Written by Jason M. Wong
Saturday, 27 June 2009 00:00

Teutonic Engineering at its best!

Download PDF here

Until recently, the 40mm grenade launcher was almost exclusively dominated by the M203. With the recent adoption of the Heckler and Koch M320 by the U.S. Army, a look back at Heckler and Koch's legacy 40mm systems is in order. First designed in the late 1950's, the 40mm grenade system was a stop gap system to bridge the distance between grenades thrown by hand, and the employment of light mortars. Hand grenades are limited by the distance the infantryman can throw the grenade, typically about 25 meters. A mortar is capable of dropping rounds as close as 60 meters from the firing position, but the weight of the system and ammunition present logistical and load bearing issues for light infantry. Clearly, a smaller and lighter weapon system was needed to bridge the gap. Enter the 40mm grenade.

The HK69: the original Heckler and Koch grenade launcher

The HK69 grenade launcher is a stand alone, single-shot, shoulder-fired, breech-loaded weapon. The receiver incorporates the barrel assembly, firing system, and trigger mechanism. Configured with a rifled barrel, the barrel is hinged at the front of the receiver and rotates upward and away from the receiver, much like an over/under shotgun. Like a shotgun, the oversized latch to the rear of the receiver (and what appears to be the weapon's hammer) is actually the barrel release mechanism. By pushing the barrel release latch to the rear, the barrel is unlocked from the receiver, and springs open under spring tension. The system lacks an ejector because one is not needed; the additional engineering and weight was deemed unnecessary for a single shot weapon. Instead, the barrel breech is cut to allow the user to pull the spent cartridge from the breech of the barrel. This design element has continued throughout the HK 40mm system design, and can still be seen within the current M320 design.

Weighing in at 5.75 pounds, the HK 69 distinguished itself from the XM148 and the M203 in that it utilized a break action, similar to a shotgun. This design proved fruitful, and has lived on as one of the most useful designs in 40mm systems. The M203 was limited to a round approximately 5.25 inches in length – if the round was any longer in length, the M203 receiver interferes with the loading of the 40mm round in the M203 barrel. Not so with the HK69. Unlike

the M203, the HK69 has no issue accepting oversized 40mm rounds. Because the barrel swings upwards and away from the receiver, the barrel is not obstructed by the receiver. This design element has also continued to the present, and can be seen with slight variation within the Heckler and Koch M320 weapon platform.

The safety mechanism on the HK69 is a lever system, on the left side of the receiver, with large markings to show whether the weapon is rendered safe, or ready to fire. The safety blocks the trigger bar from releasing the hammer; in this manner, the weapon may be safety carried loaded, hammer cocked, with the safety on. Not one to trust mechanical safeties, potential users may consider carrying the weapon in Condition 2 (hammer down on a loaded chamber) as a better alternative.

The hammer on the HK69 is external to the receiver and is exposed for manual manipulation. When needed, the hammer can be quickly cocked, rendering the weapon ready to fire. In the event of a misfire, the weapon can be quickly re-cocked by engaging the hammer. The trigger on the HK69 was surprisingly light. Given the design as a single action trigger, perhaps the responsive trigger should not be surprising. When shooting the family of Heckler and Koch 40mm weapons, the HK69 had the best trigger system, far exceeding the double action only triggers found on later Heckler and Koch systems.

As a standalone system, the HK69 utilizes a polymer pistol grip, and a lightweight tubular telescoping metal stock. Sling swivels are available for use with a sling. The system is strictly a standalone unit, and cannot be mounted to a host weapon in the same manner as the HK79 weapon system, or other future HK 40mm systems.

Two sight systems are employed on the HK69. The first system utilizes a small, fold down blade sight capable to engaging targets at 50 to 100 meters. For longer range accuracy, a folding ladder sight allows the user to engage targets out to 350 meters. With a little practice and experience, soldiers could engage targets beyond the listed maximum range. Adopted by the German army in 1974, the HK69 was popular within the European community, but saw limited commercial success in the United States.

Potential downsides of the HK69 included the all metal interface – the weapon seemed significantly heavier than any other 40mm grenade system, save for perhaps the HK79, when mounted to a G3 rifle. The steel receiver had a tendency to get extraordinarily hot when exposed to desert firing conditions. Presumably, the steel receiver would be equally cold if

exposed to sub-freezing temperatures. The same issues were not observed when test firing the other systems. Other downsides included the single-action only trigger. Although the single action trigger was extraordinarily crisp when compared to other 40mm systems, the weapon has no provision to fire as a double action. In the event the shooter forgets to cock the weapon, the weapon will not fire – the trigger simply releases the hammer – the trigger will not cock the hammer if the hammer is down. As a first generation 40mm weapon system, the HK69 is highly effective, easy to use, with the fire control mechanisms intuitive to most shooters.

The Heckler and Koch HK79 – competitor to the American M203

Partially based upon the HK69 design, the HK79, together with the XM148 and M203, brought significant firepower to the individual infantryman. No longer limited to the engagement distance of hand thrown grenades, the individual infantryman could use his rifle as a mobile platform for indirect fire. Similar to rifle grenades of World War II, the 40x46mm grenade system offered a larger payload and more advanced safety systems. More importantly, rifle grenades of World War II relied upon blanked ammunition to launch grenades down range. With the advent of the 40x46mm grenade systems, the individual infantry soldier could engage the enemy with a 40mm grenade, with follow on fire from his rifle. There was no longer a need for the soldier to carry ball and grenade launching rifle ammunition.

The HK79 was the German response to the M203. Designed to be attached to German battle rifles, the HK79 was most commonly seen mounted to the G3, and HK33 model rifles, but could be adapted for mounting to most European designed rifles. Because the system was based upon the design attributes of the HK69, there are design commonalities between the two systems. Most notably, the HK79 is made primarily of steel, resulting in a heavy addition to any battle rifle.

The HK79 grenade launcher is a single-shot, shoulder-fired, breech-loaded weapon. Like that HK 69, the receiver incorporates the barrel assembly, firing system, and an unusual trigger mechanism. Configured with a rifled barrel, the barrel is hinged at the front of the receiver. Unlike the HK69, the HK79 barrel rotates downward and away from the receiver. The practical effect however is the same – the barrel extends away from the any obstruction created by the receiver, allowing extra length 40mm rounds to be easily chambered. Similar to the HK69, the barrel is released via an oversized latch on the left side of the receiver. By pulling the barrel release latch to the rear, the barrel is unlocked from the receiver, and allows the barrel to open under spring tension. Like the HK69 (and all HK 40mm systems) the system lacks an ejector - the barrel breech is cut to allow the user to pull the spent cartridge from the breech of the barrel.

Operation of the safety is achieved via a cross-bolt manual safety catch, a traditional round push through switch installed on the receiver, forward of the cocking mechanism. The “safe” and “fire” positions are marked with red and white rings respectively; the weapon can be loaded and cocked with the safety set at either position. Unlike the HK69, the fire control mechanisms on the HK79 are entirely different from any previous or subsequent 40mm grenade launcher.

Replacing the external hammer of the HK69 is the Hk79’s horizontal T-grip, at the rear of the receiver. Similar in size and shape to the charging handle on an M-16 rifle, the HK79 hammer is set by retracting the charging handle to the rear. The charging handle also has the effect of resetting the trigger. Like the HK69, the system can be re-cocked without unlocking the breech, in the unlikely event of a misfire. In this respect, the HK79 is similar to the failed American XM148, which also used an external handle to charge the weapon. However, the HK79 system is much more refined than the XM148 system as would be expected from German engineering.

The trigger for the HK79 system is located in an unusual, but convenient location. Given the position of the shooter when firing the HK79, the trigger has been thoughtfully located on the left side of the receiver, just below the location of the G3 cocking handle. When considering that a shooter’s natural hand position will be on the forward grip while aiming the 40mm system, the trigger’s location is convenient and practical. Similar to the HK69, the HK79 trigger was crisp, light and responsive, if not unusual. Due in part to the unusual location, and unlike most firearms which utilize the pointer or middle finger to engage the trigger, the HK79 is fired by the shooter depressing the trigger with the weak handed thumb. As a single action only system, the trigger was as crisp as the HK69, but sufficiently different to prevent a direct comparison between the two systems.

Similar to the M203 system, the HK79 uses a quadrant leaf sight mounted to the right side of the weapon system. The sight is fairly typical for 40mm systems of the period, with graduated aiming points in 50-meter increments, out to 350 meters.

Practically, there is little room to manipulate the HK79 charging handle. Detailed photos demonstrate the close proximity between the charging handle and the G3 magazine. Loading and charging the HK79 under stressful conditions would be challenging, but not impossible. More importantly, the combined weight of the HK79 and G3 combination is a hefty 13.4 pounds (6.1 kg) unloaded. Nevertheless, the system was adopted worldwide by a number of countries, including Panama, New Zealand, and Norway. From available Heckler and Koch advertising, it appears that the HK79 can be adapted to a wide variety of battle rifles, including the Steyr AUG,

Colt M16, and British SA80.

The Heckler and Koch AG-C – a new generation of 40mm systems

Faced with improved engineering in the firearms industry, new manufacturing techniques and materials, and the need to replace an aging 40mm system resulted in the development of the Heckler and Koch AG-C. Initially developed for the G36 battle rifle, the AG-C represents the third generation of Heckler and Koch 40mm grenade systems, and features the use of plastics and aluminum – a far cry from the original steel construction of the HK 69 and HK 79 models.

The AG-C is a single shot, break action launcher, and utilizes many of the proven features found within the HK 69 system. Similar to the HK 69, the now ubiquitous breech cuts originally seen on the HK 69 system are utilized within the AG-C system. The barrel of the AG-C unlocks and opens to the left – rather than upward for the HK 69, or downward for the HK79.

By allowing the barrel to open to the side, the AG-C system replaces the HK 69 as a standalone weapon, yet also permits mounting the AG-C system on a rifle, thereby replacing the legacy HK 79 weapon system.

As a standalone weapon, the AG-C is fully self contained. The system utilizes an undersized pistol grip, a retractable stock, and side mounted ladder sights graduated to 350 meters. An electronic range finding sight is currently under development for future precision applications. When used in the standalone configuration, the system appears to be a direct (and updated) replacement to the HK 69.

Replacing the HK 69 alone is not the most practical benefit of the AG-C. By removing the retractable stock, the unit mounts directly to a battle rifle fitted with Mil-Std 1913 Picatinny rails. As the sights are mounted off center, the ladder sights remain on the unit, eliminating the need to re-zero the system or mount new sights on the rifle. In addition, because the barrel unlocks and opens to the left (rather than rotating vertically with prior legacy models) the system allows flexibility in selecting ammunition. Like its predecessors, the ability to swing outward (rather than opening forward, as the M203) allows the weapon to chamber a greater range of long length 40mm rounds. With the advent of newly designed medium range 40mm rounds which are typically longer than the standard M433 High Explosive round, the ability to accept longer length rounds is beneficial to the end user.

Issued with the double action trigger, the trigger pull on the AG-C is long and heavy. Compared to the HK 69, the trigger on the AG-C is horrendous. In fairness to Heckler and Koch engineers,

the length and weight of the trigger pull are not likely to be noticed by users in stressful situations, and one may want to be absolutely certain the trigger is being engaged when firing high explosive rounds. Nevertheless, there is no comparison between the trigger systems of the HK 69 and the AG-C – the HK 69 has a single stage trigger that is crisp and responsive, and is the better trigger by far.

Fitted with a rotating ambidextrous safety reminiscent of Heckler and Koch battle rifles, the AG-C looks and feels at home when mounted on an HK36 battle rifle. Given the ability to mount directly to any rifle outfitted with Picatinny rails, the AG-C was a natural choice, and has been adopted for use with the British L85A2, and the Canadian Diemaco C7A1 rifle. When U.S. military trials were announced seeking a replacement for the M203 system, the AG-C was an automatic contender.

The Heckler and Koch M320 – replacement to the M203

In 2004, the U.S. Army announced a requirement for a new 40mm grenade system. Part of the requirements called for the new system to be a commercial off-the-shelf solution, ready for use, or ready for use with minimal modification. The requirements within the solicitation called for the new systems to be:

"…more reliable, more ergonomic, more accurate and safer than the M203 Grenade Launcher. The GLM shall be capable of firing all current U.S. standard 40mm x 46mm low-velocity ammunition. It must have a breach mechanism that is able to accept improved lethality munitions with longer payloads/projectiles than current 40X46mm munitions to accommodate system growth. The GLM must initially mount on the M4 Modular Weapon System with a mounting architecture flexible enough for adaptation to the M16A2 and M16A4 rifle as well as future rifles/carbines. The mounting hardware can differ for each host weapon; however, the basic launcher and sighting system must be able to mount to all host weapon variations with only minor modifications. When removed and replaced, the module will return to its normal bore alignment regardless of the host weapon interface."

In May 2005, an announcement was made regarding the selection of the Heckler and Koch system as the winner of an open competition to provide a new 40mm grenade launching system. Designated the XM320, the system has been modified from the prior AG-C system to fit the needs of the U.S. Army.

Of immediate note is the shorter barrel and integrated folding front grip. During a discussion with Mr. Wayne Webber, President of Heckler and Koch USA, it was noted that the Army wanted a more compact package, resulting in the shorter barrel. Of course, the shorter barrel meant that the ballistics of a 40mm round fired from the short barrel of the M320 differed from

the ballistics of a 40mm round fired from the longer AG-C barrel. As a result, the sights had to be reconfigured to allow accurate fire from the system.

Similar to the AG-C, the M320 weapon system can be used as a standalone system, or may be mounted to a battle rifle. The M320 is a lighter system than the M203 it replaces, and does not require special mounting interfaces or hardware that the M203 requires. Of course, the M203 was introduced in 1969, and is a nearly 40-year old system; the M320 is a modernized system that uses modern materials and manufacturing techniques to address the latest developments within the small arms industry.

According to Barbara Muldowney, U.S. Army deputy product manager for Individual Weapons (PEO-Soldier), the M320 provides a number of advantages over the currently fielded M203. “Currently, with the 203, in order for the soldier to put the munitions in, they actually have to turn over the whole system,” she said. “If it’s under an M4, for example, they have to make sure that it is upside down so that the breech is exposed. Then they put the munition in and pull the pump in so that it closes. With the XM320 they can always have their sight on the target while they put the munitions in, so they don’t have to take the two extra steps of inverting the weapon system and then turning it back over.” Approximately 71,000 M203s are currently in military inventories, although only about half are currently in service.

Given the progression from the HK 69 to the M320 over a period of nearly 40 years, it’s no wonder that the M320 is a thoroughly modern 40mm grenade system. Nevertheless, when viewed through a historical lens, the features and attributes of the HK 69 can clearly be seen throughout the lineage of Heckler and Koch grenade systems. Absent an electronic solution, the decidedly low-tech ladder sight is still the most effective means of aiming at multiple distances. The breech cuts originally found on the HK 69 are still a proven feature of the M320 that has persevered through multiple design changes and modifications.

The engineers at Heckler and Koch have repeatedly proven to be insightful to the needs of military operators by producing highly capable weapon platforms. If prior acts are an indication of future performance, expect the M320 to excel and provide many years of service to the U.S. Military.

Model	Cyclic Rate	Capacity	Modes of Fire	Weight (lbs)	Width (in)	Barrel length (in)	Overall

Length (in.)								
M320	N/A	1	S/F	3.3/1.5	3.50	9.0	11.90	
AG-C	NA	1	S/F	3.30/1.5	3.50	11.0	13.90	
HK79	NA	1	S/F	5.71/2.6	2.68	11.0	13.78	
HK69	NA	1	S/F	5.77/2.6	2.25	14	28.90	(stock ex