



# ARES

## The Russian GM-94 Grenade Launcher

Maxim Popenker with N.R. Jenzen-Jones

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- A**VOID the area
- R**ECORD all relevant information
- M**ARK the area to warn others
- S**EEK assistance from the relevant authorities

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# ABBREVIATIONS AND ACRONYMS

<b>AGL</b>	Automatic grenade launcher
<b>GM-94</b>	<i>Granatomet Magazinnyy obraztsa 1994</i> (Гранатомет Магази́нный; magazine-fed grenade launcher, model of 1994) [Russian]
<b>HE</b>	High explosive
<b>HE-FRAG</b>	High explosive fragmentation
<b>HEAT</b>	High explosive anti-tank
<b>HEDP</b>	High explosive dual-purpose (both anti-tank and anti-personnel)
<b>KBP</b>	<i>Konstruktorskoye Byuro Priborostroyeniya</i> (Конструкторское Бюро Приборостроения; 'Instrument Design Bureau') [Russian]
<b>LPO-97</b>	<i>Legkiy Pekhotnyy Ognemet obraztsa 1997</i> (Легкий Пехотный Огнемёт; 'light infantry flamethrower, model of 1997') [Russian]
<b>MVD</b>	<i>Ministerstvo Vnutrennikh Del</i> (Министерство Внутренних Дел; 'Ministry of Internal Affairs') [Russian]
<b>RHA</b>	Rolled homogeneous armour
<b>RHBZ</b>	<i>Radiatsionnaya, Khimicheskaya i Biologicheskaya Zashchita</i> ('Radiological, Chemical and Biological Defence; Радиационная, Химическая и Биологическая Защита) [Russian]



# INTRODUCTION

The Russian GM-94 (*Granatomet Magazinnyy*; Гранатомет магазинный; 'magazine-fed grenade launcher') grenade launcher is a specialised pump-action grenade launcher chambered for a proprietary 43 x 30 mm cartridge and frequently used to fire thermobaric projectiles. Originally intended for law enforcement (LE) use against heavily armed criminals and non-state combatants operating in urban environments, it later evolved into a more versatile weapon which is currently in service with Russian LE and military units, and is offered for export.

## DEVELOPMENT HISTORY

Development of the GM-94 grenade launcher began in 1993, under the guidance of Vasilij Gryazev, chief designer of the Instrument Design Bureau (*Konstruktorskoye Byuro Priborostroyeniya*; Конструкторское Бюро Приборостроения; КБП), in Tula, Russia. Prior to producing the GM-94, KBP was independently developing a new 43 x 30 mm thermobaric projectile for urban combat. The driving design concept for this new cartridge was to achieve a limited lethal radius, which would limit collateral damage and allow the user to fire such rounds at almost point-blank ranges<sup>1</sup>.

This new 43 mm round was designed to achieve its kill effect only by the detonation of the thermobaric<sup>2</sup> payload, with a polymer projectile body resulting in almost no appreciable fragments. The warhead, also constructed of polymer, features a point-detonating fuse. The plastic rimless case is 30mm long, with steel insert at the base which contains a high-pressure chamber with propellant charge and a primer.

Photo 01



Four VGM93 thermobaric rounds. Note the 43 x 30 mm cartridge case, separated from one of the projectiles.

Photo credit: 'RUBLEW' (guns.allzip.org user).

Photo 02



A Russian Soldier preparing to fire the GM-94 grenade launcher.

Photo credit: KBP

Existing lethal projectiles for 40 mm grenade launchers are typically of the high explosive (HE), high explosive fragmentation (HE-FRAG), or high explosive dual-purpose (HEDP) type, which achieve their antipersonnel effects primarily through fragmentation of the munition body. Whilst the lethal radius for most 40 mm low velocity grenades is between 5 and 10 meters, their fragments still can cause significant wounds

Later, a top-folding stock design was developed, and this is now standard on most production models.

Sometime around 1998, the Russian Ministry of Internal Affairs (MVD) issued a formal requirement for a 43 mm CQB grenade launcher, firing both 'lethal' (thermobaric) and less-lethal (tear gas and kinetic impact)

Photo 03



A prototype GM-93 grenade launcher.  
Photo credit: KBP

Photo 04



A GM-94 grenade launcher with fixed shoulder stock.  
Photo credit: KBP

at longer ranges (DoD, 2008; Kintex, n.d.a, n.d.b; US Army, 2003). For example, US Army manuals indicate that conventional HE (M406) and HEDP (M433) cartridges should not be used within 130m of friendly troops. By comparison, the VGM93 ammunition fired by the GM-94 has a safety range of just 10m (KBP, 2013a; US Army, 2003).

Once the design of the 43 mm VGM93 round had been finalised, KBP rapidly developed a prototype multi-shot grenade launcher, based on their own RMB-93 12 gauge combat shotgun, scaled up for a larger cartridge (KBP, 2007a; KBP, 2013b). The early prototype 43 mm grenade launcher, known internally as the GM-93, featured a fixed shoulder stock<sup>3</sup>. The earliest production model made use of the 'skeleton' type fixed stock used with the VSK-94 (KBP, 2007a). The same fixed skeletonized stock also appears on some LPO-97 launchers in service with the Russian army.

projectiles<sup>4</sup>. The Russian Army also showed interest in the design and, after extensive trials held in 2002-2004, the new grenade launcher and its ammunition were adopted by both the MVD and the Army (KBP, 2007a). The Russian military is known to favour so-called 'flame weapons', including incendiary, thermobaric, and fuel-air explosive weapons. In late 2014, Major General Eduard Cherkasov commander of Russia's Radiological, Chemical and Biological Defense (RHBZ; anglicised to 'RChBD') troops, announced a focus on 'flame weapons', and described a programme of modernisation and development. Arms and munitions using these principles are more prominent within Russian military service than in NATO and allied nations (Jenzen-Jones, 2014b).

# GM-94 CHARACTERISTICS

The GM-94 is a manually-operated (pump-action), hand-held, magazine-fed weapon. It feeds from an integrated tubular magazine, located above the rifled barrel. The magazine contains three rounds and can be reloaded through the top-opening loading door above the receiver.

The receiver is made from stamped steel, with a fixed, machined steel breechblock. Reloading is achieved by sliding the barrel forward to open the breech, then rearwards until it is locked to the receiver. Fired cartridge cases are ejected downwards, allowing the GM-94 to be fired from either shoulder.

Photo 05



A GM-94 launcher with the barrel in the forward position for loading.

Photo credit: 'Karden'

Photo 06



A GM-94 launcher with open loading door, showing the tubular magazine.

Photo credit: 'Karden'

Photo 07



A GM-94 tubular magazine loaded with cartridges.

Photo credit: 'Karden'



The trigger mechanism of the GM-94 is of double-action only (DAO) type and features an internal hammer. An ambidextrous manual safety is provided in the form of a lever located above the pistol grip.

Starting with the empty barrel locked back, the loading sequence is as follows:

- Load magazine through the loading gate at top of receiver;
- Open breech by sliding barrel forward via polymer fore-end;
- Once the barrel is in the forwardmost position, a cartridge will be dropped from the magazine and loaded into the T-slot in the stationary breech face;
- Close the breech by sliding the barrel back until it is locked to the receiver by two locking hooks, located at either side of the breech.

The weapon is now loaded and will fire when the safety is disengaged and the trigger pulled. After discharge, the sequence above can be repeated, with spent case being automatically ejected down from the grip.

The GM-94 features a folding ladder-type rear sight and a blade-type fixed front sight. The rear sight is marked for ranges between 50 and 300 metres in 50-metre increments. The top-folding shoulder stock can serve as a carrying handle when folded.

The GM-94 can be fired with the shoulder stock folded, but it is likely that this would only be of use in emergencies; when folded, the stock covers the sights of the weapon.

Photo 08



A GM-94 launcher with the barrel in the forward position. Note the stationary breech and barrel locking clamps.

Photo credit: Karden

Photo 09



A cartridge held at the stationary breech of the GM-94, ready to be chambered by sliding the barrel rearwards.

Photo credit: Karden

## Markings

Manufacturer markings on the GM-94 are typically located on the left side of the receiver and consist of a model name ('ГМ-94'), serial number, and the last two digits of the year of manufacture, stamped in one line. See Photo 10 below for an example.

Photo 10



A GM-94 grenade launcher displayed at MAKS-2009, showing visible markings on the left side of the receiver.

Photo credit: Vitaly V. Kuzmin.

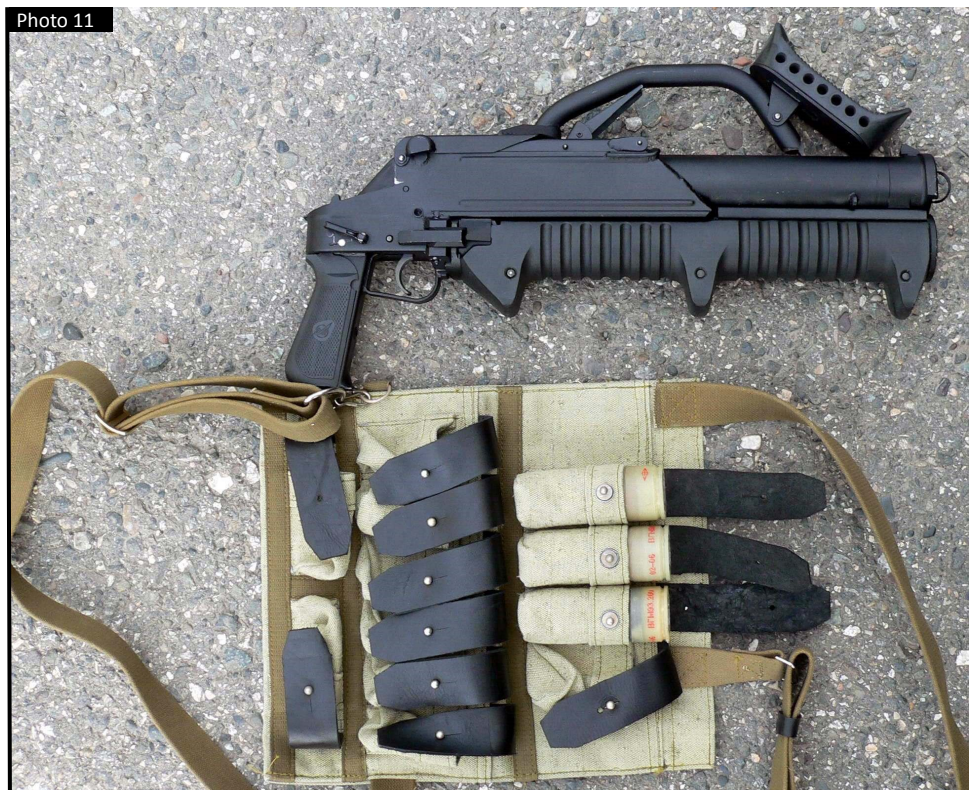


## Accessories

The GM-94 grenade launcher is issued with an operations manual, a cleaning kit, and a canvas chest rig with 12 individual pockets, each intended to hold one cartridge (see photo 11). There are also companies manufacturing aftermarket accessories for the GM-94, including carrying cases and backpacks designed to carry the grenade launcher and numerous rounds of ammunition (ALLMULTICAM, n.d.). Several examples of the GM-94 have been observed fitted with EOTech type holographic weapon sights (see, for example, Jenzen-Jones, 2014a).

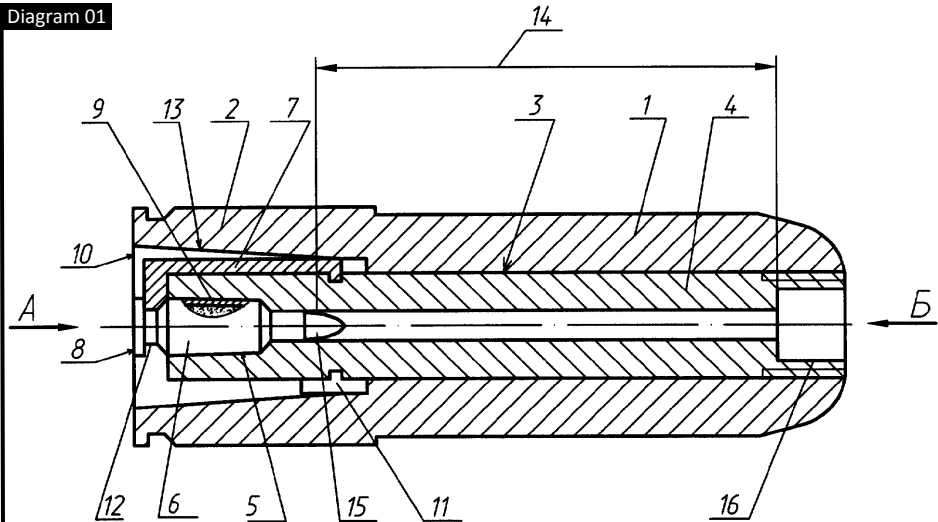
and accepts a standard 7.62 x 39 mm tracer cartridge with T-45 bullet, which has a ballistic trajectory comparable to the VGM93.100 thermobaric cartridge thanks to a short barrel built into the device (see diagram 01) (Abramov et al., 2002). After firing, the PUS device is ejected from the gun in the same manner as a standard fired cartridge case. It can then be reused once the empty 7.62 x 39 mm case is removed and replaced with a fresh round. The simulator is compatible with the standard GM-94 grenade launcher (KBP, 2013a).

KBP also produce the PUS training simulator, which is shaped like a live 43 x 30 mm cartridge,



The GM-94 and issued chest rig, featuring pouches for 12 rounds of ammunition.  
Photo credit: Karden

Diagram 01



A schematic drawing of the PUS training simulator, showing the 7.62 x 39 mm tracer round.

Diagram credit: Abramov et al.

## Table 1: GM-94 Technical Specifications

<b>Type</b>	Grenade launcher
<b>Operation</b>	Manually-operated (pump action, forward-sliding barrel)
<b>Calibre</b>	43 x 30 mm (VGM93)
<b>Weight (unloaded)</b>	5.0 kg <sup>6</sup>
<b>Length</b>	820 mm with stock unfolded 545 mm with stock folded
<b>Range</b>	300 m (point targets) 800 m (maximum)
<b>Sights</b>	Iron sights (ladder type with 50-300m marked in 50m increments)
<b>Feed device &amp; capacity</b>	3-round integral tubular magazine (+1 in the chamber)
<b>Projectile Velocity</b>	85 m/s

Photo 12



The PUS training simulator  
Photo credit: KBP Tula

# VGM AMMUNITION

The VGM93<sup>7</sup> series 43 x 30 mm cartridge consists of a 30mm long rimless cylindrical polymer case and a projectile, also constructed with minimal metal content. The cartridge uses a 'high-low' pressure system, in which the gas produced upon firing expands into empty space in the case before propelling the projectile up the barrel of the weapon. This has the effect of reducing the peak pressure of firing, making the round suitable for use in light, shoulder-fired grenade launchers (Williams, 2008). The base of the case contains a steel insert with the high pressure chamber, which holds the propellant charge and a primer. The low pressure chamber

is formed by the plastic case and the base of the projectile (see photo 13). Cartridge cases are non-reloadable.

The nominal muzzle velocity of the VGM93.100 thermobaric projectile is 85 metres per second. Each complete round weighs about 350 g, with a projectile weight of approximately 250 g. The various projectile types are all of similar external design, with round-nosed polymer shells and integral polymer driving bands toward the base.

Photo 13



A fired VGM93.700 training round, with the 43 x 30 mm cartridge case at the right.

*Photo credit: 'Maradona' (forums.guns.ru user)*

Photo 14



A VGM93.700 training round with inert projectile.

*Photo credit: Maxim Popenker*



# Cartridge types

Several VGM93 cartridges are available, as follows:

**VGM93.100** – Thermobaric (FAE) round, containing some 160 g of explosive filling. The impact fuze arms approximately 3 metres from the muzzle. The lethal blast radius is 3 metres, and the minimum safe distance from the impact point is approximately 10 metres.<sup>8</sup> Upon impact, this round can penetrate up to 8 mm of mild steel or interior wall with its blast, while producing almost no primary fragments.

**VGM93.200** – less-lethal round loaded with CS agent. Can incapacitate unprotected personnel within an area up to 100 m<sup>2</sup> from the point of impact.

**VGM93.300** – smoke round.

**VGM93.400** – less-lethal flash-bang round.

**VGM93.500** – less-lethal aerosol round

**VGM93.600** – less-lethal round with kinetic impact projectile

**VGM93.700** – training round with inert projectile

**VGM93.800** – manipulation/drill round with inert projectile and no propellant

**VGM93.900** – High explosive fragmentation (HE-FRAG) round

Photo 15



The range of available VGM93 cartridges produced by KBP Tula.

Photo credit: KBP Tula

## Markings

The VGM93 cartridges are marked on both the cartridge case and the projectile. The marking format is as follows: cartridge type code (e.g. 'VGM93.100'), factory code or symbol, lot number, and the last two digits of the year of manufacture in one line, on the side of the cartridge

case. The projectile will be marked with a factory code or symbol on one line, with a lot number and the last two digits of the year of manufacture below (see photo 14). No headstamp is present.

# GLOBAL DISPERSION AND EMPLOYMENT

In Russian military service the GM-94 is designated the 'LPO-97' (*Legkiy Pekhotnyy Ognemet*; Легкий Пехотный Огнемёт; 'light infantry flamethrower'). The LPO-97 is formally classified as a flamethrower because the Russian army considers most hand-held thermobaric weapons to be 'flame weapons', despite the fact that thermobaric munitions, including the VGM93.100 projectile, primarily achieve lethality through blast. In law enforcement use the weapon retains the designation 'GM-94'.

Initially, GM-94 launchers were issued to specialised tactical units of the Russian MVD, such as SOBR (СОБР; Специальный отряд быстрого реагирования; Special Rapid Reaction Unit). These weapons are assigned to specific operators who qualify with them, and are deployed during missions where high intensity, short-range engagements are a possibility. Originally, LPO-97 grenade launchers were issued to RHBZ units, which then temporarily assign appropriately armed personnel to infantry and other units as required. However, in 2012 the

Russian army issued a tender for 50 LPO-97 grenade launchers and 2,500 rounds of VGM93 ammunition for issue to the 45<sup>th</sup> Detached Reconnaissance Regiment (airborne) (Zakupki.gov.ru, n.d.). The GM-94 has seen regular use in engagements targeting pro-Chechen militants, including during high-profile operations in the Caucasus city of Nalchik, in 2005. Russian military forces employed the GM-94 during a successful operation to free two hostages held by pro-Chechen militants in Nalchik, in October 2005 (BBC, 2005).

Photo 16



A Russian soldier prepares to fire a GM-94 into an open window in the Caucasus city of Nalchik.  
Photo credit: AFP

The GM-94 is known to have been exported to Kazakhstan, where it is in service with the Kazakhstani paramilitary police tactical unit *Sunkar* ('Hawk') (Ryan, 2009). It has also been documented in the hands of non-state combatants in Libya during the overthrow of the Gaddafi regime in 2011. Photo 17 shows a Libyan rebel holding the weapon aloft. Finally, the GM-

94 grenade launcher was also observed in use during the Russian seizure of the Crimean peninsula. At least two examples were documented, including one weapon fitted with an EOTech type holographic weapon sight (Jenzen-Jones, 2014). Photo 18 shows unidentified combatants (likely Russian military) armed with two GM-94 grenade launchers.

Photo 17



A GM-94 is raised in the air by a Libyan rebel fighter, celebrating a victory in Tripoli in August 2011.

Photo credit: Sergey Ponomarev/AP

Photo 18



Combatants wearing civilian clothing, suspected to be Russian forces, with two GM-94 launchers. Crimea, February 2014.

Photo credit: Unknown

# NOTES

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<sup>1</sup>Source: private correspondence with author.

<sup>2</sup>Note that whilst many western specialists consider FAE and thermobaric weapons to be different in operating principle, Russian sources typically use the terms synonymously.

<sup>3</sup>Source: private correspondence with author.

<sup>4</sup>Source: private correspondence with author.

<sup>5</sup>Pseudonym used for confidentiality and security purposes.

<sup>6</sup>Note that a KBP promotional video and some other sources list the weight as 4.8 kg.

<sup>7</sup>Note that this is often written as 'VGM-93'; the dash can be included or omitted, even in official nomenclature.

<sup>8</sup>In practice, some sources advised the authors this safety range could be reduced to 5 metres if the operators are using body armour, eye protection, and hearing protection.

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