

Notes on making the SBC6120 work and play

Important Note: The author takes no responsibility for any errors and is in no way liable for any mishaps or damages during these activities. The risk remains entirely with the user,

1. How to set up your computer

Assuming Hyperterm and COM1 are used on an XP machine the following settings are required:

- *Hyperterm:*

Terminal: VT100, with ASCII character set and Backspace=Delete (Note: some of my routines use VT100 functions).

Input Translation: Shift JIS (usually default).

ASCII Setup: Force to 7-bits (important), Wrap lines.

- *COM1:*

Port Settings: 9600Bd (Jumper is set on SBC6120 to 9600), 8bits, Parity: None, Stop bits: 2, Flow control: None.

2. How to set up the system (refer to picture on last page)

The computer needs to be connected to the SBC6120 using a null modem (crossing out the signal lines) and a serial DB9 to IDC tail cable (e.g. obtained from an old PC).

The 2.5" laptop HDD is connected to the SBC6120 using a standard IDE adapter cable. Check for proper location of pin1 and make sure the connector sits exactly on all pins – there is no guide frame on the HDD. The two separate pin pairs are not used (intended to set master/slave).

Power is supplied through cables cut from an old PC, only +5VDC (red) and GND (black) are used. There is an overvoltage diode in the SBC6120 and a 1A fuse which will blow – make sure there are 5.0V (or 5.1 to compensate for losses). *Important:* a power supply taken from a PC needs a base load on +5V to properly regulate, the SBC6120 is not enough load! If you decide to use one, load the +5V with an e.g. 22ohms/2W resistor. Should you use a 5V/1A wall wart, then it needs a capacitor e.g. 1'000uF/16V on the power line to make sure the HDD starts (needs about 1A) cleanly. In my test a powerful lab supply was used.

3. How to start and operate

With everything set, power is applied and the SBC6120 starts an internal test routine, indicating progress on the POST LEDs. Once it's completed only the outside LEDs should be lit and a welcome message is posted on the terminal ending with a > prompt. If this is not displayed or garbled the settings of Hyperterm must be reviewed.

Once > is displayed, the SBC6120 commands may be used.

OS/8 can now be booted with B↵ and in the HDD supplied a welcome message and a default date will be posted and ends in the . prompt. Make sure the keyboard is in Caps Lock mode as OS/8 only accepts upper case. Looking at the SBC6120, note that only one LED (Power) remains lit.

Type DIR↵ and wait a moment to see the directory of SYS: displayed. Type R CLEAR↵ and the screen should clear and the . prompt appear at the top (this is a small program issuing VT100 commands). Consult Chapter 4 of the OS/78 manual obtained e.g. from www.pdp8online.com. Even using e.g. OS/8 V3Q this text is relevant.

4. How to play some games

Next type R BASIC↵ and see *NEW OR OLD--* being asked. Type OLD SNOOPY↵ and wait till *READY* appears, then type RUN↵. When asked to select the output device type 1↵ and slowly

Snoopy will be typed on the screen in the form of an old teletype picture! At the end **READY** is displayed and you type CTRL C to return to OS/8. Replace SNOOPY with HELLO in this procedure and proceed to reply to some rather silly questions displayed. To see the listing of the basic programme enter TYPE SNOOPY.BA and the listing will be displayed on the screen. To obtain more information on the basic language used here refer e.g. to Chapter 6 of the OS/78 manual to be found e.g. on www.pdp8online.com.

With more confidence now type R CHEKMO↵ and the chess program CHEKMO-II will start. This is a real chess program, not just a silly toy. Refer to the manual supplied (it's on the HDD, enter TYPE CHEKMO.WU↵ but in a much nicer form from www.technikum29.de/de/lernprojekte/schach on my webpage) to find out how to play against your SBC6120, it's good fun. It helps to have a real chessboard on the side to follow the moves. To exit type CTRL C.

Just to show a small example:

R CHEKMO↵

W. YOUR MOVE? C2-C5↵

B. YOUR MOVE? PB↵ (Note: this tells the SBC6120 to play the black pieces)

B. E7-E5

W. YOUR MOVE? BD↵ (Note: optional, this displays the current state of all pieces on the board, result not shown here)

W. YOUR MOVE? E2-E4↵

B. (Note: SBC6120 will display its move)

Etc., etc., see manual for more complex moves and for a layout of the board. CTRL C↵ to exit.

The HDD has more games from Steve Gibson loaded, they are on partition IDA1:. To see them type DIR IDA1:↵ and the directory of this partition will be displayed. To transfer a game to SYS: type e.g. COPY SYS:<IDA1:SNOOPY.BA↵ and this file will be copied and listed as such. No check whether it was already there!

On another partition (2 or 3) is more OS/8 software, do not copy the OS/8 system programs into SYS: as this is another version! But there is other stuff that might prove helpful.

All partitions have been configured for OS/8 and this can be tested with the DIR command, e.g. DIR IDA6:↵. The result will be 0 FILES but plenty of free BLOCKS. A local (non-bootable) backup of SYS: may be copied to one of the free partitions with e.g. COPY IDA:5:<SYS:*. *↵, check the result with the DIR IDA5:↵ command.

Type R EXIT↵ to exit OS/8 and return to BTS6120, this is another small program on the HDD. A message from BTS6120 will be displayed on top of the screen followed by its > prompt.

5. How to load more program groups (for experts)

This procedure requires careful work. It is only recommended for operators with some experience in SBC6120 and PC soft- and hardware. It is recommended that programs or program groups be loaded into an empty partition 0003 or higher and from there transferred for use e.g. to SYS: using OS/8 commands. To reformat the system partition 0000 and reload a fresh OS/8 system is considered a very high risk operation and not recommended – everything might be lost! The needed tools are found at Steve Gibson's site www.grc.com/pdp-8/os8utils-sbc.htm.

Basically a software package in the .ide format needs to be produced or an existing .ide source considered. These sources can be viewed with the Win8 emulator by Bob Armstrong (this works on my Win7 Pro 64bit system) on the PC. Refer to the various manuals and websites for details. There are known problems with the tools on Win7 or higher and 64bit systems. Here older industrial XP 32bit machines are used.

Once such a source e.g. SBC6120.ide (*Note*: Steve's games.ide is already loaded on partition 0001) is ready the procedure is as follows:

First a free partition has to be „formatted“ by BTS6120. If not in BTS mode use R EXIT ↵ or reset the SBC6120. Seeing >, type DF 000x↵ (indicating the empty partition you selected, 0000 to 0002 are already used on the HDD supplied, check before all this in OS/8 with DIR to see whether they are empty or you are sure to totally overwrite the contents). Reply to the challenge with Y. Wait till the process is completed and > is displayed again.

Remove power and remove the HDD from the SBC6120.

Shut down your PC and connect the HDD to an IDE port, e.g. IDE2 and power supply (*Note*: with the XP systems here it was not possible to use USB adapters, WinToATA would not recognize the disk. It should work according to Steve's website, but here it did not). Reapply power, the HDD should be recognized by the BIOS (*Note*: in SETUP, configuration for IDE2 should be set to Auto) and will show only on Disk Management as an unformatted and unnamed drive due to the special BTS6120 format. Do NOT activate any Windows formatting/naming functions or everything OS/8 on the disk will be lost! Open a Command Prompt window and change to the Windows directory where your .ide image and WinToATA.exe are located. Type wintoata 000x↵ indicating the partition you want to load. Upon recognizing a drive and a ready partition, WinToATA will open a directory window to select a file. Otherwise an error message will be displayed. Select the .ide file and it will be loaded. The program will report success or failure. It will not load anything into a partition that is not empty i.e. not freshly prepared on BTS6120. If reported ok, shut down the PC.

Remove the HDD and reconnect it to the SBC6120. Apply power and boot OS/8 as above. Type DIR IDAx:↵ for the directory of the partition just loaded to check the files. If it displays ok, you're done.

To backup any own work on the SBC6120 system externally, the program ATAtoWin may be used. It writes an .ide image of the selected partition under a selected file name on the PC. The procedure to do this is similar. Connect the drive to the PC as above, open a Command Prompt window, change to the relevant directory and run e.g. atatowin 0001↵ and a directory window will be opened asking for a file name. After ok, the file will be copied, success reported and the HDD may be removed. The file can be checked by loading it into Win8. If it's non-bootable, first an .ide system file needs to be booted and then a second device attached with the new file. Then it can be manipulated in Win8.

Notes:

Reference is made to

Bob Armstrong's pages: <http://www.sparetimegizmos.com/Hardware/SBC6120-2.htm>

WinEight: <http://sparetimegizmos.com/Download.htm>

Steve Gibson's pages: <https://www.grc.com/pdp-8/pdp-8.htm>

PDP8Online for documentation: http://www.pdp8online.com/query_docs/query_all.html

OS/78 manual: http://www.pdp8online.com/pdp8cgi/query_docs/queryb.pl?level=1os78um;id=5

CHEKMO-II: www.technikum29.de/de/lernprojekte/schach (text in English available)

The autor wishes to thank all the active collectors and engineers who brought this SBC6120 project and the fascinating PDP8 history to life!

6. SBC6120 Test Setup

