INTRODUCTION TO

HELICAL SCAN DRIVES

USED FOR COMPUTER APPLICATIONS

INCLUDES 4MM DAT AND 8MM

HELICAL SCAN DRIVES

GENERAL THEORY

The helical scan drives, which consist primarily of the 4M M DAT drives and the 8MM Exabyte drives, record data in a considerably different fashion that the QIC drives.

With the QIC drives, there is no tape path to speak of since the tape is contained within a cartridge and the cartridge doo r opens allowing the tape head to be placed directly against t he tape in the cartridge.

These helical scan drives are essentially derived from the V CR technology. There are several heads located around the perimeter of a rotating drum. The tape is routed out of the tape cartridge, around several tape guides, and is positioned around most of this rotating drum.

Substantial data can be written onto these tapes by thes e drives due to the method of recording. One of the multiple heads is generally a servo head which provides tracking informatio n. The other heads/gaps are at angles to each other, accomplished either by the head itself or the angle that the wheel is mounted in th e drive. This allows two separate tracks of data recorded at a n angle across the width of the tape to actually overlap each other. The heads will only read the data on the tracks it is aligned to, so there is no problem with this overlap.

Since these tracks are written across the width of the tape, as opposed to from end to end on the QIC drives, no complicate d tracki ng is needed where the head is being moved. In fact, wit h these drives, the entire head wheel, with the head element s remaining in fixed position relative to each other, merely s pins in place and the tape is brought to it.

As all of the current 8MM drives are made by Exabyte, irrespective of the name on the outside of the drive, there is interchangability between drives (if the same software is used).

HOWEVER, while most of the 4MM DAT drives use the DDS format, they are not necessarily interchangeable as the number of head elements in each may vary. As a rule, they are interchangeable within OEMs and downward compatible.

Due to the spinning of the head wheel, even though the tape appears to be moving extremely slowly, the effective tape speed is much higher than on QIC drives.

All of these helical scan drives, with limited exception, are a SCSI I and/or SCSI II interface. While most are single ended SCSI, some are differential SCSI. As such, SCSI ID is important as is SCSI termination. Also, differential SCSI cannot be tested on or work with single ended SCSI controllers and vice versa.

Because of the different tracking scheme on these drives as opposed to the QIC drives, since the head is not physically moving to reach the outer edges of the tape on track location, lengthy testing in terms of capacity for final system test <u>is not required</u>.

As these drives use the same size tape cartridges as the video and audio tape available to consumers, one of the most common problems is the use of these lower quality tapes in these drives. This allows a build up of tape debris in the head wheel drum around the tape head elements. Thus, one of the first things to be done is to carefully clean the head wheel around the tape head elements.

Additionally, given the complicated loading and tape movement mechanics of these drives, the next most common problems are mechanical in terms of both the loading function and the tape path. The roller tape guides must be freely moving and if one side is shiny it generally implies that the roller is not turning properly.

Tape tension is also very critical and is set not by the cartridge but rather by the tape guides in the tape path.

By far the most common problem on these drives is the head wheel assembly.

Another area to be aware of is that the syncing of the data to the PCBs and the head wheels is critical. Thus, when the head wheel is changed out, or the MX or SV boards or even their Eproms are changed, the head sync adjustment must be made.

Another common failure on the Exabyte is the eject mechanism. The gears that control the opening and closing of the tape door are plastic and easily damaged. Also, given the length of time associated with the loading and unloading of the tape, which is a function of the complicated tape path, it is likely that the end user gets impatient, hitting the eject button repeatedly or forcing the door closed, either of which can damage the plastic gears.

The tape path is, of course, critical to the proper operation of these units. If any of the tape guides, many of which you will note are at an angle, does not have the proper position or tension, there should be a noticeable flutter in at least the edge of the tape which will cause data errors, among other things.

Another common problem is the build up of dirt and grit in the motor assemblies. The motors in the unit will attract dust and dirt due to the magnetic field they generate during operation. Failure to clean these motor assemblies will cause fluctuation in motor speed causing the drive to lose sync and thus causing read/write problems.

These drives must be cleaned at least every 20 hours of use. Should only use OEM approved cleaning cartridges which will automatically eject after the proper cleaning time. ***NEVER*** use any of the wet cleaning kits. Failure to properly and timely clean these units will result in read/write problems.

