

# Installation of PT-SS30-IDE for SWTPC 6809 with 16 addresses per IO slot

## General Notes

Last updated 05/18/24

These instructions assume that your computer is configured and you get the monitor prompt.

A modified S-BUG has a "W" command added to boot from the SD board.

Some versions of FLEX are case sensitive. FLEX 3 is not case sensitive.

When FLEX pauses when listing to the screen, hit the space bar or try control "S".

S-BUG generally works with upper or lower case, but there are still a couple of places where lower case does not work.

OS9 will boot from the IDE if no floppy diskette is inserted.

The PT-SS30-IDE plugs into the Slot 6 (0-7 numbering).

The address of the IDE interface as used by OS9 and FLEX drivers is E068-E06F. E060-E067 is a multiple mapped copy of E068-E06F.

Only one of the 40 pin IDE connectors on the SS30-IDE can be used at a time.

## Configure the SS30-IDE Board

Set JP3 and JP5 to the 16 position. This configures the board for 16 addresses per slot.

## Install the SD/IDE adapter

Plug the SD/IDE adapter in connector JP6. Depending on the type of connector used on J6 it could be possible to possible to plug the SD/IDE adapter in shifted either left or right. Even though the connector is keyed, you can still plug the board in shifted left or right by one pin.

## Power for the SD/IDE adapter

The SD adapter plugs into the SS30-IDE board. No power cable is needed for SD/IDE adapters supplied by Peripheral Technology. The PT supplied boards were modified to supply power through the 40 pin connector. You will need to connect a power source to one of the power connectors for all other SD/IDE boards. Please note that the power LED will still light even if you don't plug power to the SD/IDE board, but the board will not function. If you should ever use the other IDE connector, it will be necessary to provide power to the SD/IDE card. The power connector on the SS-30 IDE can be used for this purpose. It may also be used to power an unmodified SD/Adapter or power a GoTek floppy emulator. It does not provide enough power for a real floppy drive.

## Boot ROMS

For most MP-09 boards it will be necessary to install a pair of boot ROMS for either OS9 or SBUG. You will have to swap the EPROMs to switch between SBUG/FLEX and OS9. Some MP-09 boards have been modified to support 2732's with a switch to select between the upper half and lower half of a 2732. This would allow for SBUG and OS9 to be selected by the switch on the processor board. Later Peripheral Technology MP-09 reproduction processor boards have a toggle switch in the upper left corner of the board. Should you have one of these boards you will be able to switch between SBUG and OS9 by flipping the switch.

## Booting From SD

You will need a pre-load SD card or you will need to format an SD memory card and install FLEX and/or OS9 to the SD memory card. Other instruction sheets cover the transfer of FLEX or OS9 to the SD memory card. FLEX and OS9 can reside on the same SD memory card. The first 4GB is reserved for FLEX; the remainder of the space is reserved for OS9. FLEX can have up to 256 16MB partitions, and OS9 can have up to 8 4GB partitions. Your partitions don't have to be the maximum size. You can format each partition any size you wish.

## FLEX

A floppy controller must be installed for the IDE to work. You don't have to have a drive connected to the floppy controller. The combined HD/floppy driver will hang if it does not find a floppy controller during the startup process.

The "W" command will boot FLEX. There is a few seconds lag before FLEX loads.

FLEX Drive numbers:

- 0 - HD Boot Partition - 16MB - Partition 0
- 1 - HD Partition 1 - Contains SD BASIC and support files
- 2 - Floppy - Hardware Drive select 0
- 3 - HD Partition 2

Should you boot from a floppy with SD drivers you may read /write to an SD card for a 6800. The arrangement of data on the SD card for FLEX2 or FLEX9 is the same. The 6800 SD memory card does not have any data beyond the first 4GB.

## FLEX IDE Information

Partitions are always allocated as 16MB . You may format a smaller size within the 16MB space, but partitions are always on 16 MB boundaries. Number of cylinders can be between 2 and 256. 256 cylinders gives approx 16MB of user space.

Only half of the 512 byte sector is used. The other half is discarded. It's too processor intensive to block/unblock the extra 256 bytes in a 512 byte sector.

FLEX with IDE drivers uses 8 byte descriptors to describe each of FLEX's drives (0-3)

These descriptors are located at \$DE22 - \$DE41.

Look at DESHDFD.txt for a description. For an IDE descriptor only these bytes matter:

0 - not equal 0 for a HD, 0 = FLOPPY  
1 - Drive select      0=master 1=slave  
7 - partition number beginning with 0

Currently only 256 partitions are supported but more could be added. Bit 6 in descriptor is reserved for this purpose. It would take a rewrite of the HD drivers to implement this.

The source code for FORMAT, NEWDISK, various descriptors, floppy and HD drivers are located on drive 0.

## "DRIVES" Utility

You can change the assignment of drives in FLEX with the drives command:

command line format:

report current settings

**drives**<cr>

hard drive assignments have 4 parameters

drive n t d p    n = logical drive  
                  t = type W or F  
                  d = physical strapped drive(0=Master,1=Slave)  
                  p = partition on hard drive(0-255)

floppy drive assignments have 3 parameters

drive n t d      n = logical drive  
                  t = type W or F  
                  d = physical strapped drive(0-3)

+++**DRIVES 3 F 1**      - will set drive number 3 to a floppy with floppy select of 1  
+++**DRIVES 3 W 0 4**    - will set drive number 3 to the SD card - Drive 0 - (Master) - Partition 4  
+++**DRIVES 2 W 0 99**   - will set drive number 2 to the SD card - partition 99

# OS9

## System requirements:

RAM - 0000-DFFF

EPROM E800-FFFF and F800-FFFF

6850 in slot 0 - E004

FD2, FD2A, DC4 or equivalent floppy controller

PT-146818 clock board in slot 5

**VERY IMPORTANT** - The floppy controller "ready mode" must be set to 6800. If you fail to configure the floppy controller for 6800 mode, the drive may give error 246 (Not Ready) and may have read and write errors.

**You will need to change this jumper back to 6809 mode to use FLEX.**

OS9 attempts to boot from floppy first. To boot from HD, unplug the USB memory stick for a GoTek or a diskette in a real drive. Should the boot from floppy fail, the bootstrap will then try to boot from HD. It takes between 5 and 10 seconds for the bootstrap to give up on booting from floppy before booting from SD Memory. Should the boot from SD fail there will be another attempt at floppy then on to SD. After a few attempts the system stops. The reset button must be pressed after correcting the boot issue typically by making sure the SD memory card is fully inserted, or selecting another image on the GoTek. You must either press the reset button or power down and power up the system after inserting an SD memory card.

After booting OS9 from SD memory card, these are the system descriptors:

/dd - default drive can be either floppy or HD depending on OS9Boot file

/h0 - 322580 sectors- about 85MB

/h1 - 322580 sectors- about 85MB

/h2- 322580 sectors- about 85MB

/h3- 322580 sectors- about 85MB

/d0

/term

Each hard drive descriptor /h0 ,/h1, /h2, /h3 is for a different partition on the same SD memory card.

OS9 will support up to 4GB per partition. The current descriptors provide about 85MB per partition.

There is some redefinition of OS9 Descriptor entries.

Drive number is the partition number - can be 0 to 8. The step rate entry is now the hardware drive number. 0=Master, 1=Slave. There is currently no checking for valid entries for the partition or Master/Slave select. The number of partitions is set by the drive count in the WD1002 driver. The WD1002 driver must be reassembled and a new version of OS9 made using OS9GEN should you change this.

If you want a 4GB partition use 500 tracks, 256 sectors/track, 256 heads per track for the descriptor. User option /32/ in the format line. ex FORMAT /H1 /32/ sets the cluster size to 32. Don't select surface/logical format or verify. It will take many hours (days?) and is not needed. If you do decide to try a verify be sure and turn "pause" off using "tmode".

## SD Memory Usage and Allocation

SD memory cards use a 512 byte sector size. SD memory transfers 16 bits at a time for 256 read/writes per sector. Since a 6809 is an 8 bit processor, we simply discard half of the data and have the 256 bytes per sector we need. While SD memory cards can be placed in an 8 bit mode, this would result in needing to read/write 512 byte sectors when OS9/FLEX wants a 256 byte sector size. The overhead to block and unblock a 256 byte sector size to a 512 byte size would be great and not necessary considering the low cost of mass storage.

Since half of the storage is discarded, a 32GB SD card provides 16GB of usable memory for FLEX and OS9.

FLEX - is assigned the first 4GB of space (8GB for the SD device). This would allow up to 256 16MB partitions to be used.

OS9 starts at 4GB and every partition is 4GB in size, although you need not format all of it.

0-4 GB FLEX - FLEX can have 256 16MB partitions in this space.

4-8 GB OS9 - Boot Partition - Partition 0

9-12 GB OS9 Partition 1

13-16 GB OS9 Partition 2

-----Limit for 32GB SD card

17-20 GB OS9 Partition 3

21-24 GB OS9 Partition 4

25-28 GB OS9 Partition 5

29-32 GB OS9 Partition 6

-----Limit for 64 GB SD Card

33-36 GB OS9 Partition 7

The eighth partition would require a 128 GB SD Card.

The OS9 driver currently handles 8 partitions. The driver can handle up to 16 partitions, but the drive count in the WD1002 driver would need to be changed from 8 to 16 and reassembled. Since Level 1 OS9 typically has a shortage of memory it's probably not a good thing to set this to 16 partitions by default. The extra partitions require RAM for tables, taking memory away for user tasks.

16 Partitions (15 - Since FLEX gets one) is the limit for the IDE interface. We are out of bits. LBA mode has 0-27 bits of address space. Bits 24-27 are used to select up to 16 4GB partitions for FLEX and OS9.