

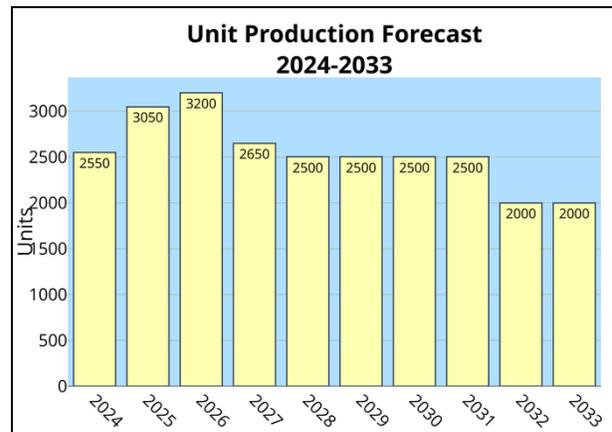
ARCHIVED REPORT

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Carl Gustaf M2/M3/M4 MAAWS

Outlook

- October 2014: Saab introduces Carl Gustaf MAAWS at the AUSA annual exhibition
- U.S. Army procurement of M3A1 MAAWS commenced in FY18; U.S. Marine Corps procurement commenced in FY19
- Major Polish order for at least 6,000 M4 launchers announced in March 2024
- Forecast reflects as-needed production of launchers only



Orientation

Description. A man-portable anti-armor and multipurpose weapon system.

Sponsor. The contractor initially pursued this program as a private venture. The Swedish Ministry of Defense, through the Swedish Army, sponsors the further development and Swedish Army procurement of this weapon system.

Status. Development through as-needed serial production.

Total Produced. Through 2021, we estimate the prime contractor and licensees produced at least 106,756 Carl Gustaf launchers.

Application. A reusable, man-portable anti-armor and multipurpose weapon.

Price Range. In 2022 U.S. dollars, the Carl Gustaf M2-550 launcher maintains a unit price of \$9,677.

Japan's license-produced Carl Gustaf M2 launcher continues to carry a unit price of \$11,636 for procurement by the Japan Ground Self-Defense Force (JGSDF).

The 751 (FFV 751) HEAT round carries a unit price of \$154.

The Carl Gustaf M3 launcher carries a unit price of \$23,225.

According to U.S. Department of Defense FY23 budget request documentation (April 2022), the M3A1 MAAWS carries an FY23 unit price of \$29,832 for U.S. Army procurement and \$37,707 for U.S. Marine Corps procurement.

Carl Gustaf M2/M3/M4 MAAWS**Contractors****Prime**

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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

Crew. Two (gunner and loader).

Breach Mechanism. Tilting ringbolt.

Recoil Mechanism. Recoilless, modified Burney.

Ammunition. The prime contractor currently offers the following 84mm ammunition types for the Carl Gustaf M2:

- FFV 441B High Explosive
- FFV 551 High Explosive Anti-Tank
- FFV 597 HEAT (132mm over caliber)
- FFV 751 HEAT (rocket-assisted tandem warhead)
- FFV 502 High Explosive Dual-Purpose
- FFV 469B Smoke
- FFV 545 Illumination
- FFV 552 Target Practice
- FFV 553B subcaliber training device

Dimensions. The weight data reflect the basic weapon with mount. The lightweight M3 version weighs 8 kilograms (17.6 lb). The projectile weight and cone standoff data reflect using the FFV 751 HEAT round, which weighs 3.2 kilograms (7.04 lb).

	<u>SI Units</u>	<u>U.S. Units</u>
Weapon length	1.13 m	3.71 ft
Weapon caliber	84 mm	3.31 in
Weapon weight	14.2 kg	31.24 lb
Projectile weight	3.8 kg	8.36 lb
Cone standoff	3.25 cal	3.25 cal

Performance. The performance data reflect the basic M2; data for the M2-550 are in parentheses where different. The armor perforation data reflect published contractor literature for the FFV 751 HEAT tandem round. The contractor claims the over-caliber 132mm FFV 597 HEAT round perforates 90 centimeters (35.43 in) of armor (composite) at 500 meters.

	<u>SI Units</u>	<u>U.S. Units</u>
Muzzle velocity	260 (350) mps	853.01 (1,148.29) fps
Effective range	475 (700) m	519.47 (765.53) yd
Altitude	Line of sight	Line of sight
Armor perforation	50+ cm	19.68+ in

Propulsion. A solid double-base propellant. The FFV 751 and 597 rounds are rocket-assisted, with the rocket motor igniting after the projectile exits the launcher.

Control & Guidance. The Carl Gustaf sights are bore-sighted to the launcher; the rifling in the launcher stabilizes the projectile.

The FFV 751, FFV 551, FFV 502, and FFV 597 rounds also feature several spring-loaded fins at the rear of the projectile, providing aerodynamic stabilization in flight.

Warhead. See the Ammunition section of this report (above) for a complete list of available warhead types.

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Variants/Upgrades

To date, the following models of the Carl Gustaf have emerged:

Designation	Description
M2	Basic Carl Gustaf weapon system; see Technical Data (above).
M2-550	Enhanced M2, with a modified support bracket and foregrip. Mounts FFV 555 electro-optic sight, an image intensification sight, or the Computerized Laser Sight. Saab Bofors Dynamics introduced the FFV 551 rocket-assisted projectile with this model.
M3-550	Lightweight (8-kg/17.6-lb) version; fires all available Carl Gustaf rounds. Entered serial production in 1985 for export.
Lightweight Recoilless Gun System	At the June 1985 Paris Air Show, (then) Boeing of Canada displayed its new Lightweight Recoilless Gun System. Using the proven Carl Gustaf line of ammunition, the LRGS featured an advanced carbon-fiber/epoxy composite launch tube. The launcher did not include a steel liner; steel sleeves provided the necessary strength and protection from erosion. The launcher weighed 5.8 kilograms (12.76 lb) with sight and firing mechanism. The LRGS appeared to have significant potential as a system in the light anti-tank weapon weight category, with the punch of a medium weapon. However, the program has been dormant since 1997, and we expect no further development.
AT4/Carl Gustaf	Saab Bofors Dynamics integrated the Carl Gustaf FFV 502 HEDP ammunition with its 84mm AT4 light anti-tank weapon. For further information on this variant, see the report "AT4/M136 and AT12T" in this service.

Modernization and Retrofit Overview. Not generally applicable, as the prime contractor usually integrates any product improvements as production cut-ins.

In support of the Carl Gustaf program, contractors have developed two optical sight options for the basic weapon system, as follows:

Computerized Laser Sight. Computing Devices Canada (Ottawa, Canada) – a component of General Dynamics (Falls Church, Virginia) – developed the CLS, which integrates an eyesafe laser rangefinder and

a third-generation image intensification sight with a ballistic computer that receives meteorological data along with input from a crossing rate sensor. The CLS greatly enhances first-round hit probability. Canada evaluated the new sight under operational conditions; the Canadian Army has procured it. Several other parties have reportedly expressed interest in the system.

NS-ZS 3.3x80 Night Sight. Photonic Optische Geräte GmbH (Vienna, Austria) developed the NS-ZS 3.3x80 night sight, which can also integrate a laser rangefinder. In 1998, Denmark selected this sight for its Carl Gustaf weapons.



84mm Carl Gustaf Fire Team in Action

Source: Saab Bofors Dynamics

Carl Gustaf M2/M3/M4 MAAWS

Program Review

Background. In the early 1940s, Hugo Abramson (an engineer) and Harold Jentzen (an artillery officer) began development of a new recoilless rifle, ostensibly based on the newly introduced German recoilless technology. The two Swedes fabricated the first Carl Gustaf weapon in 1946 to meet a Swedish Army requirement. Following extensive operational testing, the Swedish Army officially adopted the Carl Gustaf M1 in 1949.

Corporate Evolution

The state-owned Gevärsmuseet organization ran the first serial production line; the program was subsequently transferred to Forenade Fabriksverken, which manufactured the 84mm ammunition for the weapon. Deliveries of the original FFV 550 Carl Gustaf weapons to the Swedish Army commenced in 1950. Saab Dynamics now acts as the prime contractor for the Carl Gustaf program.

Keeping Current

The Carl Gustaf has proven to be one of the most popular and efficient anti-tank weapons available on the international market. The prime contractor has continually modified the weapon design and supplied enhanced projectiles to keep the Carl Gustaf abreast of the latest tank technology. In addition, new design projectiles have made the Carl Gustaf a true multipurpose weapon suitable for use against fortifications as well as for laying smoke and providing battlefield illumination.

Description. The basic Carl Gustaf weapon is a man-portable, shoulder-fired recoilless rifle. While one man can operate the weapon, two men normally compose the crew.

Simple and Effective

The trigger mechanism, which employs lateral percussion for ignition, mounts on the bottom right-front of the launch tube. The M2 version features a standard telescopic sight with a two-power magnification, in addition to open sights. A 3- to 12-power sight is available as an option. The launcher also features a bipod for support during firing.

The 84mm ammunition features a light alloy cartridge case with a plastic blow-out base.

Production Models

The prime contractor has enhanced the marketability of the Carl Gustaf by developing several production models.

M2. The basic Carl Gustaf weapon (see above).

M2-550. This enhanced version features a modified support bracket and foregrip to accommodate the FFV 555 electro-optic sight. This sight, weighing 3.4 kilograms (7.48 lb), greatly enhances the target acquisition process by automatically calculating the target range. An image intensification sight is available for night use. In addition, the M2-550 can mount the Computerized Laser Sight (see Modernization and Retrofit Overview, above).

The prime contractor also introduced the FFV 551 rocket-assisted projectile with this model. The projectile fires in the normal manner. At about 18 meters (59 ft) in front of the launcher, the rocket ignites, accelerating the projectile's speed from 260 meters per second to 350 meters per second. The FFV 551 features a range over 200 meters (218.7 yd) greater than that of the earlier FFV 65 round. Six spring-loaded fins stabilize the FFV 551 projectile in flight, enhancing the terminal effect of the HEAT warhead.

M3-550. At the 1983 Paris Air Show, (then) Forenade Fabriksverken revealed a new, lighter version of the Carl Gustaf. This model weighs only 8 kilograms (17.6 lb) without the electro-optic sight – much lighter than the 14.2-kilogram base weight of the earlier model. The M3-550 entered serial production in 1985 for export. The M3-550 fires all types of Carl Gustaf ammunition, including the potent FFV 751 round.

AT4/Carl Gustaf. Saab Bofors Dynamics integrated the Carl Gustaf FFV 502 HEDP ammunition in its 84mm AT4 light anti-tank weapon. For further information on this variant, see the "AT4/M136 and AT12T" report in this service.

Munition Development

FFV 597 Over-Caliber Round. In the mid-1980s, Forenade Fabriksverken announced the introduction of the 132mm FFV 597 over-caliber round for the Carl Gustaf. This round featured a separate 132mm warhead sticking out in front of the weapon and a breech-loaded propelling cartridge. The two components joined inside the barrel via a connecting device.

The FFV 597 reportedly offered considerably enhanced armor perforation. The contractor claimed 90-centimeter (35.4-in) perforation at "normal" ranges, based on testing against composite and stratified armor. While such performance would be sufficient to defeat the base glacis armor of any known tank, it would still be ineffective against explosive reactive armor.

Unspecified technical issues with this round apparently prompted the contractor to cease marketing the FFV 597

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in the early 1990s. The contractor subsequently withdrew the FFV 597 from the market.

FFV 751 Tandem Warhead. The contractor developed this new tandem warhead-type round specifically to deal with the explosive reactive armor technology of tanks such as the T-72 and T-80. The FFV 751 is rocket-assisted and fin-stabilized. The contractor claims a minimum 50-centimeter (19.7-in) armor perforation performance with this warhead, which features piezoelectric fuzing for all-aspect performance. A bush fuze allows the munition to penetrate bushes or scrub without initiation.

M3A1 MAAWS. The U.S. Army Special Forces Command (ARSOF) originally sponsored the development and fielding of the Multirole Anti-Armor Anti-Personnel Weapons System (MAAWS) package for use by the U.S. Special Operations community and the 75th Ranger Regiment (Airborne). MAAWS consists of the standard M3 Carl Gustaf and a family of advanced 84mm ammunition types, including:

- An anti-tank (AT) round with a maximum effective range of 700 meters (765.5 yd)
- A high-explosive (HE) round with a maximum effective range of 1,300 meters (1,421.2 yd)
- A smoke round
- An illumination round

- An area-deterrent round
- A confined space (CS) round

The prime contractor is also developing a new anti-structures munition for the MAAWS family of munitions.

The MAAWS package features the Picatinny Fire Control Device. This component allows the

operator to choose from three range settings to compensate for differences in trajectory between the various MAAWS rounds.

The 75th Ranger Regiment (Airborne) reportedly began employing the MAAWS package in 1990. ARSOF fielding of MAAWS was originally to have been completed by the end of 2005. The U.S. Department of Defense continues procurement of MAAWS launch tubes and munitions to support Army-wide inventory objectives for war reserves and training.

Training Devices. Two subcaliber training systems are available for the Carl Gustaf:

- The FFV 219 fires a 9x19mm round, emulating the ballistics of the FFV 65 round.
- The FFV 553B uses a 7.62x51mm round; it is also suitable for use as a spotting round for another weapon.



84mm M3A1 MAAWS

Source: U.S. Army

Carl Gustaf M2/M3/M4 MAAWS

Funding

The Swedish Ministry of Defense funds the development and Swedish Army procurement of the Carl Gustaf, with input from the contractor.

The following table reflects U.S. Department of Defense FY23 budget request documentation (April 2022) for U.S. Army and U.S. Marine Corps procurement of the M3A1 MAAWS launcher system. All amounts are in millions of U.S. dollars.

		U.S. FUNDING					
		FY19	FY19	FY20	FY20	FY21	FY21
		<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
M3A1 MAAWS Procurement							
U.S. Army		300	19.9	254	19.2	214	19.8
U.S. Marine Corps		215	13.6	336	21.9	288	21.9
		515	33.5	590	41.1	502	41.7
		FY22	FY22	FY23	FY23	FY24	FY24
		<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
M3A1 MAAWS Procurement							
U.S. Army		330	26.2	315	22.5	-	-
U.S. Marine Corps		298	20.5	277	21.4	-	-
		628	46.7	592	43.9	-	-
		FY25	FY25	FY26	FY26	FY27	FY27
		<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
M3A1 MAAWS Procurement							
U.S. Army		-	-	-	-	-	-
U.S. Marine Corps		-	-	-	-	-	-
		-	-	-	-	-	-

Worldwide Distribution/Inventories

Export Potential. Saab Bofors Dynamics, the Carl Gustaf prime contractor since it acquired the Forenade Fabriksverken firm, continues to buck the trend of recoilless rifle-type anti-armor weapons by producing not only a recoilless rifle but a man-portable one as well. The key to this success is the continuous development of the ammunition to address the latest threat. The Carl Gustaf enjoys a well-established customer base around the world. At least 36 nations maintain this weapon in inventory.

Countries. The following countries use the Carl Gustaf: **Australia, Austria, Belize, Botswana, Cambodia, Canada, Denmark, Dubai, Estonia, Germany, Ghana, Greece, India** (licensed production), **Ireland, Israel, Italy, Japan** (licensed production), **Kenya, Latvia, Lithuania, Malaysia, Myanmar**, the **Netherlands, New Zealand, Nigeria, Norway, Poland, Portugal, Sierra Leone, Singapore, Sweden**, the **United Arab Emirates**, the **United Kingdom**, the **United States, Venezuela**, and **Zambia**. This list is not all-inclusive.

Forecast Rationale

The 84mm Carl Gustaf recoilless rifle continues to hold its own in an international market increasingly dominated by disposable man-portable rocket launchers.

The weapon system boasts a proven combat record, including service with Canadian troops in the Tora Bora region of Afghanistan. The Carl Gustaf has proven to be effective against troops, field fortifications, light armored vehicles, and even tanks.

Saab Dynamics maintains the marketability of the Carl Gustaf through the development of new rounds. These new rounds should enable the Carl Gustaf to maintain its combat effectiveness throughout the next decade.

In October 2014, Saab introduced the Carl Gustaf M3A1 MAAWS. This variant weighs approximately 15 pounds, offering a significant weight savings to the

Carl Gustaf M2/M3/M4 MAAWS

soldier. It is also reportedly compatible with intelligent sighting systems for programmable ammunition.

Launcher Production Surge

The Forecast International Weapons Group expects the near-term production surge to continue, reflecting new U.S. Department of Defense procurement and the resumption of Japanese licensed production for the Japan Ground Self-Defense Force (JGSDF).

In 2012, the U.S. Department of Defense procured additional Carl Gustaf M3 launchers and ammunition for \$56.8 million. This procurement was not only for the U.S. Special Operations Command but, more significantly, for the U.S. Army as well. In FY18, the

U.S. Army commenced serial procurement of the M3A1 MAAWS. U.S. Marine Corps procurement commenced during FY19.

The ongoing war in Ukraine, in particular, has revitalized interest in the Carl Gustaf, which is being procured in the M4 variant. Sweden inked a SEK3 billion deal with Saab in May 2023 for the delivery of an unknown number of launchers through 2030. The following year, in March 2024, Saab announced a major contract (SEK12.9 billion) to supply thousands of launchers to Poland through 2027. That same month, the company also began work on a new production line in India.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Saab Dynamics												
Carl Gustaf												
	77,245	2,550	3,050	3,200	2,650	2,500	2,500	2,500	2,500	2,000	2,000	25,450
Total	77,245	2,550	3,050	3,200	2,650	2,500	2,500	2,500	2,500	2,000	2,000	25,450