Delivering the Goods
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Converting MH-65C Helicopters to MH-65Ds Adds New Digital Navigation Systems

By Linda M. Johnson

WASHINGTON—The U.S. Coast Guard's Short Range Recovery "Dolphin" Helicopter has been undergoing a series of overhauls, the latest of which upgrades the service's MH-65Cs to MH-65Ds by adding new digital computer displays, embedded GPS and inertial navigation systems, and other digital avionics components.

The upgrade to the Delta or "D" configuration "replaces old navigation systems with more modernized digital systems that are much more reliable and accurate for aircraft navigation," explained Cmdr. Michael Campbell, the project manager for the H-65 conversion and sustainment project that is upgrading the service's aging HH-65s to MH-65s.

The Delta upgrade, which is known as obsolete component modernization, involves "taking some of the black boxes—the guts of the helicopter—and modernizing the old, analog systems with newer, more capable digital systems," he said.

By adding digital equipment that is smaller and lighter than the old equipment, the Delta upgrade decreases the weight of the aircraft and increases its fuel efficiency and the amount of fuel it can carry.

"The new systems are primarily installed within the avionics compartment in the rear of the aircraft. Their inputs are fed into the existing legacy flight deck displays in the cockpit, so from the operator's perspective, the upgrade is not a significant change," Campbell noted.

The Coast Guard has begun upgrading its MH-65C helicopters to MH-65Ds by adding digital components that are smaller and lighter than the old equipment, making the MH-65Ds more fuel efficient. *U.S. Coast Guard photo*

"However, the digital architecture, or digital framework, provides a building block for the next upgrade, which will re-designate the aircraft to the MH-65E," he explained. "The Echo upgrade will completely modernize the cockpit by integrating the Common Avionics Architecture System, known as CAAS, which is similar to the system installed in the Coast Guard's MH-60T aircraft."

In addition, "the new components that are installed in the Delta upgrade replaced some of the legacy components that were the most mission-degrading—the ones that were the oldest, that were no longer supportable and that were really starting to impact the ability of the aircraft to do its assigned missions," Campbell said.

"The H-65 operational availability was negatively impacted and forecasted to decrease in the near term due to higher failure rates and the difficulty in finding replacements for some of the aging components," he noted. "So we prioritized those components with the highest failure rates first to form the baseline for the Delta upgrade."

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Series of Upgrades

The Delta upgrade is the fourth in a series of six upgrades that will recapitalize the H-65 helicopters first introduced to the Coast Guard in the mid-1980s. These helicopters operate from Coast Guard air stations ashore and from flight deck-equipped Coast Guard cutters to fulfill search and rescue, law enforcement and homeland security missions.

The upgrades are being done as part of the helicopter's regularly scheduled maintenance. The H-65 must undergo planned depot maintenance at the Coast Guard's Aviation Logistics Center in Elizabeth City, N.C., every four years. "It made sense to combine the upgrades with the regular overhaul process since those aircraft are already planned to be out of service, resulting in minimal to no impact to fleet readiness," Campbell explained.

"Every aircraft that goes into planned depot maintenance for overhaul is now getting both the MH-65 Charlie upgrades and the MH-65 Delta upgrades together," he said. "So, now they get two upgrades at once—they come in as HH-65Cs and come out as MH-65Ds."

The first upgrade, which designated an HH-65A or HH-65B as an HH-65C when complete, involved re-engining the helicopter to provide 40 percent more power and significantly higher performance.

Another upgrade added a weapons capability for mounting a 7.62 mm machine gun for firing warning shots and a .50-caliber long-range rifle for precise targeting that can be used to disable the outboard engines on a non-compliant go-fast boat. This Airborne Use of Force (AUF) package also provides improved communications systems that support better interoperability with other U.S. Department of Homeland Security components and the Department of Defense. AUF-modified aircraft are designated as MH-65Cs.

As described earlier, the Delta upgrade addresses obsolete aircraft "safety of flight" subsystems and adds a dual embedded GPS and inertial navigation system. However, "the added intention of the Delta upgrade was to establish the baseline for the next upgrade to a completely integrated digital cockpit, which will provide a lot more capability," Campbell noted.

The Echo upgrade will be a much bigger upgrade, as it will replace the automatic flight control system as well as the entire avionics system. The first Echo upgrades are tentatively scheduled to begin sometime in fiscal year 2014.

MH-65D Locations

Coast Guard Air Station Atlantic City, N.J., received the first production MH-65D aircraft in January and just received its seventh and eighth MH-65Ds earlier this month. The station is scheduled to receive its ninth and final MH-65D in early June.

As the Coast Guard's designated prime unit for the H-65s—the unit where new upgrades and prototypes are tested out or fielded—"it is fitting that these upgraded aircraft went to Atlantic City first," he said.

The Coast Guard's Aviation Training Center in Mobile, Ala., is the next location scheduled to receive an MH-65D, its second if you include the prototype received previously. Air Station Kodiak, Alaska, is scheduled to receive four MH-65Ds to replace its four HH-65C aircraft this year. About 22 helicopters a year are being overhauled into the Delta models.

"Traditionally, aircraft are overhauled every four years regardless of what air station they are assigned to. An air station may turn in one aircraft in exchange for a newly overhauled aircraft once per year," Campbell explained.

The cockpit of the MH-65D. *U.S. Coast Guard photo by Lt. Cmdr. Al Antaran*

"But when you're transitioning to a new model aircraft and all the logistics support that goes with it—the transition training and all the parts and pieces that you need to support it—it's obviously much more efficient to do one full unit at a time," he noted.

"We've been following this unit-by-unit transition model from re-engining through the MH-65Cs and now as we transition into the Deltas. We've changed the model so that we do one air station at a time and do the whole unit because it is simply much more effective to transition a whole unit at once," he said.

A pilot formerly qualified in the HH-65A, HH-65B and HH-65C, Campbell explained that "the H-65 program has been extremely successful over the past couple years and the primary reason for that success is because we are a tight group with close working relationships with our entire stakeholder community. We make a great team."

More information on the H-65 Short Range Recovery Helicopter conversion and sustainment project can be found online at: http://www.uscg.mil/acquisition/mch.■

Coast Guard RDC Helps Battle Maritime Invaders

Scientists at the U.S. Coast Guard Research and Development Center (RDC) in New London, Conn., are helping lead the battle against the proliferation of invasive species from ballast water discharged by cargo ships—an environmental, medical and economic catastrophe that has quietly spread havoc around the globe.

Virtually all cargo ships use ballast water to maintain stability, balance and structural strength. In addition, a ship may take on ballast water as it enters a harbor to safely pass under bridges or fit under loading cranes, and may discharge ballast to safely cross shoals on the bottom of the waterway. In general, ships take on ballast water as they unload cargo and discharge ballast water while loading cargo. At times, this may mean completely emptying their ballast tanks while alongside a dock.

Ships discharge approximately 2 million gallons of ballast water per hour into U.S. waters. The organisms contained in ballast water may include invasive species or disease-causing bacteria not native to the port where it is discharged.

Ballast water discharge is a major factor in the spread of invasive aquatic species worldwide. It has been implicated in the introduction of aquatic organisms into new areas. Examples of invasive species brought to the United States in ballast tanks include the zebra mussel, round goby, Japanese shore crab and Asian clam.

A study by the U.S. Food and Drug Administration showed that ballast water and other waters from cargo ships were likely responsible for introducing cholera strains from South America to U.S. Gulf of Mexico ports in the early 1990s.

Scientists with the Coast Guard Research and Development Center plan to evaluate the Great Ships Initiative ballast water treatment test facility in Superior, Wis., above in May.

Collectively, aquatic nuisance species transported via ballast water have caused billions of dollars in damage to the U.S. economy and unmeasured damage to the environment.

For example, zebra mussels—believed to have been carried to North America in ballast water from foreign vessels—continue to cause considerable damage by clogging the intakes of municipal water supplies and hydroelectric plants, driving out native aquatic life and covering beaches with sharp shells.

RDC scientists, who have been studying aquatic invasive species for more than a decade, are now testing ballast water treatment testing procedures that will allow U.S. authorities to begin enforcing stringent new regulations intended to limit destructive and dangerous aquatic infestations.

"Overall, the United States spends billions of dollars each year combating invasive species on land as well as water," said Penny Herring, the marine biologist in charge of the RDC's aquatic nuisance program.

From the RDC offices on the west bank of the Thames River at Fort Trumbull, Herring and her colleagues oversee a complex research network with a goal of ensuring accurate, uniform data collection from ballast water treatment test facilities all over the country.

This task is particularly challenging because individual treatment systems may use different treatment technologies, such as filters, ultra-violet light and chlorine. Individual test facilities also operate in different environments, such as salt water on the East and West Coasts and fresh water in the Great Lakes region, noted Gail Roderick, an RDC physical scientist working on the ballast water project.

Roderick spent a week in January at the California Maritime Academy in Vallejo, Calif., observing new data-

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collecting procedures on a ballast water treatment system installed for testing aboard the Golden Bear, the academy's 500-foot training ship.

In May, she and Herring plan to evaluate the shore-based test facility at the Great Ships Initiative in Superior, Wis., the westernmost point of the Great Lakes.

The RDC effort—supported in part by the U.S. Department of Transportation and the Environmental Protection Agency's Great Lakes Restoration Initiative—will ensure that accurate and credible data can be collected by ballast water treatment test facilities on both fresh and salt water when testing various ballast water treatment technologies.

Roderick explained that the RDC's findings will help the Coast Guard certify test procedures for independent test facilities in the United States and abroad, much as Underwriters Laboratories—an independent, not-for-profit product safety testing and certification organization—gives its stamp of approval for various consumer products.

This research will be used to help enforce proposed Coast Guard ballast water treatment regulations that are based on International Maritime Organization (IMO) standards not yet in effect. Under the proposed regulations, new ships delivered from 2012 onward and all ships operating on the seas from 2016 onward would be required to meet a stringent ballast water discharge standard.

Use of approved ballast water treatment technologies will allow cargo ships to treat ballast water onboard rather than exchange it with seawater—an outmoded practice that is difficult to monitor, carries environmental and safety risks, and would be phased out under the proposed regulations.

Ultimately, the pending Coast Guard and IMO regulations will force commercial ships to use ballast water treatment programs, thus preventing the hazardous introduction and spread of aquatic nuisance species.■

Mission Effectiveness Project Update

Day breaks as the Coast Guard Cutter Thetis is moored at the Coast Guard Yard in Baltimore. Thetis—a 270-foot Medium Endurance Cutter homeported in Key West, Fla.—is currently undergoing refurbishment as part of the Mission Effectiveness Project (MEP). MEP significantly improves a cutter's mission capability and reduces its operating and maintenance costs by replacing obsolete systems.

Coast Guard Cutter Northland, another 270-foot Medium Endurance Cutter, departed the Coast Guard Yard April 1 after completing MEP on time and on budget. Under MEP, 17 of the 110-foot Island-class patrol boats, 14 of the 210-foot Reliance-class Medium Endurance Cutters and 13 of the 270-foot Famous-class Medium Endurance Cutters are undergoing extended refurbishment at the Coast Guard Yard.
U.S. Coast Guard photo by Petty Officer 3rd Class Matthew Masaschi

ASK MASTER CHIEF AYER

Q. Why is the Response Boat Medium (RB-M) not able to operate in ice? We need that capability at our station.

A. It is all about requirements and compromises. The requirements for any program are developed by the sponsor and in the case of the RB-M, that is the Office of Boat Forces (CG-7). In a perfect world, we would build a boat that would do everything for everyone, but in the real world, we have to pick and choose which capabilities we expect to utilize the most and in many cases, that means forgoing other capabilities.

In the case of the RB-M, two of the most important requirements are speed and maneuverability, which require a relatively light vessel with a propulsion system that provides the necessary power to achieve the required speed. In order to meet these requirements, an aluminum hull with a water jet propulsion system was selected. Neither of these choices lends itself to operating in ice. Water jets and ice do not mix very well. At a minimum, ice clogging of the water inlet would be a constant issue.

If we could build a steel- hull boat with conventional propulsion that could meet the critical performance parameters and operate in ice, we would. It might even be less expensive to build and easier to maintain. But the reality is we can't—steel is too heavy and we can't get the speed and performance out of a more conventional propulsion system.

If your unit needs ice capable boats, then the RB-M is clearly not the ideal solution. However, if your unit needs a fast, responsive and safe vessel for the majority of your missions, the RB-M fits the bill very well.

— MCPO Brett F. Ayer, Command Master Chief, Coast Guard Acquisition Directorate

An RB-M from the Coast Guard's Boat Forces Center in Yorktown, Va., patrols Wormley Creek. *U.S. Coast Guard photo*

The RB-M's water jet propulsion system gives the boat its speed and maneuverability. *U.S. Coast Guard photo*

[To submit a question for an upcoming Acquisition Directorate newsletter, please e-mail Master Chief Brett F. Ayer directly at: Brett.F.Ayer@uscg.mil or acquisitionwebsite@uscg.mil.]