



Fist of the Fleet Association

a non profit 501 (c) (19) military organization

NEWSLETTER

July 2016

Preserving the Past Providing for Today
Promoting the Future

SUMMER EDITION

By: Jerry "Ricochet" Fritze

Harry S. Truman Strike Group Returns from Extended Deployment By: Sam LaGrone, USNI July 13, 2016

USS Harry S. Truman (CVN-75) pulled into Naval Station Norfolk, Va. along with — guided-missile cruiser USS Anzio (CG-68) and guided missile destroyers USS Bulkeley (DDG-84), USS Gonzalez (DDG 66) and USS Gravelly (DDG-107) — after the deployment in support of Operation Inherent Resolve (OIR).

“During the coalition fight against ISIL, Truman and embarked Carrier Air Wing 7 completed 2,054 combat sorties, expending 1,598 pieces of precision ordnance—the most carrier-based ordnance throughout OIR—to degrade [ISIS] resources and leadership,” read a statement from the service. “Throughout [the] deployment, more than 200 days at sea, the crew excelled in every opportunity to deliver direct and positive effects in theater, especially during Operation Inherent Resolve,” said Capt. Ryan B. Scholl, Truman’s commanding officer in a statement from the service. “I couldn’t be more proud of their performance.”

The CSG left Norfolk in November for a planned seven-month deployment that was extended by an extra month at the behest of the Secretary of Defense.

“This decision is central to our ongoing effort to dismantle and roll back terrorist networks in Syria, Iraq and elsewhere,” Chief of Naval Operations Adm. John Richardson said in a Navy statement in April endorsing the move. The Truman CSG deployment was the first of the planned Optimized Fleet Response Plan that aims to cap carrier deployments at seven months as part of a 36-month deployment and maintenance cycle. While the Navy didn’t meet its seven-month goal the service said it’s still committed to meeting the benchmark.

“Before deviating from our seven-month deployments, we consider each Combatant Commander’s request to ensure the readiness of our naval forces. We will do everything we can to mitigate the impact on our families and execute planned seven-month deployment lengths going forward,” Richardson said at the time. At the tail end of the deployment, the Truman CSG conducted two and a half weeks of operations from the Eastern Mediterranean with the Eisenhower CSG – the first time two U.S. carriers operated in the region in years.

Last week USS Dwight D. Eisenhower (CVN-69) crossed into U.S. 5th Fleet and U.S. Central Command.

Editor’s Note

The Fist of the Fleet arrived back at NAS Lemoore about July 11th and entered in to their post-deployment Stand Down period so we supplied them with a Get of Jail Free card for this issue so that they could take care of their more immediate needs without having to worry about collateral activities.



Mission Statement

**Perpetuate the history of Naval Aviation Squadrons VT-17, VA-6B, VA-65, VA-25 and VFA-25,
Remember deceased veterans and comfort their survivors,
Conduct charitable and educational programs,
Foster and participate in activities of patriotic nature,
Assist current active squadron members, and
Provide assistance to family members in times of emergency.**

www.fistofthefleet.org

PAGE 1

President's Message

On behalf of the membership may I extend our hardest welcome home to all members old and new of Strike Fighter Squadron Twenty-Five after your long and highly successful deployment in USS Harry S. Truman, CVN-75. You were all in the news through several clips that we all thoroughly enjoyed watching as you battled our foes in the Middle East. We are all so very proud of you, the men and women of VFA-25 that continue to carry the banner of our great squadron. Hopefully now there will be sufficient time to get reacquainted with loved ones and take a break before your ever-present training cycle continues, sharpening all Fisties at the tip of the spear.

Congratulations again to CDR Winston "Stoner" Scott II who assumed command of VFA-25 in early June. Many members may not realize, but this is Stoner's third time serving with the Fist of the Fleet. I am sure no one knows FOF better. As always FOFA stands ready to support our active duty shipmates through Educational Grants and the Harry Jones and Sailor of the Year awards.

As to Association business you can see from Chuck Webster's finance report that we are in excellent financial shape. We will be presenting the 2016 Harry Jones Award soon as well as the Sailor of the Year Award later this year. We always appreciate contributions from the membership that support and sustain these awards to squadron personnel. My sincere thank you to those members who have so generously contributed to these programs. I will also be ordering some additional challenge coins for future new members and awardees. As to our next reunion in 2017 it is time to begin preparations. The final site has not been determined yet, but we will begin looking at Charleston, SC to see if it will fit with our group. Any input or volunteers would be appreciated to help with this event.

As a reminder, we are still looking for a "Few Good Men", two to be exact, to step forward and lead your Association into the future. Nick Johnson (FOFA Secretary), and I will be completing our final terms of our respective offices this December. Please consider serving the membership and keeping FOFA moving forward. Call or email with any questions about these officer positions.

We are going to move forward with placing our membership Directory on our FOFA website and password protect the access to dues current members. I have not received a single comment from the membership to the contrary. If all works well we will no longer print and distribute future directories via the mail so keep your latest copy from this year if you prefer that means.

Stay vigilant and be aware of your surroundings. There are some bad people out there that want to hurt us. I also hope you will join me in strongly supporting our law enforcement professionals throughout our great nation as they daily put their lives on the line to protect each of us. They have paid a severe price lately defending their communities. Stay safe,

OFFICERS

President: Gary L. Kerans
2740 Whispering Way Cir.
Prescott AZ 86303
Cell 928-925-5099
Email domeaz@me.com

Vice President: John Leslie
205 Bluebird Lane
Saint Augustine FL 32080
Tel 904-233-4712
Email leslie_john@bellsouth.net

Secretary: Nick Johnson
8217 Kiawah Trace
Port Saint Lucie, FL 34986
Tel 936-499-8051
Email nrjohn@yahoo.com

Treasurer, CFO: Chuck Webster
39224 132nd St.
Bath SD 57427
Tel 605-229-3940
Email cwebster@nrctv.com

Sergeant at Arms/PR: Bob Schreiber
949 Crystal Park Blvd.
Clifford Township PA 18407
Tel: 570-780-4356
Email robert.a.schreiber@echoes.net

Member at Large Al Gorthy
8839 W 143 Terrace
Overland Park KS 66221
913-681-9026

Gary "Dome" Kerans



Blue Angles Tour Dates

Aug 6/7 Seafair Air Show Seattle WA

Sept 3/5 Cleveland Nat'l Air Show OH
17/18 National Championship Races Reno NV

Oct 1/2 Rocky Mtn Air Show Aurora CO
15/16 Star-Spangled Spectacular Baltimore MD
29/30 NAS Pax River MD

10/11 NA S Oceana VA
24/25 MCAS Miramar CA

8/9 San Francisco Fleet Week CA
22/23 Wings Over Houston TX

Nov 5/6 Birthplace of the Blues Angels Air Show Jax Beach FL
12 Blue Angels Homecoming Pensacola FL

Change of Command

Congratulations to CDR Winston "Stoner" Scott, a 3-time Fistie, on assuming command of the finest Fighter-Attack Squadron in the world, and Farewell to Chad "Decaf" Gerber and our hearty Thanks for a job Well Done!



It's Official: 'MQ-25A Stingray' U.S. Navy's Name for First Carrier UAV By: Sam LaGrone, USNI, July 15 2016

After months of deliberation, the name and designation of the Navy's first carrier unmanned aerial vehicle is now official: MQ-25A Stingray. In 2006 the program was conceived as a low observable lethal, and deep penetrating strike platform (Unmanned Combat Aerial Vehicle), as outlined in the 2006 Quadrennial Defense Review. In 2011 the tenor of the program changed again with additional influence from the Office of the Secretary of Defense to the less stealthy and lightly armed Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) program that could serve as a stopgap for counter-terrorism operations if the U.S. lost their UAV bases in Afghanistan.

Following intense congressional scrutiny the Navy's UCLASS program was pulled into an overarching UAV strategic program review (SPR) led by Deputy Secretary of Defense Bob Work. During the SPR, the UCLASS program was recast to serve primarily as an unmanned tanker. The emphasis on the first airframe in the program is primarily aerial refueling. "We're probably going to drop some of the high-end specs and try to grow the class and increase the survivability [later]," Vice Adm. Joseph Mulloy, deputy chief of naval operations for integration of capabilities and resources said. "It has to be more refueling, a little bit of ISR, weapons later and focus on its ability to be the flying truck."



X-47B Unmanned Combat Air System Demonstrator (UCAS-D) launches from the aircraft carrier USS Theodore Roosevelt (CVN 71) in 2013.

Have you paid your 2016 Dues?

Annual Dues: \$25/YR

Life Time Dues \$200

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Chuck Webster 39224 132nd St. Bath SD 57427

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The Navy has completed testing of its MAGIC CARPET technology that simplifies the process of landing a fighter on an aircraft carrier – with data suggesting that pilots may make single-digit flight path corrections on final approach instead of hundreds and land “significantly” closer to their target on the flight deck, according to those involved in the testing.

The premise of MAGIC CARPET is simple – rather than worry about adjusting roll, yaw and pitch, adding and reducing power, and predicting how the plane’s course will intersect with the moving ship’s, the pilot can more directly and simply control flight path. And because the services’s Boeing F/A-18E/F Super Hornets and EA-18G Growlers have digital flight controls, MAGIC CARPET remaps those controls to do just that. The Maritime Augmented Guidance with Integrated Controls for Carrier Approach and Recovery Precision Enabling Technologies (MAGIC CARPET), a collaboration by Naval Air Systems Command and the Office of Naval Research, was first tested aboard USS George H.W. Bush (CVN-77) last year and completed its final test aboard USS George Washington (CVN-73) this week ahead of an interim software version release this fall.

MAGIC CARPET accomplishes three things through a software-only change to the airplane, with no changes whatsoever needed to the carrier receiving the fighters. Pilots approaching the carrier focus on three things: watching their lineup, with the goal being to catch the third of four wires in the aircraft arresting gear; angle of attack, needed to ensure the tailhook on the back of the plane catches a wire; and speed. Even if a pilot begins his approach to the ship perfectly, every little adjustment to maintain that path to the ship requires counter-adjustments in other areas – “just dozens of corrections, tiny corrections, that I’m making” for the final 18 seconds, called “flying on the ball

The Super Hornets and Growlers were built with digital flight controls, and some automation was built into the system from the start. “We call it a living wing, you see the wing doing this (adjusting itself) all the time because I told it not to roll, and so any disturbance in the air mass that would make me roll, the airplane will compensate automatically,” Kindley explained, demonstrating the dynamic wing movement with his hands. “So what we’ve basically done is taken that idea and applied it to landing, because I know most of the time I’m going to fly a 3-degree glideslope.” When MAGIC CARPET is engaged and put into “delta path mode,” the plane will fly on a 3-degree glideslope downwards regardless of wind and other conditions outside. Even when the plane flies through the burble, or disturbed air behind the aircraft carrier’s island, the plane reacts and continues on its planned glideslope.

Then, MAGIC CARPET allows for more intuitive and much less cumbersome adjustments to that flight path by decoupling roll from yaw from pitch, and instead creating a single input that affects the ultimate goal – the airplane’s flight path. The pilot can make a little correction to the flight path using the stick and then simply let go of the stick to stay on that new path. “I’ve never seen anything like this before,” Kindley said. If a pilot is coming in high, “you just push the stick forward and then let go, and it stops itself on glideslope. Same thing when I’m below glideslope, you just pull the stick back and then let go. So instead of making multiple corrections with the throttle and stick to affect glideslope, I’ve made one and then let go.” The same is true for side-to-side corrections – the pilot adjusts and then lets go of the stick to maintain the new direction, with the plane always keeping that same 3-degree glideslope for a smooth landing on the carrier flight deck. Finally, MAGIC CARPET calculates the movement of the carrier as it sails through the water and precisely understands where the landing area will be by the time the fighter gets to it. Today, pilots have to constantly guess the velocity vector, Kindley said, and find themselves “spotting the deck” – which often times puts them too low and may cause the Landing Signal Officer (LSO) on the flight deck to wave them off.

With this new tool, “we can look at how fast the ship is moving, it’s not a hard math problem – if I know how fast the ship is moving here then I can figure out how fast the runway is moving to the right, and so I can just, I go into delta path mode and we have a different symbol, velocity vector goes away and it actually looks like a little landing area. So no kidding, all you do is you put the landing area on the landing area, and then you let go. It’s really that simple.” Ultimately, Kindley said, MAGIC CARPET “makes it so the plane is working for you instead of against you” while landing.



An F/A18-F Super Hornet in Air Test and Evaluation Squadron VX-23 comes in for an arrested landing on the deck of USS George Washington while testing the MAGIC CARPET carrier landing assistance technology.



VX-23 F/A18-F Super Hornet catches the arresting gear wire while landing aboard USS George Washington while testing the MAGIC CARPET carrier landing assistance technology.

I am pleased to report that the financial condition for the FOFA during the first six months of 2016 has stayed solid. We have a present balance of \$25,445.85 in our saving account and \$2258.44 in our checking account with Navy Federal. Annual membership payments are down this year but we did pick up a new life member, Larry Wahl. Larry served in VA-25 '69 till '71 and again '78 till '80. Only five annual members have paid their yearly dues; Michael Murphy, Laurence Woodbury, Steve Anderson, William Cremer, and Lee Hirschel. Annual Members are reminded to make their 2016 payments either via PayPal or check.

FOFA Association members continue with their generous support of the active duty personnel serving with VFA-25. During the first six months we received generous donations to support the Ltjg Harry Jones award, the new Sailor of the Year award, the educational grant fund, and RR3 on the USS Midway. With having our nonprofit standing with the IRS reinstated, I continue to send tax letters to Association members for their gifts and tax filings.

VFA-25 is in their final month of deployment and will be returning to NAS Lemoore before the next educational class period start. Hopefully squadron personnel will take full benefit of Educational Grant Program which we take very serious and will welcome grant award applications from the squadron during their turn around. Chuck "Pooh" Webster, FOFA Treasurer

Marines Taking 30 Hornets From Boneyard by: Otto Kreisher, USNI

Marine Corps aviation, struggling to meet its operational and training missions with a shrinking fleet of aged F/A-18 Hornets, is pushing a program to recover and update 30 out-of-service F/A-18Cs in an effort to remain combat ready until the new F-35B is fielded in numbers. The Marines have contracted with Boeing to refurbish and modernize the single-seat Hornets to a "C-plus" standard with new avionics and an updated AN/APG-65 radar. The Boeing work also will extend the service life of the fighters from 6,000 hours to 8,000 hours. Twenty-three of the Hornets to be updated are being recovered from the Aerospace Maintenance and Regeneration facility, commonly known as the "boneyard," at Davis-Monthan Air Force Base in Arizona. Most are F/A-18Cs that have not reached their original flight hour limits. The other seven Hornets are being transferred from the Navy, which is replacing its legacy Hornets with the new and more capable Super Hornets, Marine Corps spokeswoman Capt. Sarah Burns told USNI News.

Budget restrictions have reduced the aviation depots' ability to do schedule major maintenance and to carry out the service life extension efforts to keep the old aircraft flyable. As a result, Lt. Gen. Jon Davis, the assistant commandant for aviation, has testified that in order to provide combat-ready aircraft for deployments, virtually none of the fighter squadrons at home stations have anywhere near the aircraft they need to conduct training and to remain ready to deploy for an emergency.

The Marines are having low-hour F/A-18Cs taken from the Boneyard or from transitioning Navy squadrons and sent to a Boeing maintenance facility at the former NAS Cecil Field, Fla., for the updated avionics and structural work. One updated C-plus Hornet has been delivered to Marine Fighter-Attack Squadron 115, and another has completed the Boeing work and is being verified for operational use, Burns said. Six aircraft are at the Boeing plant and five more are set for delivery. The upgrade works takes about a year, Boeing said

Russia to Modernize Its Lone Aircraft Carrier Next Year, New Carrier Program Could Start in 2025 By: Sam LaGrone, USNI Starting next year, Russia's only aircraft carrier will start a modernization maintenance period to upgrade its arresting gear and launching systems, according to a report this week from the Russian *TASS* news wire. The 55,000-ton *Admiral Kuznetsov* will enter the two to three-year upgrade availability at an unknown Russian yard sometime next year to undergo upgrades to allow the carrier to improve launching and recovering aircraft, the source told *TASS*. "The works on the vessel will begin after she returns from a long-distance voyage in the Mediterranean in the first quarter of 2017 and will last for two-three years," the source said. "The modernization will focus on the aircraft carrier's flight deck, including replacement of the deck covering, tailhooks, aircraft arresting gear and other elements of the take-off system."

Kuznetsov, commissioned in 1990, is the sole carrier of the Russian Navy and has deployed intermittently following the collapse of the Soviet Union. The carrier is set to conduct a fall deployment to the Mediterranean later this year with a composite air wing composed of Sukhoi Su-33 Flanker and Mikoyan MiG-29K/KUB Fulcrum fighters as well as Kamov Ka-27, Ka-31 and Ka-52K helicopters. The refit comes as Russia has been on a two-year long campaign to increase the efficacy of their surface forces since the seizure of the Crimean peninsula in 2014 and the icing of relations with the West.

Eric Wertheim, *the author of the U.S. Naval Institute's Combat Fleets of the World*, told USNI News on Friday that Russia has the desire to have an active carrier force. "It shows whether or not they can sustain the carrier program going forward they really want to [maintain a carrier capability]," he said.

"They have to make sure that it stays operational and workable. It's the only game there is for them... The big question mark is if this is sustainable."

News of *Kuznetsov's* refit comes as Russia's Ministry of Defense is considering starting construction of a new carrier around 2025. "It will most likely happen by the end of 2025. We have three projects that have been proposed by the Krylov [research] center. Overall, they are not bad," Deputy Defense Minister Yuri Borisov told reporters at the ongoing HeliRussia-2016 helicopter exhibition in Moscow, according to state-controlled news service *Sputnik*. That would mean for the better part of a decade *Kuznetsov* will be Russia's only carrier – if they can meet the expected timeline. "The Russians are not famous for completing shipbuilding program ahead of schedule," Wertheim said.

DID YOU KNOW: NAVY, MILITARY AND OTHER INFORMATION

France Sending Carrier Charles de Gaulle Back to ISIS Fight Later This Year By: Sam LaGrone, USNI July 2016

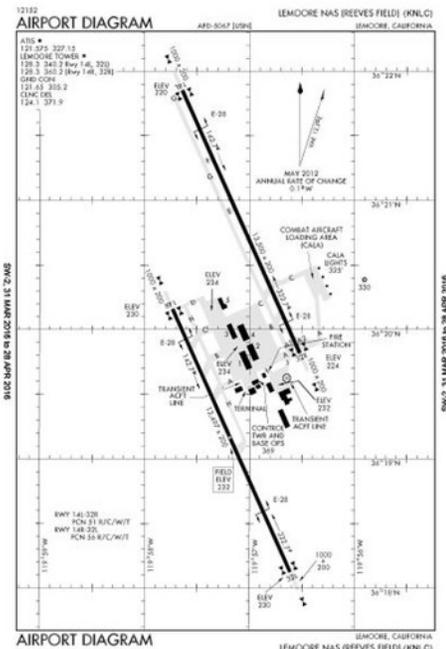
The French carrier Charles de Gaulle (R91) will re-deploy later this year to continue strikes against ISIS in Iraq and Syria, French President Francois Hollande said on Wednesday. "The battle group, which includes the Charles de Gaulle, will again be deployed to Operation Chammal... because we have to strike back at those who attacked us here in January and November 2015," Hollande said in a speech in commemoration of Bastille Day, according to Reuters. The deployment would be the third for the carrier as part of the French Operation Chammal, which began in September 2014. In its last deployment, the 35,000-ton de Gaulle began airstrikes against ISIS targets in Syria on November 23 from the Eastern Mediterranean and continued until March. The carrier was the primary naval strike platform for coalition forces during a two and a half month lull in U.S. carrier operations. In December, de Gaulle became the flagship of U.S. Naval Forces Central Command Task Force 50 that leads the Operation Inherent Resolve naval strike forces – the first for a non-U.S. ship.

"To achieve that level of interoperability, true integration, to the point where Charles de Gaulle Strike Group could take command of Task Force 50 – the first time ever that a non-U.S. element has taken command of a task force – is just so indicative of the partnership we share, and the ability to perform at the very highest levels of warfare, and that's exactly what you did," Chief of Naval Operations Adm. John Richardson said last month during a presentation of a Meritorious Unit Commendation to the de Gaulle battle group. During the period, "the strike group executed 271 combat sorties, including 259 precision strikes that significantly degraded ISIL operations in Iraq," read the citation. The carrier's first deployment as part of the coalition ISIS strikes came only a few weeks after the deadly attacks in Paris on the satirical magazine Charlie Hebdo in early 2015.



FIST OF THE FLEET ASSOCIATION REQUEST FOR ACTION

Stephen Emerson, a son of Jesse R. Emerson (VA-22 in 1964-65), is seeking research material for a book he is writing about NAS Lemoore during the Vietnam War. He is interested in interviewing VA-25 members about their and their families' experiences at Lemoore and during WestPac/Vietnam deployments. Any information or stories (hopefully true ones!) that you can provide that cover the 1961 to 1975 period would be greatly appreciated. Contact Steve Emerson at: saebooks@yahoo.com or 407-413-2334. Thanks.



THE EVOLUTION OF WARFARE: MODERN INVENTORIES AIR- TO GROUND

The AGM-88 HARM (High-Speed Anti-Radiation Missile) is currently the standard U.S. anti-radiation missile

Because of the less than satisfactory performance of the AGM-45 Shrike and AGM-78 Standard ARM in Vietnam, the Naval Weapons Center started a program in 1969 to develop a new anti-radiation missile. A major development goal was a high-speed missile (because this gave enemy radar operators less time to shut down their emitters), and therefore the project was named HARM (High-Speed Anti-Radiation Missile). Other goals included broadband seekers, a large warhead, operational flexibility, and high reliability. In 1970, the designation ZAGM-88A was allocated to the projected missile.

Because of the ambitious specifications, development was slow. In 1974, Texas Instruments was announced as prime contractor for the HARM, and the first flight of an AGM-88A missile occurred in 1975. Various problems were encountered in the development of the seeker and guidance system, including inability to distinguish between emissions from behind and in front of the aircraft. In early 1980, the problems were essentially solved, and in 1981, the initial production contract was awarded to Texas Instruments. The first production AGM-88A missiles were delivered in 1983, and HARM reached IOC (Initial Operational Capability) with the U.S. Navy in 1985, and the USAF in 1987. The first operational use of HARM occurred in April 1986, when the type was used to destroy Libyan radars.

The AGM-88A missile is powered by a Thiokol SR113-TC-1 dual-thrust (boost/sustain) low-smoke solid-fueled rocket motor, and has a 66 kg (146 lb) WDU-21/B blast-fragmentation warhead (25000 steel fragments) in a WAU-7/B warhead section. The warhead is triggered by an FMU-111/B laser proximity fuze. The seeker of the WGU-2/B guidance section has to be pre-tuned to likely threats at depot-level maintenance, so every base or ship has to store a selection of differently tuned HARM seeker heads. In flight, the AGM-88 is controlled by the WCU-2/B control section using four movable BSU-59/B mid-body fins, and stabilized by the fixed BSU-60/B tailfins

Data for AGM-88 (except where noted):

Length 4.17 m (13 ft 8 in)

Wingspan 112 cm (44 in)

Finspan 61 cm (24 in)

Diameter 25.4 cm (10 in)

Weight 360 kg (800 lb)

Speed Mach 2+

Range 150 km (80 nm)

Propulsion Thiokol SR113-TC-1 dual-thrust solid-fueled rocket

Warhead 66 kg (146 lb) WDU-21/B blast-fragmentation

AGM-88C: WDU-37/B blast-fragmentation



The AGM-84 Harpoon/SLAM

The AGM-84 Harpoon is the only dedicated anti-ship missile in service with U.S. armed forces. It has been developed into several advanced versions, including the SLAM (Stand-off Land Attack Missile) derivatives for high-precision attacks on land targets.

In 1965 the U.S. Navy began studies for a missile in the 45 km (25 nm) range class for use against surfaced submarines. The name Harpoon was assigned to the project (i.e. a harpoon to kill "whales", a naval slang term for submarines). After the sinking of the Israeli destroyer Eilat in 1967 by Soviet-built anti-ship missiles, the U.S. Navy saw the need to develop a dedicated anti-shiping missile, and therefore Harpoon's primary mission became surface ship attack. The development project was formally begun in 1968, and the missile designator ZAGM-84A was allocated in 1970 after the Navy had issued a formal RFP (Request For Proposals). In June 1971, McDonnell Douglas was awarded the prime contract for Harpoon, and the first test missile flew in October 1972. Because the range requirement was increased to 90 km (50 nm), turbojet propulsion was selected by McDonnell Douglas. Production of the Harpoon began in 1975, and the first version to enter service was the shipborne RGM-84A in 1977, followed by the AGM-84A on P-3 aircraft in 1979.

The Harpoon missile is powered by a Teledyne/CAE J402 turbojet in an A/B44G-1 propulsion section, giving it a maximum range of about 100 nm for the air-launched version. After launch, the missile is guided towards the target location as determined by the launching aircraft or ship by a three-axis Attitude Reference Assembly (ATA) in an AN/DSQ-44 guidance section. The ATA is less accurate than a full-fledged inertial system, but good enough for Harpoon's range. For stabilization and control, the AGM-84A has four fixed cruciform wings (3x BSU-42/B, 1x BSU-43/B) and four movable BSU-44/B tailfins. The missile flies at a low cruise altitude, and at a predetermined distance from the expected target position, its AN/DSQ-28 J-band active radar seeker in the nose is activated to acquire and lock on the target. The radar switch-on distance can be set to lower or higher values, the former requiring a more precisely known target location but reducing the risk to be fooled by enemy ECM. An alternative launch mode is called BOL (Bearing-Only Launch). In this mode, the missile is launched in the general direction of the target, and its radar activated from the beginning to scan for the target in a +/- 45° sector in front of the flight path. Once a target has been located and the seeker locked, the AGM-84A missile climbs rapidly to about 1800 m before diving on the target ("pop-up maneuver"). The 221 488 lb WDU-18/B penetrating blast-fragmentation warhead (in the WAU-3(V)/B warhead section) is triggered by a time-delayed impact fuse. When no target can be acquired after radar activation, the Harpoon will self-destruct.



The AGM-84E Harpoon Block 1E SLAM (Stand-off Land Attack Missile) is essentially a new missile. It is a high precision land-attack missile, which combines the airframe, engine and warhead of the anti-ship Harpoon with the WGU-10/B IIR seeker of the AGM-65D Maverick and the data link of the AGM-62 Walleye. Development of SLAM began in 1986 as an interim precision-attack missile pending delivery of the AGM-137 TSSAM (Tri-Service Standoff Attack Missile), and the first all-up AGM-84E rounds were delivered in November 1988. SLAM became operational with the U.S. Navy in 1990, just ready for a few missiles to be used in action in Operation Desert Storm in early 1991. After the TSSAM was cancelled in 1995, the importance of SLAM increased significantly. The AGM-84E flies a complex path to its target using its inertial system, and during the final 60 seconds of the flight it is controlled through the data link (using an AN/AWW-13 pod on the launching aircraft) using imagery from the IIR seeker. The WDU-18/B warhead is in a new WAU-23/B warhead section with an (optionally delayed) impact fuse.

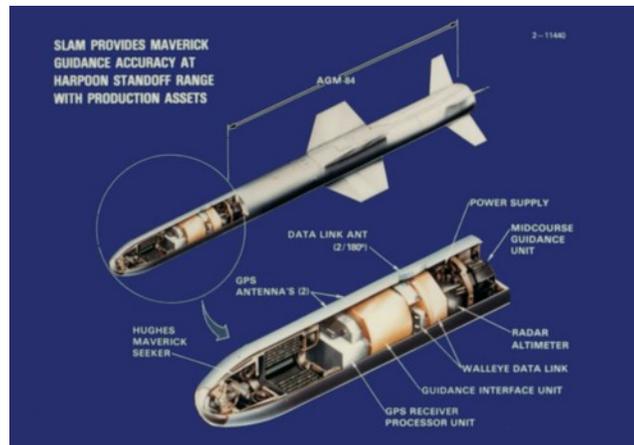
The AGM-84H SLAM-ER (Stand-off Land Attack Missile - Expanded Response) is a much improved AGM-84E. Development began in 1994, and the first flight test occurred in March 1997. The first production missiles were delivered to the Navy in April 1998, and IOC (Initial Operational capability) was eventually reached in March 2000. The most prominent new feature of the AGM-84H are the pop-out swept wings (similar to those of the RGM/UGM-109 Tomahawk), which significantly increase the missile's range and maneuverability. The new AN/DSQ-61 guidance section includes the computers, the inertial system, and the new multi-channel GPS receiver. The data link has a longer range and is more jamming-resistant. Software upgrades in the WCU-24/B control section make it easier for the operator to direct the missile to the selected target, and also introduce such features as target switching immediately before launch and search-while-track mode to search for a better aim-point without breaking lock on an existing one. The IIR seeker is hardened against laser countermeasures and last but not least, the AGM-84H has a much heavier 360 kg (800 lb) WDU-40/B penetrating blast-fragmentation warhead in a WAU-30/B warhead section.

Specifications

Note: Data given by several sources show slight variations.

Data for AGM-84D/E/F/H/K,

	AGM-84D	AGM-84E	AGM-84F	AGM-84H/K
Length:	12 ft 7.5 in	14 ft 9 in	14 ft 6.9 in	14 ft 4 in
Wingspan:	36 in			96 in
Diameter:	13.5 in)			
Weight:	1200 lb	1385 lb	1400 lb	1600 lb
Speed:	Mach 0.85			
Range:	120 nm	50 nm	170 nm	150 nm
Propulsion:	Sustainer: Teledyne/CAE J402-CA-400 turbojet; 680 lb			
Warhead:	488 lb WDU-18/B penetrating blast-fragmentation		AGM-84H/K: 800 lb WDU-40/B penetrating BF	



NEXT TIME IN THE EVOLUTION OF WARFARE: LOOKING FORWARD