AMPEX
EXCELLENCE AT THE EDGE

Small Business Innovator, Technology Leader
Affordable, Rugged Data Systems

Ruggedized Systems for Aerospace, Ground, and Maritime Vehicles, Labs, Mission Operations, & Flight Test

- Data Capture and Storage
- Hardware Host for Third Party Software
- Processing and Analysis
- Encryption and Cybersecurity

Lifecycle Affordability

Optimized for Electronic Warfare and Intelligence, Surveillance, & Reconnaissance

Onboard Storage for Your Critical Data

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.

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
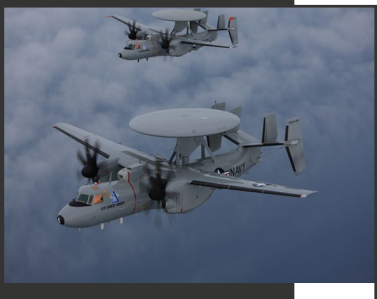
Aerospace and Ground Vehicle Bus Data

- 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

Network File Servers That Do So Much More
The Future is Onboard Software for Data Analysis

Do you have the hardware to handle it?

Hardware Host for Mission-Enhancing Software & Algorithms
Full access to add any third-party software and the horsepower to run it

- Machine Learning / Artificial Intelligence
- Conditions-based Maintenance

Support for Data Processing of Raw Signals
We'll collaborate with you to build the best solution

NSA's Commercial Solutions for Classified Encryption (CSfC)
The National Security Agency's (NSA) successor to Type-1 "GOTS" encryption

- Organic key generation, ease of key handling
- Reduces lifecycle encryption cost and cryptographic control measures

Data Distribution Hub
Reformat, transcode, or multiplex data and distribute it across the platform

Boot Device for Other Onboard Systems
Pre-boot Execution Environment (PXE) system for your mission computers

Combat-Proven Systems for Any Platform

Every US Navy E-2 Hawkeye flies with two Ampex TuffServ Network File Servers onboard

F-18 programs around the world use Ampex TuffServs for data distribution, processing, flight test, and mission data storage for a variety of operations to include electronic warfare

Unmanned systems like the MQ-9 Reaper use Ampex TuffServs to support autonomous flight and reconnaissance data collection

Ampex TuffServs also support ground and maritime platforms

TuffServ® Network File Server Series
Rugged NAS for Extreme Environments

These computer/recorder/server systems are tailored to perform in extreme airborne, ground, maritime, 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 high-capacity removable storage, high-speed recording, and a range of interface options.

- Greater than 100TB of solid-state storage
- Removable Memory Modules
- Up to 1,900 Megabytes per second data rate
- Multiple 10 Gig-E, 1 Gig-E interfaces
- Other optional interfaces include sFPDP, 1553B, video (compressed and uncompressed), among others

TuffServ 640

TuffCORD™ Mission & Video 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 w/ 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

miniR®v2 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™ Data Acquisition Unit (DAU) is a network multiplexer using the IRIG 106 Chapter 10 packet and stream format. Based on the successful miniR® recorder system, the AMux 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.

- IRIG106 Chapter 10 Multiplexer
- 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 Mbits/sec

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. The CAR is a scalable, rugged, network-attached storage (NAS) and compute device with the flexibility to add capabilities 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 ground vehicles and "attritable" aerospace systems. With its compact size, light weight, and low power dissipation, it can be installed in tight spaces. This SWaP-C rugged recorder still affords the customer everything Ampex customers have become accustomed to over the years.

- Software-defined Recording with Ampex Common Compute Environment (ACCE)
- Modular, Extensible, Linux-Based Open Architecture
- Network File Server w/ NAS capabilities
- USB "Type-C" Connectivity
- Standard: 2x 1000BaseT Ethernet
- GNSS/GPS Receiver (with disable feature)
- Power through wide-range DC
- "All-in-One" Processor & Storage with Fixed or Removable Storage Media

TuffServ® Rackmount Solutions

High Data Rate, Large Capacity Streaming, Network Recording Systems

TuffServ Rackmount Solutions (TRS) are available in a standard, 19-inch rackmount chassis. These highly customizable units provide 10-Gigabit Ethernet interfaces configurable as optical or copper, plus 1-Gigabit Ethernet interfaces (1000Base-T), as well as expansion capability for 40-GigE, 100-GigE, and WiFi networking. The network interfaces can be configured for a combination of management, recording, and data playback. The TRS units also include high-capacity solid-state storage and high-speed, raw recording and playback.

- 19-inch rackmount chassis
- Configurable Ethernet interfaces; WiFi networking
- High-capacity, solid-state storage
- High-speed recording and playback
- Separable management and data network interfaces
- AES encryption
- Built for high reliability and 24/7 operation
- Options for additional I/O

Fast, Smart, Secure, and Reliable Open Architecture Systems

Value-added third-party software can be added to any system: Cybersecurity, Machine Learning for Data Validation and Analysis, Advanced Encryption

Network interface options are not all-inclusive and can be customized

Network capabilities include: NFSv4, NFSv3, CIFS/SMB, PCAP, FTP, TCP, UDP, IP

Ampex Product	Features & Benefits	Size/ Weight	Speed	Max Storage	Built-In Interfaces	Optional Interfaces	Security
TuffServ 640	Highest Speed Largest Capacity	470 in^3 7.63"H x 4.88"W x 12.63"D 30 lbs	1,900 MB/ sec	96 TB+	2x 10 Gig-E 1x Gig-E Serial	4x 10 Gig-E Video sFPDP 1553B GPS, IRIG-B	✓ AES 256 bit FIPS 197 FIPS 140
TuffServ 540	Highest Speed w/ the Lowest SWaP Radiation Tolerant Option	105 in^3 2.9"H x 4.25"W x 8.5"D 10lbs	900 MB/sec	16 TB	2x Gig-E	10 Gig-E sFPDP 1553B	✓ AES 256 bit FIPS 197
TuffServ 480v2	Optimized for Speed & RF Signal Capture (Radar, EW, SIGINT) Uncompressed Video	381 in^3 5.25"H x 7.25"W x 10"D 17.5 lbs	800 MB/sec	32 TB	2x Gig-E	10 Gig-E Video sFPDP 1553B GPS, IRIG-B	✓ AES 256 bit FIPS 197 FIPS 140
TuffServ 282	Dual Removable Memory Module & New NSA Commercial Encryption (CSfC)	475 in^3 9"H x 4.8"W x 11.0"D 14.6 lbs	300 MB/sec	16 TB+ 512 GB (2 modules)	4x Gig-E Fibre Channel IPFC	N/A	✓ AES 256 bit FIPS 197 FIPS 140 CSfC
TuffCORD	MIL-STD Ruggedness Lowest Cost Video Version (Uncompressed & Compressed)	109 in^3 3.6"H x 4.8"W x 6.3"D 5.5 lbs	250 MB/sec	8 TB	2x Gig-E	4x Gig-E Video 1553B GPS, IRIG-B High-speed Serial GPIO	✓ AES 256 bit FIPS 197 FIPS 140
miniRv2	Network File Server Optimized for Flight Test w/ External "Slice-based" Interfaces	99 in^3 3.5"H x 4.125"W x 6.82" D 74 oz	1 Gbits/s (1,000 Mb/s)	2 TB	1x Gig-E Fast Ethernet	Fully expandable "Slice-based" system supports a multitude of interfaces	✓ AES 256 bit FIPS 197
AMux	External "Slice-based" DAU Network Multiplexer	105 in^3 2.9"H x 4.25"W x 8.5"D 39 oz	1 Gbits/s (1,000 Mb/s)	Network Multiplexer	1x Gig-E Fast Ethernet	Fully expandable "Slice-based" system supports a multitude of interfaces	N/A
CAR	Lowest Cost Expendable NAS Perfect for Attritable Systems (UAS, Decoys, Missiles)	59 in^3 1.8"H x 4.8"W x 6.8"D 2 lbs	200 MB/sec	2 TB	2x Gig-E USB-C (Download) Audio GPS	Video 1553B ARINC 429 High-speed Serial GPIO	N/A

Performance specifications are based on Ampex measurements, other use cases may vary.

The Ampex Difference

If you can find another product that combines a better mix of performance, the benefits of a small business, and U.S. manufacturing/ownership, buy it. Ampex encourages customers to compare "apples to apples" and when you do, you will 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.

Non-Proprietary, Open Architecture Systems

Full access to add third-party software, no proprietary constraints

- Red Hat Enterprise Linux OS
- Supporting standards and technologies including:
    - Future Airborne Capability Environment (FACE)
    - Open Mission Systems (OMS)
    - Sensor Open Systems Architecture (SOSA™)
    - Vehicular Integration for C4ISR/EW Interoperability (VICTORY)
- Certifiable Linux Integration Platform (CLIP)
- COTS processors and storage

World Class Performance

Speeds ranging from hundreds of Mbs to hundreds of Gbs and capacities ranging from GBs to hundreds of TBs

Experts in Ruggedization Standards

Shock, Vibration, EMI, Power, and Environmental

Lifecycle Maintainability

- DMS Management
- Software/Cybersecurity Update Service

Silicon Valley Headquarters

The Benefits of a Small Business

Small enough to be agile, big enough to be reliable

- Access to U.S. Government Small Business Innovation Research (SBIR) funds; (non-program dollars to build a prototype at no cost)
- Help in meeting your small business goals

Markets Served

- Aerospace, Ground, Maritime Vehicles
- Unmanned Systems
- Electronic Warfare
- Intelligence, Surveillance, and Reconnaissance
- Ground Control Stations
- Marine Systems
- Near Space Systems
- Test and Evaluation
- Range Telemetry Tracking
- Simulation

An Extensive and Noteworthy History

Ampex Data Systems builds cutting-edge data management and data security solutions today by standing on our foundation as a world leader in data recording and storage for over 75 years.

Ampex Electric and Manufacturing Company was one of the first Silicon Valley companies and was formed by Alexander M. Poniatoff in San Carlos, California in 1944. The name AMPEX consists of Poniatoff's initials, with "EX" for "excellent" to form the unique brand.

The company's initial, national success came when Bing Crosby grew tired of his radio show interrupting his golf game. Crosby inked a deal with Ampex to record the show on an Ampex Model 200 reel-to-reel tape machine so it could be broadcast via tape delay. This served as the catalyst for Ampex's unrivaled success in the Hollywood and entertainment recording industries for the next several decades. Notable milestones included an unknown truck driver named Elvis Presley recording his historic first single, "That's All Right" using an Ampex 521 reel-to-reel in 1954. In 1956, the introduction of the Ampex VRX-1000 (later renamed the Mark IV), hailed as the first practical videotape recorder.

Ampex would go on to win several Emmy's, an Oscar, and a Grammy for its groundbreaking innovations. The company's culture of innovation would also foster revolutionary innovators like Ray Dolby, of Dolby Digital. Ray's first job as a teenager was at Ampex, and later he would help build the VRX-1000. Also, Larry Ellison, co-founder of Oracle, helped develop the technology behind Oracle while working for Ampex in the 1970's.

Today, Ampex stands on the same foundation of superior innovation with its industry-leading line of ruggedized data management systems for aerospace and ground vehicles and supporting laboratories, a technology which began in 1950 when Ampex built the first 'dedicated' instrumentation recorder for the U.S. Navy, the Model 500.

In 2014, Delta Information Systems, Inc. acquired Ampex, combining Ampex technology with the power of the Delta Family of Companies including Delta Digital Video, GDP Space Systems, and Acroamatics Telemetry Systems, Inc.

A DELTA INFORMATION SYSTEMS COMPANY

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