MASSACHUSETTS INSTITUTE OF TECHNOLOGY
HAYSTACK OBSERVATORY
WESTFORD, MASSACHUSETTS 01886
December 10, 2014 (Rev. B)

To: Distribution

From: Chester Ruszczyk

Subject: Mark6 Maintenance

Maintenance for the Mark6 systems can be separated into two areas: the Mark6 Host/Server and the disk modules.

1. Mark6 Host/Server

In the Mark6 system the major replaceable components are the mother board and associated hardware, the Operating System (OS) disk drive, the disk module backplane, the eSATA cables and the power supplies. The components that have the highest failure rate, based upon the manufacturer's estimated mean time between failures (MTBF) are:

- The host chassis power supply (95,150 hrs)
- The expansion chassis power supply (135,268 hrs)
- The motherboard (500,000 hrs)
- The eSATA cables (250 insertions).

Power supply failure: Incipient failure of the power supplies will usually be indicated by system crashes that require restart. A replacement supply may be obtained from the manufacturer.

eSATA cable failure: The eSATA cables are rated for 250 insertions. It is recommended that after ~250 insertions, the cable be reversed by unplugging it from the module and SAS controller card of the Mark6 on the front and the back of the unit respectfully, then reinserting in the opposite configuration. Note that the cable with the white tape is always to be inserted into the top SAS slot. After an additional 250 insertions, the cable should be replaced entirely by a new cable obtained from the manufacturer.

Additional information: Information on software maintenance and upgrade will be posted on the forum, see the Contact section for details. Software utilities and test software, as developed, will be posted on the VLBI forum along with descriptions in the Mark6 User's manual.

2. Disk Modules

Conditioning of New Disk Modules: The conditioning of new disk modules can be accomplished with the software utility *hammer.sh.* The results of the conditioning process may be viewed with *hammerplot.sh*. Instructions for using the software utilities can be viewed by entering the "--help" command, or by referring to the Mark6 User's Manual.

Operations with a Failed Disk: If a disk fails during operations, the Mark6 software will detect the failure and remove the disk from the working pool. There may be a slight degradation in the sustainable write data rates that could resulting in a small percent of lost data during recording, but the system will continue normal operations. Future versions of software will report the disk module where the faulty disk(s) are found.

Replacement of a Failed Disk: A failed disk may be identified by noting that the LED in the front of the module is not illuminated when the disk is being written to. It may also be identified from a command line on the Mark6 by issuing the linux "df" command if the disk is mounted, or the "lsscsi -t" command if it is not. If the "df" command is utilized, a one to one correspondence can be made to the mount point and the device allocation. If the "lsscsi -t" command is used, it will be necessary to identify the drive that is not detected from the output. Once the LED or the lsscsi position is identified, the relationship between the slots and the LED's are as follows:

LED	lssci identifier	Printed Circuit Board Label
0	sas:0x4433221100000000 / sas:0x4433221108000000	B3
1	sas:0x4433221101000000 / sas:0x4433221109000000	B2
2	sas:0x4433221102000000 / sas:0x443322110A000000	B1
3	sas:0x4433221103000000 / sas:0x443322110B000000	B0
4	sas:0x4433221104000000 / sas:0x443322110C000000	A3
5	sas:0x4433221105000000 / sas:0x443322110D000000	A2
6	sas:0x4433221106000000 / sas:0x443322110E000000	A1
7	sas:0x4433221107000000 / sas:0x443322110F000000	A0

To replace a disk:

- Loosen (but do not remove) the four screws securing it to the disk module and slide it out of the module.
- After the HDD is completely removed from the module, remove the screws and insert them loosely into the replacement HDD.
- Slide the new HDD into the disk module.
- Mate the HDD connectors to the female connector of the module and tighten the screws.

- Format the disk for use within the module by partitioning it, formatting it, and copying the appropriate metadata on to it, as follows:.

1) Create the disk's data partition
   a) parted /dev/sdX mktable gpt
   b) parted /dev/sdX mkpart primary xfs 1 -100M
   c) parted /dev/sdX MSN#+_disk number replacing
      i) e.g. parted /dev/sdX EHT%0001_4
2) Create the disk's meta-data partition
   a) parted /dev/sdX mkpart primary xfs -100M 100%
   b) parted /dev/sdX MSN#+_disk number replacing "m"
      i) e.g. parted /dev/sdX EHT%0001_4m
   c)
3) Format the data / meta-data partitions with an xfs file system
   a) mkfs.xfs -f /dev/SDX1
   b) mkfs.xfs -f /dev/SDX2

4) Manually mount the disk
   a) mount -t xfs -o "mark6 gid" /dev/SDX2 " /mnt/disk/.meta/"slot module is in"/"disk #"
      i) e.g. mount -t xfs -o 1002 /dev/sdX2 /mnt/disk/.meta/1/4
5) Manually mount another disk of the module
   a) mount -t xfs -o "mark6 gid " /dev/SDY2 /mnt/disk/.meta/"slot module is in"/"different disk #"
      i) e.g. mount -t xfs -o 1002 " /dev/SDY2 /mnt/disk/.meta/1/1
6) cp over the meta data group, subgroup (if used), disk_sn and eMSN files.
   a) cd /mnt/disk/.meta/1/4
      i) cp /mnt/disk/.meta/1/1/group .
      ii) cp /mnt/disk/.meta/1/1/eMSN .
      iii) cp /mnt/disk/.meta/1/1/disk_sn .
7) Modify the disk_sn to now remove the HDD replaced with the serial number of the new disk. This will have to be done for all HDD in the module.
8) Unmount the disks within the disk module
      i) cd
      ii) mount -u /mnt/disk/.meta/1/1
      iii) mount -u /mnt/disk/.meta/1/4
9) All disks should now be available for recording.

3. Contact Information

For support of the Mark6 system it is recommended that you search the Mark6 forum http://vlbi.org/vlbi-forums/, and if a posting does not match your problem please make a post.

The forum will contain links to existing and new Mark6 memos to help resolve maintenance issues.

If there is a hardware failure, Conduant can also be contacted via email support@conduant.com concerning the appropriate failed item. Note, that Conduant will not help you debug the potential problem, but will help find a replacement if under warranty.