



The Army's M-4 Carbine: Background and Issues for Congress

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Summary

The M-4 carbine is the Army's primary individual combat weapon for infantry units. The M-4 uses a direct gas impingement system that blows carbon from the fired cartridge back into the weapon's receiver, which can lead to weapon malfunctions. The U.S. Special Operations Command (USSOCOM) is replacing its M-4s with the Special Operations Combat Assault Rifle (SCAR). It is a modular weapon with a short-stroke piston system which eliminates carbon blow back that theoretically improves reliability. Some have questioned why the Army has not adopted the SCAR or another similarly designed weapon. A series of studies and tests of the M-4 and potential competitors have added to this debate, and the Army has taken steps to begin evaluating other weapons in late 2009 to replace the M-4. This report will be updated as events warrant.

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Background

In the mid-1990s, the Army began fielding the M-4 carbine, a lighter, more compact version of the Vietnam-era M-16 rifle. Both M-16 and M-4 carbines are 5.56 mm caliber weapons and are primarily manufactured by Colt Defense LLC, Hartford, CT. Army officials are said to be satisfied with the M-16 family of weapons, suggesting that the M-16 is “simply too expensive to replace with anything less than a significant leap in technology.”¹ The Army’s “leap ahead” program to replace the M-16 family of weapons—the Objective Individual Combat Weapon (OICW) program—began in 1994, and one weapon evaluated in that program, Heckler & Koch’s XM-8 assault rifle, was considered by some as the M-16’s/M-4’s replacement. As late as 2005, the XM-8 was reportedly close to being officially approved as the Army’s new assault rifle, but alleged acquisition and bureaucratic conflicts compelled the Army to cancel the XM-8 in October 2005. The Army plans to continue its procurement of M-16s and M-4s for “years to come,” while some in Congress have called for an “open competition” to choose a successor to the M-16 and M-4 assault rifles.²

Concerns with M-4 Reliability and Lethality

Reports suggest that soldiers have expressed concerns regarding the reliability and lethality of the M-4.³ Reliability can be described as “the probability that an item can perform its intended function for a specified interval under stated conditions” and lethality as “the killing or stopping power of a bullet when fired from a weapon.”⁴

Center for Naval Analyses (CNA) Study on Small Arms in Combat⁵

In December 2006, the Center for Naval Analyses (CNA) published a survey and study at the request of the Army’s Project Manager-Soldier Weapons of 2,600 soldiers who had returned from Iraq and Afghanistan and who had engaged in a firefight using a variety of small arms. Some of the M-4-specific observations were as follows:

- Over 50% of soldiers using the M-4 and M-16 reported that they never experienced a stoppage [malfunction] while in theater, to include during training firing of the weapons (p. 2).
- Frequency of disassembled cleaning had no effect on the occurrences of stoppages. Variations in lubrication practices, such as the type of lubrication used

¹ Matthew Cox, “Better Than M4, But You Can’t Have One,” *Army Times*, March 1, 2007, and “Competition Sought for New Army Rifle,” *Army Times*, April 27, 2007.

² *Ibid.*

³ *Ibid.*

⁴ Shawn T. Jenkins and Douglas S. Lowrey, “A Comparative Small Analysis of Current and Planned Small Arms Weapon Systems,” MBA Professional Report, Naval Postgraduate School, Monterey, CA, December 2004, pp. 29-31.

⁵ Information in this section is taken from Center for Naval Analyses (CNA) Study: “Soldier Perspectives on Small Arms in Combat,” December 2006. CNA is a federally-funded research and development center (FFRDC) for the Department of the Navy.

and the amount of lubrication applied, also had little effect on stoppages. Using a dry lubricant decreased reports for stoppages only for M-4 users (p. 3).

- Of soldiers surveyed who used the M-4, 89% reported being satisfied with their weapon (p. 11).
- Of M-4 users, 20% recommended a larger bullet for the M-4 to increase lethality (p. 30).
- Regarding M-16s and M-4s, many soldiers and experts in theater commented on the limited ability to effectively stop targets, saying that those personnel targets who were shot multiple times were still able to continue fighting (p. 29).

Although M-4 critics cite this report as evidence of unsuitability of the M-4, it might also be interpreted as a favorable report on the M-4's overall reliability and acceptance by soldiers. The "larger bullet" recommendation for lethality purposes may, in fact, be a valid recommendation based on observations from Iraq and Afghanistan, but the "bigger bullet debate" has been a source of contention for many small arms experts ever since the Army adopted the 5.56 mm M-16 during Vietnam in lieu of the 7.62 mm M-14 rifle.

Special Forces Opts to Replace the M-4⁶

In 2001, the U.S. Special Operations Command (USSOCOM) was said to have documented M-4 reliability problems in an official report, noting that the M-4 suffered from an "obsolete operating system" and recommending the redesign of the current gas system.⁷ The USSOCOM report allegedly described the M-4's shortened barrel and gas tube as a "fundamentally flawed" design, which contributed to failures extracting and ejecting spent cartridges during firing. In recognition of these deficiencies, the 1st Special Forces Operational Detachment-Delta, also referred to as "Delta Force," reportedly began working with German arms manufacturer Heckler & Koch to replace the M-4's gas system with a piston operating system to improve reliability and increase parts life. In 2004, Delta reportedly replaced their M-4s with the HK-416—a weapon that combines the operating characteristics of the M-4 with the piston operating system.⁸

In early 2003, USSOCOM officials initiated efforts to identify potential new combat rifle capabilities.⁹ From May through August 2004, USSOCOM evaluated 12 weapons from nine different manufacturers.¹⁰ In November 2004, USSOCOM awarded a contract to FNH USA¹¹ to develop the Special Operations Combat Assault Rifle (SCAR).¹² The SCAR will come in two variants—the heavy 7.62 mm SCAR-H and the light 5.56 mm SCAR-L.¹³ Each variant will

⁶ For additional information on U.S. Special Forces, see CRS Report RS21048, *U.S. Special Operations Forces (SOF): Background and Issues for Congress*, by Andrew Feickert.

⁷ Information in this section is from Matthew Cox, "Better Than M4, But You Can't have One," *Army Times*, March 1, 2007.

⁸ Matthew Cox and Kris Osborn, "M4, In Their Sights," *Defense News*, February 25, 2008.

⁹ Scott R. Gourley, "Soldier Armed: Special Operations Forces Combat Assault Rifles," *Association of the U.S. Army (AUSA) Army Magazine*, May 1, 2006.

¹⁰ "US SOCOM Awards Contract for SCAR Development," *Jane's International Defense Review*, January 2008, p. 26.

¹¹ FNH USA is the U.S.-based sales and marketing entity for the Belgium-based FN Herstal S.A.

¹² Scott R. Gourley, "SCAR Evaluation Nears Conclusion," *Jane's Defence Weekly*, March 19, 2009, p. 12.

¹³ Information in this section is from Joshua Kucera, "SOCOM Selects New Assault Rifle," *Jane's Defence Weekly*, (continued...)

accommodate three different barrels—a standard 35.7 cm barrel, a 25.5 cm close-combat barrel, and a sniper variant barrel. All barrels reportedly will take less than five minutes to switch. The SCAR-L is intended to replace USSOCOM M4-A1 carbines and features the same type of gas piston operating system that the HK 416 employs.

Army's Asymmetric Warfare Group and the H&K-416

The Army describes the Asymmetric Warfare Group (AWG), based in Ft. Meade, MD, as an Army special missions unit consisting of carefully selected military, Department of the Army Civilians, and contractors who “observe and collect information about the evolving asymmetric operating environment by providing advisors to deployed and deploying forces in support in the Global War on Terrorism.”¹⁴ The Army reportedly initially approved AWG acquisition and use of HK-416s in lieu of M-4s, but then reversed this decision stating, “The AWG also advises units on training, tactics, and procedures. In this capacity, the use of the standard issue M-4 is required. In support of this mission set, the decision was made to transition to the M-4 and the AWG is now turning in its H&K rifles.”¹⁵ A report maintains that AWG “fought to keep its several hundred 416s, arguing that they outperform the Army’s M-4 and require far less maintenance.” Because the HK-416 operates in a similar fashion to the M-4 and has comparable performance characteristics, it is unlikely that training, tactics, and procedures vary greatly between the two weapons, thereby causing some to question the motives behind the Army’s decision to recall the AWG’s HK-416s.

M-4 Reliability Testing

A 2002 Marine Corps Systems Command test was said to have concluded that the M-4 malfunctioned three times more often than the M-16A4, as the M-4 failed 186 times for a variety of reasons over the course of 69,000 rounds fired, while the M-16A4 failed 61 times.¹⁶ In a test conducted by the Army between October 2005 and April 2006, 10 new M-16s and 10 new M-4s were fired in a 35,000-round test under laboratory conditions, with both weapons firing approximately 5,000 rounds between stoppages.

Congressionally Requested M-4 Test

In April 2007, Senator Tom Coburn (R-Oklahoma) sent a letter to then Acting Secretary of the Army Peter Geren questioning why the Army planned to spend \$375 million on M-4 carbines through FY2009 “without considering newer and possibly better weapons available on the

(...continued)

February 5, 2005, p. 8.

¹⁴ See 2008 U.S. Army Posture Statement Information Paper—Asymmetric Warfare Group http://www.army.mil/aps/08/information_papers/prepare/Army_Asymmetric_Warfare_Group.html, accessed May 20, 2008.

¹⁵ Information in this section is from Matthew Cox, “Army Takes HK416s From Special Unit,” *Army Times*, March 11, 2008.

¹⁶ Matthew Cox, “Better Than M4, But You Can’t Have One,” *Army Times*, March 1, 2007.

commercial market.”¹⁷ Senator Coburn’s letter also cited M-4 reliability and lethality concerns and called for a competition to evaluate alternatives to the M-4, citing a need to conduct a “free and open competition.” The Army initially agreed to begin the tests in August 2007 at the Army Test and Evaluation Center at Aberdeen Proving Ground, MD, but then postponed the test until December 2007.¹⁸ The test evaluated the M-4 against the HK-416, the HK -XM8, and the FNH SCAR, with each weapon firing 6,000 rounds under sandstorm conditions. Officials reportedly evaluated 10 each of the four weapons, firing a total of 60,000 rounds per model resulting in the following: XM-8, 127 stoppages; FNH SCAR, 226 stoppages; HK-416, 233 stoppages; and the M-4, 882 stoppages.¹⁹ On December 17, 2007, when the Army briefed Congress and the press, the Army reportedly claimed that the M-4 suffered only 296 stoppages during the test, explaining that the stoppage discrepancy from the original 882 M-4 stoppages reported could have been due to the application of the Army Test and Evaluation Center’s post-test Reliability, Availability, and Maintainability (RAM) Scoring Conference.²⁰ This process attributes failures to such factors as operator error or part failure and, as an example, if evaluators linked 10 stoppages to a broken part on a weapon, they could eliminate nine of the stoppages and count only one failure for reporting purposes. It is not known whether the Army also applied the RAM process to the other three weapons in the test, but it might be assumed that if the other three weapons were given equal treatment, those weapon’s stoppages would also likely be decreased in a manner similar to the M-4.

Congressional Action

The House and Senate approved the Administration’s FY2009 M-4 Budget Request (see H.R. 5658 and S. 3001, FY2009 National Defense Authorization Act). Accompanying H.Rept. 110-652, May 16, 2008, calls for the services to work together to develop and resource a joint, long-term competitive strategy for small arms, including a “next-generation carbine.” S.Rept. 11-335, May 12, 2008, recommends “that Secretary of Defense submit a report on the feasibility and advisability of conducting a full and open competition for carbine-type weapons.” (Sec.112, S.Rept. 11-335).

Army Looks for a Replacement for the M-4²¹

In August 2008, the Army issued a request for information to the small arms industry seeking information on “the state of the art in small arms technologies.” This request is viewed by some as the first step in a carbine competition that the Army intends to conduct sometime in 2009 after Colt Defense turns over the M-4’s technical data rights in June 2009. The Army plans to release a request for proposal (RFP) in the late summer of this year requesting prototype weapons for testing. Army officials have stated that they will consider other caliber weapons other than the

¹⁷ Information in this section is from Matthew Cox, “Competition Sought for New Army Rifle,” *Army Times*, April 27, 2007.

¹⁸ Matthew Cox, “Army Tests of Rival Carbines Postponed,” *Army Times*, September 20, 2007.

¹⁹ Matthew Cox, “New Carbines Outperform M-4 in Dust Test,” *Army Times*, December 17, 2007.

²⁰ Information in this section is from Matthew Cox, “Giving M-4 Failures an Alibi,” *Army Times*, December 29, 2007.

²¹ Matthew Cox, “U.S. Army Asks Industry for an M-4 Replacement,” *Army Times*, October 6, 2008 and Matthew Cox, “Army Solicits Industry for M-4 Replacement,” *Army Times*, September 29, 2008.

current 5.56mm. Factors that the Army will consider in its evaluation are improved accuracy, durability in all environments, and modularity.

Potential Issues for Congress

Additional Reliability and Lethality Testing

It can be argued that the M-4 is generally well-regarded by the soldiers who use it in combat and its lethality may be more a function of the round used as opposed to the actual weapon itself. One potential option for gaining greater insight into this issue might be to outfit selected Army infantry companies (about 120 soldiers) in both Iraq and Afghanistan with XM-8s, HK-416s, and FNH SCARs for a comparative study with an infantry company equipped with M-4s. Such a study, conducted in combat as opposed to in laboratories and on firing ranges, might provide what could be described as “the ultimate test” of these weapons. Such testing is not unprecedented, as the Army has tested its Land Warrior integrated modular combat system in Iraq with an infantry battalion in actual combat. Such a field test might also be worth considering when the Army begins evaluating prototype M-4 replacement weapons.

USSOCOM Implications of Replacing M-4s

It has been suggested that USSOCOM’s decision to adopt the FNH SCAR has implications for the Army. In one sense, the SCAR is the first modular small arms system adopted by the military. The SCAR-L and SCAR-H will replace the following weapons: M-4A1, MK-18 close quarter carbine, MK-11 sniper security rifle, MK-12 special purpose rifle, and the M-14 rifle.²² There is also a 90% parts commonality between the SCAR-L and SCAR-H, including a common upper receiver and stock and trigger housing and an enhanced grenade launcher can be attached to either model.²³ While the SCAR might not meet all of the conventional Army’s requirements, its adaptability in terms of missions (close quarters combat to long-range sniper operations), being able to rapidly convert from a 5.56 mm to a 7.62 mm weapon, and the ability to accommodate a variety of modifications such as grenade launchers and special optics, might be factors worth considering as the “modular Army” plans future small arms programs.

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²² Scott R. Gourley, “Soldier Armed: Special Operations Forces Combat Assault Rifles,” *Association of the U.S. Army (AUSA) Army Magazine*, May 1, 2006.

²³ Nathan Hodge, “Stopping Power,” *Jane’s Defence Weekly*, July 25, 2007.