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Haenel / Schmeisser The "Sturmgewehr" MP 43 MP 44 Stg. 44 assault rifle (Germany)

Caliber: 7.92x33 mm (7.92mm Kurz)
Action: Gas operated, tilting bolt
Overall length: 940 mm
Barrel length: 419 mm
Weigth: 5.22 kg
Rate of fire: 500 rounds per minute
Magazine capacity: 30 rounds

Hitler's Germany was the leading country in the development of the assault rifle. Even the term "assault rifle", is no more than a translation of the German term *Sturmgewehr*, devised for propaganda reasons by no less than Hitler himself (or at least so the legend goes).

MP 43 assault rifle, the first production variant of the Sturmgewehr, left side

Germany began to develop intermediate cartridges during the mid-1930s. There were some developments in 7 mm and 7.75 mm calibre, but Heereswaffenamt (HWaA, or department of armaments), decided to retain the existing rifle calibre of 7.92 mm, to save money on new machinery that would otherwise be required to produce bullets and barrels of a non-standard calibre. The new 7.92 mm "short infantry cartridge" (Infanteriepatrone Kurz), developed by the Polte Werke in 1938, was officially designated the 7.92 mm PP Kurz. It had metric dimensions of 7.92 x 33, considerably shorter and less powerful than the standard 7.92 x 57 rifle / MG cartridge, and propelled a 8.1 g (125 grain) bullet to roughly 680 meters per second.
In 1939 HWaA issued a contract for the development of a "Maschinenkarabiner", or machine carbine (MKb for short), chambered for the new Kurz cartridge, to the company C. G. Haenel Waffen und Fahrradfabrik. Initial development took place under the designation of MKb.42 - Maschinenkarabiner, 1942. The new weapon was intended as a replacement for submachine guns, bolt action rifles and, partly, light machineguns for

front troops and was intended to have an effective range of 600 meters or so. The famous designer Hugo Schmeisser led the Haenel development team, which produced the first working prototypes of new weapon by 1942, known as MKb.42(H).

MP 43 assault rifle, the first production variant of the Sturmgewehr, right side

After extensive combat tests of the MKb.42(H), HWaA asked Haenel for several significant improvements over their initial design. Most notable was the request to replace the submachine-gun like open-bolt firing system with more convenient closed-bolt system, to improve single-shot accuracy. Schmeisser redesigned the weapon accordingly, and by 1943 submitted the improved version to the HWaA. But by this time Hitler had ordered that only existing types should be developed and manufactured, and the Maschinenkarabiner was not on this list. To avoid this nuisance, the Germans decided simply to rename the MKb to the MP, or Machinenpistole (submachine gun), which was on the "approved" list. So, the new and improved weapon received the designation MP-43, and went into limited production and field trials at the front. During the following year, the MP-43 experienced several minor modifications, leading to MP-43/1 and MP-43/2 designations, but these differed only in details such as front sight bases and grenade launcher interfaces.

MP 43 assault rifle partially disassembled

In April 1944 the designation of all MP-43s was changed to MP-44, with no actual changes made to the design. At this time there were plenty of glowing reports from the German troops fighting with MP-43s and MP-44s at the Eastern front. Seeing these reports, Hitler finally approved the mass production and issue of the new *"wunderwaffe"*, and in December 1944 officially christened it the *Sturmgewehr*, or Assault Rifle, 1944 (StG.44) This was a pure act of propaganda, but the name stuck not only to that gun, but also to the whole new class of automatic weapons designed to fire intermediate cartridges.
The total number of MP-43s, MP-44s and StG.44s produced was about 450,000, and these guns proved very effective, but not without some flaws. After the end of the war the direct development of the Stg.44 was stopped, but the East German police used some remaining guns. Another major post-war user of Stg.44 was Yugoslavia; their paratroopers used it under the designation "Automat, padobranski, 7.9 mm M44, nemacki" until the early 1980s, when the Kalashnikov-type M64 and M70 rifles finally replaced it. Yugoslavia also produced 7.92 x 33 Kurz ammunition until the late 1970s.

Stg.44 assault rifle with the Krummlauf Vorsatz J (curved barrel) attachment, which was designed to be fired "around the corner" or from inside the armored vehicle

The StG.44 (like its earlier versions MP.43 and MP.44) is a gas operated, selective fire weapon. The receiver and trigger housing with pistol grip are made from steel stampings, with machined steel inserts. The trigger housing with pistol grip is hinged to the receiver and folds down for disassembly. The gas drive utilizes a long-stroke piston, and the bolt is tipped down to lock into the receiver. The gun is fired from a closed bolt. The MP-43 and subsequent versions all were hammer-fired, while the MKb.42(H) was striker-fired. The safety lever is located at the left side of the pistol grip unit, and a separate cross-bolt type of fire mode selector allows for single-shot and full auto fire. The charging handle is attached to the gas piston rod, and the ejection port has a dust cover. The recoil spring is located inside the wooden butt. At the top of the butt there is container for a cleaning kit, closed by the spring-loaded steel cover. The Stg.44 was provided with open, leaf-type sights, and could be fitted with telescope sights or a specially developed active infrared sighting unit, called "Vampir" (vampire).
The muzzle of the Stg.44 was threaded to accept a cup-like grenade launcher; a special muzzle nut usually covered the threads. The Stg.44 also could be fitted with a special curved barrel attachment ("Krummlauf"), which allowed the gun to be fired "around the

corner" or from inside a tank, without exposing the shooter to the enemy fire. Several types of these attachments were developed, but only one type, the 30-degree "Krummlauf Vorsatz J", was apparently manufactured in any significant numbers. This device had a special mirror sighting adapter and reduced the bullet velocity down to mere 300 meters per second due to the high friction in the curved barrel extension. This apparently did not bother the German Army, since these curved barrel adapters were intended for short-range encounters only.

HK416 modular assault rifle / carbine / upper receiver assembly (Germany)

Caliber: 5.56x45mm NATO
Action: Gas operated, rotating bolt
Overall length (stock collapsed/extended): 10" barrel: 686 / 785 mm; 14" barrel:
Barrel lengths: 10.5" / 267mm; 14.5" / 368mm; 16.5" / 419mm and 20" / 508mm
Weight: 3.31 kg w. 10.5" barrel, 3.5kg w 14.5" barrel
Rate of fire: 700-900 rounds per minute
Magazine capacity: 30 rounds

Following the revision of the OICW Block 1 / XM8 program, the Heckler & Koch company decided to enter the US military and law enforcement markets with the alternative design, which, in fact, looks quite promising. Based on the experience, gained during successful upgrade program of the British SA80 / L85A1 program, HK decided to cure the existing M16 rifles and M4 carbines from most of their problems, inherent to this 40-years old design. The key improvements, made by HK, are their patented short-stroke gas piston system, borrowed from HK G36 rifle. This system replaced the direct gas system of standard M16 rifle, so no powder residue will remain in the receiver even after long shooting sessions. The "new" gas system also is self-regulating and will work reliably with any barrel length. Other improvements include new buffer assembly, improved bolt, and a cold hammer forged barrel, as well as free-floating handguard with integral Picatinny-type rails. Originally developed as a "drop-in" upper receiver assembly for any standard M16/M4 type lower receiver, HK416 is also available as a complete weapon, with HK-made lower receivers. Current (late 2005) models include carbines with 10.5" and 14.5" barrels, and 16.5" barreled carbine and 20" barreled rifle will be added later.

HK416 carbine with 10.5 inch (267mm) barrel

Another interesting development, which is apparently based on the upscaled HK416 design, is the HK417 - the 7.62x51NATO rifle that combines AR-15/M16 type ergonomics, layout and handling with improved reliability of HK-made and designed gas piston system. This rifle probably will use HK G3-type magazines. If the rumors about HK417 are true, the 5.56mm HK416 / 7.62mm HK417 combination will be a direct rival to the newest FN SCAR system.

HK416 carbine with 14.5 inch (368mm) barrel

HK416 is a gas operated, selective fired weapon of modular design. It uses short-stroke gas piston that operates the 7-lug rotating bolt. Receiver is made from high grade aluminium alloy. Combination-type safety / fire selector allows for single shots and full automatic mode. Hk416 retains all M16-style controls, including last round bolt hold-open device, rear-based charging handle and magazine release button on the right side of the magazine well. HK416 is fitted with four Picatinny rails as standard, and may accept any type of sighting devices on STANAG-1913 compliant mounts. It also can accept modified HK AG36/AG-C 40mm grenade launcher, which is clamped directly to bottom rail. Buttstock is of typical M4 design, multi-position telescoped.

IMBEL MD-2 and MD-3 (Brasil)

Caliber: 5.56x45 mm (.223 remington)
Action: Gas operated, rotating bolt
Overall length: 1010 mm (764 mm with folded stock)
Barrel length: 453 mm
Weigth: 4.4 kg
Rate of fire: 700 rounds per minute
Magazine capacity: 20 or 30 rounds

The MD-2 assault rifle was developed by IMBEL (Industria de Materiel Belico do Brasil). Development began circa 1982, first prototype, named MD-1, appeared in 1983 and final version, named MD-2, came out circa 1985 and later was adopted by Brasilian military.
MD-2 started as a simply scaled down FN FAL rifle (manufactured in Brasil under license as IMBEL LAR), but during the design time the FAL locking system (tilting block) was replaced by M16-type rotating bolt. The receiver design is, however, still very similar to FAL.

IMBEL MD-2 rifle (MD-3 rifle in the insert below)

MD-2 is a gas operated, selective fire assault rifle, with rotating bolt locking. Trigger group is mounted into the pistol grip unit, which is hinged to the receiver and folds down and forward for disassembly and maintenance. MD-2 featured side-folding metallic buttstock, MD-3 rifle is similar to the MD-2 but has fixed plastic buttstock. MD-2 uses any M16 style magazines.

IMBEL MD-97 assault rifle (Brazil)

MD-97L
Caliber 5,56x45mm NATO
Overall length 1010 mm (770 mm with butt folded)
Barrel length 437 mm
Weight 3,7 kg rmpty
Magazine capacity 20 or 30 rounds

MD-97LC
Caliber 5,56x45mm NATO
Overall length 850 mm (600 mm with butt folded)
Barrel length 330 mm
Weight 3,3 kg empty
Magazine capacity 20 or 30 rounds

IMBEL MD-97 family of rifles was developed on the basis of earlier IMBEL MD-2 rifles, with certain improvements in parts and overall size. The family consists of two basic models, the selectively-fired MD-97L rifle, which is intended for Brazilian Army's Special Forces, and semi-automatic only MD-97LC carbine, which is intended for police use.

IMBEL assault rifles, top "military" MD-97L, bottom "police" MD-97LC; versions with folding buttstocks

IMBEL MD-97 rifles feature gas operated action with short-stroke piston and rotary bolt locking. The trigger unit and folding or fixed buttstock are same as on earlier 7,62mm Fz MD963 rifles (Brazilian-made copies of Belgian FN FAL rifle). Both rifle and police carbine variants are available with either fixed or folding buttstocks; the military MD-97L also can be fitted with domestically-made 40mm underbarrel grenade launcher or bayonet. MD-97 rifles use M16-compatible magazines.

IMI Galil assault rifle (Israel)

	Galil AR / ARM	Galil AR / ARM	Galil SAR	Galil MAR
Caliber	7.62x51mm NATO	5.56x45mm NATO		
Overall length (stock open / folded)	1050 / 810 mm	979 / 742 mm	840 / 614 mm	690 / 445 mm
Barrel length	535 mm	460 mm	332 mm	195 mm
Weight, empty	4 kg (without bipod an carrying handle)	3.95 kg (4.35 kg ARM)	3.75 kg	2.95 kg
Magazine capacity	25 rounds	35 or 50 rounds		35 rounds
Rate of fire	650 rounds per minute	650 rounds per minute	650 rounds per minute	600 - 750 rounds per minute
Effective range of fire	500 - 600 meters	450 meters	300 meters	150-200 meters

The experience, gained by the Israeli Defense Forces (IDF) during the Six-days war of 1967, showed the deficiencies of the FN FAL rifles, which were the main armament of the IDF infantry. The FAL rifles were too sensitive to fine sand and dust of Arab deserts, and too long and bulky to carry and maneuver. On the other hand, the same war showed the advantages of the Kalashnikov AK-47 assault rifles, used by Arab infantry with great success. After the end of this war IDF decided to develop a new assault rifle, which will eventually replace the FN FAL battle rifles and some of the UZI submachine guns. It was also decided that the new assault rifle should be built around the new American low-impulse cartridge, known as 5.56x45mm. During the late 1960s the IDF tested two rival designs, one of the Uziel Gal, and the other of the Israel Galili. The latter design, based on the Finnish Valmet Rk.62 assault rifle (a license-built AK-47 clone), eventually won the competition and was selected as a new IDF assault rifle in the 1973, but its actual adoption was delayed by the next Israeli-Arab Yom Kippur war of the 1973.

The machinery and documentation package was bought from Valmet and transferred to the state owned Israel Military Industries (IMI) company. There are some rumors that the first production Galil rifles were built on the Valmet-made receivers. The basic Galil rifle later evolved into several configurations, including the full-size 5.56mm AR and ARM assault rifles, compact 5.56mm SAR rifle for the tank and vehicle crews, 7.62mm NATO AR selective fire and 7.62mm NATO semi-automatic Galatz sniper rifle, 5.56mm MAR subcompact assault rifle, also known as Micro-Galil, and some other modifications, like the unsuccessful .30 Carbine Magal police rifle.

Galil ARM 5.56mm. The only differences from the Galil AR are the folding bipod and carrying handle

While being a successful weapon, the Galil was not widely issued to the IDF during its lifetime, because during the late 1960s and early 1970s Israel received large shipments of the US M16 and CAR-15 assault rifles at the very low prices. M16 rifles became the major armament of the IDF, with the Galils mostly issued to the Armored corps, Artillery corps and some units of the Israeli Air Forces. The Galil rifles were exported to the various South American, African and Asian countries. Estonia also received some Galil rifles in the early 2000s. The slightly modified Galil rifle is manufactured by the South African Vektor company, a division of the DENEL. Those models included the R-4 (Galil AR), R-5 (Galil SAR) and R-6 (Galil MAR) assault rifles, and are used by the South African Military. Another offspring of the Galil is the Croatian APS-95 assault rifle. The semi-automatic only versions of the both 5.56mm and 7.62mm Galil AR rifles were widely sold to both domestic and foreign civilian and law enforcement markets.

Galil AR 7.62mm. Note the longer barrel and deeper magazine

In general, the Galil rifles are fine weapons, but somewhat heavy and expensive to manufacture.

Same rifle, with bipods unfolded. Insert shows the left-side fire selector / safety switch with Hebrew markings.

Technical description.

Basically, the Galil assault rifle can be described as a modified Kalashnikov AK-47 design, and a detailed description of its functioning can be found in respective article at this site. The key differences between the Galil and the AK-47 are as follows. The Galil featured a machined steel receivers of the original AK-47 rifles, but of slightly different shape. The AK-47-style safety - selector switch at the right side of the gun is complemented by the additional smaller switch at the left side of the receiver, above the pistol handle. The cocking handle is bent upward, so it can be operated with either hand.

Galil SAR 5.56mm with shorter barrel (with older type brownish color wooden forearm)

The sights of the Galil featured a front hooded post, mounted on the gas block, with the rear diopter sight, mounted on the receiver top cover.

Rear sight is of the flip-up type, with settings for 300 and 500 meters. Additional folding night sights with luminous inserts can be raised into position, which allows to aim the gun in the low light conditions at the ranges of up to 100 meters. The barrel and the flash hider can be used to launch the rifle grenades from the barrel, using the blanc or live cartridges (depending on the rifle grenade type). The Galil ARM also features a folding detachable bipods and a carrying handle. The bipod base incorporates a bottle opener and a wire cutter. The standard folding buttstock is patterned after FN FAL Para, folds to the right to save the space. Some of the late production Micro-Galil (MAR) rifles also are fitted with the Picatinny-type rail, which allows to mount various sighting devices. Standard AR and ARM rifles can be fitted with scope mounting rail on the left side of the receiver. All 5.56mm Galil rifles are fed using proprietary 35 or 50 rounds curved box magazines with AK-47 style locking. M16-type magazines can be used via the special adapter. 7.62mm Galil rifles are fed using proprietary 25 rounds box magazines. Civilian semi-automatic Galil variants sometimes are fitted with 10 rounds magazines to comply with local firearms laws.

Galil MAR 5.56mm, or Micro-Galil. The most modern Galil derivative.

INSAS assault rifle (India)

Caliber: 5.56x45 mm NATO
Action: Gas operated, rotating bolt
Overall length: 945 mm with fixed butt; 960 / 750 mm with folding butt
Barrel length: 464 mm
Weight: 3.2 kg empty
Rate of fire: 650 rounds per minute
Magazine capacity: 20 or 30 rounds

Since late 1950s, Indian armed forces were equipped with 7.62mm NATO L1A1 slef-loading rifles, which were licensed copies of the famous Belgian FN FAL rifle. As the 7.62mm self-loading rifles started to become obsolete by the 1980s, India began to develop the INSAS (Indian National Small Arms System), which incorporated features from several popular foreign designs. The INSAS system was originally planned to have three components - a standard rifle, a carbine, and a squad automatic rifle (LMG), all chambered for 5.56 x 45 NATO ammunition. In 1997 the rifle and LMG were ready for mass production, and in 1998 the first units were observed on an Independence Day parade armed with INSAS rifles. The mass introduction of the INSAS rifle was initially delayed by the lack of the domestically made 5.56 mm ammunition and India accordingly bought significant stocks of ammunition from the Israeli IMI company. At the present time at least 300,000 INSAS rifles are in service with the Indian army; some of these have seen action in Indo-Pakistani conflict. The INSAS rifles are made by the Ishapore Rifle Factory.

The INSAS rifle is broadly based on the famous Kalashnikov AK-47 action, but with many modifications. The basic gas-operated action with long stroke gas piston and a rotating bolt, as well as the stamped steel receiver, are generally the same as in modern Kalashnikov rifles. However, the gas system is fitted with a manual gas regulator, similar in design to that found on FN FAL rifles, as well as a gas cutoff. The charging handle has been moved from the bolt carrier to the left side of the forearm; it is similar in position and design to German HK G3 rifle. The selector / safety switch is located at the left side of the receiver, above the pistol grip, and allows for single shots and three round bursts. The rifle is fitted with a side-folding carrying handle, and either a solid or side-folding metal buttstock. Furniture can be made from wood or polymer. Standard magazines are made from semi-translucent polymer and contain 20 rounds. Longer 30-round magazines of similar design are available for the INSAS LMG but can also be used in the rifle. The sights consist of a hooded front, mounted on top of the gas block, and a diopter rear, mounted on the receiver cover. The flash hider is shaped to accept NATO-standard rifle grenades. INSAS rifles can be fitted with AKM-style multipurpose knife-bayonets.

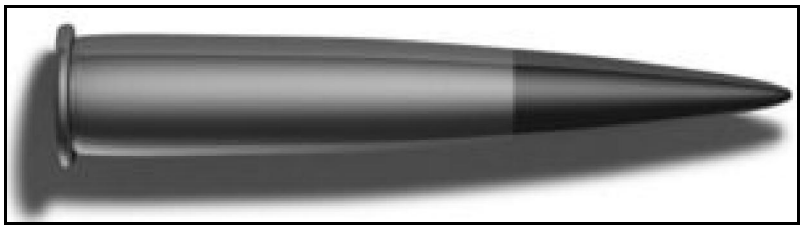
Interdynamics MKR assault rifle (Sweden)

Caliber: 4.5x26 mm Rimfire (special ammunition)
Action: blowback
Overall length: 840 mm
Barrel length: 600 mm
Weight: 3.0 kg less magazine
Rate of fire: *no data*
Magazine capacity: 50 rounds

The Interdynamics MKR assault rifle was another unsuccessful and unconventional design of the Swedish company Interdynamics AB. Interdynamics MKR assault rifle appeared during 1980s on the top of the "micro-caliber" craze. The idea behind micro-caliber (less than 5 millimeters / .20 inch) ammunition was to achieve high velocity, flat trajectory and good penetration in automatic weapon, and with low recoil. The Interdynamics cartridge was based on .22 Winchester Magnum Rimfire cartridge case, with curved taper and 4.5mm / .177" caliber pointed bullet, made of solid brass. Lightweight bullet (1.58 g / ~24.4 grain) achieved a muzzle velocity of about 1000 m/s (3270 fps). The effectiveness of this bullet was claimed to be on par with 5.56x45mm bullet at the ranges up to 300 meters. Unsurprisingly, the stopping power of such tiny bullet was questionable at its best, and use of rimmed, rimfire ammunition obviously compromised the reliability of the rifle. As a result, Interdynamics MKR assault rifle remained only in prototype stage.

Interdynamics MKR assault rifle

Because of the relatively low power of this ammunition, the MKR gun was made using simple blowback system. Rimmed ammunition was fed from semi-circular magazines, located behind the pistol grip, so the overall layout can be classified as bullpup. Ambidextrous charging handle was located at the top of the plastic receiver. Carbine version of the MKR rifle was similar in design, but had shorter barrel.



Schematic drawing of the 4.5 mm rimfire cartridge for Interdynamics MKR assault rifle

Interdynamics MKS assault rifle (Sweden)

	MKS rifle	MKS carbine
Caliber	5.56x45 mm	
Action	Gas operated, rotating bolt	
Overall length (butt open / folded)	868 / 634 mm	751 / 517 mm
Barrel length	467 mm	350 mm
Weight	2,75 kg	2,36 kg
Rate of fire	750 - 1100 rounds per minute	
Magazine capacity	30 rounds	

The Interdynamics AB company of Sweden attempted to enter an assault rifle market with its MKS rifle in mid-1970s. The Interdynamics MKS assault rifle was more or less conventional in respect to materials and technologies, but layout was not conventional, with box magazine serving as a pistol grip. This layout resulted in shorter overall length when compared to conventional rifles with the same barrel lengths, but seriously compromised ergonomics. Because the standard 5.56mm magazine is significantly deeper 9front to back) than a typical pistol grip, the firing hand's hold and a trigger reach were far from being comfortable. The MKS rifles never were made in any quantities and deserved its place in firearm history more as a curiosity than anything else.

The Interdynamics MKS assault rifle (top, with buttstock unfolded) and MKS carbine (bottom, with buttstock folded)

The Interdynamics MKS assault rifle was a gas operated selective fired weapon with rotating barrel locking. Gas system featured a gas regulator. The receiver was made from stamped sheet steel, magazine housing served as a pistol grip. The skeletonized buttstock folded to the right side to save the space. The L-shaped flip-up rear sight has two range settings, for 250 and 400 meters. Carbine version of MKS rifle featured shorter barrel, otherwise being similar to rifle version.

Kalashnikov AK-74, AKS-74 and AK-74M assault rifles (USSR / Russia)

	AK-74	AKS-74	AK-74M
Caliber:	5.45x39 mm		
Action	Gas operated, rotating bolt with 2 lugs		
Weight, empty	3.07 kg	2.97 kg	3.4 kg
Length:	940 mm	940 / 700 mm	942 / 704 mm
Barrel length	415 mm		
Rate of fire	600 - 650 rounds per minute		
Magazine capacity	30 rounds standard		

The idea of the reduced caliber ammunition for military shoulder arms was played with for a very long time. Each time the technology leaped forward, the standard calibers were reduced - from the 0.45 - 0.50 inch (11.4 - 12.7mm) of the mid-1800 to the .30 of the mid-1900s. The idea of further reduction of the caliber down to 6.5 - 5.6 mm (.240 - .220 inch) was also considered in many countries since the beginning of the XX century, but it was not until the 1960s when the idea of the low impulse, small-caliber, high velocity round came up to something real. When US Army adopted the M16 rifle in the mid-1960s, everybody else eyed Americans with interest. And as soon as the idea of small caliber rifle was found worthwhile, the total rearming began.

Experimental Kalashnikov 5.45mm assault rifle, ca. 1970

Soviet army started the development of its own small-caliber ammunition in the early 1960s. After some years of development, a new round was created. This round featured a bottlenecked, tapered case 39mm long made of steel, loaded with slim, relatively long bullet with nominal caliber of 5.45mm (actual bullet diameter is 5.62 mm). The bullet featured a combined steel and lead core with the hollow nose, muzzle velocity from the 415mm barrel was about 900 m/s. It must be noted that the new 5.45mm ammunition featured a new case of smaller diameter (compared to 7.62x39 M43 cartridges); this allowed for lighter round and also solved the problem of loading of the 7.62mm

ammunition into the 5.45mm weapon by mistake (which otherwwise might result in a catastrophical failure of the weapon).
As soon as the new ammunition was available and accepted by the Soviet Military, it was decided to develop a new family of small arms around this cartridge, and an official requirements for new family of small arms were issued to all development organizations in 1966. Trials of new weapons commenced in 1968, and it must be note that most rifles, submitted for trials, were of highly advanced designs, as the main goal of the new weapon was to significantly improve hits probability (compared to 7.62mm AKM rifles). Most weapons were build using so called "balanced action", in which additional mass is added to the action to counter-recoil synchronously with the bolt group, to minimize its effect on the gun stability. About the only weapon of the more or less conventional design was the entry by Kalashnikov team - this was more or less the old AKM rifle, adapted for new 5.45mm ammunition.

Experimental Konstantinov SA-006 assault rifle, ca. 1970

After extensive and torturing tests two weapons were put forward for extended troop trials - the conventional A-3 assault rifle by Kalashnikov and 'balanced action' SA-006 rifle by Konstantinov. During field trials the latter was found to be much more accurate (and thus more combat-effective), especially in the hands of the average trained soldiers, while being adequately reliable. Despite that, trials commission have recommended the Kalashnikov entry for adoption, as its design was already familiar to both industry and troops, and possibility of teething problems during production and use was relatively low, compared with entirely new design by Konstantinov. New Kalashnikov rifle also was simpler in design, lighter and somewhat cheaper to manufacture.

AK-74 5.45mm assault rifle

Following the decision of trials commission, Kalashnikov 5.45mm assault rifle was officially adopted by Soviet army early in 1974 as" *5.45mm Avtomat Kalashnikova, obraztsa 1974 goda (AK-74)*". Basically, it was the same old AKM weapon, adapted to smaller 5.45mm ammunition and fitted with relatively large muzzle brake. Another distinguishing feature was found on the buttstock, in the form of two lightening oval cuts on either side. The folding butt version, known as AKS-74, which was intended for airborne troops, also featured a new type of folding buttstock - instead of the earlier pattern of underfolding stock, found on 7.62mm AKMS rifles, the AKS-74 featured more rigid and robust side-folding metallic buttstock, which folded to the left side of the gun.

AK-74 rifle of the late production, with black plastic furniture and the new pattern bayonet

Early production guns featured polymer pistol grips and wooden buttstocks and handguards. Later in production all furniture was made from polymer The "Night" version, known as AK-74N, was manufactured with the night /IR scope rail added to the left side of the receiver. The latest variation of the AK-74 family was introduced circa 1991 and replaced in production both AK-74 and AKS-74. It was the AK-74M rifle, which is still in production and currently is a standard issue rifle of the Russian army.

AKS-74. Folding butt version for the airborne troops

The AK-74M externally differs from the AK-74 of late 1980s production by having the side-folding, solid black plastic buttstock and the scope rail, mounted on the left receiver as as a standard. Some minor improvements also were made in the production process and external finish of the new rifle. AK-74M retained almost all advantages and disadvantages of the earlier Kalashnikov designs, including reliability, simplicity of operations and maintenance, and less than ideal "human engineering" and ergonomics. At the present time the AK-74M, along with earlier AK-74/AKS-74 is the standard shoulder arm of the Russian Army. The plans of replacing it with the widely advertised Nikonov AN-94 assault rifle were not carried out to any significant extent - the AN-94 is (and

most probably will be) issued only certain "elite" units of the Russian Army, police and the Internal Affairs Ministry troops. The AK-74 type, 5.45mm assault rifles also were manufactured in the East Germany, Bulgaria, Poland and Romania. Most of these designs after the dissolution of the Warsaw Pact were converted to the 5.56mm NATO ammunition.

AK-74M. The latest variant, issued to the Russian troops since early 1990s. Key differences from the earlier AK-74 rifles are the side-folding plastic buttstock and the scope mounting rail on the left side of the receiver.

AK-74M with GP-30 40mm grenade launcher installed

The standard issue '7N6' 5.45x39mm ammo (note lacquered steel case and slim, long bullet)

AK-74M with buttstock folded

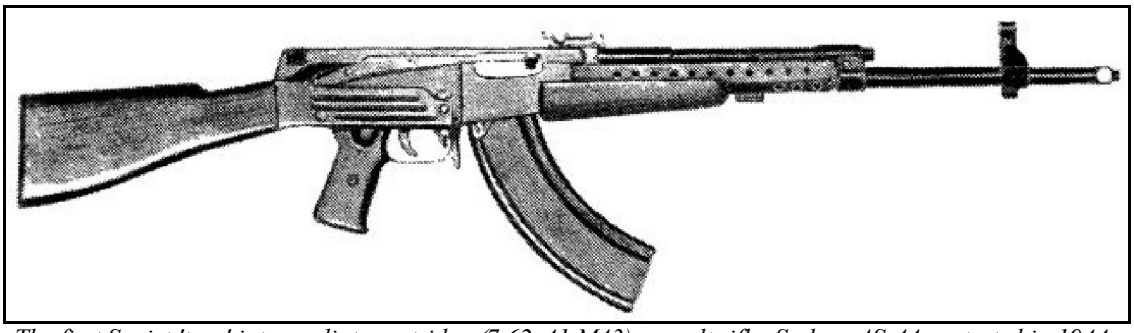
Kalashnikov AK (AK-47) AKS, AKM and AKMS assault rifles (USSR)

Caliber 7.62x39 mm
Action: Gas operated, rotating bolt with 2 lugs
Overall length: 870 mm
Barrel length: 415 mm
Weight, with empty magazine: AK 4,3 kg; AKM 3,14 kg
Magazine capacity 30 rounds (40 rounds box magazines and 75 rounds drums from RPK also may be used)
Cyclic rate of fire 600 rounds per minute

The Kalashnikov assault rifle, also known to the West as the AK-47 (*Avtomat Kalashnikova - 47*, Kalashnikov automatic rifle, model of 1947), and its derivatives, also known under the common name of AK, is the most prolific small arm of the 2nd half of the XX century. It had been and still is (in more or less modified form) manufactured in dozens of countries, and used in hundreds of countries and conflicts since its introduction. The total number of the AK-type rifles made worldwide during the last 60 years is estimated at 90+ millions. This is a true legendary weapon, known for its extreme ruggedness, simplicity of operation and maintenance, and unsurpassed reliability even in worst conditions possible. It is used not only as a military weapon, but also as a platform for numerous sporting civilian rifles and shotguns (see Saiga semiautomatic shotguns, for example). The AK is an amalgam of previously known features and solutions, combined in the most effective way. The effectiveness, however, depends on the criteria used to measure it, and the key criteria for any and every Soviet and Russian military arm are: Reliability, Simplicity of operation and maintenance, Suitability for mass production. There never was any significant demand for good ergonomics or superb accuracy, though.

The true story of AK began late in 1942, when Soviet troops captured several specimen of the very new German MKb.42(H) machine carbine (assault rifle), along with some

7.92 Kurz ammunition. By mid-1943 the MKb.42(H) along with US-supplied M1 carbine were evaluated by Soviet experts, and it was decided on top level that similar weapons, firing the intermediate power cartridge, must be developed for Soviet army as soon as possible. The task of initial development of new ammunition was accomplished in rather short time. By November 1943 technical specifications for the 7.62x41mm cartridge, having bottlenecked, rimless case and firing 8-gram pointed bullet, were sent out to all Soviet small arms design bureaus and organizations.



The first Soviet 'true' intermediate cartridge (7.62x41 M43) assault rifle, Sudaev AS-44, as tested in 1944. Unfortunately, Sudaev fell severely ill in 1945 and died next year before finalizing his design

By the spring of 1944, there were at least ten designs of automatic weapons in the works (not counting semi-automatic carbines that resulted in adoption of SKS and bolt-action carbines that went nowhere). In mid-1944, trials commission selected the AS-44 assault rifle, designed by Sudaev, as the overall best, and ordered a limited production run for troops trials. Some AS-44 rifles were manufactured in spring of 1945, and these were evaluated by troops in summer of 1945, just after the Victory in Europe. Troops generally liked the AS-44, as it has longer effective range compared to PPSh-41 submachine gun, and provided better accuracy in semi-automatic fire. The problem was that AS-44 was overly heavy (more than 5 kg empty), and trials commission ordered next round of development and trials, which started early in 1946.

Tokarev 7.62x41 experimental assault rifle, as tested in late 1945

Enter Mikhail Kalashnikov, the young sergeant of Soviet tank forces, who, after being wounded in combat in 1942, designed a prototype submachine gun while on medical leave. His first weapon was rejected on the grounds of complexity, but the designer himself was assigned to the Red Army's Small Arms and Mortar Research & Proving

ground (NIPSMVO) near the Moscow to continue his education and work on other weapons. Here Kalashnikov designed a semi-automatic carbine, heavily influenced by American M1 Garand rifle. This carbine, while not successful by itself, served as a starting point for the first Kalashnikov's assault rifle, provisionally known as AK No.1 or AK-46. In November of 1946 the AK-46 project was chosen for prototype manufacture along with 5 other projects (out of 16 submitted to commission), and Kalashnikov was sent to the city of Kovrov (also not far from the Moscow), to manufacture his weapon at the small arms factory there. The AK-46 was gas operated, rotary bolt weapon that utilized short-stroke gas piston above the barrel, and two-part receiver with separate trigger unit housing and dual controls (separate safety and fire selector switches on the left side of the trigger unit).

The first Kalashnikov assault rifle prototype of 1946, also known as AK-46. Note that it had numerous internal and external differences from the later models, including separate safety and fire mode selector switches, as well as non-reciprocating charging handle, all located on the left side of the weapon

In December 1946 new assault rifles were tested at NIPSMVO range, with AS-44 being used as a control (its development has ceased earlier in 1946 due to untimely death of the Sudaev, who was severely ill by the 1945). As an initial result of these tests, the AK-46 was selected for further development by trials commission, with two more weapons selected for further evolution being rifles from designers Dementiev and Bulkin. The second round of trials, which included three weapons (AK-46 by Kalashnikov, AB-46 by Bulkin and AD by Dementiev), resulted in rejection of the improved AK-46, which was inferior to other rivals in many aspects. Despite that failure, Kalashnikov, using his contacts and support from some member of trials commission (whom he knew from his earlier work at NIPSMVO in 1943-46) pursued the head of the trials commission to review the results, and finally got a green light to continue his development for next round of trials. Following the technical failure of the AK-46, Kalashnikov and his companion designer Zaitsev (who was a staff weapons designer at Kovrov plant) decided to completely rework the design, using successful technical solutions borrowed from various weapons, including direct competitors. For example, the long-stroke gas piston, attached to the bolt carrier, along with captive return spring assembly and receiver cover were apparently inspired by Bulkin's AB-46 rifle; the idea of large clearances between bolt group and receiver walls, with minimum friction surfaces, was inspired by the

Sudaev's AS-44, the safety / dust cover lever was copied from Browning designed Remington model 8 hunting rifle etc.

AK-46 prototype disassembled

It must be noted here, that such copying and borrowing of ideas was actually encouraged by the trials commission (and the whole Soviet ideology), as all intellectual property in USSR was considered to be property of 'the people', or the state. Thus, any state-owned intellectual property could (and must) have been used to the benefit of the people / the state by anyone. And creating a new, most effective assault rifle for the victorious Soviet army was certainly on the top of the list of things, beneficial for the Soviet state at the time.

The Bulkin AB-46 experimental assault rifle, which greatly influenced the AK-47

After extensive tests, conducted in December 1947 - January 1948, which included slightly improved Dementiev KB-P-410, Bulkin TKB-415 and all-new Kalashnikov AK-47 rifles, results were somewhat inconclusive. The AK-47 was found to be most durable and reliable out of three contestants, but it also dragged behind the other two in the accuracy department, especially in full automatic (which was, and still is considered the

primary mode of fire for assault rifle in Russia). In fact, the only weapon that fulfilled accuracy requirements was the Bulkin AB-47 / TKB-415, but it had certain problems with parts durability. After lengthy discussion, trials commission finally decided that the better is the enemy of the good, and it is advisable to have not-so accurate but reliable weapon now, rather than to wait indefinitely for accurate-and -reliable weapon in the future. This decision ultimately lead commission to recommend AK-47 for troops trials in November, 1947. It was decided that the production of the new weapon must be commenced at Izhevsk arms plant (now Izhevsk Machine building Plant or IzhMash in short). Kalashnikov has moved from Kovrov to Izhevsk to help with production of the new weapon, which commenced in mid-1948. Official adoption followed late in 1949, with standard nomenclature being '*7.62mm avtomat Kalashnikova AK*' (7.62mm automatic carbine Kalashnikov). At the same time, a folding buttstock version was adopted for airborne units use, as '*7.62mm avtomat Kalashnikova skladnoy AK*S' (7.62mm automatic carbine Kalashnikov, folding).
It must be noted that the original design of the receiver, which was assembled from stamped steel 'box' with large machined steel insert pinned at the front, caused a lot of troubles at factory. The technology (equipment and labor) level of the time resulted in extremely high percentage of rejected receivers due to misformed walls, improper pinning of parts, bad geometry etc. After critical revision of the process at the factory it was calculated that it will be more economically feasible to return to the 'old-school' machined receivers. New, machined receiver was designed by one of factory's staff designers, and after approval by military, it was put into production at IzhMash in 1951, under the same basic designation.

The experimental Kalashnikov assault rifle of 1947, also known as AK-47, first model

Through the following years, design of AK incorporated many minor changes and updates, but it was the experimental Korobov TKB-517 assault rifle (tested by Soviet army in mid-fifties) that spurred further development of AK. The Korobov TKB-517 assault rifle was a great deal lighter than AK, about 1/3 cheaper to manufacture, and significantly more accurate in full automatic fire. This lead the Soviet army to issue new requirements for a lighter and more effective assault rifle, which were formulated in 1955. These requirements were also complemented by requirement for a companion squad automatic / light support weapon (light machine gun in Russian nomenclature).

Trials for new weapons were held in 1957-58. Kalashnikov team from Izhevsk submitted an improved AK with new type of stamped receiver and other minor improvements, which competed against a number of weapons from other design teams from the Kovrov and Tula. In technical terms, the Kalashnikov entry fared about average in these trials, with certain rival weapons proving to be more combat-effective and less expensive to make. The trials commission, however, decided again that the better is the enemy of the good, and recommended the improved AK for adoption due to its proven performance and familiarity to the industry and troops. It was officially adopted in 1959 as the AKM (*Avtomat Kalashnikova Modernizirovannyj* - Kalashnikov Automatic rifle, Modified) along with companion RPK squad automatic weapon / light machine gun.

Bulkin AB-46 experimental assault rifle, partially disassembled.

The key changes in AKM, as compared to AK, were the introduction of the stamped steel receiver instead of the milled one, and improved trigger/hammer unit, with added hammer release delay device (often incorrectly referred as a rate reducer). Other changes were the redesigned, slightly raised buttstock and the pistol grip, and the addition of the removable muzzle flip compensator. This spoon-like compensator is screwed onto the muzzle and utilized the muzzle blast to reduce muzzle climb during the automatic fire. The compensator could be replaced by the screw-on "PBS-1 noiseless firing device", generally known as a silencer. This silencer requires a special, sub-sonic ammunition with heavier bullets to be used. Another change from AK to AKM was a slightly improved rear sight, with settings from 100 to 1000 (instead of the 800 on AK) meters. Both 800 and 1000 meters, however, are way too optimistic for any practical use, since the effective fire is limited roughly to 300-400 meters, if not less.

In the 1974, Soviet Army officially adopted the 5.45mm ammunition and the appropriately chambered AK-74 assault rifle as its new standard shoulder arm. The AKM, however, was never officially declared obsolete and removed from service, and is still in Russian army stocks. Some non-infantry units of the Russian Army are still armed with 1960s vintage AKM assault rifles. There's also an increasing interest in the 7.62mm weapons since many troops were disappointed by the effectiveness of the 5.45mm ammo

during the local conflicts in the 1990s. Some Russian special forces troops (mostly police and Internal Affairs Ministry), currently operating in Chechnya, are using the venerable 7.62mm AKM rifles.

The experimental Kalashnikov assault rifle of 1947, also known as AK-47, first model, disassembled

The AK and AKM rifles were widely exported to the pro-Soviet countries and regimes all around the world. Manufacturing licenses along with all necessary technical data packages were transferred (for free or at nominal fee) to many Warsaw Pact countries (Albania, Bulgaria, China, East Germany, Hungary, North Korea, Poland, Romania, Yugoslavia). Certain 'non-communist', but friendly countries, such as Egypt, Finland and Iraq, also received manufacturing licenses.

The experimental Kalashnikov assault rifle of 1947, also known as AK-47, second model (note that it has a small muzzle brake / compensator)

At the present time, despite the world-wide proliferation of the small-bore (5.56 / 5.45mm) weapons, many companies still manufacture 7.62mm assault rifles for military or police use (for example, there's an AK-103, made in limited numbers by the IZHMASH in Russia). Also, production of the semi-automatic only civilian AK

derivatives is continued in many countries, including Russia, Bulgaria, Romania, China and others.

Early production / issue Kalashnikov AK rifle, as manufactured between 1949 and 1951, with stamped receiver and early type slab-sided magazine

Technical description for the AKM assault rifle:
The AKM is a gas operated, selective fire assault rifle.

The gas operated action has a massive bolt carrier with a permanently attached long stroke gas piston. The gas chamber is located above the barrel. The bolt carrier rides on the two rails, formed on the receiver walls, with the significant clearances between the moving and stationary parts, which allows the gun to operate even when its interior is severely fouled with sand or mud. The rotating bolt has two massive lugs that lock into the receiver. Bolt is so designed that on the unlocking rotation it also makes a primary extraction movement to the fired case. This results in very positive and reliable extraction even with dirty chamber and cases. The rotation of the bolt is ensured by the curved cam track, machined in the bolt carrier, and by the appropriate stud on the bolt itself. The return spring and a spring guide are located behind the gas piston and are partially hidden in its hollow rear part when bolt is in battery. The return spring base also serves as a receiver cover lock. The cocking handle is permanently attached to the bolt carrier (in fact, it forms a single machined steel unit with carrier), and does reciprocate when gun is fired.

Post-1951 production Kalashnikov AK rifle with milled receiver and bayonet attached, right side

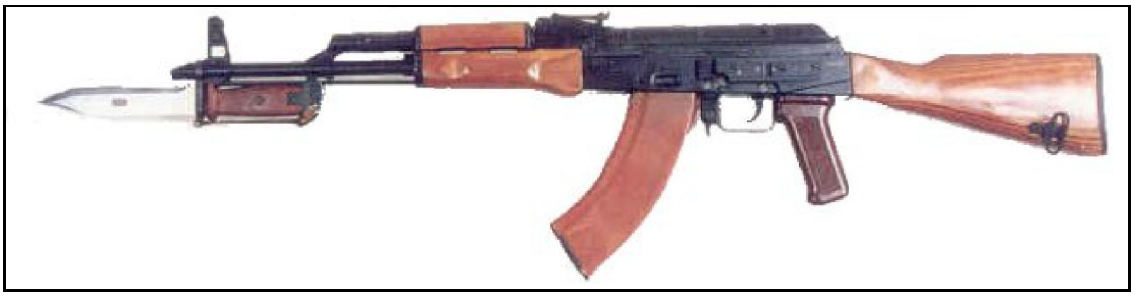
The receiver of the AKM is made from the stamped sheet steel, with machined steel inserts riveted into the place where required. Earliest AK-47 receivers were also made from the stamped and machined parts, riveted together, but this soon proved to be unsatisfactory, and most of the AK (made between 1951 and 1959) rifles were made with completely machined receivers. The receiver cover is a stamped sheet metal part, with stamped strengthening ribs found on the AKM covers.

Post-1951 production Kalashnikov AK rifle with milled receiver and bayonet, left side

The relatively simple trigger/hammer mechanism is loosely based on the 1900's period Browning deigns (much like the most other modern assault rifles), and features a hammer with two sears - one main, mounted on the trigger extension, and one for the semi-automatic fire, that intercepts the hammer in the cocking position after the shot is fired and until the trigger is released. Additional auto sear is used to release the hammer in full auto mode. The AKM trigger unit also featured a hammer release delay device, which is served to delay the hammer release in the full auto fire by few microseconds. This does not affects the cyclic rate of fire, but allows the bolt group to settle in the forwardmost position after returning into the battery. The combined safety - fire selector switch of distinctive shape is located on the right side of the receiver. In the "Safe" position (topmost) it locks the bolt group and the trigger, and also served as a dust cover. The middle position is for automatic fire, and the bottom position is for single shots. The safety / fire selector switch is considered by many as the main drawback of the whole AK design, which is not cured in the most of derivatives until now. It is slow, uncomfortable and sometimes stiff to operate (especially when wearing gloves or mittens), and, when actuated, produces a loud and distinctive click. There's no bolt stop device, and the bolt always goes forward when the last shot from the magazine is fired.

Kalashnikov AK rifle with PBS silencer, as used by Soviet Spetsnaz

AKM is fed from the 30 rounds, stamped steel magazines of heavy, but robust design. Early AK magazines were of slab-sided design, but the more common AKM magazines featured additional stamped ribs on the sides. Positive magazine catch is located just ahead of the trigger guard and solidly locks the magazine into the place. Insertion and the removal of the magazine requires slight rotation of the magazine around its front top corner, that has a solid locking lug. If available and required, a 40 round box magazines of similar design, or the 75 rounds drums (both from the RPK light machine gun) can be used. Late in production plastic magazines of the distinctive reddish color were introduced.



Kalashnikov AKMN rifle (Modernized, with Night sight mounting bracket on the left side of receiver), with muzzle compensator installed

AKM rifles were issued with wooden stocks and pistol handles. Late production AKM rifles had a plastic pistol grip instead of wooden one. The wooden buttstock has a steel buttplate with mousetrap cover, that covers the accessory container in the butt. The AK buttstock are more swept-down than the AKM ones. The folding stock version had been developed for the airborne troops and its had an underfolding steel shoulder stock. These modifications of the AK and AKM were designated the AKS and AKMS, respectively. AK were issued with the detachable knife-bayonets, and the AKM introduced a new pattern of the shorter, multipurpose knife-bayonet, which can be used in conjunction with its sheath to form a wire-cutter. All AK and AKM rifles were issued with the canvas carrying slings.

Kalashnikov AKM (modernized) rifle, with stamped receiver and new type of knife / bayonet

The sights of the AKM consist of the hooded front post and the U-notch open rear. Sights are graduated from 100 to 1000 (800 on AK) meters, with an additional "fixed" battle setting that can be used for all ranges up to 300 meters.

Kalashnikov AKMS - AKM with folding buttstock

AKM rifles also can be fitted with the 40mm GP-25 grenade launchers, that are mounted under the forend and the barrel. Grenade launchers had its own sights on the left side of the unit.

AKM with GP-25 40mm underbarrel grenade launcher

Kalashnikov AK-9 compact assault rifle (Russia)

Caliber: 9x39 mm SP-5, SP-6
Action: Gas operated, rotating bolt
Overall length: 465 / 705 mm; 646 / 881 mm with silencer
Barrel length: ?
Weight: 3,1 kg with empty magazine, 3.8 kg with silencer installed
Rate of fire: ? rounds per minute
Magazine capacity: 20 rounds

The AK-9 is the most recent addition to the line of the Russian-made weapons, built for the family of the sub-sonic 9x39 ammunition, which includes SP-5 ball and SP-6 armor-piercing rounds. The AK-9, developed by the Izhevsk Machine building plant (IzhMash, the home of Kalashnikov assault rifles) is intended to compete with already established weapons such as AS silenced assault rifle and 9A-91 and SR-3M multipurpose compact assault rifles. The AK-9 is intended for use by special elements of the Russian army (recon troops) and by various Law Enforcement agencies, engaged in anti-terror, anti-drug and anti-organized crime operations.

Kalashnikov AK-9 compact assault rifle

The AK-9 is based on the so-called "hundred series" of Kalashnikov assault rifles, such as AK-104, but with certain improvements. It features same tried and proven gas operated, rotary bolt action and same "Kalashnikov-style" controls including reciprocating bolt handle, safety/fire selector lever and overall layout with side-folding polymer buttstock. Polymer furniture is improved with addition of the accessory Picatinny rails on the bottom of the forend, and the left side of receiver is fitted with Russian-standard scope rail. Barrel can be fitted with specially designed quick-detach silencer (sound moderator), which is especially effective with 9x39 subsonic ammunition. Magazine is made of black polymer, holds 20 rounds of ammunition and appears to be of

proprietary design, not compatible with other (competing) weapons of the same caliber, which are already in service with Russian military and law enforcement.

Kalashnikov AK-9 compact assault rifle

Kalashnikov AK-101 assault rifle (Russia)

Caliber: 5.56x45 mm NATO
Action: Gas operated, rotating bolt with 2 lugs
Length, mm: overall: 943; w/folded stock: 700;
Barrel lenght: 415 mm
Weight: 3.4 kg empty
Rate of fire: 600 rounds per minute
Magazine capacity: 30 rounds

The AK-101 assault rifle is an export version of the 5.45mm Kalashnikov AK-74M assault rifle. The main difference between AK-101 and AK-74M is in ammunition used - the AK-101 is chambered for 5.56x45mm NATO ammunition. Otherwise it is basically the same as the AK-74M, which is current standard issue rifle of the Russian army.

Kalashnikov AK-101 assault rifle with 40mm GP-30 underbarrel grenade launcher

Kalashnikov AK-103 assault rifle (Russia)

Caliber: 7.62x39 M43
Action: Gas operated, rotating bolt with 2 lugs
Length, mm: overall: 943; w/folded butt 700;
Barrel Length, mm: 415
Weigth: 3.4 kg empty
Magazine capacity, 30 rounds
Rate of fire: 600 rounds per minute

The Kalashnikov AK-103 assault rifle is a modification of the current Russian standard issue AK-74M rifle for older 7.62x39mm ammunition. It is primary intended for export, although it is belived that few AK-103 are in use by various Russian special Law Enforcement groups, which prefer 7.62mm over 5.45mm for its better stopping power. So far the biggest buyer for AK-103 assault rifles was the Venezuela, which in 2006 bought 100,000 AK-103 rifles and is sintent to purchase the manufacturing license and necessary equipment for domestic production of this weapon.

The AK-103 is technically similar to AK-74M except for caliber and magazines used; any 7.62mm AK / AKM type magazine can be used in AK-103, but rifles now are issued with new production 30-round magazines made of black polymer.

Kalashnikov AK-107 and AK-108 assault rifle (Russia)

Caliber: 5.45x39mm (5,56x45NATO for AK108)
Action: Gas operated, rotating bolt with 2 lugs, balanced bolt-carrier/bolt group to reduce recoil jumping
Length: 943 / 700 mm
Barrel lenght: 415 mm
Sighting range,m: 1000
Weigth: 3.8 kg empty
Magazine capacity: 30 rounds
Rate of fire: 850 (900 for AK108) rounds per minute

During 1960s and 1970s Soviet gun designers tried several approaches to improve hit probability of the standard infantry rifle, when firing in bursts / full automatic mode (which is primary mode of fire for ordinary infantry troops as per Soviet and Russsian field manuals and practice). One of such approaches is known as a “balanced action”. First developed during late 1960s by designers Alexandrov and Paranin in Izhevsk, and by Tkachev in Klimovsk, this system used a counter-mass to compensate the recoil impulse, generated by massive bolt group, slamming against the receiver in its rearmost and forwardmost position during the reloading cycle. The counter-mass is linked with second gas piston and moves in opposite direction to bolt group. Synchronization is achieved using a simple rack and pinion system. In this system, only the impulse of the fired cartridge is transferred to the receiver, and through the buttstock to the shoulder of the shooter. The impulses of the heavy and fast-moving bolt group are compensated by the counter-mass, and do not affect the shooting, unlike the AK where the moving bolt group produces a lot of additional recoil and vibration. The “balanced system” was employed in the AKB rifle, developed by V.M. Kalashnikov (son of the famous Mikhail Kalashnikov) in Izhevsk, and in the AEK-971 rifle, developed in Kovrov, both unsucessfully tested during "Abakan" trials of late 1980s.

AK-107 assault rifle

Despite the failure of both designs in the army trials, development was continued, with intention to produce weapons superior (in full automatic fire mode) to standard AK-74 for domestic police use and export. The Izhevsk entry, initially known as AKB, evolved into the AK-107 and AK-108 rifles, which differed only by the ammunition used - AK-107 was intended for domestic use and thus chambered for 5.45x39 ammunition, while AK-108 was intended for export and thus chambered for 5.56x45 NATO ammunition. Both weapons were widely advertised through late 1990s and early 2000s, although it appears that no significant orders were ever received by the IzhMash factory.

AK-107 assault rifle, disassembled

The AK-107 assault rifle is gas operated weapon with balanced action. It employs fairy conventional rotary bolt with dual locking lugsm which is operated by long-stroke gas piston located above the barrel. To provide balancing action, secont gas piston is fitted in the front of the first one. When gun is fired, main gas piston moves rearwards, operating the bolt group, while balancing piston moves in opposite direction, being synchronised to the main one via simple rack and pinion system. In all other respects the AK-107 is quite similar to the standard AK-74M assault rifle, except that AK-107 / 108 were also offered with optional 3-round burst firing capability.

Illustration of the balanced action, with dual, counter-moving gas pistons above the barrel.

Kalashnikov AK-102, AK-104, AK-105 assault rifles (Russia)

Caliber: **AK-102** 5.56x45 mm NATO; **AK-104** 7.62x39 M43; **AK-105** 5.45x39 M74
Action: Gas operated, rotating bolt with 2 lugs
Length, mm: overall: 824; w/folded butt 586
Barrel Length, mm: 314
Weight, 3.0 kg empty
Magazine capacity: 30 rounds
Rate of fire: 600 rounds per minute

The AK-102, AK-104 and AK-105 rifles are essentially similar to one another, being different only in the caliber and type of magazine used. All three are 'compact' versions of the 5.56mm AK-101, 7.62mm AK-103 and 5.45mm AK-74M, respectively. The main visible differences between those 'Hundredth series compact assault rifles' and earlier 5.45mm AKS-74U compact assault rifle are that 'Hundred series' rifles use somewhat longer barrels and full length gas pistons, as opposed to shorter AKS-74U, and solid, side-folding polymer stocks. In fact, other than shorter barrels with special muzzle devices (flash / blast reducers) those compact rifles are similar in details to their respective full-size variants.

5.56mm Kalashnikov AK-102 assault rifle (AK-105 looks exactly the same)

7.62mm Kalashnikov AK-104 assault rifle

Kalashnikov AKS-74U (Krinkov) short assault rifle (Russia - USSR)

Caliber: 5,45x39 mm
Action: Gas operated, rotating bolt with 2 lugs
Overall length: 735 mm (490 mm with folded buttstock)
Barrel length: 210 mm
Magazine capacity, 30 rounds standard
Weight empty: 2,71 kg
Effective range: about 200 meters
Rate of fire: 650-735 rounds per minute

The AKS-74U short assault rifle (the "U" suffix means "Ukorochennyj" in Russian = "Shortened" in English) has been developed in the late 1970s from the AKS-74 assault rifle. The AKS-74U was intended as a personal defense weapon for tank, gun, helicopter and other vehicle crews, and for the special operations forces, which required compact but relatively powerful individual automatic weapon. The AKS-74U has the size and effective range of a typical submachine gun, but has advantage of the general issue, assault rifle ammunition and magazines, as well as the parts interchangeability with the general issue assault rifle, the AK-74. Since its introduction the AKS-74U, unofficially known as a "Ksyukha" (variation of a Russian woman name) or "okurok" (cigarette stub), also had been issued to various Police and other Law Enforcement forces acres the USSR and the Post-USSR countries, including Russia. Interestingly, the AKS-74U is known in the USA as the "Krinkov" - a name, apparently devised by Afghani Mujaheddins during Soviet invasion to the Afghanistan in 1980s. The AKS-74U is somewhat popular among its users due to its compact size, which allows it to be carried in the cars and even concealed under the clothes. On the other side, its effective range of fire is greatly limited by the poor accuracy at ranges beyond 150-200 meters, while the bullet itself remains lethal at much greater ranges.

AKS-74U short assault rifle

The AKS-74U also known for its tendency for rapid overheating when firing in bursts. A special version of the AKS-74U had been developed for the Special Forces (Spetsnaz), which could be fitted with quickly detachable silencer and a special 30mm silenced grenade launcher model BS-1 "Tishina" ("silence"). The launcher uses special HE-DP grenades, which are launched using special blank cartridges, stored in the box magazine, contained in the launcher pistol grip.

AKS-74U-UBN with the BS-1 "Tishina" 30mm suppressed grenade launcher (shown detached, along with special blank launcher cartridge and 30mm HE-DP grenade)

The AKS-74U has only minor differences from the basic AKS-74 assault rifle, which I will describe below. For the technical description of the AK-74 and AKS-74, please refer to the appropriate article at this site.

AKS-74U has a severely shortened barrel, with the gas chamber moved back and appropriately cut down gas piston rod. Since the portion of the barrel after the gas port is very short, a special muzzle device was designed, which is used as a flash hider and the gas expansion chamber (to achieve reliable gas operated action). The front sight base is lowered, and the standard adjustable rear sight is replaced by the flip-up rear (marked for 200 and 400 meters distance), mounted on the receiver cover. The receiver cover is hinged to the receiver at the front and flips up when opened (original AK-74 receiver cover is detachable). Otherwise the AKS-74U is similar to the AKS-74, it has same controls, folding buttstock, and uses same magazines. AKS-74U cannot be fitted with bayonet. Some versions had a standard side-mounted rail for the night or red-dot scopes, and are known as AKS-74UN.

Khaybar KH2002 assault rifle (Iran)

Caliber: 5.56x45 mm
Action: Gas operated, rotating bolt
Overall length: 730 mm (with "medium" barrel)
Barrel length: n/a
Weight: 3.7 kg with empty magazine
Rate of fire: 800-850 rounds per minute
Magazine capacity: 30 rounds

Khaybar KH 2002 assault rifle is a recent development of the Iranian Defense Industry Organization; this rifle was first shown in 2004 and is intended to replace the obsolete 7.62x51 HK G3 rifles of German origin, which are license-built in Iran since the Shah times. Khaybar KH 2002 assault rifle can be best described as a bullpup conversion of the Iranian S-5.56 rifle, which is a direct copy of the Chinese CQ assault rifle.

Khaybar KH 2002 assault rifle is gas operated, selectively fired rifle of bullpup layout. It uses M16-type direct gas system with multi-lug rotary bolt locking. Polymer pistol grip with enlarged trigger guard is attached below the tubular barrel shroud. Safety / fire selector lever is located at the left side of the receiver, behind magazine housing and away from the pistol grip. Ejection is to the right side only. Feeding system uses M16-compatible magazines, with M16-style magazine release button located on the right side of the magazine housing. Sights are of open type, with rear sight being installed within a carrying handle. Additional equipment includes lightweight folding detachable bipods and knife-bayonet. According to the manufacturer, rifle is available with three styles of barrels: short (carbine), medium (standard rifle) and long (designated marksman rifle).

Korobov TKB-022 assault rifle [experimental] (USSR / Russia)

Caliber: 7.62x39 mm M43 (also experimental 5.6x39mm)
Action: Gas operated, vertically sliding bolt
Overall length: 525 mm / 20.7"
Barrel length: 415 mm / 16.3"
Weigth: 2.8 - 2.4 kg (depending on version) / 6.2 - 5.3 lbs
Rate of fire: 560 rounds pr minute
Magazine capacity: 30 rounds

The line of TKB-022 experimental assault rifles is one of most intrigying developments in small arms, made in Soviet Union. In many respects these weapons, designed during early sixties by Soviet gun designer G. A. Korobov were many years ahead of its time. Those guns were simply too advanced for conservative-thinking Soviet Army officers who preferred simple, familiar, proven and reliable Kalashnikov assault rifles over anything else. Regardless of thst, the TKB-022 is well worth mentioning, if just for the sake of curiosity.

7.62mm Korobov TKB-022 experimental assault rifle, first model in the TKB-022 line, circa 1962

TKB stands for *Tulskoe Kosntructorskoe Buro* - Tula Design Bureau, an arms-designing organisation associated with Tula arms factory (TOZ), which later evolved into the KBP - large and famous arms design and manufacturing state-owned company. Korobov was one of the more advanced designers at KBP, and he always tried to step ahead of its time. In this case, he tried to create a compact weapon, suitable for motorized troops riding in cramped armored personnel carriers (BMP, BTR) or helicopters. Despite very compact size, this weapon retained full-length barrel (and thus effective range and lethality) of

much longer standard assault rifles such as Kalashnikov AKM. In fact, TKB-022 has best barrel length to overall length ratio among most military rifles ever built. During mid- to late sixties Korovov produced several variations of the TKB-022, from TKB-022PM to TKB-022PM5. The last one, the TKB-022PM5, which was produced in 1968, was chambered for then-experimental 5.6x39 ammunition (which latter evolved into 5.45x39). All weapons were tested by Soviet army, but turned down on unpublished reasons (most probably becuse the gun was simple too advanced for contemporary military thinking, but also possibly because no-one at the time could tell for sure if plastic housing would hold its integrity in extreme weather conditions or during many years of storage or use).

7.62mm Korobov TKB-022PM experimental assault rifle, left side, circa 1965

The TKB-022 assault rifle is gas-operated weapon with annular gas piston located around the barrel. To achieve minimum length, it is assembled into bull-pup configuration and uses vertically sliding bereech block (bolt), rather than traditional and most common bolt that cycles back and forth. Since the movement of the bolt (breechblock) in this design cannot be used to extract, eject and load cartridges, Korobov developed a special U-shaped rammer / extractor, that strips the frech cartridge from magazine, pushes it into the chamber, then, after the discharge, pulls the fired cartridge case back from the chamber. Upon feeding the next fresh cartridge, the fired case is pushed forward and slightly up, into the ejection chute above the barrel. Spent cases finally fell off the gun above the muzzle. Gun was capable of full- and semi-automatic fire, with combined safety / fire mode selector switch located above the trigger on the left side of the gun. The gun housing was made from reddish-brown plastic, with metall structure hidden inside.

7.62mm Korobov TKB-022PM experimental assault rifle, right side, circa 1965