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Research Newsletter

ROCKY MOUNTAIN BLUES

SUMMARY

Ever since StorageTek spent millions on its optical storage project, which was never completed, Colorado has been a center of optical storage device activity. StorageTek's project was responsible for training many engineers in the technology that created the nucleus of the local industry in optical storage devices. StorageTek's mainstream business has always been magnetic storage devices, and it has contributed substantially to the local talent pool in this technology as well. Control Data Corporation (CDC) also contributed to the optical storage talent pool by forming OSI in Colorado Springs. The local optical storage companies that emerged from this include Cherokee, ISI, Maximum Storage, Mountain Optotech, Optical Division of AMC, Optotech, OSI, and Reference Technology. OSI became a joint venture between Control Data and Philips and was renamed LMSI, or Laser Magnetic Storage International.

Pentax, a Japanese optical components company that moved into the area, recently announced its intention to sell a WORM drive from this location, although the product will be of Japanese manufacture.

Sony recently established its technical and market planning base in Boulder to support its U.S. sale of magneto-optical drives, drawing upon the local technical and management talent.

These companies' accomplishments include the following:

- Developing the world's first 5.25-inch optical drive and the first 1.2GB 5.25-inch optical drive (ISI)
- Holding the number one worldwide market share in 12-inch WORM drives (LMSI)
- Developing the first ruggedized quasimilitary drives (Cherokee)
- Developing new, low-overhead software for WORM drives (Maximum Storage)
- Developing software tools and turnkey services that are making CD-ROM publication a profitable reality (RTI)

Despite these accomplishments, the financial results remain disappointing and most of the participants have only a marginal positive cash flow. The year 1989 was thought to be a turning point, but results so far indicate only a modest improvement over 1988, certainly no sunburst of prosperity.

The one exception, in the optical storage area, is in CD-ROM drives. These drives have almost doubled in shipments since 1988. LMSI is the only company in this Colorado group that has a CD-ROM product and it is imported from Philips.

The company experiencing the best performance in terms of growth is Exabyte, the originator of the data storage tape drive that uses 8mm video cassettes to store 2.5GB for about \$10.

These companies in the Colorado area produce all but three of the U.S.-manufactured optical disk drives. The three exceptions are Optimem, in Mountain View, California (owned by Cipher Data); Laserdrive, in Santa Clara, California (40 percent owned by Kodak, 40 percent by Olivetti); and Kodak, located in Rochester, New York, which are all struggling as well.

How are the Colorado manufacturers of magnetic storage products doing if optical storage is so slow? The biggest unit-volume producer of Winchester drives, Miniscribe of Longmont, has crashed but not yet burned. Miniscribe's fall has taken at least one major supplier with it, Domain Technology. Miniscribe may revive with the new seasoned management that has been put in place, but it will take a long time to return to credibility. Domain is in Chapter 11 but still operating, and Dataquest hopes to see it emerge and survive as a viable entity in this industry.

DETAILED COMPANY ANALYSES

Some of the current situations of this group of Colorado companies are described here.

Applied Magnetics Corporation (AMC)

The Optical Division of Applied Magnetics Corporation (AMC), in Monument, is just getting started. In February 1989, the company acquired rights to Hewlett-Packard's optical head assembly designs as part of a six-year development program. AMC has been in the magnetic recording head business for more than 20 years and has an enviable track record plus a clear number one market share. The optical head program is in its infancy and features some interesting technology, but is at least one year away from profitability.

Array Technology

Array Technology of Boulder, a former subsidiary of Seagate, bought the operation back from Seagate during the cash crunch at Seagate. It has a working product—a 5.25-inch disk array that can contain as many as 66 drives with an extremely high guarantee of data availability. This subsystem uses a UNIX operating system and interfaces with the VME bus. After about 18 months of existence, it has not been able to raise venture capital, despite this product's apparent place in the mainstream of future Winchester drive trends.

BOSCO

BOSCO (Bernoulli Optical System Company) of Boulder is a division of Iomega Corporation (Roy, Utah). BOSCO is developing a 5.25-inch Bernoulli cartridge drive that will use ICI's "optical paper" and store 1.2GB of data. The drive uses two optical head assemblies so that the entire 1.2GB is on-line, unlike rigid disk optical drives, which have one-head assembly and require that the cartridge be "flipped" to read or write the opposite side. The flexible, write-once media in the cartridge is low in cost, and the probable introductory price for the cartridge is about \$50, or about half the cost of current rigid disk WORM optical cartridges. Sorry about that, folks. Progress appears to be excellent, but this product will not be ready to produce any revenue before 1990. It is also not clear where the volume manufacturing will take place.

Cherokee Data

Cherokee Data of Boulder has been the first company to produce 5.25-inch WORM drives for military applications. Production volumes have been very low because of the long evaluation process indigenous to military programs, plus the uncertainties caused by the change in administrations. Literally tens of thousands of 5.25-inch WORM drives are currently being specified in RFQs from the military and its contractors, and one or two "hits" could transform Cherokee into a profitable business.

Data Pure

Data Pure of Longmont is a start-up that is producing a benchtop 3480 tape cleaner. The 19 x 19 footprint, 48-pound device cleans the tape with a combination of blade and fabric wipe cleaners. Both the front and the back of the tape are cleaned in this process. The company has agreements with four distributors and recently signed an OEM agreement that will be announced in the next few weeks. The tape cleaner has a list price of \$8,200 and the company is presently shipping about one unit per day, which should increase as it begins shipments on the new OEM contract. The founders of the company came from Aspen Peripherals. StorageTek, HP, and Digital would all seem to be prime candidates for this device.

Exabyte

Exabyte of Boulder has a helical scan 8mm tape drive that stores data on a standard 8mm videotape. The Exabyte product has been extremely successful. The appearance of the RDAT (4mm) format should not provide any real problems for Exabyte. It is as capable of producing 4mm products as any other producer, should the market require it. In addition, Exabyte has been locking up dozens of accounts that are presently amenable to helical scan drives. Color Exabyte gold.

Intellistor

Intellistor of Longmont, a Fujitsu subsidiary—too early to tell.

ISI

ISI of Colorado Springs has been a leader in this group in terms of technology, and like most of the others, has been continually strapped for cash. It is enjoying an increase in the rate of orders compared with last year, but certainly not explosive growth. In addition to the improved order rate, Dataquest understands that ISI has received and is performing on R&D contracts worth in excess of \$2 million. In Dataquest's opinion, the drive shipment rate at ISI would produce only moderate profitability were it not for the help provided by these R&D contracts.

LMSI

LMSI of Colorado Springs is the one "big guy" on the Colorado optical storage scene. LMSI is the joint venture between CDC and Philips of the Netherlands. Philips is deeply committed to and is a worldwide leader in optical storage. The CDC share may end up as a Seagate share if the Seagate acquisition of Imprimis goes through—an interesting scenario. LMSI has achieved the number one market share position in the 12-inch WORM drive arena, and looks to further improve its lead. It has contracts with IBM on the IMAGEPLUS subsystem that attaches to the AS400 Silverlake minicomputer. It also has the contract for the drives in the DEC RV64 optical subsystem. Unfortunately, production shipments of these subsystems will not be required until the fourth quarter of this year, which does not help the 1989 results much. However, barring any general economic downturn, 1989's results should be only moderately better than last year. Existing contracts on the IBM and Digital Equipment programs and others, plus new products under development, should result in a strong 1990 for LMSI's WORM products. Its 5.25-inch program has barely gotten off the ground, but should provide some help in 1990. The CD-ROM product has been a winner with sales equaling production capacity.

Maximum Storage

Maximum Storage of Colorado Springs is a small (as are the rest), 5.25-inch WORM production operation that claims it is now operating at a level that produces equal income and expenditures. While its product is based on ISI's design, it differs in that it has software that uses much less disk

space for overhead than do competing products. Maximum also has built upon the original ISI design that it bought rights to and has increased capacity and made improvements in manufacturability. Production volume is such that it can still be accommodated in one fairly large room, which is not atypical for this business at this point in time.

Pentax

The Pentax operation, in Broomfield, was started several years ago with the help of local Colorado management talent. It has sold many optical components over the years, including optical head components for disk drives. In December 1988, it announced a 5.25-inch WORM optical disk drive. The current plan is to ship samples in early 1990, so 1989's optical disk revenue will not be affected.

PrairieTek

PrairieTek of Longmont appears to be progressing well as a start-up, with a 2.5-inch Winchester drive. However, the 2.5-inch market still is not a proven one and success depends on future acceptance. Dataquest believes that this acceptance is coming, but no significant volumes will occur before 1990.

Reference Technology, Inc. (RTI)

Reference Technology, Inc. (RTI), of Boulder, started out as a purveyor of 12-inch, read-only optical disk drives. Since then it has matured into a company that specializes in CD-ROM technology. It is now regarded as a specialist in providing software tools or turnkey management to produce CD-ROM products. If anyone doubts the future of CD-ROM, watch an RTI demonstration, and all doubt will be removed. RTI has produced a modest profit since the fourth quarter of calendar 1988. In Dataquest's opinion, RTI should continue onward and upward.

Sony

The new Sony operation in Boulder is dedicated to supporting the sales and service of the Sony 5.25-inch magneto-optical drive, which began shipping during late 1988. Judging by early market

acceptance, this drive and its associated rewritable media give every indication of being a very successful product. From every indication, Sony has jumped into a commanding lead in the rewritable magneto-optical drive industry. Ricoh/Olympus and Canon are challenging, as is Maxoptix. The Sony drive is produced in Japan, so the revenue accruing to the Colorado economy will be minimal. The Maxoptix product is now going to be produced by Kubota in Japan.

StorageTek

StorageTek of Louisville is a large, viable magnetic storage product operation with a good product and market mix. However, the company is experiencing a struggle, due to a soft market in which customers are asking to stretch out existing contracts. It will have to run very hard just to stay in place during 1989.

brightest exception to this forecast. LMSI is doing well in CD-ROM, but had better expand its production capacity quickly or risk losing ground to the Japanese very rapidly. Sony's rewritable product is showing early signs of having a good year indeed.

Several things need to happen to improve the picture during the next 12 months. The IBM Imageplus and the Digital RV64 optical subsystems have to be big successes in the image management market. Wang will need to regain momentum. The Federal Government and its defense contractors need to award contracts on the more than 40,000 drives (5.25-inch WORM) for which they have solicited bids. New innovative WORM products should be developed (they will be). And finally, Miniscribe will need to put Humpty Dumpty back together again, so to speak. If these things happen, Dataquest will be very eager and pleased to write a newsletter titled "Rocky Mountain High."

Robert R. Gaskin

DATAQUEST CONCLUSIONS

The Colorado storage product scene is one of slow and spotty growth for both optical and magnetic storage products. As noted, Exabyte is the

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