Military & Aerospace

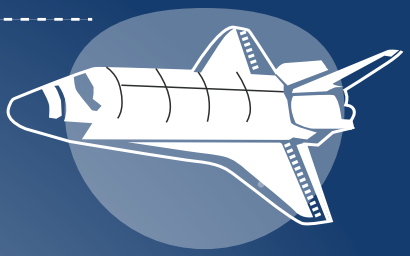
SEALEVEL®

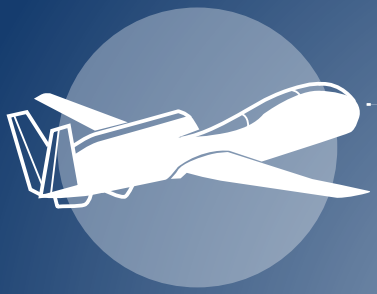
Delivering Design & Manufacturing Excellence Since 1986

COMMAND, CONTROL, AND TACTICAL COMMUNICATIONS IN ANY ENVIRONMENT

SPACE

Sealevel Systems designed and manufactured a custom PC card in collaboration with NASA with extensive synchronous and asynchronous capabilities. The product was first launched into space in 2000 to monitor the position of the space shuttle's robotic arm.



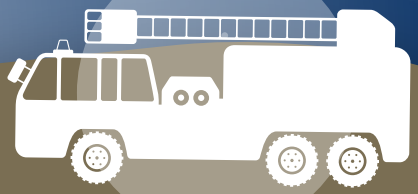


AIR

Sealevel I/O and computing systems provide "always on" command and control access for 760 U.S. Military UAVs via ground control, data communications, and surveillance systems. These solutions are intentionally designed – and selected – for their backward compatibility and connectivity with the latest peripherals.

LAND

Sealevel has designed and manufactured over 19,000 docking stations for U.S. Army maintenance systems in military aircraft and ground vehicles, as well as more than 60,000 Defense Advanced GPS Receiver programming devices, meeting rigorous military environmental and EMI standards.



HOMELAND

More than 15,000 Sealevel embedded systems – from rackmount computers to dispatch stations to mobile consoles – are deployed across the US for use by public safety services, including law enforcement, fire departments, EMS, and the National Guard.

SEA

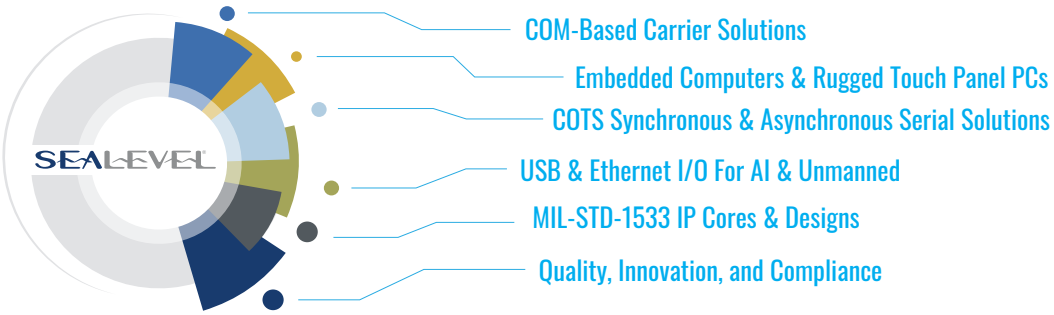
100% of U.S. Naval vessels use Sealevel equipment to connect and monitor data communications and other ship systems. Specifically, our serial I/O adapters provide the interface for communication and navigation in ground control guidance systems.

AMERICAN-MADE I/O & COMPUTING IN SUPPORT OF MODERN DEFENSE AND LEGACY SYSTEMS

Sealevel Systems, Inc. is an American-owned designer and manufacturer of COTS and full custom hardware and software. Our customers range from industry leaders to every major US and Allied nations military contractor including Northrop Grumman, Raytheon, BAE, Boeing, L3Harris, NAVWAR, NAVAIR, and SOCOM.

Sealevel delivers proven, COTS, mission-ready products and customized solutions for advanced systems, achieved by leveraging over 35 years of engineering and manufacturing experience serving military, government, and commercial customers. From complex laptop docking stations to high-speed communication adapters, Sealevel's electrical and mechanical design expertise delivers unparalleled performance while meeting stringent MIL-STDs.

Sealevel's 52,000-square-foot facility sits on a 17-acre site in Liberty, SC. To protect electronic components during design, assembly, and test, we have installed over 30,000 square feet of ESD tiling spanning our manufacturing, engineering, and tech support departments.



Sealevel proudly supports the following protocols, programs, and systems:

Battle Force Tactical Network (BFTN)
Battle Force Tactical Trainer (BFTT)
Battlefield Airborne Communications Node (BACN)
Canadian Surface Combatant (CSC)
Command and Control Systems Program Office (PMW-150 C2PMOD)
Common Data Link Management System (CDLMS)
Global Secure Airborne Communication (GSAC)
Joint Range Extension Applications Protocol (JREAP)
Joint Support Ships (JSS) Canada
Network Tactical Common Data Link (NTCDL)
One System Remote Video Terminal (OSRVT)
Patriot Missile Defense System
Roll-On Beyond-Line-of-Sight Enhancement (ROBE)
Scalable Portable Integrated Data Router (SPIDR)
Taiwan Automated Air Defense System (TAADS)
US Navy Broad Area Marine Surveillance (BAMS)

Sealevel is a member of these associations to support, educate, and interact with our armed forces:

Armed Forces Communications and Electronics Association (AFCEA)
Association of Old Crows (AOC)
Association of the United States Army (AUSA)
National Defense Industrial Association (NDIA)

Our Mission
Sealevel Systems, Inc. is committed to **engineering** leading-edge communications solutions, **manufacturing** our products to the highest quality standards, **growing** a creative team of trailblazers, and **sustaining** a legacy of community investment.

COM-BASED CARRIER SOLUTIONS

COM Express modules install on a carrier board that provides the application-specific I/O and external connectors. While there are eight different pin outs defined by the standard, it is recommended that all new designs use COM Express Type 6, Type 7, or Type 10. COM Express also allows for easy CPU changes or upgrades, future-proofing the design.

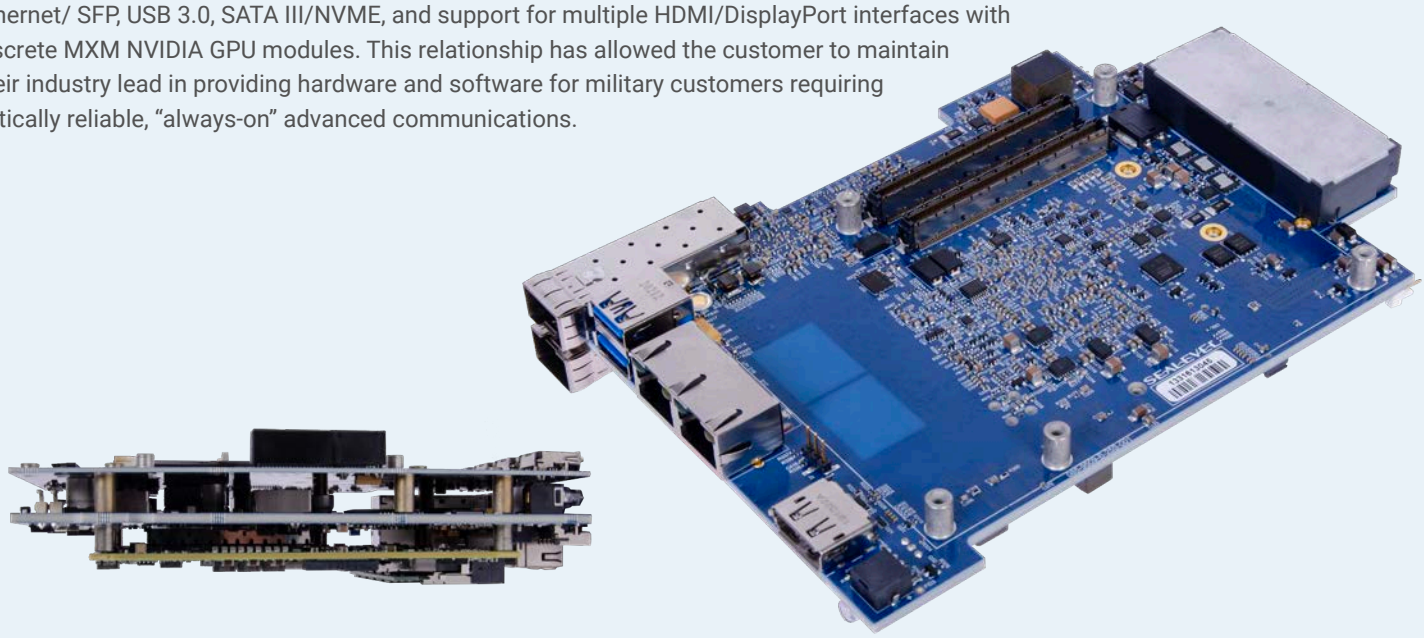
Fast Time to Market
The COM module provides the high-speed computing functions common to most applications including the CPU, memory, graphics, Ethernet and USB communications, SSD interface, and expansion buses. This improves time to market as engineering resources can be dedicated to designing the technology required for the specific application.

Scalability & Long-Term Availability
The carrier board can be designed to enable interchangeability of the COM module and to easily change or upgrade the CPU functionality as needed in the future without the need to redesign the entire system. Additionally, COM modules are available with an up to 15-year lifecycle guarantee – allowing installations to exceed natural lifecycles.

Rugged & Industrial System Design
Sealevel specializes in rugged hardware designed to withstand environmental challenges including hazardous locations, shock & vibration, and temperature extremes. With COM architecture, the connectors are mounted directly to the carrier board, eliminating cable connections and enabling maximum reliability. COM modules are available with a -40°C to +85°C operating temperature r

Case Study: Military Networking Solutions

A leading supplier of advanced tactical and enterprise communications equipment enlisted Sealevel to help launch a new line of COM-based voice, data, and video communications systems. The first system was a carrier board based on Intel Haswell Core-i CPUs with 16GB RAM, dual Gigabit Ethernet, USB 2.0, eSATA, and DisplayPort interfaces. Subsequent designs have migrated to 8-, 12-, and 16-Core Xeon-D CPUs with up to 128GB RAM, 10 Gigabit Ethernet/ SFP, USB 3.0, SATA III/NVME, and support for multiple HDMI/DisplayPort interfaces with discrete MXM NVIDIA GPU modules. This relationship has allowed the customer to maintain their industry lead in providing hardware and software for military customers requiring critically reliable, "always-on" advanced communications.



Sealevel's Solution

In order to meet the compact footprint, robust I/O, and wide operating temperature range requirements, Sealevel developed a series of designs to meet these application requirements and migrate to the latest computing technologies. These COM carrier board designs feature multiple high-speed signals efficiently routed in very small form factors that continue to operate even in less-than-ideal power conditions.

Featured Product: Tactical Communications Server

- (5) Gigabit Ethernet (2 Isolated PoE PSE)
- (2) USB 2.0
- SATA II Interfaces
- Mini DisplayPort
- Single 2.5" SSD Support
- Designed for -40°C to 85°C operating temperature range

Featured Product: Gigabit Ethernet Tactical Server

- Up to 128GB DDR4 RAM
- (2) 10 Gigabit Ethernet
- (2) Gigabit Ethernet
- (2) USB 3.0
- HDMI
- Battery charging interfaces
- Dual M.2 SSD support
- Designed for -40°C to 85°C operating temperature range

EMBEDDED COMPUTERS & RUGGED TOUCH PANEL PCs

Sealevel embedded computers and touch panel PCs combine the advantages of COTS and custom to provide ruggedized computer solutions to meet and exceed specific application requirements. Ideal for installation in armored vehicles, for controls in remote workstations, and electronic warfare subsystems, these computers are designed to operate reliably in extreme conditions.

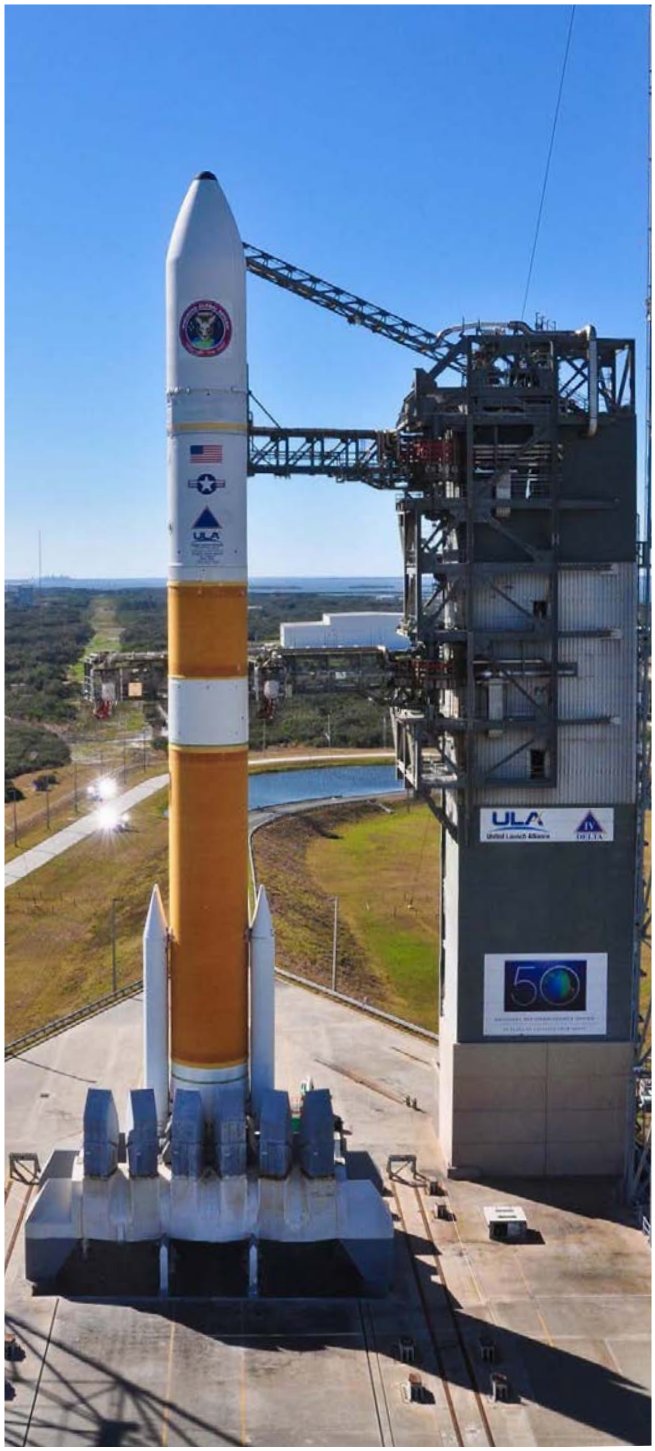
Fanless Design
Sealevel's solid-state computing systems are designed without fans for improved reliability and long-term field deployment. Systems are also engineered without internal cables for performance in high-vibration applications.

Wide Operating Temperature Range
Through extensive thermal modeling – and prototype testing – Sealevel's computers are designed with certification in mind to meet and exceed temperature requirements.

Future-Proof COM Architecture
Utilizing Computer-on-Module architecture, Sealevel boards are designed to allow for easy changes, and upgrades, to the CPU functionality without a complete system redesign or replacement.

Embedded Computers
Designed for applications where reliable computing and SWaP-C² optimization is a must, the Relio™ family of embedded I/O computing systems combines the reliability of a PLC with the configurability of an industrial computer. Relio embedded computers feature a fanless, solid-state design and offer extended temperature and vibration tolerance. COM Express design allows for technology migration, future-proofing your industrial PC. Choose from a variety of compact form factors and processor options, all with long-term availability and superior life cycle management.

Rugged Touch Panel PCs
Achieve computing, I/O and HMI requirements with Sealevel rugged HazPAC® and SeaPAC® touch panel PCs. Our fanless, industrial panel PC systems are designed to operate over wide operating temperatures for unmatched reliability. HazPAC touchscreen panel PCs are certified by ATEX, IECEx and for Class I, Division 2. These hazardous area computers also maintain NEMA 4/IP64 protection from sprayed liquids.



Case Study: VoIP Support for NASA Space Launch Facilities

NASA utilizes standardized VoIP communications terminals at all space launch facilities. One launch pad complex may utilize more than a dozen terminals to facilitate headset communication throughout the entire gantry and launch vehicle area. Highly explosive gases are present at the launch pad complex so NASA requires the use of a Class I, Division 2 rated panel PC at each panel. The panel PCs must also be able to withstand intense shock and vibration, as well as extreme temperatures generated by fire and the heat of the rocket exhaust.

A leading designer and manufacturer of mission critical VoIP communications systems partnered with Sealevel to fulfill requirements for the NASA Mission Next Generation Voice (MNGV) system – specifically the rugged touch panel PC for each of the terminals.

Sealevel's Solution

The Sealevel sales and engineering teams recommended the HazPAC 10® Rugged Panel PC to meet the extensive environmental requirements and to future-proof the hardware with a COM Express design that can easily be upgraded to meet evolving needs. The HazPAC 10 has the prerequisite Class I, Division 2 (Groups A, B, C, D , T4) rating for use in locations where flammable gases and/or liquids are present. The durable, glass, 5-wire resistive touchscreen and thick, machined, aluminum bezel support a system that is impervious to flames, chemicals, and solvents. And the fanless design achieves a wide -40°C to 60°C operating temperature.

Featured Product: HazPAC® 10 Rugged Panel PC

- Available in 8.4" and 15" touchscreen models
- Certified by ATEX, IECEx, and for Class I, Division 2 (Groups A, B, C, D, T4)
- NEMA 4/IP64 aluminum bezel
- Wide -40°C to 60°C operating temperature range

COTS SYNCHRONOUS & ASYNCHRONOUS SERIAL SOLUTIONS

Sealevel offers the widest selection of synchronous serial choices for radio, radar, telemetry and other data intensive applications. Our serial adapters are trusted for military, aerospace, and commercial applications where reliable, high-speed communications are required. These interfaces support RS-232, RS-422, RS-485, and RS-530 electrical interface standards and offer a traditional bus-based approach as well as USB and Ethernet solutions.

PCI Synchronous Serial Adapters

Critical military, aerospace, and commercial applications often use synchronous communication when high-speed data transfer is required. All Sealevel synchronous serial products are engineered with strict attention to timing to achieve the most reliable, high-speed communication possible.

PCIe Synchronous Serial Adapters

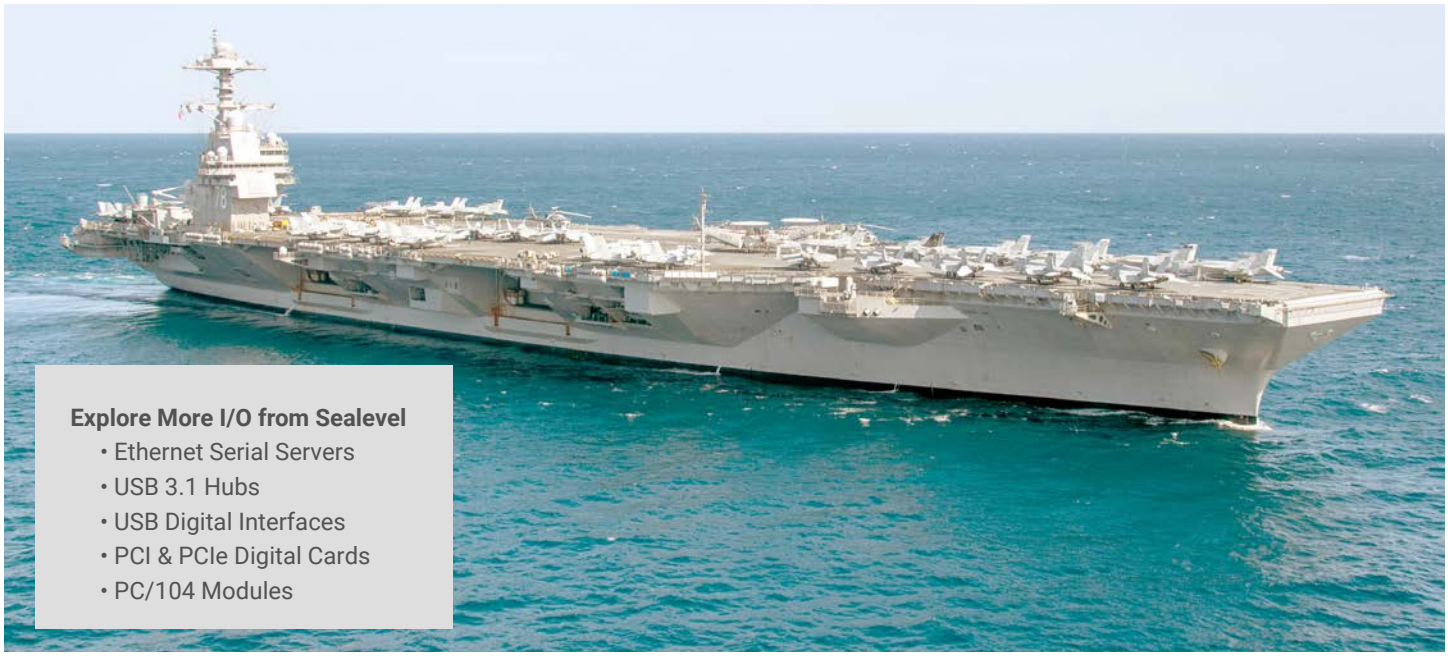
Sealevel PCIe X1 synchronous serial cards are fully compatible with X2, X4, X8, X16, and X32 PCI Express slots. Software developed for standard PCI adapters will also work with Sealevel PCIe synchronous serial adapters, simplifying the transition to this next-generation PCI bus.

Synchronous Serial Server

The Relio R2 Sync Server is a rugged, solid-state industrial computer designed for applications requiring synchronous communications, small size, high reliability, powerful processing, and a long product life cycle. The system is compliant with MIL-STD-810 shock and vibration specifications. The R2 Sync Server features four synchronous serial ports; each synchronous channel is individually configurable for RS-232, RS-422, RS-485, RS-530/530A, or V.35.

ACC-188 Radio Adapters

The ACC-188 synchronous serial radio adapter is interoperable among various tactical radio brands and models used by the defense community. The ACC-188 works with any radio that has a synchronous serial communication port using MIL-STD-188-184 and enables the tactical radios to send data such as GPS maps, images, coordinates, and IM-type communications. Combined with DISA's PDA-184 software, the system provides reliable, consistent data transfer.



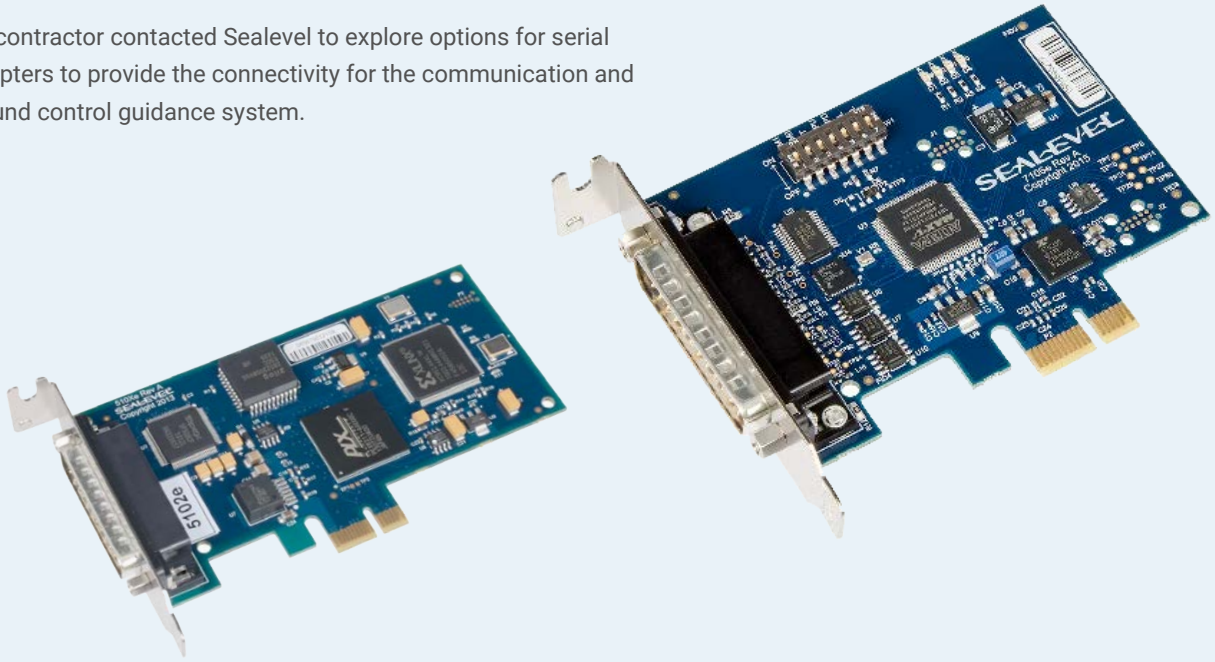
Explore More I/O from Sealevel

- Ethernet Serial Servers
- USB 3.1 Hubs
- USB Digital Interfaces
- PCI & PCIe Digital Cards
- PC/104 Modules

Case Study: Serial Communications for Ground Control

The U.S. Navy's arsenal includes a jet-powered, long-range cruise missile that receives real-time, in-flight guidance via SATCOM. This communication enables the missile to dynamically track and engage targets. This capability is extremely valuable as it can take some time for the missile to reach a designated target.

An aerospace prime contractor contacted Sealevel to explore options for serial communications adapters to provide the connectivity for the communication and navigation in the ground control guidance system.



Sealevel's Solution

Based on the specified requirements, Sealevel recommended our 5102e and 7106e PCI Express Serial Communications Adapters.

The 5102e allows for maximum compatibility with a variety of interfaces and protocols. Intended for communications, avionics, navigation, and radar applications, the 5102e provides robust synchronous communications. This multi-interface board is fully configurable and features a digital phase lock loop (DPLL) circuit for increased reliability when using NRZI or RM encoding.

With its ultra-high-speed UART, flexible clock prescalar, and large 256-byte Tx/Rx FIFOs, the 7106e is able to support a wide range of baud rates, making it ideal for data-intensive applications that require fast and reliable throughput rates. And for rapid troubleshooting, the onboard LEDs indicate status, electrical interface, and line termination.

Featured Product: 5102e PCI Express Serial I/O Adapter

- Configurable for RS-232, RS-422, RS-485, RS-530A, or V.35
- All modem control signals implemented
- Supports data rates up to 128K bps

Featured Product: 7106e PCI Express Serial I/O Adapter

- Configurable for RS-232, RS-422, RS-485, or RS-530
- Ultra-high-speed UART
- Supports asynchronous data rates exceeding 921.6K bps

USB & ETHERNET I/O FOR AI & UNMANNED

Sealevel's extensive I/O line enables robust control and communications for a wide range of unmanned and vision system designs, including UAVs (unmanned aerial vehicles), UGVs (unmanned ground vehicles), and UUVs (unmanned underwater vehicles). Our accessible software allows for easy configuration to meet communication protocol needs. And every I/O product comes with a lifetime warranty and a long-term availability guarantee.

USB Serial Adapters

From one to sixteen ports, SeaLINK® USB serial adapters allow for quick integration with RS-232, RS-422, and RS-485 peripherals – invaluable for receiving intelligence from unmanned aircraft, Underwater Remotely Operated Vehicles (ROVs), and other tactical and vision systems. Unlike traditional UART-based products, SeaLINK USB serial adapters use a state-machine architecture that reduces host processor overhead for faster, more reliable communications in critical deployments. Sealevel offers the largest selection of USB serial adapters available, many featuring high-retention USB connectors to prevent loss of connectivity.

Ethernet & PoE Adapters

Sealevel's eI/O Ethernet and PoE I/O adapters are cost-effective and allow remote monitoring of analog and digital I/O from anywhere on an Ethernet network. I/O options include optically isolated inputs, Reed, Form C, and solid-state relay outputs, and analog to digital inputs. Sealevel's SeaI/O Ethernet modules are also compatible with 10/100Base-T Ethernet. For new technology builds, as well as retrofitting legacy equipment, these devices provide reliable control and monitoring across autonomous infrastructure.

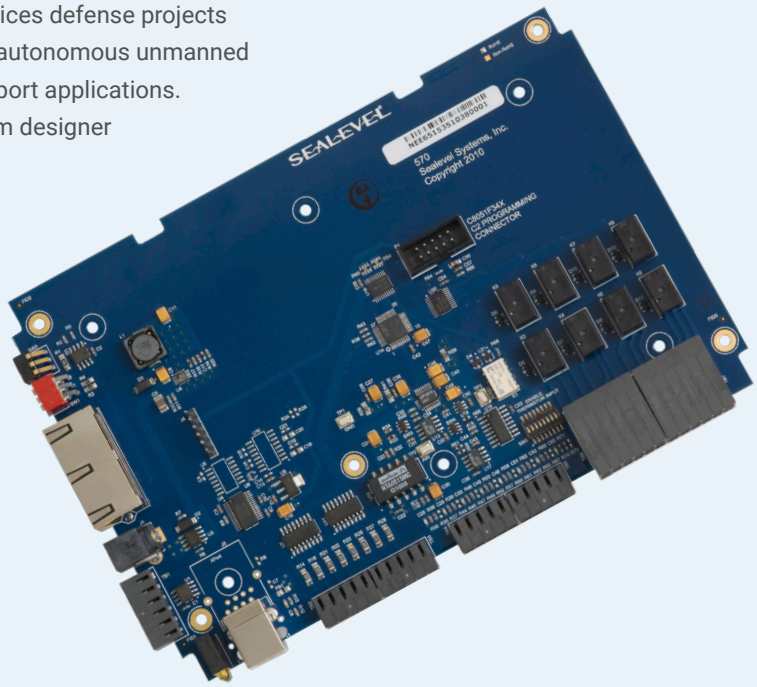
SeaI/O Data Acquisition Devices

Sealevel's SeaI/O data acquisition devices provide powerful digital, analog, and serial expansion to any autonomous system. With robust optical isolation, as well as wide operating temperature ranges, SeaI/O DAQ devices are engineered and manufactured for reliable performance in extreme environments. Connect to the host via wireless, Ethernet, USB, RS-485, or RS-232 to add the functionality required for your particular DAQ application. Multiple units can be daisy-chained using convenient pass-through connectors to create a versatile remote control and monitoring network.

Case Study: Robust, Shock & Vibe Tolerant Hardware for A-UGVs

An industry leader in advanced robotic system design and integration delivers robotic control software and services to the aerospace, military, and security industries. They are established as the preferred development partner for robotic system integrators worldwide.

The company partners with a large prime contractor that services defense projects as well as commercial customers. The contractor's family of autonomous unmanned ground vehicles (A-UGVs) can be utilized in several troop support applications. Due to extreme environmental factors, both the robotic system designer and contractor require shock and vibration-tolerant hardware.



Sealevel's Solution

Based on the dense I/O requirements coupled with the need to withstand shock and vibration, the Sealevel team specified the OEM version of the SeaI/O-570E and an enclosed SeaI/O-420E Ethernet data acquisition device for the unmanned ground vehicles.

Each A-UGV in this configuration utilizes four 570E-OEM units and one 420E. Both devices allow users to communicate via industry-standard Modbus TCP protocol or Sealevel's SeaMAX API software libraries. Additionally, the Sealevel Modbus Connect app allows access to the registers, coils, and discrete I/O for testing and troubleshooting during application development.

Featured Product: SeaI/O-570E-OEM Ethernet DAQ Device

- 10/100Base-T Ethernet Modbus TCP interface
- (8) single-ended 16-bit analog inputs
- (8) optically isolated inputs
- (8) Form C relay outputs

Featured Product: SeaI/O-420E Ethernet DAQ Device

- 10/100Base-T Ethernet Modbus TCP interface
- (16) optically isolated inputs
- (8) SPDT Form C Reed relays

MIL-STD-1553 IP CORES & DESIGNS

MIL-STD-1553 is a widely used serial communications bus for military and avionic applications. Sealevel offers an alternative for implementing 1553 using software IP cores integrated into FPGA devices. IP cores can provide substantial advantages over standard 1553 ICs.

Reduced Cost
IP core technology including the use-license can deliver more than a 50% cost reduction in 1553 node price for moderate quantities.

Easy Ability to Upgrade
Since FPGAs can be reprogrammed, the 1553 functionality can be enhanced, modified, or replaced by a new IP core if required.

Small Footprint Saves Board Space
IP cores can fit into FPGAs already included in a design and the analog transceiver is much smaller than a dedicated 1553 IC.

Easy Evaluation
Using tools like ModelSim, the entire functionality can be evaluated and simulated before a single trace is routed for the PCB.

Supports Long Product Life Cycle
IP cores are not FPGA specific and the core can be moved to a different FPGA part in the event of obsolescence or supply chain issues.

PMC
The BRD1553PMC board provides up to eight communications channels compatible with MIL-STD-1553B and MIL-STD-1760. Each channel can be configured independently to work with H009 and WB-194 in conjunction with MIL-STD-1553.

PCI
Choose either 1 or 2 channel MIL-STD-1553 model configurable as Bus Controller (BC), Remote Terminal (RT), and Monitor (MT).

PC/104+
Add two channels of MIL-STD-1553B to the PC/104+ stack. Each channel can be configured independently to work with H009 and WB-194.

CompactPCI/PXI
The BRD1553cPCI provides up to eight channels of MIL-STD-1553B communications and also includes eight generic I/O pins that can be used as RS-422, RS-485, or ARINC-429 (2 transmit and 2 receive channels).

VME
Add 4 or 8 channels of MIL-STD-1553B to your VME system. Each channel is individually configurable as Bus Controller (BC), Remote Terminal (RT), and Monitor (MT).

Software
All MIL-STD-1553 boards are software compatible with DDC® Enhanced Mini-ACE® components and architecture and are provided with drivers for Microsoft® Windows® and Linux.

* DDC® and Mini-ACE® are registered trademarks of Data Device Corporation, Bohemia, NY, USA

Case Study: Interoperable Support for Test & Calibration
An international defense prime contractor that specializes in aerospace electronic systems needed reliable, interoperable support for an avionics test system. Specifically, this test system is used for the calibration of the Boeing F-15EX Eagle II. The system must display consistent operation as part of the test and measurement process, well in advance of live deployment. Therefore the designated interfaces must also conform to those high-reliability standards. Beyond safety and performance, this extensive test and measurement process also reduces costs associated with damaged equipment.

For this application, the test system needed to incorporate a MIL-STD-1553 IP core for a wide range of implementations and achieve vendor and technology-agnostic architecture.

Sealevel's Solution
Based on the program requirements, Sealevel specified the MIL-STD-1553 BC/RT/MT IP Core. In addition to meeting the immediate specifications, the solution offered a dramatic cost reduction as well as protection against obsolescence or supply chain issues as the core is not FPGA-specific. And, as the technology evolves, the functionality can easily be enhanced, future-proofing the solution.

Featured Product: MIL-STD-1553 BC/RT/MT IP Core for FPGA

- Suitable for any MIL-STD-1553 BC, RT, MT implementation
- Compatible with DDC® ACE® and Enhanced Mini-ACE® interface and functionality, works with existing software drivers
- Small FPGA area utilization
- Supports any clock frequency, reduces clock domains
- Modular architecture allows flexible implementations
- Based on vendor and technology-independent VHDL code

QUALITY FOCUSED OPERATIONS FROM START TO SHIP

Sealevel's team of over 90 employees spans our engineering, manufacturing, and business departments. Our fully integrated staff is committed to customer satisfaction as demonstrated by our ISO 9001:2015 certification and rigorous quality processes. Every employee stands behind our first-in-industry lifetime warranty on I/O and the long-term availability of all products, beyond the life of your mission.

Dedicated Hardware & Software Engineering Resources

Sealevel is the leading designer and manufacturer of industrial computers, Ethernet serial servers, USB serial, PCI Express and PCI bus cards, and software for critical communications. We partner with OEMs and industry leaders to meet their specific application needs through our complete standard product line and custom design and manufacturing capabilities. We offer over 350 standard products in a wide variety of configurations and have successfully designed and deployed over 90,000 embedded computers since 2004.

Areas of Expertise

- COM Baseboard Design including COM Express® Type 6, 7, and 10, SMARC®, and Qseven
- x86 Architecture
- RISC Single Board Computer Design
- PCIe/104
- 8, 16, and 32-bit Microcontroller-Based CPUs
- Serial I/O – Asynchronous or Synchronous
- 10 Gigabit Ethernet
- USB 3.2, 2.0, 1.1, 1.0
- MIL-STD-1553
- High Density/BGA
- PCB Layout
- Thermal Modeling
- Functional Density
- SWaP-C²
- Device Drivers for Windows, Windows Embedded and Linux
- Embedded Firmware
- Microprocessor Control

Manufacturing

All product design and assembly take place at our ISO 9001:2015 registered manufacturing facility, located in the United States of America. These processes are subject to our rigorous quality standards to meet our high-reliability guarantee for critical communications electronics. Our state-of-the art Surface Mount Technology (SMT) line consists of an Automated Screen Printer with 2D Inspection, four High Speed SMT pick and place machines, a Ten Zone Forced Convection Reflow Oven, and a 5-Camera Automated Optical Inspection system. Following initial build, our in-house team of J-STD-001 and IPC-A-610 certified technicians completes through hole soldering.

Areas of Expertise

- High Speed Surface Mount Technology (SMT)
- Printed Circuit Board (PCB) Assembly
- Through Hole Assembly
- Board Level Assembly
- Box Build Assembly
- Automated Screen Printing with 2D Inspection
- Automated Optical Inspection
- Closed-Loop Inline Aqueous Cleaning
- Automated Conformal Coating
- Multi-Angle Transmissive X-Ray
- Vibration & Thermal Screening

Design – and Test – for Certification

Sealevel's "design for certification" approach to engineering and manufacturing ensures that our compliance, test and certification engineers are involved beginning with initial concepts. Every custom embedded computer and industrial I/O design is refined to meet safety, security and environmental requirements. Sealevel's in-house Compliance & Test engineers complete in-house evaluations utilizing our multi-angle transmissive x-ray, 2-axis vibration table, and multiple thermal chambers. This pre-certification analysis, validation, and test methodology reduces time to market as well as costs for our customers.

Areas of Expertise

- MIL-STD-810, MIL-STD-461, MIL-STD-1472, MIL-STD-901, MIL-STD-464, MIL-STD-167-1
- EMC (FCC, CE)
- EFT
- IEC/EN
- IP (Ingress Protection)
- NEMA
- ATEX
- IECEx
- CID1 and CID2
- Thermal Shock
- Environmental Stress
- Radiated Emissions
- Endurance Testing
- Impact Resistance

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