

Using Track-Following Servos on Next Generation Tape Drives

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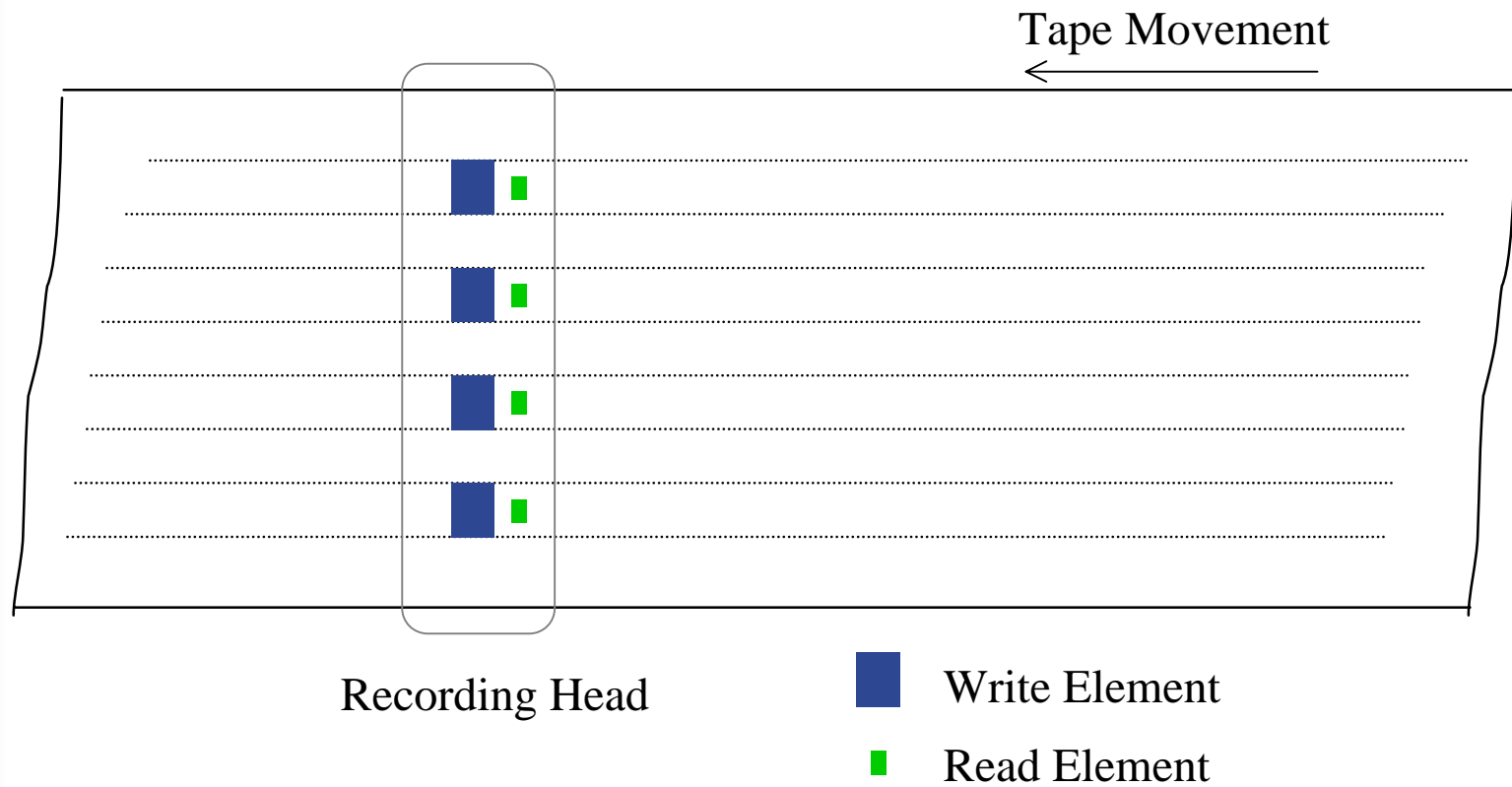
www.fcpa.com

Fujitsu Limited

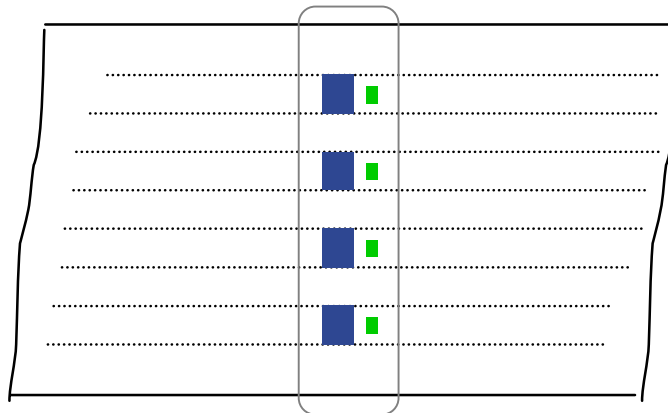
- ◆ Among the top five largest computer companies
 - Japan - Fujitsu Ltd
 - USA - Amdahl
 - Europe - ICL Group
- ◆ More than \$37.7 billion in sales
- ◆ Employs 180,000 people
- ◆ Operations in over 100 countries



Linear Tape Recording Basics

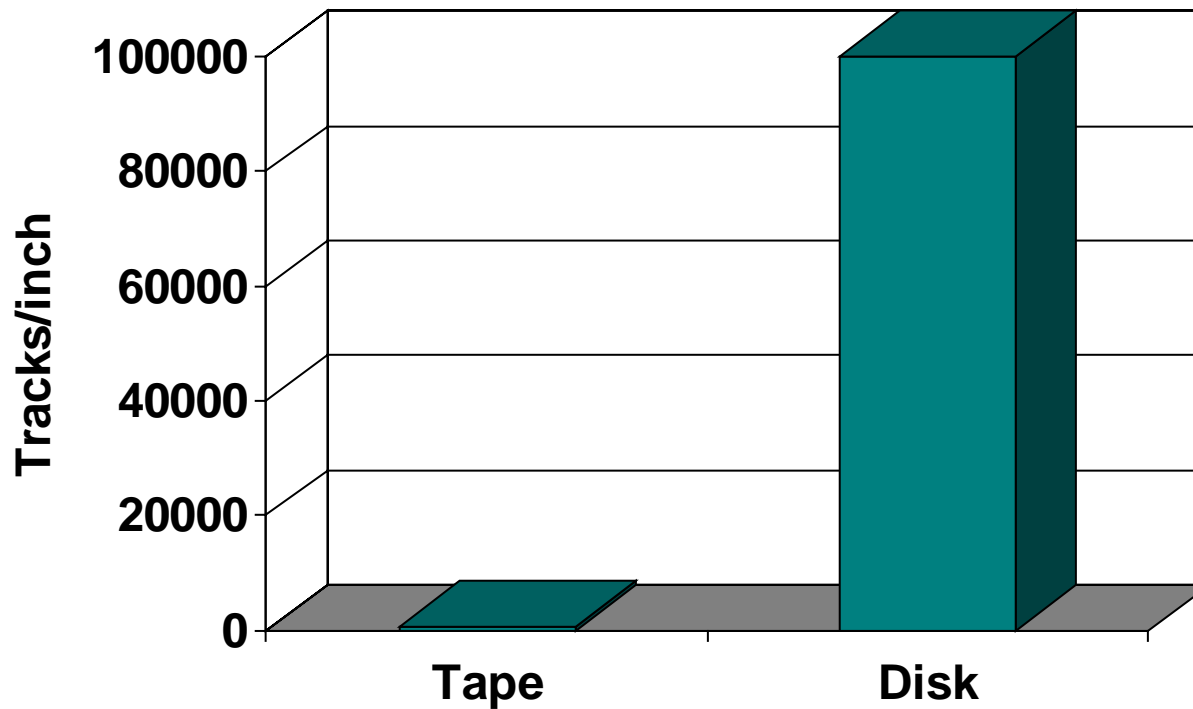


Needed Improvements in Tape Technology



- ◆ Greater media area
 - Thinner tape
- ◆ Higher bit density
 - Higher coercivity media
 - Improved modulation codes
 - "Predictive" signal decoding
- ◆ Higher track density
 - Servo Track-following

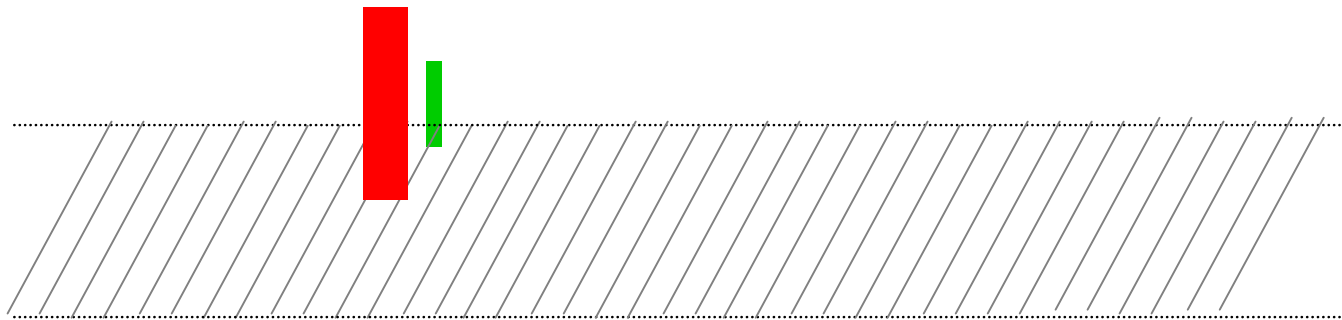
Track Density Comparison



Large Potential Capacity Growth Enabled by Increasing Track Density

Challenge to Increasing Track Density: Vertical Tape Movement

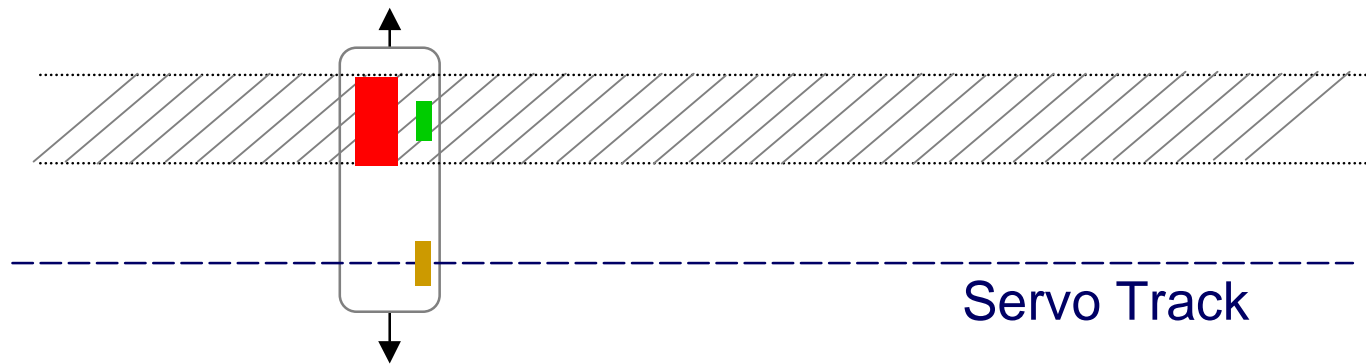
Recorded Track Below Read Head



Poor Data Recovery

- Write Element
- Read Element

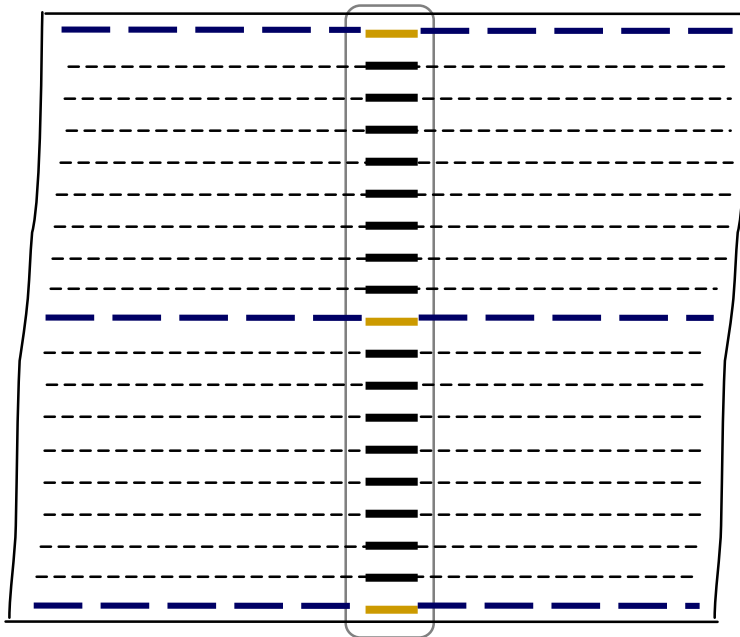
Track-following Technology



Head Moves to Follow Servo Track

- Write Element
- Read Element
- Servo Element

3590 Magstar™



3 Redundant Servo Tracks

Fujitsu M8100

- ◆ 10GB Capacity
- ◆ 13.5 MB/sec



Magstar is a trademark of IBM

Linear Tape Open



◆ High Performance Tape Format

- Announced November '97
 - Formed by HP, IBM, and Seagate
- Open format specification
 - Compliance tested
- Evolutionary technical roadmap
 - Products available this year
- More information:
 - www.lto-technology.com



Linear Tape Open



Ultrium Roadmap

		<u>Generation 1</u>	<u>Generation 2</u>	<u>Generation 3</u>	<u>Generation 4</u>
Capacity	Native	100GB	200GB	400GB	800GB
	Compressed*	200GB	400GB	800GB	1.6TB
Transfer Rate	Native	10-20MB/s	20-40MB/s	40-80MB/s	80-160MB/s
	Compressed*	20-40MB/s	40-80MB/s	80-160MB/s	160-320MB/s
Recording Method		RLL 1, 7	PRML	PRML	PRML
Media		MP	MP	MP	Thin Film

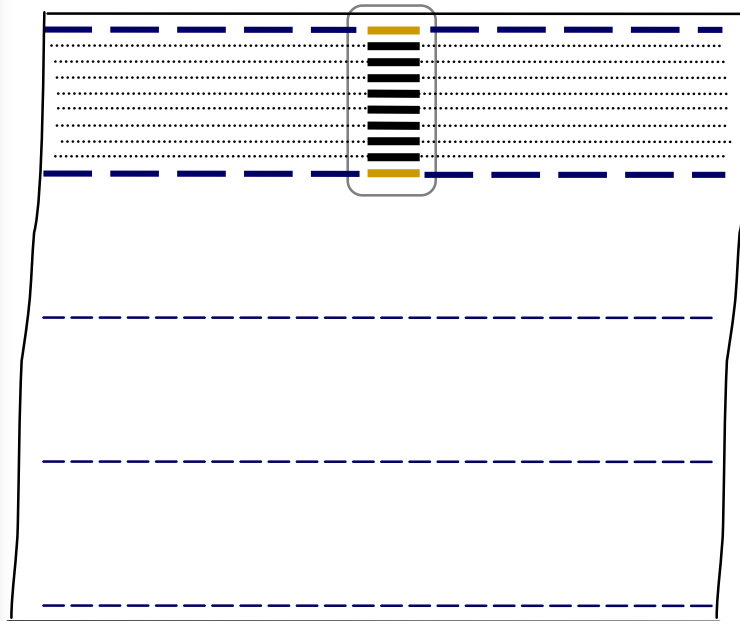
*Assumes 2:1 compression ratio



FUJITSU COMPUTER PRODUCTS OF AMERICA, INC.



Linear Tape Open



2 Redundant Servo Tracks

Ultrium

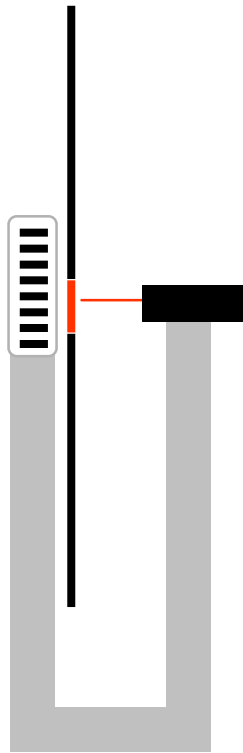
- ◆ 384 tracks
- ◆ Time-base Servo
- ◆ Powerful ECC
- ◆ Dynamic Rewrite
- ◆ Cartridge Memory



SuperDLT

SDLT

- ◆ 100GB Capacity
- ◆ Revolutionary Technical Roadmap
 - Pivoting Optical Servo
 - PRML
 - Reflective-bonded Media
- ◆ ? Servo Redundancy
- ◆ More information:
 - www.dlftape.com



Choosing Next Generation Tape

- ◆ Look for:
 - Most tape area
 - Widest and longest tape
 - Track-following Servo
 - Redundant servo sensors
 - Evolutionary Technical Roadmap
 - Lower risk of reliability problems
 - Multiple manufacturers
 - Ensure competitive pricing

