

Sperry*Univac 90/30 Emulator Reference

Introduction

This emulator was developed using the documentation that was publicly available on the Internet and with manuals from Charlie Gibbs' extensive archive of OS/3 material. The copy of OS/3 that the emulator runs is Release 4.2 from 1978 which was found on the Bitsavers web site.

At the time of writing the emulator includes:

- The emulator itself which comprises a virtual maintenance panel and a U100 console.
- An 8416/8418 utility program which allows you to explore virtual disk images.
- A dump/restore program which was used to convert the OS/3 tape image into a virtual disk.
- A 90/30 dis-assembler which was used to dis-assembler parts of the operating system which were used as an aid to debugging the emulator.
- The test data for the Verify System Build (VSB) jobs that was extracted from \$Y\$SRC.
- A collection of CPU tests that were used to debug the instruction set emulation.
- A small collection of 90/30 and OS/3 manuals that were instrumental to the development of the emulator. There are more manuals available on Bitsavers.

Configuring the Emulator

Most of the emulator's personality is hard coded into the emulator itself. However, it is possible to configure the virtual disks that will be available to the operating system. This is accomplished using simple XML files. There are two configuration files supplied with the emulator: REL042.cfg and VSB.cfg. These start the emulator with either the OS/3 4.2 release pack or the VSB SYSRES and data packs mounted. These are sufficient to run the emulator and use OS/3 to run the Verify System Build (VSB) jobs or your own jobs as desired.

To run the emulator using a specific configuration is necessary to supply the -c option on the command line, as shown below:

```
U9030 -c REL042.cfg
```

In the absence of the -c option the emulator will start and you will be able to run CPU tests but you will not be able to boot the operating system since no disks will be mounted.

Sample Configuration File

```
<?xml version="1.0" encoding="UTF-8"?>
<configuration>
  <iotrace>y</iotrace>
  <svctrace>y</svctrace>
  <ida>
    <disk type='8418' addr='0' file='../Disks\VSBRES.8418' />
    <disk type='8418' addr='1' file='../Disks\SDIVSB.8418' />
  </ida>
</configuration>
```

Parameters:

- **iotrace** enables or disables I/O tracing. A value of y enables tracing, anything else disables tracing.
- **svctrace** enables or disables SVC instruction tracing. A value of y enables tracing, anything else disables tracing.
- **ida** is a container for the Integrated Disk Adapter disk configuration.
- **disk** defines a virtual disk.
 - **type** may be either 8416 or 8418
 - **addr** specifies the device address. May be 0 through 7.
 - **file** specifies the path to the virtual disk. If the file does not exist an empty disk will be created. This will need to be initialized by the operating system using the DSKPRP utility before it can be used.

The Emulator

To start the emulator simply click one of the 9030 Emulator short cuts in the start menu. When the emulator starts two windows will open, the console and the virtual maintenance panel.

90/30 Virtual Maintenance Panel

T I K A R S E M I C L C B D E S ADDR																Supervisor		Program		
PSW	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 000000															0	00000000	0	00000000	
INST	00000000000000															1	00000000	1	00000000	
REL	000000															2	00000000	2	00000000	
<div>PRINTER</div> <div>Save As</div> <div>READER</div> <div>Load</div>																	3	00000000	3	00000000
																	4	00000000	4	00000000
																	5	00000000	5	00000000
																	6	00000000	6	00000000
																	7	00000000	7	00000000
																	8	00000000	8	00000000
																	9	00000000	9	00000000
																	10	00000000	10	00000000
																	11	00000000	11	00000000
																	12	00000000	12	00000000
																	13	00000000	13	00000000
																	14	00000000	14	00000000
																	15	00000000	15	00000000

☐ Inhibit Timer

IPL

300

Run

Stop

Step

Debug

CPU Test

This is where you will interact with the CPU and the various unit record devices like the card reader and printer. You can see the contents of all of the processor's registers. These values are updated periodically as the processor runs. There are a number of buttons that you will use to tell the emulator what to do.

Buttons

IPL

The Initial Program Load (boot) button. This button and the edit box next to it allow you to boot the operating system from any of the configured virtual disks. Simply enter the disk device address into the edit box and click the IPL button. If you are using any of the supplied configuration files the boot device will always be 300. If you don't see any errors when you click the button you will need to switch to the console window to interact with the operation system.

Stop

Once you have IPL'd you can click the Stop button to halt the processor. You will see Halted appear below the register

values.

Run

If the processor is halted clicking this button will start it running again.

Step

Once you have IPL'd, clicking this button will put the processor into single step mode. You will see Halted appear below the register values. By using single step mode you can trace the execution of instructions one at a time. The value of the various registers will be updated for each instruction. To execute the next instruction, click the Run button. To terminate single step mode, click Step again.

This is an extremely tedious way to debug a program or the emulator itself. It is far easier to use the built in debugger.

CPU Test

This button will allow you to run any of the CPU tests. The processor should not be running the operating system when you try to do this. I'm not sure what will happen if you try to run the CPU tests and the OS at the same time, but it won't be good.

Debug

Starts the integrated debugger. This will be discussed in a later chapter.

Printer Save As

Clicking this button allows you to save the current contents of the print capture file to a file of your choice. Once the save is completed the new file will be opened in Notepad.

Reader Load

Clicking this button allows you to load a file into the card reader's hopper. The file can be one of several formats: ASCII text, 16-bit Hollerith or 12-bit Hollerith. Unless you are trying to read object decks you won't need to worry about the Hollerith options. The file extension tells the emulator what format the file is in.

- ASC – unspecified ASCII text
- ASM – assembler source code
- RPG – RPG source code
- H16 – 16 bit Hollerith code
- H80 – 12 bit Hollerith code

There will probably be new extensions added in the future to denote things like Cobol source, JCL, etc.

90/30 Console



Sperry*Univac 90/30 Console

This is where you will interact with the operating system. The console provides a very limited U100 emulation. Just enough, in fact, to satisfy OS/3.

Very few of the Uniscope special function keys are implemented. These are:

- Msg Wait – press F11 to send Msg Wait to the processor. This is the key you will use to signify that you want to enter a console command.
- Transmit – Press F12 to transmit the current contents of the console window to the processor. This key does nothing if you see WAIT in the lower right corner of the window.
- Home – places the cursor in the first unprotected position.
- Up – moves the cursor to an unprotected position on a line above the current cursor location.
- Down – moves the cursor to an unprotected position on a line below the current cursor location.
- Left – moves the cursor to the first unprotected position to the left of the cursor.
- Right – moves the cursor to the first unprotected position to the right of the cursor.
- Backspace – moves the cursor to the first unprotected position to the left of the cursor and overwrites that position with a space.

Debugger

I will document this some day.