

**GAO**

Report to Congressional Requesters

January 1989

# PROCUREMENT

## Responses to Questions Posed by Beretta on the M9 Handgun





United States  
General Accounting Office  
Washington, D.C. 20548

National Security and  
International Affairs Division

B-222372

January 4, 1989

The Honorable Barbara A. Mikulski  
The Honorable Paul S. Sarbanes  
United States Senate

The Honorable Steny H. Hoyer  
The Honorable Tom McMillen  
House of Representatives

As requested, we have addressed the nine specific questions provided to you by Beretta U.S.A. Corporation concerning quality and performance aspects of the M9 9-mm handgun being provided to U.S. forces under contract with the Army. The specific questions and our responses are included in appendix I.

As discussed in our report dated September 15, 1988, to the Chairman, *House Committee on Government Operations, Procurement: Quality and Safety Problems With the Beretta M9 Handgun* (GAO/NSIAD-88-213), the M9 quality and performance problems relate primarily to frame cracks and slide failures. The contractor has implemented actions that appear to have resolved the frame crack problem. With regard to the slide failure problem, the Army and the contractor are addressing this issue and expect to have it resolved by January 1989.

As agreed with your office, we did not obtain official Department of Defense comments on this report. However, we did meet with officials responsible for the matters discussed in the report, and we have incorporated their comments where appropriate.

Our review was performed during September and October 1988 in accordance with generally accepted government auditing standards. Our objectives, scope, and methodology are discussed in appendix II.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its issue date. At that time, we will send copies to interested committees and other Members of Congress; the Secretaries of Defense, the Army,





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**Appendix I  
Responses to Questions on the M9 Handgun  
Posed by the Beretta U.S.A. Corporation**

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The four failures during field use were experienced by Navy Special Warfare Forces. These failures involved two M9s and two Navy-owned Beretta civilian models.

The 12 laboratory test failures involved 9 M9s and 3 military-owned civilian versions of the M9. The first laboratory slide failure involved an M9 that was being tested by the Army for barrel ringing. The remaining 11 laboratory failures occurred during testing to determine the cause of the slide failures. A test objective was to fire the weapons until the slides failed.

Table I.1 shows the pertinent details of each failure, including the type of weapon involved, the number of rounds fired through each weapon for each lot of ammunition, and the round count at failure.

meet the requirements of its Special Warfare Forces, particularly those units that fire a large number of rounds. Therefore, the Navy is looking for an improved 9-mm weapon that (1) can withstand extensive training firings, (2) has a long service life, and (3) provides reliable functioning in life-threatening situations.

Although the Navy has not finalized its Special Warfare handgun requirements, in the interim it plans to procure 500 weapons of a type yet to be determined and to eventually buy 3,000 new handguns for its Special Warfare Forces.

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#### Question 4

Has an M9 slide ever broken at less than 10,000 rounds, using properly certified North Atlantic Treaty Organization (NATO) ammunition?

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#### Response

There have been five slide failures that occurred at 10,000 rounds or less. The M882 ammunition used in these weapons had been tested and accepted by the Army as meeting U.S. and NATO specifications. For the two failures at 10,000 rounds or less that occurred in an operational environment, the lots of ammunition used in these weapons are not known. For the three laboratory failures, the ammunition was not NATO-certified.

Army officials told us that NATO-certified ammunition is ammunition that has been tested by one of the two NATO Regional Test Centers and found acceptable for use in NATO 9-mm handguns. Such certification assures NATO member countries that ammunition meets NATO specifications and will work properly in their weapons.

According to Army officials, except for government acceptance testing, there is no requirement that the M9 must fire NATO-certified ammunition. For training and operational purposes, any 9-mm ammunition tested and accepted as meeting U.S. and NATO specifications is authorized for use in the M9.

The non-NATO certified ammunition used for testing purposes involved M882 ammunition manufactured by Federal Cartridge Corporation. This ammunition utilized a powder formula (HPC-26), which was found to cause excessive chamber pressures when fired at extremely cold temperatures (-65 degrees Fahrenheit). However, Army officials determined that the low temperature anomaly had insignificant operational impact and, therefore, decided to use the ammunition. In addition, because the

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**Response**

We estimate that, as of October 1988, 172 M9s had been endurance-tested. These tests included lot acceptance tests, first article tests, and slide failure tests. Approximately 120 of the 172 weapons were endurance-tested as part of the lot production acceptance testing process. After firing, the weapons are disassembled and inspected for problems.

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**Question 6**

One slide breakage incident occurred during the testing of M882 ammunition that was producing concentric rings (barrel-ringing) on the inside of M9 chambers. What types and lots of ammunition have been known or alleged to produce this condition? What pressure level would be required to create rings inside hardened steel M9 chambers?

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**Response**

The first Army M9 slide failure occurred on February 8, 1988, while it was being tested for a barrel-ringing condition. The barrel-ringing problem was first noticed by the Federal Cartridge Corporation, in July 1986, while test-firing weapons using the HPC-26 formula ammunition.

Army officials have not been able to pinpoint a particular chamber pressure level that would induce barrel ringing. However, based on tests conducted prior to the first slide failure, they determined that barrel-ringing related more to barrel toughness or hardness than to ammunition. According to the Army testing officials, the tests confirmed that 9-mm M882 ammunition was not the cause of barrel ringing.

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**Question 7**

Are sufficient rounds still available for testing from all lots of ammunition that broke M9 slides? If not, identify those lots and related incidents of breakage for which identical ammunition is no longer sufficiently available.

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**Response**

The issue of sufficiency of the number of rounds available for retesting would depend on the type and number of tests conducted. However, according to the Army, a minimum of 1,800 rounds would be required to test each ammunition lot.

Ten different lots of M882 ammunition were used in the Army's laboratory tests to determine the cause of the M9 slide failures. As of October 1988, there were varying amounts of ammunition available for further tests for eight of the lots. With regard to the slide failures that occurred

assembly area. The Army has two corrective action efforts ongoing. The first effort involves a slide catch mechanism to prevent the slide from separating from the weapon and injuring the shooter. This corrective action is expected to be incorporated into the production line in January 1989. The second effort, which is longer term in nature, involves actions to prevent the slide from breaking. This effort could involve improving the heat treatment process to increase the toughness of the slide and/or redesigning the slide to eliminate the design flaw. A definitive timetable for the second set of efforts has not yet been established.

**Question 9**

How many M9 pistols have reached the 3,000-round usage mark? Did any of these pistols have signs of slide or frame cracks?

**Response**

In response to the Army's March 1988 safety-of-use message directing M9 users to replace the slide after 3,000 rounds and to return the replaced slides to the Anniston Army Depot, the services, as of October 1988, had replaced about 1,821 slides, as shown in table I.4.

**Table I.4: Number of M9 Slides Replaced by the Services** (as of October 1988)

Depot	Number of slides returned
Anniston Army Depot	53
Crane Naval Weapons Support Center	1,066 <sup>a</sup>
Warner Robins Air Logistics Center	100 <sup>b</sup>
Albany Marine Corps Logistics Base	600 <sup>a</sup>
Brooklyn Coast Guard Supply Center	2
<b>Total</b>	<b>1,821</b>

<sup>a</sup>Not all the slides are at the depots. Some have been retained by the field units or at intermediate maintenance locations.

<sup>b</sup>This represents an estimate of the number of slides that have been replaced. The Air Force does not require that the replaced slides be returned to the depots.

We could not determine whether the number of returned slides represents the total number of M9s that have been fired to 3,000 rounds. Service officials said that they do not know whether all of their units are observing the safety-of-use message and replacing the slides after 3,000 rounds. We know of one case involving a Navy Special Warfare unit where the slide was not replaced at the 3,000-round mark. In this case, the unit experienced a slide failure after about 10,000 rounds. Navy officials stated that since that incident on July 14, 1988, all Navy Special Warfare units have been reminded of the importance of observing the 3,000-round slide replacement recommendation.



# Objectives, Scope, and Methodology

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The objective of our review was to provide answers to nine questions on the M9's quality and performance, which the requesters had received from Beretta U.S.A. Corporation and asked us to address. The questions, for the most part, sought an expansion of many of the issues presented in our September 15, 1988, report to the Chairman, House Committee on Government Operations, Procurement: Quality and Safety Problems With the Beretta M9 Handgun (GAO/NSIAD-88-213).

In addition to information we developed during our previous M9 review, we reviewed Army and Navy M9 depot operations to determine the number and condition of returned M9 slide assemblies and frames. We also obtained data on the types and amounts of ammunition used in various ammunition, slide failure, and barrel-ringing tests and the process for determining that an ammunition lot is NATO-certified.

We interviewed program, test, and acquisition officials at the following locations:

- Ammunition Test Site, Fort Dix, New Jersey;
- Army Armament Research, Development and Engineering Center, Picatinny Arsenal, Dover, New Jersey;
- Anniston Army Depot, Anniston, Alabama;
- Naval Weapons Support Center, Crane, Indiana;
- NATO North American Regional Test Center, Fort Dix, New Jersey;
- Naval Sea Systems Command, Arlington, Virginia;
- Office of the Secretary of the Army, Washington, D.C.;
- Office of the Chief of Naval Operations, Washington, D.C.; and
- Office of the Secretary of Defense, Washington, D.C.

We also obtained information by telephone on the number of M9 slides returned to the depots from officials at the following locations:

- Marine Corps Logistics Base, Albany, Georgia;
- Coast Guard Supply Center, Brooklyn, New York;
- Kirtland Air Force Base, Kirtland, New Mexico; and
- Warner Robins Air Logistics Center, Warner Robins, Georgia.

As requested, we did not obtain official Department of Defense comments on this report. However, we discussed the draft report with responsible officials and included their comments as appropriate. We performed our review during September and October 1988 in accordance with generally accepted government auditing standards.

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# Major Contributors to This Report

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**National Security and  
International Affairs  
Division, Washington,  
D.C.**

Richard Davis, Senior Associate Director, (202) 275-4141  
Robert J. Lane, Group Director  
John P. Swain, Evaluator-in-Charge  
George W. Tabb, Evaluator

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**Responses to Questions on the M9 Handgun**  
**Posed by the Beretta U.S.A. Corporation**

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Because all but two of the returned slides had not been inspected, we could not determine how many of them were cracked. In addition, for most cases there was no documentation, or the accompanying documentation did not indicate the number of rounds fired through the weapon from which the slide was removed.

Regarding the part of the question about frame cracks, it should be noted that the 3,000 round safety-of-use message did not pertain to frames, only slides. However, as discussed in our response to question 1, 234 M9 pistols or frames have been turned in. Because they had not been inspected, officials were unable to state the specific reasons for turn-in. According to Army testing officials, in the absence of a highly visible crack in the frame, a frame crack would be difficult to detect in the field because of the detailed inspection process requiring the use of a die-penetration technique. This type of inspection is not normally performed by field units.

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in an operational environment, the Navy could not provide us with information on the specific lots of ammunition that were being used in the weapons at the time of the four slide failures.

Table I.3 shows the inventory status of the ammunition used during the Army's laboratory tests.

**Table I.3: Inventory Data on the 10 Ammunition Lots Used in the Army's Test (as of October 1988)**

<b>Ammunition lot</b>	<b>Number of rounds available</b>
FC-001	0
FC-002	0
FC-019	1,373
FC-020	234
FC-026	12,024 <sup>a</sup>
FN-37	500,000
WCC-007	300,000
WCC-080	185,465
WCC-083	200,000
WCC-095	13,537

<sup>a</sup>As of August 1988.

The ammunition amounts shown in table I.3 represent the stock level at Army ammunition depots or storage facilities. The Army could not provide information on ammunition stocks that may be available at troop locations.

## Question 8

What precautions did the Army take to limit the use of M882 ammunition in the M9 and in other weapons after the slide separation incidents occurred?

## Response

The Army did not impose restrictions on the use of M882 ammunition in the M9 or in any other weapons. The Army's March 1988 M9 safety-of-use message recommended that users monitor the number of rounds fired in each weapon and replace the slide at the 3,000-round mark. The slide replacement recommendation was based on an Army estimate that slide failure could occur as early as at 4,300 rounds. Therefore, the 3,000-round mark was considered a very conservative estimate.

The Army does not believe that the slide failure is ammunition-related. Instead, it believes that there is a basic design flaw in the weapons slide

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Army planned to change the formula to one that produced acceptable low temperature chamber pressures (HPC-33), it decided not to submit HPC-26 M882 for NATO certification.

Table I.2 shows the types and amounts of ammunition, by powder formula, used in the weapons that experienced slide failures.

**Table I.2: Ammunition Information for Weapons Experiencing Slide Failures**

Date of slide failure	Number of rounds by powder formula		Round count at failure
	HPC-26 formula	Other formula	
1984	a	a	Unknown
09/23/87	a	a	30,000 <sup>b</sup>
01/06/88	a	a	4,500 <sup>b</sup>
07/14/88	a	a	10,000 <sup>b</sup>
02/08/88	6,007	0	6,007
03/10/88	4,908	0	4,908
03/14/88	17,408	0	17,408
03/16/88	21,264	0	21,264
03/17/88	9,656	15,000	24,656
03/17/88	7,806	0	7,806
05/23/88	14,470	7,472	21,942
05/26/88	14,000	7,486	21,486
06/22/88	0	23,310	23,310
07/14/88	0	30,083	30,083
07/18/88	0	30,545	30,545
08/25/88	0	27,684	27,684

<sup>a</sup>These slide failures occurred in an operational environment, and the specific ammunition lots are not known.

<sup>b</sup>Approximate number of rounds

In addition to these tests, Beretta also tested each of 12 M9s to 20,000 rounds. The type of ammunition used in the tests included HPC-26 formula as well as NATO-certified ammunition. While none of these weapons experienced a slide failure, 5 of the 9 weapons firing NATO-certified ammunition developed slide cracks. However, none of the three weapons firing the HPC-26 formula ammunition developed slide cracks. The cracked slides were detected using a scanning electron microscope or magnetic particle inspection process.

**Question 5**

What is the total number of M9 pistols endurance-tested, for any purpose, including delivery acceptance, to date?

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**Table I.1: Slide Failure Data for M9S and Military-Owned Civilian Versions of the M9**

Weapon type	Date of failure	Failure environment	Ammunition lots used	Number of rounds fired	Round count at failure
<b>Navy weapons</b>					
92S	1984	Field	Unknown	Unknown	Unknown
92SB	09/23/87	Field	Unknown	30,000 <sup>a</sup>	30,000 <sup>a</sup>
M9	01/06/88	Field	Unknown	4,500 <sup>a</sup>	4,500 <sup>a</sup>
M9	07/14/88	Field	Unknown	10,000 <sup>a</sup>	10,000 <sup>a</sup>
<b>Army weapons</b>					
M9	02/08/88	Laboratory	FC-026	6,007	6,007
M9	03/10/88	Laboratory	FC-026	4,908	4,908
92SBF	03/14/88	Laboratory	FC-002	13,347	
			FC-026	4,061	17,408
92SBF	03/16/88	Laboratory	FC-002	5,000	
			FC-001	10,000	
			FC-026	6,050	
			FC-019	214	21,264
92SBF	03/17/88	Laboratory	FC-037	15,000	
			FC-026	5,150	
			FC-019	4,350	
			FC-020	156	24,656
M9	03/17/88	Laboratory	FC-026	7,000	
			FC-019	806	7,806
M9	05/23/88	Laboratory	FC-026	7,500	
			FC-019	1,500	
			FC-020	5,470	
M9	05/26/88	Laboratory	WCC-083	7,472	21,942
			FC-026	7,500	
			FC-019	1,000	
			FC-020	5,500	
M9	06/22/88	Laboratory	WCC-083	7,486	21,486
			WCC-007	23,310	23,310
M9	07/14/88	Laboratory	WCC-007	30,083	30,083
M9	07/18/88	Laboratory	WCC-007	30,545	30,545
M9	08/25/88	Laboratory	WCC-095	24,000	
			WCC-080	3,684	27,684

<sup>a</sup>Approximate number of rounds.

A Navy Special Warfare official told us that the Navy, although generally pleased with the M9 and its civilian version, has decided that it needs another type of weapon for its Special Warfare Forces. The slide failure problem has detracted from the Navy's confidence in the M9 to



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# Responses to Questions on the M9 Handgun Posed by the Beretta U.S.A. Corporation

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## Question 1

How many M9 frames have broken during field use? If any, how many rounds were fired in each weapon?

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## Response

Field units have not reported any broken or cracked M9 frames; however, 234 M9 frames or complete handguns have been returned to service depots for rework. Because the frames had yet to be inspected to determine what rework was required, officials could not say whether any of the frames were cracked.

In addition, frame cracks were detected at the contractor's plant during lot acceptance testing of the December 1987 and January 1988 production lots. Lot testing procedures require that a sample of weapons (normally 3) be selected from each production lot (normally 6,000) and fired to 5,000 rounds. After the test-firing is completed, the weapons are disassembled and inspected. All of the sample weapons in the December 1987 lot as well as all of the sample weapons in the January 1988 lot had cracked frames. As a result, both lots, totaling 12,000 weapons, were not accepted by the Army.

Beretta U.S.A. Corporation, in conjunction with the Army, developed and implemented a frame crack engineering change proposal in April 1988. These efforts appear to have corrected the problem. Since implementation of the change proposal, Beretta's efforts have been directed at reworking the December 1987 and January 1988 production lots as well as the February and March 1988 production lots, which had not been submitted to the government for acceptance testing. Rework of these frames was completed in July 1988, and the frames have been tested and accepted by the government.

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## Questions 2 and 3

How many M9 slides have broken during field use? If any, how many rounds were fired in each weapon?

How many have broken during special or non-normal use? What type and lot of ammunition were being used at the time of each incident of slide breakage? How many rounds of each lot were used per incident?

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## Response

As of October 18, 1988, a total of 16 slides from M9s or military-owned civilian versions of the M9 were known to have broken during field use and laboratory testing. Four failures occurred during field use, and 12 during laboratory testing.

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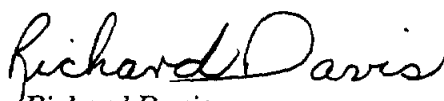
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and the Navy; and the Director, Office of Management and Budget. Copies will also be made available to other parties upon request.

The major contributors to this report are listed in appendix III.

  
Richard Davis  
Senior Associate Director

