

CH-53K® King Stallion®



The Navy approved the CH-53K for full-rate production (FRP) in December 2022. Earlier that month, DOT&E published a combined IOT&E and LFT&E report of CH-53K's operational effectiveness, suitability, and survivability to inform the FRP decision. The CH-53K is operationally effective when transporting external cargo, troops, and lightweight pallets. There are several deficiencies with heavy payload delivery and crew-vehicle interface that should be corrected. The CH-53K is not operationally suitable because of low aircraft availability. Phase II LFT&E has yet to be resourced, planned, and scheduled. The Navy is updating the Test and Evaluation Master Plan (TEMP) and developing test plans in order to conduct FOT&E in FY24. CH-53K® and King Stallion® are registered trademarks of the Department of the Navy.

SYSTEM DESCRIPTION

The CH-53K is a three-engine, dual-piloted, heavy lift helicopter intended to replace the aging CH-53E helicopter. The CH-53K mission payload external load transport is more than twice the CH-53E capability. The triple hook system is designed to transport independent external loads, which allows for three different location drops per sortie. Another major improvement is the replacement of mechanically actuated flight controls with a fly-by-wire system.

CH-53K is equipped with aircraft survivability equipment designed to provide self-defense capability against ground-to-air and air-to-air missile threats. This suite consists of the Department of Navy Large Aircraft Infrared Countermeasures system with advanced threat warning sensors, radar warning receiver, and countermeasure dispensing system.

The Marine Corps will support CH-53K Organizational-Level (O-level), Intermediate-Level (I-level), and Depot-Level (D-level) maintenance concepts. The number of personnel per squadron required to maintain the CH-53K is expected to remain the same as for the CH-53E.

MISSION

Units equipped with the CH-53K aircraft provide the Marine Air-Ground Task Force with assault support to include maritime special operations, by transporting heavy equipment, armored vehicles,

combat troops, and supplies from ships to inland locations under all weather conditions. Secondary CH-53K missions include tactical recovery of aircraft and personnel, helicopter air-to-air refueling, air evacuation, aerial delivered ground refueling, forward arming and refueling point operations, air delivery, and rapid insertion and extraction operations.

PROGRAM

The CH-53K is an Acquisition Category IC program. The program of record stipulates the procurement of 200 aircraft. The program completed IOT&E in April 2022 in accordance with a DOT&E-approved test plan. DOT&E provided a combined IOT&E and LFT&E report in December 2022, in support of the FRP decision, which the Navy approved later that month.

The CH-53K Program Office (PMA-261) is updating the TEMP in support of two phases of FOT&E. The first FOT&E phase consists of two integrated test (IT) periods and an operational test period. The two IT periods were conducted in FY23 to collect data for secondary missions and updated aircraft survivability equipment. The operational test period, which will complete the first FOT&E phase, is scheduled for FY24 and will assess the operational effectiveness, suitability, and cyber survivability of the aircraft's survivability equipment and the Digital Interoperability system, and verify the correction of deficiencies observed during IOT&E. The Navy will submit an operational test plan

for DOT&E's approval, and DOT&E will publish an FOT&E report after testing is complete. Initial planning has started for the second phase of FOT&E but is yet to be scheduled.

Phase II LFT&E has yet to be resourced, planned, and scheduled. DOT&E has been reporting since FY20 that the Navy has yet to fund the Phase II LFT&E in accordance with the DOT&E-approved TEMP.

» MAJOR CONTRACTOR

- Sikorsky Aircraft Corporation, a subsidiary of Lockheed Martin Corporation – Stratford, Connecticut

TEST ADEQUACY

As reported in last year's Annual Report, IOT&E was adequate to support the evaluation of operational effectiveness, operational suitability, and cyber survivability. IOT&E was not adequate to characterize aircraft survivability equipment performance. In last year's report, DOT&E recommended a retest of aircraft survivability equipment. The Navy intends to conduct this test in FY24 with a DOT&E-approved test design. The results will be included in a DOT&E FOT&E report in FY24.

The Marine Operational Test and Evaluation Squadron (VMX-1), under the auspices of the Navy Operational Test and Evaluation Force, conducted two FY23 IT events, both in accordance with DOT&E-approved test plans and observed by DOT&E. The first event was conducted from October 2022

through July 2023, collecting IT data on low-rate initial production Lot 2 aircraft to evaluate CH-53K's ability to conduct its secondary missions. VMX-1 conducted the second IT event from May through August 2023, collecting data on a new version of aircraft survivability equipment installed in an engineering development model aircraft.

PERFORMANCE

» EFFECTIVENESS

In the December 2022 IOT&E report, DOT&E determined that the CH-53K is operationally effective when transporting external cargo, troops, and lightweight pallets. The aircraft demonstrated it exceeds the external load and range performance requirement. The CH-53K is not effective for internal heavy payload delivery or the transport of standard Air Mobility Command 463L pallets because the cargo rollers and portable electric winch deficiencies increase the time required to load heavier pallets into the cabin. Interface deficiencies prevented effective data transfer between the Joint Mission Planning System and the aircraft's mission computer, which increased pilot workload and could hamper mission execution.

» SUITABILITY

In the December 2022 IOT&E report, DOT&E determined that the CH-53K is not operationally suitable. The aircraft demonstrated acceptable results for all reliability and maintainability metrics.

However, the demonstrated low aircraft availability does not support sustained operations. Additionally, the low probability of success of the automatic blade fold system will result in mission aborts and extended deck cycles that could hamper amphibious operations. The aircraft demonstrated its sortie generation rate requirement. Unexpected main and tail rotor blade erosion damage was observed on aircraft operating in the desert environment during IOT&E. Extended time was needed to repair blade erosion damage because of the lack of a structural repair manual. Battle damage assessment and repair also requires a structural repair manual that has yet to be delivered.

» SURVIVABILITY

The lack of a structural repair manual for battle damage assessment and repair negatively impacts survivability. The classified annex to the DOT&E combined IOT&E and LFT&E report contains a detailed cyber survivability assessment.

RECOMMENDATIONS

The Navy should:

1. Fund and complete the planned Phase II LFT&E program in accordance with the DOT&E-approved TEMP.
2. Improve internal cargo and 463L pallet loading capability.
3. Improve automatic blade fold system reliability to

make CH-53K suitable for amphibious operations.

4. Improve the design of the leading edge and tip caps of the main and tail rotor blades to increase component life when operating in all desert environments.
5. Continue to develop the structural repair manual to facilitate organizational-level repairs.
6. As recommended in the FY22 Annual Report, conduct aircraft survivability equipment operational testing prior to fielding to characterize aircraft susceptibility to threat weapon systems.
7. Conduct additional cyber survivability testing to fully characterize cyber threats.
8. Investigate and correct the integration deficiencies between the Joint Mission Planning System and the aircraft's mission computer that could prevent successful mission execution.
9. Continue to address recommendations found in DOT&E's combined IOT&E and LFT&E report, to include the survivability recommendations from the classified annex.