Advanced Tutorial of Repairing Bad Sectors (red and green blocks) of Seagate F3 Series HDDs

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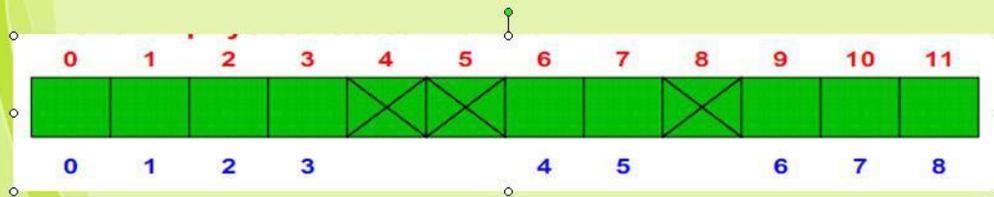Please keep it confidential.

We should note that MRT is different with color definitions of commonly used MHDD. MRT uses color definition standard of PC3000 UDMA. Green represents good sector. Yellow and pink represents the sectors that are read slowly. Red or gray represents the sectors (bad sectors) that can't be read. That is to say, the red and green blocks in MHDD are the read, yellow, pink blocks in MRT. And the gray blocks (normal sectors) in MHDD are the green blocks in MRT. For convenience, we use the wording of red and green blocks that represents bad sectors and sectors that is difficult to read in this document.

Before repairing bad sectors, we have to distinguish the reasons of bad sectors. If the heads have problem, it will lead to regular red and green blocks. Red and green blocks appear to be section by section. Every time when it scans the area that has bad heads, it will have red and green blocks. For the red and green blocks caused by the bad heads, only through the method of head shielding (cut head) can repair it completely. It does not belong to the scope of this article. This article applies to a situation that the heads are good, disk has scratch or bad sectors and causes red and green blocks. In this situation, we often think of using M command to have low level format. It could solve part of the problem, but not always effective. For bad sectors that can not be repaired by low level format, we can only shield them. Adding bad sectors into defect list and hid them, the red and green blocks can be repaired.

Let's carry out a simple operation. We go to the scanning program, and scan the disk. Also, we select and record bad sectors into defect list. After opening this option, the bad sectors that are encountered in scanning will be recorded into the defect list file. The following options allow us to choose which type of color is recorded into defect list. We usually set the time of determining yellow blocks a little bit longer. This avoids that it will have a large number of yellow blocks when scanning the slow HDD. Then we will add the blocks that can't read or read slowly into the defect list.

We scan a short section first. There will be a few different color blocks. Then we stop scanning and find those blocks are added into defect list. We delete the back of the entries first and only leave one entry. Then save the defect list again. Now we look at these PBA address of bad sectors. PBA is the most primitive linear address. In the PBA address, we remove the defective sectors. And we get a non-defective LBA address. Let's look at a diagram.

This diagram illustrates the relationship between the PBA and the LBA. We first check PBA addresses of bad sectors, which are the physical bad block address. Note that the results are hexadecimal. 0xC00, in decimal system is 3072. We can see the address of LBA is 0xC00, and corresponding PBA address is also 0xC00. It indicates that there is no defect in front sections.

In order to avoid interference, I will recalculate translator and set the translator to an original state. Then, we add the defect lists into HDD. In menu "Tools - Repair Tools - Write the LBA defects to HDD", we brush the scanned LBA defect list files into G-List or P-List. The difference is P-List is much more stable than G-List, but it is faster to add into G-List than that into P-List. To do this operation and let the defect list takes effect. let us look at PBA address of bad sectors . We can see the PBA address is not the same as the original one. That is, the original bad physical sectors have been shielded. The original 3072 - 3327 PBA corresponding 256 addresses blocks have been removed. So now LBA: 3072 corresponding PBA is 0xD00. In decimal system that is 3328. We can see 3328 - 3072 = 256. It is exactly the number that the number of physical sectors have been shielded. This is the operation of shielding red and green blocks.

Let's look at the specific use. We open the scanner, set determination time, open defect list, select "Skip the bad blocks" option. This is the most common type of setting. Note that it is necessary to select "Skip the bad blocks" option. Because of scanning bad blocks is very slowly, so you can save time.And select "add skip part into defect list" option. Because it is probably that near the bad blocks are also bad blocks. We have just added new defects, so now it scans very slowly. To illustrate, now we re-set the translator back to its initial state.

We need to determine a reasonable setting time, so as to record shielded color blocks we

want into the defect list. The default value of yellow blocks is greater than 5ms, less than 20ms. This value is too small for the old HDD. So usually it is more appropriate to set yellow block to be greater than 10ms, less than 20ms for repair disk. When we fully scan HDD, we will get a defect list. If bad sectors of HDD are few, we do not need to do extra processing. If bad sectors are too many, we can do additional processing to defect list. Optional additional processing are: 1. Expand defect 2. Arrange defects

Expanding defect can merge the red and green blocks that near the red and green block together. Such it can shield a large scale, the results will be better. Arranging defects can combine the entries that is overlapping. After scanning defect list, we recommend you to organize them, so that procedures would be more quickly.
with error   red blocks   (can't be read)
Timeout   gray blocks   (can't be read)
with slowing down   pink blocks   (can be read but very slowly)
with delay   yellow blocks   (can be read but very slowly, better than pink blocks)

After finishing the above operations, we get a defect list, which records the address of red and green blocks that we need to shield. We need to write them into HDD. Writing into G-List or P-List are both ok. This operation should take a moment, if you want a little faster, we recommend you to write into G-List.
After writing into defect list, next step is to make it into effect.
Note that this step can be opened with factory low level format. Then the HDD can be put aside, just give the power supply to it. Or you can not open the factory low level format. Let the list take effect first, and do the erasing operation. After completion of the overall erasing, the HDD can be used.

Now we change a HDD that has many bad sectors to demonstrate.
Here we give a standard recommendation process:
1. Fully scan HDD that records defect list files
2. Write defect files into G-List. You can edit the defect list first before writing. (It is time-consuming, please be patient.)
3. Let the defect list take effect
4. G-List to P-List operation. (It is time-consuming, please be patient.)
5. Let the defect list take effect again.
6. Use common procedures to open automatically erasing function.
Then the HDD can be put aside, it can be used when erasing finished.

In addition, there are several alternative processes. They are almost the same, just some slight differences in the effectiveness and speed. We can choose the most suitable processes in practice.
Process II:
1. Scan defect list files
2. Write defect files into G-List
3. Let defect list take effect and open factory low level format

Process II is relatively recommended. The advantage is less to operate, saving time. Step 3 when you open a factory low level format process, the HDD will not have to connect to SATA interface, just give the power supply to it. The SATA interface can be freed to repair next HDD. How to determine the factory low level format process is over? It is simple. You reconnect the SATA interface and find no BSY, light 2 and 4 are ready. It means the factory low level format process is over.

Process III:
1. Scan defect list files
2. Write defect files into G-List
3. Let defect list take effect
4. G-List to P-List operation.
5. Let defect list take effect
6. Let defect list take effect and open factory low level format
In this process, it goes to P-List finally. After finishing step 6, the HDD can be used.

Process IV:
1. Scan defect list files
2. Write defect files into G-List
3. Let defect list take effect
4. Use erasing tool in factory program to erase

Process V:
1. Scan defect list files
2. Write defect files into P-List
3. Let defect list take effect
4. Use erasing tool in factory program to erase.   it can be used when erasing finished.

The drawback of Process IV and V is that erasing procedure requires to occupy MRT general program. The advantage is that it can see the progress details of erasing.

In fact, the process can also be more. The purpose of those processes is to write into defect list first, let the defect list take effect and overall formatting or erasing the sectors of HDD in the end. Based on this principle, you can practice more processes of your own.
Finally, we look at the complete presentation.
The step of G-List to P-List operation is optional. If you do this, defects are in the P-List. It is stable. If you don't do this, defects are in the G-List. In fact, the effect is about the same. The main problem is that G-List is easier to be cleared up by using the i command accidentally. So go to the P-List, it won't happen.

Secure Erase function can be used, the advantage is done automatically. After opening, there is no need to connect to SATA interface. You can also use the online erase. The

disadvantage is that it will always occupy MRT. No matter data coverage erasing, or secure erase HDD data, or start factory low level format process, the goal is the same. When defect list takes effect, HDD must be totally erased or formatted once, and then HDD can be used. After erasing is completed, we re-scan HDD and will find the red and green blocks have completely disappeared.

This is the tutorial of repairing bad sectors (red and green block) of Seagate F3 series HDDs by using MRT.

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