An MCP Debugging Guide

* MCP CONFIGURATION REQUIREMENTS : Before proceeding with the manual
install, it is useful to first discuss the features of the MCP that can
affect installation.

The first is hardware configuration. An 82300D MCP has two hardware links to
its personal-computer (PC) host:

1: An interrupt pin, or IRQ level. On PCs, no two pieces of hardware can
   share the same IRQ level; if you do have two devices on the same level,
   you will probably get intermittent lockups.

2: An IO base address. PCs have separate memory and IO address spaces;
   the 82300D has a set of 8 registers located in the 64 KB IO address space.
   No two devices can have the same IO address locations; such an address
   conflict will usually result in a failure to recognize the MCP.

* A TROUBLESHOOTING PROCEDURE : If you run into severe installation
problems with the MCP, you need to reduce the problem to its simplest
elements:

1: Check MCP card switch and jumper setting, RAM configuration, and
   physical installation. (See Appendix 1 for the 82300D and Appendix
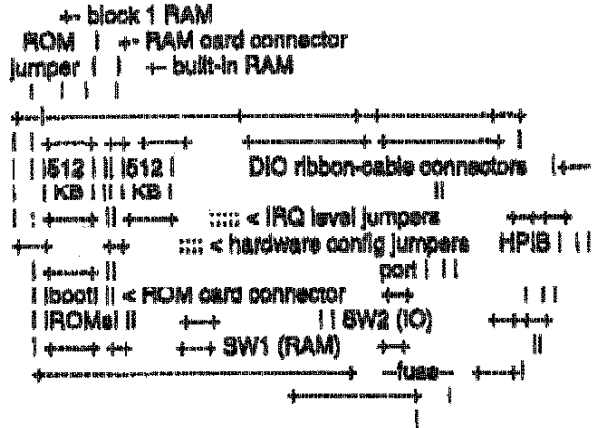   2 for the 82324B.)

   If you have an 82300D and are having some really bizarre problems (like the
   PC refusing to boot or disk drives not working properly) use an ohmmeter to
   make sure the 5-amp fuse (the little green widget that looks like a
   resistor, in the middle of the edge connector) isn't open. (This device is,
   thank God, not included on the 82324B.)

2: Check out the PC's configuration. If there are any unusual cards in the
   machine that you can do without, pull them out. Check the DOS version, DOS
   RAM and disk configuration, and display adapter type. Make sure that all
   items are those specified as supported by the documentation.

3: Copy CONFIG.SYS and AUTOEXEC.BAT to backup files (say CONFIG.SAV and
   AUTOEXEC.SAV), then create new CONFIG.SYS and AUTOEXEC.BAT files with
   absolutely the most minimal set of statements needed to get your PC to run.

% If you have a very old MCP card with a ROM BASIC on it, and install new
   software, you may find the display behavior to be extremely bizarre.
   This will occur if you haven't set the ROM IN/OUT pin on the MCP to
   ROM OUT; if ROM IN is set, the MCP will try to boot ROM BASIC, which
   has the wrong graphics and display binaries, causing the bizarre display
   behavior.

[X.1] APPENDIX 1 -- 82300 HARDWARE CONFIGURATION

" The 82300 card has the following layout:

```
      +- block 1 RAM
  ROM |  +- RAM card connector
jumper |  |  +- built-in RAM
  |   |  |  |
+--+--|--------------------------+----------------+--+------------------+--+
|  |  +----+ ++ +----+         +----------------+ +----------------+    |
|  | |512 | || |512 |         DIO ribbon-cable connectors   |+---
|  |  | KB | || | KB |                               ||
|  :  +----+ || +----+     :::: < IRQ level jumpers       +--+--+
+--+     ++    :::: < hardware config jumpers   HPIB | ||
  | +----+ ||                        port | | |
  | |boot| || < ROM card connector    +--+       | | |
  | |ROMs| ||      +--+          | | SW2 (IO)   +--+--+
  | +----+ ++     +--+ SW1 (RAM)    +--+        ||
  +----------------------------------+   --fuse-- +----+
                   +-----------------+   |
                            |
```

-- with the dimensions in millimeters:

```
|-------------------- 340 ------------------------|

---+-------------------------------------------------+  ---
|  |                                      |  21
|  |                                      |+--- ---
|  |                                      ||  |
|  |                                      ++-+  |
|  |                                      ++-+  | |
123 +---+                                  |  94
|  |                                      |  |
|  |                                      |  |
|  |                                      ++++  |
|  |                                      ||  |
|  +------------------------------------+  +---+|  ---
---                 +----------------+  |  28
                            |  ---
| 13|------------- 223 ---------------|--- 81 ---| 24|
```

Note that the ribbon cable connectors have clamps that stick about 6 millimeters above the board. They can be popped out if need be.

A short guided tour:

% ROM Jumper:

This three-pin jumper was used (in the 82300B product) to select operation from the 82304A ROM card (now obsolete). If the ROM card was present, the jumper clip was set to the ROM IN (upper) position; now it is always set to the ROM OUT (lower) position.

```
            4  3  2  1
```

The possible switch configurations are as follows:

```
+-----------+------+-----+-----+-----+
| RAM size  | SW4  | SW3 | SW2 | SW1 |
+-----------+------+-----+-----+-----+
| 512 KB    | OFF  | OFF | OFF | on  |
| 1.0 MB    | OFF  | OFF | OFF | OFF | < -- default for 82300C/D
| 1.5 MB    | OFF  | OFF | on  | on  |
| 2.0 MB    | OFF  | OFF | on  | OFF |
| 2.5 MB    | OFF  | on  | OFF | on  |
| 3.0 MB    | OFF  | on  | OFF | OFF |
| 3.5 MB    | OFF  | on  | on  | on  |
| 4.0 MB    | OFF  | on  | on  | OFF |
+-----------+------+-----+-----+-----+
```

% Hardware Configuration Jumpers:

This is a set of four three-pin jumpers that define the card type. In ALL
types of 82300 cards they MUST be set to the lower position.

% IRQ Level Jumpers:

These five two-pin jumpers allow selection of the 82300 card's IRQ level
jumpers, as follows:

```
          : : : : :
       IRQ 9 7 5 4 3
```

The default IRQ level is 7.

% SW2 (IO Configuration Switches)

This is a 9-position DIP switch that is used for troubleshooting, for
selecting the 82300's PC IO address, and to select the 82300's HPIB port
as System Controller or Non-System Controller. The switches are defined as
follows:

```
     1       0
+---------------------+
|  +--------+------+  |
|1|   |XXXXX|  | Used for troubleshooting: must be ON.
+--+--+----+---+---+--+
|2|   |XXXXX|  | A3: default is 0.
|  +-----+-----+  |
|3|XXXXX|     |  | A4: default is 1.
|  +-----+-----+  |
|4|   |XXXXX|  | A5: default is 0.
|  +-----+-----+  |
|5|XXXXX|     |  | A6: default is 1.
|  +-----+-----+  |
|6|   |XXXXX|  | A7: default is 0.
|  +-----+-----+  |
|7|   |XXXXX|  | A8: default is 0.
|  +-----+-----+  |
```

This HPIB port can be accessed at select code 7; note that the select code cannot be changed, nor (at present) can the port be accessed from DOS applications in any convenient way.

Note that if you change IRQ levels or the IO address on the 82300 card, you must modify the invocation of the HPBLP.SYS driver to reflect the change. See Appendix 3 for details.

[%%]

% Block 1 RAM:

This is a bank of 512 KB RAM. This bank is now shipped loaded with chips
on the 82300C/D; it was NOT preloaded on the 82300A/B, and the customer had
to buy a set of RAMs (82303A) to fill it up.

% Built-in RAM:

This is a (soldered) bank of 512 KB RAM (same chips as block 1).

% Boot ROMs:

There are two boot ROMs, one above the other. In the 82300A and all but
the very last production 82300Bs, these two boot ROMs are soldered into the
card, and the boot ROMs had the part numbers:

    TOP: 1818-3115
    BOTTOM: 1818-3114

On some late-production 82300Bs and all 82300C/Ds, the ROMs are socketed;
some of these 82300Bs contain the old ROMs, but the very last production
82300Bs and all the 82300C/Ds have the following boot ROMs:

    TOP: 1818-4577
    BOTTOM: 1818-4578

Changing the ROMs normally involves tearing out the old ROMs and inserting
sockets for the new ones; the socket part number is 1200-0567.

The new boot ROMs included ALL the same code as the old boot ROMs, plus
16 KB more that provided the fast boot used by MCP 2; old software could
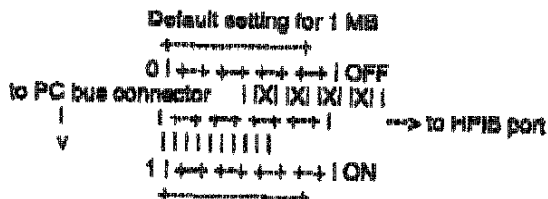use the board, and boot as before.

% RAM Card Connector:

Allows connection of the 82305A RAM card. This piggyback card features a
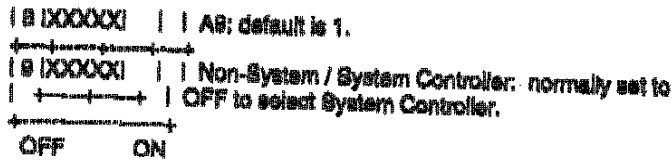built-in bank of 512 KB RAM, with sockets for 8 more sets of 512 KB RAM
(82303A).

% ROM Card Connector:

Allowed connection of the (now-obsolete) 82304A BASIC ROM card.

% SW1 (RAM Configuration Switch):

This is a four-position DIP switch pack that is used to tell the card how
much memory it contains. It is set as follows:

```
                  Default setting for 1 MB
                  +--------------------+
                0 | +-+ +-+ +-+ +-+ | OFF
to PC bus connector  | IXI IXI IXI IXI |
     |            | +-+ +-+ +-+ +-+ |     --> to HPIB port
     v            | I I I I I I I I |
                1 | +-+ +-+ +-+ +-+ | ON
                  +--------------------+
```

```
| 9 |XXXXX|   |  | A9: default is 1.
+---+-------+---+
| 9 |XXXXX|   |  | Non-System / System Controller:  normally set to
|   +---+---+   | OFF to select System Controller.
+---+-------+---+
  OFF       ON
```

Switches 2 through 9 select the PC IO address of the 82300 card,
corresponding to adress bits A3 through A9; address bits A0 through A2 are
fixed at 0.

The default settings correspond to address 250 hex:

```
A9 A8 A7 A6 A5 A4 A3 (A2 A1 A0) =
 1  0  0  1  0  1  0 (0  0  0) = 10 0101 0000 binary = 250 hex
```

The alternate switch settings generally recommended for the MCP are 280 hex
(which normally goes along with IRQ9) and 330 hex (which normally goes
along with IRQ5).


```
      1      0              1      0
```

```
    OFF <280 HEX> ON          OFF <330 HEX> ON
```
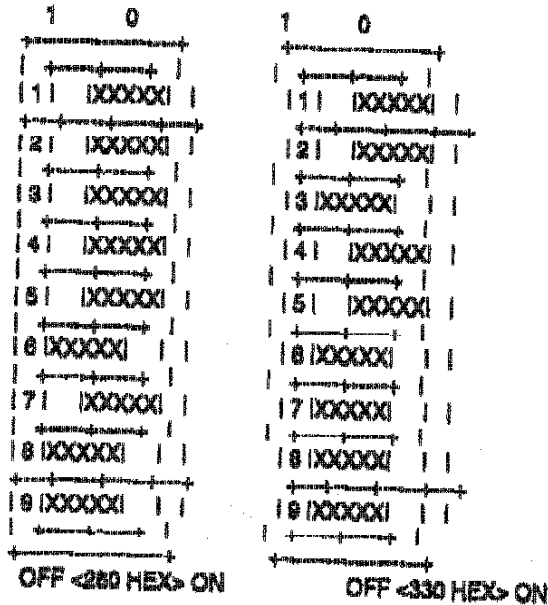
% Fuse (5 Ampere):

This is a small green component that resembles a resistor; If it is blown
many strange things can happen, such as the PC failing to boot.

% DIO Ribbon-Cable Connectors:

These two ribbon-cable connectors allow access to a standard BASIC
Workstation DIO bus, and let the 82300 control various DIO "sister" cards,
such as the 50963A SRM card or the 82306A GP-IO card.

% HPIB port:

* The HPBLP.SYS driver must be used to reflect (or, in the case of 82324 high-speed port address and IRQ level, make) changes in MCP hardware configurations.

By default, the HPBLP.SYS driver does not require any parameters, and is loaded as:

  DEVICE=HPBLP.SYS

It does have a capability for parameters, however, and this default configuration is equivalent to invoking it with the following parameters:

  DEVICE=HPBLP.SYS /1:7:250:C800 /2:9:280:C800 /3:5:330:C800

-- where each set of parameters gives card number, IRQ level, IO base address, and high-speed port address; this default invocation implies the configuration:

```
+-----------------+------+-------------------+------------------------+
| card number | IRQ | IO address | high-speed port address |
+-----------------+------+-------------------+------------------------+
| 1          | 7 | 250H      | C800                    |
| 2          | 9 | 280H      | C800                    |
| 3          | 5 | 330H      | C800                    |
+-----------------+------+-------------------+------------------------+
```

These parameters are implied whether you have 1, 2, or 3 MCPs, although the high-speed port address is irrelevant since the introduction on D.00.03 and no longer needs to be specified (this leaves it at the default). On the 82300, the address and IRQ level are set by hardware (as explained in Appendix 1); on the 82324, only the IO address is set by hardware; the IRQ level is set by the parameters specified in HPBLP.SYS.

If you have to change these parameters, note that you cannot give two cards a conflicting parameter, even if the card isn't present -- the driver will always assume there are 3 cards whether they are there or not, and object if you give two of them conflicting parameters. For example, suppose you have a single MCP at IO address 250, and you want to try a different IO address; if you want to use 390H, which isn't used in the default configuration, you could invoke HPBLP.SYS as:

  DEVICE=HPBLP.SYS /1:7:390

However, if you wanted to change the IO address of your card to 330, which is the default for MCP card 3, you'd need to switch the parameters as follows:

  DEVICE=HPBLP.SYS /1:7:330 /2:9:280 /3:5:250

[%%]