

**H**ELICOPTER MINE COUNTERMEASURE Squadrons — designated HM — are something of an anomaly among US Navy aviation units. There are now only two operational HM squadrons, both based at Naval Station Norfolk, Virginia. They fly the mighty Sikorsky MH-53E Sea Dragon helicopter for their mine-sweeping missions, and use several sophisticated devices to search for mines and neutralize them.

To visit NS Norfolk is to visit a world in itself. The four-lane Admiral Taussig Boulevard brings you right to the heart of the largest naval base in the world — all 4,300 acres of it. Immediately obvious are the 14 piers at the western end of the base, where aircraft carriers, cruisers, submarines, destroyers and supply ships of the US Atlantic Fleet are maintained

and supported. You'll also see a very large number of buildings and hangars and plenty of aircraft and helicopters: C-2 Greyhounds, E-2 Hawkeyes, SH-60F/HH-60H/MH-60S Seahawks, and MH-53E Sea Dragons. There are more than 15 flying squadrons based here. Between them, these units generate an average of 275 flights per day, or one every six minutes.

### HM-15 and sister squadrons

The airfield element of NS Norfolk is Chambers Field. A 10-minute drive through the base brings you to the northern part of Chambers Field, and the shores of Willoughby Bay, where HM-15 'Blackhawks' resides.

*Combat Aircraft* was received by CDR Patrick E. Gendron, HM-15's commanding officer, who talked about the squadron and its specific task within the US Navy. 'HM-15 [...] is one of two squadrons Navy-

# DRAGONS VERSUS MINES

*Combat Aircraft* visits Naval Station Norfolk, Virginia to discover how the US Navy's MH-53E Sea Dragon aircrews go about their hazardous work countering sea mines.

report: **Hans Drost, Henk de Ridder and Dick Wels**

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## MH-53 SEA DRAGON SPECIFICATION

Overall length	99ft 0in (30.19m)
Height	28ft 4in (8.64m)
Rotor diameter	79ft 0in (24.08m)
Empty weight	36,332lb (16,480kg)
Maximum take-off weight	73,414lb (33,300kg)
Powerplant	3 x 4,750shp (3,543kW) General Electric T64-GE-419 turboshafts
Maximum speed	315km/h
Cruising speed	150kt (172mph)
Maximum range	702 miles (1,130km)

wide that have integrated an active-duty airborne mine countermeasures squadron with its reserve counterpart. Our primary mission is airborne mine countermeasures [AMCM], with secondary capabilities for vertical on-board delivery [VOD], heavy lift, and humanitarian assistance and disaster relief [HADR] support. We have the same tasks as our sister squadron HM-14.'

Training for those destined to be part of the minesweeping community is handled by HM-12 'Sea Dragons', which was recently re-activated after having served as the training squadron until 1994. Before October 1, 2015, training was the task of the Airborne Mine Countermeasures Weapon Systems Training School (AWSTS). Now, HM-12 serves as the MH-53E community's Fleet Replacement Squadron (FRS).

The primary mission of the FRS is to train aviators and aircrew members in the operation of the MH-53E. Newly-winged (CAT I) pilots work toward a Pilot Qualified in Model (PQM) designation through a series of syllabus ground and flight requirements. Graduates of the curriculum are slated to go to HM-14 or HM-15 for their first sea duty assignment. Pilots transitioning from another aircraft, or who have been out of the aircraft for more than 12 months, are sent through a condensed syllabus at the FRS in order to become Naval Air Training and Operating Procedures Standardization (NATOPS)-qualified in the MH-53E. They are designated as CAT II or CAT III pilots and will eventually go to HM-14 or HM-15 as active-duty or reserve pilots. New HM-12 instructors are trained and qualified by fellow HM-12 instructors and undergo a separate instructor under training (IUT) syllabus. Once this is complete, they will conduct syllabus flights for CAT I, II, and III pilots.

In the coming months, HM-12 will be adding mine-countermeasures training flights (towing) to its syllabus. At present, towing is only conducted by HM-14 and HM-15. The FRS is a shore-duty tour and does not forward-deploy its assets.

HM-12 has five aircraft assigned. HM-14 has 10 aircraft in total, with two permanently forward-deployed to Pohang, South Korea. A total of 13 are on strength with HM-15, which has four on permanent deployment to Bahrain. Several aircraft from HM-14 and HM-15 belong to the squadron's reserve component, but such ownership does not place constraints on whether



## 'BLACKHAWKS' HISTORY

HM-15 — HELMINERON FIFTEEN — is one of the 'younger' squadrons within the US Navy. It was not until January 2, 1987 that HM-16 was disbanded while HM-15 was being established. The new squadron was the first of the two deployable US Navy AMCM squadrons to receive the Sikorsky MH-53E helicopter, a derivative of both the minesweeping RH-53D and the three-engined CH-53E Super Stallion.

One of the squadron's first major achievements came in 1989 when HM-15 provided HADR support to the devastated areas around Santa Cruz, Watsonville, and Hollister, California after an earthquake. From January 1991 to April 1992, it deployed a detachment of three aircraft and 100 personnel to the Persian Gulf in direct support of Operations 'Desert Shield' and 'Desert Storm'. In mid-1994, HM-15 was integrated with its reserve sister

squadron, the 'Golden Bears' of HM-19.

HM-15 embarked on board USS *Inchon* (MCS 12) in late February and early March 1999 to participate in mine countermeasures (MCM) exercises with allies in the Mediterranean Sea and Persian Gulf. When hostilities erupted in Kosovo, the *Inchon* and her complement of 10 embarked MH-53Es from HM-14 and HM-15 were diverted to the Adriatic Sea. There, they took part in Operation 'Shining Hope', the humanitarian relief effort for the thousands of Kosovar refugees displaced during the crisis.

HM-15 has a permanent detachment in Bahrain and reports to the 5th Fleet area of responsibility (AOR). It can conduct shore or shipboard operations. The squadron also embarks regularly upon the USS *Ponce* Afloat Forward Staging Base Intermediate (AFSBI-15) located in the Middle East.

or not these aircraft can be deployed. Numbers of pilots change continuously as personnel rotate in and out of the squadrons. At any given time, there are approximately 30 pilots each in both HM-14 and HM-15. HM-12 pilot totals vary too, with approximately 10 instructors and 12 pilot students and 24 aircrew at any given time.

### Minesweeping

As the primary duty of the HM units, minesweeping is a vital and dangerous mission. CDR Gendron explained how it is carried out. 'Minesweeping missions are flown by carrying either internal equipment or externally transporting this equipment to a minefield environment. The MH-53E utilizes either a single-winch or multi-winch, depending on the mission, and this houses various types of cables reeled out of the aircraft. Only one type of device can be towed at a time by the MH-53E.

'In order to sweep an area, the aircraft positions itself in a hover outside of the minefield to be swept and lowers the equipment via winches and tow cables into the water. This process is called 'streaming'. The towing aspect occurs when the aircraft begins moving forward, placing tension on the aircraft via a tow cable and tow boom. The tow cable and tow boom connect the gear in the water to the aircraft. The aircraft will tow the particular device at a low altitude and airspeed through a designated area until the entire section has been swept or hunted. The aircraft is flown at low altitude — no higher than 150ft — and slower airspeeds while tethered to the water.

'Once complete with the mission, the aircraft proceeds outside of the field and returns to a hover. The crew either brings the equipment back on the aircraft, returns the device to the recovery crews, or externally transports the Magnetic Orange Pipe to its storage location.'

This image: A 'Blackhawks' MH-53E Sea Dragon takes part in cast and recovery operations with explosive ordnance disposal technicians in the 5th Fleet area of responsibility. US Navy/MCS2C Wyatt Huggett

Inset: CDR Patrick E. Gendron, HM-15's commanding officer. Hans Drost

## SPECIALIST EQUIPMENT

- The Mk105 (or 'Sled') is a magnetic minesweeping system. It is connected directly to the tow boom by a ground crew or via an in-flight transfer line.

- The Mk104 is an acoustic minesweeping system. It can be attached to the Mk105 'Sled' to form the Mk106 in order to sweep against magnetic-acoustic mines. Other systems include:

- The Mk103, used to cut moored mines using a V-shaped wire system with explosive cutters attached to these wires. These cutters function to cut the cable, allowing the mine to float to the surface.

- The Magnetic Orange Pipe (MOP), mentioned by CDR Gendron in the main text, is a device carried externally and flown to the minefield. The MOP can be utilized as a shallow-water device against magnetic mine threats.

- The AN/AQS-24A is a towed sonar and re-acquisition/identification device. The sonar scans the sea volume and sea floor. A laser can be attached to the device in order to precisely identify mine types.

- The Airborne Mine Neutralization System (AMNS), designated AN/ASQ-232, is a remotely controlled mine-neutralization system. The fiber-optic and cable-guided neutralizer is housed in a

self-propelled, remotely-controlled vehicle that incorporates the sensors needed to relocate and identify a mine target. Crews can use inert/training rounds for practice or live expendable neutralizers to destroy bottom, close-tethered, and in-volume sea mine threats.

The MH-53E has a separate hydraulic system utilized specifically for operating mine-countermeasures internal equipment (tow boom/winch/davit), known as the Utility 2 (U2) hydraulic system. Towing occurs when the tow cable is connected to the tow boom (via a tow ball) that can rotate 12 degrees left or right of center. The tow boom allows movement of the aircraft independent of the device that is being towed. The length and type of tow cable varies depending on the device.

A multitude of equipment is utilized according to each specific gear set. Two different types of davit are used to stream the Mk104 or the AN/AQS-24A device. Mk103 cutter racks house the explosive cutter devices until the cutters are attached to the tow wire. Cradles hold the AN/AQS-24A device on the ramp of the aircraft when not in use.

The AN/ASQ-232 AMNS set consists of a winch modification kit (WMK), in-water

assembly (IWA), davit/sheave assembly, launch box assembly, and cradle. The device uses the Single Winch II configuration. Aircrew in the back are responsible for streaming the gear, operating the winches and davit, hooking up the tow cable to the tow boom, updating the pilots on gear status, monitoring the gear, and recovering the gear.

The AN/AQS-24A and AMNS require the aircrew to operate consoles in the rear of the Sea Dragon. The AN/AQS-24A console controls power to the device and provides feedback including sonar or laser imagery from the device (also known as the 'fish') to the console's video screen. The AMNS system and neutralizer is controlled from a specific console.

Pilots monitor all parameters through a tow panel, a Mk108 indicator, and an instrument indicator on the main instrument panel. Tension, speed, and skew (deviation left or right from a centered tow boom) of the device are controlled manually and 'flown' by the pilots. The pedals control skew, and speed/tension is manipulated by the cyclic (also known as the stick) in the aircraft.

### Working with divers

Tactics personnel work to identify the mine types prior to executing a mission or during post-mission analysis. The MH-53E squadrons can co-ordinate with explosive ordnance disposal (EOD) divers in order to locate mines and work to detonate the mine. EOD divers can be on site and standing by when tasked, or they may be flown to the minefield location and inserted. A separate spotter aircraft (an MH-53E or MH-60S) can fly in proximity to the minesweeping aircraft and deploy on-board EOD divers when required.

The in-flight stream, tow, and recovery procedures are the same for minesweeping at sea or in a harbor. However, there are unique challenges in both environments. Sea states are generally higher outside of a harbor, so the crew members must ensure that they stay within the safe operating limits of the gear and the aircraft. In a harbor, resources may be limited.

The type of equipment that can be used depends upon the amount of surface traffic and the water depths and conditions in the harbor. Weather naturally has an influence. Rigid-hull inflatable boat (RHIB) crews required for Mk105 operations have sea state limitations based on the Pierson-



Moskowitz sea state scale, as do all the aforementioned devices. There are lower thresholds for some equipment, which can limit some missions based on sea state requirements.

Transit to the mission area can be conducted under instrument flight rules (IFR), but streaming, towing, and recovery of the gear must be carried out with a cloudbase of at least 500ft and two miles' visibility. Towing is not conducted with thunderstorms in the operating area, or forecast to be there, during the mission. High winds are a factor and aircraft wind limits must be applied. Furthermore, MH-53E tow missions are limited to daylight only.

### Flying the Dragon

The MH-53E crew depends on the mission, but always involves two pilots plus between two and five aircrew members. The Mk103 and AN/AQS-24A missions require five aircrew. A typical crew consists of a helicopter aircraft commander (HAC), a co-pilot and a crew chief, plus the remaining team as required. The qualifications of the HAC depend upon the sortie. A standard flight needs a HAC; a towing mission a mission commander (rated as an attack helicopter aircraft commander, AHAC); a maintenance check flight a functional check pilot (FCP); and an AWSTS student training flight an instructor pilot (IP).



Airborne mine countermeasures is a crew-intensive task that requires the enlisted crew members to stream, monitor, and recover mine countermeasures equipment. They assist the pilots verbally, utilizing conning calls, during critical phases of flight such as landing upon a ship or night vision device (NVD) landings.

For protection, the MH-53E can be outfitted with two XM218 0.5in (12.7mm)-caliber machine guns and one GAU-21 0.5in-caliber machine gun. The XM218s are placed on both sides of the aircraft, mounted in the port and starboard doors, and the GAU-21 is fired from the tail (ramp) section. Protective defensive mechanisms include the AN/AAR-47 missile warning system and the AN/ALE-39 chaff and flare dispenser.

The MH-53E possesses a variety of non-AMCM capabilities. Most notably, it is the US Navy's only heavy-lift helicopter. External cargo weighing up to 25,000lb can be transported underneath the helicopter. Furthermore, it can move heavy internal cargo and up to 55 passengers to and from shore or

shipboard environments. As previously mentioned, the aircraft provides VOD support and is instrumental in HADR missions. It has a long-range flight capacity with in-flight refueling, affording the ability to act as an on-scene commander during search and rescue missions. A rescue hoist is available for land or sea rescue, but the aircraft is not a primary platform for personnel rescue. Finally, the MH-53E can also act as a para-drop platform for parachute jumpers to safely conduct static line or free-fall jumps from up to 12,000ft.


### Future developments

The MH-53E community and Commander, Helicopter Sea Combat Wing Atlantic (CHSCWL) work with the Naval Surface Warfare Development Center in Panama City, Florida, in new product development and equipment acquisition. The AN/AQS-24A currently in use is in the process of an upgrade to AN/AQS-24B standard, this possessing an upgraded high-speed synthetic aperture sonar. The AN/AQS-24C is meanwhile in development. The upgrades provide

improved sonar capability and coverage in mine detection and identification.

Mobile Landing Platform (MLP) 3 is in the testing and evaluation phase on the West Coast. It will transit in the coming months to NS Norfolk and later be deployed to the 5th Fleet area of responsibility in support of forward-operating AMCM and other units. The MLP 3 will act as an Afloat Forward Staging Base (AFSB).

Finally, as unmanned systems take on increasing importance in modern warfare, the Mine Hunting Unit (MHU) unmanned surface vehicle is being introduced, tested, and evaluated as a supplement to the MH-53E. The MHU platform comprises an unmanned RHIB that provides the capability to stream, tow, and recover the AN/AQS-24A during operations.

According to Naval Air Systems Command, the MH-53E will continue to perform the AMCM mission until at least 2025. The US Navy is in the process of evaluating its requirement for both the AMCM and VOD missions beyond that date. 

This image:  
**An MH-53E of HM-15 using the Mk105 sled.**  
US Navy/LCDR John L. Kline

Left: **Vertical on-board delivery remains a vital role for the MH-53E.**  
US Navy/SN Phylcia Hanson