

Long Range Hypersonic Weapon (LRHW) – Dark Eagle



In August 2023, the Army transitioned to Middle Tier of Acquisition (MTA) rapid fielding authorities to deliver a ground-launched Long Range Hypersonic Weapon (LRHW) (Dark Eagle). The Army program consists of the LRHW transporter-erector-launcher (TEL) and battery operations center (BOC). The Navy is developing the prototype All-Up Round (AUR) under the Conventional Prompt Strike (CPS) program, which is being reported on in a separate article, and supplying them to the Army.

Flight testing of the AUR continued with an attempted launch from the Army's LRHW (Dark Eagle) prototype TEL in March 2023. This test, Joint Flight Campaign-2 (JFC-2), did not occur due to challenges in pre-flight checks. The JFC-2 Retest (JFC-2R) was attempted in September 2023 but did not occur as a result of pre-flight checks. The JFC-3 test is planned for FY24, also planned to be launched from the Army LRHW TEL. JFC testing continues through FY29 using both Navy and Army launchers.

SYSTEM DESCRIPTION

The LRHW (Dark Eagle) is a prototype surface-to-surface long range strategic fires system composed of one TEL and two AUR missiles (designed by the Navy) packaged in Army canisters (AUR+C). The initial LRHW battery will include a BOC and four TELs, each with two AUR+C. The MTA rapid fielding effort only consists of the BOC and TELs.

The AUR is composed of the Common Hypersonic Glide Body and a Navy-developed two-stage rocket booster in a canister designed for the Army's LRHW TEL. The Navy, under the CPS program, is producing the same AUR and placing it in Navy canisters to be launched from *Zumwalt*-class destroyers and *Virginia*-class submarines.

MISSION

Army commanders will use the LRHW (Dark Eagle) to engage adversary high-payoff and time-sensitive targets. U.S. Strategic Command (USSTRATCOM), with direction from the National Command Authority, will serve as the employment authority for LRHW missions.

PROGRAM

The Army Rapid Capabilities and Critical Technologies Office was responsible for developing and fielding prototype LRHW equipment to the first unit equipped. In August

2023, the Army designated the LRHW as an MTA rapid fielding program and transferred the LRHW (Dark Eagle) program, consisting of the BOC and TEL, to Program Executive Office, Missiles and Space. The Army intends to field two additional batteries of LRHW to complete the MTA rapid fielding phase by FY27.

The Navy's CPS program designed the AUR+C and elements of the weapons control system for the Army's LRHW (Dark Eagle) program in FY23. The Army will integrate the AUR+C with its weapon control system to field a BOC and four TELs to the LRHW unit in FY24.

» MAJOR CONTRACTORS

- Lockheed Martin Corporation – Huntsville, Alabama (BOC and TEL, system integration prototype)
- Dynetics, a subsidiary of Leidos – Huntsville, Alabama (TEL trailer and Common Hypersonic Glide Body)

TEST ADEQUACY

As recommended in the FY21 Annual Report, the Army developed a plan for transitioning prototypes for production, fielding, operations, and sustainment to the MTA rapid fielding pathway and completed the transition in FY23.

As recommended in the FY21 Annual Report, the Army is developing the LRHW Master Test Strategy to be submitted for DOT&E approval by 2QFY24. The test strategy should include

the following considerations: a concept of employment consistent with the expected operational and threat environment; an operational demonstration which includes strategic-level mission planning; testing and evaluation in the full-spectrum contested environment, including representative targets; and validated modeling and simulation (M&S), combined with ground and subscale test data to support evaluation of mission effectiveness, suitability, survivability, and lethality.

As recommended in the FY21 Annual Report, the Army is collaborating with the Navy to develop an LFT&E strategy. The Army needs to incorporate representative targets and environments into flight tests and other live lethality and survivability tests. The Army should continue to collaborate with the Navy and Air Force to identify and leverage common practices, test corridors and infrastructure, test data, and M&S capability across the family of hypersonic weapon systems.

The CPS program has performed arena testing on an operationally representative warhead, which is fundamental to the development of the lethality model. Navy CPS sled and flight tests have not included operationally representative targets and do not allow for a direct assessment of the weapon's lethal effects. The Navy intends to rely on a combination of M&S, component testing, and hardware-in-the-loop evaluations to incorporate the contested environment and is investigating methods to obtain lethality and effectiveness data

by incorporating representative targets into flight and ground tests.

The Army has not evaluated the effects of a full-spectrum threat (kinetic, non-kinetic, electromagnetic, cyber) contested environment on the performance of the AUR, the TEL, or the BOC. The Army is relying on the Navy's use of a combination of M&S, component testing, and hardware-in-the-loop evaluations to evaluate full-spectrum survivability of the AUR in the representative threat environment. The LFT&E strategy, written by the Navy and incorporating Army-specific targets and environments, is expected to be submitted for DOT&E approval in 2QFY24.

The Army and Navy conducted one JFC test shot of the prototype AUR in FY22, during which a test anomaly prevented acquisition of data over a portion of the planned flight profile. Flight testing of the CPS prototype AUR continued with an attempted launch from the Army's LRHW prototype TEL in March 2023. This test, JFC-2, did not occur due to a system anomaly which prevented ignition of the AUR. The Navy has identified the cause of the anomaly and implemented corrective actions. The retest (JFC-2R), planned to be launched from the LRHW TEL, was intended to be conducted in September 2023. As a result of pre-flight checks, the test did not occur. The test was not planned to be conducted in an operationally realistic environment (cyber and electromagnetic) and did not use representative threat targets. JFC-3 is planned for FY24, also to be

launched from the LRHW TEL. JFC testing is scheduled to continue through JFC-10 in FY29.

DOT&E will provide an early fielding report of the demonstrated operational effectiveness, lethality, suitability, and survivability of the LRHW and CPS AUR+C system with associated flight tests conducted through FY26.

PERFORMANCE

» EFFECTIVENESS, LETHALITY, SUITABILITY, AND SURVIVABILITY

Not enough data are yet available to evaluate the operational effectiveness, lethality, suitability, and survivability of the LRHW system.

RECOMMENDATIONS

The Army should:

1. Continue efforts to develop the LRHW Master Test Strategy that includes integrated testing, operational testing, live fire testing, and cybersecurity assessments to credibly demonstrate the required Dark Eagle effectiveness, suitability, lethality, and survivability and submit for DOT&E approval.
2. Continue collaboration with the Navy on the LFT&E strategy that adequately verifies and validates required M&S tools to create credible weaponizing and mission planning tools

in support of the proposed operational fielding dates.

3. Include full-spectrum survivability demonstration in a contested environment during an operational demonstration.
4. Conduct end-to-end cyber survivability testing to include a cooperative vulnerability and penetration assessment and adversarial assessment.
5. Validate M&S outputs and combine with ground test data to support design of experiments and evaluation of operational effectiveness, survivability, and lethality.
6. As recommended in the FY21 Annual Report, incorporate operationally representative targets and environments into flight tests and other lethality and survivability tests.
7. Continue collaboration with the Navy and Air Force to identify and leverage common practices, test corridors and infrastructure, test data, and M&S capability across the family of hypersonic weapon systems.