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To: Mark 5 Development Group

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Subject: Conditioning Mark 5 Disk Modules

The Mark5A or dimino control program must not be running; kill Mark5A (or dimino) before conditioning or running SSERase.

Normally, the control program can be killed with 'EndM5' or 'Enddim'. The stand-alone SSERase utility can be used to condition a set of disks. There are two settable parameters:

-m sets the message level (range -1 to 3, default 1)

-c sets conditioning (0 for FALSE, 1 for TRUE, default is FALSE)

For example:

```
SSERase -c1 -m0
```

goes through the conditioning process on whatever disks it finds. Conditioning amounts to a read-write cycle through the whole set of disks. With the message level set to 0, debug prints a progress report every minute. The progress report is the number of bytes per bus remaining to be read or written in the current read or write cycle.

Conditioning disks is recommended before recording, especially if they are to be recorded at 1024 Mb/s, or at a higher data rate.

Typical conditioning times:

| GB           | Seconds | Hours  | Average Mb/s                           |
|--------------|---------|--------|--|
| 8×120=960    | 9100    | 2H32M  | 1684 with Mark 5A or B                 |
| 8×120=960    | 6900    | 1H55M  | 2226 with Mark 5B+                     |
| 8×160=1280   | 7600    | 1H06M  | 2700 Estimated with Mark 5B+           |
| 8×164.7=1317 | 12000   | 3H25M  | 1711 Hitachi with Mark 5A or B         |
| 8×185.2=1482 | 14000   | 3H40M  | 1744 Hitachi with Mark 5A or B         |
| 8×185.2=1482 | 9400    | 2H36M  | 2528 Hitachi with Mark 5B+             |
| 8×200=1600   | 16000   | 4H20M  | 1641 Western Digital with Mark 5A or B |
| 8×200=1600   | 11000   | 3H09M  | 2258 Western Digital with Mark 5B+     |
| 8×250=2000   | 18000   | 5H06M  | 1700 Hitachi, WD with Mark 5A or B     |
| 8×250=2000   | 12000   | 3H17M  | 2706 with Mark 5B+                     |
| 8×300=2400   | 22000   | 6H10M  | 1730 with Mark 5A or B                 |
| 8×300=2400   | 14000   | 3H50M  | 2755 with Mark 5B+                     |
| 8×320=2560   | 23000   | 6H25M  | 1744 Western Digital with Mark 5A or B |
| 8×320=2560   | 15000   | 4H10M  | 2733 Western Digital with Mark 5B+     |
| 8×400=3200   | 29000   | 8H04M  | 1744 Hitachi with Mark 5A or B         |
| 8×400=3200   | 18000   | 5H00M  | 2800 with Mark 5B+                     |
| 8×500=4000   | 36000   | 10H08M | 1754 Seagate with Mark 5A or B         |
| 8×500=4000   | 23000   | 6H23M  | 2787 with Mark 5B+                     |
| 8×750=6000   | 55000   | 15H24M | 1730 Estimated with Mark 5A or B       |
| 8×750=6000   | 34000   | 9H30M  | 2820 With Mark 5B+                     |
| 8×1000=8000  | 46000   | 12H50M | 2767 With Mark 5B+                     |
| 8×2000=16000 | 100000  | 27H40M | 2570 With Mark 5B+                     |

These times are approximate for the typical case; but, if any of the disk drives in the module has a problem, times can be longer.

If conditioning takes longer than 10% more than the times listed above, try reconditioning the module. If the conditioning time does not improve after conditioning a second time, then the slow drive or drives should be replaced before the 8-pack is used at the highest data rates. The performance statistics reported by 'SSErase -c1' can be used to identify the slow drive or drives. A suspicious module should always be retested because disks might have been improved by the conditioning process. Note that a slow, but fully functional, 8-pack is OK to use at lower data rates.

For an explanation of the meaning of the "SSErase STATS" numbers, see the "get\_stats" and "start\_stats" commands in the "Mark 5A Command Set Memo" <<http://www.haystack.mit.edu/tech/vlbi/mark5/docs/command5a.pdf>>, or in the "Mark 5B Command Set Memo". Note that SSErase does not report the <replaced-block-count>, which has no meaning when conditioning.

After you start conditioning, pay close attention to the progress report, which reports the number of bytes remaining per bus, and should start with a number slightly less than twice the capacity of the disk drives in the module. For example, a 2-TB module of 8 250-GB disk drives starts out

```
SSErase NOTE: This will run a long time
SSErase DEBUG: In progress, 495348088832
SSErase DEBUG: In progress, 490338975744
```

Sometimes, these numbers do not look right. For example, the report below says that there are more than 4 TB per bus remaining, which is impossible for a 2-TB module:

```
SSErase NOTE: This will run a long time
SSErase DEBUG: In progress, 4393014263808
SSErase DEBUG: In progress, 4387735011328
```

Another thing to look for at the beginning of the conditioning process is the byte counts not changing by a significant amount from line to line, indicating that the conditioning is proceeding very slowly.

In situations like these, you need to

```
Ctrl-C to terminate SSErase
SSReset to reset StreamStor board
SSErase to erase the module
```

Try condition again:

```
SSErase NOTE: This will run a long time
SSErase DEBUG: In progress, 495348088832
SSErase DEBUG: In progress, 490338975744
```

Near the middle of the `script` file, as `SSErase` finishes the read phase, you should see something like the following, with the byte count going down to near zero before the write phase starts. Sometimes the read phase ends prematurely, and sometimes `SSErase` terminates at the end of the read phase, without executing the write phase. In either of these cases, the conditioning should be repeated.

```
SSErase DEBUG: In progress, 18420465664
SSErase DEBUG: In progress, 16102719488
SSErase DEBUG: In progress, 13784252416
SSErase DEBUG: In progress, 11463098368
SSErase DEBUG: In progress, 9255059456
SSErase DEBUG: In progress, 7086538752
SSErase DEBUG: In progress, 4922081280
SSErase DEBUG: In progress, 2718629888
SSErase DEBUG: In progress, 400043802624
SSErase DEBUG: In progress, 395863392256
SSErase DEBUG: In progress, 391681736704
SSErase DEBUG: In progress, 387509911552
SSErase DEBUG: In progress, 383333433344
```

After conditioning has completed, SSErase reports response time statistics, as shown below. In this example, disk drive 0 has response times much slower than the other 7 disk drives in the module. When this happens, a second conditioning often clears up the problem, as shown in the second example below. Note that the conditioning time for this module has dropped from 12622 seconds to 11264 seconds.

```
SSErase DEBUG: That took 12622.2 seconds
SSErase DEBUG: XLRSetUserDir() OK
SSErase DISK: 0, WD-WMACK2080759
SSErase STATS: 0 : 4108242 : 1640169 : 210057 : 47483 : 75913 : 19171 : 2579 : 1005 ;
SSErase DISK: 1, WD-WCAV28584156
SSErase STATS: 1 : 5943591 : 141791 : 10622 : 6595 : 1984 : 30 : 6 : 0 ;
SSErase DISK: 2, WD-WMACK2080271
SSErase STATS: 2 : 4200999 : 1646581 : 239982 : 14295 : 2732 : 30 : 0 : 1 ;
SSErase DISK: 3, WD-WMANK5921640
SSErase STATS: 3 : 5980799 : 105998 : 4853 : 5877 : 6282 : 800 : 8 : 3 ;
SSErase DISK: 4, WD-WMACK2198080
SSErase STATS: 4 : 4390810 : 1670658 : 41685 : 906 : 548 : 12 : 0 : 1 ;
SSErase DISK: 5, WD-WMACK2080199
SSErase STATS: 5 : 4341249 : 1657510 : 102118 : 2168 : 1454 : 84 : 27 : 10 ;
SSErase DISK: 6, WD-WMACK2200994
SSErase STATS: 6 : 4335127 : 1704332 : 63829 : 1070 : 238 : 21 : 2 : 1 ;
SSErase DISK: 7, WD-WMACK2080570
SSErase STATS: 7 : 4343424 : 1672913 : 85846 : 1643 : 778 : 14 : 2 : 0 ;
```

```
SSErase DEBUG: That took 11263.6 seconds
SSErase DEBUG: XLRSetUserDir() OK
SSErase DISK: 0, WD-WMACK2080759
SSErase STATS: 0 : 4222511 : 1652184 : 218173 : 10624 : 1117 : 61 : 11 : 3 ;
SSErase DISK: 1, WD-WCAV28584156
SSErase STATS: 1 : 5921958 : 149320 : 15852 : 11396 : 6139 : 18 : 1 : 0 ;
SSErase DISK: 2, WD-WMACK2080271
SSErase STATS: 2 : 4198077 : 1649539 : 242490 : 14254 : 323 : 1 : 0 : 0 ;
SSErase DISK: 3, WD-WMANK5921640
SSErase STATS: 3 : 5984343 : 106145 : 4295 : 4822 : 4616 : 460 : 3 : 0 ;
SSErase DISK: 4, WD-WMACK2198080
SSErase STATS: 4 : 4397392 : 1665058 : 41032 : 829 : 360 : 11 : 1 : 1 ;
SSErase DISK: 5, WD-WMACK2080199
SSErase STATS: 5 : 4341392 : 1656905 : 103246 : 2011 : 1111 : 16 : 2 : 1 ;
SSErase DISK: 6, WD-WMACK2200994
SSErase STATS: 6 : 4370668 : 1681003 : 52005 : 835 : 158 : 14 : 1 : 0 ;
SSErase DISK: 7, WD-WMACK2080570
SSErase STATS: 7 : 4328909 : 1674870 : 97609 : 1969 : 1306 : 19 : 2 : 0 ;
```