

## Repair tutorial for PCB ROM of WD hard drive

Foreword: This article discusses the ROM read/write issue, which is very important for Western Digital HDD repair. As the M25P10 chip is widely used as the ROM on WD hard drives, we will take M25P10 as an example:

When the M25P10 chip is in a good status, we can perform read/write process directly through PCBA (just set the jumper setting of the HDD and connect it to our console, you can read/write the ROM by using the functions built in the "ROM and HEAD Operations" tag). As the controlling program of ROM read/write is stored in the ROM and the data stored in the ROM is found corrupted/missing, the program controlling the read/write towards the ROM chip would also be damaged or non-available. That is why we can't read/write the ROM through PCBA by using the main program. In this situation, the ROM chip should be unsoldered from the PCBA and you would use the programmer to perform read/write process on it.

The following information is based on the condition that the ROM data is corrupted.

For WD hard drive repair when the ROM data is corrupted, we need to unsolder the ROM chip from the drive's PCBA and solder it to the external programmer board included in our software package for reading/writing. Then we unsolder the ROM from the programmer board and solder it back to the drive's PCBA. That is to say that we need to perform unsoldering and soldering 4 times in total. In these circumstances, the chance of damage to the ROM Chip increases. Some of our customers worked out a new "solution" for ROM read/write and presented it to us for confirmation:

Here is the "solution" provided by our customers: Connect the ROM chip pins to the chip programmer using cables directly without unsoldering the chip from the PCBA, and try to read/write the ROM data using the chip programmer.

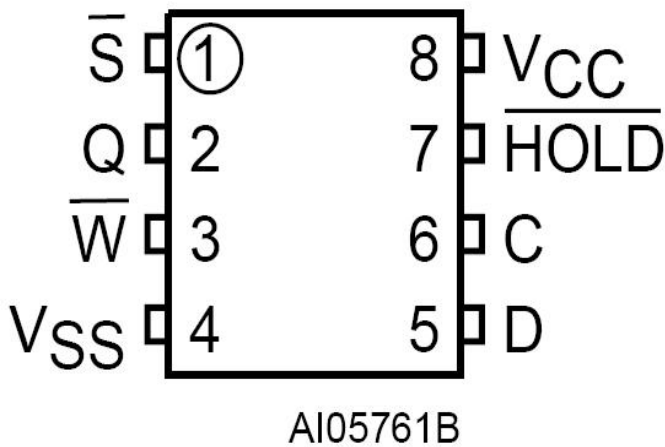


Experimentation showed this "solution" did not work.

We will describe in details the reason why this "solution" failed:

First, let's take a look at the basic structure of the chip M25P10 used as ROM on WD hard drives. The following are M25P10 chip's diagram and pin definition provided by STMicroelectronics.

## M25P10-A



Pin Definition



M25P10 Chip

**Serial Data Output (Q).** This output signal is used to transfer data serially out of the device. Data is shifted out on the falling edge of Serial Clock (C).

**Serial Data Input (D).** This input signal is used to transfer data serially into the device. It receives instructions, addresses, and the data to be programmed. Values are latched on the rising edge of Serial Clock (C).

**Serial Clock (C).** This input signal provides the timing of the serial interface. Instructions, addresses, or data present at Serial Data Input (D) are latched on the rising edge of Serial Clock (C). Data on Serial Data Output (Q) changes after the falling edge of Serial Clock (C).

**Chip Select (S).** When this input signal is High, the device is deselected and Serial Data Output(Q) is at high impedance. Unless an internal Program, Erase or Write Status Register cycle is in progress, the device will be in the Standby mode (this is not the Deep Power-down mode). Driving Chip Select (S) Low selects the device, placing it in the Active Power mode. After Power-up, a falling edge on Chip Select (S) is required prior to the start of any instruction.

**Hold (HOLD).** The Hold (HOLD) signal is used to pause any serial communications with the device without deselecting the device. During the Hold condition, the Serial Data Output (Q) is high impedance, and Serial Data Input (D) and Serial Clock (C) are Don't Care. To start the Hold condition, the device must be selected, with Chip Select (S) driven Low.

**Write Protect ( $\overline{W}$ ).** The main purpose of this input signal is to freeze the size of the area of memory that is protected against program or erase instructions (as specified by the values in the BP1 and BP0 bits of the Status Register).

According to the "solution" provided by our customers, we can see that because the ROM chip is still being connected to the PCBA, all the ports of the chip are still under control of the master chip and peripheral circuit. Therefore, when the programmer attempts to send signals to the ROM chip, it could not be input via the ROM chip pins successfully.

As we already know the function of ( $\overline{W}$ ) port, when this port is in its VL, the chip is under write protection. As described before, the chip is still on PCBA, so the  $\overline{W}$  port could not be changed to VH but will stay in VL, the programmer can't perform a "write" operation to the ROM chip.

For the same reason, we can see that because both of the S and HOLD port are in their VL status, the HOLD function is activated, which means all serial communication will be banned. Meanwhile, the Serial Data Output port (Q) is in a high impedance status, the signals from the Serial Data Input port (D) and Serial Clock port (C) will be ignored.

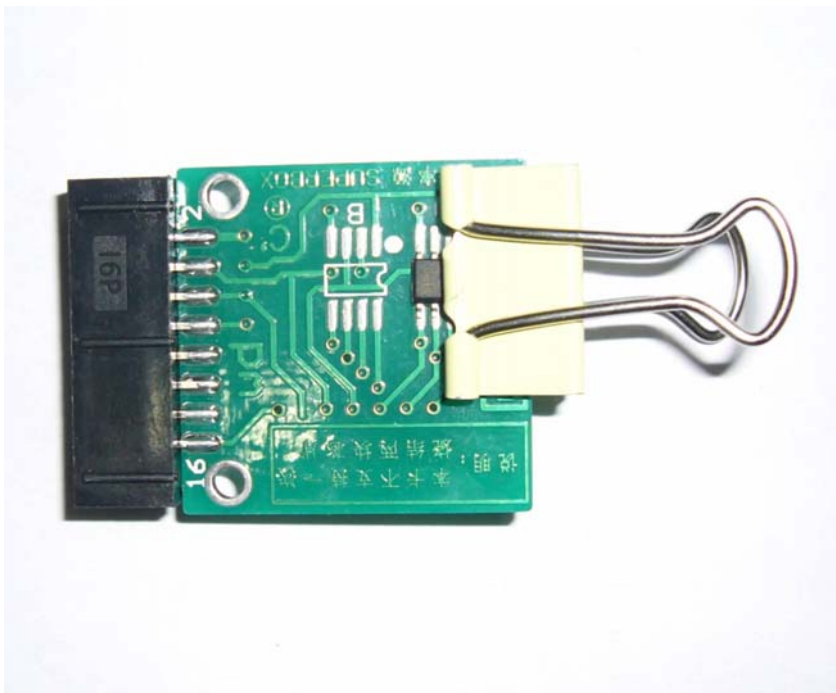
Moreover, the data exchange operation of the clock port (C) and Data input port (D) cannot be carried out normally because of a disorder caused by the peripheral circuit.

From the above analysis, we can see that when the ROM chip is still on the PCBA; all processes of read/write carried out to it would a wasted effort.

To reduce the soldering and unsoldering times, now we will introduce a convenient way to use SalvationDATA HD Doctor for WD toolkit for ROM read/write as a reference. This will reduce the solder and times can also reduce the risk of damage to the ROM chip.



Please see the following picture:



When doing a ROM read/write process with SalvationDATA external programmer which is included in the HD Doctor for WD toolkit, you can use a clamp to fix the ROM to the programmer board (then you need not resolder the ROM chip to the board). Make sure each pin of the ROM chip is connected to the correct interface perfectly.

**Caution:** To avoid short circuit, you must maintain insulation between the clamp and the programmer board when you use the clamp for holding the chip. We strongly recommend that you use a nonmetallic clamp.

The above material are all provided by SalvationDATA Technologies