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Modernizing shipboard electronics

New surface warships and maritime electronics drive Navy planning for the next decade. **PAGE 8**

Stuffing boards onto SoCs

SWaP-constrained applications reap benefits of reconfiguring boards into systems on chip. **PAGE 19**

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The push for new surface warships, maritime electronics, and technology for global missions is driving U.S. Navy planning for shipboard power through the next decade.



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Shrinking boards into systems on chip

Military applications that rely on small size, weight, and power consumption (SWaP) such as unmanned vehicles, soldier-worn electronics, and battlefield networking are reaping the benefits of reconfiguring boards into systems on chip (SoC).



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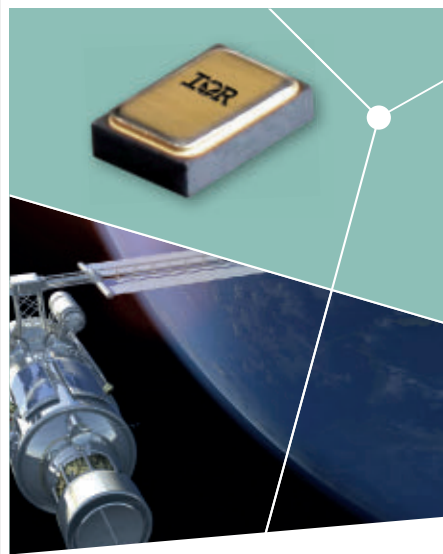
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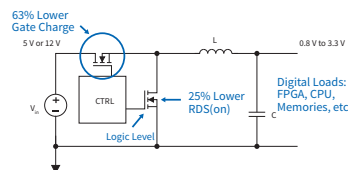
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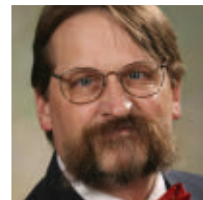
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Shrinking DOD budget has good news for defense electronics

It's a cliché, yet nonetheless true, that things aren't always what they seem — especially when it comes to the fiscal 2017 DOD budget request. At first glance, it looked to me like technology spending was headed down, based on topline numbers. A closer look reveals something else.

Despite cuts in the overall 2017 DOD budget, as well as cuts in procurement accounts, the budget calls for increases in research, development, test, and evaluation (RDT&E), as well as in communications, electronics, telecommunications, and intelligence (CET&I) technologies.

That could be good news — at least in the short term — for the defense electronics and electro-optics industries. Military research spending helps prime the technology pump and sets the stage for potential future increases in procurement for promising military technologies.

For the 2017 Pentagon RDT&E request, the military is asking for \$71.66 billion. If Congress agrees, this would be the largest military research budget since \$72.84 billion in 2012. It would represent an increase for the third straight year, and increase research spending to levels not seen in the past five years.

The DOD is asking Congress for \$10.74 billion for CET&I procurement and research, which is up 5.1 percent

from 2016 levels and the highest in at least three years. Cyber security and cyber warfare also look to be a substantial plus in the 2017 DOD budget. The Pentagon wants to increase cyber spending by 15 percent (nearly \$1 billion) over current-year levels.

The fiscal 2017 DOD budget calls for spending \$6.7 billion for cyber operations, which represents an increase of about \$900 million over fiscal 2016 enacted levels for the Pentagon's defensive and offensive cyberspace operations capabilities and cyber strategy, according to the 2017 *Defense Budget Overview*.

Several programs in the 2017 DOD budget bode well for electronics technology. Take The Navy's Advanced Above Water Sensors research and development program, for example. Advanced Above Water Sensors seeks to develop enabling technologies for shipboard radar and digital signal processing technologies that will defend surface warships and land sites from cruise missiles, ballistic missiles, attack aircraft, submarines, and related threats. The budget asks for \$85.9 million for this program — nearly double the \$43.9 million these programs received this year.

Just goes to show you how deceiving initial impressions can be.

Certainly the DOD budget request isn't all good news. Procurement

accounts — which contain large programs like ships, submarines, aircraft, armored combat vehicles, and military communications systems — are down for 2017. The procurement budget calls for spending \$112.1 billion next year, which is down 6.5 percent from current-year procurement levels of \$119.9 billion. The overall 2017 DOD budget calls for spending \$583 billion.

Individual program losers in the 2017 DOD budget include the Navy's project to develop an unmanned carrier-based attack bomber. Navy leaders now want to convert the Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) program to an unmanned carrier-based aerial tanker.

The F-35 joint strike fighter program also doesn't escape unscathed. The Pentagon is set to cut 20 F-35s from the 893 it was due to build over the next five years. Yet planned budget increases in RDT&E, CET&I, cyber security, Advanced Above Water Sensors, and other budget line items bode well for the near-term prospects for military electronics spending.

There's much more in the 2017 DOD budget, and I will be reporting on other trends in areas like electronic warfare, unmanned vehicles, and other important areas that rely on advanced electronics technologies. ↙

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Military research budget headed up third straight year; largest since 2012

BY JOHN KELLER

WASHINGTON — U.S. military research spending appears to be headed up for the third straight year after four consecutive years of downward U.S. Department of Defense (DOD) research spending.

The fiscal 2017 DOD budget request for research, development, test, and evaluation (RDT&E) is \$71.66 billion, which if enacted would be the Pentagon's largest research budget since \$72.84 billion in 2012.

In recent years the Pentagon's RDT&E budget hit a peak of \$80.92 billion in 2010, slid steadily to \$63.1 billion in 2014, and now appears to be headed up to levels not seen in the past five years.

The fiscal 2017 DOD budget request was submitted to Congress last month. Federal fiscal year 2017 begins next October 1. Congressional committees will scrutinize the Pentagon's budget request this spring, and approve a final budget next fall.

Of particular interest in the 2017 DOD research budget is the electronics-heavy intelligence and communications account, which would rise by 13.3 percent from this year, growing from \$2.97 billion in 2016 to \$3.37 billion in 2017.

For next year the U.S. Air Force has by far the largest proposed research budget of \$28.15 billion, an 11.6 percent increase over this

year's \$25.21 billion. Next are defense agencies with a proposed budget of \$18.47 billion, a 2 percent drop from this year's \$18.86 billion. The U.S. Navy has a \$17.35 billion 2017 research budget, down 4.4 percent from this year's \$18.15 billion. Next comes the U.S. Army with a 2017 research budget request of \$7.62 billion, up less than 1 percent from this year's \$7.56 billion.

Highlights of the 2017 Air Force research budget include \$1.36 billion for the Long Range Strike-Bomber (LRS-B); \$54.8 million for the Small Diameter Bomb; \$182 million for Space Based Infrared System (SBIRS) High full-scale development; \$189.8 million for intercontinental ballistic missile fuze modernization; and \$32 million for anti-tamper technology.

Highlights of the 2017 Navy research budget include \$126.3 million for undersea warfare applied research; \$700.8 million for the Ohio Replacement next-generation ballistic missile submarine development; \$100.6 million for advanced submarine systems development; \$84.9 million for frigate development; and \$252.4 million for offensive anti-surface warfare weapon development.

Highlights of the 2017 Army research budget include \$37.8 million for command, control, and communications technology; \$27.9 million for electronic warfare (EW) technology; \$39.3 million for the tactical

IN BRIEF

▶ DOD budget ups military cyber security spending

Leaders of the U.S. Department of Defense (DOD) plan to increase spending for cyber security and cyber warfare operations next year by 15 percent, or nearly a billion dollars, over current-year levels. The fiscal 2017 DOD budget calls for spending \$6.7 billion for cyber operations, up from about \$900 million this year for defensive and offensive cyberspace operations. The planned increase in cyber spending represents at least the second consecutive increase for cyber operations. U.S. military cyber strategy focuses on building cyber capabilities and organizations for DOD's three primary cyber missions: defending DOD networks and information; defending against cyber attacks of significant consequence; and providing cyber support to operational and contingency plans, DOD officials say. Military cyber planning has five goals: developing cyberspace capabilities; defending the DOD information network, securing DOD data, and mitigating cyber risks to DOD missions; preparing to defend U.S. interests from major cyber attacks; developing cyber options to control cyber warfare; and building international alliances to deter shared threats. ◀

unmanned ground vehicle (TUGV); \$3.6 million for anti-tamper technology support; and \$91.8 million for Chinook heavy-lift helicopter product improvement.

Among the defense agencies, the U.S. Defense Advanced Research Projects Agency (DARPA) is asking for \$2.97 billion next year, a 3.7 percent increase from this year's \$2.87 billion. Highlights of DARPA's 2017 budget request are \$353.6 million for information and communications technology; \$313.8 million for tactical technology; and \$429 million for network-centric warfare technology.

The Defense Information Systems Agency (DISA) is asking for \$251.9 million next year, which would be a 20 percent increase from this year's \$209.7 million. Highlights of the 2017 DISA budget include \$57.5 million for C4I interoperability; \$24.5 million for global command and control systems; and \$1.6 million for the Cyber Security Initiative.

The Missile Defense Agency (MDA) is asking for \$5.9 billion next year, which would be a 5.2 percent cut from this year's \$6.2 billion. Highlights of the 2017 MDA budget include \$959.1 million for Aegis ballistic missile defense; \$563.6 million for ballistic missile defense targets; and \$862.1 million for ballistic missile defense midcourse defense segment.

U.S. Special Operations Command is asking for \$497.2 million next year, which would be a 10.3 percent cut from this year's \$554.1 million. Highlights of the 2017 Special Operations Command budget include \$159.1 million for aviation systems; \$44.9 million for warrior systems; and \$54.6 million for maritime systems. ◀

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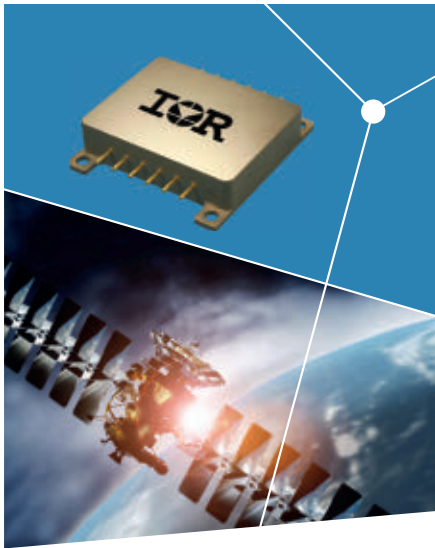


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Spending headed up for military communications and intelligence electronics

BY JOHN KELLER

WASHINGTON — U.S. military electronics spending is set for substantial increases next year, as the U.S. Department of Defense (DOD) is asking Congress for \$10.74 billion in fiscal 2017 for procurement and research in military communications, electronics, telecommunications, and intelligence (CET&I) technologies.

The 2017 DOD budget CET&I budget request is up 5.1 percent from the \$10.09 billion that Congress allocated this year. The \$10.74 billion request for CET&I equipment and research is the highest in at least three years. The DOD request for CET&I procurement and research does not include military activities with substantial electronics content, such as aircraft avionics, vetronics, and missile guidance. It also does not include DOD-wide spending for CET&I activities.

The DOD's CET&I budget request for fiscal 2017 includes \$7.47 billion for procurement, up 3.6 percent from this year's congressional enacted level of \$7.11 billion. The budget also requests \$3.37 billion for CET&I research, development, test, and evaluation (RDT&E), up 13.3 percent from this year's enacted level of \$2.97 billion.

Highlights of the Army's CET&I 2017 procurement budget request includes \$437.17 million for the Warfighter Information Network-Tactical Ground Forces Tactical Network; \$43.81 million for the Defense Enterprise Wideband Satellite Communications Systems; \$273.65 million for the Handheld Manpack Small



U.S. military electronics spending is heading upward for communications, electronics, telecommunications, and intelligence technologies.

Form Fit digital radio; \$131.36 million for communications security; and \$192.04 million for the Distributed Common Ground System-Army.

The Navy's 2017 CET&I request includes \$248.77 million for fast attack submarine acoustic equipment; \$274.89 million for AN/SLQ-32 shipboard electronic warfare equipment; \$145.7 million for the Fixed Surveillance System deep-sea sonar system; \$212.03 million for the Consolidated Afloat Networks and Enterprise Services tactical shipboard network; \$102.48 million for shipboard tactical communications; and \$170.73 million for shipboard information warfare.

The Air Force CET&I request includes \$98.45 million for air traffic control and landing systems; \$72.36 million for communications security equipment; \$198.92 million for the Minimum Essential Emergency Communications Network; and \$117.94 million for tactical communications and electronics equipment.

The 2017 DOD budget request asks Congress for a total of \$583 billion, reducing overall Pentagon spending by \$2.2 billion over last year's request. ◀

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Navy modernizing maritime forces



The push for new surface warships, maritime electronics, and technology for global missions is driving U.S. Navy planning for shipboard power through the next decade.

BY **Edward J. Walsh**

The U.S. Navy, while confronting critical funding shortfalls, pressed forward in 2015 with construction of new littoral combat ships (LCS), destroyers, amphibious assault ships, and smaller vessels and combat craft. The service also achieved important milestones for ship combat systems, weapons, sensors, and mine warfare systems for the in-service fleet and ships still being built and under contract.

As in recent years, the overriding

challenge for the Navy remains designing and paying for the fleet needed to carry out its traditional forward-presence mission in the Persian Gulf and Indian Ocean, and new contingencies as the U.S. responds to ISIS, other Middle East crises, and Russian military operations in Ukraine.

The Navy supports the Obama Administration's "pivot to Asia," described by then-Secretary of State Hillary Clinton in an October 2011

Foreign Policy article, entitled "America's Pacific Century." The U.S. Department of Defense (DOD) 2014 Quadrennial Defense Review reinforced the Navy's role in the Pacific pivot by calling for continued emphasis on the Asia-Pacific region.

For the DOD, the pivot means strengthening the U.S. Pacific presence to counter China's growing military capabilities. Last March, the Office of Naval Intelligence revealed that China is arming its ships and submarines with a new YJ-18 high-speed, anti-ship missile, which has a reported range of 290 nautical miles. Its predecessor, the YJ-82, has a range of 20 nautical miles.

Last September, IHS Jane's reported that China may be building its



Chief of Naval Operations Admiral John Richardson, here conducting an all-hands call with the crew of the destroyer Zumwalt (DDG-1000) at the Bath Iron Works shipyard, in his new Strategic Vision, cautions that the U.S. faces multiple threats that require a powerful forward Navy presence.

first aircraft carrier at a shipyard in northern China.

Chief of Naval Operations (CNO) Adm. John Richardson released his "Design for Maintaining Maritime Superiority," in January. In the report, he said that "for the first time in 25 years, the United States is facing a return to great power competition. Russia and China both have advanced their military capabilities to act as global powers."

Richardson added that North Korea, while trying to strengthen its

nuclear arsenal, threatens security in North Asia and beyond. He said Iran's advanced missiles, proxy forces, and other capabilities continue to pose threats, and terrorist groups are a long-term threat to stability and security around the world.

The CNO noted that the Navy budget likely will continue to be under pressure. "We will not be able to 'buy' our way out of the challenges that we face. The budget environment will force tough choices but must also inspire new thinking."

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The amphibious ship Makin Island (LHD-8), last of the class, is powered by a hybrid electric drive propulsion system that enables it to achieve huge savings in fuel costs.

Richardson called for strengthening naval power at and from sea; achieving high-velocity learning at every level; strengthening the Navy team for the future; and expanding and strengthening the U.S. network of partners.

Director of Surface Warfare Rear Adm. Peter Fanta told a Navy conference in January that “the maritime threat is changing. In 1985, the U.S. Navy had the advantage. We now face a multi-axis, multidimensional threat, while our weapons and shipbuilding processes are slower and more complex.”

Vice Adm. Thomas Rowden, Commander, Naval Surface Force, in articles and speeches, described the Navy’s concept of “distributed lethality” as a “cultural shift” that stresses an increase in individual unit lethality and innovative force packaging to present adversaries with a more complicated combat problem.”

Fanta added that “distributed lethality” means “if it floats it fights” by increasing lethality of ships, distributing offensive capability geographically, and enhancing defensive capabilities.

Size of the fleet

Navy leaders have told Congress that meeting the requests of combatant commanders for forward naval presence would require as many as 450 ships. A November 2015 Congressional Research Service report on Navy force structure noted that the Navy submitted a plan to Congress in March 2015 calling for 308 ships, based on the Administration’s January 2012 strategic guidance and the 2014 QDR.

The 308-ship fleet would include 11 aircraft carriers, 88 cruisers and destroyers, 52 littoral combat ships, 34 amphibious assault ships, 29 combat logistics ships, 10 expeditionary fast transport ships, and 24 other ships. The undersea force would consist of 12 ballistic missile submarines and 48 attack submarines.

The new five-year shipbuilding plan (2016–2020), proposes a total of 48 ships: nine in 2016, 10 each in 2017 and 2018, nine in 2019, and 10 in 2020. The 2016 goal includes two Virginia-class attack submarines, three littoral combat ships, two Arleigh Burke-class (DDG-51) destroyers, one San Antonio-class (LPD-17) amphib,

and one TAO(X) oiler. The current 30-year plan calls for construction of 264 ships, or nine per year.

For the long term, the Navy, in its “Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels” for 2015, said that it plans to build an “affordable follow-on, multimission, mid-sized future surface combatant” to replace the Flight IIA Burke-class destroyers, which will begin reaching the end of their service lives in 2040.

Echoing Congressional concerns about shipbuilding costs, the Congressional Budget Office estimates that the Navy plan would cost 11.5 percent more than the Navy’s own estimate. Navy officials have said, moreover, that constraints on funding imposed by the Budget Control Act of 2011 will prevent the service from carrying out missions stipulated in the Pentagon’s strategic guidance document.

Still, Navy Secretary Ray Mabus noted in January that since 2010, the Navy has awarded contracts for 84 new ships, compared to 41 between 2002 and 2008.

The Navy’s plan faces resistance within the DOD. Late last year, Defense Secretary Ashton Carter, in a widely-cited memorandum, directed Mabus to cut the planned buy of littoral combat ships from 52 to 40 ships and, in the new five-year plan, from 14 to six. The Navy originally hoped to build 55 littoral combat ships, then cut the planned buy of LCS to 32, and designated the remainder as frigates, to be outfitted with heavier weapons.

Zumwalt-class destroyers

A huge end-of-year highlight for shipbuilding was the start of underway

trials in early December for the Navy's newest major surface combatant, the guided missile destroyer USS Zumwalt (DDG 1000) built by General Dynamics Maritime Systems at its Bath, Me., shipyard.

The Navy initially expected to buy 32 ships and end the Burke class with Michael Murphy (DDG-112). In July 2008, Navy leaders announced instead they would build only three Zumwalts and restart the Burke program, saying that the Burke-class destroyers are more suited for area anti-air defense, ballistic missile defense, and open-water, anti-submarine warfare.

The three-ship Zumwalt program has been controversial. The Navy estimates the procurement cost of the first two ships at some \$8.7 billion and the third ship at \$3.49 billion. The 600-foot Zumwalt displaces nearly 14,500 tons, compared to about 9,600 tons for Ticonderoga-class (CG-47) cruisers and between 8,300 and 9,200 tons for the three flights of Burke destroyers now in service.

Designed to provide naval surface fire support for Marines ashore, the Zumwalt has become a multi-mission ship, well-armed for surface warfare and air defense. The ship introduces a "tumblehome" hull, a deckhouse built by Huntington Ingalls Industries using fiberglass-type composites, an integrated "fight through" power system, and a BAE Systems-built 155-millimeter gun (two per ship) that fires a guided long-range, land-attack projectile developed by Lockheed Martin to ranges beyond 60 nautical miles.

The ship computing architecture, built by Raytheon, automates many ship systems, enabling the ship to

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The Burke-class destroyer John Paul Jones (CG-53) has been designated the U.S. Navy's test ship for its newest combat systems baseline, which will enable the destruction of approaching high-altitude ballistic missiles and lower-flying anti-ship missiles.

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The new power system consists of two 36-megawatt Rolls Royce MT-30 and two 3.8-megawatt RR450 gas turbine engines that will power advanced induction motors provided by Converteam to turn the propeller shafts and provide power to ship systems.

The focus on installing and testing the power system caused schedule delays on two Burke destroyers being built at Bath and for the two following Zumwalts, Michael Monsoor and Lyndon Johnson DDGs 1001 and 1002, which were scheduled to reach operational capability in 2018 and 2021, respectively. Labor-management disagreements contributed to the delays, as the company spread the workforce among both programs while trying to cut costs to become more competitive with the Huntington Ingalls Pascagoula, Miss., yard.

Littoral Combat Ship

The LCS program continued to build

ships in two hullform variants, a trimaran and a conventional hull. Six ships (LCS 1 through LCS 6) are in fleet service.

The Austal USA-General Dynamics team, which is building the Independence (LCS 2) trimaran variant, launched Omaha (LCS 12) in November at Austal's Mobile, Ala., yard.

The trimarins, designated by even hull numbers, are 419 feet long and displace about 3,100 tons. The team also is preparing Montgomery (LCS 8) and Gabrielle Giffords (LCS 10) for trials, with Manchester (LCS 14) and Tulsa (LCS 16) in the build yard. The yard delivered Jackson (LCS 6) last August.

Fincantieri Martin Marinette, teamed with Lockheed Martin, is building the conventional-hulled Freedom (LCS 1) variant, 388 feet long and displacing 3,400 tons. Detroit, Little Rock, Sioux City, Wichita, Billings, and Indianapolis (LCS 7, 9, 11, 13, 15, and 17) are in various stages of construction at Martin

Marinette's Wisconsin shipyard.

The Navy introduced for the LCS class a concept of interchangeable mission modules for anti-surface, anti-submarine, and mine countermeasures. The modules are being developed separately from the shipbuilding program by prime contractor Northrop Grumman, which is integrating the mission packages of weapons and sensors for each of the modules. The company received a \$38.5 million sole-source contract for further mission package work in August 2015.

The modules consist of the mission components and systems — the weapons and sensors and support gear. When the mission personnel and either the MH-60R (surface and ASW) or MH-60S (mine-countermeasures) helicopters are included, the modules become mission “packages.”

The modules are in various stages of development, testing, and fielding, with the surface module the most advanced and the submarine warfare module the farthest from delivery.

The LCS program has been criticized for cost overruns, hull cracks, and system failures at sea. The program suffered an embarrassing blow last December when the propulsion system of Milwaukee (LCS 5) failed while the ship was underway in the Atlantic three weeks after its commissioning.

Amphibious assault ships

In late December, Huntington Ingalls won a contract to build LPD-28, the 12th San Antonio class (LPD-17) amphibious assault ship. Originally the class was to end at 11 ships. Congress provided funding for the ship and directed the Navy to build

it, based on a 2002 memorandum between the Navy, Bath, and then-Northrop Grumman Ingalls Shipbuilding (now Huntington), that shifted contracts for three LPDs from Bath to Ingalls and for three Burke-class destroyers to Bath. The "hull swap" deal directed that if in the future a 12th LPD was added, Bath would get an additional Burke.

The 12th LPD, some Navy and industry officials say, represents a step to a future amphibious assault ship called LXR. The Navy wants to build 11 LXRs, the first in 2020, to replace the 12 Whidbey Island and Harper's Ferry classes. John Murtha (LPD-26) and Portland (LPD-27) are close to completion at Huntington



The Ticonderoga-class cruiser Normandy (CG-60) was one of the first CGs to receive the newest Aegis baseline, which provides an integrated air-missile defense capability.

Ingalls. Last July, General Dynamics NASSCO won a \$13 million modification to an earlier contract for LXR preliminary design work.

Huntington also is building Tripoli (LHA-7) the second ship of a new class of amphibians to replace the now-decommissioned, five-ship Tarawa class LHAs. Tripoli and first of class America (LHA-6), now in service, are designed to move landing forces and equipment by air instead of landing craft staged in a

weldeck. The ships are built with a larger hangar deck than earlier amphibians, more extensive aviation facilities, and increased aviation fuel capacity.

These ships, 844 feet long and displacing 45,000 tons, will accommodate all Marine Corps aircraft, including the new F-35B vertical-take-off-and-landing joint strike fighter. However, critics of the shift to all-aviation insertion said that compared to landing craft, aircraft transit is limited in the volume of men, vehicles, and equipment it can move ashore. Without the weldeck, they argued, America is just a small aircraft carrier. In 2012, the Navy and Marine Corps agreed to modify the design for future LHAs to restore the weldeck.

Burke-class destroyers

Burke destroyers now funded and under construction represent the "Flight IIA" design that started with Oscar Austin (DDG-79) and will continue until the start of the Flight III variant.

In November, Bath launched Rafael Peralta (DDG-115) and authen-

ticated the keel for Thomas Hudner (DDG-116); Bath also is building Daniel Inouye (DDG 118).

Huntington Ingalls is building John Finn (DDG-113), the first "restart" ship, Ralph Johnson, Paul Ignatius, and Delbert D. Black (DDGs-114, -117, and -119).

Fast-transport ships

LCS builder Austal also is building 10 expeditionary fast transport (EPF) craft, formerly called joint

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high-speed vessels, under a \$1.6 billion contract awarded in 2008. The EPFs, capable of 35 knots and a 1,200 nautical-mile range with a 600 short-ton capacity, will transport personnel, vehicles, and cargo within operational theaters.

The EPF vessels will provide expeditionary warfare support, humanitarian assistance, disaster relief missions, and potentially special operations, and are fitted for roll-on/roll-off cargo load and operations in shallow-water ports. In October, the company won a \$53.4 million award for initial engineering support for the 11th ship.

In late October, Brunswick (EPF-6) completed acceptance trials in the Gulf of Mexico. Three more EPFs are under construction.

LCS to frigates

The Navy has responded to criticism that the littoral combat ships are too lightly armed by redesignating the later ships as frigates and adding more powerful weapons.

In late 2015, the Navy decided to replace, for the surface warfare mission package, the Raytheon-built Griffin IIB missile with the Army's AGM-114L Longbow Hellfire missile, which is used by Army AH-4D Apache attack helicopters to attack armored targets.

The surface package includes a gun mission module with a 30-millimeter naval gun, and an aviation module consisting of the MH-60R helicopter armed with Hellfire missiles and 7.62-millimeter and .50-caliber machine guns.

The ships also are armed with a Mk-110 57-millimeter gun and the SeaRAM missile defense system, which integrates an 11-round anti-

ship missile with the radar of the Phalanx 20-millimeter terminal defense gun. The Navy test-fired a RAM (rolling airframe missile) from a SeaRAM launcher aboard Coronado last August.

Mission package progress

Navy officials say the LCS mission packages are moving along. In October, the Navy announced that "increment 2" of the surface warfare mission package went through successful initial operational test and evaluation aboard Coronado.

In 2015, the Navy turned to industry for additional support. In March, Naval Sea Systems Command (NAVSEA) in Washington awarded funding to both LCS team leads, Lockheed Martin and Austal, for new analyses of the program.

In April, the General Dynamics NASSCO unit won a \$24 million award to support LCS homeported in San Diego. In May, GD Bath, although it doesn't build the ships, received \$11.2 million for maintenance

support for the Independence variant, and then in August won another contract for planning yard work for both LCS variants.

In July, CACI Technologies of Chantilly, Va., won a \$9.4 million modification to a previous award for program analysis and business support for the LCS Program Executive Office. Computer Sciences Corp. won a \$20.3 million award to support LCS fleet introduction and sustainment.

Major system modernization efforts continued, at varied levels, for Burke destroyers and selected Ticonderoga cruisers, which are fitted with the Aegis combat system built by longtime Aegis prime Lockheed Martin Mission Systems and Training (MST). In September, the company won a NAVSEA award that with options over 10 years could be valued at \$428 million. The company also is building "Aegis Ashore," a land-based system, with two planned sites, one in Romania and the second in Poland.



The Navy has decided to add a 28th San Antonio-class amphib, which will serve as a baseline for a future LXR class. The above photo shows New York (LPD-21) entering New York harbor. The ship was built with seven tons of steel from the World Trade Center.

The Navy and Congress clashed last year over the Navy's plan to place 11 of the 22 cruisers in a reduced operating status, as some House members suggested that if the Navy did so, those ships would never return to sea.

Under the 2015 defense authorization and appropriations acts, the Navy is modernizing cruisers on a phased 2-4-6 plan: two ships per year, work to take no more than four years, and no more than six ships in the yards at any time. Cowpens (CG-63) and Gettysburg (CG-64) started the phased modernization last September.

In separate reports on the 2016 budget, House and Senate armed services and appropriations urged



Among many new missions, the Navy now is tasked with counter-piracy and maritime security operations in East African waters. Shown above is the Burke-class destroyer Kidd (DDG-100) intercepting a fishing vessel held by pirates in the Arabian Sea.

the Navy to seek more money for cruiser modernization.

Shipboard weapon systems

Despite funding pressures that have cut the number of ships to be

included, the Aegis modernization will provide an integrated air and missile defense (IAMD) capability.

Through 2015, the Navy certified performance of a new Aegis program, designated baseline 9, which provides IAMD. Variants are 9A for cruisers, 9.B1 for the two Aegis Ashore sites, and 9.C1, which provides not only IAMD but also a second-generation ballistic missile defense (BMD) 5.0 program.

Cruisers Princeton Normandy and Chancellorsville (CGs-59, -60, and -62) have been fitted with 9A, with Normandy and Chancellorsville already deployed.

Destroyers Barry, John Paul Jones, and Benfold (DDGs-52, -53,

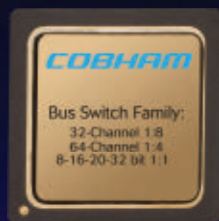
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and -65) have received 9.C1, and installations on Arleigh Burke and Mitscher (DDGs-51, -57) are nearing completion.

A 9.C2 baseline will be delivered in 2018 and provide a new BMD 5.1 program.

For full-up IAMD capability, the destroyers will have Raytheon's cooperative engagement capability (CEC) and the Naval integrated fire control-counter air (NIFC-CA), which will operate together to consolidate data from multiple surface and



The aircraft carrier Theodore Roosevelt (CVN-71) launches a Rolling Airframe anti-ship missile (RAM) during an Atlantic Ocean exercise. The Navy's littoral combat ships will be armed with SEARAM, a RAM missile that uses the radar of the Phalanx terminal defense system.

airborne sensors.

General Dynamics Advanced Information Systems won a \$7.8 million NAVSEA award in December for NIFC-CA development and integration. The cruisers will get NIFC-CA, but not the newest BMD programs.

Raytheon Integrated Defense Systems (IDS) is the longtime prime for CEC, which consolidates target data from ships and E-2D Hawkeye aircraft equipped with a CEC processor and antenna system. Several variants are aboard the carriers, cruisers, destroyers, and San Antonio and Wasp-class amphibies.

The IAMD combat system will be supported by an Aegis common source library, Common Track Manager and Common Track Server software components, Common Processor System, and the Common Display System.

DRS Laurel Technologies builds the CPS and CDS. Originally developed for the Zumwalts and Aegis modernization, the CDS also will go aboard carriers and new amphibies.

Under a series of contracts awarded to Lockheed Martin MST and Raytheon IDS last year, both



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27.5mm / 1.083"

19.3mm / 0.76"

Height: 8.0mm / 0.315" Tall

○ Sync	○ V Trim	○
○ UVLO Set	○ -V _{OUT} 1	○
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32.7mm / 1.287"

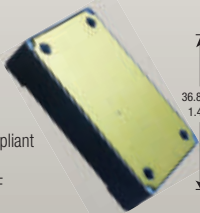
26.1mm / 1.03"

Height: 8.0mm / 0.315" Tall

○ Sync	○ V Trim	○
○ UVLO Set	○ -V _{OUT} 1	○
○ -V _{IN}	○ +V _{OUT} 1	○
○ Input Filter	○ -V _{OUT} 2	○
○ +V _{IN}	○ +V _{OUT} 2	○

150 Watts: MGDS-155 Series

- Ultra Wide input ranges
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 - 150-480V_{IN} Range
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57.9mm / 2.28"

36.8mm / 1.45"

Height: 12.7mm / 0.50" Tall

○ -V _{IN}	○ -V _{OUT}	○
○ Sync	○ Sense (-)	○
○ On/Off	○ V Trim	○
○ +V _{IN}	○ Sens (+)	○
	○ +V _{OUT}	○

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companies are working on elements of Aegis Advanced Capability Builds (ACBs), now ranging from ACB-12 to ACB-16.

The ACB effort includes concept development, work on the command and decision system, weapons control system, and ship integration and testing. Aegis modernization also encompasses significant upgrades to ship weapons, sensors, and machinery, carried out during shipyard availabilities.

BAE Systems and General Dynamics NASSCO are doing most of the shipyard work, in Norfolk, Mayport, Fla., San Diego, and Honolulu. The IAMD weapons upgrade will include the SM-3 BMD missile and SM-6 anti-air missile, both built by Raytheon.

Other new systems include the evolved Seasparrow missile and Phalanx block 1B terminal defense system, SQQ-89(v) undersea warfare system, and versions of the shipboard electronic warfare (EW) system resulting from a surface EW improvement plan (SEWIP). General Dynamics, Lockheed Martin, and Northrop Grumman all have SEWIP contracts, for Blocks 1, 2, and 3, respectively, in various stages of development and production.

Shipboard radar

The centerpiece for future Navy IAMD will be the Raytheon-developed air and missile defense radar (AMDR), designated SPY-6, an "S-band" radar planned for integration with the Aegis system aboard the Flight III Burke-class destroyers. The AMDR, the Navy says, is expected to be 30 times more capable than the current Aegis SPY-1D.

Following a full-system critical

design review last May, the company started assembling an engineering development model with a single 14-foot diameter array face, followed by testing at the company's Sudbury, Mass., facility through early 2016. The model will go to the

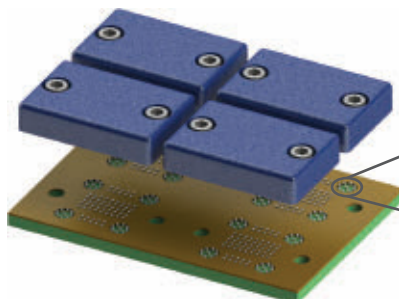
Navy's Hawaii land-based test site for more testing.

Raytheon has produced "interface definition language modules" for developing the Aegis upgrade, now called ACB-20, to support AMDR.

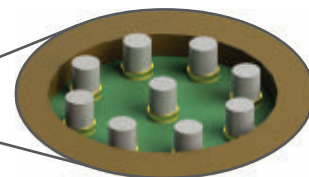
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IIIs will be the 14-foot-diameter system which, while considerably more sensitive than the SPY-1 it replaces, will be less capable than a 20-foot-diameter system originally envisioned for a future cruiser or CGX, now canceled.

The AMDR S-band capability provides search, tracking, cueing, missile communication, surveillance for self-defense, and kill assessment. Also required is an X-band capability for horizon and surface search, navigation, and periscope detection and discrimination. The Northrop Grumman SPQ-9B surface-search radar will perform the X-band function for AMDR for initial Flight III ships.

Future weapons

In late 2014, the test bed ship *Ponce* fired a laser weapon system while on station in the Persian Gulf, engaging small surface targets and an unmanned aerial vehicle. Following the testing, the Navy designated the system as operational.

The laser weapon system, a collaboration of the Office of Naval Research (ONR) and Navy laboratories, along with electromagnetic rail guns or EMRGs that fire superfast hypervelocity projectiles (HVPs), are in various stages of development.

In 2011, the Navy's Maritime Laser Demonstrator used a Northrop Grumman solid-state laser to destroy several small targets. ONR's Solid-State Laser Technology Maturation program has awarded contracts to Northrop Grumman, Raytheon, and Boeing to develop a 100- to 150-kilowatt laser capable of destroying small craft, aimed at demonstrations by 2018.

The Navy also has extensively

tested electromagnetic rail guns powered by magnetic force generated by extremely high power levels to launch an HVP up to 5,600 miles per hour. BAE Systems and General Atomics have built prototypes able to reach ranges of 50 to 100 nautical miles.

The Navy now plans to test-fire an EMRG from an expeditionary fast patrol craft in 2016, and has explored mounting one on *Lyndon Johnson*, the third Zumwalt ship.

Navy officials indicate that the HVP developed for the railgun also could be fired, at lower velocities than from the EMRG, from the 150-millimeter guns aboard the Zumwalt class DDGs and even from the five-inch Mk 45 deck guns aboard the *Ticonderoga* CGs and Burke-class destroyers.

In April 2015, an HVP was fired from a 62-caliber deck gun at the Navy's Dahlgren, Va., test range. BAE Systems is working under a 2013 ONR contract to produce five-inch and 155-millimeter HVPs.

The Navy planned to demonstrate the operational railgun from an EPF this year. That plan has been reconsidered, Navy officials say, and may be dropped in favor of moving the gun to an operational ship faster.

Ship machinery

For decades, the Navy has sought decisive advances in ship power system performance by shifting power architectures from mechanical drive to what's called integrated electric drive (IED).

An IED system, Navy engineers have long said, would eliminate the "tyranny of the drive shaft" that dictates that hull design be based on the

arrangement of engines and power systems along the propeller shaft.

Electric drive, they say, is critical to providing the intense bursts of power needed by the AMDR and laser and electromagnetic weapons, going aboard Flight III Burke-class destroyers and the future surface combatant, also called DDG-51 Flight IV, planned to start construction in 2030.

The DDG-1000 program was originally targeted for IED, but the Navy decided against using the high-torque permanent magnet electric motors originally selected, and opted for a lower-risk intermediate system using advanced induction motors.

Three amphibies — *Makin Island* (LHD-8), *America* (LHA-6), and *Tripoli* (LHA-7, under construction) — are powered by a hybrid electric drive (HED) plant consisting of General Electric LM2500 gas turbine engines and an all-electric auxiliary system, which is more efficient at speeds below 13 knots, enabling the ship to shut down the gas turbines at lower speeds. The Navy said that *Makin Island* saved of \$18,000 per day in fuel costs on its first deployment.

The Navy plans to backfit the HED design to the Flight IIA Burke-class destroyers. L-3 Communications Maritime Systems won an industry competition in 2012 to build two HED prototype systems. In mid-2015, the company was awarded options for production of two systems, which will be installed on Burke-class destroyers *Stockdale* (DDG-106) and *Gravelly* (DDG-107) this summer. The Navy then hopes to install four systems per year on the Burke-class destroyers. 

Shrinking boards into systems on chip

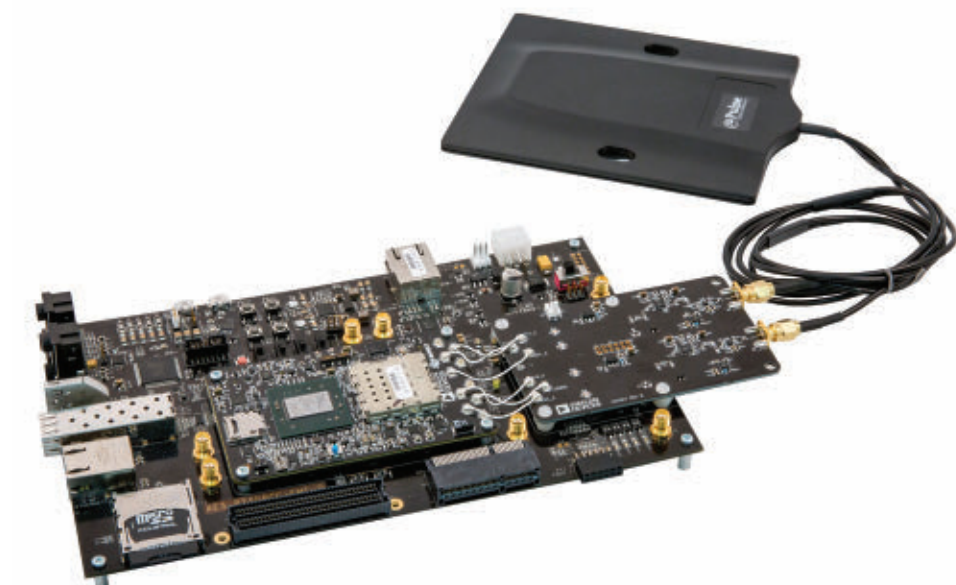
Military applications that rely on small size, weight, and power consumption (SWaP) such as unmanned vehicles, soldier-worn electronics, and battlefield networking are reaping the benefits of reconfiguring boards into systems on chip (SoC).

BY J.R. Wilson

The evolution of small-form-factor (SFF) embedded computing has been so rapid and its impact on design and system capabilities so extensive that it may take years for design engineers and military applications designers to integrate current state-of-the-art system-on-chip (SoC) technologies.

"[This ongoing evolution] is causing a big, big shift in the way designers approach these systems," says Luc Langlois, director of global technology marketing at Avnet Electronics Marketing in Acton, Mass. "Essentially, we're seeing the boundaries between traditional software and hardware design slowly erode or blur. For example, when dealing with a part that has some embedded processors and programmable logic, there is the possibility of creating an accelerator. Think of software as executing a task sequentially. In programmable logic, you can massively parallelize these operations, which is where you get the performance."

It comes down to software experts designing hardware. "So now

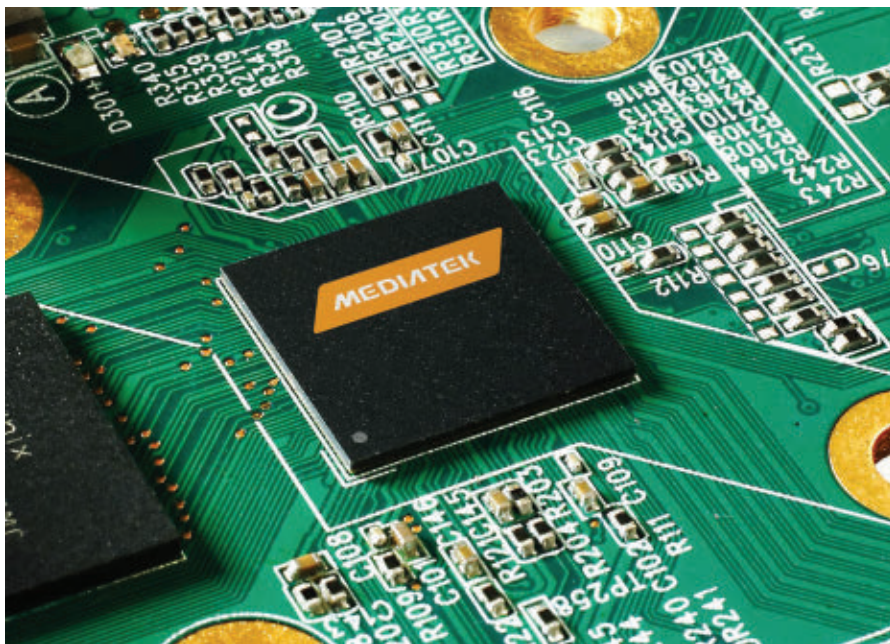


The PicoZed SDR SOM combines the Analog Devices AD9361 RF-agile transceiver with a Xilinx Zynq-7035 all-programmable system on chip (SoC), enabling engineers to develop software on the system-on-module for use in deployable software-defined radio systems.

you have software designers able to design hardware-based accelerators on the same chip that sends data into the programmable logic, where you can get an acceleration of that instruction up to 100x," Langlois says. "That's a challenge for designers because now you have to learn a lot of different skills. The advantage is you have years and years of legacy software algorithms you can tap into and still get the acceleration in programmable logic by having a single chip. All that is now in the SoC

and all the related flows are essential to unlocking the technologies in those SoCs."

As with much military technology in the past few decades, SoC came out of the commercial world, primarily pushed by the cellular market and, more recently, development of the Internet of Things (IoT). The first made it ideal for military communications systems with fewer components, smaller mechanical parts, less weight, less heat dissipation, and lower cost.



MediaTek Inc. in Hsinchu, Taiwan, specializes in systems-on-chips with 10 and 12 cores.

Demand for customization

Developments by the major chip manufacturers enabled defense contractors to use single processors rather than multiple components. Their primary challenge is to meet high user demand for customization in products produced in the thousands rather than millions. That volume — and the speed of evolution in chip technology — make it impractical, if not financially impossible, to build their own chips. As a result, contractors must take what's available in the commercial market that enables compliance with the standards of the military market.

The new small footprint Embedded G-Series SoC from Advanced Micro Devices (AMD) in Sunnyvale, Calif., for example, combines a low-power x86 microprocessor with an integrated discrete-class graphics-processing unit (GPU) and I/O controller and enterprise-class error-correction code (ECC) memory support on a single chip, in dual and quad core variants. The result, the

company says, is “an exceptional HD multimedia experience and a heterogeneous computing platform for parallel processing... [setting] the new foundation for a power-efficient platform for content-rich multimedia and workload processing well suited for a broad variety of embedded applications.”

Taiwan-based NEXCOM International maintains the combined demands of IoT, cloud computing, and expanded network communication have pushed the evolution of traditional embedded devices, transforming them into intelligent systems that are gradually becoming adopted and deployed for both commercial and military applications.

“In the era of specialized knowledge economy, the challenge of integrating multiple silicon intellectual property (SiP) cores requires complex verification of various elements, from SoC processors, firmware, drivers to operating system kernels,” according to a NEXCOM white paper. “Therefore, a highly

integrated SoC module, comprising both hardware and software elements, is a shortcut to reducing the development life cycle of SoC solution and time-to-market.”

At a 2014 Embedded Systems Engineering panel on the evolution of SoCs, Dan Demers, director of marketing-Americas for Congatec Inc. in San Diego, said one of the most important effects of the SoC concept is the ability it gives to developers of small-form-factor board and modules to consider future standards that further reduce overall size.

Considering future standards

“The real-estate savings that are found with SoCs are pretty considerable when we note that not too many years ago it took many chips to equal the benefits of these SoCs,” Demers told the panel. “Another benefit to SoCs is that many also realize a power savings, which in turn helps to fuel further development on more powerful, yet less power-hungry, devices.

“Today’s SoCs are getting a lot of accolades for their relative high capabilities for image processing, which is opening the door to many new applications,” Demers continued. “When you step back and look at what the latest Intel and AMD SoCs offer, it is quite amazing. We are realizing silicon platforms that are both today- and tomorrow-focused. They contain relative high computational capability and a lot of flexibility for the board/module designer and, of course, the overall system design engineer.” As SoCs continue to evolve, he added, designers will look to new ways to use their smaller size on current and future form factors.

“SoC is always improving,” notes

Zak Sucher, business development manager at Israel's Techaya. "In every generation, we are managing to squeeze more applications on a single chip, so today we can use one or two chips where we once used three or four. It is going toward eventually taking over all previous platforms, but the military market moves slower; you can still find things today that were in use 10 or 15 years ago and what's being done today will still be there 10 or 15 years forward."

"We see them on soldier apps, where everything he carries needs to be small and provide a lot of comms to other devices; the same for UAVs [unmanned aerial vehicles], where you need low power consumption, small units, and interconnectivity," Sucher says. "So all soldiers and unmanned applications are the major users. A soldier can only carry a certain amount of equipment and every gram of equipment he can remove means he can carry more food, water, or ammo. So the lighter the radio and other equipment, the more essential items he can carry."

Shift to multifunction capability

While size, weight, and power (SWaP) and component integration are and always will be primary drivers for commercial and military platforms, a major shift toward software is giving multifunction capability to more and smaller systems. Becoming software-defined also enables faster and less expensive updating of capabilities without needing to change the hardware with each incremental advance, a critical factor for SoC-based military systems that do not change with the frequency of commercial smartphones.

"What has driven all this is the need to integrate all these functions and the really wideband apps, such as electronic warfare [EW]. So it's a combination of more bandwidth and the [system] intelligence to run some software apps inside these embedded processors," says Avnet's Langlois. "EW, for example, is all about dominating the RF spectrum for jamming while receiving your own communications in the clear across an ultra-wideband past 200 GHz. So traditional programmable logic, even before SoCs, continue to play a role because they are the only devices that can interface with these high-speed components, as they have for the past 20 years."

Just as the demand for more battlespace bandwidth across the board has been growing faster than the military can implement new technologies to address

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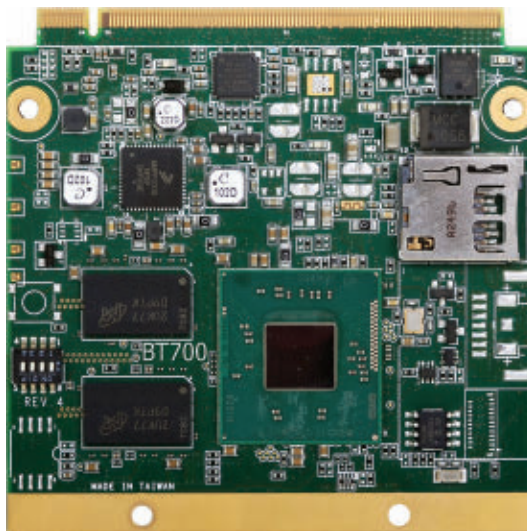


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it, so has it impacted the ongoing evolution in SoC speed and capability. That is especially true in areas such as EW, software-defined radios, and large antenna arrays.

“EW has an ever-increasing demand for bandwidth, digitizing beyond 200 GHz of spectrum, which is massive — and it never ends,” Langlois says. “We’re talking thousands of gigaMACs, which is one billion multiply and accumulate instructions that just about any signal processing app uses. In some cases, we have on the order of 2000 to 3000 gigaMACs of digital signal processor (DSP) capability. In EW, where you’re trying to digitize and analyze 200 gigabits of bandwidth, these SoCs certainly will be important. Another big app is phased array, where you have arrays



The Qseven BT700 module is based on the next-generation Intel Atom processor E3800 product family. It delivers computing, media, and graphical capabilities, as well as a built-in security engine — all on a sub-10-watt system-on-chip (SoC).

of antennas for MIMO [multiple input/multiple output] apps, 10x10 or bigger.

“In terms of SDR, the P25 standard proposed for public safety apps is seeing a lot of interest, [especially] any type of comms system that needs to send video, Langlois continues.

“The avionics space certainly has multiple requirements (HUDs, SATCOM, radar, security) with new features making it harder to reverse-engineer this new family of SoCs. The same is true for anything that goes into space and needs to be rad-hard and robust in terms of single event upsets. These new SoCs will be used there, as well, although there is always a lag between the creation of any type of rad-hard chip and its incorporation into final products.”

Data converter standards

The JESD204/JESD204B revision data converter serial interface standard was created through the JEDEC committee to standardize and reduce the number of data inputs/outputs between high-speed data converters and other devices, such as field-programmable gate arrays (FPGAs).

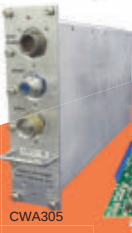
JESD204B supports the high bandwidth required by current generation high-performance, high-speed, and multi-channel applications, while greatly reducing the number of digital I/Os needed. For example, very high-speed analog-to-digital converters previously requiring a complex interface design of multiple FPGA I/Os, now accomplish the same task with only a few pins. The interface’s total bandwidth also can be separated into multiple channels based on application requirements, but without requiring additional pins.

Fewer interconnects simplifies layout and enables smaller form factor realization without impacting overall system performance, according to Analog Devices Inc. (ADI) in Norwood, Mass. These attributes are important to address the system size and cost constraints of a range of high-speed A/D converter applications,





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including wireless infrastructure, transceiver architectures, software-defined radios, portable instrumentation, medical ultrasound equipment, and military-aerospace applications, such as radar and secure communications.

There were incremental improvements and innovations in the shift to advanced SoCs. Programmable logic with embedded processors began appearing some 10 years ago. Speciality CPUs had ARM and DSP accelerators, but they weren't as flexible as programmable logic. Langlois says the race really started around 2004–2005, as traditional FPGAs became more of a software engine and began to rival existing products.

The next big milestone for Xilinx was Zynq, which is marketed as an SoC rather than an FPGA. It came to the forefront about four years ago, when combining software, hardware, and multiple peripherals began to appear.

Parallel signal processing

"The next step is what to do with all that data," Avnet's Langlois adds. "Over 200 gigabytes of bandwidth requires a whole lot of processing power to pull out data. You need massively parallel signal processing, which we're pulling into with embedded processors, such as Xilinx' Zynq Ultrascale+ MPSoC [multiprocessor SoC], a true SoC with all the programmable logic, but also a 64-bit quad-core ARM A53 processing system, on-chip memory, security features, more gigabit receivers, and signal processing in a single device. That is our flagship, just now rolling out, with the first devices shipping this summer."

This new generation of SoC offers numerous advantages to the end user: much higher performance, faster design-to-market cycles, the ability to leverage years of legacy software, etc. However, it also imposes a need for more software expertise on the part of designers, especially as end users increasingly demand pre-engineered solutions, rather than trying to build their own solutions from scratch as SoC complexity gets higher and higher with each new release. It is all part of an effort to avoid the commercial smartphone obsolescence track, where buying a phone more than a year old could be several generations behind in technology and software.

"The software infrastructure is now going to dominate the whole landscape of development and, by extension, all the functionality the user can get," Langlois says. "For example, a lot of our military customers are designing products they not only want to be able to communicate, such as SDRs, but also send video, sometimes

from multiple camera streams, over the air securely. That has been very challenging because you don't have enough bandwidth to send raw video. The latest generation, however, can compress that video within the SoC, using H.265 High Efficiency Video Coding, making it feasible to send streaming video from a UAV."

Several trends have forced evolutions of systems architectures, in turn driving evolutions of required buses, according to a white paper by SoC specialist Arteris Inc. in Campbell, Calif. The first trend involves application convergence, "the mixing of various traffic types in the same SoC design (video, communication, computing, etc.)," the Arteris white paper states. "These traffic types, although very different in nature, for example from the Quality of Service point of view, must now share resources that were assumed to be 'private' and hand-crafted to the particular traffic in previous designs.

"Moore's Law is driving the integration of many IP blocks in a single chip. This is an enabler to application convergence, but also allows entirely new approaches —



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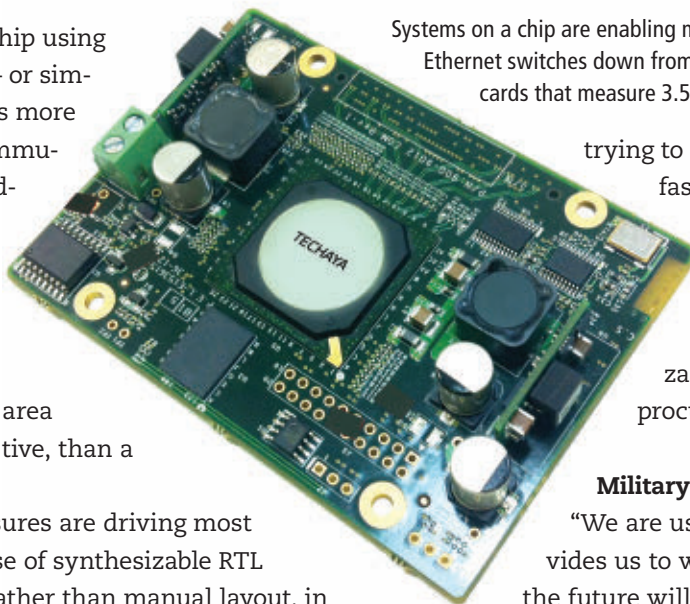
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parallel processing on a chip using many small processors — or simply allows SoCs to process more data streams, such as communication channels,” according to the white paper. “Consequences of silicon process evolutions between generations: Gates cost relatively less than wires, both from an area and performance perspective, than a few years ago.

“Time-To-Market pressures are driving most designs to make heavy use of synthesizable RTL [register transfer levels] rather than manual layout, in turn restricting the choice of available implementation solutions to fit a bus architecture into a design flow,” the white paper says.

It leaves SoC manufacturers in a bit of a quandary:



Systems on a chip are enabling manufacturers like Techaya to shrink Ethernet switches down from rack-mounted units to board-level cards that measure 3.5 by 3.5 inches.

trying to keep up with an extremely fast-moving and evolving technology and using it to meet increasingly complex military demands, while at the same time remaining cognizant of the realities of military procurement and life cycles.

Military market issues

“We are using what the industry provides us to work with; what else they do in the future will come and we will adapt it to serve our needs and comply with military standards. We’re always looking for new technology that will enable us to improve our equipment. We’re in the middle, following the [processor] manufacturers on one side and providing solutions to identified needs of the military on the other,” says Techaya’s Sucher.

“Everything is going faster, getting smaller, and adding processing capability. Today you have 10G, 40G, and 100G in bandwidth, so I think the next step is security and cyber,” Sucher says. “If you have a smaller device, you have more space to build protection circuits around it, but cyber security isn’t necessarily easier with SoC. We have some solutions in the pipeline for those, but it’s too early to go into detail. However, they are essential to make sure our systems are well protected and can’t be jammed or penetrated.”

There is general agreement that the U.S. and Israel stand well ahead of the rest of the world — friend and foe — in the development and fielding of advanced SoCs, in no small measure a combination of their technology bases and their customer demands to fit into smaller and smaller form factors, which cannot be achieved in any other way. But others, notably China, are working hard to catch up.

The role of China

“We see a lot of Chinese companies trying to buy Israeli companies, so it’s hard to tell if innovation in China comes from domestic efforts or from what they are buying or trying to buy elsewhere. But the U.S. and Israel must remain in the lead,” Sucher says.



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The anatomy of a system-on-chip

A typical SoC comprises:

- a microcontroller, microprocessor, or DSP core — MP-SoC having more than one processor core;
- memory blocks, including a selection of ROM, RAM, EEPROM, and flash memory;
- timing sources, including oscillators and phase-locked loops;
- peripherals, including counter-timers, real-time timers, and power-on reset generators;
- external interfaces, including industry standards, such as USB, FireWire, Ethernet, USART, and SPI;
- analog interfaces, including A/D converters and D/A converters; and
- voltage regulators and power management circuits.
- A bus — either proprietary or industry-standard, such as the AMBA bus from ARM Holdings — connects these blocks. DMA controllers route data directly between external interfaces and memory, bypassing the processor core and thereby increasing the data throughput of the SoC. ◀

Avnet's Langlois says he agrees, not so much because of the technology itself, but the ability to use it. "I doubt very much the U.S. is in danger of losing its edge. It's not just about the device; you're seeing so much functionality, it is

extremely challenging for design teams to even leverage what they have. So a lot of the investment of leading U.S. companies making any type of embedded processing is in tools and design flow," Langlois explains.

"You can't just get into this business without a massive investment in tools, high-level synthesis; you just can't spin that up in a short amount of time. I don't see anyone else able to give their design teams those tools, which require years of development. Israel has a lot of expertise in very niche market segments, but the underlying chips, so far as I know, are all from the U.S.," Langlois adds.

Network-on-chip

The continuing development of faster, smaller, lighter, less power-hungry, and more capable microprocessors and the new trend from quad-core to octacore processors has enabled one new evolution in the SoC concept: network-on-chip (NoC).

According to Arteris Inc., its advanced NoC employs system-level network techniques to solve on-chip traffic transport and management challenges, using a homogeneous, scalable switch fabric network to transport multipurpose data packets within complex, IP-laden SoCs.

"The NoC approach has a clear advantage over traditional buses for nearly all criteria, most notably system throughput," according to an Arteris white paper.

"Hierarchies of crossbars or multilayered buses have characteristics somewhere in between traditional buses and NoC; however, they fall far short of the NoC with respect to

performance and complexity," according to an Arteris white paper. "Detailed comparison results necessarily depend on the SoC application, but with increasing SoC complexity and performance, the NoC is clearly the best IP block integration solution for high-end SoC designs today and into the foreseeable future."

Billions of new embedded devices, from commercial smartphones to military radars, are shipped each year. And each year sees a greater number of those capable of higher and higher degrees of connectivity, especially "plug-and-play" connections, utilization of cloud computing paradigms, and the ability to serve as their own platforms for collaboration and networking.

As multi-core architectures, internationalization, efficient security algorithms, and open source platforms become more and more dominant, everyone from engineering design teams to SoC/NoC producers to end users need to maintain a vigilant knowledge of the technologies involved and the implications as such systems become ubiquitous.

"As silicon providers like Intel and AMD continue to drive down the size, power, and cost of their SoCs, there will likely be more proliferation of their platforms into the more outer layers of IoT," predicts Congatec's Demers. "That is where the significant growth is happening and it is quite a race we are witnessing. Those who master the layout and placement for small-form-factor boards and modules will likely have even more influence on their shapes and sizes (specifications) in the future." ◀

► Boeing to provide anti-jam upgrade for communications satellites

Electronic warfare (EW) experts at the Boeing Co. will upgrade the anti-jam and information-security capabilities of an important military satellite communications (SATCOM) system. Under a \$55 million U.S. Air Force contract, Boeing experts will provide an X-Band anti-jam upgrade for the Wideband Global SATCOM satellite constellation, increasing its resilience to unintentional and hostile electronic threats. The Wideband Global SATCOM satellite, successor to the Defense Satellite Communications System-III, is the backbone of U.S. military global satellite communications. One WGS satellite has about 12 times the bandwidth of a DSCS-III satellite; just one WGS satellite provides more SATCOM capacity than the entire DSCS constellation. The WGS constellation provides flexible, high-capacity, high-data-rate, and long-haul communications to warfighters. In addition to providing global SATCOM for Marines, soldiers, sailors, and airmen, the WGS provides SATCOM capability to the White House Communication Agency, the U.S. State Department, international partners, and other users. International partners participating on the WGS program are Australia, Canada, Denmark, Luxembourg, the Netherlands, and New Zealand. ◀

Exelis to repair electronic warfare missile-defense system components

BY John Keller

PHILADELPHIA — Electronic warfare (EW) experts at Exelis Inc. in Clifton, N.J., will replace important components of the U.S. Navy Integrated Defensive Electronic Countermeasures (IDECM) program, which helps defend military aircraft from radar-guided, anti-aircraft missiles.

Officials of the Weapon Systems Support branch of the Naval Supply Systems Command in Philadelphia announced a \$7.6 million contract to Exelis to repair IDECM weapons replaceable assemblies. Harris Corp. in Melbourne, Fla., completed its acquisition of Exelis last May.

IDECM provides self-protection capability against surface-to-air and air-to-air, radar-guided threats as it detects, identifies, and manages electronic countermeasure response to radar-guided missiles.

IDECM uses a techniques generator and fiber-optic towed decoy to protect aircraft from missile radar. Its jamming system uses a combination of onboard transmitters and the fiber-optic towed decoy to deceive enemy radars and missile systems.

IDECM is a Navy-led joint program that includes the U.S. Air Force. The system integrates electronic self-protection systems on the host aircraft.

There are four IDECM block configurations: IB-1, AN/ALQ-165 and



Exelis will replace important components of the Navy's IDECM system, which helps defend aircraft such as the F/A-18, shown above, from radar-guided missiles.

the AN/ALE-50 Towed Decoy; IB-2, AN/ALQ-214 and the AN/ALE-50 Towed Decoy; IB-3, AN/ALQ-214 and the AN/ALE-55 Fiber Optic Towed Decoy (FOTD); and IB-4, AN/ALQ-214 engineering change proposal.

IDECM Blocks 1-3 when integrated with the Navy's F/A-18E/F Hornet jet fighter-bomber provide incremental improvement in survivability against RF threats. IDECM Block 4 is an engineering change proposal to the ALQ-214(V)3 which will result in an ALQ-214 configuration suitable for use on the F/A-18C/D (replacing the ALQ-126B) and the F/A-18E/F (with either the ALE-55 or ALE-50 towed decoy).

On this contract, Exelis will do the work in Clifton, N.J., and should be finished by December 2017. ◀

FOR MORE INFORMATION visit Exelis online at www.exelisinc.com, or the Naval Supply Systems Command at www.navsup.navy.mil.

Navy asks for electro-optical dome of imaging over surface warships

BY John Keller

ARLINGTON, Va. — U.S. Navy researchers are pursuing an initiative to use electro-optical sensors to improve the situational awareness of surface warship crews. They seek to develop a visible-light and infrared sensor able to image the entire area around the ship, from 360 degrees of horizon to straight above the vessel.

This imaging dome would provide situational awareness in the open ocean, along coasts, and inside harbors to detect, locate, and track potential airborne and surface threats. Office of Naval Research (ONR) officials in Arlington, Va., issued a request for information (N00014-16-RFI-0002) for the Hemispherical Imaging for Situational Awareness project. ONR experts also released a request for information for the Imaging Through Obscurants project, which seeks to develop electro-optical shipboard electro-optical sensors able to see through fog, haze, rain, and snow.

The Hemispherical Imaging for Situational Awareness project seeks the ability to monitor the entire hemispherical dome (360 degrees azimuth by 90 degree vertical) for potential threats around surface vessels. Conventional imaging sensors are too inefficient for this job, and would lead to single frames with hundreds of megapixels of data, more than 90 percent of which do not contain meaningful or relevant information.



Navy researchers want to create a dome of imaging capability to protect surface warships from missiles and other threats.

Navy researchers also are trying to deal with challenges of creating an imaging dome around surface ships. The vertical angle changes from near the horizon to directly overhead, for example, and the background and expected threat signatures change dramatically with range and angle.

Researchers are primarily interested in visible-light and infrared sensors for this project because of their superior resolution, but they are considering passive millimeter wave sensors for their ability to image through clouds, dust, fog, and rain.

The goal is to find unconventional approaches to full hemispherical imaging for situational awareness, and generate data more efficiently with high probability of detection and low false alarm rates. ◀

MORE INFORMATION IS online at <https://www.fbo.gov/spg/DON/ONR/ONR/N00014-16-RFI-0002/listing.html>.

▶ CSRA to maintain DCGS military networking for reconnaissance imagery

Military networking experts at CSRA Inc. (formerly SRA International) in Fairfax, Va., will maintain and upgrade a U.S. Air Force reconnaissance imagery-distribution system under terms of a \$35.4 million contract. Officials of the Air Force Acquisition Management Integration Center (AMIC) Detachment 2 at Joint Base San Antonio, Texas, are asking CSRA to manage and maintain the Air Force Distributed Common Ground System (AF DCGS) Processing, Exploitation, and Dissemination (PED) Operation Center. The AF DCGS PED architecture consists of an Asynchronous Transport Mode (ATM) network that transports serial sensor bit streams, non-serial imaging sensors bit streams for still images and full-motion video. The ATM network also moves still images, video, voice, avionics bit streams, and data from reconnaissance aircraft flying overseas to various AF DCGS sites for processing, Air Force officials say. ATM broadband networks are designed to transport digital voice, data, and video signals, and are in place to unify telecommunication and computer networks. These networks handle traditional high-throughput data traffic like file transfers, as well as real-time, low-latency content such as voice and video. ◀

PRODUCT applications

POWER ELECTRONICS

Navy chooses RCT Power Systems to design new bi-directional shipboard power conversion modules

U.S. Navy shipboard electronics experts needed experimental power-conversion modules and energy-storage components for advanced shipboard electrical shipboard power systems. They found their solution at the RCT Systems Inc. Power Systems Division in Linthicum Heights, Md.



Officials of the Naval Sea Systems Command in Washington announced a \$12.4 million contract to RCT Power Systems for research and developmental testing and manufacturing of bi-directional power conversion modules to support a 4160-volt AC, 60 Hz shipboard electrical architectures.

Navy researchers want these shipboard electronics components to interface with the battery or rotating machine energy storage and power load modules of next-generation, integrated shipboard power systems.

RCT Power Systems experts also will study, analyze, design, develop, and test energy-storage solutions for the power conversion modules. Bi-directional power conversion enables power systems to connect either to storage battery systems or direct-current power supply systems. Typically these kinds of power converters rely on digital power control for efficiency.

RCT Power Systems (formerly Satcon Applied Technology) designs, builds, and integrates products and technologies in power electronics, hybrid and electric vehicles, renewable energy, motors and generators, and power systems architectures. RCT Power Systems will do the work in Linthicum Heights, Md., and should be finished by January 2021.

FOR MORE INFORMATION visit RCT Power Systems online at <http://rct-systems.com>.

BATTERIES

Army chooses lithium-ion rechargeable batteries from Mathews Associates and Bren-Tronics

U.S. Army leaders needed rechargeable lithium-ion batteries for various

uses in the field, such as powering voice and data radios. They found their solution at Mathews Associates Inc. in Sanford, Fla.; and Bren-Tronics Inc. in Commack, N.Y.

U.S. Defense Logistics Agency

Land and Maritime officials in Columbus, Ohio, announced a \$23.2 million contract to Mathews and Bren-Tronics for lithium-ion batteries. The two companies will share the contract.



A lithium-ion battery are among the most popular types of rechargeable batteries for portable electronics, with a high energy density, small memory effect, and a slow loss of charge when not in use. Lithium-ion batteries can be tricky to use for military applications because they contain a flammable electrolyte under pressure. Still, their advantages in power density make them popular for systems like the PRC-104, PRC-119, SINCGARS, PRC-138, KY-57, and other military radios.

Among the lithium-ion batteries Mathews offers are the BB-2590/U and BB-2812/U. The 20-volt BB-2590/U, for a variety of military radios, has dual state of charge gauge, a high-impact plastic housing, and hermetically sealed lithium-ion cells.

Bren-Tronics makes a variety of lithium-ion batteries for military applications, including the BT-70483, BT-70492A, and BT-70492BK. The BT-70483 is for handheld radios and thermal imagers. The BT-70492A is for portable thermal cameras, and the BT-70492BK is for portable thermal imagers.

Mathews Associates and Bren-Tronics will do the work in Florida and New York, and should be finished by November 2018. ←

FOR MORE INFORMATION visit Mathews Associates online at www.maifl.com and Bren-Tronics at www.bren-tronics.com.

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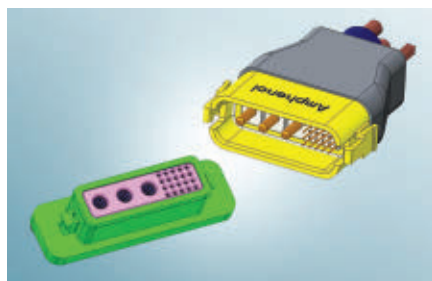


To submit new products for consideration, contact John Keller at jkeller@pennwell.com.

CONNECTORS

Rugged connector with power and signal contacts introduced by Amphenol

Amphenol Industrial Products Group in Sidney, N.Y., is introducing the Amphe-RXS connector that incorporates power and signal contacts in one connector for space-constrained applications like 3-phase electric



motors, hybrid or electric vehicles, motorcycles, scooters, and material handling. The rugged Amphe-RXS uses Amphenol's RADSOK terminals as power contacts and either standard or high-vibration (AHVB) signal terminals. RADSOK technology enables high amperage, lower t-rise, low resistance, and low mating forces. These power terminals can range in size from 2.4 to 5.7 millimeters to 120 amps continuous, while its signal terminals can range from size 22 to size 16. The all-in-one connection system can accommodate a variety of easy locking solutions ranging from plastic lock tabs to small screws. Lever locks or large jack screws are not necessary due to low mating forces.

FOR MORE INFORMATION visit **Amphenol Industrial Products Group** online at www.amphenol-industrial.com.

www.militaryaerospace.com

COMPUTER BOARDS

3U and 6U OpenVPX boards for military radar and EW offered by Curtiss-Wright

The Curtiss-Wright Defense Solutions Division in Ashburn, Va., is introducing the 3U OpenVPX CHAMP-XD1 and 6U CHAMP-XD2 digital signal processing (DSP) embedded computing modules for deployment in compute-intensive, harsh-environment military electronic warfare (EW), radar, surveillance, and reconnaissance applications. The modules use the Intel Xeon processor D-1500 product family. The modules, which are available with 8-core versions of the processor, also will be available with 12 and 16-core versions of the proces-



sor, which Intel will make available in the first quarter of 2016. The 12-core version will offer extended-temperature support, and all of the variants offer 7-year availability. The Intel Xeon processor D-1500 product family offers enhanced performance at low power for use on rugged open-architecture modules. The 3U CHAMP-XD1 began shipping in December 2015; the 6U CHAMP-XD2 will ship in early 2016.

FOR MORE INFORMATION visit **Curtiss-Wright Defense Solutions** online at www.cwcdefense.com.



DATA ACQUISITION

FMCs for data acquisition in radar and communications introduced by Pentek

Pentek Inc. in Upper Saddle River, N.J., is introducing FlexorSet model 5973-324 for 3U VPX and model 7070-324 for PCI Express data acquisition for radar, communications, and general data-acquisition applications. They consist of the Flexor model 3324 four-channel A/D and four-channel D/A FPGA mezzanine card (FMC) installed on either of two carriers. The carriers contain optimized Pentek field-programmable gate array (FPGA) intellectual property (IP) for A/D acquisition and D/A waveform playback, which is matched to the four 500 MHz, 16-bit A/Ds and the four 1.5 GHz, 16-bit D/As with digital up-converters (DUCs) on the FMC. The model 3324 FMC front end accepts four analog HF or IF inputs on front-panel connectors with transformer coupling into two Texas Instruments ADS54J69 dual A/D converters, boosting density for high channel count systems.

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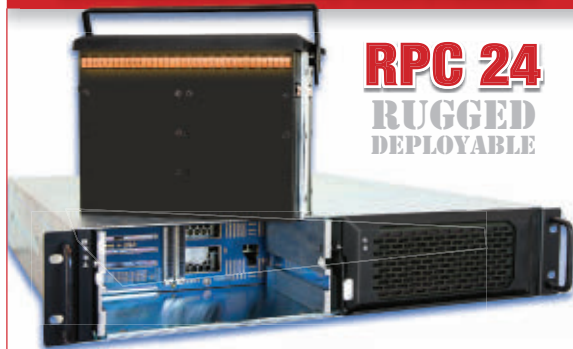
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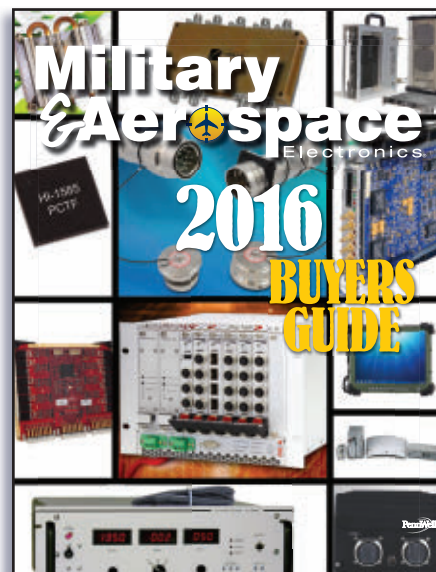
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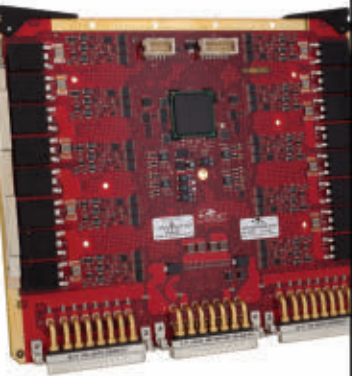
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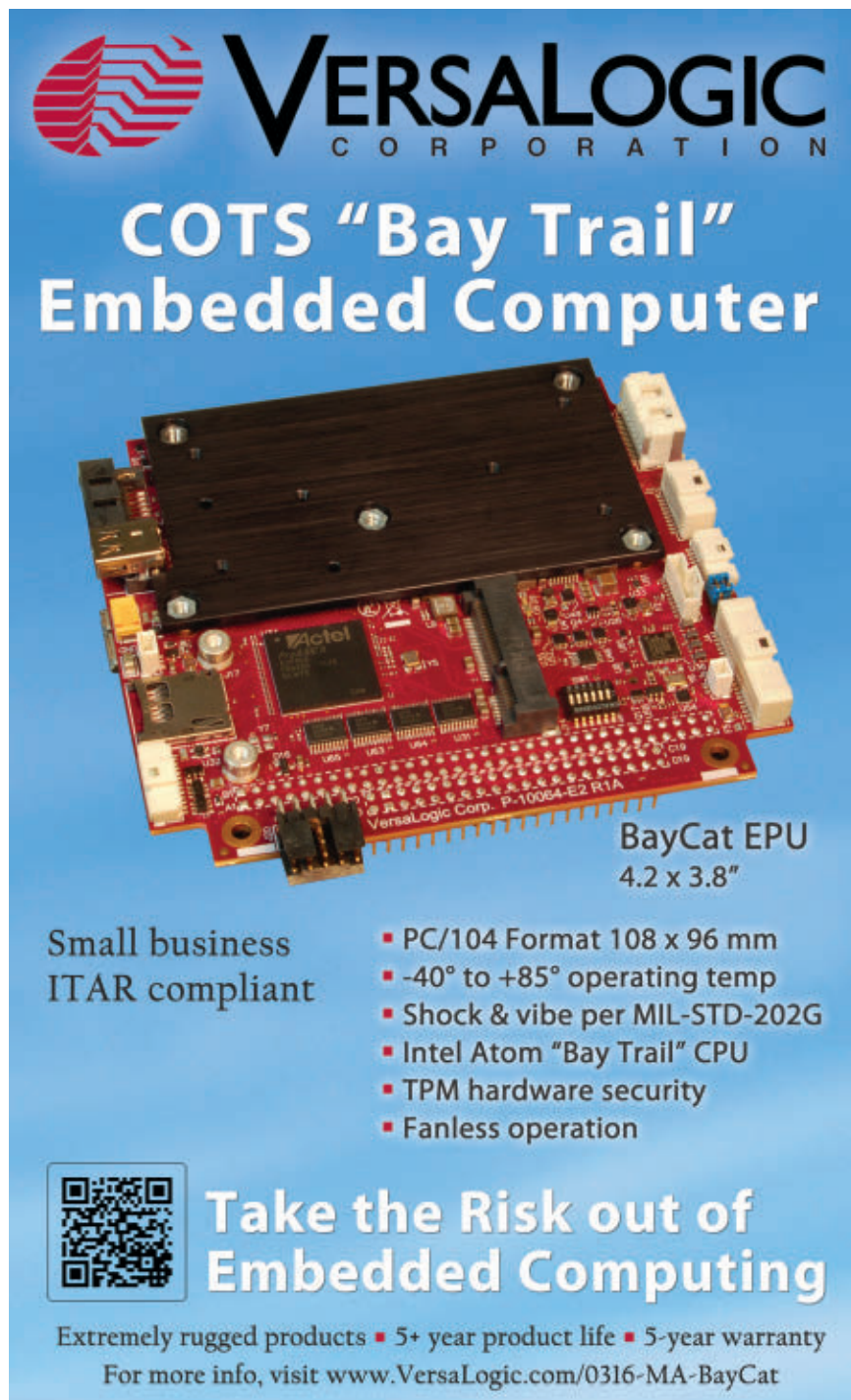
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GE Intelligent Platforms
Hughes Circuits Inc
Innovative Integration
IXI Technology
KAMAKA Electronic Bauelemente
Vertriebs GmbH
Kimball Electronics
Kontron
MAZeT GmbH
MEN Micro Inc
■ **Mercury Systems**
(See ad page 11)
MPL AG
North Atlantic Industries Inc
Orion Technologies LLC
■ **Pentek Inc**
(See ad inside back cover)
Projects Unlimited
Rigel Engineering LLC
Sparton

Stewart Connector
TASC Technical & Assembly Services
Corp
TEN TECH LLC
■ **Themis Computer**
(See ad page 39)
Trenton Systems Inc
■ **VersaLogic Corp**
(See ad page 38, 40)
WinSystems Inc

COMMUNICATIONS AND PERIPHERALS

AUDIO EQUIPMENT

AUDIO EQUIPMENT

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Impact Power Technologies
L-com Global Connectivity
LRAD Corp
Shoghi Communications
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Bodkin Design & Engineering LLC
Design Criteria Inc
Fabritech Inc
Fibercore Ltd
Fibersense & Signals Inc
H&L Instruments LLC
Lenthor Engineering Inc
MegaWatt Lasers Inc
Micro Laser Systems Inc
OptiConcepts Inc
OSI Laser Diode Inc
Power Technology Inc
TeraXion Inc

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Canyonwest Cases
Comtech PST
Custom Circuit Boards
Design Criteria Inc
Electromagnetic Technologies
Industries Inc
Evans Capacitor Co
Fabritech Inc
HUBER+SUHNER AG
Pro-Comm Inc
Quell Corp
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(See ad page 17)
Shoghi Communications
SmarTest LLC
Southwest Antennas
Taconic
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Advanced Test Equipment Rentals
American Portwell Technology
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API Technologies Corp
BEEcube Inc, a National Instruments Co
BittWare
Canyonwest Cases
CES - Creative Electronic Systems SA
Clear-Com
Cornet Technology Inc
■ **Crystal Group Inc**
(See ad page 9)
Custom Circuit Boards
Dawn VME Products
Delta Digital Video
Design Criteria Inc
Digicom Electronics
Dynamic Engineering
EDT | Engineering Design Team Inc
Electromagnetic Technologies
Industries Inc
Evans Capacitor Co
Fabritech Inc
GACI Rugged Systems
GridPlex Networks
Harris Corp



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(See ad page 49)

Hughes Circuits Inc
Innovative Integration
JuiceBox Energy Inc
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Kontron



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(See ad page 43)

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LEONI Fiber Optics Inc
Lexycom Technologies Inc
The Light Brigade Inc
Milsource
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(See ad page 17)
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Shore Microsystems Inc
SmarTest LLC

Southwest Antennas
Taconic
Tech Products Inc
Telkonet Inc
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Trenton Systems Inc
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US Technologies
VDesign Technologies
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Communications
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BittWare
Canyonwest Cases
Clear-Com
Cornet Technology Inc
Datalink Technologies
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(See ad inside back cover)
Pryme
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(See ad page 17)



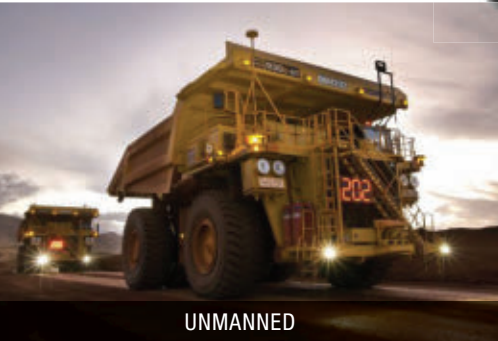
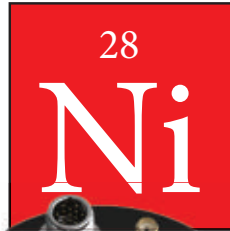
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Berliner Glas KGaA Herbert Kubatz
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(See ad page 44)

SENER
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(See ad page 47)



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(See ad page 22)

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Cornet Technology Inc

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(See ad page 9)
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■ **Data Device Corp (DDC)**
(See ad page 5)

Dawn VME Products
■ **Elma Electronic Inc**
(See ad inside front cover)
■ **Extreme Engineering Solutions Inc (X-ES)**
(See ad page 37)

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GACI Rugged Systems
GE Intelligent Platforms
Hi-Tech Controls
Kontron

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(See ad page 17)
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(See ad page 47)

AcQ Inducem
American Portwell Technology
BittWare
Clear-Com
Cornet Technology Inc
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(See ad page 5)
Digital Systems Engineering Inc (DSE)
Dynamic Systems Inc
■ **Extreme Engineering Solutions Inc (X-ES)**
(See ad page 37)
FreeSpace Networks



■ **Holt Integrated Circuits**
(See ad page 49)

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MEN Micro Inc
Pleora Technologies Inc
Powell Electronics
■ **R&D Interconnect Solutions**
(See ad page 17)
Rigel Engineering LLC
SurplusEQ.com Inc
United Electronic Industries Inc

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Astronics Ballard Technology
Digital Systems Engineering Inc (DSE)
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GE Intelligent Platforms
Milsource
PALMARII Dynamics AB
PELORUS NAVAL SYSTEMS Inc
ViaSat Inc

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■ **AIM-USA**
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American Portwell Technology
Amphenol PCD
Astronics Ballard Technology
Clear-Com
Digital Systems Engineering Inc (DSE)
Dynamic Systems Inc
■ **ECRIN Systems**
(See ad page 21)
■ **EMCOR Government Services**
(See ad page 7)
L-com Global Connectivity
Rigel Engineering LLC
SurplusEQ.com Inc
Telkonet Inc
TXO Systems Ltd
WinSystems Inc

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BittWare
Clear-Com
Dynamic Systems Inc
■ **EMCOR Government Services**
(See ad page 7)
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L-com Global Connectivity
Lexcom Technologies Inc
PALMARII Dynamics AB
PELORUS NAVAL SYSTEMS Inc
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Sporian Microsystems Inc
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Curtiss-Wright Defense Solutions
■ **Data Device Corp (DDC)**
(See ad page 5)
Digital Systems Engineering Inc (DSE)
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(See ad inside back cover)

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(See ad page 30)

■ **RGB Spectrum**
(See ad page 30)

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■ **Themis Computer**
(See ad page 39)

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United Electronic Industries Inc
Winchester Systems Inc

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Graham Magnetics
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(See ad page 9)

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Microway Inc

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(See ad page 30)

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Winchester Systems Inc

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Aitech Defense Systems Inc
Amphenol Aerospace
Astronics Ballard Technology
Cepoint Networks LLC
CES - Creative Electronic Systems SA
CRU Inc

■ **Elma Electronic Inc**
(See ad inside front cover)

■ **Extreme Engineering Solutions Inc (X-ES)**
(See ad page 37)

falcon
electronics

■ **Falcon Electronics**
(See ad page 51)

Graham Magnetics
IXI Technology
Orion Technologies LLC

■ **Phoenix International**
(See ad page 30)

■ **R&D Interconnect Solutions**
(See ad page 17)

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Winchester Systems Inc
WinSystems Inc

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Eureka Dry Tech
Germane Systems
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Epoxy Technology Inc
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(See ad page 30)

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ADLINK Technology Inc
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(See ad page 9)

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(See ad page 37)

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Kontron
MERITEC
Powell Electronics
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(See ad page 5)

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Advanced Interconnections Corp

AirBorn
Amphenol Aerospace
Amphenol PCD

API Technologies Corp
Aries Electronics Inc

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AVX

BellowsTech LLC
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Carlisle Interconnect Technologies

Coaxial Components Corp (Coaxicom)
CPC (Colder Products Co)

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(See ad page 51)

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March Electronics Inc
MERITEC

Molex Inc, Optical Solutions Group
Multi-Contact USA

Omnetics Connector Corp
PA&E

P&A Components Inc
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Permac Industries Inc

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Analytic Systems
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Carlisle Interconnect Technologies
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(See ad page 9)

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(See ad page 37)

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P&A Components Inc
Quagwire Technologies
Rennsteig Tools Inc
Rose Electronics
Ross Engineering Corp
Stewart Connector
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TeraXion Inc
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Sigenics Inc

■ **VPT Inc**
(See ad page 3)

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(See ad page 5)

■ **Falcon Electronics**
(See ad page 51)



■ **Interstate Connecting Components**
(See ad page 48)

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(See ad page 47)

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C&K Components
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(See ad page 5)
■ **ECRIN Systems**
(See ad page 21)

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Essex Industries
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Haydon Kerk Motion Solutions Inc
Hi-Tech Controls
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(See ad page 48)

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TLC International

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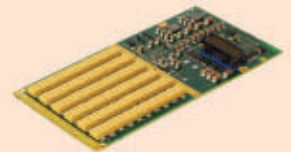
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(See ad page 51)
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(See ad page 1, 6)
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(See ad page 1, 6)

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P&A Components Inc
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Crouzet Aerospace
■ **Data Device Corp (DDC)**
(See ad page 5)
Design Criteria Inc
Digi-Key Electronics
Evans Capacitor Co
■ **Falcon Electronics**
(See ad page 51)
Fox Electronics
■ **Holt Integrated Circuits**
(See ad page 49)

KAMAKA Electronic Bauelemente
Vertriebs GmbH
Lenthor Engineering Inc
March Electronics Inc
Nordson ASYMTEK
PA&E
P&A Components Inc

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(See ad page 13, back cover)

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STMicroelectronics Inc
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Custom Circuit Boards
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(See ad page 51)

Fox Electronics
GE Aviation

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Vertriebs GmbH
P&A Components Inc
Sensitron Semiconductor
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STMicroelectronics Inc
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CORWIL Technology Corp
Crouzet Aerospace
Custom Circuit Boards

■ **Data Device Corp (DDC)**
(See ad page 5)

e2v



■ **Falcon Electronics**
(See ad page 51)

GE Aviation
Intersil

■ **IR HiRel - An Infineon Technologies Co**
(See ad page 1, 6)

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Vertriebs GmbH
Modular Devices Inc
MS Kennedy Products
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Stewart Connector
STMicroelectronics Inc

■ **VPT Inc**
(See ad page 3)

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Crane Aerospace & Electronics

■ **Falcon Electronics**
(See ad page 51)

■ **Gaia Converter**
(See ad page 16)

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(See ad page 1, 6)

IRT Integrated Rectifier Technologies Inc
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Vertriebs GmbH
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Sensitron Semiconductor
Solitron Devices Inc
STMicroelectronics Inc
Thermacore Inc

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(See ad page 51)

Forza Silicon
GE Aviation
Intersil

KAMAKA Electronic Bauelemente
Vertriebs GmbH

■ **Lansdale Semiconductor Inc**
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North Atlantic Industries Inc
Stewart Connector
Trenton Systems Inc
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(See ad page 51)
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(See ad page 37)

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(See ad page 30)
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(See ad page 17)

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 (See ad page 51)
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 OSI OptoElectronics Inc
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 Infinite Graphics Inc
 Infinite Optics Inc
 JENOPTIK Optical Systems GmbH
 Kowa American Corp
 Logitech Ltd
 Lumetrics Inc
■ Master Bond
 (See ad page 30)
 Max Levy Autograph Inc
 Nufern
 Omega Optical Inc
 Opco Lab
 OSI OptoElectronics Inc
 PG&O - Precision Glass & Optics
 PIXELTEQ
 Reynard Corp
 SwissOptic AG
 United Lens Co Inc
 West Coast Tech Ltd
 Westech Optical Corp
 WhiteOptics LLC
 ZC&R Coatings for Optics, an Abris
 Technologies Co

OPTICAL DETECTORS

aPeak Inc
 ASE Optics
 Blue Sky Research
 Boston Electronics Corp
 DRS Technologies Inc
■ Falcon Electronics
 (See ad page 51)
 Gigahertz-Optik Inc
 G-S PLASTIC OPTICS
 HoodTech Vision
 Kowa American Corp
 Logitech Ltd
 Martin, Froeschner & Associates
 MAZeT GmbH
 Opto Diode Corp
 OSI Laser Diode Inc
 OSI OptoElectronics Inc
 Photron Inc
 Sierra-Olympic Technologies Inc (SOTI)
 Specialised Imaging Inc
 Specialised Imaging Ltd
 TNC Optics & Technologies Pte Ltd
 Toshiba Imaging Systems Div
 Video Scope International Ltd
 Xenics

OPTICAL FIBER

Alfa International
 Blue Sky Research
 Carlisle Interconnect Technologies
 Coractive High-Tech
 EMCORE Corp
 GiGa Concept Inc
 Go4Fiber Ltd
 Greenlee Communications
 HUBER+SUHNER AG

Infinite Optics Inc
InnovaQuartz LLC
■ **Interstate Connecting Components**
(See ad page 48)
Krell Technologies Inc



L-com Global Connectivity
LEMO SA
LEONI Fiber Optics Inc
Logitech Ltd
Micro Laser Systems Inc
Nuferr
OptiConcepts Inc
Photon Control Inc
Quagwire Technologies
Rennsteig Tools Inc
TE Connectivity
TNC Optics & Technologies Pte Ltd

OPTICAL FILTERS

Deposition Sciences Inc (DSI)
DiCon Fiberoptics Inc
Infinite Graphics Inc
Infinite Optics Inc
Iridian Spectral Technologies
JENOPTIK Optical Systems GmbH
Logitech Ltd
Max Levy Autograph Inc
MAZeT GmbH
OEWaves Inc
Olympus
Omega Optical Inc
PG&O - Precision Glass & Optics
PIXELTEQ
Reynard Corp
TeraXion Inc
TLC International
TNC Optics & Technologies Pte Ltd
United Lens Co Inc
West Coast Tech Ltd
ZC&R Coatings for Optics, an Abrisa Technologies Co

OPTICAL IMAGING

Active Silicon Inc
Advanced Optics Inc
ASE Optics
Bodkin Design & Engineering LLC
Boston Electronics Corp
Comm Port Technologies Inc
DRS Technologies Inc
EO Strategies
Fibersense & Signals Inc
GiGa Concept Inc
G-S PLASTIC OPTICS
H&L Instruments LLC
HoodTech Vision
Infinite Graphics Inc
Infinite Optics Inc
Iscan Inc
ISVI Corp
Keo Scientific Ltd

Kowa American Corp
Lambda Research Corp
Logitech Ltd
Max Levy Autograph Inc
Medit Inc
Olympus
ORIENTIR
Photon Inc
PIXELTEQ
Reynard Corp
SENER
Sierra-Olympic Technologies Inc (SOTI)
Specialised Imaging Inc
Specialised Imaging Ltd
Sting Ray Optics LLC
Telops Inc
TNC Optics & Technologies Pte Ltd
Toshiba Imaging Systems Div
United Lens Co Inc
Video Scope International Ltd
West Coast Tech Ltd
Westech Optical Corp
Xenics

OPTICAL SWITCHES

Applied Avionics Inc
Coherent Solutions
Cornet Technology Inc
DiCon Fiberoptics Inc
■ **Falcon Electronics**
(See ad page 51)
Fibersense & Signals Inc
LEONI Fiber Optics Inc
OptiConcepts Inc
OptoTest Corp
OSI Optoelectronics Inc
Pickering Interfaces Inc
Powell Electronics
Quagwire Technologies
■ **R&D Interconnect Solutions**
(See ad page 17)
Raycom Electronics
Shore Microsystems Inc
SurplusEQ.com Inc

OPTICAL TRANSCEIVERS

Applied Optoelectronics Inc
Fibercore Ltd
GMW Associates
H&L Instruments LLC
■ **Interstate Connecting Components**
(See ad page 48)
Molex Inc, Optical Solutions Group
Quagwire Technologies
■ **R&D Interconnect Solutions**
(See ad page 17)
Shore Microsystems Inc
Sparton
TeraXion Inc
TXO Systems Ltd

OPTICS

Advanced Optics Inc
ASE Optics
Avo Photonics
LLC VTC BASPIK Ltd
Berliner Glas KGaA Herbert Kubatz GmbH & Co
Carr Quality Assurance Consulting
Deposition Sciences Inc (DSI)

Diverse Optics Inc
DRS Technologies Inc
EO Strategies
Eureka Dry Tech
Fibercore Ltd
GiGa Concept Inc
G-S PLASTIC OPTICS
Infinite Graphics Inc
Infinite Optics Inc
InnovaQuartz LLC
Iridian Spectral Technologies
JENOPTIK Optical Systems GmbH
Kowa American Corp
Krell Technologies Inc
Kugler of America Ltd
Lambda Research Corp
LAS-CAD GmbH
Laser Physics UK Ltd
Logitech Ltd
Lovalite SAS
Max Levy Autograph Inc
Micro Laser Systems Inc
Opco Lab
ORIENTIR
PG&O - Precision Glass & Optics
Photon Control Inc
Photonic Sense GmbH
Quagwire Technologies
Reynard Corp
Sierra-Olympic Technologies Inc (SOTI)
Sting Ray Optics LLC
SurplusEQ.com Inc
SwissOptic AG
TE Connectivity
Telops Inc
TLC International
TNC Optics & Technologies Pte Ltd
United Lens Co Inc
Visotek Inc
West Coast Tech Ltd
Westech Optical Corp
WhiteOptics LLC
ZC&R Coatings for Optics, an Abrisa Technologies Co

THERMAL IMAGING

Active Silicon Inc
Anitoa Systems LLC
Bodkin Design & Engineering LLC
Boston Electronics Corp
CohuHD
EO Strategies
HoodTech Vision
Infinite Optics Inc
Iridian Spectral Technologies
Kowa American Corp
Lenthor Engineering Inc
Max Levy Autograph Inc
ORIENTIR
Palmer Wahl Temperature Instruments
PCE Instruments UK Ltd
Phase 1 Technology Corp
Reynard Corp
Sierra-Olympic Technologies Inc (SOTI)
Sierra Pacific Innovations
Sting Ray Optics LLC
Telops Inc
Wavelength Electronics Inc
West Coast Tech Ltd
Xenics

ULTRAVIOLET LIGHT SOURCES

Gigahertz-Optik Inc
Micro Laser Systems Inc
Nightstick
Passat Ltd
Photon Control Inc
Reynard Corp
SurplusEQ.com Inc

NAVIGATION

AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST (ADS-B) EQUIPMENT

Carr Quality Assurance Consulting
Cepoint Networks LLC
CohuHD
Cortron Inc
Crystal Image Technologies
Harris Corp
Kappa optronics GmbH
Shoghi Communications
Sparton
TRU-Vu Monitors Inc

GPS SYSTEMS

ASE Optics
Cepoint Networks LLC
CERTON
Crystal Image Technologies
GPS Source Inc
■ **KVH Industries Inc**
(See ad page 43)
SENER
Shoghi Communications
Spectracom
Technology Advancement Group Inc (TAG)
US Dynamics Corp
VectorNav Technologies LLC

TERRAIN

Cortron Inc
Crystal Image Technologies
Harris Corp

PLATFORM SYSTEMS/SUBSYSTEMS

AUTOPILOTS

HoodTech Vision
Jewell Instruments

AVIONICS



AcQ Inducom

ADL Embedded Solutions Inc
ADLINK Technology Inc
Advanced Conversion Technology Inc
Ametek Aerospace & Defense
Amphenol PCD
Applied Avionics Inc
ASE Optics
Astronics Ballard Technology
Atrenne Computing Solutions
Avionics Interface Technologies (AIT)
Carlisle Interconnect Technologies
CERTON
CES - Creative Electronic Systems SA
Clear-Com
Conscious Systems Engineering LLC
Cortron Inc
Crane Aerospace & Electronics
Curtiss-Wright Defense Solutions
Design Criteria Inc
Digital Systems Engineering Inc (DSE)
Dynamic Engineering
EdmondMarks Technologies
■ **Elma Electronic Inc**
(See ad inside front cover)
Essex Industries
■ **Extreme Engineering Solutions Inc (X-ES)**
(See ad page 37)
GACI Rugged Systems
Germane Systems



■ **Holt Integrated Circuits**
(See ad page 49)

Interpoint
Jewell Instruments
Kontron
Lenthor Engineering Inc
Meggit Defense Systems
MEN Micro Inc
North Atlantic Industries Inc
Orion Technologies LLC
Permac Industries Inc
Rennsteig Tools Inc
SENER
Sensitron Semiconductor
Sensoray Co Inc
Shoghi Communications
SpaceAge Control Inc
Sparton
Speel Praha Ltd
TenCate Advanced Composites
TEN TECH LLC
Teradyne
US Dynamics Corp
VDesign Technologies
VectorNav Technologies LLC
Viable Power Conversion Technologies

CABIN MANAGEMENT SYSTEMS

Conscious Systems Engineering LLC
Rose Electronics
Sensoray Co Inc
Shoghi Communications
Tef Cap Industries

COUNTERMEASURES

Cortron Inc
dB Control
MC Countermeasures Inc
Sensoray Co Inc
Sparton
Viable Power Conversion Technologies

ELECTRONIC FLIGHT INSTRUMENT SYSTEMS (EFIS)

■ **Gaia Converter**
(See ad page 16)
Kappa optronics GmbH
Rose Electronics
TEN TECH LLC

LANDING SYSTEMS

JuiceBox Energy Inc
SensUp

LIGHTING

Eco Energy Pros
Elumination LED Lighting
Interface Displays & Controls Inc
MAZeT GmbH
Nightstick
Permac Industries Inc
Rose Electronics

LIGHT MANAGEMENT SYSTEMS

Design Criteria Inc
MAZeT GmbH
Nightstick
Rose Electronics

NAVIGATION EQUIPMENT

Advanced Conversion Technology Inc
Atrenne Computing Solutions
CERTON
Cortron Inc
Dawn VME Products
Interface Displays & Controls Inc
JuiceBox Energy Inc



■ **KVH Industries Inc**
(See ad page 43)

Lenthor Engineering Inc
MEN Micro Inc
Rose Electronics
SENER
Sensoray Co Inc
SensUp
VectorNav Technologies LLC

SATELLITE SYSTEMS

ADL Embedded Solutions Inc
Berliner Glas KGaA Herbert Kubatz GmbH & Co
GE Intelligent Platforms
IXI Technology
Lenthor Engineering Inc
Rose Electronics
Shoghi Communications

TEN TECH LLC
ViaSat Inc

SECURITY SYSTEMS

Active Silicon Inc
Active Silicon Ltd
ADL Embedded Solutions Inc
Cepoint Networks LLC
Comm Port Technologies Inc
Cortron Inc
Dspnor AS
GE Intelligent Platforms
JuiceBox Energy Inc
Rose Electronics
Sensoray Co Inc
SensUp
Shoghi Communications

SHIPBOARD/MARITIME ELECTRONICS

ADLINK Technology Inc
Advanced Conversion Technology Inc
Analytic Systems
Atrenne Computing Solutions
Avionics Interface Technologies (AIT)
Cortron Inc
Crane Aerospace & Electronics
Dawn VME Products
Digital Systems Engineering Inc (DSE)
Dspnor AS
Dynamic Engineering

■ **Elma Electronic Inc**
(See ad inside front cover)

GACI Rugged Systems
GE Intelligent Platforms
Germane Systems
Hoyt Electrical Instrumentation
Interpoint
JuiceBox Energy Inc
Kontron

■ **KVH Industries Inc**
(See ad page 43)

L-com Global Connectivity
MC Countermeasures Inc
MEN Micro Inc
Modular Devices Inc
North Atlantic Industries Inc
OPHIR RF
Orion Technologies LLC

■ **PICO Electronics Inc**
(See ad page 13, back cover)

■ **RGB Spectrum**
(See ad page 30)

Rose Electronics
SENER
Sensoray Co Inc
Technology Advancement Group Inc (TAG)
Thermacore Inc
US Dynamics Corp
Viable Power Conversion Technologies

TRAINING AND SIMULATION

1st Power
Avionics Interface Technologies (AIT)
Clear-Com
Cortron Inc
Dataforth Corp
Delta Digital Video
Dspnor AS
Germane Systems

Lexycom Technologies Inc
MC Countermeasures Inc
Meggit Defense Systems
Orion Technologies LLC
■ **RGB Spectrum**
(See ad page 30)
Rose Electronics
SENER
Sensoray Co Inc
Shoghi Communications
Sparton
Technology Advancement Group Inc (TAG)
Viable Power Conversion Technologies

UNMANNED VEHICLES

AcQ Inducom
Active Silicon Inc
Active Silicon Ltd
ADL Embedded Solutions Inc
ADLINK Technology Inc
Advanced Conversion Technology Inc
Analytic Systems
Atrenne Computing Solutions
BittWare
Clear-Com
Crane Aerospace & Electronics
Delta Digital Video
Design Criteria Inc
EdmondMarks Technologies
■ **Extreme Engineering Solutions Inc (X-ES)**
(See ad page 37)

GE Intelligent Platforms
IXI Technology
JuiceBox Energy Inc
Kappa optronics GmbH
Lenthor Engineering Inc
Lexycom Technologies Inc
Orion Technologies LLC
PALMARII Dynamics AB
PELORUS NAVAL SYSTEMS Inc
Permac Industries Inc
Phase 1 Technology Corp
Rigel Engineering LLC
Sensitron Semiconductor
SensUp
Shoghi Communications
Solid Spot
SpaceAge Control Inc
VectorNav Technologies LLC
Viable Power Conversion Technologies
VStar Systems Inc

VETRONICS

Advanced Conversion Technology Inc
Applied Avionics Inc
Astronics Ballard Technology
Atrenne Computing Solutions
Curtiss-Wright Defense Solutions
Digital Systems Engineering Inc (DSE)
■ **Elma Electronic Inc**
(See ad inside front cover)

GACI Rugged Systems
GE Intelligent Platforms
■ **Holt Integrated Circuits**
(See ad page 49)

Modular Devices Inc
North Atlantic Industries Inc
Orion Technologies LLC
Pleora Technologies Inc

Sensitron Semiconductor
Thermacore Inc
TRU-Vu Monitors Inc

WEATHER SYSTEMS

Columbia Weather Systems Inc
JuiceBox Energy Inc
PCE Instruments UK Ltd
Rose Electronics

WEIGHT AND BALANCE SYSTEMS

Impact Technical Services Ltd
Sensoray Co Inc

RF AND MICROWAVE

AMPLIFIERS

Advanced Test Equipment Rentals
Agile Microwave Technology Inc
AH Systems Inc
API Technologies Corp
Carr Quality Assurance Consulting
Comtech PST
dB Control
EMCORE Corp
Empower RF Systems

■ Falcon Electronics (See ad page 51)

GPS Source Inc
High Pressure Technologies Inc
Intersil

L-com Global Connectivity

■ Mercury Systems (See ad page 11)

Mouser Electronics
MS Kennedy Products
NI Microwave Components
Norden Millimeter Inc
OPHIR RF
Pickering Interfaces Inc
Pro-Comm Inc
Sensitron Semiconductor
Southwest Antennas
STMicroelectronics Inc
Taconic
TASC Technical & Assembly Services Corp
TriQuint Semiconductor
US Dynamics Corp
US Technologies

ANTENNAS

AH Systems Inc
API Technologies Corp
Carlisle Interconnect Technologies
Clear-Com
Dayton-Granger
Electromagnetic Technologies Industries Inc
GPS Source Inc
Harris Corp
HUBER+SUHNER AG
■ Interstate Connecting Components
(See ad page 48)
L-com Global Connectivity
Max Levy Autograph Inc
Permac Industries Inc

Powell Electronics
Southwest Antennas
Streamline Circuits Corp
Taconic
TE Connectivity
TenCate Advanced Composites
Teseq
ViaSat Inc

BONDING AND ADHESIVES

Alfa International

■ Electrolube (See ad page 24)

Henniker Plasma

■ Master Bond (See ad page 30)

■ R&D Interconnect Solutions (See ad page 17)

SHENMAO America Inc

DIPLEXERS/MULTIPLEXERS

API Technologies Corp
AVX
Carr Quality Assurance Consulting
Electromagnetic Technologies Industries Inc
EMCORE Corp
GPS Source Inc
NI Microwave Components
Pickering Interfaces Inc
Southwest Antennas
US Dynamics Corp

DISCRETE COMPONENTS

AVX
Crane Aerospace & Electronics
■ Falcon Electronics
(See ad page 51)
Fox Electronics
GPS Source Inc
■ IR HiRel - An Infineon Technologies Co
(See ad page 1, 6)
Mouser Electronics
Norden Millimeter Inc
Powell Electronics
SHENMAO America Inc
TASC Technical & Assembly Services Corp
TE Connectivity
Wavelength Electronics Inc
Wolfspeed

FILTERS

Amphenol Aerospace
API Technologies Corp
Barry Industries Inc
Carlisle Interconnect Technologies
Cobham Signal & Control Solutions (formerly Aeroflex)
Electromagnetic Technologies Industries Inc
Fabritech Inc
GPS Source Inc
■ Interstate Connecting Components
(See ad page 48)
Keysight Technology Inc
L-com Global Connectivity
March Electronics Inc
Max Levy Autograph Inc

MiltechUK
Mixed Signal Integration Corp
Mouser Electronics
MS Kennedy Products
OEwaves Inc
Quell Corp
Raycom Electronics
Sealing Devices Inc
Southwest Antennas
TriQuint Semiconductor
US Dynamics Corp

FREQUENCY SYNTHESIZERS

Crane Aerospace & Electronics
NI Microwave Components
SignalCore Inc
TASC Technical & Assembly Services Corp
US Dynamics Corp
US Technologies

HYBRIDS

Agile Microwave Technology Inc
Electromagnetic Technologies Industries Inc
NI Microwave Components
Streamline Circuits Corp
TASC Technical & Assembly Services Corp

MICROWAVE SUBASSEMBLIES

Barry Industries Inc
BellowsTech LLC
BroadWave Technologies Inc
Carlisle Interconnect Technologies
Cobham Signal & Control Solutions (formerly Aeroflex)

Dalau Inc

Empower RF Systems
HUBER+SUHNER AG

■ Mercury Systems (See ad page 11)

NI Microwave Components
Norden Millimeter Inc
OPHIR RF

PA&E

Permac Industries Inc
Pickering Interfaces Inc
Pro-Comm Inc
QTI Sensing Solutions

■ R&D Interconnect Solutions (See ad page 17)

Servometer
Teledyne Storm Microwave
ViaSat Inc

MIXED-SIGNAL DEVICES

Agile Microwave Technology Inc
API Technologies Corp
BEEcube Inc, a National Instruments Co
■ Falcon Electronics
(See ad page 51)
GPS Source Inc
HUBER+SUHNER AG
■ Mercury Systems
(See ad page 11)
Mixed Signal Integration Corp
Sparton
STMicroelectronics Inc

MMICS

AdTech Ceramics
KAMAKA Electronic Bauelemente Vertriebs GmbH
SHENMAO America Inc
Stewart Connector
TriQuint Semiconductor
ViaSat Inc
Wolfspeed

OSCILLATORS/SYNTHESIZERS

Cobham AvComm (formerly Aeroflex Test Solutions)
Device Engineering Inc
Electromagnetic Technologies Industries Inc
■ Falcon Electronics
(See ad page 51)
Fox Electronics
Mixed Signal Integration Corp
NI Microwave Components
OEwaves Inc
Pro-Comm Inc
Spectracom
TriQuint Semiconductor
Ultraview Corp
US Dynamics Corp
US Technologies

RF ATTENUATORS

API Technologies Corp
Barry Industries Inc
BroadWave Technologies Inc
Coaxial Components Corp (Coaxicom)
DS Instruments
Dynamic Systems Inc
GPS Source Inc
HUBER+SUHNER AG
KAMAKA Electronic Bauelemente Vertriebs GmbH
Keysight Technology Inc
Mouser Electronics
Pickering Interfaces Inc
Stewart Connector
Streamline Circuits Corp

RF PACKAGING

AdTech Ceramics
Agile Microwave Technology Inc
AI Technology Inc
Aries Electronics Inc
Barry Industries Inc
EGIDE USA Inc
Fabritech Inc
HUBER+SUHNER AG
PA&E
Permac Industries Inc
Ross Engineering Corp
SEI - Semiconductor Enclosures Inc
SHENMAO America Inc
Taconic
Tech Products Inc

RF SWITCHES

Agile Microwave Technology Inc
API Technologies Corp
BroadWave Technologies Inc
Cobham Signal & Control Solutions (formerly Aeroflex)
Comtech PST
Electro-Mech Components Inc

EMCORE Corp
GPS Source Inc

■ Interstate Connecting Components

(See ad page 48)

Keysight Technology Inc

■ Mercury Systems

(See ad page 11)

Mouser Electronics
Pickering Interfaces Inc

■ R&D Interconnect Solutions

(See ad page 17)

Raycom Electronics
Stewart Connector
Teradyne
Teseq
TriQuint Semiconductor
US Dynamics Corp
US Technologies

SIGNAL GENERATORS

4DSP LLC
Advanced Test Equipment Rentals
Averna
CIC Research
Cobham AvComm (formerly Aeroflex Test Solutions)

DS Instruments
GPS Source Inc
Keysight Technology Inc
MC Countermeasures Inc
NI Microwave Components
Phase Matrix
Pickering Interfaces Inc
Pro-Comm Inc
Quantum Composers

■ R&D Interconnect Solutions

(See ad page 17)

Saelig Co Inc
SignalCore Inc
SmarTest LLC
Spectracom
Teradyne
US Dynamics Corp
ViaSat Inc

TRANSMIT/RECEIVE MODULES

Averna
Device Engineering Inc
EMCORE Corp
Empower RF Systems
GMW Associates
Innovative Integration
Lexycom Technologies Inc
■ Mercury Systems
(See ad page 11)
NI Microwave Components
Norden Millimeter Inc
OPHIR RF

PENTEK

■ Pentek Inc

(See ad inside back cover)

Powell Electronics

■ R&D Interconnect Solutions

(See ad page 17)

SignalCore Inc
Teseq
US Dynamics Corp
VDesign Technologies

UP/DOWN CONVERTERS

4DSP LLC
Agile Microwave Technology Inc
Averna
Behlman Electronics Inc
FiberPlex Technologies LLC
Innovative Integration

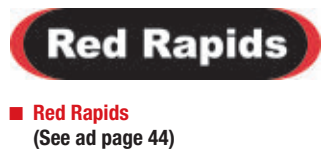
■ Mercury Systems

(See ad page 11)

Mixed Signal Integration Corp
NI Microwave Components
Norden Millimeter Inc
Phase Matrix

■ PICO Electronics Inc

(See ad page 13, back cover)



■ Red Rapids

(See ad page 44)

Shore Microsystems Inc
SignalCore Inc
Southwest Antennas

SAFETY EQUIPMENT AND COMPONENTS

ALARM SYSTEMS

Comm Port Technologies Inc
EIDBadges.com

■ EMCOR Government Services

(See ad page 7)

General Digital Software Services
LRAD Corp
Puleo Electronics Inc

ANTI-STATIC EQUIPMENT

Eureka Dry Tech
Premier Polymers
Quell Corp
Tef Cap Industries

COLLISION AVOIDANCE SYSTEMS

A&A Coatings
General Digital Software Services

EMI/RFI

AGDisplays
Amphenol Aerospace
CIC Research
EMCCons Dr Rasek GmbH & Co KG
Fabritech Inc

■ Gaia Converter

(See ad page 16)

Hi-Tech Controls
MAJR Products Co
MiltechUK

Ness Engineering Inc
OPHIR RF
Quell Corp
Raycom Electronics
Servometer

FIRE DETECTION

Brook One Corp
■ EMCOR Government Services
(See ad page 7)

STALL WARNING

General Digital Software Services
SpaceAge Control Inc

TERRAIN AWARENESS WARNING SYSTEMS (TAWS)

General Digital Software Services
MiltechUK

WINDSHEAR WARNING SYSTEMS

General Digital Software Services

SERVICES

ASSEMBLY/SUBCONTRACT SERVICES

■ Acromag Inc

(See ad page 41)

ADCO Circuits
Alfa International
Altron
Analytic Systems
ASE Optics
Atrenne Computing Solutions
Avnet Inc
Avo Photonics
BellowsTech LLC
Berliner Glas KGaA Herbert Kubatz GmbH & Co
BEST Inc
Blue Wolf
Chassis Plans

■ Cobham RAD Solutions (formerly Aeroflex)

(See ad page 15)

■ Cobham Semiconductor Solutions (formerly Aeroflex)

(See ad page 15)

Contract Manufacturing Consultants Inc
Custom Manufacturing & Engineering Inc
dB Control
Digicom Electronics
DILAS Diode Laser Inc
Diverse Optics Inc
e2v
EdmondMarks Technologies
Elan Technical Corp
Electro-Mech Components Inc
EMCCons Dr Rasek GmbH & Co KG
ESAM Inc
Essex Industries
Federal Electronics Inc
fulgamut Inc
G-S PLASTIC OPTICS
Handling Specialty Manufacturing Ltd
Hughes Circuits Inc

Impact Technical Services Ltd
InnovaQuartz LLC
Intepro Systems
International Air Tool and Industrial Supply Co

■ Interstate Connecting Components

(See ad page 48)

JENOPTIK Optical Systems GmbH
Jewell Instruments
L-com Global Connectivity
Lenthor Engineering Inc
LEONI Fiber Optics Inc
March Electronics Inc

■ Master Bond

(See ad page 30)

Max Levy Autograph Inc
Micom Laboratories Inc
Molex Inc, Optical Solutions Group
MS Kennedy Products
Naprotek Inc
Nelson Design Services Inc
Nordson ASYMTEK
Nortech Systems Inc
Nova Electric
Powell Electronics
Pro-Comm Inc
Projects Unlimited
Quanta Laboratories

■ R&D Interconnect Solutions

(See ad page 17)

Raycom Electronics
Reynard Corp
SHENMAO America Inc
Signet FPD Inc
Sparton
S-Products Inc
SwissOptic AG
TASC Technical & Assembly Services Corp
TEAL Electronics
Technology Advancement Group Inc (TAG)
Teradyne
TLC International
US Technologies
Viable Power Conversion Technologies
Video Scope International Ltd
Visotek Inc
VStar Systems Inc

CALIBRATION SERVICES

API Services
CAD/CAM Services Inc
Custom Manufacturing & Engineering Inc
EMCCons Dr Rasek GmbH & Co KG
Keysight Technology Inc
Micom Laboratories Inc
OptoTest Corp
Palmer Wahl Temperature Instruments
Rokap Inc
Ross Engineering Corp
Teradyne
Video Scope International Ltd

CONSULTANTS

A&A Coatings
Advanced Systems Engineering Group-ASEG
AEI Systems

Alfa International
 Alphi Technology
 Altron
 American Laser Enterprises LLC
 A'n D Cable Products Inc
 aPeak Inc
 ASE Optics
 Beaver Aerospace & Defense
 Bodkin Design & Engineering LLC
 CAD/CAM Services Inc
 Carr Quality Assurance Consulting
 CAU Pegasus Systems Integration Group
 Conscious Systems Engineering LLC
 Contract Manufacturing Consultants Inc
 DecisionDatabases.com
 Design Criteria Inc
 DeTect Inc
 Digicom Electronics
 DLS Electronic Systems Inc
 Dynamic Systems Inc
 e-con Systems India Pvt Ltd
■ ECRIN Systems
 (See ad page 21)
 EMCCons Dr Rasek GmbH & Co KG
■ EMCOR Government Services
 (See ad page 7)
 EO Strategies
 Forefronts Defense Systems
 fulgamut Inc
 GL Communications Inc
 Green Hills Software Inc
 Growth Technical Marketing
 Handling Specialty Manufacturing Ltd
 HC Controls Inc
 Impact Technical Services Ltd
 IndustryARC
 Infinite Graphics Inc
 INICORE Inc
 InnovaQuartz LLC
 Keo Scientific Ltd
 The Light Brigade Inc
 MAJR Products Co
 Microm Laboratories Inc
 Naprotek Inc
 Nelson Design Services Inc
 Ness Engineering Inc
 PALMARII Dynamics AB
 Passat Ltd
 PELORUS NAVAL SYSTEMS Inc
 The Photonics Group
 Puleo Electronics Inc
 Quanta Laboratories
 Raycom Electronics
 R Blaine Industries Inc
 ReportBazaar
 Rigel Engineering LLC
 Rokap Inc
 SHENMAO America Inc
 Spartan
 Specialised Imaging Inc
 Specialised Imaging Ltd
 Storage Clarity
 TEN TECH LLC
 Teradyne
 TLC International
 TXO Systems Ltd
 Varna Products
 Video Scope International Ltd
 Visotek Inc

VStar Systems Inc
 Winchester Systems Inc

DESIGN ENGINEERING

1st Power
 4DSP LLC
 Active Silicon Inc
 ADCO Circuits
 ADL Embedded Solutions Inc
 Advanced Conversion Technology Inc
 Advanced Micro Peripherals
 Advanced Systems Engineering Group-ASEG
 Advantech Corp



AEI Systems
 AGDisplays
 Alfa International
 Allied Industrial Marketing
 Altron
 American Laser Enterprises LLC
 Analytic Systems
 API Services
 API Technologies Corp
 Avo Photonics
 AVX
 Beaver Aerospace & Defense
 BellowsTech LLC
 Blue Wolf
 C&K Components
 CERTON
 Chassis Plans
 Conscious Systems Engineering LLC
 CORWIL Technology Corp
 Custom Manufacturing & Engineering Inc
 Dawn VME Products
 Dedicated Computing
 Design Criteria Inc
 Digicom Electronics
 Digital Systems Engineering Inc (DSE)
 Diverse Optics Inc
 DLS Electronic Systems Inc
 e2v
■ ECRIN Systems
 (See ad page 21)
 EdmondMarks Technologies
■ EMCOR Government Services
 (See ad page 7)
■ Extreme Engineering Solutions Inc (X-ES)
 (See ad page 37)
 Fabritech Inc
 Fancort Industries Inc
 Forza Silicon
 fulgamut Inc
 GPS Source Inc
 Handling Specialty Manufacturing Ltd
 HITEC Sensor Solutions Inc
 Impact Technical Services Ltd
 Infolytica Corp
 InfoSight Corp
 INICORE Inc

InnovaQuartz LLC
 Intepro Systems
 Intersil
 IXI Technology
 Jewell Instruments
 JuiceBox Energy Inc
 Lexycom Technologies Inc
 Max Levy Autograph Inc
 MAZeT GmbH
 MegaWatt Lasers Inc
 Molex Inc, Optical Solutions Group
 Ness Engineering Inc
 Nortech Systems Inc
 Northwire Inc
 OptoTest Corp
 Orion Technologies LLC
 PA&E
 PALMARII Dynamics AB
 PELORUS NAVAL SYSTEMS Inc
 The Photonics Group
 Puleo Electronics Inc
 Quantum Composers
 Raycom Electronics
 R Blaine Industries Inc
 Reynard Corp
 Rigel Engineering LLC
 SensUp
 SHENMAO America Inc
 Signet FPD Inc
 Southwest Antennas
 Sting Ray Optics LLC
 Telesis Technologies Inc
 Telops Inc
 Teradyne
 Translume Inc
 US Technologies
 Vadatech Inc
 Varna Products
 Viable Power Conversion Technologies
 Video Scope International Ltd
■ VPT Inc
 (See ad page 3)
 VStar Systems Inc
 Winchester Systems Inc
 Wolfsped

DISTRIBUTORS

■ Acromag Inc
 (See ad page 41)
 Allied International
 Avnet Inc
 Beaver Aerospace & Defense
 BEST Inc
 Cable Labels USA
 Canyonwest Cases
 Graham Magnetics
 HC Controls Inc
 Hoyt Electrical Instrumentation
 Impact Technical Services Ltd
 International Air Tool and Industrial Supply Co
■ Interstate Connecting Components
 (See ad page 48)
 JTime Inc
 MAJR Products Co
 Milsorce
 Phase 1 Technology Corp
 Powell Electronics
 ProMation Engineering Inc
 Rokap Inc

Ronco
 Saelig Co Inc
 SHENMAO America Inc
 Smitties Lights and Sirens
 Storage Clarity

SOFTWARE

APPLICATIONS

1st Power
 4DSP LLC
 AdaCore
■ AIM-USA
 (See ad page 23)
 Anadigm
 Avionics Interface Technologies (AIT)
 CAD/CAM Services Inc
 Carr Quality Assurance Consulting
 Dspnor AS
 Dynamic Systems Inc
 e-con Systems India Pvt Ltd
 EIDBadges.com
 Generic Logic Inc
 GridPlex Networks
 Intepro Systems
 IXI Technology
 Lynx Software Technologies Inc
 Photon Inc
 Puleo Electronics Inc
 Rapid Imaging Software Inc
 Telkonet Inc

COMMUNICATIONS/ NETWORKING

Cable Labels USA
 Clear-Com
 Cornet Technology Inc
 Dynamic Systems Inc
 Generic Logic Inc
 GL Communications Inc
 Graphic Products
 Green Hills Software Inc
 GridPlex Networks
 H&L Instruments LLC
 Harris Corp
 Lynx Software Technologies Inc
 Pleora Technologies Inc
 Puleo Electronics Inc
 Storage Clarity
 SYSGO
 Telkonet Inc
 Vector Informatik GmbH

DATABASE MANAGEMENT

Averna
 Beamex
 Comm Port Technologies Inc
 CRU Inc
 Harris Corp

DATA SECURITY

CRU Inc
 Dynamic Systems Inc
 Global Training Solutions Inc
 Green Hills Software Inc
 Lynx Software Technologies Inc
 Shoghi Communications
 Storage Clarity
 Telkonet Inc

DESIGN AND DEVELOPMENT TOOLS

■ Abaco Systems (See ad page 47)

AdaCore
AEI Systems
Anadigm
Astronics Ballard Technology
Avionics Interface Technologies (AIT)
BittWare
CAD/CAM Services Inc
CERTON

■ Data Device Corp (DDC) (See ad page 5)

DDC-I Inc
General Digital Software Services
Generic Logic Inc
Graphic Products
Green Hills Software Inc
Hitex GmbH
Infinite Graphics Inc
Infolytica Corp
Jama Software
Keysight Technology Inc
Lambda Research Corp
LAS-CAD GmbH
Lynx Software Technologies Inc
MAZeT GmbH
PTC
Synopsis Inc
Vector Informatik GmbH

DOCUMENT MANAGEMENT SYSTEMS

Beamex
Jama Software
Storage Clarity

ELECTRONIC DESIGN AUTOMATION (EDA)

Infinite Graphics Inc

GRAPHICS AND SIMULATION

■ Abaco Systems (See ad page 47)

Active Silicon Ltd

■ AIM-USA

(See ad page 23)

Astronics Ballard Technology
Generic Logic Inc
Global Training Solutions Inc
HC Controls Inc
Infinite Graphics Inc
Rapid Imaging Software Inc
Vector Informatik GmbH

INFORMATION SECURITY

AdaCore
Comm Port Technologies Inc
CRU Inc
Dynamic Systems Inc
EIDBadges.com
Global Training Solutions Inc
Green Hills Software Inc
Lynx Software Technologies Inc
Shoghi Communications
Storage Clarity
SYSGO

MOVING MAPS

Interface Displays & Controls Inc
Rapid Imaging Software Inc

OPERATING SYSTEMS

■ Abaco Systems (See ad page 47)

AbsInt Angewandte Informatik GmbH
BitMapper Int Tech
Dedicated Computing
Dynamic Systems Inc
Global Training Solutions Inc
Green Hills Software Inc
Lynx Software Technologies Inc
Microway Inc
PTC
SYSGO

■ VersaLogic Corp (See ad page 38, 40)

Winchester Systems Inc

PRODUCT LIFE CYCLE MANAGEMENT (PLM)

Averna
Avionics Interface Technologies (AIT)
CERTON
Dedicated Computing
e2v
Jama Software
PTC

PROGRAMMING LANGUAGES

AdaCore
DDC-I Inc
Dynamic Systems Inc
Global Training Solutions Inc
Green Hills Software Inc
PTC

REAL-TIME OPERATING SYSTEMS (RTOS) AND KERNELS

■ Abaco Systems (See ad page 47)

AdaCore
BitMapper Int Tech
DDC-I Inc
Dynamic Systems Inc
General Digital Software Services
Green Hills Software Inc
Hitex GmbH
Lynx Software Technologies Inc
PTC
SYSGO

SOFTWARE CODE DESIGN, TEST, AND VERIFICATION

4DSP LLC

■ AIM-USA

(See ad page 23)

Averna
Avionics Interface Technologies (AIT)
BitMapper Int Tech
CERTON
Green Hills Software Inc
Hitex GmbH
Lynx Software Technologies Inc
Puleo Electronics Inc
Storage Clarity
Verocel

TEST AND MEASUREMENT

CALIBRATION EQUIPMENT

ADLINK Technology Inc
API Services
Averna
Beamex
Bodkin Design & Engineering LLC
Carr Quality Assurance Consulting
Chroma Systems Solutions Inc
CIC Research
Electronic Development Labs Inc (EDL)
HC Controls Inc
HUBER+SUHNER AG
Infinite Graphics Inc
Keysight Technology Inc
Martin, Froeschner & Associates
Max Levy Autograph Inc
MC Countermeasures Inc
OPAL-RT Technologies
OPHIR RF
OptoTest Corp
PCE Instruments UK Ltd
Reynard Corp
Ross Engineering Corp
Sensor Developments Inc
Spectracom
Stanford Magnets

COTS UPSCREENING

AAEON Electronics Inc
DLS Electronic Systems Inc
Kappa optronics GmbH
North Atlantic Industries Inc
OPAL-RT Technologies
OPHIR RF
QTI Sensing Solutions

EMC COMPLIANCE

1st Power
Advanced Test Equipment Rentals
AEI Systems
AH Systems Inc
API Technologies Corp
CIC Research
DLS Electronic Systems Inc
EMCCons Dr Rasek GmbH & Co KG
EMC PARTNER AG
Keysight Technology Inc
OPHIR RF
Sparton
Teledyne LeCroy

HALT/HASS

Aries Electronics inc
Averna
dB Control
DLS Electronic Systems Inc
EMCCons Dr Rasek GmbH & Co KG
inTEST Thermal Solutions
Kappa optronics GmbH
Microm Laboratories Inc
Projects Unlimited
QTI Sensing Solutions
Qualmark Corp
Quanta Laboratories
Thermotron Industries

METERS

AEI Systems
Beamex
Carr Quality Assurance Consulting
Chroma Systems Solutions Inc
CIC Research
DS Instruments
GMW Associates
Greenlee Communications
HC Controls Inc
HIOKI EE Corp
Jewell Instruments
Keysight Technology Inc
Microm Laboratories Inc
OptoTest Corp
Oxford Instruments Industrial Analysis
Palmer Wahl Temperature Instruments
PCE Instruments UK Ltd
Process Technology
Ross Engineering Corp
RWC Testing & Lab Supplies
SurplusEQ.com Inc
TEAL Electronics
Teradyne
TRS RenTelco

NETWORK ANALYZERS

AAEON Electronics Inc
Advanced Test Equipment Rentals
AEI Systems
Anritsu
Avionics Interface Technologies (AIT)
CORWIL Technology Corp
■ Data Device Corp (DDC)
(See ad page 5)
GL Communications Inc
Go4Fiber Ltd
Greenlee Communications
Keysight Technology Inc
OptoTest Corp
PCE Instruments UK Ltd
SurplusEQ.com Inc
Teledyne LeCroy
TRS RenTelco
TXO Systems Ltd
Vector Informatik GmbH

NETWORK/DATA BUS ANALYZERS

■ AIM-USA

(See ad page 23)

Anritsu
Astronics Ballard Technology
Avionics Interface Technologies (AIT)
Cobham AvComm (formerly Aeroflex Test Solutions)

■ Data Device Corp (DDC) (See ad page 5)

HIOKI EE Corp
Teradyne
Vector Informatik GmbH

OPTICAL TEST AND MEASUREMENT

ADLINK Technology Inc
Advanced Optics Inc
American Laser Enterprises LLC
Anitoa Systems LLC
Anritsu
Aries Electronics inc

ASE Optics
Averna
Bodkin Design & Engineering LLC
Boston Electronics Corp
Coherent Solutions
DiCon Fiber Optics Inc
Diverse Optics Inc
Farrand Controls
Fibersense & Signals Inc
FocalSpec Inc
GiGa Concept Inc
GL Communications Inc
Go4Fiber Ltd
Greenlee Communications
G-S PLASTIC OPTICS
H&L Instruments LLC
Infinite Graphics Inc
ISVI Corp
JENOPTIK Optical Systems GmbH
Keo Scientific Ltd
Keysight Technology Inc
Kingfisher International Pty Ltd
Kowa American Corp
Krell Technologies Inc
Lambda Research Corp
Laser Physics UK Ltd
The Light Brigade Inc
Luciol Instruments SA
Lumetrics Inc
Martin, Froeschner & Associates
Max Levy Autograph Inc
MAZeT GmbH
Medit Inc
Microm Laboratories Inc
Micro Laser Systems Inc
Novacam Technologies Inc
Omega Optical Inc
Opco Lab
OptiConcepts Inc
Opto System Co Ltd
OptoTest Corp
Oxford Instruments Industrial Analysis
PCE Instruments UK Ltd
Photon Control Inc
Photron Inc
Prior Scientific Inc
Quantum Composers
Reynard Corp
RWC Testing & Lab Supplies
Sensoray Co Inc
Sierra-Olympic Technologies Inc (SOTI)
SmarTest LLC
Specialised Imaging Inc
Specialised Imaging Ltd
Sting Ray Optics LLC
SurplusEQ.com Inc
SwissOptic AG
Teledyne LeCroy
Telops Inc
Toshiba Imaging Systems Div
WhiteOptics LLC

OSCILLOSCOPES

AEI Systems
Anritsu
CIC Research
Cobham AvComm (formerly Aeroflex Test Solutions)
DynamicSignals LLC
Electronic Development Labs Inc (EDL)

HIOKI EE Corp
Keysight Technology Inc
PCE Instruments UK Ltd
SurplusEQ.com Inc
Teledyne LeCroy
TRS RenTelco

PORTABLE TEST SYSTEMS

ADLINK Technology Inc
■ **AIM-USA**
(See ad page 23)
Aircraft Instrument Support Services Inc
API Services
Astronics Ballard Technology
Averna
Avionics Interface Technologies (AIT)
Beamex
Bustec Inc
Canyonwest Cases
Cepoint Networks LLC
Chroma Systems Solutions Inc
CIC Research
Cobham AvComm (formerly Aeroflex Test Solutions)
Custom Manufacturing & Engineering Inc
■ **Data Device Corp (DDC)**
(See ad page 5)
DynamicSignals LLC
Electronic Development Labs Inc (EDL)
Fibersense & Signals Inc
GiGa Concept Inc
Gigahertz-Optik Inc
GL Communications Inc
GMW Associates
Go4Fiber Ltd
Greenlee Communications
HC Controls Inc
Henniker Plasma
HIOKI EE Corp
HUBER+SUHNER AG
Innovative Integration
Intepro Systems
IO Industries Inc
Keysight Technology Inc
Martin, Froeschner & Associates
MC Countermeasures Inc
Medit Inc
North Atlantic Industries Inc
OptiConcepts Inc
OptoTest Corp
Oxford Instruments Industrial Analysis
PCE Instruments UK Ltd

PENTEK

■ **Pentek Inc**
(See ad inside back cover)

Phase Matrix
Prior Scientific Inc
Qualmark Corp
Ross Engineering Corp
RWC Testing & Lab Supplies
Spectracom
Teradyne
Teseq

United Electronic Industries Inc
US Technologies
Vector Informatik GmbH

SOFTWARE-DRIVEN INSTRUMENTATION

4DSP LLC
■ **Abaco Systems**
(See ad page 47)
■ **AIM-USA**
(See ad page 23)
Averna
Avionics Interface Technologies (AIT)
Beamex
Chroma Systems Solutions Inc
Cobham AvComm (formerly Aeroflex Test Solutions)
DynamicSignals LLC
General Digital Software Services
HC Controls Inc
HIOKI EE Corp
Innovative Integration
Keysight Technology Inc
MC Countermeasures Inc
OEwaves Inc
OptoTest Corp
PCE Instruments UK Ltd
Photon Control Inc
Prior Scientific Inc

Red Rapids

■ **Red Rapids**
(See ad page 44)

Teradyne
Ultraview Corp

SPECTRUM ANALYZERS

4DSP LLC
ADLINK Technology Inc
AEI Systems
Anritsu
Averna
Bodkin Design & Engineering LLC
Cobham AvComm (formerly Aeroflex Test Solutions)
FreeSpace Networks
Keysight Technology Inc
LEONI Fiber Optics Inc
MAZeT GmbH
Oxford Instruments Industrial Analysis
PCE Instruments UK Ltd
Photon Control Inc
Saelig Co Inc
Spectracom
TRS RenTelco

THERMAL MANAGEMENT/ COOLING SYSTEMS

CONDUCTION COOLING

A&A Coatings
Aavid Thermalloy LLC

Acromag
THE LEADER IN INDUSTRIAL I/O

■ **Acromag Inc**
(See ad page 41)

ADL Embedded Solutions Inc
AI Technology Inc
Atrenne Computing Solutions
Barry Industries Inc
BitMapper Int Tech
Dawn VME Products
Electronic Development Labs Inc (EDL)
■ **EMCOR Government Services**
(See ad page 7)
■ **Extreme Engineering Solutions Inc (X-ES)**
(See ad page 37)
Fabritech Inc
Ness Engineering Inc
Orion Technologies LLC
Sealing Devices Inc
TEN TECH LLC
Valutech Inc
Varna Products

CONVECTION COOLING

A&A Coatings
Aavid Thermalloy LLC
ADL Embedded Solutions Inc
Allied International
Atrenne Computing Solutions
BitMapper Int Tech
Dawn VME Products
Dynamic Engineering
■ **EMCOR Government Services**
(See ad page 7)
■ **Extreme Engineering Solutions Inc (X-ES)**
(See ad page 37)
inTEST Thermal Solutions
Ness Engineering Inc
TEN TECH LLC
Varna Products

LIQUID COOLING

A&A Coatings
Aavid Thermalloy LLC
Alfa International
Atrenne Computing Solutions
BV Thermal Systems
CPC (Colder Products Co)
Dedicated Computing
inTEST Thermal Solutions
Meggit Defense Systems
Ness Engineering Inc
Process Technology
ProMation Engineering Inc
TEN TECH LLC
Valutech Inc
Varna Products

1st Power

Rugged Power-Global Solutions Div,
(sub of Energy Technologies Inc),
219 Park Ave E, Mansfield, OH 44902,
419-522-4444, sales@1stpower.com,
www.1stpower.com

4DSP LLC

3101 Bee Caves Rd, Suite 350, Austin,
TX 78746, 800-816-1751,
sales@4dsp.com, www.4dsp.com

AAEON Electronics Inc

11 Crown Plaza, Hazlet, NJ 07730,
732-203-9300, sales@aaeon.com,
www.aaeon.com

A&A Coatings

2700 S Clinton Ave, South Plainfield, NJ
07080, 888-725-0150,
info@thermalspray.com,
www.thermalspray.com

Aavid Thermalloy LLC

1 Aavid Cir, Laconia, NH 03246,
603-528-3400, jnicolato@aavid.com,
www.aavid.com



■ Abaco Systems

12090 Memorial Pkwy SW,
Huntsville, AL 35803, 866-652-2226,
www.abaco.com

Delivers and supports open modular
solutions developed to upgrade and
enhance the growing data, analytics,
communications and sensor
processing capabilities of target
applications. The company, spun out
of General Electric in 2015, is a leader
in open architecture computing and
electronic systems for aerospace,
defense and industrial applications.
(See ad page 47)

Absint Angewandte Informatik GmbH

Science Pk 1, Saarbrücken 66123,
Germany, 49-681-383-600,
info@absint.com, www.absint.com

Absopulse Electronics Ltd

110 Walgreen Rd, Ottawa, ON K0A 1L0,
Canada, 613-836-3511,
tony@absopulse.com,
www.absopulse.com

Acnodes Corp

14628 Central Ave, Chino, CA 91710,
909-597-7588, info@acnodes.com,
www.acnodes.com

AcQ Inducom

Rijnstraat 20, Oss, Noord-Brabant
5347 KN, Netherlands, 31-412-641922,
info@acq.nl, www.acq.nl



■ Acromag Inc

Embedded Solutions Group, 30765 S
Wixom Rd, Wixom, MI 48393-2417,
248-295-0310,

solutions@acromag.com,
www.acromag.com

Offers a complete line of embedded
computing and I/O solutions
including bus boards, single-board
computers, FPGA modules, embedded
computers, COM Express, mezzanine
modules, wiring accessories, and
software. Industries served include
military, aerospace, manufacturing,
transportation, utilities, and scientific
research laboratories.

(See ad page 41)

Active Silicon Inc

479 Jumpers Hole Rd, Suite 301,
Severna Park, MD 21146,
410-696-7642, info@activesilicon.com,
www.activesilicon.com

Active Silicon Ltd

Pinewood Mews, Bond Close, Iwer
SLO ONA, UK, 44-1753-650-600,
info@activesilicon.com,
www.activesilicon.com

AdaCore

150 W 30th St, 16th Fl, New York, NY
10001, 212-620-7300,
sales@adacore.com, www.adacore.com

ADCO Circuits

2868 Bond St, Rochester Hills, MI
48309, 248-853-6620,
sales@adcocircuits.com,
www.adcocircuits.com

ADL Embedded Solutions Inc

4411 Morena Blvd, Suite 101,
San Diego, CA 92117-4345,
858-490-0597, sales@adl-usa.com,
www.adl-usa.com

ADLINK Technology Inc

5215 Hellyer Ave, #110, San Jose, CA
95138, 408-360-0200,
info@adlinktech.com,
www.adlinktech.com

AdTech Ceramics

511 Manufacturers Rd, Chattanooga, TN
37405, 423-755-5400,
sales@adtechceramics.com,
www.adtechceramics.com

Advance Circuit Technology Inc

19 Jet View Dr, Rochester, NY 14624,
585-328-2000, sales@advcircuit.com,
www.advcircuit.com



Advanced Conversion Technology Inc

2001 Fulling Mill Rd, Middletown, PA
17057, 717-939-2300,

sales-ma@actpower.com,
www.actpower.com

Designs and manufactures an
extensive range of AC-DC and
DC-DC power supplies (switching,
linear, rack-mounted, VME, rugged,
and more) as well as inverters for
various applications since 1981.
Designs meet the typical MIL
standards including MIL-STD-704,
MIL-STD-1399, MIL-STD-1275,
MIL-STD-461, and MIL-STD-810. QMS
is AS9001C. Made in the US.

Advanced Interconnections Corp

5 Energy Way, West Warwick, RI 02893,
401-823-5200, info@advanced.com,
www.advanced.com

Advanced Micro Peripherals

Sedgeway Business Pk, Witchford,
Cambridgeshire CB6 2HY, UK,
44-1353-659-500, sales@ampltd.com,
www.ampltd.com

Advanced Optics Inc

PO Box 117, Pewaukee, WI
53072-0117, 262-548-1155,
sales@advancedoptics.com,
www.advancedoptics.com

Advanced Systems Engineering Group-ASEG

6867 Nancy Ridge Dr, Suite A,
San Diego, CA 92121, 858-550-0500,
info2016@aseg.com, www.aseg.com

Advanced Test Equipment Rentals

10401 Roselle St, San Diego, CA 92121,
858-558-6500, rentals@atecorp.com,
www.atecorp.com

Advantech Corp

11380 Reed Hartman Hwy, Cincinnati,
OH 45241, 513-742-8895,
eainfo@advantech.com,
www.advantech.com



■ Aegis Power Systems Inc

805 Greenlawn Cemetery Rd,
Murphy, NC 28906, 828-837-4029,
mae@aegispower.com,

www.aegispower.com

Designs and manufactures custom
AC-DC and DC-DC power supplies
for a variety of markets including
defense, COTS, datacom, electric
vehicle, industrial, unmanned
systems, aircraft, robotics, shipboard,
and more. Is ISO 9001:2008 certified,
veteran-owned, and a member of the
IPC Electronics Association.

(See ad page 22)

AEi Systems

5777 W Century Blvd, Suite 1160,
Los Angeles, CA 90045, 310-216-1144,
info@aeng.com, www.aeng.com

Aerotech Inc

101 Zeta Dr, Pittsburgh, PA 15238,
412-963-7470, sales@aerotech.com,
www.aerotech.com

A-FLEX

1818 E Carnegie Ave, Santa Ana, CA
92705, 949-251-1668, aflex@msn.com,
www.a-flex.com

AGDisplays

(sub of Asset Genie Inc), 220 Huff Ave,
Suite 400, Greensburg, PA 15601,
724-552-4904, www.agdisplays.com

Agile Microwave Technology Inc

101 Bloomingdale Rd, Hicksville, NY
11801, 516-931-1760,
info@agilemwt.com, www.agilemwt.com

AH Systems Inc

9170 Cozycroft Ave, Chatsworth, CA
91311, 818-998-0233,
sales@ahsystems.com,
www.ahsystems.com

■ AIM-USA

7 Neshaminy Interplex, Suite 211,
Trevose, PA 19053, 267-982-2600,
salesusa@aim-online.com,

www.aim-online.com

Manufactures and designs avionics
test and simulation products for
MIL-STD-1553, STANAG3910/EFEX,
ARINC429, AFDX/ARINC664P7,
Panavia serial link, Fibre Channel and
MIL-STD-1760 applications including
high-performance test and simulation
modules, embedded interfaces, data
bus analyzers, network analyzers and
customized systems.

(See ad page 23)

AirBorn

4321 AirBorn Dr, Addison, TX
75001-0519, 972-931-3200,
prodinfo@airborn.com, www.airborn.com

Aircraft Instrument Support Services Inc

4500 Williams Dr, Suite 300-231,
Georgetown, TX 78633, 512-252-3031,
ralphposey@sbcglobal.net,
www.aissinc.net

Aitech Defense Systems Inc

(sub of Aitech Rugged Group Inc),
19756 Prairie St, Chatsworth, CA 91311,
888-248-3248, sales@rugged.com,
www.rugged.com

AI Technology Inc

70 Washington Rd, Princeton Junction,
NJ 08550, 609-799-9388,
ait@aithechnology.com,
www.aithechnology.com

Alfa International

32 Mechanic Ave, Woonsocket, RI
02895, 401-765-0503,
info@alfaadhesives.com,
www.alfaadhesives.com

Allied Industrial Marketing

W62 N248 Washington Ave, Suite 208,
Cedarburg, WI 53012, 262-618-2403,
info@alliedindustrialmarketing.com,
www.alliedindustrialmarketing.com

Allied International

7 Hill St, Bedford Hills, NY 10507,
914-241-6900, alec@alliedinter.com,
www.alliedinter.com

Allied Motion Technologies Inc

495 Commerce Dr, Suite 3, Amherst, NY
14228, 716-242-7535,
inquiry@alliedmotion.com,
www.alliedmotion.com

Alpes Lasers SA

Maximilien de Meuron 1, Case Postale
1766, Neuchatel CH-2001, Switzerland,
41-32-729-95-10, info@alpeslasers.ch,
www.alpeslasers.ch

Alphi Technology

1898 E Southern Ave, Tempe, AZ
85282-5836, 480-838-2428,
sales@alphitech.com,
www.alphitech.com

Altera Corp

101 Innovation Dr, San Jose, CA 95134,
408-544-7000, newsroom@altera.com,
www.altera.com

Altron

6700 Bunker Lake Blvd NW, Minneapolis,
MN 55303, 763-427-7735,
sales@altronmfg.com,
www.altronmfg.com

Alturdyne Power Systems

660 Steele St, El Cajon, CA 92020,
619-440-5531, info@alturdyne.com,
www.alturdyne.com

AMCO Enclosures—an IMS Engineered Products Brand

1 Innovation Dr, Des Plaines, IL 60016,
847-391-8100,
www.amcoenclosures.com,
www.amcoenclosures.com

American Applied Materials Corp

765 Weyburn Pl, Los Angeles, CA
90024, 310-660-7828,
sales@rareearth-magnets.net,
www.rareearth-magnets.net

American Laser Enterprises LLC

28221 Beck Rd, Suite A-4, Wixom, MI
48393, 248-449-3714, info@a-l-e.net,
www.a-l-e.net

American Portwell Technology

44200 Christy St, Fremont, CA 94538,
510-403-3399, info@portwell.com,
www.portwell.com

Ametek Aerospace & Defense

50 Fordham Rd, Wilmington, MA 01887,
978-988-4711, aerosales@ametek.com,
www.ametekaerodefense.com

Amphenol Aerospace

(div of Amphenol Corp), 40-60 Delaware
Ave, Sidney, NY 13838, 800-678-0141,
cservice@amphenol-aao.com,
www.amphenol-aerospace.com

Amphenol PCD

(div of Amphenol Corp), 72 Cherry Hill Dr,
Beverly, MA 01915, 978-624-3400,
info@amphenolpcd.com,
www.amphenolpcd.com

AMWEI Thermistor

11-502 Songpingshan, Langshan Rd
Nanshan, Shenzhen, Guangdong
518057, China, 86-755-2657-0111,
sales@amwei.com, www.amwei.com

Anadigm

2036 N Gilbert Rd, Suite 2-417, Mesa,
AZ 85203, 480-422-0191,
sales@anadigm.com, www.anadigm.com

Analytic Systems

8128 River Way, Delta, BC V4G 1K5,
Canada, 604-946-9981,
info@analyticssystems.com,
www.analyticssystems.com

A'n D Cable Products Inc

1460 Washington Blvd, Suite A-102,
Concord, CA 94521, 925-672-3005,
sales@andcable.com,
www.andcable.com

Anitoa Systems LLC

1717 Embarcadero Rd, Palo Alto, CA
94303, 408-887-6026,
info@anitoa.com, www.anitoa.com

Anritsu

1155 E Collins Blvd, Suite 100,
Richardson, TX 75081, 800-267-4878,
www.anritsu.com

aPeak Inc

63 Albert Rd, Newton, MA 02466,
617-964-1709, info@apeakinc.com,
www.apeakinc.com

API Services

Automated Precision Div, 709 City Ctr
Blvd, Suite B-105, Newport News,
VA 23606, 757-223-4157,
services@apitechnical.com,
www.apitechnical.com

API Technologies Corp

4705 S Apopka Vineland Rd, Suite 210,
Orlando, FL 32819, 855-294-3000,
sales@apitech.com, www.apitech.com

Applied Avionics Inc

3201 Sandy Ln, Ft Worth, TX
76112-7203, 817-451-1141,
sales@appliedavionics.com,
www.appliedavionics.com

Applied Optoelectronics Inc

13115 Jess Pirtle Blvd, Sugar Land, TX
77478, 281-295-1800,
info@ao-inc.com, www.ao-inc.com

Aries Electronics inc

2609 Bartram Rd, Bristol, PA 19007,
215-781-9956, info@arieselec.com,
www.arieselec.com

Arnold Magnetics Corp

841 Avenida Acaso, Camarillo, CA
93012, 805-484-4221,
www.amcpower.com,
www.amcpower.com

ASE Optics

(div of Rochester Precision Optics),
850 John St, West Henrietta, NY 14586,
585-292-5450 x2125,
sales@aseoptics.com,
www.aseoptics.com

Ashine Industries Inc

5 Orchid Ct, Toronto, ON M2L 2X8,
Canada, 416-493-5187,
ashine@ashine.com, www.ashine.com

Astronics Ballard Technology

11400 Airport Rd, Suite 201, Everett, WA
98204, 425-339-0281,
sales@ballardtech.com,
www.ballardtech.com

AstroNova Aerospace Inc

(div of AstroNova Inc), 600 E Greenwich
Ave, West Warwick, RI 02893,
401-828-4000,
mtgroup@astromed.com,
www.astro-med.com/
ruggedized_products

ATG Electronics

10700 7th St, Rancho Cucamonga, CA
91730, 951-245-6222,
sales@atgelectronics.com,
www.atgelectronics.com

Atrenne Computing Solutions

10 Mupac Dr, Brockton, MA 02301,
508-588-6110, sales@atrenne-cs.com,
www.atrenne.com/acs

Averna

87 Prince St, 5th Fl, Montreal, QC
H3C 2M7, Canada, 514-842-7577,
sales@averna.com, www.averna.com

Avionics Interface Technologies (AIT)

3703 N 200th St, Omaha, NE 68022,
402-763-9644, sales@aviftech.com,
www.aviftech.com

Avnet Inc

ElectroAir Div, (div of Avnet Electronics
Marketing), 400 Franklin Rd, Marietta,
GA 30067, 800-241-7530,
www.em.avnet.com

Avo Photonics

700 Business Ctr Dr, Suite 125,
Horsham, PA 19044, 215-441-0107,
sales@avophotonics.com,
www.avophotonics.com

AVX

1 AVX Blvd, Fountain Inn, SC 29644,
864-967-9387, www.avx.com

Barantec Inc

777 Passaic Ave, Clifton, NJ 07012,
973-779-8774, info@barantec.com,
www.barantec.com

Barry Industries Inc

60 Walton St, Attleboro, MA 02703,
508-226-3350, sales@barryind.com,
www.barryind.com

LLC VTC BASPIK Ltd

44 Nikolaev Str, Bldg 6, Vladikavkaz
362021, Russia, 7-8672-24-19-61,
market@baspiik.com, www.baspiik.com

Beamex

2152 Northwest Pkwy, Suite A, Marietta,
GA 30067, 770-951-1927,
beamex.inc@beamex.com,
www.beamex.com

BearCom Two-Way Radio Communications

4009 Distribution Dr, Garland, TX 75041,
800-527-1670, info@bearcom.com,
www.bearcom.com

Beaver Aerospace & Defense

(sub of Phillips Service Industries),
11850 Mayfield, Livonia,
MI 48150, 734-853-5003,
psidirectories@gmail.com,
www.beaver-online.com

BEEcube Inc, a National Instruments Co

4600 Patrick Henry Dr, Santa Clara, CA
95054, 510-248-4643,
sales@beecube.com, www.beecube.com

Behlman Electronics Inc

(sub of Orbit International), 80 Cabot Ct,
Hauppauge, NY 11788,
631-435-0410 x195,
sales@behlman.com, www.behlman.com

Beijing JCZ Technology Co Ltd

M3 Bldg 1, E Rd of Jiuxianqiao,
Chaoyang Dist, Beijing 100016, China,
86-6442-6995, overseas@bjcz.com,
www.bjcz.com

BellowsTech LLC

(sub of Servometer), 1289 N US Hwy 1,
Suite 1, Ormond Beach, FL 32174,
386-615-7530,
bellows@bellowstech.com,
www.bellowstech.com

Berliner Glas KGaA Herbert Kubatz GmbH & Co

Space Div, (sub of Berliner Glas Group),
Waldkraiburger Str 5, Berlin 12347,
Germany, 49-30-60905-0,
info@berlinerglas.de,
www.berlinerglas.com

BEST Inc

3603 Edison Pl, Rolling Meadows, IL
60008, 847-797-9250,
bwet@solder.net, www.solder.net

BESTProto

3603 Edison Pl, Rolling Meadows, IL
60008, 847-797-9250,
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Binder-USA

3903 Calle Tecate, Camarillo, CA 93012,
805-437-9925, sales@binder-usa.com,
www.binder-usa.com

BitMapper Int Tech

B1, Mayur Complex, Opp Bhelake Nagar,
Kothrud, Pune, Maharashtra
411038, India, 91-20-25386926,
info@bitmapper.com,
www.bitmapper.com

BittWare

45 S Main St, Concord, NH 03301,
603-226-0404, info@bittware.com,
www.bittware.com

Blue Sky Research

510 Alder Dr, Milpitas, CA 95035,
408-941-6068,
sales@blueskyresearch.com,
www.blueskyresearch.com

Blue Wolf

9179 W State St, Garden City, ID 83714,
208-629-5222, info@bluewolfinc.com,
www.bluewolfinc.com

Bodkin Design & Engineering LLC

77 Oak St, Suite 201, Newton, MA
02464, 617-795-1968,
info@bodkindesign.com,
www.bodkindesign.com

Boston Electronics Corp

91 Boylston St, Brookline, MA 02445,
617-566-3821, boselec@boselec.com,
www.boselec.com

Bravo Communications Inc

3463 Meadowlands Ln, San Jose, CA
95135, 408-297-8700,
sales@bravobravo.com,
www.bravobravo.us

BroadWave Technologies Inc

170 Airport Pkwy, Suite A, Greenwood, IN
46143, 317-888-8316,
sales@broadwavetech.com,
www.broadwavetech.com

Brook One Corp

250 Consumers Rd, Suite 206, Toronto,
ON M2J 4V6, Canada, 416-901-0988,
www.brookone.com, www.brookone.com

Bustec Inc

6137W 10930N, Highland, UT 84003,
385-207-8232,
per.lindberg@bustec.com,
www.bustec.com

BV Thermal Systems

(sub of Budzar Industries), 1064
Woodland Ave, Modesto, CA 95351,
209-522-3701, sales@bvthermal.com,
www.bvthermal.com

Cable Labels USA

Network Connections Group USA Div,
Lake Mary Blvd, Lake Mary, FL 32746,
407-321-7394,
info@cablelabelsusa.com,
www.cablelabelsusa.com

CAD/CAM Services Inc

1529 Brooklane, Suite 201, Celina, TX
75009, 972-382-3021,
scott@cadcam.org, www.cadcam.org

Cadex Electronics Inc

22000 Fraserwood Way, Richmond, BC
V6W 1J6, Canada, 604-231-7777,
sales@cadex.com, www.cadex.com

C&K Components

15 Riverdale Ave, Newton, MA 02458,
617-969-3700, www.ck-components.com

Canyonwest Cases

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85269, 480-816-9652,
sales@canyonwestcases.com,
www.canyonwestcases.com

Carlisle Interconnect Technologies

(div of Carlisle Cos Inc), 100 Tensolite Dr,
St Augustine, FL 32092, 904-829-5600,
sales@carlisleit.com, www.carlisleit.com

Carr Quality Assurance Consulting

28536 Oakmont, Mission Viejo, CA
92692, 949-306-4354,
fred@carrconsulting.org,
www.carrconsulting.org

CAU Pegasus Systems Integration Group

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19341, 800-771-7139,
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Cepoint Networks LLC

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RTVSystems), 1W Otterson St, Nashua,
NH 03060, 603-557-7464,
sales@cepoint.com, www.cepoint.com

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32924, 321-674-2155,
sales@certon.com, www.certon.com

CES - Creative Electronic Systems SA

Ave Eugène-Lance 38, PO Box 584,
Grand-Lancy 1, Geneva CH-1212,
Switzerland, 41-22-884-51-00,
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www.ces-swap.com

Chassis Plans

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92131, 858-571-4330,
sales@chassisplans.com,
www.chassis-plans.com

Chroma Systems Solutions Inc

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92610, 949-600-6400,
sales@chromausa.com,
www.chromausa.com

CIC Research

427 S Grand Ave, San Jacinto, CA
92582, cicel@cic-research.com,
www.cic-research.com

Clary Corp

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91016, 626-359-4486,
sales@clary.com, www.clary.com

Clear-Com

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magsales@clearcom.com,
www.clearcom.com

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856-461-0091,
sales@cleardrainusa.com,
www.cleardrainusa.com

Coaxial Components Corp (Coaxicom)

1501 SE Decker Ave, #201, Stuart, FL
34994-3964, 866-262-9426,
sales@coaxicom.com,
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Cobham AvComm (formerly Aeroflex Test Solutions)

10200 W York St, Wichita, KS 67215,
316-522-4981, info-test@aeroflex.com,
http://ats.aeroflex.com

Cobham Motion Control Solutions (formerly Aeroflex)

350 Kennedy Dr, Hauppauge, NY 11783,
631-231-9100,
sales-motion@aeroflex.com,
www.aeroflex.com/motion

■ Cobham RAD Solutions (formerly Aeroflex)

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ascs-sales@aeroflex.com,
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Auckland 0632, New Zealand,
64-9-478-4849,
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www.coherent-solutions.com

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858-391-1795, info@cohuhd.com,
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Hillsboro, OR 97124, 503-629-0887,
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www.columbiaweather.com

Comco Inc

2151 N Lincoln St, Burbank, CA 91504,
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www.comcoinc.com

Comm Port Technologies Inc

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08512, 732-738-8780,
info@comm-port.com,
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Components Technology Institute Inc

2608 Artie St, Suite 4, Huntsville, AL
35805, 256-536-1304,
leon.hamiter34@cti-us.com,
www.cti-us.com

Comtech PST

(sub of Comtech Telecommunications
Corp), 105 Baylis Rd, Melville, NY
11747, 631-777-8900,
bob.califra@comtechpst.com,
www.comtechpst.com

Concorde Battery Corp

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418-845-2466, sales@coractive.com,
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Cornet Technology Inc

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703-658-3400, sales@cornet.com,
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Cortron Inc

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www.cortroninc.com

CORWIL Technology Corp

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95035, 408-618-8700,
info@corwil.com, www.corwil.com

CPC (Colder Products Co)

1001 Westgate Dr, St Paul, MN 55114,
651-645-0091, info@cpeworldwide.com,
www.cpcworldwide.com

Crane Aerospace & Electronics

(div of Crane Co), 10301 Willows Rd,
Redmond, WA 98052, 425-882-3100,
power@crane-eg.com,
www.interpoint.com

Crouzet Aerospace

Custom Sensors and Technologies Div,
1465 Lawrence Dr, Thousand Oaks,
CA 91320, 847-220-1542,
jill.wagar@cstsensors.com,
www.crouzet-aerospace.com

CRU Inc

1000 SE Tech Ctr Dr, Suite 160,
Vancouver, WA 98683, 360-816-1800,
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■ Crystal Group Inc

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www.rackmountsales.com

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20050 SW 112th Ave, Tualatin, OR
97062, 503-612-2300, sales@cui.com,
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Lakeview Ctr Plaza, Suite 200,
Ashburn, VA 20147, 703-779-7800,
ds@curtisswright.com,
www.curtisswrightds.com

Custom Circuit Boards

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Custom Manufacturing & Engineering Inc

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Daisy Data Displays Inc

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Dalau Inc

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marksage@dalauinc.com,
www.dalau.com

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360-306-5878,
info@datalinkgateways.com,
www.datalink-gw1000-abeip.com

Dawn VME Products

47915 Westinghouse Dr, Fremont, CA
94539, 800-258-3296,
mail@dawnvme.com,
www.dawnvme.com

Dayton-Granger

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Ft Lauderdale, FL 33335-0550,
954-463-3451,
sales@daytongranger.com,
www.daytongranger.com

dB Control

(sub of HEICO Corp Electronic
Technologies Group (ETG)), 1120 Auburn
St, Fremont, CA 94538, 510-656-2325,
marketing@dbcontrol.com,
www.dbcontrol.com

DDC-I Inc

4600 E Shea Blvd, Suite 102, Phoenix,
AZ 85028, 602-275-7172,
sales@ddci.com, www.ddci.com

DecisionDatabases.com

3rd Fl, Fountain Chambers, Nanabhai Ln,
Fort, Mumbai 400001, India,
91-99-28237112,
sales@decisiondatabases.com,
www.decisiondatabases.com

Dedicated Computing

N26 W23880 Commerce Cir,
Wauwatosa, WI 53188, 262-951-7200,
sales@dedicatedcomputing.com,
www.dedicatedcomputing.com

Delphi Automotive Plc

5725 Delphi Dr, Troy, MI 48098,
248-813-2000, www.delphi.com

Delta Digital Video

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300 Welsh Rd, Bldg 3, Suite 120,
Horsham, PA 19044,
215-657-5270, dddv@delta-info.com,
www.deltadigitalvideo.com

Deposition Sciences Inc (DSI)

(sub of Lockheed Martin), 3300 Coffey
Ln, Santa Rosa, CA 95403,
707-573-6700, solutions@depsci.com,
www.depsci.com

Design Criteria Inc

1821 W 4000 S, Suite 200, Roy, UT
84067, 801-393-1414,
power@designcriteria.com,
www.designcriteria.com

DeTect Inc

1022 W 23rd St, Panama City, FL
32405, 850-763-7200,
contact@detect-inc.com,
www.detect-inc.com

Device Engineering Inc

480 E Alamo Dr, Chandler, AZ 85225,
480-303-0822, info@deiaz.com,
www.deiaz.com

DeWAL Industries

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02882, 401-789-9736,
cbrooks@dewal.com, www.dewal.com

Diamond-MT Inc

213 Chestnut St, Johnstown, PA 15906,
814-535-3505,
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94804, 510-620-5200,
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510-639-7003, info@digicom.org,
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56701, 800-344-4539,
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Digital Systems Engineering Inc (DSE)

17491 N 93rd St, Scottsdale, AZ 85255,
480-515-1110, info@digitalsys.com,
www.digitalsys.com

DILAS Diode Laser Inc

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85747, 520-232-3480,
sales@dilas-inc.com, www.dilas.com

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91730, 909-451-7500,
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DLS Electronic Systems Inc

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847-537-6400, jblack@dlsemc.com,
www.dlsemc.com

DRS Technologies Inc

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VA 22202, 703-416-8000,
www.drs.com

DRS Technologies Inc

40 Professional Dr, Gaithersburg, MD
20879, 301-921-8010, www.drs.com

DS Instruments

Test & Measurement Div, 180 E Foothill
Blvd, San Luis Obispo, CA 93405,
805-242-6685,
support@dsinstruments.com,
www.dsinstruments.com

Dspnor AS

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5160, Norway, 47-55-94-15-15,
info@dspnor.no, www.dspnor.com

Dynamic Engineering

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95060, 831-457-8891,
sales@dyneng.com, www.dyneng.com

DynamicSignals LLL

900 N State St, Lockport, IL 60441,
514-633-7447,
prodinfo@gage-applied.com,
www.gage-applied.com

Dynamic Systems Inc

15331 NE 90th St, Redmond, WA
98052, 425-216-1204,
leifa@dynamic-systemsinc.com,
www.dynamic-systemsinc.com

e2v

Semiconductors Div, 765 Sycamore,
Suite 200, Milpitas, CA 95035,
408-240-5211, inquiries@e2v-us.com,
www.e2v-us.com

Eco Energy Pros

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91316, 818-296-9442,
web@ecoenergypros.com,
www.ecoenergypros.com

e-con Systems India Pvt Ltd

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Super A-16 & A-17, Thiru-Vi-Ka
Industrial Estate, Chennai, Tamil Nadu
600032, India, 91-44-45532052,
anitha@e-consystems.com,
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EIDBadges.com

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Elan Technical Corp

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55344, 952-452-8667,
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■ Electrolube

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EMCORE Corp

2015 Chestnut St, Alhambra, CA 91803,
626-293-3400,
catv-sales@emcore.com,
www.emcore.com

■ **EMCOR Government Services**
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emcor_info@emcor.net,
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Offers an experienced single-source
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(See ad page 7)

EMC PARTNER AG

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Switzerland, 41-61-775-20-35,
sales@emc-partner.ch,
www.emc-partner.com

Empower RF Systems

316 W Florence Ave, Inglewood, CA
90301, 310-412-8100,
sales@empowerrf.com,
www.empowerrf.com

EO Strategies

12 Prospect St, Holliston, MA 01746,
774-217-1122,
rickm@eo-strategies.com,
www.eo-strategies.com

Epoxy Technology Inc

14 Fortune Dr, Billerica, MA 01821,
978-667-3805, salesinfo@epotek.com,
www.epotek.com

ESAM Inc

2100 NE Spalding Ave, Grants Pass, OR
97526, 541-476-9162,
info@esam.com, www.esam.com

Essex Industries

7700 Gravois Rd, St Louis, MO 63123,
314-832-4500, info@essexind.com,
www.essexindustries.com

Eureka Dry Tech

(sub of Taiwan Dry Tech Corp), 3F,
59 Section 4, Xinyi Rd, Taipei 106,
Taiwan, 886-2-2755-4545,
sales@eurekadrytech.com,
www.eurekadrytech.com

EURESYS Inc

(div of EURESYS SA), 27126-B Paseo
Espada, Suite 704, San Juan Capistrano,
CA 92675, 949-743-0612,
sales.america@euresys.com,
www.euresys.com

EURESYS SA

Ave du Pre Aily, 14, Angleur 4031,
Belgium, 32-4-367-72-88,
sales.europe@euresys.com,
www.euresys.com

Evans Capacitor Co

72 Boyd Ave, East Providence, RI 02914,
401-435-3555, chasd@evanscap.com,
www.evanscap.com

Excelitas Technologies

1330 E Cypress St, Covina, CA 91724,
626-967-9521, aes.na@excelitas.com,
www.excelitas.com/pages/product/
high-reliability-power-supplies.aspx

■ **Extreme Engineering
Solutions Inc (X-ES)**

3225 Deming Way, Suite 120,
Middleton, WI 53562,
608-833-1155, sales@xes-inc.com,
www.xes-inc.com

Designs and builds single-board
computers, I/O boards, power
supplies, backplanes, chassis,
and system-level solutions for
embedded computing customers.
Offers cutting-edge performance
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(See ad page 37)

Fabritech Inc

(sub of Sanders Industries Holdings Inc),
20 Hagerty Blvd, Suite 2, West Chester,
PA 19382, 610-430-0027,
mfein@fabritechinc.net,
www.fabritechemi.com



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RAMs. Supplies companies including
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Holt, InfiniD, Microsemi, PDI, Semtech,
SMART Modular Technologies, TT
electronics, Vishay and Xtreme
Semiconductor.
(See ad page 51)

Falcon Electronics

1505 W University Dr, Suite 105, Tempe,
AZ 85281, 480-829-1100,
ian@falconelec.com,
www.falconelec.com

Fancort Industries Inc

31 Fairfield Pl, West Caldwell, NJ 07006,
973-575-0610, info@fancort.com,
www.fancort.com

Farrand Controls

(div of Ruhle Co Inc), 99 Wall St, Valhalla,
NY 10595, 914-287-2600,
sales@ruhle.com, www.ruhle.com

Federal Electronics Inc

75 Stamp Farm Rd, Cranston, RI 02921,
401-944-6200, sales@federaelec.com,
www.federaelec.com

Fibercore Ltd

Fibercore House, Southampton
Science Pk, Southampton, Hampshire
SO16 7QQ, UK, 44-2380-769-893,
info@fibercore.com, www.fibercore.com

FiberPlex Technologies LLC

10840 Guilford Rd, Suite 412, Annapolis
Junction, MD 20701-1110,
301-604-0100, clients@fiberplex.com,
www.fiberplex.com

Fibersense & Signals Inc

146 Peelard Rd, Concord, ON L4K 2C9,
Canada, 416-418-4427,
sales@fibersensefirst.com,
www.fibersensefirst.com

Finetech

560 E Germann Rd, Suite 103, Gilbert,
AZ 85297, 480-893-1630,
www.finetechusa.com

FocalSpec Inc

1595 Peachtree Pkwy, Suite 204-110,
Cumming, GA 30041,
770-713-0837, info@focalspec.com,
www.focalspec.com

Forefronts Defense Systems

(sub of Forefronts Technologies Group),
PO Box 427, Dufur, OR 97021-0427,
541-467-2511,
operations@forefronts.com,
www.forefronts.com

Forza Silicon

2947 Bradley St, Suite 130, Pasadena,
CA 91107, 626-796-1182,
info@forzasilicon.com,
www.forzasilicon.com

Fox Electronics

5570 Enterprise Pkwy, Ft Myers, FL
33905, 239-693-0099,
elf@foxonline.com, www.foxonline.com

FreeSpace Networks

(sub of Abicom International Ltd),
Unit 19E The Innovation Ctr, Warwick
Technology Pk, Warwick, Warwickshire
CV34 6UW, UK, 44-1926-623-309,
info@freespacenetworks.co.uk,
www.freespacenetworks.co.uk

FSP Group USA

14284 Albers Way, Chino, CA 91710,
909-606-0960, info@fspgroupusa.com,
www.fspgroupusa.com

fulgamut Inc

11700 Mukilteo Speedway,
Suite 201-1236, Mukilteo, WA 98275,
505-490-1786, markf@fulgamut.com,
www.fulgamut.com

Futura Automation Pvt Ltd

Plot S4, Off 3rd Cross, 1st Stage, Peenya
Industrial Area, Bangalore, Karnataka
560058, India, 91-80-28375290,
info@futuraautomation.com,
www.futuraautomation.com

GACI Rugged Systems

5 Ave du Quebec, Villebon sur Yvette
91140, France, 33-1-69-07-16-86,
sales@gaci.fr, www.gaci.fr

■ **Gaia Converter**

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H7L 5R2, Canada, 514-333-3169,
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transient protections for modular
power architectures. Designs and
manufactures over 3500 power
modules to help power supplies
comply with MIL-STD-461, 1275, 704,
DO-160 or equivalent standards.
(See ad page 16)

Gamber-Johnson

3001 Borham Ave, Stevens Point, WI 54481, 715-344-3482, www.gamberjohnson.com/products/mobile-workstations

GammaTech Computer Corp

48303 Fremont Blvd, Fremont, CA 94538, 800-995-8946, marketing@gammatechusa.com, www.gammatechusa.com

GE Aviation

351 Exning Rd, Newmarket CB8 0AU, UK, 44-1638-675-648, aviation.gemediarelations@ge.com, www.geaviation.com

GE Intelligent Platforms

(div of General Electric), 12090 S Memorial Pkwy, Huntsville, AL 35803, 434-978-5100, ge-ip.info@ge.com, www.gedefense.com

Gel-Pak

31398 Huntwood Ave, Hayward, CA 94544, 510-576-2220, info@gelpak.com, www.gelpak.com

General Atomics Aeronautical Systems Inc

14200 Kirkham Way, Poway, CA 92064, 858-312-2810, pr-asi@ga-asi.com, www.ga-asi.com

General Digital Software Services

(sub of General Digital Corp), 8 Nutmeg Rd S, South Windsor, CT 06074, 860-282-2900 x159, jconsolini@generaldigital.com, www.gdssoftwareservices.com

Generic Logic Inc

6 University Dr 206-125, Amherst, MA 01002, 413-253-7491, sales@genlogic.com, www.genlogic.com

Germane Systems

3680 Centerview Dr, Chantilly, VA 20151, 703-502-8890, sales@germane.com, www.germane.com

GEViCAM Inc

691 S Milpitas Blvd, Suite 115, Milpitas, CA 95035, 408-945-9900, info@gevicam.com, www.gevicam.com

GiGa Concept Inc

11811 Suzor-Cote, Montreal, QC H3M 2H8, Canada, 514-745-8877, egirard@gigaconcept.com, www.gigaconcept.com

Gigahertz-Optik Inc

(sub of Gigahertz-Optik GmbH), 5 Perry Way, Newburyport, MA 01950-4009, 978-462-1818, b.angelo@gigahertz-optik.com, www.gigahertz-optik.com

GL Communications Inc

818 W Diamond Ave, 3rd Fl, Gaithersburg, MD 20878, 301-670-4784, gl-info@gl.com, www.gl.com

Global Training Solutions Inc

3163 Winston Churchill Blvd, PO Box 26067, Mississauga, ON L5L 5W7, Canada, 416-806-5777, info@globaltrainingsolutions.ca, www.globaltrainingsolutions.ca

GMW Associates

955 Industrial Rd, San Carlos, CA 94070, 650-802-8292, sales@gmw.com, www.gmw.com

Go4Fiber Ltd

3/F Tung Lee Bldg, 9 Lai Yip St, Kwun Tong, Hong Kong, 852-2174-1338, sales_group@go4fiber.com, www.go4fiber.com

GP:50 NY Ltd

2770 Long Rd, Grand Island, NY 14072, 716-773-9300, sales@gp50.com, www.gp50.com

GPS Source Inc

64 Mission Dr, Pueblo West, CO 81007, 719-561-9520, sales@gpssource.com, www.gpssource.com

Graham Magnetics

1715 4th St, Graham, TX 76450, 530-906-0056, robert@datatapes.biz, www.grahammagnetics.com

Graphic Products

6445 SW Fallbrook Pl, Beaverton, OR 97008, 888-326-9244, info@graphicproducts.com, www.graphicproducts.com

Green Hills Software Inc

30 W Sola St, Santa Barbara, CA 93101, 805-965-6044, info@ghs.com, www.ghs.com

Greenlee Communications

(sub of Textron Inc), 1390 Aspen Way, Vista, CA 92081, 800-642-2155, communicationssales@greenlee.textron.com, www.greenleecomunications.com

GridPlex Networks

7000 Terminal Sq, Upper Darby, PA 19082, 610-734-1245, chairman.gridplex@gmail.com, www.gridplexnetworks.com

Growth Technical Marketing

6501 Hercus Ct, San Jose, CA 95119, 408-780-4769, tim@growthtechnicalmarketing.com, www.growthtechnicalmarketing.com

G-S PLASTIC OPTICS

408 St Paul St, Rochester, NY 14605, 585-295-0200, info@gsoptics.com, www.gsoptics.com

Guernsey Coating Laboratories Inc

1788 Goodyear Ave, Ventura, CA 93003, 805-642-1508, sales@gclinc.com, www.gclinc.com

Gumstix Inc

3130 Alpine Rd, Suite 288-606, Portola Valley, CA 94028, 650-206-2464, sales@gumstix.com, www.gumstix.com

Handling Specialty Manufacturing Ltd

(sub of Whiting Equipment Canada), 219 S Service Rd W, Grimsby, ON L3M 1Y6, Canada, 905-945-9661, mhaurilak@handling.com, www.handling.com

H&L Instruments LLC

34 Post Rd, PO Box 580, North Hampton, NH 03862-0580, 603-964-1818, rlandman@hlinstruments.com, www.hlinstruments.com

Harris Corp

2400 Palm Bay Rd NE, Palm Bay, FL 32905, 321-729-2289, gcsdweb2@harris.com, www.harris.com

Haydon Kerk Motion Solutions Inc

(sub of AMETEK), 1500 Meriden Rd, Waterbury, CT 06705, 203-756-7441, info.haydonkerk@ametek.com, www.haydonkerk.com

HC Controls Inc

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HDL Research Lab Inc

406 W Blue Bell Rd, PO Box 2108, Brenham, TX 77834-2108, 979-836-2300, sales@hdlpower.com, www.hdlpower.com

Henniker Plasma

Unit B3, Trident Business Pk, Daten Ave, Warrington, Cheshire WA3 6AX, UK, 44-1925-830-771, info@plasmamatreatment.co.uk, www.plasmamatreatment.co.uk

HEPA Corp

3071 E Coronado St, Anaheim, CA 92806, 714-630-5700, info@hepa.com, www.hepa.com

Hexion Inc

Epoxy, Phenolic Coating Resins Div, 180 E Broad St, Columbus, OH 43215, 614-225-4000, 4information@hexion.com, www.hexion.com

High Energy Devices LLC

26 Hollenberg Ct, Bridgeton, MO 63044, 314-291-0030, info@highenergydevices.com, www.highenergydevices.com

High Pressure Technologies Inc

24895 Ave Rockefeller, Valencia, CA 91355, 661-257-7600, sales@highpressuretech.com, www.highpressuretech.com

HIOKI EE Corp

81 Koizumi, Ueda, Nagano 386-1192, Japan, 81-268-28-0562, os-com@hioki.co.jp, www.hioki.com

Hitachi Cable America

(sub of Hitachi Metals), 900 Holt Ave, Manchester, NH 03109, 603-669-4347, info@hca.hitachi-cable.com, www.hca.hitachi-cable.com

Hi-Tech Controls

7374 S Eagle St, Centennial, CO 80112-4240, 303-680-5159, info@hitechcontrols.com, www.hitechcontrols.com

HITECNICO

B1, St George Science and Technology Industrial Pk, Outer Ring Rd, Baoan, Shenzhen, Guangdong 518104, China, 86-755-3632-8012, info@hitecnico.com, www.hitecnico.com

HITEC Sensor Solutions Inc

537 Great Rd, Littleton, MA 01460, 978-742-9032, sales@hitecorp.com, www.hitecorp.com

Hitex GmbH

Greschbachstr 12, Karlsruhe D-76229, Germany, 49-721-9628-0, sales@hitex.de, www.hitex.com



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(See ad page 49)

HoodTech Vision

(div of Hood Technology), 3100 W Cascade Ave, Hood River, OR 97031, 425-445-8884, chris@hoodtech.com, www.hoodtech.com

Hoyt Electrical Instrumentation

23 Meter St, Penacook, NH 03303, 603-753-6321, info@hoytmeter.com, www.hoytmeter.com

HUBER+SUHNER AG

Degersheimerstr 14, Herisau, Appenzell Ausser rhoden 9100, Switzerland, 41-71-353-41-11, info@hubersuhner.com, www.hubersuhner.com

Hughes Circuits Inc

544 S Pacific St, San Marcos, CA 92078, 760-744-0300, sales@hughescircuits.com, www.hughescircuits.com

IBI Systems Inc

6842 NW 20th Ave, Ft Lauderdale, FL 33309, 954-978-9225, ibisys@aol.com, www.ibi-systems.com

Icron Technologies Corp

4664 Lougheed Hwy, Suite 221, Burnaby, BC V5C 5T5, Canada, 604-638-3920, info@icron.com, www.icron.com

IEE Inc

7723 Kester Ave, Van Nuys, CA 91405, 800-422-0867, smotter@ieeinc.com, www.ieeinc.com

IEH Corp

140 58th St, Suite 8E, Brooklyn, NY 11220, 718-492-4448, ieh@iehcorp.com, www.iehcorp.com

ImageVision Control Room Consoles

1650 Hausmann Gin Rd, La Grange, TX 78945, 888-664-6762, sales@imagevisioninc.com, www.imagevisioninc.com

Impact Power Technologies

145 Wood Rd, Braintree, MA 02184, 781-380-8860, info@impactpowertech.com, www.impactpowertech.com

Impact Technical Services Ltd

3 Kingsley St, Leicester LE2 6DY, UK, 44-116-244-8855, enquiries@impactts.co.uk, www.impacttechnicalservices.co.uk

IMPERX

6421 Congress Ave, Boca Raton, FL 33487, 561-989-0006, sales@imperx.com, www.imperx.com

IMTEK | NoOdor.com

70 Box 2066, Alpharetta, GA 30023, 770-667-8621, service@imtek.biz, www.noodor.com

IndustryARC

14 Middleport Rd, Hamilton, NY 13346, 614-588-8538, sales@industryarc.com, www.industryarc.com

Infinite Graphics Inc

4611 E Lake St, Minneapolis, MN 55406, 612-721-6283, sales@igi.com, www.igi.com

Infinite Optics Inc

1712 Newport Cir, Suite F, Santa Ana, CA 92075-5118, 714-557-2299, stan@infiniteoptics.com, www.infiniteoptics.com

Infinity Contacts Inc

8720 Helms Ave, Rancho Cucamonga, CA 91730, 909-466-9207, www.infinitycontactsinc.com

Infolytica Corp

300 Leo Pariseau, Suite 2222, Montreal, QC H2X 4B3, Canada, 514-849-8752, info@infolytica.com, www.infolytica.com

InfoSight Corp

20700 US Hwy 23, PO Box 5000, Chillicothe, OH 45601, 740-642-3600, sales@infosight.com, www.infosight.com

INICORE Inc

5600 Mowry School Rd, Suite 180, Newark, CA 94560, 510-445-1529, info@inicore.com, www.inicore.com

InnovaQuartz LLC

23030 N 15th Ave, Phoenix, AZ 85027-1315, 624-434-1895, info@innovaquartz.com, www.innovaquartz.com

Innovative Integration

741 Flynn Rd, Camarillo, CA 93012, 805-383-8994, nhenderson@innovative-dsp.com, www.innovative-dsp.com

Integrated Dispensing Solutions Inc

5311 Derry Ave, Bldg D, Agoura Hills, CA 91301, 818-597-4300, service@dispensinglink.com, www.dispensinglink.com

Intepro Systems

14712-A Franklin Ave, Tustin, CA 92780, 714-953-2686, www.inteproate.com

Interface Displays & Controls Inc

4630 North Ave, Oceanside, CA 92056, 760-945-0230, info@interfacedisplays.com, www.interfacedisplays.com

International Air Tool and Industrial Supply Co

3574 Hancock St, 2nd Fl, San Diego, CA 92110, 619-795-7955, info@intlairtool.com, www.intlairtool.com

Interpoint

(div of Crane Aerospace & Electronics), 10301 Willows Road NE, Redmond, WA 98052, 425-882-3100, power@crane-eg.com, www.craneae.com/interpoint

Intersil

1001 Murphy Ranch Rd, Milpitas, CA 95035, 408-432-8888, www.intersil.com



■ Interstate Connecting Components

(div of Heilind Mil-Aero), 120 Mt Holly Bypass, Lumberton, NJ 08048, 888-881-5420, www.connecticc.com
Supplies the military-aerospace industry with military and industrial connectors, backshells, connector accessories, and electromechanical products. As an AS9100C-certified and QPL'd value-added connector assembly distributor, the company stocks thousands of components and can build MIL-SPEC connectors in only two days or less.
(See ad page 48)

InterTest Inc

303 State Rt 94, Columbia, NJ 07832, 908-496-8008, bginfo@intertest.com, www.intertest.com

intEST Thermal Solutions

41 Hampden Rd, Mansfield, MA 02048, 781-688-2300, sales@intestthermal.com, www.intestthermal.com

IO Industries Inc

15940 Robin's Hill Rd, London, ON N5V 0A4, Canada, 519-663-9570, info2@ioindustries.com, www.ioindustries.com

■ IR HiRel - An Infineon Technologies Co

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Designs, develops, and manufactures high-reliability power conversion solutions for space, defense, commercial aircraft, heavy-duty industrial, and medical markets. Offers radiation-hardened, high-temperature, and standard hybrid DC/DC converters with built-in EMI filtering. All are available with complete analyses reports for thermal, reliability, FMEA, electrical stress, radiation susceptibility, and worst case.
(See ad page 1, 6)

Iridian Spectral Technologies

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iRobot Corp

8 Crosby Dr, Bedford, MA 01730, 888-776-2687, sales@irobot.com, www.irobot.com/defense

IRT Integrated Rectifier Technologies Inc

15360-116th Ave, Edmonton, AB T5M 3Z6, Canada, 780-447-1114, sales@irtrectifier.com, www.irtrectifier.com

Iscan Inc

21 Cabot Rd, Woburn, MA 01801, 781-932-1199, info@iscaninc.com, www.iscaninc.com

ISVI Corp

3 Morse Rd, 2A, Oxford, CT 06478, 203-592-8723, sales@isvi-corp.com, www.isvi-corp.com

IXI Technology

22705 Savi Ranch Pkwy, Suite 200, Yorba Linda, CA 92887, 714-221-5000, sales@ixitech.com, www.ixitech.com

Jama Software

135 SW Taylor St, Portland, OR 97204, 503-922-1058, www.jamasoftware.com

JENOPTIK Optical Systems GmbH

Optics Business Unit, Goeschwitzer Str 25, Jena 07745, Germany, 49-3641-65-3148, optics.os@jenoptik.com, www.jenoptik.com/optics

Jewell Instruments

850 Perimeter Rd, Manchester, NH 03103, 603-669-6400, sales@jewellinstruments.com, www.jewellinstruments.com

JTime Inc

640 Larkfield Ctr, Santa Rosa, CA 95403, 707-837-9570, sales@jtime.us, www.meinberg-usa.com

JuiceBox Energy Inc

1650 Ctr Pointe Dr, Milpitas, CA 95035, 571-435-1899, gmaguire@juiceboxsolar.com, www.juiceboxsolar.com

KAMAKA Electronic Bauelemente Vertriebs GmbH

Ulmer Str 130, Aalen, Baden Württemberg 73431, Germany, 49-7361-96620, karasch@kamaka.de, www.kamaka.de

Kamatics Corp

1330 Blue Hills Ave, Bloomfield, CT 06002, 860-769-3277, john.bertolini@kaman.com, www.kamatics.com

Kappa optronics GmbH

Kleines Feld 6, Gleichien, Niedersachsen D-37130, Germany, 49-5508-974-0, info@kappa-optronics.com, www.kappa-optronics.com

Keopsys SA

2 Rue Paul Sabatier, Lannion 22300, France, 33-2-96-05-08-00, websales@keopsys.com, www.keopsys.com

Keo Scientific Ltd

190-221 19 St SE, Calgary, AB T2E 7M2, Canada, 403-383-7192, trondsen@keoscientific.com, www.keoscientific.com

Kepeco Inc

131-38 Sanford Ave, Flushing, NY 11355, 718-461-7000, hq@kepecopower.com, www.kepecopower.com

Keysight Technology Inc

1400 Fountaingrove Pkwy, Santa Rosa, CA 95403-1738, 800-829-4444, www.keysight.com

Kimball Electronics

1205 Kimball Blvd, Jasper, IN 47546, 812-634-4000, patrick.prondzinski@kimballelectronics.com, www.kimballelectronics.com

Kingfisher International Pty Ltd

720 Springvale Rd, Mulgrave, VIC 3170, Australia, 61-3-8544-1700, sales@kingfisher.com.au, www.kingfisherfiber.com

Kontron

14118 Stowe Dr, Poway, CA 92064, 858-677-0877, info@us.kontron.com, www.kontron.com

Kowa American Corp

20001 S Vermont Ave, Torrance, CA 90502, 310-327-1913, customerservice@kowa.com, www.kowa-usa.com

Krell Technologies Inc

1126 Campus Dr W, Morganville, NJ 07751, 732-617-7091, sales@krelltech.com, www.krelltech.com

Kugler of America Ltd

(sub of Kugler GmbH/Germany), 48 South Rd, Unit 1, Somers, CT 06071, 860-749-6400, info@kuglerofamerica.com, www.kuglerofamerica.com



KVH Industries Inc

50 Enterprise Ctr, Middletown, RI 02842, 401-847-3327, info@kvh.com, www.kvh.com
Manufactures high-performance fiber-optic sensor systems for guidance, navigation and stabilization applications. The company's fiber-optic gyros and inertial systems are used in a broad range of defense and commercial applications, including unmanned systems and weapon platforms.
(See ad page 43)

Lambda Research Corp

25 Porter Rd, 2nd Fl, Littleton, MA 01460-1434, 978-486-0766, sales@lambdaresearch.com, www.lambdaresearch.com

Lansdale Semiconductor Inc

5245 S 39th St, Phoenix, AZ 85040, 602-438-0123, lansdale@lansdale.com, www.lansdale.com
Is a semiconductor aftermarket manufacturer supplying over 3000 military and commercial grade integrated circuits. Technologies include DTL, RTL, TTL, STTL, LSTTL, PROMS, CMOS and analog ICs produced using the original tooling.
(See ad page 35)

LAS-CAD GmbH

Brunhildenstr 9, Munich 80639, Germany, 49-89-173607, info@las-cad.com, www.las-cad.com

Laser Physics UK Ltd

Golborne Lodge Technology Ctr, Whitchurch Rd, Milton Green, Cheshire CH3 9DR, UK, 44-1829-773-155, info@laserphysics.co.uk, www.laserphysics.co.uk

L-com Global Connectivity

45 Beechwood Dr, North Andover, MA 01845, 978-682-6936, sales@l-com.com, www.l-com.com

The LED Studio

Hanger Way, Petersfield GU31 4QE, UK, 44-20-3617-1979, sales@theledstudio.co.uk, www.theledstudio.co.uk

LEMO SA

Chemin des champs courbes 28, PO Box 194, Ecublens 1024, Switzerland, 41-21-695-16-00, info@lemo.com, www.lemo.com

Lenthor Engineering Inc

311 Turquoise St, Milpitas, CA 95035, 408-957-3487, davidm@lenthor.com, www.lenthor.com

LEONI Elocab Ltd

258 McBrine Dr, Kitchener, ON N2R 1H8, Canada, 519-893-1155, infocables@leoni.com, www.leoni-northamerica.com

LEONI Fiber Optics Inc

(sub of LEONI GmbH), 209 Bulifants Blvd, PO Box 615, Williamsburg, VA 23188, 757-258-4805, cusme-s.contact@leoni.com, www.leoni-northamerica.com

Lexycom Technologies Inc

425 S Bowen St, Unit 7, Longmont, CO 80501, 303-774-7822, info@lexycominc.com, www.lexycominc.com

The Light Brigade Inc

837 Industry Dr, Tukwila, WA 98188, 206-575-0404, sales@lightbrigade.com, www.lightbrigade.com

LiquidCool Solutions

2717 Hwy 14 W, Suite D, Rochester, MN 55901, 866-530-0101, herb.zien@liquidcoolsolutions.com, www.liquidcoolsolutions.com

Logitech Ltd

(sub of Roper Industries Inc), Erskine Ferry Rd, Old Kilpatrick, Glasgow G60 5EU, UK, 44-1389-875-444, enquiries@logitech.uk.com, www.logitech.uk.com

Lovalite SAS

7 Rue Xavier Marmier, Besancon 25000, France, 33-3-81-53-26-25, info@lovalite.com, www.lovalite.com

LRAD Corp

16990 Goldentop Rd, Suite A, San Diego, CA 92127, 858-676-1112, info@lradx.com, www.lradx.com

Luciol Instruments SA

7B Rt Suisse, Mies 1295, Switzerland, 41-22-755-5650, info@luciol.com, www.luciol.com

Lumetrics Inc

Eagle's Landing Business Pk, 1565 Jefferson Rd, #420, Rochester, NY 14623, 585-214-2455, sales@lumetrics.com, www.lumetrics.com



Lynx Software Technologies Inc

855 Embedded Way, San Jose, CA 95138, 408-979-3900, inside@lynx.com, www.lynx.com
Provides RTOS and virtualization solutions while embracing open standards. LynxOS is a deterministic, hard RTOS with military-grade security. The LynxSecure Separation Kernel Hypervisor supports the most stringent security and safety requirements. LynxOS-178 is designed for safety critical systems and has been certified to the highest level of avionics safety.

Macro Sensors

(sub of American Sensor Technologies), 7300 US Rt 130 N, Pennsauken, NJ 08110, 856-662-8000, sales@macrosensors.com, www.macrosensors.com

MAJR Products Co

780 South St, Saegertown, PA 16433,
814-763-3211, sales@majr.com,
www.majr.com

March Electronics Inc

25 Feldland St, Bohemia, NY 11716,
800-444-6056,
sales@marchelectronics.com,
www.marchelectronics.com

Martin, Froeschner & Associates

14300 Mines Rd, Livermore, CA 94550,
925-989-4930, sales@mfaoptics.com,
www.mfaoptics.com

■ Master Bond

154 Hobart St, Hackensack, NJ
07601, 201-343-8983,
main@masterbond.com,
www.masterbond.com

Develops a range of products for use in electronic and electro-optic applications, including a complete line of optical potting and encapsulating compounds some of which are also thermally and electrically conductive. Adhesives are formulated to operate over a wide temperature range and hold up to cryogenic temperatures and shock. (See ad page 30)

Materion Advanced Materials Group

(div of Materion), 2978 Main St, Buffalo, NY 14214, 800-327-1355,
advancedmaterials@materion.com,
www.materion.com

Matrox Imaging

1055 St Regis Blvd, Dorval, QC H9P 2T4, Canada, 800-804-6243,
imaging.info@matrox.com,
www.matrox.com/imaging

**Max Levy Autograph Inc**

Military and Materials Div, (sub of II-VI Inc), 2710 Commerce Way, Philadelphia, PA 19144,
215-842-3675,
mla.custservice@ii-vi.com,
www.maxlevy.com

Specializes in ultra-precision patterned plano or curved components and 3-D structures for the photonic, biomedical, mil-aero, semiconductor, and metrology industries. Military and aerospace applications include EMI-shielded optical windows, thin-film circuits, radomes or other curved surfaces with tunable features and patterned film for low observable coatings.

MAZeT GmbH

Göschwitz Str 32, Jena 07745, Germany, 49-3641-2809-0,
sales@mazet.de, www.mazet.de

MC Countermeasures Inc

555 Legget Dr - Tower A, Suite 500, Kanata, ON K2K 2X3, Canada,
613-592-0818 x113, info@mc-cm.com,
www.mc-cm.com

MCG Surge Protection

12 Burt Dr, Deer Park, NY 11729,
631-586-5125, info1@mcgsurge.com,
www.mcgsurge.com

Mech-Tronics

100 Campus Dr, Mount Holly, NJ 08060,
609-267-0680, sales@mech-tronics.net,
www.mech-tronics.net

Medit Inc

96 Sherbrook St, Winnipeg, MB R3C 2B3, Canada, 800-239-9934,
salesteam@meditinc.com,
www.fiberscope.net

MegaWatt Lasers Inc

PO Box 24190, Hilton Head Island, SC 29925-4190, 843-342-7221,
sales@megawattlasers.com,
www.megawattlasers.com

Meggitt Defense Systems

9801 Muirlands Blvd, Irvine, CA 92618,
949-465-7700,
judy.smith@meggitt.com,
www.meggittdefense.com

Melfast

18 Passaic Ave, Fairfield, NJ 07004,
201-690-7762, victoria@melfast.com,
www.melfast.com

MEN Micro Inc

860 Penlyn Blue Bell Pike, Blue Bell, PA 19422, 215-542-9575,
stephen.cunha@menmicro.com,
www.menmicro.com

■ Mercury Systems

201 Riverneck Rd, Chelmsford, MA 01824-2820, 866-411-6729,
mktg@mail@mrco.com,
www.mcry.com

Designs and builds open architecture electronic subsystems for radar, EW, and SIGINT applications. Capabilities span the entire sensor processing chain from RF/microwave to mixed-signal to digital. The unique ability to integrate analog and digital technologies provides affordable, SWaP-optimized solutions. (See ad page 11)

MERITEC

1382 W Jackson St, Painesville, OH 44077, 440-354-2100,
info@meritec.com, www.meritec.com

Micom Laboratories Inc

556 Lepine Ave, Dorval, QC H9P 2V6, Canada, 514-633-0078,
info@micomlab.com,
www.micomlab.com

Microchip Technology Inc

Aerospace & Defense Products Group, 2355 W Chandler Blvd, Chandler, AZ 85224, 480-265-6831,
www.microchip.com/aero

Micro Laser Systems Inc

12841 Western Ave, Unit H, Garden Grove, CA 92841, 714-898-6001,
sales@microlaser.com,
www.microlaser.com

Microway Inc

Server Systems Div, 12 Richards Rd, Plymouth, MA 02360, 508-746-7341,
sales@microway.com,
www.microway.com

Midsun Specialty Products

378 Four Rod Rd, Berlin, CT 06037, 860-378-0111, info@detectape.com,
www.detectape.com

Midwest Printed Circuit Services Inc

1741 Circuit Dr, Round Lake Beach, IL 60073, 847-740-4120,
mpcs@midwestpcb.com,
www.midwestpcb.com

Milsource

920 N Nash St, Bldg B, El Segundo, CA 90245, 310-694-9930,
info@milsource.us,
www.militaryethernet.com

MiltechUK

158 Foregate St, Chester, Cheshire CH1 1HJ, UK, 44-7841-289-668,
peter.moore@miltechuk.com,
www.miltechuk.com

Mindshare by CSS

6030 S 58th St, Suite C, Lincoln, NE 68516, 402-261-8688,
www.css-mindshare.com

Mixed Signal Integration Corp

2157 O'Toole Ave, Suite 50, San Jose, CA 95131, 408-434-6305,
info@mix-sig.com, www.mix-sig.com

Mobile Desk/Mobile Office Solutions

9319 Cincinnati-Columbus Rd, Suite 18, West Chester, OH 45069,
877-663-3375, sales@mobiledesk.com,
www.mobiledesk.com

Modular Devices Inc

1 Roned Rd, Shirley, NY 11967, 631-345-3100, sales@mdipower.com,
www.mdipower.com

Modular Industrial Computer Inc

6635 Lee Hwy, Chattanooga, TN 37421, 423-499-0700,
insidesales@modularpfc.com,
www.modularpfc.com

Molex Inc, Optical Solutions Group

5224 Katrine Ave, Downers Grove, IL 60515, 630-512-8787,
fiberoptics@molex.com,
www.molex.com/fiber

Momentive Performance Materials Inc

260 Hudson River Rd, Waterford, NY 12188, 614-986-2495,
4information@momentive.com,
www.momentive.com

Momentum Services

(div of MOGAS Industries Inc), 14206 E Hardy St, Houston, TX 77039,
281-449-0294,
calexander@momentumsvcs.com,
www.momentumsvcs.com

MONTI Tools Inc

(sub of MONTI Werkzeuge GmbH), 10690 Shadow Wood Dr, Suite 113, Houston, TX 77043, 832-623-7970,
info@monti-tools.com,
www.monti-tools.com

Mouser Electronics

1000 N Main St, Mansfield, TX 76063, 817-804-3800,
kelly.degarmo@mouser.com,
www.mouser.com

MPL AG

Täferstr 20, Dättwil 5405, Switzerland, 41-56-483-34-34, info@mpl.ch,
www.mpl.ch

MS Kennedy Products

(div of Anaren Co), 6635 Kirkville Rd, East Syracuse, NY 13057,
315-701-6751,
g.overend@mskennedy.com,
www.anaren.com/msk

Multi-Contact USA

(sub of Multi-Contact AG Basel), 100 Market St, Windsor, CA 95403,
707-838-0530,
mailbox@multi-contact-usa.com,
www.multi-contact-usa.com

NAI

7975 N Hayden Rd, Suite D105, Scottsdale, AZ 85258,
480-556-6066, info@nai-group.com,
www.nai-group.com

Naprotek Inc

90 Rose Orchard Way, San Jose, CA 95134, 408-830-5000,
info@naprotek.com, www.naprotek.com

Natural Evolution Inc

5701 E 13th St, Tulsa, OK 74112,
918-836-2995,
tphillips@naturalevolution.com,
www.naturalevolution.com

Nelson Design Services Inc

3501 W Moreland Rd, Willow Grove, PA
19090, 215-784-9600,
sales@nelson-design.com,
www.nelson-design.com

Ness Engineering Inc

PO Box 261501, San Diego, CA 92196,
858-566-2372, nessengr@san.rr.com,
www.nessengr.com

Nightstick

(div of Bayco Products Inc),
640 S Sanden Blvd, Wylie, TX 75098,
800-233-2155,
info@baycoproducts.com,
www.mynightstick.com

NI Microwave Components

4600 Patrick Henry Dr, Santa Clara, CA
95054, 408-610-6810,
microwavcomponents@ni.com,
www.ni-microwavcomponents.com

Noramco Wire & Cable

70 Glacier St, Coquitlam, BC V3K 5Y9,
Canada, 604-472-6980,
norbbby@noramco.ca, www.noramco.ca

Norden Millimeter Inc

5441 Merchant Cir, Unit C, Placerville,
CA 95667, 530-642-9123,
mpardo@nordengroup.com,
www.nordengroup.com

Nordson ASYMTEK

(sub of Nordson Corp), 2747 Loker Ave
W, Carlsbad, CA 92010-6603,
760-431-1919,
info@nordsonasymtek.com,
www.nordsonasymtek.com

Nortech Systems Inc

7550 Meridian Cir, Suite 150,
Maple Grove, MN 55369,
952-345-2240, www.nortechsys.com

North Atlantic Industries Inc

110 Wilbur Pl, Bohemia, NY 11716,
631-567-1100, info@naii.com,
www.naii.com

Northwire Inc

110 Prospect Way, Osceola, WI 54020,
715-294-2121, cableinfo@northwire.com,
www.northwire.com

Novacam Technologies Inc

277 Lakeshore Rd, Suite 4, Pointe-Claire,
QC H9S 4L2, Canada, 514-694-4002,
info@novacam.com, www.novacam.com

Nova Electric

Technology Dynamics Div, 100 School St,
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201-385-0500,
howard@theallpower.com,
www.novaelectric.com

NOVA Power Solutions Inc

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louie.leitao@novapower.com,
www.novapower.com

Nufern

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860-408-5000, info@nufern.com,
www.nufern.com

OEG GmbH

Wildbahn 8i, Frankfurt, Brandenburg
15236, Germany, 49-335-5213894,
info@oeggmbh.com, www.oeggmbh.com

OEWaves Inc

465 N Halstead St, Suite 140, Pasadena,
CA 91107-6016, 626-351-4200,
sales@oewaves.com, www.oewaves.com

Olympus

Industrial Microscopy & Metrology Div,
48 Woerd Ave, Waltham, MA 02453,
781-419-3900,
info@olympus-oss.com,
www.olympus-ims.com

Omega Optical Inc

21 Omega Dr, Brattleboro, VT 05301,
802-251-7300, sales@omegafilters.com,
www.omegafilters.com

Omnetics Connector Corp

7260 Commerce Cir E, Minneapolis, MN
55432, 763-572-0656,
sales@omnetics.com,
www.omnetics.com

OPAL-RT Technologies

1751 Rue Richardson, Suite 2525,
Montreal, QC H3K 1G6, Canada,
514-935-2323,
darcy.laronde@opal-rt.com,
www.opal-rt.com

Opco Lab

704 River St, Fitchburg, MA 01420,
978-345-2522, sales@opcolab.com,
www.opcolab.com

OPHIR RF

5300 Beethoven St, Los Angeles, CA
90066, 310-306-5556,
info@ophirrf.com, www.ophirrf.com

OptiConcepts Inc

PO Box 1170, Valdese, NC 28690,
828-320-0138, info@opticoncepts.com,
www.opticoncepts.com

Opto Diode Corp

(an ITW Co), 1260 Calle Suerte,
Camarillo, CA 93012, 805-499-0335,
sales@optodiode.com,
www.optodiode.com

Opto System Co Ltd

100 Nogami Miyamaki, Kyotanabe City,
Kyoto 610-0313, Japan,
81-774-68-4441,
optwest@gold.ocn.ne.jp,
www.opto-system.co.jp/en

OptoTest Corp

4750 Calle Quetzal, Camarillo, CA
93012, 805-987-1700,
sales@optotest.com, www.optotest.com

OptoTherm Inc

2591 Wexford-Bayne Rd, Suite 304,
Sewickley, PA 15143, 724-940-7600,
sales@optotherm.com,
www.optotherm.com

ORIENTIR

199 Western Rd, High-Tech Dist Western
Zone, Chengdu, Sichuan 611731, China,
86-28-8795-7656, sales@orient-ir.com,
www.orient-ir.com

Orion Technologies LLC

2100 N Alafaya Trail, Orlando, FL 32826,
407-476-2120,
sales@oriontechnologies.com,
www.oriontechnologies.com

OSI Laser Diode Inc

4 Olsen Ave, Edison, NJ 08820,
732-549-9001,
pscarillo@osilaserdiode.com,
www.laserdiode.com

OSI Optoelectronics Inc

(div of OSI Systems Inc), 12525 Chadron
Ave, Hawthorne, CA 90250,
310-978-0516,
info@osioptoelectronics.com,
www.osioptoelectronics.com

OTTO

2 E Main St, Carpentersville, IL 60110,
847-428-7171,
info@ottoexcellence.com,
www.ottoexcellence.com

Oxford Instruments Industrial Analysis

300 Baker Ave, Suite 150, Concord, MA
01742-2124, 978-369-9933,
industrial@oxinst.com,
www.oxford-instruments.com/industrial

PA&E

434 Olds Station Rd, Wenatchee, WA
98801-8110, 509-664-8000,
sales@pacaero.com, www.pacaero.com

PALMARII Dynamics AB

Toftogsvagen 32, Vellinge, Skaane
SE-235 91, Sweden, 46-40-645-3700,
mark.ridgley@palmarii-dynamics.com,
www.palmarii-dynamics.com

Palmer Wahl Temperature Instruments

234 Old Weaverville Rd, Asheville, NC
28804, 828-658-3131,
info@palmerwahl.com,
www.palmerwahl.com

Panasonic Computer Solutions Co

3 Panasonic Way, 2F-5, Secaucus, NJ
07094, 888-223-1012,
www.panasonic.com/toughbook

P&A Components Inc

14035 Bryant Ln, Sylmar, CA 91342,
818-356-7969,
www.pacomponentsinc.com

Passat Ltd

116D Viceroy Rd, Unit 1-4, Vaughan, ON
L4K 2M4, Canada, 905-695-1088,
info@passatltd.com, www.passatltd.com

PCE Instruments UK Ltd

Units 12/13 S Point Business Pk,
Ensign Way, Southampton, Hampshire
SO31 4RF, UK, 44-2380-987-030,
info@industrial-needs.com,
www.pce-instruments.com/english/

Peerless Electronics Inc

700 Hicksville Rd, Suite 100, Bethpage,
NY 11714, 516-594-3500,
drome@peerlesselectronics.com,
www.peerlesselectronics.com

PEI-Genesis

2180 Hornig Rd, Philadelphia, PA 19116,
215-673-0400, sales@peigenesis.com,
www.peigenesis.com

PELORUS NAVAL SYSTEMS Inc

30021 Tomas, Rancho Santa Margarita,
CA 92688, 949-459-2130,
info@pelorusnavalsystems.com,
www.pelorusnavalsystems.com

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07458, 201-818-5900,
info@pentek.com, www.pentek.com
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55306, 952-894-7231,
sales@permacindustries.com,
www.permacindustries.com

PG&O - Precision Glass & Optics

3600 W Moore Ave, Santa Ana, CA
92704, 714-540-0126, info@pgo.com,
www.pgo.com

Phase 1 Technology Corp

44 Jefryn Blvd, Suite Y, Deer Park, NY
11729, 888-732-6474,
info@phase1tech.com,
www.phase1tech.com

Phase Matrix

(sub of National Instruments), 4600
Patrick Henry Dr, Santa Clara, CA 95054,
408-610-6810,
sales@phasematrix.com,
www.phasematrix.com

■ Phoenix International

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92865, 714-283-4800,
info@phenxint.com,
www.phenxint.com

Manufactures rugged COTS mass
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(See ad page 30)

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sales@photon-control.com,
www.photon-control.com

Photonic Sense GmbH

Am Goldberg 3, Eisenach 99817,
Germany, 49-3691-7318-0,
info@photonic-sense.com,
www.photonic-sense.com

The Photonics Group

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45069, 724-712-3500,
info@thephotonicsgroup.com,
www.thephotonicsgroup.com

Photron Inc

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CA 92126-4446, 858-684-3555,
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MA 01824, 781-897-1710,
ussales@pickeringtest.com,
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MIL-PRF units, environmental
screening, and custom specifications
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approved facility.
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727-545-0741, info@pixelteq.com,
www.pixelteq.com

Pleora Technologies Inc

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K2K 3A2, Canada, 613-270-0625,
info@pleora.com, www.pleora.com

Powell Electronics

200 Commodore Dr, Swedesboro, NJ
08085, 800-235-7880,
info@powell.com, www.powell.com

Power Design Services

121 E Brokaw Rd, San Jose, CA 95112,
408-437-1931,
sales@powerdesignservices.com,
www.powerdesignservices.com

Power Technology Inc

PO Box 191117, Little Rock, AR
72219-1117, 501-407-0712,
sales@powertechnology.com,
www.powertechnology.com

Premier Polymers

230 Kings Hwy E, Suite 215,
Haddonfield, NJ 08033, 856-745-5077,
eshaffer@prempoly.com,
www.premierpolymersolutions.com

Printed Circuits Inc

1200 W 96th St, Minneapolis, MN
55431-2699, 952-888-7900,
bburns@printedcircuits.com,
www.printedcircuits.com

Prior Scientific Inc

80 Reservoir Pk Dr, Rockland, MA
02370-1062, 781-878-8442,
info@prior.com, www.prior.com

Process Technology

7010 Lindsay Dr, Mentor, OH 44060,
440-974-1300,
info@process-technology.com,
www.processtechnology.com

Pro-Comm Inc

1105 Industrial Pkwy, Brick, NJ 08724,
732-206-0660, procomm222@aol.com,
www.procomm222.com

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fullenkamp@pui.com, www.pui.com
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AS9100C and Nadcap-electronics in
both circuit-card assemblies (CCA)
and cable and harness assemblies
(CHA). Manufactures to J-STD-001
Class 3, IPC-A-610 rev E, and
IPC/WHMA-A-620 rev B.

ProMation Engineering Inc

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34604, 352-544-8436,
dean.geraci@promationei.com,
www.promationei.com

Pryme

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714-257-0300, sales.service@pryme.com,
www.pryme.com

PTC

140 Kendrick St, Needham, MA 02494,
781-370-5000, www.ptc.com

Puleo Electronics Inc

39 Hutcheson Pl, Lynbrook, NY 11563,
516-599-4875, sales@puleoinc.com,
www.annunciator.com

PulseTech Products Corp

1100 S Kimball Ave, Southlake, TX
76092, 817-329-6099,
ppc@pulsatech.net, www.pulsatech.net

QTI Sensing Solutions

2108 Century Way, Boise, ID 83709,
208-377-3373, qtisales@thermistor.com,
www.thermistor.com

Quagwire Technologies

20 N Wacker Dr, Suite 1200, Chicago, IL
60606, 847-331-3255,
sales@quagwire.com,
www.quagwire.com

Qualmark Corp

10390 E 48th Ave, Denver, CO 80238,
303-254-8800, sales@qualmark.com,
www.qualmark.com

Quanta Laboratories

3199 De La Cruz Blvd, Santa Clara, CA
95054, 408-988-0770,
test@quantalabs.com,
www.quantalabs.com

Quantum Composers

212 Discovery Dr, Bozeman, MT 59718,
406-582-0227,
sales@quantumcomposers.com,
www.quantumcomposers.com

Quell Corp

5639 Jefferson St NE, Albuquerque, NM
87109, 505-243-1423,
eeseal@quell.us, www.eeseal.com

■ R&D Interconnect Solutions

(div of R&D Altanova),
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fabrication, and customer support.
(See ad page 17)

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powersys@rantec.com, www.rantec.com

Rapid Imaging Software Inc

PO Box 69006, Tucson, AZ 87108,
608-824-1131, info@rapidimaging.net,
www.rapidimaging.net

Raycom Electronics

1 Raycom Rd, PO Box 250, Dover, PA
17315, 717-292-3641,
raycomsales@electrotechnik.com,
www.raycomelectronics.com

R Blaine Industries Inc

Polyimide & Hybrid Polymers Div, 1517
Hill Rd, Suite 5F, Reading, PA 19602,
610-236-1445, info@vtecpi.com,
www.rblaine.com

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797 N Grove Rd, Suite 101,
Richardson, TX 75081, 972-671-9570,
sales@redrapids.com,
www.redrapids.com
Offers a catalog of signal acquisition
and generation hardware products
that are targeted at communication,
telemetry, radar and surveillance
systems. Products include signal
converters, transmitters, receivers
and FPGA DSP accelerators. All of
the products are built around open
architecture standards for embedded
systems (XMC/VPX/cPCI) and
server/desktop computers (PCIe).
(See ad page 44)

Red Rock Technologies Inc

206 W Julie Dr, Suite 2, Tempe, AZ
85283-2895, 480-483-3777,
info@redrocktech.com,
www.redrocktech.com

Rennsteig Tools Inc

301 Rt 17 N, Suite 800, Rutherford, NJ
07070, 330-315-3044,
info@rennsteig.us, www.rennsteig.us

ReportBazzar

30 Wall St, 8th Fl, New York, NY 10005,
212-389-6363, sales@reportbazzar.com,
www.reportbazzar.com

Reutech Communications

9 Valley View Rd, New Germany, Durban,
Kwazulu-Natal 3610, South Africa,
27-12-740-8000,
joelbaptist@gmail.com,
www.reutechcomms.com

Reynard Corp

1020 Calle Sombra, San Clemente, CA
92673, 949-366-8866,
sales@reynardcorp.com,
www.reynardcorp.com

■ RGB Spectrum

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CA 94501, 510-814-7000,
sales@rgb.com, www.rgb.com**
Provides display processing,
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solutions, specializing in
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and training. Products include
multiviewers, multiscreen display
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recorders, DVI matrix switches, and
scan converters.
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Rigel Engineering LLC

1690 S Tropical Trail, Merritt Island, FL
32952, 321-473-6999,
sales@rigel-eng.com,
www.rigel-eng.com

Rokap Inc

1002 Yale Ave, Wallingford, CT 06492,
203-774-0085, fod@rokap.com,
www.fodsigns.com

Ronan Engineering Co

Measurements Div, 8050 Production Dr,
Florence, KY 41042, 859-342-8500,
ronan@ronanmeasure.com,
www.ronan.com

Ronco

70 Planchet Rd, Concord, ON L4K 2C7,
Canada, 905-660-6700, info@ronco.ca,
www.ronco.ca

Rose Electronics

10707 Stancliff Rd, Houston, TX 77099,
800-333-9343, sales@rose.com,
www.rose.com

Rosen Aviation LLC

1020 Owen Loop S, Eugene, OR 97402,
541-434-4637,
pbloodworth@rosenaviation.com,
www.rosenaviation.com

Ross Engineering Corp

540 Westchester Dr, Campbell, CA
95008, 408-377-4621,
info@rossengineeringcorp.com,
www.rossengineeringcorp.com

RPMC Lasers Inc

203 Joseph St, O'Fallon, MO 63366,
636-272-7227, rpms@rpmclasers.com,
www.rpmclasers.com

RWC Testing & Lab Supplies

1821 N Zaragosa Rd, PMB 640, El Paso,
TX 79936, 915-852-3375,
customerservice@rwc-testing.com,
www.rwc-testing.com/store

Saelig Co Inc

71 Perinton Pkwy, Fairport, NY 14450,
585-385-1750, sales@saelig.com,
www.saelig.com

Safety Equipment Corp

1141 Old County Rd, Belmont, CA
94002, 650-595-5422,
info@safetysafetyequipmentcorp.com,
www.gascabinets.com

SEACON

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92020, 619-562-7071,
seacon@seaconworldwide.com,
www.seaconworldwide.com

Sealing Devices Inc

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716-684-7600,
seals@sealingdevices.com,
www.sealingdevices.com

SEI - Semiconductor Enclosures Inc

85 Parker St, Newburyport, MA 01950,
978-462-1880, sales@
semiconductorenclosures.com,
www.semiconductorenclosures.com

SENER

c/ Severo Ochoa 4, Parque Tecnológico
de Madrid, Tres Cantos, Madrid 28760,
Spain, 34-91-807-73-18,
info@sener.es, www.sener-group.com

Sensitron Semiconductor

(div of RSM Electron Power Inc), 221 W
Industry Ct, Deer Park, NY 11729-4681,
631-586-7600, sales@sensitron.com,
www.sensitron.com

Sensoray Co Inc

7313 SW Tech Ctr Dr, Tigard, OR 97223,
503-684-8005, sales@sensoray.com,
www.sensoray.com

Sensor Developments Inc

1050 W Silver Bell Rd, PO Box 290,
Lake Orion, MI 48359, 248-391-3000,
sales@sendev.com, www.sendev.com

Sensup

4 Ave Des Peupliers, Batiment E,
Cesson Sevigne 35510, France,
33-2-99-54-89-78,
contact@sensup-tech.com,
www.sensup-tech.com

Servometer

501 Little Falls Rd, Cedar Grove, NJ
07009-1291, 973-785-4630,
info@servometer.com,
www.servometer.com

Shanghai Datian Valve Pipe Engineering Co

3223 Zhouzhu Rd, Pudong Dist,
Shanghai 201323, China,
86-21-6810-6365, export@dtjt.com,
www.datianvalve.com

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95131, 408-943-1755,
watson_tseng@shenmao.us,
www.shenmao.com

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Yantian, Shenzhen, Guangdong
518081, China, 86-755-3632-8012,
info@hti-global.com, www.hti-global.com

Shoghi Communications

74 Electronic Complex, Industrial Area,
Shoghi, Shimla 173219, India,
91-177-2860630,
marketing@shoghicom.com,
www.shoghicom.com

Shore Microsystems Inc

45 Memorial Pkwy, Long Branch, NJ
07740, 732-870-0800,
sbald@shoremicro.com,
www.shoremicro.com

Sierra-Olympic Technologies Inc (SOTI)

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3100 Cascade Ave, Hood River, OR
97031, 541-716-0016,
chris@sierraolympic.com,
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6620 S Tenaya Way, Suite 200,
Las Vegas, NV 89148, 702-369-3966,
sales@x20.org, www.x20.org

SignalCore Inc

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Austin, TX 78729, 512-501-6000,
sales@signalcore.com,
www.signalcore.com

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949-380-3031, sales@signetfpd.com,
www.signetfpd.com

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3440 S Dearbord St, Chicago, IL 60616,
312-448-8000, chips@sigenics.com,
www.sigenics.com

SmarTest LLC

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Santa Clara, CA 95050, 408-656-8184,
sales@smartest.us.com,
www.smartest.us.com

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Kimberley 8301, South Africa,
27-8327-25886,
smitties911@gmail.com,
www.smitties911.co.za

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2464 El Camino Real, #140, Santa Clara,
CA 95051, 408-821-7703,
tedw@solidspot.com,
www.solidspot.com

Soliton Devices Inc

3301 Electronics Way, Suite C,
West Palm Beach, FL
33407, 561-848-4311,
sales@solitondevices.com,
www.solitondevices.com

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Suite 100, York, PA 17402,
717-718-8816, tech@souriau.com,
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SpaceAge Control Inc

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661-273-3000,
email@spaceagecontrol.com,
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60173, 847-762-5800,
kenneth.sawilchik@sparton.com,
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NY 14623, 585-321-5800,
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larbi.ouchelouch@speel.cz,
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Stanford Magnets

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sales@stanfordmagnets.com,
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Stealth.com

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03431, 603-358-5577,
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STMicroelectronics Inc

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518-658-3202, addinfo@4taconic.com,
www.taconic-add.com

TASC Technical & Assembly Services Corp

Electronic Equipment Manufacturing Div,
2222 N Pacific St, Seattle, WA 98103,
206-682-2967, mhirst@tasc-wa.com,
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andy.tydem@us.tdk-lambda.com,
www.us.tdk-lambda.com/hp

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www.teal.com

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Dulles, VA 20166, 703-406-3000,
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PA 17105-3608, 800-522-6752,
www.te.com

Tef Cap Industries

1155 Phoenixville Pike, Suite 103,
West Chester, PA 19380,
610-692-2576, tefcapind@tefcap.com,
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4235 S Stream Blvd, Suite L-130,
Charlotte, NC 28217, 855-588-3626,
sales@teguar.com, www.teguar.com

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10977, 845-425-2000,
contact.corp@teledynelecroy.com,
www.teledynelecroy.com

Teledyne Storm Microwave

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www.tlcinternational.com

TNC Optics & Technologies Pte Ltd

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Kampong Ubi Industrial Estate,
Singapore 408705, 65-674-46912,
sales@tncoptics.com,
www.tncoptics.com

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(div of Toshiba America Information
Systems), 9740 Irvine Blvd, Irvine,
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gary.pitre@tais.toshiba.com,
www.toshibacameras.com

Total Control Solutions

20175 County Rd 50, Minneapolis, MN
55340, 763-416-1610,
info@tcs-tech.com,
www.totalcontrolsolutions.com

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734-528-6371, www.translume.com

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2350 Centennial Dr, Gainesville, GA
30504, 770-287-3100,
sales@trentonsystems.com,
www.trentonsystems.com

Trion Technology

2131 Sunnydale Blvd, Clearwater, FL
33765, 727-461-1888,
info@triontech.com, www.triontech.com

TriQuint Semiconductor

2300 NE Brookwood Pkwy, Hillsboro, OR
97124, 503-615-9000, info@tqs.com,
www.triquint.com

Troy Acoustics Corp

2580 Sidney Lanier Dr, Brunswick, GA
31525, 818-376-8490,
joan.drucker@troyacoustics.com,
www.troyacoustics.com

TRS RenTelco

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websales@txo-systems.com,
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www.uniforcesales.com

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www.ueidaq.com

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www.unitedlens.com

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US Technologies

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info@ustechnologies.com,
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Vadatech Inc

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702-896-3337, info@vadatech.com,
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Valutech Inc

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L3R 6E7, Canada, 905-940-0961,
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www.valutechinc.com

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95682, 530-676-7770,
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mouttou@vdesign.in, www.vdesign.in

Vector Informatik GmbH

Ingersheimer Str 24, Stuttgart 70499,
Germany, 49-711-80670-0,
sales@vector.com,
www.avionics-networking.com

VectorNav Technologies LLC

10501 Markison Rd, Dallas, TX 75238,
512-772-3615, sales@vectornav.com,
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Vega Technolgy Group LLC

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44720, 216-772-1434,
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14469, 585-657-6151,
info@velmex.com, www.velmex.com

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insidesales@viasat.com,
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West Coast Tech Ltd

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jcarlino@westechoptical.com,
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