NOTES ON THE TESTING

THE GREAT BUFFER DEBATE: It all goes back to the "streaming vs. start/stop" question. Buffered or cached drives were an attempt to keep streaming mechanics in motion in a start/stop environment.

During a WRITE command, if the host is feeding data at a rate faster than the drive can write, a buffer provides the holding tank from which data can be trickled at the drive's speed while accepting it at the host's faster rate. However, if the host is slower than the tape drive, having the buffer makes no difference, and the buffer is not needed.

HOW THE UTILITY AFFECTS PERFORMANCE: The degree to which a drive streams or starts & stops during operation is directly affected by whether the utility being used is run under the operating system in a 'stand-among' mode, or without the operating system in a 'stand-alone' mode.

With a stand-among utility, such as DUMP_II, write commands to tape are only part of the job performed. The utility must first (1) logically decide what is to be written, based on the template given in the command, (2) find enough memory for the block size specified in the command, and (3) place the data in memory.

This unalterable process takes time, and a subsystem that finishes each command quickly will idle, or stop, until the next instruction, when it can start again. For this reason, a tape drive will appear to 'stream' at 50 ips (because it isn't waiting for the next command), and seem to 'start/stop' at 100 ips (beacuse it must wait). Each mode takes the same amount of time to finish. Does adding a buffer make a difference? We found that it did not.

With a stand-alone back-up utility, such as PCOPY or COMMAND STRING under the Reliability Program, there is no logical overhead, so tape commands may be issued at a faster rate. This makes a faster drive operate more efficiently, possibly even to act like it is streaming.

HOW BLOCK SIZE AFFECTS BACK-UP: The larger the block size, the harder it is for the BMX-2 to secure contiguous sections of memory for the transfer -- hence, the operation takes longer. However, this also decreases the gap space, allowing physically more data per tape.

RESULTS EXPLANATIONS:

1) The performance of DG back-up utilities cannot be improved by enhancing the speed, density, or transfer rate of the tape drive.

2) In assessing back-up needs and solutions, consider the following conclusions drawn from our testing:

a. When using logical back-up, a high-speed, high-density tape drive (ie: 100 ips, 6250 bpi, streaming) will have periods of 'wait time' because it finishes each command at a faster rate, with less tape used, and must wait for the next command. (In our tests, at 50 ips, 6250 bpi, the tape had continuous motion; at 100 ips, 6250 bpi, it did not.)

b. With a logical back-up utility, such as DUMP or DUMP_II, specifying a larger block size in the command line reduced the number of gaps on the tape and increased the amount of data written on tape.... but also slowed the process because more memory was needed.

c. Using the Dynamic Gap feature of the BMX-2 to artificially extend the length of the inter-record gap maintained the motion of a high density, high speed drive, but the benefit of high density storage was significantly reduced because the gaps were longer, thereby reducing how much data was recorded on the tape.

d. Adding a buffer to the high speed, high density drive did nothing to prevent 'wait' states.

e. Physical back-ups (ie: PCOPY), which copy entire disks without regard to a user template, showed a marked improvement over logical back-up utilities in performance with high density, high speed drives.

3) The limitations described have nothing to do with the design of the tape coupler or the tape drive, and have everything to do with the speed of the mag tape drivers of the host and the back-up utility used.

4) Buffered tape drives, streaming tape drives, and high density tapes can operate with the BMX-2 Tape Coupler, but the overall drive configuration parameters may be different for each customer's requirements. The user should experiment by adjusting the drive configuration parameters (refer to the drive manual for details).

Zetaco's technical support of buffered tape drives is limited. Please refer to Section C of the BMX-2 Integration Guide.

EXTENDING THE GAP LENGTH WITH 'DYNAMIC GAP LENGTH SELECT': On the other hand, the Dynamic Gap Length Select feature on the BMX-2 allows the user to extend the gap space for a selectable period of time. Using this feature, a user can make a drive 'stream,' but the trade-off is that the amount of data written on the tape may be less than what's desired. This trade-off will have to be determined by each user, and what will best suit his/her application.

IS HIGH DENSITY TAPE (6250 bpi) DESIRABLE?: Although using 6250 bpi tape doesn't reduce the recording time on any kind of tape drive (whether streaming or start/stop, buffered or un-buffered), more data will fit onto the tape, so fewer reels of tape will be used. (If, however, Dynamic Gap is extended too far, the data density on the tape may be less than otherwise expected.)

TAPE SPEED: Due to the architecture of the DG processors, implementing higher speed tape drives (higher than 50 ips), makes little or no difference in time needed to copy a file or whole disk.

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Maximum Block Size (K Bytes)	9, 16, 24, 32, (64 optional)	32	32	32
Interface Ramp Delay	0 thru 15	0	0	0
File Mark Write Sync	yes or no	yes	yes	yes
Read Error Retries	0, 4, 8, 12, 16	16	16	16
Write Error Retries	0, 4, 8, 12, 16	16	16	16
Error Correction ON	yes or no	yes	yes	yes
Unit	0 thru 7	0	0	0
Lock Out 3200 bpi Writes	yes or no	no	no	no
Remote Density Select Enabled	yes or no	yes	no	no
High Speed Ramp Enabled	yes or no	no	no	no