

UNCLASSIFIED

AD NUMBER

ADA953115

CLASSIFICATION CHANGES

TO: unclassified

FROM: confidential

LIMITATION CHANGES

TO:

Approved for public release, distribution unlimited

FROM:

Distribution authorized to DoD only; Administrative/Operational Use; 01 JUN 1968. Other requests shall be referred to Army Chief of Staff, Attn: Weapons Systems Analysis Directorate, Washington, DC 20310.

AUTHORITY

1 Feb 1984 per d/a ltr; DAMA, 1 Feb 1984 per d/a ltr

THIS PAGE IS UNCLASSIFIED

REGRADED UNCLASSIFIED

ARMY STUDY

3660
V. 6

APPENDIX 5

REPORT OF THE M16 RIFLE REVIEW PANEL

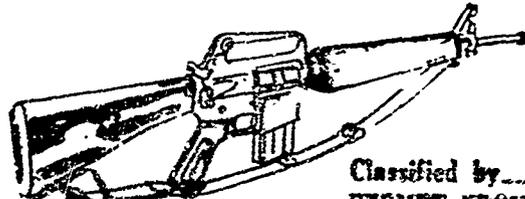
AD A 953115



DTIC
ELC
APR 9 1984
A

The Army Library (ANRALP)
ATTN: Army Studies Section
Room 1A534, Pentagon
Washington, D. C. 20310

DTIC FILE COPY



This document has been approved
for public release and sale; its
distribution is unlimited.

Classified by _____
EXEMPT FROM GENERAL DECLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPTION CATEGORY _____
DECLASSIFY ON _____

1 JUNE 1968

PROCUREMENT, PRODUCTION, AND DISTRIBUTION HISTORY
OF THE
AR15-M16-M16A1 WEAPON SYSTEM

REGRADED UNCLASSIFIED

REGRADED UNCLASSIFIED

84 08 13 282



DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF
FOR RESEARCH, DEVELOPMENT, AND ACQUISITION
WASHINGTON, DC 20310

REPLY TO
ATTENTION OF

DAMA-WSW

1 FEB 1994

MEMORANDUM FOR THE RECORD

SUBJECT: Declassification Action - Report of the M16 Rifle Review Panel (C)
dated 1 June 1968. [REDACTED]

1. The Report on the M16 Rifle Review Panel dated 1 June 1968 was prepared for the Office of the Chief of Staff of the Army, by the Office of the Director of Weapons System Analysis. The Ground Combat Systems Division, Office of the Director of Weapons Systems, Office of the Deputy Chief of Staff for Research, Development and Acquisition, is the successor to the originator of the report.
2. This office has completed a review of subject report and appendices 1 through 11 and has determined classification of Confidential is no longer needed. The report is now Unclassified. Selected extracts of the report are at Enclosure 1.
3. Notification of this declassification will be forwarded to all distribution addressees and a declassified copy will be forwarded to the Defense Technical Information Center, Cameron Station, for file.

1 Encl
as


WILLIAM C. COOMER
Colonel, GS
Chief, Ground Combat Systems
Division

file



Appendix 5
Procurement, Production, and Distribution History
of the
AR15-M16-M16A1 Weapon System
Table of Contents

	<u>Page</u>
A. Introduction	5-1
B. Initial Procurement Through Fiscal Year 1963	5-2
C. Fiscal Year 1964 Procurement	5-9
D. Fiscal Year 1965 Procurement	5-21
E. Fiscal Year 1966 Procurement	5-22
F. Fiscal Year 1967 Procurement	5-36
G. Fiscal Year 1968 Procurement	5-38
H. Allocation and Distribution	5-45
I. Negotiations	5-47
J. Quality Assurance	5-55
K. Conclusions	5-62
 Inclosures	
1. Fiscal Year 1964 Milestones	5-67
2. Summary of Acceptance Testing Specification for M16-XM16E1 5.56mm Rifles	5-68



~~CONFIDENTIAL~~

	<u>Page</u>
3. Summary of Quality Assurance Standards for the M196 5.56mm Tracer Cartridge	5-77
4. Summary of Quality Assurance Standards for the M193 5.56mm Ball Cartridge	5-84
5. Analysis of Current M16 Rifle Procurement	5-87
L. Bibliography	5-94

Tables

5-1 XM16E1 Rifle Requirements	5-9
5-2 Army-Marine Corps Fiscal Year 1966 Procurement for Free World Forces	5-31
5-3 Fiscal Year 1966 Army Procurement	5-32
5-4 Fiscal Year 1966 Other Customer Procurement	5-32
5-5 Ammunition Production Expansion	5-35
5-6 Fiscal Year 1967 Rifle Procurement	5-36
5-7 Fiscal Year 1968 Apportionment Computation	5-39
5-8 Theater Distribution of M16 Rifle	5-46
5-9 M16 Acceptance Data Based on Colt's Final Inspection Reports	5-59
5-10 Total Lots Produced Fiscal Year 1967 and First Quarter 1968, 5.56mm M193 Ball Ammunition	5-61
5-11 Army Rifle Procurement and Deliveries	5-64
5-12 DOD Rifle Program Fiscal Year 1961-68	5-65

Appendix 5

PROCUREMENT, PRODUCTION, AND DISTRIBUTION HISTORY
OF THE
AR15-M16-M16A1 WEAPON SYSTEM

A. Introduction

The procurement history of the AR15-M16-M16A1 rifle has been marked by a divergency of opinion as to the capabilities and deficiencies of the weapon system, and varying requirements.

Army procurement was begun with the purchase of a small quantity of AR15 rifles for test and evaluation in fiscal year 1962, and followed by a limited procurement, one-time buy in fiscal year 1964. Although no further procurement was anticipated, an urgent requirement for the rifle in Vietnam in 1965 initiated a large purchase in fiscal year 1966. Subsequent procurements in fiscal years 1968 and 1969 have been based on production capacities rather than on any well-defined, long-range program. Within this same period (1966 to 1968) requirements to support forces in Vietnam, particularly the Free World Military Forces, have been increased rapidly.

Ammunition procurements have, in general, kept pace with rifle deliveries, and once the production base was established, have created no significant problems.

CONFIDENTIAL

B. Initial Procurement Through Fiscal Year 1963

Rifle Procurement, U.S. Air Force

The first official act initiating the Air Force AR15 program occurred on 29 August 1960 when the Air Force Vice Chief of Staff commented that there appeared to be a requirement for a better small arm for Air Force local security forces to replace the caliber .30 carbine. Following the directions of the Vice Chief of Staff, an all-command survey was made, and after study it was determined that the Air Force had a total requirement for 80,000 rifles, to be procured over a five-year period. Following a briefing to the Vice Chief of Staff on 16 May 1961 by the Air Staff, the Vice Chief of Staff declared that "the Armalite AR15 rifle was the weapon that should be procured."¹

After a comprehensive study of the weapons available, the Air Force selected the AR15 as the weapon that best satisfied its requirements. Funds for procurement of 19,000 new rifles and 1.9 million rounds of 5.56mm ammunition were requested in the Air Force 1962 budget. The Department of Defense at first withheld the funds for procurement and gave three reasons:

Introduction of another rifle of different caliber and characteristics into the Department of Defense inventories was not desirable.

¹ Air Force History of the AR15 Rifle (Mid-1960 to Mid-1962), undated.

CONFIDENTIAL

Adoption of a .223 caliber rifle for the Air Force was not consistent with NATO standardization objectives.

Large quantities of M1 and M2 carbines were available in Army and Air Force depots and although they were twenty years old, they were still useable.^{2/}

Following a series of meetings and letters, the Air Force received approval from the Department of Defense on 12 September 1961 to procure 8,500 AR15 rifles and 8.5 million rounds of ammunition for test, training, and unconventional warfare. However, on presentation to the House Subcommittee on Appropriations on 21 September 1961, the procurement of the Air Force AR15 rifles was withheld pending consideration of additional data.

Congressional approval for the procurement of 1,000 AR15 rifles for test and evaluation in the Republic of Vietnam by the Advanced Research Project Agency (ARPA) of the Department of Defense in December 1961 reopened further discussions on the Air Force procurement.^{3/} Final Congressional authorization for the Air Force procurement was granted 15 May 1962. The 8,500 rifles and 8.5 million rounds of ammunition thus authorized for the Air Force

² Air Force History of the AR15 Rifle (Mid-1960 to Mid-1962), undated.

³ USAMC Rpt, 23 Jun 64, sub: Brief History of the Background of the Weapon System.

CONFIDENTIAL

were procured from Colt's Patent Firearms Manufacturing Company, Inc., Hartford, Connecticut, under Contract AF-33-(657)-9413, dated 29 August 1962.^{4/} The final rifle of this contract was delivered 28 January 1963.

Following its success in procuring this initial quantity of weapons, the Air Force included 19,000 additional AR15 rifles in its FY 1963 budget. Before the request reached Congress, the final report from the ARPA test of 1,000 AR15 rifles in Vietnam was published. This report established the AR15 rifle as an excellent weapon with improved lethality. The Air Force plan to procure a total of 80,000 AR15 rifles during a five-year period was recognized and accepted by the Department of Defense and Congress and the FY 1963 budget request was approved without delay.^{5/}

Rifle Procurement, U.S. Navy

The U.S. Navy, in May 1962, conducted a limited service test of the AR15 rifle for possible use by the Sea Air Land (SEAL) Teams. In comparison with other weapons of this type in the Navy inventory, the reliability, ruggedness of construction, light weight, and

⁴ Ltr, ARPA, 21 Dec 61, sub: ARPA Order 298-62.

⁵ Memo, OASD (Comptroller) for ASAF(FN), 20 Jan 63.

CONFIDENTIAL

relative simplicity of the AR15 rifle proved it to be an ideal weapon for SEAL operations. The Navy consequently purchased 172 AR15 rifles for special operations by amphibious SEAL teams.^{6/}

Rifle Procurement U.S. Army

In response to a 12 October 1962 memorandum from the Secretary of Defense, requesting views on the relative effectiveness of the M14 and AR15 rifles and the Soviet Assault Rifle (AK47), the Army initiated action to test and evaluate these weapons. To provide the weapons needed for the evaluation, the Department of the Army on 25 October 1962 authorized the procurement of 300 AR15 rifles and 600,000 rounds of ammunition.^{7/} A contract was placed with Colt's for this quantity on 30 October 1962.^{8/} The Commanding General, U.S. Army Materiel Command (CGUSAMC), provided program authority to procure 38 more AR15 rifles on 23 November 1962, bringing the total to 338 at a unit cost of \$107.00. Existing contracts were revised accordingly.

⁶ Memo, JCS (JCSM-99-63), 12 Feb 63, sub: Rifle Procurement Program.

⁷ DCSLOG Ltr, 25 Oct 62, sub: Procurement of AR15, Accessories and Ammunition.

⁸ Contract, DA-19-020-AMC-0015(W).

CONFIDENTIAL

Ammunition Procurement

The first record of a separate procurement action for 5.56mm ammunition was based on a stated requirement by the Air Force on 16 October 1962.^{9/} The August 1962 contract was granted to Colt's for both rifles and ammunition. The Air Force forwarded a partial technical data package to Picatinny Arsenal, New Jersey, asking if the Army had any interest. The Army response on 13 December 1962 indicated that a meeting had been held at Frankford Arsenal, 30 November 1962, with representatives from the Air Force, during which it was agreed that Frankford Arsenal would prepare an initial technical data package for a one-time Air Force purchase of commercial cartridges for use in the AR15 rifle.

A second meeting was held 9 January 1963 at Lake City Army Ammunition Plant, Missouri, with Army and Air Force representatives.^{10/} The purpose of this meeting was to develop practical drawings and specifications, based on the previous experience of the Air Force, which had made an earlier procurement of Remington 5.56mm cartridges through Colt's Inc. (see pages 5-3 and 5-4). The Air Force pointed out that the performance of the Remington cartridges had not been satisfactory because of four principal

⁹ Ltr, Ogden Air Materiel Area, 16 Oct 62, sub: Production of Cartridge, 5.64mm, H.V. Ball.

¹⁰ Min. U.S. Air Force Meeting on 5.6-mm Ammunition, 9 Jan 63.

CONFIDENTIAL

deficiencies: keyholing, stripping of the bullet jacket, packaging, and a light powder charge.

The Air Force representative from Eglin Air Force Base, Florida, declared that he thought a change in twist in the rifling of the barrel from 1 turn in 14 inches to 1 turn in 12 inches would correct the problem of keyholing. The U.S. Army Munitions Command representative stressed the importance of having a military specification for the rifle, since any variation in the design of the rifle could require a change in design of the ammunition.

By March 1963 the Army expressed its interest in the procurement of caliber .223 ammunition when the Project Manager for the AR15 rifle directed that 600,000 rounds be purchased immediately to satisfy urgent requirements for ammunition to support the 338 rifles on hand.^{11/} The Commanding General, U.S. Army Munitions Command (CGUSAMUCOM), further directed that the ammunition would be the Remington Arms caliber .223, which Remington Arms had developed and was the sole producer. A military technical data package was not available, but provisions were placed in the contract for Remington Arms to provide a full description with drawings and specification requirements.

¹¹ Msg, CG, USAMUCOM, to CO, APSA, 18 Mar 63.

The Air Force acted as the procurement agency for the ammunition it procured in FY 1963: 8.5 million rounds to support its FY 1962 procurement of 8,500 AR15 rifles and 19.0 million rounds to support its FY 1963 procurement of 19,000 AR15 rifles. However, because of the Army's renewed interest in and requirement for the same cartridge, the two services cooperated in the development of the military specifications and quality assurance provisions. On 6 March 1963, CGUS:MC appointed the AR15 Rifle Project Manager which facilitated this cooperation.

Many difficulties arose during the delivery of the initial Air Force and Army FY 1963 procurement because of such incompatibilities between the rifle and the ammunition as chamber dimension and primer sensitivity. (For a detailed discussion, see Appendixes 2 and 4.)

The Army procurement of 600,000 rounds of .223 ball ammunition was made under Item 1 of Contract DA-19020-AMC-0159(A) in May 1963. Item 2 of this same contract provided for delivery of the technical data furnished by the contractor to describe the commercial .223 ammunition. This data had previously been furnished to the various services for evaluation.^{12/}

¹² Frankford Arsenal Tenth Memo Rpt on AR15 Rifle-Ammunition System, 15 May 64.

CONFIDENTIAL

C. Fiscal Year 1964 Procurement

Rifle Procurement

The first major procurement of the M16 weapon system by the Army was funded in FY 1964. Justification for this procurement was based on the results of the M14, M16, and AK47 Comparative Evaluation, which was completed in early 1962 and recommended limited procurement of M16 rifles for issue to air assault, special forces, and airborne units. The Secretary of Defense approved this procurement in February 1963 upon recommendation of the Joint Chiefs of Staff, who had reviewed the Army test reports.^{13/} Initial requirements were then established.^{14/}

Table 5-1 XM16E1 RIFLE REQUIREMENTS

	<u>Air Assault</u>	<u>Special Forces</u>	<u>Airborne</u>	<u>Total</u>
Initial Issue	13,000	6,665	34,352	54,017
Maintenance Float	630	333	1,718	2,701
Combat Support (6 mos.)	5,070	2,598	13,386	21,054
Pipeline (2 mos.)	1,690	866	4,462	7,018
	<u>20,410</u>	<u>10,462</u>	<u>53,913</u>	<u>84,790</u>

¹³ Memo, SECDEF, 13 Feb 63, sub: Rifle Procurement Program.

¹⁴ ODCSLOG Staff Study, 24 Jan 63, sub: AR15 Rifle.

CONFIDENTIAL

The Army and the Air Force disagreed upon proposed changes to the rifle prior to the FY 1964 procurement. A meeting to resolve these differences was held in the office of the Assistant Secretary of the Army (Installations and Logistics) on 6 March 1963, with members of the Army and Air Force staff in attendance. The Assistant Secretary of the Army (Installations and Logistics) representative stated during the meeting that the Secretary of Defense had previously agreed to permit the Army to make changes to the rifle which were considered absolutely essential, provided the Air Force and Marine Corps also agreed to these changes. During the meeting, it became apparent that the major disagreements were in the requirement for a bolt closure device, which the Army believed was necessary, and a change of the barrel twist to 1 turn in 12 inches, which the Air Force wanted. The Army position on the barrel twist was that the Army did not wish any change that might reduce lethality, and therefore could not agree to the Air Force change without further testing.^{15/} The Air Force position was based on USABRL data and USAF testing at Eglin AFB.^{16/} (Appendix 2 treats this testing in detail.)

After evaluation of test data, the services agreed to adopt

¹⁵ MFR, ASA(I&L) 7 Mar 63, sub: AR15 Rifle.

¹⁶ Report, BRL, Dec 62, sub: Technical Note No. 1482 - Comparative Effectiveness Evaluation of the M14 and Other Rifle Concepts.

CONFIDENTIAL

the 1 in 12 inch barrel twist, and the Secretary of Defense authorized the Army to procure the rifle with a manual bolt closure device.

The Secretary of Defense directed the Army to exercise its single service procurement (system manager) assignment and buy for all services, beginning with FY 1964.^{17/}

Assuming that the FY 1964 requirements for the rifle would be approximately 104,000 and that subsequent requirements would be limited to 33,500 in FY 1965 for the Air Force, the Defense Department approved sole-source procurement from Colt's Inc.^{18/}

The U.S. Army Weapons Command submitted a recommendation to the Secretary of the Army on 30 October 1963 for an award of contract to Colt's Inc. for the delivery of 104,000 5.56mm rifles. The recommendation contained further pertinent information:^{19/}

There is an urgent FY 64 requirement for this weapon, and the award of a contract to the proposed contractor (Colt's Inc.) will enable early deliveries to be made and the program to be completed in the shortest possible time.

17 Memo, OSD, 11 Mar 63, sub: AR15 Ammunition and Rifles.

18 Memo, OSD, 27 Jun 63, sub: Action on Rifle Production Base Plan.

19 Memo, Hq, USAWECOM, 30 Oct 63, sub: Submission for Approval of Award of Contract for Rifles, 5.56mm, M16.

CONFIDENTIAL

There will be no government-furnished facilities nor special tooling provided for the proposed award.

Colt's agreed to accept an option up to 40,000 each at a price not to exceed the contract price provided that the option would be awarded not less than 6 months prior to the final delivery.

The negotiated price was \$113.00 for each of the 19,000 Air Force rifles and \$122.84 for each of the Army rifles with the bolt closure device. The Army procurement specified that seven magazines, one bipod, and one bipod case be provided for each rifle by the manufacturer. The Air Force was to receive only one magazine. The delivery schedule would commence with 300 rifles per month in March 1964, and build-up to 10,000 per month in November 1964, and contract completion in April 1965.

Ammunition Procurement

The first year buy involving a major procurement action for 5.56mm ammunition was in support of the Army procurement of 85,000 XM16E1 rifles and the Air Force procurement of 19,000 M16 rifles in FY 1964. This was the first year that the Army assumed the role of purchasing agent for the total service requirement of 5.56mm ammunition.

Several procurement programs were prepared by the U.S. Army Munitions Command during the period May through August 1963, 20/

²⁰ Ltr, CG, USAMUCOM, 14 May 63, sub: Production of 5.64mm (caliber .223) Ball Ammunition for the AR15 Rifle.

CONFIDENTIAL

in an effort to keep ammunition production in phase with rifle production.^{21/}

The basic guidance provided the Commanding Officer, Ammunition Procurement Supply Agency, specified:

1. Establishment of a production base for 5.64mm (5.56mm) ammunition.
2. Maintenance of a production base for 7.62mm ammunition.
3. Competitive procurement of both 5.64mm and 7.62mm ammunition.^{22/}

The plan developed by U.S. Army Munitions Command included a separate procurement, by competitive negotiation among the 7.62mm base producers, of 1 million rounds of 5.56mm ball ammunition. It envisioned the manufacture and test of this quantity to obtain a preproduction evaluation of the procurement package before the first deliveries from the major procurement.

Ammunition specification MIL-C-9963 was coordinated among representatives of the four services and agreed upon by them during the Technical Coordinating Committee Meeting 13-14 August 1963.^{23/}

²¹ Ltr, Project Manager, 5 Jul 63, with three inclosures, sub: Procurement Program, 5.56mm Ammunition for AR15 Rifles.

²² Memo, Hq, USAWECOM, 30 Oct 63, sub: Submission for Approval of Award of Contract for Rifles, 5.56mm, M16.

²³ Min, Technical Coordinating Committee Meeting, 13-14 Aug 63.

CONFIDENTIAL

The Project Manager Rifles, approved the plan and issued program authority to U.S. Army Munitions Command on 21 August 1963 for the procurement of 1 million rounds of 5.56mm cartridges of ball ammunition at a program cost of \$75 thousand.^{24/}

In the meantime, complications with the development of military specifications for the ammunition to assure compatibility with the rifle were being investigated. As a result of the Army staff position on the inadvertent fire safety hazard, procurement actions on the ammunition were temporarily suspended.^{25/} (See Appendix 4.) This suspension resulted in further delay of both the procurement plan and the development of the milestone schedule. (See Inclosure 1 for comparison of the schedule developed in September 1963 and the one prepared 4 December 1963.)^{26/}

The government request for proposals (RFP) on the initial 1 million rounds of the FY 1964 procurement was not favorably considered by the three commercial producers of small arms ammunition-- Olin Mathieson Chemical Corporation, Remington Arms Company, and Federal Cartridge Corporation. All three producers objected to parts of the technical data package.

²⁴ 2d Incl, Hq, USWECOM, 21 Aug 63, to Ltr, Project Manager, sub: Procurement Program, 5.56mm Ammunition.

²⁵ Ltr, Hq, USANUCOM, 3 Oct 63, sub: Procurement Program, 5.56mm Ammunition for AR15 Rifle.

²⁶ Ltr, Project Manager, 4 Dec 63, sub: Progress Report RSS DD-SG(1) 554, M16 Rifle.

CONFIDENTIAL

Olin Mathieson objected to certain specifications on cartridge case wall thickness and to the specifications of INR 4475 propellant. Remington objected to the same specifications and recommended that the prescribed maximum mean chamber pressure be increased from 52,000 p.s.i. to 53,000 p.s.i. Federal Cartridge expressed the view that the maximum mean chamber pressure should be raised to 54,000 p.s.i.

A meeting was held at Frankford Arsenal on 20 January 1964 with representatives of the three cartridge producers, DuPont--the sole producer of INR 4475 propellant--the Air Force, and the Army to review the requirements of the technical data package.^{27/} At this meeting, DuPont declared that it must manufacture propellant lots which would develop not more than a maximum mean chamber pressure of 2,000 pounds per square inch (p.s.i.) less than that permitted to cartridge manufacturers and also expressed concern as to whether or not the company could consistently meet even an increased limit of chamber pressure from 50,000 p.s.i. to 51,000 p.s.i. (53,000 p.s.i. for the assembled cartridge). DuPont, however, declared that there would be no problem in supplying enough propellant to load one million rounds. It was agreed to change the cartridge case drawing to reflect the new dimensions proposed by Remington,

²⁷ Office Memo, Hq, USAMUCOM, 17 Jan 64, sub: Meeting on Procurement of 1 million cartridges, 5.56mm, Ball. M193, Frankford Arsenal.

CONFIDENTIAL

because Remington maintained that its first drawings had been misinterpreted by the Army. It was also agreed to amend the Request For Proposal to permit increase of the maximum mean chamber pressure of the propellant to 51,000 p.s.i. and of the cartridge to 53,000 p.s.i. (for the one million rounds only). The Project Manager concurred in these changes on 17 January 1964, thereby eliminating the existing roadblocks to obtaining responsive proposals to the Request For Proposal for one million rounds.

Instructions to the Ammunition Procurement and Supply Agency by the Project Manager on 24 January 1964 were:

It is most desirable and in the interest of the Government to have more than one contractor involved in this procurement. This will enable more than one producer to develop a learning curve concerning this ammunition. Since the Government does not intend to develop an in-house capability for this ammunition at this time, multi-production capacity is desirable for mobilization and emergency requirements. Finally, two or more producers will offer the Government the most desirable feature of price reductions and savings--competition. In view of the above, this procurement should be split between at least two contractors (if the costs can be justified). It is realized that costs will vary between different producers.28/

The contract for one million cartridges, awarded 19 February 1964, was split; 500,000 cartridges were procured from Remington Arms Company and 500,000 from Olin Mathieson Corporation (Western Cartridge Company).

²⁸ Min. Meeting, Cartridge. 5.56mm, RFP, 1 Million, 28 Jan 64.

CONFIDENTIAL

With the contract for the initial one million cartridges signed, attention next focused on the propellant problem, which needed to be resolved before procurement action on the remaining 131 million rounds could be completed. The propellant and cartridge manufacturers had not agreed that relaxation of the chamber pressure to 53,000 p.s.i. would permit large-scale procurement.^{29/} Therefore, the requirement for increased product improvement in the propellants area became urgent.

Although disagreements on the technical data package, primarily relating to the propellant, remained to be solved, contracts for the remaining 131 million cartridges were awarded on 26 February 1964 as follows:^{30/}

Olin Mathieson Corporation--77,880,000

Remington Arms Company, Inc.--57,000,000

Federal Cartridge Company--15,000,000

At the time the above contracts were awarded, the contractors were asked to propose another type propellant for testing to permit qualification of additional types. Each of the three ammunition producers recommended a different alternate propellant for the original

²⁹ DF, Frankford Arsenal (SMUFA-6000), 21 Jan 64, sub: Evaluation of Propellants for 5.56mm Ammunition.

³⁰ MFR, Frankford Arsenal, 30 Mar 64, sub: AR15-M193 Ball Cartridge Procurement.

CONFIDENTIAL

INR 4475. Remington advocated a tubular-grain, centralite-coated propellant (CR 8136), which was produced by DuPont. Olin recommended a spherical-grain propellant (WC 846), which was an Olin product. Federal advocated neither the DuPont nor Olin product, but favored a product of Hercules Powder Company (HPC-10).

The plan to evaluate the three candidate propellants included the procurement of 25,000 M193, .56mm ball cartridges from each of the three propellant companies. Each propellant company was given free choice in selection of a cartridge producer to load and assemble cartridges with candidate propellants. (Each firm elected to have the loading of the sample done by Remington Arms Company.) (Details and results of this test are outlined in Appendix 4.) The final recommendation was that both propellants CR8136 and WCS46 be approved as permissible alternates to INR 4475 in the loading of 5.56mm M193 ball ammunition.^{31/} Manufacturers were advised of the Frankford Arsenal findings 28-29 April 1964.^{32/}

Meanwhile, production of the initial one million cartridges progressed with no major difficulty, although Remington advised Frankford Arsenal on 28 April 1964 that it did not have enough INR 4475 propellant to complete the 500,000 order and would be 19,000

³¹ Frankford Arsenal Tenth Memo Rpt on AR15 Rifle-Ammunitions System, 15 May 64.

³² Msgs, CC, Frankford Arsenal, to Olin, Federal, and Remington, 28 and 29 Apr 64.

CONFIDENTIAL

short (481,000 delivered). It was initially planned to test thoroughly a 25,000-round sample from each producer. However, because subsequent developments indicated that future production would be loaded with CR8136 or WC846 propellant rather than IMR 4475, the 25,000-round samples would not be representative of the future production. For this reason, the testing was limited to a simulated acceptance test similar to those for normal production lots of ammunition, except that the function and casualty test was omitted.^{33/}

By the end of November 1964, delivery of 5.56mm ammunition (131 million procurement) lagged behind the original schedule requirements by approximately 9,837,000 rounds. The failure of Federal to qualify a preproduction sample because of primer sensitivity resulted in a shortage of 6,908,000, while Remington's low deliveries in November gave the company a 2,929,000-round shortage on its contract commitment. Olin Mathieson, the third producer, was on schedule. After the fourth attempt by Federal to manufacture an acceptable preproduction sample failed, consideration was given to terminating the Federal contract for default. The Project Manager, however, directed that the contractor be given another opportunity to submit

³³ Memo, Frankford Arsenal (SMUFA-6000), 29 Apr 64, sub: Tests of Samples from First Million Production of 5.56mm M193 Ammunition.

CONFIDENTIAL

a preproduction sample.^{34/} Although Remington had met the requirements for the preproduction sample (accepted 25 June 1964), it also had difficulty during December in maintaining primer sensitivity within the prescribed limits.

The next preproduction sample produced by Federal passed all aspects of the test with the exception of profile alignment. Frankford Arsenal conducted tests to study the effects of bullet obliquity on ultimate function.³⁵ The results of this test indicated that the bullet obliquity did not adversely affect the cartridge performance, but to minimize user reaction, it was recommended that the use of these cartridges be limited to Continental United States. Frankford Arsenal recommended immediate process and inspection improvements on the part of the contractor.

Deliveries against the contract for 131 million rounds (19 million for the U.S. Air Force) were completed on 30 November 1964.

³⁴ Summary Rpt, Frankford Arsenal, 22 Dec 64, sub: Deliveries of 5.56mm Ball Ammunition.

³⁵ Memo, Frankford Arsenal (SMUFA-0300), 22 Mar 65, sub: Request for Deviation Approval of Technical Action (RTA) CHPD 105-65(DV)--Cartridge, 5.56mm, Ball, M193.

CONFIDENTIAL

D. Fiscal Year 1965 Procurement

Rifle Procurement

There was no Army procurement action for the M16 rifle in FY 1965. Other customer procurements were 33,500 rifles for the Air Force, 1,550 rifles for the Navy, and 142 for the Coast Guard.

Ammunition Procurement

The FY 1965 Army ammunition procurement program initially consisted of 20 million rounds of 5.56mm M193 ball cartridges. The program authority for this quantity was released to Frankford Arsenal on 1 September 1964; the production contract was awarded 25 March 1965, with deliveries made from commercial sources during the period April 1965 through March 1966. The Air Force procured 27,797,760 rounds of 5.56mm M193 ball cartridges from Remington Arms with deliveries from January 1965 through March 1966.

The 1965 procurement of 5.56mm, M196, tracer ammunition consisted of 42,872,000 rounds for the Army and 1,000,000 rounds for the Air Force. Deliveries were completed during February 1966.^{36/}

³⁶ Memo, Hq, USAMC, undated, sub: Milestones, FY 1965.

CONFIDENTIAL

E. Fiscal Year 1966 Procurement

Rifle Procurement

The Chief of Staff directed on 13 April 1964 that the Army Staff examine the alternatives of rifle procurement and distribution to insure maximum readiness of U.S. troops. It was to be assumed that no more M14 rifles would be procured in peacetime.^{37/} The final report, titled Study of Rifle Readiness, was forwarded to the Chief of Staff by Deputy Chief of Staff for Logistics (DCSLOG) on 5 June 1964. One assumption in the study was: "There will be no procurement of XM16E1 (AR15) rifles after the fiscal year 1964 buy of 85,000."^{38/} At the time of this study it was also assumed that the Special Purpose Individual Weapon (SPIW) program would produce a significantly improved weapon which would be ready for type classification by the 4th quarter of FY 65. (Any assumption regarding early availability of the SPIW was soon to prove invalid. During the period July through November 1964, the forecasted type classification date for SPIW slipped from 4th quarter FY 65 to 2nd quarter FY 68-see Inclosure 1 to Appendix 10 for discussion of the SPIW program.) The recommendations of this study, which were approved by the Chief of Staff, were:^{39/}

37 CSN 64-146, 13 Apr 64.

38 Study of Rifle Readiness, 15 May 64.

39 Ltr, ODCSLOG, 6 Aug 64.

CONFIDENTIAL

1. That all actions to refine requirements be expedited and directed toward development of requirements for specific weapons to improve posture and that an air pipeline be assured to maintain it.

2. That the Army maintain its position that no M1 rifles should be released for Military Assistance purposes, making exceptions in only very unusual cases such as the support of Vietnam.

3. That action be taken to authorize the overhaul of M1 rifles during FY 65 for the Army rather than for other customers as now planned.

4. That backlog of M1 rifles, remaining after the FY 65 overhaul program, be rebuilt in FY 66 for the Army and that rebuild in subsequent years be based upon need.

5. That the tests on the conversion of M1 rifles to 7.62mm configuration, currently being conducted by the Army Materiel Command, be expedited and that weapons so modified be given an abbreviated field test at the earliest practicable date.

6. That all four present production facilities be retained in a high state of readiness for the next year. Such retention will provide a capacity of 98,000 rifles per month, more than adequate to support a 22 Division Force, with a P-Day of D+11 months.

7. That retention of these facilities be re-evaluated next year on the basis of progress of the SPIW program.

With reference to the DCSLOG Study of Rifle Readiness, the Commanding General, U.S. Army Materiel Command, advised the Chief of Staff:

To the extent that the DCSLOG Study of Rifle readiness (15 May 1964) is sensitive to the assumption to buy no more XM16E1 (AR15) rifles, its conclusions are suspect.

CONFIDENTIAL

As nearly as we can see at present, the XM16 realizes at least 50% of the improvement that the SPIW generates over the M14. The cost of the XM16 system (including ammo.) will be a little less than the M14 for equivalent production rates. The SPIW System will cost at least 25% more than the M14.

The XM16 can be made available in production quantities four years sooner than SPIW.^{40/}

The DCSLOG response to the letter from the Commanding General, U.S. Army Materiel Command, stated:

The object of the SPIW program was to develop a weapon that would be a quantum improvement over the standard rifle. For the past several years we have fought off any solution which would commit the Army to another interim rifle which could hinder the development of a greatly improved individual weapon in the 1965-70 time frame. If a caliber .223 weapon is to be selected as the successor to the 7.62mm M14, it should be the best caliber .223 weapon available and one which fills the quantum improvement qualification. This could possibly be the AR18, the Stoner 63 or some other design. Such a decision cannot be made until the future of the SPIW is clear.^{41/}

The Deputy Chief of Staff for Logistics was directed on 21 August 1964 to prepare a study of the resumption of procurement of M14 rifles for the Secretary of Defense.^{42/} This action was directed by the Secretary of the Army as the result of a briefing by DCSLOG and ACSFOR on 18 August 1964. The study, submitted to the

40 Ltr, USAMC, 23 Jul 64, sub: DCSLOG Study of Rifle Readiness.

41 Ltr, ODCSLOG, 6 Aug 64.

42 CSM 64-341, 21 Aug 64, sub: The Army Rifle Program

CONFIDENTIAL

Chief of Staff on 4 November 1964, emphasized the fact that by the end of FY 1966 the combined assets of M14 and M1 rifles would be insufficient to meet requirements, and by the end of FY 1970, a deficit of 85,813 weapons would exist.^{43/} These data included the 85,000 M16 rifles which were procured in FY 1964. The analysis of the rifle position included in this study pointed out that the deteriorating Army rifle position was caused by slippage in development and type classification of the most likely follow-on weapon to the M14 rifle--the Special Purpose Individual Weapon (SPIW). The report also stated: "Pending receipt of the follow-on weapon, the Army staff prefers the M14 rifle over the M16. Recent briefings to the Chief of Staff and the Secretary of the Army affirmed this position." The rationale for this was logical in that the Army view was that any additional interim rifle procurement should be for the weapon already in the inventory in greatest quantity. This was further buttressed by U.S. commitment to NATO Standardization Agreements that provided for equipping participant national forces with 7.62mm weapons. The DCSLOG recommendation was that 100,000 M14 rifles be procured from the FY 1966 budget. The final action on the summary sheet is not clear; however, it was returned to DCSLOG on 13 November 1964 as a dead case.^{44/}

⁴³ Summary Sheet, ODCSLOG, 4 Nov 64, sub: Study of Procurement of M14 Rifles.

⁴⁴ MFR, Perna Development Division, ODCSLOG, 13 Nov 64.

CONFIDENTIAL

There is no record of any further action on the FY 1966 procurement of rifles until May 1965.

In February 1965, representatives of Colt's Inc. commenced a series of visits and letter exchanges with the Army staff concerning the maintenance of a production base.^{45/} The U.S. Air Force FY 1965 contract was scheduled for completion in October 1965. Production for the Army FY 1964 program had started in May 1964 and was originally scheduled to be completed in April 1965. The Army contract had been modified by U.S. Army Materiel Command, however, to provide for final deliveries in December 1965.^{46/} Representatives from Colt's declared that they believed there was an obligation to maintain an operating production base in view of the previous Army and Air Force procurements and particularly in view of the situation in Southeast Asia. Colt's representatives said that the base could be maintained either through direct contracts from the Department of Defense for stated quantities of rifles or through purchase of rifles for use by the Military Assistance Program. They also advised that if they did not have work by 1 May 1965 on government contracts, production quantity would decrease and unit costs would increase. The Army staff (DCSLOG) response to Colt's Inc. was that the prospects

⁴⁵ Ltrs, Colt's, 16 Feb 65, 24 Feb 65, and 7 Apr 65 and Cable, 5 May 65.

⁴⁶ Memo, ODCSLOG, sub: Production Base Plan for the M16 Rifle, 8 Mar 65.

CONFIDENTIAL

were poor for any new orders for rifles in the near future, however, the Army was not aware of the Air Force plans.^{47/} The Chief of Staff approved the recommendation that the Army make no changes in the rifle program until the study was completed, and that the maintenance of an operating line for producing M16 rifles was not necessary.^{48/} The Chief of Staff advised ASA(ISL) of his decision on 12 May 1965.^{49/} This decision was influenced by the fact that there were no further known or projected Army force structure requirements for the M16.

Meanwhile, on 19 May 1965, the Commanding General, U.S. Army Materiel Command, requested approval to procure at least 60,000 XM16E1 rifles for potential U.S. Army and military assistance requirements in Southeast Asia.^{50/} He said that although there was no firm requirement at that time to substantiate the proposed procurement, in his opinion it was probable that an urgent demand would develop.

DCSLOG replied to the Commanding General, U.S. Army Materiel Command, on 26 May 1965, advising him that at present there was

⁴⁷ Ltr, DCSLOG to Vice President, Colt's Inc., dtd 11 Mar 65.

⁴⁸ Summary Sheet, ACSFOR, 21 Apr 65, sub: Army Requirements for the M16 Rifle.

⁴⁹ Memo, CofSA, 12 May 65, sub: Inquiry of Colt Industries, Inc.

⁵⁰ Ltr, Hq, USANC, 19 May 65, sub: Procurement of Rifles.

CONFIDENTIAL

no requirement for additional XM16E1 rifles; however, the Air Force had indicated a requirement of 65,358 M16 rifles per year through the FY 1966-70 time frame.^{51/}

On 14 July 1965, the Commanding General, U.S. Army Materiel Command, again recommended procurement of XM16E1 rifles to the Vice Chief of Staff.^{52/} In this letter, he pointed out that according to the latest projection for commitment of forces equipped with the XM16E1 rifle to Southeast Asia, the CONUS stocks of the rifle would be depleted by July 1965. He further pointed out that the lightweight and rapidfire characteristics of the XM16E1 rifle made it a much better weapon for use in Southeast Asia than the M14 rifle. A note added to this letter said:

I have just received a TwX from MACV requesting for planning purposes cost and delivery schedule for 50,000 XM16E1 rifles and associated ammunition. In view of this request from Westmoreland, I think the 60,000 figure is too conservative.

On 28 July 1965, the Commanding General, U.S. Army Materiel Command, submitted a PEMA Reprogram Request to DCSLOG for 43,000 XM16E1 rifles at a cost of \$5,160,000.^{53/} This reprogramming action was returned without action on 17 September 1965 on the basis

-
- 51 Ltr, Air Force Logistics Command, 29 May 65, sub: M16 Rifles.
52 Ltr, Hq, USAMC, 14 Jul 65.
53 Ltr, Hq, USAMC, 28 Jul 65, sub: FY 66 PEMA Program.

CONFIDENTIAL

of a decision by the Chief of Staff not to buy additional XM16E1 rifles at that time to equip units not then authorized the XM16E1 rifle.^{54/} DCSLOG, by a separate action, included in the Omnibus Program Change Proposal the anticipated combat consumption for the XM16E1 and advised U.S. Army Materiel Command that the requirement would be included in the January Supplemental (fiscal year 1966) budget. It was requested that 30,134 XM16E1 rifles be included in the budget to meet anticipated combat consumption for troops in Vietnam at that time.^{55/}

The FY 1966 requirement for procurement of the XM16E1 rifle was initiated by a request from Commander, U.S. Military Assistance Command, Vietnam on 6 December 1965 for 170,000 M16 rifles, including 10,000 for immediate use and approximately 10,500 to be equipped with the XM148 grenade launcher.^{56/} A follow-up cable from Commander, U.S. Military Assistance Command, Vietnam on 7 December 1965 outlined a requirement for the FY 1966 Military Assistance Program of 106,000 M16 rifles for Republic of Vietnam Armed Forces and 17,000 M16 rifles for Republic of Korea forces.^{57/}

⁵⁴ 1st Incl, DCSLOG, 17 Sep 65 to Ltr. Hq, USAMC, 28 Jul 65, sub: FY 66 PENA Program.

⁵⁵ Exhibit P1, Budget Submission, 1 Oct 65.

⁵⁶ Msg, MACV 42787 (DAIN 187924), 6 Dec 65.

⁵⁷ Msg, MACV 42932, 7 Dec 65, sub: FY 66 Military Assistance Program.

CONFIDENTIAL

In response to this urgent requirement, the Assistant Secretary of the Army (I&L) directed the Commanding General, U.S. Army Materiel Command, to award a letter contract to Colt's Inc. for the accelerated production and delivery of 100,000 XM16E1 rifles. U.S. Army Materiel Command was also directed to make plans for the immediate expansion of the 5.56mm ammunition production capacity.^{58/} The letter order contract with Colt's was signed 7 December 1965.

The Secretary of Defense asked Commander, U.S. Military Assistance Command, Vietnam to clarify his requirements in that it could not be determined whether the rifles referred to in the message of 7 December were in addition to or a part of the 170,000 rifles requested in the 6 December message.^{59/}

Commander, U.S. Military Assistance Command, Vietnam refined his requirements for the XM16E1 rifle, now stated as 179,641 rifles to re-equip fully all ground combat units.^{60/}

As a result of the Secretary of Defense decision to procure 100,000 additional rifles, the Deputy Chief of Staff for Logistics submitted a change to the January 1966 Supplemental Budget for an

⁵⁸ Ltr, ASA(I&L), 6 Dec 65, sub: Accelerated Production of Rifle, 5.56mm, XM16E1 and Ammunition.

⁵⁹ Msg DEF, 8 Dec 65.

⁶⁰ Revision to October 1 Budget Estimates, 6 Dec 65.

additional 100,000 XM16E1 at a cost of \$11 million and 494.9 million rounds of 5.56mm ammunition at a cost of \$30.7 million.^{61/}

Subject Issue 854 by Department of Defense added to the Army program funds for an additional 123,000 rifles and related ammunition. These rifles and ammunition were intended for Military Assistance Program. Subject Issue 933 provided a breakout of the Military Assistance Command, Vietnam requirements between the Army and the Marine Corps.^{62/}

Table 5-2--ARMY-MARINE CORPS FISCAL YEAR 1966 PROCUREMENT FOR FRE. WORLD FORCES

<u>RVN ARMY</u>	<u>QUANTITY</u>	<u>AMOUNT</u> <u>(\$MILLIONS)</u>
M16 Rifles	100,000	14.1
5.56mm Ammo	535.0 M*	33.2
<u>ROK ARMY</u>		
M16 Rifles	14,000	2.0
5.56mm Ammo	76.0 M	4.7
<u>RVN MARINES</u>		
M16 Rifles	6,000	.9
5.56mm Ammo	32.3 M	2.0
<u>ROK MARINES</u>		
M16 Rifles	3,000	.5
5.56mm Ammo	14.5 M	.9

* Millions.

⁶¹ Msg, MACV 43529 (DAIN 196152), 12 Dec 65.

⁶² Subject Issue 933, 22 Dec 65.

CONFIDENTIAL

The Army further refined the overall total FY 1966 budget requirement for the XM16E1 rifle.^{63/} (Tables 5-3 and 5-4)

Table 5-3--FISCAL YEAR 1966 ARMY PROCUREMENT

Original Submission	30,134
USARV	68,000
In lieu of M14 rifles plus consumption	115,271
RVN Army	100,000
ROK Army	<u>14,000</u>
TOTAL ARMY PROCUREMENT	327,405

Table 5-4--FISCAL YEAR 1966 OTHER CUSTOMER PROCUREMENT

U.S. Air Force	60,082
U.S. Marine Corps	91,872
U.S. Navy	2,000
U.S. Coast Guard	<u>1,411</u>
TOTAL OTHER CUSTOMERS	155,365

Because of the increased requirement for the M16 rifle and the need for an expanded production base, two alternatives were considered. The first was to increase Colt's production to the 25,000 monthly rate as rapidly as possible. The second was to establish a second source of production. It was estimated, however, that it would be 22 months before the first delivery could be made from a second source, since no military technical data package existed.^{64/}

⁶³ The Army Materiel Plan, Vol. VII, May 66.

⁶⁴ Fact Paper, OASD (ISL), 18 Jan 66, sub: M16 Rifles.

CONFIDENTIAL

The decision was made by Office of the Secretary of Defense on 19 February to expand Colt's production to 25,000 rifles per month.^{65/}

Included in the Commander, U.S. Military Assistance Command, Vietnam message of 6 December was the request that M16 and XM16E1 rifles now in hands of U.S. forces not engaged in general combat be redistributed against his stated requirement. To alleviate the shortage of rifles for combat units, the Air Force offered to provide production M16 rifles (without the manual bolt closure device) to the Army. The Army accepted 3,543 of these rifles from the Air Force for issue to the Continental United States training base in order to release those assets of XM16E1 rifles on hand to Vietnam.^{66/}

Colt's Inc., reached a capacity of 25,000 rifles a month in December 1966. The initial production from the FY 1966 procurement was received in May 1966 and the final delivery was made in December 1967. The total program cost for the 327,405 rifles was \$38.6 million with a program unit cost of \$117.89.^{67/}

Ammunition Procurement

The Secretary of Defense decision on 6 December 1965 to expand M16 rifle production as a result of increased requirements in Vietnam created an immediate requirement to expand the 5.56mm ammunition

⁶⁵ Memo, OASD, 19 Feb 66, sub: Procurement of Rifles, 5.56mm, M16, and XM16E1.

⁶⁶ Msg DA (DA 745194), 27 Dec 65, sub: M16 Rifles.

⁶⁷ The Army Materiel Plan, Vol. VII, May 67.

CONFIDENTIAL

production base. The Deputy Chief of Staff for Logistics recommendation stated that a monthly production capacity for 100 million rounds of 5.56mm ammunition must be established to meet the increased Southeast Asia requirements.^{68/}

The plan submitted by Deputy Chief of Staff for Logistics and approved by the Department of Defense provided for the conversion of caliber .30 ammunition facilities at Lake City Army Ammunition Plant at a cost of \$2 million and at Twin Cities Army Ammunition Plant at a cost of \$3.5 million.^{69/} Lake City could initiate production in July 1966 and attain a maximum monthly rate of 32 million rounds by December 1966. Twin Cities could commence producing in September 1966 and reach 50 million rounds per month by March 1967. The total existing capacity in private industry was 16,400,000 rounds per month.

Further revision of the FY 1966 M16 rifle procurement caused a revision of the monthly requirements for 5.56mm ammunition from 100 million rounds per month to 150 million rounds per month. By a memorandum of 6 January 1966, Assistant Secretary of the Army (I&L), in response to a Deputy Chief of Staff for Logistics proposal, revised the funds required for expansion.^{70/}

⁶⁸ DF, Dir of Proc to ASA(I&L), 10 Dec 66, sub: Expansion of Production Capacity for 5.56mm Ammunition.

⁶⁹ Memo, Deputy Secretary of Defense, 23 Dec 65, sub: Expansion of Production Capacity for 5.56mm Ammunition.

⁷⁰ Memo, ASA(I&L), 6 Jan 66, sub: Expansion of Production Capacity for 5.56mm Ammunition at Lake City and Twin Cities.

CONFIDENTIAL

Table 5-5--AMMUNITION PRODUCTION EXPANSION

<u>FACILITY</u>	<u>PREVIOUSLY APPROVED</u>	<u>REVISED TO</u>	<u>5.56MM CAPACITY PER MONTH</u>
Lake City AAP	\$2,000,000	\$1,621,000	40,000,000
Twin Cities AAP	\$3,500,000	\$4,300,000	100,000,000
TOTAL	\$5,500,000	\$5,921,000	140,000,000

The two government-owned commercially-operated (GOCO) plants of Lake City AAP (operated by Remington Arms Company) and Twin Cities AAP (operated by Federal Cartridge Company) experienced some difficulty in their accelerated start-up of production of a new and different caliber of ammunition. In addition to shortages of machine tools and trained operators, both plants experienced the same problems the commercial producers had had in meeting primer sensitivity and case wall thickness requirements. Some delays were also experienced in obtaining a source for cups necessary for the manufacture of cases, bullet jackets, and primers.^{71/} (These problems have been resolved and the GOCO plants are currently having no more difficulty in meeting production schedules and standards than are the commercial producers.)

⁷¹ Trip Rpt, Frankford Arsenal, 2 Aug 66, sub: Visit to LCAAP.

CONFIDENTIAL

F. Fiscal Year 1967 Procurement

Rifle Procurement

The Army procurement in FY 1966 of 327,405 rifles precluded any further procurement in FY 1967. With an established nine-month production lead time on the M16 rifle (deliveries may commence on the tenth month following fund release), and the fact that Army FY 1966 deliveries were not completed until December 1967, only three months of production would have been available. The production capacity for January through March was funded by other customers.^{72/} (See Table 5-6.)

Table 5-6--FISCAL YEAR 1967 RIFLE PROCUREMENT

U.S. Navy	19,237
U.S. Coast Guard	700
U.S. Air Force	65,000
U.S. Marine Corps	<u>18,294</u>
TOTAL	103,231

During the FY 1967 funding period, because of increased requirements for the rifles to support forces in Vietnam, the decision was reached to broaden the M16 and M16A1 rifle production base. Of the several ways to achieve this, the one chosen was to establish an independent second source to insure future competitive procurement and to provide for geographical dispersion of production

⁷² ANP, Vol. VII, May 67.

CONFIDENTIAL

facilities. Negotiations with Colt's Inc., for the purchase of the patent rights and technical data package continued, although no agreement was reached at the time of submission of the FY 1967 Supplemental Budget. However, in anticipation of an early agreement with Colt's Inc., the Army requested \$4.0 million in the fiscal year 1967 supplement for the establishment of the production for the second source.^{73/}

Ammunition Procurement

The ammunition procurement for fiscal year 1967 totaled 660,100,000 rounds of all types of 5.56mm cartridges.^{74/}

⁷³ CFP, ODCSLOG-7, 25 Jan 67.

⁷⁴ Exhibit P-1, Supporting Data for FY 69 Budget Estimate, 11 Jan 63.

CONFIDENTIAL

G. Fiscal Year 1968 Procurement

Rifle Procurement

The FY 1968 budget submission included a request for the procurement of 175,000 M16A1 rifles at a total cost of \$35.7 million.^{75/} This recommended procurement was based on the requirement, at that time, to provide preferred rifles (M14 and M16A1) to the active Army and to preclude further issue of the older M1 rifle to active Army units. As a result of the Small Arms Weapon System (SAWS) Study, the Chief of Staff had recommended to the Secretary of the Army that the M16A1 be adopted as a standard Army rifle in addition to the 7.62mm M14 and .30 M1 rifles. The overall Army procurement objective was a single-family small arms weapons inventory, based on the Colt's 5.56mm individual weapons and, for the present, the 7.62mm M60 machine gun. The first objective of the program was to eliminate at an early date the caliber .30 family of infantry weapons. The computations for the total budget submission included the estimated program cost of the rifles plus \$9.0 million, which was the price Colt's Inc. had previously quoted for the patent rights, and \$.8 million for procurement of the technical data package.^{76/}

⁷⁵ Exhibit P-1, 7 Dec 67.

⁷⁶ CFP, ODCSLOG-7, 25 Jan 67.

CONFIDENTIAL

The Department of Defense Program Budget Decision approved the quantity of 175,000 rifles, but limited the funding to \$31.2 million. The Army reclama to this decision stated:

Negotiations for purchase of patent rights for the M16A1 rifle are being conducted with Colt's. To date there are no firm indications that Colt's will reduce their initially quoted price for rights from \$9.0 million. To insure availability of funds with which to conclude an agreement the current asking price for patent rights must be provided by restoring \$4.5 million to the FY 68 budget.^{77/}

The Army reclama was turned down.

At the time of development of the FY 1968 apportionment, the Army budget request for M16A1 rifles was established at 247,716 at a total cost of \$31.8 million. The revised quantity was based on the Secretary of Defense decision to accept Colt's increased production capacity (25,000 to 27,500 per month) beginning September 1967 and to award a quantity to a second producer.^{78/}

Table 5-7--FISCAL YEAR 1968 APPORTIONMENT COMPUTATION

Colt's Capacity	333,632
2d Source Capacity	<u>15,000</u>
TOTAL CAPACITY	348,632
Other Customer Requirements	
	(-) <u>100,916</u>
TOTAL ARMY PROCUREMENT	247,716

⁷⁷ PBD 324, 16 Dec 56.

⁷⁸ Budget Backup Data, ODCSLOG, undated.

The total cost of \$31.8 million (versus \$31.2 million for 175,000 rifles) for the increased quantity of rifles was based on a DCSLOG decision to transfer the requirement for \$5.5 million (a recomputed estimate on funds required for procurement of patent rights and technical data package from Colt's) from Budget Activity 5 to Budget Activity 11. This administrative decision provided \$5.5 million for the additional 72,716 rifles. Activity 11 provided necessary funding for the acquisition of patent rights and for the technical data package.^{79/}

During the FY 1967-68 funding period, negotiations with Colt's for the purchase of patent rights and the technical data package were successfully concluded and a second source procurement plan was developed. (The contract with Colt's was actually dated 30 June 1967.) The principal points of the plan for a second source for the M16 family of rifles were:^{80/}

Negotiation under authority of 10 U.S.C. 2304 (a) (16), excluding Colt's, Inc. will be used to broaden the M16 mobilization base by establishing a second production source which will be highly competent and competitive with Colt's for future procurement. The use of formal advertising, including 2-step formal advertising is inappropriate (even with authority to exclude Colt's from bidding) because an award would have to be made to the lowest bidder on the multi-year quantity.

⁷⁹ Budget Backup Data, ODCSLOG, undated.

⁸⁰ Memo, HQ AMC, 22 Sep 67, sub: Significant Elements of Second Source Procurement Plan - M16 Family of Rifles.

CONFIDENTIAL

Thus, the dual reason for the procurement, i.e., (1) broadening the mobilization base (production capacity and available production package) and (2) providing a highly competitive second source, would not be accomplished by formal advertising. Furthermore, under negotiation procedures, the opportunity to 'buy-in' will be decreased through the requirement for submitting cost or pricing data under P.L. 87-653 (Truth in Negotiations Act).

Known qualified sources, including the three current mobilization producers will be invited to participate. Proposals will be solicited, without price, requiring all offerors to submit technical proposals meeting special stringent standards to identify the unusual expertise and specialized facilities, including engineering support, necessary for contract performance. (See ASPR 1-903.2) During negotiation of Phase 1, any firm which does not meet (or exceed) these special standards may be eliminated from further negotiations and the RFP will provide that the Government may elect not to solicit prices from such firms. All remaining firms which meet (or exceed) these special standards will be asked to submit price proposals in Phase 2.

A firm-fixed price multi-year procurement covering a three year requirement of 167,000 rifles is planned.

Desired and mandatory delivery schedules will be specified in the RFP. A reward incentive will be specified to encourage achievement of the desired schedule; a penalty incentive (e.g., liquidated damages) will be applied when deliveries are not on schedule.

Contractors will be authorized to acquire for government account, new facilities not to exceed \$4,000,000; any stated DIPEC facilities; and one, or any part of one, of the available M14 production lines.

Technical data and manufacturing drawings will be made available on an incremental basis to participating firms.

A complete technical data package will be released in sufficient time to allow for submission of complete technical proposals on a timely basis.

Options will be included in the multi-year contract to pick up additional requirements. These options would have a ceiling price subject to downward negotiation, giving effect to escalation for labor and material, as appropriate, and the elimination of nonrecurring costs such as those incurred in start-up. Time, rate and production leadtime of the quantities added by the exercise of these options shall be determined in the course of negotiation.

A review procedure consisting of a technical evaluation board to score individual contractor proposals reporting to a source selection council is proposed.

The CG, AMC will be the source selection authority.

After the evaluation of the technical proposals, the award will be made in Phase 2 to a qualified source on the basis of the proposal most advantageous to the Government, 'price and other factors considered.' The other factors to be considered should include high grade engineering capability, reliability of the producer (cost estimating and production delivery scheduling), modern production methods and facilities, option prices, sources of equipment (lease, GFP, contractor-owned), availability of high grade personnel in-house vs. outside sources, and any other factors directly contributing to the organization of a contractor who will best meet the Government's requirements at a reasonable price for the multi-year quantity and yet have the potential of competitive prices with Colt's in subsequent procurements to follow. To accomplish the foregoing, the RFP should require all offerers to submit a Contract Pricing Proposal (DD Form 633). This cost or pricing data is essential to identify

CONFIDENTIAL

nonrecurring costs in the basic contract so that they may be properly treated in determining option and follow-on prices, if any. The cost data will help to identify any 'buy-in' offers, and will also provide a basis for judgment as to the realism of the contractor's prices and technical competence.

The dates of solicitation and award were:

<u>Events</u>	<u>Date</u>
Presolicitation Notice	1 Sep 67
Approval of Procurement Plan and D&F	27 Sep 67
Presolicitation Conference	3 Oct 67
Release of Step 1 RFP	3 Oct 67
Prepare and Release RFP	20 Dec 67
Step 1 Technical Proposals received	20 Jan 68
Source Selection Advisory Council briefed on proposals by prospective contractors	25 Jan 68
Procurement objectives revised to select two producers from the four offerors under consideration	28 Mar 68
Additional data submitted by the four offerors in response to re- vised procurement objectives	4 Apr 68
Source Selection Board evaluation completed	10 Apr 68
Source Selection Advisory Council findings completed	15 Apr 68
Decision by Source Selection Authority	15 Apr 68
Congressional notification of proposed awards	18 Apr 68
Letter contracts awarded	19 Apr 68

Ammunition Procurement

The FY 1968 Presidential budget provided \$52.9 million for the procurement of 678.8 million rounds of 5.56mm ammunition. As a result of the increased procurement of rifles at apportionment, the

ammunition procurement request was increased to 708 million cartridges at a total cost of \$73.2 million.^{81/} The DOD budget decision approved procurement of 658 million rounds at a cost of \$57.0 million.^{82/}

Ammunition production has exceeded the actual requirements. The decision to load tracer ammunition with only IMR propellant and ball ammunition with only ball propellant has had no serious impact on the production capacity of 5.56mm ammunition.

⁸¹ Exhibit P-1, Supporting Data for FY 68 Apportionment, 9 Jun 67.

⁸² Program Change Directive 8031, DOD, dtd 1 Apr 68.

JUL 1 1964

H. Allocation and Distribution

Allocation

The allocation of the M16-M16A1 rifles and associated ammunition among services is accomplished by the Joint Materiel Priorities and Allocations Board. All services are represented at the board hearings, but allocations are based on priorities established or approved by the Secretary of Defense and the stated requirements of Commander, U.S. Military Assistance Command, Vietnam.

As a result of actions by the Allocations Board, deliveries of rifles and ammunition may not be made to the service during the contracting period.

Distribution

Distribution of rifles and ammunition within the Army is based on established and approved requirements. The theater distribution of the initial 85,000 rifles procured in fiscal year 1964 and the theater distribution of total assets through December 1967 (which includes the bulk of the fiscal year 1966 purchase) are shown in Table 5-8. Losses and distributions to Free World Forces are not included in quantities on hand.

CONFIDENTIAL

Table 5-8--THEATER DISTRIBUTION OF M16 RIFLE

<u>THEATER</u>	<u>TOTAL ON HAND 1 JAN 66</u>	<u>TOTAL ON HAND 31 DEC 67</u>
USAREUR	1,408	1,408
Vietnam	32,068	191,354
USARPAC less Vietnam	481	9,053
Other Overseas	1,722	1,947
STRAF	23,156	32,802
*CONUS less STRAF	<u>2,514</u>	<u>30,340</u>
TOTAL ACTIVE ARMY	61,349	266,904
Reserve Components	1,197	1,151
CONUS Depot	<u>19,264</u>	<u>7,438</u>
TOTAL WORLDWIDE	81,810	275,493

Source: PEMA Item Readiness 1966 and 1968.

*Includes Training Base.

CONFIDENTIAL

CONFIDENTIAL

I. Negotiations

To understand fully some of the features of negotiations with Colt's Inc. for the procurement of the patent rights and the technical data drawings for the M16 rifle, it is necessary to know what part the several claimants to these rights have played in the development of the M16 rifle.

The recognized designer of the AR15 rifle is Mr. Eugene M. Stoner, who was employed as the chief engineer of Armalite, a division of Fairchild Aircraft.

Mr. Robert W. MacDonald, president of Cooper-MacDonald, Inc., was an oversea sales representative for Fairchild prior to the development of the AR15. He was also a sales representative for Colt's Inc. After the AR15 was developed and its sales potential was recognized by Mr. MacDonald, he recommended to Colt's Inc., which had been negotiating for production rights with Fairchild, that Colt's tool up for production.

Colt's Inc. acquired the rights from Fairchild on or about 7 January 1959, at a cost of \$75,000 plus 4½ percent royalty on all weapons produced. Colt's contract with Mr. MacDonald provided a payment of \$250,000 plus a 1 percent royalty on every rifle produced.^{83/} (The fee to MacDonald is referred to as a finders fee

⁸³ Testimony Before the Special Subcommittee on the M16 Rifle Program, Hearings, ASC.

CONFIDENTIAL

CONFIDENTIAL

and takes into account funds which he expended on exhibits and firing demonstrations throughout the world.)

The requirement that Colt's Inc. pay the above-mentioned royalties totaling 5½ percent was a factor in all negotiations.

The Deputy Commanding General, U.S. Army Weapons Command, on 3 July 1963, directed Project Manager, Rifles, to include two features in the negotiations with Colt's Inc. for the FY 1964 procurement of 104,000 rifles (85,000 for the Army and 19,000 for the Air Force). These two features, which had apparently been discussed previously (although not documented) with Colt's Inc. were:

A government option to purchase the rights and technical data package from Colt's at an agreed upon price or other consideration.

That we will negotiate out, what we consider to be exorbitant, the 15% royalty paid to Fairchild.^{84/} (Note: The 15% applied to all repair parts only.)

In the original Request for Quotation (RFQ), dated 8 August 1963, Colt's Inc. was requested to quote a price for delivery to the government of a complete technical data package and the right to manufacture, or have others manufacture, the AR15 rifle. Colt's was not responsive to this portion of the RFQ, and by letter dated 30 September 1963 stated that it did not intend or propose, as a part of or in conjunction with the present procurement, to sell or

⁸⁴ Memo, Hq, USAWECOM, 3 Jul 63, sub: Procurement AR15.

CONFIDENTIAL

CONFIDENTIAL

license all or any portion of its proprietary rights to the government. Colt's further stated that at such time as the total requirements for the rifle exceed 500,000 units it will consider licensing other sources of production.^{85/}

A meeting was held in the Office of the Assistant Secretary of the Army (I&L) on 4 October 1963 regarding Colt's refusal to negotiate with the Army for proprietary rights of manufacture for the 1964 procurement. After a discussion with the Deputy Assistant Secretary of Defense, the Assistant Secretary of Defense (I&L) directed U.S. Army Materiel Command to amend the RFQ to delete the requirement and to continue to negotiate after award in the event of a new requirement in the future.^{86/} At the time of this decision, there were no plans to procure more than 85,000 rifles for the Army.

During 1964, two meetings were held between Colt's representative and General Counsel, U.S. Army Materiel Command, to discuss negotiations, one on 3 June 1964 and one on 6 October 1964. At the 6 October meeting, Colt's made four alternative offers; the most favorable was that the Department of Defense pay \$5.4 million, less \$10.00 credit for each rifle produced, plus 5 percent royalty. (That is, if the Department of Defense had procured 540,000 rifles

⁸⁵ Memo, Hq, USAWECOM, 30 Oct 63, sub: Submission for Approval of Award of Contract for Rifle, 5.56mm, M16.

⁸⁶ NER, Project Manager Staff Officer, 4 Oct 63.

CONFIDENTIAL

CONFIDENTIAL

at that time the only cost would have been a 5 percent royalty.) This offer was unattractive at the time because there were no indications that the Department of Defense would require 540,000 more rifles in the future. In June 1965 the Army attempted to determine if Colt's proposals of October 1964 represented their best offer. Colt's responded with a different proposal in that it also wanted a guarantee that Colt's would be given the contract for the first 100,000 rifles of the Army's requirement each year and would be permitted to bid competitively on any excess over 100,000.^{87/}

The decision of 6 December 1965 to procure an additional quantity of M16 rifles renewed the Army's interest in the patent rights. However, the letter order contract which was awarded on 7 December 1965 for 100,000 M16 rifles did not include any provision for negotiations. The Army, because it urgently needed the rifles and wished to commence production as soon as possible, elected to include this provision when the contract was definitized at a later date.

The first known correspondence dealing with the proprietary rights in the fiscal year 1966 contract, was a letter from the General Counsel, U.S. Army Materiel Command, to the President of

⁸⁷ Testimony of ASA (I&L), p. 4725, and USAMC General Counsel, p 4823, in Hearings before the Special Subcommittee on M16 Rifle Program, ASC, 8 and 9 Aug 67.

CONFIDENTIAL

Colt's Inc. on 13 April 1966, with which was forwarded a draft license agreement and the suggestion that the Army and Colt's have a meeting to negotiate the terms of the contract.^{88/}

The 13 April letter from USAMC was answered by Colt's on 25 April 1966, stating in part:^{89/}

We believe it is unrealistic to hope that we can effect a licensing agreement on or before reaching agreement on the proposed added quantities under our present letter contract. * * * We take the position that the conclusion of a licensing agreement is not a necessary prerequisite to the procurement now contemplated under our letter contract.

The subject of licensing agreement was further discussed at a meeting between the Army and Colt's Inc. on 14 May 1966. An additional negotiating session was scheduled at Rock Island for 16 May. However, this was cancelled when Colt's representatives stated they were prepared to come for general discussions but not negotiations. This meeting was followed by an exchange of correspondence on 19 and 23 May 1966 which generally related only to the agreement to negotiate.^{90/} It was mutually agreed by both Colt's Inc. and the Army that the urgency of the requirement to produce rifles had prevented the completion of negotiations prior to the signing of the definitized contract for the FY 1966 procurement. On 19 May 1966,

88 Ltr, USAMC General Counsel to Colt's Inc., 13 Apr 66.

89 Ltr, Colt's Inc. to USAMC General Counsel, 25 Apr 66.

90 Testimony, Hearings before the Special Subcommittee on M16 Rifle Program, ASC, 27 Jul 67.

CONFIDENTIAL

the two parties agreed to complete negotiations during the next six-month period and a clause was written into Contract 0018, stating that negotiations must be completed prior to 1 December 1966.

Again on 7 June 1966, the General Counsel of U.S. Army Materiel Command wrote to the president of Colt's Inc. urging that negotiations commence at the earliest date.^{91/} A request for proposal (RFP) by Headquarters, U.S. Army Materiel Command, on 15 July 1966 was answered by Colt's Inc. on 13 September 1966. This offer by Colt's quoted a price of \$9 million plus a 9 percent royalty for the M16 rifle rights only, in addition to \$8 million for the reproduction of the technical data package.^{92/}

The Colt's proposal of 13 September 1966 was followed by meetings on 6 October, 11 October, 2 November, 21 November, and 8 December 1966 at which total Army requirements and royalties were discussed at some length. There were also discussions on contract restrictions of the second source producer.^{93/}

During these meetings, it became apparent that the Colt's representative had access to the Army's estimate for future

91 Ltr, USAMC General Counsel to Colt's Inc., 7 Jun 66.

92 Testimony by USAMC General Counsel, p. 4753, Hearings before the Special Subcommittee on M16 Rifle Program, ASC, 27 Jul 67.

93 MFR's, USAMC General Counsel, 6 and 11 Oct, 2 and 21 Nov, and 6 Dec 66.

requirements and to the Army's plans for expansion of the production base.^{94/} When this fact was brought to the attention of the Chief of Staff, he directed the Deputy Chief of Staff for Logistics to prepare a memorandum establishing the General Counsel, U.S. Army Materiel Command, and the Project Manager, Rifles, as the single points of contact with Colt's Inc. until negotiations were completed.^{95/}

Negotiations continued until the contract was finally signed on 30 June 1967. The negotiations might have been completed several months earlier if a mutual agreement had not been made on 17 February 1967 to negotiate only for rights to the rifle and if the Army had not insisted on 2 March 1967 that the rights to the CAR15 (XM177) submachine gun be included. New terms were thus introduced and required a longer time for resolution.

The basic terms of the contract signed with Colt's Inc. on 30 June 1967 were summarized by Dr. Robert A. Brooks, Assistant Secretary of the Army (I&L).

This contract deals with the acquisition of a patent license. . . . this license authorizes the United States to manufacture the rifles and submachine guns, or to cause them to be manufactured in

94 MFR, USAMC General Counsel, 8 Dec 66.

95 CSM 66-546, sub: Army Point of Contact with Colt's Firearms Division of Colt Industries, Inc., 16 Dec 66.

CONFIDENTIAL

the United States and to sell them, to give them to grant-aid countries, and to use them anywhere in the world. . . .

The terms of the contract are as follows: The Army is paying Colt a lump sum of \$4.5 million for the rights. The Army will pay a 5½ percent royalty on procurement of the weapons from sources other than Colt. This is subject to the condition that, if the royalty which Colt in turn is paying to its licensors should decrease, the royalty rate which the Army pays will be correspondingly decreased.

Third, Colt has represented to us that their production rate (Note: production capacity) is 27,500 units per month, plus spare parts. The Army will enter into a contract with them to take their production of these weapons up to this rate for the balance of the period of the outstanding contract--through April 1968, and for 24 months thereafter.

During fiscal years 1968 and 1969 the Army will purchase from Colt on a sole source basis its requirements of spare parts and magazines, limited to those parts presently manufactured by Colt and to all nondisposable magazines developed by Colt.

We negotiate the prices, of course, of these spare parts from time to time. It will be subject to a ceiling price to be negotiated between the parties.

The second source to be established under this license agreement will not have the right to manufacture or sell, except for and to the Department of Defense.

Finally, until further notice from the Department of Defense but not beyond April 1970, the license which is granted pursuant to this agreement shall give the Department of Defense the exclusive right to make foreign sales of M16 rifles and XM177 type submachine guns, with such exceptions prior to May 1970 for Colt's foreign sales as Colt may from time to time submit prior to any commitment, and the Department of Defense may approve.^{96/}

⁹⁶ Testimony of Dr. Brooks, ASA(I&L), Before the Special Subcommittee on the M16 Rifle Program, ASC, 27 Jul 67, p. 4715-4716.

J. Quality Assurance

Introduction

The quality assurance program for the M16 rifle and the associated 5.56mm ammunition developed by an evolutionary process from the general terms of commercial specifications to the requirements established today. Many of the current standards were created because deficiencies were discovered in the system through laboratory tests and field use. Appearing periodically, examples of poor quality control have served to reinforce a need to tighten existing controls or to establish new test or inspection procedures.

Development of Quality Control Procedures

The basic policy for quality assurance is that the contractors and producing activities are responsible for controlling product quality and for offering to the Army for acceptance only those items or lots of items considered by them to conform to contractual requirements.^{97/} The test procedures to be followed and the criteria for acceptance were included in the contracts for both the ammunition and the rifle.

The procurement agencies of the Army are responsible for determining, by verification inspections, that contractual

⁹⁷ AR 715-20, 21 Apr 60, sub: Procurement Inspection and Quality Control.

CONFIDENTIAL

requirements have been complied with before the Army accepts supplies and services. When definitive specifications are the basis for procurement, the inspection system of the contractor will be considered acceptable if the quality of the produced supplies or services is consistently acceptable, and the production process includes, as a minimum, the performance of those quality assurance provisions stated in the specification.

Verification inspection procedures include a review and evaluation of the contractors' quality control procedures. The verification inspection will insure that the contractor has correct gaging, measuring, and test equipment and that the equipment is properly calibrated. The verification inspection will also include examination of the inspection records maintained by the contractor.

Prior to 1962, the Deputy Chief of Staff for Logistics had overall staff responsibility for the implementation of verification inspections. The transfer of certain procurement functions from the Office of the Deputy Chief of Staff for Logistics to the Office of the Assistant Secretary of the Army (I&L) on 1 August 1962 shifted the functions of procurement policy and contract award, including verification procedures, review, and supervision to the Office of the Assistant Secretary of the Army (I&L). ^{98/} At the present time, the Army staff has no assigned responsibility for quality assurance.

⁹⁸ Ltr, DA, 19 Jul 62, sub: Transfer of Certain Procurement Functions from ODCSLOG to OASA (I&L).

SECRET

Headquarters, U.S. Army Materiel Command, is responsible for implementation of the quality assurance program for the Department of the Army and has direct access to the Assistant Secretary of the Army (I&L) on quality assurance matters. The USAMC quality assurance system extends and applies throughout the entire life cycle of an item of materiel. The system starts its operation during the USAMC participation in the preparation of qualitative materiel requirements (QMR), small development requirements (SDR), or other research and development project authority documents; progresses through design, testing, production, and use and reconditioning phases; and ends only when the item is dropped from the supply system.^{99/} Headquarters, USAMC, is also responsible for insuring that production contracts contain a clear statement of quality program and quality control requirements and that the contractor has been found capable of carrying out the requirements. In 1964 and 1965 Defense Contract Administrative Services (DCAS) was created and assumed responsibility for in-plant inspections and acceptance.

Specific tests that are required during the production and post production phase of the life cycle of materiel are defined as follows:^{100/}

The preproduction is an engineering type test of

⁹⁹ Regulation, Hq, USAMC, AMCR 700-6, 19 Oct 64, with Change 1, 2 Dec 64, sub: USAMC Quality Assurance System.

¹⁰⁰ Regulation, Hq, USAMC, AMCR 700-6, 19 Oct 64, with Change 1, 2 Dec 64, sub: USAMC Quality Assurance System.

CONFIDENTIAL

a preproduction model which has been produced in accordance with the supply procurement specifications and drawings using the same methods, materials, and equipment as will be used during regular production, in order to verify production drawings, processes, and materials.

Production tests are required to assure that the product from production meets the user quality requirements and is at least as good as the quality standard expressed by the QMR on the type-classified item.

An initial production test is conducted of an early item from the first production run. This test is for the purpose of verifying the adequacy and quality of material when manufactured according to the production drawings and the mass production processes.

Comparison tests are tests of random samples of production line items, conducted as a quality assurance measure to detect any design, manufacturing, or inspection deficiencies that may reduce the effective operation of the item by the using agency.

Surveillance tests are conducted to determine the extent of deterioration of an item while in stockpile.

The acceptance testing specifications for the M16 rifle outline those tests which are to be conducted by the contractor ^{101/} The manufacturer may utilize his own facilities or any other commercial laboratory acceptable to the government. The purchase description requires specific testing for (1) headspace; (2) firing pin indent; (3) trigger pull; (4) interchangeability of parts; (5) high-pressure resistance; (6) targeting and accuracy,

¹⁰¹ Springfield Armory Purchase Description (SAPD) - 253B, sub: Acceptance Testing Specification for Rifles, 5.56mm, M16, and XM16E1, 29 Apr 66, with Amendment, 24 Oct 66.

CONFIDENTIAL

functioning, and reliability firing tests; and (7) final examination of the rifle. (The requirement for each test is outlined in Inclosure 5-1.) The requirements and methods for the above tests are approved by all services.

Table 5-9--M16 ACCEPTANCE DATA
BASED ON COLT'S FINAL INSPECTION REPORTS

	<u>Number of Weapons Tested^{1/}</u>	<u>Number of Weapons Accepted^{2/}</u>	<u>Percent Accepted</u>
1st Quarter 1964	356	326	91.6
2d Quarter 1964	10,965	10,446	95.3
3d Quarter 1964	19,151	16,930	88.4
4th Quarter 1964	24,914	22,069	88.6
1st Quarter 1965	26,355	24,756	93.9
2d Quarter 1965	24,925	24,165	97.0
3d Quarter 1965	25,274	24,244	95.9
4th Quarter 1965	25,599	24,200	94.5
1st Quarter 1966	40,749	37,289	91.5
2d Quarter 1966	50,425	48,100	95.4
3d Quarter 1966	42,555	40,505	95.2
4th Quarter 1966	65,969	63,000	95.5
1st Quarter 1967	77,381	75,000	96.9
2d Quarter 1967	82,280	77,000	97.2
3d Quarter 1967	47,741	45,000	96.4
4th Quarter 1967	93,713	91,100	97.2
1968 ^{3/}	28,185	27,500	97.6

¹ Number of weapons fired (initial and repeat firings) in the function firing (which is the first) phase of the quality assurance inspection.

² Number of weapons accepted after the function firing, accuracy, targeting, and final inspections.

³ January only.

CONFIDENTIAL

The development of quality control procedures for 5.56mm ammunition commenced with the FY 1964 procurement. U.S. Army Munitions Command, however, had provided assistance to the U.S. Air Force in 1963 in the development of the product specification.^{102/} The Air Force specification, discussed previously, was basically an adaptation of the commercial specification developed by Remington Arms Company, Inc., and provided for a degree of quality assurance. Modifications to the military specifications (as outlined in Inclosure 4-1) were, in part, the result of changes to the quality assurance provisions. The requirement for the fouling test, as discussed in Appendix 4, was based on the need to maintain quality control of production. Changes in the military specifications which established metallurgical controls over cartridge cases and primer composition were measures to achieve standardization in 5.56mm ammunition and to prevent the occurrence of system incompatibilities.^{103/}

Those characteristics contained in the military specifications requiring quality assurance testing and the standards which must be met by the 5.56mm M196 tracer cartridge are outlined in Inclosure 5-2 and by the 5.56mm M193 ball cartridge, in Inclosure 5-3.

102 MFR, Hq, USANUCOM, 26 Jun 63, sub: AR15 Rifle Ammunition (cal. .223).

103 Ltr, Frankford Arsenal, 24 Aug 67, sub: Quality Assurance Provisions for 5.56mm Cartridges.

CONFIDENTIAL

A general review of the quality of 5.56mm M193 ball cartridges of ammunition produced through FY 1967 and the first quarter of FY 1968, a total of 660 lots representing 909 million cartridges, presents the acceptance data on these lots as shown in Table 5-10.^{104/}

Table 5-10--TOTAL LOTS PRODUCED
FISCAL YEAR 1967 AND FIRST QUARTER FISCAL YEAR 1968,
5.56mm M193 BALL AMMUNITION

	<u>Lots</u>	<u>Total Rounds</u>
Submitted for Acceptance	660	909,056,506
Accepted on First Test	596	840,036,371
Accepted on Retest	47	49,656,295
Accepted on Waiver-- Unrestricted Use	6	10,036,200
Accepted on Waiver-- For CONUS Only	6	2,272,760
Rejected	5	7,054,880

104 Memorandum, Frankford Arsenal, 23 Oct 67, sub: Quality Assurance Review of 5.56mm M193 Ball Ammunition.

CONFIDENTIAL

K. Conclusions

The procurement of the M16 rifles has been discontinuous and uncoordinated because of the lack of a definitive rifle program. The rifle program is based upon total requirements, the status of follow-on weapons, status of production base, and budget guidance. All of these factors have influenced the rifle program, and consequently the annual procurements. The procurement of ammunition has been related to the current and planned distribution of rifles and to the rifle production schedule.

Both the M16 rifle and ammunition were introduced into the Army inventory in sizeable quantities without undergoing the standard procedures required for Type Classification, Standard A. This fact significantly contributed to the quality assurance problems that were experienced.

There has been no significant production problems with the rifle except for minor discrepancies in quality control. Colt's delivery record has been outstanding in that delivery schedules have invariably met or exceeded contract quantities. The production schedule of ammunition has been delayed on several occasions as a result of shortages of materials and of the inability of producers to meet the specifications. The expansion of the ammunition production base resulted in the requirement for more stringent control measures and a period of time for the new producer to gain production experience.

CONFIDENTIAL

The future expansion of the production base for rifles could easily result in additional control measures and a lag in production by new producers until they acquire the production experience Colt's now has.

The Army procurements during fiscal years 1962-68 have been irregular although the deliveries reflect a steady increase (see Table 5-11). The FY 1968 deliveries to the Army are not firm and may change as directed by the Joint Allocations Board. The M16 rifle procurement program for all services for fiscal year 1961-68 total over one million rifles (Table 5-12).

Negotiations extended over an excessively long period (from 1963 to 1967). A review of the procurement history indicates that the Army's changing requirements for rifles was a primary factor in the negotiations. In 1964 when Colt's offered four proposals for consideration, the Army could not foresee a requirement for further procurements. By the time the Army had established a requirement again in 1965, Colt's was in a position to negotiate on its own terms, which were understandably motivated by profit. Because the 1966 procurement was based on an urgent requirement in Vietnam, the Army was forced to buy, and hope for a more favorable agreement with Colt's later. Undoubtedly, Colt's believed that time was on its side, and that the requirements for rifles in Vietnam would force the Army to sign an agreement for rifles on terms favorable

CONFIDENTIAL

TABLE 5-11 ARMY RIFLE PROCUREMENT AND DELIVERIES

PROCUREMENT		DELIVERIES						
YEAR	TOTAL PROCUREMENT	FY62	FY63	FY64	FY65	FY66	FY67	FY68*
FY62	338	338						
FY63								
FY64	85,000			2,129	57,081	25,790		
FY65								
FY66	327,405					31,450	166,218	129,737
FY67								
FY68	247,716							105,016
TOTAL PROCUREMENT	660,459							
TOTAL DELIVERIES BY YEAR		338		2,129	57,081	57,240	166,218	234,753
CUMULATIVE TOTAL DELIVERIES		338		2,467	59,548	116,788	283,006	517,759

SOURCE - Army Materiel Plans - 1964-1968.
PEMA Item Readiness, Selected Items, 1966-1968.

* Deliveries through 1 January 1968.

CONFIDENTIAL

TABLE 5-12 DOD RIFLE PROGRAM FISCAL YEAR 1961-68

FY	DOD	ARMY	USAF	USMC	USN	COAST GUARD	TOTAL
FY61	1,000 ^{1/}						1,000
FY62		338	8,500				8,838
FY63			19,000				19,000
FY64		85,000	19,000		240	20	104,260
FY65			33,500		1,550	142	35,192
FY66		327,405	60,082	91,872	2,000	1,411	482,770
FY67			65,000	18,294	19,237	700	103,231
FY68		247,716	65,000	34,916		1,000	348,632
TOTAL	1,000	660,459	270,082	145,082	23,027	3,273	1,102,923

^{1/} These rifles were procured for DOD-ARPA evaluation.

SOURCE - Army Materiel Plan, 1964-1968.

CONFIDENTIAL

to Colt's. The Army was in a position in which time would not permit the establishment of a second producer without a contractual agreement with Colt's. The delay in final negotiations was further aggravated by a lack of understanding by Colt's and the Army of the requirement for rights to the XM177 submachine gun.

After the first 100,000 weapons are produced, very little reduction in unit price appears to be experienced in the small arms manufacturing industry, including automated production. The learning curve is approximately ninety-eight percent (see Inclosure ~~5-11~~ ⁽⁵⁻⁷⁾).

The establishment of multiple sources for M16 production does not appear to be economically justified unless the recurring unit cost at Harrington and Richardson is at least 33 percent below that established by ceiling prices and the recurring unit cost at General Motors is at least 60 percent below that established by the ceiling prices (see Inclosure ~~5-11~~ ⁵⁻¹²). However, a prime consideration in these ⁽⁵⁻¹⁾ procurement contracts was accelerated quality production.

5-66

CONFIDENTIAL

CONFIDENTIAL

FISCAL YEAR 1964 MILESTONES

1 Million Rounds

<u>September 1963 Schedule</u>	<u>December 1963 Schedule</u>	<u>Description of Action</u>
12 Aug 63	12 Aug 63	Production Proposals Solicited
14 Aug 63	14 Aug 63	Coordination of Specification Completed
16 Aug 63	16 Aug 63	Receipt of Program Authority
	20 Jan 64	Contractor's Response to Revised Proposal
	24 Jan 64	Review and Evaluate Proposals, Select Contractor and Make Allocation to the District
1 Nov 63	7 Feb 64	Production Contract Awarded
10 Jan 64	3 Apr 64	Delivery for Special Engineering Tests
1 Feb 64	1 May 64	Complete Special Engineering Tests

131 Million Rounds

23 Aug 63	23 Aug 63	Receipt of Program Authority (27 Million Rounds)
12 Sep 63	12 Sep 63	Receipt of Program Authority (104 Million Rounds) Total of 131 Million Rounds
4 Nov 63	27 Dec 63	Production Proposals Solicited
	31 Jan 64	Contractor's Response to RFP
	14 Feb 64	Review and Evaluate Proposals
10 Jan 64	2 Mar 64	Production Contract Awarded
30 Apr 64	30 Jun 64	Initial Delivery
	30 Mar 65	Production Contract Completed

Inclosure 5-1

CONFIDENTIAL

SUMMARY OF ACCEPTANCE TESTING SPECIFICATION FOR M16-XM16E1 5.56mm RIFLES

Each lot of rifles shall be examined as specified before acceptance.

Lot Size The first five (5) lots shall each consist of 500 rifles or one month's production, whichever is smaller.

When five successive lots are accepted, the lot size shall be increased to 5,000 rifles or one month's production, whichever is smaller.

When five successive lots of increased size are accepted, the lot size shall further increase to 10,000 rifles or one month's production, whichever is smaller.

If rejection of a lot occurs at any time, the next smaller test lot size criteria shall be reinstated and the above procedure repeated in returning to the larger lot size.

Quality Assurance Characteristic	Requirement	Number of rifles in each lot tested	Prescribed action when requirement is not met
Headspace	Minimum: 1.4646 in. Maximum: 1.4706 in.	Each Rifle	Each rifle failing the requirement shall be rejected.
Firing Pin Indent	Minimum: 0.020 in. when bolt and firing mechanism is released Maximum: 0.008 in. when bolt is closed and firing mechanism is not released. Firing pin indent shall not be off center more than one-half the diameter of the firing pin point.	20	Failure of 2 or more rifles shall cause rejection of the lot. Failure of 1 rifle shall cause a second sample of 40 rifles to be tested (in addition to the original 20). Failure of rifle in the second sample shall cause the contractor to screen the repressed lot and to correct noted deficiencies.

Source: Springfield Army Purchase Description SAPD-253B, 29 April 1966.

CONFIDENTIAL

661

Quality Assurance Characteristic	Requirement	Number of rifles in each lot tested	Prescribed action when requirement is not met
Trigger Pull	Minimum: 5.5 lbs Maximum: 8.5 lbs Trigger pull shall be free of creep.	Each rifle	Each rifle failing the requirement shall be rejected.
Parts Inter-changeability	All parts shall be interchangeable between rifles. Parts of ten rifles shall be interchanged in a prescribed fashion, and each rifle shall meet the requirements for headspace, firing pin indent, targeting and accuracy, and functioning before and after interchange of parts.	10	Failure of reassembled rifles to meet the requirements shall cause retest or rejection of the lot. Failure in the retest shall cause rejection of the lot subject to reconditioning and further test. A sample of 20 rifles shall be tested from each retest or reconditioned lot.
Parts Inter-changeability (Between lots)	Parts of 5 rifles from the initial production lot shall be interchanged with those of 5 rifles from each month's production. Reassembled rifles shall meet all acceptance requirements.	N/A (5 per month)	The contractor will be informed of any failure of the rifles to meet the requirements and shall take corrective action as necessary.
Parts Inter-changeability (Repair Parts)	A sample of five parts from each month's production of each current repair part shall be tested for interchangeability. Reassembled rifles shall meet all acceptance requirements.	N/A	Failure of any part to meet requirements shall cause rejection of represented lot of parts subject to reconditioning. Tests of reconditioned lots shall be made using a sample size of ten.

CC.

Quality Assurance Characteristic	Requirement	Number of rifles in each lot tested	Prescribed action when requirement is not met
High-Pressure Resistance	<p>Each barrel subassembly and bolt shall withstand firing of one high-pressure test cartridge and shall be free of cracks, seams, and other injurious defects after proof firing.</p> <p>Each barrel and bolt to be used as repair parts shall meet the above requirements.</p>	Each barrel subassembly and bolt.	Barrels and bolts failing to meet the requirement shall be rejected.
Targeting	A series of 10 rds fired from the rifle at a range of either 100 yds or 50 yds (preferably 100 yds) shall be within the prescribed target area using semi-automatic fire.	Each rifle	Each rifle failing the requirement shall be rejected.
Accuracy	<p>Extreme spread of a 10 rd shot group less than: 4.8 in at 100 yds, or 2.4 in at 50 yds</p>	Each rifle	<p>Evidence of a flyer (i.e. a shot hole which is a greater distance from the nearest shot hole than the extreme spread of the other nine shot holes) or keyhole shall be cause for 10 rd retest.</p> <p>Evidence of a flyer or keyhole in the retes shall be cause for rejection of the rifle.</p> <p>Rifles failing to meet the extreme spread requirement shall be rejected.</p>

CONFIDENTIAL

Quality Assurance Characteristic	Requirement	Number of rifles in each lot tested	Prescribed action when requirement is not met
Semi-Automatic Fire	In the targeting and accuracy firing no double shots shall be fired with a single trigger pull.	Each rifle	Rifle firing double shots shall fire a second 10 rounds. Rifles firing double shots in the retest shall be rejected.
Functioning	No rifle shall be able to be fired when set in the "safe" position		
	Cyclic rate shall be: Minimum: 650 rds/min Maximum: 850 rds/min	One out of ten rifles	Each rifle failing the requirement shall be rejected and shall cause the other nine rifles represented to be tested.
	In the automatic mode, firing shall stop immediately when the trigger is released.	Each rifle	Each rifle failing the requirement shall be rejected.
	Operate automatically w/o malfunctions or unserviceable parts while firing one full magazine.	Each rifle	Each rifle failing the requirement shall be rejected.

Reliability	Be capable of passing a 6000 round reliability test with not more than the number of malfunctions and unserviceable parts listed in Table I.	1	If reliability requirements are not met the lot is rejected.
	Firing shall alternate semi-automatic, automatic fire (approx. 5 rd burst) and automatic fire (continuous burst (20 or 30 rds))		If the cause of failure is attributed (by the Government representative) to a serious defect (one affecting safety) the contractor shall correct all rifles in the lot and 2 rifles from the lot shall be retested.

CONFIDENTIAL

CC 1001111111

Quality Assurance Characteristic	Requirement	Number of rifles in each lot tested	Prescribed action when requirement is not met
Barrels may be cooled after each 100 rds.			
Cleaning of the rifle, if necessary, shall be accomplished after each 1000 rds.			If the cause of failure is not attributed to a serious defect, a reliability retest of two rifles from the same lot shall be made with or without reconditioning the lot.
For rounds 6011 through 6020, the rifles must pass the targeting and accuracy test.			If either of the 2 rifles in the retest fails, the lot shall be rejected.
Rifles shall be checked each 2000 rds for headsace and instrumental velocity.			

CONFIDENTIAL

Number of rifles
in each lot
tested

Prescribed action when requirement
is not
met

Quality Assurance
Characteristic

Requirement

Each Rifle

Each rifle failing to pass the specified
examination shall be rejected.

Final Examination

The following components will
be examined as specified

Lower Receiver Pistol Grip
Stock Assembly Group
Automatic Sear Group
Hammer Group
Trigger Group
Safety Group
Bolt Catch Group
Trigger Guard Assembly
Takedown Pin
Buffer Retainer Group
Buffer Group
Pistol Grip
Lower Receiver
Receiver Pivot Pin Assembly
Charging Handle Assembly
Bolt and Bolt Carrier Group
Firing Pin
Bolt Cam Pin
Bolt Assembly
Extractor
Ejector
Bolt Rings
Bolt
Bolt Carrier and Key Assembly
Bolt Carrier Key
Upper Receiver & Barrel Assembly Group
Hand Guards
Flash Suppressor
Front Sight Group
Front Swivel
Front Sight Post Group
Front Sight
Gas Tube

CONFIDENTIAL

6 11 11

Number of rifles in each lot tested Prescribed action when requirement is not met

Quality Assurance Characteristic

Requirement

Barrel Assembly
Ejection Post Cover Assembly Group
Rear Sight Group
Upper Receiver

CONFIDENTIAL

Notes (Cont'd)

3. One unserviceable part other than those specified shall be allowed if in the judgment of the Government representative the failure does not represent an unsafe or defective condition which is prevalent throughout the lot of items involved.

CO. 12. 1. 1. 1. 1.

Quantity Assurance Characteristic	Requirement	Number of cartridges in each lot examined	Test Temperature	Prescribed action when sample does not meet requirement
Primer Sensitivity	Energy imparted by 3.94 ± 0.02 ounce steel ball falling: 3 in - shall not initiate primer 12 in - shall initiate primer	50 from each lot of primers at each height in prescribed complete rundown test.	N/A	If average critical height plus (minus) 3 standard deviations exceeds (is less than) 12" (3") the lot of primers shall be retested with 100 primers at each height in the prescribed complete rundown test. Failure of the second sample to meet the above criteria shall cause rejection of the lot of primers.
Residual Stress	Cartridge case shall not split when subjected to a 1% mercurous nitrate solution for 15 min.	50	Ambient	Failure of 2 or more cartridges shall cause rejection of the lot. Failure of 1 cartridge shall cause an additional 50 cartridges to be tested. Failure of 1 cartridge in the second test sample shall cause rejection of the lot.
Air Tightness of Base Closure Seal	Bullet shall not release more than one bubble of air when subjected to an internal pressure differential of 7½ p.s.i. for 30 seconds for the first sample and 5 p.s.i. for the second sample.	25	Ambient	Failure of 7 or more bullets shall be cause for rejection of the lot. If between 3 and 7 bullets fail to test, a second sample of 50 bullets shall be tested. Failure of 7 or more bullets from the 1st and 2nd samples together shall be cause for rejection of the lot.

60

Quality Assurance Characteristic	Requirement	Number of cartridges in each lot examined	Test Temperature	Prescribed action when sample does not meet requirement
Waterproof	Cartridge shall not release more than one bubble of air when subjected to the following internal pressure differential: 1st Sample: 7.5psi for 30sec 2nd Sample: 5.0psi for 15sec	50	Ambient	Failure of 4 or more cartridges shall be cause for rejection of the lot subject to testing a second sample of 100 cartridges. Failure of 7 or more cartridges, the second sample shall be cause for rejection of the lot.
Accuracy	Average mean radii of all targets of sample cartridges shall not exceed 5 in at 200 yds.	90	Ambient	Failure of the cartridges to meet the requirement shall cause a second sample of 180 cartridge to be tested. Failure of the cartridge in the second sample shall cause rejection of the lot.
Trace	Trace shall be visible between 75 and 500 yds from the muzzle.	100	Ambient	Failure of more than 20 shots shall cause rejection of the lot. No second sample is permitted.
Action Time	Overall primer ignition, propellant burning and bullet-barrel time shall not exceed 4 milliseconds.	50	70° ± 2°F	Failure of 2 or more cartridges shall cause rejection of the lot. Failure of 1 cartridge shall cause an additional 50 cartridges to be tested. Failure of 1 cartridge in the second test sample shall cause rejection of the lot.

CU 1043

Quality Assurance Characteristic	Requirement	Number of cartridges in each lot examined	Test Temperature	Prescribed action when sample does not meet requirement
Velocity	Average muzzle velocity shall be 3200 ft/sec \pm 40 ft/sec at 70° \pm 2°F. The standard deviation of the velocities shall not exceed 40 ft/sec. Average velocity shall not decrease by more than 250 ft/sec (with respect to velocity at 70° \pm 2°F) when fired at extreme temperatures.	20	70° \pm 2°F	Failure of the cartridges to meet the requirement shall cause a second sample of 120 cartridges to be tested.
		10	-65° \pm 5°F	Failure of the cartridges in the second sample shall cause rejection of the lot.
		10	70° \pm 2°F after storage at -80° \pm 5°F	Chamber pressure and port pressure tests shall be conducted simultaneously.
		10	125° \pm 2°F after storage at 160° \pm 2°F	

Chamber Pressure
 Average chamber pressure shall not exceed 52,000 psi at 70° \pm 2°F. Avg. chamber pressure plus 3 standard deviations shall not exceed 58,000 psi.
 Conducted simultaneously with velocity test.
 Rejection standards of velocity test apply.

Port Pressure
 Average port pressure shall be 15,000 psi \pm 2000 psi at 70° \pm 2°F. Average port pressure shall neither increase or decrease by more than 2000 psi (with respect to port pressure at 70° \pm 2°F) when fired at extreme temperatures.
 Conducted simultaneously with velocity test.
 Rejection standards of velocity test apply

Li

Quality Assurance Characteristic	Requirement	Number of cartridges in each lot examined	Test Temperature	Prescribed action when sample does not meet requirement
Function & Casualty	Cartridge shall function without casualty at ambient temperature, and under specified extreme temperatures.	240	Ambient	Lot shall be rejected if function and casualty defects exceed the acceptance number for the cumulative sample in Table 1. If the function and casualty defects exceed the (Table 1) limits for the 1st sample, but not for the 1st and 2nd samples together, a 2nd sample consisting of double the number of cartridges shall be tested. If the total number of defect in the combined 1st and 2nd sample exceeds the acceptance number for the cumulative sample, the lot shall be rejected.
		120	-65° ± 5°F	
		120	70° ± 2°F after storage at -80° ± 5°F	
		120	125° ± 2°F	
		120	70° ± 2°F after storage at 160° ± 2°F	

TABLE I

Defects	Acceptance	
	First sample	Cumulative (1st & 2d sample)
1. Misfire.....	1	2
2. Bullet remaining in bore.....	0	-
3. Primer leak	0	-
(a) Perforation in firing pin indent in primer cup (Rifle M16 only).....	1	-
(b) Escape of gas through primer cup other than 3a.....	30	60
(c) Escape of gas around primer cup.....		

I I (Cont'd)

Defects	Acceptance	
	First sample	Cumulative (1st & 2d sample)
(d) Blown primer or primer falls out of pocket on retraction of bolt.....	0	1
(e) Primer remains in pocket but is physically loose.....	1	2
4. Case casualties		
(a) Longitudinal split ^{4/}		
(1) Neck and shoulder (I or S).....	20	41
(2) Body (J).....	2	4
(3) Body (K).....	1	2
(4) To head (L).....	0	1
(5) Through head(M).....	0	1
(b) Circumferential rupture ^{4/}		
(1) Partial, shoulder or body (J & S).....	1	2
(2) Partial, body (K).....	2	1
(3) Partial, head (L).....	0	1
(4) Complete.....	0	1
5. Failure to extract.....	0	1
6. Weapons stoppage ^{5/}	0	1

- 1/ No second sample permitted. Lot shall be rejected.
- 2/ If one or more defects are found in the first sample, a second sample consisting of double the quantity of cartridges specified under Function & Casualty of table II shall be fired. Prior to the testing of the second sample the firing pin of the specific rifle(s) in which the defect originally occurred shall be replaced by a new firing pin. If an additional primer perforation is found in the second sample, the lot shall be rejected.
- 3/ Of the cartridges in which this defect occurs, not more than 10 in the first sample nor more than 18 in the cumulative sample shall exhibit escape of gas around 50% or more than 50% of the periphery.
- 4/ For location of defects indicated by letters in parenthesis, see Drawing C7643674.
- 5/ All stoppages attributable to the ammunition, with the exception of misfire, complete rupture or failure to extract, observed in all tests shall be included.

Table 1

Quality Assurance Characteristic	Requirement	Number of cartridges in each lot examined	Test Temperature	Prescribed action when sample does not meet requirement
Fouling	Fouling accumulated in the weapon during the firing of 1000 sample cartridges shall not cause failure of the weapon to function	1000 from initial production sample	Between 50° and 80°	Testing shall cease when a stoppage due to ammunition fouling occurs.

CO.

Quality Assurance Characteristic Requirement Number of cartridges in each lot examined Test Temperature Prescribed Action When Sample Does Not Meet Requirements

Function and Casualty Same as for the M196 cartridge except that the acceptance number of defects shall be as shown below.

Defects	Acceptance	
	First Sample	Cumulative (1st & 2nd Sample)

1. Misfire	1	2
2. Bullet remaining in bore ¹	0	
3. Primer leak:	0	2
(a) Perforation in firing pin indent in primer cup (Rifle M16 only) ²	1	56
(b) Escape of gas through primer cup other than (a) above	28	1
(c) Escape of gas around primer cup ³	0	2
(d) Blown primer or primer falls out of pocket on retraction of bolt	1	
(e) Primer remains in pocket but is physically loose		
4. Case casualties	19	39
(a) Longitudinal split ³ :	2	4
(1) Neck and shoulder (I or S)	1	2
(2) Body (J)	1	1
(3) Body (K)	0	1
(4) To head (L)	0	1
(5) Through head (M)	0	1

Defects (Cont'd)

Defects (Cont'd)	First Sample	Acceptance Count (Live (1st or 2nd Sample))
(b) Circumferential ruptures:		
(1) Partial, shoulder or body (J & S)	1	2
(2) Partial, body (K)	0	1
(3) Partial, head (L)	0	1
(4) Complete	0	1
5. Failure to extract	0	1
6. Weapons stoppage ⁴	0	1

(b) Circumferential ruptures:

- (1) Partial, shoulder or body (J & S)
- (2) Partial, body (K)
- (3) Partial, head (L)
- (4) Complete

5. Failure to extract

6. Weapons stoppage⁴

No second sample permitted. Lot shall be rejected.

2 If one or more defects are found in the first sample, a second sample consisting of double the quantity of cartridges specified under Function and Casualty of Table II shall be fired. Prior to the testing of the second sample, the firing pin of the specific rifle(s) in which the defect originally occurred shall be replaced by a new firing pin. If an additional primer perforation is found in the second sample, the lot shall be rejected.

3 For location of defects indicated by letters in parentheses, see Drawing C7643674.

4 All stoppages attributable to the ammunition, with the exception of misfire, complete rupture or failure to extract, observed in all tests shall be included.

5 All the cartridges in which this defect occurs, not more than 9 in the first sample nor more than 17 in the cumulative sample shall exhibit escape of gas around 50% or more than 50% of the periphery.

CONFIDENTIAL

Analysis of Current M16 Rifle Procurement

Background

In the analysis which follows, cost data from each of the M14 rifle producers have been evaluated to gain insight on cost-quantity relationships in the small arms manufacturing industry. These relationships are then compared with past and projected procurement of the M16 rifle.

Procurement cost data for each of the four M14 rifle producers are illustrated in tabular form in Table I. The target price data shown was stipulated in the contracts. These data do not include initial tooling, facilities, government furnished equipment or other start up costs.

From an inspection of the data presented in Table I, it can be seen that the M14 unit cost increased significantly for each commercial producer until approximately 100,000 rifles were produced. After that, costs decrease as a function of quantity on approximately a ninety-eight percent slope. After the initial 15,000 unit run, Springfield Armory costs were decreasing on the same slope as that experienced by industry. The lower cost per unit at TRW was attributed to the fact that they developed an automated production line.

Tooling, facility and other start up costs on the M14 rifle program were in excess of \$27 million. Additionally, each rifle

Table I
M14 Rifle Production
and Target Price

<u>Contractor & Contract No.</u>	<u>Contract Date</u>	<u>Quantity</u>	<u>Target Price</u>
<u>Springfield Armory</u>			
OWC Order No. 1	26 Mar 58	15,600	\$175.00
OWC Order No. 2	7 Oct 59	32,000	128.00
OWC Order No. 3	Sep 60	70,500	128.00
OWC Order No. 4	Aug 61	49,000	124.00
<u>Harrington & Richardson</u>			
DA 19-020-ORD-4921	29 Apr 59	35,000	\$ 83.66 ^{a/b/}
DA 19-020-ORD-5208	7 Apr 60	70,000	114.29 ^{a/b/}
DA 19-020-ORD-5447	10 May 61	133,000	113.60 ^{c/}
DA 19-020-ORD-5599	15 Feb 62	224,500	106.80 ^{c/}
DA 19-020-ANC-0007W	12 Oct 62	75,000	97.60 ^{d/}
<u>Olin Mathieson</u>			
DA 19-020-ORD-4853	17 Feb 59	55,000	\$ 68.75 ^{a/}
DA 19-020-ORD-5209	30 Nov 60	81,500	91.00 ^{a/}
DA 19-020-ORD-5593	13 Apr 62	90,070	118.82 ^{c/}
DA 19-020-ANC-0006W	8 Oct 62	150,001	104.50 ^{d/}
<u>TRW</u>			
DA 11-199-ORD-687	2 Oct 61	100,000	\$ 71.73 ^{e/}
DA 33-019-ANC-14(W)	8 Oct 62	219,163	79.50 ^{d/}

1,780.

- ^a Fixed price redeterminable.
- ^b Redetermined price is listed
- ^c Fixed price incentive based on cost.
- ^d Firm fixed price.
- ^e Firm fixed price delivery incentive.

CONFIDENTIAL

was equipped with five magazines at a total cost of \$4.20 per weapon. By amortizing the non-recurring costs over the entire production runs and including magazine costs, the actual cost of the M14 rifle was approximately \$25 above that shown in Table I.

Past production and unit price for the M16 rifle are illustrated in Table II. These data differ from that illustrated for the M14 rifle in that these data represent the total cost of the weapons procured, including seven magazines. No additional tooling, facility or non-recurring start up costs were incurred. Current contract options permit the cumulative quantity of weapons produced to be extended from that shown to a total of 1,100,000 weapons at a unit price of \$104.39 for the additional weapons. It can be seen from inspection of the data in Table II that the unit price for the M16 rifle has decreased as production of total quantity produced at approximately the same rate as the M14 rifle.

Multiyear letter contracts for second source M16 rifle producers were announced in April 1968. Production quantities and ceiling prices are illustrated in Table III.

CONFIDENTIAL

CONFIDENTIAL

Table II
M16 Rifle Production
and Unit Price

<u>Contractor & Contract No.</u>	<u>Contract Date</u>	<u>Quantity</u>	<u>Unit Price</u>
DA 11-199-AMC-508	Nov 63	84,250	\$126.37
DA 11-199-AMC-508	Jul 65	100	125.37
DAAF 03-66-C-0018	Jun 66	403,905	111.50
DAAF 03-66-C-0018	Jun 66	15,372	107.00
DAAF 03-66-C-0018	Dec 66	10,000	102.30
DAAF 03-66-C-0018	Dec 66	27,531	104.58
DAAF 03-66-C-0018	Sep 67	124,772	107.61
DAAF 03-66-C-0018	Sep 67	74,414	106.24
DAAF 03-66-C-0018	Sep 67	43,530	104.39

Table III
M16 Multi Source Procurement
Ceiling Prices

<u>Contractor</u>	<u>Contract Period</u>	<u>Quantity</u>	<u>Ceiling Price</u>
Harrington & Richardson	1st year	60,000	\$250.00
	2nd year	180,000	150.00
General Motors Corp.	1st year	60,000	316.00
	2nd year	180,000	205.00

CONFIDENTIAL

The data in Table III differs from that previously illustrated in that all normal elements of non-recurring start up costs have been included. However, non-recurring costs of \$5.3 million to acquire the proprietary rights and technical data package required to establish these production sources have not been included. Recurring costs of \$8.68 per rifle for the required seven magazines and a royalty payment of 5.5 percent of the total cost per unit are not included in the ceiling prices.

Analysis

Three assumptions have been made in the analysis which follows:

1. The Authorized Acquisition Objective (AAO) for M16 rifles is 2,000,000.
2. Colt production will be terminated at 1,000,000 units.
3. Procurement of the remaining rifles to complete the AAO will be equally divided between General Motors and Harrington & Richardson.

Amortizing the \$5.3 million non-recurring cost of acquiring production rights over the 1 million rifles to be produced results in a per unit increase in cost of \$5.30. This, together with the recurring cost of \$8.38 per weapon to obtain seven magazines and 5.5 percent royalty cost, provide the basis for constructing a table of comparable costs for M16 rifles. These data are illustrated in Table IV.

CONFIDENTIAL

Table IV
M16 Comparable Cost Data

<u>Contractor</u>	<u>Contract Period</u>	<u>Quantity</u>	<u>Ceiling Price</u>	<u>Other Non-recurring Cost</u>	<u>Other Recurring Cost</u>	<u>Royalty @ 5%</u>	<u>Total Price</u>
Harrington & Richardson	1st year	60,000	\$250.00	\$5.30	\$8.38	\$14.50	\$278.18
	2nd year	180,000	150.00	5.30	8.38	9.00	172.68
	3rd year	260,000	147.00*	5.30	8.38	8.84	169.52
General Motors	1st year	60,000	316.00	5.30	8.38	18.13	347.81
	2nd year	180,000	205.00	5.30	8.38	12.03	230.71
	3rd year	260,000	201.00*	5.30	8.38	11.81	226.49
Colt	Current		NA	NA	NA	NA	104.39

* Projected cost based on 98% industry average learning curve.

CONFIDENTIAL

If the difference between first and second year ceiling prices is considered as non-recurring start up cost and the remaining variable cost element of the Harrington and Richardson ceiling price is reduced by one-third, the resulting total unit price for each of the three years would be \$225.43, \$119.92, and \$116.77, respectively. Under these most favorable circumstances, the procurement at Harrington and Richardson would cost \$13 million more than current prices from Colt. If the AAO were to double over that assumed, the resulting units would decrease in price an additional \$9.00 or approximately \$107.00 per rifle.

By a similar analysis, if the variable cost element of the General Motors ceiling price were to be reduced by sixty percent, the resulting unit prices would be \$218.05, \$100.94, and \$99.36, respectively. Under these most favorable circumstances, the procurement at General Motors would cost \$2.9 million more than current prices from Colt. An increase in the AAO would have the same effect as that illustrated for Harrington and Richardson.

CONFIDENTIAL

L. Bibliography

Air Force History of the AR15 Rifle (Mid-1960 to Mid-1962), undated.

Report, USAMC, 23 June 1964, Brief History of the Background of the Weapon System.

Letter, Advanced Research Projects Agency, 21 December 1961, ARPA Order 298-62.

Memorandum, Office Assistant Secretary of Defense (Comptroller) for ASAF(FM), 20 January 1963.

Memorandum, Joint Chiefs of Staff, (JCSM-99-63), 12 February 1963, Rifle Procurement Program.

Letter, Deputy Chief of Staff for Logistics, 25 October 1962, Procurement of AR15, Accessories and Ammunition.

Letter, Ogden Air Materiel Area, 16 October 1962, Production of Cartridge, 5.65mm, High Velocity Ball.

Minutes, U.S. Air Force Meeting on 5.65mm Ammunition, 9 January 1963.

Message, Commanding General, USANUCOM, to CO, Ammunition Procurement and Supply Agency, 18 March 1963.

Frankford Arsenal Tenth Memorandum Report on AR15 Rifle-Ammunition System, 15 May 1964.

Memorandum, Secretary of Defense, 13 February 1963, Rifle Procurement Program.

Office, Deputy Chief of Staff for Logistics Staff Study, 24 January 1963, AR15 Rifle.

Memorandum for Record, Assistant Secretary of the Army (I&L) 7 March 1963, AR15 Rifle.

Memorandum, Office, Secretary of Defense, 11 March 1963, AR15 Ammunition and Rifles.

Memorandum, Office, Secretary of Defense, 27 June 1963, Action on Rifle Production Base Plan.

CONFIDENTIAL

CONFIDENTIAL

Memorandum, Headquarters, USAWECOM, 30 October 1963, Submission for Approval of Award of Contract for Rifles, 5.56mm, M16.

Letter, CG, USAMUCOM, 14 May 1963, Production of 5.64mm (Caliber .223) Ball Ammunition for the AR15 Rifle.

Letter, Project Manager, 5 July 1963, with three inclosures, Procurement Program, 5.56mm Ammunition for AR15 Rifles.

Memorandum, Headquarters, USAWECOM, 30 October 1963, Submission for Approval of Award of Contract for Rifles, 5.56mm, M16.

Minutes, Technical Coordinating Committee Meeting, 13-14 August 1963.

2d Inclosure, Headquarters, USAWECOM, 21 August 1963, to Letter, Project Manager, Procurement Program, 5.56mm Ammunition.

Letter, Headquarters, USAMUCOM, 3 October 1963, Procurement Program, 5.56mm Ammunition for AR15 Rifle.

Letter, Project Manager, 4 December 1963, Progress Report (RSS DD-SD(M) 554), M16 Rifle.

Office Memorandum, Headquarters, USAMUCOM, 17 January 1964, Meeting on Procurement of One Million Cartridges, 5.56mm, Ball, M193, Frankford Arsenal.

Minutes, Meeting, Cartridge, 5.56mm (RFP), One Million, 23 January 1964.

Disposition Forms, Frankford Arsenal (SMUFA-6000), 21 January 1964, Evaluation of Propellants for 5.56mm Ammunition.

Memorandum for Record, Frankford Arsenal, 30 March 1964, AR15-M193 Ball Cartridge Procurement.

Frankford Arsenal Tenth Memorandum Report on AR15 Rifle-Ammunition System, 15 May 1964.

Messages, CO, Frankford Arsenal, to Olin Mathieson Chemical Corporation, Federal Cartridge Corporation, and Federal Arms Company, 28 and 29 April 1964.

Memorandum, Frankford Arsenal (SMUFA-6000), 29 April 1964, Tests of Samples from First Million Production of 5.56mm M193 Ammunition.

CONFIDENTIAL

Summary Report, Frankford Arsenal, 22 December 1964, Deliveries of 5.56mm Ball Ammunition.

Memorandum, Frankford Arsenal (SMUFA-0300), 22 March 1965, Request for Deviation Approval of Technical Action (RTA) (CHPD 105-65 DV) Cartridge, 5.56mm, Ball M193.

Memorandum, Headquarters, USAMC, undated, Milestones, Fiscal Year 1965.

Chief of Staff Memorandum 64-146, 13 April 1964.

Study of Rifle Readiness, 15 May 1964.

Letter, Office, Deputy Chief of Staff for Logistics, 6 August 1964.

Letter, USAMC, 23 July 1964, DSCLOG Study of Rifle Readiness.

Letter, Office, Deputy Chief of Staff for Logistics, 6 August 1964.

Chief of Staff Memorandum 64-341, 21 August 1964, The Army Rifle Program.

Summary Sheet, Office, Deputy Chief of Staff for Logistics, 4 November 1964, Study of Procurement of M14 Rifles.

Memorandum for Record, PEMA Development Division, Office, Deputy Chief of Staff for Logistics, 13 November 1964.

Letters, Colt's, 16 February 1965, 24 February 1965, and 7 April 1965 and Cable, 5 May 1965.

Memorandum, Office, Deputy Chief of Staff for Logistics, Production Base Plan for the M16 Rifle, 8 March 1965.

Summary Sheet, Assistant Chief of Staff for Force Development, 21 April 1965, Army Requirements for the M16 Rifle.

Memorandum, Chief of Staff, Army, 12 May 1965, Inquiry of Colt Industries, Inc.

Letter, Headquarters, USAMC, 19 May 1965, Procurement of Rifles.

CONFIDENTIAL

Letter, Air Force Logistics Command, 29 May 1965, M15 Rifles.

Letter, Headquarters, USAMC, 14 July 1965.

Letter, Headquarters, USAMC, 28 July 1965, Fiscal Year 1966 PEMA Program.

1st Inclosure, Office, Deputy Chief of Staff for Logistics, 17 September 1965 to Letter, Headquarters, USAMC, 28 July 1965, Fiscal Year 1966 PEMA Program.

Exhibit P1, Budget Submission, 1 October 1965.

Message, MACV 42787 (DAIN 187924), 6 December 1965.

Message, MACV 42932, 7 December 1965, Fiscal Year 1966 Military Assistance Program.

Letter, Assistant Secretary of the Army (I&L), 6 December 1965, Accelerated Production of Rifle, 5.56mm, XM16E1, and Ammunition.

Message, Department of Defense, 8 December 1965.

Revision to October 1 Budget Estimates, 6 December 1965.

Message, MACV 43529 (DAIN 196152), 12 December 1965

Subject Issue 933, Department of Defense, 22 December 1965.

The Army Materiel Plan, Vol. VI, May 1966.

Fact Paper, Office, Assistant Secretary of Defense (I&L), 18 January 1966, M16 Rifles.

Memorandum, Office, Assistant Secretary of Defense, 19 February 1966, Procurement of Rifles, 5.56mm, M16 and XM16E1.

Message, Department of the Army (DA 745194), 27 December 1965, M16 Rifles.

The Army Materiel Plan, Vol. VII, May 1967.

Disposition Form, Director of Procurement to Assistant Secretary of the Army (I&L), 10 December 1966, Expansion of Production, Capacity for 5.56 Ammunition.

CONFIDENTIAL

CONFIDENTIAL

Memorandum, Deputy Secretary of Defense, 23 December 1965,
Expansion of Production Capacity for 5.56mm Ammunition.

Memorandum, Assistant Secretary of the Army (I&L),
6 January 1966, Expansion of Production Capacity for 5.56mm
Ammunition at Lake City and Twin Cities.

Trip Report, Frankford Arsenal, 2 August 1966, Visit to
Lake City Army Ammunition Plant.

Army Materiel Plan, Vol. VII, May 1967.

CEP, Office, Deputy Chief of Staff for Logistics-7,
25 January 1967.

Exhibit P-1, Supporting Data for Fiscal Year 1969 Budget
Estimate, 11 January 1968.

Exhibit P-1, 7 December 1967.

CEP, Office, Deputy Chief of Staff for Logistics-7,
25 January 1967.

Program Budget Division 324, 16 December 1966.

Budget Backup Data, Office, Deputy Chief of Staff for Logistics,
undated.

Budget Backup Data, Office, Deputy Chief of Staff for Logistics,
undated.

Memorandum, Headquarters, AFM, 22 September 1967, Significant
Elements of Second Source Procurement Plan -- M16 Family of Rifles.

Exhibit P-1, Supporting Data for Fiscal Year 1968 Apportion-
ment, 9 June 1967.

Testimony Before the Special Subcommittee on the M16 Rifle
Program Hearings, Armed Services Committee.

Memorandum, Headquarters, USAWECOM, 3 July 1963, Procurement
AR15.

Memorandum, Headquarters, USAWECOM, 30 October 1963,
Submission for Approval of Award of Contract for Rifle, 5.56mm, M16.

CONFIDENTIAL

~~CONFIDENTIAL~~
UNCLASSIFIED

Memorandum for Record, Project Manager Staff Officer,
4 October 1963.

Testimony of Dr. Robert A. Brooks, Assistant Secretary of
the Army (I&L), p. 4725, and USAMC General Counsel, p. 4823, in
Hearings before the Special Subcommittee on M16 Rifle Program,
Armed Service Committee, 8 and 9 August 1967.

Letter, USAMC General Counsel to Colt's Inc., 13 April 1966.

Letter, Colt's Inc., to USAMC General Counsel, 25 April 1966.

Testimony, Hearings before the Special Subcommittee on M16
Rifle Program, Armed Services Committee, 27 July 1967.

Letter, USAMC General Counsel to Colt's Inc., 7 June 1966.

Testimony by USAMC General Counsel, p. 4753, Hearings before
the Special Subcommittee on M16 Rifle Program, Armed Service
Committee, 27 July 1967.

Memorandum for Record, USAMC General Counsel, 6 and 11 October,
2 and 21 November, and 6 December 1966.

Memorandum for Record, USAMC General Counsel, 8 December 1966.

Chief of Staff Memorandum 66-546, Army Point of Contact with
Colt's Firearms Division of Colt Industries, Inc., 16 December
1966.

Testimony of Dr. Robert A. Brooks, Assistant Secretary of
the Army (I&L), before the Special Subcommittee on the M16 Rifle
Program, Armed Services Committee, 27 July 1967.

Army Regulation 715-20, 21 April 1960, Procurement Inspection
and Quality Control.

Letter, Department of the Army, 19 July 1962, Transfer of
Certain Procurement Functions from Office, Deputy Chief of Staff
for Logistics to Office, Assistant Secretary of the Army (I&L).

Regulation, Headquarters, USAMC, ANCR 700-6, 19 October 1964,
with Change 1, 2 December 1964, USAMC Quality Assurance System.

~~CONFIDENTIAL~~
UNCLASSIFIED

UNCLASSIFIED

Regulation, Headquarters, USAMC, ANCR 700-6, 19 October 1964, with Change 1, 2 December 1964, USAMC Quality Assurance System.

Springfield Armory Purchase Description 253B, Acceptance Testing Specification for Rifles, 5.56mm, M16, and XM16E1, 29 April 1966, with Amendment, 24 October 1966.

Memorandum for Record, Headquarters, USAMUCOM, 26 June 1963, AR15 Rifle Ammunition (Caliber .223).

Letter, Frankford Arsenal, 24 August 1967, Quality Assurance Provisions for 5.56mm Cartridges.

Memorandum, Frankford Arsenal, 23 October 1967, Quality Assurance Review of 5.56mm M193 Ball Ammunition.

UNCLASSIFIED

enota

DEPARTMENT OF THE ARMY
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D.C.

Encl 5-3

Computations representing
figures on page 5-93:

H+R

1st yr. liability paid 530.00
Indef: 150.00
non-recurring cost \$100.00

$\frac{1}{3}$ of \$150 recurring = \$50.00

$\frac{1}{3}$ of \$8.38 recurring = 2.79

reduction = \$52.79

1st yr reduction = 275.15 - 52.79 = 222.36 ✓

2nd yr reduction = 172.68 - 52.79 = 119.89 ✓

3rd yr reduction = 107.52 - 52.79 = 54.73 ✓

DEPARTMENT OF THE ARMY
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D.C.

Encl 5-5

Computations supporting
the figures on page 5-93:

G M

1st year ending June 30, 1952

2nd year

non-recur. cost \$11.00

16 of \$205 recurring = \$3280.00

16 of \$8.38 recurring = \$134.08

reduction = \$3414.08

1st yr reduction = \$4451 - \$1037 = \$3414.08

2nd yr reduction = \$3571 - \$1957 = \$1614.00

3rd yr reduction = \$356.27 - \$178.31 = \$178.96

* above reduced figures vary
from \$90 less to \$1.74 more than
the figures on page 5-93