INSTRUCTIONS FOR APPLE BUBBLE MEMORY OPERATION WITH CP/M

OVERVIEW

The CP/M patch discussed below was developed on an Apple II plus using a Microsoft Softcard with CP/M version 2.23.

For the Apple Bubble to work under CP/M, a patch must be made to the CP/M operating system. The main body of the patch is a subroutine located in the I/O Configuration Block (IOCB) user patch area for the PUN: and RDR: (0F280H-0F300H Z80), while the rest consists of a jump to this subroutine placed at the beginning of the normal floppy disk RWTS routine. Once the operating system is patched and rebooted, the bubble disk can be accessed, and should first be initialized with a program that erases the bubble disk and then adds a file that prevents writing to tracks 20H-22H that do not exist on the bubble.

EPROM INSTALLATION

The EPROM on the Apple Bubble should be replaced by the EPROM version 3.00 provided with this CPM kit. This EPROM has all the same routines as version 2.10, but, in addition, has CP/M bubble bios routines at the last jump address in the jump table at C800H of the slot expansion area of the bubble disk. Before removing the older EPROM note which end of the EPROM package is notched and insert the new EPROM in the same orientation. Please take precautions against electrostatic discharge when handling the EPROM, preferrably working on a grounded or antistatic surface when making the change.

BUBBLE BOARD INSTALLATION

With the POWER OFF, insert the bubble disk in SLOT 5 of the Apple computer and the floppy disk controller in SLOT 6. Place a copy of a CPM system disk in drive A and turn the power on. Upon bootup, note whether the system is a 44K or 60K version which is indicated by the normal CPM greeting before the prompt.

PATCHING THE OPERATING SYSTEM

The floppy disk provided with CP/M bubble patch kit has the following files:

        BUBPAT44.SUB
        BUBPAT60.SUB
        BUBPAT44.BAK
        BUBPAT60.BAK
        BUBINIT.COM
        BUBINIT.ASM

BUBPAT44.SUB or BUBPAT60.SUB are SUBMIT files that are to be used to patch a 44K or 60K system disk respectively. Transfer

the appropriate file to the CPM system disk to be patched in drive A. This patch depends on the SUBMIT.COM and PATCH.COM files provided with CPM to also be present on the system disk. The patch file can be viewed with the TYPE command. It consists of two calls of the PATCH.COM program. The first call patches the sector on the system disk that ends up in the IOCB user patch area. This patch is the same for the 44K and 60K system. The second call patches the sector with the RWTS routine. Although the patch code is the same, a JSR 0280 in 6502 code, it is in a different place in the 44K and 60K versions. The apropriate patch can be now run with the command:

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A>SUBMIT BUBPATXX
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Before applying the patch, the PATCH.COM program checks whether the bytes to be patched correspond to those specified in the patch command. If they do not agree, a "verification error" message will be displayed and the patch will not be made. This could mean that the system disk is the wrong version of CPM or that the IOCB user patch area is being used for other purposes. In the latter case, it is possible to use one of the other two IOCB user patch areas to store the patch subroutine. The two files, BUBPAT44.BAK and BUBPAT60.BAK, will place the patch in the IOCB user patch area at normally reserved for the LST: at F200H-F27FH. To use these instead, the extension BAK must be changed to SUB after changing the extension of the current SUB files to something else.

After a successful patch to operating system on the system disk, it is necessary to turn off the computer and then turn it back on to reboot the patched operating system.

INITIALIZING THE BUBBLE DISK

With the Apple bubble in SLOT 5 and the operating system patched and rebooted, it is first necessary to initialized the bubble sectors. This is done with the BUBINIT.COM program on the supplied floppy disk. Run the program:

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A>BUBINIT
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The bubble disk will buzz for several seconds as the sectors are all erased by filling them with the byte E5H. The last thing this program does is make an entry to the directory of the dummy file, NOTRACKS.MTY, which prevents the tracks 20H to 22H from being used. This file has the attributes R/O and SYS so it will not be seen in the directory and cannot be unintentionally erased.

CPM BUBBLE OPERATION

The bubble disk will appear as drive 1 in the slot it is in, i.e., in slot 5 it is DRIVE C: and in slot 6 it is DRIVE A:.

The bubble disk will respond to the operating system commands just like a floppy disk.

If one desires to boot from the bubble disk, it is necessary to use the COPY command to load the operating system on the first three tracks. With the bubble disk in slot 5 and a patched CP/M system disk in drive A, the command:

    A>COPY C:/S

will transfer the system file to the bubble. The bubble disk will then be able to cold boot the operating system if it is in slot 6 when the power is turned on.

Note that if a floppy disk is copied to the bubble using the command, COPY d:=d:, the last three tracks of the floppy disk will not be copied because the bubble does not have these tracks. Also, the directory entry for the SYS file, NOTRACKS.MTY, will be erased so the operating system will not know that these tracks do not exist and will attempt to store data on these tracks. The exception to this is if the floppy to be copied to the bubble disk was previously copied from the bubble with this command. Then it will have the NOTRACKS.MTY in its directory protecting the last three tracks from being used for storage and thus no data is lost when it is copied back to the bubble.

PATCH RELOCATABILITY

The part of the bubble CPM patch that is in the BIOS area is relocatable so that it is alright to use the CPM60.COM program on a 44K CPM system disk that has been patched with BUBPAT44.SUB. The result is the same as using BUBPAT60.SUB on an unpatched 60K CPM system disk.