

CURRENT DEPLOYMENTS



A clear advantage.



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CRYSTAL GROUP, INC.

When lives are on the line, reliability matters. That's why when applications demand fail-safe computer architecture that can withstand harsh conditions, defense and industry leaders choose Crystal Group.

We design and manufacture rugged, high-performing computer hardware for high reliability in the most extreme and unpredictable conditions. An employee-owned and operated small business founded in 1987, we provide the defense, government, commercial and industrial markets with in-house customization, engineering, integration, configuration management, product life-cycle planning and support services.

Field tested, combat proven rugged computing devices from Crystal Group include industry-leading servers, displays, networking products, embedded computers, and data storage backed by 5+ year warranties. Crystal Group is certified to quality management standards ISO 9001:2015/AS9100D and our products meet or exceed military, IEEE, and IEC industrial standards.

Reliability matters. Crystal Group delivers. Superior quality you can trust.

A clear advantage.





ACES HY The U.S. Air Force relies on the Airborne Cueing and Exploitation System – Hyperspectral (ACES-Hy) to detect what the naked eye cannot. The unique system, able to identify objects such as improvised explosive devices (IEDs) based on their spectral signatures, had unique and exacting requirements – which Crystal Group met with flexible, adaptable engineering services and rugged servers and storage devices for processing and storing captured data.

AEHF Ground Relay Stations National leaders and warfighters rely on the Advanced Extremely High Frequency (AEHF) series of communication satellites and ground relay stations for the secure, reliable transmission of sensitive information even in highly contested areas. The associated ground stations need to be powerful, protected, secure, and survivable, so engineers opted for Crystal Group's rugged servers and in-house engineering services, to help modify a preexisting configuration to meet current and future program needs.

B-2 Bomber The Adaptable Communications Suite on the B-2 Spirit, known worldwide as the Stealth Bomber and considered to be the most survivable aircraft ever built, needed an incremental technology refresh. U.S. Air Force engineers selected a Crystal Group rugged server, carbon fiber server, and rugged display for their high reliability, dependability, and ability to meet security and performance requirements for mission-critical onboard and ground station systems.

EC-130H Compass Call The EC-130H Compass Call airborne tactical weapon system requires superior reliability and low failure rates to disrupt enemy command and control communications and provide electronic attack capabilities to tactical air, surface, and special operations forces.

Engineers selected Crystal Group's RS112 1U and RS378 3U rugged servers for their ability to withstand shock and vibration while operating in hostile electromagnetic interference (EMI) environments, as well as Crystal Group's Configuration Management program for the maintenance and life-cycle management of the commercial off-the-shelf (COTS) hardware.

Gorgon Stare The U.S. Air Force Gorgon Stare wide-area sensor surveillance system, a spherical array of nine video cameras mounted to a remotely controlled unmanned aerial vehicle (UAV) able to capture and transmit live motion imagery of an entire city, scans roads for bombs or insurgents and provides real-time situational awareness for warfighters in large-scale operations. The image-intensive system taps a suite of Crystal Group rugged servers, switches, and storage equipment to capture, process, and store imagery on the aircraft and ground station.

KC-46 Aerial Tanker The Boeing KC-46 Aerial Tanker – used for aerial refueling and passenger, patient, and cargo transport – is a fully interoperable member of the U.S. Air Force network-centric fleet thanks to its onboard military data network (MDN) system, an integrated suite of processors and communications equipment. MDN uses a custom-designed Crystal Group device to convert digital visual interface (DVI) video output to a high-definition vector imaging (HDVI) signal compatible with inputs on the large-format console and aerial refueling operator's station console.

TMAN Multilevel security, cross-domain data sharing platform enables the transfer and streaming of data and images across intelligence networks operating at different security classification levels.

AIAMD U.S. Army Integrated Air and Missile Defense (AIAMD) enables the integration of current and future modular components in a network-centric, plug-and-fight architecture to exploit the full combat potential of air and missile defense capabilities on the battlefield. AIAMD takes advantage of the Crystal Group RS112 1U rugged server for its flexibility, scalability, robustness, and rugged environmental performance.

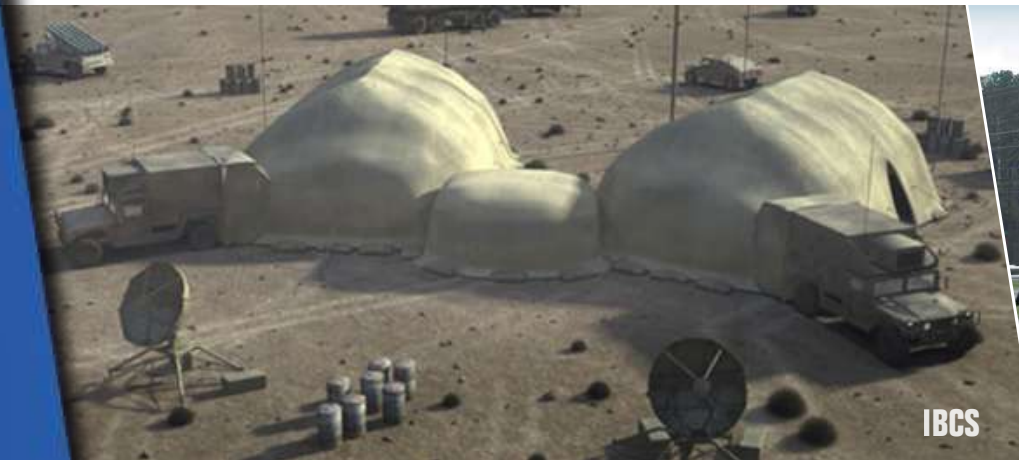
AMDPCS The U.S. Army Air/Missile Defense Planning and Control System (AMDPCS) provides command and control capabilities, encompassing various Air Defense shelter systems, intelligence preparation, situational awareness, and the planning, coordination, and synchronization of air battle. The AMDPCS harnesses the Crystal Group RS132L24 1U rugged server to fulfill its mission and benefit Army operations.

AN/TPN-31 ATNAVICS The Air Traffic Navigation, Integration and Coordination System (ATNAVICS) is a highly mobile, tactical Airport Surveillance Radar and Precision Approach Radar air traffic control system for the quick deployment of temporary airfield operations in support of military and disaster relief missions. The U.S. Army's self-contained ATNAVICS taps Crystal Group's rugged electronics to ensure reliable operation following transport by military aircraft/helicopter and ground vehicle trailer and in the face of virtually all weather conditions, day and night.

C-RAM The U.S. military relies on Counter Rocket, Artillery, and Mortar (C-RAM) equipment to protect warfighters and other high-value assets by detecting rocket, artillery, and mortar launches and intercepting incoming rounds in flight. For the C-RAM, engineers selected the Crystal Group RS255 2U rugged server, designed to be responsive and reliable, and to withstand severe shock and vibration, transport over harsh terrain, and extreme environmental conditions encountered while deployed in theater.



EMARSS The Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS) is sophisticated intelligence, surveillance, and reconnaissance aircraft collects, analyzes, and disseminates real-time intelligence and precisely locates and identifies targets.



IBCS

FUSE The Federated Universal Synchronization Engine (FUSE) uses software and hardware to synchronize video and sensor data from multiple intelligence sources, such as various unmanned aircraft systems (UAS), into a cohesive operational picture on a single ground control station. FUSE employs a rugged transit case containing a server and networking hardware from Crystal Group, which was selected for its expertise in integrating multiple, disparate hardware components into a unified solution able to withstand any environment in which the system would be fielded.



NGATS

IBCS The Integrated Air and Missile Defense Battle Command System (IBCS) establishes a network-centric system of systems that integrates current and future air and defense systems to maximize defense capabilities, optimize resources, and provide flexibility on the battlefield.

NGATS The Next Generation Automated Test System (NGATS) mobile, rapidly deployable, and reconfigurable system provides unit-level through depot-level maintenance testing and screening of complex electronic and electro-optical weapon systems.



PROPHET

Prophet Enhanced System The U.S. Army's Prophet Enhanced all-weather, 24-hour, near-real-time tactical signals intelligence and electronic warfare system provides force protection and situational awareness via modular, advanced technologies packaged in transit boxes for quick installation into ground vehicles. Engineers chose Crystal Group's RS112 1U rugged server not only for its superior ruggedness, reliability, configuration management capability, and overall value to the armed forces, but also for the company's responsiveness, fast turnaround time, and extensive configuration management.



RADIANT MERCURY

Radiant Mercury Radiant Mercury for Rugged Applications enables sensitive data to be shared among different U.S. Army, Navy, and Air Force security systems during critical missions. Lockheed Martin's cross-domain software runs on server-class, high-assurance Crystal Group RS111S13 1U, RS112 1U, and RS255 2U rugged servers that provide secure enclave segregation and high reliability.

THAAD The land-based, globally transportable, and rapidly deployable Terminal High Altitude Area Defense (THAAD) system enables the interception and destruction of ballistic missiles during their final, or terminal, phase of flight. THAAD employs RS255 2U and RS378 3U rugged servers from Crystal Group, selected for the company's ability to deliver rugged hardware and custom designs that meet specific program needs.

Vigilant Pursuit Decreasing the time between data collection and soldier action, the Vigilant Pursuit system combines multiple intelligence sources to help soldiers quickly and accurately identify high-value targets and make decisions that require time-sensitive responses in the field.

WIN-T Warfighter Information Network-Tactical (WIN-T) provides mobile, secure, reliable, and survivable command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities in the field. The Army's tactical communications network backbone, WIN-T enables secure, reliable voice, video, and data communications anytime, anywhere.

XRT Leidos engineers chose Crystal Group's RS378 3U rugged server for the company's eXpeditionary RT (XRT) system, a high-performance computing platform designed to manage and analyze a wealth of sensitive situational-awareness information from various sources on-site and in real time for in-theater mission planning, intelligence, and tactical operations. Leidos selected the RS378, able to accommodate up to 512GB of memory and 16 removable 2.5-inch drives or eight 3.5-inch drives, for its ruggedness and scalability.



THAAD



Vigilant Pursuit



WIN-T



XRT



ADMACS The Aviation Data Management and Control System (ADMACS) is a tactical data management system that communicates and displays real-time, mission- and safety-critical information across the ship's computer networks, connecting the air department, ship divisions, and embarked staff managing aircraft launch and recovery operations. The cutting-edge information system relies on Crystal Group's RS112 1U rugged server for high compute performance and versatility.

ADNS and ISNS The U.S. Navy depends upon an integrated wide-area network (WAN), including the Automated Digital Network System (ADNS) and Integrated Shipboard Network System (ISNS), to support well-informed, geographically dispersed forces with voice, video, and data communications and information. Navy networking specialists selected Crystal Group's RS112 1U rugged servers for the ADNS and ADNS WAN optimization, because they meet the stringent environmental requirements necessary for shipboard use; Crystal Group's RS255 rugged server for the ISNS subset of the ADNS because of its superior environmental performance; and Crystal Group's Configuration Management program and customer support to help keep the equipment operating over a long usable life.

ALEX The Automatic Launch of EXpendables (ALEX) system provides shipboard management of expendable decoys via computer control, using deck-mounted decoy launchers, for ship self-defense.

A-RCI Sonar In the Acoustic Rapid Commercial off-the-shelf Insertion (A-RCI) Sonar program, modular, open architecture, COTS computing technologies upgrade sonar signal processing capabilities without altering existing submarines. Crystal Group COTS rugged server and embedded computing technologies modernize submarine sonar systems and digital signal processing capabilities to help the Navy maintain an advantage in the acoustic detection of threats.

CANES Consolidated Afloat Networks and Enterprise Services (CANES), the U.S. Navy's next-generation tactical afloat network, is designed to accommodate continual hardware and software upgrades, meet rapidly changing warfighting requirements, enhance operational effectiveness, and improve quality of life for deployed sailors. Crystal Group's RS112 1U, RS265 2U, and RS375 3U rugged servers support the submarine portion of the CANES program.

U.S. NAVY / MARINES



CENTRIXS The Combined Enterprise Regional Exchange System (CENTRIXS) supports information sharing and operation planning by various organizations, governments, and vessels. This premier network facilitates coalition interoperability with the help of Crystal Group's RS378 3U rugged server, selected for its superior environmental performance and competitive price.

CSRR The U.S. Navy modernized communications on much of its submarine fleet with the Common Submarine Radio Room (CSRR) system, which harnesses COTS technology in a network-based open architecture to increase bandwidth efficiency, availability, and reliability, while reducing the amount of equipment and personnel required. For the high-reliability, compact CSRR, engineers chose Crystal Group's RS112 1U rugged server.

E-6B Mercury The Boeing E-6B Mercury communications relay and strategic airborne command post aircraft and all its onboard electronics systems are designed specifically to be survivable and reliable, to support the U.S. Navy's ballistic missile submarine force and provide a vital link to national command authorities. Engineers selected the RS114PS18 rugged carbon fiber server from Crystal Group to help ensure the high availability of this unique, survivable airborne communication system.

JPALS The Joint Precision Approach and Landing System (JPALS), an all-weather landing system based on differential GPS for land-based and sea-based aircraft, enables precision approach and landing capabilities even in adverse weather conditions. JPALS provides accurate, reliable, and high-integrity guidance for fixed- and rotary-wing aircraft, as well as anti-jam protection to ensure mission continuity in hostile environments.



CENTRIXS



CSRR



E-2D



E-6B



JPALS

E-2D The Northrop Grumman E-2D Advanced Hawkeye all-weather, carrier-capable, tactical aircraft provides early warning and command and control capabilities, ranging from sea and land surveillance to radio communications relay, air traffic control, and the control of fighter planes for defense, strike, search-and-rescue, and emergency missions. Crystal Group supplies the mission computer, an integral part of the E-2D's new avionics hardware suite.

ISNS A subset of the Automated Digital Network System (ADNS), Integrated Shipboard Network System (ISNS) uses open-architecture equipment to outfit ships with a local and wide area network. Crystal Group's RS255 rugged server brings high performance, high capacity, high reliability, and superior environmental performance to the ISNS at a competitive price.

U.S. NAVY / MARINES



LCS A fast, maneuverable, and networked surface combatant, the Littoral Combat Ship (LCS) provides operational flexibility and capabilities necessary to accomplish critical warfighting missions. Independence-class LCS use RS233L24 2U, RS378L24 3U, and RS255L24 2U rugged servers from Crystal Group, which was selected for the company's ability to support legacy hardware in a modern chassis and its superior customer support.

LHA-8 The Landing Helicopter Assault (LHA)-8 is the Navy's largest amphibious expeditionary warfare ship, optimized for surface and aviation operations, and designed to serve the Navy, the Marine Corps, and joint missions. The large, modern amphibious assault ship with volume air search radar supports various aircraft, helicopters, and amphibious vehicle deployment.

MIPS The U.S. Navy's Maritime Integrated Air and Missile Defense Planning System (MIPS), an operational-level planning tool for rapidly developing and visualizing optimized courses of action for the deployment of air and missile defense assets. This critical Navy program employs Crystal Group's RS378 3U rugged server.

MQ-8 Fire Scout The U.S. Armed Forces employ the Northrop Grumman MQ-8 Fire Scout unmanned autonomous helicopter for reconnaissance, situational awareness, aerial fire support, and precision targeting. The unmanned rotorcraft uses Crystal Group's RS255 2U rugged server, able to withstand high levels of shock and vibration and the Fire Scout's operational environments at land bases and on surface ships.

MVCS The Multiple Vehicle Communications System (MVCS) enables Littoral Combat Ship (LCS) mission packages to communicate simultaneously with multiple unmanned surface vehicles (USVs) and unmanned underwater vehicles (UUVs) via common data links, communication paths, and network communication services. Crystal Group provides its RS252S13 2U rugged server, well suited to at-sea missions, to support the MVCS and its role on the LCS, which delivers mine countermeasure, anti-submarine warfare, and surface warfare capabilities.



LCS



LHA-8



MIPS



MQ-8



MVCS



P-8A



RADMERC



RADMERC



RQ-21A BLACKJACK

P-8A Poseidon Boeing P-8A Poseidon long-range maritime patrol aircraft are equipped with modern electronics hardware to capture, process, and store video data, used for intelligence, surveillance, and reconnaissance (ISR) as well as anti-submarine warfare and anti-surface warfare missions. Crystal Group, working in close cooperation with Boeing, provides its RSS116F data storage unit, RS100F storage server computer, and RS300FM digital video processor components to the Video and Data Storage System (VADSS) onboard the popular P-8A aircraft.

RADMERC The Radiant Mercury (RADMERC) cross-domain intelligence sharing system transmits sensitive data between unclassified and classified security domains while preventing unauthorized access. RADMERC leverages Crystal Group rugged servers (RS235, RS255, RS111S13, RS112) with multi-core processors in a flexible, scalable, "single box" solution to promote global Department of Defense and Intelligence Community collaboration and sharing of resources.

RQ-21A Blackjack The Boeing Insitu RQ-21A Blackjack small, tactical unmanned aircraft system (STUAS) provides persistent maritime and land-based reconnaissance, surveillance, and target acquisition (RSTA) data collection and dissemination capabilities to the U.S. Navy and U.S. Marine Corps. Crystal Group's RCS6450 rugged switch and RS378 3U rugged server support the RQ-21A and its ability to launch on land and at sea, quickly integrate multiple intelligence and sensor payloads, and operate in even harsh, high-temperature environments for up to 12 hours continuously or 24 hours with short surges.

U.S. NAVY / MARINES



SSEE Ship's Signal Exploitation Equipment (SSEE) assesses and analyzes signal intelligence data efficiently to improve situational and battlespace awareness. The mission management and analysis system performs all processing functions necessary to acquire, identify, locate, and analyze signals intelligence (SIGINT) data onboard Navy ships, providing critical information to warfighters to enable fast, informed decision making and effective mission execution.

SEWIP The U.S. Navy's Surface Electronic Warfare Improvement Program (SEWIP) enhances the capabilities of the AN/SLQ-32(V) integrated shipboard combat and electronic warfare (EW) system responsible for early detection, signal analysis, threat warning and protection from anti-ship missiles. For the SEWIP upgrades, engineers chose Crystal Group's RCS7750-24 and 48F rugged switches, able

to withstand harsh at-sea environments and work reliably in the presence of extreme temperatures, fog, mist, saltwater, and more.

TacMobile The Tactical Mobile (TacMobile) program provides integrated and interoperable, fixed and mobile command, control, communications, computers, and intelligence (C4I) capabilities to support land, sea, and air operations with increased situational awareness, including the accurate location and status of enemy and friendly forces.

TIH Electronic Warfare Technology Insertion Hardware upgrades electronic warfare capabilities on new and deployed fast-attack and ballistic/guided missile submarines.

TIPS The mobile, rapidly deployable, self-contained Tactical Imagery Production System (TIPS) processes imagery and video to support command and control decision making in forward operational areas. TIPS processes raw imagery and video collected on the tactical battlefield to provide intelligence and situational awareness data, including timely imagery and multimedia, to facilitate operational analysis, planning, training, and documentation. Helping achieve and maintain information dominance, TIPS is a hub for the consolidation of intelligence, surveillance, and reconnaissance (ISR) information, and a source of accurate, actionable intelligence for commanders.

TMAN Trusted Manager (TMAN) is a multilevel security, cross-domain data sharing platform enabling the transfer and streaming of data, images, and full-motion video across intelligence networks operating at different security classification levels. TMAN uses rugged and reliable Crystal Group hardware to provide high-speed, secure information sharing for modern military, intelligence, and law enforcement.

VSE The U.S. Navy uses Virtual Secure Enclave (VSE) technology to manage cybersecurity risk and establish data sharing in a robust, protected, resilient, and reliable maritime information environment, particularly in cyber-contested and combat areas. The VSE secure network environment taps Crystal Group's RS132L24 1U and RS255 2U rugged servers.





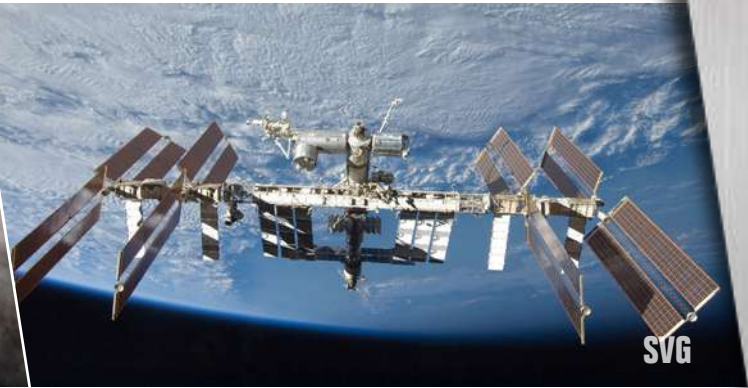
ASTI



ASTI



LIGHTNING DETECTOR



SVG

ASTI The Alaskan Satellite Telecommunications Infrastructure (ASTI) satellite communications network uses high-performance, high-availability Crystal Group hardware to support critical communications among air traffic control facilities. ASTI links the Alaskan Air Route Traffic Control Center in Anchorage with 64 FAA facilities throughout the region – including 59 remote sites, three flight service stations, and a test and training facility – and provides Alaska with 90 percent of its inter-facility communications for critical, essential, and routine air traffic control services supporting commercial aviation.

Launch Pad Lightning Strike Detector The Launch Pad Lightning Strike Detector, a lightning measuring system located at launch pads, uses sensors and cameras to observe, record, and assess electrical activity in the immediate area to help determine when it is safe to launch. Crystal Group's RS378 3U rugged server is installed on the launch platform to gather data on lightning strikes that could affect the launch vehicle and other instruments.

SVG The Space Video Gateway (SVG) system delivers high-definition (HD) and standard-definition (SD) video streams – including research data, educational footage, external and internal equipment inspection information, and communications from the crew – from the International Space Station (ISS) to NASA's Johnson Space Center in Houston, Texas. The SVG uses Crystal Group's CS900 server on the ISS to receive HD and SD video from on-board cameras and downlink the video streams using a NASA-developed network card. The CS900 server is tested to MIL-STD-810F, MIL-STD-167-1, and MIL-S-901D, meeting the requirements necessary for a space-based operational environment.

CRS-8000 Saab Medav Technologies' CRS-8000 Compact Radio Monitoring System, an advanced direction finding and locating solution, is deployed in the field for years and relies on robust, rugged computing equipment. Engineers equipped the mission-critical, ground-based military system with Crystal Group's RS112 1U, RS232 2U, RS255 2U rugged servers and RE0412 embedded computer due to their ability to withstand vehicle caused shock and vibration while operating in a hostile environment of extreme temperature differences.

E-7A Wedgetail The Boeing 737 Wedgetail airborne early warning and control (AEW&C) aircraft's state-of-the-art surveillance, communications, and battle management system comprises an advanced Multi-Role Electronically Scanned Array (MESA) radar and 10 mission crew consoles. The mission-critical system takes advantage of Crystal Group rugged electronics to gather, analyze, and distribute information from a wide variety of sources to other air and surface assets.

EDGE-T The Extended Air Defence Ground Environment – Transformation (EDGE-T) centralized command-and-control center provides advanced battle-space monitoring, threat alerts, and a battle-management system for air operations, including missile defense. EDGE-T employs Crystal Group hardware to rapidly analyze multiple sources of information to support fast, efficient decisions and deployment of combat air forces to respond to threats on land, sea, air, and space. The system hosts a suite of integrated air and

LEAPP The Land Environment Air Picture Provision (LEAPP), developed by Lockheed Martin for the British Army, enhances information sharing and both operational and situational awareness. LEAPP, which employs Crystal Group's RS235 2U rugged server, detects, tracks, logs, and displays all air activity within range of integrated sensors; overlays that data with other information, such as enemy positions; and presents a correlated air picture to support knowledge-based decision-making and fast reaction times.



CRS-8000



WEDGETAIL



EDGE-T



LEAPP

missile defense capabilities – ensuring the integration and interoperability of a wide range of tactical communications, sensors, weapons, and legacy systems – to enable warfighters to manage a continuous command-and-control (C2) cycle, operating at the speed of the battle space.



LMV The Littoral Mission Vessel (LMV) modern, multi-role ship employs Crystal Group rugged hardware in a highly configurable, modular design to protect waterways and sea lines of communication, and to support disaster relief, surveillance, and mine countermeasure operations. The LMV features advanced combat capabilities, automation, remote monitoring, and an integrated command center combining bridge, combat information, and machinery control functionality.

MRJ Trusted test flight computers are instrumental in capturing and processing data essential to the advancement and certification of the new Mitsubishi Regional Jet (MRJ) modern commercial aircraft.

MILGEM project The MILGEM project is a national warship program designed to deliver multipurpose littoral combat ships able to be deployed for various missions, including reconnaissance, surveillance, target identification, early warning, and anti-submarine, surface-to-surface, and surface-to-air warfare. The modern warships harness advanced technologies to achieve stealth and integrated platform management, combining electrical power generation and distribution, fire detection, firefighting, damage control, video, and stability systems.

TASMUS The TASMUS tactical area communications system harnesses powerful, rugged hardware to bring a mobile, survivable, flexible, and secure network-centric communication infrastructure to the tactical field. The Turkish military's TASMUS Shelters rely on Crystal Group's network switches, workstations, servers, and displays for a common picture of the battlefield in near-real time and data-sharing among battlefield systems, from sensors to weapon systems. It facilitates fusion and display of intelligence information to commanders at all levels and handles the exchange of targeting data from sensor to weapon systems.

TTWCS The Tactical Tomahawk Weapons Control System (TTWCS), a critical part of the Tomahawk Weapons System, integrates with the boat's navigation, communication, situational awareness, and launch systems to compute the long-range, all-weather, subsonic missile's route to strike targets. The Royal Navy in the United Kingdom uses Crystal Group's RS112 rugged servers and RSS13S17 1U rugged storage systems within its TTWCS.

CRYSTAL GROUP delivers what your program *DEMANDS.*

COMBAT-PROVEN PRODUCTS

Crystal Group's portfolio of combat-proven and field-tested solutions are designed to withstand harsh environments, meet and exceed military standards, and provide the latest COTS technologies to best manage cost, availability, scalability and flexibility.

DEPENDABLE SERVICES

When a program, mission, or challenge requires a custom solution, Crystal Group delivers with vertically-integrated services, including product design and development, testing, systems engineering and integration, mechanical and electrical engineering, configuration management, and product life-cycle planning.

DEDICATED SUPPORT

Crystal Group's capable staff and global network provide fast and effective product support when and where it is needed. Count on Crystal Group for prompt response times, quick turnarounds, 5+ year warranties, and quality service around the clock and around the globe.