THE ACCELERATOR 286
User's Manual

The Accelerator 286 is an internal option card designed to significantly enhance the performance of your IBM PC, PC/ XT, or compatible computer. The Accelerator 286 delivers faster performance than an IBM AT in computation intensive operations at a very reasonable cost.

The Accelerator 286 replaces your computer's 8088 microprocessor with an 80286 16-bit microprocessor (the same microprocessor used in the IBM AT and AT compatibles). The 80286 processor runs at a full 8 megahertz (MHz), as compared to the 8088's clock speed of 4.77 MHz. The Accelerator 286 also includes 8 kilobytes (K) of cache memory. Software applications can run up to seven times faster with the Accelerator 286. The Accelerator 286 is not known to be incompatible with any software or any IBM PC, XT or compatible system.

Your Accelerator 286 has several important features which ensure high performance and full compatibility.

- 80286 microprocessor
- Fast clock speed of a full 8 MHz
- 8K bytes of high speed zero-wait-state cache memory
- Support for 80287 running at 5 or 8 MHz
- Hardware switchable 8088 remains in system for full compatibility
- Automatic cache-disable during self-test for compatibility with most BIOSes
- Hardware switchable cache-disable

These features and more are explained in this manual. You should read the entire manual before you begin to install your Accelerator 286. In addition, if you have never installed option cards in your computer, refer to your computer's manual before proceeding.

ABOUT CACHE MEMORY

Cache memory consists of 8K bytes of random-access memory (RAM) on the Accelerator 286's 16-bit bus. This memory allows the Accelerator 286 to utilize the full potential of its 80286 microprocessor. Unlike the 8088, which is installed on an 8-bit bus and can access only one byte of memory at one time, the 80286 is a true 16-bit microprocessor installed on a 16-bit bus. This cache memory provides the 80286 with memory (for program instructions and data) that it can access at high speed with zero-wait-states one word (two bytes) at a time.

To insure full compatibility with a wide range of machines and system BIOSes, the Accelerator 286 cache memory is automatically disabled during the machine's self test. For the first two minutes after re-booting or switching to the 80286 using the toggle switch, you will not see a marked increase from the PC's "normal" speed. After this initial 2 minutes, high speed caching will begin.

INSTALLATION

Your Accelerator 286 is very easy to install. All you need is the card itself with attached ribbon cable, an IC chip puller and a sorewdriver.

Important: Do not remove the ribbon cable from the Accelerator 286. If for any reason you do remove the cable, first mark the Pin 1 end of the cable connector to ensure that you insert the cable connector correctly when you re-install the cable.

INITIAL STEPS

Turn the computer off and disconnect the power cord first from the wall outlet and then from the back of your computer. Remove the cover from the top of your system. The cover of the IBM PC and IBM PC-XT is secured by five screws in the back of the system (see the diagram—Removing the Cover). Some compatibles have different screw configurations or flip top covers (refer to the owners manual for your machine). Remove and retain the screws as they will be needed to close the back of the set after installation. Once the screws are removed, carefully slide the cover toward the front of the system to remove it.

The Accelerator 286 should go into the full length expansion slot closest to the 8088 socket on the motherboard. The connector ribbon cable length will govern which expansion slot can be used. Remove the retaining screw and dummy metal adaptor bracket from the back of the computer for the
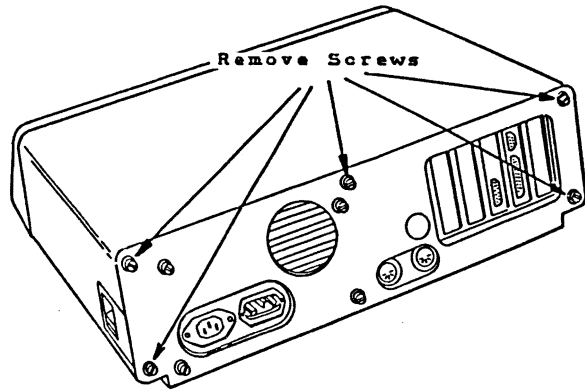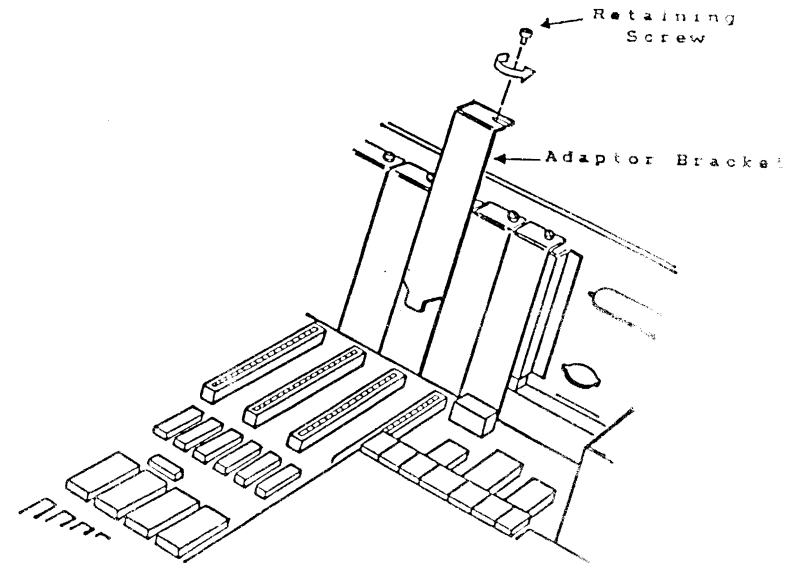
REMOVING THE COVER

appropriate expansion slot (see the diagram — Removing the Adaptor Bracket). Be sure to save the screw as it will be needed to fasten the Accelerator 286.

Remove the 8088 from your computer's "motherboard" and set it aside to be reinstalled on the Accelerator 286 card. Use an IC extractor or small screwdriver to pry first one end and then the other end of the 8088 chip loose. Do not pry the 8088 up at too much of an angle and take care not to bend any pins.

Remove the 8087 if it is installed in your motherboard. The 8087, if present, is normally located immediately to the right of the 8088 chip that you removed. If you have a 8087, you

must remove it whether or not you intend to install a 80287 math coprocessor on the Accelerator 286. Use the IC extractor to remove the 8087 following the same steps as removing the 8088.

If you will be using an 80287 math coprocessor chip, read the section entitled Using The 80287 with Your Accelerator 286 following these installation instructions. Otherwise, continue to the next section.


REMOVING THE ADAPTOR BRACKET

REINSTALLING THE 8088

Your Accelerator 286 offers the unique and valuable feature of allowing you to keep the 8088 on the Accelerator 286 board for full compatibility with speed dependent programs which cannot run at the high speed of your Accelerator 286. To run these programs, toggle the upper switch "down" for PC speed 8088 mode. For more information about the use of the 8088 switch, see the section entitled — Switches. The 8088 should be installed into the socket labeled U8 on your Accelerator 286. The 8088 socket is located one row below the 40 pin ribbon cable, just below and to the left of the top switch (see the diagram — Accelerator 286 Layout). When installing the 8088 match the dot or notch on one end of the 8088 with the notch on the left side of the socket of the Accelerator 286 (assuming you are looking at the Accelerator 286 as shown in diagram — Accelerator 286 Layout). The 8088 must be pointed in the correct direction or you could destroy the 8088 processor ·and damage your Accelerator 286. Make sure all of the pins are lined up with their corresponding holes in the socket and press down gently but firmly using a slight rocking motion, being careful not to bend any pins. If any pins are bent, remove the 8088 and gently straighten them because the pins can only be flexed a few times before breaking.

CONFIGURING THE ACCELERATOR 286 CARD

Next, set jumper J7 located at the lower left hand side of the card in the "up" position if your computer is an IBM PC or PC compatible or in the "down" position if your computer is an IBM XT or XT compatible (see the diagram—Setting

ACCELERATOR 286 LAYOUT
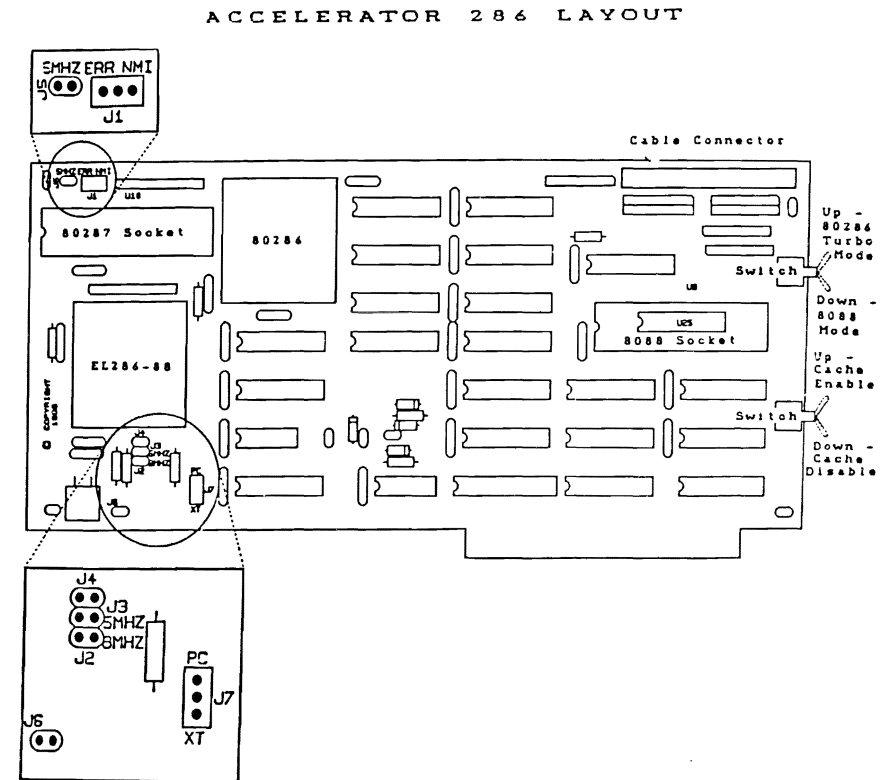
the PC-XT Selector Jumper). This jumper consists of 3 pins and 1 jumper clip. For insturctions on setting these jumpers, see the section entitled Jumper Settings.

There are 2 switches located on the back plate of your Accelerator 286. These switches are used to ensure full compatibility with all software and system BIOSes. For full Turbo operation, both the upper and the lower switches should be set in the "up" position. (More information about the functions of these switches is provided in the section entitled Switches.) For installing the Accelerator 286, put both switches in the "up" position now (see the diagram—Accelerator 286 Layout).

SETTING THE PC-XT
SELECTOR JUMPER

For PC
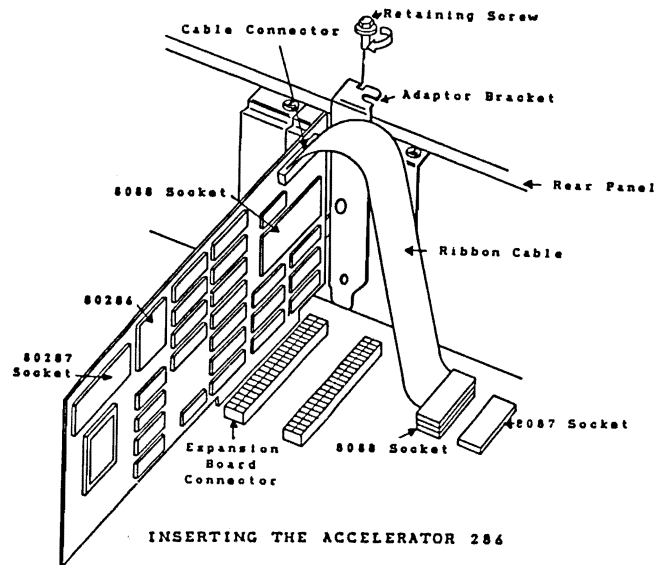Installation

For XT
Installation

PC

PC

J7

J7

XT

XT

INSERTING THE ACCELERATOR 286

The ribbon cable should arrive from the factory connected to the cable connector of your Accelerator 286. If it is not connected, it should be connected to the 40 pin cable connector on the Accelerator 286 so that there is not a twist in the cable after the other end is installed in the 8088 socket.

Insert the other end of Accelerator 286 ribbon cable connector into the empty 8088 socket. Make sure that the pins match up exactly to the holes in the socket which the 8088 came from. Do not twist the ribbon cable and do not insert it en it into the 8087 socket.

You now install the the Accelerator 286 card by lining up the card with the Accelerator 286's mounting bracket toward the

rear of the system unit as shown in the diagram — Inserting the Accelerator 286. Using two hands, grasp each end of the card and, using even pressure, push the card's gold-finger connectors straight down into the expansion slot. Be sure that you have inserted the card completely and securely into the slot. Then secure the mounting bracket with the screw from the dummy bracket. Make sure that the air flow through the computer is unrestricted to permit proper cooling of the Accelerator 286. Replace the system unit cover and reconnect the power cord.

INSERTING THE ACCELERATOR 286

OPERATION

The Accelerator 286 is now installed and you are ready to run your IBM PC, PC/XT or compatible computer at AT speeds. Turn on your computer and run any program to verify that your Accelerator 286 is functioning correctly. If you have installed an 80287, run any program that uses it to verify that the 80287 is also running correctly. If you have any problems, see the section entitled Trouble Shooting in this manual.

The Accelerator 286 does not need software or special procedures to operate. With the Accelerator 286 installed, your system will work just the way it did before, only faster.

USING THE 80287 WITH YOUR ACCELERATOR 286

The 80287 is a "math coprocessor" that speeds up many floating point operations. The following steps will enable you to install an 80287 math coprocessor on your Accelerator 286.

Insert the 80287 into the socket provided for it (U10) on your Accelerator 286. Pin 1 of the 80287 is identified by a small circle on the back of the chip. When you insert the 80287 chip into the socket, place Pin 1 at he lower left corner. The small notch at the Pin 1 end of the chip corresponds to a notch at the left side of the socket. Use these identifying marks to make sure you insert the chip correctly. Carefully align all of the chip's pins with the socket holes, and then press the chip gently into place, using a slight rocking motion if necessary. Be extremely careful not to

bend any of the pins, as this could damage or destroy your 80287. See the section entitled Reinstalling the 8088 for more detailed instructions on physically installing the 80287.

Your Accelerator 286 can run with either a 5 or 8 MHz 80287 math coprocessor. You must set the 80287 jumper to correspond to the speed of the coprocessor you are using. A 5 MHz 80287 is usually marked 80287 or 80287-3 and an 8 MHz 80287 is usually marked 80287-8. For instructions on how to set a jumper, refer to the section entitled Jumpers Settings.
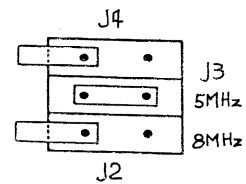
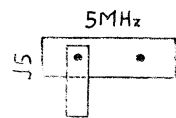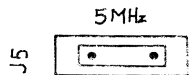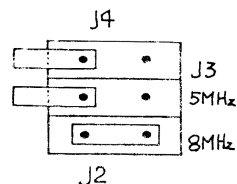| For 5 MHz 80287:	For 8 MH/ 80287:
Set J2 — OFF	Set J2 — ON
Set J3 — ON	Set J3 — OFF
Set J5 — ON	Set J5 — OFF

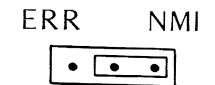SETTING THE 80287
SPEED JUMPERS

For 5 Mhz Operation   For 8 MH/ Operation

The Accelerator 286 is compatible with all 3 commonly used numeric processor error handling system: Non Maskable Interrupts (NMI), Numeric Processor Error (ERR), and software handling of errors. (A numeric processor error is caused by "illegal" activities such as dividing by zero.) Most software for the AT uses NMI. You should initially set J1 to the right for NMI. If this creates "Parity Error" or "Parity Check" messages to appear on your screen when using the 80287, switch the jumper to the left for ERR. If you continue to have problems, such as phantom characters appears on the screen while using the 80287, set J1 off.
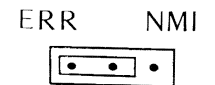
SETTING THE 80287 NUMERIC
PROCESSOR ERROR HANDLING JUMPER

SWITCHES

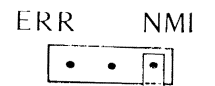80286-8088 Switch — In Turbo mode, the Accelerator 286 runs with the 80286 microprocessor operating at a full 8 MHz. However, there are a few application software programs that are speed dependent and will not work with the microprocessor running at 8 MHz. These software packages cannot run at the 8 MHz high speed of the 80286 in your Accelerator 286. (These programs cannot run on the IBM PC-AT or AT compatibles for the same reason.) To insure full compatibility with all application software, your Accelerator 286 has a toggle switch located in the back plate attached to the card. (It is the upper switch and is located on the outside rear of your PC after installation.) To run these speed dependent programs, turn off the power, toggle the switch down, turn on the power, and your PC will reboot in the slow speed mode (4.77 MHz with the 8088 operating). To return to the high speed 80286 mode, there is no need to turn off the power, just toggle the switch up and your Accelerator 286 will automatically reboot to the 80286 and run at a full 8MHz.

IMPORTANT NOTE: Whenever toggling between the 8088 and 80286 microprocessors, you must first save all data as the switch between microprocessors will reboot the computer and all unsaved data will be lost.

Cache Disable Switch — With cache enabled (SW2 "Up"), the Accelerator 286 runs programs in its cache memory for highest performance. There are, however, some situations in which you would not want the high speed cache to operate in

order to ensure compatibility. For example, while the Accelerator 286 is fully compatible with Lotus-Intel-Microsoft (LIM) Extended Memory Specification (EMS) for accessing more than 640K of memory, some non-standard extended memory systems may conflict with the cache memory. Similarly, some low level hard disk formatting, (which is usually performed by the manufacturer before shipment) and some older, floppy disk based copy protection schemes do not permit caching. In addition, if you run a diagnostic program to check your system's memory, you should disable cache memory to give the diagnostic program direct access to the system's main memory. In these situations, you can disable cache by using the toggle switch which is the lower switch on the outside rear of your PC after installation. The cache disable switch can be used to turn cache on or off while operating without rebooting or having to save your data. Please note that it takes approximately 2 minutes after you have toggled the switch "up" for cache to turn on.

JUMPER SETTINGS

To "set" a jumper refers to the pins that are inserted into and covered by the plastic jumper clip. For example to set a 2 pin jumper (eg J2), the jumper clip should connect the two pins. For a 3 pin jumper (eg J1), setting a jumper to the left means that you cover the left 2 pins and leave the rightmost pin exposed and setting a jumper to the right means that you cover the right 2 pins and leave the leftmost pin exposed. To turn a jumper "off" is to cover only one pin of the 2 (or 3) pins in the jumper group and leave the other pins exposed. This has the same effect as completely removing

the jumper clip but prevents losing the clip in case it is ever needed in the future.

J1 — For 80287 operation— set jumper to the left for ERR (Numeric Processor Error) and to the right for NMI (Non Maskable Interrupt). If no 80287 is installed, the jumper can be in any position.

J2 — For 80287 operation— Must be installed to run the 80287 at 8 MHz. Must be "off" to run the 80287 at 5 MHz. If no 80287 is installed, the jumper can be in any position.

J3 — For 80287 operation— Must be installed to run the 80287 at 5 MHz. Must be "off" to run the 80287 at 8 MHz. If no 80287 is installed, the jumper can be in any position.

J4 — For manufacturing test purposes only.

J5 — For 80287 operation— Must be installed to run the 80287 at 5 MHz. Must be "off" to run the 80287 at 8 MHz. If no 80287 is installed, the jumper can be in any position.

J6 — For manufacturing test purposes only.

J7 — For IBM PC or PC compatible, must be set in the up position. For IBM PC-XT or XT compatible, must be set in the down position.

J8 — For manufacturing test purposes only.

TECHNICAL SPECIFICATIONS

Microprocessor

80286-8 running at 8 MHz

80287 Math Coprocessor Compatibility

Accommodates optional 5 MHz 80287-3 (running at 5 MHz) or 8 MHz 80287 or 80287-8 (running at 8 MHz).

8088 Switchable

For compatibility with timing dependent programs.

Access Methods

Accesses system memory and performs system I/O operations by 8088 emulation through a ribbon cable to the 8088 socket on the main circuit board.

Cache

8K bytes of zero-wait-state memory on the board.

Cache Disable Switch

For low level have disk formatting, memory diagnostic testing, and full compatibility with all copy protection and expanded memory.

DMA Compatibility

Fully DMA compatible

Dimensions

5 inches x 9 inches