

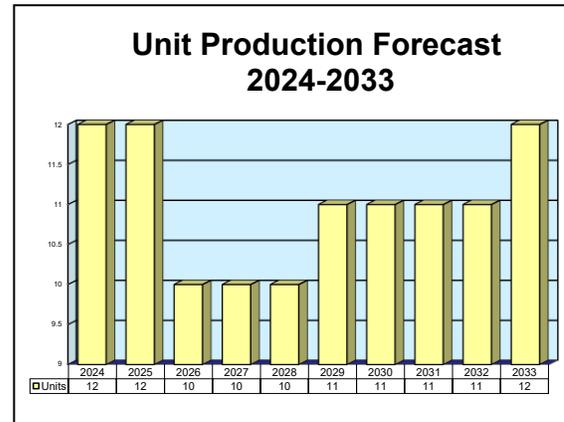
# ARCHIVED REPORT

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## M242 Bushmaster 25mm Cannon

### Outlook

- Serial production ongoing for U.S. DoD procurement and export
- M242 remains most closely associated with Bradley Fighting Vehicle program
- Of the at least 190 M2A2 ODS Bradley Fighting Vehicles the U.S. donated to Ukraine, about 35% have been lost in action thus far



### Orientation

**Description.** A medium-caliber ordnance system optimized for mechanized infantry combat vehicles.

**Sponsor.** Hughes Helicopters originally developed the Chain Gun technology as a private venture. The U.S. Army sponsored the final development and U.S. procurement of the M242.

**Status.** Development through serial production.

**Total Produced.** Through 2023, we estimate the prime contractors and licensee produced at least 12,297 M242 cannon, in all variants.

**Application.** A main armament system for mechanized infantry combat vehicles.

**Price Range.** In 2024 U.S. dollars, the M242 carries an estimated unit price of \$72,481.

### Contractors

#### Prime

<b>Northrop Grumman Defense Systems, Armament Systems</b>	<a href="http://www.northropgrumman.com">http://www.northropgrumman.com</a> , 3309 N Reseda Circle, Mesa, AZ 85215 United States, Tel: + 1 (480) 324-8600, Fax: + 1 (480) 324-8758, Prime
<b>BAE Systems Inc, Platforms &amp; Services (U.S. HQ)</b>	<a href="http://www.baesystems.com">http://www.baesystems.com</a> , 2000 N 15th St, 11th Fl, Arlington, VA 22201 United States, Tel: + 1 (703) 247-4619, Email: <a href="mailto:land.armaments@baesystems.com">land.armaments@baesystems.com</a> , Second Prime
<b>General Dynamics European Land Systems, Santa Bárbara Sistemas</b>	<a href="http://www.gdels.com">http://www.gdels.com</a> , Via de los Poblados 3, PE Cristalia Edificio 7/8, Madrid, Spain, Tel: + 34 91 585 04 55, Fax: + 34 91 585 02 18, Email: <a href="mailto:info.sbs@gdels.com">info.sbs@gdels.com</a> , Licensee

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](mailto:rich.pettibone@forecast1.com)

## M242 Bushmaster 25mm Cannon

### Technical Data

**Crew.** Per platform application.

**Muzzle Brake.** Multi-port.

**Recoil System.** Hydromechanical.

**Breech Mechanism.** Reciprocating, open bolt.

**Method of Operation.** Power-driven endless chain.

**Ammunition.** The M242 fires all NATO-standard 25x137mm ammunition. Available U.S. ammunition types include:

- M791 and M919 Armor Piercing Discarding Sabot-Tracer (APDS-T)
- M792 High Explosive Incendiary-Tracer (HEI-T)
- M793 Target Practice-Tracer (TP-T)
- M910 and M910E1 Training

**Dimensions.** The following data reflect the current production standard.

	<u>SI Units</u>	<u>U.S. Units</u>
Caliber	25 mm	0.98 in
Length	2.67 m	8.76 ft
Width	31.8 cm	12.5 in
Height	37.3 cm	14.7 in
Weight	119 kg	261.8 lb

**Performance.** The muzzle velocity data reflect firing M791 APDS-T ammunition.

	<u>SI Units</u>	<u>U.S. Units</u>
Muzzle velocity	1,345 m/sec	4,412 ft/sec
Rate of fire (rounds per minute)	Single shot, 100/200/500 rds/min	Single shot, 100/200/500 rds/min
Time to rate	0.15 sec	0.15 sec
Time to stop	0.12 sec	0.12 sec
Dispersion	0.5 mil	0.5 mil

The prime contractor claims the M242 maintains a mean rounds between stoppage rate of 18,000 rounds.

**Power.** The M242 requires 5.97 kilowatts (8.0 hp) for operation at the 500-round-per-minute firing rate.



25mm M242 Bushmaster on Bradley Fighting Vehicle

Source: U.S. Army

## M242 Bushmaster 25mm Cannon

### Variants/Upgrades

**Variants.** None.

**Modernization and Retrofit Overview.** Generally not applicable, although the U.S. DoD has remanufactured a large portion of its M242 inventory.

### Program Review

**Background.** Concurrent with its private development of the AH-64 Apache attack helicopter in the early 1970s, Hughes Helicopters began development of a new armament system of revolutionary design in 1972.

#### *Enter the Chain Gun*

This new armament system – featuring the unique Chain Gun mechanism – stressed a lightweight design, ruggedness, simplicity, and reliability. When the U.S. Army selected the Hughes AH-64 as the next-generation attack helicopter in 1976, the then-designated XM230 became the gun component of the new aircraft.

Following the introduction of the M230, Hughes developed new applications for the Chain Gun mechanism, including the 25mm M242 Bushmaster and the 30mm Bushmaster II. (For a detailed discussion of the M230, see the "M230 Aircraft Cannon" report and the "Bushmaster II/Mark 44 30/40mm Cannon" report.)

In 1984, McDonnell Douglas acquired the Hughes Helicopter Company; in 1997, Boeing purchased McDonnell Douglas. In 2002, Alliant Techsystems purchased the cannon business of Boeing. In 2014, ATK merged with the aerospace and defense units of Orbital Sciences Corporation to create a new company called Orbital ATK. The prime contractor – now operating as Northrop Grumman Defense Systems – continues development of the Chain Gun technology.

**Description.** The heart of the Chain Gun mechanism is a single, double-row roller chain that moves in a racecourse pattern over four sprockets. This chain operates the sliding bolt mechanism of the weapon. The weapon requires an external power source for operation.

#### *Advantages of Constant Timing*

The mechanism offers a number of advantages. In addition to significantly reducing the number of moving parts, the Chain Gun principle allows for open-bolt operation without the need for declutching mechanisms. The primary advantage of this operating system is the fact that the chain drive ensures constant timing of the mechanism, despite ammunition variations. The long bolt-lock time provides for essentially gasless action.

The constant, chain-driven timing of the mechanism results in a weapon system with greatly enhanced reliability.

#### *Bradley Main Armament*

In September 1975, Hughes Helicopters responded to a DoD Request for Proposals to develop an externally powered 25mm cannon for the M2/M3 Bradley Fighting Vehicle program. Hughes developed the ordnance concurrently with the M230; the U.S. Army type-classified the weapon as the M242 Bushmaster in February 1980.

The M242 is a dual-feed weapon, capable of firing both armor-piercing and high-explosive ammunition. The M242 is unique among externally powered weapons in that it is totally hangfire-safe, due to its patented fail-safe electromechanical mechanism.

#### *Expanding List of Applications*

In addition to the U.S. Army's M2/M3 Bradley Fighting Vehicle application, the M242 is also the main armament of the U.S. Marine Corps' Light Armored Vehicle-25 and Spain's Vehiculo de Exploracion de Caballeria vehicle. For the latter application, Santa Barbara SA (now Santa Barbara Sistemas, a component of the General Dynamics European Land Systems group) produced the M242 under license. Various customers have also integrated the M242 with the following vehicles:

- Akrep
- Armored Combat Vehicle-New Generation
- Armored Infantry Fighting Vehicle
- Bionix
- Cobra
- Dragoon 300
- EE-11 Urutu
- Egyptian Infantry Fighting Vehicle
- FV510 Warrior (including Desert Warrior)
- FV721 Fox
- GKN Reconnaissance Vehicle (based on FV510)
- M2/M3 Bradley Fighting Vehicle
- M113 and Mobile Tactical Vehicle-Light

## M242 Bushmaster 25mm Cannon

NVH-1  
 Pandur/Pandur II  
 Piranha (6x6 and 8x8 versions)  
 Stormer  
 Stridsfordon CV9025  
 Terex AV81  
 Ulan/Pizarro (Schützenpanzer 90)  
 V-150/V-300 Commando  
 XA series

### *U.S. Navy Also on Board*

In 1983, the U.S. Navy began procuring the M242 as part of the Mk 38 machine gun system for its smaller

vessels, replacing the obsolescent 20mm Mk 16 cannon. Total procurement under the original contract reached 410 units.

In April 2007, BAE Systems commenced delivery of an additional 67 Mk 38 Mod 3 units for the U.S. Navy.

In March 2011, the U.S. Navy awarded BAE Systems a contract worth \$33.9 million for 150 ORDALT (ordnance alteration) kits for the Mk 38 Mod 3 machine gun system. The ORDALT kit consists of the following components and features: two-axis stabilization, a remote-control capability, and an eyesafe laser rangefinder.

## Funding

Hughes Helicopter Company originally funded the M242 Bushmaster as a private venture. The U.S. Army has funded U.S. procurement of the M242 since 1980. Recent funding data are unavailable, because the Army and Marine Corps no longer list the M242 as a separate line item in annual budget documentation.

## Worldwide Distribution/Inventories

**Export Potential.** Since its first export sale in 1987, the M242 Bushmaster has made a strong impact on the international market. The M242 remains in service with at least 11 nations; integration with an increasingly wide variety of combat vehicles continues.

**Countries.** Australia, Canada, Kuwait, Malaysia, New Zealand, Philippines, Saudi Arabia, Singapore, Spain, Ukraine, and the United States.

## Forecast Rationale

Australia's Light Armored Vehicle program and Singapore's Bionix program continue to account for the largest portion of 25mm M242 Bushmaster export sales.

With the M242 Bushmaster, as well as the other members of the Chain Gun family of weapons, Northrop Grumman Defense Systems (Orbital ATK) has become the world's largest producer of medium-caliber automatic ordnance.

### *Tied to the Bradley Fighting Vehicle*

Despite its expanding list of vehicular applications, the M242 Bushmaster will remain most closely tied to the fortunes of the Bradley Fighting Vehicle. The objective of the U.S. Army's Bradley program is to upgrade the existing Bradley fleet to the most current configurations.

According to U.S. Department of Defense FY24 budget request documentation (March 2023), the U.S. Army intends to spend \$158.27 million on upgrading A2 series Bradley Fighting Vehicles to the A4 configuration in FY24.

### *Bradleys in Ukraine*

On January 5, 2023, the U.S. Department of Defense announced it would transfer Bradley Fighting Vehicles to Ukraine. The consignment initially consisted of 109 M2A2 Operation Desert Storm Bradleys and four M7 Bradley Fire Support Team vehicles, and later grew to about 190 Bradleys.

By January 2024, open-source intelligence confirmed 31 Bradleys had been destroyed in Ukraine, 23 damaged, 11 damaged and abandoned, and one captured. These losses represent approximately 35% of Ukrainian Bradleys.

### *Mk 38 Mod 3 Naval Application*

The U.S. Navy continues to procure the Mk 38 Mod 3 variant of the M242 Bushmaster for shipboard armament applications.

Despite current procurement requirements, the Forecast International Weapons Group believes that refurbishment of older M242 cannon is already supplanting recent levels of new production.

**M242 Bushmaster 25mm Cannon**

**Ten-Year Outlook**

<b>ESTIMATED CALENDAR YEAR UNIT PRODUCTION</b>												
<b>Designation or Program</b>		<b>High Confidence</b>				<b>Good Confidence</b>			<b>Speculative</b>			
	<b>Thru 2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>	<b>2033</b>	<b>Total</b>
<b>Northrop Grumman Defense Systems (Orbital ATK)</b>												
<b>M242</b>												
	12,086	12	12	10	10	10	11	11	11	11	12	110
<b>Total</b>	12,086	12	12	10	10	10	11	11	11	11	12	110