

XM17/XM18 Modular Handgun System (MHS)

Executive Summary

- The Army selected SIG SAUER’s full-size (XM-17) and compact (XM-18) variant pistols for the Army Modular Handgun System (MHS), and awarded a production contract to SIG SAUER on January 19, 2017.
- The Army conducted operational and live fire testing for both variants in FY17. Analysis is ongoing for operational effectiveness, operational suitability, and lethality. DOT&E intends to submit a combined IOT&E/LFT&E report to Congress in 2QFY18.
- During drop testing in which an empty primed cartridge was inserted, the striker struck the primer causing a discharge. SIG SAUER implemented an Engineering Change Proposal (ECP) to correct this deficiency by implementing lightweight components in the trigger group mechanism. This fix may have contributed to the splintering of two triggers during the IOT&E.
- Both the XM17 and XM18 pistols experienced double-ejections where an unspent ball round was ejected along with a spent round. Due to the increased frequency of occurrence during Product Verification Test (PVT), the Army stood up a root cause analysis team to identify the cause of the double ejections in parallel with continued PVT. As of this report, this analysis is still ongoing.
- During the PVT testing, the MHS with ball ammunition demonstrated significantly more stoppages than with the special purpose munition.
- During IOT&E, the MHS with special purpose munition met its Mean Rounds Between Failure (MRBF) reliability requirement. It did not meet its Mean Rounds Between Stoppage (MRBS) reliability requirement. For the MHS, a stoppage is defined as any deficiency that prevents the pistol from operating as intended, but is corrected through immediate action. A failure is defined as a hardware deficiency that requires replacement or repair. Slide stoppages accounted for 50 percent of XM17 stoppages, and 75 percent of the XM18 stoppages observed during IOT&E. In these stoppages, the slide failed to lock after users fired the last round in the magazine.

System

- The MHS program is comprised of the XM17 full-size variant and XM18 compact variant 9 mm pistols. The majority of Army MHS users will use the XM17 variant. Individuals and units requiring a concealed weapon will use the XM18 variant.
- Both variants include modular features to allow for the future addition of different targeting enablers (e.g., infrared and visible laser pointers), pistol grips, and alternate magazine options.
 - Targeting enablers can be mounted on the weapon using a standard platform known as Picatinny rails.



1 - XM17, Full Size, with 21-round magazine
 2 - XM18, Compact, with 17-round magazine
 3 - XM1152 Ball round
 4 - XM1153 Special Purpose (SP) round
 5 - XM1156 Dummy round
 6 - XM1157 Blank round
 7 - Slide Catch Lever

- Small, medium, and large polymer grip modules accommodate different hand sizes.
- The XM17 and XM18 pistols are mechanically locked, short-recoil operated weapons. Common features include an automatic striker pin safety lock reversible magazine catch to accommodate left- or right-handed shooters, ambidextrous manual safety, and external slide catch lever. Loading is automatic with each shot fired, until the magazine is empty. The slide is locked to the rear after the last shot is fired.
- The MHS incorporates a non-reflective, neutral color for detection avoidance. The Army intends for the MHS to be operable with a future suppressor.
- The Army required the weapon to use ball ammunition and special purpose ammunition. The XM1152 Ball cartridge uses a 115 grain truncated nose full metal jacket projectile and the

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XM1153 Special Purpose cartridge uses a 147 grain jacketed hollow point projectile.

- The contractor provides two 21-round magazines and one 17-round magazine with each pistol as part of the MHS.
- The MHS is an Army program with joint interest. The Army, including Army Special Operations Command, intends to purchase 238,000 pistols (approximately 231,000 XM17 and 7,000 XM18). The Navy, Marine Corps, and Air Force may purchase 224,000 pistols under the same contract.

Mission

- Military personnel conducting core mission combat operations use the MHS for personal self-defense and as their secondary weapon system. Core missions include anti-terrorism, direct action, force protection, anti-hijacking, evasion, special

investigations, special operations, reconnaissance, protective service, law enforcement, resource protection, base security and terminal air control, and combat search and rescue. Civil affairs and peacekeeping operations are core missions in some Services.

- Military personnel conducting collateral activities use the MHS as their primary weapon system. Collateral activities include foreign and U.S. humanitarian assistance, counter-terrorism, and counter-narcotics, all of which may involve military operations in urban terrain/operations, close quarters battle, and other operations on the battlefield.

Major Contractors

- Pistol: SIG SAUER Inc. – Newington, New Hampshire
- Ammunition: Olin-Winchester – East Alton, Illinois

Activity

- The Army's Program Executive Office Soldier released the final solicitation for the MHS to industry on August 28, 2015.
- The Army conducted bid sample testing from February 16 through June 22, 2016. This testing included initial ballistic characterization of candidate ammunition.
 - The program's acquisition strategy, as reflected in its request for proposal (RFP), allowed the Army to select up to three vendors based on bid sample testing to continue into PVT.
 - Vendors submitted nine proposal submissions. The Army selected the 9 mm MHS submission from SIG SAUER, which is a variant of their P320, and awarded a production contract to SIG SAUER on January 19, 2017.
- Glock filed a protest with the Government Accountability Office (GAO) on February 24, 2017.
 - Glock challenged the Army's interpretation of the solicitation regarding the minimum number of contract awards required by the RFP.
 - The GAO denied the challenge, finding that the RFP allowed the Army to make one award in June 2017.
- The Army entered into PVT in April 2017 for both the XM17 full-size variant and XM18 compact variant MHS pistols. This testing consisted of developmental testing, LFT&E, a fixed stand accuracy assessment, and a shooter-in-the-loop accuracy assessment.
- During drop testing in which an empty primed cartridge was inserted, the striker struck the primer causing a discharge. The Army directed SIG SAUER to develop an ECP to correct this deficiency. SIG SAUER modified the trigger mechanism to eliminate this deficiency. Subsequent testing validated that this ECP corrected the deficiency and the pistol no longer fired when dropped. The MHS with this ECP modification was submitted as the production-representative pistol for PVT, LFT&E, and IOT&E.
- During PVT testing with the ball ammunition, both MHS variant pistols would occasionally experience double ejections in which it would eject unspent ammunition along with the

spent ammunition. The frequency of this occurrence increased as more rounds were fired through the pistol. The program manager created a team to determine the root cause of this failure.

- Several reliability stoppages were observed with both the XM17 and XM18 when shooting ball ammunition. The ball ammunition was not included in the IOT&E because of the demonstrated reliability problems during PVT and the ongoing root cause analysis.
- The Army conducted IOT&E for the XM17 and XM18 with shooters for all Services firing special purpose munition from August 14 through September 22, 2017, at Fort Bragg, North Carolina, in accordance with the DOT&E-approved test plan.
- The Army received a Conditional Materiel Release for the XM17 and XM18 with both the special purpose munition and the ball ammunition in November 2017. The 101st Airborne Division is the first unit scheduled to receive the pistol.
- The Army completed live fire testing that consisted of firing the ball and special purpose rounds into ballistic gelatin and through realistic battlefield barriers of interest for ball cartridges. The Army will combine the results of this testing with the results of "shooter-in-the-loop" accuracy testing to model MHS lethality.
- The Army intends to have a Full-Rate Production decision in September 2018. DOT&E intends to submit a combined IOT&E and LFT&E report in 2QFY18.

Assessment

- The MHS met its accuracy requirement that 10 shots at 35 meters can be covered by a 4-inch disk, with the center of the grouping being no more than 4 inches from the point of aim, 90 percent of the time. This was an entrance criterion for the IOT&E.
- During PVT, the XM17 and XM18 were tested for MRBF and MRBS with special purpose munition and with ball ammunition with testing out to the required service life of 25,000 rounds per pistol. The MRBF reliability requirement

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- is 5,000 MRBF for a 98 percent probability of completing a 96-hour mission without a failure. The MRBS reliability requirement is 2,000 MRBS for a 95 percent probability of completing a 96-hour mission without a stoppage.
- During PVT, the XM17 and XM18, with special purpose munition, met its requirement for both MRBF and MRBS:
 - The XM17 demonstrated 8,929 MRBF (99 percent probability)
 - The XM18 demonstrated 8,333 MRBF (99 percent probability)
 - The XM17 demonstrated 1,923 MRBS (95 percent probability)
 - The XM18 demonstrated 2,155 MRBS (96 percent probability)
 - During PVT, the XM17 with ball ammunition met its requirement for MRBF but not its requirement for MRBS. The XM18 with ball ammunition did not meet its MRBF or MRBS requirement.
 - The XM17 demonstrated 6,944 MRBF (99 percent probability)
 - The XM18 demonstrated 3,906 MRBF (98 percent probability)
 - The XM17 demonstrated 343 MRBS (75 percent probability)
 - The XM18 demonstrated 197 MRBS (61 percent probability)
 - The IOT&E was conducted only with the special purpose munition. The ball ammunition was not included due to the PVT reliability problems and the initiation of an engineering team to determine root cause analysis.
 - During IOT&E, the Army observed 120 stoppages for XM17 and 85 stoppages for XM18. Operators were able to rapidly recover by performing immediate action drills without any additional maintenance or support. The stoppages had minimal operational impact on the operators' ability to fire and continue the mission. The assessment of operational suitability is ongoing.
 - Preliminary data from the IOT&E indicate that the XM17 and XM18 met the MRBF reliability requirement of 5,000 MRBF and a 95 percent probability of completing a 96-hour mission without a failure. Neither weapon met the MRBS reliability requirement of 2,000 MRBS and a 95 percent probability of completing a 96-hour mission without a stoppage.
 - The XM17 demonstrated 38,247 MRBF (99 percent probability).
 - The XM18 demonstrated 9,501 MRBF (99 percent probability).
 - The XM17 demonstrated 336 MRBS (74 percent probability).
 - The XM18 demonstrated 229 MRBS (65 percent probability).
 - The predominant cause of stoppages was the failure of the slide to lock (FSLR) after the firing of the last round in the magazine (60 of 120 stoppages for the XM17 and 63 of 85 stoppages for the XM18). The purpose of the slide locking to the rear is to inform the operator that the last round has been expended, and that the operator needs to reload a magazine into the weapon. Operators who are trained in pistol qualification, as taught by the Army marksmanship unit, utilize what is known as a high pistol grip. This grip places the non-dominant hand along the pistol slide on top of the slide catch lever. Many operators stated that the placement of the slide catch lever caused them to engage it while firing the pistol, which resulted in the slide not locking to the rear when the last round was expended in a magazine. Sixty percent of all FSLR stoppages (75 of 123) were experienced by 8 shooters out of the 132 who participated in the IOT&E. The Army marksmanship unit experts stated that this is an insignificant problem that can be mitigated with training and experience with the weapon. The MRBS demonstrated during IOT&E is significantly increased if this stoppage is eliminated:
 - The XM17 demonstrated 708 MRBS (87 percent probability).
 - The XM18 demonstrated 950 MRBS (90 percent probability).
 - There were two trigger splintering hardware deficiencies observed during the IOT&E. Preliminary analysis indicates that this may be correlated with the ECP developed by SIG SAUER to correct the deficiency of the pistol firing when dropped with the safety not engaged.
 - The assessment of LFT&E results is ongoing.
- ### Recommendations
- Status of Previous Recommendations. This is the first annual report for this program.
 - FY17 Recommendations. The Army should:
 1. Upon identification of the root cause of the double ejections and ball ammunition reliability problems, confirm fixes to both the XM17 and XM18 in future testing.
 2. Work with the vendor to identify and eliminate cause of variability in the manufacture of the trigger group mechanism.
 3. Consider redesign of the slide catch lever or operator training changes to prevent engagement by operators while shooting the pistol.

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