By David Crane

Photos courtesy U.S. Army

olt's M4 carbine came in dead last in an "Extreme Dust Test" (EDT) conducted in the fall of 2007 that pitted the current-issue carbine against the FN's Mk16 (SCAR-Light), HK's 416, and HK's XM8. The impetus for the test, the second dust test conducted on the M4 in the same year (2007), was Sen. Tom Coburn (R-Okla.), who believed that more reliable assault rifles and carbines than the M4 existed and should be compared to the M4 before the U.S. Army issued an approximately \$375-million sole-source procurement contract to Colt.

In April 2007, Sen. Coburn stated in a letter, "I am concerned with the Army's plans to procure nearly half a million new rifles outside of any competitive process." So, Coburn asked that the Army hold a "...free and open competition."

Accordingly, the U.S. Army Test and Evaluation Center (ATEC) team tested 10 sample guns of each weapon system, 40 guns total, and exposed them all to 25 hours of "dusting."

Dust testing consisted of each rifle getting a heavy dose of lubricant, the muzzle being capped, and the ejection port cover closed. Then, each weapon was exposed to a heavy dust environment in a dust chamber for 30 minutes.

After the dust bath, a tester fired 120 rounds through each weapon. Then, back in the dust







To see which assault rifle can best withstand the rigors of the sandbox, the Army conducted a "dust test" between the M4, SCAR, 416 and XM-8. Guess which one came in dead last?

chamber they went for another 30 minutes of sand spray and dust bathing before having to fire another 120 rounds. This sequence was repeated until each weapon had fired 600 rounds.

Then, all the weapons were wiped down and lubed again with heavy lubrication, and put back in the dust chamber for 30 more minutes, 120 rounds fired again, repeated to 600 rounds. At the 1,200-round mark— and every additional 1,200round mark thereafter— the weapons received a full cleaning and lubrication.

This continued until the testers had put a total of 6,000 rounds through each individual test weapon. Ten guns per weapon type times 6,000 rounds each comes to a total of 60,000 sandy rounds through each weapon type. When the dust finally settled— sorry— here's how all four test weapons stacked up, best to worst:

XM8: 127 stoppages/malfunctions Mk16 SCAR-L: 226 stoppages/malfunctions HK416: 233 stoppages/malfunctions M4 Carbine: 882 stoppages/malfunctions

What's curious about the M4's performance in this test is the fact that the 10 samples that were tested to 60,000 total rounds—again, 6,000 rounds apiece— only experienced 307 total malfunctions/stoppages during a previous test that summer. Why did Colt's malfunction rate nearly triple?

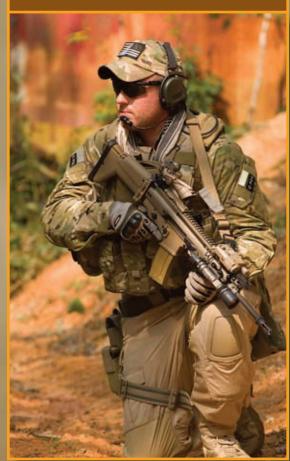
According to Brig. Gen. Mark Brown of the U.S. Army Pro-







FN SCAR: 226 STOPPAGES

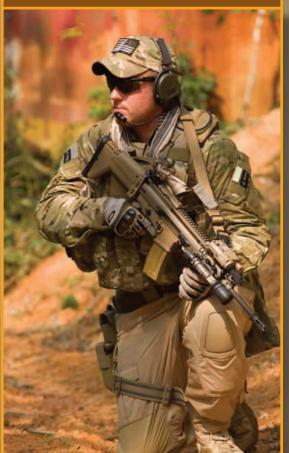


COLT M4: 882 STOPPAGES

HK416: 233 STOPPAGES



We can't help but wonder how an AK-47, the world's most reliable assault rifle, would have fared against the four rifles tested in the Army's



Extreme Dust Test.

gram Executive Office Soldier (PEO Soldier), "Test conditions for test two [summer] and three [latest] were ostensibly the same." So, what was different? Different test officials and different time of year. That's pretty much it, which indicates that the EDT test protocol may not be repeatable.

Dissecting The Numbers

But let's dissect the numbers a bit. In the summer '07 test, which was actually the second "extreme dust test" for the Colt M4, the M4 experienced 148 "Class 1 and 2" weapon stoppages and 148 Class 1 and 2 magazine stoppages, for a total of 296 Class 1 and 2 stoppages. The M4 also experienced 11 Class 3 stoppages.

By contrast, in the fall version of the test, the M4 experienced 624 Class 1 and 2 weapon stoppages and 239 Class 1 and 2 magazine stoppages, for a total of 863 Class 1 and 2 stoppages. In this test, the M4 also experienced 19 total Class 3 stoppages, meaning the M4 experienced 643 total weapon-related malfunctions.

The Army defines stoppages with different classes. Class 1 stoppages take 10 seconds or less to clear by the shooter. Class 2 stoppages take more than 10 seconds armorer to clear.

Here's the breakdown for the other weapons: FN Mk16 (SCAR-L): 191 Class 1 and 2 weapon stoppages and 19 Class 1 and 2 mag stoppages for 210 total Class 1 and 2 stoppages; 16 total Class 3 stoppages.

HK416: 210 Class 1 and 2 weapon stoppages and 9 Class 1 and 2 mag stoppages for a total of 219 Class 1 and 2 stoppages; 14 total Class 3 stoppages.

HK XM8: 98 Class 1 and 2 weapon stoppages and 18 Class 1 and 2 mag stoppages, for 116 total Class 1 and 2 stoppages; 11 total Class 3 stoppages.

An interesting observation from this test is that all weapons exceeded their headspace limit by the end of the test. This condition resulted in ruptured cartridge cases on several weapons towards the end of the test. More specifically, this happened at or before 6,000 rounds had been fired under EDT conditions, and required replacing the weapon's bolt. There was "no significant difference in head space loss" between weapon types.

Doing The Math

If I've got the math right, the M4's 882 stoppages over 60,000 rounds amounts to a 1.47 percent stoppage rate, which translates to 1.47 stoppages out of every 100 rounds fired. Now, one might argue that this means the M4 fired over 98 percent of the 60,000 total rounds without a problem. That might sound satisfactory to to clear by the shooter. Class 3 stoppages require an a layman, but if the EDT test protocol actually mimicked realistic infantry combat conditions, this stoppage/malfunction rate would be way too high. The M4 stopped once for every 68 rounds fired, or one jam for a bit over every two magazines. One stoppage in every 68 rounds is just way too high a failure rate for an infantry



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combat rifle. However— and this is very fortunate for the grunts who are issued the M4— the protocol really doesn't mimic combat conditions.

By contrast, the next worst performer, the HK416, stopped once every 257 rounds. Quite a difference. The second-place finisher, the FN Mk16, stopped once every 265 rounds. And, the winner, the XM8, stopped once every 472 rounds.

Another thing that really sticks out is the relatively high number of magazine-related stoppages the M4 experienced versus all the other weapons tested. There were 239 (M4) versus 19 (FN MK16), 9 (HK416) and 18 (HK XM8), respectively, a striking difference, and one that definitely should be examined more closely and solved, realistic test or not. Like the Japanese say, the

nail that sticks out gets hammered.

By the way, in a PowerPoint brief authored by Lt. Col. Timothy Chyma on the M4 Extreme Dust Tests, there's mention of a soldier's "basic load." In a basic load, soldiers only carry 210 rounds in seven 30-round magazines, which weighs about 7 lbs. A soldier carrying double the basic load will carry 420 rounds in 14 30-rounders, which weighs about 14 lbs.

According to U.S. Army officials, in a typical combat engagement, soldiers expend less than one basic load. Even more specifically, according to these officials, soldiers rarely fire more than 140 rounds in an engagement.

In actual combat conditions, weapons are not usually exposed to such a constant and unrelenting amount of dust, dirt, grit and contaminants, and, even if they were,

U.S. Army combat troops clean and lubricate their weapons more frequently than was allowed for by the test protocol.

However, it could effectively be argued that U.S. combat troops shouldn't have to clean and lubricate their weapons more frequently than the test protocol allowed. It could be argued that, since we're now eight years into the millennium, our troops shouldn't have to maintain a battle rifle nearly so diligently in order to keep the basic combat rifle working in sand and dust and other adverse environments, which is, of course, one of the reasons Sen. Coburn and others are pushing for a gas piston/op rod-driven replacement for the M4 in the first place.

Soldier Satisfaction

So, considering that the Colt M4 Carbine lost the fall 2007 test by

such a significant margin, just how satisfied are soldiers with the weapon? Pretty satisfied, as it turns out.

A total of 2,607 soldiers were surveyed by the Center of Naval Analysis. Of those, 917 were actually assigned the M4 and had used it in combat. Of those 917 who had been issued the M4, 816 reported "overall satisfaction" with the M4. That works out to an 89 percent satisfaction rating, which is pretty good, considering. Additionally, 734 endusers (80 percent) reported they were confident that the M4 would fire without any malfunctions in combat.

Eighty-three percent (761) reported that they were confident the M4 would not suffer major breakage or failure that would necessitate repair before further use.

A further 743 soldiers (81 percent) assigned the M4 in combat did not experience a single stoppage while engaging the enemy. By contrast, 74 soldiers (19 percent) assigned the M4 did experience a stoppage during

a combat/enemy engagement. Furthermore, 143 soldiers

Furthermore, 143 soldiers (16 percent) who experienced a stoppage during a combat engagement reported a "small impact" to their ability to engage the enemy after performing immediate or remedial action to clear the stoppage. That said, 31 soldiers (3 percent) who experienced a stoppage/malfunction during a combat engagement reported that they were unable to engage the enemy during a "significant portion" or in the entire firefight after performing immediate or remedial action to clear the stoppage.

Only 12 soldiers, or one percent, thought the M4 should be replaced.

Inside Skinny

One of my professional contacts out of U.S. Army Asymmetric Warfare Group (AWG) provided the following insight into the test results

that provides some perspective on the dust test results:

Fortunately for

the grunts, the

protocol really

doesn't mimic

combat conditions.

"Because the HK416 and M4 were the only production weapons, the 10 HK416 and M4 carbines were all borrowed sight unseen [from Army inventory] and the manufacturers had no idea that they were in for a test. The 10 SCARs and 10 XM-8s were all handmade and delivered to Aberdeen with pretty much full knowledge of a test. The SCAR even got some addition help with extra lubrication.

"With the HK416, 117 of the 233 malfunctions were from just one of the 10 weapons.

"The survey that Brown and Col. Radcliffe are referring to where they cite that the 'M4 is very popular amongst the soldiers deployed forward in combat' was based on the soldiers just getting their M16s replaced by M4s.

"They were asked if they liked it [compared to the M16] and of course the answer is going to be yes. It is



Lying in the desert dirt exposes weapons to grit and sand.



Whether it's up and over or crawling into spider holes, combat is a dirty business.





Helos kick up plenty of dust and grit.



The worst crud in the box is not dirt or sand, it's the fine dust in the desert wind storms called a Simooms.

Without that single bad HK416 test weapon, the HK416 might have finished first in the test.

lighter and smaller, with all these cool optics and lasers on them. Not to mention that average soldiers have no frame of reference when it comes to small arms; they're not really weapons experts." Assuming my AWG contact's information is accurate, without that single bad HK416 test weapon, the HK416 might have finished first in the test. This is significant, insofar as the 416 is the easiest and cheapest replacement for the M4. You only have to replace the M4's direct-gas-impingement upper receiver with the 416's gas piston/op rod-driven upper— and perhaps a better magazine.

Either way, a much easier and less-expensive fix than buying an entire new weapons system, be it the SCAR-L (Mk16) or XM8.

David Merrill, military communications manager for FNH USA, responded to the contention that the SCARs were hand-picked by writing: "The weapons we sent were not 'custom' made, they were from our LRIP production line. Your inside information on the lubrication was partially correct—our weapons received some additional lube, but it was just enough to bring them up to the same level as everyone else. We started off the

test with a lighter coating than all the other weapons."

So, what's the Army planning to do? One thing they're not planning is replacing the M4 with any one of its three conquerors from the last test. According to Col. Robert Radcliffe, Director of Combats, U.S. Army Infantry Center, Ft. Benning, Ga., the Army is going to stick with the M4 because soldier surveys from the sandbox, like the one cited above, show that U.S. Army combat troops like the weapon, at least as compared to the M16.

And, according to Brig. Gen. Brown, the Army is looking for a "leap ahead" advancement, a next-generation infantry small-arms technology for a replacement weapon, not just minor, incremental improvements like those represented by the HK416, FN SCAR-Light, and HK XM8. The quest for a replacement for the M4 will be a long one.

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