

MODERN FIREARMS

Series



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SR-3 / SR-3M "Vikhr" compact assault rifle (Russia)

	SR-3	SR-3M
Caliber:	9x39 SP-5, SP-6	
Action	Gas operated, rotating bolt	
Overall length (butt folded / open)	396 / 640 mm	410 / 675 mm 700 / 970 mm with silencer
Barrel length	156 mm	156 mm
Weight:	2.0 kg less magazine	2.2 kg less magazine 3.2 kg with empty 30-rd magazine and silencer
Rate of fire	900 rounds per minute	900 rounds per minute
Magazine capacity	10 or 20 rounds	10, 20 or 30 rounds

The SR-3 "Vikhr" ("Whirlwind") compact assault rifle was developed in TSNIITOCHMASH by A. Borisov and V. Levchenko during early 1990s. Initially known as "MA" (*Malogabaritnyj Avtomat* = small-size assault rifle), it was based on the silenced 9 mm AS "Val" assault rifle, and intended for concealed carry by special VIP protection teams and State security operatives. The SR-3 is widely used by various FSO (Federal Protection Service, a VIP protection organization, which guards the President and the government of the Russian Federation) and FSB (Federal Security Service) operatives, elite Russian counter-terror teams and other specialized users in the MVD and Russian police. In terms of size and weight, the SR-3 is similar to many submachine guns, but it fires much more powerful 9x39mm ammunition, available in armor piercing (SP-6) and ball (SP-5) loadings. Thus, SR-3 is considered to be an assault rifle rather than a submachine gun.



SR-3 Vikhr compact assault rifle, shoulder stock folded

Following the demand from users, the TSNIITOCHMASH recently developed an improved version of the SR-3, with intent to produce a more versatile weapon for Law Enforcement use. The new SR-3M (Modified) compact assault rifle features more convenient fire controls and charging handle, integral forward grip (folding), and, most important, specially developed quick-detachable silencer (sound moderator) and a standard side rail for mounting day or night optics on the left side of the receiver. Another useful accessory for the SR-3M is a new magazine with enlarged capacity (30 rounds), which also provides more reliable feeding during automatic fire.



SR-3 Vikhr compact assault rifle, shoulder stock extended

The SR-3 features the receiver, machined from a bar of steel, and gas-operated action with long stroke piston, plus the same rotating bolt group from the AS. However, the SR-3 has no integral silencer, nor provision to mount one, and thus is much shorter than the AS. Other changes included a more compact, top-folding butt and simplified flip-up rear sight. The redesigned charging handle, made in the form of dual sliders above the forearm, must be grasped by thumb and index finger and then retracted to load the weapon. The trigger unit is generally the same as in the AS, but the AK-type safety is replaced by ambidextrous lever above the pistol grip. The fire mode selector is of cross-bolt, push button type and located behind the trigger, inside the trigger guard. SR-3 uses same polymer magazines for 10 or 20 rounds, as the parent AS and VSS rifles. Open sights consist of a protected front post and a flip-up rear sight with U-notch, with settings for 100 and 200 meters range. The SR-3M differs by having AS-style controls (safety lever, semi / auto selector switch inside the trigger guard, charging handle), improved polymer furniture, AS-style side-folding shoulder stock, quick-detach mount for proprietary silencer at the muzzle, and a side-rail for mounting of various optical equipment (Red-dot or telescope day sights, night sights)



SR-3M Vikhr compact assault rifle, early model, with 'old pattern' 20-round magazine; shoulder stock and forward grip extended



SR-3M Vikhr compact assault rifle, current issue model, with 'old pattern' 20-round magazine, quick-mounted silencer and telescope sight



SR-3M Vikhr compact assault rifle, current issue model, with 'new pattern' 30-round magazine

Korobov TKB-408 assault rifle (USSR)

Caliber: 7.62x39mm M43

Action: Gas operated, tilting bolt

Overall length: 790 mm

Barrel length: n/a

Weight: 4.3 kg

Rate of fire: n/a

Magazine capacity: 30 rounds

The TKB-408 assault rifle has been developed by designer German A. Korobov by 1946. This weapon has been designed in Tula, for 1946 Soviet Army trials for a new assault rifle. Usually claimed as a first military-type automatic rifle of bullpup configuration, this weapon, in fact, has been preceded by several designs that appeared during the WW2 in Great Britain and USSR (i.e. Korovin 7.62mm experimental assault rifle of 1945). This weapon was tested by Soviet Army commission in 1946-47, but was found unsatisfactory; eventually, trials were won by Kalashnikov AK rifle.



Korobov TKB-408 assault rifle

TKB-408 is gas operated, locked breech weapon that uses vertically tilting bolt to lock the barrel. Cocking handle is located at the left side of the weapon, above the wooden handguard; it does not reciprocate when gun is fired. Gun fired in full automatic mode and in single shots. Firing mode selector is located at the left side of receiver, above pistol grip. Separate safety switch is located within the triggerguard, in front of the trigger. Ejection port is located at the right side of weapon, above the magazine, and has flip-down dust cover. There were no provisions for firing from the left shoulder. TKB-408 used proprietary magazines, made from sheet steel. each magazine held 30 rounds and had a forward projection that entered the magazine lock, located at the bottom of pistol grip. Weapon was mostly made of stamped steel, with wooden buttstock and handguard.

Korobov TKB-517 assault rifle (USSR)

Caliber: 7.62x39mm M43

Action: Delayed blowback

Overall length: mm

Barrel length: mm

Weight: kg

Rate of fire: rounds per minute

Magazine capacity: 30 rounds

German A. Korobov, Russian gun designer from Tula, began the development of assault rifles soon after the World War Two, when he designed the TKB-408 bullpup rifle for 1946-47 Soviet Army trials. Despite the failure of TKB-408, Korobov continued the development of various assault rifles, both in bullpup and traditional configurations. During late 1940s, he tried gas delayed blowback action in his series of TKB-454 experimental assault rifles, all chambered for standard issue 7.62x39 ammunition. While these rifles displayed some good results in accuracy department, these also showed insufficient reliability. By the 1952, Korobov switched to the Kiraly-type retarded blowback action, with the two-part bolt that uses braking action of the lever, interposed between bolt parts and receiver. This action allowed for significant increase of accuracy, as well as simplification of design and production, compared to then-standard Kalashnikov AK assault rifles.



Korobov TKB-517 assault rifle. The small "tube" above the barrel is a cleaning rod.

During mid-1950s, Soviet Army initiates new trials for improved assault rifle design in the same 7.62x39 M43 caliber. Korobov submits his improved TKB-517 rifle, still based on the Kiraly type delayed blowback action; this weapon was extensively tested against modified Kalashnikov AK rifle, as well a number of other designs, and found to be superior to all. Korobov was found to be most accurate and controllable in full automatic mode (primary mode of fire, according to Soviet tactical doctrine), especially when fired from the shoulder or from the hip. It was also significantly lighter and less expensive to make than modified AK. Nevertheless, Soviet Army preferred less effective, but *familiar* and already well established Kalashnikov AKM over the more effective and lighter, but entirely *new* design.

TKB-517 is delayed (retarded) blowback operated weapon, that uses two-part bolt system, designed prior to WW2 by Paul Kiraly of Hungary. In this system, bolt has two parts - lighter breechblock with breechface and extractor, and heavier bolt carrier. A two-arm lever is interposed between these two parts; lower arm of the lever rests against the receiver when bolt is fully closed. When gun is fired, pressure in the chamber forces the cartridge case backwards and against the breechface. Bolt begins to travel back, but the lever acts as a mechanical disadvantage, transferring the short movement of the light bolt to the longer movement of the heavy bolt carrier. This action is sufficient to slow down initial movement of the breechface before the bullet leaves the barrel. Once the pressure in the barrel is low enough, the lever breaks the contact with the receiver, and the rest of recoil cycle both bolt parts complete as a single unit. Similar system later has been used in the French FAMAS assault rifle. receiver of TKB-517 has been made from stamped steel, furniture was made from wood. Charging handle was attached to the bolt carrier at the right side. Safety / fire mode selector was located above the pistol grip, also at the right side of the gun. TKB-517 used standard AK/AKM type magazines, including large-capacity 40 and 75-round ones, developed for RPK light machine gun.

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LAPA FA 03 assault rifle (Brazil)

Caliber: 5,56x45mm NATO
Action: Gas operated, rotating bolt
Overall length: 738 mm
Barrel length: 490 mm
Weight: 3,5 kg empty
Rate of fire: 650 rounds per minute
Magazine capacity: 20 or 30 rounds

The LAPA FA-03 rifle was developed by Nelmo Suzano at *Laboratorio de Pesquisa de Armamento Automatico* (LAPA) between 1978 and 1983. This lightweight bullpup rifle features a plastic housing and an interesting double action trigger system, but very few rifles were made in mid-1980s, probably no more than 500 in total. Some of the LAPA FA-03 rifles are still used by special police forces of Brazil.



The LAPA FA-03 assault rifle is a gas operated weapon that uses conventional piston-operated system with rotating bolt locking. The most unusual thing about FA-03 is its trigger, which can be set to "double action" mode, in which rifle can be carried safely with loaded chamber and hammer in lowered position, safety disengaged. In this mode, rifle is ready to fire but it requires along and deliberate trigger pull to fire the first round (a system very popular in modern semi-automatic pistols). Otherwise this was a fairly conventional weapon, with right side only ejection and open sights (rear sight is built into carrying handle).

M14 rifle / Mk.14 Mod.0 Enhanced Battle rifle (USA)

Caliber: 7.62x51 mm NATO (.308 Winchester)

Action: Gas operated, rotating bolt

Length: 1120 mm

Barrel Length: 559 mm

Weight loaded: 5,1 kg (6.6 kg M14A1)

Magazine: 20 rounds, detachable box

Rate of fire: 700 -750 rounds per minute

The experience gained by US troops during the Second World war showed that the M1 Garand rifle has a lot of things to be improved. The first was the feeding system with 8-rounds en-bloc clips that does not allow the refilling of the partially full magazine. Others were excessive length and weight of the rifle. The cartridge used in M1 Garand and known as .30-06 (7.62x63mm) was too long and too heavy, effectively limiting the load of ammunition carried by each soldier. First attempts to improve M1 were made during the war, and numerous experimental modifications in .30-06 were built, mostly using the 20-rounds detachable magazines from Browning BAR M1918 automatic rifle. One of such prototypes was the T20 ("T" means "test") of 1944. T20 was basically the M1 Garand rifle fitted with 20 rounds BAR magazine and with selective fire capability.



Close-up view on the controls of the military M14 rifle, including fire mode selector switch (on receiver above the trigger)

This prototype latter evolved into the T37 rifle, which had gas cylinder moved back a little and was chambered for newest American prototype cartridge - T65. The T65 was no more than .30-06 case, shortened by 1/2 inch (12 mm), but retaining the original ballistic properties due to modern propellants used. It was slightly lighter and cheaper to make than .30-06, and has long effective range and good potential for accuracy, both desired by US Army. The idea of truly intermediate round was not acceptable to the US Military at that period. In the early 1950s T37 evolved into the T44 experimental rifle, which featured redesigned, self-regulated gas system with short stroke gas piston. Further development and tests lead to the slightly modified T44E4 and T44E5 (heavy barreled squad automatic weapon) prototypes, which were finally adopted by US Army as M14 and M15 rifles in the 1957.

The M15, a heavy barreled weapon, however, was never brought into production. It must be noted that T44E4 was extensively tested against the only other entree in the US trials, the T48 rifle (Belgian FN FAL rifle made under license in USA by H&R Inc.). Both rifles passed the trials with equally high results, but US finally settled on the T44 because it was slightly lighter, similar to M1 Garand in manufacturing and operation, and, above all, a "Native American" design.



T37 experimental rifle

The contracts to produce M1 rifles were issued to some US companies, such as Thompson-Ramo-Wooldridge (TRW Inc), Harrington and Richardson Arms Co (H&R), Winchester-Western Arms Division of Olin Mathieson (Winchester) and Springfield Armory Inc (Springfield). Production was ceased by US Government in 1964, with some 1 380 000 weapons made.



M14 rifle, military issue version with fire mode selector switch installed

The termination of the production was the result of combat experience in the SE Asia, particularly in Vietnam. The M14 was too long and too heavy to be carried all day long in hot and wet climate. The 7.62mm NATO ammunition was too heavy, limiting the amount of ammunition carried by soldiers on patrols. The selective fire capability was mostly useless, since the M14 was way too light for powerful cartridge it fired, and climbed excessively when fired in bursts. In fact, most of the M14s were issued to troops with fire selectors locked to semi-automatic mode, to avoid useless waste of ammunition in automatic fire. The squad automatic version, known as M14E2, also was not too successful in its intended role. As soon as those deficiencies of the M14 became obvious for US Army Command, they started the search for lighter rifle, and finally settled on the Colt/Armalite AR-15 5.56mm assault rifle, adopting it as the M16A1. M14 was replaced as a first line weapon in the late 1960s, but is still used in small numbers by US Navy. It also served as a platform to build M21 Sniper rifles. Semi-automatic only versions of the M14 rifle are commercially manufactured for civilian and police markets by the Springfield Armory Inc since 1974 under the name of M1A. Some other US companies are assembling the M14-type semi-automatic rifles using military surplus M14 parts kits.

Beginning in the early 1970s thousands of M14 rifles were given to several nations under military aid programs. In the 1990s alone, over 100,000 of these rifles have been given away to Estonia, Latvia, Lithuania, the Philippines, South Korea, Taiwan, and Turkey. In USA, for some time M14 was mostly relegated to Honor Guard and similar duties, but during recent campaigns in Iraq and Afghanistan many old M14 rifles were withdrawn from warehouses, dusted off and issued to troops in the field to improve range and lethality of troops armed with 5.56mm weapons. Some M14 rifles are issued as is, some are fitted with new telescope sights to serve as a para-sniper / designated marksman rifles (concept similar to Russian SVD rifle). US Marine Corps also re-issued M14 rifles for use in Designated Marksman role (DMR), and those rifles are fitted with newly made polymer stocks with adjustable buttstocks and pistol grips, and other accessories such as detachable bipods or sound moderators (silencers). Recently US Special Forces, operating under the US Navy flag, stepped forward with the Mk.14 Mod.0 Enhanced Battle rifle, which is an M14 fitted with many new commercially available parts, new stock with adjustable butt and plenty of Picatinny rails, and new accessories such as noise suppressors and optical equipment. The Mk.14 Mod.0 EBR is currently being used by US Navy SEAL's and possibly some other special operation forces within US Military.



M14S semi-automatic rifle, as made in China by Poly Technologies.

In general, the M14 was a controversial weapon. It had the accuracy and range of the "old time" military rifles, but was too long, heavy and lacked the automatic fire firepower of a true assault rifle, often required in the modern close combat. Nevertheless, it was a reliable and powerful weapon, often favored by users for high lethality, long range and good penetration - features much appreciated by US soldiers during recent operations in Afghanistan and Iraq.



Springfield M1A semi-automatic rifle with polymer stock and 10-rounds magazine

The M14 is a gas operated, magazine fed, selective fire (originally) design. The gas system is located under the barrel, and has a short stroke (about 1 1/2 inch - 37 mm) gas piston which operates the M1 Garand style action rod. The gas system features an automatic gas cutoff feature, which limits the amount of gases used to operate the weapon.

The rotating bolt is quite similar to one found in M1 Garand but it has a roller instead of the simple lug, which connects the bolt to the operating rod. The fire mode selector is located at the right side of the receiver, above the trigger, and could be removed if rifle should not be fired in bursts, or re-installed if required. The rear receiver bridge features the stripper clips guides, so the detachable magazine could be refilled in place by using standard stripper clips. The bolt stop device is incorporated into the left wall of the receiver and holds the bolt open when last round from the magazine is fired. The safety switch is similar to M1 Garand and is located at the front of the triggerguard. Standard sights consist of the blade front sight with two protective "ears" and diopter-type adjustable rear sight, mounted on the rear of the receiver. Barrel is equipped with long flash suppressor. To be used in selective fire mode, M14 can be equipped with light detachable bipod. The M14A1 Squad Automatic rifle differs from M14 in the following: the fire selector is always installed. The standard wooden single-piece stock with semi-pistol grip is replaced by the "straight line" wooden stock with separate pistol grip and with folding front grip under the forearm. The hinged shoulder rest is attached to the buttplate. Special removable muzzle jump compensator is fitted to the barrel, as well as lightweight bipod.



US Navy's Mk.14 Mod.0 Enhanced Battle rifle, a heavily modified M14 automatic rifle



M14 Designated Marksman Rifle (DMR), as issued by US Marine corps. This particular rifle is fitted with quick-detachable sound moderator (silencer)



M14A1 "Squad automatic weapon". Note the different stock with folding forward grip and detachable bipod

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Madsen light automatic rifle LAR M/62 (Denmark)

Caliber: 7.62x51 mm NATO

Action: Gas operated, rotating bolt

Overall length: 1074 mm

Barrel length: 536 mm

Weight: 4.3 kg

Rate of fire: 550 - 600 rounds per minute

Magazine capacity: 20 rounds



Madsen light automatic rifle LAR M/62, caliber 7.62x51 NATO, folding butt

Famous Danish company Dansk Industrie Sindikat (DISA) "Madsen" developed a modern prototype automatic rifle in late 1950s. Apparently, early models were made in caliber 7.62x39 M43 Soviet, to participate in Finnish army trials for new assault rifle. Later on, circa 1959, same weapon was reworked to fire larger and much more powerful 7.62x51 NATO ammunition, and in this form it was offered for any interested buyer as Madsen Light Automatic Rifle, LAR M/62. Apparently, this weapon failed to attract any serious buyers, and it soon went into oblivion.



Madsen light automatic rifle LAR M/62, caliber 7.62x51 NATO, fixed butt

Madsen light automatic rifle LAR M/62 is a gas operated, selective fire weapon which fired from closed bolt. It uses rotary bolt locking and a long stroke piston gas system, with manual gas regulator. Receiver of the gun is made from aluminum alloy, with separate trigger unit / pistol grip attached below. Manual safety / selector switch is located on the left side of pistol grip. Rifle is fitted either with fixed wooden butt or with side-folding tubular metallic butt.



Madsen light automatic rifle LAR M/62, caliber 7.62x51 NATO, fixed butt



Madsen light automatic rifle LAR, caliber 7.62x39 M43 Soviet, made for Finnish assault rifle trials

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Mauser Gerät 06 / Stg.45 assault rifle (Germany)

Caliber: 7.92x33mm (7,92mm Kurz)

Action: delayed blowback

Overall length: 893 mm

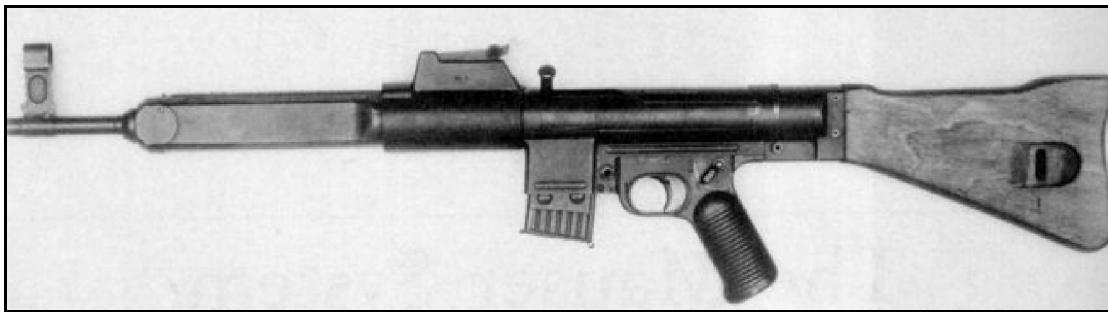
Barrel length: 400 mm

Weight: 3.7 kg

Rate of fire: 400 rounds per minute

Magazine capacity: 10 or 30 rounds

German development of assault rifles did not stop with the adoption of the Haenel / Schmeisser "Sturmgewehr" Stg.44 rifle. The Stg.44 was far too heavy and, while being made mostly of stampings, still required plenty of raw materials. So, several German companies continued to produce 7.92 mm Kurz rifles of various designs. Most interesting among these was the Mauser design, usually credited to Wilhelm Stähle and Ludwig Vorgrimler. By 1943 Mauser Werke had developed a gas-operated weapon, which featured rigid roller locking broadly derived from MG 42 machine gun. This experimental weapon had a factory designation of "Gerät 06" (Device 06). This system (copied several times during the post-war period with equally unspectacular results) proved itself too complicated, but then the head of the analytical department at Mauser devised a version of the retarded (sometimes also called delayed) blowback system. In this system, there was no gas system and piston, and no rigid locking. Instead, rollers were used to retard the opening of the breech until the chamber pressure dropped down to safe levels. This system was factory designated as "Gerät 06H", and by early 1945 was officially type-classified as Stg.45. It is believed that, no more than 30 specimens of these new weapons were made before Allied forces captured the Mauser Werke in Oberndorf, so it made no impact on the war. But, instead, it made significant impact on the post-war developments, since one of its designers, Ludwig Vorgrimler, went to France, where he continued to develop this design for several years. During the early 1950s he moved to Spain, where he participated in development of the CETME assault rifles, which led directly to the famous Heckler & Koch family of small arms, including the G3 and other assault rifles, submachine and machine guns, all featuring the same roller-delayed blowback system.



Mauser Gerät 06, an early roller-locked, gas-operated prototype dated to circa 1943

The famous Mauser Werke began to develop its own assault rifle by the 1943. It was decided to produce the cheapest possible design, with as much stamping and welding used as possible. The original design, called "Gerät 06", had a short-stroke gas piston and a locking system with two rollers, located in the bolt, which was forced out to the barrel extension to lock the bolt. When the gun was fired, the gas piston forced the bolt carrier back, and this withdrew the rollers from the cuts in the barrel extension, unlocking the bolt, and then pulling it back to eject the spent case and load a fresh round on its way back. This system was later found too complicated, and experiments proved that the locking system could be done away with since the rollers by themselves were able to retard the initial bolt movement, until the pressure in the chamber dropped down to a safe level. This improved system greatly simplified the design. This version was designated "Gerät 06H". Because there was no primary extraction, a fluted chamber was devised to avoid sticking cases and subsequent torn rims and resulting jams. The receiver, as well as the round hand guards, was made from two stamped parts, left and right, connected by simple welding. The gun was built with a straight-line layout to reduce muzzle climb during automatic fire, so the sights were placed well above the barrel. This also resulted in the development of a shorter magazine with capacity of only 10 rounds, requested by the troops. The retarded-blowback Stg.45(M) were easily distinguishable from the original gas-operated "Gerät 06" rifles by the ribbed handguards of circular cross-section on the former, as opposed to the slab-sided handguards on the latter gun. The Stg.45(M) was a good deal lighter than the Stg.44, and required about 50% less raw materials to make.



Mauser StG.45(M), one of the very few pre-production rifles

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Nikonov AN-94 "Abakan" assault rifle (Russia)

Caliber: 5.45x39 mm

Action: Gas operated, rotating bolt; moving barrel-receiver-gas drive group for delayed recoil action

Overall length: 943 mm (728 mm with butt folded)

Barrel length: 405 mm

Magazine capacity: 30 rounds

Weight, without magazine: 3.85 k g

Cyclic rate of fire: 1800 and 600 rounds per minute variable (see description below for explanation)

Maximum effective range: 700 meters

The AN-94 assault rifle had been officially adopted by the Russian Army and the Ministry of Internal Affairs in 1994 as a possible replacement for the venerable Kalashnikov AK-74 series assault rifles. The AN index means "Avtomat Nikonova", or Nikonov Assault rifle. This rifle had been designed by the Gennady Nikonov, a Russian arms designer, at the IZHMASH state factories, during the late 1980s and early 1990s. This rifle, initially known as the ASN prototype, had been developed for and submitted to the Russian Army trial contest, held in the early 1990s. This contest, known under the code name "Abakan" (a small city in Russia), was intended to develop the more effective replacement for the AK-74 assault rifles. The ASN was tested among the many other prototypes and eventually won the trials, and was consequently adopted. Originally it was intended to replace most, if not all, AK-74 rifles in the Russian service, but it soon turned out that the complete replacement is impossible due to the economical (mostly) and some other reasons. At the present time the AN-94 is considered as the "professionals' choice", and is used in limited numbers by the elite forces of the Russian Army, police and Internal Affairs Ministry. The main body of the Russian armed forces are still armed with the Kalashnikov assault rifles, and AK-type rifles will remain in service for a long time, most probably.



AN-94 assault rifle, buttstock in the open position

Much controversy is created about the AN-94 rifle, mostly because it is advertised as a quantum leap from the Kalashnikov designs, and because of its official action description, known as the "blow back shifted pulse (BBSP)". This weird description could confuse anybody, especially since it is used in conjunction with the note of gas operation of the AN-94. I will try to explain the operation of the AN-94 later in this article, but first I will discuss some of its main features.

The key improvement of the AN-94 over the AK-74 is the introduction of the 2-rounds burst mode, added to the standard single shots and full auto mode. The two rounds bursts are fired at very high rate of fire, and a trained shooter can make a single hole in the target at 100 meters in this mode. This allows for significant increase in lethality, stopping power and body armour penetration over the single shot mode, with the same "single shot" accuracy. The full auto mode of AN-94 consists of the two stages - first two rounds are fired in the "high rate" fire, and the remaining rounds are fired in low rate of fire, until the trigger is released or the magazine is emptied. In the single shots or the full auto mode, there's no significant advantages over the AK-74. At this point, one can ask "is all this complication of the AN-94 mechanism worth the achieved results"? From my point of view, there's no simple answer. The trained professional warrior can use the 2-rounds burst capability of AN-94 to the great degree of success, but prior to this, a lot of time and resources should be spent to train this professional soldier to use AN-94 effectively. Unlike the more common designs, like the Russian Kalashnikov or American M16 rifles and others, the AN-94 internals are not "user friendly", and it took weeks, if not months, to get used to this rifle, its assembly / disassembly and maintenance procedures. It is also more expensive to made and maintain, than the AK-74. From all this it is obvious why this very interesting rifle hardly will see any widespread service, at least with the Russian Army (which at this moment is conscripted by the large, and on a low budget). On the other hand, some elite units can make a good use for major advantages of the AN-94.



AN-94 rifle, buttstock folded

From the personal, but trustworthy reports I can add the following. First, the ergonomics of the AN-94 is not the best one. The shape of the pistol grip, and the inclined from the vertical plane magazine are way from being comfortable. The rear diopter sight has small apertures, not protected from dirt, and is hard to clean in the battle conditions. It also has sharp edges and can snag in the clothes or make a scratches on the skin when handled roughly. The grenade launcher mount under the barrel is a little weird, since it uses a large "bridge" between the stock and the launcher. The folding butt interferes with the trigger when folded, and the fire selector, which is separated from the safety, is hard to operate, especially when wet. On the other hand, as said above, in the 2-rounds burst it is very accurate and offers a great advantage in the terminal effectiveness over the standard single shot mode.

Technical description of the AN-94 assault rifle.

The heart of the AN-94 is the more or less common gas operated, rotating bolt, long piston stroke action. The barrel with the gas chamber above it is mounted on the receiver, which holds the reciprocating bolt carrier with relatively short rotating bolt. The receiver is allowed to recoil inside the plastic gun shell or housing, against the receiver recoil spring. This spring is located under the receiver, at the bottom of the housing and to the left, and because of this the magazine is offset and inclined from vertical to the right. The rod under the barrel, which looks like the gas tube, is, in fact, a forward guide for the recoiling barrel / receiver assembly. This rod also used as a forward mounting point for the grenade launcher. The cocking handle is attached directly to the right side of the bolt carrier.



Author poses with the AN-94 assault rifle (Interpolytech-2001 exhibition, Moscow, Russia)

The feed system is quite unconventional, since it had to transfer the rounds from stationary magazine and into the recoiling receiver. To achieve this, AN-94 uses a two-stage feed, that comprises a feedway, built into the bottom of the recoiling receiver, and a separate rammer, that is used to feed the cartridges from the magazine and into the feedway.

In brief, the AN-94 works as follows. First, let's assume that the full magazine is inserted and the chamber is empty, receiver / barrel assembly is in the forward position. When one pulls the charging handle, the bolt carrier goes back, unlocking and retracting the bolt. At the same time, the rammer, which is linked to the bolt carrier via the thin steel cable and a large pulley, goes forward, stripping the first round from the magazine and placing it into the feedway in the receiver. Another action that takes place the same time is the cocking of the hammer, which is also located in the recoiling receiver. When the charging handle is released, the bolt assembly goes forward, slamming the cartridge from the feedway and into the chamber, and locks the barrel. Now, the gun is ready to fire.

When fire selector is placed to the "full auto" mode, and the trigger is pressed, following happens. As soon as the fired bullet passed the gas port, the traditional gas operated action begins. Since the bolt group is relatively light and the amount of the gas pressure is carefully calculated, the bolt group rapidly goes back, unlocking the barrel, extracting and ejecting the spent case. Due to the recoil impulse, the barrel receiver assembly begins to recoil inside the gun housing, compressing the recoil spring. At the same time, the cartridge rammer quickly strips the next cartridge from the magazine and introduces it into the feedway. The bolt group, under the influence of its main spring and the return buffer spring, rapidly goes forward, chambering the second round from the feedway. As soon as the bolt group locks the barrel, the hammer is released automatically, and the second shot is fired with the theoretical rate of fire of 1800 rounds per minute. At this moment the receiver is still recoiling inside the housing, and its recoil is accumulated and not yet affects the shooter and the position of the gun. When the second bullet is fired and left the barrel, the recoil cycle of the receiver / barrel group is stopped, and the hammer is held in the cocked position. At this moment the shooter feels the recoil of two fired rounds simultaneously, "shifted in time". The reloading cycle continued as described above, but the hammer is held until the recoiling unit will not be returned into the forward position. If the gun was set to the "2 rounds bursts" mode, the hammer will be held cocked until the trigger will be released and then pulled again. If the gun was set to the "burst mode", the hammer unit will switch itself automatically to the low rate of fire, and will release itself only once per complete recoil cycle. I will not describe the design and the action of the trigger system of the AN-94, since it is way too complicated to be explained in few words.

Other features of the AN-94 include: the fiberglass-reinforced polymer housing, integral with the handguards; the magazine bay that can accept standard AK-74-compatible magazines with 30 or 45 rounds capacity, as well as the newest 60-rounds four-stack box magazines. The sight system of the AN-94 is a step aside from all previous Russian assault rifles, and comprised by the protected front post, adjustable for zeroing, and the asterisk-shaped rear diopter, with 5 apertures drilled in the asterisk points. To set the distance, one must rotate the asterisk and set the desired aperture at the top of the

receiver. The universal scope mounting rail is attached to the left side of the receiver as a standard. The safety and the fire selector are two separate controls. The safety is mounted inside the triggerguard, and the fire selector is a small switch above the triggerguard at the left side of the receiver. The fire selector has 3 positions, for single shots, 2-round bursts and for full-auto. Safety has 2 positions - Safe and Fire. The buttstock is made from the same high-impact plastic as the housing / stock unit and folds to the right to save the space. The strange-looking "8"-shaped muzzle attachment is a special, self-cleaning muzzle brake, which is claimed to be highly effective. It can be easily detached from the muzzle if required. The front sight base carries a rear bayonet lug on its right side, so the bayonet is mounted in the horizontal plane, to the right of the muzzle. This allows to fire the grenade launcher with the bayonet attached (which is impossible with the Kalashnikov-type rifles).

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NORINCO Type 86s rifle (PR China)

Caliber: 7.62x39 mm
Action: Gas operated, rotating bolt
Overall length: 667 mm
Barrel length: 438 mm
Weight: 3.59 kg empty
Magazine capacity: 30 rounds (AK-47 type)

Type 86s rifle was produced by Chinese state arms factories as a commercial, export-only item, and sold worldwide through Chinese NORINCO corporation during late 1980s and 1990s. It is not known if this weapon was originally made for PLA (Chinese People's Liberation army), but present author suspects that it was intended for export only from the start. The simple reason behind that suspicion is that by the time of appearance of this weapon (late 1980s), PLA has standardized on Type 81 assault rifle as its primary infantry arm. Type 56 assault rifle (Kalashnikov AKM clone), which served as a basis for Type 86, was declared obsolete in PLA, and mostly sold for export. It is possible that Type 86 rifle was offered in selective-fired version for various government buyers, but I have no proof for that. So far all specimens of this weapon were encountered in civilian semi-automatic only configuration. Type 86s semiautomatic rifle was sold worldwide, and at least some found its way into USA before president Clinton vetoed importation of Chinese small arms into USA in 1994.



Type 86s rifle is another adaptation of previously existing weapon of traditional layout into more compact bullpup layout. It was probably inspired by Finnish-made Valmet M82 weapon, which appeared about 4 years before Chinese version of the same basic Kalashnikov-type action. In the case of Type 86s, the basic receiver with all internals was "borrowed" from late production Type 56 assault rifle with stamped receiver and semi-automatic only "civilian" trigger. All furniture, along with characteristic safety lever and

cocking handle was discarded. A new cocking handle was attached to the top of gas piston rod, under the integral carrying handle, and a new manual safety was installed on the right side of the weapon, just above the trigger guard. A short metallic buttplate was pinned to the bottom of the receiver at its rear end. Couple of features were copied from other designs; those included Steyr AUG-style folding front grip and FAMAS-style integral carrying handle with built-in open sights and top-mounted cocking handle. Type 86s rifle uses standard Type 56 / Kalashnikov AKM magazines for 7,62x39 ammunition.

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OTs-11 "Tiss" compact assault rifle (Russia)

Caliber: 9x39 mm SP-5, SP-6

Action: Gas operated, rotating bolt

Overall length: 490 mm (butt folded) or 730 mm (butt extended)

Barrel length: 200 mm

Weight: 2.5 kg empty

Rate of fire: rounds per minute

Magazine capacity: 20 rounds

OTs-12 "Tiss" compact assault rifle (manufacturer's index *OII-12 "Tucc"*, also sometimes spelled as OC-12 in English-language sources) was briefly manufactured during early 1990s by the TSKIB SOO (Central Design Bureau for Sporting and Hunting Arms, located in the city of Tula). It was intended for police use, and was closely based on the AKS-74U compact assault rifle, with main difference being usage of the large caliber, subsonic 9x39 ammunition, which provided significant stopping power and barrier penetration capabilities at short and medium ranges (up to 200-300 meters). Only several hundreds of OTs-12 rifles were made at TSKIB SOO in about 1993, but the mass production, which was anticipated at Tula arms factory, never commenced. Few OTs-12 rifles are still in use by some Law Enforcement units across the Russia.



The OTs-12 "Tiss" compact assault rifle by design is similar to the Kalashnikov AKS-74U rifle, featuring same gas-operated, rotary bolt action, as well as similar controls and furniture, including side-folding skeletonized buttstock. Main differences include new barrel with muzzle brake / compensator, new bolt and a new 20-round magazine for 9x39 ammunition.

Pindad SS2 assault rifle (Indonesia)

	SS2-V1	SS2-V2	SS2-V4	SS2-V5
Caliber	5.56x45 mm NATO			
Action	Gas operated, rotating bolt			
Overall length (butt open / folded)	990 / 740 mm	920 / 670 mm	990 / 740 mm	770 / 520 mm
Barrel length	460 mm	403 mm	460 mm	252 mm
Weight	3.4 kg	3.2 kg	4.2 kg	3.2 kg
Rate of fire	~ 700 rounds per minute			
Magazine capacity	30 rounds			



Pindad SS2-V4 assault / para-sniper rifle

The SS2 family of rifles (from Indonesian "Senapan Serbu 2" - Assault Rifle 2) is manufactured in Indonesia by PT Pindad factory and is based on SS1 (FN FNC) rifle, made by the same factory under license from Belgian company FN Herstal. SS2 rifles are in use by Indonesian army since 2005, and also are offered for export. Initially available in three basic versions (standard rifle SS2-V1, carbine SS2-V2 and para-sniper SS2-V4) it is now also available in subcompact SS2-V5 version, first shown in 2008.



Pindad SS2-V1 assault rifle

All SS2 rifles share same basic design and same two-part upper / lower receiver construction. Both upper and lower receiver parts are made from aluminum alloy and connected one to another using two cross-pins. Gas-operated action uses long-stroke gas piston, located above the barrel, and a multi-lug rotary bolt that locks into the barrel extension. Charging handle is attached to the bolt carrier on the right side and moves with the bolt group when gun is fired. Fire mode / safety lever is located on the left side of the gun, and permits for single shots and full automatic fire.

All versions are fitted with side-folding skeletonized buttstock, and all variants have integral Picatinny type rail on the top of the receiver. In all versions other than SS2-V4 this rail is fitted with removable carrying handle with diopter-type rear sight. Front sight is attached to the gas block, leaving the muzzle part of the barrel unobstructed, so rifle can be used to fire rifle grenades.



Pindad SS2-V2 assault rifle with Pindad-made 40mm grenade launcher

The SS2-V4 version is issued less front sight base or carrying handle, being fitted with telescope sight and optional cheek rest on the buttstock. SS2-V4 also features heavier barrel for more accurate long-range fire. SS2-V1 and SS2-V2 variants can be fitted with 40mm under-barrel grenade launcher, also made by Pindad.



Pindad SS2-V5 assault rifle

QBZ-95 / 97 (Type 95 / 97) assault rifle (China)

Data for QBZ-95 (QBZ-97 in parentheses, where differs from QBZ-95)

Caliber: 5.8x42 mm (5.56x45 mm NATO)

Action: Gas operated, rotating bolt

Overall length: 760 mm

Barrel length: 520 mm

Weight: 3.4 kg unloaded

Rate of fire: ~ 650 rounds per minute

Magazine capacity: 30 rounds

In the late 1980s Chinese designers developed a 5.8 x 42 cartridge, apparently designated DBP87, which is claimed to be superior to both the 5.56 mm NATO and the 5.54 mm Soviet. This cartridge develops a muzzle velocity of 930 metres per second from a standard barrel, with a bullet weighing 4.26 gram.

As soon as the ammunition was ready, the PLA began to develop an entirely new and much more modern family of small arms based on the same action. This family, known as QBZ-95 ('Qing Buqiang Zu' = Light Rifles family, 1995), was first displayed outside the PLA in 1997, when China took over Hong Kong; it was observed that the Chinese guards were armed with a new, modern looking bullpup rifle. In fact it is one of an entirely new family of weapons, all designed around the same action and bullpup layout, which include the assault rifle, a shorter carbine, a light support weapon (with a bipod, a heavier barrel and large capacity magazine), and a sniper rifle. While being quite similar inside, these guns have different body shapes and cannot be converted from one configuration to another. The QBZ-95 line of weapons is now spreading throughout the PLA, commencing with elite units.



5.8x42mm QBZ-95 assault rifle, right side view; magazine is removed and a 4X telescope sight is installed

The QBZ-95 is a gas operated, magazine fed, automatic weapon with a bullpup layout. It has a short stroke gas piston and a rotating bolt. The charging handle is located at the top

of the receiver, under the carrying handle. The housing is made from polymer, with an integral carrying handle, which holds the rear sight base, and has mounting points for optical or night vision scopes. The ejection port is made only at the right side of the weapon, so it cannot be fired from the left shoulder. Standard sights are of the open type, graduated from 100 to 500 metres. The front part of the barrel in the standard version is left unobstructed, so the QBZ-95 rifle can be used to launch rifle grenades. It also can be fitted with an underbarrel grenade launcher or with a knife bayonet. A compact carbine version, sometimes referred to as the CAR-95, cannot use either a grenade launcher or a bayonet, because of the much shortened barrel. Fire controls of QBZ-95 rifle consist of a trigger and a safety/selector switch, located (quite inconveniently) at the rear left of the receiver, behind the magazine housing. QBZ-95 can fire single shots or bursts.



5.8x42mm QBZ-95 assault rifle, left side view

The export version, QBZ-97, which is chambered for popular 5.56 x 45 NATO ammunition, is internally similar to QBZ-95, but has a different, much deeper magazine housing, which accepts a NATO-standard (M16-type) magazines.



5.56x45mm QBZ-97 / Type 97 assault rifle; note different magazine port, designed to accept STANAG / M16-type magazines

Robinson Armaments M-96 and XCR rifle (USA)

Data for RobArm XCR rifle

Caliber: 5.56x45mm NATO; also 6.8x43mm Remington SPC and 7.62x39 M43

Action: Gas operated, rotating bolt

Overall length: 959 mm (stock open), 696 mm (stock folded)

Barrel length: 407 mm (other lengths available)

Weight: 3.4 kg

Rate of fire: n/a

Magazine capacity: 30 rounds

American company Robinson Armament Co introduced its M-96 Expeditionary Rifle in late 1990s. It was basically a semi-automatic only modular weapon, patterned after famous Stoner 63 weapon system. It was available in several configurations; in about 2002, Robinson Armament also introduced a military / police only RAV-02 rifle, which was based on same design but added selective-fire capability. Over that time, M-96 series rifles were no more than limited production items, sold mostly on civilian US market. Unlike original Stoner 63 design, no belt-fed versions were made in M-96 line. In about 2004, Robinson Armament unveiled a new design, which, while retaining basic modular concept, stepped out of Stoner pattern in several aspects. The new XCR rifle was submitted to SCAR special forces rifle trials, which were won by FN Mk.16 and Mk.17 SCAR rifles. Since mid-2006, RobArm XCR rifles are sold on civilian US market in semi-automatic only versions; selective-fired versions are available only for government buyers.



Robinson Armaments M-96 RAV-02 assault rifle (selective-fired), version chambered for 7.62x39mm

RobArm M-96 rifles were built on single, universal receiver, made from stamped steel. These receivers hosted quick-detachable barrels and basic gas-operated actions with long-stroke gas piston and rotary bolt locking. Receivers had mounting points for trigger units on "top" and "bottom" surfaces, and feed unit mounting points on "bottom" side only. In standard rifle configuration receiver is put with gas tube below the barrel, and magazine and trigger units mounted on the underside of weapon. In the "Bren-type" configuration, receiver is turned upside down so gas tube lies above the barrel, and magazine inserts from the top; the trigger unit is installed on the opposite, "bottom" side of weapon. Both trigger unit and magazine feed units also were made from stamped steel. Barrels with appropriate front sight mounts were used for every configuration, and rear sight block was attached to the mounting points on receiver, opposite to trigger unit. Guns were fitted with detachable, solid polymer stocks, and detachable plastic forends / handguards. In "standard" rifle and carbine configurations, charging handle was located at the left side of receiver, and ejection was to the right. In the "Bren-type" configurations, charging handle was on the right, and ejection was to the right (because the receiver was turned "upside down").



Robinson Armaments M-96 rifle in standard configuration

RobArm XCR rifle is quite different from M-96. Most important, it abandoned the idea of single receiver with detachable units, that can be turned upside-down. XCR rifle reverted to the more common upper / lower receiver configuration, in which upper receiver hosts removable barrel, gas system, and basic action with rotary bolt locking. Gas system features traditional gas piston, and four-position gas regulator. Bolt has three locking lugs and locks into the barrel extension. Lower receiver hosts trigger unit and pistol grip, and has an integral magazine housing. Manual safety (which doubles as fire mode selector in "military" versions) is located on lower receiver, above the pistol grip, and can be located on left side only or both sides of receiver.



Robinson Armaments XCR rifle, caliber 5.56x45mm, with open sights (detachable and folding).

Bolt catch release button is located at the rear of magazine veil, just ahead of trigger guard. Cocking handle is located at the left side of upper receiver, and can be used to assist the bolt closure.

XCR rifles are fitted with side-folding skeleton buttstock. Top of receiver is shaped into integral Picatinny type accessory rail, with three additional rails located around the barrel at 3, 6, and 9 o'clock positions. For more convenient use, these rails can be covered with special polymer panels, that form rifle's forend / handguard. There are no standard sighting equipment "as is", but any compatible open or telescopic and night sights can be installed using Picatinny rail.



Robinson Armaments M-96 rifle in top-feed ("Bren-type") configuration, with short barrel



Robinson Armaments XCR rifle, caliber 5.56x45mm



Robinson Armaments XCR rifle, caliber 6.8x43mm Remington SPC, with Trijicon ACOG telescope sight

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Ruger AC-556 assault rifle / Mini-14 GB rifle (USA)

Caliber: 5.56x45mm NATO (.223 Remington); also 7,62x39 M43 in Mini-30

Action: Gas operated, rotating bolt

Overall length: 943 mm (851 / 603 mm for AC-556F)

Barrel length: 470 mm (330mm for AC-556F)

Weight: 2,9 kg empty

Magazine capacity: 5, 10, 20 or 30 rounds detachable box magazines

Rate of fire: 750 rounds per minute (for AC-556 only)

Bill Ruger, one of leading US arms designers of post-WW2 period, began development of a new semi-automatic rifle circa 1970. The rifle was intended for either civilian and para-military use; it was patterned after current US issue military rifle, the M14, and was chambered for relatively new 5,56x45mm (.223 Remington) ammunition. Since its commercial introduction in 1973 the Ruger Mini-14 rifle found wide acceptance among both civilian shooters and a variety of police and security forces around the world. For government users, Ruger produced two specialized versions of the basic rifle - the Mini-14GB and AC-556. The former is still a semi-automatic only weapon, but is fitted with protected front sight, flash-hider and a bayonet lug. The latter is a selective-fired weapon, and thus can be classified as a true assault rifle. All weapons in the Mini-14 family share same basic design, although there are differences in certain parts; for example, AC-556 rifles had slightly longer receiver, which hosts the fire mode switch at its rear part.



Ruger AC556 assault rifle with 30-round magazine. Note the fire mod selector at the rear of receiver, above the trigger

The first major modification to the Mini-14 family appeared in 1978, when Ruger introduced an all-stainless version of the basic rifle. Until now, all Ruger Mini-14 rifles are available either in carbon or stainless steel versions. In around 1982 Ruger introduced its next civilian modification of the Mini-14, known as the "Ranch" rifle. This version was optimized for use with telescope sight, and thus was produced with integral scope bases on receiver. Ejection mechanism was changed to eject spent cases to the right side, clear of the scope, and rear sight was fitted on the folding base. In 1986, Ruger introduced a Mini-30 rifle, which was same basic weapon but adapted to 7,62x39 M43 ammunition of Russian origin. The last change in the Mini-14 line-up appeared as late as in 2005, when Ruger company introduced a new version of the Mini-14, which

incorporated integral scope bases of the earlier "Ranch" rifles with protected front sight and non-folding diopter rear sight, which has smaller mount than that of previous rifles. In general, Mini-14 rifles are known for their good reliability and durability. Accuracy is usually quoted as somewhat inferior to AR-15 (M16)-type weapons, which are very popular in USA; however, Mini-14 rifles are accurate enough for most purposes, and are excellent weapons for hunting, home defense, and general plinking.



Ruger AC556F assault rifle, with short barrel, 20-round magazine and stock opened

Ruger Mini-14 is gas operated, semi-automatic only weapon which uses Garand-type rotary bolt with two lugs. Action is operated by the long-stroke gas piston, which is located below the barrel and is concealed within forend of the stock. The gas piston has cup-shaped head, and is linked to the bolt via Garand-type operating rod which runs at the right side of the weapon. Manual safety also patterned after M1 Garand or M14 rifle, and is located at the front of the triggerguard. The selective-fire AC-556 hosts fire mode selection mechanism at the rear of the somewhat lengthened receiver. Fire mode selector is a separate switch on the right side of receiver, behind the ejection port. It has three positions - for single shots, 3-round bursts and full automatic fire.



Ruger AC556F assault rifle, with stock folded

Standard stock of the Mini-14 is of single-piece type, with semi-pistol grip and separate heatshield above the barrel. Early Mini-14 rifles had wooden heatshiled which exposed operating rod; military-type Mini-14GB and AC-556 rifles, as well as current production civilian guns, feature polymer heatshields which cover most of the operating rod. Over the time, Ruger also produced a folding-stock versions with wooden stock, plastic pistol grip and side-folding metallic shoulder stock. Ruger also makes "all-weather" polymer stocks

for Mini-14 and Mini-30 rifles. It also must be noted that there are many aftermarket stocks for Mini-14 rifles.



Ruger Mini-14/GB "paramilitary" rifle, less magazine

Standard sights consist of a blade-type front and adjustable diopter-type rear sight; "Ranch" type rifles also had integral scope mounts on the receiver, which will accept proprietary Ruger scope rings.

Original magazine capacities for Mini-14 rifles were 10 or 20 rounds, but since infamous American "Assault weapons ban" of 1994 Ruger offered civilian Mini-14 rifles with magazines containing only 5 rounds; however, some magazine makers produced aftermarket magazines for Mini-14 and Mini-30 in capacities of up to 40 (box) and 90 (snail-drum) rounds.



*Ruger Mini-14/GB-F "paramilitary" rifle with folding stock, full-length barrel and 30-round magazine.
Note lack of fire selector on receiver*



Ruger Mini-14 rifle, original version (1980's production) with aftermarket magazine



Ruger Mini-14 "Ranch" rifle of pre-2005 production. Note receiver with integral scope mounts and folding rear sight



Ruger Mini-14 rifle, current version (as made since 2005). Note different front and rear sights and polymer handguard which covers most of the operating rod



Ruger Mini-30 "Ranch" rifle of current manufacture, with polymer stock

SA Vz.58 assault rifle **(Czechoslovakia / Czech Republic / Slovak Republic)**

Caliber: 7.62x39 mm

Action: Gas operated, tilting breech block

Overall length: 845 mm (635 mm with folded stock)

Barrel length: 390 mm

Weight: with empty magazine 3.10 kg, with loaded magazine 3.60 kg

Magazine capacity: 30 rounds

Rate of fire: 800 rounds per minute

Effective range: about 400 meters

The Samopal vzor 1958 (submachine gun, model of 1958) was the standard assault rifle of the Czechoslovak army from the late 1950s and until the dissolution of the ČSSR in the 1993. At the present time the SA Vz.58 is still used by the Czech and Slovak armies, as well as sold for export in some quantities. The SA Vz.58 saw not much of real combat, so it is hard to judge how it stakes up against the most known contemporary rivals, like the Soviet / Russian AK-47 or the US M16A1. But the overall quality, fit and finish of this rifle is excellent. This rifle had been designed by the Czech arms designer Jiří Čermák, under the project codename "KOŠTĚ", or "Broom", in English. Development began in January of 1956, and the rifle was adopted for service only 2 years later, in 1958. The rifle was manufactured by the state-owned arms factory "Česká zbrojovka", located in the town of Uherský Brod (CZ-UB).



Vz.58V with folding buttstock

The Czech army planned to replace the SA Vz.58 with the newest CZ-2000 rifle system, chambered for 5.56mm NATO ammunition, but the financial difficulties severely slowed down this process.

The SA Vz.58 strongly resembles externally the famous Kalashnikov AK-47 assault rifle, but internally it is entirely different and of original and well-thought out design.

Technical description.

The SA Vz.58 is a gas operated, magazine fed, selective fire weapon. It uses more or less conventional short stroke gas piston, located above the barrel. The gas piston has its own return spring. The locking system features a linearly moving bolt (breechblock) with a separate tilting locking piece. The breechblock (bolt) is located under the bolt carrier, and the locking piece is hinged to the bolt and located under it. Gun fires from the closed bolt all times. When gun is fired, the gas piston gives a short tap to the bolt carrier. After a free movement of about 22 mm (.9 inch) the bolt carrier swings the locking piece up from the locking recesses in the receiver, and thus unlocks the bolt. From this moment on the bolt group moves back at once, extracting and ejecting the spent case and chambering the fresh cartridge. At the end of the return stroke the bolt stops in the forwardmost position against the breech face, while the bolt carrier continues to move forward, swinging the locking piece down and into the locking recesses, thus locking the bolt to the receiver. The overall system can be roughly described as a mix between the Walther P-38 pistol and the Czech ZB-26 (or British Bren) machine gun locking. The charging handle is attached to the right side of the bolt carrier.



Vz.58P with fixed buttstock

The trigger / hammer unit also differs from the most common designs in that it is a striker fired design. The massive cylindrical striker is located at the rear, hollowed part of the bolt, and has its own spring located under the bolt group return spring. The striker has a lug that interacts with the sear and is used to hold the striker in the cocked position. The overall design of the trigger unit is relatively simple and has few moving parts. The safety / fire mode selector switch is located at the right side of the receiver, and has 3 positions for safe, single shots and full automatic fire.

The basic variant, SA Vz.58P, has a fixed buttstock, and furniture made either from wood (early models) or from wood-impregnated plastic (late production models). The SA

Vz.58V has a side-folding metallic buttstock, and the SA Vz.58Pi is similar to the SA Vz.58P except that it has a large mounting bracket on the left side of the receiver, that allows for the IR / Night sights to be mounted.

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SAR-80 (Singapore)

Caliber: 5.56x45 mm (.223 remington)

Action: Gas operated, rotating bolt

Overall length: 970 mm (738 mm with butt folded)

Barrel length: 459 mm

Weight: 3.7 kg empty

Rate of fire: 600 rounds per minute

Magazine capacity: 20, 30 rounds

During 1970s Singapore Army used US-designed M16A1 assault rifles. In 1976, a company called CIS (Charter Industries of Singapore , now ST Kinetics), began to develop its own assault rifle with aim to supply these rifles for singapore military and for foreign countries. To save the time CIS invited some engineers from British company Sterling Armament, who used to manufacture US-designed Armalite AR-18 assault rifle, so new Singapore rifle heavily borrowed from original AR-18 design. First prototypes came out in 1978 and the final design was approved by Singapore military in 1984 under the name of SAR-80. This rifle was used to some extent by Singapore Army and also was exported to some countries, including Croatia.



SAR-80 is a gas operated, selective fire weapon of simple construction. It uses short stroke gas piston that pushes the massive bolt carrier with rotating bolt. The bolt carrier rides on two guide rods. Each rod has a recoil spring around it, gas piston rod has its own return spring. The receiver is made from steel stampings. Pistol grip, handguards and buttstock are made from plastic. SAR-80 uses M16-style magazines. Gas drive has gas regulator that can be cut off completely to safely launch rifle grenades from the muzzle

SIG 516 tactical rifle (USA)

	SIG 516 Patrol	Sig 516 Precision Marksman
Caliber:	5.56x45 NATO / .223 Remington	
Action	Gas operated, short stroke piston, rotary bolt locking	
Overall length	920 ... 947 mm	914 ... 1003 mm
Barrel length	406 mm / 16"	457 mm / 18"
Weight, less magazine	3.3 kg	3.5 kg
Rate of fire (for MIL / LE versions only)	750 - 900 rounds per minute	n/a
Magazine capacity	30 rounds	

The family of SIG 516 Tactical rifles is a most recent product of the US-based branch of the international arms maker SIG-Sauer. Intended primarily for the US markets, this family of weapons included two basic semi-automatic versions, intended for civilian and Law Enforcement markets. The same family also includes selective-fired "assault rifles", strictly intended for Government (LE and Military) use. The SIG 516 Tactical rifles are closely patterned after the Ar-15 / M16 family of rifles, but with certain improvements, such as piston-operated gas action with adjustable gas regulator. It is possible that select-fire version of the SIG 516 rifle will also compete for replacement of the current US Army's M4 carbine.



SIG 516 Patrol rifle

The SIG 516 Tactical rifles are gas operated weapons that use Ar-15 / M16 configuration, with aluminum alloy upper and lower receivers assembled by two captive cross-pins. The basic Ar-15 / M16-style rotary bolt gas operated action is improved with addition of the short-stroke gas piston that runs inside handguards, above the barrel. The gas block is equipped with manually adjustable gas regulator. The trigger unit, manual safety and feed system (magazines, bolt release etc) are also similar to the Ar-15 / M16. The SIG 516 Patrol rifles feature shorter 16 inch barrels and adjustable M4-type buttstocks. The SIG 516 Precision Marksman rifles have longer 18-inch barrels and adjustable 'sniper' stock. In either version, barrels are chrome-lined. The sighting equipments is installed using integral Picatinny rail on the top of the receiver and on the additional 4 rails on the forend.



SIG 516 Precision Marksman rifle

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SIG 716 tactical rifle (USA)

	SIG 716 Patrol	Sig 716 Precision Sniper
Caliber:	7.62x51 NATO / .308 Winchester	
Action	Gas operated, short stroke piston, rotary bolt locking	
Overall length	? mm	? mm
Barrel length	406 mm / 16"	504 mm / 20"
Weight, less magazine	? kg	? kg
Rate of fire	n/a	n/a
Magazine capacity	10 or 20 rounds	

The family of SIG 716 Tactical rifles is a most recent product of the US-based branch of the international arms maker SIG-Sauer. This family reflects current resurrection of the interest toward 7.62mm NATO / .308 Win weapons among US and other NATO troops, currently operating in Afghanistan and Iraq. It also targets to US domestic LE and civilian markets, as the SIG 716 family of rifles includes both Selective-fire (LE/Military only) and Semi-automatic (Civilian legal) guns. The SIG 716 Tactical rifles are closely patterned after the Ar-15 / M16 family of rifles, but are somehow bigger due to the bigger and more powerful caliber, and with certain improvements, such as piston-operated gas action with adjustable gas regulator. The SIG 716 Tactical rifles can be considered to be bigger brothers to the very similar family of SIG 516 tactical rifles, which are chambered for 5.56mm / .223 caliber ammunition. Obviously, it also will compete against such 7.62mm rifles as HK 417, FN SCAR/H Mk.17 and a variety of other 7.62mm Ar-15 / M16 knock-offs. The rifles shown here are prototypes, and it is believed that production rifles will begin to appear on US market not earlier than 2011.



SIG 716 Patrol rifle with EOTech red-dot and back-up iron sights, as displayed at ShotShow 2010

The SIG 716 Tactical rifles are gas operated weapons that use Ar-15 / M16 configuration, with aluminum alloy upper and lower receivers assembled by two captive cross-pins. The basic Ar-15 / M16-style rotary bolt gas operated action is enlarged and strengthened to work with more powerful 7.62mm / .308 caliber ammo and improved with addition of the short-stroke gas piston that runs inside handguards, above the barrel. The gas block is equipped with manually adjustable gas regulator. The trigger unit, manual safety and feed system (magazines, bolt release etc) are also similar to the Ar-15 / M16. The SIG 716 Patrol rifles feature shorter 16 inch barrels and adjustable M4-type buttstocks. The SIG 516 Precision Sniper rifles have longer 20-inch heavy profile barrels and adjustable 'sniper' stock. In either version, barrels are chrome-lined. The sighting equipments is installed using integral Picatinny rail on the top of the receiver and on the additional 4 rails on the forend. Military / LE only selective fire versions feature full-automatic and/or 3-round burst firing modes, civilian SIG 716 rifles will fire only in semi-automatic mode. SIG 716 rifles are compatible with current Armalite AR-10 Gen.2 magazines, which are available in 10- or 20-round capacities.

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SIG SG-540 SG-542 SG-543 assault rifles (Switzerland)

	SIG SG 540	SIG SG 542	SIG SG 543
Caliber	5.56x45mm (.223 Rem)	7.62x51mm (.308 Win)	5.56x45mm (.223 Rem)
Length	950 mm	1000 mm	805 / 569 mm
Barrel length	460 mm	465 mm	300 mm
Weight empty	3.26 kg	3.55 kg	3.0 kg
Magazine capacity	20 or 30 rounds	20 or 30 rounds	20 or 30 rounds
Rate of fire	650-800 rounds/min	650-800 rounds/min	650-800 rounds/min

The SIG SG-540 had been developed by the Swiss company SIG in the mid-1970s as a new, lightweight assault rifle, chambered in then-new small-caliber ammunition (.223 Rem / 5.56mm NATO). The SG-540 was licensed to the Manurhin of France and FAMAE of Chile, and had been temporarily used by French Army (who replaced it with FA MAS rifle in the early 1980s), Portuguese Army and Chilean army, and some other countries, mostly in South America and Africa. 7.62mm NATO version also had been developed, but found no significant sales. The SG-540 itself had not been adopted by Swiss military, but it became the platform for further improvements, which lead to the SIG-550 / Stgw.90 assault rifle. SG-540 currently is in production only by FAMAE company of Chile.



5.56mm SIG SG-540 assault rifle, with fixed butt and optional bipod

Early SIG prototypes, chambered in 5.56mm ammunition and known as SIG SG-530, were using some forms of roller locking, and thus, were too complicated and expensive to make. To make the rifle as cheap and reliable as possible, SIG designers selected the AK-47 style action, gas operated, with gas piston attached to the bolt carrier, and with rotating bolt with two massive lugs. The recoil spring is located around the gas piston rod, and the

bolt carrier attached to the gas piston rod by the removable charging handle. The gas port has gas regulator with two different open and one closed position (latter for firing rifle grenades). The receiver is made from stamped steel and has two major parts, upper and lower, which are connected by pushpins. The barrel is screwed into the upper receiver.



5.56mm SIG-Manurhin SG-540 assault rifle as made in France under license, with side-folding butt

The trigger unit has a safety/fire selector switch on the left side of the receiver, with 3 settings: safe, semi-auto, full-auto. If desired, additional module could be installed in the trigger mechanism to allow 3-rounds burst mode. Rear sights are drum-type (like those found on Heckler-Koch rifles). SG-540 has muzzle compensator/flash hider of NATO-standard diameter, so it is possible to launch rifle grenades from the muzzle. The SG-540 has integral folding bipods under the handguard, and can be issued with fixed plastic buttstock or with side-folding tubular metallic buttstock.



7.62mm SIG SG-542 assault rifle, with fixed butt

The carbine version of the SG-540 is called SG-543 and has shorter barrel. SG-543 can't fire rifle grenades. 7.62mm version of SG-540 is known as SG-542 and visually differs mostly by rectangular magazine of greater depth. SG-542 is chambered for 7.62x51mm NATO ammunition. The civilian version of the SG-540 can fire only in-semi-auto and can be chambered also for .222 Remington cartridge. Other chamberings such as 7.62x39mm Russian (for SG 540) and .243 Winchester (for SG 542) are possible but extremely rare.



5.56mm SIG SG-543 short assault rifle, with side-folding butt

SIG SG-550 SG-551 SG-552 Stgw.90 assault rifles (Switzerland)

	SIG SG 550 / Stgw.90	SIG SG 551 (SG 551 LB)	SIG SG 552
Caliber	5.56x45mm	5.56x45mm	5.56x45mm
Length (stock open / folded)	998 / 772 mm	833 / 607 mm (924 / 698 mm)	730 / 504 mm
Barrel length	528 mm	363 mm (454 mm)	226 mm
Weight empty	4.05 kg w/o magazine	3.3 (3.4) kg w/o magazine	ca. 3.0 kg w/o magazine
Magazine capacity	20 or 30 rounds	20 or 30 rounds	20 or 30 rounds
Rate of fire	700 rounds/min	700 rounds/min	780 rounds/min

In the late 1970s the Swiss army began the search for a new, smaller caliber rifle to replace old, full-power 7.5mm Stgw.57 (SIG 510) automatic rifle. Initial tests were done with the 5.6 x 48 Eiger and 6.5 x 48 GP80 ammunition. Prototype rifles were developed by SIG (based on their SG-540 design) and by the state-owned Waffenfabrik Bern (W+F). However, the Swiss army selected a slightly improved version of the 5.56 x 45 NATO cartridge as the 5.6 mm GP90, and further testing proved the superiority of the SIG SG-541 rifle over its W+F rival. In 1983, the Swiss Army officially adopted the SIG SG-541 as the Sturmgewehr-90, or Stgw.90 although due to financial reasons production began only in 1986. Currently, the Stgw.90 is a standard Swiss service rifle.



SIG SG 550 / Stgw.90 assault rifle, left side view

The Swiss army took its last deliveries of the Stgw.90 in the mid-1990s, but these rifles are still offered for export by the international SIGARMS organization, as well as sold for the civilian market in semi-automatic only versions. In export form this rifle is known as the SIG SG-550. "Carbine" and subcompact "Commando" assault rifle versions are available in the form of SIG SG-551 and SIG SG-552, respectively. Civilian versions of the SIG SG-550 and 551 are known as the Stgw.90 PE in Switzerland or SIG 550-SP and 551-SP when sold for export.

The SIG-550 is often referred as the finest 5.56 mm rifle ever made. It is also, not surprisingly, quite expensive. Recently, SIG Arms has introduced a civilian / law-enforcement offspring of the SG-550, known as SIG 556. This is a semi-automatic rifle, altered to accept M16-type magazines and fitted with "Americanized" furniture.



SIG SG 551 SWAT compact assault rifle for police/special forces use, fitted with Trijicon ACOG scope, tactical light, front grip and cheek rest

Basically, the SIG-550 is a somewhat lightened and refined SIG SG-540/541 rifle. SIG SG-550 is gas operated, with gas piston removably attached to the bolt carrier, and with rotating bolt with two massive lugs. The recoil spring is located around the gas piston rod, above the barrel, and the bolt carrier attached to the gas piston rod by the mean of removable charging handle. The most compact weapon in the line, the SIG SG-552, is similar to SIG SG-551 but it has even shorter handguard and barrel. Due to short barrel and gas piston, SG-552 has return spring relocated to the rear part of the receiver, and thus it has an altered bolt carrier and upper receiver. The gas port has gas regulator with two different open and one closed position (latter for firing rifle grenades). The receiver of all SG-55x series guns is made from stamped steel and has two major parts, upper and lower, which are connected by pushpins. The barrel is screwed into the upper receiver.



SIG SG 551 SWAT short assault rifle for police/special forces use, fitted with Trijicon ACOG scope, tactical light and front grip; modern production version with ful-length Picatinny rail on top and folding iron sights.

The trigger unit has a safety/fire selector switch on the left side of the receiver, with 3 settings: safe, semi-auto, full-auto. If desired, additional module could be installed in the trigger mechanism to allow 3-rounds burst mode. Rear sights are drum-type (like those found on Heckler-Koch rifles). On certain current production models rear sight is replaced with full-length Picatinny style rail with folding back-up rear sight. SIG SG-550 has muzzle compensator/flash hider of NATO-standard diameter, so it is possible to launch rifle grenades from the muzzle. The SIG-550 can be fitted with detachable folding bipods under the handguard, and is issued with side-folding, skeletonized polymer buttstock. Every rifle of SIG SG-550 family can be fitted with proprietary, quick detachable scope mount, although current production rifles are usually fitted with one or more picatinny rails. Swiss Stgw.90 are often seen with 4X fixed power scope, export versions can be equipped with commercial telescope sights, ACOG or "red dot" sights, depending on customer preferences. SIG SG-550 also can be fitted with bayonet. Standard magazine capacity for Swiss military Stgw.90 rifles is 20 rounds, as Swiss tactical doctrine calls for accurate semi-automatic fire, reserving full automatic mode only for emergency purposes. Standard magazines can be clamped together for ease of carry, using integral studs on the magazine walls. For those who might require more firepower, SIG also produces 30-round magazines.



Complete family of SIG 55x rifles, top to bottom: SIG SG 550 / Stgw.90, SIG SG 551-LB SWAT, SIG SG 551 and SIG SG 552 SWAT

The carbine version of the SIG-550 is called SG-551 and has shorter barrel. Quite recently, SIG also introduced a "long barrel" version of the SG-551, which is known as SIG SG-551LB. SIG-551 can't fire rifle grenades.

SIG SG 750 and SG 751 SAPR rifle (Switzerland)

	SIG 751 SB	SIG 751 LB
Caliber:	7.62x51 NATO / .308 Winchester	
Action	Gas operated, long stroke piston, rotary bolt locking	
Overall length	870 / 643 mm	960 / 733 mm
Barrel length	326 mm / 12.8"	416 mm / 16.4"
Weight, less magazine	3.63 kg	3.82 kg
Rate of fire (for MIL/LE versions only)	650 rounds per minute	650 rounds per minute
Magazine capacity	20 rounds	

The SIG SAPR (Semi-Automatic Precision Rifle) was first announced in 2004 by the Swiss-based branch of the international SIG-Sauer arms making company, and, apparently, entered initial production in Switzerland in 2009. Over the development years the SIG SAPR system evolved into two branches - one retained semi-automatic mode of fire and is intended for civilian and law enforcement markets; another is a select-fire battle / assault rifle, which is intended for Military and special Law Enforcement applications only. The SIG SG 751 SAPR rifles are based on the time-proven 5.56mm SIG SG 550 / Stgw.90 family of rifles, with major elements of the action necessarily enlarged and strengthened to handle bigger and more powerful 7.62 NATO / .308 Win ammunition. At the present time, SIG SG 751 SAPR rifles are offered in two military versions (SB - short-barreled and LB-Long Barreled). Civilian versions may have different barrel lengths (currently advertised civilian-legal versions have barrels 455 or 570 mm long) and, obviously, cannot fire in full automatic or burst modes.



Military / LE select-fire SIG SG 751 LB SAPR rifle

The SIG SG 751 SAPR rifle is gas operated, with gas piston removably attached to the bolt carrier, and with rotating bolt with two massive lugs. The recoil spring is located around the gas piston rod, above the barrel, and the bolt carrier is attached to the gas piston rod by the mean of removable charging handle. The gas block is equipped with manual gas regulator with four positions (normal operations / adverse conditions / for use with silencer / shut-off, manual reload). The receiver of the SIG SG 751 SAPR rifle is assembled from two parts - stamped steel upper and aluminum alloy lower, connected by the captive push-pins.



Military / LE select-fire SIG SG 751 SB SAPR rifle, with shoulder stock folded

The controls are ambidextrous, and in MIL / LE versions the combined safety / selector lever has 4 positions - for Safe, Single shots, 3-round bursts and Full-automatic fire. In civilian-legal versions this lever has only 2 positions - for Safe and Fire. Feed is from proprietary 20-round detachable box magazines, made of plastic. Cold-hammer forged barrel can be easily replaced if needed. Barrel is free-floated for maximum accuracy. The sighting equipment is installed on the integral Picatinny rail on the top of the receiver, and normally SIG SG 751 SAPR rifle is provided with back-up iron sights, consisting of folding front sight and drum-type diopter rear sight. The polymer side-folding stock is same as used on the 5.56mm SIG SG 550 / Stgw.90 rifles



Civilian semi-automatic only SIG SG 751 LB SAPR rifle