



## Forty-two to Tango

MH-60T recapitalization revitalizes the Coast Guard medium-range recovery helicopter fleet with state-of-the-art systems and renewed structures.

By Frank Colucci

Little more than a year after the first-production MH-60T was delivered by the Aviation Logistics Center (ALC) at Elizabeth City (E-City), N.C., the U.S. Coast Guard (USCG) has received 14 helicopters rebuilt with integrated avionics and renewed airframes. Tango-model H-60s are operational at Coast Guard Air Stations Sitka, Alaska; San Diego, Calif.; and E-City, and at the Aviation Training Center in Mobile, Ala. One even flew missions in the Gulf of Mexico supporting the response to the Deepwater Horizon oil spill. The overall plan is to field 42 fully updated medium-range recovery (MRR) helicopters by 2020.

MH-60T modernization stretches the structural life of the rescue helicopters through 2027 or beyond, and fleet plans now include renewed rotor systems and maritime search radars.

Seven HH-60Js are currently in the 10-month expanded programmed depot maintenance (PDM) cycle that turns an HH-60J Jayhawk into an MH-60T. ALC rebuilds and rewires the well-worn Jayhawks around a "glass cockpit" that integrates a modern communications/navigation suite, electro-optical sensor system (ESS), and digital weather radar. The Rockwell Collins Common Avionics Architecture System (CAAS) at the center of the upgrade

is designed to help Coast Guard crews manage their high cockpit workload. According to MH-60 systems manager Lt. Cmdr. Joe McGilley, "There are little tweaks here and there, but for the most part it's working great."

Tango-model operational testing at San Diego and E-City, is complete. "Ideally, we'd like to have a dedicated test aircraft or fleet spare," conceded McGilley, "We really don't have extra aircraft. All of our aircraft are operational." He added, "When you fly 24/7, V-Zero, there's no flex in that schedule."

Sikorsky Aircraft Corporation delivered 42 HH-60Js from 1990 to 1996 and gave the Coast Guard a search and rescue and law enforcement platform with about 300 nautical miles radius and six to seven hours endurance. Today, about three-quarters of the hard-flown helicopters have exceeded their original 10,000-hour airframe life. The high-time Jayhawk has more than 13,000 flight hours. Equally troubling, HH-60J radars and other avionics are growing obsolescent and unsupportable.

MH-60T modernization started as a communications/navigation upgrade funded by the Integrated Deepwater System plan. Early Deepwater industry schemes scrapped the 22,000-pound Jayhawk for the 15,000-pound AB/AW139 with less payload and endurance. However, USCG leadership noted MH-60Js armed and armored for Airborne Use of Force (AUF) have to carry about 200 pounds of armor plus 7.62 mm or .50-caliber guns and marksmen. Even heavier loads mix Tactical Law Enforcement or Maritime Safety and Security Teams with up to 6,000 pounds of fuel, and Jayhawks give the Coast Guard heavy Vertical Insertion/Vertical Delivery capability. When the service reclaimed the role of Deepwater Prime System Integrator, it directed funds to update Jayhawk avionics and kept the valuable helicopters flying.

### Smart Glass

The CAAS, central to the MH-60T upgrade, has five color multi-function displays that show flight and systems symbology and sensor imagery. The Coast Guard bought CAAS hardware identical to that in Army special operations helicopters, but an MH-60T cockpit working group teamed with VH-60N presidential helicopter engineers to develop a uniquely Coast Guard glass cockpit. Instead of the split-screens used by special operations aviators, the USCG-formatted flight symbology for full-page displays. Expanding square and other automated search patterns and weather radar imagery can be overlaid on the MH-60T digital map. Coast Guard mission plans can be written on computer workstations and transferred to the helicopter via memory card.

The MH-60T communications suite supplements dual Rockwell Collins ARC-220 HF and ARC-210 UHF/VHF military radios with two Wolfsburg RT-5000 civil-band radios to communicate with law enforcement agencies. The digital cockpit also gives Coast Guard crews basic text-messaging capability and can send automated position reports aircraft-to-aircraft and aircraft-to-ground. A more elaborate C4ISR (command, control, communications, and computers, intelligence, surveillance, reconnaissance) insertion aims to share electro-optical imagery and other data with cooperative law enforcement and homeland defense forces.

Rockwell Collins also provides the modern VOR/ILS, TACAN, ADF and DF navigation aids, and integrated Traffic Collision Avoidance System on the MH-60T. While the Jayhawk had no true autopilot other than basic altitude-hold functions, the MH-60T introduces a three-axis flight director to fly search patterns hands-off. The Tango pilot can pick a geographic point for an automated approach but still works the collective to arrive at a rescue hover. An EFW heads-up display on AUF aircraft shows the pilot basic flight and heading information.



**Opposite:** Jayhawks are undergoing the programmed depot maintenance cycle to modernize the medium-range recovery helicopters to MH-60T standard. They will be used as responders for offshore operations, and can provide shore-based aviation surveillance capability and transport. **Above:** Coast Guard Air Station Kodiak MH-60 Jayhawk crewmen and emergency medical personnel from the Kodiak and Coast Guard fire departments stabilize Rebecca Moffat, a 25-year-old female, at Air Station Kodiak after she was rescued four miles from the east coast of Uyak Bay on Kodiak Island, Oct. 11, 2010. Moffat, who suffered a broken leg while hiking, was hoisted and safely transported by the helicopter rescue crew to the awaiting emergency medical personnel who transferred her to Providence Kodiak Island Medical Center in stable condition for further treatment.

Jayhawk pilots and rescue crewmen have long used infrared visionics to see at night, but the day-night ESS on the MH-60T integrates infrared and low-light and color TV sensors and a laser pointer/illuminator. With the ESS, an MH-60T summoned from Sitka found a lost hiker in darkness less than 6 minutes after arriving on the scene, McGilley said, "Having an ESS that's state-of-the-art and integrated into the cockpit, especially when operating in Alaska, you can't put a value on that." The 9-inch ESS gimbal made by FLIR Systems, Inc., is also small enough to fit the Coast Guard MH-65C short-range recovery helicopter and is one of the most capable for its size in the world.

MH-60T modernization swaps the old analog weather radar of the HH-60J for a Honeywell Primus 700A digital radar with beacon detection and some sea-search capability. The Coast Guard is meanwhile studying more capable maritime search radar (RSS) for the helicopter. McGilley explained, "Because our fixed-wing fleet is so small and so widely spread, the MRR winds up doing a lot of the long-range surface-search missions for the Coast Guard." The careful market survey is meant to define a radar based on actual helicopter missions and an acquisition cycle stretching five years or more. "What was good this year is obsolete next year," said McGilley. "We want to have a well-defined requirements document ... What do we expect our mission set to look like by the time we're fielding the RSS?"

MH-60T crews transition from the Jayhawk to the Tango at Mobile, and ATC now has two modernized helicopter primarily for training. A cockpit procedures trainer with CAAS displays was in place before the first MH-60T was delivered, and the Coast Guard plans to convert the full-motion simulator at Mobile from an HH-60J to MH-60T cockpit in 2012.



**Top:** The MH-60T project achieved initial operational capability on Oct. 1, 2009. To date, 14 MH-60Ts have been delivered. The project will upgrade 42 in-service HH-60J helicopters. **Above, left:** The new glass cockpit of an MH-60T. **Above, right:** The MH-60Ts have an enhanced Electro-Optic/Infrared Sensor System as well as radar, and airborne use of force capability to meet Coast Guard mission requirements.

### Stronger Structures

E-City craftsmen routinely replace Jayhawk cabin roof transmission beams cracked by heavy loads and are experts at rebuilding worn helicopters. The MH-60T emerges from its expanded PDM with structural improvements in the tail cone and elsewhere for an effectively indefinite service life. Sikorsky supported the MH-60T structural Service Life Extension Program with parts and engineering.

While the Tango conversion gives the MH-60T airframe essentially indefinite life, main rotor blades, swashplates, and other dynamic components still have defined service lives. About a quarter of the MRR fleet will come due for dynamic recapitalization at the same time. McGilley said, "We're anticipating a huge slug of them needing it in two years."

To reduce the high cost of engine repairs, the helicopter modernization also introduces an Enhanced Digital Engine Control Unit (EDECU) for the General Electric T700-GE-701C turboshafts that still power the MH-60T. The EDECU and a new but unchanged hydro-mechanical unit increase power 5 percent with no changes to the engine's hot section.

CAAS cockpit displays give the MH-60T crew new caution, advisory, and **systems health pages**. The system also includes diagnostics for **general maintenance** and systems surveys. The Coast Guard is **prototyping a dynamic vibration** monitoring system to replace the track-and-balance system used today and initial test results appear promising.

The original USCG HH-60J was based on the airframe and avionics architecture of the Navy's SH-60F anti-submarine warfare helicopter. Coast Guard leadership now looks to the Navy for airframes to replace the MH-60Ts lost this year. "We have the craftsmen with the talent and the skills to do it," said McGilley.

Congress and the White House have approved funding to replace the E-City MH-60T (the first-production conversion) lost in Utah. The Alaska congressional delegation has requested funding to replace its Tango model lost in Washington. The Navy has identified at least one SH-60F in its "sundown" fleet for Coast Guard conversion. McGilley observed, "Most of these aircraft have very few hours compared to what we're dealing with."

April 1, 2011, will be the 95th anniversary of Coast Guard aviation. Due to the MH-60T recapitalization and other successful aviation acquisition projects, the Service is ensuring the aircraft and mission equipment for the front line air stations is "always ready" for years to come.