

The Merging of Instrumentation Recording and Consumer Storage Technologies

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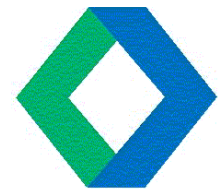
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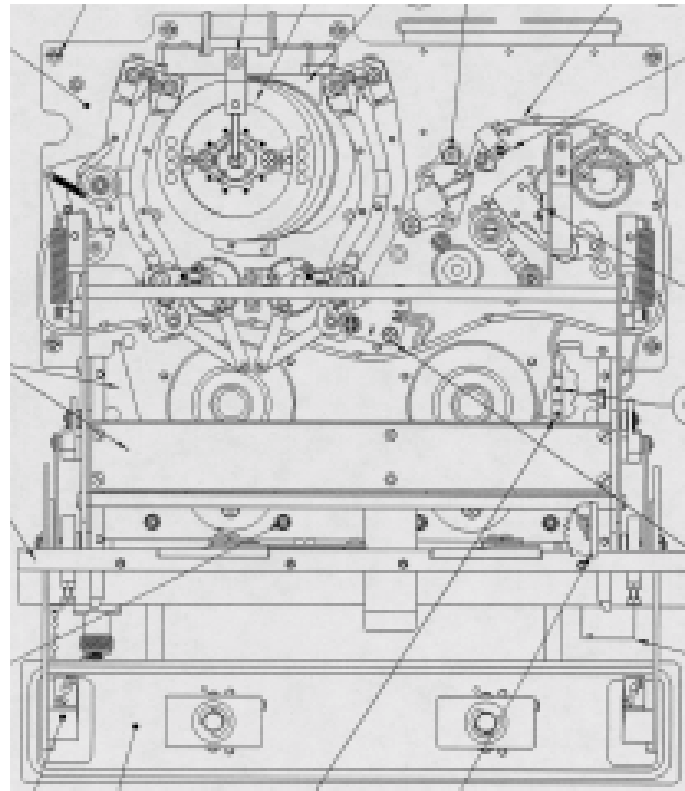


METRUM-DATATAPE

a SYPRIS company

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- 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

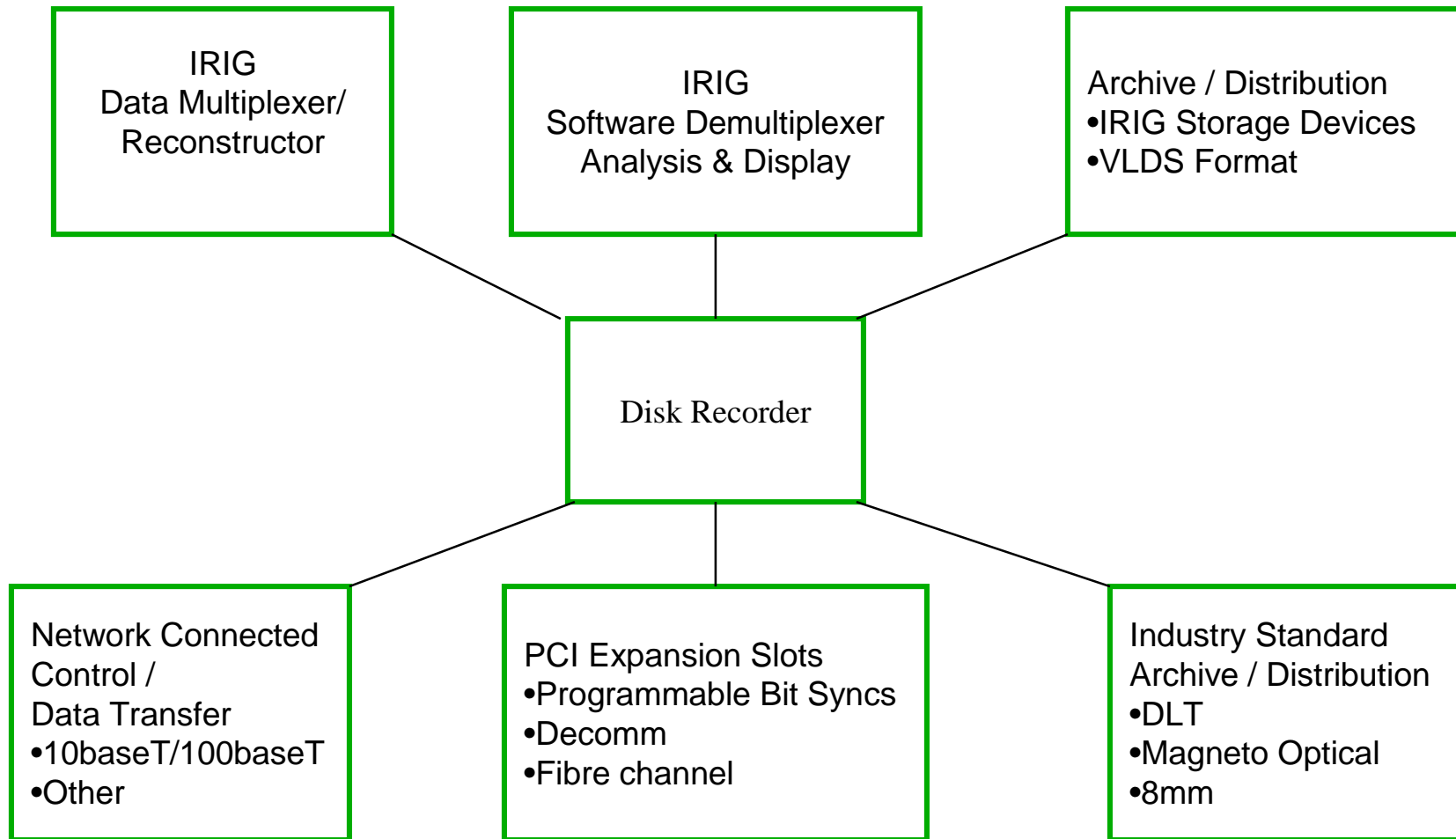
- Flash Disk and Solid State
 - Advantage
 - Excellent environmental profile
 - Very low power consumption
 - Can access data during record session
 - Disadvantage
 - Cost
 - Supply
 - Must have archive device
 - Declassification

A sampling of Solid State Recorders

Product	Manufacturer	Maximum Capacity	Maximum Sustained Data Rate
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

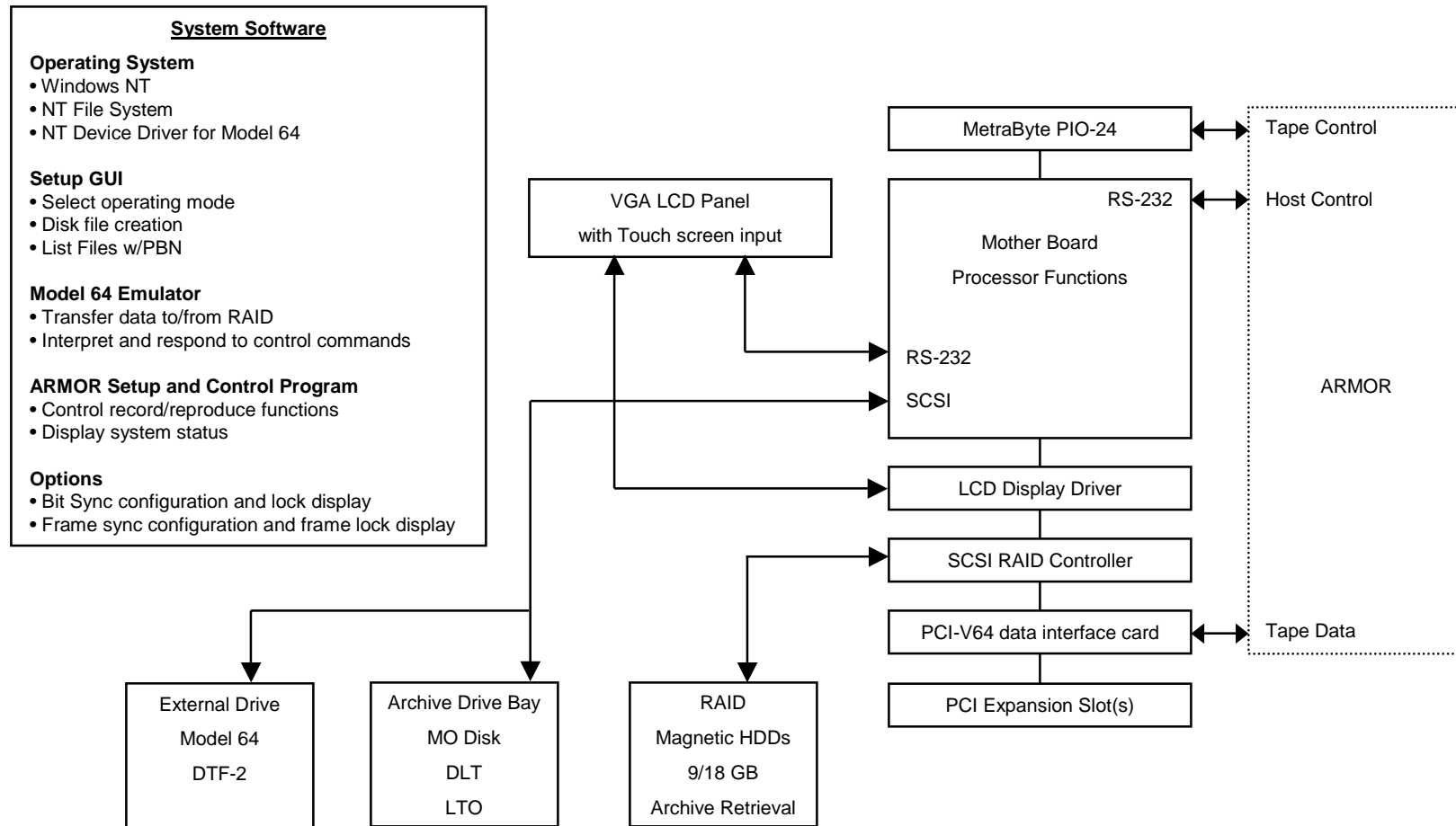
- Model 80 Disk Recorder
 - Plug & Play compatible with IRIG VLDS Recorders
 - IRIG ARMOR interconnectivity & control
 - Bridge between legacy and new technologies

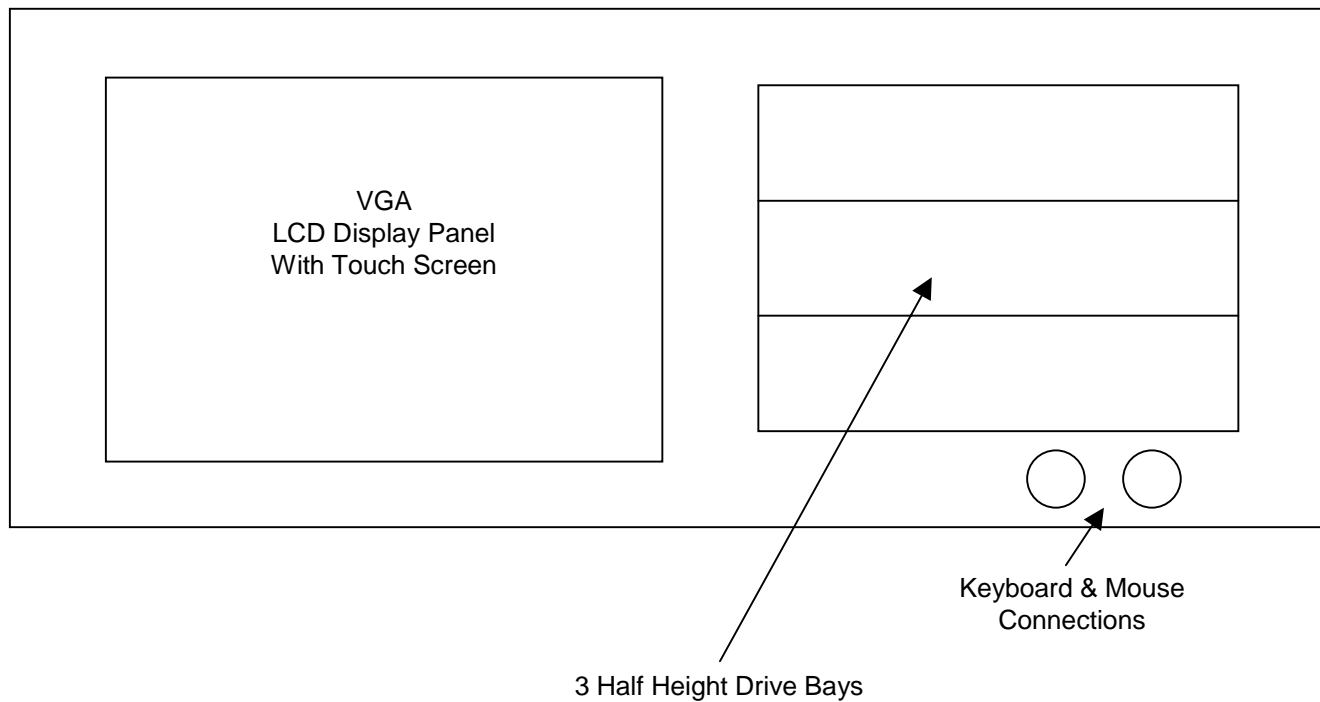


- LCD front panel display with touch screen input provides system control and status monitoring.
- Transfer of data files as simple as drag and drop on the Windows NT desktop.
- Internal drive bays house archival data drives such as DLT, MO, 4mm, 8mm, DVD.
- Back panel SCSI port supports external archival 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