HIPPO V-LPX
4 8 6
System Manual

The material in this manual is for information only and is subject to change without notice.

REVISION: 1.0

RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference with radio and television reception.

If this equipment does cause interference to radio or TV 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 the receiving antenna.
*	Relocate the computer away from the receiver.
*	Move the computer away from the receiver.
*	Plug the computer into a different outlet so that computer and receiver are on different branch circuits.
*	Ensure that card slot covers are in place when no card is installed.
*	Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
*	If peripherals are used with this system, it is suggested to use shielded, grounded cables, with in-line filters if necessary.

If necessary, the user should consult the dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

Note

*1.		Electronic components are sensitive to dust and dirt. Do inspect and clean the computer system regularly.*

*2.		Turn off the power whenever you install or remove any connector, memory module and add-on card. Before turning on the power, make sure that all the connectors, memory modules and add-on cards are secured.*

*3.		After power is on, wait for a minute. The system BIOS are going through a self-test during this period and nothing is shown on the screen. After the self-test, the system BIOS will initialize the display adaptor and show messages.*

*4.		The SIMM sockets are fragile device. Do not force the SIMM modules into the sockets. It may break the locking latches.*

Preface

The manual provides information about the installation and maintenance of the HIPPO V-LPX motherboard. In-depth explanations of the functions of this motherboard are provided. In the appendix, the system BIOS setup is explained.

The content in this manual is only for reference and is intended to provide the basic information for the general users. There are also technical information for hardware and software engineers.

In this manual, there are five Chapters. Chapter 1 contains a brief introduction and specification of HIPPO V-LPX motherboard. In the Chapter 2, the functions of the HIPPO V-LPX are explained. It also outlines many advanced features of the CPU and the system architecture. Chapter 3 explains the installation of various options such OverDrive processor, DRAM module, on board local bus VGA and jumpers settings. Technical information is provided in the Chapter 4. Chapter 5 explain the software utility for the on board local bus VGA.

Information in Appendix A and B are for maintenance purpose.

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Chapter 1
Introduction

Congratulation to you. You have SL-250 just purchased the most powerful and innovative 486 system.

The motherboard in SL-250 you purchased belong to a series of 486 local bus motherboard, HIPPO V-LPX which supporting all portfoliation of 486 microprocessors, 486SX, 486DX and 486DX2. The PQFP 486SX model comes with a OverDrive socket to allow upgrading its CPU with an 487SX or OverDrive processors. In the other word, the OverDrive socket allow users to increase the processing power of the motherboard by simply installing a faster processor. This prevent the HIPPO V-LPX motherboard easily becoming outdated by the ever increasing demand on the processing by the advanced software and thus effectively prolonged the life time of the motherboard.

The 486 microprocessor is the most powerful Intel x86 micro-processor. It provides enough raw processing power for the most advanced software and operating system available today and in the future. Operating system such as UNIX and WINDOWS demands the 486 power so as to operate at tolerable speed.

Every HIPPO V-LPX comes with a VGA port, which is hooked to 486 local bus to communicate a CPU full speed instead of the tradition 8 MHZ AT bus speed. The high performance VGA means HIPPO V-LPX the perfect choice for today GUI oriented software such as WINDOWS and CAD/CAM applications.

HIPPO V-LPX has an carefully architectured 4 level deep write buffer in its core logic. Internal to 486 is 8 KB 4 way set associative cache. When this cache is enabled. Typically, 75 to 80 percent of memory access are writes. It is more important to improve 486 write

performance with a good write buffer than to improve the 486 read performance by an expensive large external cache. As a matter of fact, although the HIPPO V-LPX has no external cache, it outperform a 486 motherboard with a trivial large external cache in many occasions.

Fast A20 and fast reset generations are incorporated to improve the performance of advanced operating system and expanded memory managers.

Compatibility and reliability are important issues. Expansion slot is compatible to standard AT bus and any peripheral may be used. On board POWER GOOD generator is essential to ensure the reliability of the system and is well-designed to work with all power supplies.

Chapter 2
General Features

SPECIFICATIONS

Processor :

- INTEL 486 processor (SX, DX or DX2 depends on model)
- Socket for OverDrive processor (only in PQFP 486SX model)

Cache :

- 8 KB four way set associative internal cache

Memory :

- 4 level deep intelligent write buffer (Dynamic Cache Architecture).
- 8 SIMM socket for 256 KB, 1 MB, 4 MB or 16 MB DRAM module
- Support 60 and 70 ns fast page mode DRAM
- Maximum of 32 MB DRAM (128 MB with 16 M SIMM) on board
- Page mode and hidden refresh
- Shadow RAM for system and video BIOS

GENERAL FEATURES

Slot :

-   1 x 120 Expansion I/O Slot (AT Compatible)

System Support Functions :

-   Real time clock
-   7 DMA channels
-   Fast A20 gate and fast reset

VGA :

-   High performance on board local Bus VGA
-   Resolution upto 1024x768 non-interlaced 256
Color
-   256KB, 512KB or 1MB display memory
-   Hardware raster operations, destination
alignment, color expansion, and cursor
-   CPU and CRTC FIFO, and prefetch guene
-   Drivers support for popular software - Windows,
LOTUS, WordPerfect, AutoCAD, OS/2, etc

On Board Peripherals :

-   Support upto two IDE Drive through a 2x20
jumper header
-   Support upto two 5¼" or 3½" Floppy Drive
through a 2x14 jumper header
-   One address selectable Parallel Port using a DB25
connector

- Two address selectable Serial Ports using two DB9 connector
- Support one PS/2 Mouse Connector

Other Features :

- 4 layer
- On board POWER GOOD generation
- Hardware Turbo switch
- Hardware Reset switch

GENERAL FEATURES

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486 MICROPROCESSOR

Nowadays, 486 represents a family of microprocessor. It consists of 486SX, 486DX and 486DX2. Furthermore, 486 core Over-Drive processor is also available.

486SX is an entry level 486 microprocessor. It differs from a 486DX by lacking the numeric processing unit. 486SX motherboard perform numerical processing either with software emulation or with a yet to be installed 487SX or OverDrive processor.

486DX2 is the highest performance and newest model in the 486 family. It has all the functional unit of a 486DX microprocessor. However, it operates twice as fast as a 486DX at the same system operating frequency because it's internal operating speed is boosted to the double of external speed with a on chip phase lock loop or so called the clock doubling technology.

Until the real arrival of next generation Intel P5 micro-processor, the 486 microprocessor is still the state-of-art microprocessor which merges many innovative features on a single chip for advanced applications and operating systems. Fabricating with the 0.8 um process, this CPU consists of more than one million transistors. It is still the highest integrated commercially available CISC microprocessor.

80486 is a 32-bit microprocessor with 32-bit external data bus and 32-bit external address bus. It not only contain a central processing unit, but also integrates a numeric processor and a four-way set associate cache memory. It is fully binary compatible with 80386 and 80387. All existing software for PC XT/AT can be used on HIPPO V-LPX. However, due to the new internal architecture, the performance of 80486 is two or four times of 80386.

The overall performance of computer system can be improved by cache memory. Nevertheless, if the cache memory is separated from CPU, CPU still needs to fetch code and data through external bus. That means the data transfer rate should not be too fast so that the external device are able to keep pace with the CPU. In 80486, the cache controller and cache memory are integrated into the chip. Most of the operations can be carried out inside the CPU, which reduces the bus operations on external data and address bus and thus speeds up the internal execution.

The internal cache memory is a 8K bytes, 16 bytes line size, four-way set associative configuration. The hit rate of this configuration in a multitasking and multi-processor environment is much higher than direct mapped or two-way set associative external cache.

Bus snooping feature keeps the cache memory consistent with the main memory. When an external processor overwrites the content in main memory, the corresponding data in the internal cache memory will be invalidated and will be fetched from main memory when CPU reads this data.

When a read miss occurs, the CPU will initiate a burst mode read operation. In this operation, CPU performs four successive read operations each of which takes only one cycle. Total 128 bits data are fetched into the CPU's internal cache. Since burst mode read operation is very fast, the traffic of the CPU bus is greatly reduced and the bus is available to other bus masters,

such as DMA controller.

Reading 128 bits data into CPU will take some times. In order to reduce the delay, the internal cache controller works parallel with CPU. It fetches the data needed by CPU for the present operation and the CPU read cycle is terminated. Then the other data are read into the internal cache memory while CPU is doing something else. This arrangement permits the CPU to run at zero wait state.

By eliminating the access to external bus, operations with the internal cache can be completed in a single cycle. 80386 at least needs two cycles for an operation. To further increase the rate of data transfer inside the CPU, the internal bus of the cache memory is increased to 128 bits, which is four times of the external bus. Since, in most of the time, the CPU is using the internal cache, the large bus size substantially improves the overall performance.

When the CPU writes data to the main memory, the data is first stored in a write buffer. There are four write buffers. When the external bus is idle, data will be sent to main memory. If all buffers are filled, it can start write operation in burst mode. Since the internal cache is updated immediately, the CPU need not suspend its operation and there is no need to wait or the external device to update the main memory.

Many often used instructions are executed in a clock cycle and some instructions are modified to take fewer cycles than in 80386. On the contrary, 80386 may take two to three more cycles for the same instruction. The CPU contains an advanced instruction pipeline structure and a 32-byte code queue to speed up the execution.

80486 includes all the functions of 80386 and is able to support sophisticated software and operation systems which are widely employed now. It is able to operate in real mode, protected mode and virtual 8086 mode.

Internal memory management unit provides a flexible addressing scheme for the next generation operation system. Multitasking, concurrent operation and manipulating huge data base can be accomplished with excellent performance. Paging mechanism is employed to allow powerful operating system to implement virtual memory. Each segment is divided into several pages which are 4K bytes per page. Page mechanism is transparent to software and allows software to address 64 terabytes.

Furthermore, the 64KB segment boundary which is an barrier of 8088 and 80286 is removed and the segment length can be increased up to 4GB.

The demand for sophisticated, number-crunching scientific and business applications has rapidly increased in recent years. In the past, microprocessor features an integer Arithmetic Logic Unit which only handles simple integer operations such as addition and multiplication. Floating point operations which are actually utilized by applications must be accomplished through software routines.

To meet the demand of floating-point calculation, a numeric coprocessor is necessary. However, an external coprocessor has been found to the bottleneck of data transfer. 80486DX, 80486DX2 and OverDrive processor integrates the coprocessor on chip and thus the data transfer to external bus is eliminated. The coprocessor is compatible with 80387. It works parallel with other units in the CPU, which results in a better performance of numeric processing.

OverDrive Socket

The 169/238 (depends on version) pin PGA socket at the left bottom corner is a OverDrive socket. OverDrive processor installed into the socket disable the 486SX CPU and take its place to control the motherboard. Over-Drive processor is basically a full function 486 CPU with numerical processing unit. Except for 487SX, OverDrive processor has more processing power by doubling its internal clock. On the other world, a motherboard installed with a 25 MHZ OverDrive processor becomes running at 50 MHZ and having processing power resembling a true 50 MHZ 486DX motherboard. OverDrive processor supported by a 238 pin OverDrive Socket also enhance their internal cache structure, integer unit design to further enhance its raw processing power.

HIPPO V-LPX allow installed of an OverDrive processor operating at different frequency with its main CPU. For example, a 33 MHZ OverDrive processor is allowed to installed onto a 25 MHZ 486SX HIPPO V-LPX to convert it to a 66 MHZ motherboard. Or, a 25 MHZ OverDrive processor is allowed to installed onto a 33 MHZ 486SX HIPPO V-LPX to convert it to a 50 MHZ motherboard. Please refer to Chapter 3 to installation an OverDrive processor.

OverDrive Socket prolong the life time of a motherboard. As more and more advanced software emerge, more and more processing power is demanded. In order to run advanced software, people used to upgrade the whole system to improve processing power. Over-Drive socket prevent your motherboard become outdated by future processing power demanding software such as WINDOW NT. Simply select a suitable OverDrive processor available today and future to match with your software needs.

Note :   OverDrive socket only comes with motherboard with PQPF 486SX CPU.

DYNAMIC CACHE ARCHITECTURE

HIPPO V-LPX is being deliberately architectured to include a so calledd Dynamic Cache Architecture (DCA). It is designed to match or exceeds the performance of 486 motherboard having a conventional cache. The motherboard is optimised to improve 486 local bus's performance factors. It is a motherboard with cache performance at a non-cache price.

Following details the key architectural features of a DCA.

Write performance of HIPPO V-LPX is enhanced with a 4 level deep write buffers. With the write buffers, up to 4 consecutive 486 write can be completed in zero wait state. 486 is allowed to continue execution out of its internal cache while the write buffer is unloading the previous write data to DRAM at lower speed.

Further, HIPPO V-LPX's write buffer is 32 bit width. It is able to assembly data byte by byte. If 486 write data that is already in the buffer, the write will be directed to the buffer instead of DRAM. This feature help improve the 16 bit DOS software performance.

The HIPPO V-LPX write buffer is designed not to slow down 486 accessing external world when it is busy unloading data. Any 486 read will be processed before any write unload. And the write buffer is able to respond from its buffers to a write buffer read hit. If only a part of the data requested is presented in the write buffer, the reminder is fetched from the DRAM before further write buffer unload.

486 comes with an internal write through cache. So, 486 find most of its read data reside in its internal cache. It usually need to go outside the chip for write data. Thus, it is the excellent write buffer architecture that help most in boost HIPPO V-LPX's performance.

DRAM SYSTEM

The HIPPO V-LPX 486 motherboard can be installed with two banks of DRAM in its 8 SIMM sockets. The board support up to eight 256 KB, 1 MB, 4 MB or 16 MB SIMM module giving total DRAM size upto 128 MB. The DRAM may be 60 or 80 ns fast-page mode.

The DRAM subsystem provides a flexible memory configuration. Several combinations of DRAM type are allowed. The DRAM type and the memory size are automatically detected by the system BIOS. So, you may easily change the configuration of the system.

The DRAM controller supports page mode. The DRAM is divided into pages with equal size. Successive DRAM accesses within the same page need not require wait state. Furthermore, a burst line fill mode is implemented. In case of a read miss occurred in cache memory, 16 bytes data will be fetched from DRAM to the cache. The page mode operation can speed up the line fill operation. To enhance the system performance, shadow RAM is also supported. By shadow RAM, it means system BIOS and video BIOS contained in low speed EPROM are copied into DRAM. Improvement is significant because access to DRAM is much faster than EPROM. The HIPPO V-LPX motherboard is able to copy the BIOS onto its cache memory to further improve the performance.

The DRAM refresh logic is redesigned to improve the overall system performance and power consumption. In the original PC/AT design, the DRAM refresh operation will suspend the CPU operation because it has to access the DRAM. In high speed system like HIPPO V-LPX motherboard, the CPU indeed can process a large amount of data during the DRAM refresh period.

By implementing hidden refresh, the refresh operations for expansion card on the AT slot and for the DRAM are separated. To be compatible with AT bus add on card, the refresh operation for AT bus is same as that found in the original PC/AT. But the refresh operation for the DRAM will be carried out individually and will be done when there is no access to the DRAM.

Local Bus VGA

The on board VGA attains a significant performance increase over standard super VGA controllers. This is possible by relocating the VGA controllers from the standard 8 MHZ 16 bit ISA bus to the 25/33 MHZ 32 bit 486 local bus and run at the CPU's clock speeds. The relocation means 6 to 8 times increase in the speed of moving data between CPU and the display memory.

Without the I/O bottleneck, 486 CPU's full performance is made available to support high performance super-VGA graphics with little difficulty. In some new PC system, display bottleneck is avoided by including a graphics coprocessor or accelerator in the super VGA card. To get rid of the AT bus bottleneck, instead of sending all display data to the VGA card, high level command is sent to the coprocessor and the coprocessor take the 486's work to expand the display data. This method solved the AT bottleneck problem. However, it keep 486 idle by doing nothing. Further, the additional cost in both the controller and VRAM (which is often required in coprocessed solutions) makes this type

of implementation prohibitively expensive.

In HIPPO V-LPX motherboard, the on board VGA controller, HT216-32 has very limited graphic accelerator function. Majority of graphic function is performed by the powerful 486 microprocessor. The simplicity of the HT216-32 means it is priced close to super-VGA controllers. It's local bus ability produces 2-5 times (on a average) the performances of ISA based super-VGA controllers.

The HT216-32 was designed from inception to run on the local bus. This is in contrast to VGA controllers which were designed for the ISA bus, but have had a local bus interface added without restructuring the device architecture. Thought its ability to run at CPU clock rates, the use of separate memory and dot clocks, and the judicious use of FIFOs and buffers, the HT216-32 offers performance that meets or exceeds the majority of "accelerated: solutions at a much lower cost. Asynchronous processing allows handling of independent simultaneoUs tasks.

In addition to the local bus capabilities, the HT216-32 contains limited number of hardware assist functions to enhance performance in GUM environments. These include implementations of Windows defined 256-raster operations, fast page mode memory support, a hardware cursor, fat pixel color-expansion, automatic source alignment to destination, page look-ahead and single operation read-modify-write.

The local bus VGA support display memory of 1 MB, 60 ns 256Kx4 DRAM.

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Chapter 3
Configuring The System

Important note : Turn off the power before installing or replacing any components.

INSTALLING OVER-DRIVE PROCESSOR

OverDrive processor is a PGA devices. Besides the 486SX, there is an 169/238 pin PGA socket. To install OverDrive processor, be sure to line up pin 1 and pin 169/238 of the OverDrive processor with the corresponding pin of the socket as shown below.

Important Note :

When the motherboard is installed with OverDrive processor operating at frequency different than that on board 486SX, it is important to make alteration to the setting of jumpers JP12 and JP13. Otherwise, the system may either be not function or operating at its maximum performance. Please refer to the related jumper setting table.

INSTALLING DRAM SIMM MODULES

There are two banks of memory and totally 8 SIMM sockets on the HIPPO V-LPX motherboard. Whenever you add memory to the motherboard, install four modules at the same time. That means at least one bank of memory is filled on each time of adding memory. If the SIMM modules is installed correctly then the SIMM modules should be locked firmly by the locking latches of the sockets. Please check carefully before turning on the power. Otherwise, the system will not work properly.

To install a module, the module edge is angled into the socket's contact and then the module is pivoted into position, where the locking latches will secure it. If the module edge is not completely inserted into the socket, it cannot be pivoted to be in vertical position and should be dragged out and reinserted again. Do not force the module into the SIMM socket. It will damage the locking latches.

If the BIOS reports an memory error or parity error, drag out the modules and insert them again. If the locking latches are damaged, contact your dealer to replace the socket.

CONFIGURATION OF MEMORY

The configuration of the memory is very flexible. There are several combinations of DRAM types you may consider. 1 MB, 4 MB or 16 MB SIMM are acceptable. So, a basic system can be equipped with fewer memory and later more memory can be installed when upgrading the system. The memory size is detected automatically by system BIOS and indicated during memory test after reset. No jumper is needed to be set for the memory size and DRAM type.

To determine what DRAM speed rating should be used depends on the systems speed and wait state. The highest performance is accomplished by using zero wait state, but high speed DRAM has to be used. If zero wait state is selected, fast page mode DRAM is needed. The wait state setting is applied to all banks of memory. Therefore make sure to install DRAM with the same speed rating, or accommodate the wait state setting to the slow DRAM type.

Because of the shadow RAM function, the 386 KB memory between 640 KB to 1 MB cannot accessed. So, the memory size found by the system BIOS is not equal to the actual memory size. For example, when there is 4 MB on board, the BIOS will show 3712 KB.

DRAM CONFIGURATION

HIPPO V-LPX supports 2 banks of SIMM DRAM memory of 256 KB, 1 MB, 4 MB and 16 MB types. Any combination of these types of DRAM memory may be installed, meaning it is possible to install any type of SIMM DRAM in any bank. This provides for unlimited flexibility of system upgrade.

HIPPO V-LPX automatic turn on DRAM interleaving as it is installed with the same type of SIMM DRAM in both banks. You may recognise the interleaving by slight increasing in benchmark figure.

Normal or fast paging DRAM may be installed into each bank of SIMM DRAM. 60 or 70 ns DRAM may be used and user is required to inform HIPPO V-LPX about the DRAM speed through BIOS setting.

CONFIGURING THE SYSTEM

CONTROL OF SYSTEM SPEED

System speed can be controlled by keyboard and turbo switch. To change the speed by keyboard, use '-' and '+' of the numeric keypad. Press 'Ctrl' 'Alt' and '-' for normal speed and press 'Ctrl' 'Alt' and '+' for fast or turbo speed.

Connect P10 to the turbo switch of the case and P11 to the turbo LED of the case. When the turbo mode is selected, the turbo LED of the case will be turned on. System run at turbo speed if P10 is open.

Whenever the system speed is set to be normal by turbo switch, it cannot be changed by the keyboard, and vice versa.

RESET CMOS SETUP INFORMATION

Sometimes, the improper setting of system setup may make the system malfunction. In this case, turn off the power and put jumper JP1 into 2-3 position for a while. The internal CMOS status register is reset. Then replace JP1 to 1-2 position and turn on the power. The BIOS finds the CMOS status register is reset and regards the setup information is invalid. So it will prompt you to correct the information.

USE THE ON BOARD VGA

To use on board VGA, you are need to ensure the jumper JP5 has been placed to position 1-2 so that the system BIOS recognise the on board VGA. When the on board VGA is used, don't insert another VGA card to the expansion slot, otherwise, neither the on board VGA nor the VGA card works.

INSTALL DISPLAY CARD ONTO EXPANSION SLOT

HIPPO V-LPX comes with on board local bus VGA. However, there may be occasion another display adapter is employed in place of the local bus VGA. User is reminded to set jumper JP5 to 2-3 to disable the on board VGA. Otherwise, nothing will appear in screen.
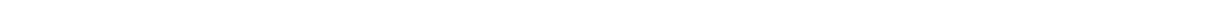
SYSTEM BOARD JUMPER SETTING

CPU Speed

	JP14	JP15
25/50 MHz	1 - 2	2 - 3
33/66 MHz	2 - 3	1 - 2

Note :   Alteration to setting of these jumpers are required when the motherboard is installed with OverDrive processor operating at frequency different than the on board 486SX.

On Board VGA Enable / Disable

JP5	
1 - 2	Enable
2 - 3	Disable

Clear CMOS RAM

JP1	
1 - 2	Normal Operation
2 - 3	Clear COMS RAM

Note :   JP1 should only be placed IN position while the system board is powered off.

Monitor Type

JP2	
1 - 2	Auto Detect
2 - 3	Monochrome
OFF	Color

Floppy, IDE, Serial Port and Parallel Port

Device	I/O Address
FDC PRI	3F0-7H
IDE PRI	1F0-7,3F6,3F7H
IDE SEC	170-7,376,377H
COM1	3F8-FH
COM2	2F8-FH
COM3	3E8-FH
COM4	2E8-FH
LPT1	3BC-3BEH
LPT2	378-37FH

SYSTEM BOARD CONNECTORS

Under typical conditions, these connectors should be connected to the indicators and switches of the system unit. The functions of connectors on the motherboard are listed below.

	Description
P1	PS/2 Mouse
P2	External Battery Connector
P3,P4	Power Supply Connector
P5	Feature Connector
P6	Floppy Connector
P7	IDE Connector
P8	Panel Connector
P9	Key Lock Connector
P10	Turbo Switch
P11	Turbo LED
P12	Speaker Connector
P13	Hardware Reset Connector
J1	Serial Port Connector 2
J2	Serial Port Connector 1
J3	Parallel Port
J4	VGA Connector
KB1	Keyboard Connector
KB2	PS/2 Keyboard Connector

Pin assignment of the connectors are illustrated as follows:

P2 - External Battery Connector

Pin	Assignment
1	+ Vdc
2	Key
3	Ground
4	Ground

P3 - Power Supply Connector

Pin	Assignment
1	Power Good
2	+5 Vdc
3	+12 Vdc
4	-12 Vdc
5	Ground
6	Ground

P4 - Power Supply Connector

Pin	Assignment
1	Ground
2	Ground
3	-5 Vdc
4	+5 Vdc
5	+5 Vdc
6	+5 Vdc

P9 - Key Lock Connector

Pin	Assignment
1	+5 Vdc
2	Key
3	Ground
4	Keyboard inhibit
5	Ground

P10 - Turbo Switch Connector

Pin	Assignment
1	Selection Pin
2	Ground

P6 - Floppy Connector

Pin	Signal	I/O	Pin	Signal	I/O
1	Ground	-	18	-Direction	O
2	-Reduced Write	O	19	Ground	-
3	Ground	-	20	-Step	O
4	N.C.	-	21	Ground	-
5	Ground	-	22	-Write Data	O
6	N.C.	-	23	Ground	-
7	Ground	-	24	-Write Enable	O
8	-Index	I	25	Ground	-
9	Ground	-	26	-Track 00	I
10	-Motor Enable 0	O	27	Ground	-
11	Ground	-	28	-Write Protect	I
12	-Drive Select 1	O	29	Ground	-
13	Ground	-	30	-Read Data	I
14	-Drive Select 0	O	31	Ground	-
15	Ground	-	32	-Head Select 1	O
16	-Motor Enable 1	O	33	Ground	-
17	Ground	-	34	-Disk Change	I

P7 - IDE Connector

Pin	Signal	I/O	Pin	Signal	I/O
1	Host Reset	I	21	N.C.	-
2	Ground	-	22	Ground	-
3	Host Data 7	I/O	23	-Host IOW	I
4	Host Data 8	I/O	24	Ground	-
5	Host Data 6	I/O	25	-Host IOR	I
6	Host Data 9	I/O	26	Ground	-
7	Host Data 5	I/O	27	Host IORDY	I
8	Host Data 10	I/O	28	Host ALE	I
9	Host Data 4	I/O	29	N.C.	-
10	Host Data 11	I/O	30	Ground	-
11	Host Data 3	I/O	31	Host IRQ14	O
12	Host Data 12	I/O	32	-Host IOCS16	O
13	Host Data 2	I/O	33	Host ADR 1	I
14	Host Data 13	I/O	34	N.C.	-
15	Host Data 1	I/O	35	Host ADR 0	I
16	Host Data 14	I/O	36	Host ADR 2	I
17	Host Data 0	I/O	37	-Host CS0	I
18	Host Data 15	I/O	38	-Host CS1	I
19	Ground	-	39	-Active	O
20	Ground	-	40	Ground	-

P11 - Turbo LED Connector

Pin	Assignment
1	LED Anode
2	LED Cathode

P12 - Speaker Connector

Pin	Assignment
1	Data out
2	No Connection
3	Ground
4	+5 Vdc

P13 - Hardware Reset Connector

Pin	Assignment
1	Selection Pin
2	Ground

CONFIGURING THE SYSTEM

J1 - Serial Connector 2
J2 - Serial Connector 1

Pin	Signal	I/O	Pin	Signal	I/O
1	Carrier Detect	I	2	Receive Data	I
3	Transmit Data	O	4	Data Terminal Ready	O
5	Ground	-	6	Data Send Ready	I
7	Request To Send	O	8	Clear To Send	I
9	Ring Indicator	I			

J3 - Parallel Port Connector

Pin	Signal	I/O	Pin	Signal	I/O
1	-STROBE	O	14	-AUTO FEED	O
2	DATA 0	O	15	-ERROR	I
3	DATA 1	O	16	-INIT	O
4	DATA 2	O	17	SLCT IN	O
5	DATA 3	O	18	GROUND	-
6	DATA 4	O	19	GROUND	-
7	DATA 5	O	20	GROUND	-
8	DATA 6	O	21	GROUND	-
9	DATA 7	O	22	GROUND	-
10	-PACK	I	23	GROUND	-
11	BUSY	I	24	GROUND	-
12	PAPER END	I	25	GROUND	-
13	SLCT	I			

J4 - VGA Display Connector

Pin	Signal	Pin	Signal
1	Red Video	9	No Pin
2	Green Video	10	Sync Return (Ground)
3	Blue Video	11	N. C.
4	N. C.	12	N. C.
5	Ground	13	Horizontal Sync
6	Red Return (Ground)	14	Vertical Sync
7	Green Return (Ground)	15	N. C.
8	Blue Return (Ground)		

KB1 - Keyboard Connector

Pin	Assignment
1	Keyboard Clock
2	Keyboard Data
3	Spare
4	Ground
5	+5 Vdc

KB2 - PS/2 Keyboard Connector

Pin	Assignment
1	Keyboard Data
2	Spare
3	Ground
4	+5 Vdc
5	Keyboard Clock
6	Spare

Chapter 4
Technical Information

This section provides technical information about HIPPO V-LPX and is intended for advanced users interested in the basic design and operation of HIPPO V-LPX.

MEMORY MAPPING

Address	Range	Function
000000-07FFFF	000K-512K	System Board Memory (512K)
080000-09FFFF	512K-640K	System Board Memory (128K)
0A0000-0BFFFF	640K-768K	Display Buffer (128K)
0C0000-0DFFFF	768K-896K	Adaptor ROM / Shadow RAM (128K)
0E0000-0EFFFF	896K-960K	System ROM / Shadow RAM (64K)
0F0000-0FFFFF	960K-1024K	System BIOS ROM / Shadow RAM (64K)
100000-7FFFFF	1024K-8192K	System Memory
800000-FFFFFF	8192K-16318K	System Memory

I/O ADDRESS MAP

I/O Address Map on System Board

I/O address hex 000 to 0FF are reserved for the system board I/O.

ADDRESS (HEX)	DEVICE
000-01F	DMA Controller 1, 8237
020-03F	Interrupt Controller 1, 8259, Master
040-05F	Timer, 8254
060-06F	Keyboard Controller
070-07F	Real Time Clock, NMI (non-maskable interrupt) mask
080-09F	DMA Page Register, 74LS612
0A0-0BF	Interrupt Controller 2, 8259
0C0-0DF	DMA Controller 2, 8237
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F8-0FF	Math Coprocessor Port

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I/O address hex 100 to 3FF are available on the I/O channel.

ADDRESS (HEX)	DEVICE
1F0-1F8	Fixed Disk
200-207	Game I/O
278-27F	Parallel Printer Port 2
2F8-2FF	COM 2
300-31F	Prototype Card
360-36F	Reserved
378-37F	Parallel Printer Port 1
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome Display and Printer Adapter
3C0-3CF	Reserved
3D0-3DF	Color Graphics Monitor Adapter
3F0-3F7	Diskette Controller
3F8-3FF	COM 1

SYSTEM TIMERS

      HIPPO V-LPX has three programmable timer/counters controlled by 82C321 and they are defined as channels 0 through 2:

Channel 0	System Timer
Gate 0	Tied on
Clk in 0	1.190 Mhz OSC
Clk out 0	8259 IRQ 0

Channel 1	Refresh Request Generator
Gate 1	Tied on
Clk in 1	1.190 Mhz OSC
Clk out 1	Request Refresh Cycle

Channel 2	Tone Generation of Speaker
Gate 2	Controlled by bit 0 of port hex 61
Clk in 2	1.190 Mhz OSC
Clk out 2	Used to drive the speaker

Note :   Channel 1 is programmed to generate a 15-micro-second period signal.

The 8254 Timer/Counters are treated by system programs as an arrangement of four programmable external I/O ports. Three are treated as counters and the fourth is a control register for mode programming.

SYSTEM INTERRUPTS

Sixteen levels of system interrupts are provided on HIPPO V-LPX. The following shows the interrupt-level assignments in decreasing priority.

Level		Function
Microprocessor NMI		Parity or I/O Channel Check
Interrupt Controllers		
CTLR 1	CTLR 2	
IRQ0		Timer Output 0
IRQ1		Keyboard (Output Buffer Full)
IRQ2		Interrupt from CTLR 2
	IRQ8	Real-time Clock Interrupt
	IRQ9	Software Redirected to INT 0AH (IRQ2)
	IRQ10	Reserved
	IRQ11	Reserved
	IRQ12	Reserved
	IRQ13	Coprocessor
	IRQ14	Fixed Disk Controller
	IRQ15	Reserved
IRQ3		COM 2
IRQ4		COM 1
IRQ5		Parallel Port 2
IRQ6		Diskette Controller
IRQ7		Parallel Port 1
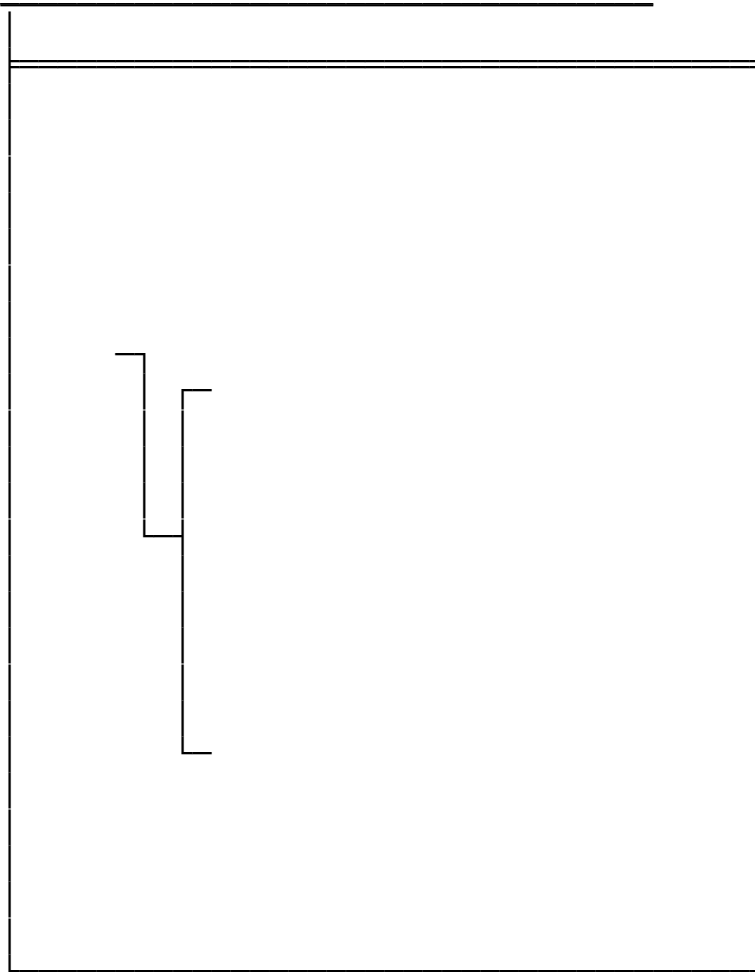
DIRECT MEMORY ACCESS (DMA)

HIPPO V-LPX supports seven DMA channels.

Channel	Function
0	Spare (8 bit transfer)
1	SDLC (8 bit transfer)
2	Floppy Disk (8 bit transfer)
3	Spare (8 bit transfer)
4	Cascade for DMA Controller 1
5	Spare (16 bit transfer)
6	Spare (16 bit transfer)
7	Spare (16 bit transfer)

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TECHNICAL INFORMATION
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The following shows the addresses for the page register.

Page Register	I/O Address (HEX)
DMA Channel 0	0087
DMA Channel 1	0083
DMA Channel 2	0081
DMA Channel 3	0082
DMA Channel 5	008B
DMA Channel 6	0089
DMA Channel 7	008A
Refresh	008F

REAL TIME CLOCK AND CMOS RAM

Real time clock and CMOS RAM are contained on board. Real time clock provides the system date and time. CMOS RAM stores system information. Both are backed up by battery and will not lose information after power off. The following page shows the CMOS RAM Address Map.

CMOS RAM ADDRESS MAP

Addresses	Description
00-0D	* Real-time clock information
0E	* Diagnostic status byte
0F	* Shutdown status byte
10	Diskette drive type byte - drives A and B
11	Reserved
12	Fixed disk type byte - drives C and D
13	Reserved
14	Equipment byte
15	Low base memory byte
16	High base memory byte
17	Low expansion memory byte
18	High expansion memory byte
19-2D	Reserved
2E-2F	2-byte CMOS checksum
30	* Low expansion memory byte
31	* High expansion memory byte
32	* Date century byte
33	* Information flags (set during power on)
34-3F	Reserved

REAL TIME CLOCK INFORMATION

The following table describes real-time clock bytes and specifies their addresses.

Byte	Function	Address
0	Seconds	00
1	Second alarm	01
2	Minutes	02
3	Minute alarm	03
4	Hours	04
5	Hour alarm	05
6	Day of week	06
7	Date of month	07
8	Month	08
9	Year	09
10	Status Register A	0A
11	Status Register B	0B
12	Status Register C	0C
13	Status Register D	0D

TECHNICAL INFORMATION

SYSTEM EXPANSION BUS

      HIPPO V-LPX provides one 16-bit slots, which is installable with a 16-bit slot card in order to increase the number of the expansion slot to the maximum of five.

The I/O channel supports:

*   I/O address space from hex 100 to hex 3FF

*   Selection of data access (either 8 or 16 bit)

*   24 bit memory addresses (16MB)

*   Interrupts

*   DMA channels

*   Memory refresh signal

TECHNICAL INFORMATION

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The following figure shows the pin numbering for
I/O channel connectors (A-side and B-side).

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TECHNICAL INFORMATION
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The following tables summarize pin assignments for the I/O channel connectors.

I/O Channel (A-Side)

I/O Pin	Signal Name	I/O
A1	-12 Vdc	Power
A2	GND	Ground
A3	GND	Ground
A4	I/O CH CK	I
A5	SD7	I/O
A6	SD6	I/O
A7	SD5	I/O
A8	SD4	I/O
A9	SD3	I/O
A10	SD2	I/O
A11	SD1	I/O
A12	SA0	I/O
A13	IOCRDY-	I
A14	AEN	I/O
A15	SA19	I/O
A16	SA18	I/O
A17	SA17	I/O
A18	SA16	I/O
A19	SA15	I/O
A20	SA14	I/O
A21	SA13	I/O
A22	SA12	I/O
A23	SA11	I/O
A24	SA10	I/O
A25	SA9	I/O
A26	SA8	I/O

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A27	SA7	I/O
A28	SA6	I/O
A29	SA5	I/O
A30	SA4	I/O

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I/O Channel (A-Side)

I/O Pin	Signal Name	I/O
A31	SA3	I/O
A32	SA2	I/O
A33	SA1	I/O
A34	SA0	I/O
A35	GND	Ground
A36	GND	Ground
A37	+5 Vdc	I/O
A38	SBHE	I/O
A39	LA23	I/O
A40	LA22	I/O
A41	LA21	I/O
A42	LA20	I/O
A43	LA19	I/O
A44	LA18	I/O
A45	LA17	I/O
A46	-MEMR	I/O
A47	-MEMW	I/O
A48	SD8	I/O
A49	SD9	I/O
A50	SA10	I/O
A51	SA11	I/O
A52	SA12	I/O
A53	SA13	I/O
A54	SA14	I/O
A55	SA15	I/O
A56	GND	Ground
A57	GND	Ground
A58	GND	Ground
A59	+5 Vdc	Power
A60	+5 Vdc	Power

TECHNICAL INFORMATION

I/O Channel (B-Side)

I/O Pin	Signal Name	I/O
B1	+12 Vdc	Power
B2	+5 Vdc	Power
B3	GND	Ground
B4	GND	Ground
B5	RESET DRV	O
B6	+5 Vdc	Power
B7	IRQ9	I
B8	-5 Vdc	Power
B9	DRQ2	I
B10	-12 Vdc	Power
B11	0WS	I
B12	+12 Vdc	Power
B13	GND	Ground
B14	-SMEMW	O
B15	-SMEMR	O
B16	-IOW	I/O
B17	-IOR	I/O
B18	-DACK3	I
B19	DRQ3	O
B20	-DACK1	I
B21	DRQ1	O
B22	-Refresh	I/O
B23	CLK	O
B24	IRQ7	I
B25	IRQ6	I
B26	IRQ5	I
B27	IQR4	I
B28	IRQ3	I
B29	-DACK2	O
B30	T/C	O

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I/O Channel (B-Side)

I/O Pin	Signal Name	I/O
B31	BALE	O
B32	+5 Vdc	Power
B33	OSC	O
B34	GND	Ground
B35	GND	Ground
B36	+5 Vdc	Power
B37	+5 Vdc	Power
B38	-MEM CS16	I
B39	-I/O CS16	I
B40	IRQ10	I
B41	IRQ11	I
B42	IRQ12	I
B43	IRQ15	I
B44	IRQ14	I
B45	-DACK0	O
B46	DRQ0	I
B47	-DACK5	O
B48	DRQ5	I
B49	-DACK6	O
B50	DRQ6	I
B51	-DACK7	O
B52	DRQ7	I
B53	+5 Vdc	Power
B54	-MASTER	I
B55	GND	Ground
B56	GND	Ground
B57	GND	Ground
B58	+5 Vdc	Power
B59	+5 Vdc	Power
B60	+5 Vdc	Power

TECHNICAL INFORMATION

Chapter 5
Software Utility

VGA SOFTWARE

This section includes descriptions of how to use the device drivers and utilities provided. These programs make it possible for you to take full advantage of the extended capabilities utility programs and device drivers include:

SETUP.EXE

Uncompression utility to load software.

RAMBIOS.SYS

copies Video BIOS into system memory, enabling programs that use the video BIOS extensively to run faster.

HTVGA.EXE

allows you to set Screen Saver options and set compatibility modes.

V7ANSI.SYS

can be used instead of the DOS ANSI.SYS device driver (which only works with standard text modes) to provide support for both extended and standard text modes.

DU.COM

Directory Listing Utility - displays directory information in as can be accommodated on the screen in the selected mode.

CLR.COM

Clear Screen Utility - is used to clear the entire screen when you are using extended text modes.

ESU.COM

Enhancement Selection Utility - allows you to set text and graphics modes.

HTDIAG.EXE

Diagnostics Program - helps you spot problems that may occur with the Video Controller.

ALTPARM.EXE

Alternate Display Parameter Utility - provides display parameters in addition to those included in the Video BIOS.

HTVESA.COM

Provides support for the VESA BIOS Extensions (VBE) standard.

(1)   SETUP.EXE

SETUP.EXE is a menu-driven program which allows you to select the VGA utility programs or software drivers you wish to use.

Since the files on the utility and drivers disks are compressed, you must run SETUP.EXE first, before attempting to install software drivers or use the utility programs. All of the software installation procedures which follow on this manual assume you have run SETUP.

SETUP can be run from either a floppy drive or a hard drive and files can be copied either to your hard disk or to floppy disks. To run SETUP from your hard drive, copy the contents of the VGA Utility Disk to your hard disk.

Using SETUP.EXE

1.   Make the Drive with SETUP.EXE the current Drive/directory. Type: SETUP <Enter>

2.   Highlight an option by using the up and down arrow keys to move the cursor. Use the [Enter] key to make a selection.

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The available options and their functions are detailed below. While running SETUP you can press the [F1] key at any time for context sensitive help.

Help

briefly explains how to use the program.

Install RAMBIOS

adds the device driver RAMBIOS.SYS to your CONFIG.SYS file. Refer to the RAMBIOS.SYS section below for details.

Install Software

provides a list of software packages which VGA controller supports in extended modes. From the Install Software menu you can select which resolution drivers you wish to enable your software applications to run in. Refer to the Install Software section below for details.

Exit Now

returns you to DOS.

In order to make the proper choices in the Menu Program, refer to the following sections for complete descriptions and information on the utility programs and application software drivers.

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(2)   **RAMBIOS.SYS**

RAMBIOS.SYS copies the video BIOS into system memory which enables text-based programs that use the video BIOS extensively to run faster.

Selecting this option will copy the RAMBIOS.SYS to the root directory of your hard disk and add the following as the first line of your CONFIG.SYS file:

DEVICE=RAMBIOS.SYS.

A CONFIG.SYS file will be created if one does not already exist.

RAMBIOS.SYS uses about 24K of memory. If you run software applications that require a lot of memory, use memory resident programs and/or have several drivers or "buffers" in your CONFIG.SYS file you may experience some difficulties. Removing RAMBIOS.SYS from your CONFIG.SYS file may solve the problem by "freeing up" the 24K of memory. Refer to your DOS Manual if you need instructions for doing this.

1.   Select the Install RAMBIOS option from the main SETUP menu.

2.   The Drive/directory from which SETUP is being run is automatically selected as the default source path to the utility files. Confirm this selection or make any necessary changes.

3.   The root directory of your hard disk [C:\] is selected as the default destination for the file RAMBIOS.SYS. Confirm this selection or make any necessary changes.

4.   When the source and destination drives have been confirmed, SETUP will automatically install RAMBIOS.SYS. The message "Type any key to continue" will appear

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when the action is completed. Press any key to return to the SETUP main menu.

5.   Continue with SETUP to install software or exit the program.

The changes made to your CONFIG.SYS file will not take effect until you re-boot your computer.

Install Software

1.   Select the Install Software option from the main SETUP menu.

2.   Use the up and down arrow keys to move the cursor through the Product Category window to select which software drivers you wish to install and press [Enter].

3.   For each software driver, a list of the resolutions supported is given. Highlight a resolution to be installed by using the up and down arrow key to move the cursor.

4.   Press [Enter] to select a resolution. A ">" appears in front of selected resolutions, [Enter] also deselects a resolution if you find you've made an error. [Esc] exits you from the current windows without saving any settings.

5.   Once your selections have been made, move the highlight to "Done Selecting" and press the [Enter] key to copy the files to your hard disk. SETUP provides default paths to the source and destination drives. You can use the default selections or provide your own. Press [Y] to confirm, [N] to change, or [Esc] to cancel.

6.   The message "Unpacking...from..." will appear as the copying process takes place. The message "Type any key to continue" appears when the process is complete. Press any key to return to the Product Category window.

7.   Repeat steps 2 through 6 to install additional software drivers or return to DOS by highlighting Exit Now and typing [Enter].

The Install Software option copies the drivers you have selected to your hard disk. To install the software drivers for use by your software applications, you must follow the installation instructions detailed in Software Utility - Application Software."

(3)   HTVGA.EXE

The Utility program, HTVGA.EXE, is a menu-driven program which allows you to set:

Monitor type
Compatibility modes
Screen Saver options.

You can also run HTVGA.EXE by entering a command at the DOS prompt.

Since HTVGA.EXE can change the mode your display is operating in, you should not run HTVGA.EXE from a DOS shell.

Using The HTVGA Menu

1.   Use the SETUP program to copy the file HTVGA.EXE (select Video Seven Utilities) to your hard disk.

2.   Make the Drive with HTVGA.EXE the current Drive/directory.

3.   At the DOS prompt, type:

HTVGA <Enter>

4.   Highlight an option by using the up and down arrow keys to move the cursor. Use the [Enter] key to make a selection.

        The available options and their functions are detailed below. While running HTVGA you can press the [F1] key at any time for context sensitive help.

Help
     briefly explains how to use the program.

About
     displays your current system configuration.

Select Monitor
     lets you select the type of monitor (color or monochrome) you have connected to the VGA adapter. This step is necessary if you wish to use an emulation mode.

Select Emulation Mode
     enables/disables emulation of CGA or Hercules modes. The options available depend upon the type of monitor chosen in "Select Monitor." Emulation must be enabled before you attempt to run a Hercules or CGA program.

Screen Saver
>   lets you enable/disable the screen saver feature.

Pure Mode
>   enables/disables the extended modes. In "Pure
>   VGA" mode, all extensions are disabled.

Exit Now
>   returns you to DOS.

*In order to make the proper choices in the Menu Program,
refer to the following sections for complete descriptions.*

Running HTVGA.EXE From The DOS Prompt

For ease of use you can bypass the menu
program and run HTVGA directly from the DOS prompt.

1.   Make the Drive with HTVGA.EXE the current
Drive/directory.

2.   At the DOS prompt, type:

HTVGA [mode command] <Enter>

Compatibility Modes

It will run most programs written for any of the popular graphics standards: VGA, EGA, CGA, MDA, and HGC.

HTVGA must be run and a compatibility mode must be enabled before you run any Hercules or CGA compatible software.

You can enable or disable a compatibility mode:

- By entering a command at the DOS prompt or from within a batch file.
- With the HTVGA Utility Menu program.

CGA Compatibility

In order to run CGA-specific programs, CGA compatibility mode must be turned on with the HTVGA.EXE program. You will know that you are in compatibility mode because the VGA controller uses a different text font when emulating CGA. CGA: LOCK enables CGA mode through one warm boot allowing the use of self-booting CGA programs. To disable CGA compatibility mode you must use the HTVGA CGA: OFF command.

HTVGA CGA:ON   Configures the VGA for CGA compatibility.

HTVGA CGA:LOCK   Enables CGA compatibility through one warm boot.

HTVGA CGA:OFF   Disables a current configuration for CGA compatibility.

Hercules Compatibility

Hercules Compatibility Mode, or Momochrome Mode, allows you to configure the VGA controller to emulate the Hercules Graphics Card (HGC).

The HGC has 64K of video graphics memory. The VGA controller can run software written to utilize the graphics capabilities of the Hercules Graphics Card in two ways:

-   FULL mode, configured to use the full amount of memory (two graphics pages, or 64K).
-   HALF mode, configured to use half that amount (one graphics page, or 32K) of memory. Use this mode if you have a CGA co-resident.

By using the HTVGA   MONO:LOCK command, Hercules compatibility will remain enabled through one warm boot. To disable Hercules compatibility you must use the HTVGA MONO:OFF command.

HTVGA MONO:ON   Configures the VGA controller for HGC
compatibility.

HTVGA MONO:LOCK   Enables HGC compatibility through one warm
boot.

HTVGA MONO:OFF   Disables a current configuration for HGC
compatibility.

HTVGA MONO:FULL   Configures the VGA controller for full64K (two-page) HGC compatibility. The VGA controller becomes fully Hercules compatible and cannot have a co-resident IBM-compatible CGA board. (This command functions the same as "MONO:NO.")

HTVGA MONO:HALF   Configures the display for 32K, (One-page)half HGC compatibility. Use this configuration ifyou have an IBM-compatible CGA in your system.

EGA Compatibility

The VGA controller is fully BIOS compatible with EGA. Because EGA and VGA are very closely related at the hardware level, BIOS-level compatibility enables virtually all EGA software to run without problems. Should you experience difficulties, you should contact the software manufacturer to see if their software package requires an update to work properly on a VGA.

Pure VGA Compatibility

The Video BIOS implements many extended functions beyond standard VGA. Sometimes, a software application may not function properly if it detects these extended functions. You can disable the WIN.VGA extended functions with the HTVGA PURE command.

HTVGA PURE:ON Configures the VGA controller for only pure IBM VGA standard modes - disables all the extended modes.

HTVGA PURE:OFF   Enables all the extended functions.

Screen Saver

Screen Saver can extend the life of your monitor by preventing images from being "burned" into your screen due to long periods of inactivity such as when you are away from your computer.

Screen Saver "shuts off" your screen display if no key is pressed on your keyboard for some period of time. (The default setting for time elapsed is five minutes.)

Generally, your screen display is returned by pressing any key on your keyboard. Pressing the "SHIFT" key is thought to be one of the best choices because this key usually has little or no effect on a program in progress.

Because Screen Saver relies on signals from the keyboard, it is generally not recommended to activate Screen Saver if you will use:

- A mouse and not be using the keyboard regularly.
- Microsoft Windows.
- Games or other software with which you use a joystick (e.g. Flight Simulator).

Software that causes the screen to "shut off" even when you are using the keyboard.

You may alter the Time-out Value - the length of time elapsed before Screen Saver "shuts off" your screen display - if you use software that combines the use of a pointing device and the keyboard.

Screen Saver Commands And Their Functions

HTVGA SAVE:ON Enables Screen Saver - turns off the screen when there has been no keyboard activity for 5 minutus.

HTVGA SAVE:n   Enables you to change the number of minutes before Screen Saver turns off the display. The letter "n" represents any number of minutes
[1-99].

HTVGA SAVE:OFF   Disables Screen Saver.

HTVGA NOSAVE Disables Screen Saver.

Using Screen Saver

1. Make the Drive with HTVGA.EXE the current Drive/directory.

2. At the DOS prompt, to:

    -   Enable the Screen Saver feature, type:

        HTVGA   SAVE:ON <Enter>

    -   Change the number of minutes before Screen Saver turns off the display, type the following command substituting the number of minutes you want for [n]:

        HTVGA   SAVE:[n] <Enter>

        Screen Saver can be automatically invoked every time you boot your system by placing the HTVGA SAVE:ON or HTVGA SAVE:n command in your AUTOEXEC.BAT file.

    -   Disable Screen Saver, type:

        HTVGA   SAVE:OFF <Enter>
        or
        HTVGA   NOSAVE <Enter>

When Software Does Not Work With Screen Saver

The Screen Saver feature will not work correctly with software that doesn't pass on your keystrokes properly. You will know this is a problem if:

- The screen goes blank while you are using the keyboard.
- Striking a key does not return an image to your screen after it has gone blank.

If either of these symptoms occur, try:

- Restoring the screen by hitting the "NUM LOCK" key.
- Exiting your program "blind" by using the normal sequence. This allows you to save the work you have done and return to DOS.
- Rebooting your machine.

After regaining the screen via one of the above options, disable Screen Saver and resume using your program.

Important Points

- To deactivate Screen Saver once it is activated during boot up your AUTOEXEC.BAT file, type:

HTVGA   SAVE:OFF <Enter>

- To stop Screen Saver from being automatically enabled at startup, delete "HTVGA   SAVE:ON" from your AUTOEXEC.BAT file and reboot your system.

- To automatically disable Screen Saver when you use a program that doesn't work with Screen Saver, use a batch file to invoke the program and include "HTVGA SAVE:OFF" or "HTVGA   NOSAVE."

Refer to your DOS Manual if you need instructions for creating/editing a batch file.

(4)   V7ANSI.SYS

V7ANSI.SYS is a device driver that provides support for extended as well as standard text modes for DOS 3.x. Provided with DOS 5.x is a version of ANSI.SYS which supports extended text modes. Refer to your DOS manual for information on the uses of ANSI.SYS.

Use V7ANSI.SYS only with DOS 3.x. Use the DOS ANSI.SYS for DOS 5.x.

Using V7ANSI.SYS

If your CONFIG.SYS file includes the command "DEVICE = [path] ANSI.SYS," you must remove it when adding V7ANSI.SYS.

1.   Use the SETUP program to copy V7ANSI.SYS (select Video Seven Utilities) to you hard disk.

2.   Create/modify your CONFIG.SYS file by adding the following to the file:

DEVICE = [path] V7ANSI.SYS

3.   Reboot your computer for the change to take effect.

(5)   DIRECTORY LISTING UTILITY (DU.COM)

The Directory Listing Utility takes full advantage of the screen by displaying directory information in as many columns as can be accommodated. It can used in any mode and can display from 50 to 129 entries at a time as opposed to the 25 entries available through the DOS "DIR" command.

Using DU.COM

1.   Use the SETUP program to copy the file DU.COM to your hard disk.

You may wish to include the directory in the search path if you place DU.COM in other than your root directory.

2.   At the DOS prompt, to display a list of:

-   All files in the current directory, type:

DU <Enter>

-   All files in a directory other than the current directory, specify the full DOS directory name and use wildcards as in these examples:

DU \MYFILE*.* <Enter>
DU \MYFILE\LETTERS*.* <Enter>

- Only certain files in directory, specify multiple search strings on the command line by including the file names (wildcards may be included) and/or extensions as in these examples:

        DU letter.* ltr*.txt <Enter>
        DU \MYFILE*. exe *.com <Enter>

- Only sub-directories, use the option/d on the command line like this:

        DU/d <Enter>

- Files including hidden files, use the option/h on the command line like this:

        DU/h <Enter>

- Files including system files, use the option/s on the command line like this:

        DU/s <Enter>

You can:

- STOP the display with <Esc>
- PAUSE the display with any key except <Esc>

(6)   ENHANCED MODE CLEAR SCREEN UTILITY (CLR.COM)

The Enhanced Mode Clear Screen Utility clears the entire screen in any text mode. Enhanced modes display information on as much of the screen as possible for the mode chosen. The DOS command, CLS, only clears the portion of the screen used by standard modes. To clear the entire screen in any text mode, type:

CLR <Enter>

(7)   ENHANCEMENT SELECTION UTILITY (ESU.COM)

The Enhancement Selection Utility allows you to change text and graphics modes easily.

*   Do not attempt to set a text or graphics mode that your monitor is not capable of supporting. See "Technical Information / Programmer's Information" for monitor requirements.*

Setting Text Modes With The ESU Menu

1.   Use the SETUP program to copy the file ESU.COM to your hard disk.

2.   Make the Drive containing ESU.COM the current Drive/directory.

3.   At the DOS prompt, type:

     ESU <Enter>

4.   Use the up and down arrow keys to choose the text mode you want from the list that appears on the screen.

Setting Text And Graphics Modes From The DOS Prompt

1.   Make the Drive containing ESU.COM the current drive/directory.

2.   At the DOS prompt, type:

   ESU / [mode number] <Enter>

   See "Technical Information / Programmer's Information" for list of Text and Graphics Modes.

(8)   DIAGNOSTICS PRPGRAM (HTDIAG.EXE)

The Diagnostics Program will help you spot problems that may occur with your display adapter. The program is run from the DOS prompt by typing:

HTDIAG <Enter>

HTDIAG is provided uncompressed on the Utility Disk and can be run directly from the disk.

First, the Diagnostics program will display:

- Amount of video memory available on the system.
- The Video BIOS version.
- Switch settings.
- Co-resident (if installed) graphics adapter.
- Memory location(s) used by other devices.

Next, you will be prompted for the type of monitor connected to your VGA adapter. This determines which resolutions, attributes, and capabilities of the WIN.VGA the diagnostics program will test.

Finally, use the up and down arrow keys to select which of the diagnostic tests you wish to run.

(9)   ALTERNATE PARAMETER UTILITY
(ALTPARM.EXE)

The Alternate Parameter Utility, ALTPARM.EXE, is a menu-driven program which allows you to:

-    Load a monitor-specific parameter file.
-    Customize the size and/or position or your display and save it to a user-defined parameter file.
-    Use ergonomic, refresh rates on compatible monitors.

Monitor-specific parameter files are provided for a number of popular variable frequency monitors. Other parameter tables enable the VGA controller to display resolutions at a flicker-free refresh rates of 70 Hz, 72 Hz, and 76 Hz. Ergonomic modes require a variable frequency monitor and have special timing requirements. Refer to "Technical Information / Monitor Timings" for the monitor requirements of the ergonomic modes. The 56HZ600.ALT file provides 800 x 600 resolution parameters for monitors which display this resolution at a 35.0 KHz horizontal and 56.0 Hz vertical frequency rather than 37.9 KHz and 60.0 Hz. Such monitors include the Sony Multiscan 1302 or the NEC MultiSync II or 2A.

Using the ALTPARM Menu

1.   Use the SETUP program to copy the ALTPARM files (select Video Seven Utilities) to your hard disk.

2.   Make the Drive containing ALTPARM.EXE the current Drive/directory and type:

     ALTPARM <Enter>

3.   Highlight an option by using the up and down arrow keys to move the cursor. Use the [Enter] key to make a selection.

     The available options and their use are detailed below.

Change Screen Parameters
     lets you select which extended text and/or graphics modes of the current parameter file you wish to modify. You can modify standard VGA modes only if the current parameter file uses the 72 Hz modes. Follow the instructions on the screen to position or size the display.

Load Parameter File
     provides you with a selection of parameter file (either custom or default) from which to choose.

Save Parameter File
      allows you to save a customized parameter table.
ALTPARM will automatically save the file with a ALT
extension. Caution should be used when modifying
and saving parameter files as it is possible to write
over existing files which you may want to keep.

Restore Old Parameters
      returns you to the default settings of the current
parameter file provided you have not used the Save
Parameter File option.

Exit Program
      returns you to DOS.

Running ALTPARM From The DOS Prompt

For ease of use you can bypass the menu
program and load a parameter file directly from the DOS
prompt.

1.   Make the Drive with ALTPARM.EXE the current
Drive/directory.

2.   At the DOS prompt, type:

ALTPATM [filename] <Enter>

For example, to load the default 800 x 600 ergonomic parameter file type:

ALTPARM ERGO600 <Enter>

ALTPARM must be loaded every time you turn on your computer or you perform a warm boot. For ease of use, it is recommended you place the ALTPARM command line in your AUTOEXEC.BAT file.

Many variable frequency monitors are microprocessor controlled,' that is, you can set the size and position of the display by controls on the monitor. If you have a monitor such as the NEC MultiSync 4D or the Nanao/Eizo Flexscan 9080i, you may need to use a combination of monitor settings and ALTPARM to obtain the optimum display.

(10)VESA BIOS Extensions- HTVESA.COM

HTVESA.COM is a Terminate and Stay Resident (TSR) program which provides support for the Video Electronics Standards Association (VESA) BIOS extensions standard. This allows you to run software that provides a VESA driver in an extended VGA mode such as 800 x 600 with 16 colors.

You must run HTVESA prior to running software which supports the VESA standard. Make the directory that contains HTVESA.COM the current Drive/directory.

The enable VESA compatibility for software which requires only 1 video memory window, type:
HTVESA / 1 <Enter>

To enable VESA compatibility for software which requires 2 video memory windows, type:

HTVESA /2 <Enter>

You may have to experiment with both commands to determine the needs of your VESA-compatible software.

Then, run your software which uses the VESA driver. HTVESA will remain resident in memory until you reboot your system.

SOFTWARE UTILITY - APPLICATION SOFTWARE

The capabilities of the VGA controller go beyond the VGA standard. To use the extended modes, support must be provided in the software through the use of drivers to allow you to choose the extended graphics resolutions, colors, or text modes.

Software Support

The system is packaged with software drivers for several popular software programs. It is compatible with the VESA (Video Electronics Standards Association) standard. If your software has a "VESA driver" you can select it to use this mode. This section describes the procedures necessary to configure these programs and/or install special drivers to give you the best performance from your software.

The pages that follow cover the installation of software drivers for the following programs:

AutoCAD
AutoShade
Cadvance
Lotus 1-2-3 and Symphony
Generic CADD
P-CAD
Presentation Manager
VersaCAD Design
Windows
Word
WordPerfect

Additionally, instruction are included for using extended text modes with:

Lotus 1-2-3 and Symphony
WordPerfect

The list of softwate drivers is constantly changing. Be sure to check the README file on the Utility Disk for the most current information.

Before You Begin

- You must run the SETUP program prior to in stalling most of the application software drivers covered in this section. SETUP decompresses the software drivers and copies them to the appropriate sub-directories of your hard disk.

- To avoid damage to your monitor and other parts of your computer system, be sure you have correctly installed the before you attempt to configure the software as described in this section.

- Graphics resolutions beyond 640x480 are not supported on fixed-frequency analog displays such as the IBMr 8513 or the Zenithr ZCM-1490.

- Extended graphics resolutions have minimum monitor scan frequency requirements:

-     800 x 600 non-interlaced resolution requires a
Variable Frequency Display such as the NECr MultiSyncr
or Sonyr Multiscanr.

-     1024 x 786 interlaced resolution requires a Variable
Frequency Display such as the NEC MultiSync 3D or a
Dual Frequency Display such as the Seiko CM-1430.

-     1024 x 786 non-interlaced resolution requires a
Variable Frequency Display such as the NEC MultiSync 4D
or Nanaor/Eizor Flexscan 9070U.

*Not all monitors capable of displaying the 1024x768
interlaced resolution are capable of displaying the 800x600 resolution.
See "Technical Information / Monitor Timings for the Extended
Graphics Modes" for information on scan frequency requirements.*

-     You may have to run ALTPARM to adjust the
horizontal and vertical size and position controls when
using extended resolution modes.

(1)   AUTOCAD

VGA utility supports AutoCAD releases 9, 10, and 11 in real mode, and releases 10/386 and 11 in protected mode.

AutoCAD Real Mode Installation

It supports real mode AutoCAD in the following resolution:

```
640 x 480        16 colors
720 x 540        16 colors
800 x 600        16 colors
1024 x 768  16 colors
```

The Video Seven real mode AutoCAD driver consists of one AutoCAD ADI display driver and an installation program. The installation program allows you to change the currently selected resolution of AutoCAD's graphics screen, modify the software interrupt vector used by AutoCAD to communicate with the ADI display drivers, and modify the colors used in several areas of the AutoCAD graphics screen.

Before you can begin working with AutoCAD you must load the ADI driver into your computer's memory. This procedure must be done every time you turn your computer on, or when you perform a warm boot. It is therefore suggested that the command to load the ADI driver be placed in your AUTOEXEC.BAT file.

To install the ADI driver, type:

VGAREL11 <Enter>

This command will load the ADI driver into the

computer's memory. The driver will then display identification information on the screen, and confirm that it has been installed. The driver will also notify you as to which interrupt vector will be used to communicate with AutoCAD.

The VGAREL11.COM driver supports ADI version 4.0. It supports Fast Vector mode and Packet modes. The VGAREL11.COM driver also supports AutoShade and AutoSketch.

AutoCAD ADI Configuration

AutoCAD need only be configured for the ADI General Display Driver once. Even if you turn off your computer or reboot it, AutoCAD well remember that the ADI General Display Driver has been installed. Follow the procedure outlined below to configure AutoCAD:

1.   Start AutoCAD as described in the AutoCAD documentation.

2.   When AutoCAD's Main Menu appears, select "Configure AutoCAD." This will be done automatically if AutoCAD senses that it has not yet been configured.

3.   After reviewing your current configuration, press <Enter>

4.   Select: "configure Video Display" and press:

Y (Selects "Different Video Display")

5.   Press: 1 (Chooses ADI)

6.   AutoCAD will ask you a series of questions. Consult the AutoCAD Installation and Performance Guide for more details on these options.

7.   When you have completed the series of questions, press:

Y (To save configuration)

Controlling Resolution And Colors

The real mode AutoCAD driver allows you to choose different screen resolutions, colors, and interrupt vectors through the use of the Install Program, VGAINST.EXE.

```
Software Utility
```

---

1.   Use the SETUP program to copy the AutoCAD drivers
to the AutoCAD sub-directory of your hard disk. At the
DOS prompt, type:

       VGAINST <Enter>

   The install program will prompt you several
   responses. Text displayed between brackets is the
   default response. To accept the default response
   simply press the <Enter> key.

2.   Enter name of driver to be modified. The default is
VGAREL11.COM. Press <Enter> to accept.

   The name of the driver is required because the
   install program will modify both the memory resident
   version of the ADI driver and the file on your hard
   disk. This way any changes you make will be
   remembered for future sessions with AutoCAD.

   You many wish to create several different versions of
   the driver to support different resolutions or colors.
   To do this simply copy the supplied driver to a file
   with a different name and then modify it to the
   desired settings.

3.   You will be prompted for an interrupt vector number.
The supplied default, 7A, will work correctly under most
circumstances. The only reason you will ever want to
modify this interrupt vector is if the default value
conflicts with some other software you might have in
your system.

4.   Configure AutoCAD resolution. The following menu
will appear on your screen:

   Resolution Data
     Current Resolution is:
       0: 640 x 480 by 16 colors

Available Resolution are:
    1: 640 x 480 by 16 colors
    2: 752 x 410 by 16 colors
    3: 640 x 350 by 16 colors
    4: 720 x 540 by 16 colors
    5: 800 x 600 by 16 colors
    6: 1024 x 768 by 4 colors
    7: 1024 x 768 by 16 colors

Enter selection [0]:

The above list will change slightly as resolutions are added or removed. The resolution you can select depends upon your type of monitor and/or the memory configuration.

5.   Configure AutoShade rendering resolution. Your screen will look similar to the following:

AutoShade 256 color rendering Display Resolution

Current resolution is:
0: 640 x 400 by 256 colors

Available resolution are:
1: 320 x 200 by 256 colors
2: 640 x 400 by 256 colors
3: 640 x 480 by 256 colors
4: 720 x 540 by 256 colors
5: 800 x 600 by 256 colors

Enter selection [0]:

The resolution you can select depends upon type of monitor and/or the memory configuration.

6.   Select the AutoCAD color model, either Release 9 or Release 10 (for both 10 and 11) depending on your version of AutoCAD.

7.   Select Configuration Data.

You will be presented with the options of changing the:

- number of command lines
- screen colors
- palette colors
- 256 color settings

You can modify any of the above or use the default settings.

-   If you choose to modify the screen colors you will be asked to make selections from the following list of colors.
-   If you choose to modify the palette colors you will be asked to enter new palette colors in hexadecimal notation.
-   If you choose to modify the 256 color setting you will have the option of changing each of the 256 drawing colors.

For the Graphics Area Background color of the drawing area, you may select either a dark (black) or a light graphics area background. If you select a light graphics area background, then lines drawn in color 7, grey, will be drawn in black instead. This choice most closely resembles a black ink drawing on paper. Graphics area and text area background colors are applicable only to the VGAREL11.COM driver.

Some of the colors you will be selecting will not correspond to the table listed above. This is because the color you are selecting will be XOR'd with the color it is overlaying. In particular this is true of the XOR color, the Menu Highlight color, the grid dot color, and the cursor color.

You can change screen colors while in AutoCAD. Use the AutoCAD SHELL command and run VGAINST.EXE and then type "EXIT" to return to AutoCAD.

AutoCAD Protected Mode Installation

The WIN.VGA supports protected mode AutoCAD (releases 10/386 and 11) in the following resolutions:

```
640 x 480        16 and 256 colors
720 x 540        16 and 256 colors
800 x 600        16 and 256 colors
1024 x 768  16 and 256 colors (256 requires 1MB)
```

256 color modes are for AutoCAD release 11 only. The protected mode driver, ADIDISP.EXP also supports 3D Studio and AutoShade 2.0

AutoCAD need only be configured for the ADI General Display Driver once. Even if you turn off your computer or reboot it, AutoCAD will remember that the ADI General Display Driver has been installed. Follow the procedure outlined below to configure AutoCAD:

1.   Use the SETUP program to copy the protected mode AutoCAD driver, ADIDISP.EXP to the AutoCAD sub-directory of your hard disk.

2.   Start AutoCAD as described in the AutoCAD documentation.

3.   When AutoCAD's Main Menu appears, select "Configure AutoCAD".

4.   After reviewing your current configuration, press
<Enter>.

5.   Select: "Configure Video Display" to change the
display setting.

6.   Select: "ADI P386 4.0/4.1" to install the protected
mode driver.

7.   From the menu provided, select the resolution you
wish to use. The default option is displayed between
brackets.

Resolution Data
   Current Resolution is:
      0: 640 x 480 by 16/256 colors

   Available Resolution are:
      1: 640 x 350 by 16 colors
      2: 640 x 480 by 16/256 colors
      3: 720 x 540 by 16/256 colors
      4: 800 x 600 by 16/256 colors
      5: 1024 x 768 by 16/256 colors

   Enter selection <0>:

*The above list will change slightly as resolutions are added or
removed. The resolution you can select depends upon your type of
monitor and/or the VGA memory configuration.*

8.   Make selections to use either the 16 or 256 color driver and set background color.

9.   Follow the instructions provided on the screen to complete and save your changes to the AutoCAD configuration.

AutoCAD Dual Screen Mode

Both the real and protected mode AutoCAD drivers support a dual screen mode of operation. If you have a monochrome monitor and display adapter in your system along with the setup program you can operate AutoCAD in a mode which uses both monitors. The graphics screen will be displayed on your color monitor and the text screen will appear on the monochrome monitor.

To use the dual screen mode your monochrome monitor and display adapter must be active before starting AutoCAD. If it is not already active type:

MODE MONO <Enter>

The AutoCAD driver will automatically configure AutoCAD for dual screen mode.

In dual screen mode, it must be configured for a resolution other than 1024 x 768 with 2 colors. You cannot have a monochrome display adapter co-resident when the it is configured for this mode.

(2)   AUTOSHADE

The VGA Driver supports AutoShade in the following resolution:

320 x 200	256 colors
640 x 480	256 colors
720 x 540	256 colors
800 x 600	256 colors
1024 x 768	256 colors (AutoShade 2.0)

Drivers support AutoShade versions 1.1 and 386. Use ADIDISP.EXP for AutoShade 2.0 support.

The following AutoShade instruction are applicable to the VGAREL11.COM driver. When AutoShade is first run it will request information from you in order to properly configure itself.

1.   When provided the selection of the Display Devices, choose "AutoDesk Device Interface Rendering Driver" (Press "1").

   The interrupt vector initially used should be "7Ah" and should correspond to the interrupt vector to which the ADI driver has been configured.

2.   When provided the selection of the Rendering Display, again choose "AutoDesk Device Interface Rendering Driver" (Press "1").

   Use the default "7Ah" interrupt driver as outlined above.

3.   When presented with the question: "Do display and rendering devices share a single screen?", respond with "Yes."

4.   Follow the instructions for installing the real mode AutoCAD driver to configure AutoShade's resolution.

(3)   CADVANCE

The VGA Driver supports Cadvance in the following resolutions:

```
800 x 600        16 colors
1024 x 768  16 colors
```

Drivers support Cadvance versions 3.0 and 3.5.

1.   Use the SETUP program to copy the Cadvance drivers to the Cadvance sub-directory of your hard disk.

2.   Change from the default to a high resolution driver by typing:

```
RENAME GS.DRV GS.LOD
RENAME GS800.DRV GS.DRV
or
RENAME GS1024.DRV GS.DRV
```

3.   Start Cadvance as usual.

(4)   GENERIC CADD LEVEL 3

The VGA Driver supports Generic CADD in the 1024 x 768 16 color resolution.

Installing Generic CADD

1.   Use the SETUP program to copy the Generic CADD driver to the Generic CADD sub-directory of your hard disk.

2.   At the DOS prompt, run the Generic CADD "CONFIG" program by typing:

    CONFIG <Enter>

3.   Select "WIN.VGA 1024 x 768 by 16 color driver."

4.   Exit CONFIG and run Generic CADD as usual.

(5)   LOTUS 1-2-3 and SYMPHONY

The VGA Driver supports 1-2-3 and Symphony in the following resolutions:

132 x 25	16 colors
132 x 43	16 colors
100 x 60	16 colors
80 x 60	16 colors
720 x 540	16 colors
800 x 600	16 colors

Drivers supports 1-2-3 versions 2.x and Symphony version 1.2.

Installing 1-2-3 or Symphony

1.   The following files are the Lotus driver files. Use the SETUP program to copy the files you wish to use from the Utility Disk to the 1-2-3 and/or Symphony subdirectory of your hard disk.

FILE NAME	RESOLUTION	MONITOR TYPE
VD132x25.DRV	132x25 - Text	VFD,AD
VD132x43.DRV	132x43 - Text	VFD,AD
VD100x60.DRV	100x60 - Text	VFD,AD
VD80x60.DRV	80x60 - Text	VFD,AD
GD720V20.DRV	720x540 - Grahpics	VFD
GD800V20.DRV	800x600 - Graphics	VFD

2.   Place the 1-2-3 or Symphony Utility disk in Drive A
and type:

       INSTALL <Enter>

3.   Follow screen directions to "Main Menu."

4.   Select "Advanced Options."

5.   At the "Advanced Options Menu," select "Add New
Drivers to Library."

6.   Follow directions to add drivers.

7.   Return to the "Advanced Options Menu."

8.   Select "Modify Current Driver Set."

9.   Select "Graphics Display."

10. You will be presented with a list of all available
drivers. Select the driver you wish to install.

11. Select "Save Changes."

12. Follow instructions to name the new driver set or
make it the default driver set and complete installation.

(6)   P-CAD

The VGA Driver supports P-CAD in the following resolutions:

```
640 x 480        16 colors
720 x 540        16 colors
800 x 600        16 colors
1024 x 768  16 colors
```

Drivers support P-CAD versions 3.0, 4.0, and 5.0.

Installing P-CAD

1.   Install P-CAD choosing "IBM VGA" as the display adapter.

2.   Use the SETUP program to copy the P-CAD drivers to your P-CAD Driver sub-directory [PCAD\DRV].

FILE NAME	RESOLUTION	NO. OF COLORS
DPCAD640.DRV	640 x 480	16
DPCAD720.DRV	720 x 540	16
DPCAD800.DRV	800 x 600	16
DPCAD1K.DRV	1024 x 768	16

3.   Use an editor to modify the P-CAD configuration file "PCADDRV.SYS." Change "DIBMVGA.DRV" to the name of the file for the resolution you are installing (e.g. for the 800 x 600 mode, replace DIBMVGA.DRV with DPCAD800.DRV).

4.   Reboot your computer for the change to take effect.

(7)   PRESENTATION MANAGER

The VGA Driver supports Presentation Manager in the following resolutions:

640 x 480	16 colors
720 x 540	16 colors
800 x 600	16 colors
1024 x 768	16 colors

Drivers support Presentation Manager version 1.2.

1.   From within the OS/2 DOS Compatibility Box, run the SETUP program to copy the Presentation Manager driver and monitor files to your OS2\DLL sub-directory.

2.   Boot your system with the OS/2 Installation Disk. When asked to press return to continue or escape to cancel, press <Esc>.

3.   Change the display resolution by typing the following:

    RENAME DISPLAY .DLL DISPLAY .OLD
    COPY VGAxxxx .DLL DISPLAY .DLL

    (where VGAxxxx . DLL = V7 driver filename)

4.   Load the appropriate monitor file by typing:

RENAME MONITOR .DLL MONITOR .OLD
COPY MONxxxx . DLL MONITOR . DLL

(where MONxxxx . DLL = V7 monitor filennme)

If a MONITOR . DLL file does not currently exist in your OS2/ DLL sub-directory, simply rename the appropriate Video Seven monitor filename to MONITOR . DLL.

5. Reboot your system for the changes to take effect.

Proper operation of OS/2 Presentation Manager requires the line IOPL=yes be in your CONFIG.SYS file.

(8)   VersaCAD DESIGN

The VGA Driver supports VersaCAD in the following resolutions:

640 x 480	16 colors
720 x 540	16 colors
800 x 600	16 colors
1024 x 768	16 colors

Drivers supports VersaCAD Design versions 5.3, 5.4 and VersaCAD/386.

The VersaCAD drivers consist of a resolution file and a configuration file for VersaCAD Design 5.3 and VCAD54.CFG is for VersaCAD Design 5.4 and VCAD386.CFG is for VersaCAD/386.

Installing VersaCAD

1.   Use the SETUP program to copy the VersaCAD driver and configuration files to the VersaCAD sub-directory of your hard disk.

FILE NAME	RESOLUTION	NO. OF COLORS
VCAD800.EXE	640 x 480	16
	720 x 540	16
	800 x 600	16
VCAD1024.EXE	1024 x 678	16
VCAD1KP.EXE	1024 x 768 (386)	16

2.   Use an editor to modify the VersaCAD batch file (usually in the root directory of your hard disk) to include the driver name of the resolution you've selected. For example, if using VersaCAD

EDLIN VCAD53 . BAT <Enter>

CD \ VCAD53
VCAD800 [or VCAD1024]
VRUN

Save your changes.

3.   Change to the VersaCAD directory and start
VersaCAD.

4.   Select [E] to change the screen configuration.

5.   Select the desired resolution.

(9)   WINDOWS 3.x

The VGA Driver supports Windows 3.x in the following resolutions:

```
640 x 480         16 colors
640 x 480         256 colors
720 x 512         256 colors
800 x 600         16 colors
800 x 600         256 colors (requires 1Mb)
1024 x 768  16 colors
1024 x 768  256 colors (requires 1Mb)
1280 x 1024       16 colors (requires 1Mb)
```

Windows applications will be displayed at the resolution you choose when installing Windows.

Installing Windows

1.   Install Windows 3.0 selecting "VGA" as the display option. Choosing "Video Seven VGA w/512K" will lead to incorrect results.

Install Windows 3.1 selecting "VGA" as the display option.

2.   Use the SETUP program to copy the Windows drivers to the Windows\ System sub-directory of your hard disk.

3.   Start Microsoft Windows.

4.   Use the FILE-RUN command and type:

   C:\ WINDOWS\ SYSTEM\ HTSETUP <Enter>

   Be sure to type the correct path name if you have
   installed Windows using a different directory name.

   HTSETUP modifies your SYSTEM.INI file based upon
   the selection you make.

5.   HTSETUP will identify your VGA board and will
prompt you for the path to the Video drivers. Type:

   C:\ WINDOWS\ SYSTEM <Enter>

6.   A dialogue box will appear which allows you to select
the resolution you wish to run. The default is the current
resolution is not supported by your card or by the
amount of memory you have on your system then the
selection appears greyed out.

7.   Select the resolution. If you choose a 1024 x 768
resolution then you also have the option to choose large
or small fonts. Large fonts are recommended for easier
readability.

   Choosing "Install" at this point allows you to redirect
   the path to the Video drivers. Use this option if you
   get an update to your Windows drivers in the future.

8.   You must exit and restart Windows for the change to
take effect. Select "Restart Windows" and you will be in
the resolution you chose in step 6.

   *386 Owners: Running Windows in 386 Enhanced Mode requires
the file V7VDD.386 on the Utility Disk be used. HTSETUP will modify
your SYSTEM.INI file to use this driver, however, you may be required*

to have your Windows disks available to complete this step.

to have your Windows disks available to complete this step.

(10)WORD 5.0 and 5.5

The VGA Driver supports Microsoft Word in the following resolutions:

```
132 x 25        16 colors
132 x 43        16 colors
100 x 60        16 colors
80 x 60         16 colors
720 x 540       16 colors
800 x 600       16 colors
1024 x 768  16 colors
```

Drivers support Microsoftr Word versions 5.0 and 5.5.

Installing Word Drivers

1. Rename the SCREEN.VID file in your Microsoft Word subdirectory to SCREEN.OLD.

2. Use the SETUP program to copy the Word driver files, SCREEN.VID and VIDSETUP.EXE, from the Utility Disk to your Word subdirectory.

3. Run the Video driver setup utility by typing:

    VIDSETUP <Enter>

4.   Select which resolutions you wish to have available. Use the up and down arrow keys to move the cursor. Select or deselect a resolution by using the [Ins] and [Del] keys. Keep in mind that your monitor must be capable of displaying the resolutions you select.

Microsoft Word automatically uses the highest resolution selected to display it's Print Preview mode.

5.   Start Word. Use the OPTIONS command to change the display resolution.

Some versions of mouse drivers may not function properly in extended text or graphics modes causing the mouse pointer to disappear or not work beyond the standard 80 columns. If you are using a mouse with Word and experience difficulties, contact the manufacturer of your mouse for an updated version (if available) of their driver.

(11)WORDPERFECT 5.0 and 5.1

The VGA Driver supports WordPerfect in the
following resolutions:

```
132 x 25        16 colors
132 x 43        16 colors
100 x 60        16 colors
80 x 60         16 colors
800 x 600       16 colors
1024 x 768  16 colors
```

Installing WordPerfect 5.0 Graphics Drivers

1.   Use the SETUP program to copy the WordPerfect 5.0
graphics drivers from the Utility Disk to the WP50
directory of your hard disk.

2.   Bring up the WordPerfect Setup Menu.

3.   Chosose selection #3 "Display," then select #5
"Graphics Screen Type."

4.   Select the resolution you wish to use.

Installing WordPerfect 5.1 Text and Graphics Drivers

1.   Use the SETUP program to copy the WordPerfect 5.1
drivers from the Utility Disk to your WP51 subdirectory.

2.   Use the WordPerfect Setup Menu to select which text
and graphics resolution you wish to use.

BUILT-IN VIDEO AND TWO MONITOR SYSTEMS

You have the option of using a co-resident display adapter and monitor with the Local BUS VGA and its associated monitor. This additional display adapter/monitor may be added into your system or built-in. The Local BUS VGA will only work with certain combinations of an additional display adapter/monitor.

You may use a Monochrome Display Adapter (MDA), a Herculesr Graphics Card or a Color Graphics Adapter (CGA) co-resident with the system.

You cannot use any EGA or VGA as a second adapter when using the Local BUS VGA Controller.

You cannot have an MDA or HGC co-resident if you are using the Local BUS VGA in the 1024 x 768. 2 color mode.

The capability of the Local BUS VGA and Primary Display is altered by the type of second display adapter/monitor combination.

All display adapters use a portion of a computer's memory for color and monochrome attributes, therefore:

-     If your second display adapter/monitor combination is color, then the color capability of the Local BUS VGA/ monitor will not be available.
-     If your second display adapter/monitor combination is monochrome, then the monochrome capability of the Local BUS VGA/ monitor will not be available.

To switch between the color and monochrome screens, use the DOS MODE commands as follows:

To make the monochrome screen/display adapter active type:

MODE MONO <Enter>

To make the color screen/display adapter active, type:

MODE CO80 <Enter>

TECHNICAL INFORMATION

Monitor Timings For The Extended Graphics Modes

The extended graphics resolution of 800 x 600 requires a variable   frequency display such as the NEC MultiSync series or Sony Multiscan series of monitors. The 1024 x 768 resolution. in interlaced mode, requires a monitor such as the NEC MultiSync 3D, the IBM 8514 or the Seiko CM-1440. The 1024 x 768 non-interlaced mode requires a monitor such as the Nanao/Eizo 9080i or the Mitsubishi Diamond Scan 6905. The chart below indicates the necessary scan frequencies (monitor timings) for the extended graphics modes.

Modes are listed in hexadecimal notation.

512K DRAM Configuration:

Mode	Resolution	Colors	Monitor Vertical	Timings Horizontal
60	752 x 410	16	70 Hz	31.0 KHz
61	720 x 540	16	60 Hz	35.0 KHz
62	800 x 600	16	60 Hz	37.9 KHz
63	1024 x 768	2	43 Hz	35.5 KHz
64	1024 x 768	4	43 Hz	35.5 KHz
65*	1024 x 768	16	43 Hz	35.5 KHz
65+	1024 x 768	16	60 Hz	48.5 KHz
66	640 x 400	256	70 Hz	31.1 KHz
67	640 x 480	256	60 Hz	31.5 KHz
68	720 x 540	256	60 Hz	35.0 KHz

1MB DRAM Configuration:

Mode	Resolution	Colors	Monitor Vertical	Timings Horizontal
6A*	1024 x 768	256	43 Hz	35.5 KHz
6A+	1024 x 768	256	60 Hz	48.5 KHz

* Interlaced
+ Non-interlaced

The Video Seven mode 6Ah should not be confused with the VESA 800 x 600 16-color mode which uses the same mode number.

These lists reflects the monitor timings which are programmed in the VGA BIOS. The ALTPARM.EXE utility can be used to customize the display on monitors that have different horizontal and/or vertical scan rates.

**Monitor Timings For The Ergonomic Graphics Modes**

It is capable of displaying many resolutions with a refresh rate of 72 Hz and some modes as high as 76 Hz. These refresh rates eliminates almost all monitor flicker detectable by the human eye and provides a more visually stable display. Standard refresh rates for VGA range between 60 Hz and 70Hz as listed in the above chart. Your monitor must be capable of running at the higher vertical and horizontal sync rates the ergonomic modes require. The chart below indicates the necessary scan frequencies (monitor timings) for the ergonomic

graphics modes. Use of these modes is enabled through the ALTPARM program.

Modes ate listed in hexadecimal.

Mode	Resolution	Colors	Monitor Vertical	Timings Horizontal
3	80 x 25	16	72 Hz	31.8 KHz
12	640 x 480	16	72Hz	39.4 KHz
12	640 x 480	16	76 Hz	40.6 KHz
40	80 x 43	16	72 Hz	30.0 KHz
41	132 x 25	16	72 Hz	30.0 KHz
42	132 x 43	16	72 Hz	30.0 KHz
42	80 x 60	16	72 Hz	39.4 KHz
44	100 x 60	16	72 Hz	38.3 KHz
61	720 x 540	16	72 Hz	42.8 KHz
62	800 x 600	16	72 Hz	48.1 KHz
62	800 x 600	16	76 Hz	50.4 KHz
65	1024 x 768	16	70 Hz	56.9 KHz
67	640 x 480	256	72 Hz	39.4 KHz
68	720 x 540	256	72 Hz	42.8 KHz
69	800 x 600	256	72 Hz	48.1 KHz
6A	1024 x 768	256	70 Hz	56.9 KHz
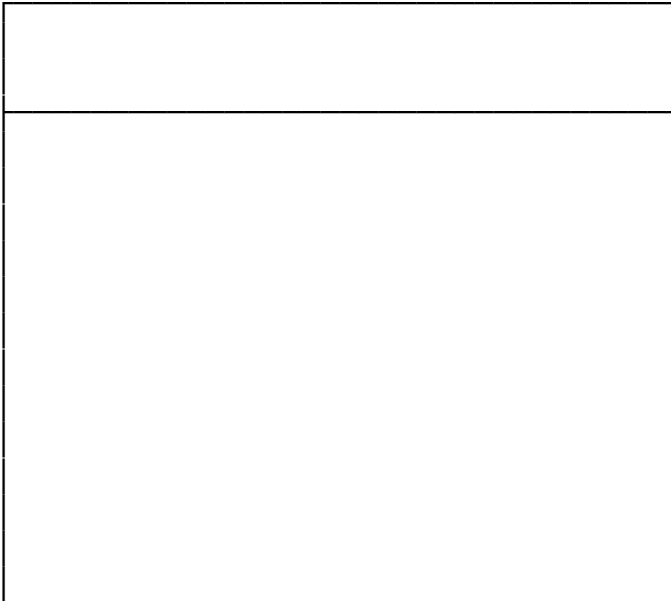
When setting an ergonomic mode be sure to choose one which falls within the timings your monitor is capable of. Modifications to the screen display can be made from within ALTPARM.

PROGRAMMER's INFOMRATION

Text And Graphics Modes

Modes are listed in hexadecimal notation.

512K DRAM Configurations:

Mode	Resolution	Colors	Monitors	Type
0.1	40 x 25	16	VFD,AD	Text
2.3	80 x 25	16	VFD,AD	Text
4.5	320 x 200	4	VFD,AD	Graphics
6	640 x 200	2	VFD,AD	Graphics
7	80 x25	4	VFD,AD	Text
D	320 x 200	16	VFD,AD	Graphics
E	640 x 200	16	VFD,AD	Graphics
F	640 x 350	4	VFD,AD	Graphics
10	640 x 350	16	VFD,AD	Graphics
11	640 x 480	2	VFD,AD	Graphics
12	640 x 480	16	VFD,AD	Graphics
13	320 x 200	256	VFD,AD	Graphics
40	80 x 43	16	VFD,AD	Text
41	132 x 25	16	VFD,AD	Text
42	132 x 43	16	VFD,AD	Text
43	80 x 60	16	VFD,AD	Text
44	100 x 60	16	VFD,AD	Text
45	132 x 28	16	VFD,AD	Text
60	752 x 410	16	VFD	Graphics
61	720 x 540	16	VFD	Graphics
62	800 x 600	16	VFD	Graphics
63	1024 x 768	2	ID	Graphics
64	1024 x 768	4	ID	Graphics
65*	1024 x 768	16	ID	Graphics
65+	1024 x 768	16	HVF	Graphics
66	640 x 400	256	VFD,AD	Graphics
67	640 x 480	256	VFD,AD	Graphics
68	720 x 540	256	VFD	Graphics
69	800 x 600	256	VFD	Graphics

1MB DRAM Configuration:

Mode	Resolution	Colors	Monitors	Type
6A*	1024 x 768	256	ID	Graphics
6A+	1024 x 768	256	HVF	Graphics

Monitors : AD - Fixed-Frequency Analog Display
VFD - Varianle-Frequency Display
ID - Interlaced Display
HVF - High Resolution VFD

*   Interlaced
\+   Non-interlaced

Appendix A
Operation and Maintenance

STATIC ELECTRICITY

When installing or removing any add-on card, DRAM module or coprocessor, you should discharge the static electricity on your body. Static electricity is dangerous to electronic device and can build-up on your body. When you touch the add-on card or motherboard, it is likely to damage the device. To discharge the static electricity, touch the metal of your computer. When handling the add-on card, don't contact the components on the cards or their "golden finger". Hold the cards by their edges.

KEEPING THE SYSTEM COOL

The motherboard contains many high-speed components and they will generate heat during operation. Other add-on cards and hard disk drive can also produce a lot of heat. The temperature inside the computer system may be very high. In order to keep the system running stably, the temperature must be kept at a low level. A easy way to do this is to keep the cool air circulating inside the case. The power supply contains a fan to blow air out of the case. If you find that the temperature is still very high, it would be better to install another fan inside the case. Using a larger case is recommended if there are a number of add-on cards and disk drives in the system.

CLEANING THE "GOLDEN FINGER"

Whenever inserting an add-on card to the motherboard, make sure that there is no dirt on the "golden finger" of the add-on card. If not, the contact between the "golden finger" and the slot may be poor and thus the add-on card may not work properly. Use a pencil eraser to clean the "golden finger" if dirt is found.

CLEANING THE MOTHERBOARD

The computer system should be kept clean. Dust and dirt is harmful to electronic devices. To prevent dust from accumulating on the mother-board, installing all mounting plates on the rear of the case. Regularly examine your system, and if necessary, vacuum the interior of the system with a miniature vacuum.

Appendix B
System Board Layout