

Advanced Mission Computer (AMC) Product Family

High-performance, COTS-based, open systems architecture product family, configurable to any operating environment



**GDAIS' Open Systems
Advanced Mission Computer**

System Definition

The AMC is a set of digital computer hardware and software that performs general purpose, I/O, video, voice, and graphics processing. Communication is over multiple buses, including 1553, Fibre Optic Fibre Channel, and Local PCI, and all modules integrate in an industry standard 6U VME backplane.

The I/O configuration may be tailored with PMC mezzanine modules. The design is scaleable and expandable, with a clear and built-in path for technology upgrades and insertion.

A well-defined avionics Application Programming Interface (API) abstracts the application software from the underlying hardware, affording system evolution to ever-increasing performance standards, while effectively managing obsolescence. An Ethernet interface supports software development and system maintenance.

The General Dynamics Advanced Information Systems (GDAIS) Advanced Mission Computer (AMC) is a leading edge, flexible, and rugged processing product family which can be readily configured to meet the needs of modern military systems, from benign laboratory to harsh avionics environments. The AMC is an integrated information processing system, providing complete hardware and software solutions. It is built on a well-defined open systems architecture allowing for rapid insertion of emerging technologies. GDAIS supplies system design and integration services to ensure a precise fit to the requirements of each specific user platform.

The AMC leverages Commercial Off-the-Shelf (COTS) technology, non-development item (NDI) products, and proven expertise in application-specific requirements to provide high-performance, state-of-the-art computing resources. This, coupled with GDAIS' 30 years of experience in military avionics design, manufacture, and delivery, assure low-risk and affordable integrated avionics solutions.

AMC Applications

Because of its configurability and flexibility, the AMC can be used efficiently in a wide range of applications, ranging from embedded module functions to full-scale multi-computer configurations.

The system operates reliably in avionics, ground-based, and shipboard extreme conditions. Some of the general areas in which GDAIS has experience and to which the AMC can be applied are:

- Mission Processing
- Display Processing
- Stores Management
- Information Management

Open Systems Hardware Architecture

The AMC open system architecture is based on a modular implementation that lets the configuration be tailored to meet user requirements.

This building block approach also simplifies technology insertion and product improvement activities by allowing distinct components of the system to change with minimal impact to the rest of the system.

- Standard VME-64 Electrical Interface and pinouts
- Standard PCI Mezzanine Interface
- Flexible, configurable user-defined I/O pinouts and front panel design
- Optional local or cluster interconnections

AMC Product Family

Open Systems Software Architecture

The AMC open systems software architecture concept is based on a standard layered software implementation. User application-level software views the computer through a well-defined avionics API. The API buffers user software from the low-level hardware and software implementation details that will change with time.

The GDAIS product line has already successfully implemented multiple technology rolls without impacting user operational software. As processor, bus, and I/O technology improvements become available, the avionics API helps assure user program portability.

- All I/O is accessed through well-defined driver interfaces tailored to specific platform needs.
- System startup and BIT approach are designed to let the user manage key characteristics, such as startup time, BIT coverage, error-handling, etc.
- The API is easily expandable to accommodate platform unique functionality and performance requirements.

Core System Software

Core System Software (CSS) is an enhanced real-time operating system for the AMC that leverages COTS products.

The CSS is a fully embedded system software, application program interface, and diagnostic software set for the AMC.

Technical Specifications

System Software Features

Languages Supported	C, C++, Ada
Services Provided	POSIX 1003.1B Compliant CSS
Development Environment	UNIX or PC-based Tornado® Embedded Software Development Environment by Wind River Systems

System Electrical Features

Processing	Single or Multiple Processor Configuration, PowerPC Based
Memory	Cache, Volatile, and Non-Volatile, Tailorable (up to 512MB SDRAM, 64MB Flash per processor)
Buses	VME64x-VITA 1.1-1997, 32/64-bit PCI Rev. 2.1, MIL-STD-1553A/B, Fibre Channel, Ethernet, RS-232
Standard I/O	IEEE 802.3 Ethernet 10/100Base Tx EIA RS-232/422/485
Mezzanine I/O Options	ANSI Standard Fibre Channel (FC-PH 4.3) MIL-STD-1553A/B
Power Conversion	115V AC, 3-Phase, 400Hz

System Mechanical and Environmental Features

Form Factor	ATR Chassis or Custom Sized, Conduction Cooled 6U VME Cards - IEEE1101.2, PMC Standard IEEE P1386/1386.1
Operating Temperature	-40°C to +90°C (at Base Card Edge)
Storage Temperature	-62°C to +125°C
Pressure Altitude	-1800 to 70,000 feet
Humidity - Operating	0 to 100% non-condensing
Humidity - Storage	0 to 100% condensing
Sine Vibration	10g from 15 to 2000 Hz
Random Vibration	0.1g ² /Hz from 15 to 2000 Hz
Shock	15g peak half sine 11ms

Details

CSS is a specification of mission-independent objects and operations, and comprises software components to support application execution. The CSS provides all I/O support, application loading capability, multi-processing support, and Built-In-Test (BIT) software. The CSS is integrated with Wind River's VxWorks® operating system.

The CSS provides these basic services to the Operational Flight Program (OFP):

- System services for managing resources and supporting synchronization and communication among concurrent activities. Includes BIT services to check the health of the mission computer and services to initialize and load the OFP.
- Transport services for I/O operations:
 - MIL-STD-1553 drivers
 - Fibre Channel drivers
 - VMEbus drivers
 - Discrete and serial I/O drivers

The CSS uses the following COTS tools:

- Tornado® embedded software development platform by Wind River
- Diab C/C++™ Compiler by Wind River
- CrossWind™ debugger by Wind River
- WindView™ timing analyzer by Wind River
- FLASH Utilities by card supplier

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