

# The Merging of Instrumentation Recording and Consumer Storage Technologies

Jim Matthews

Metrum-Datatape Inc.

4800 E. Dry Creek Rd., Littleton CO 80122-3701

Phone: (303) 773-4963 FAX: (303) 773-4762

E-mail: [jmatthews@metrum-datatape.com](mailto:jmatthews@metrum-datatape.com)

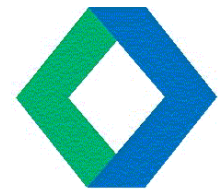
Presented at the THIC Meeting at the Embassy Suites Hotel  
Denver South

Englewood CO 80112

on June 28, 2000

The Premier Advanced Recording Technology Forum

**THIC Inc.**

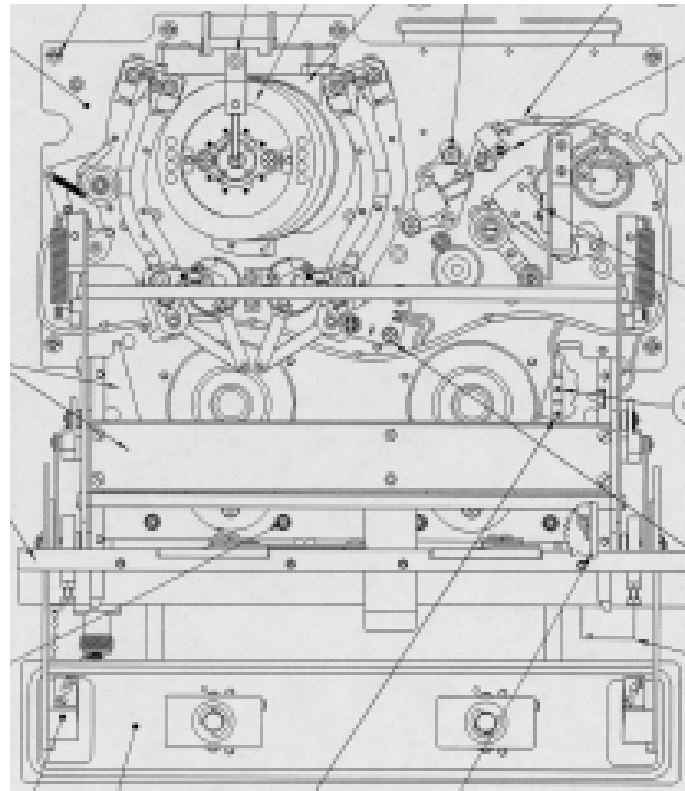


**METRUM-DATATAPE**

a SYPRIS company

- Who is driving storage technologies?
- Data Storage Trends
- Instrumentation vs Consumer Technologies
- New Technologies
- Disk Recorder
- Conclusion

The instrumentation & test community was the driving force behind today's storage technology.



Harsh Environment Transport

---

Who is the driving force behind tomorrow's test & instrumentation storage technology?



- Traditional *Instrumentation Recorder* technologies and traditional *Consumer Storage* technologies are on merging path
  - Shift from IRIG 106, Chapter 6 - Magnetic Tape Recorder and Reproducer Standards
  - Shift to consumer storage products such as DLT & AIT
- In 90's manufacturers spent R&D to make heritage products function like a computer peripheral
  - SCSI
  - PCI Interfaces
- The Range Commanders Council (RCC) in US is adopting new IRIG standards
  - Data formats that are easily Internet, LAN & WAN transferable
  - Command and Control of Instrumentation Recording systems

- In 90's manufacturers evolved from box suppliers to systems providers
  - Broader range of products
  - Provide integrated products
- Trend is to handle data storage generically
  - Manufacturers are developing the flexibility to provide COTS products to meet industry needs for storage & telemetry
  - The demand for cost vs performance is a driving force
- The demand for the distribution of data via networks and satellite links is rising
- The demand to Increase performance while maintaining backwards compatibility support is also rising.
  - Higher aggregate throughput
  - Higher digital bit rates
  - Higher analog bandwidths with greater dynamic range

## ■ Instrumentation Recorders

- are the technology products most instrumentation & test engineers and scientist lose sleep over.
- capture real time test data at a constant rate over a period of time without interruption.
- reproduce data in the same “unyielding” fashion.
- capture data that exists for only a brief moment in time.

## ■ Consumer Storage Devices

- are the technology products most consumer PC users tend to ignore and take for granted.
- Stores data that arrives in a non-uniform manner, “*clumps & bunches*”
- can be told to wait when the processor is too busy to make the transfer.
- may store data that exists in several locations at once.

Media	Size	Type	Native Capacity	Native Data Rate
56x CD-ROM	n/a	Optical Disk	.65 GByte	8.4 MByte/sec
8x CD-R	n/a	Optical Disk	.65 GByte	1.2 MByte/sec
ADR	8mm	Tape	25 GByte	2 MByte/sec
AIT	8mm	Tape	50 GByte	6 MByte/sec
DD-2 L	19mm	Tape	330 GByte	15 MByte/sec
DDS-4	4mm	Tape	20 GByte	3 MByte/sec
DLT III	1/2"	Tape	10 GByte	1.25 MByte/sec
DLT IV	1/2"	Tape	40 GByte	6 MByte/sec
DTF	1/2"	Tape	42 GByte	12 MByte/sec
Fixed Disk	n/a	Hard Drive	22 GByte	12 MByte/sec
LTO	1/2"	Tape	100 GByte	20 MByte/sec
Magneto Optical	n/a	Optical Disk	5.2 GByte	1.2 MByte/sec
Mammoth	8mm	Tape	20 GByte	3 MByte/sec
VLDS S-VHS	1/2"	Tape	27.5 GByte	8 MByte/sec
VXA	8mm	Tape	33 GByte	3 MByte/sec



- Tape
  - Advantage
    - Cost
    - Platform Independent
  - Disadvantage
    - Large number of “standards”
    - Not rugged enough for high performance flight test
    - Obsolescence
    - Slow access of data events on playback

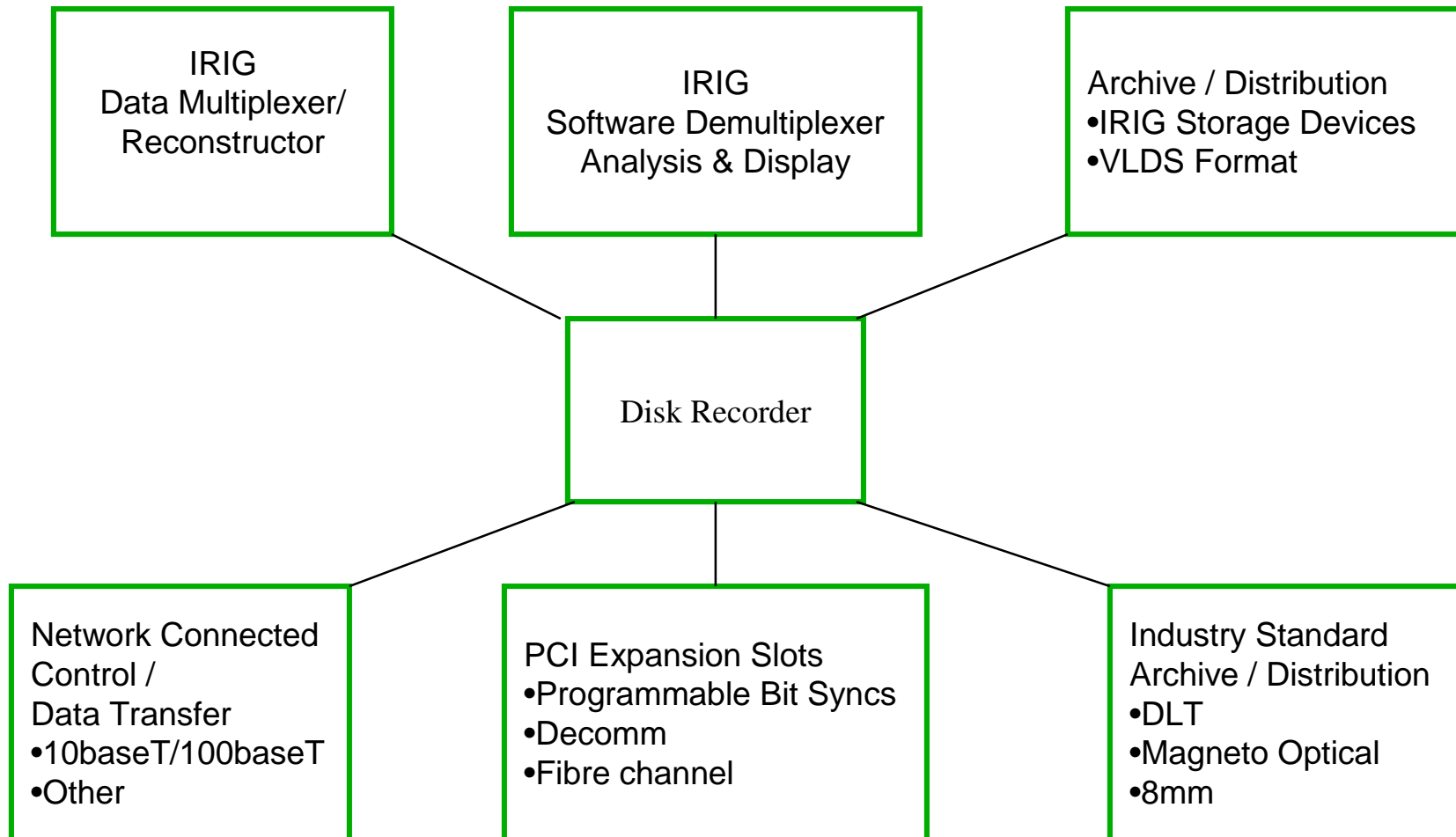
- Flash Disk and Solid State
  - Advantage
    - Excellent environmental profile
    - Very low power consumption
    - Can access data during record session
  - Disadvantage
    - Cost
    - Supply
    - Must have archive device
    - Declassification

## A sampling of Solid State Recorders

<b>Product</b>	<b>Manufacturer</b>	<b>Maximum Capacity</b>	<b>Maximum Sustained Data Rate</b>
Solid State MARS	Metrum-Datatape	38 Gbytes	13 Mbytes
MONSSTR	Calculex	207 Gbytes	128 Mbytes
S/TAR	L3	100 Gbytes	50 Mbytes
HSSR	Orbital Sciences	200 Gbytes	45 Mbytes

- Hard Disk and RAID
  - Advantage
    - Cost
    - Speed
    - Improves with technology
    - Fast access of data events on playback
  - Disadvantage
    - Not rugged enough for high performance flight test
    - Cannot access data during record session
    - Must have archive device

- Model 80 Disk Recorder
  - Plug & Play compatible with IRIG VLDS Recorders
  - IRIG ARMOR interconnectivity & control
  - Bridge between legacy and new technologies

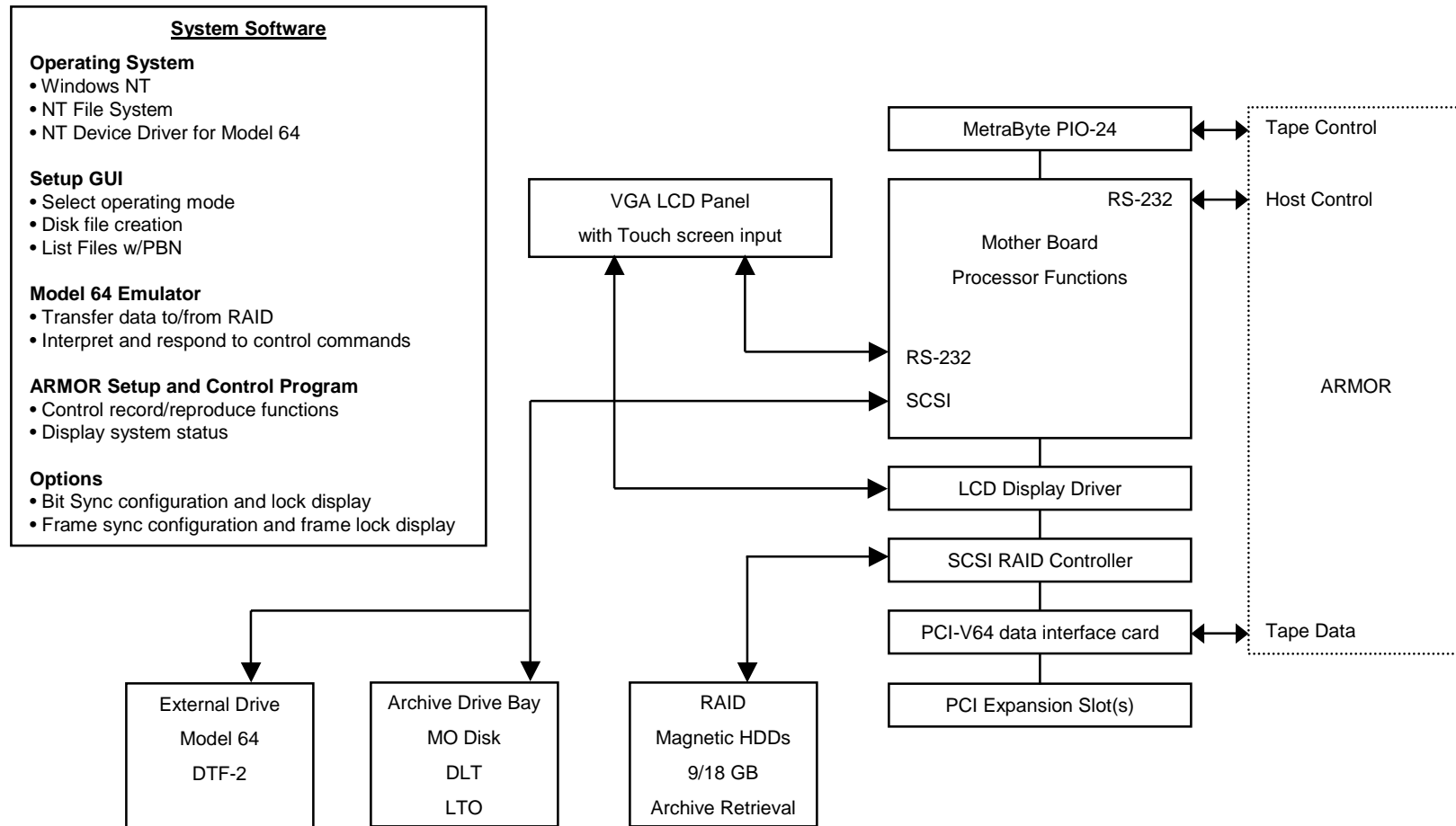


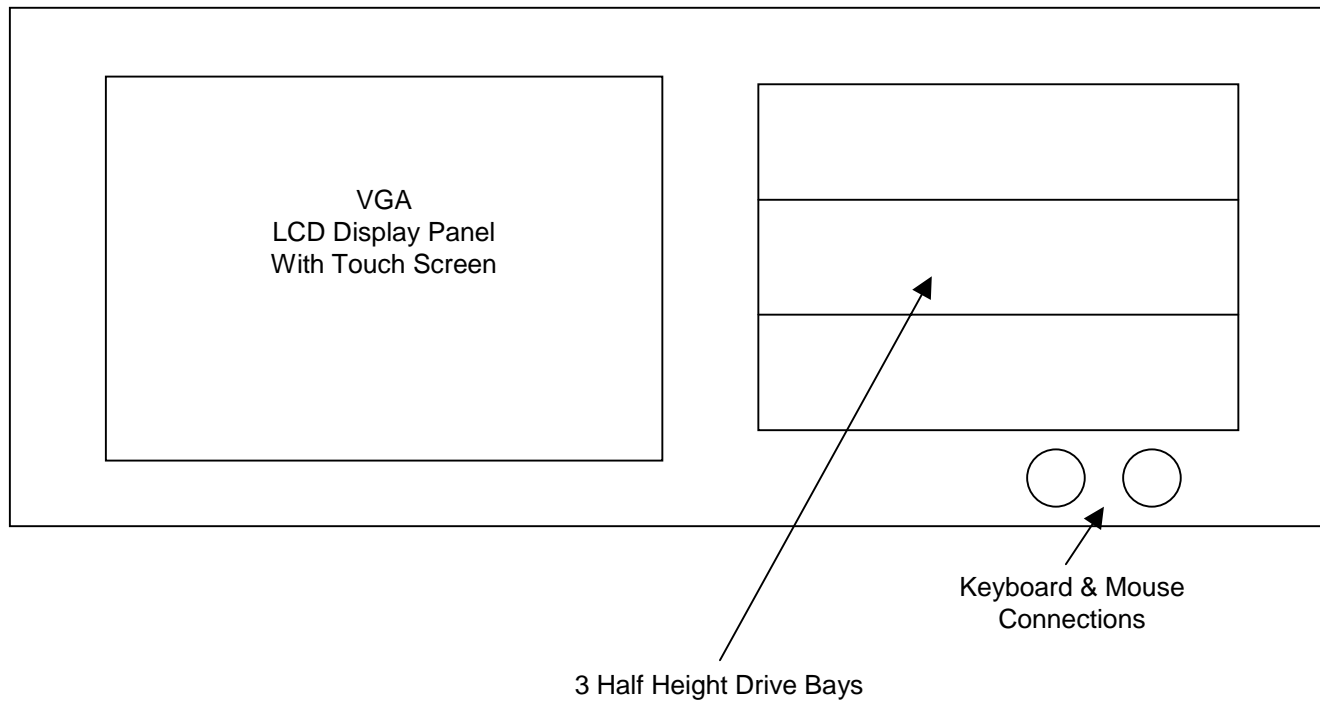
- LCD front panel display with touch screen input provides system control and status monitoring.
- Transfer of data files as simple as drag and drop on the Windows NT desktop.
- Internal drive bays house archival data drives such as DLT, MO, 4mm, 8mm, DVD.
- Back panel SCSI port supports external archival drives such as Sony DTF, Model-64
- Industry standard Ethernet 10baseT/100baseT network with TCP/IP, FTP, and Telnet support.
- Complete Model-64 emulation when used with ARMOR front end or as a single stream recorder.

## ■ Specifications

- Data multiplexing front end
  - Front Panel
  - Processor
  - Data Rate
  - Disk Capacity
  - Data File Format
  - Network Support
  - Internal Archive Drive Bays
  - Expansion Slots
  - Size
  - Internal archive drive support
  - External archive drive support
- ARMOR  
VGA LCD with Touch Screen  
Pentium III 450 MHz  
0 to 128 Mbps  
27, 36, 54, or 72 GB  
NT File System (NTFS)  
10baseT / 100baseT  
3 - half height  
3 - PCI  
19 inch rack mount, 7" height  
Internal - Ultra SCSI, IDE  
Ultra SCSI







- Old Technologies
  - No longer economically feasible for traditional instrumentation and test manufacturers to design transports.
  - Last ever real time instrumentation tape transport has already been designed
- New Technologies
  - R&D efforts of traditional telemetry manufacturers will be in the design of enclosures, interfaces and GUI to make consumer storage devices perform as Instrumentation and test storage systems.
  - The new challenge is to bridge legacy products with new technologies