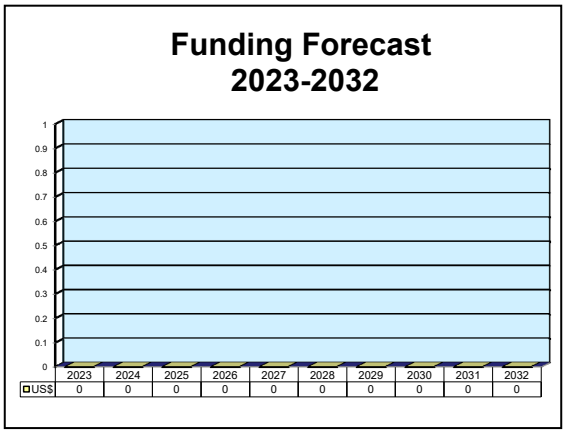
Airborne Reconnaissance Low (ARL)

Outlook

- The first ARL-E was delivered in 2020, marking the beginning of the end of the ARL program's most recent period of heavy funding
- No ARL funding was requested for FY23, and the Army has indicated that the ARL-E program was canceled
- Following the development of several technology testbeds, the higher-ceilinged, jet-powered Hades could replace the ARL in the Army's plans



Orientation

Description. The Airborne Reconnaissance Low (ARL) is a reconnaissance platform that enables the detection, location, and identification of targets in operations such as counternarcotics through the use of electro-optics, radar, communications intelligence, and precision location/direction finding equipment.

The original line of ARLs, known as EO-5s, is based on the De Havilland Dash 7 aircraft.

Next-generation Bombardier/De Havilland Dash 8-based ARLs are known alternatively as RO-6A or ARL-E.

Sponsor

U.S. Army
Program Executive Officer Intelligence & Electronic Warfare
Project Manager Signals Warfare
Vint Hill Farm Station
Warrenton, VA USA

Status. In service.

Total Produced. An estimated 15 RC-7/EO-5C ARL aircraft have been produced for the U.S. Army.

Application. The DHC-7-based EO-5C ARL-M is used for airborne surveillance of borders, ground force movement, and littoral region activities; land mapping; and resource management.

The Q300 (Dash 8) based RO-6A ARL-E performs the same role with modernized equipment on board a more modern platform.

Price Range. Based on a U.S. Army request in 2000, the price of an EO-5C ARL-M aircraft was estimated to be $31 million (in 2000 dollars).

The FY17 U.S. Army budget request documents revealed that the conversion of a raw Dash 8 aircraft into an ARL-E carried an average cost of $23.350 million, without the added costs of installation or payload. The price to convert a Saturn Arch-configured Dash 8 to the RO-6A ARL-E configuration is about $3.504 million, while the price to convert a Desert Owl-configured model is approximately $9.845 million, both without the cost of installation or payload. Installation costs are approximately $7.007 million per aircraft. Conversion costs are expected to average $18.535 million per aircraft, not including the additional cost of the airframe or payload.

Payload procurement and installation costs add another $35.414 million, on average, to the price of converting the three starting configurations into an ARL-E. The total cost of the RO-6A ARL-E payload, conversion of the aircraft, and installation is approximately $53.949 million.

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Contractors

Prime

Adams Communication & Engineering Technology Inc (ACET), Headquarters	http://www.adamscomm.com, 11637 Terrace Dr, #201, Waldorf, MD 20602 United States, Tel: + 1 (301) 861-5000, Prime
Northrop Grumman Technology Services	http://www.northropgrumman.com, 2340 Dulles Corner Blvd, Herndon, VA 20171 United States, Tel: + 1 (703) 713-4000, Prime
Raytheon Technologies	http://www.rtx.com, 1000 Wilson Blvd, Arlington, VA 22209 United States, Tel: + 1 (781) 522-3000, Fax: + 1 (781) 860-2520, Prime
King Aerospace Inc	http://kingaerospace.com, 4444 Westgrove, Addison, TX 75001 United States, Tel: + 1 (972) 248-4886, Fax: + 1 (972) 732-7294, Packager
Leidos	http://www.leidos.com, 1750 Presidents St, Reston, VA 20879 United States, Tel: + 1 (571) 526-6000, Packager

Subcontractor

Argon ST, (a Boeing Company)	http://www.argonst.com, 12701 Fair Lakes Circle, Ste 800, Fairfax, VA 22033 United States, Tel: + 1 (703) 322-0881, Fax: + 1 (703) 322-0885 (COMINT)
Digital Receiver Technology Inc (DRT)	http://www.drti.com, 12409 Milestone Center Dr, Germantown, MD 20876-7114 United States, Tel: + 1 (301) 916-5554, Email: info@drti.com (COMINT Equipment)
L3Harris - Communication Systems-West	http://www.l3harris.com, 640 North 220 W, PO Box 16850, Salt Lake City, UT 84116-0850 United States, Tel: + 1 (801) 594-2000, Fax: + 1 (801) 594-3572 (CDL/SATCOM)
L3Harris - Wescam	http://www.l3harris.com, 649 N Service Rd W, West Burlington, Ontario, Canada, Tel: + 1 (905) 633-4000, Fax: + 1 (905) 633-4100 (MX-20)
Lockheed Martin Rotary and Mission Systems	http://www.lockheedmartin.com, 100 Global Innovation Circle, Orlando, FL 32825-5003 United States, Tel: + 1 (407) 306-1000 (Phoenix Eye Radar)
Northrop Grumman Mission Systems	http://www.northropgrumman.com, 1580 W Nursery Rd A, Linthicum, MD 21090 United States, Tel: + 1 (410) 765-1000, Email: es_communications@ngc.com (ARL-E Long-Range Radar)
OGSystems, a Parsons Company	http://www.parsons.com, 14291 Park Meadow Dr, Suite 100, Chantilly, VA 20151 United States, Tel: + 1 (703) 870-7552 (PeARL)

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 75 Glen Road, Suite 302, Sandy Hook, CT 06482, USA; rich.pettibone@forecast1.com

Technical Data

Characteristics. ARL evolved from two complementary programs: Grisly Hunter, an electro-optical reconnaissance and surveillance system, and the Airborne Radio Direction Finding (ARDF) system, which provided real-time, highly accurate radio intercept and location data. The ARL integrates the two systems into a single platform that satisfies all the requirements identified by the U.S. Army Southern Command (SOUTHCOM) Statements of Need published for Grisly Hunter and the ARDF system. Illegal drug cartel bases and trafficking routes are detected, located, and identified through the use of electro-optic, radar, intelligence, and direction-finding equipment. To perform these types of SOUTHCOM missions, the platform can operate in a completely autonomous mode at a low to medium altitude for an extended period (at least 10 hours), and it is capable of taking off and landing in austere forward areas.

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ARL is also used for surveillance and reconnaissance of hostile-force lines of communication, shipment / infiltration routes, logistics routes, transshipment points, and small base camps, as well as larger processing facilities.

WAMTI/SAR. The wide-area moving target indicator / synthetic aperture radar (WAMTI/SAR) is derived from the Hughes (now Raytheon) Integrated Synthetic Aperture Radar system. The WAMTI/SAR has an improved spot and strip resolution capability and is a multimode, in-flight-reprogrammable radar giving all-weather, 24-hour coverage.

The ARL-M is an X-band reconnaissance and surveillance system that has two modes of operation. Its WAMTI mode scans a 10,000-square-kilometer area in less than a minute, detecting ground movers that are depicted on a cartographic map of the area. The depicted symbols provide target direction and location information. The SAR spot mode provides 1.8-meter-resolution imagery of a 10-square-kilometer area. The WAMTI mode detects movement on the ground and provides a cue to invoke the spot mode for an SAR image of the same area.

The RO-6A ARL-E is based on the Bombardier Dash 8 Q300 platform.

Source: U.S. Army

Variants/Upgrades

APY-12 Phoenix Eye. Lockheed Martin's APY-12 Phoenix Eye is a long range, X-band, SAR with moving target indication capability in both GMTI and WAMTI modes. The APY-12 radar flies on board ARL-M aircraft, providing all-weather, day/night ISR-related radio imaging, tracking, and targeting.

ARL-C. C-Bird is used for signal intercepts and direction finding. Two of these variants were built, but were later converted to the ARL-M configuration.

ARL-I. I-Bird is equipped only with imaging sensors. One ARL-I was built, but it was later converted to the ARL-M configuration.

ARL-M. The M-Bird (a.k.a. Crazy Hawk) combines the capabilities of the C and I variants with those of a forward-looking infrared (FLIR) system, an infrared line scanner, a daylight camera, and the APY-12 Phoenix Eye WAMTI/SAR. Communication signal intercepts and direction finding are done through the Superhawk communications intelligence (COMINT) system. The M-Bird has precision targeting capability via laser.

ARL-E. The ARL-E is a further evolution of the Airborne Reconnaissance Low system. As opposed to the earlier ARL generations, rather than being hosted on board a Dash 7-based platform, the ARL-E is hosted on board a Bombardier/De Havilland Dash 8 platform.

The ARL-E carries the Wescam MX-20HD EO/IR ball turret, among other equipment.

Aerial Common Sensor. Plans had called for integrating the ARL with the U.S. Army Guardrail to create a system called Aerial Common Sensor. The ACS program has since been restructured (see below).

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Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS). The ACS program was restructured and renamed EMARSS.

EO-5. EO-5 is the U.S. Army designation for Dash 7-based ARLs. The "C" variant (or EO-5C ARL-M) was the final variant in the original ARL line.

Long Range Radar (LRR). In September 2015, the U.S. Army selected Northrop Grumman to develop the LRR SAR/GMTI radar for the ARL-E. At the time, Northrop Grumman stated that the radar would be based on a design combining the backend of its ZPY-5 VADER with a specially designed active electronically scanned array (AESA). No detailed information concerning this radar has been released publicly.

RO-6A. RO-6A is the U.S. Army designation for the Dash 8-based ARL-E.

TO-5. TO-5 is the U.S. Army designation for the Dash 7-based ARL trainer aircraft.

Wescam MX-20HD. The L3Harris Wescam MX-20HD is an EO/IR sensor ball turret that provides imaging on board ARL-E platforms. Additional duties include target lasing, with accurate target location provided by inertial measurement units (IMUs) and MX-GEO software.

Program Review

Background. The ARL program was known as Grisly Hunter until 1990, when the Department of Defense restructured the program to add more sensors. Mission equipment carried over from Grisly Hunter included a forward-looking infrared (FLIR) system cued by miniature MTI radar and an infrared line scanner that retracts into the aircraft's belly. In 1991, the Army awarded a $19 million contract to California Microwave as the primary contractor.

Testing and Integration Phase

ARL-I and ARL-C aircraft fielding was delayed from late FY92 to the third quarter of FY93 because of contractor difficulties and a delay in securing flight certifications. The ARL-M contract was delayed in FY93 to complete the congressionally mandated Sensor Mix Study.

The Army began operational testing on ARL aircraft in 1993. SOUTHCOM reportedly had sufficient funds to procure from three to six off-the-shelf De Havilland DHC-7s, modified to add more sensors to detect, locate, and identify a variety of ground, sea, and air targets, both day and night. Workstation integration began in FY94. By the end of FY95, several ARL multifunction systems had been tested and evaluated. Workstation integration and enhancements were also completed.

Sphere of Use Increases

North Korea. In anticipation of the July 1996 retirement of the Mohawk surveillance system, the Army outfitted three ARL systems with Hughes Integrated Surveillance and Reconnaissance (HISAR) systems featuring an MTI. ARL systems were used to patrol Korea's 38th parallel between Mohawk deactivation and deployment of U-2 spy planes. The ARLs were then reassigned to their home base at Fort Bliss, Texas, to support SOUTHCOM.

Haiti and Bosnia. During Haiti's 1995 elections, the ARL was instrumental in identifying potential trouble spots. And early in the U.S. mission in Bosnia, various Bosnian leaders were shown exceedingly clear pictures of themselves on television. The ARL system was considered one of the most flexible intelligence assets, unmanned aerial vehicles (UAVs) included, due to its ability to fly over specific areas of interest on short notice. The ARL-I allowed the U.S. Army to concentrate its forces where needed to prevent attempts at destabilization.

Working with UAVs

The Army has investigated the possibility of interfacing ARL aircraft with UAVs. This would enable intelligence information to be provided instantaneously to on-the-move units such as special operations forces or attack helicopters. Under the plan, ARL workstations would be linked with UAVs in a series of three phases.

In Phase One, the ARL could receive, analyze, and disseminate UAV imagery. The actual movement of the UAV would be controlled from the ground. The UAV imagery link would cost approximately $500,000 per platform, according to Army estimates.

In Phase Two, the ARL would be able to control UAV sensors for about $600,000 per platform. In Phase Three, ground controllers would be able to temporarily or permanently pass control of the UAV to an ARL aircraft for better imagery gathering. Phase Three upgrades would result in a $750,000 price increase per platform.

It has not been disclosed whether any of these UAV upgrades have been integrated into the ARL platform.

RF Tags Reduce Fratricide

In early 1998, the Defense Advanced Research Projects Agency (DARPA) began developing "RF tags" that would allow airborne platforms sporting SAR/MTI to receive information from the ground via low-cost, miniature radio frequency tags. The effort was aimed at improving targeting capability and situational awareness for a variety of surveillance aircraft.

This program would allow covert transmissions of still video, ground sensor data, and alert data. The system would also send GPS information to allow this information to be overlaid on the screens of the aircraft, as well as to improve the accuracy of the SAR image. Combining RF tags and SAR/MTI could aid in identifying friendly forces more accurately.

ACS Enters the Picture

In mid-1998, the U.S. Army pulled ARL-M out of the next-generation Joint SIGINT Avionics Family (JSAF) program. The Army intended to purchase the ARL's replacement, the Aerial Common Sensor. Additionally, the Army stated that it could not afford six JSAF systems, given that the ACS was to become operational within a few years.

Plane Down

The U.S. FY99 defense budget gave the Army an extra $35 million to procure an additional ARL-M aircraft and a ground station. The funding also authorized continued procurement of SAR/MTI systems, ground stations, and other support equipment.

In July 1999, one ARL aircraft crashed in Colombia. The Army subsequently requested $31 million to replace the downed plane in 2000. In response, the U.S. Senate set aside replacement funds in its FY01 Military Construction Bill. In 2001, two increments, totaling approximately $19 million of an estimated $27 million Army contract, were awarded to California Microwave Systems for a sixth RC-7B ARL-M aircraft to replace the crashed plane.

New Features, New Equipment

Older ARL aircraft (M1, M2, M3, and M6) began receiving upgrades in 2003 under the Aircraft Survivability Equipment (ASE) modifications program. ARL modernization funding was split into three program areas: COMINT subsystem upgrades, radar replacement, and aircraft survivability equipment.

COMINT subsystems were modified to expand their intercept and direction-finding capabilities. A set of exploitation tools and an enhanced digital audio recorder were provided to Army units in Fort Bliss and Korea. The HISAR system was replaced with a new system sector and single-beam MTI, a strip-mode synthetic radar that possesses a wide-area search MTI mode, an SAR, a high-resolution spotlight SAR, and a simultaneous SAR/MTI capability. The new ARLs are also equipped with survivability features such as APR-39 radar warning receivers, ALE-47 flare and chaff dispensing systems, and AAR-47 missile warning systems. Funding for these upgrades ended in 2004.

ACS Snag = ARL Upgrade

The ARL replacement, the ACS, ran into a technical quandary when it was discovered that the selected airframe could not handle the payload weight. Two weeks after issuance of the September 2005 ACS stop-work order, the Army contracted with Lockheed Martin to upgrade the ARL-M radar, which among other tasks provides high-resolution SAR images in support of missions in North Korea. The $10.9 million contract involves replacing four SAR systems with Lockheed Martin's advanced Phoenix Eye radar.

Radar Enhancements

Included in the U.S. Army's FY07 budget were various radar modifications, including enhancement of the Phoenix Eye radar to feature a "GMTI over strip-SAR" mode, a sea-state mode, and in-flight calibration. The budget also included funding to enhance the Lynx radar with a GMTI capability and improved "coherent change" detection. All radars were to be modified to reflect current hardware/software configurations.

Also supported in the FY07 budget was an imagery upgrade for the ARL-M fleet to include the addition of laser illuminators, haze filters, geopositioning software, and image-processing algorithms. Completion of this upgrade has not been confirmed.

New Bells and Whistles

U.S. Army FY08/FY09 budget documentation indicated that $115.6 million would be spent on ARL modifications through FY13 (the modifications began in FY08). FY07 and FY08 funding covered the conversion of the ARL C1 and C2 aircraft into full multifunction aircraft (M7 and M8).

According to FY08/FY09 budget documents, all ARL-M radars were to receive mode upgrades in FY08, including replacement of the antenna gimbal assembly and servo assembly and transmitter with modern and sustainable subassemblies. The budget also contained funding for the upgrade of radio frequency components to take advantage of technology improvements and protect against parts obsolescence. The resulting advanced radar modes would be applied to address capabilities such as super-resolution GMTI, 3D SAR, SAR/imagery fusion, and complex data exploitation.

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Also in FY08, imagery upgrades of the ARL-M fleet were to be completed and MX20 multifunction displays were to be modified to reflect the current standard (to include the addition of laser illuminators, haze filters, geopositioning software, and image processing algorithms). In addition, all ARL systems were to be outfitted with a digital pan camera for wide-field-of-view, high-resolution imaging. The pan cameras were to include a mid-wave IR capability for night use. Also on tap for FY08 was the addition of a COMINT system to M1-M6 aircraft, including incorporation of a complete acquisition and direction-finding antenna manifold, a tactical SIGINT payload system, navigation interfaces, and a man-machine interface. Completion of these upgrades has not been confirmed.

FY11 Budget Document – Upgrades

The U.S. Army's FY11 procurement budget included funding for ARL-M7 field antennas and software upgrades. It also included funding for an upgrade of the COMINT system on M4, M5, M7, and C1 aircraft, and for two spare COMINT systems. More specifically, this upgrade standardized the ARLs with a COMINT capability that could support Operation Iraqi Freedom (OIF) and Overseas Contingency Operations (OCO). The upgrade also included architectural modifications for "federated acquisition boxes." The COMINT system would be configured for remote operations and multilevel security operations. Finally, COMINT funding for FY11-FY15 provided funding to exploit high-priority target waveforms.

FY11 procurement funding also covered the costs of fielding the second of two ARL-C (communications) to ARL-M (multifunctional) conversions. These conversions involve modification of the "triport" (three sensor ports) to allow for a navigation modification; a modification to the aircraft survivability equipment; a power modification; a modification to the COMINT antenna; and the installation of either electro-optical / infrared (EO/IR) or radar payloads or a digital camera. The latter modification would also involve an upgrade of the imagery capability (EO/IR and digital pan camera) of the communications suite and of mission analyst workstations.

Finally, the budget included funding for modification of the existing HD sensors. This modification would result in the provision of HD EO/IR sensors on the ARL aircraft that supported OIF. Due to the high operational tempo of OIF, the existing imagery intelligence sensors burned out and required immediate replacement.

An EO-5C ARL-M Based on the De Havilland Dash 7

Source: Wikimedia Commons, Tomás Del Coro

Funding

FUNDING, U.S. ARMY

	Prior QTY	Prior AMT	FY21 QTY	FY21 AMT	FY22 QTY	FY22 AMT	FY23 QTY	FY23 AMT
Procurement								
LI#1036AZ2001 – Multisensor ABN Recon (MIP)								
AZ2050 – ARL Payloads (MIP)	-	1,274.077	-	62.876	-	81.989	-	0.000
LI#A02109 – ARL SEMA (MIP)	-	12.294	-	9.796	-	0.000	-	0.000
LI#3404A02110 – ARL SEMA Mods (MIP)	-	80.828	-	9.598	-	14.437	-	0.000

	FY24 QTY	FY24 AMT	FY25 QTY	FY25 AMT	FY26 QTY	FY26 AMT	FY27 QTY	FY27 AMT
LI#1036AZ2001 – Multisensor ABN Recon (MIP)								
AZ2050 – ARL Payloads (MIP)	-	14.601	-	14.605	-	14.685	-	14.622
LI#A02109 – ARL SEMA (MIP)	-	0.000	-	0.000	-	0.000	-	0.000
LI#3404A02110 – ARL SEMA Mods (MIP)	-	5.007	-	5.215	-	5.240	-	5.213

	Prior AMT	FY21 AMT	FY22 AMT	FY23 AMT	FY24 AMT	FY25 AMT	FY26 AMT	FY27 AMT
RDT&E								
PE#0305206A – Airborne Reconnaissance Systems								
EH5 – ARL Payloads Adv Dev (MIP)	-	16.574	7.417	0.000	7.358	1.300	1.301	1.314

All $ are in millions.

Sources: U.S. Department of the Army, FY23 Budget Estimates, Aircraft Procurement, Army, April 2022;
U.S. Department of the Army, FY23 Budget Estimates, RDT&E, Army, Vol. III, Budget Activity 7, April 2022

Contracts/Orders & Options

Contractor	Award ($ millions)	Date/Description
California Microwave	7.0	Mar 2002 – Part of a $250 million cost-plus-fixed-fee (CPFF) contract for logistical support of the ARL-M aircraft program. Completed Dec 2002. The U.S. Army Communications-Electronics Command Acquisition Center, Fort Monmouth, NJ, was the contracting activity. (DAAB10-90-C-7068)
California Microwave	6.8	Jun 2002 – Part of a $31 million CPFF sole-source contract for incorporation of engineering change proposals in the ARL-M program. Completed Dec 2003. The U.S. Army Communications-Electronics Command Acquisition Center, Fort Monmouth, NJ, was the contracting activity. (DAAB07-01-C-L304)
Northrop Grumman	6.7	Apr 2003 – CPFF contract for logistics services for the fleet of ARL-M aircraft. Completed Dec 2007. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, was the contracting activity. (DAAB07-03-C-P404)

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Contractor	Award ($ millions)	Date/Description
Northrop Grumman	4.6	Dec 2003 – Part of a $17.7 million CPFF contract to acquire logistic support services for maintenance of the ARL-M aircraft fleet. Completed Dec 2004. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, was the contracting activity. (DAAB07-03-C-P404)
Lockheed Martin	10.9	Oct 2005 – Contract to upgrade the ARL-M radar by replacing four SAR systems with the advanced Phoenix Eye radar.
King Aerospace	28.2	Dec 2011 – Life-cycle contract support for ARL De Havilland Dash 7 aircraft fleet. Work was expected to be completed by Dec 31, 2014. The U.S. Army Contracting Command, Redstone Arsenal, AL, was the contracting activity. (W58RGZ-05-C-0302)
King Aerospace	32.35	Dec 2013 – Modification to a previously awarded life-cycle support contract for the ARL De Havilland Dash 7 aircraft fleet. Work was expected to be completed by Dec 31, 2014. (W58RGZ-05-C-0302; P00213)
King Aerospace	40.259	Dec 2014 – FFP contract for the continuation of contractor logistics support for the DHC-7 ARL EO-5 aircraft. Work completion date was Dec 2015. (W58RGZ-15-C-0026)
Leidos	661.840	Nov 2015 – U.S. Army CPFF, indefinite delivery/indefinite quantity contract for the design, architecture engineering, configuration management, system integration, aircraft integration, testing, and technical and logistics support of the ARL-E system. Work was expected to be completed by Nov 3, 2020. (W56KGY-16-D-0001)
King Aerospace	31.310	Jun 2016 – U.S. Army modification (P00013) to a previously awarded contract for logistics support of the Dash 7 ARL EO-5 aircraft fleet. Work was expected to be completed by Jun 30, 2017. (W58RGZ-15-C-0026)
King Aerospace	15.237	Jun 2017 – U.S. Army modification (P00027) to a previously awarded contract for logistics support of the Dash 7 ARL EO-5 aircraft fleet. Work was expected to be completed by Dec 31, 2017. (W58RGZ-15-C-0026)
Northrop Grumman Systems	75.039	Sep 2018 – U.S. Army modification (P00015) to a previously awarded contract for logistics support of special electronic mission aircraft: MC-12S, RC-12S, EO-5C, TO-5C, and RO-6A. Work is expected to be completed Feb 28, 2027. (W58RGZ-17-C-0014)
Northrop Grumman Systems	42.089	Feb 2020 – Hybrid (cost-no-fee, CPFF, CPIF, FFP, and fixed-price-incentive) modification (P00054) to a previously awarded contract to provide contractor logistics support services for Special Electronic Mission Aircraft. Work was expected to be completed Aug 31, 2020. (W58RGZ-17-C-0014)
Northrop Grumman	176.472	May 2020 – Modification (P00056) to a previously awarded contract to support Army SEMA life-cycle services. Work was expected to be completed Aug 31, 2020. (W58RGZ-17-C-0014)
Northrop Grumman Systems	21.703	Jun 2020 – Modification (P00063) to a previously awarded contract to provide logistics support services for SEMA missions. Work was expected to be completed Aug 31, 2021. (W58RGZ-17-C-0014)

Contractor	Award ($ millions)	Date/Description
Northrop Grumman Systems	20.715	Jul 2020 – Modification (P00077) to a previously awarded contract to provide contractor logistics support services for SEMA missions. Work was expected to be completed Aug 31, 2021. (W58RGZ-17-C-0014)
Northrop Grumman	18.137	Aug 2020 – Modification (P00088) to a previously awarded contract to provide contractor logistics support services for SEMA missions. Work was expected to be completed Aug 31, 2021. (W58RGZ-17-C-0014)

Worldwide Distribution/Inventories

All Dash 7-based ARL-M and Dash 8-based ARL-E aircraft are used solely by the **U.S. Army**.

The Army Procurement Objective was for nine ARL-E-modified Dash 8 Q300s, but the Mission Equipment Package objective was only eight, leaving the last unit as a trainer.

There is no indication that any ARL system has been offered for export or that any nation has requested the aircraft through a Foreign Military Sales (FMS) program.

Forecast Rationale

In 2020, the first ARL-E was delivered to the U.S. Army, marking the beginning of the end of the Airborne Reconnaissance Low (ARL) program's most recent period of heavy funding.

Past activities included upgrading the U.S. Army ARL-C fleet to the EO-5C ARL-M standard – a change that saw the redesignated aircraft receive upgrades to the radar and several other systems. Subsequently, the ARL-Ms maintained a stable configuration for a few years, and sustainment funding was all that the program received.

In 2015, the U.S. began the process of replacing its ARL-M fleet with the ARL program's next-generation system, the RO-6A ARL-E. While the outgoing ARL-Ms were based on the Dash 7 platform, the latest iteration is based on the more modern Bombardier/De Havilland Dash 8 (Q300).

At one time, the U.S. Army had an acquisition objective of nine RO-6A ARL-E units. Six of the ARL-Es were to be converted from existing intelligence, surveillance, and reconnaissance (ISR) aircraft, and three were to be converted from raw, commercially available airframes. Only eight would have received the full mission set, with the other functioning as a trainer.

Because some of the aircraft already possessed relevant ISR components, the conversions were to be conducted on a piecemeal basis. Each aircraft would have received individually customized payload updates through procurement funding. In addition to procurement funding, RDT&E funding was allocated to drive development of systems and performance capabilities new to the ARL-E program.

RDT&E for advancement of the ARL-E's long-range radar concluded in 2019 – the ARL-M's Lockheed Martin APY-12 Phoenix Eye radar was replaced with Northrop Grumman's Long Range Radar (LRR). RDT&E work continued with integrations of signals capabilities for the ARL-E's COMINT systems.

RO-6A ARL-E airframe procurement and most modifications were to be completed by 2025, after which ARL funding were expected to fall back to sustainment levels.

However, a surprise came in the April 2022 release of the U.S. Army's FY23 budget estimates. Unexpectedly, all funding related to ARL line items had been removed for the 2023 fiscal year. Something big was happening in the ARL program and there was very little to no discussion about it happening in the trade press or in the U.S. armed forces' notices to the public. A clue as to what was happening came soon and through an unexpected channel.

A few months after the release of the FY23 budget estimates, in July 2022, the U.S. Army issued a press release discussing the handing over of the Product Manager Medium Altitude Reconnaissance and Surveillance System (PM MARSS) duties to Michael Payne. In the release, it revealed that Eric Hughes, who had assumed the Acting PM MARSS title in February 2022, had presided over ARL-E program termination and equipment disposition.

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With the ARL-E platform assets in the process of coming online and no discussion of program difficulties being revealed to the public, at least insofar as Forecast International analysts were able to determine, it is unknown what led to the ARL-E program's early termination.

An educated guess is that the Army developed reservations about fielding another lower altitude, turboprop-powered ISR asset, given such an aircraft's vulnerabilities to ground-based attacks. Another detraction to the platform is the ARL-E's host aircraft, the Dash 8. It is an older, less efficient design than most contemporary aircraft, which reduces the platform's long-term viability and increases its operating costs.

The Army also had a modern, better performing option in the pipeline.

For several years, the Army has had a developmental program to refine ISR capabilities on board higher-ceilinged, jet-powered aircraft. This has led to the creation of several experimental testbeds, all with Greek mythological names.

The Airborne Reconnaissance and Target Exploitation Multi-Mission Intelligence System (Artemis) was the first demonstrator, then the Airborne Reconnaissance and Electronic Warfare System (Ares), and finally the Army Theater Level High-Altitude Expeditionary Next Airborne ISR Radar (Athena-R). Eventually, the lessons learned through the developmental, operational, and testing efforts related to these aircraft are expected to lead to a fielded ISR platform called the High-Accuracy Detection and Exploitation System (Hades).

According to several sources, Hades is expected to be based on a commercially available, jet-powered airframe that is deployable in an unmanned configuration. Fielding is expected as early as 2028 and up to 16 units could be produced.

It is uncertain whether the Army's focus on the Hades program led to the termination of the ARL-E, but given some of the mission crossover, it is a possibility.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR COMMINGLED FUNDING (in US$)												
Designation or Program		High Confidence				Good Confidence			Speculative			
	Thru 2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
MFR Varies												
Airborne Reconnaissance Low (ARL) Mods & Procurement <> United States <> Army <> DHC-7/Q300 <> ARL-M & ARL-E Commingled Funding												
	1,530,885,000	0	0	0	0	0	0	0	0	0	0	0
Total	1,530,885,000	0	0	0	0	0	0	0	0	0	0	0