

Airpower Against Ships

By Rebecca Grant

USAF is developing the tactics and technology needed for operations against targets in the vast Pacific.

At Dyess Air Force Base in Texas, armorers loaded a B-1 bomber from the 337th Test and Evaluation Squadron. Tucked in the bomb bay on Feb. 4 was a weapon prototype ready for its third in-flight test: a Long-Range Anti-ship Missile, built to scourge hostile naval vessels, at long range, and in the midst of enemy jamming and electronic clutter.

The B-1 crew released the weapon over the cold seas of the Navy's Pacific test range off Point Mugu, Calif. The LRASM guided to several waypoints receiving updates from a data link in flight, and skimmed past obstacles at low altitude.

Think bombers testing anti-ship weapons are on the fringe of airpower? Not so. The mission is a natural, according to Dyess crews that've participated in testing over the last two years. "We can not only carry more of this weapon than any other platform, but our versatile speeds that have proven useful in the past decade in Afghanistan will also prove useful in the vast maritime environment," explained Capt. Alicia Datzman, LRASM project officer, after one such test. "With our loitering and refueling capability we can hang

out for a while waiting on a specific target set or sprint to where we need to deliver these weapons," she said in a press release.

What's the goal? Maritime domain awareness and options for maritime strike have become a critical part of maintaining the global commons. The Pacific rebalance, daily operations around the Persian Gulf, and the 2014 Third Offset strategy all rely on watching what's moving on the seas and responding when needed. Peers like China with new destroyers, cruisers, and carriers may be targets if they act aggressively—and so may be terrorists and pirates. Either way, USAF airpower contributes long-range punch in surveillance and strike.

SHIP HUNTING

B-52s participated in maritime exercises in the Baltics in 2014. The B-52 has also been fitted with a Dragon Eye AN/ASQ-236 active electronically scanned array radar pod in part to improve search for maritime targets. And with an arsenal of new weapons and tactics, airmen are honing skills for maritime search and strike.

Finding and sinking ships were important components in the maturation

of airpower, from the sinking of SS *Ostfriesland* to B-25s skip-bombing in the Pacific.

Then there was the Cold War. The Soviet navy grew into a formidable adversary. Two other jolts came 15 years apart and announced the shift from bombs and torpedoes to missiles as the weapons of choice. In 1967, Egypt used patrol boats and cumbersome Styx missiles to sink the Israeli destroyer *Eilat*. Then in 1982, sea-skimming Argentine fighters guided by a P-2 Neptune fatally damaged HMS *Sheffield* during the Falklands War.

Consequently, maritime operations re-emerged as a major mission area for USAF in the 1980s. "As the Falklands conflict demonstrated, airpower is a critically important part of successful maritime operations. We will be putting more emphasis on such collateral roles as sea-lane protection, aerial minelaying, and ship attack," stated Air Force Chief of Staff Gen. Charles A. Gabriel, according to a 1982 *Air Force Magazine* article.

As a result, the B-52s were modified to carry the Harpoon missile. This 1,145-pound weapon boasted a penetrating warhead, radar guidance, and a range better than 60 miles.



Here: USS Schenectady, a decommissioned tank landing ship, lists after being struck by JDAMs during exercise Resultant Fury off the coast of Kauai, Hawaii, in 2004. Below left: Gen. Mark Welsh III, Chief of Staff, spoke of the importance of joint systems and procedures to connect ships and fifth generation aircraft. Below right: Then-PACAF commander Gen. Hawk Carlisle said some Pacific region allies are doing a good job of developing airpower to contribute to maritime defense and security.

Actually sinking ships was not the top priority. Knocking them out was the first step. The idea for Harpoon was to obtain a “mission kill” on a naval vessel. Once damaged, the ship was no longer as high a threat, and aircraft could return later with direct attack bombs to destroy it as needed. A Harpoon strike mission kill might disable the target ship’s defenses or eliminate its ability to see the battlespace.

The US Navy’s maritime strategy as articulated by service Secretary John F. Lehman Jr. in the 1980s called for aggressive use of carriers and surface action groups against the Soviet navy. The B-52G armed with Harpoon stood

ready to take up several different roles in this air-sea battle.

On perimeter defense, the B-52Gs could roam with tanker support and surveillance by AWACS and Navy systems. B-52Gs could strike Soviet navy targets on the flanks of the US carrier battle groups, leaving them free to concentrate on offensive strikes against Soviet surface combatants.

“As the E-3A located distant enemy forces, it would vector both the carrier aircraft and the B-52s into the target range. With an Air Force KC-10 tanker tasked to provide fuel, this air armada could remain aloft for long periods. If Harpoon-equipped B-52s were joined

by B-52s carrying mines, the force’s versatility would increase considerably. Mine-capable B-52s could establish mine fields in significant enemy approaches, such as harbors and choke points. Minefields would force the enemy fleet to disperse, making individual ships more vulnerable to Harpoon attack,” wrote Donald D. Chipman and Maj. David Lay in 1986 in *Air University Review*.

The key determinant at the time was the 200-mile-range missiles carried by Soviet Backfire bombers. Added to that, Soviet surface ships carried missiles with a range of 250 miles. Soviet doctrine called for the fleet to



USAF photo by SSgt. Evelyn Chavez



USAF photo by 2nd Lt. Jake Bailey



disperse when under attack. Single Soviet navy ships could roam the edges of the battlespace, posing potentially lethal threats to US ships and aircraft. Adding the B-52Gs to the mix extended sea superiority in both range and time.

The Air Force based a squadron of B-52s with Harpoons on Guam and another at Loring Air Force Base in Maine. Backed with weapons, concepts, and tests, the B-52 was at a peak phase as a sea power weapon. This was dangerous, close-in work, but analysis showed a powerful combat and deterrence payoff. The ideal of course was for patrolling B-52s to lurk over a choke point like the Kurile Islands in the Pacific or the Greenland-Iceland-United Kingdom gap and threaten to plink off Soviet navy vessels.

Toward the end of the Cold War doubts crept in about whether Harpoon would correctly identify the “red” or enemy target. In December 1988, an F/A-18 from USS *Constellation* launched a Harpoon missile during an exercise off Kauai, Hawaii, en route to a Western Pacific deployment. The missile accidentally acquired the Indian freighter *Jagvivek*, which had strayed onto the range. The Harpoon carried an inert warhead, but one Indian crew member was killed. Concerns lingered about the use of Harpoon with allied or neutral shipping in the area, but soon the importance placed on anti-ship tactics receded with the demise of the Soviet navy.

It has been the recent expansion and modernization of China’s navy that has caused airmen to dust off options for finding and attacking ships.

In 2004, Pacific Air Forces Commander Gen. Paul V. Hester put together an exercise combining bombers,

JSTARS, and the GPS guided Joint Direct Attack Munitions (JDAMs). Their target? A decommissioned US Navy ship USS *Schenectady*.

“The capability for airmen to rapidly respond anywhere in the Pacific to sink naval vessels in all weather, day or night, is crucial for the Pacific Command. Resultant Fury is designed to demonstrate the capability to engage and disable ships under way, ... thus providing the combatant commander an airpower ability to rapidly conduct maritime interdiction against enemy combatants,” Hester said in November 2004, according to a website about the exercise.

Nine JDAMs and four GBU-10s successfully hit USS *Schenectady*.

“The only sustained capability that Navy and Air Force aircraft currently have to engage multiple moving maritime targets is inhibited by bad weather,” said then-Maj. Gen. David A. Deptula, at the time PACAF’s director of air and space operations. “Using satellite guided bombs allows the combatant commander the ability to use aircraft to conduct maritime interdiction in all weather environments. When matched with long-range aircraft, like bombers, that gives the [commander] the ability to conduct maritime interdiction with minimum warning anywhere in the Pacific,” in hours, Deptula told Air Force News. He is now head of the Air Force Association’s Mitchell Institute for Aerospace Studies.

On the plus side, Resultant Fury demonstrated an all-weather attack capability. However, the JDAM was not an optimal weapon for striking ships. Various issues from fusing to guidance made clear that the Air Force and Navy



needed better capabilities, beginning with surveillance and tracking for maritime domain awareness.

AirSea Battle captured the urgency. Air Force Chief of Staff Gen. Mark A. Welsh III and Chief of Naval Operations Adm. Jonathan W. Greenert wrote of the importance of improving “systems and procedures for Joint Tactical Networking to connect today’s aircraft and ships with new fifth generation aircraft such as the F-35 and F-22.”

The threat has changed and grown. According to the US-China Economic and Security Review Commission, China’s navy is heading for 351 ships by the year 2020. China commissioned 17 warships in 2013, and if trends hold, that navy will become the biggest in the Pacific.

“Given China’s growing navy and the US Navy’s planned decline in the size of its fleet, the balance of power



USAF photo

Far left: MSgt. Troy Drasher inspects a Long-Range Anti-ship Missile before it is loaded onto a B-1 at Dyess. Above: A black circle added to the photo shows where a LRASM pierced a 260-foot mobile ship target during DARPA testing in August 2013. Left: A B-1 launches the LRASM. The missiles are designed to be launched from both airplanes and ships.

With Dragon Eye, the B-52 is better equipped for maritime search, too. The radar in the pod produces high resolution mapping, “enables target detection, tracking, and subsequent engagement in situations where existing electro-optical targeting pods cannot,” Air Force Global Strike Command spokesman Maj. Brett Plummer said in a press release.

Dragon Eye’s capacity “leverages the existing tremendous range, loiter time, and communication capabilities of the B-52 airframe in support of our Maritime Domain Awareness mission,” said Col. Danny Wolf, Pacific Air Forces’ chief of Integrated Air and Missile Defense and Warfighter Integration, in a June 2014 news release. “Because of the enormous size of the PACOM [US Pacific Command] area of responsibility, the MDA mission is a significant challenge for the combatant commander.”

FORWARD TARGETING

Most desired in the current doctrine for holding ship targets at risk is a broad set of capabilities that add up to forward targeting. Fleets disperse; forward targeting enables aircraft, unmanned platforms, and even weapons to extend their accuracy and range to counter dispersal techniques and protect friendly forces. Identifying belligerent naval vessels in the midst of fishing fleets and friendly navies calls for impeccable discrimination.

What’s in the quiver? Several years of quiet development and testing have delivered a growing arsenal of weapons and tactics for anti-ship operations. Many of the new capabilities are old stalwarts with upgrades enabling in-flight retargeting.

One of the first was the Tactical Tomahawk. Ironically, the Navy retired

most of its original variant of anti-ship Tomahawks in the 1990s.

Welsh and Greenert gave the example of how “an Air Force F-22 provided updated targeting information to a Navy submarine-launched Tomahawk missile.” Credit first the improvements in turning the Tomahawk from a weapon that required days of preplanning of its route to the Block IV version with GPS capability and a two-way satellite data link. The links enable controllers to flex the Tactical Tomahawk by incorporating updated location information on moving targets. Forward targeting allows advanced aircraft—those with sensors and the right data links—to pass targeting information from one platform to another. More improvements in the sensor could support advanced ship targeting techniques.

Rapid in-flight retargeting is becoming the gold standard for long-range attacks against ship targets. Recently, the Navy demonstrated the process using an F/A-18 to relay updated location information to a Tomahawk cruise missile.

In January 2015, the destroyer USS *Kidd* fired the Block IV Tomahawk at a moving ship target on an ocean test range off California. An F/A-18E in flight sent updated target location information to the missile.

and presence in the region is shifting in China’s favor,” the commission stated.

Commanders need a variety of options for responding. Hostile ships may be patrolling, posturing, “scraping paint,” or launching hostilities. Those options begin with establishing maritime domain awareness. Surveillance and detection over a large ocean area are crucial, too.

The arsenals of guided missiles depend on initial surveillance and tracking. USAF’s RQ-4 Global Hawk unmanned surveillance aircraft and U-2s in the Pacific Theater aren’t only monitoring land targets. They are capable of wide-area surveillance over the ocean as well.

Global Hawk began flights out of Misawa AB, Japan, in summer 2014. Operating from Japan’s northern tip puts Global Hawks in position to patrol areas including the East China Sea.



USAF photo by MSgt. Greg Steele

A B-52 with an AN/ASQ-236 radar pod under its wing takes off from Barksdale AFB, La., in April 2014 during the first test flight of the pod on a B-52.

Deputy Secretary of Defense Robert O. Work praised the developments as a way forward: “What happens if we take another step and just make an advanced seeker on the Tomahawk, rather than building a new missile?” In his US Naval Institute speech in San Diego in February, he continued, “We believe if we make decisions like that, that we will be able to outturn potential adversaries and maintain our technological superiority.”

Harpoon Block II is also in the line-up. The current Harpoon Block II is a more sophisticated missile with GPS guidance and a range advertised at more than 74 miles. But it’s the endgame that matters. Harpoon remains a subsonic missile, and its necessary size limits the number of weapons that land- and sea-based fighters carry. Improvements make Harpoon Block II capable of anti-ship strikes “even in crowded ports,” according to manufacturer Boeing.

Close in, the Advanced Anti-radiation Guided Missile (AARGM) that will be carried by F-35s has interesting applications against ships. Designed as the follow-on to the High-speed, Anti-radiation Missile (HARM), the AARGM can engage relocatable targets even if operators shut down the radars. An internal broadcast receiver delivers information to the missile and allows sharing of data to confirm targets and conduct other situation awareness tasks, and those capabilities apply to naval warships emitting as well.

Other Pacific friends and allies are extending what their fighters can do in maritime targeting. “Singapore is doing very innovative things with their F-15s,

notably in evolving the capabilities of the aircraft to contribute to maritime defense and security. We are looking very carefully at their innovations and can leverage their approach and thinking as well,” said then-PACAF Commander Gen. Herbert J. “Hawk” Carlisle in a *Breaking Defense* interview at AFA’s Pacific Forum in December 2013.

DISCRIMINATING MISSILE

And so, back to LRASM.

“LRASM needed the ability to engage a heavily defended moving target over long ranges, with or without a data link or GPS in the target area,” said Walt Bowen, in a March 2014 press release. He was project manager of a Johns Hopkins Applied Physics Lab team assisting with the requirements. These capabilities were needed “while also having the ability to autonomously discriminate the desired target from other ships.”

To proceed quickly, the LRASM was based on the Joint Air-to-Surface Stand-off Missile-Extended Range (JASSM-ER) airframe, allowing rapid integration with the B-1. Flight tests in 2013 led to the live fire test with a B-1 this February.

“Once operational, LRASM would play a significant role in ensuring military access to operate in open ocean/blue waters and the littorals due to its enhanced ability to discriminate and conduct tactical engagements from extended ranges,” noted a Feb. 9 DARPA announcement.

It was a technology advance for the maritime domain, too. “Unlike the JASSM’s fire-and-forget mentality, this new technology gives you the chance to fire and change your mind,” said Maj. Shane Garner, 337th TES, in a press release. “Because of the standoff feature these weapons possess, they tend to be airborne for some time, and for us to be able to change their coordinates in-flight provides us with a large range of flexibility.”

“We are very pleased with how LRASM performed today,” summed up Navy Capt. Jaime Engdahl for the DARPA press release after the February test. “We have a clear mission, to deliver game-changing capability to our warfighters in theater as quickly as possible.”

Requirements don’t stop there. What if jamming and other attacks disrupt satellite communications and positioning, targeting, and navigation data? That’s a real prospect in the maritime environment. The next frontier in sinking ships is dynamic terminal autonomy. Cruise missiles, combat aircraft, and unmanned vehicles in the area could talk to each other via local, line-of-sight links. Weapons might be able to check target position and identification autonomously to complete guidance during the final moments of a strike.

Keeping the lid on rivalries in the South China Sea could well involve all US forces. In the South China Sea, China has overlaid claims to 80 percent of the sea surface. Those claims conflict with the maritime rights of the Philippines, Brunei, Malaysia, and Vietnam.

Even at “Phase 0” steady state operations, the potential for posturing and the need for deterrence make tracking maritime targets a necessary task. Also among those ships of interest will be Russian navy vessels. Although the Far East fleet is a “pale imitation of the Soviet navy in its 1980s heyday,” Russia is “intent on a return to classic geopolitics backed up by naval power,” wrote Greg Austin in *The Diplomat* in March.

Count on innovations in maritime surveillance and targeting to continue. The shifting balances of power in the Pacific and other regions will once again call for airmen to master this unique domain. Airpower is uniquely well-suited to deliver the military effects needed in the Pacific. ☛

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