

# AMPEX

Excellence at the Edge

## Full Spectrum Data Management

Every Environment, Every Mission

Ruggedized Systems for Aerospace and Ground Vehicles,  
Lab Systems, Flight Test, and Mission Operations

- Data Capture and Storage
- Processing
- Analysis
- Encryption
- Cyber Security



U.S. Owned and Operated  
AS9100D / ISO9001:2015 Certified Small Business

# We Know What Your Data Needs

Ampex Data Systems, a Silicon Valley company, has specialized in systems for acquiring, storing, analyzing, and securing various data types with cost-effective solutions since 1944. Our in-depth understanding of how to manage nearly any data type began over 75 years ago in the Hollywood recording industry (12 Emmys, an Oscar, and a Grammy) and laid the groundwork for our unmatched ability to provide data management solutions tailored to your type of data.



## Video and Imagery

- High capacity storage for long duration video and imagery missions
- Uncompressed video storage...the best quality for automated analysis techniques
- Still image extraction, decimation, transcoding
- More than a simple DVR...remote as well as embedded encoders, streaming, recording
- In-depth understanding of video standards (MISB, SMPTE, STANAG)
- Advanced compression and output formats: H.264, H.265, MPEG TS, MP4 among others
- Multiple channels and input types: HD-SDI, RS-170, RS-343, DVI among others
- KLV Metadata support; SDI-VANC, KLV Over UDP, Serial



## Radar Data

- The speed and capacity you need to store radar data throughout your ecosystem in the air, in the lab, and on the ground
- Seamlessly collaborate with developers of systems using proprietary radar architectures



## Electronic Warfare and RF Signals Data

- SWAP-optimized for the smallest possible installation size (pods, UAVs, etc)
- High speed systems with the data rates to effectively collect large volumes of RF data
- Data triage and reduction on the fly
- Facilities certified to handle your sensitive data



## Aerospace and Ground Vehicle Bus Data

- Information assurance approved, low profile, low SWaP, cost-effective options
- A wide variety of interfaces, data types, and busses



## Flight Test Data and Telemetry

- Traditional (IRIG106 CH10) and network centric data topologies (iNET, IENA, DAR capable)
- Precision metadata...geographic or RF spectrum location, intelligent data reference, etc
- Modular, scalable recording systems with supporting ecosystems (download and configuration solutions)
- Data triage and reduction on the fly

## Mission Computers and Whole Platform Storage

- Centralized storage supporting diskless boot for client for a 'single brick' aircraft
- Information assurance made easier...centralized encryption

## Space and High Altitude

- Systems for the uniquely harsh environment of high altitude and space
- Radiation tolerant

# Beyond Data Storage...Helping You Put Your Data to Work

Ampex knows your data is a means to an end. Data helps you achieve a higher purpose, so we develop state-of-the-art embedded software to support your data-driven goals. From sophisticated indexing and data transformation for data management, to advanced encryption and machine learning for security, automatic ID, and entity extraction, we go beyond data storage and put your data to work...at the edge.

## Award-winning, Value-added Software



### Ampex Common Compute Environment (ACCE)

The most feature rich software suite for data acquisition, management, and storage.

- Recording, playback, reproduction, configuration, control, file serving, indexing, transformation
- User software optimized for recorder management
- Promotes commonality of interface across devices
- Hardware agnostic - host on non-Ampex devices

### Advanced Data Encryption & Onboard Cyber Security

Getting the most from your data starts with data you can trust. Ampex develops advanced data encryption and onboard cyber security solutions tailored for your needs.

- Standard and Advanced Encryption Capabilities
  - Type-1 encryption alternative; saves money, easier to use, greater flexibility, NOT controlled cryptographic information
  - Enables booting your entire vehicle mission network from a single, trusted 'brick' for maximum assured computing
- **BLUE Vortex** - Cyber defense via passive network monitoring
- **BLUE Sentry** - Network anomaly detection technology using machine learning algorithms

### Machine Learning for Data Analysis - **BLUE IQ**

The ever-increasing volume of data signals has outpaced the ability to effectively analyze the information. BLUE IQ is a tool that uses machine learning (a subset of artificial intelligence) to provide cognitive data analytics at the point of data collection.

- Automatic target ID and entity extraction from virtually any data type (video, RF, radar, etc)
- Real-time, large data set triage & analysis
- Auto-annotation and tagging of data
- Saves bandwidth by auto-downlinking data of primary interest, storing the rest onboard
- Automatic queuing for faster searches
- Reduces human analyst workload

# Fast, Smart, Secure, and Reliable Open Architecture Systems

Cost-effective and highly capable data capture, storage, processing, analysis, and security

## TuffServ® Network File Server Series

### Rugged NAS for Extreme Environments

These computer/recorder/server systems are tailored to perform in extreme airborne, ground and space environments to support the full spectrum of commercial and military operations including ISR and flight test. United by a common architecture, today's TuffServ family provides removable storage capacities up to 100TB and a range of interfaces and software capabilities.

- Network Storage & Processing for Networked Systems
- Field-Proven, with Lightning-Fast Performance and Scalable Architecture
- Airborne & Mobile Data Collection
- Radar & Video Recording/File Server
- Flight & Vehicle Testing and Instrumentation
- Geospatial Data Collection



## TuffCORD™ Mission Data Recorder / Network File Server

### HD Video-Uncompressed & Compressed, Bus Data, & Data Loader

The TuffCORD is designed to adapt to your mission data needs. From uncompressed and compressed video to standard bus data, the TuffCORD delivers reliable performance with the data security you need for the mission.

- Built for Rugged, MIL-STD-810 Environments with MIL-STD Power Connectors
- Greater than 250MB/s Sustained Network Throughput
- Standard Dual Gigabit Ethernet Interfaces
- Memory Module Capacities to 4TB
- AES Encryption Using FIPS
- Validated Hardware & Software
- Options for Additional or Customized I/O



## miniRv2® Solid State Recorder

### Traditional Flight Test Recording & Network File Server Functionality

The miniRv2 is an update to the miniR700 with the same SWaP but with dramatically improved performance. The new miniRv2 also adds network file server capability, making it capable of traditional, IRIG106 Chapter 10 recording as well as network centric topologies (iNET, IENA, and DAR capable). The system updates include a new Intel Atom CPU, lower cost solid state removable memory, new multiplexer, higher speed interfaces, the Ampex ACCE Management Software, and full backwards compatibility to the existing I/O module interfaces. This provides users compatibility with their existing data interfaces from the Ampex miniR700 recorder and AMux DAUs.

- Hot Swappable 64GB to 1TB+ Removable Memory Modules
- IRIG106 Chapter 10 Recorder
- IRIG106 Chapter 7 and PCM 'CVT' options
- Totally Flexible and Modular I/O
- Ethernet Recording, Control, and Streaming
- Sustained Data Rates to 1,000 Mb/s
- USB 3.0 Download Interface



## AMux Data Acquisition Units

### Configurable Standards-based Network Multiplexer

The AMux™ 1000 Data Acquisition Unit (DAU) is a network multiplexer using the IRIG 106 Chapter 10 packet and stream format. Based on the successful miniRv2® recorder system, the AMux 1000 DAU timestamps data received over any supported interface and creates a single network output channel over Ethernet, using either a dependable TCP/IP connection or a versatile UDP/IP packet stream. When UDP is used, the AMux can use multicast addressing for even greater versatility.

- Hot Swappable 64GB to 1TB+ Removable Memory Modules
- IRIG106 Chapter 10 Recorder
- IRIG106 Chapter 7 and PCM 'CVT' Options
- Extremely Compact and Rugged
- Totally Flexible and Modular I/O
- Network Streaming and Control
- Sustained Data Rates to 1,000 Mb/s



## Common Architecture Recorder (CAR)

### Integrated, Low-cost Network File Server Recorder

The Common Architecture Recorder (CAR) helps customers shift data acquisition and recording systems from a capital expense to an operating cost. CAR is scalable with the flexibility to add almost everything you might want, but not stuffed with the costly things you don't need. The low-cost of the CAR is only rivaled by its small size, making it perfect for "attributable" aerospace and ground vehicles. This compact rugged recorder offers all of the features that Ampex customers have become accustomed to over the years:

- Modular, Extensible Architecture
- 'All-in-One' Processor & Storage Module
- Up to 2 Video Channels per Module
- USB "Type C" Connectivity
- 'Best-in-Class' Video Encoding
- Integrated Information Assurance



## TRS350 Ethernet Data Recorder

### High Data Rate, Large Capacity Streaming, Network Recording System

The TRS350 is available in a standard 2U 19 inch rackmount chassis. The unit provides two 10 Gigabit Ethernet interfaces configurable as optical or copper, plus two 1Gigabit Ethernet interfaces (1000Base-T), as well as expansion capability for 40-GigE, 100-GigE, and WiFi networking. These network interfaces can be configured for management, record data, playback data or any combination. The unit provides for up to 16 high-capacity removable solid state devices, with a total capacity up to 32TB. The TRS350 offers raw record and playback performance in excess of 1Gigabyte/second sustained, providing a recording duration of more than 8 hours, even at the maximum operational rate.

- Greater than 1GB/s Sustained Payload Recording Rate
- Separable Management and Data Network Interfaces
- Standard Dual 10 Gigabit and Dual 1 Gigabit Ethernet Interfaces
- Storage Capacities to 32TB
- AES Encryption
- Built for High Reliability and Availability 24/7 Operation
- Options for Additional I/O



# Core Capabilities and Competencies

If you can find another product that combines a better mix of performance, U.S. manufacturing and ownership, and value-added technology, buy it. Ampex encourages customers to compare 'apples to apples' and when you do, you'll find that Ampex is tough to beat!



## More Than 75 Years of Industry Experience

U.S. based small business manufacturer with an established U.S. Government relationship and trusted supply chain.

### *Not a vendor, but a partner*

**Ampex can customize and develop solutions to meet your specific requirements**

- **World-class Performance**
  - Speeds ranging from hundreds of Mbs to hundreds of Gbs
  - Capacities ranging from GBs to hundreds of TBs
- **Value-added Software**
  - Advanced encryption solutions
  - Machine learning technology
  - Onboard cyber security technology
- **Open Architecture, Non-propriety Systems**
  - Future Airborne Capability Environment (FACE) compatible
  - Certifiable Linux integration platform
  - COTS processors and storage
- **Experts in Ruggedization Standards**
  - Shock
  - Vibration
  - EMI
  - Power
  - Environmental
  - Reliability



## Ampex Locations

- **Silicon Valley, California**
  - Company headquarters with easy access to industry leaders in cutting-edge technology
  - U.S. based, board to system-level engineering, design, and manufacturing
- **Colorado Springs, Colorado**
  - Home to the Ampex Intelligent Systems (AIS) business unit, centrally located in the U.S.
  - Center of excellence for value-add software innovations (advanced encryption, cyber security, machine learning)

# Fast, Smart, Secure, and Reliable Open Architecture Systems

- Value-added software can be added to any system
  - Advanced Encryption, Cyber Security, and Machine Learning
- Network interface options are not all-inclusive and can be customized

Ampex Product	Speed	Max Storage	Network Protocols	Network Interface Options*	Size / Weight	Open Architecture (non-proprietary)	Security
 <b>TuffServ 640</b>	1,900 MB/sec	80 TB	NFSv4, NFSv3, CIFS/SMB, PCAP, FTP, TCP, UDP, IP	10 Gig-E 1 Gig-E sFPDP 1553B	470 in <sup>3</sup> 7.63"H x 4.88"W x 12.63"D 30 lbs	✓ Red Hat Linux 7	✓ AES, 256 bit, FIPS 197
 <b>TuffServ 540</b>	900 MB/sec	16 TB	NFSv4, NFSv3, CIFS/SMB, FTP, TCP, UDP	10 Gig-E 1 Gig-E sFPDP 1553B	105 in <sup>3</sup> 2.9"H x 4.25"W x 8.5"D 10lbs	✓ Red Hat Linux 7	✓ AES, 256 bit, FIPS 197
 <b>TuffServ 480v2</b>	800 MB/sec	16 TB	NFSv4, NFSv3, CIFS/SMB, FTP, TCP, UDP, IP	10 Gig-E 1 Gig-E sFPDP 1553B	381 in <sup>3</sup> 5.25"H x 7.25" W x 10"D 17.5 lbs	✓ Red Hat Linux 7	✓ AES, 256 bit, FIPS 197, FIPS 140-2
 <b>TuffServ 282</b>	300 MB/sec	4 TB + 512 GB (2 modules)	NFSv4, NFSv3, CIFS/SMB, FTP, TCP	1 Gig-E Fibre Channel IP 1553B	475 in <sup>3</sup> 9"H x 4.8"W x 11.0"D 14.6 lbs	✓ Red Hat Linux 6	✓ AES, 256 bit, FIPS 197
 <b>TuffCORD</b>	250 MB/sec	4 TB	NFSv4, NFSv3, CIFS/SMB, FTP, TCP, UDP	1 Gig-E Video 1553B	109 in <sup>3</sup> 3.6"H x 4.8" W x 6.3"D 5.5 lbs	✓ Red Hat Linux 7	✓ AES, 256 bit, FIPS 197 FIPS 140-2
 <b>miniRv2</b>	1 Gb/sec	1 TB	HD/SD Video, 1553B, Analog, Ethernet, etc.	1 Gig-E 100/10 Base-E	82 in <sup>3</sup> 4.25"H x 4.12"W x 4.66" D 43 oz	✓ Red Hat Linux 7	✓ AES, 256 bit, FIPS 197
 <b>AMux 1000</b>	1 Gb/sec	N/A	HD/SD Video, 1553B, Analog, Ethernet, etc.	1 Gig-E 100/10 Base-E	105 in <sup>3</sup> 2.9"H x 4.25"W x 8.5"D 39 oz	✓ Red Hat Linux 7	✓ AES, 256 bit, FIPS 197
 <b>CAR</b>	200 MB/s	2 TB	iNET, IENA, DAR, NFSv4, NFSv3, CIFS/SMB, FTP, TCP, UDP, IP	Video, 1553B Additional Ethernet and others	62 in <sup>3</sup> 4.8"H x 1.7"W x 7.5"D 5 lbs	✓ Centos Linux 7	✓ AES, 256 bit, FIPS 197

