



"From Cruise Missiles Association to Precision Strike Association we have been dedicated to advancing the art and science of precision engagement concepts and technology for more than 20 years."

VISION STATEMENT

We aspire to be the premier association dedicated to advancing the art and science of precision engagement concepts and technology.

To accomplish this, we will promote the development of systems and procedures in order to locate, fix, track, target, and attack fixed, moving, and relocatable targets.

We recognize that battlespace management, the network within which it functions, and the adjunct command and control requirements are crucial to success on the battlefield.

PSA has a global perspective and welcomes international participation.

PSAR-13 to Focus on Global Presence in the New Strategic Environment

Precision Engagement—New Strategic Environment is the theme for the 2013 Precision Strike Annual Review (PSAR-13) scheduled for 19-20 March 2013 at the Waterford at Springfield. This Review will address strike warfare requirements and capability decisions critical to national security.

PSA perseveres in the growing importance of precision strike systems in shaping our national defense posture and in influencing events around the world. PSAR-13 is structured to be a powerful and informative program that will concentrate on global presence in the Asia-Pacific Region and will describe both the new strategic environment, as well as the needed characteristics of future strike weapons and systems. Further, PSAR-13 will provide insights into "hot-spot" activities and evolving threats to strike warfare in the Middle East.

PSA is honored to present Representative Mac Thornberry (R-TX, 13th District)—Vice Chairman of the House Armed Services Committee—to kick off the Review on opening day. Further, we are delighted that keynote speakers Honorable Frank Kendall—Under Secretary of Defense for Acquisition, Technology and Logistics—and Rear Admiral Rick Snyder, USN—Deputy Director for Joint Strategic Planning, the Joint Staff (J-5)—will address the precision strike community. Additionally, we are thrilled that Major General Steven Kwast, USAF—Director, Air Force Quadrennial Defense Review, Office of the Air Force Assistant Vice Chief of Staff—will be with us to focus on essential future initiatives and challenges.

Representative Thornberry will present the congressional perspective on the new strategic environment related to the

See **PSAR-13**, Cont. on pg. 11



Representative
Mac Thornberry
R-TX, 13th District



Honorable
Frank Kendall
USD(AT&L)



Rear Admiral
Rick Snyder, USN
The Joint Staff (J-5)



Major General
Steven Kwast, USAF
Director, AF QDR

IN THIS ISSUE

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Chairperson's Column

We hope this issue of the Precision Strike Digest finds everyone rested and rejuvenated after the holiday season. It was a time for all of us to sit back, enjoy family, and reflect on the year that has passed and to commit to resolutions for the future. The Precision Strike Association is at a stage in its existence where we need to look back on the year that has passed and to decide on our resolutions for the future.

It is clear that the national security environment is changing. The threats are increasing in number and complexity. Yet, the resources available to counter these threats are necessarily decreasing. The reality of constrained budgets will result in new operating procedures for the Department of Defense. The Deputy Secretary of Defense's June 3, 2012 memorandum outlined some of these new procedures, including a reduction in conferences and travel expenses.

Change brings opportunity. So, rather than lament the fact that policy changes will have an impact on the Precision Strike Association, let us look at this as an exciting opportunity to be innovative in how we achieve our mission and goals. We firmly believe that our mission and goals are still extremely important; they may be more important now than at any other time in our history.

The Precision Strike Association was established to provide an ethical environment for government and industry leaders to:

- Facilitate communication between leaders in government and the commercial sector that fosters a beneficial exchange of information.
- Understand and promote national defense policy and military strategy.
- Rationalize required military capabilities with the broad range of available technology and systems.
- Advise on the investment in critical science and technology in order to further the effectiveness of precision engagement operations.

It will be important for us to remember that the Precision Strike Association is a service organization. Our recent emphasis

has been on facilitating communication through the use of conferences and symposia. While this is and will continue to be a critical part of our strategy, it is time for us to think about what other services can and should this association be providing to the precision strike community. And, are there more effective and efficient ways in which we could provide these services.

There are many diverse and wonderful ideas about how the Precision Strike Association can better serve its community. For example, the Precision Strike Association could have a role in conducting charity events in support of the warfighter community; holding executive breakfasts or other small venues to allow more intimate conversation between industry and DoD leadership; establishing strategic partnerships with other like organizations to expand our sphere of knowledge and influence; or conducting job fairs to bring together those individuals who are looking for jobs with those employers who have opportunities. We would like to formally gather these wonderful ideas through what we are calling an environmental survey. In the next month, you will receive an invitation to participate in this survey. We ask you to please take a few minutes and really think about how the Precision Strike Association could better help you. You are the Association's constituents. **The Association is here to serve you; please take a few minutes to tell us how we can do just that.**

On behalf of the Precision Strike Association, I would like to extend a warm and special thank you to Andy McHugh. Andy served as the Chairman of the Board of the Precision Strike Association since 2009. The Association flourished under his dedicated leadership, and the precision strike community has truly benefited. Andy, please accept our sincere thanks for your dedication, leadership, and guidance. We look forward to your continued involvement and wish you the very best in all that you do.

Suzy Kennedy
Chairperson of the Board
Precision Strike Association

A Striking Career

PSA Honors Acquisition Leader with Roots in its Community

When neuropsychologist Roger Wolcott Sperry conducted his split-brain studies, he probably wasn't considering "whole-brained" thinker Keith Sanders.

The Assistant Commander for the Acquisition/ Program Management organization, Sanders integrates left-brained analysis and right-brained thoughtfulness to manage 99 Acquisition Category II to IV programs – a portfolio of roughly \$2 billion – for the Naval Air Systems Command.

It's a role he's held since 2010, one that requires him to be intuitive, innovative and visionary – decidedly right-brained functions, but not a creative stretch for someone who ran track in high school, played the trumpet in a jazz band and enjoys wildlife photography. For most of his 41-year federal government career, however, Sanders' profession required the cerebral focus that neuroscientists would have labeled left-brained thinking.

He has worked on nearly every air-launched weapon in the DoD inventory. His early development efforts for the Advance Bomb Family (ABF) were the first serious attempt to improve general-purpose bombs and inertial guidance kits for bombs since the Mark 80 family was conceived in the 1950s. ABF did not survive, but it influenced nearly every subsequent direct-attack weapon in the Navy and possibly the world.

Though Sanders shifted his professional focus from building bombs to building consensus, the weapons community never forgot his contributions.

On Nov. 15, the Precision Strike Association honored him with its 2012 Richard H. Johnson Technical Achievement Award at a restaurant near Naval Air Station Patuxent River.

"Keith has enjoyed a remarkable career, nobly serving our great nation for more than four decades — touching the acquisition or life-cycle support of virtually every major strike weapons program," said Andy McHugh, chairman of the Precision Strike Association, who also works for the Office of the Assistant Secretary of Defense, Research and Engineering/Systems Engineering. "Keith is very deserving of this recognition and it will be an honor to present this award to him in front of family,



Keith Sanders & PSA Chair Suzy Kennedy



Keith Sanders & NAVAIR Commander Vice Adm. David Dunaway

friends and members of the precision strike community."

"Keith worked on some of the same programs Dick Johnson [the award's namesake] did," said Steve Roerman, president of Lone Star Aerospace, an analysis and systems engineering company, who has known Sanders for more than 20 years. "Keith is someone who takes a systems approach to understanding what facts matter. That kind of systems thinking helps him navigate complex and difficult problems. When a group of people are facing a difficult set of challenges, he's one of the voices who help people find a consensus on how to overcome problems or challenges."

Known for his trademark humility, Sanders' simple response when notified that he earned the trophy was "Gee whiz. Who would have thought?"

"So much time had passed," he said. "I never saw myself as a noteworthy character in these efforts. I definitely feel ownership and pride from these efforts, but it was always as part of a team. ... In addition to JSOW [Joint Standoff Weapon] and JDAM [Joint Direct Attack Munition], I'm particularly proud of being part of the Tomahawk Block IV program. The networked capability that Tactical Tomahawk introduced in the early 2000s – those were both very significant contributors to the strike capability of the U.S. and its allies. ... Tactical Tomahawk made it possible for the on-scene commanders to redirect a weapon that was in-flight to a higher priority target, so that brought the time frames down significantly. Basically it took Tomahawk from being a weapon that was mostly strategic, down to being a true tactical tool for the special-operations teams."

Though Sanders sees himself as more of a footnote in the development of precision weapons, others see him as the headline.

“For 40 years, Keith has contributed to the evolution of precision strike systems, beginning with the Mark 80 series, laser-guided bombs, to the more sophisticated systems, like JSOW, JDAM and JASSM,” NAVAIR Commander Vice Adm. David Dunaway told those gathered at the restaurant.

“He has been on the leading edge of helping our Navy progress from launching several aircraft with multiple bombs to ensure target destruction, to launching one aircraft with multiple precision-guided weapons that can neutralize targets with little or no collateral damage. He has a long history with the Naval Air Systems Command; and it is my honor to go to work with him every day,” Dunaway added.

Retired Rear Adm. Bert Johnston, a former NAVAIR vice commander who worked with Sanders in the Conventional Strike Weapons Program Office, called him “the perfect teammate.”

“In addition to knowing everyone in the business, Keith knew how to work with them all and, most importantly, knew what was important to them,” said Johnston, who is now a defense industry consultant. “There were numerous times that Keith and I would have a discussion about where we needed to go, and the next day he would have a meeting or conference call scheduled or actions assigned to press ahead. It was obvious that Keith supported the warfighter.”

Sanders credited his mentors, from both the Navy and the defense industry, for his professional development.

“Rear Adm. Jack ‘Jocko’ Chenevey, [former program manager in Precision Strike Weapons (PMA-201)] gave me opportunities that I wouldn’t have otherwise had, in terms of trust and a long leash and latitude,” Sanders said. “He selected me as his deputy shortly before he left PMA-201.”

“Keith had a very easy manner of leadership and a superb reputation within the Navy and Marine Corps weapons communities,” said Chenevey, who has since retired. “The PMA-201 portfolio was very diverse in terms of the technologies and the field activities we had to support us. No one had a better grasp of these factors than Keith. His knowledge of the conventional air-to-ground weapons business was invaluable in our management of the development and sustainment programs.”

Longtime colleague Earle L. Rudolph Jr., Vice President of Market Development MBDA, said Sanders has provided both naval aviation and the U.S. Air Force with the tools needed to “fight and win” for more than 20 years.



Keith Sanders is honored with 2012 Richard H. Johnson Technical Achievement Award

“[Keith] was integral to the success of JDAM, GBU-24 and JSOW in PMA-201,” Rudolph said. “He was the go-to lead to make a troubled program work, to solve management and technical issues. ... He took fleet aviators and made us understand that our contribution at NAVAIR was as important as what we did in the air.”

For Sanders, the development of sophisticated weapons has been like transforming science fiction to science fact.

In his books, novelist “Tom Clancy talked about doing things with air-launched weaponry, with satellites, aircraft; when in practice, that wasn’t really achievable, but this community has dedicated itself to making it real,” Sanders said. “And through the efforts of many companies and government weapon centers, those capabilities today have truly been achieved and transformed how the Defense Department prosecutes its kinetic engagements. This group of companies and government organizations are involved in the business of weapons systems — emphasis on systems — because it involves satellites, aircraft all kinds of sensors and mission planning. The ability to deliver surgical strikes is something this community made possible. Not only the ability to do the strike, but to do it on an urgent basis. That’s where the miracles happened.” ■



Going Out With a Bang

Over his 41-year career, Assistant Commander for Acquisition Keith Sanders provided technical and management leadership for a vast portfolio of precision-strike weapons, many of which have garnered headlines for the visible impact during high-intensity combat operations.

They include:

AARGM: A complement to the High-Speed Anti-Radiation missile (HARM), the Advanced Anti-Radiation Guided Missile is a medium-range, supersonic, air-launched tactical missile whose primary mission is to attack and kill enemy radars.

AMRAAM: The Advanced Medium-Range Air-to-Air Missile is a modern beyond-visual-range air-to-air missile (BVRAAM) capable of all-weather day-and-night operations.

Guided 2-75-inch Rockets: What began as unguided air-launched rockets of 2.75-inch (70-mm) diameter in the late 1940s has evolved into the Navy's Advanced Precision Kill Weapons System, "plug and play," "point and shoot" weapon fired like the unguided 2.75-inch rocket.

Harpoon: An all-weather, over-the-horizon, anti-ship missile system, Harpoon has also been further developed into a land-strike weapon, the Standoff Land Attack Missile (SLAM).

JASSM: Joint Air-to-Surface Standoff Missile is an autonomous, long-range, conventional, air-to-ground, precision standoff missile. A 2,000-pound class weapon with a penetrator/blast fragmentation warhead, JASSM cruises autonomously in adverse weather, day or night, using a state-of-the-art infrared seeker in addition to the anti-jam GPS to find a specific aim point on the target.

JDAM: The low-cost Joint Direct Attack Munition guidance kit converts existing unguided free-fall bombs into accurately guided "smart" weapons.

JSOW: The Joint Standoff Weapon precision strike weapon is a 1,000-pound air-to-surface missile that can carry several different lethal packages.

Laser Guided Bombs: Laser-guided munitions use a laser designator to mark a target. The reflected laser light from the target is then detected by the seeker head of the weapon, which sends signals to the weapon's control surfaces to guide it toward the designated point.

Maverick: An air-to-ground tactical missile designed for close air support, the Maverick is the most widely produced precision-guided missile in the Western world.

Sidewinder: The Sidewinder family of short-range air-to-air missiles is carried on a wide range of modern tactical aircraft.

SLAM ER: The Standoff Land Attack Missile Expanded Response is the U.S. Navy's choice for surgical strike against high-value land targets and ships in port and at sea.

Tomahawk: Considered the weapon of choice for U.S. leaders, the Tomahawk is an all-weather submarine or ship-launched land-attack cruise missile. Today's Tomahawk Block IV can circle for hours, shift course on command and beam a picture of its target to controllers halfway around the world.

Walleye: A television-guided glide bomb used by the U.S. during the 1960s, the Walleye was the first of a family of precision-guided munitions designed to hit targets with minimal collateral damage. ■

KEITH SANDERS

JOB TITLE: Assistant Commander for Naval Air Systems Command's Acquisition/Program Management organization

BIO: Bachelor's degree in aeronautical engineering from Purdue University, master's from George Mason University. Joined the civil service in 1971; appointed to the senior executive service in 2003; after college, briefly worked for Pratt & Whitney before becoming a Navy civilian. He has held positions at Naval Weapons Support Center, Crane, Ind.; the Office of the Undersecretary of Defense for Acquisition, Technology and Logistics; and a variety of leadership roles at NAS Patuxent River.

TACKLING TOUGH PROBLEMS: "I was never in a position to choose to work on a tough problem. They kind of found me. You have to understand the root causes before you try to solve that problem. If you just start trying to solve the problem without really understanding what's making it happen, you can spend an awful lot of time and money guessing wrong."

ON FINDING YOUR CALLING: "Like most young people, I wasn't sure what I wanted to do when I grew up. I recommend they find themselves a meaningful role doing things they find challenging. Helping your team succeed has a beneficial side effect of furthering your opportunities. Find something you enjoy. That's the key." ■

Richard H. Johnson Award

The Precision Strike Association (PSA) for each of the past four years has honored Richard H. Johnson, bestowing a Technical Achievement Award (the Johnson Trophy).

The award is named after Johnson, the first recipient. It is presented annually to recognize an individual from the public or private sector for outstanding personal technical achievements resulting in significant contribution to precision strike systems.

Dick Johnson, who was awarded the trophy posthumously in 2009, was an exemplar of such achievements, having personally led the design or redesign of more precision strike airframes than any contemporary. His innovative designs, or imitations of them, appear in nearly every nation's military where precision strike systems are employed.

Piloting and building flying machines were passions Johnson sustained for 70 years, but it was the design of precision-guided weapons that gave him the chance to make his most unique contributions. He designed a number of precision-guided weapon airframes, including the entire U.S. Laser Guided Bomb inventory (more than a dozen types), HARM, JSOW, Javelin, Excalibur, and others. He was responsible for the aerodynamic design of more than 65% of the guided weapons used in Desert Storm

Dick Johnson was known as a quiet, gracious person who mentored others. He made his contributions as an individual member of a team, never aspiring to a management role and represented what an individual can contribute to our nation's defense.

In 2010, the PSA was honored to present the Johnson Trophy to Robert J. Whalen, President and CEO of Decision Sciences. In 2011, PSA presented the third annual Johnson Award posthumously to Robert H. Widmer, known as the "father of B-58 Hustler". The fourth person so honored is the U.S. Navy's Keith Sanders. ■



Richard H. Johnson



Alice Johnson & Ira Johnson receiving the Richard H Johnson Award



The Richard H. Johnson Award



Bob Whalen (son of Robert Whalen) accepts 2nd annual Richard Johnson Award: Dale Spencer, Earle Rudolph, Bob Whalen, Andy McHugh and Steve Roerman

PSTS-12 Wrap Up

For many of us, the cancellation of PSTS-12 scheduled for 30 OCT – 1 NOV 12 due to Hurricane Sandy was a big loss, because of the uniqueness of the classified setting, the quality of the presenters and their focus on required warfighting capabilities and new technologies. A few of the topics have been downgraded to unclassified and will be addressed at PSAR-13 including Future Force Development, Technology and National Security Policy related to C4ISR Integration, Land Warfare Munitions, and the Defense Ordnance Technology Consortium.

PSTS-12 was intended to showcase precision strike challenges. Its theme ***Precision Strike's Role in Sustaining U.S. Global Leadership*** was designed to concentrate presentation and discussion on preparing for future global challenges with a focus on emerging and rapidly evolving threats that will continually pose key challenges to U.S. national military capability.

Highly qualified leadership speakers and expert presenters were set to highlight the current and emerging threat environment, to focus on precision strike challenges and opportunities including new precision strike capabilities for global SOF needs, to spotlight a critical Intelligence Session related to long-range force projections and worldwide threat trends affecting major acquisition programs, and to address numerous riveting critical topics focused on new global challenges and issues for precision strike.

Geospatially enabled targeting materials, global reach-back for targeting support, joint fires support, GPS vulnerabilities, Tomahawk interoperability and cybersecurity were all topics of high interest to be briefed. And, then there were counter A2AD topics and the future of Air-Sea Battle.

Further, a Nuclear Panel consisting of experts from OSD and the Air Force Global Strike Command was set to discuss operations planning, nuclear challenges and issues, as well as nuclear infrastructure and nuclear systems. Also, USSTRATCOM, DTRA, Air Armament Center, and OSD were confirmed to brief strategic posture for regional deterrence, conventional prompt global strike, intelligence and sensor information, global strike requirements and operations, hard target munitions, and testing against hard and deeply buried targets.

However, all is not lost since many of the same Keynote Speakers and Session Chairs are already confirmed or have been invited to return for PSTS-13 scheduled for 22-24 OCT 13 to showcase ***Precision Strike in***

the New Strategic Environment at Home and Abroad. Keynote speakers who are likely to return to join us for PSTS-13 include Honorable Robert Work (Under Secretary of the Navy), Vice Admiral Scott Swift (Commander, U.S. Seventh Fleet), Lieutenant General Bradley Heithold (Vice Commander, USSOCOM), and Gregory Weaver (J-5, USSTRATCOM). Further, Major General David Halverson (Head of TRADOC) and an official from USAFRICOM wish to address PSTS-13 as well. Session chairs for Intelligence and the nuclear panel have already committed to PSTS-13. So, another extraordinary 3-day program is being structured.

Thoughts that VADM Swift cleared to share for this article include the return of peer competitors in the C7F AOR bringing combat challenges in ISR and Targeting, Command & Control, Force Protection, Offensive Reach, and Logistics and Sustainment. To meet these challenges, the Admiral believes that C7F needs Maritime Precision Strike which is an offensively-minded, offensively-armed force, with both capacity and capability in kinetic elements, with the result of non-kinetic defenses of which Electronic Warfare is the key. Further, he believes that a new maritime strike weapon is needed to replace the Harpoon Weapon System which dates to the 1970s. A challenge that Admiral Swift offers for our consideration: Should maritime precision strike include offensive sea mining and other mission payloads?

In the munitions arena, Jose Gonzalez—Director for Land Warfare and Munitions, Office of the Under Secretary of Defense for Acquisition, Technology and Logistics—wants us to be aware that munitions are on our leadership's minds today and likely to remain a topic of discussion for the years to come. This is a result of the shift in our defense strategy, coupled with the challenges of higher costs of preferred and priority weapons to satisfy those operational engagements. Jose notes that this presents a unique opportunity and challenges in a fiscally constrained environment, so we must work hard to develop affordable solutions. Our warfighters are counting on us!

So, please mark your calendars now for an enlightening PSTS-13 scheduled for 22-24 OCT 13. You are guaranteed a remarkable and riveting program that will concentrate on classified aspects of global presence in the Asia-Pacific Region and will also provide insights into “hot-spot” activities and evolving threats to strike warfare in the Middle East. ■

Maritime Defense of the Arabian Gulf (MDAG)

During the May-June 2012 timeframe, Central Command (CENTCOM), with facilitation from the Joint Staff J7 and the Naval Warfare Development Center and JTF 50, completed the development of the Maritime Defense of the Arabian Gulf (MDAG) Concept of Operations (CONOPs) and a Transparent Wargame development to prepare the U.S. Forces and our allies for the defense of the sea lanes from the Gulf of Oman through the Strait of Hormuz into the Persian Gulf.

The MDAG and its CONOPs addressed the process under which the Fifth Fleet and other Allies would operate to protect the sea lanes of commerce (SLOC), primarily to keep open the flow of oil from Kuwait and Saudi Arabia and the United Arab Emirates to support world demands.

The Allied forces included U.S. Navy ships, i.e. carriers, Aegis ballistic missile defense ships, L-class ships, LCS ships (not yet deployed in the AG), submarines and mine hunters, plus U.S. Army Patriot missiles and unmanned air systems (UAS) and USAF F-22's, F-15's, AWACs and C4I installations.

The Iranians possessed long range surface-to-air missiles, Integrated Air Defense (IADs) structure, fighters, several squadrons of fast attack craft, intelligence gathering ships, mini-submarines of the YONO-class, some larger diesel electric

subs, wing-in-ground effect squadrons, some larger surface combatants, and many mine laying ships of various sizes. They also possess very sophisticated shore and afloat radar capability. They routinely practice mine laying near the Strait of Hormuz and fearlessly tried to provoke reaction from the Allied and U.S. forces under 5th fleet command.

This MDAG CONOPs and Transparent Wargame were designed to develop a robust Command and Control Structure and reactive posture to find, fix, assess, and engage (if necessary). While this CONOPs and Wargame were designed to develop the process to protect the SLOCs in the Gulf, it also served to highlight some of the technology gaps for the U.S. and allied forces.

It became very obvious in the find, fix, and assess process that is very important in the Arabian Gulf (AG) Area of Responsibility (AoR) to have a very adequate, robust and secure intelligence, surveillance and reconnaissance (ISR) capability.

There is a need for E-2C, AWACS, land and ship based radars, ESM capability, fighter and attack aircraft sensors, unmanned air vehicle sensors, persistent endurance sensors e.g. aerostats (used in Operation Enduring Freedom) and National Technical Means (satellites) plus as much HUMINT as available.

An important issue in the Arabian Gulf is the effects of the

environment on the sensors. The operators must deal with severe sand storms and radio frequency ducting most of the time. The history of the Gulf War issues (from 1990 onward) and the earlier 1988 incident where the USS Vincennes shot down the Iran Air Flight 655 served to illustrate how surface and evaporation ducting can negatively affect targeting and engagement capabilities.

A lack of unmanned maritime systems for ASW and Mine Warfare places a heavy burden on the few manned assets that are deployed. The problem is that the U.S. has no production of unmanned surface vehicles (USVs) or unmanned underwater vehicles (UUVs) since it is early in the development phase of programs of record. Some prototypes have been made available to the fleet.

A lack of adequate UASs from ships and land also put a stress on the ISR coverage required and increased the danger of putting manned aircraft within missile engagement envelopes.

The MDAG CONOPs and Wargame process was very helpful to the warfighters in planning how and where and when to deploy both non-lethal and lethal assets if actions in the Gulf turns from saber rattling to actual attacks or disruption of shipping by the Iranian forces in order to keep the SLOCs open through the Arabian Gulf and the Strait of Hormuz. ■

New Dual Targeting Capability for JSOW C-1

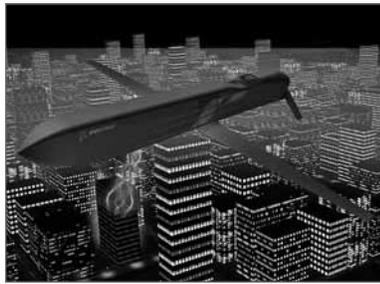
The U.S. Navy has successfully demonstrated the dual targeting capability of Raytheon's Joint Standoff Weapon (JSOW) C-1. Two recent tests during the program's

integrated test phase prove the weapon can engage challenging stationary targets. Previous testing in the integrated test phase demonstrated JSOW C-1's capability

against moving maritime targets. Both tests occurred at the U.S. Naval Air Weapons Station in China Lake, CA. ■

Knock Out for CHAMP

A high-powered microwave weapons test in the Utah desert may change future warfare as the missile successfully defeated electronic targets with little to no collateral damage.



Artists Rendering of Boeing CHAMP

In its first operational test flight last October, Boeing and the U.S. Air Force Research Laboratory (AFRL) Directed Energy Directorate, Kirtland AFB, NM, successfully tested the Counter-electronics High-powered Microwave Advanced

Missile Project (CHAMP) during a flight over the Utah Test and Training Range that was monitored from Hill AFB in Utah.

CHAMP, which renders electronic targets useless, is a non-kinetic alternative to traditional explosive weapons that use the energy of motion to defeat a target.

During the test, the CHAMP missile navigated a pre-programmed flight plan and emitted bursts of high-powered energy, effectively

knocking out the target's data and electronic subsystems.

CHAMP allows for selective high-frequency radio wave strikes against numerous targets during a single mission.

"This technology marks a new era in modern-day warfare," said Keith Coleman, CHAMP program manager for Boeing Phantom Works. "In the near future, this technology may be used to render an enemy's electronic and data systems useless even before the first troops or aircraft arrive."

CHAMP is a multi-year, joint capability technology demonstration (JCTD) that includes ground and flight tests. ■

To the PSA Membership:

The Precision Strike Association needs your help. Our membership roster is waning at a time when this community needs even greater advocacy.

If your company or your organization (DoD, FFRDC or National Lab) plays a role in precision strike, then it needs to belong to this Association dedicated to the art and science of precision engagement concepts and technology. As a member of the Precision Strike Association, your company or your organization distinguishes itself as part of a select community that plays a key role in our nation's defense.

You will become a participant in PSA's open forum where the voice of the Precision Strike Community can be heard in the open exchange of ideas.

Here the art and science of Precision Strike, including all aspects of the kill chain, is advocated and advanced. Here important issues are socialized with a national and global perspective with key DoD and Industry leaders.

Please, if your company or organization is not presently a member, consider joining. If you would like further information or details on membership, feel free to contact us at www.precisionstrike.org

PSA offers two types of membership to meet the needs of the important precision engagement community: **corporate membership**, in which a company joins as a unit, and **individual membership**, when it is more appropriate for a career or DoD professional or organization leader to join.

Annual membership dues are based on your organization's defense-related revenue. This includes both prime and subcontracts for products and services.

Less than \$1 million: \$100

\$1 million-\$9.9 million: \$300

\$10 million and over: \$750

Corporate membership entitles your company to list an unlimited number of employees to receive benefits.

There is no membership fee for Government employees. ■



F-35 Weapons Testing Underway

The F-35A began the integration phase of weapons testing in late October at Edwards AFB, CA, when the Conventional Takeoff and Landing (CTOL) aircraft successfully completed the first in-flight test with an AIM-120 Advanced Medium Range Air-to-Air Missile.

It was the first time a weapon communicated with the aircraft during flight using a data link. The program milestone rounded out a successful month of flight test, which also included inert weapons separation tests of both the AMRAAM and the Joint Direct Attack Munition (JDAM).

“In October, we were able to begin weapons separation testing with the JDAM and AMRAAM. We proved we can carry them safely and that the shapes, which matched the exact mass properties of the real weapons, could separate from the aircraft safely. Now, with the integration testing, we’ve initially proved the aircraft can talk to the weapon and that the weapon can talk to the aircraft,” said USAF Col. Roderick L. Cregier, 412th Test Wing, F-35 program manager.

Prior to Oct. 26, mass models with no internal electronics were used during all F-35A weapons testing. The AIM-120 AMRAAM used during the integration test contained the same electronics as a full-up missile, but without the rocket motor.

Successful integration testing, along with the safe separation releases in October means that the F-35 Integrated Test Force can con-



F-35A weapons testing

tinue progressing towards the weapon delivery accuracy test phase and live fire testing scheduled to begin in early 2013.

“Starting in February and continuing through the end of April, we are anticipating releasing roughly two weapons per week. This is going to be just the beginning of what I would characterize as the most ambitious weapons integration program in the history of tactical aircraft,” said Cregier.

The F-35A is designed to carry a payload of up to 18,000 pounds using 10 weapon stations. The F-35A fea-

tures four internal weapon stations located in two weapon bays to maximum stealth capability. The CTOL aircraft can also utilize an addi-

tional three weapon stations per wing if required.

The F-35B, the short takeoff and vertical landing F-35 variant, accomplished a significant test milestone in early August when the aircraft successfully released a weapon in flight. BF-3 executed an inert 1,000-pound GBU-32 JDAM separation over water in an Atlantic test range while traveling at 400 knots at an altitude of 4,200 feet.

The release was the first time for any version of the F-35 to conduct an airborne weapon separation, as well as the first from an internal weapons bay for a fighter aircraft designated for the U.S. Marine Corps, the United Kingdom and Italy. The milestone marks the start of validating the F-35’s capability to employ precision weapons and allow pilots to engage the enemy on the ground and in the air. ■



STOVL F-35 variant

MOP Ready for Prime Time

The nation's largest conventional bomb, the Massive Ordnance Penetrator (MOP), is ready for action.

In a report to the U.S. Congress, Michael Gilmore, the Pentagon's director of operational testing, said that tests conducted with the GBU-57, a 20-foot long, 30,000 pound GPS-guided bomb, have demonstrated that the redesigned weapon is now able to hit and destroy deeply buried targets.

Gilmore said MOP, which packs 5,600 pounds of explosives, "is now capable of effectively prosecuting selected hardened, deeply buried targets." While he did not discuss any specific uses for the bomb, Gilmore said it is intended to hit targets "requiring significant penetration"



USAF personnel in front of a mock-up of the MOP at Whiteman AFB, MO

that are located in "well-protected facilities."

Boeing was awarded \$82 million for the system modifications and enhancements to the bunker buster. Gilmore's report says that the modifications underwent ground tests followed by five bomb drops from a B-2 bomber on the White Sands Missile Range between June and October 2012.

The Precision Strike Association's 16th annual William J. Perry Award went to the Massive Ordnance Penetrator Team. Although the MOP Team—the U.S. Air Force, The Boeing Company and the Defense Threat Reduction Agency—achieved technical excellence in the development, test and fielding of the advanced weapon, senior defense officials acknowledged that MOP had some shortcomings against some of Iran's deepest bunkers that needed fixing.

The MOP Quick Reaction Capability will satisfy an urgent operational requirement for attacking the most challenging types of hardened and underground targets and is



The B-2 stealth bomber is the only aircraft capable of delivering the 30,000 lb weapon.

more lethal than any current hand and deeply buried target conventional weapon.

The MOP program was launched in 2004, with flight tests from a B-52 bomber in 2010. It transitioned to an Air Force Quick Reaction Capability program and was integrated on the B-2 stealth bomber.

The MOP incorporates proven technology into its design, including Joint Direct Attack Munition GPS guidance, ATACM actuators and controllers and Small Diameter Bomb fuzes. The MOP program has demonstrated penetrator survivability, fuze function, and high-order detonation.



Boeing manufactures the MOP

PSAR-13, Continued from page 1 pivot to the Asia-Pacific Region. Mr. Kendall will highlight acquisition opportunities in meeting precision strike challenges in the new strategic environment. Rear Admiral Snyder will respond to the security environment in which the United States military forces remain actively engaged, and he will focus on the rebalance for the new strategic environment. Major General Kwast will present the Air Force's perspective related to QDR-14 initiatives.

They are four of a host of numerous top visionaries and strategy experts who will talk about the

Administration's priorities, policies and strategies that impact precision engagement to help us better define the future of precision strike. Wide-ranging challenges and activities of paramount interest to the precision strike community will be discussed. The two-day review will conclude with a couple of international perspectives on the Joint Strike Fighter and a briefing from a Joint Strike Fighter Program Office weapons systems program manager on precision engagement in the new strategic environment.

A special feature of PSAR-13 will be the presentation of 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. Dr. Paul Kaminski—Director, Defense Science Board—will present this year's award on behalf of Dr. Bill Perry.

Please join our distinguished leadership speakers as they showcase critical challenges facing our great nation related to the new strategic environment. Review page 15 of this Digest for a snapshot of major topics to be addressed during PSAR-13. ■

News Briefs

Viper Strike Scores

MBDA's GBU-44/E Viper Strike munitions launched from a Cessna Caravan test aircraft scored direct hits against eight high-speed vehicles in a recent two-day test at the White Sands Missile Range, NM.

Viper Strike has been used in combat by both manned and unmanned aircraft, and will deploy next on the USMC KC-



Viper Strike Munition

130J Harvest HAWK aircraft. Viper Strike is launched from a common launch tube that can be carried either internally or externally from the host aircraft, helicopter or UAV.

Viper Strike is a glide munition capable of precisely hitting targets from extended standoff ranges using GPS-aided navigation and an end-game, semi-active laser seeker. Its small, 44-lb. highly agile airframe and quiet attack profile provides a covert launch and low collateral damage effects against stationary and high speed moving targets.. ■

APKWS is a Hit

As a result of its continued success in theater, the U.S. Navy is buying more BAE Systems Advanced Precision Kill Weapon System (APKWS) rockets with the company recently signed a \$28 million full-rate production contract with options. The latest award extends production through 2014.

The APKWS rocket is the only fully qualified guided 2.75-inch rocket that uses semi-active laser guidance technology to strike soft and lightly armored targets in built-up and con-



Advanced Precision Kill Weapon System fined areas. The company produces the mid-body guidance kit, which changes a standard unguided rocket into a precision laser-guided missile.

More than 100 of the APKWS rockets have been fired in action in Afghanistan since the Marines first deployed the weapon in March 2012. None of the APKWS rockets fired has missed its target due to failure after launch. The APKWS rocket is qualified on the AH-1W and UH-1Y helicopters. ■

50kw High-Energy Laser Weapon

Rheinmetall has successfully tested its new 50kW high-energy weapon technology demonstrator. Conducted at the end of November, the test encompassed the entire operational sequence from target detection and tracking to target engagement.

The 50kW HEL weapon technology demonstrator consisted of two functional models: a 30kW weapon station integrated into an Oerlikon Revolver Gun air defense turret for static and dynamic tests, coupled



High-energy Weapon Technology Demonstrator

with an Oerlikon Skyguard fire control unit; and a 20kW weapon station integrated into a Revolver Gun turret of the first-generation, patched in for static tests. There were also additional modules for supplying power.

A 15mm-thick steel girder was cut through at a distance of 1,000 meters. ■

High Jenks

On Jan. 18, a retirement ceremony for Commander Byron W.

Jenkins, USN, was conducted at the Women's Memorial located at Arlington National Cemetery.

Rear Admiral William F. Moran—Director, Air Warfare— officiated. Two of PSA's Executive Board Members—Ginny Sniegon and Earle Rudolph—were present to bid CDR Jenkins farewell.

Better known as "Jenks" to the precision strike community, he served as one of the military advisors to PSA. Since October 1995 when Jenks received his wings and was designated a Naval Flight Officer, he flew various fighter aircraft, including the F-14 Tomcat and F/A-18. Jenks' assignments spanned the country with his latest tour of duty at the Pentagon where he served in OPNAV N98 as a requirements officer leading the Weapons Section.

Jenks will be sorely missed for his terrific expertise and fine briefing skills. Jenks, best of luck! We're looking forward to having you join us in a civilian capacity at future PSA events. ■



CDR Byron W. Jenkins, USN

RAF Precision Attack

Brimstone missiles are carried by RAF Tornado aircraft and a new contract with MBDA will increase UK stocks by replenishing weapons used in Afghanistan and Libya.



RAF Bullish for Brimstone

The Dual Mode Seeker Brimstone missile is used by RAF crews to engage moving or static targets during the day or at night with pinpoint accuracy. The weapon's precision guidance capability means that the pilot is able to engage fleeting targets with extreme accuracy.

Wing Commander Andy Turk said "Brimstone is being used to great effect by the RAF's Tornado Force in Afghanistan and was also invaluable during the successful air campaign in Libya. It is very popular with our air crews because of its flexibility, accuracy and reliability." ■

Excalibur over Kandahar

Gunners of Bravo Battery, 2nd Battalion, 3rd Field Artillery Regiment, early this year shot an Excalibur round out of a M-777 howitzer cannon for the first time at Forward Operating Base Frontenac.

The Excalibur is a separate loading, 155mm, extended-range, precision-guided projectile. The M-777 is designed to be a digitally programmed weapon and is about 9,800 pounds lighter than the more commonly used M-198 Howitzer, and is



Excalibur

reportedly more accurate. The Excalibur is intended to be used against personnel and light material such as command posts and air defense radars. It is guided to its target by the global positioning system, or GPS. ■

Army's New Near-Precision Artillery Round

Soldiers from the 4th Battalion, 27th Field Artillery Regiment, from Fort Bliss, TX, are the first troops to fire the XM1156 Precision Guidance Kit (PGK)

The PGK is a global positioning system guidance kit with fuzing functions that turns the U.S. Army's conventional stockpile of 155-mm high explosive M549A1 and M795



XM1156 Precision Guidance Kit

cannon artillery projectiles into near precision munitions. The Program Executive Office for Ammunition at Picatinny Arsenal, NJ, is scheduled to begin fielding the PGK to troops in Spring 2013 via an Urgent Material Release.

The PGK corrects the ballistic trajectory of the conventional projectile to improve the round's accuracy to less than 50 meters Circular Error Probable, known as CEP. The prime contractor for PGK is Alliant Techsystems. ■

G-CLAW Standoff Precision Guided Munition

Textron Defense Systems has entered into a cooperative research and development agreement (CRADA) with the U.S. Special Operations Command Program Executive Office (PEO) Fixed Wing for development of a standoff precision guided munition capability.

Initial activities will focus on Textron Defense Systems' Guided Clean Area Weapon (G-CLAW), a cost-effective, lightweight, guided precision unitary weapon providing anti-personnel and anti-material capabilities, as well as features for low collateral damage and hazardous unexploded ordnance (UXO) prevention.

They intend to integrate the G-CLAW into PEO Fixed Wing's common launch tube dispenser and complete the required testing to secure flight and weapons safety certifications. From there, they will conduct inert and live-fire demonstrations of precision unitary munition delivery from a tactical carrier aircraft such as the MC-130W Dragon Spear. Integration activities will culminate in an end-to-end, live-fire demonstration. ■

Perry Award to be Bestowed at PSAR-13

A high point of the 2013 Precision Strike Annual Review (PSAR) will be presentation of the Precision Strike Association's 17th annual William J. Perry Award, which recognizes superb contributions to precision strike systems.

PSA received 14 excellent nominations from the U.S. military services, government, and industry, and the selection committee has a very difficult decision in front of them.

The selection will be made by Feb. 26, at which time all the nominators will be advised of the committee's decision and the winner will be notified. The William J. Perry Award Ceremony will take place as part of the Precision Strike Annual Review luncheon program on 19 March.

"It is gratifying to see that folks made it a priority to recognize their colleagues' dedication and accomplishments. It is this mutual respect and commitment that makes the Precision Strike community so successful," said Suzy Kennedy, PSA Chairperson.

The prestigious award is presented annually to programs that strengthen the country's national security by applying precision strike capability to Department of Defense systems.

The Perry Award recognizes public or private sector leadership or achievement that results in significant contributions to the development, introduction or support of precision strike systems. The recipient must have strengthened our national security by direct application of precision strike capabilities to DoD systems and/or to the enhancement of our industrial



technology base for application to precision strike technology.

Dr. Perry served as the 19th Secretary of Defense during the Clinton Administration (Feb. 3, 1994 to Jan. 23, 1997). He received B.S. (1949) and M.A. (1950) degrees from Stanford University, and a Ph.D. in mathematics from Pennsylvania State University in 1957.

From 1977 to 1981 Perry served as Under Secretary of Defense for Research and Engineering, where he had responsibility for weapon systems procurement and research and development. Among other achievements, he was instrumental in the development of stealth aircraft technology.

As Defense Secretary, Perry devoted much time to restructuring defense acquisition policy and procedure, pursuing measures on acquisition reform begun when he was a Deputy Secretary. In March 1996, Perry approved a new DoD comprehensive acquisition policy that emphasized commercial practices and products. Perry considered these reforms one of his most important accomplishments, and saw savings generated by the new practices as part of the key to adequate funding of the military in an era of continuing tight budgets.

Perry's successful career in the Department of Defense actually spanned eight years of profound changes – four years as Under Secretary for R&E, a year as Deputy Secretary from 1993 to 1994, and three years as Secretary. After he left the Pentagon, Perry returned to San Francisco to join the board of Hambrecht and Quist as a senior adviser. He also



rejoined the faculty at Stanford University.

Named after the former U.S. defense chief and precision strike weapons advocate, others to have received the prestigious Perry Award include: Dr. Perry, the first recipient (1997); former Vice President Dan Quayle (1998); RADM Walter M. Locke, USN (Ret.) (1999); The Johns Hopkins University, Applied Physics Laboratory (2000); NAVSTAR Global Positioning System Joint Program Office (2001); Rep. James V. Hansen (R-UT) (2002); Terry Little, a well-respected acquisition reform pioneer (2003); USAF/USN/Boeing JDAM Program Team (2004); U.S. Warriors of Operation Enduring Freedom and Operation Iraqi Freedom (2005); The Tactical Tomahawk Team (2006); The Small Diameter Bomb Team (2007); Guided Multiple Launch Rocket & High Mobility Artillery Rocket System Team (2008); and, U.S. Special Operations Command Stand-Off Precision Guided Munitions (SOPGM) Quick Reaction Team (2009); the Sniper Advanced Targeting Pod (2010); the Project Dragon Spear Joint Acquisition Task Force (2011); and, the Massive Ordnance Penetrator (MOP) Team (2012). ■

Please plan to join us!

PRECISION STRIKE ANNUAL REVIEW (PSAR-13)

19-20 March 2013

WATERFORD AT SPRINGFIELD - SPRINGFIELD, VA

Theme

Precision Engagement—New Strategic Environment

Confirmed Keynote Speakers

Congressman Mac Thornberry — R-13th District, TX

Honorable Frank Kendall — USD(AT&L)

Rear Admiral Rick Snyder, USN — The Joint Staff (J-5)

— Showcasing —

Military Departments & International Precision Weapons Sessions
Rebalance to the Asia-Pacific Region & “Hot Spots” in the Middle East
Critical Perspectives—National Security, Defense Policy, and the Budget
Precision Weapons & Munitions for Tomorrow’s Strategic Environment
Future Force Development
ASD(R&E) S&T & AFRL Initiatives for the Asia-Pacific Region
Technology & National Security Policy—C4ISR Integration
QDR-14 Precision Engagement Initiatives
Mid- and Far-Term Challenges for Precision Engagement
Acquisition Opportunities in Meeting Precision Strike Challenges
USSOCOM’s Perspective on Delivering Precision Strike Capabilities
Defending America’s Shining City on a Hill
Be Careful What You Wish For
Joint Strike Fighter—Precision Engagement in New Strategic Environment

Presentation

17th Annual William J. Perry Award

(Special remarks by Dr. Paul Kaminski—Chairman, Defense Science Board)

Information & Registration — Call: 703-247-2599

E-Mail: info@precisionstrike.org Visit: www.precisionstrike.org

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CALENDAR OF EVENTS

Precision Strike Annual Review (PSAR-13)

Date: March 19-20, 2013

Theme: *Precision Engagement — New Strategic Environment*

Location: Waterford at Springfield — Springfield, VA

Precision Strike Technology Symposium (PSTS-13)

Date: October 22-24, 2013

Theme: *Precision Strike in the New Strategic Environment at Home & Abroad*

Location: Johns Hopkins University/ Applied Physics Laboratory — Laurel, MD

Sponsorships and exhibit opportunities available for all events—for more information email info@precisionstrike.org or visit our website: www.precisionstrike.org

IN THE NEXT ISSUE... Precision Strike Annual Review Wrap-up

Membership Application – Precision Strike Association

The undersigned, desiring to support and cooperate in the activities of the Precision Strike Association, applies for Membership:

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Annual membership dues are based on your organization's defense-related revenue. This includes both prime and subcontracts for products and services. Please select your dues category below.

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- \$15 per annum of dues is for a one-year subscription to National Defense magazine for the paid memberships. The government membership includes a free subscription to National Defense magazine.

Payment: Check (Payable to Precision Strike Association)

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