Basics of the MDA 8086 Trainer Kit

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The **MDA 8086** is a Trainer Kit which behaves in a similar manner to an actual 8086 microprocessor with only minor differences. This trainer kit can work in two modes, Machine Mode and Serial Monitor Mode.

In **Machine Mode**, we must type out the hexadecimal machine code using the keypad on the trainer. In **Serial Mode**, the hexadecimal machine code can be directly transferred to the trainer.

## Machine Mode

Before we can start using the trainer itself, we have to produce the hexadecimal machine code.

1. Write out the **assembly language code** and save it to a .asm file. It would be best to test out this code using the **Emu 8086** software beforehand to make sure everything is working properly.
2. Convert the .asm file to machine code using the **MASM 8086** software. We will require the **.lineout** file.
3. Open the .lineout file produced. This should contain hexadecimal values for each line of code we wrote in assembly language.

Next, we need to insert the hexadecimal values into the trainer kit. This involves a few steps.

1. Firstly, press the **AD** button. This will take us to the **segment number** section. The MDA 8086 only has **64KB** of memory, which is being used as the code segment, data segment, stack segment and extended segment. Thus, the segment number must be 0000.
2. Next, press the **: (colon)** button. This will take us to the **offset** section. The offset values start from **1000** in the MDA 8086, so use that as the first location.
3. Next, press the **DA** button. This will take us to the **data** section, where we can insert a single hexadecimal value.
4. Next, press the **+ (plus)** button. This will increment the memory location. Insert the next hexadecimal value. We can also go back to the previous memory location using the **– (minus)** button.
5. When all the values have been inserted into the appropriate memory locations, press the **reset** button. This will set the value of the IP register to 0000. It will not reset the other registers.
6. Press the **STP** button to run the program step-by-step.
7. Press the **REG** button to check the register values after each step. The + and - buttons can be used to navigate the different registers.

Note: When inserting values, if we have a 16-bit value, e.g. 4789h, the value must be inserted in the **little-endian** format, i.e. 89 goes to the first memory location and 47 goes to the next.

## Serial Monitor Mode

To use the **Serial Monitor Mode**, we first need to create the .obj file from our .asm file using the **MASM 8086** software, as before. Afterwards, we need to create a .abs file using the **LOD186** software.

Next, we need to load the .abs file into the MDA 8086 kit. We do this using the **WinIDE8086** software which comes along with the MDA 8086 kit. From the **Device Manager**, check the communication port (COMx) to which the MDA 8086 kit is connected. In the settings of the WinIDE8086 software, ensure that this communication port is selected. If we ensure that the MDA 8086 is in the **kit mode**, then pressing the **reset** button should show some output in the terminal, ensuring us that we are connected properly.

We can start the loading process by pressing **L** on the terminal and pressing the return key. Next, if we press the **Page Up** button, we should be shown the prompt to select the file. Selecting the .abs file will load it into the MDA 8086 kit. Finally, we can return the kit to **monitor mode** and press the **GO** button to run the program.