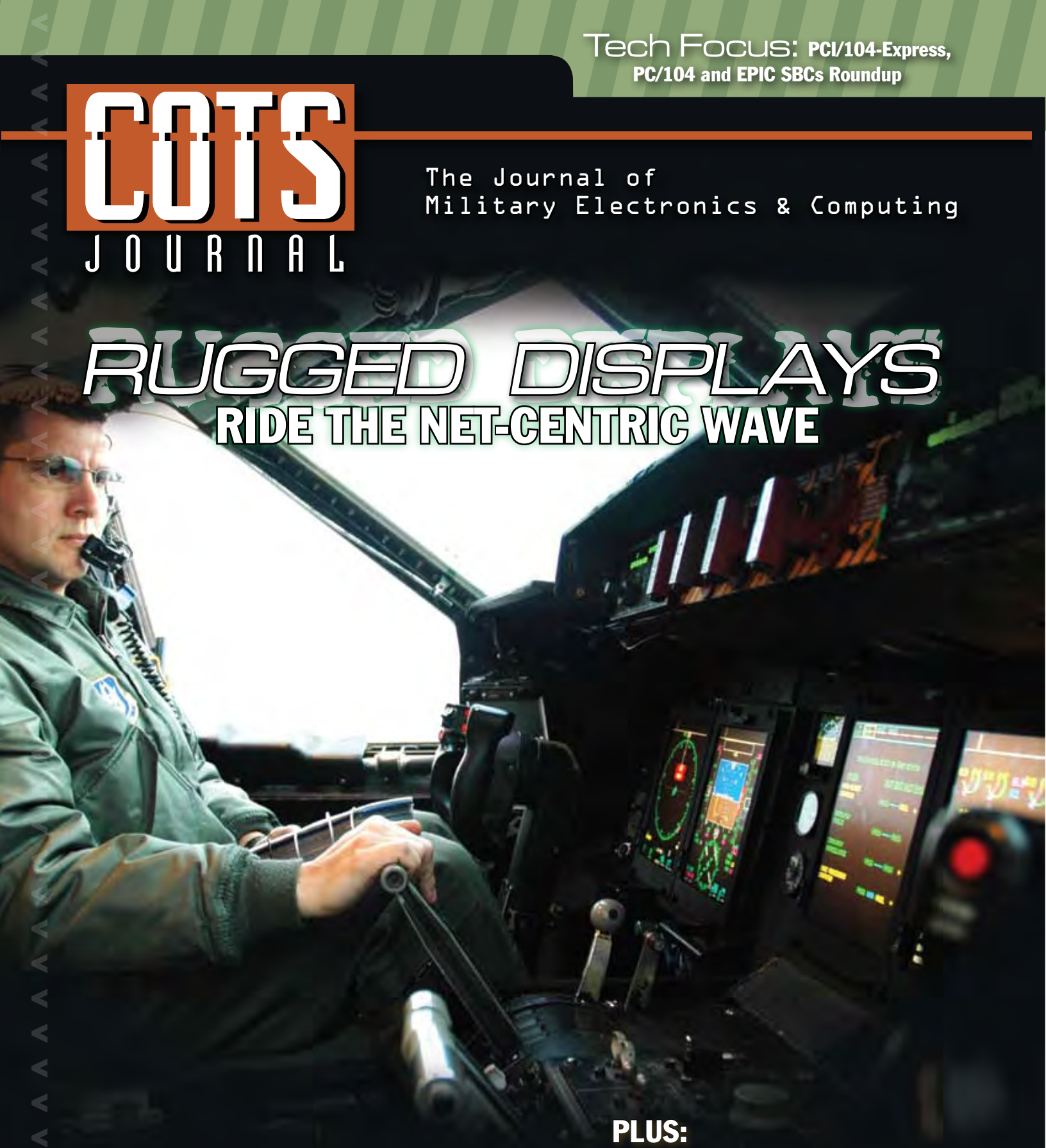
Tech Focus: **PCI/104-Express, PC/104 and EPIC SBCs Roundup**

COTS JOURNAL

The Journal of Military Electronics & Computing

RUGGED DISPLAYS

RIDE THE NET-CENTRIC WAVE



PLUS:

ATCA and MicroTCA Gain Traction in Defense Apps

Serial ATA Eclipses Other Storage Schemes

Volume 11 Number 5 May 2009 www.cotsjournalonline.com

An RTC Group Publication

RTD Embedded Technologies, Inc.

"Accessing the Analog World"

COMPLETE LINE OF PCI/104-EXPRESS MODULES & SYSTEMS

"MIL Value for COTS Prices"™

www.rtd.com

COTS JOURNAL
The Journal of Military Electronics & Computing

Features

May 2009 Volume 11 Number 5

Special Feature

Rugged Displays and Display Interfaces

Tech Recon

ATCA in Military Comms

System Development

Memory and Storage Interfaces

Technology Focus

PCI/104-Express, PC/104 and EPIC SBC Roundup

COTS (kots), *n.* **1.** Commercial off-the-shelf. Terminology popularized in 1994 within U.S. DoD by SECDEF Wm. Perry's "Perry Memo" that changed military industry purchasing and design guidelines, making Mil-Specs acceptable only by waiver. COTS is generally defined for technology, goods and services as: a) using commercial business practices and specifications, b) not developed under government funding, c) offered for sale to the general market, d) still must meet the program ORD. 2. Commercial business practices include the accepted practice of customer-paid minor modification to standard COTS products to meet the customer's unique requirements.

——**Ant.** When applied to the procurement of electronics for the U.S. Military, COTS is a procurement philosophy and does not imply commercial, office environment or any other durability grade. *E.g., rad-hard components designed and offered for sale to the general market are COTS if they were developed by the company and not under government funding.*

Departments

Coming in June...
...See Page 68

Cover Story ..... Page 12

A heavy-cargo transport designed to provide strategic airlift, the C-5 Galaxy aircraft modernization effort incorporates a "glass cockpit" with digital avionics, a new aircraft propulsion system, and reliability improvements. Here, Master Sgt. John Witzke, a 709th Airlift Squadron flight engineer, inspects the cockpit controls of a C-5 during a pre-flight inspection prior to flying a mission.

U.S. Air Force photo/Senior Airman Deb Robinson

COTS JOURNAL
The Journal of Military Electronics & Computing

Publisher
PRESIDENT
John Reardon, johnr@rtcgroup.com

PUBLISHER
Pete Yeatman, mail@yeatmangroup.com

Editorial
EDITOR-IN-CHIEF
Jeff Child, jeffc@rtcgroup.com

CONTRIBUTING EDITOR
David Cotton, davidc@rtcgroup.com

MANAGING EDITOR
Marina Tringali, marinat@rtcgroup.com

COPY EDITOR
Rochelle Cohn

Art/Production
CREATIVE DIRECTOR
Jason Van Dorn, jasonv@rtcgroup.com

ART DIRECTOR
Kirsten Wyatt, kirstenw@rtcgroup.com

GRAPHIC DESIGNER
Christopher Saucier, chriss@rtcgroup.com

DIRECTOR OF WEB DEVELOPMENT
Marke Hallowell, markeh@rtcgroup.com

WEB DEVELOPER
James Wagner, jamesw@rtcgroup.com

Advertising
WESTERN REGIONAL SALES MANAGER
Stacy Mannik, stacym@rtcgroup.com
(949) 226-2024

WESTERN REGIONAL SALES MANAGER
Lauren Trudeau, laurent@rtcgroup.com
(949) 226-2014

EASTERN REGIONAL SALES MANAGER
Shandi Ricciotti, shandir@rtcgroup.com
(949) 573-7660

BILLING
Maggie McAuley, maggiem@rtcgroup.com
(949) 226-2024

COTS Journal

HOME OFFICE
The RTC Group, 905 Calle Amanecer, Suite 250, San Clemente, CA 92673
Phone: (949) 226-2000 Fax: (949) 226-2050, www.rtcgroup.com

EDITORIAL OFFICE
Jeff Child, Editor-in-Chief
20A Northwest Blvd., PMB#137, Nashua, NH 03063
Phone: (603) 429-8301 Fax: (603) 424-8122

Published by THE RTC GROUP

"Keeping cool under pressure"

Enjoy the Art of Dissipation Inside CM Computers latest SixHex

...cooling your valuable boards to a temperature they deserve.

Sealed 1 ATR, 12 slot, 1500 Watts PSU, +5V (+3.3V) 160 Amps, 17 Kg

SIXHEX™ SIX HEAT EXCHANGE from CM Computers pushes the limits of conduction cooling to meet the demand for low weight, stand alone advanced COTS military systems.

Expressly designed to compete against unpractical liquid cooled chassis alternatives, up to 150+ Watts per slot can be cooled to 85ºC at card edge whilst providing further significant advantages.

The SixHex is available in a single pack ½, ¾ and 1 ATR solution with 5, 7 & 12 slot sizes, also incorporating all standard features and innovations established in previous CM Series (S, SEF, HES & FAC).

Breaking all limitations previously understood by ATR designers

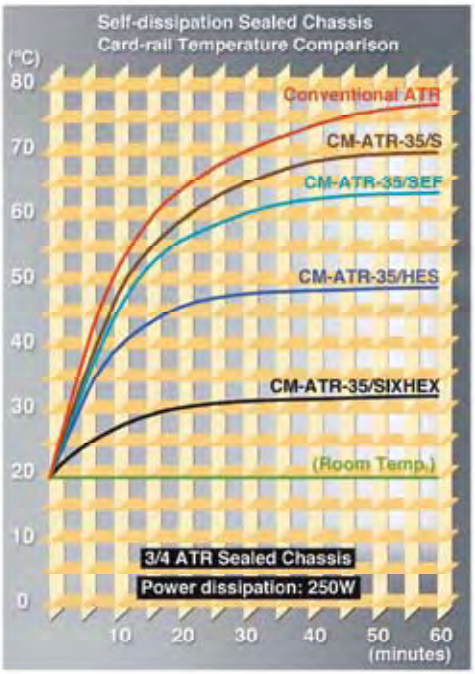
Our fourth generation SixHex is perfectly suited to forthcoming true military systems that require lighting thermal performance and uncompromising reliability.

This series features an optional Microcontroller Supervisory Unit that monitors all relevant electrical & environmental chassis operational parameters.

Sealed ¾ ATR, 7 slot, 800 W PSU, +5V (+3.3V) 80 A, 14 Kg

Product Highlights

- Contaminant-free enclosure
- VPX, VME & cPCI ready
- Accepts Conduction & Air-cooled 6Us
- Flexible top & bottom I/O wiring
- Integrated Temperature Control Unit
- Six internal Heat Exchangers
- Up to 3.6 m² thermo-active surface
- Up to 1.8 KW total Power Dissipation
- Up to 150 W per slot
- Dramatically increases payload MTBF
- 2 User defined PSU DC outputs
- 20ºC less than heat exchanger ATRs
- 45ºC less than conventional ATRs
- Customizable to specific requirements



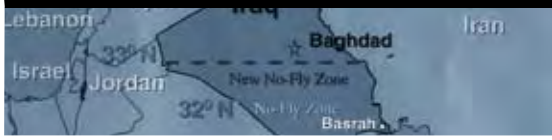
All our chassis products are delivered Tested and Certified by independent authorized Labs per MIL-STD-461E & MIL-STD-810F for immediate deployment in US Navy & US Air Force military Fighters and Helicopters.

***CM Computer SixHex:** Pure Power, Pure Dissipation, Pure Thermodynamics*

Visit **www.cmcomputer.com** or contact us at **info@cmcomputer.com** to request our Chassis Catalog

CM Computer
True Military COTS Products

Publisher's Notebook



The Dancing Elephants

No matter how hard I try to get away from talking about the budget and the shift in focus of military programs, current events just keep dragging me back to the elephant in the room. In my March column I wrote "Secretary of Defense, Bill Gates." Now I'm not sure if that was subliminal or just an error on my part. Recently, Secretary of Defense, Robert Gates, released the first volley in this year's budgeting cycle. This is the annual exercise where the administration sends its request to Congress and then it gets modified and tweaked and usually added to over the summer. That's right: added to. You would think that—based on the current economic issues—the exact opposite should be the case.

In order for Congress to take the lead on cutting back defense spending, they would need to be prepared to absorb a fair degree of pain that comes along with cutting weapons or personnel spending in each of their districts. The rumor mill has it that a prominent politician remarked that the C-17 would be capped at 205 planes over their dead body. I'm sure that there are similar views by other politicians given all the other programs that Secretary Gates has on the chopping block. There will meanwhile be full throttle support by politicians for any programs planned to move into their constituent's territory.

The 2010 proposal caps the F-22 ($143 million each) procurement at 187 and increases the funds for the F-35 (which cost more than $45 million each) by more than $4 billion. I wonder if the Air Force still has the policy in effect that requires them to maintain a warm production line for the so-called fifth-generation fighter. There are only two fifth-generation fighters: the F-22 and the F-35. If this policy is still in effect then any delay in the full-rate production of the F-35 must be filled by an extension of the F-22 production. Now again, which plane is the one the Air Force wants over the other?

Clearly the Army's Future Combat Systems is in the crosshairs of budget cuts. It still has development programs for systems that are geared toward peer-to-peer conflicts. The Army needs to quickly re-evaluate its mission and either reinvent itself or start aligning politicians on the hill for a hard fight to stave off a $87 billion cut. Gates stated that he supports the Army's requirement for new vehicles but they have to be the right vehicles. The Navy has its program problems also. The "DDG 1000 versus the DDG 51 debate" is just one. Obviously, shuffling the deck chairs of the DoD budget is causing a lot of sleepless nights everywhere.

By eliminating some of the most expensive and complex weapons systems—or at least putting them on the chopping block—Secretary Gates is setting in motion lasting changes he believes are necessary to move the military in the right direction to contend with the near-term fights against terrorist and regional conflicts. His proposed changes will have no effect on the administration's plans to raise the Pentagon's 2010 base budget by 4 percent to $534 billion. If budget cuts must come in 2011, there are many different forms they may take. But it's hard to imagine what form they would take to successfully move from an administration proposal to a congressionally approved budget decision.

Keeping Robert Gates on as Secretary of Defense as the holdover from the former administration was not only good for the DoD, it was also good for the new administration. Having a new SECDEF appointed by President Obama would put his fingerprints on the war in Iraq. Gates is also tasked with taking on the defense industry. Although there has been a lot of wasteful spending that should have been controlled, the defense industry is one that still hasn't had an economic collapse that so many segments of the economy have had. Having Gates spearhead the reform of the defense industry provides the administration cover. If there is an economic backlash then Gates can take the hit. Meanwhile, having him around to clean up Iraq and initiate direction changes to the military allows the new President to keep his hands clean. When all the dirty work is over, Gates is on the chopping block and a new SECDEF will be appointed without having any legacy issues.

The current atmosphere in the embedded military electronics market mirrors what happened in the mid-nineties. The elephants are dancing, so the mice either hide or find a way to seize the moment. Since history tends to repeat itself, what we will be seeing is a few savvy suppliers to primes working the market place. This means creating alliances with some of the primes will enable their combined effort to offer the military solutions that are more advanced, have quicker delivery and in many cases are less costly. Those alliances will beat out proposals submitted by primes that have no embedded computer suppliers working with them. Now is the opportune time to establish a significant market advantage for all tiers of military suppliers. ▮▮

Pete Yeatman, Publisher
COTS Journal

Proven Innovation
from a trusted partner

Introducing the latest line of High-Definition, Wide-Screen Monitors

Avalex is an innovation leader. We set the standard in airborne surveillance and military markets. Avalex is a leading supplier of flat panel displays, digital mapping systems, digital video recorders, and sensor pointing systems. We are constantly evaluating and developing more innovative solutions; solutions we can customize to fit our customers' needs. The rugged and reliable Series 7 line includes unparalleled clarity and crisp graphics from computers or high-definition video sources. When the airborne surveillance and military markets want rugged, reliable and easy-to-use technologies, they want Avalex.

Battle tested. Mission ready. Trusted partner.

Series 7

12" 14" 22"

AVALEX TECHNOLOGIES

WWW.AVALEX.COM 850.470.8464

The Inside Track

Parvus Awarded Follow-on Contracts for USMC EFV Subsystems

Parvus has received new contracts from General Dynamics Land Systems (GDLS) in support of the U.S. Marine Corps' next-generation amphibious assault vehicle, the Expeditionary Fighting Vehicle (EFV) (Figure 1), for two additional EFV Line Replacement Units (LRUs). These orders build on Parvus' success with GDLS and the EFV program, designing and delivering the vehicle's Tactical Switch Router (TSR) subsystem to customer specifications on time and ahead of schedule. No financial information was disclosed.

The new LRUs under contract include the Emergency Track Deployment (ETD) subsystem and Battery Conditioning Unit (BCU). First articles for these new units are expected to ship this year to support GDLS' schedule for delivering prototype vehicles by 2010. Parvus has also received additional follow-on contracts for reliability enhancements and functional upgrades to the EFV's Tactical Switch Router (TSR) to expand its functionality with an integrated Gigabit Ethernet switch. The latest upgrades enhance intra-vehicle local area networking (LAN) capabilities for Internet Protocol (IP)-enabled computing workstations and radio frequency (RF) devices on board the EFV. The TSR subsystem is based on Parvus' COTS DuraMAR IP router product with mechanical and functional customization to accommodate USMC program-specific requirements.

Figure 1

The Expeditionary Fighting Vehicle (EFV) is an armored amphibious vehicle capable of seamlessly transporting Marines from Naval ships located beyond the visual horizon to inland objectives.

Parvus
Salt Lake City, UT.
(801) 483-1533.
[www.parvus.com].

Curtiss-Wright Penetrating Radar Contract with U.S. Army Agency

Curtiss-Wright Controls has received a contract from a U.S. Army agency to supply ground penetrating radar (GPR) technology for use in the detection of unexploded ordnances in overseas operations. Under the terms of the agreement, Curtiss-Wright Controls Embedded Computing's 3d-Radar group will provide its innovative step frequency B3231 antenna and GeoScope GPR processing solutions to the military.

In addition to its unique GPR technology, Curtiss-Wright Controls Embedded Computing's 3d-Radar also provided enhancements to its product to address specific requirements of the U.S. Army. One such enhancement is the optional real-time view incorporated into the GeoScope that enables operators to view post-processed GPR data within milliseconds of the initial capture. The real-time view has been integrated with detection algorithms developed by Exponent, Inc. Shipments of the GPR systems began in March 2009. The contract's duration is expected to span twelve months.

Curtiss-Wright Controls
Embedded Computing
Leesburg, VA.
(703) 779-7800.
[www.cwcembedded.com].

Boeing Upgrades AWACS System Component to RDM Embedded 8.1

Birdstep Technology's Raima Division has received a contract from The Boeing Company to upgrade its Airborne Warning and Control System (AWACS) avionics system with Birdstep's RDM Embedded version 8.1. The contract also provides for three years maintenance support of the system. The AWACS aircraft (Figure 2) employs complex real-time avionic systems to meet the operational objectives of the AWACS customer. All system components must function correctly to ensure that the operational objectives of the aircraft are not compromised. RDM Embedded plays an important role in the initiation and monitoring of system controls.

Figure 2

This E-3 Sentry airborne warning and control system (AWACS) was one of the many static displays at AirFest 2008 at Lackland Air Force Base, Texas.

The AWACS system is built on Wind River's VxWorks operating systems, and the RDM

Green Engineering

MEASURE IT – FIX IT

La Selva Biological Station developed a wireless sensor system to monitor the rain forest ecosystem.

Nucor Steel optimized its steel melting process to drastically reduce electricity consumption.

CEMS Engineering built a control system to reduce energy use of industrial air chillers by 30 percent.

Vehicle Projects created a complex control system for a zero-emission, fuel-cell-powered locomotive.

MEASURE IT

Acquire
Acquire and measure data from any sensor or signal

Analyze
Analyze and extract information with signal processing

Present
Present data with HMIs, Web interfaces, and reports

FIX IT

Design
Design optimized control algorithms and systems

Prototype
Prototype designs on ready-to-run hardware

Deploy
Deploy to the hardware platform you choose

Engineers and scientists around the world are solving some of today's most pressing environmental issues using the NI graphical system design platform to design, develop, and deploy more efficient and environmentally friendly products, technologies, and processes. Using modular hardware and flexible software, they are not only testing and measuring existing systems but also creating innovative ways to fix the problems they find.

>> Download green engineering resources at **ni.com/measureitfixit** **888 293 3091**

NATIONAL INSTRUMENTS

Embedded 8.1 supports the latest version of VxWorks 6.6, and v8.1 supports dual compilers built around the VxWorks operating system and adds additional support for x86 targets. Birdstep's RDM Embedded solution is a feature-rich database, ideal for embedding into critical applications.

Birdstep Technology
Seattle, WA.
(206) 748-5300.
[www.raima.com].

Northrop Grumman Enhances Display Features for Naval Radars

Northrop Grumman's Sperry Marine business unit announces the introduction of a new family of navigation radar sets with enhanced naval display features. New features incorporated into the VisionMaster FT naval display radars include red first strike for immediate identification of high-speed targets, helicopter approach sectors, freeze frame function for radio silence, station keeping, target intercept, advanced index lines and other functions to support modern naval operations. It can be integrated with scanner systems operating at very low rotating speeds, down to 5 rpm.

The VisionMaster FT naval radar display systems are available in 340 millimeters and 250 millimeters, X-band and S-band models in dedicated consoles, or for built-in installations with remote electronics. The units utilize state-of-the-art high-resolution flat-screen display technology. They are designed to serve as stand-alone radars or as part of a complete VisionMaster FT integrated bridge system

Figure 3

Sperry Marine Integrated Bridge System (IBS) combines any combination of VisionMaster FT radars, chart radars, ECDIS and/or TotalWatch to provide an efficient bridge design for any vessel and platform.

Military Market Watch

Navigation/GPS, Radar and Radio Top List of Military DSP Chip Users

The military represents a small but significant market for DSP-based silicon, with off-the-shelf discrete DSPs being favored for many applications. Navigation continues to dominate as the largest single military electronics market, since it is employed in virtually every military platform. Of course, DSP-based GPS is a key part of Navigation. The next biggest military electronics application, Missiles and Space, includes DSP-based visual guidance and more GPS. Radar follows, as the "eyes" of many platforms is a heavy user of DSP technology. As a group, reconnaissance, electronic intelligence (ELINT), and electronic countermeasures (ECM) are significant users of DSP technology. Sonar has many of the characteristics of radar, but at much lower signal frequencies and on fewer platforms. Manpack digital radios and encryption equipment are also heavy users of DSP chips.

Compared to commercial electronics markets, the military is very small in unit consumption. For example, the U.S. Navy currently has less than 300 active ships in its fleet and only a half-dozen significant ships are built a year. The active aircraft from all U.S. services number in the low thousands, and likely less than 100 new ones are produced annually. Consumer products, like cell phones, number over a billion units a year. From a chip vendor's view, it's no longer economical to have special production for military products. Although there are custom SoCs (ASICs) for some relatively high-volume military programs, like artillery shells, sonobouys and manpack radios, most of the military's DSP needs are satisfied through discrete off-the-shelf DSP chips. For ruggedized application, those off-the-shelf commercial chips are often sent to third-party test houses for burn-in and further testing.

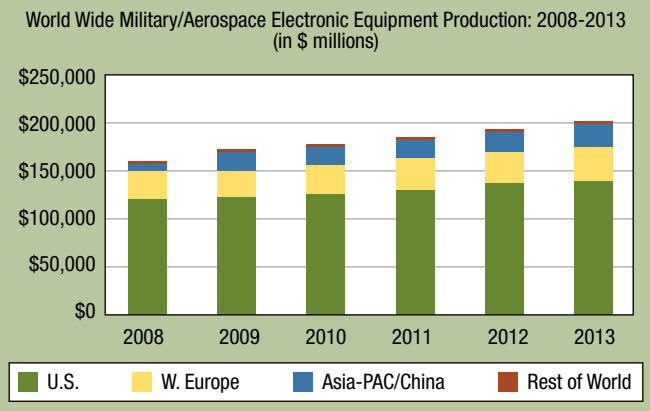


Figure 4

Forecasted here is military/aerospace electronic production worldwide from 2008 to 2013. Japan's contribution isn't reflected here, because it does not officially acknowledge making military electronics. Its production is included in communications and other categories.

Semiconductor vendors often land big military orders, but wait for many months before another arrives, so smoothing military chip production and revenues is always a problem. Nevertheless, Forward Concepts has collected data from a number of sources and has forecasted military/aerospace electronic production (Figure 4). For more information please contact Forward Concepts at: info@fwdconcepts.com.

Forward Concepts
Tempe, AZ.
(480) 968-3759.
[www.fwdconcepts.com].

(Figure 3). Like all VisionMaster FT commercial radars, the naval display versions incorporate Sperry Marine's advanced automatic clutter-suppression technology, ensuring that weak targets can be detected under poor weather conditions or in close proximity to land.

Northrop Grumman Sperry Marine
Charlottesville, VA.
(434) 974-2134.
[www.sperrymarine.com].

NASA Partners with TTTech for Reliable Network Standard

NASA and TTTech have signed a "Space Act Agreement" with the objective of crafting an open Ethernet-based standard suitable for deployment in upcoming NASA programs and space systems. TTTech has developed a new network technology named TTEthernet, combining commercial available Ethernet infrastructure with TTTech's time-triggered services.

Figure 5

Part of NASA's Constellation program, shown here is the Ares I rocket stage separation. A carefully timed event based upon preset acceleration levels, separation will occur when those levels are read by onboard accelerometers, which takes place when the first stage runs out of propellant and the internal pressure reduces.

TTEthernet provides a set of time-triggered services implemented on top of standard IEEE802.3 Ethernet. Those services are designed to enable design of synchronous, highly dependable embedded computing and networking, capable of tolerating multiple faults. NASA intends to use TTEthernet technology to provide a high bandwidth avionics databus capability supporting future technology insertion over Constellation's (Figure 5) multi-decade mission. With TTEthernet, robustly partitioned multimedia data streams, critical control data and standard LAN messages can operate in one network without unintended congestions or interactions. This enables handling of mixed level criticality functions in complex Ethernet-based networks, effectively circumventing limitations of Ethernet technology for design of advanced integrated systems.

TTTech Computertechnik AG
Vienna, Austria
+43 1 585 34 34-899.
[www.tttech.com].

Special Feature

Rugged Displays and Display Interfaces

System, Board and Panel Innovations Fuel Rugged Display Demands

Military systems of all kinds are ramping-up requirements for sophisticated graphics and display functionality. System, board and panel vendors are feeding those needs.

Jeff Child,
Editor-in-Chief

Leveraging cutting-edge graphics chips developed for the demanding gaming market, military graphics subsystems are now able to offer complex video and graphics functionality in highly integrated board-level solutions. Cockpit displays and simulation/training applications rank as two of the most demanding users of these advanced graphics technologies. A blend of graphics and video performance is vital for advanced sensor fusion, image/frame capture and recording in applications like tactical, Red Force/Blue Force tracking and for avionics and tactical area moving map applications.

Beyond those specific applications, all the many end-nodes of today's networked military—tanks, aircraft, ships and man-portable gear—have new requirements to process and display all that data shared among the nodes. A growing crop of rugged display solutions is available for today's military system designers. These include all levels of building blocks from the displays themselves to the mezzanine graphics interface cards, to complete box-level rugged display systems.

An example of the complete display system is DRS Technologies' JV-5 vehicle computing and display system. The JV-5 vehicle computing system includes new technologies such as multicore processors, increased memory, greater data storage and expansion capability to allow for future technology improvements. These enhancements provide the computer systems with better graphics processing, data handling and system networking capabilities.

Vehicle-Based Display System

DRS Technologies received a $531 million contract ceiling extension to its current JV-5 production contract, to provide JV-5 ultra-rugged vehicle computing and display systems for the U.S. Army's Force XXI Battle Command, Brigade and Below (FBCB2) (Figure 1) program and Blue Force Tracking (BFT), and the United States Marine Corps (USMC) situational awareness requirements. This IDIQ contract provides for an indefinite quantity of JV-5 vehicle computing and display systems over the next five years, allowing the U.S. Army to place delivery orders against this contract for individual requirements. The ceiling extension was awarded to DRS by the U.S. Army's Communication-Electronics Life Cycle Management Command (CELCMC) in Fort Monmouth, New Jersey. The company's DRS Tactical Systems unit in Melbourne, Florida will manufacture the systems and is scheduled to continue delivering them through 2012.

Figure 1

U.S. Army's Force XXI Battle Command, Brigade and Below (FBCB2) program and Blue Force Tracking (BFT) system is designed for commanders to track friendly and hostile forces on the battlefield. It increases a vehicle commander's situational awareness of the battlefield graphically instead of collecting reports verbally.

Rackmout Display Solution

The military's initiative toward net-centric operations has boosted the de-

mand for all manner of display-based computer terminals. Along just such lines, the Industrial Automation Group of Advantech offers the IACP-4000D (Figure 2), a 4U 19-inch rackmount industrial workstation with a 5.7-inch VGA TFT LCD display that supports a Pentium 4/Celeron D processor. This design reduces the interconnections between the backplane and the CPU card, which enhances the platforms reliability.

Features include: shock-resistant disk drive bay designed to hold up to three 5.25-inch and one 3.5-inch disk drives, front accessible USB interface for easy data transferring, dual front-accessible filtered cooling fans providing optimal airflow, front LEDs indicating system health, lockable front door, and support for 300W single PS/2 and redundant ATX power supplies. The IACP-4000D is compact and has a reliable design catered for use in limited space environments, such as test and measurement stations.

Another complete display system example is the DC1 from MEN Micro. It combines the new Intel Atom processor with aluminum construction to provide a low-power, highly reliable computer that withstands the harsh environments found within many mobile, mission-critical and harsh applications. This is a fanless display computer that is both rugged and maintenance-free.

Because the control electronics are located directly behind the display, the DC1 employs conductive cooling between the electronics and the display, eliminating the need for a cooling fan. The DC1 enables variations in display resolution and size, processor type, I/O configuration and power supply, so users can tailor the system to specific applications. The DC1 comes standard with a 15-inch display, with optional display sizes from 12 to 19 inches available as well as a wide range of power supplies. The design is also tamper-proof to deter vandalism. All components of the IP54-protected DC1 are soldered and only M12 or D-Sub I/O connectors are used. The electronics are prepared for coating to withstand humidity.

Displays for Sunlight and Night

Computer Dynamics meanwhile makes a sunlight-readable military monitor that is built to take punishment in outdoor environments. Called the Balefire (Figure 3), this system's enclosure is sealed to MIL-STD-810E (Rain) standards while operating in a 0° to +60°C temperature range. The display is enhanced with an ESR film and the system has an optional sun visor that can be raised to further enhance sunlight readability, or lowered to protect the display when not in use. Video and keypad information is transferred over a CAT5 connection through a KVM extender module.

Figure 2

The IACP-4000D is a 4U 19-inch rackmount industrial workstation with a 5.7-inch VGA TFT LCD display that supports a Pentium 4/Celeron D processor. This design reduces the interconnections between the backplane and the CPU card, which enhances the platform's reliability.

Figure 3

The Balefire is an enclosure sealed to MIL-STD-810E (Rain) standards while operating in a 0° to +60°C temperature range. The display is enhanced with an ESR film and the system has an optional sun visor that can be raised to further enhance sunlight readability, or lowered to protect the display when not in use.

To provide sunlight readability with minimal temperature rise, the 15-inch AMTFT LCD utilizes ESR enhancements. Viewing enhancement filters are included to reduce sunlight loading. Display brightness can be adjusted by a dimming control mounted on the front bezel.

Night vision capability is a critical feature for battlefield environment displays. This means a combination of harsh environmental capability mixed with high quality. Feeding such needs, DCI has designed and manufactured an LCD display called the mil.vga (Figure 4) specifically for this highly critical market segment. The display is robust in design and designed for high brightness in extreme sunlight conditions, and incorporates a low light Night Vision Imaging System (NVIS) utilizing a compliant LED backlighting system.

The display supports formats up to Â¼ VGA or 320 x 240 in either portrait or landscape mode. The monochrome LCDs use FSTN LCD technology in the transflective mode for sunlight and NVIS viewing. Viewing angles of +\- 30Â° are supported in both horizontal and vertical directions, -20Â° to +40Â° in other directions. Contrast ratios are over 2:1 over the entire viewing angle and operation temperature. The storage temperature of the unit is -51Â° to 71Â°C, with operation temperatures of -40Â° to 70Â°C. The LCD is backlit with peak wavelength of 565NM (NVIS Green) Backlights that when dimmed are viewable under NVIS (Generation III) without degrading NVIS operation.

Mezzanine Display Interfaces

Modular standards-based graphics processors are a staple for military systems. This modularity makes it easy to upgrade graphics capabilities without changing other parts of the system. Aitech Defense Systems offers a high-performance 3D graphics and imaging functionality available in a single, low-power PMC. Based on the ATI M9 graphics processor, the M590 (Figure 5) Multi-standard Graphics and Video PMC uses dual independent graphics heads to simultaneously output information from two separate data streams to two different monitors, whether analog or digital.

Designed for harsh environments, the

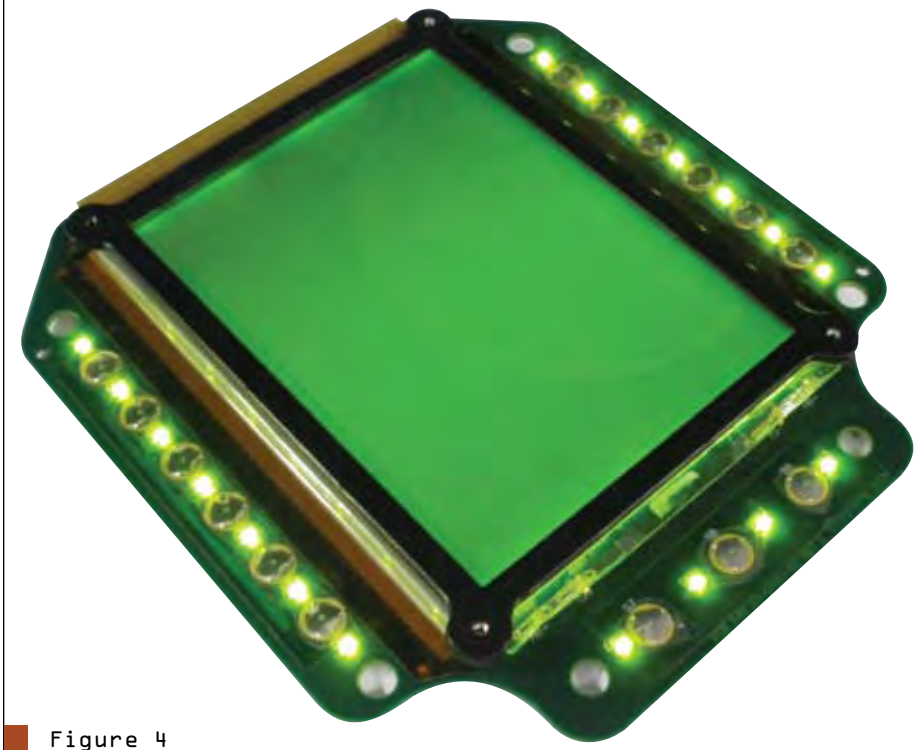


Figure 4

The mil.vga is an LCD display specifically for night vision. It's designed for high brightness in extreme sunlight conditions and incorporates a low light Night Vision Imaging System (NVIS) using a compliant LED backlighting system.

PCI-X Rev. 1.0b and PCI Rev. 2.3-compliant M590 supports advanced 2D/3D video displays and image capture/frame grabbing with overlay and underlay for high-resolution man-machine interfaces with resolutions of up to 1536 x 2048 at 30 to 200 Hz refresh rates and up to 32 bits per pixel (Truecolor+). A host of channel-independent analog and digital video input and output formats are provided, including DVI, LVDS single/double link, progressive RGBHV/RGsB, RS-343 and composite/S-video supporting RS-170, NTSC and PAL, as well as internal or external sync. The M590 is available in commercial, rugged and military temperature ranges, and in either conduction-cooled or air-cooled versions.

Figure 5

Based on the ATI M9 graphics processor, the M590 Multi-standard Graphics and Video PMC uses dual independent graphics heads to simultaneously output information from two separate data streams to two different monitors, whether analog or digital.

Radar Scan Conversion

Radar system development represents an extremely active segment of the military realm. Supporting that need, Curtiss-Wright Controls Embedded Computing offers the Eagle-2, a new high-resolution radar video scan-converter card. This compact PMC mezzanine module delivers enhanced scan conversion performance and support for high-resolution screen displays and eases the integration of advanced radar scan conversion functionality into VME, VPX and

CompactPCI and PC-based systems. The Eagle-2 supports the simultaneous scan conversion of multiple radar sources into PPI, A-Scan, or B-Scan formats at display resolutions up to 2560 x 1600, including 2048 x 2048 to address the growing demand for large-screen displays.

Eagle-2 delivers field-proven, high-performance radar scan conversion based on the industry-leading White-Powell algorithm. The card supports both forward and reverse scan conversion to ensure that all single point targets are displayed and that no holes or spokes appear in the displayed image, even when zooming in at long range. High-resolution (up to 2560 x 1600/2048 x 2048) and standard resolution (up to 1920 x 1200) versions are available. The card is available in both air-cooled L0 and L100 ruggedization levels. ▮▮

Advantech
Irvine, CA.
(949) 789-7178.
[www.advantech.com].

Aitech Defense Systems
Chatsworth, CA.
(888) 248-3248.
[www.rugged.com].

Avalex Technologies
Pensacola, FL.
(850) 470-8464.
[www.avalex.com].

Aydin Displays
Birdsboro, PA.
(610) 404-7400.
[www.aydindisplays.com].

Computer Dynamics,
a GE Fanuc company
Greenville, SC.
(864) 627-8800.
[www.cdynamics.com].

Curtiss-Wright Controls Embedded Computing
Leesburg, VA.
(703) 779-7800.
[www.cwcembedded.com].

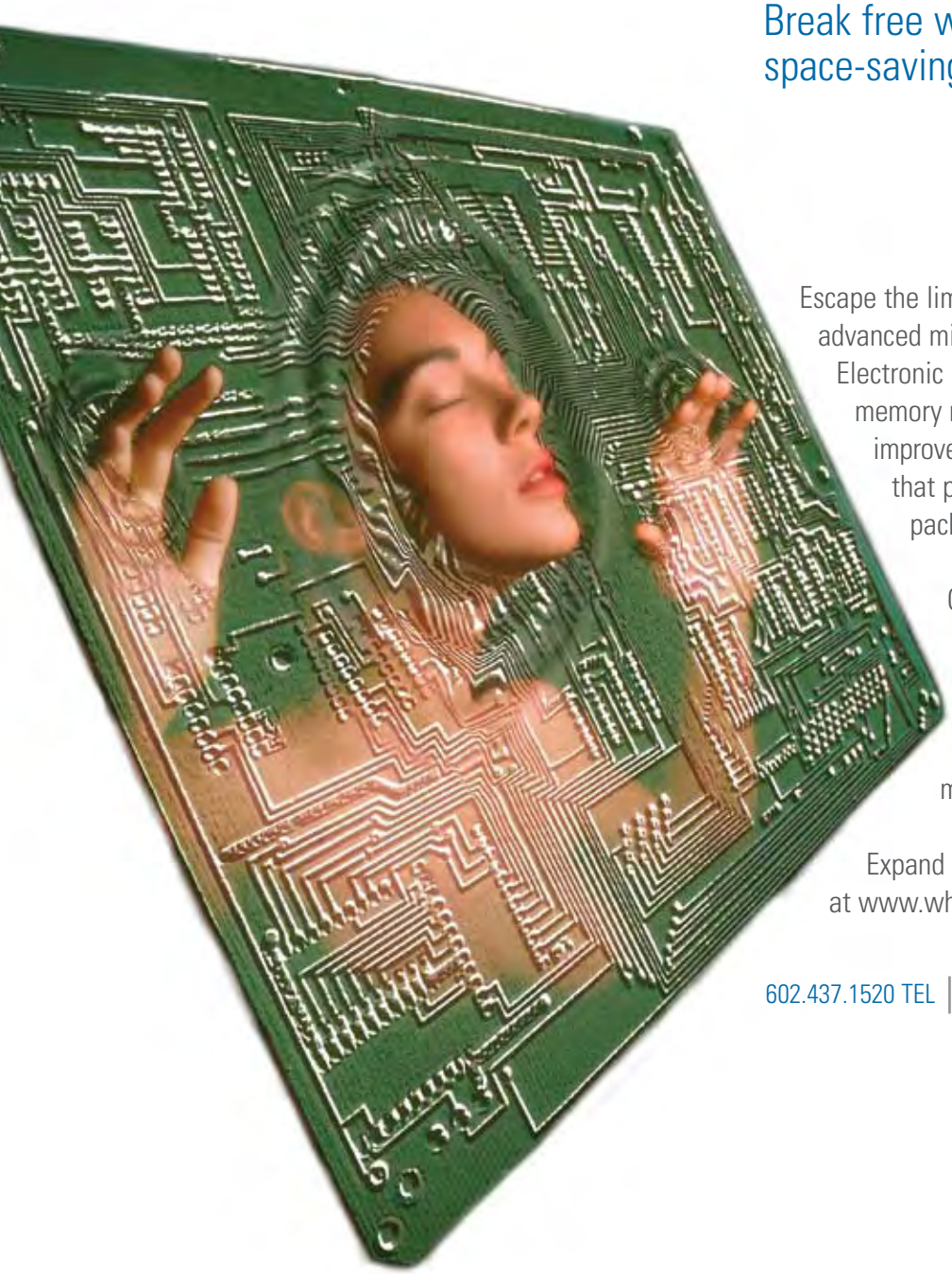
DCI
Olathe, KS.
(913) 982-5672.
[www.dciincorporated.com].

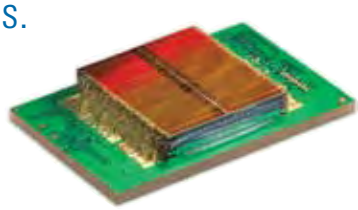
DRS Technologies
Parsippany, NJ.
(973) 898-1500.
[www.drs.com].

MEN Micro
Ambler, PA.
(215) 542-9575.
[www.menmicro.com].

Trapped in Your Design?

Break free with our space-saving solutions.





Escape the limitations of your board design with advanced microelectronics solutions from White Electronic Designs. Use our compact, high density memory modules to free up board space and improve performance. Try our new DDR2 SDRAM that packs 1GB into a SnPb ball attach BGA package less than 1/2 in^2.

Our lean multi-chip and system-in-a-package solutions are designed to solve component incompatibilities, reduce design complexity, and extend product life and environmental performance in military applications.

Expand the possibilities; change your perspective at www.whiteedc.com/escape2.

602.437.1520 TEL | 602.437.9120 FAX

WHITE ELECTRONIC DESIGNS

www.whiteedc.com

Customer First. Quality Always.

Special Feature

Rugged Displays and Display Interfaces

Case Study: Helicopter Cockpit Audio/Video System

Taking advantage of the latest and greatest integrated audio and video display electronics, engineers were able to craft complete cockpit A/V comms systems to fit in the same space once housing a glorified intercom.

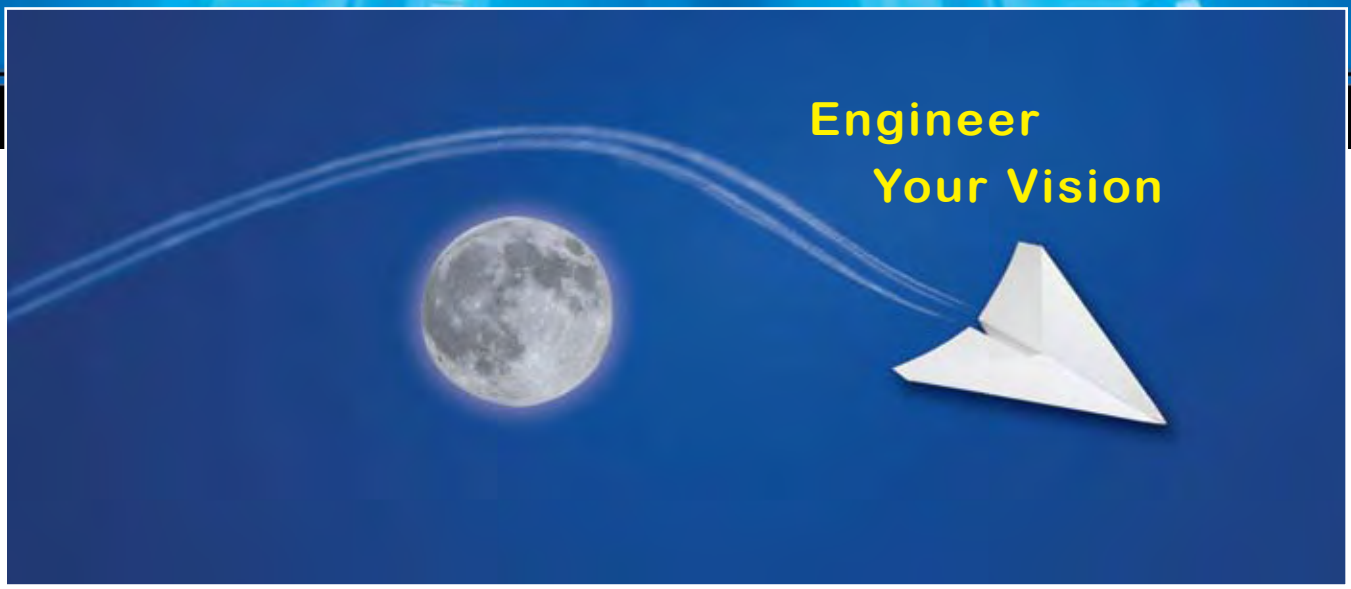
Paul Nickelsberg, President
Orchid Technologies Engineering and Consulting

Reducing Size, Weight and Power (SWaP) has become the mantra of a variety of today's military design efforts. Such was the case when Orchid Technologies was selected to develop a multi-channel data logging cockpit communications system for Coast Guard helicopters. The obsolete helicopter cockpit audio communications system (Figure 1) to be replaced measured a scant 3.75 inches wide by 2.50 high by 4.50 inches deep. Within the given volume, the original audio communications system provided intercom services between two flight personnel and ground. Three-way and two-way-only audio communications with analog headsets was supported. Manually operated controls provided in-flight personnel with system status and message indicators.

The original communications system received power and audio feeds through hard-wired point-to-point connections inside the instrument manifold. Field service and preventative maintenance (PM) was a constant and costly

Figure 1

While the original helicopter communications system received power and audio feeds through hard-wired point-to-point connections inside the instrument manifold, the redesigned system integrated support for six audio channels and NTSC video, removable and heat-resistant data storage, and display indicators readable in daylight and in night operating mode.



Application-ready Systems Launch Ideas Faster!

Don't let design challenges prevent your applications from getting off the ground.

Performance Technologies' application-ready, IPnexus® Systems for MicroTCA® and CompactPCI® provide flexible, scalable, ready-to-develop solutions right out-of-the-box. Pre-integrated systems enable you to reduce development costs, accelerate time-to-market, and speed product design.

Only ONE company furnishes both pre-integrated embedded hardware with NexusWare®, a Carrier Grade Linux® – Performance Technologies – where engineering your vision is easier than ever.

IPnexus® MicroTCA® Systems

NexusWare® - Carrier Grade Linux®

IPnexus® CompactPCI® Systems

PERFORMANCE TECHNOLOGIES

Phone: 585.256.0200 ◆ www.pt.com/cp3 ◆ E-mail: info-request@pt.com

challenge. In-flight failure rates were disturbingly high.

Engineers at Orchid began with an evaluation of the original system. They discussed the requirement that the new unit fit within the physical envelope of the old, and that power and signaling maintain compatibility with the existing installation procedures. They also identified a new feature wish list that included those items listed in Table 1.

From Intercom to Audio/Video System

The original unit was merely an intercom, but the new device had to fulfill the functions of intercom and sophisticated data logger/emergency recovery system.

Figure 2

The redesigned system was a cableless system consisting of five board assemblies. These board assemblies included a CPU/Power board, a Audio/Video Media board, a Display Driver board, Display board and USB Memory Stick Carrier Board.

The design tasks included circuit board area studies with mechanical drawings of how the new circuitry fit within the old envelope. For the front panel, the team settled on IIC-based control systems from NXP. These drove multiple multi-color high-intensity LED indicators. Now, all operator indicator lights' brightness and color could be digitally controlled. The audio system redesign followed a similar digital architecture using codec devices from Texas Instruments. The codecs were connected in a channelized, synchronous serial manner. The codecs provide audio filtering, some simple processing and the ability to time slot multiplex many separate audio channels onto a single digital stream.

The Marvell PXA270 processor was selected as the main processing element. IIC bus-mapped front panel indicators and controls make for a flexible user interface design. Rounding out the design were multiplexed audio codecs from Texas Instruments, USB Bus expanders from OKI, and video decoding solutions from NXP to complete the design. CCIR-565 decoded video was supplied to the Freescale I.MX27 system processor. Data storage was accomplished using a ruggeddized USB memory stick connector to the I.MX27 processor's USB 2.0 ports (Figure 2).

Redesigned Cockpit Audio/Video System Feature Wish List

- Support for six audio channels
- Support for a single NTSC video channel
- Support for digital microphones
- The ability to compress and store at least thirty minutes of audio and video channel activity
- The ability to survive a catastrophic loss of power for up to thirty seconds
- The storage media must be both removable and heat resistant
- All operator indicators must be daylight-readable with night operating mode

Table 1

The new features resulted in a cockpit comms system that was no longer merely an intercom, but an A/V display and comms and sophisticated data logger/emergency recovery system.

Powering-up the Design

Completing the new communication subassembly design were power supply devices from Linear Technologies and transient suppressors from On Semiconductor. Panasonic gold-capacitors served as the system's energy store for catastrophic power loss. Electrical and mechanical engineering worked closely together to define the circuit board layout, interconnection system, keep out areas and mechanical restrictions.

The team ultimately settled on a cableless system consisting of five circuit board assemblies. These circuit board assemblies included a CPU/Power board, an Audio/Video Media board, a Display Driver board, Display board and USB Memory Stick Carrier Board. All five boards within the set simply plugged together resulting in a nearly vibration-proof design.

To accelerate the software development effort the team built early prototype test jigs for the audio video and memory subsystems. These were connected to a commercial I.MX27 evaluation board. As a result, software drivers and much of the application was coded prior to the arrival of prototype hardware. As the team assembled first prototype hardware, software was ready to run. Thanks to good planning and project management, all the critical redesign and feature enhancement objectives were achieved. The new system is now a communications and data logging center—not merely an intercom. ▮▮

Orchid Technologies Engineering and Consulting
Maynard, MA.
(978) 461-2000.
[www.orchid-tech.com].

Special Feature

Rugged Displays and Display Interfaces

Emerging CERT C Offers Security Assurance for Networked Mil Systems

Security vulnerabilities are an increasing concern for "connected" systems like military software radios and other networked defense platforms. The emerging CERT C coding standard provides new levels of security assurance to such systems.

Paul Humphreys, Software Engineer
LDRA

During 2008 there was a great deal of positive talk about the emergence of a new breed of programming guidelines from the U.S. federally funded organization CERT. Languages such as C, C++ and Java are being tackled, with the goal of producing safe, secure and reliable systems. Currently though, it is CERT C that has made a splash. In October 2008, version 1.0 of the standard made its debut at the Software Development Best Practices exhibition in Boston. Both C++ and Java secure coding standards are a work in progress at present, but the focus here is on the CERT C Secure Coding Standard.

New securities and assurances offered by the coding standard will make a difference for those building military systems such as military software radios and virtually any kind of networked military platform (Figure 1). The introduction of new system capabilities can be achieved more quickly and with greater certainty when employing CERT recommended proactive security measures. And, as military systems become increasingly networked, it will be absolutely essential that more stringent security capabilities be integrated into the systems.

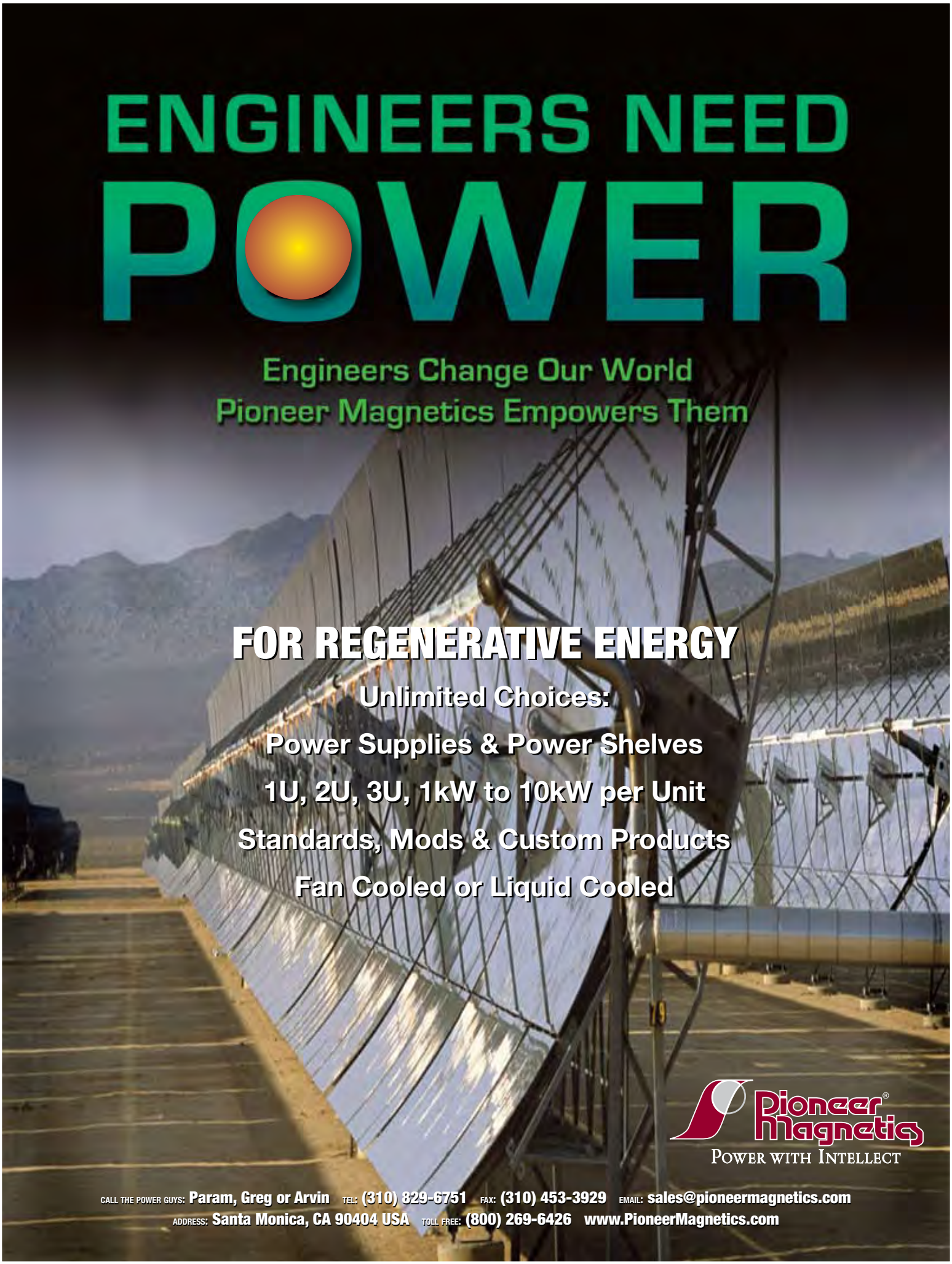
Created by DARPA

CERT was created by DARPA (Defense Advanced Resource Projects Agency) in November 1988 after the Morris Worm struck, to deal with Internet security problems. Its coordination center (CERT/CC) is located at Carnegie Mellon University's Software Engineering Institute (SEI). Although intended purely as an academic exercise to gauge the size of the Internet, the effect of the Morris Worm had repercussions throughout the worldwide Internet community, infecting thousands of machines. Many organizations with systems attached to the Internet suffered damaging denial of service attacks.

As a consequence, software vulnerabilities came under the microscope of the U.S. government in particular. The SEI

Figure 1

The securities and assurances offered by CERT C will make a difference for those building military systems such as military software radios and virtually any kind of networked military platform. As these systems become increasingly networked, it will be absolutely essential that more stringent security capabilities be integrated into them.


ENGINEERS NEED
POWER
Engineers Change Our World
Pioneer Magnetics Empowers Them
FOR REGENERATIVE ENERGY
Unlimited Choices:
Power Supplies & Power Shelves
1U, 2U, 3U, 1kW to 10kW per Unit
Standards, Mods & Custom Products
Fan Cooled or Liquid Cooled
Pioneer® Magnetics
POWER WITH INTELLECT
CALL THE POWER GUYS: Param, Greg or Arvin TEL: (310) 829-6751 FAX: (310) 453-3929 EMAIL: sales@pioneermagnetics.com
ADDRESS: Santa Monica, CA 90404 USA TOLL FREE: (800) 269-6426 www.PioneerMagnetics.com

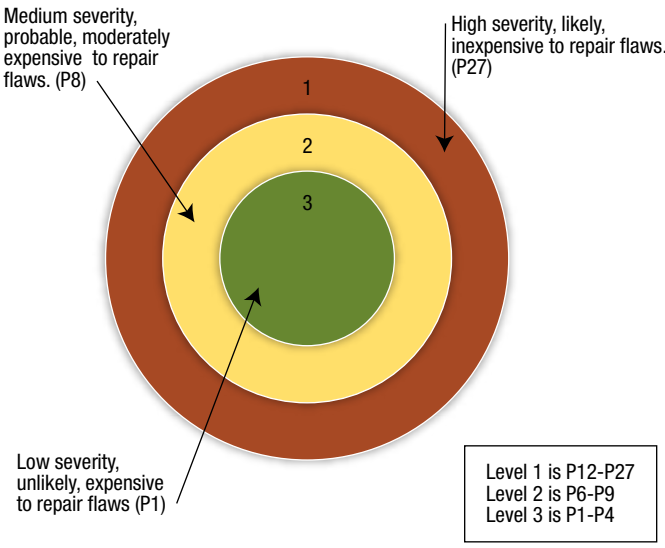


Figure 2

In CERT C, each rule or recommendation is weighted with a priority factor, obtained using a simple risk assessment algorithm. Each multiplicand is graded 1-3, giving an overall priority range of 1-27. The priority measure is further grouped into levels (1-3), which can be used in prioritizing the application of the rules.

CERT/CC was primarily established to deal with Internet security problems in response to the poor perception of security and reliability of the Internet. For a number of years prior to tackling programming guidelines, among other security-related activities, the CERT/CC studied and compiled cases of software vulnerabilities. The Secure Coding Initiative, launched in 2005, has used the database of cataloged vulnerabilities, built up over a period of 12 to 15 years at the CERT/CC, to develop secure coding practices in C and C++.

Purpose and Aims of Standard

The CERT C Secure Coding Standard provides guidelines for secure coding in the C programming language. The guidelines eliminate insecure coding practices and undefined behaviors that can lead to exploitable vulnerabilities. Developing code in compliance with the CERT C Secure Coding Standard leads to higher quality systems that are robust and more resistant to attack.

Internet connectivity is clearly a primary source of malicious attacks on software systems. A dependency on networked software systems is not just relevant to corporations or individuals, but also government and even military applications. In the changing world of defense, much greater connectivity is part of the new Network Centric Warfare paradigm. There is a need, therefore, for systems to be impenetrable whether from

IT-based hackers or, for example, from ground devices/equipment lifted from the bodies of deployed troops. On this basis, CERT C considers the overall and far-reaching need for secure coding practices.

The primary aim of CERT C is to enumerate common errors in C language programming that lead to software defects, security flaws and software vulnerabilities. The standard then provides recommendations about how to produce secure code. Although the CERT guidelines share traits with other coding standards, such as identifying non-portable coding practices, the primary objective is to eliminate vulnerabilities.

And so, what is software vulnerability? The CERT/CC describes vulnerability as a software defect that affects security when it is present in information systems. The defect may be minor, in that it does not affect the performance or results produced by the software, but nevertheless may be exploited by an attack from an intruder that results in a significant breach of security. CERT/CC estimates that up to 90 percent of reported security incidents result from the exploitation of defects in software code or design.

The aim of the Secure Coding Initiative is to work with developers and their organizations to reduce the number of new vulnerabilities introduced into secure software by improving coding practices through the provision of guidelines and training. To this end, one of the collaborations CERT has formed is with the SANS (SysAdmin, Audit, Network, Security) Institute, a leading computer security training organization.

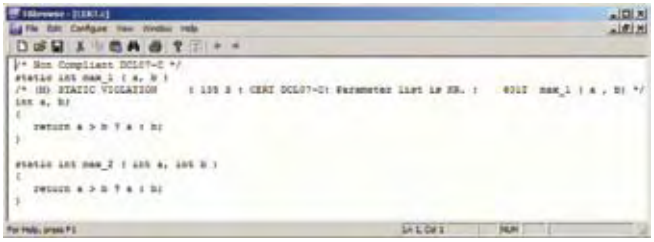


Figure 3

Shown here is a reporting of a CERT DCL07-C violation using LDRA Testbed.

Structure of CERT C

Each item in the CERT C Secure Coding Standard is termed a guideline, and is then classified as either a rule or a recommendation. Guidelines are defined to be rules if violation of the coding practice is likely to result in a security flaw, and conformance can be determined through automated analysis, formal methods, or manual inspection techniques.

Guidelines are defined as recommendations when the rule conditions cannot be met, but the application of the coding practice is likely to improve system security. Recommendations are not compulsory, or necessary to claim compliance with the standard, but should be adopted for projects with high-security requirements.

Each rule or recommendation is weighted with a priority factor, obtained using a simple risk assessment algorithm: *P = Severity x Likelihood x Remediation Cost*. Each multiplicand is graded 1-3, giving an overall priority range of 1-27.

Clearly it is sensible to address high-severity rule violations with a high likelihood, which carry a low cost of repair, as a priority. However, the remediation cost is usually not low in such cases, hence the need to weight each factor. The priority measure is further grouped into levels (1-3), which can be used in prioritizing the application of the rules, as shown in Figure 2.

Familiar Form for C Developers

The guidelines are presented in a form familiar to C developers, with those artifacts of the language prone to error covered in appropriate depth and detail. However, it is the emphasis upon security issues that sets CERT C apart from other coding standards. Potential security risks associated with poor coding practices are highlighted and in some cases driven home with real-world code samples of past vulnerabilities.

The security emphasis in CERT C is perhaps best illustrated by an example. MEM31-C "Free dynamically allocated memory exactly once" is a coding rule that is either overlooked by other coding standards or regarded simply as highlighting unnecessary or redundant code. However, double-free vulnerabilities are viewed by CERT as something that may be exploited to execute arbitrary code with the permissions of the vulnerable process.

Dynamic memory management is generally treated with caution due to the unpredictable program results that may arise from a mistake by a developer. MISRA-C:2004 even advocates banning the use of heap memory allocation. However for many applications this is not a viable proposition. CERT C provides extensive support for memory management coding practices, paying particular attention to consequences such as resource depletion and denial of service.

Development of CERT C

During the development of the CERT C coding standard, a study was undertaken using two available static analysis tools (Fortify SCA and Compass/Rose) to evaluate the efficacy of the standard when applied to real projects. The tools were extended and the guidelines refined to identify exceptions and other special circumstances. Where possible, automated checking was implemented, thus improving both the standard and the tools.

However, there were areas that one or both tools could not detect rule violations, such as with preprocessor directives. These challenging guidelines were largely omitted from the study and focus was applied to those rules that would be detected using static analysis.

When guidelines represent best practices that promote safe programming, the rules typically take the form of avoidance measures, and the suggested compliant solutions tend to be depicted as defensive programming techniques. Figure 3 illustrates use of the LDRA static analyzer tool to detect and report a violation of recommendation DCL-07: "Include the appropriate type information in function declarators." The example shows use of the outdated Kernighan & Richie C language syntax. Failing to include type information for function declarators can result in unexpected or unintended program behavior. A non-compliant case is shown to receive an appropriate report, whereas the suggested compliant alternative does not receive a report.

Input from a Variety of Sources

The wiki format adopted by the CERT/CC enabled the Secure Coding Initiative to obtain input from a variety of sources and has obviously been beneficial to the development of the standard. Visitors, depending upon privilege, are permitted to pass comment and add/edit/remove content. Although version 1.0 of the CERT C coding standard has been published, the C language and knowledge of secure coding practices continue to evolve. This evolution ensures that newly discovered vulnerabilities are addressed and provides tool vendors with the latest secure coding guidelines.

BEST-IN-CLASS MOBILE POWER SUPPLY,

even when the power source isn't

OCTAGON SYSTEMS®

www.octagonsystems.com

Octagon and our **CORE Systems**™ offer:

- –40°C to 85°C fanless operation
- 28 years experience
- 19,000,000 field hours
- Meets MIL-810F

Introducing the RMB-C2,
our newest Wireless Mobile Server

Benefits of CERT C

Portability, dependability, testability, maintainability, complexity and style are all quality attributes relevant to most coding standards. Although the focus of CERT C is yet a further measure, namely security, its guidelines also contribute to the overall quality of the software due to the relationship between these attributes. For example, the same coding practice responsible for a security-related issue may also be identified as a source of poor maintainability, and vice versa.

Conformance with CERT C helps reduce the costs that large companies are currently known to incur producing patches to the numerous security vulnerabilities found in their products. As with traditional software bugs, it's more cost-effective to eliminate them before code is released, reducing development effort and time-to-market.

Secure Libraries

CERT has put its guidelines to practice by applying them to the development of a secure integer library and managed string library. The production of these libraries and the secure coding initiative in general, is largely in response to encouragement received from the ISO/IEC WG14 committee for the C language.

The managed string library represents a safe way of managing strings dynamically and eliminates the possibility of unbounded copies, null-termination errors and truncation, by ensuring there is always adequate space available. It is freely available so that the library can be adopted and customized as required by an organization.

CERT is also working very closely with sponsors, such as the U.S. Department of Homeland Security (DHS) and other defense agencies, to correlate vulnerabilities with coding errors. The DHS also sponsors MITRE's Common Weakness Enumeration (CWE), which classifies software weaknesses that lead to vulnerabilities. The CWE now contains references to CERT C, and vice versa, with the intention that weaknesses may be eliminated by following the secure coding standard. By mapping cause and effect in this way, in addition to any interdependencies, the benefits of adhering to the secure code guidelines are clearly evident. It is also hoped that as new vulnerabilities are discovered, solutions can be identified in the standard and the link documented for the benefit of others.

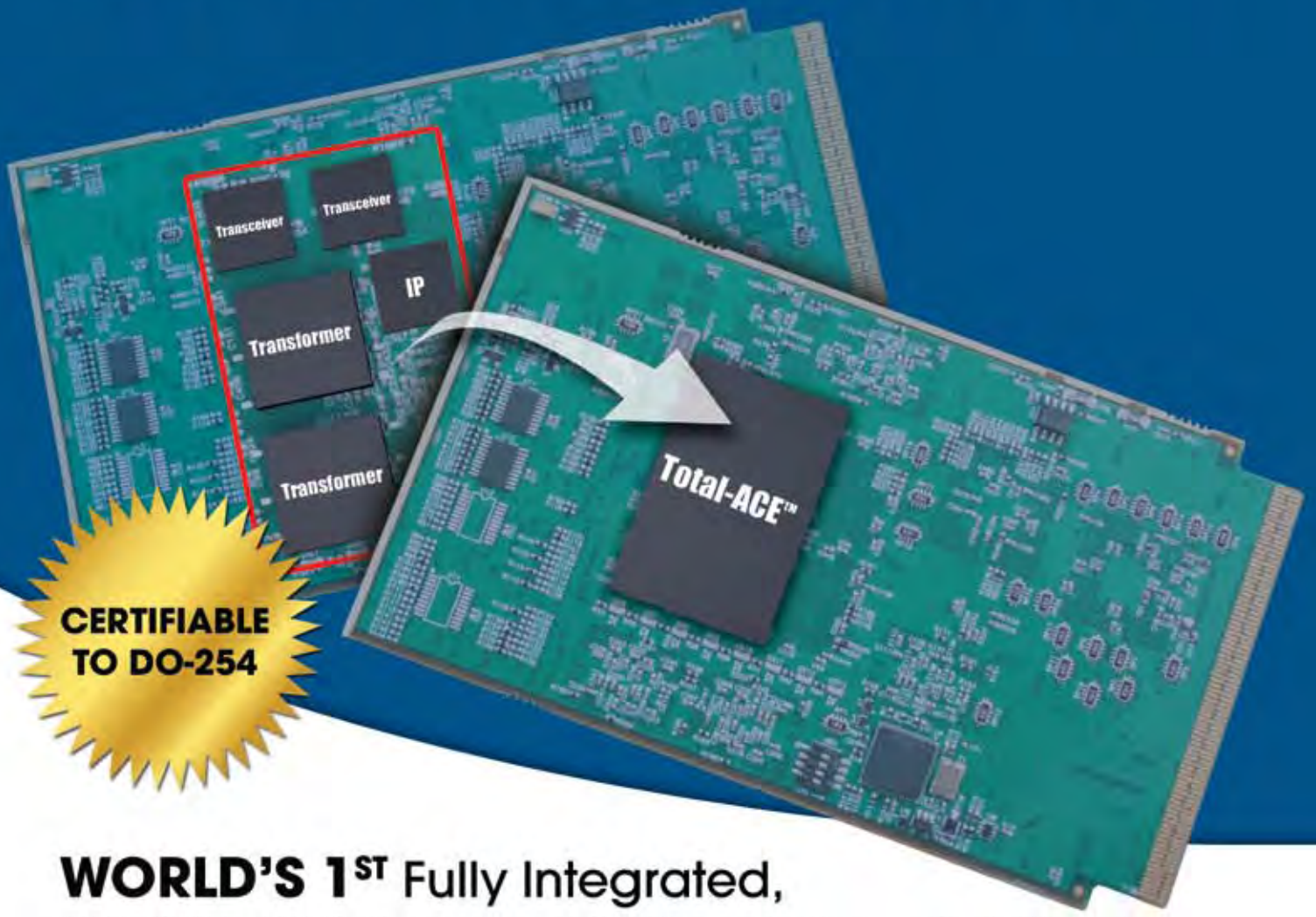
Next Step for CERT C

The next step for CERT C is acceptance and widespread use by the developers of secure software as well as, hopefully, those producing other types of software systems with quality requirements. However, for this to happen there needs to be a way to automatically check that code meets the guidelines in order to validate compliance with the standard.

As a direct response, CERT has launched the Vulnerability Discovery Project, which promotes the use of test tools and techniques. The goal is to have a process that may be used systematically by developers and testers to discover all vulnerabilities in software. As part of their vision, the project hopes to encourage and assist tool vendors to provide support for the secure coding standard in their static analysis tools. ■

LDRA
Monks Ferry, Wirral, UK.
+0151 649 9300.
[www.ldra.com].

DDC INTRODUCES
MIL-STD-1553 Total-ACE™



CERTIFIABLE TO DO-254

WORLD'S 1ST Fully Integrated, MIL-STD-1553 Terminal & Transformer Solution!

LESS **… SPACE!**

LESS **… COMPLEXITY!**

LESS **… COST!**

DDC®
©Data Device Corporation

www.ddc-web.com Toll Free: 1-800-DDC-5757

Tech Recon

ATCA in Military Comms

ATCA Finds Niche Where Military and Telco Needs Align

There's a surprisingly large amount of overlap between today's telecom system needs and those of military communications systems. ATCA is poised to bring its unique benefits to both.

Paul Virgo, Director of Vertical Marketing
Emerson Network Power

Similar to most commercial industries, the military is under constant pressure to keep costs contained, while preserving the highest levels of availability in its mission-critical system deployments. To address this ongoing need, defense and aerospace industries have begun to leverage existing commercial technologies and design expertise to meet military needs while remaining cost conscious. By tapping into the commercial ecosystem, system developers have been granted access to a full range of cost-effective communications channel characteristics, including the guaranteed data transfer characteristics of the classic Internet Protocol (IP) and the real-time data voice and media transfers available through IP streaming protocols.

All that said, in order to be successful in military deployments, it is critical that the technology addresses the special requirements of mission-critical system design, namely high reliability, high availability plus an ability to perform hot-swap replacements of system units. Moreover, these systems typically must also be capable of operating in harsh environments, including extreme temperature, extreme shock and constant vibration.

The notion may come as a surprise to military system designers, but commercial telecom applications share many of these same requirements and are also switching to all-IP networks to deliver voice, data and multimedia to consumers at the lowest possible cost. In order to maintain 99.999% (five nines) service availability, they have a critical need for high reliability and hot-swap replacement. They even face relatively harsh operating environments—as far as commercial systems are concerned—with a typical installation site consisting of a small concrete building with limited ventilation and subject to earthquakes, tornadoes and other environmental challenges.

Open Standards-Based ATCA

Developed by the PCI Industrial Computer Manufacturers Group (PICMG), AdvancedTCA (ATCA) technology is targeted to meet the requirements for the next generation of "carrier grade" telecommunications equipment. Because it was initially conceived to address the high availability and reliability requirements of telcos, it is only natural that ATCA platforms be readily adapted for use in mission-critical military and aerospace communications systems. Furthermore, the specification is stable, well established and fully supported by more than one hundred vendors and system integrator companies who offer a full range of compatible products and services. In short, it addresses all of the mission-critical design considerations that military system integrators require.

Figure 1

The defense industry term "barge testing" refers to a test verifying the continual operation of equipment throughout a blast scenario, which was simulated in this case by placing plastic explosives 24 feet deep and 20 feet away from a barge containing the functioning equipment—and then detonating it.

WEBINAR

Open Specifications for Highly Available, Mission-Critical Systems:

An Introduction to ATCA and the Service Availability Forum

Moderated by Chris Ciufo, *Military Embedded Systems*

Register now!

www.goahead.com/aboutus/events.aspx

Tuesday, June 2nd
11:00a.m. - Noon PDT

When missions are at stake and lives are on the line, operational availability of war-fighter systems is an absolute requirement. While the need to ensure availability of such systems has not changed, standards-based platforms are changing the approach. Systems integrators are looking for integrated, application-ready platforms that ensure service continuity, drive down costs and reduce schedule risks. Open specifications playing a key role in this transition are AdvancedTCA (ATCA) and those from the Service Availability Forum (SA Forum). In this session you will learn key concepts including an introduction to ATCA and SA Forum specifications, an overview of services key to ensuring continuous availability of your mission-critical application, and a look inside a real-world implementation.

GOAHEAD

RadiSys
THE POWER OF WE

Open Standards in Military Apps

By basing their designs on open standards, the commercial telecommunications industry has developed an approach to design that enables them to create systems quickly and cost-effectively. Because products that comply with the established standards are fully interoperable, many independent hardware and software vendors can develop a wide range of products to meet diverse customer requirements. This fosters competition, which stimulates innovation, drives down cost and allows system developers to quickly respond to changing market needs.

Leveraging standards-based communications technologies also facilitates the rapid development and deployment of mission-critical communications systems. This presents a critical and timely benefit for the military and aerospace industries, which frequently need to deploy emerging technologies and solutions as they become available for use in existing theaters of operation. Usually they do not have time to develop custom designs to ensure interoperability. Reuse of field-proven designs can help speed both system development and time to production. The wide range of interoperable products available from multiple vendors means that most of the system elements a designer will need are readily available off-the-shelf for prototyping.

While the reliability of commercial hardware may be a concern for military system designers, it is important to remember that high reliability is a core priority for telecommunications system hardware vendors—unlike consumer manufacturers that consider cost to be the key concern. Emerson Network Power, for example, performs a detailed reliability and failure analysis of its boards and

Figure 2

The Northrop Grumman barge test included a 14-slot AXP1405 AdvancedTCA shelf outfitted with two of these ATCA-7221 processor blades. Two ATCA-F101 system controllers and switch blades were also included, plus a second, smaller two-slot Centellis 2000 system.

systems, because looking at the architecture, interconnect, power and cooling in reference installations provides a detailed measure of reliability.

Another concern that might arise for military system developers is the availability of unique or legacy architectures in the ATCA format. This issue is easily addressed within the bounds of the ATCA specification, as the board and backplane interface specifications are all independent of the underlying compute architecture. This allows the system to support virtually any legacy or unique compute architecture the developer requires including digital signal processing.

Shock Treatment for ATCA

To demonstrate the ability of ATCA technology in addressing the unique needs of military applications, the Embedded Computing business of Emerson Network Power was invited by Northrop Grumman to submit its ATCA equipment to "afloat shock testing," better known in the defense industry as "barge testing" (Figure 1). The goal was to verify the continual operation of the equipment on board throughout the blast scenario, which was simulated by placing 60 pounds of MX-1 plastic explosives 24 feet deep and 20 feet away from a barge containing the functioning equipment—and then detonating it.

Emerson supplied a14-slot AXP1405 AdvancedTCA shelf outfitted with two Emerson ATCA-7221 processor blades (Figure 2) in addition to two ATCA-F101 system controllers and switch blades. A second, smaller two-slot Centellis 2000 system from Emerson containing two ATCA-7150 processor blades was also included in the testing. The systems were mounted in shock-isolated Northrop racks and secured to the floor of the barge. Finally, the systems were connected back to the barge test control room by an optical Ethernet link that allowed constant monitoring and communication during the test. Continual operation of the equipment was verified by a stream of PINGs and other mechanisms. In addition, test equipment and cameras in the barge were used to measure the movement of the racks during the testing.

Northrop conducted multiple blasts over several days to account for different rack positions, equipment weightings and physical orientation. Final test results confirmed no equipment failures or system resets for any of the Emerson products on board. These dramatic results demonstrated the ability of ATCA products to withstand the harsh environmental concerns that would be commonplace in traditional military deployments.

Despite these compelling test results, some installations of commercial ATCA hardware may require adaptations before deployment—depending on the nature of the environment. Fortunately, the substantial ecosystem surrounding ATCA

includes companies that will ruggedize commercial boards to prepare them for harsh environmental conditions. Rigorous shock and vibration requirements can also often be met through minor modifications to off-the-shelf boards, as well as conformal coating for salt spray environments.

One such service provider, Emerson's partner ACT/Technico, offers a multistage ruggedization strategy that addresses both temperature and shock/vibration needs. The program extends the temperature range of off-the-shelf Emerson boards from the warranted limit of 0° to +55°C, up to -20° to +70°C and in some cases beyond. ACT/Technico also processes the commercial board through functional temperature screening to verify operation over the extended temperature range.

Military and Telecom Share Many Similar Aspects

	Military Comms	Telecoms
Pressure to control costs	Yes	Yes
Demand for mission-critical high-availability operation	Yes	Yes
Transitioning to Internet Protocol (IP)	Yes	Yes
Requirement for hot-swap capability	Yes	Yes
Extreme temp, shock and vibration operations	Yes	Yes

Table 1

Commercial telecom applications share many of the same requirements of military communications systems. Both are switching to all-IP networks to deliver voice, data and multimedia to users at the lowest possible cost.

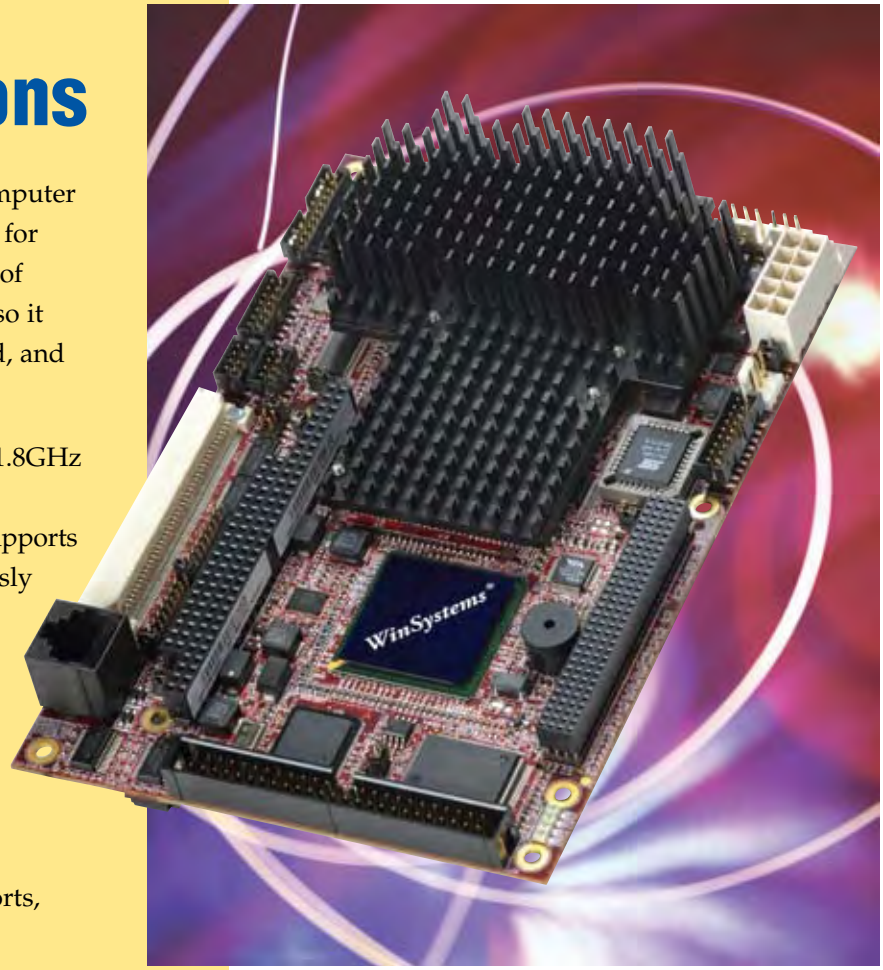
Some Adaptation Required

Though some adaptation may be required depending on the demands of the deployment, the benefits of using commercial ATCA hardware remain clear and significant. Because of the similarity in requirements between mission-critical communications networks and commercial telecommunications networks, most of the functional elements for a mission-critical design have already been fully addressed in the ATCA specification. ATCA offers the flexibility to meet unique system needs while providing all the required features of system management and high availability. As demonstrated in the Northrop barge test, ATCA has what it takes for the military realm. Military system designers can leverage ATCA technology with the assurance of its field-proven reliability to realize design cycle time and cost advantages. ■■

Emerson Network Power
Tempe, AZ.
(800) 759-1107.
[www.emersonnetworkpower.com].

A 1GHz Fanless Rugged SBC of *EPIC* Proportions

The EPX-855 is a rugged single board computer that provides an open powerful platform for demanding applications. It has a wealth of onboard I/O plus expansion options. Also it supports Linux, Windows® XP embedded, and other x86 real-time operating systems.



- Intel® 1GHz CPU (fanless) or optional 1.8GHz Pentium® M
- Intel® Extreme Graphics 2 technology supports CRT and LVDS flat panels simultaneously with dual independent display and resolutions up to 2048 x 1536
- 802.11 a/b/g wireless support
- Custom splash screen on start up
- Two Ethernet ports; one Gigabit and one 10/100Mbps
- CompactFlash (CF) card supported
- Four serial COM ports, four USB 2.0 ports, 24 bi-directional TTL digital I/O lines, and two UDMA IDE ports
- Bi-directional LPT port, keyboard controller, FDC, and AC97 audio
- PC/104 and PC/104-*Plus* Bus expansion
- EPIC sized 4.5" x 6.5" and RoHS compliant
- +5V only operation
- -40°C to +70°C operational temperature range
- Responsive and knowledgeable technical support
- Long-term product availability
- Quick Start Kits offered for easy software development

Contact us for additional information or OEM pricing. Our helpful and knowledgeable factory application engineers look forward to working with you.

M2M 100 COMPANIES 2009 · epic™ · Linux · Extended Temperature · RoHS compliant

Call 817-274-7553 or Visit www.winsystems.com/EPX-855

Ask about our 30-day product evaluation

WinSystems®

An Employee-Owned Company

715 Stadium Drive • Arlington, Texas 76011
Phone 817-274-7553 • FAX 817-548-1358
E-mail: info@winsystems.com

RTD Embedded Technologies, Inc.

The Stackable PC Company™

Intel® Core™ 2 Duo 1.86 GHz

Intel® Pentium® M 1.4 GHz

AMD Geode™ LX 500 MHz

cpuModules™

-40 to +85°C

		Intel Core 2 Duo		Intel Pentium M						Intel Celeron				AMD Geode LX	
		CMA22MVD1860HR	CMA22MCS1200HR	CMA157886PX1400HR	CMX158886PX1400HR	CMX158886PX1400HR-ECC	CMD158886PX1400HR	CMX158886PX1400HR-BRG	CMD158886PX1400HR-BRG	CME146786CX650HR	CME147786CX650HR	CML147786CX650HR	CMX147786CX650HR	CME136686LX500HR	CME137686LX500HR
Expansion Bus	PC/104 ISA Bus			✓						✓	✓	✓	✓	✓	✓
	PCI-104 PCI Bus	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
	PCIe/104 Express Bus	✓	✓												
CPU and BIOS	CPU Max Clock Rate (MHz)	1860	1200	1400	1400	1400	1400	1400	1400	650	650	650	650	500	500
	Number of Cores	2	1	1	1	1	1	1	1	1	1	1	1	1	1
	Intel SpeedStep Technology	✓		✓	✓	✓	✓	✓	✓						
	ACPI Power Management	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	2.0	2.0
	Max Onboard DRAM (MB)	1024	1024	512	1024	512	1024	1024	1024	512	512	512	512	512	512
	RTD Enhanced Flash BIOS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Nonvolatile Configuration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	RTD Quick Boot	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	USB Legacy (Keyboard & Boot)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peripherals	Watchdog Timer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Solid State Hard Drive Disk Chip	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB
	Audio				✓	✓	✓	✓	✓		✓	✓	✓		
	Analog Video	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA
	Digital Video	LVDS	LVDS	LVDS	LVDS	LVDS	LVDS	LVDS	LVDS			TTL	LVDS	LVDS	
	PS2 Mouse/Keyboard/Utility Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	USB Mouse/Keyboard	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I/O	RS-232/422/485 Ports	4	4	4	4	4	2	4	2	2	2	2	2	2	2
	SATA	2	2												
	USB 2.0	6	6	4	2	2	4	2	4	2	2	2	2	2	2
	Gigabit Ethernet	1	1												
	10/100Base-T Ethernet			1	1	1	1	1	1	1	1	1	1	2	1
	Parallel Port				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	aDIO (Advanced Digital I/O)	14	14	14	18	18	18	36	36	18	18	18	18	18	18
	aAI (12-bit Advanced Analog Input)	8	8												
	multiPort (aDIO, ECP, FDC)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SW	ROM-DOS Installed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DOS, Windows, Linux	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

visit www.rtd.com for complete product listing

ECC Memory available.

dspModules™
- Coprocessors & Accelerators

Specialty I/O
- Pulse Width Modulator
- Incremental Encoder
- Opto-Isolated MOSFET

Frame Grabbers
- Single or Multi-channel
- MPEG-2 Compression

Video Controllers
- Analog VGA
- TTL and DVI panels

Communication Modules
- Express Dual 1G Ethernet
- Copper or Fiber Ethernet
- USB 2.0 and FireWire™
- CAN Bus & CAN Spider
- Dual Synchronous Serial
- Octal PCI Serial

Wireless Telematics
- GSM & GSM-R
- EDGE, GPRS, SMS
- GPS & Wi-Fi

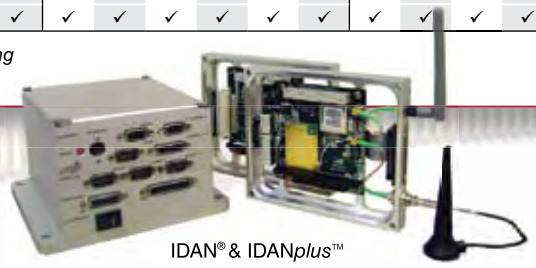
Motion Controllers
- DC Motor Controllers
- Synchro, Resolver, LVDT

Mass Storage
- 1.8/2.5" IDE & PCMCIA
- CompactFlash

Bridge Modules
- expressMate™
- PCIe to PCI
- PCI to ISA

Power Supplies
- PC/104 & PC/104-*Plus*
- PCI/104-Express™ Family
- 50/75/83/88/100 Watts
- ATX Power Supplies
- UPS Backup
- MIL-STD-704/461

Full Bandwidth Regeneration or Reorganization of stackable PCIe and PCI Busses with peer-to-peer communication enabled and PCIe-over-Cable Ports



IDAN® & IDAN*plus*™

Conduction-cooled IDAN® cpuModule

A Founder of the PC/104 Consortium
ISO9001:2000 Certified

RTD Embedded Technologies, Inc.

103 Innovation Boulevard • State College, Pennsylvania • 16803 • U.S.A.
Phone: 814-234-8087 • Fax: 814-234-5218 • www.rtd.com • sales@rtd.com

www.rtd.com

HighRel PC/104 ISA, PCI & PCIe Modules and Systems

-40 to +85°C

Data Acquisition

Wireless Telematics

TI 8000 MIPS dspModule™

dataModules®
-40 to +85°C

		Smart A/D		Analog I/O						Digital I/O						
		SDM7540HR	SDM8540HR	DM6420HR	DM6430HR	DM7520HR	DM7530HR	DM8530HR	DM9530HR	DM6812HR	DM6814/16HR	DM6888HR	DM7820HR	DM8820HR	DM9820HR	FPGA7800HR
Bus	Active Bus	PCI	PCI	ISA	ISA	PCI	PCI	PCI	PCIe	ISA	ISA	ISA	PCI	PCI	PCIe	PCI
	Passthrough Bus	ISA				ISA	ISA		PCI				ISA		PCI	ISA
	DMA or PCI Bus Master	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	McBSP Serial Ports	✓	✓			✓	✓	✓	✓							
Analog Input	Single-Ended Inputs	16	16	16	16	16	16	16	16							
	Differential Inputs	8	8	8	8	8	8	8	8							
	Max Throughput (KHz)	1250	1250	500	100	1250	500	500	500							
	Resolution (bits)	12	12	12	16	12	16	16	16							
	Input Ranges/Gains	3/7	3/7	3/4	1/4	3/6	3/3	3/3	3/3							
	Autonomous Calibration	✓	✓													
	Data Marker Inputs	3	3	3		3										
Conversions	Channel-Gain Table	1K	1K	1K	1K	1K	1K	1K	1K							
	Scan/Burst/Multi-Burst	✓	✓	✓	✓	✓	✓	✓	✓							
	A/D FIFO Buffer	8K	8K	8K	8K	8K	8K	8K	8K							
	Sample Counter	✓	✓	✓	✓	✓	✓	✓	✓							
	SyncBus	✓	✓			✓	✓	✓	✓							
Digital I/O	Total Digital I/O	16	16	16	16	16	16	16	16	48	18/9	64	48	48	48	48
	Bit Programmable I/O	8	8	8	8	8	8	8	8	24	6/0		48	48	48	✓†
	Advanced Interrupts	2	2	2	2	2	2	2	2	2			2	2	2	✓†
	Input FIFO Buffer	8K	8K	8K	8K	8K	8K	8K	8K							
	Versatile Memory Buffer												4M	4M	4M	8MB
	Opto-Isolated Inputs											48				
	Opto-Isolated Outputs											16				
	User Timer/Counters	3	3	2	2	3	3	3	3	3	3		10	10	10	6
	External Trigger	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓†
	Incr. Encoders/PWMs										3/9		4/8	4/8	4/8	✓†
Analog Out	Analog Outputs	2	2	2	2	2	2	2	2							
	Max Throughput (KHz)	200	200	200	100	200	100	100	100							
	Resolution (bits)	12	12	12	16	12	16	16	16							
	Output Ranges	4	4	3	1	4	5	5	5							
	D/A FIFO Buffer	8K	8K			8K	8K	8K	8K							

visit www.rtd.com for complete product listing

† User-defined, realizable in FPGA

PCIe/104 cpuModule® featuring Intel® Core™ 2 Duo processor, with eight PCIe x1 links, one PCIe x16 link, 8 analog inputs, 2 SATA, LPC, 6 USB 2.0 and Dual Ethernet. Shown here with Analog dataModule® and ATX Power Supply

Conduction-cooled, Hybrid RF/Embedded System

- VHF/UHF receiver
- Multi-band synthesizer
- FPGA Coprocessor
- High-end GPS receiver
- Pentium M cpuModule
- Isolated Power Supply

HiDAN*plus*™

HiDAN™ Systems

- Rugged, watertight enclosure
- Integrated tongue & groove O-ring
- Environmental sealing & EMI suppression
- Structural heat sinks & heat pipes
- Milled aluminum frames with optional heat fins
- MIL cylindrical I/O connectors
- MIL-SPEC paint & shock-mounts optional

IDAN® — Intelligent Data Acquisition Node

- Rugged PC/104 stackable framed modules
- Quick interchangeability and expansion
- Structural heat sinks, cooling fins & heat pipes
- Milled aluminum frames
- Standard PC connectors
- Optional MIL-SPEC paint & shock mounts

HiDAN*plus*™

Radar System Application

- High-end FPGA Board
- MIL-SPEC A/C Power Supply
- Synchro to Digital Converter
  - cpuModule, relayModule and dataModules

HiDAN*plus*™ Systems

- HiDAN with IDAN modularity
- Stackable signal raceway

rtd®
"Accessing the Analog World"

"MIL Value for COTS prices"™

Tech Recon

ATCA in Military Comms

MicroTCA Gaining Ground in Military Applications

Well suited for today's crop of bandwidth-hungry military programs, MicroTCA has moved to the forefront as the leading embedded computing form factor choice.

David Pursley, Field Applications Engineer
Kontron

Deeply rooted in VME and CompactPCI platforms, military embedded design is undergoing a noticeable shift. Modern warfare initiatives are driving designers to find more bandwidth, while at the same time moving to small form factor systems with high availability and proven ruggedness. With diverse requirements ranging from integrated weapons control to handheld GPS-based radios to real-time sharing of surveillance data, military communications are going network-centric.

The latest systems link individual soldiers to vehicles, aircraft, ships and command centers, and more complex systems also require greater communication bandwidth, broader functionality and smaller footprints. Factor in the need for mobility, flexibility and ruggedness, and designers are recognizing high-end processing in small form factors as a key design factor moving forward. Modern warfare systems must balance these issues with the need for standards-based solutions that can be developed and deployed within specific timeframes and budgets.

Net-Centric Programs

Initiatives such as the Army's FCS (Future Combat Systems), JTRS (Joint Tactical Radio System) and WIN-T (Warfighter Information Network – Tactical) (Figure 1), require significantly greater bandwidth, far beyond technologies found on earlier battlefields and are an ideal fit for the ATCA and MicroTCA platforms. Moving things a step further, recently announced MicroTCA specifications take the extensive knowledge and practices developed with ATCA and AdvancedMC, and apply them to smaller form factor, plug-in systems. High bandwidth in a small form factor, coupled with standards development, proven ruggedness, high availability and multicore support is driving ATCA and its smaller counterpart MicroTCA forward, with MicroTCA especially showing great promise in rugged military system design.

MicroTCA boards and systems are designed to meet NEBS Level 3 requirements, addressing demands such as thermal margins, fire suppression, emissions and the ability to continue working even during a severe earthquake. As a result, standard MicroTCA systems are beyond rugged enough for environments such as ground installations or on certain types of airborne platforms. It's the further ruggedization of MicroTCA that holds greater interest for the military embedded design community.

A range of standardized rugged implementations of MicroTCA is being driven forward by a committee of the PICMG standards body. These include rugged air-cooled MicroTCA (MTCA.1), hardened MicroTCA for military applications (MTCA.2), and conduction-cooled MicroTCA (MTCA.3); MTCA.1 was in fact ratified very recently. These new standards leverage the ANSI /VITA 47 specification to define environmental requirements. For example, MTCA.1 extends MicroTCA into more rugged military environments as defined by ANSI/

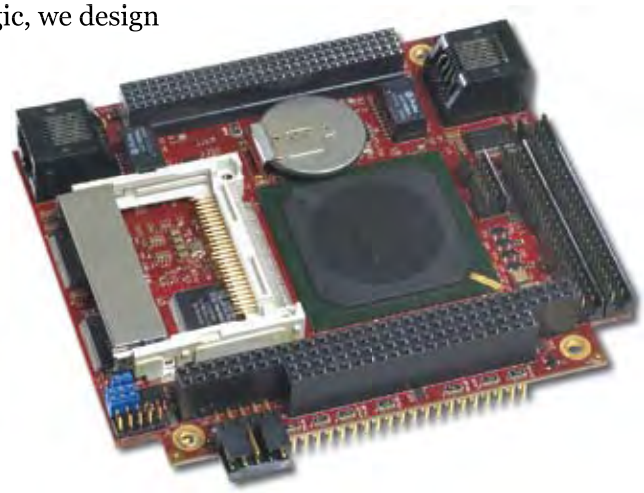
Figure 1

WIN-T Increment 1 establishes a comms network backbone that provides the full range of audio and visual communications at various echelons and locations using SatCom nodes coupled with Line-Of-Sight (LOS) radios.

You design products that enhance the quality of life.

Our products help you do it.

One of the most important decisions a medical OEM makes is their choice of an embedded computer. It's at the heart of any system. At VersaLogic, we design our embedded computer products to ensure high reliability and long-term availability. That's why our single board computers can be found in a long list of medical products. And because we understand that medical customers have special requirements, every board we make is run through exhaustive quality tests, ensuring that we deliver only the best. Whether you need one of our standard products or a version customized to your needs, our skilled technical staff will work with you to meet your exact specifications.



Contact us to find out how for more than 30 years we've been perfecting the fine art of extra-ordinary support and on-time delivery: One customer at a time.

1.800.824.3163
1.541.485.8575
www.VersaLogic.com/RTC

VERSALOGIC CORPORATION

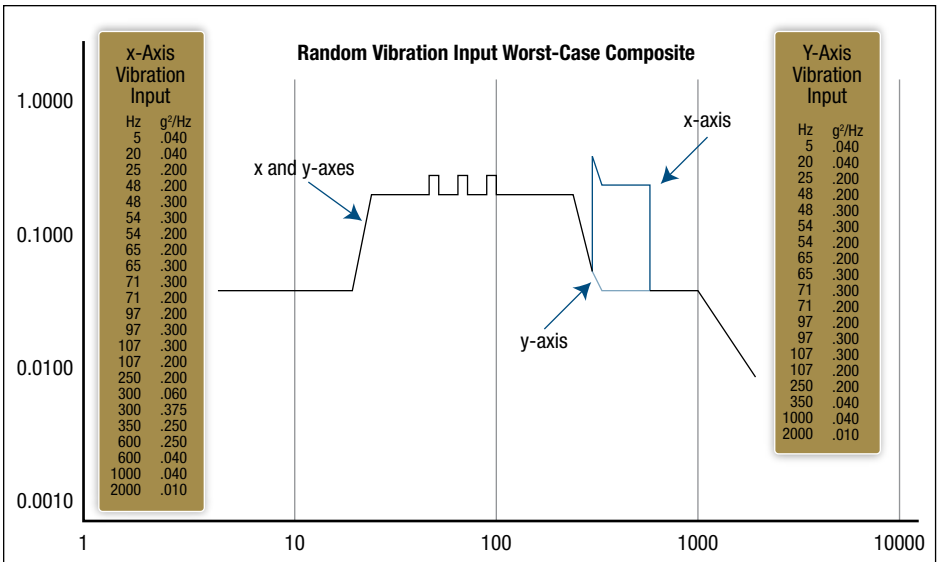


Figure 2

Shown here is BAE Systems' AMC connector vibration input "worst case" test report for WIN-T JC4ISR radio.

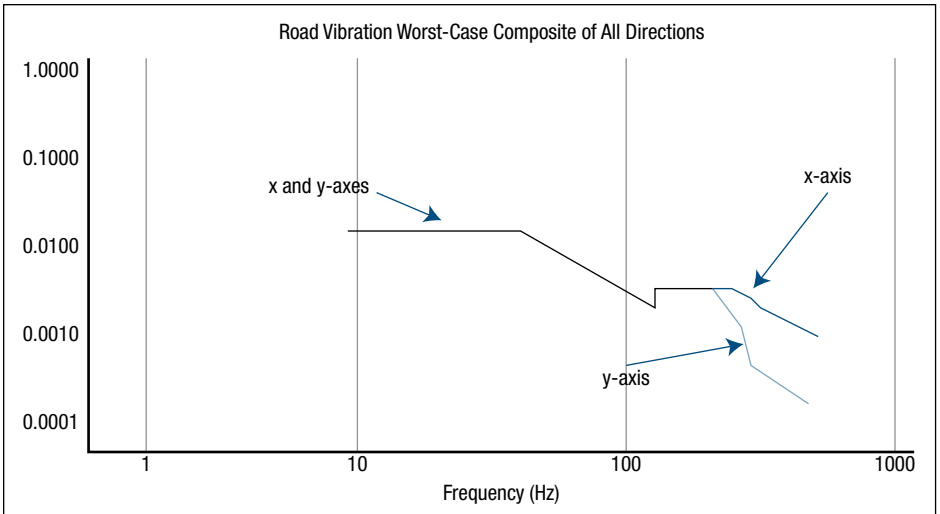


Figure 3

This graph show's BAE Systems' AMC connector road vibration "worst case" test report for WIN-T JC4ISR radio.

VITA 47's EAC6 environmental class and V2 vibration class.

MTCA.3, now underway with PICMG, defines a conduction-cooled interface that allows AMCs to meet the most extreme thermal, shock and vibration profiles defined in ANSI/VITA 47 (such as performing in conduction-cooled systems with no airflow at all in sealed environments). Designers can anticipate these efforts will link VPX and MicroTCA as competing design options (see sidebar "MicroTCA or VPX?"). Early results show promise and rugged MicroTCA options are already available in advance of these standards.

MicroTCA boards and systems are available for use in high shock and vibration air-cooled environments through use of shock isolation, all soldered components and board locking mechanisms. Similarly, solutions available today provide conduction-cooled MicroTCA through the use of standard AdvancedMCs surrounded by a "clamshell" with wedge locks for thermal dissipation.

James Robles, senior technical fellow for The Boeing Company, explains that "telecommunications architectures like MicroTCA and AdvancedTCA are attractive to Boeing because we know they won't go away. We like what we see in the NEBS, and of course there is good hardware available on the market."

MicroTCA in Action

The WIN-T program is intended to be mobile, flexible and rugged enough to maintain the highest levels of situational awareness through all kinds of battlefield conditions; significant portions of the network are in fact using the MicroTCA architecture. MicroTCA offers native support of Internet-protocol-based network topologies, offering designers a powerful solution given the network-centric nature of WIN-T.

From a management perspective, the network on a MicroTCA backplane looks like any LAN found at a typical office since each MicroTCA blade is connected on a standard network. The primary benefit here is simplified software development as compared to other architectures.

In VME or even standard CompactPCI implementations, anything being done to software on one blade can potentially affect software on the other blades. In contrast, MicroTCA's software development model is less complex; software appears as a simple network and is much more like a PC running software on a desktop. As a result, designers avoid the complicated interconnect issues that require management during the software development phase with VME or CompactPCI architectures.

Test results published by BAE Systems show that MicroTCA is rugged enough for even ground mobile applications (Figures 2 and 3). Findings verified the MicroTCA edge connector sufficiently accommodated the vibration profiles required for the WIN-T JC4ISR radio. Specifically, the connectors never failed, and there was no significant corrosion fretting after the equivalent of a 25-year life cycle.

Similarly, Dr. W. Joel D. Johnson,

software defined radio (SDR) digital transceiver program lead at Harris Government Communications Systems Division, explains that Harris Corporation has successfully used MicroTCA for radios that will be used in the harshest of environments, albeit with modifications such as conduction-cooling and a new connector.

Where MicroTCA Fits

VME and CompactPCI have long been mainstay military design platforms, typically offering 6U architectures with some amount of redundancy and a medium level of bandwidth. Many onboard vetronic, navtronic and avionic applications do not require high-bandwidth communication between blades or vehicles, and VME and CompactPCI architectures are highly viable solutions—320 Mbytes/s for VME64. But with a limited number of gigabit Ethernet connections on the backplane, these architectures do not support the bandwidth required for more communication-intensive applications. Switched-fabric extensions to these architectures (VITA 31, VITA 41 and PICMG 2.16) do offer more bandwidth, but the required 6U form factor is just not conducive to smaller designs.

MicroTCA, ratified in July 2006 as PICMG MCTA.0, addresses these issues with high processing capacity, extremely high communication bandwidth and high availability in a small 2U form factor. VME and CompactPCI implementations offer just two serial connections on the backplane; MicroTCA offers as many as 21 high-speed serial connections, each providing as much as 2.5 gigabits per second bandwidth.

This is all packed into a 2U board, meaning MicroTCA requires less space to achieve greater bandwidth—advantageous for military initiatives seeking continued improvements in Size, Weight and Power (SWaP). MicroTCA was initially developed for air-cooled, less rugged applications, but its NEBS Level 3 rating meant it could handle greater shock and vibration from the outset. And with the ratification of MTCA.1, standard-compliant COTS MicroTCA can now be used for all but the most rugged air-cooled applications.

SWaP continues to be a top military issue, but many applications require computing bandwidth and high availability that just cannot be sacrificed as a design trade-off. In these instances, MicroTCA has a small form factor advantage over both VME and CompactPCI, including their derivatives VITA 31, VITA 41 and PICMG 2.16. MicroTCA blades are smaller and use less power, yet they can still deliver more communication bandwidth and higher computational abilities by using multiple processors on a single backplane. VME or CompactPCI designs can match this performance in 6U, but fall short when modified to 3U. And at 2U x 3-6 HP x 183.5 mm, MicroTCA may be one of the larger small form factors, but is still more compact than 3U VME or CompactPCI.

MicroTCA or VPX?

System designers considering MicroTCA may also want to explore VITA 46, or the VPX architecture. Both architectures target the same types of military applications but from opposing perspectives. VPX is ultra rugged and currently has no solid development path to a less expensive solution with broader application. MicroTCA is its contrast, initially being developed as a less rugged, lower cost solution, and now specializing in specific rugged features through derivative specs built to address precise rugged elements.

Very rugged, mission-critical applications are well suited for ultra-rugged VPX processing—for example, conduction-cooled ground mobile installations. If time permits a development cycle as long as a year, and if the application is running in a ground vehicle rather than an aircraft, VPX could be an ideal design choice due to its ruggedness. For airborne and naval applications, MicroTCA's proven communication bandwidth and ruggedness could be the ideal architecture.

The designer's choice is often defined by budgets—in terms of both time and money (Table 1). Currently VPX is likely to be the more costly solution of the two, but both have their place in military design. For ultra-rugged ground vehicle conduction-cooled applications, VPX will often provide a better solution despite its cost. On the other hand, for the greater group of applications that fall short of that extreme, MicroTCA is a better solution in terms of its computing, bandwidth, form factor and design cost parameters.

	cPCI	VME	PICMG 2.16	VPX	MicroTCA
Form factor	3U x 160mm	6U x 160mm	6U x 160mm	3U x 160mm	73.5mm x 181.5mm
CPU to CPU communication	1 CPU board typical	VMEBus	GbE	GbE, 10GbE	GbE, 10GbE
Peripheral communication	PCI Bus	VMEBus	PCI Bus	PCI Express, Serial Rapid I/O	PCI Express, Serial Rapid I/O
Hot swap of line cards	Peripherals only	No	Yes	No	Yes
Rugged	Yes	Yes	Yes	Yes	Underway
Widely applicable	Yes	Yes	Yes	Military-centric	Yes

Table 1

MicroTCA has added more directions that military system designers can go with. Ruggedness, cost and performance trade-offs need to be weighed carefully.

Multicore and More

MicroTCA means small size and high bandwidth for both communications and computing. Its extensive computing resources come from up to 12 compute blades on a single backplane, which can extend dramatically if each blade in a single 2U system uses a multicore processor. When a system grows to 3U or perhaps 4U, it could be operating today with as many as 24 cores. At that, it would still maintain a very small footprint, which may be what designers consider the most powerful and unique advantage of MicroTCA. A broad scope of communication bandwidth capabilities is realistic (ranging from 40 Gbits/s to more than 1Terabit/s) because actual bandwidth depends on the implementation. The Kontron OM6120 (Figure 4), for example, is a compact 5U system for up to twelve AMCs. Accommodating a high number of multicore Processor AMCs gives designers a wide range of options in communication power.

Earlier military systems did not always require high availability. Today, however, maximum system uptime is an overriding requirement for integrated

Reduce Energy cost

The next generation COM

CoreExpress-ECO: Maximum performance at minimum size.

Advantages:

- Intel® Atom™ processor Z510 or Z530
- 512 MB or 1 GB SDDR2 RAM (opt. 2 GB)
- 100% legacy free
- 2 PCI Express lanes
- 8 USB 2.0 ports
- Integrated graphics processor
- Smallest form factor (65 x 58 mm), 28 grams
- Best performance-per-watt
- Optimized, passive cooling
- Integrated EMC protection
- Extended temperature range -40°C ... +85°C (opt.)

A new form factor

LiPPERT's latest development, CoreExpress-ECO, is the smallest COM module available today. It measures only 65 x 58 mm, yet comes with the best performance-per-watt figures. Minimum power consumption and an optimized cooling concept make its integration a snap. The module does not use any legacy interfaces.

Future proof

CoreExpress-ECO modules are designed for long product life. Its components have been specially selected for long-term availability. Versatile IO interfaces allow flexible implementation of all required interfaces on the carrier board.

Versatile

Applications profiting from the flexibility and robustness of the CoreExpress-ECO are mobile healthcare, telemedicine, diagnosis systems, industrial image processing, communication systems, logistics, medical devices, mobile health care, mobile embedded PC systems, POI, POS, robotics, traffic management, and digital signage devices.

LEMT - LiPPERT Enhanced Management Technology

CoreExpress modules support the System Management Controller based LEMT. It provides auxiliary functions like condition monitoring, operating hours counter and secure flash memory.

Development Support and Operating Systems

Evaluation of the CoreExpress-ECO is made easy using the valuation kit. The kit is completely self-contained and is set up in no time. It comprises a sturdy case, a CoreExpress module on an EPIC carrier board, a flat panel display, power supply and full documentation. Supported operating systems are Windows XPE, Windows CE, QNX and Linux.

+++++ Whitepaper at www.coreexpress.com +++++

LiPPERT Embedded Computers Inc.
5555 Glenridge Connector, Suite 200
Atlanta, GA 30342
Phone (404) 459 2870 · Fax (404) 459 2871
ussales@lippertembedded.com · www.lippertembedded.com

THE EMBEDDED PC COMPANY

battlefield management. To accommodate this effectively, MicroTCA offers a means to monitor the health of a system and then "heal" it in the field. Through an Intelligent Platform Management Interface (IPMI), users are notified when the system is running below peak performance. As temperature thresholds change, fans speeds can be throttled up and down automatically. If a board fails, the system can remain up and running while it is removed and replaced. Along with hot swap and full redundancy, IMPI-based health monitoring prevents any single point of failure in the system.

Suited for Diverse Military Needs

Modern military's diversity of application requirements has tremendous impact on system design in terms of redundancy, system management, processing power, form factors, housing and usage of fabrics. With the recent passage of MTCA.1, the rugged air-cooled standard, MicroTCA fulfills many practical demands on system design for a variety of applications, and is quickly gaining traction in mil/aero apps such as communication systems, sonar and radar.

MicroTCA can be a powerful design option in this scenario, offering the high bandwidth, increased computing power and small form factor required for communication-centric implementations. Rugged enough to handle high-end computational demands under environmental extremes, these standards-compliant offerings will soon go still further in handling even the harshest of environments. This combination of industry testing, increased acceptance and standards body work is fueling MicroTCA's rapid movement as a military design choice from command centers to shelters to the battlefield. ■■

Figure 4

The OM6120 is a compact 5U system for up to 12 AMCs. Accommodating a high number of multicore AMCs gives designers a wide range of options in communication power.

Kontron America
Poway, CA.
(858) 677-0877.
[www.us.kontron.com].

GOOD THINGS...

XPand3200

...COME IN SMALL PACKAGES

In today's military environments **small size matters**! The **XPand3200** from Extreme Engineering Solutions (X-ES) sets a new standard for conduction-cooled, sub-½ ATR systems. This MIL-STD-810F qualified system redefines the limits of (low) power, (high) performance, and (multi-purpose) functionality for your program use. Supported X-ES CPU boards include:

- XPedite5170 embeds Freescale's MPC8640D, a dual e600 PowerPC processor with AltiVec support, or
- XPedite5370 hosts Freescale's dual-core MPC8572E PowerQUICC® III processor, or
- XPedite7170 targets an Intel® Core™2 Duo (SL9380) processor with 4 GB of DDR2 memory, and
- Every X-ES board is supported in-house with Linux, VxWorks, INTEGRITY, Windows, and Neutrino software.

X-ES will customize XPand3200 to meet program-specific I/O requirements. An optional SATA SSD memory module provides up to 128 GB of "shirt-pocket" storage. Other I/O support includes: Front panel USB port for flight-line maintenance, multi-Gigabit Ethernet, graphics, RS-232/422/485 serial, MIL-STD-1553, MIL-STD-188-114A, ARINC 429, discrete I/O, plus custom PMC or XMC I/O can be supported through the back panel D38999 circular connectors.

Contact X-ES with your system specifications and start building your XPand3200 solution today.
Call: (608) 833-1155 • Email: sales@xes-inc.com • Web: www.xes-inc.com

X-ES
Extreme Engineering Solutions

Serial ATA Stakes out Territory as Next-Gen Storage Interface

From the large to the small, innovations in memory storage and interface technology are easing the burden for developers of storage systems in military applications.

Jeff Child
Editor-in-Chief

Over the past several years, serial interconnect schemes have been steadily pushing aside parallel buses, and that trend has impacted the memory and storage realm just as it has every other facet of military embedded computing. And as military systems continue to rely more and more on compute- and data-intensive software, the interface to memory and storage subsystems can't risk becoming a bottleneck. Serial ATA appears to be on its way to becoming the dominant interface technology for new storage subsystem designs. SCSI and Fibre Channel in contrast seem to be waning—although far from retreating. The redundancy of RAID architectures is still a preferred way to ensure reliable mission-critical operations.

The current trend for many applications is to move from parallel to serial interface to increase system performance, lower the cost and simplify the integration. Anticipating this trend, there are a plethora of SSDs available with interfaces ranging from USB, small cards (SD and MMC products) and SATA interface products for the military embedded market. When the application requires more storage, the most suitable choice is a pure SSD with Serial or Parallel ATA interface. Single chip drives are also reaching densities large enough for storing code and large amounts of data in any application where space is limited and durability and reliability matters.

SATA and RAID

Exemplifying both the SATA and RAID trends, last year Lockheed Martin's Undersea Systems business unit selected Performance Technologies' CPC5910 CompactPCI storage blades for use in an upgrade program for sonar systems on board Royal Navy submarines. The CPC5910 is a SATA storage blade that supports 800 Gbytes of RAID capacity. Each blade features two 3.5-inch enterprise-class SATA hard drives that support board-level hot swap and drive-level hot swap for complete flexibility and high reliability. The blades are a key element in improving the storage technology used with Royal Navy sonar systems.

The United Kingdom's Royal Navy Submarine Service currently consists of nine Fleet submarines (SSNs) of the Swiftsure and Trafalgar class, and four ballistic missile submarines (SSBN) of the Vanguard class (Figure 1). The fleet is in the process of having their sonars refitted to include open architecture processing.

Solid State Overshadowing Hard Drives

Solid-State Drives continue to capture market share away from rotating disks dives. SSDs are also much more rugged than traditional HDD solutions. A recent product example is the E-Disk Altima (Figure 2) from BitMicro Networks. This SATA, 2.5-inch, flash-based solid-state drive is capable of storing up to 416 Gbytes of data, sustaining transfer

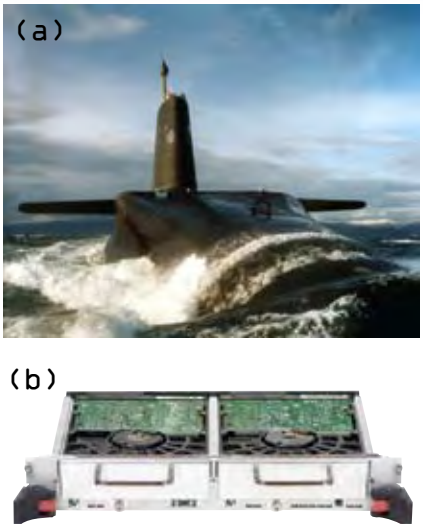


Figure 1

The Royal Navy's four ballistic missile submarines (SSBN) of the Vanguard class (a) have undergone a refit of their sonar systems to include open architecture processing. The CPC5910 CompactPCI storage blades are used in the upgrade program (b).

High Performance Reflective Memory Solutions

Dolphin's embedded products include high performance board level and software solutions that address the needs of the military, industrial automation, and test/measurement markets.The Dolphin Express Reflective Memory solution provides significantly higher performance at lower cost than other shared memory solutions. Rather than using expensive on-board RAM, the adapter leverages PCI Express technology to effectively utilize system memory leading to a high performance yet low cost solution. Typical applications range from a two node fail-over pair to large distributed shared memory applications like aircraft, ship and submarine simulators, automated testing systems, industrial automation and high-speed data acquisition.

Configuration	Bandwidth	Latency
2 Node	1.3 GBytes/sec	1.2 µsec

Memory free adapter cards based on PCI Express

Dolphin

www.dolphinics.com/rm

Figure 2

The E-Disk Altima is SATA, 2.5-inch, flash-based solid-state drive is capable of storing up to 416 Gbytes of data, sustaining transfer rates of up to 100 Mbytes/s and can withstand shock and vibration up to 1,500G and 16.4G rms respectively.

rates of up to 100 Mbytes/s and can withstand shock and vibration up to 1,500G and 16.4G rms respectively. Mobile computing applications are set to benefit from these features since the 2.5-inch E-Disk Altima E2A3GL solid-state drive is a drop-in replacement for disks used in business laptops or rugged portable PCs. It is among the new generation of E-Disk SSDs supported by the EDSA DMC and LUNETA MFI ASICs.

Apacer's latest SAFD 254 employs its proprietary stacking technology, which supports the widest range of operating temperature by as much as 128 Gbytes compared to all other available industrial SSD solutions in today's market. With the highly reliable NAND SLC memory, the SAFD 254 is capable of read/write speed of up to 150/130 Mbytes/s.

Apacer's SAFD 254 uses global wear leveling technology, which manages the uneven "wear" on the sectors of a flash media memory by distributing the writes through whole sectors of the flash media to extend its life cycle. The built-in S.M.A.R.T technology (Self-Monitoring, Analysis, and Reporting Technology) provides users with an interface that allows instant display of key information including spare blocks and erase counts, which reduces the risk of sudden disk damage and proactively notifies customers to back up system and data. Also, the built-in low power detector initiates cached data saving before the device's power supply is too low. Such intelligent power failure recovery function prevents the system from data damage or data error due to sudden power outage, providing superior data security.

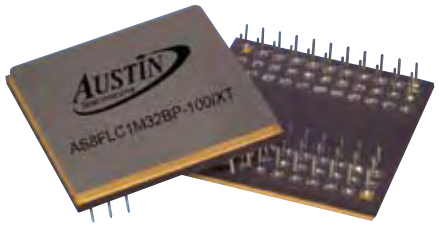


Figure 3

The DSCC-approved hermetic 32 Mbit and 64 Mbit flash multi-chip modules are available in a 66PGA or 68CQFP low-profile ceramic package. They feature a reliable non-volatile high-speed memory access of less than 70 ns and -55° to 125°C temperature operation.

Single-Chip Flash Drives

The single chip SSD drive meanwhile is having a huge impact on mobile military devices. But the trick for the military market is to take advantage of SSD flash-based storage while not getting caught in the lightening quick life cycles of flash IC components. For its part, Austin Semiconductor recently has added two new DSCC-approved hermetic flash multi-chip modules (MCM) to their line of products. The 32 Mbit and 64 Mbit flash multi-chip modules (Figure 3) are available in a 66PGA or 68CQFP low-profile ceramic package, and feature a reliable non-volatile high-speed memory access of less than 70 ns, very low operating (120 mA max) and standby power (150 uA), -55° to 125°C temperature operation and boot block sector architecture. Ideal applications for the MCMs are core program boot code storage, navigation/GPS/radar, missile control and guidance as well as weapons control and guidance.

The devices are DSCC SMD 5962-09205 Approved (1M x 32) and DSCC

SMD 5962-08245 Approved (2M x 32). They have a bottom boot block (sector) architecture and operate with single 3.3V supply. Available in multiple access time variations, the devices feature 100,000 Erase/Program Cycles and a minimum 100,000 Program/Erase Cycles per sector guaranteed. Embedded erase and program algorithms are included along with an erase Suspend/Resume function and support for reading data from or programming data to a sector not being erased.

Figure 4

The SANbric is a rugged removable rotating media storage system for high-altitude applications and is available with up to 2.7 terabytes (TB) of hard drive storage. The SANbric deploys six 3.5-inch drives in a JBOD configuration.

Requirements at the Terabyte Level

Shifting gears to the high-capacity, airborne segment of military storage needs, there comes a point where rotating disk storage still makes more cost-effective sense than SSDs. Curtiss-Wright Controls Embedded Computing earlier this year rolled out an expanded version of its popular SANbric (Figure 4) storage subsystem, a rugged removable rotating media storage system for high-altitude applications. Available with up to 2.7 terabytes (TB) of hard drive storage, the SANbric deploys six 3.5-inch drives in a JBOD configuration supported by a dual high-speed Fibre Channel Storage Area Network (FC SAN) communications architecture.

SANbric is designed for use in the harsh environments typical of military aerospace intelligence, surveillance and reconnaissance applications such as ELINT, COMINT, SIGINT, SAR, MTI and SDR. SANbric enables system integrators to rapidly and easily deploy a high-performance, high-capacity storage system at a cost significantly less than that of solid-state flash memory-based alternatives.

SANbric, locked in its shock isolation unit (SIU), is designed to operate under shock and vibration conditions, over a wide temperature range and at high altitude. It uniquely deploys six FC disk drives in a single sealed cartridge, reducing system weight and simplifying cabling and connectivity between the drives. The isolation provided from harsh environments enables the use of standard Fibre Channel disks in many applications previously considered too harsh for rotating media devices. SANbric can be connected to any standard FC adapter or switch for scalability in a SAN configuration. ▮▮

Apacer Memory America
Milpitas, CA.
(408) 586-1291.
[www.apacer.com].

Austin Semiconductor
Austin, TX.
(512) 339-1188.
[www.austinsemiconductor.com].

BiTMICRO Networks
Fremont, CA.
(510) 743-3193.
[www.bitmicro.com].

Curtiss-Wright Controls Embedded Computing
Leesburg, VA.
(703) 779-7800.
[www.cwcembedded.com].

Performance Technologies
Rochester, NY.
(585) 256-0200.
[www.pt.com].

Technology Focus

PCI/104-Express, PC/104 and EPIC SBC

PCI Express Breathes New Life into the PC/104 Realm

As PCI Express and USB make their way into the PC/104 universe, military system developers are no longer limited to ISA-bus speed limitations. But will PCI still have a place in the picture?

Jeff Child
Editor-in-Chief

Many military system designers select PC/104 because its ultra-small, 3.55-in. x 3.775-in. form factor enables an off-the-shelf solution for applications that may previously have been possible only with a custom CPU design. For example, the small size allows PC/104 CPUs, and even complete multi-board systems, to be placed in the nose cone of a missile (Figure 1), or fit nicely inside a small UAV.

By leveraging the PC as its core foundation, PC/104—and its wider community of form factors including PC/104-Plus, PCI-104 and EPIC—has been able to leverage all facets of the PC infrastructure. Last year the PC/104 Embedded Consortium brought PCI Express into the realm of PC/104. The Consortium has detailed a consolidated and consistent stackable PCI Express roadmap, starting with the adoption of the PCI/104-Express and PCIe/104 specifications. The spec brought PCI and PCI Express buses together to form PCI/104-Express. For additional room on a module, the PCIe/104 removes the PCI bus. This new stackable PCI Express bus can be immediately incorporated across the Consortium's 104, EPIC and EBX form factors. A new high-speed surface mount connector was specially sponsored and designed for this application.

Maximum effort went into configuring this connector so that it was capable of handling the rugged environments of the embedded market, optimized for the 0.600-inch (15.24 mm) stack height of the PC/104 architecture, and capable of transporting the high-speed signaling of PCI Express over large stack heights while keeping PCI Express Gen 2 in sight.

Maintaining the strategy of preserving ties to legacy PC/104, the PC/104 Embedded Consortium's major ESC announcement this year was the addition of USB connections to the stackable PCI/104-Express and PCIe/104 specifications. Since the adoption of those two specs a year ago, a number of vendors have rolled out products based on the PCI/104-Express and PCIe/104 specs. The PCI Express links can be configured as multiple x4 links or x8 links. The addition of the industry-standard USB will help provide quick connectivity for add-on modules that have USB-driven devices.

Figure 1

PC/104's stacked architecture and compact size make it well suited for systems like the avionics in the nose cone of a missile. Here, *COTS Journal* Chief Editor Jeff Child gets an update on the THAAD missile program at this year's Winter AUSA conference.

Some expect that this marrying of USB and PCI Express to the PC/104 world may eventually be the elimination of PCI bus for the PC/104 realm, even though the venerable ISA bus will still have a place. Any application—whether it's in the embedded or desktop/server space—that needs performance will want to migrate to PCI Express or USB anyway. In contrast, ISA still has a role as a low-speed, easy-to-implement interface to sensors, analog/digital I/O and so on.

The roundup on the following pages showcases some representative examples of PC/104, PC/104-Plus, PCI/104-Express and EPIC single board computer products. Many of these vendors offer both PC/104 and EPIC families of products. For the purposes of this product roundup, each vendor was asked to include just one of their latest and greatest products. ▮▮

Special Focus:
Military Vehicle Electronics

COTS JOURNAL

The Journal of
Military Electronics & Computing

SPECIAL JULY ISSUE

ALERT: CRITICAL CHANGES TO MILITARY VEHICLES MANDATED

Changes by the DoD and U.S. Army to vehicle requirements will necessitate re-thinking previously planned electronics. Existing programs like Future Combat Systems were launched before technologies like VPX emerged and before the trend toward integrated rugged box-level systems hit its stride.

Will the "*short delay*", mentioned by Secretary Gates, allow for changes in suppliers? Changes in technology? Who are the suppliers targeting the changes in the vetronics market? As an engineer re-designing vehicles how do I best proceed?

The latest requirements will be featured in the **July issue of *COTS Journal.*** Discover how these changes may be influenced by technology and the latest available products.

A must read for everyone dealing with vetronics

COTS Journal July Special Feature:

Military Vehicle Electronics: Power and Size Tradeoffs
Onboard communications and control electronics (vetronics) are expected to multiply in sophistication for both next-generation and Current Force fighting vehicles. These factors are putting pressure on system designers to find ways to meet the complicated cooling, shock and vibration problems that emerge when more computing gear is packed into those vehicles. Included will be an update on the Army's Future Combat Systems program, Current Force upgrades and the latest DoD mission requirement changes.

Robert Gates, Secretary of Defense

"…there is no question in my mind that the Army needs a vehicle modernization program. I will make the money available for it." Robert Gates, Secretary of Defense," we can have a short delay, while we look at the requirements again."

"… as they began working on the infantry fighting vehicle and looking at the lessons learned, in Iraq and Afghanistan, they began adding armor to the infantry fighting vehicle," said Gates "And all of a sudden, it was looking like 38 tons on a 30-ton chassis. That seems to me to be a problem."

Technology Focus:

PCI/104-Express, PC/104 and EPIC SBCs Roundup

SBC Provides Right-Sized PC/104 Solution

PC/104 has always shined in defense applications that need a modest amount of computer power. Adlink Technology has released the Ampro by Adlink CoreModule 430 SBC to continue its line in the PC/104 market. The CoreModule 430 shows confidence that the venerable PC/104 ISA bus will be viable for years to come. With the highly integrated DM&P Vortex86 processor, the CoreModule 430 combines a wealth of legacy I/O interfaces with onboard video, DDR2 RAM, USB 2.0 and 10/100 Ethernet on a single 90 x 96 mm module. This announcement offers the broad installed base of 386 and 486 PC/104 users a path forward for continued production of existing medical, industrial control and avionics systems.

CoreModule 430 offers a choice of 300 MHz or 800 MHz Vortex86 processors for Extreme Rugged environments including temperatures from -40° to +85°C, vibration up to 15 Grms, and shock up to 50 Grms. CoreModule 430 offers 2D graphics with a TTL flat panel interface along with legacy CRT. CoreModule 430 also touts a full 16-bit ISA bus and an Intel Ethernet controller for consistent performance over temperature.

Onboard I/O includes one UDMA IDE port, Compact Flash socket, four serial ports, two with RS-422/485 capability, two USB 2.0 ports, Intel 10/100 Ethernet, parallel port, PS/2 keyboard/mouse, and eight general-purpose digital I/O pins. In addition, the module brings out SPI and LPC Bus interfaces to offer more flexibility for attaching custom I/O. Prices start in the $200s for the CoreModule 430 in production quantities with 256 Mbytes of onboard DDR2 RAM. QuickStart Kits include embedded board support packages (BSPs) such as Windows CE 5.0 and 6.0, QNX 6.3, and a complete embedded Linux 2.6 distribution.

ADLINK Technology
San Jose, CA.
(408) 360-0200.
[www.adlinktech.com].

Core Duo EPIC SBC Boasts Dual Display Capability

A stackable EPIC single board computer with onboard Intel Core Duo processor is built entirely with industrial-grade components and special vibration-proof connectors to provide a rock-solid, reliable embedded platform suitable for high vibration and wide temperature range applications. The PCM-4390 from Advantech can support dual independent LVDS (36-bit/48-bit) displays. The module is compliant with PCI-104, PC/104+ and PC/104, allowing additional I/O expansion modules to be easily stacked for greater functionality.

PCM-4390 is designed with industrial-grade components for higher reliability and a wider operating temperature range. It is also equipped with robust connectors: male and female connectors with locking clasp to enhance anti-vibration capability. To further enhance its robustness, PCM-4390 uses a USB-DOM Solid State Disk (SSD) solution. USB-DOM supports quicker boot-up and read/write performance, an improvement over CompactFlash (CF) and regular Hard Disk Drives (HDD).

PCM-4390 comes with Advantech Secure and Unified Smart Interface (SUSI) support. SUSI is a suite of APIs that simplifies hardware and software application implementation. It additionally supports socket SODIMM DDR2 400/533/667 MHz SDRAM up to 1 Gbyte. It also has two SATA II ports, dual BroadCom Giga LAN, eight GPIO, four COM (3 x RS-232, 1 x RS-232/422/485) and eight USB 2.0 ports. PCM-4390 offers a choice of a fanless solution and/or Windows XPe.

Advantech
Irvine, CA.
(800) 866-6008.
[www.advantech.com].

Fanless PC/104 SBC Operates up to 800 MHz

Fans aren't welcome in most military applications. Feeding those needs is a new PC/104 SBC from Diamond Systems running the Vortex86SX/DX CPU at up to 800 MHz. Ruggedized and operating fanless over the extended temperature range of -40° to +85°C, Helios is a suitable choice for low-cost, embedded applications operating in harsh environments. Helios combines a low-power, highly integrated x86-based CPU with high-accuracy autocalibrating data acquisition circuitry on a single PC/104 board. Helios has up to 256 Mbytes of RAM soldered on board. The module offers standard PC peripheral features, including four USB 2.0 ports, one 10/100Base-T Ethernet interface, four RS-232 ports, an IDE interface and VGA/LCD graphics.

Helios' optional onboard data acquisition circuitry includes sixteen 16-bit analog inputs, four 12-bit analog outputs, up to 40 digital I/O lines, a 512-sample FIFO and two counter/timers. The analog I/O circuit includes Diamond Systems' industry-leading autocalibration circuitry, which ensures accurate analog I/O performance to within +/- 2LSB over the entire industrial operating temperature range of -40° to +85°C. Helios features 256 Mbytes of soldered DRAM, -40° to +85°C fanless operation and low power consumption under 5W. The Helios single board computer is available immediately both with and without data acquisition, priced from $225 to $550 depending on processor speed and options.

Diamond Systems
Mountain View, CA.
(650) 810-2500.
[www.diamondsystems.com].

Atom Processor and GPS Ride PC/104-Express

A host of power-sensitive military applications—ranging from small UAVs and UGVs to handheld devices—are hungry for lower power embedded computing. Based on the latest Intel Atom processor, a PC/104-Express board called the MSM200X/XL/XP from Digital-Logic provides all standard PC interfaces required for such demanding applications, including Ethernet LAN, an audio controller (HDA-AC97), four RS-232 interfaces, two SATA and one PATA interfaces. In addition, the PCI/104-Express bus (PCI + PCIe), PCIe Minicard and six USB interfaces are available as functional extensions.

All three options (X, XL and XP) are equipped with the SMA200 Atom Z510/Z530 processor (1.1 or 1.6 GHz) and offer up to 1 Gbyte RAM. The XL version is a low-cost variant without battery or sound codec, while the XP version features a 4 Gbyte SDD on board (optional for the two other variants). The versions MSM200X and MSM200XP are also available for the extended temperature range of -40° to +85°C. The boards have dimensions of 90 mm x 96 mm (W x L) and a weight of 105 or 115 grams respectively.

Digital-Logic
Luterbach, Switzerland.
+41 (0)32/ 681 58 40.
[www.digitallogic.ch].

Rugged PC/104 Plus Card Sports Atom Processor

Rugged military applications, in-vehicle ones in particular, require a blend of extended temperature range, low power operation combined with high performance. With all that in mind, Eurotech has launched its ISIS XL, a rugged PC/104 Plus Board based on the Intel Atom processor Z5xx series platform. The ISIS XL offers high-performance x86-compatibility in a fanless design that requires only a fraction of the power previously needed for comparable systems. A full range of onboard peripherals are provided including 8 x USB 2.0 ports, VGA, LVDS, HD-Audio, RS-232/422/485, Ethernet, GPIO and IDE. Expansion requirements are well covered by a combination of PC/104 (ISA), PC/104+ (PCI) and PCI Express Mini Card, so interfacing to real-world I/O or the latest wireless technology is easy.

Requiring less than 5W of power and running at up to 1.3 GHz for the industrial-grade ISIS XL and up to 1.6 GHZ for the commercial-grade ISIS, both modules have all the functionality and connectivity previously associated with much larger and more power-hungry systems. The ISIS and ISIS XL come with up to 1 Gbyte of DDR2 RAM and 4Gbytes of soldered-down flash for security and durability. Further solid-state flash expansion is available via an SDIO socket. The ISIS XL will be available in the second quarter of 2009.

Eurotech
Columbia, MD.
(301) 490.4007.
[www.eurotech.com].

EPIC SBC Boasts Low Power, Multiple Comm Interfaces

For military applications that depend on remote terminals, protocol conversion or data logging in power-shy environments, the ideal SBC would combine a low-power CPU with lots of onboard communications formats. That's exactly what the EPIC form factor SBC4670 from Micro/sys offers. It matches the fast, low-power 520 MHz PX270 ARM processor with Power Over Ethernet, onboard GPS, a socket modem capable of GSM/GPRS, CDMA or Bluetooth, and/or a CAN bus interface. The board also contains support for an 800 x 600 color flat panel display, audio output and debounced keypad input, as well as eight channels of 14-bit A/D with simultaneous reads, eight channels of 14-bit D/A and 24 channels of digital I/O.

The SBC4670's processor can dynamically shift velocity in response to performance or power consumption changes. On-chip cache, an SDRAM controller, a CompactFlash interface and a USB host controller are also on board, as well as five serial ports, 128 Mbytes of SDRAM, 64 Mbytes of boot flash and a 16-bit PC/104 bus interface. The SBC4670 supports Linux, Windows CE and VxWorks. A stackthrough version is available for plugging into a custom OEM I/O card. Pricing for the basic SBC4670 starts at $595 in single quantity, and at $650 for an industrial temperature (-40° to +85°C) version.

Micro/sys
Montrose, CA.
(818) 244-4600.
[www.embeddedsys.com].

Conduction-Cooled EPIC Card Serves Up 733 MHz Eden

In many defense and aerospace platforms, size, weight and power (SWaP) are critical design considerations. Developed for applications that need all three, Octagon Systems offers the EPIC form factor XE-900 SBC, designed to operate in harsh, demanding environments. The XE-900 incorporates the 32-bit, low-power VIA Eden ESP CPU family. Three versions are available: the 400 MHz and 733 MHz versions operate at -40° to +85°C, and the 1 GHz version operates at -40° to +75°C. Memory includes 512 Kbytes of surface mount flash for BIOS, a SO-DIMM socket for up to 512 Mbytes of SDRAM and 1024 bytes of user-available serial EEPROM. ATA-4 hard drive and CompactFlash interfaces support up to three drives: CD-ROM, hard drive, EIDE flash drives and other EIDE devices. The board includes CRT and flat panel video, six RS-232/422/485 serial ports, two USB ports, 10/100 Base-T Ethernet, PC/104 and PC/104-Plus expansion and 24 lines of bit-programmable, digital I/O with 16 mA sink/source capability. It features ACPI 2.0 and PCI power management. The conduction-cooling system eliminates the need for a fan even at 1 GHz.

Companion XE-900 OS Embedder kits are available for Linux 2.6 and Windows XP. These kits combine hardware and software for instant-on operation. The single piece price is $795 for the 1 GHz version, $745 for the 733 MHz version and $695 for the 400 MHz version. Volume discounts are available for all three.

Octagon Systems
Westminster, CO.
(303) 430-1500.
[www.octagonsystems.com].

Pair of PC/104-Plus Boards Eyes Rugged Apps

Compute density has become the watchword in numerous military applications such as UAVs, vetronics and avionics systems. Feeding such needs, Parvus has unveiled its CPU-1472 and CPU-1474, two PC/104-Plus form factor SBCs featuring the low-power Intel Celeron M 1 GHz processor and Intel i855GME chipset. The CPU-1472/74 cards operate without any active cooling (fanless) over standard (0° to +60°C) and extended (-40° to +85°C) operating temperature ranges. Like other Parvus/Eurotech CPU modules, system DRAM is soldered on board to enhance shock/vibration resistance, and each card is individually thermally qualified to ensure high reliability. A structural heat spreader plate is integrated on top of each CPU module to dissipate heat from critical components.

The CPU-1474 features dual Local Area Network (LAN) controllers (Gigabit and Fast Ethernet) and four USB 2.0 ports, along with standard PC peripherals and I/O interfaces, including dual serial ports, TFT/LVDS interfaces, AC97 audio interface, keyboard and mouse ports, and IDE controller. The CPU-1472 is similar but provides a total of eight USB 2.0 ports and a single 10/100 Ethernet controller. These x86 CPU modules are compatible with Linux, Windows XP Embedded and other popular operating systems. Hardware development kits (DTKs) and accessories are available, as well as professional services for systems engineering of rugged box-level solutions tailored to customer requirements.

Parvus
Salt Lake City, UT.
(801) 483-1533.
[www.parvus.com].

1.86 GHz Core 2 Duo Climbs Aboard PC/104-Express

PCI/104-Express marries the legacy of the PC/104 form factor to the realm of speedy switched fabrics. RTD Embedded Technologies does just that with its latest Core 2 Series of cpuModules with Intel Core 2 Duo Processor and 1 Gbyte of SDRAM. These boards are powered by the GS45 chip set from the "Montevina" platform. A dual channel DDR2 memory interface ensures adequate memory bandwidth to keep up with both processor cores. An Intel Gen 5.0 integrated graphics engine provides extensive rendering capabilities. Some of this CPU's I/O features include Gbit Ethernet, three SATA hard drive connections plus an onboard SATA Disk Chip, up to six USB 2.0 ports, up to four RS-232/422/485 serial port, analog SVGA and digital LVDS video ports.

These modules also support RTD's Advanced Digital I/O and Advanced Analog I/O (aAIO), which allows them to be used as single board solutions for some data acquisition and controller applications. The Core 2 Series cpuModules and controllers are available in PCI/104-Express and PCIe/104 form factors.

RTD Embedded Technologies
State College, PA.
(814) 234-8087.
[www.rtd.com].

Compact, Rugged PC/104-Plus SBC Rolls

Fans are frowned on in harsh environment military applications. They represent a single point of failure that's not worth the risk. Offering its latest fanless SBC solution, VersaLogic began shipping a new PC/104-Plus SBC called the "Manx"—a mid-range SBC featuring a highly efficient AMD Geode LX 800 processor. The product is function and pin-out compatible with VersaLogic's older Puma SBC, offering customers a higher performance migration path from that popular product. The new Manx incorporates mid-range processing speed (500 MHz) with very low power consumption (less than 5 W). The ACPI suspend-to-RAM state feature reduces power draw to an incredible 0.2 W between active sessions.

This high-reliability fanless design is available in both standard (0° to +60°C) and extended (-40° to +85°C) temperature versions. The Manx has standard onboard features that include 256 Mbytes of soldered-on DRAM, 10/100 Ethernet, four USB 2.0 ports, LPT port, IDE interface, three COM ports and analog audio. A CompactFlash socket provides reliable, high-capacity onboard storage with no moving parts. The PC/104-Plus expansion interface supports both ISA and PCI add-on modules. The Manx will be available in production quantities in June. Pricing is about $550 in OEM quantities.

VersaLogic
Eugene, OR.
(541) 485-8575.
[www.versalogic.com].

PC/104-Plus Board Suited for Battery Power Apps

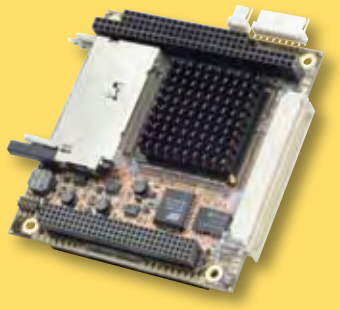
For mobile, battery-driven military systems such as ground robots and small UAVs, power consumption means everything. Serving such needs, WIN Enterprises offers the MB-07303, a PC/104-Plus CPU module with AMD Geode LX800 processor at 500 MHz. MB-07303 features CRT support, 18-bit or 24-bit TTL LCD and digital I/O functions that include two COMs, four USB 2.0 ports, one Ultra ATA-66 interface and CompactFlash. Low power consumption and low heat production enable fanless operation in a wide temperature range.

The board sports one DDR socket for up to 1 Gbyte of memory and dual 10/100 Mbit/s PCI bus Ethernet. The AMD Geode LX800 processor provides mid-range performance in a small form factor with low power/low heat characteristics. The AMD Geode LX800 processor is partnered on the board with the AMD Geode CS5536 chipset. An optional audio module is available providing mic-in and speaker-out functions. The MB-07303 is available now at the single unit price of $298. Quantity discounting is provided.

WIN Enterprises
North Andover, MA.
(978) 688-2000.
[www.win-ent.com]

Complete PC/104-Plus SBC Offers Long Life Cycle

Obsolescence continues to vex military system designers. PC and consumer processor silicon goes end-of-line so fast it can make your head spin. WinSystems eases that burden with their PPM-LX800-G, a highly integrated, PC/104-Plus-compatible, 500 MHz Pentium-class SBC. This SBC is based on the low-power AMD LX 800 at 0.9W CPU, which has product availability through at least 2015. The board includes the CPU, video, Ethernet, USB, COM ports, EIDE controller, digital I/O, mouse, PC 97 audio and keyboard controllers on one board that measures only 3.6 x 3.8 inches (90 x 96 mm).



The PPM-LX800-G can be populated with up to 1 Gbyte of system DRAM plus onboard CompactFlash. A high-resolution video engine is on board that supports displays with resolutions up to 1920 x 1440 for a CRT or up to 1600 x 1200 for a flat panel. An Intel 82551ER 10/100 controller supports Ethernet networking. Further I/O support includes two USB 2.0 ports (with in-rush and over-current protection), four independent full-duplex serial UARTs, 16-lines of TTL-compatible digital I/O and AC97 audio. The PPM-LX800-G contains the core logic to provide PC compatibility for the I/O and bus interface logic including the Ultra DMA100 controller for hard drives, keyboard/mouse controller, LPT interface, interrupt controller and real-time clock. The PPM-LX800-G is priced at $495.

WinSystems
Arlington, TX.
(817) 274-7553.
[www.winsystems.com].

ULTRA SMALL CORE 2 DUO® SYSTEM WITH 500GB OF REMOVABLE STORAGE

S705 RAIDER

Rugged, Ultra Small, Core 2 Duo® System with 500GB of Removable Solid State Disk

- *Up to 2.16 GHz Core 2 Duo® Processor w/ 4MB of L2 Cache*
- *2GB of 667MHz DDR-2 SDRAM*
- *Ultra small and lightweight; 4.6" x 4.6" x 1.6" @ 2 lbs.**
- *Ultra low power requirements; as low as 15W total*
- *Two 2.5" removable SATA Solid State Drives up to 500GB*
- *Dual GigE ports with TCP/IP Offloading Engine (TOE)*
- *Two video options, RGB with Sync-On-Green and DVI*
- *LVDS for interface with LCD panels*
- *Support for two ExpressMini Cards for WiFi and Cell phone MODEMs*
- *Eight buffered General Purpose I/O lines*
- *Full Audio support with onboard 3W Amplifier*
- *Nine USB ports, two Serial ports with RS-232/422/485 buffers and Flow Control*
- *Special Application Module (SAM™) to support: GPS, Mil-STD 1553 or CAN bus interfaces*
- *Available in Rugged, Conduction Cooled Extended Temp -40°C to +85°C*

** (single drive bay configuration)*

Custom configurations welcomed.

All General Micro Systems products are proudly Designed and Manufactured in the USA.

GMS COMPUTING ENGINES

GENERAL MICRO SYSTEMS, INC.
TEL(800) 307-4863 · gms4sbc.com

Products

Get Connected with companies and products featured in this section.
www.cotsjournalonline.com/getconnected

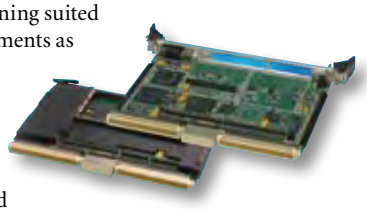
3U cPCI Board and Rack Family Satisfies Extreme Thermal Needs

CompactPCI, particularly in its 3U flavor, is no longer the new kid on the block in the military market. It's paid its dues and is now fully accepted. MEN Micro has introduced a new, rugged 3U CompactPCI (cPCI) family consisting of two single board computers (SBCs) and a rack that provide reliable performance in temperatures as extreme as -40°C and +85°C. The new line includes the conduction-cooled F50C that easily fits into the new conduction-cooled rack (Model # 0701-0054). Both the F50P and F50C SBCs offer the choice of either powerful MPC8548 and MPC8543 PowerPC processors running at speeds up to 1.5 GHz as well as up to 2 Mbytes of SDRAM, 2 Mbyte non-volatile SRAM, 128K non-volatile FRAM and up to 16 Gbytes of flash solid-state disk storage.

Convection-cooled SBCs are fitted with tailor-made heat sinks necessary for their environmental requirements—up to +85°C. The conduction-cooled cPCI rack is an extremely robust, heat-dissipating enclosure designed for use in environments from -40° to +85°C (-40° to +185°F). It is IP-65-compliant, hermetically sealed against environmental impacts and uses wedge locks and MIL-C-38999 connectors to offer excellent vibration and shock resistance. Pricing starts at $1,637 for the F50C and $2,322 for the F50P. The conduction-cooled rack is $5,473.

MEN Micro, Ambler, PA. (215) 542-9575. [www.menmicro.com].

VME SBC Boasts Latest Low-Power Core2 Duo Processor



Perhaps the greatest triumph of VME is its capability to maintain backward compatibility while remaining suited to incorporating new computing elements as they evolve. Exemplifying this trend is Aitech Defense Systems' new 6U VME SBC using Intel's latest T7500 low-power, high-performance Merom Core 2 Duo dual core processors. The new C160 is designed for rugged, mission-critical mobile applications requiring exceptionally low power and high processing throughput.

The new single-slot C160 now offers clock frequencies up to 2.2 GHz for the high-performance version and 1.67 GHz for the low-power version, which draws only 25W. The new board also uses Intel's Virtualization Technology (VT), enabling the board to run different applications simultaneously using multiple virtual partitions. The fully featured C160 incorporates a custom metal thermal management frame supporting an array of integral stiffeners for increased resistance against high shock and vibration. The board offers large memory arrays providing extensive volatile and non-volatile memory resources. These include up to 2 Gbytes fast DDR2 SDRAM operating at 667 MHz and up to 8 Gbytes of onboard flash disk (NAND Flash), with IDE controller eliminating the need for externally attached mass-storage media. OEM pricing for the C160 6U VME SBC starts at $6,050.

Aitech Defense Systems, Chatsworth, CA.
(888) 248-3248. [www.rugged.com].

Wide-Screen LCDs Support Multi Signal Operations.

Large, high-def displays are in demand everywhere these days including aircraft and ground vehicles. Avalex Technologies has released its newest line, the rugged and reliable Series 7 monitors. The wide screens come in 12, 14 and 22 inches. Historically, displays, like most televisions, have had an aspect ratio of 4:3. This means that the ratio of the width of the display screen to the height is 4 to 3. For wide-screen LCD monitors, the aspect ratio is 16:9 (or sometimes 16:10 or 15:9).

Avalex wide-screen LCD displays are useful for viewing multiple signals such as camera video or Electro-Optical/Infra-Red (EO/IR) signals. Also displayed are XGA (Extended Graphics Array), SXGA (Super XGA), UXGA (Ultra XGA), WSXGA+ (Wide SXGA plus), and WUXGA (Wide Ultra XGA) computer signals in wide-screen format, and displaying multiple windows side by side. The high-definition feature or option also uses a wide-screen aspect ratio. The Series 7 display line includes wide viewing angles and a number of standard options, such as high definition, touch screen, freeze and zoom video capability, heater glass for use in cold temperatures and video loop through.

Avalex Technologies, Pensacola, FL.
(850) 470-8464. [www.avalex.com].

Digital-Oscilloscope Series Delivers Sophisticated Features

Advances in test and measurement technologies have brought capabilities to the desktop that once required a rack of boards and chassis. An example along those lines is Agilent Technologies' expanded line of digital-storage oscilloscopes (DSO), with six new models that comprise its next-generation 1000 Series. These new scopes offer bandwidths between 60 MHz and 200 MHz and deliver features normally found on more expensive scopes. The oscilloscopes are available with two or four channels, and each comes in a package that is just 5 inches deep and weighs less than 7 pounds.

All 1000 Series models are equipped with a bright LCD display that offers a sharper image and is visible from a much wider viewing angle than competitive scopes. And with up to 20 kpts of memory per channel, the 1000 Series allows engineers to use the full sample rate of the scope up to 8x longer than other scopes in its class. The scopes can display 23 automatic measurements—up to 21 simultaneously—including measurements from a built-in six-digit counter. Engineers can record and replay up to 1,000 occurrences of a trigger for easy identification of glitches and other anomalies. Agilent DSO1000A Series products are priced from $1,200 to $2,410 depending on configuration.

Agilent Technologies, Palo Alto, CA. (650) 752-5000. [www.agilent.com].

Get Connected with companies and products featured in this section.
www.cotsjournalonline.com/getconnected

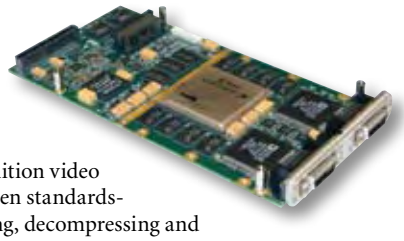
VXS Card Enables 1.3 TeraMAC/s Signal Processing

Multi-channel applications such as beamforming, Radar, SIGINT, COMINT and wireless communications have a seemingly endless appetite for high-speed data conversion. With that in mind TEK Microsystems has released its QuiXilica Atlas-V5 VXS product. The new Atlas-V5 provides eight channels of 12-bit 1 Gsps (Gigasamples per second) analog inputs streaming up to 12 Gbytes/s into three Xilinx Virtex 5 FPGAs in a single 6U VME/VXS slot. The Atlas-V5 is the first product to support 1 Gsps ADC devices with 12 bits of resolution.

Atlas-V5 uses eight 12-bit ADC digitizer channels each performing at up to 1.0 Gsps combined with three Xilinx Virtex-5 FPGAs. Each channel has an input bandwidth of 1.5 GHz, supporting operation up to the third Nyquist band, and uses a single ADC without interleaving. The front end FPGAs, typically SX95T devices, each accept four channels of input data for initial processing. The outputs of the front end FPGAs are then combined in the back end FPGA for additional processing and output via the VXS backplane or front panel QSFP fiber optic links at aggregate rates up to 3.75 Gbytes/s. Like all of the QuiXilica-V5 products, the Atlas-V5 is available for a wide range of operating environments, including rugged air- and conduction-cooled for deployed applications.

TEK Microsystems, Chelmsford, MA. (978) 244-9200. [www.tekmicro.com].

High-Def Video XMC Has JPEG2000 Compression



High-definition video shared over IP-based networks will define the next generation of the U.S. military's situation awareness and command/control technologies. Facilitating that trend, Curtiss-Wright Controls Embedded Computing offers the XMC-280, an interface for high-definition video with JPEG2000 compression. The XMC-280 provides an open standards-based high-performance solution for capturing, compressing, decompressing and displaying two channels of video up to 1080p and 1920 x 1200 resolutions. Designed for demanding military video applications, the XMC-280 facilitates the design of systems that require the distribution or recording of video such as those in situational awareness applications.

The XMC-280 features: two video Inputs (each can be Digital DVI, Analogue RGB or PAL/NTSC composite) each up to 1920 x 1200 at 60 Hz, and two DVI-D digital outputs. Captured video is compressed using a high-performance FPGA-based JPEG2000 algorithm, or transmitted over PCIe interface uncompressed. Two stereo channels (or four mono channels) of audio are provided for input/output (16-bit 48 kHz, WAV and PCM encoding). Pricing for the XMC-280 starts at $5,000.

Curtiss-Wright Controls Embedded Computing, Leesburg, VA.
(703) 779-7800. [www.cwcembedded.com].

VXS Board Serves up Dual Freescale 8641Ds

VXS has established itself as a "here and now" technology for bringing switched fabric performance into the infrastructure of VME. Mercury Computer Systems offers the Ensemble 5000 Series VXS HCD5220 Dual 8641D Dual-Core Processing Module. The HCD5220 is the first of several new products from the VXS Ensemble 5000 Series product family designed to extend embedded, high-performance computing to a sensor-networked environment, enabling rapid access to critical information from distributed sensors via the Converged Sensor Network (CSN) Architecture.

The Ensemble VXS HCD5220 is rich with architectural innovations and industry firsts. The HCD5220 combines the high-performance computing power of two Freescale 8641D PowerPC processors with dual PMC/XMC mezzanine sites, creating the ultimate balance of I/O and processing per slot. The HCD5220 includes key architectural elements from Mercury's CSN Architecture. Each PowerPC processor in a large multi-board system is paired with several internal and external Gbit Ethernet interfaces, allowing any processor to communicate with any other processor for system control, as well as with customer-configured external networked resources. The Ethernet network is in addition to the 3.125 Gbaud Serial RapidIO switch topology for application data. The VXS HCD5220 module is available now. Entry-level versions in volume start at under $10,000.

Mercury Computer Systems,
Chelmsford, MA.
(978) 256-1300.
[www.mc.com].

PrAMC Features 1.2 GHz EP80579 Processor, 8 Gbytes of Memory

The AMC mezzanine form factor, as well as its cousin PrAMC, has established a strong market presence following in the footsteps of PMC. JumpGen Systems has rolled out the PRM-110, a processor AdvancedMC (PrAMC) featuring the Intel EP80579 Integrated Processor with Intel QuickAssist Technology and up to 4 Gbytes of ECC DDR2 memory. The PRM-110 supports up to 5 GigE links including 2 Front Panel and 3 routed to the AMC connector. The PRM-110 may be deployed with 600 MHz, 1.066 GHz, or 1.2 GHz processors to serve as coprocessor or host processor for embedded communication applications. The Intel EP80579 is available with integrated accelerators that support Intel QuickAssist Technology through software packages provided by Intel. The software drivers enable acceleration of cryptographic and packet processing for VPN/firewall and unified threat management, wireless and WIMAX access applications, and SMB and home network attached storage applications.

The board features up to 8 Gbytes of persistent memory, a PCI Express x4 interface to AMC.1, Type 4 and several Gbit Ethernet options. The card is available in both full and mid-size AMC configurations for AdvancedTCA (ATCA), MicroTCA and proprietary architecture system. The PRM-110 is shipping to select customers this quarter and will be generally available in Q3 2009.

JumpGen Systems, Carlsbad, CA. (760) 931-7800. [www.jumpgen.com].

5.7-inch Touch Panel Computer Is Fanless

The combination of touch panel technology and the ability of processors to handle sophisticated touch screen graphic interfaces has transformed the notion of what a military computer terminal can do. Feeding that trend, the Industrial Automation Group of Advantech introduces a lower cost version of their current TPC-66T 5.7-inch QVGA TFT LCD touch panel computer. The TPC-66T-E2BE version comes with 64 colors, 320 x 240 resolution and an Intel low power consuming CPU and heat sink to achieve a unique fanless design.

The low-voltage processor (Intel XScale PXA270 312 MHz) with an LED backlight is very power efficient, and with its 320 x 240 resolution, it provides a clear display for its compact size. Furthermore, the TPC-66T-E2BE provides multiple standard communication ports (2 x RS-232, 1 x RS-485, 1 x Ethernet, 1 x USB) allowing connectivity with a variety of peripherals.

The TPC-66T-E2BE supports Microsoft Windows CE and comes with an NEMA4/IP65 front panel resilient enough to withstand the harsh conditions of any industrial environment.

Advantech, Irvine, CA. (949) 789-7178. [www.advantech.com].

Instrument Duo Does Precise Temp and Battery Measurement

Military portable gear and vehicles are relying more and more on battery power. Developing such systems requires precise measurements. Data Translation feeds those needs with more powerful versions of its VOLTpoint and TEMPpoint instruments for battery and temperature measurement. By incorporating proprietary ISO-Channel technology, users can get unprecedented accuracy in analog voltage readings regardless of the environmental conditions.

ISO-Channel technology offers increased reliability over older relay front end designs prone to system failure, by implementing a separate DC/DC Converter on each 24-bit A/D converter for all 48 channels. VOLTpoint and TEMPpoint measurement instruments have ISO-Channel floating front ends with each input connected to an individual, floating A/D converter with onboard signal conditioning. VOLTpoint is a precision measurement instrument designed and newly enhanced for measuring a wide range of voltage inputs of +/-10V, +/-100V and +/-400V. TEMPpoint is a series of temperature measurement instruments designed for high accuracy and industrial robustness. These instruments allow direct thermocouple, RTD, and precision voltage or resistance measurements with a PC. Pricing for VOLTpoint and TEMPpoint begins at $3,195 and both are available immediately in USB and Ethernet Versions.

Data Translation, Marlboro, MA.
(508) 481-3700. [www.datatranslation.com].

Quadrature Counter Packs 4-Axes Support in a Single Chip

Military applications requiring precise motion control and measurement—like robotics and UAVs for example—are looking for more integrated solutions. LSI Computer Systems has introduced the LS7566R, the latest addition to its incremental encoder interface family of ICs. It provides an efficient hardware solution for extracting position data directly from the quadrature outputs of as many as four encoder units. The input quadrature clocks from encoders are digitally filtered for elimination of noise and errors arising out of encoder dither, providing a high level of reliability.

Communications to host processors are facilitated by a 3-state octal bus and an interrupt protocol with selections from a pool of marker flags. LS7566R includes four identical channels, each featuring 24-bit up/down counter for accumulating encoder positional data. Also provided is a 24-bit input register along with its companion 24-bit comparator for target position. The maximum count frequency is 40 MHz. Operating voltage is 3V to 5.5V. The LS7566R is available in a 48-pin TSSOP package. Unit price in 1k quantity is $5.80.

LSI Computer Systems, Melville, NY.
(631) 271-0400. [www.lsicsi.com].

Rugged Direct-Spray Enclosure Supports 3U Boards

The new generation of ground vehicles, UAVs and rotor wing aircraft designs is sensitive to size, weight, power and cost. With that in mind, SprayCool offers MPE-3U, a 3U form factor of its scalable MPE line of direct-spray rugged enclosures. The MPE-3U weighs in at only 18 lbs, but is rugged enough to provide environmental isolation to both commercial grade and rugged 3U cards. Building on the legacy of flexibility inherent in all SprayCool enclosures, the MPE-3U allows customers to deploy commercial-grade or legacy electronics in the same enclosure.

In the case of electronics cards designed for air or conduction cooling, this translates directly into lower costs and faster development cycles for integrators and their military customers. The MPE-3U enclosure can scale above 7 slots and is designed to meet industry standard designs for 3U VPX, cPCI/cPCIe and VME-64X and proprietary electronics boards, offering significantly more cooling capability per slot (up to 100 W) than enclosures using lower capacity cooling technologies such as air or conduction cooling. The operating environment can range from temperatures of -55° to +71°C, and altitudes of up to 55,000 ft, even in unpressurized compartments.

SprayCool, Liberty Lake, WA. (509) 232-2600. [www.spraycool.com].

Get Connected with companies and products featured in this section.
www.cotsjournalonline.com/getconnected

Microstep Motor Integrates Encoder, Driver and Controller

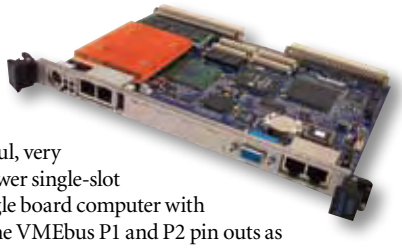
The number of small motors in a complex system like an aircraft is often unappreciated. Arcus Technology has developed an all-in-one NEMA 11 microstep motor with driver, controller and encoder integrated into the motor's back cap, minimizing external electronics and wiring. The DMX-K-SA-11 stepper motor uses Renishaw's magnetic AM256 magnetic encoder chip for real-time position verification. The small package size of the magnetic chip encoder allows the motor to stay within the 1.1-inch-square form factor of the NEMA 11 standard. The new DMX-K-SA-11 stepper motor is ideal for size-sensitive applications requiring open-loop microstep motion with real-time position confirmation.

The integrated DMX-K-SA-11 is a 16-microstep driver that is capable of full, 1/2, 1/4, or 1/16 microsteps in three different stack sizes. With an operational range of -40° to 125°C, high resistance to shock and vibration, and rotational speed capability up to 60,000 rpm, the AM256 combines ruggedness and performance needed for harsh environments.

Arcus Technology, Livermore, CA.
(925) 373-8800. [www.arcus-technology.com].

VME Replacement Board Offers Processing Boost

A strength of VME's legacy is that there's a wide array of vendors supporting obsolescence issues. A drop-in replacement for the end-of-life SBS VR7 VME board from Xembedded is now available, but with much more processor power. The XVME-689-VR7 is a



powerful, very low-power single-slot 6U single board computer with the same VMEbus P1 and P2 pin outs as the company's VR7. The XVME-689-VR7 VMEbus processor integrates an Intel Celeron M processor running at 1.0 GHz with up to 512 Kbytes of level 2 cache and a PCI-to-VMEbus interface. 512 Mbyte or 1 Gbyte ECC or Non-ECC DDR, 266/333 MHz SDRAM are available on the XVME-689-VR7. The XVME-689-VR7 has VGA Graphics out front panel or rear video support (Pixel resolution up to 1600 x 1200 at 85 Hz).

Additional options available on the XVME-689-VR7 are EIDE onboard 1.8-inch hard drive, CompactFlash carrier, two Serial ATA150 (SATA150) external devices and a floppy disk interface. SCSI can be added with the use of a SCSI PMC board. This XVME-689-VR7 processor module allows users to take advantage of the low-power, multiprocessing capability of the VMEbus while using standard off-the-shelf PC software, operating systems and VMEbus I/O modules.

Xembedded, Ann Arbor, MI.
(734) 975-0577. [www.Xembedded.com].

Get Connected with companies and products featured in this section.
www.cotsjournalonline.com/getconnected

Serial ATA Flash Drive Ready for Tough Environments

Serial ATA is quickly becoming the dominant storage interface technology—in both flash and rotating disks. Apacer has launched its new Serial ATA Flash Drive (SAFD) 254 for industrial and embedded applications. Apacer's latest SAFD 254 employs its proprietary stacking technology, which supports the widest range of operating temperature by as much as 128 Gbytes compared to all other available industrial SSD solutions in today's market. With the highly reliable NAND SLC memory, the SAFD 254 is capable of read/write speed of up to 150/130 Mbytes/s.

Apacer's SAFD 254 uses global wear leveling technology, which manages the uneven "wear" on the sectors of a flash media memory by distributing the writes through whole sectors of the flash media to extend its life cycle. The built-in S.M.A.R.T technology (Self-Monitoring, Analysis, and Reporting Technology) provides users with an interface that allows instant display of key information including spare blocks and erase counts, which reduces the risk of sudden disk damage and proactively notifies customers to back up system and data. Also, the built-in low-power detector initiates cached data saving before the device's power supply is too low. Such intelligent power failure recovery function prevents the system from data damage or data error due to sudden power outage, providing superior data security.

Apacer Memory America, Milpitas, CA.
(408) 586-1291. [www.apacer.com].

VPX SBC Serves Up 1.86 GHz Core2 Duo

VPX is shaping up to be the favorite next-gen embedded computer architecture for the military. GE Fanuc Intelligent Platforms's latest VPX offering is the SBC620 rugged 6U VPX single board computer. The SBC620 features an Intel 1.86 GHz Core2 Duo (Penryn) processor with 6 Mbytes of L2 cache memory and up to 4 Gbytes of DDR2 SDRAM. The SBC620 is characterized by the flexibility and performance of its I/O subsystem. The onboard Intel 5100 chipset provides four x4 PCI Express lanes to the VPX backplane, with one XMC site supported by x8 PCI Express and a second site supported by x4 PCI Express. I/O flexibility is further enhanced by the provision of six USB 2.0 ports, two Gbit Ethernet ports, two SATA (3 Gbit/s) ports and two RS-232/422 ports.

The SBC620 also features an XGI Volari Z11 graphics processor, enabling the SBC620 to support dual VGA or VGA/DVI output. Available in five ruggedization levels from convection-cooled for development to conduction-cooled extended temperature operation for deployment, and providing optimum performance per watt, the SBC620 can be optionally configured with covers to allow for 2-level maintenance in line with the VITA-48 (REDI) standard.

GE Fanuc Intelligent Platforms, Charlottesville, VA.
(800) 368-2738. [www.gefanucembedded.com].

LEADING THE WAY IN TOUCH SCREEN TECHNOLOGY

The proven leader in optical touch screens has now made its technology available for use in the next generation front line systems. Capable of withstanding the harshest environments, zForce can be configured dynamically to achieve a graphical interface for simple interpretation while under extreme threat.

- Out performs other touch screen technologies for easy use and durability
- Simple finger touch control based on proven standards
- 100% application configurable for displays up to 10”
- Proven in the consumer electronic space with thousands units shipped

For Further Information:
949.233.8630
mark@nu-techsales.com

neonode

1U Rackmount Networking Platform Features 8 x GbE

The 1U rackmount form factor is finding a significant niche in military applications. Feeding that need, a 1U rackmount networking and network security platform is based on the Intel EP80579 integrated processor, a system-on-a-chip (SoC) that integrates CPU, North Bridge, South Bridge and optional Intel QuickAssist accelerator technology on a single chip. Compared with three-chip solutions, the EP80579 offers more performance per watt and application-specific performance in less space than traditional designs. The platform offers a choice of processor performance of either 600 MHz or 1.2 GHz, a high-bandwidth DDRII DIMM slot with memory up to 2 Gbytes, and a full set of VPN functions such as encryption, hashing and public/private key generation. Storage features include one 3.5" SATA HDD and CompactFlash.

The platform offers five GbE Copper and a maximum of eight GbE Ethernet ports via PCI-E by 1 or by 4 that are accessible on the front panel. To prevent network problems when the platform shuts down, PL-8000 supports one segment of LAN bypass function through WDT and GPIO pin definitions. Pricing for the unit with onboard processor begins at $435 in OEM quantities.

WIN Enterprises, North Andover, MA. (978) 688-2000. [www.win-ent.com].

PMC Card Offers Time-Triggered Networking

TTP is a communication protocol for design of fault-tolerant distributed hard real-time systems with clean definition of key system interfaces. TTTech has developed a PMC Card with TTP communication controller and a PowerPC host processor. TTPPMC Card enables time-triggered and deterministic networking for complex distributed systems. It has been designed for the use of all kinds of standard modules with PMC interface. System configuration with TTP-based PMC cards allows customers to benefit from faster time-to-market and reduced lifecycle costs.

Distributed embedded computing with TTPPMC Card enables development of distributed applications independent of the underlying communication architecture, physical layer, topology or embedded host hardware. TTPPMC Card makes application design as easy as possible. It contains an Austriamicrosystems AS8202NF communication controller and a standard Freescale MPC5567 host processor on board. A TTP network facilitates the development of reusable platforms and supports full separation of application design from system interfacing details.

TTTech North America, Tucson, AZ.
(619) 994-8626. [www.tttech.com].

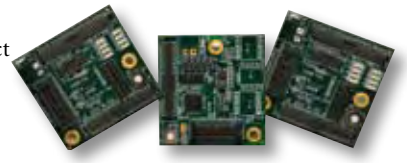
Extended Temperature Module Sports Atom Z5xx Series

Intel's Atom provides the best of two worlds: PC compatibility and low-power operation. Using the new industrial temperature versions of the ultra-low-power Intel Atom processor Z5xx series and the System Controller Hub US15WPT, a new COM Express module is geared around low power consumption and the industrial temperature range. All components used for the high-density design conga-CAx from Congatec are specified for an ambient temperature range of -40° to +85°C. Typical power requirements for this module are less than 5W. When combined with ACPI 3.0 battery management, ultra-mobile industrial applications are now possible.

The conga-CAx is available in two different CPU variants. One version is powered by the Intel Atom processor Z510PT with 1.1 GHz and 400 MHz front side and memory bus. The other version features the1.33 GHz Intel Atom processor Z520PT. Both variants are equipped with 512k L2 cache and can access up to 1 Gbyte of rugged onboard soldered DDR2 RAM. The conga-CAx also offers a rich connectivity feature-set. This includes up to 2 PCI Express x1 lanes, PCI Bus, EIDE interface, Gbit Ethernet, High Definition Audio and 8 USB ports. The onboard IDE flash drive provides up to 2 Gbytes of mass storage and is also specified for the full industrial temperature range.

Congatec, Cardiff-by-the-Sea, CA. (760) 635-2600. [www.congatec.us].

Trio of Controller Boards Rides StackableUSB



With ISA-based all but fading from view, system designers are hungry for a straightforward bus interconnect for small systems. StackableUSB feeds that need offering PC/104-like stackability linked via USB. Micro/sys continues to expand its selection of StackableUSB line with the release of three general-purpose industrial Client microcontroller boards: the USB1132, USB1124 and USB1108. The first in this family is the USB1132, a PIC32 Industrial Client card powered by the Microchip PIC32. The USB1132 has 1.56 DMIPS/MHz performance at 80 MHz, 512 Kbytes flash and 32 Kbytes SRAM memory. Features include 16 channel, 10-bit, 500 ksps ADC, RS-232, eight programmable LEDs, digital I/O, and much more (SPI, I2C, timers). The USB1124, meanwhile, is the more energy-economical PIC24 Industrial Client microcontroller powered by the Microchip PIC24, which typically requires only 40 mA power.

Rounding out the new selection is the Micro/sys USB1108 powered by an 8-bit, pipelined, 8051 general-purpose microcontroller (the Silicon Labs C8051F340). The USB1108 has 48 MIPS performance at 48 MHz, 64 Kbyte flash, 2 Kbyte EEPROM and 4352 bytes RAM. The USB1108 gives OEMs access to basic microcontroller features such as a 10-bit differential ADC, digital I/O, timers, PWMs, SPI, I2C and RS-232. The basic USB1132 starts at $165 in single quantity, the USB1124 at $145, and USB1108 at $125.

Micro/sys, Montrose, CA. (818) 244-4600. [www.embeddedsys.com].

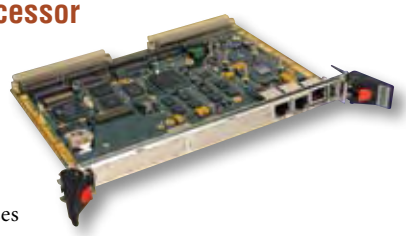
USB Module Aids Connectivity for RS-232-Based Apps

Even as military systems embrace even more sophisticated processing elements, there's still a vast array of mundane serial interfaces that need to be linked to. USB is a good solution for bridging that gap. A USB to single-channel RS-232 level serial UART from Future Technology Devices incorporates FTDI's FT232RQ IC, which handles all the USB signaling and USB to UART protocols. The modules provide a fast, simple way to connect devices with an RS-232 level serial UART interface (9 way standard D-type connector) to USB (type B socket). Supporting communications with any RS-232 device, the module's RS-232 port provides full hardware handshaking capability and a data rate of up to 1 Mbit/s. It also has three LEDs that indicate power and give a visual indication of traffic through the module. The FT232RQ is an industry standard USB to asynchronous serial interface IC.

Device drivers for all current Microsoft Windows, Mac OS X and Linux operating systems are available for free. The USB-COM232-PLUS1 module has a wide range of operating temperature from -40° to + 85°C making it suitable for applications in harsh environments.

Future Technology Devices International, Glasgow, Scotland.
+44 (0) 141 429 2777. [www.ftdichip.com].

1.6 GHz Atom N270 Processor Powers VME SBC



With a power consumption of under 20W, a new ultra-low-power VME single board computer is based on the Intel Atom processor. The VP A45/01x from Concurrent Technologies uses the 1.6 GHz Intel Atom processor N270 and the Intel 945GSE Express chipset both from the Intel embedded roadmap, ensuring long-term availability. With 2 Gbyte DDR2-533 SDRAM, this ultra-low-power board also supports a variety of peripheral I/O ports, flash drive, CompactFlash site and PMC/XMC modules.

Commercial and extended temperature versions are now available, and ruggedized, conduction-cooled or air-cooled (to VITA 47) versions will be available shortly. With a wide range of flexible I/O, the VP A45/01x supports a PMC/XMC site with front I/O and P2 rear I/O (VITA35 P4V2-64ac) plus a second 33 MHz PMC site with front I/O and rear I/O via the optional P0. A range of onboard I/O is available to the user: two Ethernet interfaces, a USB 2.0 port and an RS-232 interface via the front panel, whilst the rear panel I/O includes digital 3D graphics (2048 x 1536), keyboard, mouse, four GPIO signals, two USB 2.0 ports, an RS--232/ RS422/RS-485 port and two SATA150 interfaces. The optional P0 also supports two Gigabit Ethernet interfaces.

Concurrent Technologies, Woburn, MA.
(781) 933-5900. [www.gocct.com].

PC/104 Consortium & 3U CompactPCI Boards Gallery

Featuring the latest in PC/104 Consortium & 3U CompactPCI Boards technology

P104-WDG-CSMA: PC/104-Plus Watchdog Timer Status Monitor

- PC/104-Plus watchdog timer
- Watchdog open collector reset outputs
- Temperature sensor with calibration pot
- Temperature monitor / alarm
- Temperature measurement with 8-bit A/D
- Fan status and speed control
- PCI/104 power monitor / limit alarm
- Opto-isolated input to trigger reset
- General purpose opto-isolated input
- Two isolated outputs, current limited
- TTL reset pushbutton input
- Two general purpose 8-bit A/D inputs
- Light sensor for enclosure security

ACCES I/O Products, Inc.
Phone: (858) 550-9559
Fax: (858) 550-7322
E-mail: contactus@accesio.com
Web: www.accesio.com

P104-DIO-96: PC/104-Plus 96-Channel High Speed Digital I/O

- 96 Channel TTL-DTL high speed digital I/O
- Software selectable in vs. out as 8 bit and 4 bit ports
- Emulates 4 industry standard 8255 PPIs (mode 0)
- Full 32-bit PCI interface design
- Buffered circuits for higher driving capacity
- Low CPU overhead
- Known power-up states
- Output port status read back
- Standard 50-pin IDC connectors (x4)
- 0 to +70° C and -40 to +85° C versions available

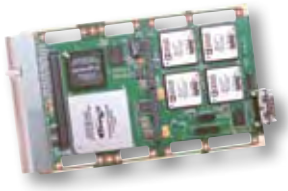
ACCES I/O Products, Inc.
Phone: (858) 550-9559
Fax: (858) 550-7322
E-mail: contactus@accesio.com
Web: www.accesio.com

ADLS15PC – Intel Z510/530 Atom PC/104 CPU 1.1GHz - 1.60GHz - NOW SHIPPING!

- Intel US15W SCH
- Up to 2GB DDR2 SODIMM200
- 8x USB2.0
- COM1/2, LPT
- CRT/LVDS
- GIGABIT Ethernet
- PATA Interface
- RTC and Watchdog
- Up To 4GB Onboard SSD
- PC/104-Plus
- +5V Single Rail
- Picture Shown with Passive Cooling
- Serving the PC/104 Industry for over 15 years!

Advanced Digital Logic
Phone: (858) 490-0597
Fax: (858) 490-0599
E-mail: sales@adl-usa.com
Web: www.adl-usa.com

GT-3U-cPCI



- Altera® Stratix® IV GX FPGA implementing BittWare's ATLANTiS™ FrameWork for control of I/O, routing, and processing
- Four ADSP-TS201S TigerSHARC® DSPs
- BittWare's FINe™ Host/Control Bridge for control plane processing and interface via 10/100 Ethernet and RS-232
- 3U CompactPCI form factor (PICMG 2.0 R3.0)
- Ruggedized versions available

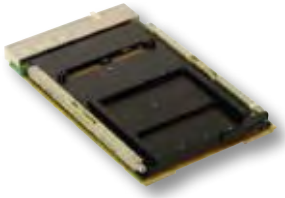
BittWare, Inc.
Phone: (603) 226-0404
Fax: (603) 226-6667
E-mail: info@bittware.com
Web: www.bittware.com

TP 442/34x - Core 2 Duo processor board

- 3U CompactPCI
- 2.16Ghz or 1.5Ghz Core 2 Duo or
- Low power 1.73Ghz Celeron M processor
- Up to 2 Gbytes DRAM; optional hard disk drive or Compact Flash
- Gigabit Ethernet, SATA, serial interfaces
- On board graphics
- XMC or PMC site

Concurrent Technologies
Phone: (781) 933-5900
Fax: (781) 933-5911
E-mail: sales@gocct.com
Web: www.gocct.com

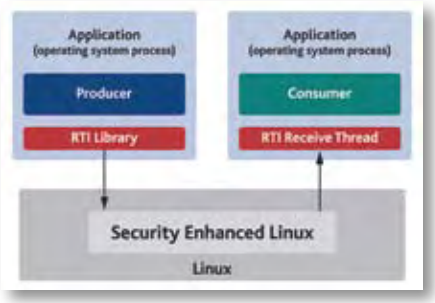
TP 402/351 – Rugged Core 2 Duo processor board



- 3U CompactPCI
- 1.5Ghz Core 2 Duo processor
- Up to 4 Gbytes DRAM, onboard Flash Disk
- Gigabit Ethernet, SATA, serial interfaces
- XMC site
- Commercial variant available

Concurrent Technologies
Phone: (781) 933-5900
Fax: (781) 933-5911
E-mail: sales@gocct.com
Web: www.gocct.com

Real-Time Messaging Middleware Meets Secure Linux

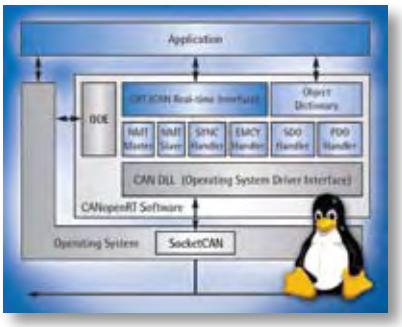


The Linux operating system has a firm foothold in the military market. Software developers like the fact that they can start developing with Linux without the overhead of a commercial OS to consider. Real-Time Innovations (RTI) has announced that RTI Data Distribution Service, its real-time messaging middleware, has been integrated with Security-Enhanced Linux (SELinux). This combination provides real-time and high-performance distributed applications with the ability to securely distribute data by combining RTI's high-performance network communications with the extremely flexible Mandatory Access Control (MAC) facilities of SELinux.

RTI Data Distribution Service allows distributed applications to securely exchange messages and data by authenticating peers and encrypting information that is sent over the network. The MAC capabilities of SELinux add several additional levels of protection against misconfiguration, software errors and application vulnerabilities: System-wide security policies control which applications are allowed to communicate with each other. Even applications with the appropriate credentials and keys can communicate only if explicitly provisioned to do so. Files containing keys, configuration information and logs are protected from unauthorized access. RTI Data Distribution Service and a reference SELinux security policy are available today from RTI.

Real-Time Innovations, Sunnyvale, CA.
(408) 990-7400. [www.rti.com].

CANopen Stack Supports SocketCAN Drivers for Linux



The popular CANopenRT protocol software from IXXAT now supports the most recent implementation of the SocketCAN drivers for Linux using the Sysfs virtual file system. SocketCAN is a set of open source drivers and a network stack that extends the Berkeley sockets API in Linux by introducing a new protocol family: PF_CAN. Main components of SocketCAN are the network device drivers for different CAN controllers and the implementation of the CAN protocol family. The SocketCAN framework has become part of a vanilla kernel starting with 2.6.25.

IXXAT's CANopenRT software has supported multiple user application threads interacting with one CANopen core stack module since its initial release. The abstraction of the CAN controller as a Socket interface now offers the possibility to run other CAN-based protocols, such as SAE J1939, on the same CAN interface in parallel to CANopen also on Linux platforms, similar to the versatility that is already available on Microsoft Windows systems with CANopenRT for the IXXAT VCI V3 driver. CANopenRT has been tested with SocketCAN drivers for NXP SJA1000 and Freescale MSCAN for Linux distributions based on the kernel version 2.6.

IXXAT, Bedford, NH. (603) 471-0800. [www.ixxat.com].

PC/104 Consortium & 3U CompactPCI Boards Gallery

CONCURRENT TECHNOLOGIES

TP A4x/30x – low power Atom processor board

- 3U CompactPCI
- 1.6Ghz Atom processor
- Up to 2Gbytes DRAM
- Gigabit Ethernet, SATA, serial interfaces
- Graphics; CANbus
- Optional disk drive or CompactFlash
- Rugged versions available

Concurrent Technologies
Phone: (781) 933-5900
Fax: (781) 933-5911
E-mail: sales@gocct.com
Web: www.gocct.com

CONCURRENT TECHNOLOGIES

TP MS1/xxx – Mass Storage Controller board

- 3U CompactPCI
- Supports 1 or 2 SATA300 drives
- Compact Flash site
- Optional support for further 2 SATA300 drives
- Supports RAID 0 and RAID 1

Concurrent Technologies
Phone: (781) 933-5900
Fax: (781) 933-5911
E-mail: sales@gocct.com
Web: www.gocct.com

DDC® Data Device Corporation

BU-65590C MIL-STD-1553 / ARINC 429 PC/104-*Plus* Card

- PC/104-*Plus* or PCI-104
- Up to 2 Dual Redundant MIL-STD-1553 Channels
- Up to 16 ARINC 429 Receive and 8 Transmit Channels
- IRIG-B Time Code Input and Output
- IRIG-106 Chapter 10 Monitor Format
- DMA Engine for Low CPU and PCI Utilization
- Built-In Self Test

Data Device Corporation
Phone: (631) 567-5600
Fax: (631) 567-7358
E-mail: service@ddc-web.com
Web: www.ddc-web.com

WinSystems®

PC/104 and PC/104-*Plus* Modules: Small, Stackable and Rugged

- x86-compatible Single Board Computers
- Analog, Digital, Serial, GPS, and USB I/O Modules
- GSM Cellular, 802.11 Wireless, ZigBee, Ethernet, and Modems
- Communication Modules
- SBC Quick Start Kits for Windows® XP, CE, and Linux
- -40° to +85°C Operational Temperature
- 30-Day Product Evaluation Available

WinSystems, Inc.
Phone: (817) 274-7553
Fax: (817) 548-1358
E-mail: info@winsystems.com
Web: www.winsystems.com

Advertisers Index

Company	Page#	Website
ACCES I/O Products	16	www.accesio.com
ACT/Technico	33	www.acttechnico.com
Avalex Technology	7	www.avalex.com
Aydin Displays, Inc.	26	www.aydindisplays.com
Ballard Technology	72	www.ballardtech.com
Birdstep Technology	42	www.birdstep.com
BittWare	34	www.bittware.com
Calex	48	www.calex.com
CM Computer	5	cmcomputer.com
Connect Tech Inc	11	www.connecttech.com
Crystal Group, Inc.	61	www.crystalrugged.com
Data Device Corporation	29	www.ddc-web.com
Datakey Electronics	4	www.datakeyelectronics.com
Dolphin Interconnect Solutions	47	www.dolphinics.com
ELMA Components Div	32	www.elmabustronic.com
Extreme Engineering Solutions, Inc.	45	www.xes-inc.com
General Micro Systems, Inc.	57	www.gms4sbc.com
Highland Technology	54	www.highlandtechnology.com
Interconnect Systems Inc	44	www.isipkg.com
Lind Electronics, Inc	65	www.lindelectronics.com
Lippert Embedded Computers	43	www.lippert-at.com
National Instruments	9	www.ni.com
neonode	63	mark@nu-techsales.com
Ocean Server Technology	15	www.ocean-server.com
Octagon Systems	27	www.octagonsystems.com
One Stop Systems	69	www.onestopsystems.com
Parvus Corporation	21	www.parvus.com
PC/104 & 3U CompactPCI Boards Gallery	66, 67	
PCI Systems	62	www.pcisystems.com
Pentair Electronic Packaging	49	www.pentair-ep.com
Performance Technologies	19	www.pt.com
Phoenix International	65	www.phenxint.com
PICO Electronics, Inc	56	www.picoelectronicsinc.com
Pioneer Magnetics	23	www.PioneerMagnetics.com
RadiSys	31	www.radisys.com
Rave Computer	25	www.rave.com
Red Rapids, Inc.	28	redrapids.com
RSI Inc. CRI Division	55	www.rsi-cri.com
RTD Embedded Technologies	36,37	www.rtd.com
RTD Embedded Technologies	2	www.rtd.com
Sensoray Company	24	www.sensoray.com
Smartronix Inc	4	www.smartronix.com
Themis Computer	20	www.themis.com
VersaLogic Corporation	39	www.versalogic.com
Vetronics	51	www.cotsjournalonline.com
VICOR	71	www.vicorpower.com
VPT, Inc,	41	www.vpt-inc.com
White Electronic Designs	17	www.wedc.com
WinSystems	35	www.winsystems.com

COTS Journal (ISSN#1526-4653) is published monthly at 905 Calle Amanecer, Suite 250, San Clemente, CA 92673. Periodicals Class postage paid at San Clemente and additional mailing offices.
POSTMASTER: Send address changes to COTS Journal, 905 Calle Amanecer, Ste. 250, San Clemente, CA 92673.

Coming Next Month

Special Feature: Beyond 1553: Evaluating the Alternatives: Tried and true I/O schemes, such as MIL-STD-1553 and ARINC 429, remain popular for pure control applications, but they're bandwidth-limited by today's standards. A slew of multipurpose communications protocols provide options to suit emerging needs. Articles in this section compare today's crop of I/O schemes relevant to military users.

Tech Recon: Space-Qualified Boards and ICs: Space-based semiconductors and board-level systems must be capable of withstanding everything from intense radiation due to high-energy atoms to bombardments from neutrons and other particles. Right-sizing the appropriate level of radiation hardening is somewhat of an art. Articles in this section explore the radiation concerns facing space designers and update readers on radiation-hardened boards and subsystems as well ASICs, FPGAs and power components designed for those applications.

System Development: Shock & Vibration Testing for Embedded Boards: As systems get denser and more complex, the problem of engineering boards and enclosures isn't getting any easier. Meeting the stringent levels of shock and vibration ratings required by most defense and aerospace programs is no slam dunk. Relying on outdated Mil-Spec guidelines like MIL-STD-810F is no longer sufficient, and full environment stress screening techniques like HASS and HALT have moved into the forefront. Articles in this section delve into those areas and compare the solutions available.

Tech Focus: FPGA Processing Boards: As the signal processing capabilities of FPGAs continue to climb, board-level configurable computing solutions have grown to become key enablers for waveform-intensive applications like sonar, radar, SIGINT and SDR. Such systems have an insatiable appetite for more digital signal processing muscle. This feature section delves into the solutions available in this area and explores how they're transforming military signal processing systems.

TALON 4

RUGGED, HIGH-PERFORMANCE RAID STORAGE

WITH INNOVATIVE, REMOVABLE DRIVE PACKS AND SBB 2.0 COMPLIANT CONTROLLERS.

- Two easily removable drive packs, each capable of transporting up to 6TB of data (using 1TB SATA drives)
- Hermetically sealed drive packs to ensure operation to altitudes of 41,000 feet (12,496 Meters)
- Rugged and fully field deployable in harsh environments
- Sustained data transfer rates of over 300 MB/s per controller

Part Number: OSS-TALON4

ROBUST DATA PROTECTION AND MANAGEMENT

TALON 4 offers multiple levels of user-selectable RAID configurations, which provide the highest level of protection and performance. A host-based management utility with remote management provides detailed configuration and status monitoring options.

ONE STOP SYSTEMS

CALL TODAY

(877) 438-2724

www.onestopsystems.com

COTS

Editorial

Jeff Child, Editor-in-Chief

It's a People Business

More than ever these days, I'm reminded that this business—and arguably most any business—is, at heart, a people business. That may seem a leap for a person such as myself who covers technology "things"—chips, boards, systems, embedded software—that get integrated into bigger "things"—weapon systems, tanks, ships, fighter jets and so on. Yes, it's the technology and systems design that enables it all, but it's people that are ultimately the ingredient that make a program achieve success, or not.

Jeff Child with Air Force Colonel Russell D. Kurtz at the RTC Group's own Boston RTECC show. The colonel is Deputy Director of Engineering for the Electronics Systems Center at Hanscom Air Force Base in Massachusetts.

This people-centric notion was reinforced for me recently when I sat down and talked with Air Force Colonel Russell D. Kurtz. The colonel has a unique perspective on the subject, serving as the Deputy Director of Engineering for the Electronics Systems Center at Hanscom Air Force Base in Massachusetts. Hanscom's ESC is actually the ninth largest employer in Massachusetts. It handles over $4 billion in funding per year for procuring electronic gear—mainly command and control and information systems—for the Air Force. The center currently manages approximately 200 programs including the E-3 AWACS, E-8 Joint STARS and E-10A/MP-RTIP. We were fortunate to get Colonel Kurtz to keynote our Real-Time & Embedded Computing Conference (RTECC) in Boston earlier this month. Interestingly, our RTECC shows are averaging an 18% increase in attendance this year.

In his presentation, entitled "Emerging AF Netcentric Strategies," the colonel touched on numerous topics including defense procurement. Much has been said about attempts at acquisition reform for the DoD. I've lost count of the number of panels and committees that have studied the acquisition process in the past two decades without generating much improvement. For his part, Kurtz doesn't buy the line that the DoD's acquisition system is broken, but rather that it needs more expert "boots on the ground." Putting it into perspective, he said, "What other country other than ours could procure and build an F-22 for example?"

The glitches in DoD acquisition in recent years, he says, can usually be attributed to the growing lack of engineering-level expertise at the DoD level. In recent years too much in the way of technical decision making and engineering was pushed off to prime contractors. This has resulted in the DoD not being able to adequately request what it wants with the proper amount of detail. With that in mind, Kurtz foresees a significant ramp-up in hiring not only within his group but throughout the DoD. I've been hearing such rumblings myself in recent months. For electronics engineers, this is certainly welcome news in the face declining employment in other industries.

It's hard to say for sure whether or not such a ramp-up in DoD procurement personnel is likely to work in favor of companies in the military embedded computer industry. My guess is that it will, because government decisions are more likely to be objective when it comes to questions on whether a subsystem—like an embedded computing system—should be outsourced or designed by the prime contractor in house.

These new engineering hires won't all necessarily be of the younger generation, but Colonel Kurtz also talked about the importance to military of people who are comfortable in today's digital age. Using the oft-quoted terms, Digital Natives and Digital Immigrants, the colonel commented on the growing generation gap straddling the digital divide that is affecting the U.S. Military. The basic idea is today's generation of kids were born and raised in a digital world of computers, the Internet, cell phones, CDs, DVDs, mp3 players and so on. In contrast, the people of the older generation are immigrants to this era, and are less comfortable adapting in it. Situational awareness systems are moving to complex graphical architectures with multiple chat sessions and windows running in parallel.

Within the military branches themselves, it wasn't long ago that 1st and 2nd Lieutenants tended to be the Digital Natives and more comfortable with computers, networks and all things digital. Today those officers are in their late 30s or early 40s, have moved up into the colonel and lieutenant colonel ranks, and are having more influence as a consequence. Their comfort level with net-centric technologies is critical fuel for the DoD's vision of its Network-centric future, and also for the types of DoD engineering job opportunities we can expect to see in the coming year. ▮▮

POWER BY DESIGN

Custom power solutions designed to fit your specific needs

Vicor Custom Power: Small company responsiveness, large company resources

The sole focus of Vicor Custom Power is designing and manufacturing turnkey custom power systems that meet your specific needs. Vicor Custom Power maintains the flexibility of a small entrepreneurial company while taking advantage of Vicors technical and business resources to deal effectively with your most challenging power requirements. Vicor has invested in the tools and resources to offer you full service solutions from prototype to mass production with the shortest lead times and the lowest risk.

General Capabilities:

- Electrical and Mechanical Design
- Rapid Prototyping
- High Volume Production Capacity
- MIL-STDs Compliance
- Reliability / Certification Testing:

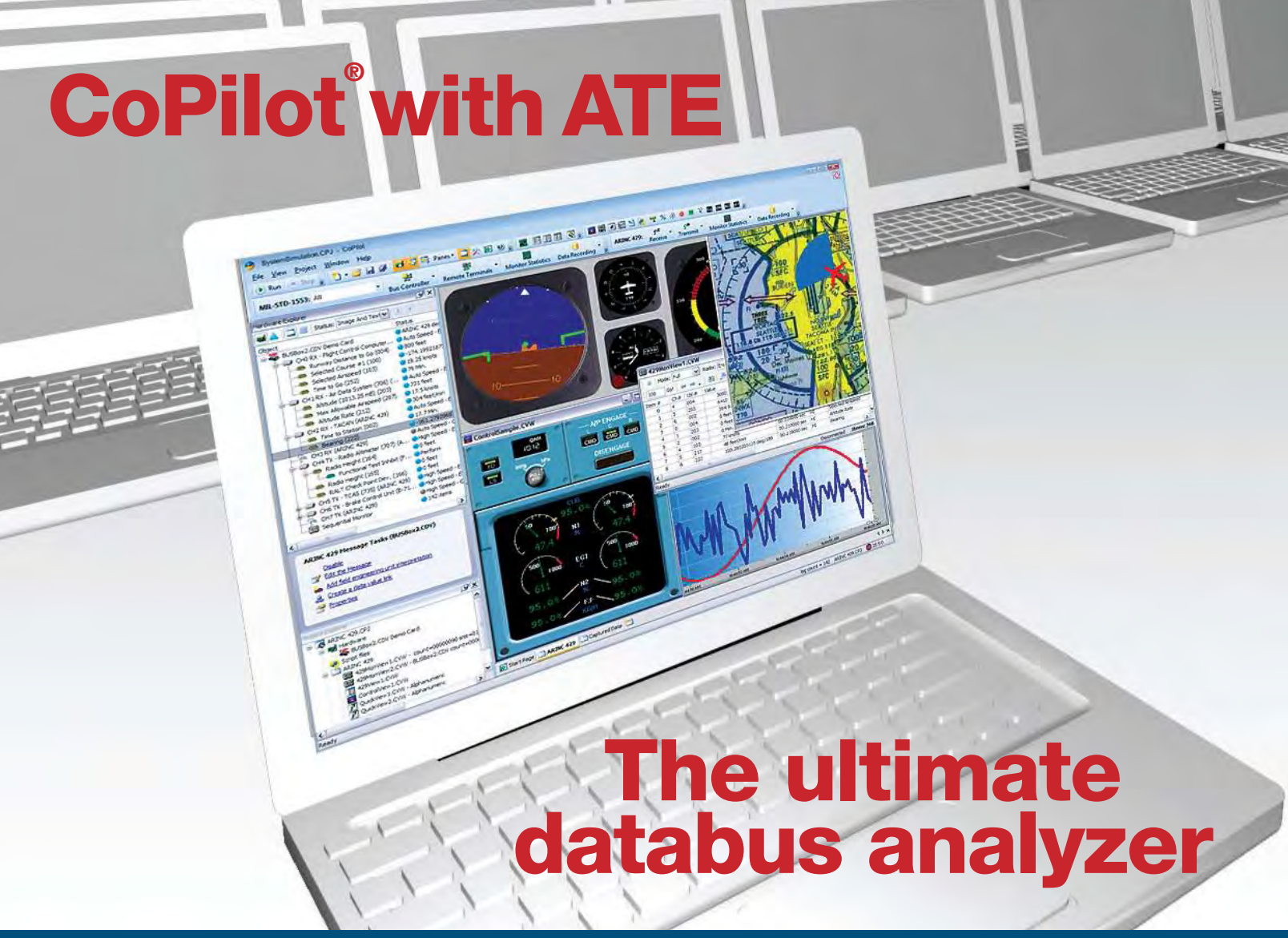
High Temperature Operational Life	Altitude
HALT *(Highly Accelerated Life Test)*	Explosive Atmosphere
Mechanical / Thermal Shock	Temperature Cycling
Vibration	Burn In
Humidity	EMI
Acceleration	Transient Immunity

Put Vicor Custom Power to work for you today, call 1-800-496-5570 to speak with a Vicor Custom Power engineer, or email apps@vicorcustom.com

vicorcustom.com

VICOR CUSTOM POWER

CoPilot® with ATE



The ultimate databus analyzer

Innovation sets us apart

CoPilot is widely recognized as the most advanced avionics databus test, simulation and analysis software on the market today. Now, test development and management tools within CoPilot's Automated Test Environment (ATE) and a powerful Python scripting engine facilitate the creation, customization, integration, distribution, control and use of test procedures. Find out today why users describe CoPilot as "The Ultimate Databus Analyzer".

MIL-STD-1553
ARINC 429
ARINC708
ARINC664/AFDX

Innovation for your success

For more information call 425.339.0281 or visit us at www.ballardtech.com

Ballard TECHNOLOGY