Product Support Bulletin

Subject: Equity/Apex Compatibility with the SOTA 386si

Date: 3/02/90   PSB No: S-0111
Page: 1 of 3   Originator: **KAS**

The purpose of this bulletin is to provide the 80386 Accelerator board test results, conducted by the Computer Product Support Center, involving the SOTA 386si from SOTA Technology, inc.

The Equity models tested were the Equity I, Equity II Equity I + and Equity Ie. The Apex models tested were the Apex, Apex Plus and Apex 100. All were tested with Norton Utilities and MS - DOS.

The table below shows compatibility and the Norton SI rating of the various systems.

Model	Norton SI	Compatibility
Equity I	12.0	Functioned normally with Norton Utilities and MS- DOS 2.11
Equity I+	12.0/16.9	Functioned normally with MS - DOS 3.3 and Norton Utilities at both CPU speeds.
Equity Ie	NA	Unable to boot at 10MHz. Performance erratic at 4.77MHz
Equity II	14.3	Functioned normally with MS - DOS 3.2 and Norton Utilities. (Tested only at 7.16MHz.)
Apex	15.9	Unable to boot at 4.77MHz. Functioned normally at 8MHz with MS - DOS 3.2 and Norton Utilities.
Apex Plus	11.5	Unable to boot at 9.54MHz. Functioned normally at 4.77MHz with MS - DOS 3.2 and Norton Utilities.
Apex 100	12.0/16.9	Functioned normally with MS - DOS 3.3 and Norton Utilities.

Installation of the board in most of the units was quick and simple to do when following the installation instructions accompanying the boards. Installation of the SOTA 386si in the Equity I and the Equity II is rather difficult. Due to the amount of disassembly required, we strongly recommend that only Authorized Service Centers install the board in the Equity I and Equity II.

<u>Installation Instructions</u>

Equity I

1. Remove the following from the main unit:
    a) upper case
    b) rear panel
    c) front panel
    d) FDD/power supply block.

2. Follow instructions for a standard installation for the SOTA 386si in an 8088 - based system.   Take care to fold the SOTA connector cable so as not to prevent reassembly.   The cable is sturdy and will tolerate being folded.

3. Reassemble the main unit and go through the testing and initialization procedure outlined in the SOTA manual.

Equity II

1. Remove the following from the main unit:
    a) upper case
    b) rear panel
    c) front panel
    d) FDD/power supply block.

2. Follow instructions for a standard installation for the SOTA 386si in an 8086 - based system.   Take care to fold the SOTA connector cable so as not to prevent reassembly. This will necessitate routing the cable so that it does not conflict with the power connection to the main system board. The cable is sturdy and will tolerate being folded.

3. Reassemble the main unit and go through the testing and initialization procedure outlined in the SOTA manual.

Our Computer Product Support Center receives numerous calls requesting information and recommendations on 80386 Accelerator boards for use with the Equity and Apex (8088- and 8086 - based) personal computers.

We have found that the SOTA 386si may meet your requirements and are competitively priced!

Although these boards were tested by qualified product support specialists, Epson America makes no representations that these third party products are compatible with all hardware configurations or software applications.

We recommend that you certify these products with your specific hardware and software requirements and consult with the third party vendor to ensure reliable operation.

SOTA Technology can be reached at:

SOTA Technology, Inc.
657 N. Pastoria Ave.
Sunnyvale, CA 94086
Phone: (408) 245 - 3366

Product Support Bulletin

Subject: Equity and Apex Series Compatibility with the System OmniBridge
           Controller and BridgeFiler External Floppy Drives

Date: 04/11/90   PSB No: S-0088B
Page: 1 of 3   Originator: KAS ⟨signature⟩

The purpose of this bulletin is to provide the results of compatibility testing
conducted by the Computer Product Support Center with the Sysgen
OmniBridge controller and Bridge - Filer external floppy disk drives.

<u>Model</u>	<u>Comments</u>
Equity I	The Equity I was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.
Equity II	The Equity II was found to be totally incompatible with the OmniBridge controller.
Equity III	The Equity III was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.
Equity I +	The Equity I + was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.
Equity le	The Equity le was found compatible with the OmniBridge controller. It was able to support only one external floppy drive, unlike the other models tested. The drive could be used as a high density (1.2Mb and 1.44Mb) or normal (360K and 720K) disk drive.

Equity II +   The Equity II + was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.

Equity IIe   The Equity IIe was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.

Equity III +   The Equity III + was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 144M) or normal (360K and 720K) disk drives.

Equity 386SX   The Equity 386SX was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 144M) or normal (360K and 720K) disk drives.

Equity 386/20   The Equity 386/20 was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.

APEX   The Epson APEX was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.

APEX +   The Epson APEX was found compatible with the OmniBridge controller. It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.

APEX 100   The Epson APEX 100 was found compatible with the OmniBridge controller.   It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.

APEX 200   The Epson APEX 200 was found compatible with the OmniBridge controller.   It was able to support one or two external disk drives (daisychained) together. The external drives could be used as high density (1.2M and 1.44M) or normal (360K and 720K) disk drives.

NOTE: The recommended switch settings for the OmniBridge controller are as follows:

            1-1 DOWN   2-1 DOWN
            1-2 DOWN   2-2 DOWN
            1-3 DOWN   2-3 UP
            1-4 DOWN   2-4 UP

         These settings select NO ADDRESS for the OmniBridge BIOS and allow it to coexist with the internal FDC of the computer in which it is being installed.   This way you do not need to disable the internal FDC or connect any cables from the OmniBridge to internal floppy drives. This was found to be a universal setting for all of the computers listed above as compatible with the OmniBridge controller.

Product Support Bulletin

Subject: Tape Backup System Test Results

Date: 6/13/89 PSB No: S-0087
Page: 1 of 2 Originator: MWT

The Epson America Product Support Center has recently tested four tape backup systems:

Archive VP - 150i	Internal, 150MB
Mountain Series 4000 FileSafe	External, 40MB
Tallgrass TG - 4060 +	External, 60MB
Tecmar QT - 60e	External, 60MB

The tape drives were tested on a variety of systems (please see the notes below). In all cases, the drive manufacturer's documentation was used as a guide to installation and operation. Note that for 8086/88 computers, the XT- type settings were used. For the 80286/386 computers, the AT- type settings were used. This is important for correctly configuring the host adapters or controller cards for IRQ, DMA and I/O port address.

Archive VP - 150i

> The VP - 150i was tested on the Equity II +, III + and 386/20. Due to the capacity and nature of the drive, it is not particularly suited for use in any of the 8086/88 computers. This was the only drive supplied with Unix/Xenix device drivers. It was tested under MS - DOS 3.3 and SC0 Xenix 286 System V version 2.2.1 with no problems encountered. The VP - 150i is also Novell tested and certified under the NetWare operating system.

Mountain Series 4000 FileSafe

> The Series 4000 FileSafe was tested on the Equity II+, III + and 386/20. Due to the use of a 16 - bit controller, it was not tested in any of the 8086/88 computers. It was tested under MS - DOS 3.3 with no problems encountered. A chapter is included in the tape software documentation on backup and restore operations on a local area network, including Novell.

Tallgrass TG - 4060 +

> The TG- 4060+ was tested on the Apex, Apex +, Equity I +,
> II +, III + and 386/20. It was tested under MS- DOS 3.2 and 3.3
> with no problems encountered. There is no documentation on LAN
> operations.

Tecmar QT - 60e

> The QT- 60e was tested on the Equity I +, II + , III + and 386/20.
> Testing was conducted under MS - DOS 3.3 with no problems
> encountered. The Tecmar documentation includes extensive
> information on installation and operation in a LAN environment.

General Notes

> Of the four units tested, the Archive and Tecmar drives offered the
> easiest installation. They also provided the best performance, with
> the Tallgrass drive giving the slowest disk-to-tape and tape -
> to- disk operations. All four drives were supplied with menu-
> driven tape utility software for the MS - DOS environment.
> Command-line and timed, scheduled operations are also
> available. As previously mentioned, the Archive drive also included
> device drivers for use in a Unix/Xenix environment, offering the
> greatest level of flexibility.

Please contact the manufacturers for additional information.

Archive Corporation
Data Storage Division
1650 Sunflower Ave.
Costa Mesa, Ca. 92626
(800) 237-4929

Mountain Computer, Inc.
360 El Pueblo Rd.
Scotts Valley, Ca. 95066
(408) 438-6650

Tallgrass Technologies Corp.
11100 West 82nd St.
Overland Park, Ks. 66214
(913) 492-6002

Tecmar, Inc.
6225 Cochran Rd.
Solon, Oh. 44139
(216) 349-1009

Product Support Bulletin

Subject: Apex / Apex Plus / Equity Series Keyboards

Date: 4/19/89
Page: 1 of 1

PSB No: S-0080
Originator: REM

The purpose of this bulletin is to provide information on the various keyboards used with the Apex, Apex Plus and Equity series computers and the part numbers of the keyboard subassemblies used with these keyboards.

The Apex and Apex Plus computer keyboards are to be replaced as whole units.

The Equity series keyboards are repaired to the subassembly level.   The Equity III keyboard PCB assembly is the only one that comes with the key top set attached.

Since some of the keyboards have the same model numbers, the difference can be determined by the FCC ID number in those cases.

The chart below provides a quick reference to determine the part number of the main keyboard PCB assembly, key top set, control logic subassembly, and keyboard cable.

Apex / Apex Plus

Model	Keyboard Unit
Apex	A265091A
Apex Plus	93553905410

Equity I, II, III

Model	Keyboard PCB Assy	Key Top set	Keyboard Cable
Equity I/II	Y145501001	Y145501021	Y144305000
Equity III	KAFLZ3AEPS1	attached	KACCL600UCA

Equity I +, II +, III+, 386/20

Model	Code	FCC ID	Keyboard PCB Assy	Control Board	Key Top set	Keyboard Cable
Q203A	AA	BKM9A8Q203A	Y127501001	attached	Y127501022	Y127501031
Q303A	AA	BMK9A8Q303A	Y127501001	attached	Y127501022	Y127501031
Q203A	A103A – AA	C9S4D7Q203A	Y163502001	none	Y127501022	Y163502020
Q203A	A103A-AA	C9S4DB4701	Y163504007	Y171501017	Y127501022	Y163504006

Equity Ie

Model	Code	FCC ID	Keyboard PCB Assy	Control Board	Key Top set	Keyboard Cable
E1160A	-	C9S4D84701- 201	Y163504007	Y171501017	Y171501007	Y171501006

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SERVICE   PRODUCT SUPPORT BULLETIN

PSB NO.: S-0065	DATE: 1/5/89	ORIGINATOR: REM	PAGE: 1 of 1

SUBJECT: DISABLING **THE FLOPPY** DISK **CONTROLLER IN EPSON COMPUTERS**

This bulletin covers the ability or inability to disable the floppy disk controller in the Epson computers.

COMPUTER	FDC CAN BE DISABLED	HOW
Equity I	No	
Equity II	No	
Equity III	Yes	CPU Board - Switch 2-3 off
Equity I+	Yes	CPU Brd - Jumper 1 in Position B
Equity II+ 10MHz 12MHz	No Yes	Multi-function Board - Jumper 2 in Position B
Equity III+	Yes	Multi-function Board - Jumper 1 in Position B - Jumper 2 in Position B
Apex	Yes	Motherboard - Remove Jumper El
Apex Plus	No	

Product Support Bulletin

Subject: Using Expanded Memory with Equity and Apex Computers

Date: 3/2/90   PSB No: S-0047C
Page: 1 of 6   Originator: KAS

Q1.   What is Expanded Memory?

A.   Conventional memory, managed by MS - DOS, is limited to 640K. In
       response to the need for greater amounts of accessible memory, the
       LIM EMS (Lotus/Intel/Microsoft Expanded Memory Specification) was
       introduced in 1984. EMS, version 3.2, provides usable memory
       beyond the 640K limit through "bank switching". The expanded
       memory is divided into 16K portions called "pages". The computer
       accesses these pages through a "page frame" or "window" which is
       64K of memory located between 768K and 896K in 80286 - based
       systems and between 800K and 960K in 8086 - or 8088 - based
       systems.   16K pages of memory are allocated for an application's
       use and the EMM (Expanded Memory Manager) handles the job of
       mapping the pages in and out of the page frame as they are
       needed. However, in order to make use of expanded memory, the
       software must be written to take advantage of the EMS. Software
       such as Lotus 1 - 2 - 3, Microsoft Windows and Borland's SideKick
       Plus make use of expanded memory. EMS is limited to 8Mb of
       expanded memory.

Q2.   What is EEMS?

A.   A superset of EMS, AQA EEMS (AST/Quadram/Ashton - Tate
       Enhanced Expanded Memory Specification) provides greater flexibility
       in the mapping of expanded memory. However, it also uses the
       technique of "bank switching" and has its own memory manager
       which accommodates such specially written software as Quarterdeck's
       DESQview. EEMS is also limited to 8Mb of expanded memory.

Q3.   What about the 155Mb RAM listed as the maximum for the Equity
         III +?

 A.   This larger amount of RAM is the maximum usable memory range
         for an 80286 microprocessor and generally refers to extended
         memory. Extended memory starts at the 1Mb boundary and extends
         out to 16Mb. As it requires a 24 - bit address to access memory in
         this range, extended memory is handled by the protected mode of
         the 80286. Examples of currently available software that can switch
         into protected mode to use extended memory are Framework II,
         AutoCAD, the VDisk RAM disk and Xenix OS.

Q4.   How does LIM EMS 4.0, the latest version, differ from the earlier
         version, LIM EMS 3.2?

 A.   EMS 4.0 supports up to 32Mb of expanded memory where EMS 3.2
         supported only 8Mb. EMS 4.0 has been changed to make it easier
         for applications to share expanded memory. In EMS 4.0, page
         mapping has been streamlined and new functions allow application
         programs to dynamically increase and decrease the amount of
         expanded memory allocated to them. In previous versions of EMS,
         the page frame was located in an unused 64K block of memory
         between 640K and 1Mb. EMS 4.0, subject to limitations in the
         system hardware, supports the page frame anywhere in the first 1Mb
         of memory. Before EMS 4.0, the page frame held four pages. Now
         you can define a page frame of up to eight pages in memory above
         640K. The size of the page frame is limited only by the amount of
         available memory.   There has also been a change to support the
         smaller than standard (16K) memory pages used by some expanded
         memory boards.

Q5.   Is EMS 4.0 compatible with my old expanded memory board?

 A.   The EMM 4.0 driver works with existing hardware. You don't need
         to buy a new expanded memory board. However, until you use
         applications that have been written to take advantage of EMS 4.0,
         you probably won't notice much improvement in performance over
         your older version.

Q6.   What memory expansion boards are compatible with the Equity I and Equity II?

A.   The following boards have been tested by Epson in the Equity I and II:

All Card w/MMU Multifunction All Computers, **Inc.**
Liberty PC   Quadram Corporation
Mini Magiccard (EV - 138)   Everex Systems, Inc.
AST SixPak Premium   AST Research
AST Rampage   AST Research

Q7.   What memory expansion boards are compatible with the Equity III?

A.   The following boards have been tested by Epson in the Equity III:

Grande Byte   STB Systems
Intel Above Board AT   Intel Corporation
Liberty AT   Quadram Corporation
AST Advantage   AST Research
AST Rampage AT   AST Research
AST Ramvantage   AST Research

Q8.   What memory expansion boards are compatible with the Equity I +?

A.   The following boards have been tested by Epson in the Equity I +:

64/256KB Expansion Option   IBM
Above Board PC (1985)   Intel Corporation
Fastcard IV (1.6)   Thesys

Q9.   What memory expansion boards are compatible with the Equity Ie?

A.   The following boards have been tested by Epson in the Equity Ie:

64/256KB Expansion Option   IBM
Quad Board II   Quadram
Fastcard IV   Thesys
RAMpage   AST Research

Note: The Intel Above Boards do not currently operate reliably with the Equity Ie.

Q10.   What memory expansion boards are compatible with the Equity II +
         and Equity Ill + (10MHz models)?

   A.   The following boards have been tested by Epson in the Equity II +
         and Equity Ill + (10MHz models):

         Advantage Premium   AST Research
         Rampage 286   *   AST Research
         Above Board 286   Intel Corporation
         Above Board 286 p/s   Intel Corporation
         Grande Byte   *   STB Systems
         Rio Grande   STB Systems
         Elite 16   Profit Systems

     * Will run at 8MHz, not at 10MHt.

Q11.   What memory expansion boards are compatible with the Equity II +
         and Equity Ill + (12MHz models)?

   A.   The following boards have been tested by Epson in the Equity II +
         and Equity III + (12MHz models):

         Rampage 286 Plus   AST Research
         Elite 16   Profit Systems
         Above Board Plus   Intel Corporation

   NOTE: Previously boards from Micron Technology were listed as compatible
         with the 12MHz models of the Equity II + and Equity III +. They
         have been removed from the list because Micron no longer produces
         ISA memory boards.

Q12.   How do you expand the memory of the Equity 386/20?

   A.   Memory expansion in the Equity 386/20 can be accomplished by
         adding SIMMs (single - in - line memory modules) to the CHET - RM
         board. Both 256K and 1Mb SIMMs are available from Epson
         America. The 256K SIMMs are sold in 1Mb kits and the 1Mb
         SIMMs are sold in 2Mb kits. Compatible third party 1Mb SIMMs are
         available from Matsushita, Toshiba and CDC Enterprises. You can
         also use third party memory expansion boards such as those listed
         above for the Equity II +/Ill +.

Q13.   Are there any guidelines to installing the SIMMs in the Equity
         386/20?

 A.   Yes, when SIMMs are installed to increase memory beyond 1Mb,
         they must be installed so that banks of SIMMs are installed as
         matched pairs.   See the matrix below:

Memory	Bank 0	Bank 1	Bank 2	Bank 3
1MB	4X256KB			
2MB	4X256KB	4X256KB		
4MB	4X256KB	4X256KB	4X256KB	4X256KB
4MB	4X1MB			
8MB	4X1 MB	4X1 MB		
10MB	4X1 MB	4X1 MB	4X256KB	4X256KB
16MB	4X1 MB	4X1 MB	4X1 MB	4X1 MB

         Note: Refer to PSB S - 0095 for 18MB RAM Setup information.

Q14.   Is there a driver supplied with the Equity 386/20 to allow the use of
         the extended memory as expanded memory?

 A.   Yes, the Equity 386/20 system software includes the device driver
         EEMM386EXE. This driver emulates LIM EMS 4.0 memory using
         the extended memory supplied by the additional SIMMs. It will
         support only the onboard memory above 1 MB, up to 15MB. This is
         the maximum memory that can be installed on the CHET- RM
         board. It will not support memory installed on memory expansion
         boards.

Q15.   Are there any expanded memory boards that are compatible with the
         Equity LT?

 A.   No, the option slots on the LT require a special connector. The
         hard drive controller and the LT cartridge modem are the only option
         cards currently available from Epson America.

Q16.   What expanded memory boards are compatible with the Apex by
         Epson?

 A.   The Above Board PC from Intel Corporation has been tested by
         Epson in the Apex.

Q17.   Are there any general guidelines for determining the chip speed to install on the memory expansion boards?

A.   Yes, if the CPU speed is 8MHz or less, use 150ns RAM chips. If the CPU speed is 10/12MHz, use 120ns RAM chips.

Q18.   Is there anything that should be kept in mind during the installation procedure for the memory expansion boards?

A.   Yes, when installing the memory boards in the Equity II + and Equity III + (12MHz models), remember that the bus speed is 12MHz. For example, the Intel Above Board 288 and Above Board Plus allow you to set up the bus speed and chip speed in their installation programs.

Q19.   What is meant by backfilling memory when using software such as DESQview?

A.   Backfilling is a function of many expanded memory boards which allows a portion of the board's memory to be used as conventional memory. In this way, you could turn a 256K system into one with 840K memory or more.   In certain situations, you may want to disable some of the computer's conventional memory and the use the memory on the expansion board (i.e. DESQview).

Q20.   Which Epson computers have memory settings that allow backfilling memory?

A.   The Equity I, Equity I +, Equity II + and Equity III + allow backfill. The Equity I comes with 256K standard and the Apex comes with 512K, thus allowing backfill. The Equity I + has DIP switch settings allowing system memory to be disabled to 256K or 512K. The Equity II+ and Equity III + have jumpers on the system memory boards to allow memory to be disabled to 256K and 512K.

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EPSON AMERICA INC.
SERVICE DEPARTMENT

PRODUCT SUPPORT BULLETIN

DATE: 1/26/88   NUMBER: S-0035
SUBJECT: USING THE PLUS DEVELOPMENT "HARDCARD" WITH THE APEX PC

The Plus Development "HardCard 20" is a single slot 20 MB fixed disk mounted on an expansion slot card, for use in IBM PC/XT and compatible computers. The unit employs controller circuitry from OMTI/Scientific Micro Systems, and uses 2,7 RLL encoding.

The HardCard has been found to be compatible with the Apex computer, but there has been some confusion among customers who are running through the installation procedures. This is due to the HardCard's special installation procedure which has been designed specifically for use with PC-DOS. Because of certain file name differences between MS-DOS and PC-DOS, the Plus install program will not run using the APEX MS-DOS.

The HardCard is shipped in a partitioned and formatted state, with a number of files included on it. The directory of files is as follows:

```
            INSTALL   EXE    47479    1-01-80    12:06a
            HCD       BAT       30    1-01-80    12:07a
            HCD1      BAT      128    1-01-80    12:07a
            HCD2      EXE    54769    1-01-80    12:07a
            HCD3      DAT    13440    1-01-80    12:07a
            HCD3      DIF      704    1-01-80    12:07a
            HCD6      SCR     4224    1-01-80    12:07a
            PREPARE   BAT      235    1-01-80    12:08a
            SHELL     BAT       18    1-01-80    12:07a
            LIGHT     COM      145    1-01-80    12:07a
            SOUND     COM      145    1-01-80    12:07a
            PATCHFMT  EXE    12670    1-01-80    12:08a
            INSTALL   DAT      425    1-01-80    12:06a
```

These files comprise the installation routine (INSTALL.EXE, INSTALL.DAT, PATCHFMT.EXE, PREPARE.BAT, and SHELL.BAT), the Plus Development fixed disk menu program (HCD*.*), and supplemental utilities (LIGHT.COM and SOUND.COM).

Please refer to the APEX MS-DOS manual for details on the **specific** command functions during the following installation procedure.

HARDCARD INSTALLATION - MODIFIED FOR THE EPSON APEX

1. After installing the HardCard in one of the option slots, boot the computer using the APEX MS-DOS disk in drive A:.
2. Enter SYS C: to transfer MS-DOS system to the HardCard.
3. Copy COMMAND.COM and FORMAT.COM from the MS-DOS diskette into the root directory of the HardCard.
4. Remove the MS-DOS diskette and insert a blank diskette in drive A:. Log onto C: and enter FORMAT A: to format the disk.
5. COPY all files from the HardCard to the formatted diskette. Label this diskette "Plus Utilities".
6. Remove the Plus Utilities diskette and press the RESET button on the APEX. The system should reboot from the HardCard.
7. Reinsert the Epson MS-DOS diskette, log onto drive A:, run FDISK to partition the HardCard for MS-DOS and then run SELECT to format the HardCard. When finished, remove the APEX diskette and reset the system. Ensure that the APEX boots from the HardCard.
8. Reinsert the Plus Utilities diskette. Copy all the files from the Plus Utilities diskette back into the root directory of the HardCard. Remove and store the diskette in a safe place.
9. Copy all files from the Epson Apex diskette(s) into the root directory of the HardCard.
10. Log into the root directory of drive C: and enter the command PREPARE. This will run a batch file that will create 16 empty subdirectories on the HardCard, into which applications software will later be loaded.
11. Also in this directory, rename the program SHELL.BAT to AUTOEXEC.BAT. This will cause the system to automatically load the Plus menu "shell" on bootup.
12. Finally, erase PATCHFMT.EXE, PREPARE.BAT, and INSTALL.* from the root directory of C:.
13. The HardCard installation is now complete. Test the system by rebooting - the Plus menu "shell" should run.

NOTE: The original Plus install program creates a floppy diskette containing the Plus files, as above, but also performs several other operations to make it what they refer to as the "REINSTALL" diskette. In PC-DOS systems, this Reinstall diskette can later be used for reformatting the HardCard. Using the modified APEX procedure, however, the "Plus Utilities" diskette that is created cannot be used as the Reinstall diskette. If an APEX user wants to reformat the HardCard, the user should use BACKUP to backup the contents, run SELECT to format, then use BACKUP to restore the files.

You may want to copy the LIGHT.COM and SOUND.COM utilities back to the HardCard, as these files control visual and audible signals that are used to indicate HardCard access. The visual indicator is a flashing "+" sign at the upper right of the display (defaults to ON), and the audible indicator is a buzzing sound (defaults to OFF).

EPSON

EPSON AMERICA INC.
SERVICE DEPARTMENT

PRODUCT SUPPORT BULLETIN

DATE: 12/14/87   NUMBER: S-0031
SUBJECT: Equity Series with Microsoft Word and Serial Printers

This bulletin is to inform you of a potential problem when using
Microsoft Word, certain Equity computers and a serial printer. The
situation exists on:

Equity I	BIOS rev. 2.21 or earlier
Equity I+	BIOS rev. 1.02
Equity II+	BIOS rev. 2.00
Equity III+ (10 MHz)	BIOS rev. 1.50 or earlier
Equity III+ (12 MHz)	BIOS rev. 2.00
Apex	BIOS rev. 1.00

When Word is configured to drive a serial printer via COM1 or
COM2, it will print a character every 1 to 2 seconds. A single line
of text may take up to a minute to print.
Word uses BIOS interrupt 14h (serial output) function 1 (send
character to port) for driving either COM port. The function number
is placed in the AH register and the interrupt called. On return, AH
is supposed to contain the line control status. However, AH is still
set to 1, indicating that a character is ready to be received. Word
then calls interrupt 14h, function 2 (receive character) and attempts
to receive the character. After 1 to 2 seconds, the routine times out
and transmission is resumed.

There are three methods of correcting this situation:

1)   If the printer supports hardware handshaking, redirect
      the printer output (MODE LPT1:=COM1:) and configure
      Word for LPT1. This works reliably with Epson printers
      or similar devices.

2)   Epson has developed a patch program (SERFIX.COM).
      This is a TSR that insures   that proper status is
      returned from INT 14h, function 1. This program is
      available   from   CompuServe   (Epson   and   Microsoft
      Forums) and the Product Support Center BBS.

3)   A revised ROM BIOS has been developed for 'the above
      systems. This   is a   limited release and will only be
      supplied on an as-needed basis.

Method 1 is the easiest solution. Method 2 is effective and is
recommended for individual users. Method 3 should be reserved for
large, multi-unit upgrades on an as-needed basis.

Please contact the Systems Support Group if you need additional
information.

EPSON

EPSON AMERICA, INC.

SERVICE   PRODUCT SUPPORT BULLETIN

SUBJECT: APEX PERSONAL COMPUTER - ANSWERS TO COMMON QUESTIONS

Q. Where can I obtain help regarding software or hardware questions on the Apex computer?

A. PFS First Choice applications software

Software Publishing Corp. provides the warranty and end-user support for the First Choice software. Please refer to Appendix "E" of the First Choice User's Guide for customer support information. The telephone number for PFS First Choice support is (415) 962-9002.

Apex Hardware and MS-DOS/GW-BASIC software support

Epson America Inc. provides technical support for questions regarding the MS-DOS/GW-BASIC (software) and the Apex computer, Apex printer and Apex monitors (hardware). Customers can obtain support by calling our Product Support Department 213 539-9955, or by writing to:

> Epson America Inc.
> Product Support Department
> 23610 Telo Ave.
> Torrance, Ca. 90505

Q. Where can I obtain warranty repair service for my Epson Apex products?

A. Epson America, Inc. has a network of Authorized Epson Customer Care Centers located in strategic locations across the country. If you require service you can call our toll free Consumer Information number at 1-800-922-8911 to locate the nearest Apex Service Center.

Q. What kind of printer can I use with the Apex?

A. The Apex comes standard with a parallel interface which is used to connect any printer or plotter with a standard parallel interface. A parallel printer cable (not included) is required to connect a printer to the computer.

Epson offers three outstanding printers from the ActionPrinter line of 9-pin and 24-pin dot matrix printers. The Apex80 is an 80 column printer and the T750 is a 136 column printer. Both have near letter quality print. The L1000 printer is an 80 column 24-pin printer with superb letter quality print.

Q. Does the Apex have a serial interface port?

A. An optional IBM PC/XT compatible serial board may be installed inside the Apex computer to connect a serial device such as a modem, serial mouse, serial printer or another computer. Many IBM PC/XT compatible serial boards are available through computer dealers. We recommended using a multifunction board in order to optimize the use of available option card slots. Epson offers a multifunction board (Epson Part No. AP-1030A-AA) which has a serial interface port, a game-port interface and a Clock/Calendar. The board is available from some Apex retailers or it can be purchased directly from Epson's Accessories Marketing at their toll-free telephone # 1-800-873-7766 and orders can be placed using your credit card.

Q. Can a hard disk drive be installed?

A. Yes, you can either replace the lower floppy disk drive with a half height hard disk drive or install a hard disk card. One nice thing about installing a hard card is that you keep both floppy drives which comes in handy for disk copying. In either case you will lose an option slot because the hard disk drive requires a separate hard disk controller card. We recommend a hard disk which draws 14 watts or less. Another thing which you must consider if you decide on using a hard card is the size (width) of the hard card. Most hard cards take up more than one slot, usually 1-1/2 slots, which means they will fit in one slot if the board next to them is a half length board. The Plus Development hardcards are very thin so they will fit no matter what type of board is in the adjacent slot. A less expensive 1-1/2 slot hard card which we have tested in the Apex is the Standard Brand Flashcard-20. We have heard reports from a few customers who have had difficulty in getting them operating correctly. Since we did not have a problem and we have spoken to other customers who have not had problems, we believe those who did have problems either had defective hard cards or did not have them installed correctly.

   Some hard disk manufacturers recommend that the computer have at least a 110 watt power supply. This is correct when installing them in an IBM PC/XT and many compatibles but Epson uses many custom low power LSI chips which leaves plenty of power for added peripherals with its 80 watt power supply. To be on the safe side we recommend using a hard disk which draws less than 12 watts. The Plus Development hard card only requires 8 watts of power.

   The most commonly used hard drive is the Seagate ST-225, 20MB drive. We recommend using a Western Digital (Model WD1002A-WX1) hard disk controller card as that model has been tested with the Apex. Customers have reported having problems with other cards such as the Western Digital XT-GEN board.

Q. What kind of floppy Disk drives does the Apex have and what
    kind of floppy diskettes should I use?

A. The Apex comes standard with two half-height, 5 1/4", 360KB
    floppy disk drives. Make sure to use only double-sided,
    double-density, soft-sector, 48 TPI floppy diskettes. The
    diskette boxes are usually marked DSDD or 2S-2D, Soft-Sector,
    48TPI. New blank diskettes must be formatted in the computer
    before being used.

Q. Can I use other types of floppy disk drives with the Apex?

A. 1.2MB, half-height floppy disk drives are not compatible with
    the Apex personal computer.

    The Epson 3.5", half-height, 720KB floppy drive (Epson Model
    code A112A-AA) has been tested with the Apex computer and is
    compatible (available from Epson computer dealers).

Q. Can I install a Math-Coprocessor chip and what type do I need?

A: A Math-Coprocessor chip is an option which speeds up the math
    functions used in many spreadsheet and math-intensive software
    applications. It can be bought at electronic parts retailers
    and computer stores (Epson America Inc. does not supply them).
    An 8087-2 Math-Coprocessor chip which runs at 8MHz is
    recommended for use with the Apex computer. An 8087 Math-
    Coprocessor may also be used but it will only operate reliably
    when the slower speed (4.77MHz) is selected. The Math-
    Coprocessor chip is installed in the socket provided on the
    Apex CPU board (the board which has the dip switches and
    parallel printer interface). The dip switches need to be set
    up to select the math-coprocessor according to the User's Guide.

Q. How can I increase the Apex RAM memory to 640K Bytes?

A. The Apex comes standard with 512KB of RAM memory which is
    suitable for most applications. The memory can be expanded to
    640KB by adding additional RAM memory chips to the CPU memory
    (piggyback) board in the empty sockets provided. Four 4464
    150ns. RAM chips are required. Epson does not supply these
    chips' directly but they are available from electronic parts
    retailers. They can also be ordered from mail order sources
    which advertise in computer magazines such as PC Magazine. You
    should be certain to order the 4464 type (150ns) RAM chips as
    there are other types of 64K RAM chips which will not work.

    Since this is not the standard configuration of the Apex as it
    is offered, Epson will not provide warranty support of this
    upgrade. If service is required, these RAM chips should be
    removed before returning the Apex for repair.

Q.   Can I use the Apex Monochrome Monitor with other IBM-PC compatible computers?

A.   The Apex 12" Monochrome monitor uses a composite video signal using an RCA type connector which is compatible with the video board supplied with the Apex computer. We have not tested it with other video boards but it should operate reliably with boards providing a composite video output.

Q.   Can I use the Apex color monitor with other IBM-PC compatible computers and what are the specifications?

A.   The Apex color monitor is an IBM-PC compatible, 16 color, RGB, dual function monitor which can be set up for either color or green screen mode with a switch on the rear panel. It has a 640 x 200 (black and white) or 320 x 200 (4 color) graphics dot resolution. It can display 16 colors in 80 column x 25 row text mode. The dot pitch is .52mm

Q.   What other monitors are compatible with the Apex and is it possible to use a television set?

A.   IBM-PC compatible RGB color or composite monochrome monitors work with the video board provided with the Apex computer. Composite color monitors will only display shades of gray.

     IBM compatible EGA monitors can also be used if an EGA video board is installed (available from computer dealers).

     IBM compatible TTL monochrome monitors may be used if a monochrome graphics video board is installed (available from computer dealers). The Apex video board does not support TTL monochrome monitors.

     A standard television set cannot be used with the Apex, although there are some new TV sets being manufactured which can also be used as computer monitors with the proper interface card. Check with the dealer to be sure. We have not tested any.

Q.   Where can I get software for the Apex computer?

A.   Epson America, Inc. does not supply software other than that which is bundled with the unit as sold. You can use virtually all IBM PC/XT compatible software available at stores which carry software.

Q.   Can I use an IBM enhanced style keyboard with the Apex?

A.   Yes, an IBM compatible enhanced style keyboard can be used. Dip switch 1 must be set to the off position. We have tested the Datadesk Turbo 101 keyboard with the Apex and it works fine.

Q. How many option cards can be installed in the Apex?

A. The Apex has three available option (expansion) slots as delivered, one of them is occupied by the included video adapter board. The expansion slots can be used for a wide variety of IBM PC/XT compatible (8-bit) option cards. In order to optimize the use of these option slots, it is recommended that a multifunction type option board be used, as well as, single slot hardcards and external modems which connect to a serial interface port.

Q. What kind of option cards are available for the Apex computer and where can I buy them?

A. In general, any IBM PC/XT compatible option board should work in the Apex computer. We suggest visiting a computer retail store to see a wide range of products too extensive to list. The products must state specifically that they are IBM PC/XT compatible. Since there are many different manufacturers it is impossible for us to test all option boards available to make sure they are all compatible. We recommend that people make sure to purchase boards from a dealer who will exchange the board if for some reason it is not compatible. In order to make the best use of the option slots available it is recommended to use a multifunction type card with clock/calendar, serial port and game port. Epson offers a multi-function board for the Apex computer (Model code AP1030) which can be ordered from Epson Accessories Marketing. They can be contacted at their toll-free telephone # 1-800-873-7766 and orders can be placed using your credit card.

Q. What kind of mouse works with the Apex?

A. There are many IBM PC compatible mice which will work with the Apex. Some come with their own interface boards which take up an option slot. A serial mouse can be used with the Epson Multifunction board. See your local computer dealer for more information.

Q. What kind of joystick can I use with the Apex and where do you connect it?

A. There are many IBM compatible joysticks available and some have different types of connectors. The joystick connector must match the connector type on the board it is being used with. An IBM compatible joystick with a 15 pin IBM compatible connector must be used with the Epson Multifunction board. We recommend using the Kraft Premium joystick as we have tested it with the Apex using the EPSON Multifunction board.

Q. What type of modem can be used with the Apex?

A.   IBM PC/XT compatible internal modems can be used as well as
external modems which connect to a serial interface port.
A serial interface board or multifunction option board must be
installed to use an external modem Epson manufactures both
types of modems which are available from Epson computer dealers.
The Epson Link 1200 external 1200 baud modem (Epson P/N C202A-A)
and the Epson Link 1200-PC internal modem (Epson P/N C203A-A).

Q. My computer would not work when I set the dip switches as
described in the User's Guide but it worked when I set them in
the opposite setting.   Why?

A. An error was made in the original Apex User's Guide, Appendix A,
page A-2, for setting the dip switches. The book indicates that
the switches are OFF when set to the right.   The switches are
actually ON when set to the right.   The Table (A-1) on page A-3
is correct.   An errata sheet has been placed in the manuals
since this error was discovered.

Q: I can't find some of the programs referred to in the MS-DOS
3.2 manual on the MS-DOS diskette. Where are they?

A.   The GW-BASIC diskette contains many of the utility programs
which are referred to in the MS-DOS manual.

Q. Will my Apex work in foreign countries?

A. The Apex computer can be used in both the United States and
internationally simply by selecting the appropriate input
voltage on the voltage selection switch located on the rear of
the unit.   The Apex will operate on either 115VAC or 230VAC at
50/60 Hz power.
One thing to be aware of,   if taking an Apex overseas,   is that
the voltage on the power outlet on the rear of the computer is
the same as the input voltage of the computer. If you have a
monitor or other device plugged into this outlet make sure it
is capable of operating on the same voltage and frequency that
the computer is connected to. Most monitors and printers are
not set up to operate on dual voltages and will be damaged if
plugged into the wrong AC voltage. This applies to the Apex
monitors and printers as well.

SUBJECT: EPSON 3.5" 720KB FLOPPY DISK DRIVE COMPATIBILITY

The purpose of this bulletin is to provide information regarding the compatibility of the Epson 3.5", 720KB floppy disk drive (Product Code A112A-AA) with the Apex and Equity series computers.

The 3.5" floppy disk drive must be used with MS-DOS 3.2 or higher.

Please refer to the following table for compatibility information.

Apex	No special setup required
Equity I	Not supported
Equity II	Must include DRIVPARM = /D:1 /F:2 in CONFIG.SYS
Equity III	Not supported*
Equity I+	No special setup required
Equity II+	No special setup required
Equity III+	No special setup required

The Epson 3.5" floppy disk drive is not compatible with the Equity I or the Equity III.

* Manzana Microsystems Inc. offers a 3.5", 720KB floppy disk drive which is compatible with the Equity III computer when used with their 3FIVE device driver.

Refer to Product Support Bulletin # S-0027A for detailed information on using the DRIVPARM command to configure Equity II systems for using the 3.5" floppy disk drive.

Product Support Bulletin

Subject: Apex Computer - 640KB Memory Upgrade Procedure

Date: 6/7/89   PSB No: S-002212A
Page: 1 of 2   Originator: REM

The Apex by Epson comes standard with 512KB of RAM memory. This can be
expanded to 640KB by installing additional RAM chips on the Apex memory
(piggyback) board in the I.C. sockets provided. The memory board is attached to
the CPU board. This upgrade requires 4 each 4464, 21464 or 41464 (4 x 64)
DRAMs (150ns) which are available from Epson's Accessories Marketing department
(Tel. # 800 - 873 - 7766) and should also be available at local electronic component
suppliers.

                        INSTALLATION   INSTRUCTIONS

1. Refer to section 5 of the Apex User's Guide (Installing Option Cards) for
   information on removing and replacing the Apex top cover. Ensure that the AC
   power is disconnected from the unit.

2. After the top cover is removed, unscrew the CPU board retaining screw and
   disconnect the 5 connectors which are attached to the top of the CPU board.
   Note the positions of the connectors for later reconnection. Refer to figure
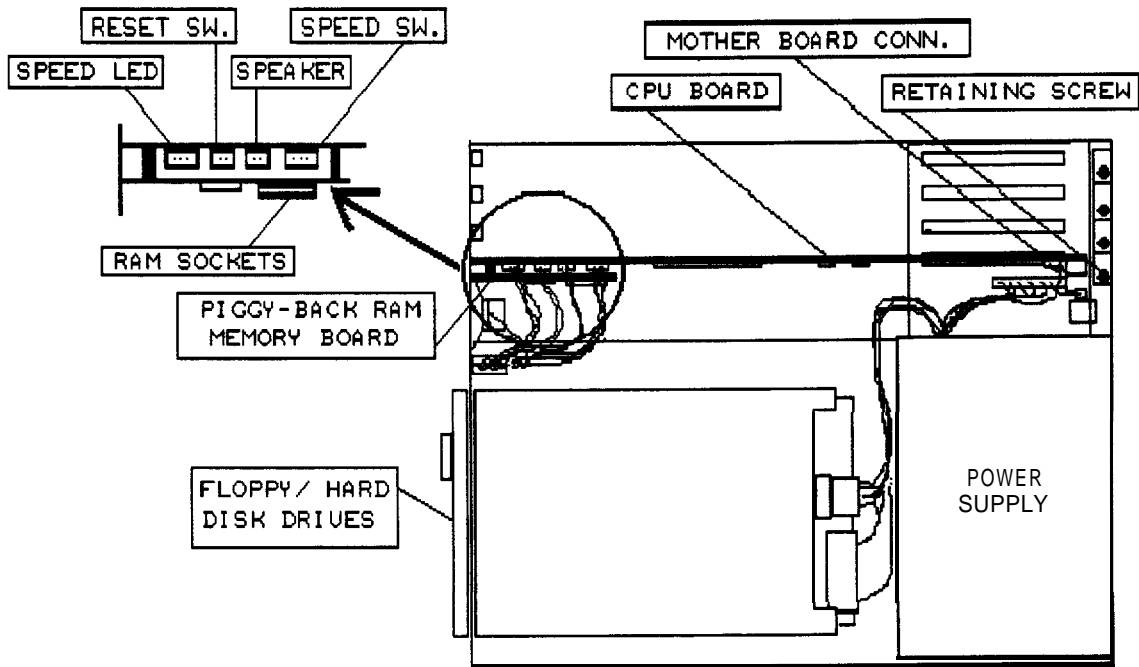   1 for details of board and connector locations.

Figure 1

3. Carefully pull up and remove the CPU board and place the board on a static free material with the component side up.

4. Insert the four RAM chips in the empty I.C. sockets marked U9, U10, U11, and U12 on the memory board.   Be sure to insert the RAM chips in the same direction as the existing RAM chips with pin 1 toward the rear of the board. Check to be certain that all chips are properly seated and that none of the pins are bent.   Refer to Figure 2 for RAM chip locations and installation direction.
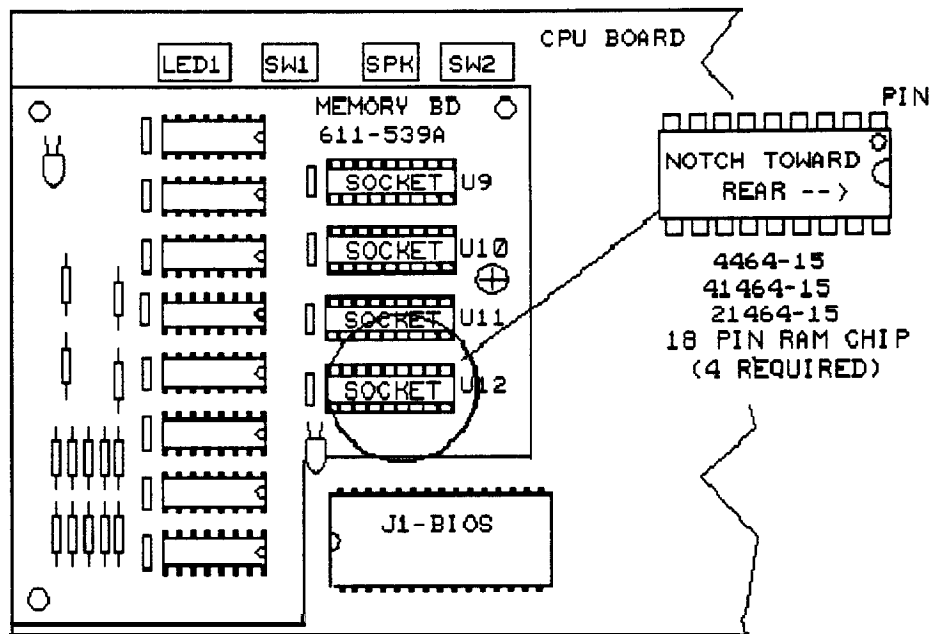

Figure 2

5. Reinstall the CPU board into the Apex motherboard (slot closest to the power supply). Reconnect the 5 connectors and board retaining screw then install the top cover.

6. Set the dip switches on the CPU board (See Section A- 3 of the User's Guide) for 640KB. Switch 3 and 4 should be set in the off position. Also check the other dip switch settings to make sure they have not been accidently changed during the upgrade.

7. Power on the Apex system and check operation. The display should indicate "640KB OK' upon initial self test.

Upgraded Apex CPU boards or Memory boards requiring service should be returned with the factory memory configuration (512KB).

The Epson Limited Warranty covers the Apex computer product as purchased. It does not cover failures caused by improper installation of circuit boards, modifications, or failures due to components which are not factory installed.

E P S O N

EPSON AMERICA INC.
SERVICE DEPARTMENT

PRODUCT SUPPORT BULLETIN

DATE: 12/2/87 NUMBER: S-0019B

SUBJECT: EQUITY SERIES/APEX MATH CO-PROCESSOR SELECTION GUIDE

The purpose of this bulletin is to assist in selecting the appropriate numeric co-processor for use in the Epson Equity series computers and the Epson Apex computer.

Use the following table to determine which type of Numeric Co-Processor is recommended for the corresponding computer.

EPSON COMPUTER	CPU SPEED	NUMERIC CO-PROCESSOR	NXP SPEED
Equity I	4.77MHz	8087	5 MHz
Equity I+	4.77/10MHz	8087-1	10 MHz
Equity II	4.77/7.16MHz	8087-2	8 MHz
Equity II+	8/10MHz	80287-8	8 MHz
Equity III	6/8MHz	80287-6	6 MHz
Equity III+	6/8/(10/12)MHz*	80287-8	8 MHz
Apex	4.77/8MHz	8087-2	8 MHz

* Product enhanced with increased CPU speed of 6/8/12Mhz starting with all units manufactured in the U.S.A..