

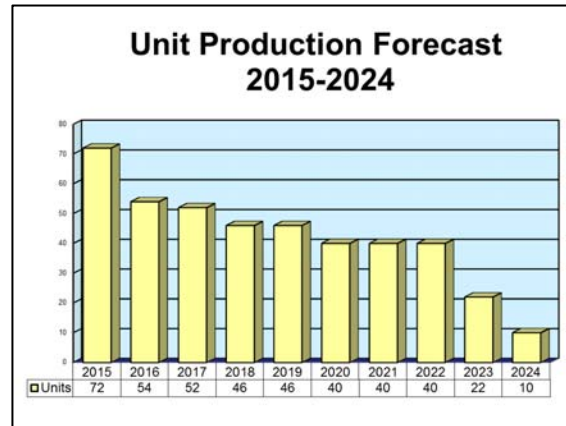
ARCHIVED REPORT

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GAU-19/A

Outlook

- GAU-19/A production continues on an as-needed basis, primarily for export
- The contractor maintains hopes for GAU-19/A integration with the V-22 Osprey and with whatever aircraft may ultimately fill the void left by the U.S. Army's canceled ARH program
- Production forecast reflects contractor's expectations for U.S. DoD procurement of the GAU-19/A



Orientation

Description. A Gatling-type machine gun.

Sponsor. The contractor funded the development and production of this weapon system as a private venture.

Licensees. None.

Status. Development through serial production on as-needed basis.

Total Produced. Through 2014, we estimate the contractor produced 496 GAU-19/A machine guns.

Application. A lightweight, rapid-firing, Gatling-type machine gun, compatible with a variety of aircraft and vehicular and naval platforms.

Price Range. In 2015 U.S. dollars, the GAU-19/A reportedly maintains a unit price of \$22,040, based on quantity purchases.

Contractors

Prime

General Dynamics Ordnance and Tactical Systems	http://www.gd-ots.com , 11399 16th Ct N Suite 200, St. Petersburg, FL 33716 United States, Tel: + 1 (727) 578-8100, Fax: + 1 (727) 578-8119, Email: mediacontact@gd-ots.com , Prime
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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

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Technical Data

Crew. Per platform application.

Muzzle Brake. None.

Recoil System. None.

Breech System. Gatling system.

Method of Operation. Gatling system.

Ammunition. The GAU-19/A fires the standard 12.7x99mm (.50-cal) heavy machine gun cartridge, available in the following ammunition types:

- M17 and M21 Tracer
- M20 High Explosive-Incendiary-Tracer (HE-I-T)
- M8 Armor Piercing Incendiary (API)
- M903 Saboted Light Armor Penetrator (SLAP)
- M948 Saboted Light Armor Penetrator-Tracer (SLAP-T)
- M2 and 33 Ball

Dimensions. The following data reflect the GAU-19/A machine gun in the three-barrel configuration. Different barrel lengths between 91.5 and 129.5 centimeters (36.02 and 50.98 in) are available per application/mission requirement.

	<u>SI Units</u>	<u>U.S. Units</u>
Caliber	12.7 mm	0.5 in (.50 cal)
Number of barrels	3	3
Length	1.18 m	3.87 ft
Width	20.32 cm	8.0 in
Weight	34.54 kg	76.0 lb

Performance. The muzzle velocity data reflect firing HE-I ammunition.

	<u>SI Units</u>	<u>U.S. Units</u>
Rate of fire (Selectable)	1,000/2,000 rpm	1,000/2,000 rpm
Muzzle velocity	884 mps	2,900 fps
Effective range	1,100 m	1,202.97 yd

The scheduled maintenance interval is 15,000 rounds. Reliability, expressed as mean time between failures, is approximately 100,000 rounds.

Power. The GAU-19/A can fire independently as a gas-operated weapon. In aircraft applications, engine bleed air can pneumatically operate the weapon. Alternatively, the GAU-19/A can integrate an electric drive or hydraulic drive.



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Source: GDATP

Variants/Upgrades

Variants. Generally not applicable. Some early versions of the weapon featured six barrels.

Modernization and Retrofit Overview. Not applicable. The contractor makes improvements available as production cut-ins.

Program Review

Background. In the 1940s, the U.S. Air Force and General Electric developed a modern Gatling weapon system under Project Vulcan to meet the need for a compact aircraft cannon capable of delivering very high rates of fire. Project Vulcan underwent its first test firing in 1953; the 20mm M61 Vulcan entered service on the F-104 Starfighter in 1956.

The .50-Caliber Gatling Gun

In the late 1970s, General Electric started the development of a new weapon to fill the gap between the successful 7.62x51mm NATO (.308 Winchester) GAU-2/A Minigun (also known as the M134 and other designations) and the 20mm M61 Vulcan. Development of a new Gatling-type weapon chambered for the 12.7x99mm (.50-cal) cartridge of the immortal Browning M2HB heavy machine gun ensued. While designed to be compatible with Saboted Light Armor Penetrator (SLAP) rounds, the GAU-19/A retains compatibility with all types of standard-issue .50-caliber ammunition. The worldwide availability of this ammunition makes the GAU-19/A all the more attractive in terms of marketability.

By the late 1980s, prototypes of the new system had undergone tests with various platform installations under the trade name GECAL 50. A short time later, General Electric accelerated development for the V-22 Osprey application, especially the U.S. Marine Corps MV-22. In 1992, the U.S. Department of Defense qualified the GECAL 50, type-classifying it as the GAU-19/A.

Corporate Evolution

In 1993, Martin Marietta acquired the Armament Systems Department of General Electric's Aerospace Division. Subsequently, Lockheed Corporation acquired Martin Marietta, the new organization becoming Lockheed Martin. In 1996, General Dynamics acquired the armaments business of Lockheed Martin, which became part of the General Dynamics Armament Systems Division.

In 2002, General Dynamics Armament and Technical Products assumed responsibility for the GAU-19/A. In 2013, General Dynamics consolidated the GDATP Charlotte operation under General Dynamics Ordnance and Tactical Systems.

General Dynamics has continued development of the GAU-19/A (mainly in relation to integration with new platforms), as well as marketing efforts.

Description. The GAU-19/A utilizes the Gatling mechanism, invented by Dr. Richard J. Gatling in 1861. In this mechanism, a number of barrels (clamped rigidly together) rotate as a unit to operate the weapon. Cam followers operate the bolt for each barrel in succession; chambering, firing, and extraction occur as the mechanism rotates.

A Member of the Gatling Family

The GAU-19/A shares this basic mechanism with several weapons, including:

- The 20mm M61 Vulcan
- The 25mm GAU-12/U Equalizer
- The 7.62x51mm NATO (.308 Winchester) GAU-2/A Minigun
- The 5.56x45mm NATO (.223 Remington) XM214 Minigun

The GAU-19/A can operate with linked or linkless ammunition by means of a delinking mechanism. When firing linked ammunition, a declutching feeder aids in clearing the GAU-19/A; with linkless ammunition, reversing the rotating barrel mechanism helps clear the weapon. The GAU-19/A also features a controlled-burst firing control, which allows for 10-round bursts of fire at the full cyclic rate.

Aircraft Applications. General Electric designed the GAU-19/A primarily as an aircraft armament system, particularly for rotary-wing aircraft (helicopters and the V-22 Osprey). For aircraft applications, the GAU-19/A is available in door-mounted, internally mounted, conformally mounted, or pod-mounted configurations. In terms of size and weight, the GAU-19/A offers greater firepower than other systems.

Other Applications. The GAU-19/A also has a wide variety of non-aircraft applications. The weapon can easily adapt to armored vehicle mounting. On a pintle or other type of mount, the GAU-19/A can serve as the primary weapon on a light wheeled or tracked vehicle, or as a secondary weapon on tanks or self-propelled

GAU-19/A

artillery systems. One promising application involves mounting the GAU-19/A on the HMMWV. For naval applications, the GAU-19/A can mount on patrol boats or other small craft as a primary armament, or on larger vessels as a close-in defensive weapon system.

Related News

Bell/Boeing Demonstrates Forward-Firing Capability on V-22 – Bell/Boeing recently conducted a successful demonstration of forward-firing capability for the V-22 Osprey at the United States Army Proving Ground in Yuma, Arizona.

"The forward-firing demonstration was a great success," said Vince Tobin, vice president and program manager for the V-22. "We've shown the V-22 can be armed with a variety of forward-facing munitions, and can hit their targets with a high degree of reliability."

Tobin said that integrating a forward-firing capability with the Osprey will increase its mission set. "These weapons, once installed, will provide added firepower and reduce reliance on Forward Arming and Refueling Points (FARPs) which are sometimes necessary to supply short-range attack rotorcraft in support of V-22 operations. Without the need for FARPs, V-22s can be launched more frequently, and on shorter notice."

Through the end of the third quarter of 2014, Bell/Boeing has delivered 242 MV-22 tiltrotor aircraft for the Marine Corps and 44 CV-22s for Air Force Special Operations Command (AFSOC). Bell Helicopter began design work on forward-fire capability in mid-2013. (Bell/Boeing, 12/14)

Tunisia Requests Black Hawks – Tunisia has requested the sale of 12 Sikorsky UH-60M Black Hawk helicopters, according to the U.S. Defense Security Cooperation Agency (DSCA).

The sale is estimated to be worth \$700 million and would also include 24 7.62mm M134 Miniguns, 24 .50-caliber GAU-19 Gatling guns, and 24 70mm Hydra-70 rocket pods, as well as the ability to integrate laser-guided variants of the rockets.

The Black Hawks would improve Tunisia's capability to deter regional threats and strengthen its homeland defense, as well as support counterterrorism operations.

The U.S. is the primary supplier of military equipment to the Tunisian military. Foreign Military Sales (FMS) activity to Tunisia has increased considerably in recent years and has largely consisted of spare and repair parts, primarily for aircraft and vehicles. (FI, 7/14)

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Funding

To date, the annual U.S. Department of Defense budget documents have not broken out GAU-19/A funding.

Contracts/Orders & Options

Since January 2001, the U.S. Department of Defense has apparently awarded only two contracts related to the GAU-19/A, as follows. No details of export contracts are available.

Date	Contractor	Amount	Description
2003/09/29	GDATP	\$6 million	34 GAU-19/As, one AC-47 system, and spare parts.
2011/04	GDATP	\$12.9 million	22 M61A2s; GAU-19/A spare parts.

On Apr 21, 2004, EDO Corporation (New York, NY) announced that it had received a development contract (of an unspecified amount) from GDATP to supply an electronic gun interface module for the GAU-19/A in the OH-58D Kiowa Warrior application.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1980s	Development and testing/integration
	1992	U.S. DoD qualifies and type-classifies GAU-19/A
	1993	Initial production award from unspecified export nation
Late	1999	U.S. approves arming Colombian UH-60 helicopters with GAU-19/A
	2015	Production on as-needed basis; development continues

Worldwide Distribution/Inventories

Export Potential. The export potential of the GAU-19/A for rotary-wing aircraft applications should be relatively healthy, given the advantages of this weapon over comparable systems.

Countries. **Colombia, Tunisia** (24 on order), **Turkey**. Also, at least two unidentified customers may have the GAU-19/A in their inventories.

Forecast Rationale

The GAU-19/A still has not made a significant impact on domestic U.S. procurement or the international market.

Still Looking to the MV-22 Osprey

The V-22 Osprey program still holds the greatest potential for the GAU-19/A weapon system. The U.S. Marine Corps maintains a revised procurement objective of 364 MV-22 aircraft. The U.S. Air Force maintains a procurement objective of 52 CV-22 aircraft. The U.S. Navy has tentative plans to acquire 48 MV-22s.

In October 2008, the U.S. Army officially canceled the ARH program, which held the potential for procuring at least 368 GAU-19/A weapon systems. Nevertheless, significant potential exists for the integration of the GAU-19/A with various aircraft. However, the high unit

price of the GAU-19/A (nearly twice that of the M2HB) will continue to limit its sales potential on the international market.

In July 2014, Tunisia requested 12 Sikorsky UH-60M Black Hawk helicopters, each armed with two M134 Miniguns, two GAU-19/As, and two Hydra-70 rocket pods.

Conservative Forecast

General Dynamics maintains hopes of securing U.S. Department of Defense procurement of the GAU-19/A for the CV-22 and MV-22 Osprey aircraft. The contractor also continues to pursue potential domestic and export sales for various aircraft applications. However, based on the program's record thus far, we continue to maintain a conservative forecast for the GAU-19/A weapon system.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
General Dynamics Ordnance and Tactical Systems												
GAU-19/A												
	496	72	54	52	46	46	40	40	40	22	10	422
Total	496	72	54	52	46	46	40	40	40	22	10	422