

simh HP2000 Emulation Notes

These are my notes for getting the HP2000 emulation up and running and then maintaining the system. I am no expert on this system. In fact prior to two weeks ago I hadn't seen an HP2000 since 1978.

This is the first system I ever used, way back in 1977. It helped me decide on my future career. Getting to use it and later the HP3000 in high school was a true privilege.

It was a thrill to find an emulation of the HP2000 up and running. I want to thank everyone that made this emulation possible. I'm glad this piece of history continues on!

Hopefully, these notes will help others with a similar experience level get the HP2000 emulation up and running easily.

If you need to contact me, you can probably find my public email address at www.collieboy.com.

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Creating the Initial System

To build a blank system from the *clean access.zip* file:

Unzip the files into a directory. I chose t:\hp2000sim.

Rename HP2100.exe to HP2100.exe.old. Get the latest version of simh and copy the new HP2100.exe to this directory.

In the file *asiop*, optionally change telnet port from 2323 to 23:

```
;attach mux 2323
; changed to port 23 (dwh):
attach mux 23
```

In the file *access.bat* I also like to rem out the CLS as I have found once in a while I want to look at prior sessions.

Now run the simulator:

```
T:\HP2000Sim>access

-
  Welcome to HP2000 Access!
-
Another task has been started on your task bar.
That task is your IOP, which has been configured
and loaded for you. Your IOP has been configured with
non-sharable devices MT0,MT1,MT2,MT3,PR0,PP0,LP0, and LP1.
-
You should review the notes through-out asmain and asiop.
Otherwise, use the HP 2000 Access Operator's Manual.
-
This is the Main Processor.
-
You have two 2883 disc drives at select code 14.
The disc command to add the second is 'disc-1,14,1'
-
We will now start the MCP for you.
-
Your Mag Tape is at select code 16.

HP 2100 simulator V2.10-3
Listening on port 4020
Listening on port 4021
```

When you start the simulator, another DOS window will start up in the background. The HP2000 actually consists of 2 CPU's: the primary CPU and an I/O processor. The IOP is in the 2nd window and will look something like this:

```
HP 2100 simulator V2.10-3
Listening on port 23 (socket 112)
Connecting to IP address 127.0.0.1, port 4021
Waiting for connection
Connection established
Connecting to IP address 127.0.0.1, port 4020
Connection established
```

Configure the system:

```
MAG TAPE SELECT CODE? 16
2754? Y
LOAD WHICH MODULE? 2883
SYSTEM GENERATION? Y
UPDATE? N
```

SYSTEM IDENTIFICATION? **HP2000**
CONFIGURATION OPTIONS? **Y**
DISC OR FORMAT COMMANDS? **DISC-1,14,1**
DISC OR FORMAT COMMANDS? **FORMAT-0**
DISC OR FORMAT COMMANDS? **FORMAT-1**
DISC OR FORMAT COMMANDS?
DISC NUMBER 0 NOT LABELED FOR TSB
DO YOU WANT IT LABELED? **Y**
DISC NUMBER 1 NOT LABELED FOR TSB
DO YOU WANT IT LABELED? **Y**
MLOCK OR MUNLOCK COMMANDS?
NUMBER OF DIRECTORY TRACKS PER DISC?
NUMBER OF ID TRACKS?

Enter date as <day of year>/<year>:

DATE? **137/11**
TIME? **1138**

The system is up when you see:

HP22687A-1812

Create a master user id of A000 w/ password A000:

NEWID-A000,A000,65535,65535,MWA,PFA

Accessing the Emulator

To telnet into the system telnet to port 2323 unless you have changed it in the asiop file

```
c:\>telnet
Welcome to Microsoft Telnet Client

Escape Character is 'CTRL+]'

Microsoft Telnet> unset crlf
Line feed mode - Causes return key to send CR
Microsoft Telnet> o localhost 2323 [or just 23 if you modified the asiop file]
```

You will now see:

Connected to the HP 2100 simulator

Press the enter key several times. Some times ctrl-M ctrl-J work better. Once the system recognizes you, you will see:

PLEASE LOG IN

Now login by typing:

HEL-A000,A000

and finally you are ready to go:

READY

Normal Shutdown

Typically to shut the system down you will just right the memory structures to disk and halt the cpu using the SLEEP command as follows:

SLEEP

```
SYSTEM DUMP OR RELOAD?<cr>
SYSTEM SHUT DOWN
HALT instruction, P: 20610 (JMP 20553)
```

Normal Startup

If you last shut the system down by using SLEEP to disk, then you start the system up from disk:

```
MAG TAPE SELECT CODE? 16
2754? Y
LOAD WHICH MODULE? 2883
SYSTEM GENERATION? N
MAG TAPE RELOAD?
LOAD OR DUMP COMMANDS?
DATE? 137/11
TIME? 1148
HP22687A-1812
```

A Simple Backup (ZIP)

The files 2883*.dsk contain the contents of the disk drive. If you last did a SLEEP to disk you can simply zip these files and you've got a backup of them.

Restoring the ZIP Backup

To restore, extract the disk drive files from the zip file.

Enabling Write Ring on the Tape Drive

By default the tape drive is write protected so you cannot write data to it. If you need to write to the tape drive you must write enable it (I assume this must be done *after* you attach a file).

To enable tape drive as write enabled:

ctrl-E to enter simh

```
set msc0 writeenabled
```

To verify use show config:

show config

```
MSC, 13181A, devno=16/17, 4 units
  MSC0, attached to sleeper.tap, write enabled
  MSC1, not attached, write enabled
  MSC2, not attached, write enabled
  MSC3, not attached, write enabled
```

SLEEP to tape

This backs up all files changed since the last hibernate to tape then shuts the system down. Kind of like an HP3000 Partial Backup.

To create a sleep tape:

ctrl-e then in simh:

```
attach msc0 sleeper.tap
set msc0 writeenabled
go
SLEEP
```

```
SYSTEM DUMP OR RELOAD? D
MOUNT REEL NUMBER  1.  PRESS RETURN
VERIFY? Y
DONE
```

```
SYSTEM DUMP OR RELOAD?
SYSTEM SHUT DOWN
```

```
HALT instruction, P: 20610 (JMP 20553)
```

Hibernate to Tape

Hibernate copies system and all files to tape then shuts the system down. Kind of like an HP3000 full backup.

ctrl-E to get into in simh:

```
attach msc0 hib110517.tap
set msc0 writeenabled
go
HIBERNATE
```

```
MOUNT REEL NUMBER  1.  PRESS RETURN
VERIFY? Y
DONE
```

```
SYSTEM DUMP OR RELOAD?
SYSTEM SHUT DOWN
```

```
HALT instruction, P: 20610 (JMP 20553)
```

The System Tape

As I understand it, the file MCP4B.TAP is the master program tape and when you boot from tape you will want to boot from that particular tape (e.g. that physical file). If you can't boot from the 2883 disk, then you will boot from the master program tape.

WARMSTART

If the system crashes, the tables on disk may be usable. If you attempt to start the system from disk and get the message:

```
SYSTEM NOT SLEPT; FOR WARM START ATTEMPT, LOAD MASTER TAPE  
AND PRESS RETURN. OTHERWISE MUST RELOAD FROM MAG TAPE
```

This means the system cannot start from disk. It must start from the master control tape. You will now mount this tape and boot from it:

ctl-E into simh and type:

```
sim> attach msc0 mcp4b.tap  
sim> go
```

press ENTER and you should see:

```
** WARM START PROGRAM **  
  
ADT CHECK - OK  
  
IDT CHECK - OK  
  
DIRECTORY CHECK - OK  
  
DISC SPACE USED CHECK - OK  
  
WARM START CHECK COMPLETE  
  
LOAD OR DUMP COMMANDS?  
DATE? 137/11  
TIME? 1539  
HP22687A-1812
```

Example of creating Salvage Tape

If the WARMSTART fails, the system will ask if you want to create a Salvage dump. If you get this message, your disk is shot and you will have to rebuild it. If you don't have up to date hibernate and sleep tapes you need to create the salvage dump or you will loose all changes since the last hibernate/sleep. At this point I must refer you to the HP Operators Manual, Section V: System Recovery.

Here is an example of WARMSTART failing and a salvage tape being created.

```
** WARM START PROGRAM **

ADT CHECK - OK

IDT CHECK - OK

DIRECTORY CHECK - BAD PROGRAM STARTING ADDRESS
WARM START FAILURE - ATTEMPT SALVAGE DUMP?
Simulation stopped, P: 03240 (JMP 3237)
sim> att msc0 salvage.tap
MSC: creating new file
sim> set msc0 write
sim> g
Y
MOUNT REEL NUMBER 1. PRESS RETURN
VERIFY? Y
DONE

SYSTEM SHUT DOWN

HALT instruction 102077, P: 20610 (JMP 20553)
sim>
```

To Load System from Sleep or Hibernate Tape

If your system is toast, according to the manual you should load from the most recent hibernate tape (full backup) and then from the most recent sleep tape (partial). Finally, if you have a Salvage Dump Tape, restore that.

do a normal start:

```
LOAD WHICH MODULE? 2883
SYSTEM GENERATION? N
MAG TAPE RELOAD? Y
MOUNT REEL NUMBER 1. PRESS RETURN
```

now ctrl-E into simh:

```
Simulation stopped, P: 03240 (JMP 3237)
sim> attach msc0 sleeper.tap
sim> g
```

and continue with the boot procedure:

```
CONFIGURATION OPTIONS?
LOAD OR DUMP COMMANDS?
DATE? 138/11
TIME? 1140
HP22687A-1812
```

Selectively DUMP

During system start up you can selectively dump files to tape.

To dump all files for A000, boot the system and when you get to the Load or Dump prompt type 'dump':

```
LOAD OR DUMP COMMANDS? DUMP
ENTER NAME LIST, ONE PER LINE; TERMINATE WITH 'END'
A000
END
MOUNT REEL NUMBER 1. PRESS RETURN
Simulation stopped, P: 03237 (SFS 12)
sim> attach msc0 a000.tap
MSC: creating new file
sim> set msc0 writeenable
sim> g

VERIFY? Y
DONE

LOAD OR DUMP COMMANDS?
```

Additionally, you can enter specific file names as <user>,<fname> such as:

A000,myfile

Also, if you just use *ALL* then the whole system is dumped to tape.

Selectively Restore

During the system startup you can selectively restore files from tape.

To restore the file BEFSL1 to user A000, restart the system then when you get to the Load or dump prompt, type load:

```
LOAD OR DUMP COMMANDS? LOAD
ENTER NAME LIST, ONE PER LINE; TERMINATE WITH 'END'
A000,BEFSL2
END
MOUNT REEL NUMBER 1. PRESS RETURN
Simulation stopped, P: 03237 (SFS 12)
sim> attach msc a000.tap
sim> g

LOAD OR DUMP COMMANDS?
DATE? 138/11
TIME? 1327
HP22687A-1812
```


Restoring T00.TAP

Within the *clean.access.zip* file in the TapeRack directory is a tape called t000.tap. This tape contains the files:

NAME	LENGTH	RECORD	NAME	LENGTH	RECORD	NAME	LENGTH	RECORD
23MTCH	C	4	ABAGEL		4	ABASE		6
ADV000		1	ADV001	F	130	ADVENT	C	5
ADVP00	C	11	ADVP01	C	14	ADVP03	C	12
ADVP10	C	14	ADVP77	C	18	ADVP88	C	10
ADVP98	C	12	ADVP99	C	12	ADVOC	C	17
AMAZE		7	BAGELS		4	BASE	C	5
BATNUM		6	BATTLE		9	BEASTI	C	10
BIORTM	C	4	BLJACK		13	BUTTON		4
CAVES1		15	CAVES2		14	CHASE		6
CHERRY	C	6	CHOMP		5	CIVIL2		22
CLOCKS		7	CRASH		10	CYLONS		9
DIGTAL	C	4	DRAG		7	DRILL		5
FLASH		3	FTBL		12	GAME		7
GOLF		11	GOMOKU		12	GRNPRX		15
HAMRBI		6	HANGFL	F	10	HANGMN		5
HILOW		3	HRACE	C	7	INSTRC		6
KENO		22	KING		15	LP0	A	LP0
LUNAR		5	MADLIB	C	28	MONFIL	F	40
MONOPY	C	35	MSTRMD	C	3	NIM		9
NUMBER		2	OTHEL	C	5	QUBIC		15
RACE	C	8	REFLCT		7	ROULET		24
ROVER		16	SHORT	F	5	SLOTS		7
SNARK		4	SNOOPY	C	9	SPY		8
STARFT		25	STARS		4	STRTRK	C	30
STTR1	C	33	TAXMAN		7	TEASER		8
TICTAC	C	4	TRADER		13	TRADES		29
TRAP		3	TWQUES		4	UNR	C	2
VOCAB		7	WORD		4	WUMPUS		10
ZEROS		6	ZOT		15			

To restore this tape, first you must create the T000 userid (password T000). You cannot restore files for a user that doesn't exist.

At the console type:

```
NEWID-T000,T000,65535,65535,MWA,PFA
```

Restart the system and do a Restore as previously outlined:

```
LOAD OR DUMP COMMANDS? LOAD
ENTER NAME LIST, ONE PER LINE; TERMINATE WITH 'END'
ALL
MOUNT REEL NUMBER 1. PRESS RETURN
Simulation stopped, P: 03240 (JMP 3237)
sim> attach msc0 t000.tap
sim> g

LOAD OR DUMP COMMANDS?
DATE? 138/11
TIME? 1406
```

Accessing the Paper Tape Reader

Before booting, in the file asio, assign an actual file name for the PTR:

```
;set up for paper tape reader (PR0)
set ptr dev=16
attach ptr test.ptr
```

After booting, verify devices are assigned by typing DEV at the console:

```
DEV
    HP2000      139/11  1628

    DEVICE      SELECT      MAXIMUM
DESIGNATOR     CODE      RECORD SIZE  ASSIGNMENT  USER
    LP0         20          68          ALL
    PP0         17          64          ALL
    PR0         16          64          ALL
    MT0         16         1024          ALL
```

PR0 is the paper tape reader, and has been assigned to all users.

The specific user must have the ability to access the device. Type Report and look at the user in question:

```
REPORT
    HP2000      139/11  1634
    ID  TIME  SPACE  CAPABILITIES  DEVICE DESIGNATORS
A000 00014 00002  PFA      MWA      PR
A001 00057 00000  PFA      MWA
G000 00044 00394  PFA      MWA
G001 00003 00000  PFA      MWA
```

Here the user A000 has the ability to use the PR device. No one else does. If you need to add that ability to a user, use the CHANGEID command at the console:

```
CHA-A000,,,PR
```

Now once logged into the A000 user, type DEV to see if the device is available:

```
DEV
    DEVICE      MAXIMUM
DESIGNATOR     RECORD SIZE  STATUS
    PR0         64
```

Note: So far I have not yet successfully retrieved the contents of a 'paper tape' although I haven't tried writing code to do so.

Trek73

OK, 99.9% of my reason for getting this emulation running is to play TREK73. This can be found on the contributed library tape 2000dmp5-5-84iclContrib.tap.gz. Restore TREKnn into G000.

To make it as I'm used to it, in TREK73 I did the following changes:

```
GET-TREK73
DEL-200,320
PURGE-TREK73
CSAVE-TREK73
PRO-TREK73
GET-TREK08
530 PRINT "                ENEMY VESSELS."LIN(0);
540 PRINT "  I'M EXPECTING [1-9] ";
CSAVE-TREK08
PRO-TREK08
```

Document Revisions

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