

The
P

recision Strike Digest



**PRECISION STRIKE
ASSOCIATION**

Affiliate, National Defense
Industrial Association

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**“Dedicated to advancing the art and science of
precision engagement concepts and technology”**

MISSION STATEMENT

*The Precision
Strike Association
is the premier
professional organization
dedicated to advancing
the art and science
of precision engagement
concepts and technologies.
The Association
focuses on the Kill Chain
by supporting the
development of systems
and procedures
in order to
find, fix, track,
target, attack, and assess
fixed, moving, and
relocatable targets.
PSA is organized as
a not for profit,
tax-exempt corporation.*

The Way Forward for Winter Roundtable 2008

Defining the Future of Precision Strike is the theme for the Precision Strike Association’s Winter Roundtable 2008. This popular all-day Winter Roundtable, sponsored by PSA, is scheduled for Wednesday, 23 January 2008 at the Crystal City Marriott. The precision strike community looks forward to a future full of exciting challenges and new opportunities for government and industry collaboration on precision engagement.

The objective of this unclassified forum is to gain insight into how the precision strike community should plan to address and meet the future key security challenges facing the United States. Winter Roundtable is designed to provide an opportunity to become better informed about current national defense policy, strategies, and national security issues related to precision engagement.

A very special feature of our Roundtable each year is the pride we enjoy in presenting the William J. Perry Award to a very deserving individual or team of experts who have made significant contributions to the development and support of precision strike systems that have led to the strengthening of our vital national security interests. The recipient of this prestigious award for Winter Roundtable 2008 is the Guided Multiple Launch Rocket System Team.

PSA is pleased to present the Honorable Ryan Henry, Principal Deputy Under Secretary of Defense for Policy, as keynote speaker.

Further, we are excited that Representative Joe Sestak (D-PA, 7th District)—Member of the House Armed Services Committee—will address the precision strike community as well. They are two of a host of numerous top visionaries and strategy experts who will talk about policies and strategies that impact precision engagement to help us better define the future of precision strike.

So, please join our outstanding and dynamic speakers as they highlight key national security challenges facing our great nation. Review page 15 of this Digest for a snapshot of major topics to be addressed during Winter Roundtable 2008. Further, please note briefing topics already scheduled for our 15-16 April 2008 Precision Strike Annual Programs Review. ?



Honorable
Ryan Henry
Principal Deputy
Under Secretary of
Defense for Policy



Representative
Joe Sestak
(D-PA, 7th District)
Member, House
Armed Services
Committee

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Chairman's Column



Hopefully you were able to attend this year's Precision Strike Technology Symposium (PSTS

2007) at Johns Hopkins University Applied Physics Lab. If so, you saw and heard one of the finest lineups of speakers and presenters that the PSA Programs Committee and Technical Chairs have ever assembled for one event.

It is clear that our precision engagement community, made up of government and industry, remains convinced of the importance of moving forward with technical and operational improvements. To do otherwise would be unacceptable in the face of the threats—current and future—facing our national security professionals. The precision strike capability we provide for coalition forces is an asymmetric advantage that must be maintained.

Meanwhile, the Precision Strike Association continues to look for ways to increase the range of our corporate membership. We are focused on the Kill Chain and welcome all businesses, big and small, to join in the collaboration needed to shorten the Kill Chain through better systems and procedures. These are really exciting times for our industry!

Delivering capability in precision engagement, like any other commodity, is based on supply and demand. The warfighter clearly is demanding more and more. So if you have colleagues or business partners in the precision engagement space, encourage them to consider membership in the Precision Strike Association.

Looking forward to the annual Winter Roundtable in January, we will discuss a full and robust set of strategy and policy issues facing the U.S. defense establishment. The dialogue about the Global War on Terrorism in the near term and new strategic threats on the future horizon will heat up. Congress and the Executive Department will work, sometimes contentiously, for answers. Winter Roundtable will be an excellent opportunity to witness firsthand this debate, and to apply your conclusions to your strategic business plan. Mark your calendars now. See page 1 and page 15 for more details regarding this popular event.

Bill Dalecky
Chairman of the Board
Precision Strike Association



Guided Multiple Launch Rocket System (GMLRS)

PSTS '07 Wrapup

The Precision Strike Association held its 17th Precision Strike Technology Symposium October 23-25, 2007, in the Kossiakoff Conference Center at the Johns Hopkins University Applied Physics Laboratory (JHU/APL) located in Laurel, MD.

Under the leadership of PSA Programs Chair Ginny Sniegon, Dr. John Walters from JHU/APL, SAIC's George McVeigh and Harvey Dahljelm with ITT Industries tri-chaired this very successful three-day SECRET/NOFORN symposium.

Dr. Bill LaPlante, head of the JHU/APL Global Engagement Department, welcomed the precision strike community to PSTS-07, saying "precision strike capability would be advanced by a Global C&C Network that connects the Right War Fighter, with the Right Information at the Right Time. Today we remain some distance from that C&C Network, certainly with the required assurance and security and quality of service to globally engage time critical targets across the spectrum of contingencies."

Dr. Michael Vlahos offered context on the Long War. He stressed the importance of understanding the reality of the Muslim world and Muslim identity versus focusing on just the policy of specific Muslim governments. Key elements of this cultural identity include universal community, a victory culture, justice, struggle and resistance through fighting to spread the faith. While this identity may not be entirely valid, it is none the less a powerful and an emotional touchstone at some level for all Muslims driving choice, allegiance and action.

USMC LtGen John Castellaw, deputy commandant for programs and resources, was the keynote speaker on the first day. Castellaw gave an excellent run-down on the Marine Corps' resource priorities in the current budget environment. In addition to maintaining the momentum against terrorist and insurgency groups in Iraq and Afghanistan, U.S. Marines must equip themselves for the strategic challenges the United States will face in the future. He also spoke about ongoing discus-



Dr. Bill LaPlante



Dr. Michael Vlahos



Lieutenant
General John G.
Castellaw, USMC



TARGETING SESSION: Dr. John Walter, Kevin Peppe, Chris Hase, James Guthrie, JT Morris

sions to reorient the operational focus of the Marine Corps from Iraq to Afghanistan.

The **Targeting Session**, chaired by **J. T. Morris**, of Whitney, Bradley & Brown (WB&B), kicked off the presentation of technical papers, focusing on various aspects of the Kill Chain as it relates to precision targeting efforts. **Chris Hase** also of WB&B explored new territory in developing a model that assessed a Family of Naval Special Warfare systems and their ability to defeat or break the enemy's kill chain. His study's focus was to inform decision makers on where best to spend limited development dollars.

James Guthrie of the Defense Threat Reduction Agency followed with a presentation that introduced the Spectre-Flight Inserted Detection Expendable for Reconnaissance (Spectre-FINDER) demonstration. It will help validate the capability to find, fix, track, target, and assess from an air-inserted unmanned aerial system (UAS) that operates below a cloud deck, directly reporting target information to local tactical aircraft and ground parties.

William Druce of JHU/APL discussed a series of Sea Trials Experiments sponsored by the Second Fleet to investigate the ability of special operations forces to accurately determine Tomahawk firing coordinates and transmit these coordinates from the field to a Tomahawk Weapon System control node. The results of these experiments would feed into the development of the TTP's (Tactics, Techniques and Procedures) for the tactical employment of Tomahawk by joint forces.

Kevin Peppe of Raytheon concluded the Targeting Session by discussing the value of close-in defense weapons, specifically the development, deployment, and future of C-RAM (Counter-Rockets, Artillery, and Mortars) systems. He showed how the system senses RAM launches, warns troops, intercepts and destroys the RAM threat in flight, coordinates a response to the

RAM launch point, and collects data to enable commanders to deny enemy RAM attacks, while monitoring friendly ground and air assets precluding collateral damage during engagements.

Dr. Rebecca Grant spoke at lunch on the “Return of the Bomber” and the emerging need for the U.S. Air Force to acquire and field a new bomber by 2018. Her insightful analysis reviewed the use of bombers from World War I through the current operations in Iraq and Afghanistan. She clearly argued the case that the existing B-52s, B-1Bs and B-2s need a replacement aircraft that will supplement bombing capabilities for the foreseeable future.



Dr. Rebecca Grant



C4ISR SESSION: Dr. John Walter, Buck Buchanan, Dr. Alison K. Brown, LCDR Andrew Biehn, USN

The C4ISR session followed lunch with the group chairman, JHU/APL’s **Thomas “Buck” Buchanan**, expressing concern about DoD’s net-centric canonical challenges that include possible new interoperability problems due to the implementation of at least five DoD enterprise service buses (ESBs). Although net-centricity is supposed to fix past DoD interoperability problems, different ESB implementations may not fulfill that goal.

JHU/APL’s **James Hillman** followed with a presentation on the results of APL’s C2 Hypotheses exercise. APL hosted a C2 Hypotheses and Experimentation Conference last March to look for a set of C2 hypotheses to be the basis of testing and experimentation. Testing of such hypotheses should lead to more informed decisions regarding C2 solutions, balancing capabilities with resources, and identifying key areas for innovation.

In the next presentation, **LCDR Andrew Biehn** from NAVAIR’s Washington Planning Center (PMA 281) spoke about applying Service Oriented Architecture (SOA) to Tomahawk C2 and the global war on terror. He described the Tomahawk C2 System’s transition to a services-oriented architecture so as to provide commanders with responsive and simple access to Tomahawk capabilities. This new framework enables Tomahawk to integrate with, and accelerate, the combat processes and the kill chain during network-centric operations with any compo-

nent or service arm, especially with third-party targeting support for special operations forces.

Raytheon’s **Charles Kille** and **John Link** spoke about real-time systems operating within a service oriented architecture (SOA) environment. Their contention is that as DoD’s net-centric revolution grows, there is an under-represented community of users that require data transfer and mission thread completion in real-time. That is, they cannot afford indeterminate latency due to non-mission focused traffic on their interfaces and sub-networks. Therefore, the presentation went into the real-time community’s critical issues, rationales, driving forces, technical constraints, and other key factors involved with a net-centric, SOA-based DoD Enterprise.

Dr. Alison K. Brown, president and CEO of NAVSYS, spoke about the benefits of the Precision GPS Ephemeris (PGE) Tactical Control Station (TCS) GPS Web Services for Precision Strike. She described the web services provided by the PGE TCS, which is a key element of the Talon Namath system that delivers high accuracy GPS corrections to CENTCOM for precision strike. It also delivers tailored web services to networked GPS users that automate the delivery of Zero-Age of Data GPS ephemeris data from the GPS Master Control Station at Schriever AFB.

Kevin Woods, Institute for Defense Analyses, presented a superb overview of the Iraqi Perspectives Project (IPP) that evolved from the USJFCOM’s Joint Lessons Learned Reports on Operation IRAQI FREEDOM (OIF). The IPP assisted USJFCOM in developing the lessons of the OIF from a more balanced, holistic view of battlefield cause-and-effect — moving toward “ground truth” and away from “conventional wisdom.”

The overall objectives of this project were to learn the right lessons of OIF, to inform near term contingency planning, and to support ongoing transformation activities. Kevin’s briefing focused on Iraq’s adaptation to precision during the 1991-2003 timeframe, providing a fascinating view of the former regime that most of us had never heard. He discussed the implications for future intelligence activities, information operations, high-value targeting, and operational warfighting concepts.

L.C. Greenwood, division chief for studies and analysis at the Counter-IED Operations Integrations Center (COIC), reported on the encouraging progress that JIEDDO has made over the past two-plus years since the organization was stood up. As a result of building the capability to



Kevin Woods



L.C. Greenwood

take in all source data, fuse it, and analyze terrorist patterns and processes in a timely manner, a large number of potential improvised explosive device attacks were pre-empted saving many lives.

The process that has been developed and refined regularly will be extremely useful to military and other operations in the Global War On Terror (GWOT) well beyond its immediate applications in Iraq and Afghanistan.



Jay Kistler

Jay Kistler, technical director for air warfare systems within the Portfolio Systems Acquisition Directorate of the Office of the Under Secretary of Defense for Acquisition, Logistics and Technology, provided a holistic presentation on electronic warfare (EW). He began his presentation with a discussion of the difficulties DoD is experiencing

with integration of various service specific capabilities, particularly with emergent technologies being aggressively produced and fielded for our forces in Iraq and Afghanistan.

He went on to share his views on current U.S. EW resources, and pending technology advances that will dramatically improve our capacity to attack our enemies and protect our forces. He provided the audience with an appreciation of how important EW has become to executing our military mission and the greater role EW will occupy in meeting future DoD requirements.

The **Weapons Session** was chaired by **USN CAPT Peter D. Murphy**, Air Warfare, Portfolio Systems Acquisition Directorate, OUSD(AT&L). He began the session discussing weapon attributes (lethality, delivery method, seeker, propulsion, adaptability, size, cost, fusing, connectivity, reliability, etc.) within the context of the kill chain. His focus for this year's Weapons Session contained three specific attributes: speed, range and accuracy.



WEAPONS SESSION: Douglas M. Larratt, Michael Behring, Dr. Keith Numbers, Captain Pete Murphy, USN

Mike Behring of Alliant Techsystems Launch Systems provided a synopsis of ATK's development efforts in building a family of Thermally Throated Ramjet propulsion units capable of obtaining and maintaining speeds in the Mach 5 range. His presentation incorporated this

near-term propulsion technology with proven airframe technologies, missile fuels and available subsystems, enabling delivery of 200+ lb warheads over 500-600 nm in less than 15 minutes. Incorporating this propulsion capability within a family of weapon systems on land, air and sea platforms would allow our forces to improve kill chain timelines.

ATK's **Douglas Larratt** briefed on the Advanced Anti-Radiation Guided Missile (AARGM) that will replace the Navy's legacy High-speed Anti-Radiation (HARM) Missile. He described the key components of AARGM, including an active millimeter wave radar seeker, a Selective Availability Anti-Spoofing Module based Global Positioning System / Internal Navigation System, an Integrated Broadcast Service Receiver and a digital, anti-radiation homing receiver with improved direction-finding accuracy, sensitivity and field of view.

Dr. Keith Numbers, the global strike leader of Air Force Research Laboratory (AFRL), discussed Technology for Future Rapid Global Engagement (FRGE) and efforts on Focused Long Term Challenges. Three far-term visions were presented and discussed: directed energy weapons with near-instant responses that are retargetable within minutes; delivery of sustained employment of survivable kinetic efforts at ranges approaching 9,000 nm for several hours; and, precise and rapid global response within one hour into austere aerospace environments. Numbers addressed readiness level timeline expectations and anticipated mid-term capability improvement, incrementally increasing global strike effectiveness.

Dr. Ron Sega, a former under secretary of the air force, keynoted PSTS-07 on the second day. Dr. Sega focused on future technology trends, addressing future capabilities and technological advances that will allow the U.S. military to generate considerably more combat capability. He emphasized the need to use information technology for precision strike and noted that situational awareness is important as well.



The Honorable Ronald M. Sega

Further, Dr. Sega talked about technology development and highlighted energy and power technologies, as well as surveillance and knowledge systems. He also noted the importance of getting more of our nation's young bright people engaged in engineering and scientific courses so that they can later be employed to help develop technology to defeat any adversary on any battlefield.

CAPT Chuck Nash, USN (Ret.), president of Emerging Technologies International and the Fox News military pundit, presented a passionate and thought

provoking luncheon address. He compared DoD acquisition processes of today with how the DoD acquired weapon systems during the WWII through Korean War time frame. Referring to recent Government Accountability Office reports and analysis of system development through initial operating capability time lines, he portrayed a slow moving, low-risk development and procurement process, which is routinely executed over budget and behind schedule.



Captain Charles T. "Chuck" Nash, USN (Ret.)

Nash explained that risk adversity in the DoD and with major defense contractors must be overcome if we are to reverse this negative acquisition trend. With the pace of global technological advances, it is paramount to accept more risk in development and get new acquisition systems to the warfighter sooner. It was apparent that many in attendance wholeheartedly agreed with Nash' remarks, based on the verbal injects during the presentation and a lively discussion following the luncheon address.

Suzy Kennedy from JHU/APL chaired the Effects Session. **Mike Deitchman** from Office of Naval Research presented a strategic view of the Navy's S&T needs. The presentation described the Naval S&T Strategic Plan and the derived areas of S&T focus.



EFFECTS SESSION: Dr. John Walter, Brian Funk, Michael B. Deitchman, Suzy Kennedy, Regan E. Burmeister, Allen P. Gehris Jr.

Brian Funk from JHU/APL described an effort to engage moving targets in an urban environment using small, weaponized unmanned aerial vehicles (UAVs.). Efforts to date have focused on characterization of the urban aerodynamic environment; a flight demonstration of a group of small hunter/killer UAVs finding, tracking, targeting, and engaging a moving target; and, a lethality demonstration of a warhead that can be carried by a small drone.

The next presentation focused on the development of a Massive Ordnance Penetrating weapon capable of delivering a large explosive payload. **Regan Burmeister** of

Applied Research Associates discussed the issues involved in weaponeering of this weapon against hard and deeply buried targets, and the results of tests against several hard and deeply buried targets.

The final presenter was **Allen Gehris** from NAVAIR, PMA-280. He described potential upgrades to the Tomahawk Weapon System (TWS). Potential weapon system improvements included integration of alternate navigation technologies for a GPS denied environment, a multiple effects warhead, communications architectures to improve interoperability, and a terminal seeker for attacking mobile targets.

Dr. Jeff Heyer from the Naval Research Laboratory's (NRL) Tactical Electronic Warfare Division provided a spirited presentation on current NRL airborne electronic attack initiatives, and an overview of DoD current capabilities vs. a growing global Electronic Warfare (EW) threat. His focus on specific adversary capabilities, along with projected worldwide future EW developments, provided the audience a snapshot of U.S. precision strike challenges. He said failure to prioritize EW R&D in the immediate future will dramatically reduce our precision strike and global power projection capabilities. On the other hand, **U.S. Army Colonel Paul Crawford**, chief of force development for the Future Combat Systems (FCS), Army G-8, discussed the way ahead for sensor platforms.

CAPT Mat Winter, USN, commander of the Navy's Precision Strike Weapons Program Office, discussed the Navy's vision of precision strike with net-enabled weapons. Covering naval development and procurement efforts to integrate data link technologies into existing and forthcoming weapons, Winter explained the many benefits that net enabled weapons bring to the warfighter by decreasing time-to-kill within the precision strike kill chain. Decision-making, mission re-tasking, battle damage assessment and abort options are significantly improved with net enabled weapons technology.

The **Armed Unmanned Systems Panel** chaired by USN **CAPT Harold "Bud" Bishop**, OPNAV, N880C, included **CAPT Tony Albano**, head of the Navy Unmanned Combat Air Systems (N-UCAS) project, who stressed



Dr. Jeff Heyer



Colonel Paul Crawford, USA



Captain Mat Winter, USN



ARMED UNMANNED SYSTEMS PANEL: Lt Col Jim Molinari, USAF, Steven Borden, Captain Harold "Bud" Bishop, USN, Captain Tony Albano, USN

the importance of persistent intelligence, surveillance and reconnaissance as a critical link to effective targeting. **USAF Lt Col J. Molinari**, Unmanned Air Systems (UAS) Task Force, presented the Air Force systems approach to UAS support and utilization, to include weapons delivery videos in a rapid, close air support environment. **Steven Borden**, deputy chief for joint attack munitions systems, PEO Missiles & Space, U.S. Army, stressed the importance of seeing over the next hill or around corners in the urban environment. He considered factors affecting use of UAVs in the urban environment and weaponization that allows for rapid response when other options are not available.



Lauren Nordstrom

Lauren Nordstrom and **Debbie Chen Watson**, both with the National Air and Space Intelligence Center, offered an update on foreign strike weapons and the IDMATS project, respectively.



Debbie Chen Watson

Dr. George Sinks, OSD-ISA Office of Europe/NATO Policy, briefed on NATO's Comprehensive Approach (CA) in Iraq and Afghanistan. He noted that NATO is in the midst of transforming the way it views and manages the complex security challenges of the 21st century. The concept at the heart of this transformation is not only crucial in current NATO operations, but it is also central to the debate over the Alliance's strategic identity in the 21st century. The CA involves the deliberate and coordinated integration of military and civil capabilities in support of Alliance operations. NATO's CA has two aspects: (1) improve NATO's internal crisis management instruments and (2) develop mechanisms and doctrine that will enable NATO to work effectively with external non-military organizations such as the UN and the World Bank.



Dr. George Sinks

of Alliance operations. NATO's CA has two aspects: (1) improve NATO's internal crisis management instruments and (2) develop mechanisms and doctrine that will enable NATO to work effectively with external non-military organizations such as the UN and the World Bank.

This new approach is most visible and important in Afghanistan. NATO operations there are serving as an incubator and testbed for the Alliance's CA. Sinks noted two specific examples of NATO's CA in Afghanistan—its effort to train Afghan National Security Forces (ANSF) and Provincial Reconstruction Teams (PRTs). The PRT projects are developed and executed in support of the four priorities of the Afghan National Development Strategy—infrastructure (roads), water and energy projects, agriculture and education. Through these PRT innovations, NATO has made substantial progress in developing and refining its own crisis management instruments. The main challenge for NATO now is the adaptation of Alliance doctrine and capabilities to facilitate cooperation with external government and non-governmental organizations.

USAF Lt Gen Henry Obering delivered a keynote address on the challenges of deploying an effective Ballistic Missile Defense (BMD) system. He focused on the tremendous progress and forward momentum that has been made in missile defense during the past three years — especially in the consistently successful flight demonstrations. Obering provided highlights pertaining to air-borne laser capabilities, sea-based X-Band radar, and he homed in on the successful ground based intercept test that was conducted in late September.



Lieutenant General Henry Obering III, USAF

He mentioned that we must also focus on the challenges of mobile launchers, intent, decision time, and intelligence limitations. Obering also talked about the need and challenges involved to effect timely command and control across operational commands. His relevant views to the precision strike community will contribute to shaping future precision engagement capabilities and influencing events around the world.

CAPT Harold "Bud" Bishop, OPNAV, N880C, provided an informative presentation on experiences with coalition partners through the recent USS Eisenhower deployment (2006-7). Carrier Strike Group 8 worked with coalition partners on the east coast then deployed to the Arabian Gulf, joining 38 nations in support of international efforts in that region. During the later months of their deployment, CSG8 joined with the French carrier, Charles de Gaulle, and formed an Expeditionary Strike Force in support of air operations over Afghanistan.



Captain Harold "Bud" Bishop, USN

Additionally, CSG8 was able to work with Kenyan Navy elements during their support of Somalia operations

in early 2007. The speaker pointed out the critical elements of coalition operations: communications systems alignment, command and control alignment, classification and security levels with different partners and the impacts on system support, and the importance of understanding and operating within the Rules of Engagement guidelines of individual nations.

Raleigh Durham, director of joint advanced concepts, OUSD(AT&L), discussed global strike capability issues while **Sean McDonald**, special scientific advisor, Office of the Deputy Assistant to the Secretary of Defense for NCB/Nuclear Matters, wrapped up the three days of presentations with a briefing on nuclear warheads.



Raleigh Durham

PSTS-07 marked the 5th consecutive year where **midshipmen from the U.S. Naval Academy's Weapons and Systems Engineering Department** participated in PSA's annual Precision Strike Technology Symposium. As the next generation of military leaders, this was a superb opportunity to witness presentations on many of the



Midshipmen from the U.S. Naval Academy's Weapons and Systems Engineering Department

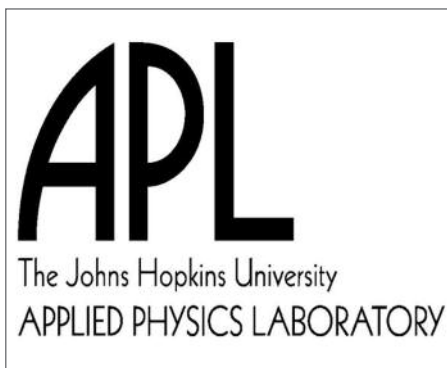
precision strike systems they will be operating after they graduate and become commissioned officers.

Instructor **CDR Kurt Statts** and the middies appreciated the unique opportunity to obtain a better understanding of what the precision strike community is all about. They noted that they gained valuable insight about precision strike technologies and concepts that are at the cutting edge in making the kill chain operate more effectively and efficiently. ?

PSTS-07 EXHIBITORS



ATK



APL - Johns Hopkins University



The Boeing Company



HSI Fire & Safety Group



Lockheed Martin Company



Marotta Controls

A-10 Thunderbolt II Goes High Tech

In August, the precision engagement modified A-10C Thunderbolt II received its Initial Operational Capability, the most significant modifications in its 30-year history, said USAF Lt. Col. Ralph Hansen, chief of A-10 requirements for Air Combat Command.

The digital A-10C allows the pilot to drop bombs without taking his or her hands off the throttle or stick. The situational awareness data link, allows the pilot to link the targeting pod to a target and the new system will determine the coordinates.

Additionally, the new 1760 data bus that runs most of the weapons systems allows the A-10C to drop the Joint Direct Attack Munition

(JDAM) and Wind Corrected Munitions Dispenser (WCMD). The new upgrades also include a digital stores management system that keeps track of the munitions.

The A-10 is best known for close-air support, airborne forward air controller, and combat search and rescue missions. The "C" model Warthog can be used against all ground targets, including tanks and other armored vehicles.



A-10C Thunderbolt II Pre-flight inspection.

See **A-10 Thunderbolt II**
Continued on page 10

PSTS-07 EXHIBITORS



Whitney, Bradley & Brown, Inc



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Ginny Sniegion, Lt Gen John Castellaw, USMC and Bill Dalecky

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- Raytheon Company,**
- The Boeing Company,**
- Orbital Sciences, Inc.,**
- Northrop Grumman,**
- Lockheed Martin Company**

F-22 Drops First SDB

In September, the F-22 Raptor successfully conducted the first airborne separation of a Boeing Small Diameter Bomb from its internal weapons bay. The drop at Edwards AFB, CA, was made to ensure the small diameter bomb, or SDB, would have a clean separation when released from the F-22.

Testing of the SDB with the F-22 is part of the Increment 3.1 upgrade to the aircraft, Major Fischer said.

Once the SDB is cleared for operational missions aboard the F-22, the aircraft will carry four times the weapons load. The F-22 can carry eight SDBs along with two Advanced Medium-Range Air-to-Air Missiles

est and fastest of currently fielded Air Force weapons.”

Carrying the SDB internally is important to maintaining the F-22's stealth because external weapons could be picked up by radar, said Bill Kuhlemeier, the Lockheed Martin chief flight test engineer. However, the requirement presents unique challenges.

Major Fischer said “no other aircraft can release a supersonic weapon out of an internal weapons bay. The flow field and shock wave interactions present a very complex challenge.”

The F-22 was not originally designed for air-to-ground operations, Kuhlemeier said.

“We have to learn how much we can get away with while inducing loads on an aircraft that wasn't designed to carry bombs,” he said. “We're finding ways to overcome that by making the Raptor stronger for the different missions. Once we can say the bomb can safely be released from the aircraft, we will move to guided tests,” he said. “We will then release the weapons to see if they hit their targets. We're starting easy and working our way up to more difficult tests.”

Major Fischer said integration of the SDB with the F-22 is important to the warfighter.

“With this weapon and aircraft, there is no place we can't reach and no place for an enemy to hide.” ?



The F-22 Raptor completes Small Diameter Bomb fight test.

“The test proved that our predictions were modeled properly,” said USAF Maj. Jack Fischer, a 411th Flight Test Squadron test pilot. “The bomb came out exactly as it should have, so we're on the right track.”

and two heat-seeking AIM-9 Sidewinder Missiles.

“Instead of taking two Joint Direct Attack Munitions, we can carry eight SDBs,” the major said. “It also increases our range considerably. The SDB envelope will be the high-

A-10 Thunderbolt II,

Continued from page 9

“The A-10C offers inter-connectivity between the pilot, the weapons and the targets,” said Lt. Col. Timothy G. Smith, commander of the 104th Fighter Squadron for the Maryland ANG, the first unit

to receive the new upgrades.

“With the new digital systems and weaponry, pilots can see much better than they have in the past and perform in all-weather,” said Lockheed Martin's Stephen Ramsey.

The A-10C is able to carry the Lockheed Martin Sniper XR or

Northrop Grumman Litening AT advanced targeting pods.

With around 75 A-10 Warthogs currently upgraded, the project to modernize 356 A-10As will cost around \$500 million and is scheduled for completion by 2011. ?

Hunter-Killer UAV Now Flying in Afghanistan

The USAF's new hunter-killer unmanned aerial vehicle (UAV) is now flying operational missions in Afghanistan. Capable of striking enemy targets with on-board weapons, the MQ-9 Reaper has conducted close air support and intelligence, surveillance and reconnaissance (ISR) missions.

Operational use of Reaper's advanced capabilities marks a tremendous step forward in the evolution of unmanned aerial systems. "The Reaper is a significant evolution in capability for the Air Force," said Air Force Chief of Staff Gen. T. Michael Moseley. "We've taken these aircraft from performing mainly as intelligence, surveillance and reconnaissance platforms to carrying out true hunter-killer missions."

The Reaper is larger and more heavily-armed than the older MQ-1 Predator and in addition to its traditional ISR capabilities, is designed to attack time-sensitive targets with persistence and precision, and destroy or disable those targets. Like



the MQ-1 Predator, the Reaper is launched, recovered and maintained at deployed locations, while being remotely operated by pilots and sensor operators at Creech AFB, NV. That's where the resemblance ends. The MQ-9 has nearly nine times the range, can fly twice as high and carries more munitions.

"It's a tremendous increase in our capability that will allow us to keep UAVs over the airspace of Afghanistan and Iraq in the future for a very long time," said USAF Lt. Gen. Gary

North, commander of U.S. Central Command Air Forces, who noted the Reaper was a perfect complement to the Air Force's existing manned airborne platforms. "This is just another evolutionary step where technology is helping commanders on the battlefield to integrate great effects from the air into the ground commander's scheme of maneuver."

Lt. Gen. North added that he expects the Reaper to bring a significant impact to military operations throughout the U.S. Central



Command area of responsibility. "The enemy knows we track them and they know that if and when they commit acts against their people and government, we will take action against them. The Reaper is an incredible weapon in our quiver," he believes. ?

News Briefs

First Ever Shots of APKWS from an Aircraft

BAE Systems recently shot two guided Advanced Precision Kill Weapon System (APKWS) rockets from a USMC Cobra helicopter, the first flights of the APKWS precision-guided weapon from an aircraft.

The successful flights, held in partnership with the U.S. Navy program office, were designed to confirm the APKWS rocket's compatibility with the Cobra's carriage

and launch systems, and to demonstrate that APKWS can be launched from the platform without requiring aircraft integration or modifications. The tests also proved again the weapon's ability to acquire, track, and hit a laser-designated target.

Following the launches, both APKWS rockets were guided by a laser designator to a ground target. The first rocket was guided to the target by a ground-based laser designator. The pilot guided the second rocket to the target using laser designation equipment onboard the helicopter.

Michelle McBride, co-leader of the Navy's APKWS project team said "the Marines have expressed a clear need for a low-cost precision-guided weapon, and these flights confirm the system is nearly ready for fielding."

APKWS is a low-cost precision munition system that adapts a standard 2.75-inch unguided rocket into a highly precise, laser-guided weapon capable of engaging unarmored and lightly armored targets. Sensors guide the warhead to target with pinpoint accuracy, ensuring that the desired target is destroyed while greatly lessening the risk of collateral damage. With APKWS, military aircrews can engage targets that were often unreachable using conventional 2.75-inch rockets.

BAE Systems has been the prime contractor for APKWS since April 2006. APKWS is a joint-interest program with Army and Navy/Marine Corps participation. ?

Advanced Sensor for Next-Generation Munition

Boeing has been awarded a \$600,000 Air Force Research Laboratory contract to develop the Seeker Integrated Target Endgame Sensor (SITES) to help advance

Joint Dual Role Air Dominance Missile (JDRADM) technology. JDRADM would be used against multiple types of targets during air-to-air and air-to-ground missions. Under the Task 1 contract with the AFRL, Boeing will study and establish the SITES program requirements baseline, ultimately leading to a system architecture. ?

Boeing and USJFCOM to Analyze Joint Warfighting Concepts and Capabilities

Boeing and the U.S. Joint Forces Command (USJFCOM) have signed a three-year Cooperative Research and Development Agreement (CRADA) to analyze current, emerging and future joint warfighting concepts and capabilities in concert with USJFCOM's Suffolk, Va.-based Joint Innovation and Experimentation Directorate.

Using constructive modeling, simulation and analysis, Boeing and USJFCOM will augment virtual and live experiments to examine the U.S. Department of Defense's family of joint concepts and their enabling capabilities. This CRADA is expected to result in new and improved concepts, processes, organizational designs and system capabilities.

Boeing has a long history of performing analytical studies using a variety of constructive warfare simulations and operates an extensive network of experimentation facilities that can link to other real and virtual assets to optimize experiment effectiveness. Boeing Advanced Systems' AMSE division will lead the company's efforts under the CRADA. ?

Harpoon III Order a Boost for Boeing

Boeing will remain the anti-ship missile leader. Larry Dickerson, an

CALENDAR OF EVENTS

Precision Strike Winter Roundtable & William J. Perry Award Luncheon

Date: January 23, 2008

Theme: "Defining the Future of Precision Strike"

Location: Crystal City Marriott, Arlington, VA

Precision Strike Annual Programs Review

Date: April 15-16, 2008

Theme: "Acquisition Excellence for Precision Strike Through Teamwork"

Location: Waterford Receptions, Springfield, VA

Precision Strike Summer Forum

Date: June 10-11, 2008

Theme: "Precision Fires as an Enabler for Force Dominance"

Location: Hilton Parsippany, Parsippany, NJ

Precision Strike Technology Symposium (PSTS-08)

(To be conducted at the SECRET/NOFORN level)

Date: October 28-30, 2008

Location: Kossiakoff Center, Johns Hopkins University Applied Physics Laboratory, Laurel, MD

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analyst at Forecast International, says “Boeing’s current success is based on international orders for its Harpoon II, but a future surge is attributed to U.S. Navy plans to acquire the Harpoon III.

Nearly 13,000 anti-ship missiles worth an estimated \$8 billion will be built over the next 10 years. Boeing is expected to garner about \$1.5 billion in revenues from anti-ship missile sales during that time, followed by MBDA with \$789 million in sales.

China will build the largest number of anti-ship missiles and generate a lot of revenue, but Beijing’s export successes have been minimal. Russia will manufacture nearly as many missiles as the United States, but the value produced will be considerably less. Low prices, even for advanced missiles, do not always translate into large market share. ?

Avenging IEDS

Boeing’s Avenger laser system can neutralize the kinds of improvised explosive devices (IEDs) and unexploded ordnance (UXO) that threaten U.S. troops.

The Laser Avenger recently engaged and destroyed five targets representing IED and UXO threats. Laser Avenger, equipped with a 1-kilowatt solid-state laser, proved its effectiveness at ranges that allowed the system to be operated at safe distances from the target. The system also took a step toward demonstrating a counter-unmanned aerial vehicle capability by destroying two small unmanned aerial vehicles that were stationary on the ground. ?

Laser-Guided Maverick Missile Meets Urgent Need

Having published an urgent operational need for a close air support weapon to defeat high-speed moving

targets with minimal collateral damage, the U.S. Air Force has expressed interest in re-establishing production of Raytheon’s laser-guided Maverick.

The laser-guided AGM-65E Maverick missile is an air-to-ground weapon that can meet the service’s needs in the near-term. The Air Force currently operates with television- and infrared-guided versions of Maverick. Until now, only the Navy and Marine Corps have employed

the laser-guided version. The laser-guided Maverick has a combat-proven record of effectiveness and reliability against armored and moving surface targets in scenarios involving urban environments and during close air support missions.

“Maverick missiles constitute a key capability required for use in the modern battlespace,” said Harry Schulte, Raytheon Missile Systems vice president of the Strike product

PEOPLE

U.S. Navy Rear Adm. (lower half)(selectee) **David A. Dunaway** is being assigned as commander, Naval Air Warfare Center, Weapons Division, China Lake, CA. Dunaway is currently serving as deputy program executive officer for air anti-submarine warfare, assault and special mission programs, Office of the Assistant Secretary of the Navy (RD&A), Patuxent River, MD. He is a former member of the PSA Board of Directors.

Navy Adm. **Gary Roughead** is now the chief of naval operations, succeeding Adm. **Michael G. Mullen** who became chairman of the Joint Chiefs of Staff on Oct. 1, replacing Marine Corps Gen. **Peter Pace** who retired. Roughead had commanded U.S. Fleet Forces Command

Army Gen. **William E. “Kip” Ward** is now commander of U.S. Africa Command. Ward, deputy commander of U.S. European Command in Stuttgart, Germany, stands up the new Africa Command as its first commander.

Air Force Gen. **Kevin P. Chilton** now serves as commander of U.S. Strategic Command with headquarters at Offutt AFB, Nebraska. He had commanded Air Force Space Command at Peterson AFB, CO. The former STRATCOM commander, Marine Gen. **James E. Cartwright**, became the eighth vice chairman of the Joint Chiefs of Staff on Aug. 31.

Marine Corps Lt. Gen. **James N. Mattis** received his fourth star with appointment as commander of U.S. Joint Forces Command and NATO’s supreme allied commander for transformation. Matti was commanding general of 1st Marine Expeditionary Force and commander of U.S. Marine Forces Central Command. Mattis replaces Air Force Gen. **Lance Smith**, who announced his retirement this summer after a 38-year-career.

Army Lt. Gen. **Thomas F. Metz** now serves as director, Joint Improvised Explosive Device Defeat Organization. Rear Adm (lower half) **William E. Shannon III** is assigned as the vice commander, Naval Air Systems Command, while Rear Adm. (lower half) **Walter M. Skinner** becomes program executive officer for tactical aircraft programs for the U.S. Navy.

Lockheed Martin executive **Christopher E. Kubasik** now leads the Electronic Systems Business Area, succeeding **Robert B. Coutts**, who is retiring. **Bruce L. Tanner** replaced Kubasik as executive vice president and CFO.

Boeing has named **Darryl Davis** to the position of president, Advanced Systems, for Boeing Integrated Defense Systems (IDS), replacing **George Muellner**, who recently announced his intent to retire, effective December 31, 2007.

Stephen Cambone has joined QinetiQ North America as senior vice president for strategy. From 2003 to 2006, he served as the first Undersecretary of Defense for Intelligence (USDI). Prior to 2003, Cambone was charged with strategic planning for DOD. In 2001, he led development of DOD’s strategic policies and plans for the Quadrennial Defense Review (QDR).

News Briefs, Continued from page 13 line. “Maverick has proved itself over many years of service to be a very versatile weapon system, and the newest laser version will significantly enhance the Air Force’s precision capability required to save lives in close combat and quick-reaction situations.”

To get that capability on Air Force aircraft in short order, the Navy has agreed to transfer some of its inventory of laser-guided Mavericks to the Air Force.

Maverick is a precision air-to-ground missile used against moving or stationary small or hard targets; armored vehicles; surface-to-air missile sites; and high-value targets such as ships, port facilities and communications centers. The missile has launch-and-leave capability that enables a pilot to fire it and immediately take evasive action or attack another target as the missile guides to the target. ?

IAF Gets Lizard Laser-Guided Bombs

Elbit Systems has been selected to equip the Israel Air Force (IAF) with its Lizard laser-guided bombs.

Lizard is a sophisticated new generation laser-guided bomb. The system, which will be used for air-to-surface attack of diverse targets, inflicts pinpoint damage while substantially reducing collateral damage. The current laser designator is designed for warheads of various sizes.

Elbit Systems has already supplied the Lizard laser-guided bomb kit to several international customers including NATO-member countries. The performance-proven LIZARD has already generated repeat orders from existing customers.

According to Elbit’s Yoram Shmueli, the decision to equip the IAF with Lizard represents an important breakthrough for Elbit Systems as

a major supplier of laser-guided systems. Shmueli added, “the use of lasers for pinpoint accuracy and reduced collateral damage is in increased demand amongst the world’s advanced air forces, and the fact that the IAF has chosen Elbit Systems’ Lizard will lead to increased orders for the system worldwide.” ?

Production Contract for MLRS Unitary Warheads

General Dynamics Ordnance and Tactical Systems has been awarded a \$7.5 million contract by Lockheed Martin for production of warheads for the U.S. Army’s Guided Multiple Launch Rocket System (GMLRS) – Unitary.

The GMLRS is equipped with a 200-pound fragmenting unitary with a range of more than 60 km. The GMLRS Unitary warhead’s combination of Insensitive Munitions features and high near-field lethality fulfills the Army’s need for a soldier-safe, low collateral damage, affordable, long-range precision artillery munition. ?

Program to Develop Mobile, Solid-State Laser Weapon System

The U.S. Army has selected Northrop Grumman for the first phase of a program to demonstrate the maturity of all enabling technologies for a mobile, solid-state laser weapon system mounted on a ground vehicle.

Called the High Energy Laser Technology Demonstrator (HEL TD), the Army’s goal for the system is to demonstrate the capability to effectively counter rockets, artillery and mortars (counter-RAM) in a relevant environment at the High Energy Laser Systems Test Facility (HELSTF) at White Sands Missile Range, NM. If deployed, HEL TD could transition to an Army acquisition program.

Northrop Grumman’s Space Technology sector received a one-year, \$8 million contract with options for a total value of nearly \$50 million over three years from the Army Space and Missile Defense Command, Huntsville, AL. Under the phase one contract, Northrop Grumman will develop a preliminary design for a ruggedized beam control subsystem on a tactical vehicle.

The HEL TD team led by Northrop Grumman consists of BAE Systems, Ball Aerospace & Technologies, and L3 Com Brashears. Northrop Grumman will provide systems engineering, system integration, the beam control subsystem, the power subsystem, the thermal subsystem and C3I. BAE Systems will provide the vehicle and platform integration; Ball Aerospace & Technologies Corp. will supply beam alignment and stabilization systems; and L3 Com Brashears will supply the beam director.

Northrop Grumman has been a leader in developing and demonstrating high-energy lasers for more than 30 years. ?

Paveway IV on F-35 Lightning

Raytheon has been awarded a contract to support the integration and flight trials of the Paveway IV guided weapon on to the Short Take-Off and Vertical Landing (STOVL) version of the F-35 Lightning II aircraft.

The UK is currently one of six European nations that are planning to take delivery of the F-35 aircraft. The integration of the RSL developed Paveway IV onto the F-35B will ensure that the UK has an autonomous weapon solution for this platform. ?

Please plan on joining us!

Precision Strike Winter Roundtable 23 January 2008

**Crystal City Marriott - Arlington, VA
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- The Way Forward for Precision Strike
- Congressional Perspectives
- National Defense Strategy
- U.S. African Command Initiatives
- Joint Capability Areas Overview
- Advanced Precision Weaponry
- William J. Perry Award Ceremony
- Congressional Staffers' Panel—Priorities & Issues
- Demonstrating Relevance in DoD's Mission—The JCIDS Path
- Missiles & Weapons Market Current Environment & Future Opportunities
- Application of ISR Capabilities to Tighten the Kill Chain

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- Acquisition Transformation
- Acquisition Executives Panel
- Industry Panel—Immediate Battlefield Needs
- Weapons Systems Recapitalization

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IN THE NEXT ISSUE
Wrapup on Precision Strike Winter Roundtable 2008

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