

# ARCHIVED REPORT

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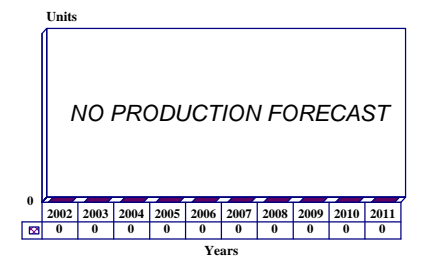
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## ADATS - Archived 4/2003

### Outlook

- Awaiting orders
- Turkey could be interested in acquiring ADATS
- Other potential customers for ADATS include Australia, Greece and Thailand
- Canada could sell off its ADATS fire units. Ottawa was already considering mothballing its ADATS units due to budget shortfalls and high maintenance costs

10 Year Unit Production Forecast  
2002 - 2011



### Orientation

**Description.** Dual-purpose (anti-tank/anti-aircraft) weapon system.

**Sponsor.** US Department of Defense through the US Army Aviation & Missile Command (AMCOM), Huntsville, Alabama (AL), USA. Originally, a private development by Oerlikon-Buhrle and Martin Marietta.

**Contractors.** Originally under advanced development by Oerlikon-Buhrle Ltd, Machine Tool Works, Military Products Division, Zurich, Switzerland and Martin Marietta Corporation, Electronics, Information and Missile Group, Orlando, Florida, USA. Oerlikon Aerospace Canada now handles activity related to the ADATS. Production of the ADATS missile in the United States was to take place at Lockheed Martin Corp's Ocala, Florida facility. Canadian production is performed by Oerlikon Aerospace Canada at its Saint-Jean-sur-Richelieu facility in Quebec.

**Major Subcontractors.** Bendix Avaelix, CAE Electronics, Contraves Italiana, Cubic Defense Systems, Devtek, Dowty Canada, Ericsson Radar Electronics, GEC-Ferranti Defence Systems Ltd/Electro-Optics Division, FMC Corporation, Garrett, General Research Systems, General Motors Canada, Hercules Inc, Hymatic Engineering, Lavalin, Litton's Laser Systems Division, Litton Systems Canada, GEC-Marconi Instruments, Martin Marietta, Moog Incorporated, Mullard & Spar Aerospace, and Williams International.

**Status.** Awaiting new orders. The US portion of this program was concluded when funding was withdrawn. Development had been completed. Production is performed in Canada. Oerlikon Aerospace is continuing to actively market the ADATS to potential international customers.

**Total Produced.** Approximately 1,232 ADATS missiles had been completed or were in production as of the end of 1996. Full-scale production in the United States never commenced. Eight complete ADATS vehicles (an M3 Bradley outfitted with the missile system) were delivered to the US Army for testing. A total of 36 complete systems on M113A2 chassis will be delivered to the Canadian armed forces for its LLAD requirement.

**Application.** Modular, dual-purpose weapon system to acquire, attack and destroy both hostile aircraft and armored vehicles, up to and including any known or projected main battle tank. ADATS can be mounted on a variety of vehicles.

**Price Range.** When the ADATS program was concluded, the modular unit (including eight active missiles and eight in reserve) cost approximately \$17 million. The estimated price of the missile itself ranges from \$170,000 to \$230,000 in Fiscal 1993 dollars.

## Technical Data

**Design Features.** A note on armor penetration: While ADATS was designed as a dual purpose system, its primary mission is against hostile aircraft. However, its performance against armor is described as formidable:

at least 100 cm (39.37 in) was claimed. The application of our standardized formula for chemical (HEAT) warheads to the ADATS missile warhead yielded a penetration figure of 95.76 cm.

	<u>Metric</u>	<u>US</u>
<b>Dimensions</b>		
Missile Length	205 cm	6.72 ft
Missile Diameter	15.2 cm	5.98 in
Missile Weight	51 kg	112.20 lb
Canister Length	219.76 cm	7.21 ft
Canister Diameter	24 cm	9.44 in
Canister Weight (empty)	13 kg	28.60 lb
System Weight	6.35 tonnes	7 tons
Launch Elevation Range	-9° to +85°	-9° to +85°

### Performance<sup>(a)</sup>

Speed	Mach 3	Mach 3
Range (vs. armor)	500-6,000 m	546.8-6,561.66 yd
Range (vs. aircraft)	1,000-8,000 m	1,093.61-8,748.88 yd
Altitude (vs. aircraft)	5,000 m	16,404.16 ft
Maneuver Capability	35 g	35 g

<sup>(a)</sup>Missile only. For performance of the M113 vehicle, see the related report in the *Military Vehicles Forecast*.

**Propulsion.** A solid fuel rocket of unknown thrust produced by Hercules Inc, Wilmington, DE. The company claims that this motor is totally smokeless.

**Control & Guidance.** Radar detection (Contraves Italiana X (I/J)-band LPD 20/11) with optical tracking; ground targets are acquired and tracked optically. Guidance is by a CO<sub>2</sub> laser beam. It is controlled through four pneumatically actuated fins at the rear of the missile. Large-scale integration of circuitry is employed aboard the missile to reduce weight. Moog Incorporated, East Aurora, New York, manufactured the actuation system. Radar range is approximately 22 kilometers (13.67 statute miles) and it has the ability to search while the vehicle is moving. GEC-Ferranti Defence Systems Ltd, Electro-Optics Division provided the Type 629G laser rangefinder. Additionally, Litton's Laser Systems Division provided 13 laser rangefinders for the unit.

**Launcher Mode.** Launched from a lightweight canister which were sealed at the factory. Four are mounted on each side of the turret. The canister acts as both a storage and handling container as well as a launcher. Shelf life is expected to exceed 10 years. ADATS is designed to be fitted upon a wide range of tracked and wheeled vehicles, including the M113A2 armored personnel carrier, M2/3 Bradley infantry fighting vehicle (IFV), and MOWAG Shark. The ADATS is also to be offered in a one-shelter version for ground deployment, shipborne versions, and for airborne applications on Apache/Black Hawk helicopters.

**Warhead.** Hollow charge, high-explosive, dual-purpose warhead with a weight of 12.5 kg (27.5 lb). The casing provides a fragmentation effect for use against airborne targets. The warhead is both proximity (for airborne targets) and impact fused (for armored vehicles). Armor penetration: 90 cm (impact fuse).



ADATS

Source: Oerlikon

## Variants/Upgrades

No variants or upgrades of ADATS were developed before this program was concluded. A preplanned product improvement (P3I) schedule was laid out but never went into effect. However, to find new markets for the system, Oerlikon and CMN are collaborating in the development of a navalized version of ADATS for close-in defense against anti-ship missiles. Long-range targeting will be provided by shipborne sensors or external data link; otherwise the ADATS will be autonomous. The physical size and weight of a navalized ADATS system is such that it can readily be installed aboard vessels as small as fast attack craft size.

A navalized ADATS, known as Sea Sprint, is being marketed by Marconi, Lockheed Martin, and Oerlikon. This system will meet the inner layer missile system requirements of the program. The Sea Sprint will be based on the shelterized version of ADATS that was sold to Thailand.

Oerlikon has also introduced the Skyshield 35/ADATS air defense system, based on the Skyguard system, that combines 35 mm guns with ADATS missiles. This system is for low level air defense. For additional information, please see the **Program Review** section.

## Program Review

**Background.** Oerlikon-Buhrle began studies on the ADATS (Air Defense Anti-Tank System) in 1973 and initiated development in 1979. After a number of American contractors were examined, Martin Marietta (now part of Lockheed Martin Corporation) was selected to develop the system fully in the United States.

Parameters drawn up for ADATS by Oerlikon-Buhrle are as follows:

1. High lethality against both air and ground targets
2. High probability of kill against both air and ground targets

3. Short reaction time
4. High rate of fire
5. High survivability
6. Autonomous operation
7. Low weight and compactness for air transport
8. Day or night operation in all types of weather
9. Ability to operate in a high ECM environment

The modular concept was adopted so that ADATS could be mounted on a variety of vehicles, both wheeled and tracked. The M113 armored personnel carrier had been the main vehicle planned for ADATS,

although the United States was to use the M3 Bradley. By far the main attribute of the ADATS system is its unique ability to deal with both armored vehicles and aircraft. This fact, plus the overall performance of ADATS, makes it an ideal candidate for various nations' rapid deployment force missions as well as the United States Marine Corps.

The system is composed of a turret with eight missile launchers, a radar, along with forward-looking infrared, electro-optic and optical units for target acquisition and tracking. A laser rangefinder and laser designator are also fitted. The radar and electro-optic display equipment, along with the computer and other fire control equipment, are mounted within the vehicle. While each ADATS vehicle is considered an autonomous, self-contained weapon system, it can alternatively be incorporated into a network of either other ADATS units or other radars for command and control operations.

**Missile Description.** The ADATS missile is composed of the following sections front to rear: impact fuse, guidance section, 12.5 kg dual purpose (hollow charge/fragmentation) warhead, proximity fuse, propulsion section, and the control section. Four swept fins are mounted at the rear of the missile for aerodynamic control and stability. The missile's smokeless motor does not reveal the launcher's position and consequently does not indicate its approach to the target. The warhead can be activated either by a contact fuse or an active laser proximity fuse that can be

disabled by a single operator switch action when engaging a ground target.

**Sequence of Engagement.** The ADATS is equipped with a surveillance/tracking radar but uses a forward-looking infrared (FLIR) for target acquisition and illumination. If the target is an aircraft, it is acquired by the onboard radar, which can be moved independently of the turret. Armored vehicle targets are acquired optically. After acquisition, the radar can be switched off to reduce probability of detection by enemy radiation-seeking weapons. The target is then followed by the passive optical tracking system (electro-optic or infrared) which is immune to countermeasures. Distance objective is determined by the onboard laser rangefinder. When within the appropriate range for either airborne or land targets, the missile is launched and guided to its target by the encoded laser beam. The system has the capability to track up to 10 targets simultaneously.

At launch, the ADATS round is accelerated to Mach 3. This smokeless motor permits easier tracking of the missile's exhaust flare by the FLIR or TV camera system. Steering instructions based on the tracked positions of the target and missile are sent by coded laser pulses to a rear-facing detector on the missile, bringing the missile to an intercept course. An electro-optical proximity fuse detonates the warhead, which is effective against both air and armored targets and carries a conical charge.

## Funding

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The US Defense Department has ended all funding for the ADATS. Program cost creep is said to have hurt this effort; the total price tag rose to around \$6.4 billion. Canada is continuing with its own ADATS program and awarded Oerlikon Aerospace a long-term contract for maintenance of its existing systems. No information is available concerning Thailand's ADATS purchase.

## Recent Contracts

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No production contracts have been placed in recent years.

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1973	Oerlikon-Buhrle began studies of ADATS concept
	1979	Development initiated
Aug	1979	Oerlikon/Martin Marietta agreement signed
Apr	1981	Firing trials began at White Sands Missile Range
Apr	1986	Canada formally selected ADATS for LLAD
Jun	1986	Canadian government approval for ADATS
	1987	US Army evaluated ADATS for FAAD-LOS-FH need
Dec	1987	ADATS won initial FAADS competition

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1988	Initial production for Canada begun
	1989	First units delivered to the US for testing
	1992	US canceled ADATS portion of FAADS
	1992-93	Last Canadian ADATS fire unit delivered
Jan	1994	Thailand ordered shelter mounted ADATS
	2000s	Oerlikon continues international marketing effort for ADATS

## Worldwide Distribution

The **United States** was once expected to be the primary operator of the ADATS. The first US Army units to have received ADATS were to be the 3rd and 8th Mechanized Infantry and the 1st and 3rd Armored Divisions stationed in Europe. The 2nd Infantry Division in South Korea was to receive the new air defense system after their European counterparts. A total of 378 systems were to be procured by the United States for use by maneuver battalions/squadrons in the heavy divisions, separate heavy brigades, and armored cavalry regiments. However, the US cancellation of its procurement program left Canada as the initial operator of the system. **Canada** purchased 36 ADATS systems.

With the US order canceled, the sales potential of ADATS plummeted. Then, in January 1994, Oerlikon secured an ADATS order from **Thailand**. The Royal Thai Air Force placed an order for an unspecified number of shelter-mounted ADATS systems (ranging from a low of three fire units, to a mid-range total of 6-8, and finally a high of 10-20 fire units) and missiles. No surveillance radar was provided and the ADATS will be integrated with the existing air defense network. The air force is said to have a requirement for an additional three shelter-based fire units, and the army could procure a mobile version for use with its mechanized units.

The ADATS has been offered to Switzerland, the Republic of (South) Korea, the Netherlands and the United Arab Emirates. In 1999, ADATS from the Canadian inventory were once again offered to **Greece**, despite Athens' decision to procure the SA-15 Tor-M1. In 2001, Greece again began to consider purchasing the ADATS. Also, **Turkey** could procure the ADATS to meet its short-range air defense need. Competitors include the Thales Crotale and Euromissile's Roland.

User Country(s). So far, only **Canada** and **Thailand** have ordered the ADATS air defense system.

## Forecast Rationale

Time is as running out for the ADATS and by some estimates already has. All opportunities for further sales of this once promising air defense systems seem to have faded away. Production has ceased and no new orders are on the horizon.

The number of countries interested in ADATS has withered over the years. Perhaps only one or two nations are still willing to consider this system to meeting their air defense needs but none appear ready to commit themselves to its procurement. Even Canada, the systems largest operator, is now willing to sell off its ADATS fire units to relieve some of the pressure on its defense budget.

Oerlikon Aerospace worked hard to find new customers for ADATS, its sales representatives visited every region of the world. Company officials believed that one or two ADATS procurement contracts were out there somewhere. They even hinted that certain unspecified countries (Kuwait, the United Arab Emirates, Saudi Arabia and perhaps Oman and Egypt) were showing growing interest in ADATS. Although their efforts were admirable, they produced no new orders.

Time appears to have overtaken the ADATS programs. With no one willing to place an order, the prospects for further production of this system are nil.

## Ten-Year Outlook

### ESTIMATED CALENDAR YEAR PRODUCTION

High Confidence  
Level

Good Confidence  
Level

Speculative

Total

Missile	(Engine)	thru 01	02	03	04	05	06	07	08	09	10	11	02-11
OERLIKON AEROSPACE													
ADATS	UNSPECIFIED	1232	0	0	0	0	0	0	0	0	0	0	0
Total Production		1232	0	0	0	0	0	0	0	0	0	0	0