

FDOS Issues with the Peripheral Technologies FD-2 Disk Controller

The original operating system for the SWTPC MF-68 disk system was FDOS. I have found, however, that FDOS does not work properly with the Peripheral Technologies FD-2 controller. This is due to a difference in the way the 2797 IC on the FD-2 handles the “Force Interrupt” command when terminating a “Read Multiple” command as compared to the 1771 IC used on the SWTPC DC-x boards. The most obvious symptom of this occurs when issuing the FILES command on a disk with more than eight files in the directory. In this case, the FILES command gets stuck in an endless loop displaying the first eight files over and over.

FDOS uses Read Multiple (and Write Multiple) for all disk I/O – even if reading just a single 256 byte sector. When FDOS has read the number of bytes it wants, it issues a Force Interrupt command to the controller, waits for the controller to show “Not Busy,” and then continues processing. At this point, FDOS assumes the sector register in the controller IC has incremented the sector number by 1 from the sector number just read. This, in turn, is where the problem occurs. Upon receipt of the Force Interrupt command, the 1771 spends about 200us “cleaning up” the Read Multiple command – including incrementing the sector number – before it indicates “Not Busy” in response to the Force Interrupt command. The 2797, on the other hand, returns “Not Busy” almost immediately upon receipt of Force Interrupt – prior to it incrementing the sector register. The fact that the sector register has not incremented when the 2797 indicates “Not Busy” is what leaves the FILES command in an endless loop.

I implemented a patch for FDOS when running on the FD-2 controller that waits for the sector number to update before issuing the Force Interrupt command. The patch can be found at:

<https://deramp.com/downloads/swtpc/software/FDOS/Disk%20Images/Patches/>

FLEX 1.0 Issues with the Peripheral Technologies FD-2 Disk Controller

When using the FD-2 disk controller with FLEX 1.0, loading files (e.g., issuing a command) takes about twice as long as with the original DC-x controllers. Both the FLEX 1.0 and 2.0 disk drivers set the “E” bit in the 1771 command for every read and write. This forces a 20ms delay even if the head is already loaded and the head load timeout (HLT) has completed. However, with the 2797 controller IC used on the FD-2, the E bit delay is 30ms instead of 20ms. For FLEX 1.0, this extra 10ms results in a slipped revolution for every sector read and doubles file load times. Interestingly, FLEX 2.0 slips a revolution every time at both 20ms and 30ms and is half as fast as it could be with just a simple driver update.

I implemented a patch for FLEX 1.0 when running on the FD-2 controller that eliminates this slipped revolution. The patch executes as a normal FLEX command that can be put in the STARTUP.TXT file. The program can be found at:

[https://deramp.com/downloads/swtpc/software/FLEX/FLEX%201.0%20\(MiniFLEX\)/Programs/](https://deramp.com/downloads/swtpc/software/FLEX/FLEX%201.0%20(MiniFLEX)/Programs/)