

UH1-Y - Benefits and Deficiencies

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Scenario

Imagine for a moment the piercing sound of a vintage siren. This is no Fourth of July parade; actions are set in motion without a spoken word and no smiles are to be found. Marines sprint to the aircraft on the line, dashing from their makeshift workspaces with the greatest sense of urgency. The smell of jet fuel permeates the air as rotors begin to turn. The pilots finish the last touches of securing their flight gear while the ground crew prepares the aircraft for whatever may be on the horizon. The pilots, the aircrew, and the ground crew all move with a purpose and with seamless transition from one task to the next. Each action is calculated and accomplished with speed and accuracy that would impress the finest NASCAR pit crew. The aircraft, a mixed section of H-1's, launch in response to a TIC (troops in contact). Their timeliness will determine the success and survivability of the Marines in contact with the enemy. The Marines' effectiveness has been finely tuned through decades of training, combat experience, and the refinement of equipment. The newest enhanced model of the Marine utility helicopter, the UH-1Y, should improve timeliness and combat effectiveness. However, the addition of new mission equipment, it has proven to detract from the Marines' ability to perform combat missions in an effective and timely manner.

Introduction

The mission of the UH-1N has changed little since its introduction to the Marine Corps in the early 1970s. The UH-1N was introduced into the Marine Corps' inventory as a utility helicopter for various missions to include command and control and assault support. Over the past three decades, advancements in technology and upgrades to the platform have increased the aircraft's weight, subsequently decreasing its capacity for cargo and/or troops. However, the current operational tempo, decreases in capacity, and a growing number of airframes that have exceeded their service life, created the demand for a UH-1Y with increased capabilities. Those capabilities include an increased lift capacity, greater range, and faster response time. Despite the technological enhancements, the UH-1Y continues to sacrifice combat proven procedures for new equipment. Despite technological improvements, the UH-1Y should be supplemented with improved defensive armament subsystem (IDAS) attaching points, legacy auxiliary fuel kits, and legacy crew seats to restore capabilities that were inherent to the UH-1N.

UH-1Y Improvements

When the UH-1N was introduced to the Marine Corps, the expected service life was 10,000 flight hours. Today, the remainder of the UH-1N platforms in service have exceeded 7,000

flight hours, and many have exceeded the 10,000-hour service life expectancy by as many as 3,000 flight hours. The current configuration of UH-1N provides for a maximum gross take-off weight of 10,500 pounds,¹ but with an average weight of approximately 7,000 pounds,² the margin of aircrew/mission essential equipment can total 3,500 only pounds.³

As of 2008, the UH-1Y has an increased maximum gross take-off weight of 18,500 pounds compared with that of its predecessor.⁴ The UH-1Y's expanded fuel capacity increased the range and time on-station for the utility helicopter role. The addition of a four-bladed rotor system and a more robust power train and drive system increased the UH-1Y speed to 166 knots (kts), up from the UH-1N's 120kts. Additionally, the UH-1Y has an 84 percent parts commonality with the redesigned AH-1Z, which is intended to replace the current AH-1W light attack helicopter in the Marine Corps arsenal. (The parts commonality will decrease the overall cost of maintaining both the AH-1Z and UH-1Y).

Deficiencies and Supplements

Improved Defensive Armament Subsystem (IDAS)

The increased maximum gross takeoff weight does allow for a

¹ NA 01-110HCG-2-1, *Operational Test and Evaluation Report, NA 01 HCG-1* (hereinafter Test and Evaluation Report).

² author's experience.

³ Test and Evaluation Report.

⁴ Test and Evaluation Report; first introduced in 2001.

heavier payload, but contrary to a popular misconception, that does not mean that the UH-1Y is the answer for the UH-1N's problems concerning armament standard combat loads. The current UH-1N platforms actually restrict the number of rockets carried on the current IDAS mounts. These restrictions are not placed on the equipment attached to aircraft; rather, the restrictions are placed on the attaching lugs located on the airframe. This shortcoming was not corrected with the new UH-1Y platform, and the restrictions are the same for both UH-1Y and UH-1N. The following excerpts are from the most recent operational test and evaluation report:

The IDAS is rated for a 1,000-pound payload; however, the IDAS mounting lugs on the airframe are limited to a weight of 571 pounds. The mounting lug weight limitation inhibited flexibility in configuring mission weapon load outs and did not allow the users to realize the full capability of the IDAS. For example, during the Offensive Air Support (OAS) missions, the UH-1Y had the power to lift two fully loaded 19-shot rocket pods. The IDAS mounting lug weight limitation restricted the pods to only 11 rockets a piece. If the mounting lugs could support the full capability of the IDAS an additional 16 rockets could be carried, resulting in an increase of firepower from 22 to 38 rockets which would lead to improved support of the Marine on the ground. The IDAS weight limitation also affected the use of external auxiliary fuel tanks. Because of the IDAS mounting lug weight limitation, the 77-gallon tank could not be fully fueled and, therefore, yielded only 4 to 17 minutes more on-station time than internal tanks alone.⁵

Due to the IDAS restrictions, the Yankee's increased

⁵ Test and Evaluation Report

maximum gross takeoff weight does not allow for additional armament capacity. By redesigning the attaching lugs on the aircraft, these restrictions could be eliminated and greater armament capabilities could be realized. Additionally, with the ability to carry more weight on the IDAS, advancements in crew served weapon systems avoid being hamstrung by weight limitations currently in place.

Inadequate Auxiliary Fuel System Capability

One of the design changes from the UH-1N to the UH-1Y was the removal of internal auxiliary fuel bags from the UH-1N and addition of external auxiliary fuel tanks from the AH-1W. However, the new tanks not only compound the problem of weight restrictions placed on the IDAS mounts, but they also create ingress and egress hazards for passengers and crew. The following excerpts are from the most recent Operational Test and Evaluation report:

The UH-1Y has a threshold requirement for an external stores system capable of employing fuel tanks. The test team evaluated the 77-gallon external auxiliary fuel tank, which was hung on the IDAS. The tank reduced the available UH-1Y weapons stations. Furthermore, the IDAS mounting lug weight limitations precluded the team from fully fueling the tank. Due to internal plumbing design and attitude of the auxiliary tanks while mounted on the UH-1Y, at least 7 gallons (47.6 pounds) of the partially filled tank were unusable. The amount of unusable fuel was dependent upon nose attitude. Nose-up attitude or loiter airspeeds significantly reduced the amount of usable fuel. The combination of unusable fuel and the IDAS mounting lug weight restriction yielded only 4 to

17 minutes more on-station time than internal tanks alone. The small amount of on-station time gained did not offset the loss of weapons stations. Additionally, the external tanks severely reduced the forward and aft depression limits of the crew served weapons and created an obstacle for troops entering and exiting the cabin for assault support missions where troops needed to exit and enter the cabin rapidly. The overall effect was that flexibility was lost during mission planning and mission execution.⁶

The UH-1Y inherited the expectations of versatility from the UH-1N. Designed to be a utility aircraft, the UH-1 begins to lose functionality in those versatile roles when external fuel tanks are mounted to the IDAS. Rapid insertion of troops is hindered with the ingress and egress hazards that go hand-in-hand with the current UH-1Y configuration. These same hazards become critical when dealing with casualty evacuations of urgent and priority patients. Additionally, with internal auxiliary fuel, or external redesign of the auxiliary fuel tanks, an extended on-station time for command and control over the battle space could easily be attained. Extended ranges could be reached with an auxiliary fuel redesign, realizing a greater potential for the UH-1Y as the Marine Corps works to increase its seabasing capabilities.

Crew Seat Issues

Another design change with the UH-1Y was the installation of crashworthy seats. The new design was meant to enhance

⁶ Test and Evaluation Report

aircrew survivability with a higher crash rating. The new seats, however, detract from cabin space and inhibit freedom of movement in the cabin area. This design flaw has resulted in the aircrew removing the seats for most missions. The following excerpts were written in the most recent operational test report:

The new Common Crash Resistant Troop Seat System (CCRTSS) inhibits the ability of the aircrew to close cabin doors. The CCRTSS was designed to attenuate crash g-load, but the larger CCRTSS structure moved seated troops four to five inches farther away from the bulkhead than legacy seating. Missions requiring movement of combat-loaded troops with the cabin doors closed will necessitate removal of the outboard facing transmission seats.

With the cabin loaded in the basic utility configuration of eight combat loaded Marines with seats installed, the crew chief could not fully access and traverse crew-served weapons due to the proximity of the Marines seated next to the door guns. Additionally, crew chiefs could not store gear beneath occupied cabin seats due to the full seat attenuation. Finally, the CCRTSS must be installed in specific locations within the cabin; whereas in the UH-1N, the cabin seats were modular and could be installed anywhere in the cabin. The configuration of cabin seats has had a marked effect on the crew chief's ability to use crew-served weapons.⁷

The fact remains that the increased maximum gross takeoff weight does not allow for additional cargo and troop capacity. The increased dimensions required for the functional design of the stroking seats detracts from the valuable real estate in the cabin area. In an already limited cabin area, crew and

⁷ Test and Evaluation Report

passengers are forced to find areas to stow gear. In the UH-1N, the modular seating system allowed for aircraft securing gear and mission essential gear to be stowed beneath the seats. By replicating the same actions in the UH-1Y, the stroking capabilities are inhibited in the new seats. Mission essential gear must be secured in space that was commonly used as maneuver space inside the cabin area. By retrofitting the modular seating system of the UH-1N into the UH-1Y, not only will the price tag of each new aircraft decrease, but the aircrew will also be able to resume missions with fewer hazards to counter.

Counter Argument

Indeed, the Marine Corps has often done more with less than any other branch of service. Conceptually, the UH-1Y would breathe new life into an aging fleet of utility helicopters and bring an increased capability to the community. In keeping with the Commandant's vision and working toward increasing capability and survivability, the acquisition community is faced with finding the right equipment to accomplish both tasks.

For example, the CCRTSS seating system for the UH-1Y was designed to increase aircrew survivability in the event of a hard landing. Part of that survivability feature required removing the provisions for internal auxiliary fuel capability and placing them outboard. The UH-1Y will continue to mature

until a common ground can be met between functionality and survivability.

Opponents to retrofitting legacy components into a new aircraft would argue that a redesign would cost billions and would affect changes in production schedules and subsequently affecting aircraft deliveries. Contracts to vendors would be broken or renegotiated, driving the cost of the UH-1Y platform to increase beyond the Marine Corps budget. Manufacturers and equipment vendors would also claim that the product that is being delivered meets all criteria set forth by Federal Regulations and safety standards, standards that the legacy equipment couldn't meet.

While the Defense Contracting Management Agency sets the parameters of the contract, and the manufacturers met those parameters, the end product still remains short of what the Marine Corps needed. Regardless, a renegotiation of the contract may cost billions and jeopardize the program.

Conclusion

Although the UH-1Y far surpasses the expectations and capabilities of the UH-1N, the equipment provided to fulfill its missions does not. Technological improvements, ultimately, should advance capabilities and enhance the employment of the weapon system. While the aircraft meets some of the criteria

set forth in the Commandant's vision, it has taxed the functionality of the crew that enables it. By finding solutions in search of a problem, the new seats and auxiliary fuel systems have created obstacles for aircrew and passengers to overcome. In the process, a major design flaw was overlooked, and the same restriction for IDAS mounting lugs found its way into the UH-1Y. By correcting the IDAS mounting lugs, as well as, retrofitting legacy crew seats and legacy internal fuel bags, the UH-1Y will prove to be more effective than the UH-1N in all of its versatile roles.

Bibliography

- Aerospace Daily & Defense Report. 2006. *H-1 Helicopter Program Ready for Operational Evaluation*. Mar 6, 217(42).
- Ball, Robert E. & Dale B. Atkinson. 2005. *Designing for Survivability*. Aerospace America. Nov 7.
- Bruno, Michael. 2005. *Wynne Approves Buy of New UH-1Y Hueys*. Aerospace Daily & Defense Report. Apr 25, 214(17).
- Butler, Amy, ed. 2005. *Status of Programs; Military Aviation*. Aviation Week & Space Technology. Oct 31, 163(17).
- - - 2008. *Helo Hiccup*. Aviation Week & Space Technology. Jul 21, 28(169).
- - -, Douglas Barrie & Robert Wall. 2006. *Helos Riding High; Pentagon Programs Take Center Stage for U.S. and European Helicopter Makers*. Aviation Week & Space Technology. Jul 17, 110(165).
- Colucci, Frank. 2005. *Naval Aviation: Navy, Marine Helicopter Fleets Will See Arrivals of New Aircraft*. National Defense. Sept 1, 20(622).
- Defense Daily. 2008. *Defense Watch*. Aug 18, 239(34).
- Fein, Geoff. 2007. *Navy on Track to Issue H-1 Helmet, Target Sight System Production Contract in '08*. Defense Daily. Sept 27, 235(62).
- Flight International. 2006. *Bell Faces Vital Review*. Mar 21.
- - - 2006. *Bell Gets H-1 Programme on Track*. Aug 8.

Hartnett, Dwayne. 2005. *AH-1Z, UH-1Y Complete First Sea Trials*.
Amarillo Daily News. May 19.

Helicopter News. 2006. *Navy Awards Bell \$137 Million Contract
for First Seven UH-1Y Helicopters*. Jul 25, 32(15).

- - - 2008. *First UH-1Y Detachment Report to Miramar for
Training, AH-1Z Faces Two-Year Delay*. Sept. 2, 34(18).

InfroProd. 2008. *USA JF Taylor Awarded Contract for
Training/Weapons Systems*. Jun 22.

Inside the Navy. 2005. *Marines Opt for New Helicopters, Drop
Remanufacturing Plans*. Mar 7, 18(9).

- - - 2006. *H-1 Helicopters Experience Glitches During
Operational Tests*. Aug 14, 19(32).

- - - 2007. *Operational Tests Uncover Problems with Marine H-1
Helicopters*. Jan 22, 20(3).

- - - 2008. *Navy's FY-09 Supplemental Request May Call for Just
Three H-1 Helos*. Apr 14, 21(15).

- - - 2008. *Young 'Unhappy' with Bell Over UH-1Y, Says Testers
Overstated Problem*. Oct 6, 21 (40).

- - - 2008. *New Navy Air Acquisition Czar Downplays UH-1Y
Concerns*. Oct 13, 21(41).

Inside the Pentagon. 2007. *Critical Intelligence*. Oct 25,
23(43).

- - - 2008. *Troubled H-1 Helo Program Exemplifies Tough Calls
Young Faces*. Jun 5, 24(23).

- - - 2008. *Critical Intelligence*. Aug 14, 24(33).
 - - - 2008. *DOD Approves Full Production for UH-1Y Despite Major Deficiency*. Oct 2, 24(40).
- NA 01-11-HCG-2-1. 2008. *Operational Test and Evaluation Report, NA 01 HCG-1*.
- Parmalee, Patricia, ed. 2005. *Test Time*. Aviation Week & Space Technology. Jun 20, 162(25).
- Phillips, Edward H. 2005. *New Hueys for Marines*. Aviation Week & Space Technology. May 9, 48(162).
- Rotor & Wing. 2005. *U.S. Marines Get First UH-1Y and AH-1Z for OpEval*. Dec 15, 39(12).
- - - 2006. *Program Updates*. Mar 15, 40(3).
 - - - 2006. *Year in Review: Contracts*. Dec 15, 40(12).
 - - - 2007. *Rotorcraft Report*. Mar 15, 41(3).
- Wall, Robert. 2004. *Under Scrutiny; Flight Test Pace at Record Levels for Key Pentagon Rotorcraft Efforts*. Aviation Week & Space Technology. Jul 19, 161(3).

Thesis Statement: Despite its technological enhancements, the UH-1Y should be supplemented with legacy auxiliary fuel kits, legacy crew seats, and legacy intercommunication systems to improve capabilities.

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UH-1Y Ancillary Gear/Mission Confliction

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