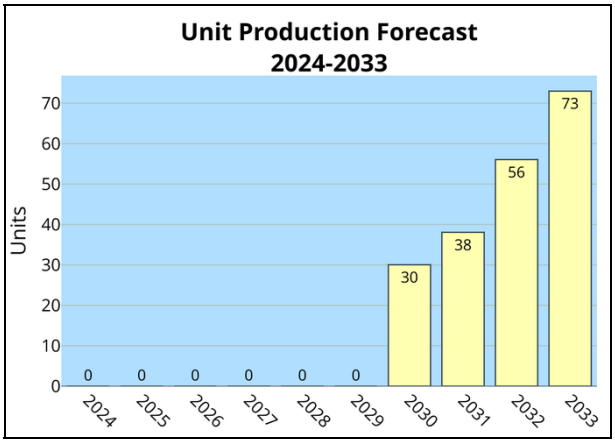
Miniature Air Launched Decoy (MALD)

Outlook

- U.S. developed MALD as a decoy or jammer
- Purchases by USAF and Navy concluded
- Pentagon studies new concepts of modular systems
- Other nations are looking at developing decoy systems



Orientation

Description. Small, expendable aerial decoy.

Sponsor. U.S. Air Force Materiel Command, Air Armament Center Precision Strike Systems Program Office, Eglin AFB, Florida. A later reorganization created the Armament Directorate.

Status. The U.S. Air Force decided in early 2002 to stop further development of the original MALD. A new competition was launched in 2003. By 2022, the U.S. had decided to cease all procurement of MALD.

Total Produced. Approximately 2,491 MALD units (including some test units) were built by the end of 2021. Low-rate initial production was approved in June 2008.

Lot 5 and Lot 6 involved the production of 404 units, with Lot 7 adding another 200 units, Lot 8 a further 200, Lot 9 140, Lot 10 250, and Lot 11 250 decoys.

Raytheon delivered the 1,000th MALD unit in May 2014 as part of the Lot 5 contract. Production of the MALD-J began with Lot 4, and Raytheon completed 96 units by the end of 2012.

Application. The primary purpose of the MALD is to increase the "fog of war" by saturating an air defense environment with a large number of false targets. Additionally, the MALD is being studied for use as a low-cost high-speed anti-radiation missile (HARM), and for use in chemical/biological detection, surveillance, and other duties.

Price Range. The new MALD was to cost no more than $125,000 apiece ($75,000 if bought in volume). Later, the price jumped to between $325,000 and $380,000 apiece.

Contractors

Prime

Raytheon	https://www.rtx.com/raytheon, 1151 E Hermans Rd, Tucson, AZ 85706 United States, Tel: + 1 (520) 794-3000, Prime

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Subcontractors

AUSCO Inc	https://www.auscoinc.com, 820 Port Washington Blvd, Port Washington, NY 11050 United States, Tel: + 1 (516) 944-9882, Fax: + 1 (516) 944-8522, Email: Info@auscoinc.com, (Fuel/Air Manifold)
EaglePicher Technologies LLC	https://www.eaglepicher.com, C & Porter St, Joplin, MO 64802 United States, Tel: + 1 (417) 623-8000, Fax: + 1 (417) 781-1910, Email: inquiry.technologies@eaglepicher.com, (Batteries)
Moog Inc	https://www.moog.com, East Aurora, NY 14052 United States, Tel: + 1 (716) 652-2000, Fax: + 1 (716) 687-4457, (Actuators)
NOTE(S): In addition to Raytheon in Tucson, other company facilities involved in this program include those located in El Segundo and Goleta, California. Other companies involved in Raytheon's MALD program include ASEI and Enser Corporation.	

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

Design Features. The Miniature Air Launched Decoy (MALD) is a small jet-powered aerial vehicle used primarily as a decoy to saturate enemy air defenses with a large number of targets.

	Metric	U.S.
Dimensions		
Length, fuselage	284.47 cm	112 in
Width, with fins	50 cm	19.7 in
Height, with fins	39.1 cm	15.4 in
Wingspan, at 0°	171.96 cm	67.4 in
Wingspan, at 35°	136.65 cm	53.8 in
Weight	115 kg	253.6 lb
Performance		
Speed, cruise	Mach 0.6	Mach 0.6
Speed, max	Mach 0.93	Mach 0.93
Known Ceiling	10,675 m	35,000 ft
Endurance	45-60 min	45-60 min
Shelf life	15 yr	15 yr

Propulsion. The new MALD is powered by a TJ-150 turbojet engine, developed by UTC Aerospace Systems, with a 150-pound sea-level-standard (SLS) thrust. The company is now part of Raytheon Technologies.

Kratos Defense teamed with North American Wave Engine Corporation to develop the Versatile Air-Launched Platform (VALP). This project investigates high-performance, low-cost propulsion. Wave Engine Corporation won a $1 million contract in June 2021 from the U.S. Air Force to develop the VALP. In 2019, the company won a $3 million contract from DARPA with demonstrations held in 2020. The VALP is designed primarily as a decoy but can perform other missions. Wave Engine Corporation has developed pulse jet propulsion technology.

Control & Guidance. The new MALD broadcasts a radio frequency signal that mimics the radar cross-section of a combat aircraft. This system was developed at Raytheon's electronic warfare (EW) unit in Goleta, California.

Launcher Mode. The original MALD system was mounted two or three to a hardpoint and was released by the pilot of the individual aircraft (including F-16 and F/A-18 fighters and B-52 bombers). The MALD Cargo Air Launched System (MCALS) allows cargo aircraft to carry this decoy. Some unmanned air vehicles will carry this system, such as the MQ-9 Reaper UAV.

Recovery. The original MALD was expendable and therefore had no recovery system.

Variants/Upgrades

The initial version of the MALD was developed for use by the U.S. Air Force against SA-2 and SA-6 air defense systems. Beginning in 2002, a new MALD, which included a jammer version, was developed to deal with more sophisticated air defense systems.

The new MALD, developed by Raytheon, could be used to meet additional requirements, including nuclear, biological, and chemical (NBC) detection; reconnaissance and surveillance; delivery of acoustic and seismic sensors; and low-cost cruise missile defense. MALD also has target drone and possible anti-UAV applications, and new MALDs could be used as low-cost HARMs. In addition, the new MALD could be fitted with a high-power microwave payload for use against electronic systems.

The U.S. Air Force and the Defense Advanced Research Projects Agency (DARPA) were at one time studying the possible development of a version of the original MALD for cruise missile defense. Under the Low-Cost Cruise Missile Defense program, the U.S. examined the feasibility of developing a Miniature Air Launched Interceptor (MALI) designed to thwart cruise missiles. Also, the original MALD could have been used as the basis for an inexpensive alternative to the canceled Tacit Rainbow. Like Tacit Rainbow, this MALD version reportedly was to have a loiter capability.

Northrop Grumman (then Teledyne Ryan) considered creating a submarine-launched version of its MALD. In this instance, the MALD was to be packaged in an expendable launch container (six to 10 per container), allowing a submarine to convince an enemy that the apparent inbound raid from the sea was real.

The Northrop Grumman MALD has been referred to as the ADM-160A; Raytheon's version has been called the ADM-160B. The MALD-J (Jammer) version is designated the ADM-160C. The U.S. Navy's version of the MALD is the MALD-N. The MALD-V is designed to carry a generic warhead or a customer-provided payload.

The U.S. Navy-funded Cerberus joint concept technology demonstration (JCTD) project is examining a quick-change nose-cone payload section. An Air Force project to add a warhead to the MALD has been suspended, but Raytheon has designed a kinetic payload.

MALD

Source: Raytheon

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Program Review

Background. The MALD originated in 1992 when the USAF Air Combat Command established the MALD parameters in Mission Need Statement 329-92. The statement called for the creation of a low-cost, expendable decoy capable of "independent" free flight and maneuvering. Above all, the U.S. insisted that the decoy be convincing to threat Integrated Air Defense Systems (IADS), both in radar cross-section and in the flight characteristics of the aircraft it was to copy.

The primary problem with the MALD concept was that at the time, no jet engine was small enough to fit the dimensional requirements specified for the decoy. Therefore, DARPA began a new project, designated the Small Engine Advanced Program, with the purpose of developing a small turbojet engine. Within three years, a working prototype of the engine had been developed and given the designation TJ-50. This engine was extremely small, but provided 50 pounds of thrust.

Northrop Grumman Takes First Crack at MALD Development

The TJ-50 underwent a two-phase risk-reduction effort for the MALD project. The first phase integrated the engine with a prototype MALD airframe inlet and exhaust nozzle to aid in charting engine performance at simulated altitude conditions. In the second phase, the engine was mated to a full-prototype MALD airframe that successfully flew in March 1996 at the Naval Weapons Station, China Lake, California.

After the successful test flight, DARPA issued a Request for Proposals in April 1996 for a MALD advanced concept technology demonstration (ACTD) contract. Northrop Grumman (then Teledyne Ryan) was selected as prime contractor for the MALD in October 1996.

Operational Description. The MALD was designed as a flying, active decoy that would be used to enhance the survivability of friendly aircraft by saturating threat air defense structures with a large number of targets. The decoy could also be used to simulate attacks against early warning radars, causing threat IADS to expend resources on the decoys.

The stated Concept of Operations envisioned that the MALD would be used as a potential suppression of enemy air defenses (SEAD) weapon. The following four types of decoy roles were identified:

- Pre-emptive Destruction – Used as a HARM, the MALD would immediately dive on any detected threat IADS radars whether or not the decoy was painted.
- Reactive Suppression – Once locked by enemy radar, the system would begin a terminal dive onto that specific IADS radar.
- Diversion – A few planes carrying a maximum number of MALDs would release the decoys from one direction. The decoys would then simulate an inbound raid, thereby causing threat IADS to focus their efforts on the decoys and expend valuable resources in an attempt to shoot down the "aircraft." Meanwhile, the real inbound raid would vector in from a different direction at a time when threat IADS would be depleted and confused.
- Saturation – This role is similar to diversion, except inbound aircraft would launch MALDs, causing multiple targets to appear on threat IADS radars. The result: great confusion and possibly temporary paralysis of threat IADS and C3 functions.

When deployed, the MALD would act as whatever type of aircraft it was programmed to emulate. All flight characteristics would be in line with the actual flight profiles of the aircraft launching the decoy. Additionally, the system would boost radar transmissions to present the correct radar signature of the aircraft it was imitating.

While the MALD's primary function is to act as a decoy, several other uses were explored. These included outfitting the MALD with sensor packages for reconnaissance and surveillance, and use of the system as a small HARM and for chemical and biological detection. Also, the MALD could be outfitted with a small number of chaffs and/or flares to cause even more confusion to the threat C3 network.

The decoy was tested on the F-16 series, but was identified for potential use on the F-15, F/A-18, F-22, B-52, F-35 Joint Strike Fighter (JSF), Typhoon, and Tornado GR.4.

Development Activity. The contract awarded to Northrop Grumman called for the fabrication and delivery of 32 MALDs and attendant support through April 1999, including aiding the U.S. Air Force in testing the decoy. Northrop Grumman was also to be the prime integrator when the MALD entered production. Before the end of 1996, the MALD ACTD had successfully passed its open-air range testing for the Preliminary Design Review.

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The primary goal of the MALD ACTD was to ensure that production models of the system did not exceed the $30,000 unit fly-away price. While DARPA and the USAF did identify the optimum performance parameters for the decoy, they could vary those parameters to cut costs in order to provide the USAF with the most effective decoy possible for the price.

In June 1997, the USAF and DARPA selected the Northrop Grumman-designed Signature Augmentation Subsystem (SAS) as the radar cross-section payload. The SAS was the heart of MALD and responsible for duplicating the radar cross-section of various aircraft. This system – in conjunction with other onboard systems – would allow the MALD to offer a total radar deception capability.

MALD flight testing commenced in January 1999 and continued into 2001. The ACTD program was completed that year, after which the program transitioned to the U.S. Air Force. In January 2002, however, the Air Force decided to postpone further development of the MALD, citing cost issues and a desire to re-evaluate how best to meet its low-cost aerial decoy needs.

New MALD. The U.S. Air Force did not give up on the MALD concept. Instead, the Air Force pursued a slightly larger and more robust version of the decoy.

The new MALD is designed to have greater range and endurance than the original. According to reports, the new concept called for a miniature decoy with an endurance of 60 minutes (twice that of the original MALD). Greater endurance will allow the new MALD to be launched from bombers outside the engagement range of hostile air defense systems.

Study contracts were awarded for a new Air-Launched Vehicle Investigation project in 2002. The companies that won those contracts were Boeing, Lockheed Martin, Northrop Grumman, Raytheon, and Accurate Automation Corp. These three-month study contracts were worth $300,000 apiece and called on the contractors to prepare designs for the new decoy.

In 2003, the U.S. Air Force selected Raytheon to develop the new MALD. An $88 million contract was awarded on May 20, with work on the contract to be conducted by Raytheon Missile Systems in Tucson. Also in 2003, the program was renamed Airborne Electronic Attack (AEA), and the MALD became part of it.

Raytheon began powered flight tests of the MALD in 2007. The U.S. Air Force approved low-rate initial production (LRIP) in June 2008. Serial manufacture was to begin in 2010. The first of possibly 1,500-3,000 units achieved Limited Operational Capability in 2009. Production could be split equally between the initial decoy version and one that carries a jammer payload. The development of a jammer version of the MALD (called the MALD-J) could help offset the retirement of U.S. Air Force and Navy electronic warfare aircraft. The MALD-J, which passed a U.S. Air Force Critical Design Review (CDR) in 2010, completed its first free-flight test in December 2009.

The jammer version was ready for service by the end of 2012 for use on F-16 fighters and B-52 bombers. Deliveries of the MALD-J began in 2012. In December 2014, Raytheon performed a test flight of a MALD-J version outfitted with a radio datalink. This demonstration also included the use of new navigation software. The U.S. completed operational trials of the MALD-J in April 2015.

Fokker Aerostructures of the Netherlands and Dallara, the race car manufacturer, worked with Raytheon to develop a new composite body for the MALD. This composite body entered production with Lot 7 (awarded in June 2014).

New Versions for New Missions

Other contractors involved in this MALD program include BAE Systems (Berthoud, Colorado); Celestica (Austin, Texas); EDO (Bohemia, New York); Enser (Pinellas Park, Florida); Engineered Fabrics Corp (Rockmart, Georgia); GDOTS (Redmond, Washington); UTC Aerospace Systems (Rockford, Illinois); LaBarge (Joplin, Missouri); SCI Technology (Huntsville, Alabama); and Tecom (Westlake Village, California).

The jammer version uses the ADM-160C designation.

Other MALD Versions. Raytheon is exploring other MALD versions, including one to perform reconnaissance and surveillance missions and another to act as a low-cost target. This research is part of the company's Cerberus project.

Raytheon could offer a ground-launched version of the MALD, known as MALD Tube-Launched (MALDTL), equipped with a booster rocket. Raytheon is studying additional missions for the MALD, including using the decoy as a sensor platform.

The U.S. Air Force and Army have shown interest in the possible development of a version of the MALD capable of intercepting cruise missiles. Northrop Grumman had previously worked on an interceptor version of its MALD, known as the Miniature Air Launched Interceptor. The MALI has a sharper nose and higher wing sweep than the original MALD, and is outfitted with a TJ-120 – a modified TJ-50 engine with 120 pounds of thrust (also called the TJ-

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50M). Demonstrations of the MALI, which included a supersonic flight test, concluded in December 2002.

Under Cerberus, the MALD could receive a datalink.

Another version, the MALD-X, is for use by the U.S. Navy. Under a $34.8 million contract, Raytheon has been developing a new version. The MALD-X would include an improved EW payload, a datalink, and low-altitude flight capability.

A series of successful flight tests took place from August 20 to August 22, 2018. Further tests of the MALD-X occurred in 2019.

The MALD-X will become the MALD-N, which will arm F/A-18E/F Super Hornet fighter and EF-18G Growler electronic warfare aircraft.

The MALD-N entered its engineering and manufacturing development (EMD) phase in 2019. Problems discovered during testing required a redesign of the fuselage. The U.S. Navy planned to award a LRIP contract in 2022, after combining funding for FY21 and FY22 buys into a single award. This did not occur.

Previously, the U.S. Navy had planned to achieve an Early Operational Capability on the Hornet fighter in 2021 and Initial Operational Capability in 2022.

No contract award was issued. The U.S. Navy cancelled their MALD program in 2022.

MALD Follow-On. The U.S. has not completely given up on the MALD-like concept. The Air Force Research Laboratory issued a request for information for a small unmanned aerial system to be used for intelligence, surveillance and reconnaissance, and supplement kinetic strike.

This new system will be low-cost (and considered expendable) and for launching from existing air assets. The system will weigh less than 1 pound at take-off with a length, width and depth of no more than 1 foot.

The U.S. Navy announced in March 2024 plans to develop a Radio Frequency Countermeasure (RFCM) Active Expendable Decoy (AED) for use from combat aircraft. This is a "free fall" decoy. This system will replace the Navy's Generic Expendable (GEN-X) AED originally developed by Texas Instruments in the 1980s. This new decoy will be compatible with the Navy's ALE-47 dispenser.

Leonardo, BAE Systems, and Raytheon are among the potential sources for this new decoy.

ETVs. The U.S. Air Force selected four companies in June 2024 to build and flight-tested enterprise test vehicles (ETVs). The ETV is a small UAV that resembles a long-range missile.

The four companies are: Anduril, Integrated Solutions for Systems, Leidos Dynetics, and Zone 5 Technologies. The ETV is to have a range greater than 926 kilometers and a cruise speed of at least 100 knots.

Gremlin. Dynetics is working with DARPA on the X61A Gremlin airborne launch and recovery drone. The mock-up was unveiled in March 2019.

The Dynetics Gremlin team consists of:

- Kratos Unmanned Aerial Systems – small UAV expertise.
- Williams International – F107 turbofan engine.
- Applied Systems Engineering – flight computer.
- Kutta Technologies – multi-vehicle control services.
- Moog Inc – control actuation systems.
- Sierra Nevada Corporation – precision navigation technology.
- Systima Technologies – C-130 pylon and launch controller hardware.
- Airborne Systems – parachute recovery system.
- Air Response – C-130 aircraft and fight test support.

The Gremlin is a low-cost, reusable unmanned aerial system. It is for launching from existing military aircraft (C-130 and C-17) for a point outside the range of hostile air defenses.

Once a Gremlin completes its mission, a C-130 transport aircraft can retrieve it. Delivered to an air base support crew, the Gremlin can be refurbished and prepared for additional missions (this can occur within 24 hours).

Kratos Defense delivered the first X-61A air vehicles by October 2019.

The first test flight of the Gremlin took place in November 2019. The flight lasted one hour and 41 minutes. The test took place at the U.S. Army's Dugway Proving Ground in Utah and included one captive-carry mission aboard a C-130A and an airborne launch and free flight.

The X-61A is designed for launch at altitudes of up to 40,000 feet, with the maximum recovery altitude being 20,000 feet. Kratos delivered five X-61As, with one lost in November 2019.

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A second flight test took place in August 2020. The Gremlin flew for 2 hours and 12 minutes. Dynetics completed a third test flight series during October 2020.

The Gremlin did successfully validate all autonomous formation flying position and safety features. However, the UAV was unable to dock with the C-130 aircraft. On October 29, 2021, the air vehicle did demonstrate a successful airborne recovery.

Gremlin

Sourse: Dynetics

An exercise of the recovery of four air vehicles in under 30 minutes has been moved to Phase 4 of the program. After recovery, transport aircraft will hand over the Gremlin to ground crews, which will prepare it for its next use within 24 hours.

DARPA held talks with various DoD organizations for the possible transition of this program in 2023.

The Pentagon said in June 2024 that it plans to create a "hellscape" using large numbers of unmanned systems to help defeat any Chinese invasion of Taiwan. The U.S. says this strategy will buy time for the U.S. and other allies of Taiwan to react to any Chinese aggression against the island republic.

LEAP. The Office of Naval Research (ONR) is looking to address the U.S. Navy's need for a next-generation expendable offboard decoy system. This new system will be able to stay airborne on station for at least one hour.

The Long Endurance Advanced Off-board Electronic Warfare Platform (LEAP) program is seeking a carrier flight vehicle and compatible countermeasures payloads. This system will provide an enhanced soft-kill defense.

The LEAP program aims to provide a follow-on capability to complement the ALQ-248 Active Mission Payload (AMP), developed under the Advanced Off-board Electronic Warfare (AOEW) program.

This system could cost around $100,000 apiece, but more capable payloads could push the unit price to over $600,000.

LEED. The U.S. Navy is working on the Long Endurance Electronic Decoy (LEED) program. The LEED is to provide an expendable autonomous decoy to help improve its anti-ship missile defenses. A modular design will enable rapid modification and evolution of the system.

Lockheed Martin is involved in the LEED program.

LADM. Saab unveiled its Lightweight Air-launched Decoy Missile (LADM) in September 2020. This system will arm Gripen E/F fighter aircraft. The LADM will protect aircraft from missile threats.

The LADM is part of Saab's entry to meet Finland's HX fighter requirement. The company is offering the Gripen combat aircraft to meet this need.

Other operators of the Gripen fighter could be offered this decoy system.

Saab and MBDA teamed in October 2021 to develop a miniaturized powered decoy as part of the Arexis system. The LADM and Arexis are the same, according to Saab officials. Technology from MBDA's SPEAR-EW system could be used in the Arexis.

Speed Racer. Lockheed Martin is also working on Speed Racer, an air-launched unmanned aircraft system. This system is a small, jet-powered UAV intended to test the validity of new manufacturing processes, onboard systems, and weapons.

Lockheed Martin revealed this program in February 2021. Speed Racer has the potential to provide a basis for new swarming UAVs or low-cost cruise missiles.

Kratos Turbine Technologies (KTT) provides the low-cost turbojets used on this air vehicle.

Air Wolf. Kratos Defense announced in August 2021 that its Air Wolf tactical drone system had completed a 100 percent successful flight at the Burns Flat, Oklahoma Range Facility. This was the inaugural flight of the Air Wolf. Testing of this system began in 2020.

The Air Wolf is one of several systems in Kratos' family of affordable, high-performance jet-powered drones, including the Gremlin and Valkyrie. The Air Wolf appears to be a version of the MQM-178 Firejet aerial target drone. Kratos Defense has declined to provide additional details.

The August flight demonstrated a number of new mission systems.

Nano SPEAR. Elbit Systems unveiled the Nano SPEAR (Self Protection Electronic Attack and

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Reconnaissance) expendable active RF decoy system in June 2023. This decoy is designed to defend aircrews and platforms from anti-aircraft threats.

Nano SPEAR

Source: Elbit Systems

The Nano SPEAR is part of family that include: the Micro SPEAR; Light SPEAR for use from helicopters and UAVs; and Advanced SPEAR ECO Pod, which is in use on C-390 transport aircraft.

Funding

The U.S. Air Force launched a new Miniature Air Launched Decoy program after terminating a similar effort of the same name run by Northrop Grumman. The new competition was launched in 2003, with Raytheon selected as prime contractor. In 2003, the MALD program was renamed the Airborne Electronic Attack (AEA) program.

The U.S. Air Force approved LRIP in June 2008. The MALD became operational in 2009. Series manufacture was approved in November 2011. Deliveries of the MALD-J version began in fall 2012. The U.S. plans to procure 3,000 MALD units: 596 of the decoy version and 2,404 of the jammer version.

In November 2011, the Air Force exercised a contract option by awarding Raytheon $5 million to convert Lot 4 MALD production to the MALD-J version. The U.S. terminated MALD-J Increment II in FY13. Increment II was to increase the MALD's effective radiated power and sensitivity, and to feature improved techniques to counter emerging threats and enable it to operate in both decoy and improved jammer modes.

The U.S. Air Force slowed procurement of the MALD in FY17 and completed it in FY18.

A new funding line for the MALD appeared as part of the U.S. Navy's budget request in FY20. The Navy planned to acquire the MALD-N. Previous budget documents said purchases of the MALD-N would run through FY27. Then, the U.S. Navy decided during 2022 to conclude funding for its MALD program.

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U.S. FUNDING

	FY22 QTY	FY22 AMT	FY23 QTY	FY23 AMT	FY24 QTY	FY24 AMT	FY25 (Req) QTY	FY25 (Req) AMT
U.S. Air Force								
Procurement								
War Consumables								
USAF – MALD	-	-	-	-	-	-	-	-
MALD – Jammer								
U.S. Navy								
Procurement								
Drones and Decoys								
MALD	18	29.9	-	-	-	-	-	-
RDT&E								
Proj - 1 PE#0604270F								
654832 – PLAID								
655305 – MALD-J								
657004 – MALD-J Inc II								
658462 – MALD								
Proj - 2 PE#0604429F	-	-	-	-	-	-	-	-
Proj - 3 PE#0602702E		-		-		-		-
Total	**-**	**29.9**	**-**	**-**	**-**	**-**	**-**	**-**

All figures in $ millions.

Figures from FY25 request.

The MALD-J effort (655305) was part of the MALD (658462) prior to FY10.

Proj - 1 PE#0604270F EW Development, Project 8462 Miniature Air Launched Decoy. Original MALD program renamed Airborne Electronic Attack. The MALD had been part of this program under Project 8462 Airborne Electronic Attack. PLAID stands for Precision Location and Identification.

Proj - 2 PE#0604429F Airborne Electronic Attack. Includes the MALD-J project.
Proj - 3 PE#0602702E Tactical Technology. TT-07 Aeronautics Technology. Funding for Gremlins.

Contracts/Orders & Options

On Jun 26, 2024, MBDA Inc., Arlington, Virginia, is awarded a $16,349,952 firm-fixed-price contract modification for the purchase for the procurement of decoy rounds compatible with the Automated Launch of Expendables Decoy Launching System for the multi-mission surface combatant ships. This contract involves foreign military sales to the Kingdom of Saudi Arabia. Work will be performed in Salisbury, England (71%); and Arlington, Virginia (29%), and is expected to be completed by June 2026. Foreign Military Sales funds for the Kingdom of Saudi Arabia in the amount of $16,349,952 will be obligated at time of award and will not expire at the end of the current fiscal year. This contract was not competitively procured, in accordance with 10 U.S. Code 3204(a)(4) (formerly 2304(c)(4)) (the terms of an international agreement of treaty between the United States and foreign government or international organization, or the written directions of a foreign government reimbursing the agency for the cost of the procurement of the property or services for such government, have the effect of requiring the use of procedures other than competitive procedures). Naval Sea Systems Command, Washington, D.C., is the contracting activity. Contract Number N00024-23-C-2301

On Aug 21, 2020, Raytheon Missiles & Defense, Tucson, AZ, was awarded a $21,803,804 cost-plus-fixed-fee contract for sustainment services associated with the ADM-160B, ADM-160C and C-1 MALD-J. Work will be performed in Tucson, and is expected to be completed May 14, 2023. This award is the result of a sole-source acquisition. Fiscal 2020 Operations and Maintenance funds in the amount of $1,500,000 were obligated at time of award. Air Force Life Cycle Management Center, Robins Air Force Base, GA, is the contracting activity. Contract Number FA8520-20-D-0005

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On Dec 20, 2019, Raytheon Missile Systems, Tucson, AZ, won a $112,267,649 modification (P00011) to a previously awarded cost-plus-incentive-fee (CPIF) contract (N00019-18-C-0088). This modification provided nonrecurring engineering support throughout the EMD phase as well as through payload integration and transition to production for the MALD-N. Work would be performed in Tucson (65 percent) and Goleta, CA (35 percent), and was expected to be completed in Sep 2022. Fiscal 2020 RDT&E (Navy) funds in the amount of $15,180,490 would be obligated at time of award. The Naval Air Systems Command, Patuxent River, MD, was the contracting activity.

On Apr 29, 2019, Raytheon Missile Systems, Tucson, AZ, received a $19,530,007 modification (P00006) to a previously awarded CPIF contract (N00019-18-C-0088) for EMD and payload integration of the MALD-N. Work would be performed in Tucson (50 percent) and Goleta, CA (50 percent), and was expected to be completed in Oct 2019. Fiscal 2019 RDT&E (Navy) funds in the amount of $9,765,002 were obligated at time of award. The Naval Air Systems Command, Patuxent River, MD, was the contracting activity.

On Jan 30, 2019, Raytheon Missile Systems, Tucson, AZ, was awarded a $32,958,080 modification (P00002) to a previously awarded cost-plus-fixed-fee (CPFF), CPIF contract (N00019-18-C-0088). This modification provides for EMD of the MALD-N. Work would be performed in Tucson, and was expected to be completed in Jul 2021. Fiscal 2019 RDT&E (Navy) funds in the amount of $16,197,594 would be obligated at time of award. The Naval Air Systems Command, Patuxent River, MD, was the contracting activity.

On Sep 25, 2018, Raytheon Missile Systems, Tucson, AZ, won a $46,663,856 CPFF contract for technical maturation and risk reduction of the MALD-N. Work would be performed in Tucson (81 percent); East Hartford, CT (4 percent); El Segundo, CA (3 percent); Salt Lake City, UT (3 percent); Papendrecht, Netherlands (3 percent); Cedar Rapids, IA (2 percent); Akron, OH (2 percent); and Indianapolis, IN (2 percent), and was expected to be completed in Nov 2020. Fiscal 2018 RDT&E (Navy) funds in the amount of $10,445,410 would be obligated at time of award. This contract was not competitively procured, pursuant to 10 U.S. Code 2304(c)(1). The Naval Air Systems Command, Patuxent River, MD, was the contracting activity. Contract Number N00019-18-C-0088

On Jun 29, 2018, Raytheon Missile Systems, Tucson, AZ, received a $96,125,000 firm-fixed-price (FFP) contract modification (P00008) to contract FA8682-16-C-0004 for Lot 11 MALD-J vehicles and support equipment. Work would be performed in Tucson, and was expected to be completed by Jun 30, 2020. This award was the result of a sole-source acquisition. Fiscal 2018 Procurement funds in the amount of $96,125,000 were obligated at time of award. The cumulative face value of the contract is $290,996,754. Air Force Life Cycle Management Center, Eglin Air Force Base, FL, was the contracting activity.

On Nov 10, 2016, Raytheon Missile Systems, Tucson, AZ, was awarded a $76,056,334 option (P00003) to previously awarded contract FA8682-16-C-0004 for Lot 10 MALD-J vehicles and support equipment. Work would be performed in Tucson, and was expected to be completed by Jun 30, 2020. Fiscal 2016 and 2017 Procurement and Operations and Maintenance funds in the amount of $76,056,334 were obligated at time of award. Air Force Life Cycle Management Center, Eglin Air Force Base, FL, was the contracting activity.

On Jul 1, 2016, Raytheon won a $34.8 million contract for development of the MALD-X, a version of this system for use on the U.S. Navy's F/A-18E/F Super Hornet fighter aircraft.

On Jun 29, 2016, Raytheon Missile Systems, Tucson, AZ, received a $118,526,926 FFP contract for Lot 9 MALD-J vehicles and support equipment. Work would be performed in Tucson, and was expected to be completed by Jun 30, 2020. This award was the result of a sole-source acquisition. Fiscal 2016 Procurement and Operations and Maintenance funds in the amount of $118,526,926 were obligated at time of award. Air Force Life Cycle Management Center, Eglin AFB, FL, was the contracting activity. Contract Number FA8682-16-C-0004

On Sep 17, 2015, Raytheon Missile Systems, Tucson, AZ, was awarded a $100,000,000 indefinite delivery/indefinite quantity contract for MALD-J production support. Contractor would provide MALD system upgrades, integration, sustainment, management, and logistical support. Work would be performed in Tucson, and was expected to be completed by Sep 30, 2020. This award was the result of a sole-source acquisition. Funds would be obligated on individual orders. Air Force Life Cycle Management Center, Eglin AFB, FL, was the contracting activity. Contract Number FA8682-15-D-0082

On Mar 18, 2015, Raytheon Missile Systems, Tucson, AZ, won a $91,562,375 modification (P00012) to exercise the option on previously awarded contract FA8682-14-C-0004 for Lot 8 of the MALD-J. The contractor would provide 250 MALD-Js. Work would be performed in Tucson, and was expected to be completed by Jun 30, 2017. Fiscal

year 2014 and 2015 Procurement funds in the full contract amount were obligated at time of award. Air Force Life Cycle Management Center, Eglin AFB, FL, was the contracting activity.

On Jun 27, 2014, Raytheon Missile Systems, Tucson, AZ, received an $80,768,012 FFP and CPFF contract for the Lot 7 MALD-J (200 each) to include data, mission planning, process verification, and provision of operational flight software. Work, which was performed in Tucson, was completed by Jun 30, 2016. This award was a result of a sole-source acquisition. Fiscal 2012, 2013, and 2014 Procurement and Operations and Maintenance funds in the amount of $79,112,476 were obligated at time of award. Air Force Life Cycle Management Center/EBJM, Eglin AFB, FL, was the contracting activity. Contract Number FA8682-14-C-0004

In the first quarter of 2013, the U.S. Air Force awarded Raytheon an $81.7 million FFP option for Lot 6 production and delivery of 202 MALD-Js and containers. The contract also included a 10-year warranty. Raytheon began delivery of MALD-Js in fall 2012.

On Aug 22, 2012, Raytheon Missile Systems, Tucson, AZ, was awarded an $81,839,791 million FFP contract for MALD-Js. Work was completed by Aug 31, 2014. AFLCMC/EBJM, Eglin AFB, FL, was the contracting activity. Contract Number FA8682-12-C-0002

On May 27, 2011, Raytheon Missile Systems, Tucson, AZ, was awarded an $82,972,665 FFP contract modification for MALD LRIP, Lot 4. Work would be performed in Tucson. AAC/EBJM, Eglin AFB, FL, was the contracting activity. Contract Number FA8682-10-C-0007, PO0019

On May 5, 2010, Raytheon Co, Tucson, AZ, received a $96,744,354 contract to provide MALD LRIP for a 24month effort to include operational testing and evaluation. At time of contract award, $89,817,202 had been obligated. 692 ARSS/PK, Eglin AFB, FL, was the contracting activity. Contract Number FA8682-10-C-0007

On Jun 30, 2010, Raytheon Co, Tucson, AZ, won a $53,100,000 contract to provide EMD of the MALD-J. This contract includes the associated engineering, program management, mission planning, modeling and simulation, hardware fabrication, production readiness, provision of software, and testing. At time of contract award, $24,500,000 had been obligated. 692 ARSS/PK, Eglin AFB, FL, was the contracting activity. Contract Number FA8682-10-C-0010

Worldwide Distribution/Inventories

Raytheon is looking to win export orders for the MALD. The **United Kingdom** and the **Netherlands** are potential customers for this system, as are **Israel** and **Poland**.

Russo-Ukrainian War. Russia invaded Ukraine on February 24, 2022. Moscow's plans for a quick victory did not occur. Instead, the Russian military is stuck in a war of attrition. The United States and countries in Europe have provided billions of dollars worth of assistance to Ukraine since the start of the conflict.

There are unconfirmed reports that Ukraine has used the ADM-160 MALD in combat. The images that appeared online in 2023 do not clearly show a MALD. The pictures are said to be of debris from a MALD recovered by Russian officials after a Ukrainian attack on Luhansk, a city in the eastern region of Ukraine occupied by the Russian military. The images appear to show an older ADM-160B version of the MALD. There is no independent confirmation of the use of the MALD by the Ukrainian military.

If the MALD was provided to Ukraine, it is unclear if it is air- or ground-luanched. The U.S. has helped Ukraine integrate Western-made weapons with its in-service Russian-made combat aircraft and ground-based mobile air defense systems.

The MALD may be paired with other air defense suppression weapons that the U.S. has provided to Ukraine. Russian news sources claim Ukrainian combat aircraft are using "false targets" generated by UAVs.

User Country. The **United States** is the initial operator of the MALD system.

Miniature Air Launched Decoy (MALD)

Forecast Rationale

The airspace over the battlefield in Ukraine is very dangerous for all types of airborne systems. The Russian military has reportedly "lost" hundreds of fixed- and rotary-wing aircraft since the start of this war.

Specific loss figures are not available. Had Moscow not restricted many flights to areas within Russia or to Ukrainian territory devoid of ground-based air defense systems, losses might have been even higher.

The Russian Air Force in February 2022 had over 700 tactical aircraft available to support its invasion of Ukraine. The poor use of these available assets is called a major contributing factor to the failure of Moscow's initial invasion plan. The Russian Air Force is called "loss averse," unwilling to risk aircraft in support of its ground forces.

The Pentagon is very interested in protecting its combat aircraft from air defense systems. One option is air-launched decoy systems. There are different schools of thought concerning how to best deal with anti-aircraft threats. Some want to emphasize onboard jammers, while others want to focus on dominating the airspace over a battlefield.

Decoys have been around for decades. Chaff, called Window by the British and Duppel by the Germans, was used by all sides in World War 2. Japan successfully used a version of chaff during the Battle of Iwo Jima. Development of decoys continued after the war and today these systems are in wide use.

The aerial combat environment is becoming more dangerous as new technologies enter service. The multiplying threats to combat aircraft are fueling demand for countermeasures systems, including decoys.

The United States possesses a robust electronic warfare capability. Raytheon's Miniature Air Launched Decoy (MALD) meets part of the countermeasures needs of the U.S. Air Force and Navy. In addition to acting as a decoy, this system is also available in a jammer version.

The Pentagon had planned to procure large numbers of MALDs over an extended period. But it turns out that U.S. procurement of MALD has ended far earlier than once planned, a serious blow to this system. The Pentagon was the most significant customer for the MALD.

When the U.S. ended its procurement, Raytheon had yet to win its first export order. Sales to foreign customers were seen amounting to less than half of U.S. purchases. Whether Raytheon can successfully win export orders for the MALD without active U.S. procurement is uncertain, but seems doubtful.

Despite the end of MALD procurement, the U.S. has no completely abandoned the idea of pursuing expendable air-launched decoy system programs. These new systems are likely to be modular unmanned air vehicles (UAVs) that can accommodate different payloads, including jammer, decoy or strike.

When this new modular system might be available is unknown, but it could appear during the first half of the 2030s.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			
	Thru 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
MFR Not Selected												
New Decoy System <> United States												
	0	0	0	0	0	0	0	30	38	56	73	197
Total	0	0	0	0	0	0	0	30	38	56	73	197