



May 9, 2023

# U.S. Army's Maneuver Short-Range Air Defense (M-SHORAD) System

## Background

The Army is procuring and continuing to develop a new maneuver short-range air defense system, or M-SHORAD. This system would perform short-range air defense, or SHORAD. The Army defines the SHORAD mission as:

Dedicated air defense artillery (ADA) and non-dedicated air defense capabilities that enable movement and maneuver by destroying, neutralizing, or deterring low altitude air threats to defend critical fixed and semi-fixed assets and maneuver forces.

Legacy SHORAD ADA systems include the FIM-92 Stinger missile, the Avenger system, and the Land-Based Phalanx Weapons System (LPWS), which is employed against rockets, artillery, and mortars.

In the early 2000s, the Army divested ADA units from Army force structure to free up personnel to create other types of units deemed more mission-critical at the time. The Army supposedly accepted the risk because it believed the U.S. Air Force could maintain air superiority. After 2005, SHORAD force structure was reduced to two battalions of Active Component Avenger systems and Counter-Rocket, Artillery and Mortar (C-RAM) batteries and seven National Guard Avenger battalions.

## Renewed Emphasis on SHORAD

Since 2005, there has been a dramatic increase in air and missile platforms that could threaten U.S. ground forces. The use of unmanned aerial systems (UASs) has increased exponentially, and UASs have been used successfully in a variety of conflicts, including the current Russo-Ukrainian conflict. Furthermore, fixed-wing aircraft, attack helicopters, and cruise missiles continue to evolve, posing a growing threat to U.S. ground forces. Given the increase in threat and limited air defense assets available to Army divisions, the Army decided to improve the air defense posture of its maneuver forces.

## M-SHORAD Requirement

In response to the growing aerial threat, the Army plans to field 144 M-SHORAD Increment 1 systems to four battalions and could field to additional battalions in the future. Each M-SHORAD battalion would consist of 40 M-SHORAD systems, support vehicles and equipment, and about 550 soldiers. In April 2021, the 5<sup>th</sup> Battalion, 4<sup>th</sup> Air Defense Artillery Regiment received the first four of its M-SHORAD systems, becoming fully equipped by late 2022. The Army plans to field the second M-SHORAD battalion in fourth quarter of FY2023. In addition to the 144 systems designated for operational units, the Army plans to procure

18 additional systems for training, operational spares, and testing, for a total of 162 systems.

## M-SHORAD Variants/Increments

While M-SHORAD is primarily intended to defend maneuver forces against air threats, it also has the capability to engage a range of ground targets. There are three M-SHORAD variants, or "Increments," envisioned by the Army.

Figure 1. M-SHORAD Increment 1



Source: <https://www.leonardodrs.com/what-we-do/products-and-services/m-shorad/>.

## M-SHORAD Increment 1

M-SHORAD Increment 1 (**Figure 1**) was developed under the Other Transaction Authority contracting process. M-SHORAD uses the M-1126 Stryker combat vehicle as its chassis. The weapons and radar packages are configured by Leonardo DRS and then installed on the Stryker by General Dynamics Land Systems (GDLS), the vehicle's original manufacturer. Leonardo DRS reports the multipurpose unmanned turret includes

- two AGM-114L Longbow Hellfire missiles capable of hitting ground targets;
- four FIM-92 Stinger missiles for aerial targets in a launcher (configured by Raytheon);
- an XM914 30 mm automatic cannon;
- an M-240 7.62 mm machine gun;
- a multi-mission radar capable of tracking both ground and air targets.

## FY2024 M-SHORAD Increment 1 Budget Request

According to FY2024 Army budget documents, the Army requested \$400.697 million in procurement funding for 22 M-SHORAD Increment 1 systems.

**Figure 2. M-SHORAD Increment 2**

Source: <https://www.army.mil/>.

## M-SHORAD Increment 2

M-SHORAD Increment 2 (**Figure 2**) is also referred to as DE (Directed Energy) M-SHORAD and would incorporate a 50 kilowatt (KW) laser as its primary armament to defend against a variety of air and artillery threats. Efforts to develop the 50 KW laser began in 2019, and in 2021, Raytheon was awarded a \$123 million developmental contract after a competitive shoot-off against Northrop Grumman. The Army reports additional testing of the 50 KW laser has enjoyed success against a variety of drones, but according to Army program officials, “challenges remain” in terms of defending against rockets, artillery, and mortars. Army plans call for M-SHORAD Increment 2 to start a user assessment beginning in the fourth quarter of FY2023, running through the first quarter of FY2024. The Army also plans for an additional final contract competition prior to FY2025.

### FY2024 M-SHORAD Increment 2 Budget Request

According to FY2024 Army budget documents, the Army requested \$110.625 million in Research, Development, Test, and Evaluation (RDT&E) funding to develop a 50 KW laser and prototype vehicles.

## M-SHORAD Increment 3

The Army reportedly plans for M-SHORAD Increment 3 to incorporate the FIM-92 Stinger replacement missile—the Next Generation Short Range Interceptor—into the Increment 1 system. In addition, these plans call for the Increment 1 30 mm automatic cannons to receive the XM 1223 Multi-Mode Proximity Airburst munition (MMPA), which features a multipurpose munition that can be employed against air, ground, and personnel targets. In March 2023, the Army reportedly selected Lockheed Martin and Raytheon Technologies to develop competing prototypes of a Next-Generation Short-Range Interceptor. The Army has indicated it is planning for a technology demonstration in FY2024, an operational demonstration in FY2026, and a production decision by FY2027.

### FY2024 M-SHORAD Increment 3 Budget Request

According to FY2024 Army Budget Documents, the Army requested \$160.426 million in RDT&E funding for Increment 3 developmental activities, including integration of the new 30 mm MMPA munition.

## Considerations for Congress

Oversight questions Congress could consider include the following:

### Lessons Learned from the Russo-Ukraine Conflict

The ongoing Russo-Ukrainian conflict has featured the use of a variety of military and commercial UASs employed in both kinetic and non-kinetic roles. In addition to both fixed and rotary wing air threats, loitering munitions have also been employed, reportedly with considerable effect.

Lessons learned related to the employment of the aforementioned systems may inform current and future development of all three M-SHORAD Increments.

Congress may consider what efforts have been undertaken by the Army to incorporate lessons learned into M-SHORAD design. Furthermore, as threat capabilities evolve, is the M-SHORAD’s design flexible enough to incorporate new lessons learned into future system upgrades?

### Limitations of Laser Weapons

Incorporating lasers as part of M-SHORAD Increment 2 could be advantageous: there are logistical benefits to not requiring traditional munitions, and the laser’s precision can help to preclude collateral damage and casualties.

However, there are also limitations associated with lasers, including atmospheric and weather effects; effects of smoke, dust, and other obscurants; and attenuation of the laser beam over distance, which limits the laser’s effective range. Furthermore, threat aerial systems can be modified to mitigate laser attacks.

Given the limitations of Increment 2’s laser system, Congress may consider how the Army plans to compensate for these potential shortcomings. Is a mixed fleet of Increment 2 and Increment 1 and 3 systems envisioned as the solution, and, if so, what is the planned mix of M-SHORAD variants to ensure maximum effectiveness under all battlefield conditions?

### Adequacy of Proposed M-SHORAD Force Structure

At present, there are 12 Active divisions and eight National Guard divisions in the U.S. Army. Under the pre-2000 SHORAD force structure construct, each division had its own dedicated SHORAD battalion. While the Army has suggested it could create additional M-SHORAD battalions over and above the current four planned battalions, Congress may consider whether four M-SHORAD battalions are adequate for the Total Force (Active, Reserve, and National Guard). If more than four battalions are required, how many M-SHORAD systems and soldiers will be required to create additional M-SHORAD battalions?

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IFI 2397

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