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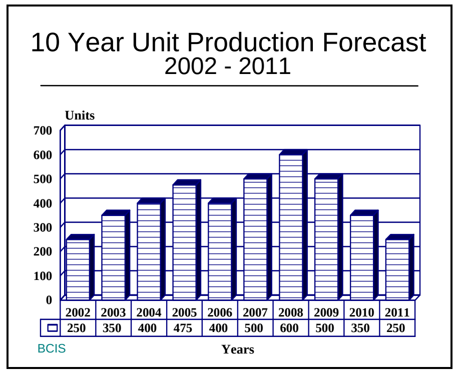
BCIS (VSX-3(V) Battlefield Combat Identification System) - Archive 02/2003

Outlook

- Ground vehicle anti-fratricide an Army priority
- Initial production in progress
- BCIS being installed on combat vehicles
- Some small production changes could be prompted by the War on Terrorism



Orientation

Description. The Battlefield Combat Identification-System (BCIS) is a point-of-engagement, anti-fratricide system that will to help distinguish between friendly and unfriendly vehicles on the battlefield. BCIS is a ground-to-ground, multifunction, all-weather, daytime/nighttime, low probability of interception (LPI), low probability of detection (LPD), question and answer system that provides positive identification of friendly targets. BCIS was designed to minimize fratricide while maximizing the combat effectiveness under rapidly changing and intense tactical scenarios.

Sponsor

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Status. Early production of LRIP models under way.

Total Produced. Through 2001, an estimated 348 units had been produced.

Application. Ground combat vehicles. Has been installed on M1A1, M1A2, Bradley Fighting Vehicle (M2A1, M2A2), the FISTV, BFIST, M113, ACE, Fox, HMMWV. It has also been installed on select NATO vehicles for demonstration.

Price Range. Unit cost at program award, US$53,000 each. Unit cost by the end of 1997 had been reduced to US$14,000. The unit cost goal is US$10,800. Ongoing efforts are reducing the cost of the system.

Cost/price estimates are based on an analysis of contracting data, other available cost information, and a comparison with equivalent items. It represents the best-guess price of a typical system. Individual acquisitions may vary, depending on program factors.

Technical Data

	Metric	**US**
Characteristics		
Frequency (response):	38 GHz (spread spectrum, frequency hopping)	
Range:	Specified	Demonstrated
Clear weather:	5.5 km	15 km
4 mm rain/hr:	3.0 km (4 mm/hr rain)	7.3 km
Dust:	5.0 km	7 km
	4.0 km (radiation fog)	
	5.5 km (fog oil)	
Probability of correct ID:	> 95%	>99%
Target ID time:	< 1 sec	
Antenna coverage:	< 3° (interrogator)	
	360° (transponder)	
Range:	150 – 5,500 m (ground-to-ground)	
	150 – 8,000 m (air-to-ground)	
Units:	Interrogator Antenna	
	Transponder Antenna	
	Receiver/Transmitter Group	
	RT-1734/VSX-3	
	Communications Interface	
	J-6421/VSX-3	

Design Features. As the lethality of weapon systems increases, and the speed and ferocity with which land battles are fought become greater, the need for systems that will aid warfighters in reducing fratricide is paramount. Positive visual identification is difficult when allies and enemies use identical or nearly identical combat platforms, and fighting battles under degraded natural and man-made conditions (obscurants, darkness, rain, dust and fog). During Operation Desert Storm, the confusion of a rapidly moving air-land battle using multinational forces created a situational awareness nightmare. The Battlefield Combat Identification System was developed to identify friendly targets under degraded environmental conditions.

The US Army/PM Combat is providing a protection/identification system that will be interoperable with NATO systems, filling a mid-term void for a fieldable NATO interoperable Combat ID system. This places the US Army on the long-term path toward a seamless combat identification system with its allies. Although different nations have different operational combat identification requirements, a waveform common to all systems is needed to minimize fratricide and system cost.

On weapons platforms, the BCIS interrogator antenna is located on or next to the gun and is oriented with the range finder. The transponder mast, which receives interrogations and transmits replies, is located on the side or top of a vehicle. The Receiver/Transmitter LRU is mounted in an armor-plated box below the transponder antenna. The Interface Unit can be mounted in a variety of places in the vehicle and contains the encryption circuitry. On non-shooter vehicles such as HMMWVs, the BCIS transponder can be located in various locations, the rear of the vehicle being a typical mounting point. For such vehicles, a quick on/off mount is possible.

BCIS has been successfully integrated and tested on the US Army's M1Al and M1A2 Abrams Tank, M2A2 Bradley Fighting Vehicle, M981 FISTV and HMMWV and passed all environmental tests. Range tests included one of California's worst rain storms, the cold weather of Alaska, and the heat of the Arizona desert.

Observations from the Limited User's Test show that platforms equipped with BCIS performed with shortened engagement times, especially at night, and had no instances of fratricide.

A platform-specific installation kit integrates BCIS onto any platform. It is an LPD system that transmits a millimeter wave Ka-band (38 GHz) spread spectrum, frequency-hopped signal only when interrogating or answering. The LPI feature is provided by the incorporation of COMSEC/TRANSEC techniques. Range requirements of 5.5 kilometers (clear weather) and 3 kilometers (rain) have been met with ample margin. BCIS tests prove that the system provides a greater than 99 percent probability of friend identification.

BCIS uses state-of-the-art microwave monolithic integrated circuit (MMIC) technology to implement the spread spectrum, frequency-hopped system. The majority of the high-electron mobility transistor (HEMT) and heterojunction bipolar transistor (HBT) MMIC components were developed under the Army's MMIC Phase 2 program, which ended in mid-1995. The 1 Watt, 38 GHz solid-state power amplifier was designed to provide performance margins that meet worst-case environmental conditions.

The Army selected millimeter-wave over laser and SHF/UHF technologies because the MMW system operates through smoke, dust, fog, rain, and other environments that inhibit laser technologies. Directive antennas at MMW frequencies provide relatively narrow beam widths, which provide discrimination in the interrogation process and do not light up the battlefield. The low-gain transponder antenna provides low radiated emissions (as compared to SHF/UHF) and, when coupled with spread spectrum and frequency hopping, provides a low probability of detection. An MMW question and answer architecture was selected over an MMW broadcast system, because even with spread spectrum, a broadcast system was deemed to be too detectable by today's smart weapons.

Out of the wide MMW spectrum (20 to 100 GHz), the BCIS baseline Ka-band system was selected as a way of meeting requirements and schedule constraints while minimizing complexity, size, cost and risk. Lower frequencies use technologies that lower cost and risk, but have the disadvantage of larger size. Higher frequencies have the advantage of smaller size, but also tend to cost more. They also tend to have tighter alignment requirements and greater signal attenuation, making higher transmit power necessary.

Since the BCIS engineering and manufacturing development phase was awarded, the BCIS Army/contractor team has worked to lower unit production cost without sacrificing system performance. As a result, a reported 71 percent of the BCIS unit costs was eliminated. Unit cost reduction has been a continuous, iterative process. TRW created a concurrent engineering environment, with a single design-to-unit-production-cost leader. The BCIS Army/contractor team focused on three major initiatives: acquisition reform; requirements reform; and technology insertions and production design improvements.

Acquisition reform included joint Army/contractor agreements for the use of commercial versus Mil Spec parts in more than 90 percent of the hardware; and relaxed MIL-STD soldering and EMIIEMC provisions. Requirements reform included Army and TRW agreements to relax large system link margins, size/weight requirements, and the interrogation time line. Technology insertions and production initiatives included eliminating field-programmable gate arrays in the digital hardware; leveraging efforts from the MMIC program by using an MMIC macro-transceiver chip to simplify design and reduce the number of parts, thereby improving the producibility of the hardware to lower the amount of labor required in manufacturing; and performing technology insertions developed by investment in a single chip synthesizer.

These initiatives and TRW's investment in millimeter wave automated assembly facilities have reportedly reduced the BCIS unit cost from US$53,000 at program award to US$14,000. Together, the BCIS Army/contractor team is achieving the best value for the government and the warfighter. The cost goal was US$10,800 per unit.

Studies performed in conjunction with prime contractors for the Apache Attack Helicopter and Kiowa Scout Helicopter and the developer of the LONGBOW fire control radar showed that BCIS technology could be integrated into the Target Acquisition and Designation System of the AH64 Apache and the mast-mounted LONGBOW fire control radar, and on the sail of the OH-58D Kiowa. The modified BCIS provides the copilot (gunner) with a shoot/don't shoot indication before the copilot fires HELLFIRE missiles at suspect target platforms.

The BCIS interrogation antenna is slaved to the acquisition/radar equipment, and the interrogation process is automatically started when the laser rangefinder or radar system is activated. "Friend" or "Unknown" responses are displayed on the pilot's and copilot's (gunner's) head-down display unit. As a low-cost method of proving the usefulness of a combat identification system on both a rotary-wing and fixed-wing platform, BCIS units were placed in HELLFIRE and Maverick pods for the purposes of advanced concept technology demonstrations (ACTDs). The

HELLFIRE pod can be installed on Apache helicopters, and the Maverick pod on Harrier fighters.

Studies involving an enhanced forward air controller (EFAC) system indicate that position accuracy and probability of correct identification provided by FACs can be greatly improved by integrating BCIS with a Global Positioning Satellite unit, a north finder (compass), and a laser rangefinder. This integrated system allows the FAC to accurately determine the position of the suspect targets by knowing the target's location, the direction to the target, the range to the target, and the "Friend" or "Unknown" status. The US Army integrated and tested a demonstration unit at China Lake that automatically sends a nine-line message to a close air support fixed-wing platform.

BCIS can be carried by an unmanned air vehicle (UAV) to provide combat identification and situational awareness data-gathering capability. The interrogation antenna is aligned with the UAV's camera and can query suspect targets or acquire data via digital datalink transmissions.

The Joint Special Operations Command funded a study to develop strap-on concepts for normally non-front line platforms. Due to their short notice, behind-enemy-line JSOC missions preclude the use of identification integrated platforms; strap-on units would be used to provide available platforms with combat identification capability. Strap-on units can reduce ECIS inventory for support platforms (e.g., supply trucks); if a supply truck needs to travel to the front line, an ECIS unit is strapped on to provide combat identification capability.

Operational Characteristics. BCIS allows the gunner or commander to make a rapid shoot/don't shoot decision at the point of engagement. Shooter platforms (tanks and fighting vehicles) are equipped with interrogator/transponder units that are used to query suspect platforms, and respond to interrogations from other shooters.

The interrogation process is automatically triggered by activation of the laser rangefinder, sending an encrypted query to the targeted platform. If the target is friendly, its transponder receives the query and responds with an encrypted answer (non-shooter platforms are equipped with BCIS transponder-only units). When the interrogator receives an encrypted answer that agrees with the laser rangefinder, it gives a *Friend* response to the gunner/commander. If an invalid answer, or no answer, is received after up to three interrogations, an *Unknown* response is provided to the gunner/commander, who then continues to follow standard engagement procedures. A *Friendly-In-Sector* response indicates a friendly response from somewhere in the interrogation beamwidth, but the BCIS range does not correspond to laser rangefinder range.

Responses are provided visually in the gunner's gun sight and/or as an audible tone on the intercom system, eliminating the need for a gunner to remove his eyes from the target.

The BCIS system retains its low probability of interception, low probability of detection, high probability of correct friend identification (>99 percent) features, and its enhanced digital datalink for inter/intra-platoon short-range communications. The common waveform will have the advantage of being much shorter in duration (approximately 7 msec for a single interrogation/reply cycle) versus the current BCIS interrogation/reply duration (approximately 300 msec). The shorter energy emissions provide a more covert platform, and in future applications will be more suitable for platforms equipped with radar, such as Apache Longbow. This interoperable development is a one-time effort and is not expected to impact the recurring cost of BCIS.

Variants/Upgrades

Platform-specific adaptations are standard. Designers have also incorporated some changes to improve the in-vehicle control panel. Switch guards were installed to reduce breakage and an easy-access battery compartment developed. A fold-down antenna was designed and will be standard.

VSX-4(V). This is a transponder-only version that would be mounted on combat support (non-shooter) vehicles. The nomenclature is provisional at this time.

Program Review

Background. In World War II, Korea, and Vietnam ground-to-ground fratricide averaged 58 percent. During Operation Desert Storm, this increased to 61 percent, and may have gone higher had combat lasted longer. This shows how hazardous today's battlefield can be. A variety of techniques, from special infrared (IR) markings to flashing non-visible signals that can be detected with night vision equipment, proved marginally effective. Since then, the Department of Defense (DoD) and allies have been working to create a more effective way to sort the good guys from the bad guys in the heat of battle.

The US Army created a Product Manager Combat Identification (PM CI) to centralize management of the Army's Combat Identification programs. This office is the centralized acquisition focus for Army programs and the Army's key player in International and Joint Service Combat Identification Programs.

The development of an optimum architecture that covers all battlespaces is necessary to ensure that affordable systems meeting the requirements are fielded. The PM CI office focused on the development of identification systems that increase the soldier's confidence in engagement decisions. Confidence in targeting and ID equipment enables forces to respond to target opportunities more quickly, using less munitions per target attack, thereby increasing combat effectiveness.

One of the first systems involved transponders activated by the laser rangefinders on tank and fighting vehicle guns. This system was tested during the March 1997 Advanced Warfighting Experiment (AWE) at the National Training Center and was accepted for the Force XXI to be fielded over the next few years.

In May 1997, an international demonstration in Muenster, Germany, compared the performance of US, German, United Kingdom, and French combat identification systems. The US Army provided BCIS units to the French, German and British armies for technical evaluation on their respective platforms. The French system is very similar to the US Army's BCIS. The German system is a laser integrator/RF response, question and answer design. The British system is a 93-GHz beacon system that constantly beacons to a shooting platform that a friendly platform is in the shooter's sight.

During this demonstration, the US Battlefield Combat Identification System was to communicate with the French Army's Battlefield Identification Friend or Foe (BIFF) System. Both are millimeter wave, Ka-band question-and-answer systems. The common waveform allowed a French shooter platform to question a BCIS-equipped platform and a US shooter platform to question a BIFF-equipped platform.

In a July 30, 1999 issue of *Commerce Business Daily*, Army officials from the CECOM Acquisition Center and PM CI announced that they were seeking sources for a 38 GHz millimeter wave, low-probability-of-detection, low-probability-of-interception, question-and-answer Battlefield Combat Identification System (BCIS) for ground-to-ground and air-to-ground military platforms. Proposed systems would have to be interoperable with the current BCIS design.

An October 29, 1999, *CBD* notice announced the expectation of a Broad Agency Announcement (BAA) to award a number of relatively small research efforts through FY05. The research areas could have short- or long-range impact on the BCIS, the Combat Identification for the Dismounted Soldier System (CIDDS), the advanced concept technology demonstrations (ACTDs), and other programs managed by PM CI. The government encouraged applications from prospective offerors, including, but not limited to, private companies (large and small), educational institutions, and nonprofit organizations. White papers and outlines were encouraged to be submitted to the technical point of contact before a final topic proposal to BAA Combat ID 2000 was submitted.

In a March 2000 *Commerce Business Daily*, Army CECOM released notice of a sole-source solicitation to TRW (DAAB07-00-R-J010) for seven representative sets with associated installation kits and spares.

A February 2001 *Commerce Business Daily* announced Solicitation W813LU-9172-8002 for a contractor to provide technical and administrative support services for survivability analysis of US Army electronic systems, to develop and refine counter-countermeasures, and to assess Soldier Survivability and Electromagnetic Environmental Effects issues associated with US Army electronic systems. The primary focus of this contract will be to investigate the impact of enemy electronic and information warfare on US Army C4I systems.

Candidate C4I systems subject to investigation will fall into one of the three functional areas: C2, IEW or communications. They may include, but are not limited to AFATDS, ASAS, CSSCS, FAADC2I, MCS, FBCB2, BCIS, GBS, TUAV, Firefinder Radars,

ISYSCON, NTDR, MSE, EPLRS, SINCGARS, JTRS, GPS, SCAMP, SMART-T and WIN-T systems. The contractor will be directed by task orders that define specific requirements, deliverables and schedule. Multiple awards may be made resulting in separate contracts for part or all of the effort described above. The period of performance is sixty months, with an anticipated award date is September 30, 2001. The estimated cost of this requirement is US$5 million over the period of performance.

<u>Combat Identification EMD, PE#0604817A, Project 482 Ground Combat Identification (CID)</u>. The Battlefield Combat Identification System is an all-weather, day/night, millimeter wave, low-probability-of-intercept/low-probability-of-detection (LPI/LPD), digitally encrypted question and answer system that provides positive identification of friendly platforms out to 5.5 kilometers (clear weather). BCIS was developed to minimize fratricide while maximizing combat effectiveness given rapidly changing and intense tactical situations. BCIS provides positive identification of friendly platforms to aid the gunner or commander in making a rapid shoot/don't shoot decision at the point of engagement. BCIS also provides short-range (out to 1 km in clear weather), LPI/LPD situational awareness messages at the platoon level. Any target identification data received by BCIS will be sent through the platform Force XXI Battle Command Brigade and Below (FBCB2) to update the situational awareness database. BCIS has been designated as a Horizontal Technology Integration program and coordinates "A" kit (platform specific) or "B" kit (common to all platforms) integration with 27 host platforms.

<u>Acquisition Strategy</u>. A competitive, cost-plus-award-fee contract for 46 EMD units and option quantities, was awarded in August 1993. An additional 65 units were procured for participation in TF XXI AWE and the Combat Identification International Demonstration. This contract was modified to include follow-on design/producibility engineering and test efforts and the delivery of four engineering models. RDT&E efforts are ongoing to provide for integration of BCIS on multiple platforms. LRIP quantities are sole-source to the EMD producer on a new contract, and a competitive, firm-fixed-price, full-rate production contract is scheduled for FY03.

Through FY99, the Army spent an estimated US$56.63 million for initial hardware and integration for both US and international testing, along with participation in Task Force XXI Advanced Warfighting Experiments. Developers also developed the software needed for low-rate initial production systems and initial operational test units. In FY99, designers completed the upgrade, assembly and contractor test of the fully Functional engineering development Models for platform (M1A1/M2A2 ODS) testing, log demonstration, and technical testing, along with waveform and NSA certification. They also completed the development, design, and fabrication of installation kits (A kit) for the Abrams/Bradley (M1A1/M2 ODS) vehicles for platform compatibility tests and initiate A-kit design and development for host platforms (M4 C2V, HMMWV M1114/M998, M113A2 APC, M1064 Mortar Vehicle, and M1068) in coordination with fielding to the 1/22 Infantry Battalion, 1st Brigade, 4th Infantry Division, identified as First Unit Equipped in FY02.

The FY00 program budgeted US$4.224 million to continue host platform A kit design and development for additional vehicles in the 1st Brigade, 4th Infantry Division for fielding in FY02 (M9 ACE, M88 ARV, M109A6, M992, Avenger, M6 Linebacker, etc.). US$250,000 was used to conduct a logistics verification demonstration (MANPRINT, maintenance, manuals, etc.), with US$911,000 budgeted to conduct a host platform compatibility test/demo for M1A1 and M2A2 ODS. US$1.025 million was designated to conduct technical testing (electromagnetic interference, azimuth resolution, probability of identification, range min/max, reliability/availability and maintainability, etc.).

US$410,000 would be used to develop and integrate BCIS software models into the M1A1 and M2A2 ODS Conduct of Fire Trainer at the 4th Infantry Division. There would be a Combat Identification Interoperability Demonstration, budgeted at US$450,000, in order to continue development of a Standard NATO Agreement (STANAG) for combat identification based upon the BCIS and the interoperability trials of prototype systems conducted in Munster, Germany.

Plans for FY01 budgeted US$1.915 million to complete the host platform A kit design and development effort for the remaining vehicle types (M93A1, HMETT, and MLRS, Wolverine) in the 4th Infantry Division for fielding in FY03. US$65,000 was budgeted to provide technical support for an initial operational test. Programming/budgeting of funds for the actual test would be coordinated with OPTEC. US$400,000 was planned for the STANAG Combat Identification Interoperability Demonstration.

No funding was programmed for FY02.

<u>Ground Combat Identification Demonstrations (D281 PE#0603772A)</u>. The objective of this project was to select, develop, and demonstrate techniques that minimize fratricide and increase combat effectiveness during surface-to-surface and air-to-surface engage-

ments. It also demonstrated the integration of advanced target identification and situation awareness capabilities into the digitized, joint battlefield environment and architecture. Approaches for technical and operational field evaluation could be selected based on the results of architecture investigations for the combined arms battlefield. This Battlefield Combat Identification (BCID) advanced technology demonstration served as the foundation for the Joint advanced concept technology demonstration (ACTD) for air-to-surface and surface-to-surface combat ID. The ACTD utilized the Army's Task Force XXI digitized brigade advanced warfighting experiment (AWE) and other field experiments as a means of assessing new capabilities. The information derived from these field experiments would be incorporated into follow-on engineering and manufacturing development efforts.

In FY97, the operational effectiveness of different BCID ATD combat identification architectures was assessed by conducting force-on-force simulations. Also, user training on Enhanced BCIS and air-to-ground combat identification equipment was completed, as was Phase I of the Helicopter to Dismounted Soldier ID (HDSID) effort. Finally, the ability of SA through the Sight (SATTS) to utilize tactical internet data to provide target ID was evaluated.

In FY98, the effort included US$2.873 million to complete analysis of the extended positional accuracy capabilities of an E-BCIS-based system and other BCID ATD systems. It extended the FY97 SATTS demonstration to include E-BCIS, Appliqué and other acquisition and target identification systems.

The program was not funded for FY99 or beyond.

BCIS Field Tests. BCIS has been field tested at several sites: Camp Roberts, California; Fort Greely, Alaska; Camp Grayling, Michigan; and Yuma Proving Ground (YPG), Arizona (summary test results follow). The TRW and Magnavox team designed BCIS to be interoperable with 16 different ground platforms. Integration on any other platform is possible with a platform-specific installation kit. Integration and platform interoperability tests were performed on the Abrams M1A1 and M1A2 tanks, Bradley Fighting Vehicle Operation Desert Storm version (BFV ODS), Fire Support Team Vehicle (FISTV) M981, and High Mobility Multipurpose Wheeled Vehicle (HMMWV).

In mid-1995, BCIS successfully completed three months of environmental testing as part of the Pre-Production Qualification Test at the National Technical Systems at Saugus, California. Environmental tests were conducted at the National Technical Systems under controlled conditions in accordance with MIL-STD-810E. A development test was conducted during the fourth quarter of 1995 at YPG. During field tests, BCIS was subjected to environmental conditions ranging from clear sky to fog, severe cold conditions (down to -42°F at Fort Greely), ice, ice-fog, snow, wind, severe heat (up to +128°F at YPG), dust, sand, humidity, rain, mud, shock and vibration.

BCIS has met the critical system performance requirements for operating range and probability of identification with significant margin. At White Sands Missile Range on a hot desert day, BCIS properly identified a friendly vehicle at more than 14 kilometers.

A Limited User Test (LUT) took place in October through November 1995 at Ft. Hunter, Liggett, California. The LUT included live fire tests, with both the M2A2 Bradley fighting vehicles and M1A2 Abrams tanks equipped with BCIS, against "friend" and "enemy" targets intermixed on the range. Vehicles equipped with BCIS had no fratricide incidents, while the non-BCIS-equipped vehicles experienced significant fratricide. Crew and user observations during the LUT stated that BCIS reduced target engagement times, especially at night.

BCIS was also tested at the Advanced Warfighting Experiment at Fort Irwin, California, in March 1997. The Army's Experimental Force (EXFOR), the 1st Brigade, 4th Infantry Division, Fort Hood, Texas, tested the equipment in field conditions while EXFOR engaged the Opposition Force (OPFOR) of the National Training Center. The Army used the results of the AWE to decide that the new equipment will work for the Army of the 21st century. More than 60 vehicles were used in the AWE – tanks, specialized engineer and chemical reconnaissance, scout, fire support and Bradley Fighting Vehicles – were equipped with BCIS. Two Air Force ground forward air controllers (FACs) assigned to the Experimental Force also had a type of BCIS equipment. Using this equipment, FACs relayed the friendly location information to close support aircraft.

An Air Force system called SADL, Situational Awareness Data Link, was also to be used in the experiment. SADL is an EPLRS (Enhanced Position Location Reporting System) radio in an airplane that can communicate directly with Army ground units. It combines with BCIS to give pilots a situational awareness picture and, with modification, displays in the pilot's head-up sight the friendly locations closest to the target being engaged.

The AWE combined the target identification capability offered by BCIS and the situational awareness provided by digital communications to evaluate whether such a system would improve the fighting capability of front-line units.

Overall, the results from the AWE were positive. Only 62 of the 800 vehicles involved in the exercise carried BCIS, but no cases of fratricide were reported on vehicles equipped with the full BCIS system. In some cases, analysts felt that fratricide incidents may have been avoided if the vehicles carried full instead of partial systems. Maintenance and reliability scores for BCIS were very good; the systems achieved a score of 98 percent.

Officials said that BCIS and improved situational awareness can save lives on the battlefield. It was noted that a lack of money had, in the past, hindered the development of anti-fratricide equipment. Since the Persian Gulf War, the Army developed hardware that can go into production within a year or two. In the old acquisition system it would have taken several years. BCIS is not a cheap solution, so affordability will continue to be a problem.

Other Events. In November 1999, planners announced that they were seeking sources for the purchase of supplies and services to design, develop, integrate, document and produce the BCIS installation kits for the M113, M1064, M1068, C2V, M548, M1078, M109A6, M270A1, M88, M9, M992, Grizzly, Hercules, HMETTS and HMMWVs. Installation Kit design would have to be compatible with both the host vehicles and the current BCIS design developed under CECOM contract DAAB07-93-C-K011 with TRW Inc.

A December 27, 1999, *Commerce Business Daily* carried a notice that the Army intended to issue Solicitation DAAB07-00-R-J015 on a sole-source basis to TRW Inc for up to 1250 initial production BCIS equipment sets and spares. This proposed acquisition would be implemented by awarding a Firm-Fixed Price type contract which would be structured with quantities separated into a base year and three one-year options.

In a March 13, 2000, *Commerce Business Daily*, US Army CECOM announced a requirement for seven BCIS Production Representative Equipment Sets and associated installation kits and spares. A non-competitive sole-source negotiation is proposed with TRW.

Funding

US FUNDING

	FY00		FY01		FY02(Req)		FY03(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E (USA)								
PE#0604817A								
482 Gnd CID	-	8.6	-	2.4	-	0.0	-	0.0

All US$ are in millions.

Recent Contracts

(Contracts over US$5 million.)

Contractor	Award ($ millions)	Date/Description
TRW	6.6	Mar 1996 – Mod to CPAF contract for 14 BCIS units, with an option for five additional systems for Task force XXI. Completed January 1997. (DAAB07-93-C-K011)
TRW	9.0	Jun 1996 – Mod to time and materials contract for BCIS Contractor Logistics Support at Ft. Hood, Texas, for Task Force XXI support. Completed July 1999. (DAAB07-93-C-K011)

Contractor	Award ($ millions)	Date/Description
TRW	2.8	Jul 1996 – Increment of a US$6.2 million modification to a US$70.3 million CPAF and time and materials contract for the BCIS R&D effort. Completed January 1997 (this increment), July 1999 (total contract). (DAAB07-93-K011)
TRW	6.5	Nov 1997 – Increment to a US$10.5 million modification to a US$90.5 million CPFF BCIS R&D IOT program, for an 18-month new/additional work effort. Completed December 1999. (DAAB07-93-C-K011)

Timetable

Month	Year	Major Development
1Q	FY96	Technical and user testing completed
3Q	FY96	Hardware build for platform integration and maintenance training for Task Force XXI completed, engineering design initiated
1Q	FY97	Provision of technical training, integration, training/maintenance for Task Force XXI, assembly and test of four PE models
2Q	FY97	PE design effort completed
3Q	FY97	Developed/updated system software for PE models
1Q	FY98	Initiated development, design, fabrication of Bradley kits (M2); initiated fabrication, assembly, test of four PE models
2Q	FY98	Initiated development, design, fabrication of Abrams kits (M1), completed fabrication, assembly of four PE models, conducted US/French interoperability tests
1Q	FY99	Initiated kit design/development for remaining vehicles
2Q	FY99	Completed Abrams/Bradley development (M1A1/M2 ODS)
3Q	FY99	Conduct of PQT, IOT&E
4Q	FY99	LRIP ASARC, LRIP award
2-3Q	FY00	Log demo/Technical Test
1Q	FY01	Major force-on-force simulation
3-4Q	FY01	IOT&E
3Q	FY02	Milestone III

Worldwide Distribution

Currently a **US**-only program.

Forecast Rationale

Fratricide has long been part of combat. In the fog of war mistakes are not only possible, but probable. As the lethality of weapons increases, so does this danger. Weapons can hit targets much too far away for positive identification. Since the Persian Gulf War, the US and its allies have made a major effort to develop technological solutions to this problem. BCIS, along with its European counterparts, is one way of protecting vehicles from blue-on-blue disaster. CIDDS brings a similar effort to the individual soldier.

The recommendation that NATO adopt BCIS/French technology is a plus for the system and validates the design effort. The following forecast is based on the assumption that procurement will have to be constrained. It reflects an estimated cost of US$26 million, which may be about the limit of the funding that can be expected, barring any significant combat need.

The forecast is a conservative estimate for production of BCIS. The Army reports having funding for at least

2,650 units. Efforts to reduce unit cost by one-third may make it possible to procure more.

Impact of the War on Terrorism. When terrorists attacked the nation on September 11, the idea that America was completely protected by oceans was shattered, the feeling that we knew what threats the nation faced evaporated, and the thought that there was time to prepare went out the window. The murderous attacks on the World Trade Center in New York City and the Pentagon in Washington sent shock waves across the nation and planners into overdrive.

First came rescue and recovery, then retaliation, protection of the homeland, and eliminating (to the extent possible) terrorism around the globe. This was followed by planning for the longer term effort of providing a homeland defense, while at the same time making sure the US military was ready to defend against the conventional threats and support the missions it faced around the world. Budget restraints were lifted, and Congress appropriated US$40 billion in emergency funds, twice what the President requested. Planners began to evaluate how to best spend the defense money.

It was not possible to make many changes in the FY2002 budget, so changes would be more prominent in future cycles, beginning in FY2003. The attacks revealed a need for prioritizing that could end up with some efforts being found less important and not as time-critical as once thought. Weaknesses in intelligence and homeland protection could result in significant amounts of money being diverted from DoD accounts to the budgets of agencies like the NSA, CIA, and FBI, or to meet the protection needs of local governments. Instability and uncertainty may characterize defense spending over the next few years.

In the longer term, program uncertainty is greater. Besides the possibility of programs being found irrelevant, ill-timed, or unnecessary, a budgetary ripple effect could result in the delay or even demise of some programs. The early emphasis on intelligence, homeland defense, and Special Operations equipment may result in some more strategic or conventional combat weapons programs being revised. Major weapons programs, naval systems, and some heavy ground weapons are vulnerable. Light, mobile systems are favored, boding well for the Army's transformation, and some "black" budget items for intelligence and counter-terrorism will surface.

The *Quadrennial Defense Review 2001* was delivered to Capitol Hill on September 30, 2001. Unlike previous reviews, this *QDR* made no specific recommendations on force size or procurement numbers for any particular weapons system. These recommendations would be generated by ongoing reviews and studies aimed at providing strategic guidance for the future.

These studies will have a direct impact on individual programs and projects over the next decade and beyond, but will not have much influence until the FY03 and FY04 budgets. FY02 was in the final stages on Capitol Hill and guidance for FY03 had already gone to the Services. This could be adjusted, but the most impact on budget planning will be felt in FY04 and beyond. Besides dealing with ongoing plans, these budgets will contain adjustments needed to get programs hit by emergency cuts and delays back on track.

Projecting exact changes in development, production, etc., is difficult at this early stage. There are too many unknowns and uncontrollable variables to make firm plans. At this stage, understanding the various influences and possibilities is more important than trying to predict what will happen. This makes it possible to better understand the implications of the rapidly changing operational situation for specific programs.

The intensity and duration of the anti-terrorism conflict will determine how much defense money will have to be diverted to meet operational needs and for how long. Some programs will need to be enlarged and expanded and some deferred or ended. Moreover, upgrade programs will be initiated and new developments started. Anti-terrorism operations and an emphasis on homeland defense (such as Combat Air Patrols over selected US cities) will increase spare and repair parts requirements. This will in turn increase the percentage of defense funding for Operations & Maintenance.

Although anti-fratricide systems will be crucial during battlefield operations involving many combat vehicles, it is not likely to be an issue during the War on Terrorism which will involve more small units and special forces operations than tanks, infantry carriers, and other fighting vehicles.

The complex, difficult nature of this kind of conflict, however, will make identification of ground vehicles to attacking aircraft and helicopters important. This could result in a near-term effort to provide BCIS units to many of the vehicles that may be used during operations. A stepped-up production is possible. Many BCIS units planned for conventional battlefield units may be switched to special operations and other vehicles used in the anti-terrorist operations, so orders to replace these units are likely.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level				Good Confidence Level			Speculative			
Designation	**Application**	**Thru 01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**Total 02-11**
BCIS (VSX-3/4(V))	COMBAT VEHICLE PROTECTION (US ARMY, USMC)	248	250	350	400	475	400	500	600	500	350	250	4075