80x25	640x400	31.5	70	Yes	Yes	Yes	Yes	Yes
26	graph	80x30	640x480	31.5	60	Yes	Yes	Yes	Yes	Yes
27^	graph	100x75	800x600	32.5	51	No	No	No	No	Yes
27	graph	100x75	800x600	35.5	56	No	No	No	No	Yes
27V	graph	100x75	800x600	48.0	70	No	No	No	No	Yes
28	graph	128x48	1024x768	35.5	43/86	No	No	No	Yes	Yes
28NI	graph	128x48	1024x768	48.0	60	No	No	No	No	Yes
28V	graph	128x48	1024x768	56.5	70	No	No	No	No	Yes
29	graph	128x64	1024x1024	51.4	47/94	No	No	No	No	Yes
2A	graph	160x64	1280x1024	42.3	39/78	No	No	No	No	Yes
2AV	graph	160x64	1280x1024	48.0	45/90	No	No	No	No	Yes
38	graph	40x25	320x200	31.5	70	Yes	Yes	Yes	Yes	Yes
39	graph	64x32	512x512	35.5	60	Yes	Yes	Yes	Yes	Yes
3A	graph	80x25	640x400	31.5	70	Yes	Yes	Yes	Yes	Yes
3B	graph	80x30	640x480	31.5	60	Yes	Yes	Yes	Yes	Yes
3C	graph	100x75	800x600	36	57	No	No	No	No	Yes

Notes:

1. 8514, 8513, 8512, 8503 are IBM PS/2 monitors.
2. Multisync monitors support both Analog and TTL operations (i.e. NEC Multisync II or compatible)

3. ** Mode 22 support 768x1024 full page (portrait) display only.
4. Only mode 21 and 28 can be set for either interlaced or non-interlaced.
5. ^ Mode 27 800x600, 512K Only.
6. V = VESA Mode, only 800x600, 1024x768 & 1280x1024 support VESA Mode.

3.1.3 Monitor Support for Other Graphics Modes

The RTVGA has downward compatibility with EGA, CGA, MDA and Hercules modes on VGA monitors with the help of VMODE.EXE for those application softwares which programmed the CRTC registers by themselves.

See next section for detail description of VMODE.EXE.

SECTION 4 SOFTWARE UTILITIES

This section explains how to use the utility software on the RTVGA Utility Diskettes. The Utility Diskettes provide the following programs:

- . VMODE.EXE (Video MODE setting program)
- . High-resolution drivers for Microsoft Windows, GEM/3, Lotus/123, WordPerfect, Ventura Publisher, PCAD and other popular software programs (See next section for detail installation steps).
- . RTANSI.SYS (may be used to replace ANSI.SYS) to support extended text display for more than 25 rows.
- . RAM.COM (RAM BIOS Loader)
- . BIGSC.COM (fix the incorrectly screen for ET Chinese version 2.0 or above)

NOTE: We are continuing to update existing drivers and develop new drivers for popular software applications. Your RTVGA Utility Diskettes may have drivers not listed in the manual. All the README files contain a full listing of current drivers and detailed installation procedures, so make sure you check the INSTALL DRIVERS list in the install program before your installation.

By the first time, insert the RTVGA Utilities Diskette into your floppy disk drive and type
RTINST [ENTER],
choose "3. INSTALL DRIVERS", "RTVGA UTILITIES", press "G" to start and specify the path then the installation going on.

4.2 Video Modes Setting With VMODE.EXE

VMODE.EXE is a program designed to help you set a right video mode on a 31.5KHz direct-drive analog monitor. The supported video modes include Standard VGA, RTVGA extended, CGA, EGA, and MGA modes.

It is necessary to use VMODE to switching video modes among all PC video standards because in the CGA era so many game programs can only be loaded during the system boot up from their own diskettes and in EGA era some application softwares programmed CRTC's register by themselves, which targeted at an EGA monitor. Therefore, if you select the "Load Game" option in the CGA menu of VMODE, VMODE will reboot the system and lock RTVGA in CGA mode. For the other options, VMODE will set RTVGA to VGA mode if you reboot your system.

For EGA modes, VMODE provides two LOCKED MODE for most possible applications which directly programmed the CRTC registers by themselves. LOCKED MODE 1 is for those modes with 640x350 resolution (MODE 0*, 1*, F, and 10). LOCKED MODE 2 is for those modes with 640x200 resolution (MODE 2,3,6,E). Switching mode between these two set in an application software is not allowed because RTVGA's CRTC registers were locked. The solution for this problem is to get a EGA monitor and configure your RTVGA to an EGA adapter if applicable.

4.2.1 How To Use VMODE

You can run VMODE in either of two ways: by calling up the menu and selecting from the menu choices, or by entering the desired mode directly with a specific command line.

* How To Use The VMODE Menu

1. Change to the path where you install the RTVGA Utilities as in section 4.1 and type:

```
VMODE [Enter]
```

2. The VMODE menu will appear, displaying the available modes for your selection.

* How To Use VMODE Through Command Line

If you already know what mode you want to select and you do not want to use the VMODE menu, you can type:

```
VMODE mymode[Enter]
```

Table 5 shows the values you can enter for mymode in the command line.

Table 5: VMODE

Desired Mode/Feature	Command Line You Would Type
Help message	VMODE ?
Switch VGA modes	VMODE Vn n=0 to 2A(HEX)
Switch to EGA LOCK1 modes(640x350)	VMODE En n=2,3,F,10(HEX)
Switch to EGA LOCK2 modes(640x200)	VMODE Dn n=2,3,6,E(HEX)
switch to CGA modes	VMODE Cn n=0,1,2,3,4,5,6(HEX)

CGA for stand-alone game programs (those which have to boot from their own diskettes)	VMODE CGAGAME
MDA and Hercules monochrome	VMODE MGA
Call INT10 for setting video mode	VMODE n n=valid mode number (HEX)
Set RTVGA to 1024x768 Non-Interlaced	VMODE NI
Set RTVGA using high refresh rate	VMODE RR
Set RTVGA using standard VGA video timing	VMODE SVGA

4.2.2 Example: Switching to Hercules Mode With VMODE

1. Change to the path where the RTVGA Utilities have been installed as in section 4.1 and type:
VMODE [Enter]
2. Use the down arrow key on your keyboard's numeric keypad to move the highlighted bar to MGA and then use right arrow to move the highlighted bar to MDA(Hercules) and hit the [Enter].

You can also switch to Hercules mode directly at the DOS prompt, just type:

VMODE MGA [Enter]

4.3 Boosting system performance with RTVGA RAM BIOS

1. Change to the path where the RTVGA Utilities had been installed and type
COPY RAM.COM C:\ [Enter]
2. Insert the following line as the first line of your AUTOEXEC.BAT with a text editor,
RAM
and, reboot your system to activate RTVGA RAM Video BIOS.
3. Or activate RTVGA RAM Video BIOS at anytime, on Command line by type
RAM

4.4 Using RTANSI Standard Console Driver

If you don't have DOS 3.3 or later release, you may need to install the RTANSI.SYS as console driver for the Enhanced modes which are beyond 80x25 screen size, otherwise the screen may be incorrect.

1. Change to the path where the RTVGA Utilities had been installed and type
COPY RTANSI.SYS C:\ [Enter]
2. Insert the following line as the first line of your CONFIG.SYS file with a text editor.
DEVICE=RTANSI.SYS
3. Reboot your system to activate RTANSI.SYS

4.5 New program for CHINESE ET users:

If the version of your copy of ET was 2.0 or above, you need to run BIGSC before ET. BIGSC.COM can fix the incorrectly screen.

SECTION 5 SOFTWARE DRIVERS INSTALLATION

This section explains how to install the RTVGA drivers for a number of popular software applications.

NOTE: We are continuing to update existing drivers and develop new drivers for popular software applications. Your RTVGA Utility Diskettes may have drivers not listed in the manual. Please check the INSTALL DRIVERS list in the install program before your installation, and contact your dealer to further support.

5.1 Configuring AUTOCAD

5.1.1 AutoCAD v2.x/R9/R10

To successfully install an ADI driver for high resolution display on your AutoCAD, you'll need AutoCAD Release 9 or later.

- 1) Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "AutoCAD v2.x" or "AutoCAD R9/R10".
- 2) You will see some procedures and a list of the available ADI drivers. Table 6 shows the drivers and the enhanced display modes they support:

Table 6: ADI Drivers on the RTVGA Utility Diskette

ADI Ver.	Resolution	Driver Name	
ADI v2	800x600/16color	DS86.EXE	
ADI v3/v4	640x800/16color	RADI.EXE	
ADI v3/v4	800x600/16color	RADI.EXE	
ADI v3/v4	1024x768/16color	RADI.EXE	(required 512KB)
ADI v3/v4	640x400/256color	RADI.EXE	
ADI v3/v4	640x480/256color	RADI.EXE	(required 512KB)
ADI v3/v4	800x600/256color	RADI.EXE	(required 512KB)
ADI v3/v4	1024x768/256color	RADI.EXE	(required 1MB)
ADI v3/v4	1280x1024/16color	RADI.EXE	(required 1MB)
ADI v3/v4	1024x1024/256-color	RADI.EXE	(min. 1MB)

Note: ADI v2 support AutoCAD V2.x.
ADI v3 support AutoCAD R9, AutoShade v1.x.
ADI v4 support AutoCAD R10, AutoShade v1.x.

- 3) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
- 4) Change to your AutoCAD directory and type "RADI" to install driver or re-configure driver.
- 5) Enter the AutoCAD Main Menu by typing "ACAD"
- 6) For the first time after install the drivers, select option 5 from the AutoCAD Main Menu to configure AutoCAD.
 - In the Configuration Menu, select option 3 ("Configured Video Display").
 - Choose "ADI Display Vx" for your new video display. Eg. If the AutoCAD is release 10, select "ADI Display v4.x".
 - Press RETURN to set the default hexadecimal interrupt code to 7A(hex).
 - Follow the directions provided by the ACAD program to complete your AutoCAD configuration.
 - When you are done configuring AutoCAD, save your changes, then return to the Main Menu.
- 7) You can start using the new display driver with your AutoCAD program. Every time you reboot your system, you will need to reload the driver from you AutoCAD directory, just type:
 - RADI [Enter]

5.1.2 AUTOCAD R11

- 1) Insert the RTVGA Utility disk in Drive A and type:
 - A: [Enter]
 - RTINST [Enter]
 choose "3. INSTALL DRIVERS" and select "AutoCAD R11".
- 2) You will see some procedures and a list of the available ADI drivers as follows:
 - RTA41.EXP -- P386/ADI 4.1 driver without display list.
 - RTA41D.EXP -- P386/ADI 4.1 driver with display list.
 - RTA41DL.EXP -- P386/ADI 4.1 driver with display list, and protected mode linear address.

The RTVGA display modes:

```
-- 640x480 16-color
-- 800x600 16-color
-- 960x720 16-color (min. 512KB)
-- 1024x768 16-color (min. 512KB)
-- 768x1024 16-color (min. 512KB)
-- 512x512 256-color
-- 640x400 256-color
-- 640x480 256-color (min. 512KB)
-- 800x600 256-color (min. 512KB)
-- 1024x768 256-color (min. 1MB)
-- 1024x1024 256-color (min. 1MB)
-- 1280x1024 16-color (min. 1MB)
```

- 3) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
- 4) Use SET command at the DOS prompt, or your AUTOEXEC.BAT file:
SET DSPADI=RTA41 (or RTA41D, RTA41DL)
- 5) Enter the AutoCAD Main Menu by typing "ACAD"
- 6) For the first time after install the drivers, select option 5 from the AutoCAD Main Menu to configure AutoCAD.
 - In the Configuration Menu, select option 3 ("Configured Video Display").
 - Choose "ADI P386 v4.0/v4.1 display" for your new video display, or enter ADI driver, "RTA41", "RTA41D" or "RTA41DL".
 - Select display mode and others.
 - Follow the directions provided by the ACAD program to complete your AutoCAD configuration.
 - When you are done configuring AutoCAD, save your changes, then return to the Main Menu.
- 7) You can start using the new display driver with your AutoCAD program. Every time you reboot your system, you will need to set the variable if you don't set it in your AUTOEXEC.BAT by type:
SET DSPADI=RTA41 (or RTA41D, RTA41DL)

5.2 Configuring AutoShade

5.2.1 SHADE V1.x

- 1) Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "AutoShade 1.x".
- 2) You will see some procedures and a list of the available ADI drivers as follows:

ADI Ver.	Resolution	Driver Name	
ADI v2	800x600 /16color	DS86.EXE	
ADI v3/v4	640x480 /16color	RADI.EXE	
ADI v3/v4	800x600 /16color	" "	
ADI v3/v4	1024x768 /16color	" "	(min. 512KB)
ADI v3/v4	1280x1024/16-color	" "	(min. 1MB)
ADI v3/v4	640x400 /256color	" "	
ADI v3/v4	640x480 /256color	" "	(min. 512KB)
ADI v3/v4	800x600 /256color	" "	(min. 512KB)
ADI v3/v4	1024x768 /256-color	" "	(min. 1MB)
ADI v3/v4	1024x1024/256-color	" "	(min. 1MB)
ADI v3/v4	320x200 /64K-color	" "	(min. 512KB)
ADI v3/v4	512x512 /64K-color	" "	(min. 1MB)
ADI v3/v4	640x400 /64K-color	" "	(min. 1MB)
ADI v3/v4	640x480 /64K-color	" "	(min. 1MB)
ADI v3/v4	800x600 /64K-color	" "	(min. 1MB)

ADI v3/v4 supports SHADE v1.0 and above.

- 3) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
- 4) Change to SHADE directory and install driver, or reconfigure driver, by type "RADI".
- 5) Reconfigure AutoShade by
SHADE -r [Enter]
- 6) Select pointing device.

- 7) Select display device: (1)
 ==> Autodesk Device Interface display driver.
 Interrupt vector in hex (default = 07Ah): [Enter] (or 7Bh)
- 8) Select rendering display device: (1)
 Autodesk Device Interface rendering driver.
 Interrupt vector in hex (default = 07Ah): [Enter] (or 7Bh)
 Do the display and rendering devices share a single screen
 (default = NO): Yes [Enter]
 Does FILPSCREEN require a redraw(default = NO): [Enter]

NOTE:

- *. Every time you reboot your system,
 If need to reload the driver, from you SHADE directory
 just type:
 RADI [Enter]
- *. Check memory's configuration if run in high
 resolution modes.

5.2.2 SHADE V2.0

- 1) Insert the RTVGA Utility disk in Drive A and type:
 A: [Enter]
 RTINST [Enter]
 choose "3. INSTALL DRIVERS" and select "AutoShade 2.0".
- 2) You will see some procedures and a list of the available
 ADI drivers as follows:

 RTA41.EXP -- P386/ADI 4.1 driver without display list.
 RTA41D.EXP -- P386/ADI 4.1 driver with display list.
 RTA41DL.EXP -- P386/ADI 4.1 driver with display list, and
 protected mode linear address.
 The RTVGA display modes:
 -- 640x480 16-color
 -- 800x600 16-color
 -- 960x720 16-color (min. 512KB)
 -- 1024x768 16-color (min. 512KB)
 -- 768x1024 16-color (min. 512KB)
 -- 512x512 256-color
 -- 640x400 256-color
 -- 640x480 256-color (min. 512KB)
 -- 800x600 256-color (min. 512KB)
 -- 1024x768 256-color (min. 1MB)
 -- 1024x1024 256-color (min. 1MB)

```

-- 1280x1024 16-color (min. 1MB)
-- 320x200 64K-color (min. 512KB)
-- 512x512 64K-color (min. 1MB)
-- 640x400 64K-color (min. 1MB)
-- 640x480 64K-color (min. 1MB)
-- 800x600 64K-color (min. 1MB)

```

3) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.

4) Use SET command at the DOS prompt, or your AUTOEXEC.BAT file:

```

SET DSPADI=RTA41 (or RTA41D, RTA41DL)
SET RDPADI=RTA41 (or RTA41D, RTA41DL)

```

NOTE:

Check Shade 2.0 manuals for additional information to configure program for RTVGA new drivers.

5.3 Configuring 3D Studio

1) Insert the RTVGA Utility disk in Drive A and type:

A: [Enter]

RTINST [Enter]

choose "3. INSTALL DRIVERS" and select "AutoShade 2.0".

2) You will see some procedures and a list of the available ADI drivers as follows:

```

RTA41.EXP -- P386/ADI 4.1 driver without display list.
RTA41D.EXP -- P386/ADI 4.1 driver with display list.
RTA41DL.EXP -- P386/ADI 4.1 driver with display list, and
protected mode linear address.

```

The RTVGA display modes:

```
-- 640x480 16-color
-- 800x600 16-color
-- 960x720 16-color (min. 512KB)
-- 1024x768 16-color (min. 512KB)
-- 768x1024 16-color (min. 512KB)
-- 512x512 256-color
-- 640x400 256-color
-- 640x480 256-color (min. 512KB)
-- 800x600 256-color (min. 512KB)
-- 1024x768 256-color (min. 1MB)
-- 1024x1024 256-color (min. 1MB)
-- 1280x1024 16-color (min. 1MB)
-- 320x200 64K-color (min. 512KB)
-- 512x512 64K-color (min. 1MB)
-- 640x400 64K-color (min. 1MB)
-- 640x480 64K-color (min. 1MB)
-- 800x600 64K-color (min. 1MB)
```

3) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.

4) Use SET command at the DOS prompt, or your AUTOEXEC.BAT file:

```
SET RCPADI = (3D-Studio drive)\RTA41 (or RTA41D, RTA41DL)
```

NOTE:

Check 3D Studio manuals for additional information to configure program for RTVGA new drivers.

5.4 Configuring CADKEY

1. Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "CADKEY/3".
2. There are two drivers for CADKEY 3:
one (RC16.EXE) for 16-color modes, and
another (RC256.EXE) for 256-color modes.
3. Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
4. Run CONFIG program to reconfigure your program environment.
5. Load driver, by type RC16 or RC256 under DOS.
6. Start your main program. (\CKGR\CKGR)

5.5 Configuring FRAMEWORK

1. Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "Framework III v1.x".
2. You will see some procedures and a list of the available drivers.
3. Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
4. Run SETUPFW to configure your Framework III.
5. From the SETUP menu choose option 2, "All other users of the setup program."
6. If you are running Framework/III from a system with two floppy drivers, insert the Framework/III "SYSTEM DISK 2" into Drive B and select option 1; if you are running Framework/III from a single-floppy-drive system, insert the diskette into Drive A and select option 1; otherwise, choose option 2 if you are running Framework/III from your hard disk drive.
7. Select option 2 for CONFIGURATION.
8. Choose option 1 to select the PRIMARY HARDWARE configurations.
9. Enter number 1 to indicate that you want to select the Screen Driver, and 7 for "I want to enter my own driver file name." Then enter the name of the driver you want to use. Table 7 lists the available driver names:

Table 7: Framework/III Drivers

Screen Format	Zoom Screen	Driver Name
80Cx30R text	640Hx480V	RF180.SC
80Cx43R text	640Hx480V	RF190.SC
80Cx60R text	640Hx480V	RF1A0.SC
132Cx25R text	640Hx480V	RF1B0.SC
132Cx30R text	640Hx480V	RF1C0.SC
132Cx43R text	640Hx480V	RF1D0.SC
132Cx60R text	640Hx480V	RF1E0.SC

80Cx30R	text	800Hx600V	RF181.SC
80Cx43R	text	800Hx600V	RF191.SC
80Cx60R	text	800Hx600V	RF1A1.SC
132Cx25R	text	800Hx600V	RF1B1.SC
132Cx30R	text	800Hx600V	RF1C1.SC
132Cx43R	text	800Hx600V	RF1D1.SC
132Cx60R	text	800Hx600V	RF1E1.SC
640Hx480V	Graphics	640Hx480V	RF12.SC
800Hx600V	Graphics	800Hx600V	RF1F.SC

10. When you have entered the driver name, type "M" to return to the main menu.
11. From the Main Menu, type "7" to save all your settings.
12. You will be prompted to insert the "SETUP Disk" into Drive A. Do not insert the SETUP Disk; instead, please insert the RTVGA Utility Diskette, since your new drivers are located on the RTVGA Utility Diskette. Press the space bar when you have the RTVGA Utility Diskette in the floppy drive.
13. Save new configuration. Choose option "1" if you are running Framework from your floppy drive, or option "2" if you are using a hard disk drive. Strike any key to exit to DOS once you have made your choice.

Eg: Configuring for 132x60-column Display, to choose the driver for 132x60-column display for the screen format and 800x600 for the "zoom" function, type:
 RF1E1.SC [Enter]

5.6 Configuring GEM/3

1. Follow the installation procedure to install GEM/3 with one of the standard screen drivers (eg. VGA). Start the installation by inserting the GEM/3 System Master Disk into drive A and typing:
 A: <CR>
 GEMPREP <CR>

2. Create a GEM DRIVER PAK DISK. Using the DOS format utility, format a blank diskette by entering the command:
eg. `FORMAT b: /V`
and enter the label as:
`GEM DRIVRPK<CR>`

where b: is the drive letter. The format utility will prompt for a volume label by displaying:
Volume Label (11 characters, Enter for none?)

3. Insert the RTVGA Utility disk in Drive A and type:
`A: [Enter]`
`RTINST [Enter]`
choose "3. INSTALL DRIVERS" and select "GEM/3".
4. You will see some procedures and a list of the available drivers.
5. Press "G" to start and follow the instruction. After installation had completed, hit [ESC] until return to DOS prompt.
6. Now re-install GEM/3. Place the GEM/3 System Master Disk in drive A and type:
`A: <CR>`
`GEMSETUP<CR>` or `GEMPREP`

Follow the installation instructions to CHANGE EXISTING CONFIGURATION. When prompted for a screen driver choice, choose OTHER (DRIVER PACK).

When prompted to insert the driver pack disk into drive A, insert the newly created disk, and "CONTINUE"

"BUSY" message will be displayed on screen, then the list of drivers. Select the resolution you wish to install as:

- A. RTVGA 800x600/16 colors display
 - B. RTVGA 1024x768/4 colors display (min. 512KB)
 - C. RTVGA 1024x768/16 colors display (min. 512KB)
 - D. RTVGA 768x1024/16 colors display (min. 512KB)
 - E. RTVGA 1024x1024/16 colors display (Virtual-1, min. 512KB)
 - F. RTVGA 1024x1024/16 colors display (Virtual-2, min. 512KB)
 - G. RTVGA 1280x1024/16 colors display (min. 1MB)
- and complete the installation procedure.

Note: GEM DRIVRPK is required by GEM/3 SETUP program.

5.7 Configuring LOTUS 123 and SYMPHONY

To install the new extended display drivers for Lotus 123 and SYMPHONY, you'll need Lotus/123 Release 2, and SYMPHONY Release 1.1 .

1. Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "Lotus/123 R2.x".
2. You will see some procedures and a list of the available drivers.
3. Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
4. Enter your Lotus/123 directory and delete old SINGLE.LIB.
5. Type "Lotus" to open the Main Menu.
6. Select "Install" from the main menu.
7. Select "Advanced options" from the Install menu.
8. Select "Add new driver to library" from the Advanced Options menu.
9. Select "Modify current driver set" from the menu.
10. Select either TEXT or GRAPHICS display.
RTVGA (132x25) Rel.2 <-- TEXT
RTVGA (132x30) Rel.2 <-- TEXT
RTVGA (132x43) Rel.2 <-- TEXT
RTVGA (132x60) Rel.2 <-- TEXT

RTVGA (640x480/16) Rel.2 <-- GRAPHICS
RTVGA (800x600/16) Rel.2 <-- GRAPHICS
11. Return to the Lotus/123 main menu and choose "Save Changes" to record the changes you have made, then exit the Lotus/123 installation program.
12. Setup Lotus/SYMPHONY use same steps as above.

Note: DON'T forget to make sure UTIL.SET existed in your LOTUS directory.

5.8 Configuring PCAD

1. Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "PCAD/4" or "PCAD/4.5".
2. You will see some procedures and a list of the available drivers:

Ext-Graphics 16-color drivers:

```
. 800x600 : RP800.DRV
. 960x720 : RP960.DRV (required 512KB)
. 768x1024 : RP768.DRV (required 512KB)
. 1024x768 : RP1024.DRV (required 512KB)
. 1280x1024: RP1280.DRV (required 1MB)
```

3. Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
4. You can change the "display" line in the PCADDRV.SYS file to select a display driver.

For example, the following content of PCADDRV.SYS can be used to select 800x600 16-color driver:

```
DISPLAY          \PCAD\RP800.DRV
```

To compare the testing results, try to modify PCADDRV.SYS file into:

```
MOUSEGAIN    HIGH  1.2
ROUNDLINES   NO
TEXTSIZE     RELATIVE 1.0 1.0
```

```
SYSTEM       \PCAD\SIBMPC.DRV
INPUT        \PCAD\IMOUSYS.DRV
DISPLAY      \PCAD\DIBMVGA.DRV    <-----
```

5. If installed PCAD version 4.5, you have the following drivers:
. 800x600 : RP800.DRV
. 960x720 : RP960.DRV (required 512KB)
. 768x1024 : RP768.DRV (required 512KB)
. 1024x768 : RP1024.DRV (required 512KB)
. 1280x1024: RP1280.DRV (required 1MB)

The installation is same as verion 4.0.

5.9 Configuring VENTURA

To install new display drivers for Xerox Ventura Publisher, you will need Ventura Publisher release 2.0.

1. Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "Ventura Publisher/2".
2. You will see some procedures and a list of the available drivers.
3. Press "G" to start and follow the instruction. After installation had completed, hit [ESC] until return to DOS prompt.
4. Insert the RTVGA Utility Diskette into Drive A and type:
VPDRV2_0 [Enter]
5. Select desired display mode as:
 - A. RTVGA 800x600/16 colors display
 - B. RTVGA 1024x768/4 colors display
 - C. RTVGA 1024x768/16 colors display (min. 512KB)
 - D. RTVGA 768x1024/16 colors display (min. 512KB)
 - E. RTVGA 1024x1024/16 colors display (Virtual-1, min. 512KB)
 - F. RTVGA 1024x1024/16 colors display (Virtual-2, min. 512KB)
 - G. RTVGA 1280x1024/16 colors display (min. 1MB)
6. Follow the instructions on the screen and respond to the remaining questions to complete the installation.

If you want to reconfigure for a different display mode, you will need to repeat installation procedure 4-6.

5.10 Configuring VERSACAD

1. Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "VersaCAD v5.x".

2. There are two drivers for VersaCad Version 5.x:

```
RV16.COM for 16-color modes, and
-- 800x600 16-color
-- 1024x768 16-color (min. 512KB)
-- 1280x1024 16-color (min. 1MB)
RV256.COM for 256-color modes.
-- 512x512/256-color
-- 640x400/256-color
-- 640x480/256-color (min. 512KB)
-- 800x600/256-color (min. 512KB)
-- 1024x768/256-color (min. 1MB)
-- 1024x1024/256-color (min. 1MB)
```

3. Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
4. You must run ENVIRO.EXE to select the correct display mode you want.
5. Run ENVIRO first
 - 1) Press N (next) until Screen device menu appears.
 - 2) Press S to select the driver you want.
Note: Do NOT select dual,
if you have no dual screen configuration.
 - 3) Type X to exit.
6. Because of aspect ratio, some 256-color mode does not show good effect. Look at RV1M.CFG file with ..PARAMS: line. You may change the aspect ratio at the number followed for your monitor.

5.11 Configuring MS WINDOWS 3.x

1. Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "WINDOWS/3.x".

2. You will see some procedures and a list of available drivers:

- 640x480/16 colors
- 800x600/16 colors
- 1024x768/16 colors (min. 512KB)
- 640x480/256 colors (min. 512KB)
- 800x600/256 colors (min. 512KB)
- 1024x768/256 colors (min. 1MB)
- 1284x1024/16 colors (min. 1MB)
- 512x512/64K colors (min. 1MB)
- 640x400/64K colors (min. 1MB)
- 640x480/64K colors (min. 1MB)
- 800x600/64K colors (min. 1MB)

3. Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
4. Run SETUP program of windows/3.0.
5. Move the highlight to Display by press the UP arrow key, then ENTER.
6. Select Others then ENTER.
7. Give the path where the drivers had installed.
8. Pick up one desired resolution display driver, then ENTER.
9. Follow the instruction on screen to finish windows setup.

5.12 Configuring WordPerfect

5.12.1. Configure WordPerfect/4.2 for extended text display:

- 1) Run the VMODE.EXE program to select the extended text mode you want to use (i.e. 132 or 80 columns by 25, 30, 43 or 60 rows).
- 2) Enter the WordPerfect Setup menu. To do so, go to the directory where you have stored WordPerfect (for insert the WordPerfect program diskette into Drive A if you are using a floppy system) and type:
WP/S [Enter]

- 4) Enter the values for column and row to match the values you selected with the VMODE.EXE program.
- 5) Choose option 0 to accept the new configuration and enter WordPerfect.

NOTE: Remember, when you exit from WordPerfect, type the command line "VMODE V3 [Enter]" to return to standard 80x25 VGA text display.

Every time you run WordPerfect, you will need to type "VMODE" and select options that matches the columns and rows that you had set in your WordPerfect setup (WP/S) previously.

Once you have configured WordPerfect, you need not repeat steps 1 through 5 unless you want to change to a different display mode.

5.12.2. Configure WordPerfect/5.0 for extended graphic display:

- 1) Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "WordPerfect/5.0".
- 2) You will see some procedures and a list of available drivers:
RTVGA 4 colors (1024x768)
RTVGA 16 colors (640x480)
(800x600)
(768x1024, min. 512KB)
(1024x768, min. 512KB)
(1280x1024, min. 1MB)
- 3) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
- 4) Start WordPerfect program, by WP.
- 5) Setup new display, by SHIFT-F1.
- 6) Select (2) Display.
- 7) Select (5) Graphics Screen Type
- 8) Save new configuration.

5.13 Configuring WORDSTAR

5.13.1. Install the WordStar Release 3:

- 1) Make sure file called "DEBUG.COM" or "DEBUG.EXE" exist.
(Check your DOS system disk).
- 2) Make a copy of the WS.COM file from your WordStar diskette or the WordStar directory on your hard drive, and give the new file the name WS132.COM. Either insert your WordStar diskette into Drive A, or enter your WordStar directory on your hard disk drive and type:
COPY WS.COM WS132.COM [Enter]
- 3) Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "WordStar".
- 4) You will see some procedures.
- 5) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
- 6) If you are not already in your WordStar directory, enter that directory. To modify WordStar to work with 132x25 text mode, type:
MAKEWS 13225 WS132.COM [Enter]
- 7) Run VMODE.EXE to select the video mode you want to display. (For this example, you would select 132x25 mode)
- 8) Go to your WordStar directory and run WordStar Release 3 by typing:
WS132 [Enter]

5.13.2. Install the WordStar Release 4:

- 1) Go to your WordStar Professional Release 4 directory and start WordStar's installation program by typing:
WSCHANGE
- 2) Type "WS.EXE" as the filename of your WS program file, and type "WS132.EXE" as the filename for new changes.
- 3) Select option A for "Console options".

- 4) Select option A for "Monitor options".
- 5) Choose option C for "Screen Sizing".
- 6) Choose option A for "Height" at the Screen Sizing Menu, then enter the desired value for the screen format (i.e. 25, 30, 43 or 60).
- 7) Choose option B for "width" at the Screen Sizing Menu and enter the value 132 or 80 for the screen size.
- 8) Once you have selected the screen format, return to the Main Installation Menu by typing a series of X's.
- 9) Run VMODE.EXE to select the extended video mode (make sure the values you select are the same as those you selected previously in the WordStar configuration).
- 10) Start WordStar Release 4 by typing: WS132.

You won't need to repeat this installation procedure unless you want to configure WordStar Release 4 for a different display mode.

Note:

Follow the rest steps when you run WordStar each time:

- 1) Run VMODE.EXE to set the desired mode. (See Section 4.2)
- 2) Type "WS" or "WS132" to start WordStar.
- 3) When you exit WordStar, type "VMODE V3" to return standard VGA display mode.

5.14 Configuring EASYCAD2:

- 1) Insert the RTVGA Utility disk in Drive A and type:
A: [Enter]
RTINST [Enter]
choose "3. INSTALL DRIVERS" and select "EASYCAD/2".
- 2) You will see some procedures and a list of available drivers:
DSRT800.BIN - RTVGA 800x600/16 colors
DSRT960.BIN - RTVGA 960x720/16 colors with 512KB
DSRT1024.BIN - RTVGA 1024x768/16 colors with 512KB
DSRT768.BIN - RTVGA 768x1024/16 colors with 512KB
DSRT1280.BIN - RTVGA 1280x1024/16 colors with 1MB

- 3) Press "G" to start and specify the path. After installation had completed, hit [ESC] until return to DOS prompt.
- 4) Run INSTALL.EXE to reconfigure program environment, select RTVGA new display driver.
- 5) Start EASYCAD main program.

NOTE:

For convenience, RTINST will insert the essential information into INSTALL.DAT at EasyCad directory directly, and backup the previous file as an .OLD file like:
INSTALL.INF. to be INSTALL.OLD

5.15 OTHERS:

If your favorite applications are not showed up here, you may

- 1) Check if the application program allows you to re-configure new display format, such as WordStar 4, ..., etc.
- 2) Call the software publisher and ask for new driver(s) to support RTVGA series SUPER VGA(s).

SECTION 6
ADVANCED TOPICS

This section covers information intended for users familiar with assembly language programming. The RTVGA standard supports a variety of video modes, accessible through a video BIOS call from assembly language or other higher-level programming languages. This section will help you, the programmer, maximize the performance of your RTVGA-3106 by accessing its enhanced display modes.

When you start up in DOS, the screen display defaults to the standard 80 column text or "alpha-numeric" mode. This will be mode 3+ on a color system, or mode 7+ on a monochrome

Table 8 on the following page lists the standard VGA video modes available with RTVGA-3106.

Table 8 Standard VGA modes

Mode (hex)	T/G	Color	box Size	Alpha Size	Screen Size	Buffer Start	Pg	Hsync (KHz)	Vsync (Hz)	Crystal (MHz)	RAM (KB)
0,1	A/N	16	8x8	40x25	320x200	B8000	8	31.5	70	25.175	256
2,3	A/N	16	8x8	80x25	640x200	B8000	8	31.5	70	25.175	256
0*,1*	A/N	16	8x14	40x25	320x350	B8000	8	31.5	70	25.175	256
2*,3*	A/N	16	8x14	80x25	640x350	B8000	8	31.5	70	25.175	256
0+,1+	A/N	16	9x16	40x25	360x400	B8000	8	31.5	70	28.322	256
2+,3+	A/N	16	9x16	80x25	720x400	B8000	8	31.5	70	28.322	256
4,5	APA	4	8x8	40x25	320x200	B8000	1	31.5	70	25.175	256
6	APA	2	8x8	80x25	640x200	B8000	1	31.5	70	25.175	256
7	A/N	-	9x14	80x25	720x350	B0000	8	31.5	70	28.322	256
7+	A/N	-	9x16	80x25	720x400	B0000	8	31.5	70	28.322	256
D	APA	16	8x8	40x25	320x200	A0000	8	31.5	70	25.175	256
E	APA	16	8x8	80x25	640x200	A0000	4	31.5	70	25.175	256
F	APA	-	8x14	80x25	640x350	A0000	2	31.5	70	25.175	256
10	APA	16	8x14	80x25	640x350	A0000	2	31.5	70	25.175	256
11	APA	2	8x16	80x30	640x480	A0000	1	31.5	60	25.175	256
12	APA	16	8x16	80x30	640x480	A0000	1	31.5	60	25.175	256
13	APA	256	8x8	40x25	320x200	A0000	1	31.5	70	25.175	256

NOTE:

* : EGA text modes with 8x14 and 9x14 character sizes and 350 lines vertical resolutions.

+ : VGA text modes with 9x16 character size and 400 lines vertical resolution.

Default display modes are 3+ for color system and 7+ for mono systems with analog monitors.

6.2 Extended VGA Modes

The RTVGA-3106 supports nineteen enhanced modes, in addition to the standard VGA modes. Table 9 summarizes the sixteen new display modes.

Table 9 Extended VGA Modes

Mode (hex)	T/G	Color	box Size	Alpha Size	Screen Size	Buffer Start	Pg	Hsync (KHz)	Vsync (Hz)	Crystal (MHz)	RAM (KB)
18	A/N	16	9x16	80x30	720x480	A0000	1	31.5	60	28.322	512
19	A/N	16	9x8	80x43	720x473	A0000	1	31.5	70	28.322	512
1A	A/N	16	9x8	80x60	720x480	A0000	1	31.5	60	28.322	512
1B	A/N	16	9x16	132x25	1188x350	A0000	1	31.2	70	40.0	512
1C	A/N	16	9x16	132x30	1188x480	A0000	1	31.2	60	40.0	512
1D	A/N	16	9x8	132x43	1188x473	A0000	1	31.2	70	40.0	512
1E	A/N	16	9x8	132x60	1188x480	A0000	1	31.2	60	40.0	512
1F	APA	16	8X8	100x75	800x600	A0000	1	35.5	57	36	512
1F V	APA	16	8X8	100x75	800x600	A0000	1	48.0	70	50.35	512
20	APA	16	8X16	120x45	960x720	A0000	1	35.5	43/43	44.9	512
21	APA	16	8X16	128x48	1024x768	A0000	1	35.5	43/43	44.9	512
21 NI	APA	16	8X16	128x48	1024x768	A0000	1	48.5	60	65	512
21 V	APA	16	8X16	128x48	1024x768	A0000	1	56.5	70	75	512
22	APA	16	8X16	96x64	768x1024	A0000	1	38	35/35	44.9	512
23	APA	4	8X16	128x48	1024x768	A0000	1	35.5	43/43	44.9	512
24	APA	256	8X16	64x32	512x512	A0000	1	35.5	62	50.35	512
25	APA	256	8X14	80x25	640x400	A0000	1	31.5	70	50.35	512
26	APA	256	8X16	800x30	640x480	A0000	1	31.5	60	50.35	512
27	APA	256	8X8	100x75	800x600	A0000	1	32.5	51	65	512
27 @	APA	256	8x8	100x75	800x600	A0000	1	35.5	57	36	1024
27 V	APA	256	8x8	100x75	800x600	A0000	1	48.0	70	50.35	1024
28	APA	256	8x16	128x48	1024x768	A0000	1	35.5	43/43	44.9	1024
28 NI	APA	256	8x16	128x48	1024x768	A0000	1	48.5	60	65	1024
28 V	APA	256	8x16	128x48	1024x768	A0000	1	56.5	70	75	1024
29	APA	256	8x16	128x64	1024x1024	A0000	1	51.4	47/47	65	1024
2A	APA	256	8x16	160x64	1280x1024	A0000	1	42.3	39/39	65	1024
2A V	APA	256	8x16	160x64	1280x1024	A0000	1	48.8	45/45	75	1024
38	APA	64K	8x8	80x25	320x200	A0000	1	31.5	70	50.35	1024
39	APA	64K	8x16	64x32	512x512	A0000	1	35.5	60	50.35	1024
3A	APA	64K	8x14	80x25	640x400	A0000	1	31.5	70	50.35	1024
3B	APA	64K	8x16	80x30	640x480	A0000	1	31.5	60	50.35	1024
3C	APA	64K	8x8	100x75	800x600	A0000	1	36.0	57	72	1024

Note:

1. @ = need to have ONE Mega bytes memory on board.
2. NI = Non-interlace mode.
3. V = VESA Mode.

Appendix A
Pin Out and Sync Frequencies

A.1 Analog Color Display Pin outs

Table A1 shows the RTVGA Graphics Adapter analog color display pinouts.

Table A1 Analog Color Display Pinouts

Pin	Function
1	Red Video
2	Green Video
3	Blue Video
4	Not Used
5	Ground
6	Red Return (ground)
7	Green Return (ground)
8	Blue Return (ground)
9	Key (no pin)
10	Sync Return (ground)
11	Not Used
12	Not Used
13	Horizontal Sync
14	Vertical Sync
15	Not Used

NOTE: Analog monochrome type monitors use Green Video for all video input and ignore Red Video and Blue Video.

A.2 Sync Signals for PS/2 Monitors

Table A2 Sync Signals for PS/2 Monitors

Vert. Res.	Hori. Freq.	Polarity	Vert. Sync Freq.	Polarity
350 lines	31.47 KHz	+	70.08 Hz	-
400 lines	31.47 KHz	-	70.08 Hz	+
480 lines	31.47 KHz	-	59.94 Hz	-

