

M-16 Rifle Case Study

**Prepared for the Chairman
of the
President's Blue Ribbon Defense Panel**

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Introduction

As a weapon system acquisition item the rifle is a low value - high quantity system. It is mechanically simple - although not so simple as many people think. But its environment and use are complex and place immense demands on reliability, durability, safety, and low cost.

There are some reasons for studying the rifle in weapon system acquisition:

- As systems rifles are not inexpensive. The 10-year system cost of current systems are on the order of 1.5 billion dollars. The big cost is the ammunition (7 to 1).
- In spite of technology, infantry lives probably still are the main currency in war. Infantry riflemen suffer more casualties in combat than the rest of the Armed Forces together. In small wars this ratio may increase rather than decrease. Tactical Air Forces, on which we spend slightly more money than we do on the land forces themselves, as well as other sophisticated weapons of war, have not changed this ratio.
- Seventy percent of the US casualties in Vietnam have been caused by small arms fire versus 25-45% in other recent U.S. wars.
- The rifle is a case by which to study the "Arsenal System".

o The rifle is a classical case for studying policy, politics, and procurement and the interaction of these with the requirements of the four Services, MAP, Allies, foreign sales, and gold flow.

It may seem that the interminable struggle described in this paper to get a superior rifle into the hands of troops was not worth the effort. It is conservative to estimate that because the M16 rifle was available in time in Vietnam and the war was fought with it rather than the M14, 20,000 Americans are alive today who would not have been.

However, a better way must be found to obtain weapons.

Names are mentioned in this study to help understand the roles of classes of players, not to hold individuals up to censure. The names and the incidents should be protected.

CHAPTER I - POST 1900

First Mention of the "Tipping" Phenomenon

Just after the turn of the century it was noted in the US that small caliber bullets tipping in the target could inflict severe wounds. No action was taken on this information. This was about the time of the adoption of the 1903 Springfield rifle and the US .30 caliber bullet. Both were to be used through World War II, and the .30 caliber bullet, with the World War II Garand rifle, was to continue in use through the Korean War.

The "Pig" Board

In 1928 the US Army convened a board of officers to conduct comparative tests of rifles firing different calibers of cartridges, for the purpose of expediting development of a semiautomatic rifle. This board was known as the "Pig Board." There was much discontent on the part of the users at this time because of the long delay of the Ordnance Corps in making available a semiautomatic rifle; development of a semiautomatic rifle had been underway with little result since the end of World War I. The work of the Board included lethality tests of the candidate cartridges against pigs, as

well as other tests and evaluations. In a remarkably penetrating and succinct report,* the Board correctly concluded that the smallest caliber cartridge it tested (.258 caliber) was more lethal than the two larger calibers (.270 and .30) at useful combat ranges. Moreover, the smallest caliber cartridge would better support a semiautomatic rifle because of (1) the lighter weight of weapon due to lower energy of the cartridge, (2) the greater amount of ammunition that could be carried at equal system weight because of the reduced weight and size of the weapon and the ammunition and (3) reduced training time due to reduced weapon recoil. It correctly concluded the increased lethality to be due to the greater ability of a small caliber bullet, while sufficiently stable in the air, to tumble in the target.** The standard .30 caliber 150 grain bullet already was at the tolerable limits of both systems weight and recoil.

The Board recommended that the .258 caliber cartridge it had tested be standardized and that a semiautomatic rifle be developed for it without delay. General MacArthur, the Army Chief of Staff, disapproved the recommendation, insofar as caliber was concerned, after the Chief of Ordnance, a West Point classmate, appealed to MacArthur that the decision would ruin him.

* Report of Board Appointed to Recommend a Specific Caliber for the Future Development of the Semi-Automatic Shoulder Rifle, dated 21 September 1928

** An additional reason is that a smaller caliber (and lighter weight) bullet can be driven at a higher velocity while reducing muzzle momentum and recoil.

He said that his career and reputation had gone into the development and refinement of the 1906 .30 caliber cartridge. MacArthur's decision was to continue to develop the semiautomatic rifle in the .30 caliber cartridge.

The "Pig Board" had discovered a wounding mechanism that had been technologically available for 20 years. Having been put into a weapons concept and been experimentally verified and described by the Board, the concept was to be ignored by the US Army for another 25 years until Stoner used it in the AR-15 (M-16) rifle in 1958. Even then, as will be seen, the Army was to resist the adoption of weapons based on this innovation for another 18 years.

The Adoption of the Garand Rifle

In 1936 the US Army adopted the arsenal-developed .30 caliber Garand rifle to replace the US 1903 .30 caliber Springfield bolt action rifle. This action came in conflict with Marine Corps interest in the Johnson .30 caliber semiautomatic rifle. The Marine Corps interest was a direct challenge to the Army arsenal system—because the Johnson rifle was an "outside" invention and because the Army traditionally procured rifles (and much other equipment) for both the Army and the Marine Corps. The Army conducted tests of the Johnson rifle in an atmosphere of public controversy and rejected it, and the Marine Corps procured some for its units. Ordnance Corps retaliation, through its control over large portions

of Marine Corps procurement and support, has left wounds and respect for the power of the Army Technical Services (now Army Materiel Command) among senior Marine Corps Generals that still is not forgotten. Johnson, like many American small arms inventors before him, finding himself unable to do business with the Ordnance Corps, took his weapons abroad.

CHAPTER II - WORLD WAR II

US Rifle Superiority

During World War II the US enjoyed the superiority for its infantry of a semiautomatic rifle while enemy infantry were armed primarily with bolt action rifles. This was a significant advantage and conserved many American lives. The reason that the US enjoyed this superiority was not because it was generally ahead of all other major powers in the development of the semiautomatic rifle. Rather, the entry of the US into the war several years after the other powers gave it the time to solve the engineering problems and place the Garand in quantity production. Both the Germans and the Soviets had semiautomatic rifles in World War II, based on pre-World War II designs. However, they did not have them in quantity.

The Weapon Mix

During World War II an infantry rifle squad of, say, ten men generally was equipped with a Thompson submachine gun for the squad leader or assistant squad leader, one or two Browning Automatic Rifles (BARs), and seven M-1 Garand Rifles. The Thompson submachine gun, 24 inches long,* weighing 12 lbs. empty, and firing the .45 caliber pistol bullet developed during

* With the stock removed.

the Philippine Insurrection, was adopted in 1928. Late in the war it was partially replaced by an easier to manufacture submachine gun firing the same cartridge. The Browning Automatic Rifle, weighing 21 lbs. with bipod and firing the same cartridge as the rifle, was developed during World War I. Although one man carried and operated the weapon, it took a second rifleman, in addition to the gunner, to carry sufficient ammunition to support the weapon. The Garand Rifle, adopted in 1936 and introduced early in the War, weighed $9\frac{1}{2}$ lbs. empty and fired the 1903 .30 caliber cartridge. In addition to these weapons, the 6-lb M-1 carbine was adopted early in the War as a pistol replacement (defensive weapon) for crew served weapons members and support troops. Because of its light weight, it was also used as a rifle substitute in some jungle areas.

This family of small arms weapons was necessary because there was no single weapon available that could combine the high rate of fire of an automatic rifle, the handiness (short length) and close range fire power of a submachine gun, the accuracy and fire duration of a rifle, and the light systems weight of the carbine.

Systems Weight

By systems weight is meant the weight of the weapon, ammunition, and magazines or clips to contain the ammunition. It is generally accepted by generations of study and experience that an infantry rifleman can tolerate on a continuing basis a weapon system weight of about 18 lbs considering the

other essential weapons and equipment he must carry. Because the infantryman is weight-limited and can use in a fire fight more ammunition than he can carry before he can be resupplied, prescribed basic loads are roughly the number of rounds afforded within the remaining weight capacity when the weight of the weapon and the necessary magazines or clips are subtracted from 18 pounds, more or less.

The United States Carbine

As previously mentioned, during World War II, the United States adopted the .30 caliber carbine as a defensive weapon for personnel whose duties only secondarily involved combat. The weapon fired a low-velocity, blunt-nosed .30 caliber bullet of low lethality. The carbine also was unreliable, especially in rain, dust, snow, and cold, due to basic design deficiencies that showed up in the earliest testing and never were corrected. A Mr. Wm. S. Auman* (now a small arms official in the Air Force at Eglin Air Force Base and the Air Force's representative on the M16 Technical Coordinating Committee) and Lt Colonel E. H. Harrison, Ordnance Corps, (now retired a Colonel and technical editor of the NRA's "American Rifleman" magazine) were test officers on the carbine. A Colonel René Studler,** as Chief of the Small Arms Office of the Office of the Chief of Ordnance, was the directing

*Ordnance R&D Center, Aberdeen, Project No. 3130 - "First Report on Tests of Production Models of the US Carbine Caliber .30, M1, from Ten Manufacturing Facilities and 83rd Report on Tests of Semi-Automatic Rifles. Ordnance Program No. 4972," dated 13 April 1945.

**Some names are mentioned throughout this study to show the roles of various classes of players in the decision process, not to expose them to criticism as individuals. Generally names are mentioned that reappear.

authority.* The carbine was developed by the Winchester Company, a company with which the Ordnance Corps maintained close relationships and in which a number of retired Ordnance Officers were usually employed. Winchester was acquired by Olin Mathison, the sole source of Ball powder. Late in World War II, the carbine also was issued in an automatic version. However, because of its excessive cyclic rate and the amount of "climb" of the barrel in automatic fire, it was useless as an automatic weapon.

The German Sturmgewehr

During 1942-44 the Germans developed the 1942 Sturmgewehr (assault rifle), the first successful automatic rifle for the individual soldier. They noted that a fully automatic rifle for the individual soldier would have to have reduced weight and reduced muzzle impulse** for the shot bursts to be usefully accurate, for the cumulative recoil of automatic fire to be tolerable, and for the soldier to be able to carry enough ammunition within tolerable systems weight to support the higher consumption rate of automatic fire. Noting also from operational research that useful infantry rifle fire took place in combat at ranges not exceeding 300 meters, they designed a weapon around a lower*** muzzle impulse 8mm Kurz (short)

* The Proving Center, Aberdeen Proving Ground, "49th Partial Report on Tests of Semi-Automatic Rifles and 3rd Report on the U.S. Carbine Caliber 30 M-1, Ordnance Program 4972," dated 30 June 1942.

** Muzzle impulse is a function of the weight and velocity of the bullet relative to the weight of the weapon. The .223 caliber bullet, for example, of the M-16 rifle can be driven at higher velocity than the 7.62mm bullet of the M-14 rifle, with lower muzzle momentum. Consequently, the M-16 can weigh less, and at the same time have less recoil, than the M-14. In the Sturmgewehr the reduced muzzle momentum was achieved by some reduction in both the weight and velocity of the bullet.

*** "Intermediate" compared with M-16 rifle's 5.56mm (cal. 223) cartridge.

cartridge. This weapon was the prototype of all successful automatic rifles for the individual soldier.* Characteristically (and unlike previous rifles and the M-14 rifle) it had a straight stock with the barrel under the gas cylinder to reduce the turning moment of the recoil of the rifle in the shoulder and thus help reduce the tendency of the shots to climb in automatic fire. The barrel and overall length were shorter than a traditional rifle and it had a pistol grip to hold the weapon more securely in automatic fire. The principle of this weapon -- the reduction of muzzle impulse to get usable automatic fire within the actual ranges of combat -- was probably the most important advance in small arms since the invention of smokeless powder. The US Ordnance technical intelligence evaluation of this weapon was that it was of little importance.

The Automatic Garand

Toward the end of the War, US forces in the Far East placed a requirement for 100,000 M-1 rifles that would fire automatically. The M-1 rifle was readily altered to fire full automatic. However, the War ended before the rifles were delivered to the field in any quantity. As in the case of the M-14 to be adopted 15 years later (and which was, in fact, a similar modification of the M-1 rifle), this was not a useful modification because the muzzle impulse of the US 1906 .30 caliber cartridge (150 grain bullet driven by 50 grains of powder) was too great for useful automatic fire for reasons that previously have been explained.

* On the advice of his ordnance officers, Hitler resisted and delayed the adoption of this weapon.

CHAPTER III - THE IMMEDIATE POST-WAR PERIOD

I

The Soviet AK-47

Used in quantity against the Soviets at Stalingrad, the German Sturmgewehr made a deep impression on the Russians. They copied the ballistics of the cartridge while improving its configuration and improving the weapon. They standardized the weapon system in 1947 as the AK-47 rifle. Since that time this weapon has been produced in more countries, in greater quantity, and to a greater degree of international standardization than any other rifle in history.

The US Army Ordnance foreign technical intelligence service conducted an evaluation test* of this weapon in 1956 and did not find it to be of special significance. At that time the AK-47 was the most effective and important rifle in the world. With the exception of the AR-15 (M-16) rifle, it still is. However, the M16 was not developed (1957) until a decade after the AK-47 was adopted (1947) by the Soviets and the M16 was not formally adopted (1967) as a standard US Army rifle until another decade after that.

*Ordnance Technical Intelligence Service Report OT10-731, dated 29 January 1957, "Evaluation Report MCN 9864. Soviet 7.62mm Submachine gun Kalashnikov (AK)-OCO Subproject No. 2142. (U)", with 1 incl: 26 October 1956 Springfield Armory Report No. SA-MK8-1112, "Submachine gun, 7.62mm, Model AK, Soviet.

II

(Western Developments)

The United States Rifle Requirement

After World War II the United States Army convened at Ft. Benning, Georgia a general board which reviewed World War II combat experience. It stated the requirement for a rifle that would combine, in a single weapon, the functions of a rifle, automatic rifle, carbine, and submachine gun. The Ordnance Corps supposedly set about to develop a weapon to fill this requirement. However, it is obvious from engineering principles that such a weapon could not be developed from .30 caliber (later 7.62mm NATO) cartridge that the Ordnance Corps insisted on retaining.

Effect of Competitive Shooting on Military Rifle Development

Incidentally, a strong influence behind the decades of development and refinement of the US .30 caliber cartridge was the mutual interest of a set of Ordnance development officers and line officers in the use of the cartridge (and the service rifle) for rifle marksmanship competition. Because the requirements of rifle competition, which is essentially a civilian sport, have borne little relationship to the requirements of small arms combat, the interest in marksmanship has tended to retard military rifle and cartridge development. Small arms combat requires the highest rate of target effects, including both hits and near misses (suppression), that can be supported, at ranges generally not exceeding 300 yards.

Competitive shooting generally stresses long range known distance single shot accuracy with systems weight of little consideration. Consequently, the Federally-subsidized Army-directed Civilian Marksmanship Program and the related National Rifle Association, while encouraging the sport of competitive shooting, have generated powerful forces that have resisted military rifle progress. This interest by Ordnance Corps and some senior line officers in .30 caliber cartridge for competitive shooting between the two World Wars was a strong reason behind the United States later forcing this cartridge, nominally modified as the 7.62mm NATO cartridge, on its allies when it was necessary to propose a cartridge for NATO standardization.

At the same time, the United Kingdom and Belgium, impressed with the principle of the German assault rifle and having been stuck with bolt-action rifles in World War II, pressed forward vigorously in assault rifle development using lower muzzle impulse ammunition.

The 1950 Joint Rifle Trials

In 1950, the United States, United Kingdom and Canadians held a joint rifle trial at the United States Continental Army Command (USCONARC) Infantry Board at Ft. Benning, Georgia. The rifles tested were the UK EM2, the Belgian FN (both in caliber .270) and the US T-25 in caliber .30. The test report concluded that the FN was the best of the three rifles. The United States weapon was found to be the worst and essentially not capable of improvement. None was considered by the user to be a significant advance.

NATO Ammunition Standardization

With the advent of NATO, the US Government selected small arms standardization as a symbol to help cement the fledgling alliance. The Ordnance Corps proposed the United States 7.62mm NATO round as the cartridge to be standardized for the NATO countries. The cartridge was the US 1906 caliber .30 rifle and machine gun cartridge with the case shortened by a half inch to accommodate the shrinkage in powder volume that had occurred in the 50 years that the cartridge had been in use. The caliber, bullet shape, weight, and ballistics of the 7.62mm NATO cartridge were essentially identical to the US .30 caliber cartridge, and its weight and length were only slightly less. *

Our NATO partners strongly resisted the adoption of this round because it would not make possible a rifle capable of useful automatic fire. Moreover, it would obsolete the assault rifles that they were developing. However, the US held the cards, having emerged from World War II as the most powerful nation, with its allies dependent upon it for economic recovery. Nevertheless, when Churchill finally accepted the US proposed cartridge to be NATO standard, the British Government nearly fell. The US Army Ordnance Corps precipitated this situation by misleading Department of the Army and US Government officials as to the technical and tactical desirability of the US cartridge as a basis for developing improved small arms weapon systems in the United States and in Europe. At the time of the

* DA Report made under Sponsorship of ODCSLOG, "Report on Interchangeability of 7.62mm NATO Ammunition (U)" dated 24 Apr 63

final agreement in 1953 on the standardization of this cartridge, the US did not have either a rifle or a machine gun to fire it. It was at this time that General Lemnitzer, having urged the round on our NATO allies as a symbol of NATO cooperation as a planner-architect of NATO, became committed to the 7.62mm NATO round, and consequently to the M14 rifle as will be seen in later events.

With the agreement to use the US NATO round, the UK adopted the FN rifle in a semiautomatic version. This was a sensible decision because a rifle using this cartridge could not be useful in automatic fire. This avoided the expense of issuing an automatic rifle to each soldier who, in fact, would only be able to use it semiautomatically, a mistake that the Army was to make in the M14 rifle. A special heavy-weight version of the FN was adopted for 2 men in each squad to provide some automatic fire. British Far East Land Forces when engaged in actual fighting continued to use the venerable Bren gun as the automatic weapon.

US Rejection of Rifle Standardization

Part of the agreement that our allies would adopt the US NATO cartridge was a tacit agreement that the US would adopt the FN rifle. The Ordnance Corps insisted on having a US company*, that it controlled, manufacture a test quantity of FN rifles. Under controversial circumstances, these rifles were found to have too soft metal in the bolts in an Arctic

*Harrington and Richardson

test. Although the US had manufactured the faulty bolts and they were readily correctable, the Ordnance Corps managed to get higher authority to renege on the agreement to accept the FN. With the failure to standardize the weapons, as will be seen, real NATO standardization (reliable interchangeability of either rifles or ammunition) were actually dead. However, with the adoption of the 7.62mm NATO cartridge, it has suited most of the parties to continue the myth of full ammunition interchangeability. For the US Army it was a useful way to justify weapons before the Congress. For the others, they were committed for the time being. In addition, they could hope for free ammunition, and, if necessary, weapons to fire it, in time of emergency.

ORO - The Beginning of Rifle Research

After the 1950 US, UK, Canadian rifle trials, General Devers, and later General Wyman, Commanding Generals of US Army Continental Army Command* encouraged the newly-formed Army-supported John Hopkins' Operations Research Office (ORO) to begin historical study, operations research, and field experimentation on the qualities of rifles and small arms combat. A Colonel Crossman, to be mentioned later, represented the Ordnance Corps in this effort.

The work of the ORO scientists, by rediscovering the Pig Board Report and through field experiments, revealed that a high velocity .22 caliber bullet could be more lethal at all ranges of tactical interest than larger

*The Command that then has user requirements and user testing responsibility.

caliber bullets (such as .30 caliber) even at equal velocity, * ** because the .22 caliber bullet with its lower mass could be more longitudinally stable in the human target. The smaller caliber also would provide lower muzzle impulse at higher velocity. This in turn would permit effective automatic fire because of lessened recoil and "climb" in burst fire; and the lighter weight of weapon and ammunition would permit sufficient ammunition to be carried on the individual soldier to support automatic fire. The flatter trajectory, afforded by higher velocity, also would improve combat accuracy by reducing vertical aiming error. Moreover, both the weapon and the individual round of ammunition would be cheaper, and there would be significant logistical advantages of the lighter weight weapon and ammunition. These scientists also determined from historical studies and operations research, as had the Germans, that 95% of all rifle fire took place at less than 300 yards.*** The rifle technology advanced by ORO**** in 1950-52 was the same as that applied by the Germans in the Sturmgewehr in 1942, and copied by the Soviets in the

*ORO Technical Memo T-160, dated June - November 1952, "Operational Requirements for an Infantry Hand Weapon" "ORO Abstract - Quotations".

**USACWL Report No. 2196, dated 1 November 1957, "Wounding by SALVO Bullets" (Dziemian and others)

***Office, Chief of Ordnance Technical Information Report F (1), "Project SALVO" dated September 1958.

****The ORO work also was the origin of the US interest in flechettes which was the basis for the SPIW rifle development to be mentioned later.

AK-47, with one exception: The Germans and the Russians were apparently unaware that by using a lighter weight high velocity small caliber bullet one could get even lower muzzle impulse, more reduction in weight of weapon and ammunition, with increased, rather than decreased, lethality over larger cartridges. This was a case where it was possible for one to have his cake and eat it too, an unusual situation in weapon development. The reason that this was possible was that US technology had long presented this solution, but the Ordnance Corps had ignored it.

CHAPTER IV - THE AR-15 AND M-14 RIFLES

I

The Development of the AR-15 (M-16) Rifle

The ORO work and the strong command interest of General Wyman resulted in the testing of an experimental .22 caliber rifle,* and, in turn, a USCONARC Draft set of Military Characteristics (draft QMR) for a small caliber, light weight, high velocity rifle. ** It later was to be frequently stated that the AR-15 (M-16)*** rifle was a purely commercial development against a commercial (non-military) requirement, as an argument against the weapon. The implication was inaccurate.

General Wyman, realizing that the resulting rifle could be several times as effective as rifles based on the .30 caliber (or 7.62mm) cartridge then tried to get the Ordnance Corps to develop a rifle to these military characteristics. When it declined to do so he got permission to go directly to US industry to develop it. He interested Mr. Eugene Stoner of the Armalite Corporation, then a subsidiary of Fairchild Engine and Airplane Corporation. Stoner had just developed the AR-10, a rifle of unusual and effective design, in NATO caliber.**** The AR-15, which he rapidly developed, was essentially this rifle scaled down to accommodate a .223 caliber

* Report of CONARC Board No. 3. Project 2709, "Evaluation of M-2 Carbine Modified to Fire High Velocity Caliber .22 Cartridge" dated 28 November 1955.

** Report of Project Number 2561, Bd Nr. 3, OCAFF, 21 Jan 1954, "Military Characteristics for a Rifle of High Velocity and Small Caliber."

*** AR-15 was the developer's designation of the weapon. M-16 was the designation given to it with the first military procurement.

**** 9 February 1962, Ltr to Mullin, Cooper-Macdonald, from Mr. Stoner (designer of AR-15), w/1 incl: ("History of Armalite Weapons (AR-10 and AR-15)").

cartridge.* He designed the cartridge** to meet the Draft Military Characteristics, the controlling one of which required penetration of a steel helmet at 500 yards. This resulted in a 55 grain boat-tailed bullet with 25 grains of powder and a nominal muzzle velocity of about 3,250 feet per second. Nominal and actual muzzle velocity are seldom the same in any weapon type. Moreover, "actual" muzzle velocity is likely to be that achieved in some standard test barrel rather than in the actual samples of the weapon. The AR-15 never did have an actual average muzzle velocity of 3,250. As will be seen, games were to be played with the muzzle velocity specification for the M-16.

Description of the AR-15

The main features of this weapon were are follows: It had the barrel under the gas system, a straight stock, pistol grip, short barrel and high sights characteristic of assault rifles. A unique gas system activated the recoiling parts by gas passed through a tube to the bolt carrier, instead of using the traditional system of a piston and operating rod. This eliminated some parts and provided more symmetrical forces during weapon cycling. To avoid problems of gas fouling or attacking the recoiling parts, a clean IMR powder was used and the recoiling parts had a special electrolite finish. The head of the bolt locked into the barrel, thus reducing the strength of materials required in the receiver. The flash hider also was

*.223 caliber was developer caliber designation. 5.56mm was the caliber designation given to the cartridge with the first military procurement.

**15 September 1962, Ltr from Mr. Stoner (AR-15 designer) to Mr. Macdonald, w/o inclosures.

a grenade launcher, thus eliminating the need to attach a launcher for launching antitank grenades as in other weapons. The gas system did not all have to be shut off for launching grenades. The AR-15 was 38 inches long and weighed 7 pounds empty, compared with the M-14's 44 inches and 9 $\frac{1}{2}$ pounds. Due to the lesser weight of the weapon, magazines, and ammunition, three times as much ammunition could be carried with the M-16 as with the M-14 at equal systems weight. An aluminum, instead of steel, magazine also helped reduce systems weight. The stock and forearm were made of plastic material instead of wood, and the receiver was made of forged aluminum castings, borrowing from aircraft manufacturing techniques.

Winchester also provided a prototype for test. This was essentially an M-2 (automatic) carbine rechambered for the more powerful .22 caliber round. This weapon was not a serious development and broke up in the resulting tests. An accompanying incident of the Winchester entry was that Winchester asked Stoner to agree to a common cartridge design during the development of the weapons so both weapons could use the same ammunition. Both agreed to use the Stoner-designed cartridge. Winchester then designed an inferior round that would fit both weapons while chambering its own weapon so that the Stoner round would not fit. The Ordnance Corps required that the Winchester ".224" caliber ammunition be used in both weapons in the ensuing Engineering and Service Tests. The logical result of an unsatisfactory Winchester rifle entry and of a degraded cartridge would not be to enhance a competition

between two lightweight rifles, but rather to discredit the lightweight, small caliber, high velocity rifle principle and the AR-15. Winchester's representative was to testify against lightweight, small caliber, high velocity rifles before the Powell Board.

II

M-14 Rifle Development

The difficulties being encountered by General Wyman in attempting to get an improved rifle were the result of the AR-15 coming in conflict with the arsenal developed M-14 rifle.

The Ordnance Corps had been developing a .30 caliber (later 7.62mm NATO) rifle in-house to provide automatic fire for the individual soldier since the end of World War II. It had spent many millions of dollars in the process. These weapons had failed user tests because of poor designs. Finally, with the threat of the small-caliber high-velocity, lightweight rifle and the embarrassment of having forced the NATO 7.62 cartridge on our allies without having been able to follow up with a rifle to fire it, the Ordnance Corps went back to an earlier T-44 (M-14) rifle design. This weapon was essentially the M-1 rifle automatic fire modification of late World War II mentioned previously.

While the Ordnance Corps was attempting to get the M-14 adopted, General Wyman, the senior user, based on the results of Service tests,*

* Mr Hqs USCOMARC, on results of Service Test and Evaluation of T44/48 (M-14/EN) Rifles, dated 20 June 1956

and experimentation with .22 caliber rifles was strongly recommending to General Taylor, the Chief of Staff, that neither the FN nor the M-14 be adopted. Rather, the Army should await the AR-15 which could be available to be tested in 1958 and to be standardized in 1959. He predicted that the AR-15 would be several times more effective as well as cheaper than either the FN or the M-14 which would be only marginal improvements at best over the standard M-1 rifle. General Wyman set forth his views vigorously in a series of official letters to the Chief of Staff, General Taylor, during 1956-1958. The letters showed a remarkably accurate appreciation of the effectiveness of a low muzzle impulse rifle and its availability date. Much trouble and expense would have been avoided if his advice had been followed. General Taylor replied in generalities.*

M-14 Rifle Adoption

In March 1957, the Vice Chief of Staff informed General Wyman by letter that Taylor, the previous day, had recommended standardizing the M-14 rifle because of the previous standardization of the 7.62mm NATO cartridge and production consideration and the fact that he had been informed it would

*Ltr, General Wyman (CG COMARC) to Gen Taylor (Chief of Staff, Army), Extract dated 17 August 1956.

Gen Wyman ltr to Gen Taylor ltr to Gen Wyman, dated 29 Aug 56

Gen Wyman ltr to Gen Taylor, dated 18 (?) September 1956

Gen Wyman ltr to Gen Taylor, dated 7 March 1957

Gen Taylor to Gen Wyman, dated 5 February 1958

(Undated) 1957 Gen Palmer (Acting Chief of Staff, Army) to Gen Wyman

take more than five years to develop a lightweight weapon. Wyman then wrote Taylor again urging that no serious production or budget commitment be made to the M-14.*

The following year General Lemnitzer was the Army Chief of Staff. The matter of the adoption of the M-14 came up again because there had been delays in procurement. Lemnitzer, who had backed NATO standardization of the cartridge, strongly reaffirmed the decision.

Initially the M-14 was to be issued in two versions - a "lightweight" (M-14) version and heavy barrel automatic (M-15) version. However, the Army decided to provide all in the M-14 automatic fire version. As finally issued, each weapon, except for two weapons in each rifle squad, had the automatic fire change lever removed; i.e., was issued as a semiautomatic rifle. As engineering principles would indicate and later tests were to prove, the two automatic rifles** in each squad were less effective per rifle than the semiautomatic ones. The user test agency of the Marine Corps recommended against Marine Corps adoption of the M-14 in the automatic mode. It was overridden by USMC Headquarters*** which had not forgotten the lesson of the Johnson rifle.

*General Wyman ltr to General Taylor, dated 15 January 1958

**The automatic version was known as the M-14(M). After the 1962 rifle tests, this was replaced by the M-14A1(USAIB) which later tests were to show also was less effective than the M-14.

***USMCIFDC, "Test of Infantry Wpns - Proj. 44-57-03" with one enclosure, dated 26 Aug 59; Hqs Schools Demonstration Troops, MCS, Quantico, "Test of Infantry Wpns, dated 19 Mar 59.

USMC Landing Force Development Center, "Extension of Test of Infantry Wpns (Proj. 44-57-03), Rpt of." with enclosure, dated 29 December 1959

The Resulting Weapon

The M-14 rifle that was adopted by the Army and the Marine Corps, at a development and procurement cost of about a half a billion dollars not including ammunition, actually was the M-1 rifle of World War II with a short stroke gas piston, an automatic fire sear and removable change lever, and a 20-round box magazine in lieu of the 8-round clip. It was more fragile and generally less accurate than the M-1 rifle because the barrel and wood were slimmed down in an attempt to keep the weapon within the weight of the M-1* and because of the addition of a fragile combination flash hider and muzzle brake. In addition, because of the fragile stock and the need to cut off the gas system and add a grenade launching attachment, the M-14 was not very effective for launching rifle grenades. The Army eliminated its requirement for launching grenades from rifles, although during the period the Ordnance Corps had developed a new (and unreliable) rifle grenade. The elimination of M-14 rifle as a grenade launcher, in turn, required the development of the LAW (a disposable tube-launched hand-held antitank weapon**). The Marine Corps, for its part, insisted that the Army provide it with a grenade launching attachment for use with its foreign-procured Energa grenade. The lack of an effective

*The weapon system weight of the M-14 is greater than that of the M-1 because of the weight of the magazines. The empty weight of the two rifles is about the same.

**This weapon also turned out to have reliability problems.

grenade launching capability in the M-14 was to lead to avoidance of
ing of the grenade launching capability of the AR-15 in Army tests. It
also led to the need for the M-79 antipersonnel grenade launcher as a separate
weapon. The adoption of the M14, to replace the M1 rifle and the carbine also
resulted in many additional men having to be armed with pistols because
the M-14 was, in fact, too heavy and bulky to replace the carbine.

Nothing positive was achieved by adopting the M-14 rifle in lieu of
the M-1 rifle at great expense to the taxpayer and delay in getting a
better weapon. There already were more than enough M-1 rifles in good
condition in the Army inventory, the M-1 was as good as the M-14, and the

automatic version M14 was not as effective as the BAR it replaced (or as
the semiautomatic M14).

Moreover, if it were useful to have an automatic fire M1 rifle with
a box magazine chambered for the NATO round (an M-14), this could have
been obtained by a modification of the existing M-1 rifles at a fraction
of the cost. There were plenty of M-1s in good condition in the in-
ventory (more had been manufactured for the Korean War). The Beretta
Company in Italy has made 200,000 such conversions as have others.*
Attempts by NATO to consider converting M-1 rifles to M-14s was ef-
fectively stalled by an ex-arsenal civilian (Mr. Bell) in DDR&E armed
with information provided him by the Office of the Chief of Ordnance
(Mr. Bonkemeyer and Mr. Cosgrove) and others.** Tests of the conver-
sion were suspended, until the M-14 procurement was completed, and
then cancelled.*** ****

* Apr 1963, Gun World, "The M1 'Grows' to M-14."

** Memo for SACFUR, "M-1 Garand Rifle Modification and Demonstration Tests,"
dated 30 September 1959

*** Office Chief of Ordnance (Bonkemeyer/Cosgrove) FACT SHEET, "Beretta
Conversion of M-1 Rifle to 7.62mm" dated 28 Oct 1959

**** 22 April 1963, Memo to Gen Hamlett, "Modernization and Standardization

AR-15 Rifle Testing and Evaluation

During the same year that the Ordnance Corps and proponents in the Army staff were promoting adoption of the M-14 rifle, the AR-15 (M-16) rifle was given concurrent Engineer Test by the Ordnance Corps and Service test by USCONARC's Infantry Board. It also was evaluated in an extensive user field experiment at the new USCONARC Combat Development, Experimentation Center at Fort Ord, California, and given an Arctic test in Alaska. Finally, a rifle board of user General Officers was convened at CONARC headquarters to decide on the caliber of the future rifle.

The Engineering and Service Tests

In the Engineering Test* at Aberdeen, the AR-15 was subjected to special tests of firing the weapon with water in the barrel. As slightly modified, the test data showed the weapon was safer under this condition than .30 caliber weapons and that this was not a significant danger with any weapon. However, this was not noted in the report. The Office of the Chief of Ordnance then sent a message to the Infantry Board warning it that the weapon was unsafe because of the "capillary action" of the small bore and instructing it as to how to put water in the barrel. (With the AR-15, it had to be forced in while with the M-1 or M-14 it would run in.) The Engineering Test was reviewed and signed by Wm C. Davis.

* 3 February 1959 (25 Feb 1959), D&PS, Aberdeen, "A Test of Rifle, Caliber 22 Apr 15; Rifle, Light-Weight Military, Caliber .224; and Pertinent Ammunition"

In the Service Test* the Infantry Board found the AR-15 significantly more effective than the M-14 and stated that if there was any problem of water in the barrel that could not be corrected it wanted the weapon anyway.** As in all of the tests of this series, the AR-15 also showed outstanding reliability. The Engineer Test also showed the AR15 to be much superior to the M14. However, Mr. Bonkemeyer in the Office of the Chief of Ordnance directed Aberdeen to split the data into separate reports so that the resulting report on the AR15 appears as though no comparison testing had been done. This avoided a comparison that was unfavorable to the M-14.

The water-in-the-bore safety deficiency of the AR15 was to be alleged for several years. LTC DeBrocke, the M14 and rifle project officer in the Office of the Chief of Research and Development (OCRD), was to carry an AR15 with a blown up barrel around the Pentagon for several years as the weapon he showed to any civilian official who expressed interest in the AR15. The baselessness of the water-in-the-barrel deficiency since has been shown in the more extensive use of this weapon in combat in swamps and water submergence conditions, as a result of the Vietnam War, than any other weapon in history.

*USA Infantry Board, "Report of Project 2787. Evaluation of Small Caliber High Velocity Rifles - Armalite (AR-15) (U)," dated 27 May 1958.

**USA Infantry Board, "Supplemental Report of Project No. 2787, "Evaluation of Small Caliber High Velocity Rifles - Armalite (AR-15)," dated 13 August 1958.

The Combat Development Experimentation Center Field Experiment

The Combat Development Experimentation Center (later Combat Development Command Experimentation Center) report* concluded, based on an extensive field experiment that a 5-to 7-man squad armed with the AR15 would be more effective than an 11-man squad armed with the M14.

The Arctic Test

The Arctic test** concluded that the ammunition for the AR15 would blow off the target with side winds at cold temperatures and that caliber .25 was the smallest caliber that would be suitable for Arctic use. (The Arctic test was completed during the Powell Board proceedings and the .25 caliber word came from there.) The test data show that no tests were conducted under Arctic temperatures and that the ammunition used was the Winchester .224 ammunition, not that designed for the weapon. (A later test at Arctic temperatures with side wind, conducted independently by Special Forces, did not encounter this problem.***). During the test Mr. Stoner visited the test site and found the front sight brackets of the AR15s loose (pins to be disassembled only at the factory

*USACDEC, "Rifle Squad Armed w/a Lightweight High-Velocity Rifle (CDOG, CDEC 58T9) - Final Report", dated 30 May 1959.

**USA Arctic Test Board, Report of Project N. 2707, dated 17 April 1959, (Arctic), Evaluation of Small Caliber High Velocity Rifles (DA Project Nr. 502-03-006; RDB Tech Obj LC-3)" with one attachment: 9 June 1969 COMARC letter to OCRD, same subject.

***7th Special Forces Group, 1st Special Forces. Exercise Great Bear. Ft. Richardson, Alaska. Letter, dated 9 February 1962, Major Faistenhammer, Jr., Commanding to Lt. Col. O'Rourke, "Combat Development Items for Test in Exercise Great Bear.

had been driven out and replaced with wire);* and no tests were conducted of caliber .25 cartridges. Moreover, the data show that of the M14, M1, BAR, and AR15, the latter was the only weapon which would function at all at very low temperatures.

The Powell Board

In view of the M14 rifle controversy, General Trudeau, the Army Chief of Research and Development, in November 1958 convened the "Powell Board" of General Officers at Ft. Monroe to recommend the characteristics of a rifle to be standardized and procured on which all could agree. Trudeau was confident that he could manage the Ordnance Corps if he and the users Generals could agree on the caliber of the rifle to be developed. However, his convening letter prohibited the board from selecting a .223 caliber cartridge on the grounds that a rifle with that small a bore would be unsafe with water in the barrel (the inaccurate Ordnance claim). After conducting hearings and interviews, the Board concluded that if it were not permitted to choose a caliber .223 rifle, it wanted the closest caliber cartridge to the .223 that it was permitted to have and that the Ordnance Corps would supply. (This according to Ordnance was .258 caliber). The Board went along with M14 production on a temporary basis only, "if warranted" and recommended an all-out effort to develop and adopt a small caliber high velocity lightweight weapon. It found that the M14 represented, at best, only a marginal improvement over the M1; therefore, the M1 should be retained until such time

*15 September 1962, Letter from Mr. Stoner (designer of AR-15) to Mr. Macdonald, "RE: Arctic Tests of AR-15 Rifle" w/o incl.

as it could be replaced by the light weight rifle.*). Ten copies of the overall report were prepared. In 1963, the Army Staff collected and apparently destroyed most of these when the document came to the attention of the Secretary of the Army and the Secretary of Defense.

The caliber .258 cartridge agreed to by Ordnance is the caliber that the Arctic Test Board test report found to be the only caliber suitable for Arctic use, without having tested it.

During the hearings, Colonel René Studler, who had recently retired as Chief of Small Arms in the Office of the Chief of Ordnance and now was employed by Winchester, testified against small caliber, high velocity rifles. He did this as the official representative of Winchester although Winchester supposedly had provided a serious candidate in the lightweight rifle competition. Studler's last responsibilities in Ordnance had been the development of the M14 rifle and Winchester became one of its principal producers.

Mr. Stoner was informed of the Board's conclusion that his weapon should be changed to caliber .258, and that the Chief of Ordnance had agreed to provide such a cartridge. Mr. Stoner then went to the Ordnance Corps and asked to be provided with the cartridge. His contact laughed and indicated the Ordnance Corps never had any intention of providing a cartridge.

The controversy that caused the Powell Board resulted from General Wyman, as the Commanding General of the US Continental Army Command and his combat arms generals, as the senior users in the Army, forcefully and properly exercising their assigned function to insure that weapons are provided that the troops need. This resulted in a confrontation with the Ordnance Corps. In this confrontation, the Ordnance Corps was supported by senior officers of the Army Staff and, ultimately, by the Chief

*Report of USCOMARC Board to Review Rifle and Bayonet Problems (U):. (Powell Board), dated 19 December 1958.

of Staff. With the standardization of the M14 by General Taylor, the failure of the Army to heed the advice of the Powell Board, and the retirement of General Wyman, the user-side of the Army was not to assert itself again; the lesson was not lost on the military officers who observed the struggle and saw these able senior user generals shot down. In fact, the traditional user agencies -- the Infantry Board and the Infantry School -- as well as new ones to be created, such as the CDC Infantry Agency and the Assistant Chief of Staff for Force Development (ACSFOR) in the Army Staff, were to become tools of the developer and proponents of the M14. This would occur as the issue shifted from the effectiveness and cost issues of the case to defense of bad decisions already made in the US and NATO, personal prestige, and a struggle of the Army Staff against the civilian leadership as corrective measures were attempted by the later.

Development Time and Costs

The costs of weapons for the previously-described tests were borne by the Fairchild Engine and Airplane Company. At the completion of these tests, the valid modifications indicated by the tests were incorporated, and the weapon system was available to be placed in production from the end of 1959. The cost of developing the weapon, including demonstrating it overseas to a number of foreign governments, was less than one million dollars; and the developing and testing time was about one year. This can be compared with the 12 years and tens of millions of dollars required to develop the M-14 (and its predecessor designs) in-house. About this time, with the approval of the State Department, 1,250 AR-15s were sold to the Indonesian Government where they were used in combat against insurgents, and 25 to the Royal Malayan Police for a like reason.

AR-15 Royalties

During the testing period, the Fairchild Company divested itself of the Armalite Division because of financial difficulties within Fairchild. The Cooper-Macdonald Company provided financial support for the inventor and his engineers and arranged for Colts to acquire the rights to manufacture the weapon and for Remington to manufacture the ammunition. In return, Cooper-Macdonald was to represent the weapon to the US Government and Asian countries. A royalty agreement provided for a $5\frac{1}{2}\%$ royalty on the net selling price of each rifle. Fairchild, as the licensor, receives 4.5% (part to the inventor) and Cooper-Macdonald, as the finder and for other services, 1%.

Roles of Cooper-Macdonald and Colts

Under this arrangement, Cooper-Macdonald provided the technical, tactical, and marketing skills, and gained the experience, in representing the weapon system in tests and demonstrations to the US military, ARPA, and abroad. The representation to the US Army, as it will be seen, entailed considerable risks: both as to the possibility of selling a weapon that the Army did not want and the possibilities of retaliation that could effect future business with the Army and with the Government. Colts, on the other hand, had neither developed the weapon nor was it for some time to have any expertise in the tactical or technical aspects of its

representation or in marketing. It gained the experience of putting the M16 into production, against Army opposition, and of expanding its production base over the years from a few hundred weapons to eventually 50,000 per month. In 1965, at the point where the weapon system basically had been sold, it severed its representation arrangement with Cooper-Macdonald.

Armalite Incorporated

When Fairchild divested itself of its Armalite Division, the valuable assets -- the AR15 and Stoner -- were separated, and a Mr. Sullivan and Mr. Dorchester kept the remaining company that was little more than the name Armalite. In 1963 Armalite attempted to sell the rights to Pakistan to manufacture the AR16.* This, essentially was an undocumented handmade prototype "punch press" 7.62mm (NATO) weapon designed by Stoner before he left Armalite. Later Armalite developed the AR18, a 5.56mm version of the AR16, which it tried to sell in competition with the AR15, trading on the similarity of names. In 1963 Armalite received potential backing of Texas oil money and the cooperation of Vice President Johnson's office, and later President Johnson's office. In 1965 it made a deal with Lockheed and Honda of Japan, to manufacture the AR18 in Japan if orders could be found. In 1965-66 in the SAWS tests to be described, the Armalite submitted several copies of AR18s in a then underdeveloped prototype form for limited testing. More recently it has been competing with Colts to establish factories for host countries in Singapore (where Colts has won out), Brazil and South Korea.

* Memo for Mr. Bundy (ISA) from Schwebe, "Rifles - Pakistan" w/o encl

CHAPTER V - AIR FORCE AND ARPA

I

1960 Army Engineering Test for Air Force

With the adoption of the M14 and the aborting of the recommendations of the Powell Board, the AR15 was dormant in the US until 1960. At that time, General LeMay, Air Force Chief of Staff, who was personally knowledgeable of small arms, became interested in the AR15 for the Air Force. He prevailed upon General Trudeau to direct the Ordnance Corps to conduct an Engineering Test of the AR15 as modified in 1959 after the 1958-59 Army tests. The test* was conducted by Development and Proof Services at Aberdeen, without any control or comparison weapon. However, when compared with identical standard engineering tests of the M14 and other weapons, the data showed the AR15 to be more effective than the other weapons. The data also show the AR15 to be the most reliable light automatic rifle ever tested in the standard light automatic rifle test. The consistently outstanding performance of the AR15 in reliability and functioning under adverse conditions, reflected in these tests and in the ARPA field test in Vietnam to be described, were in sharp contrast to the later reliability of the weapon system after the Army was to change the cartridge propellant.

*Development and Proof Services, Aberdeen, "Report on Test of Rifle, Caliber .223 AR15. Report No. DPS-96, dated November 1960.

Initial Air Force Attempt to Adopt the AR-15

Based on this evidence and additional testing accomplished by the Air Force,* General LeMay requested authority to procure the AR-15 as the basic arm of the Air Force. It would replace the carbine as the basic arm (the Air Force had rejected the M-1 and the M-14 as too heavy for its purposes). In addition, it would replace submachine guns, as well as some .30 caliber machine guns used for airfield defense. However, the request was submitted to the Hill too late in 1961, and the Army was able to block the Air Force request in the Office of the Secretary of Defense in the first part of 1962.

Report of the Ad Hoc Group on SALVO Weapons

While the Air Force was attempting to adopt the AR15 and the Vietnamese Government and Chief of the MAAG in Vietnam were preparing to request AR15 weapons through ARPA for evaluation, a DDR&E advisory panel on Ordnance concluded in its report.**

The Office of the Chief of Ordnance has stopped its investigation of small caliber (.22 and .25) conventional rifles, and the Army indicates no further interest in them. The Group concurs in this position, as the members feel that any improvement over 7.62mm (or .30 caliber) rifles can be properly classed as only marginal.

*USAF Marksmanship School, Lackland Military Training Center (ATC), "Evaluation of the Colts - ArmaLite AR15 Automatic Rifle, Caliber .223", dated 22 September 1960. The training test showed that the AR15 produced the most experts and the most qualified marksmen, the carbine next, and the M14 last.

** DDR&E "SALVO Weapons". Report of the Ad Hoc Group on SALVO Weapons, Advisory Panel on Ordnance, Transport and Supply, ODDR&E, dated 1 May 1961.

The Panel included Rene R. Studler (Chairman), Yates (Secretary), and was assisted by Melvin Bell. Special thanks for cooperation were extended to Fred Carten and Ames Bonkemeyer of the Office of the Chief of Ordnance.

II

The ARPA Field Test

In 1961, with the advent of Project AGILE (RDT&E assistance to indigenous forces in Southeast Asia), one of the initial projects jointly requested by the South Vietnamese Government and the US Chief of MAAG Vietnam was the provision of AR15 rifles for test in Vietnam. They believed that the light weight, high fire power, and low-recoil of this weapon would be advantageous for the small statured ninety-pound Vietnamese troops in jungle war. The Vietnamese were armed with the heavy recoil .30 caliber M1 rifle, the 21-pound Browning automatic rifle, and the Thompson submachine gun. They also had the US M1 carbine.

After successful test of 10 rifles, in September 1961 the Chief of MAAG requested the provision for several thousand rifles for combat testing.* **

Opposition of Admiral Felt and General Lemnitzer

Admiral Felt was against the provision of the AR15 for test. He was advised by Army officers on his staff and by the Department of the Army that the weapon had deficiencies that would extend to two years the production

* DA IN 141474, dated 16 August 1961.

** DA IN 149139, dated 11 September 1961.

lead-time, that the AR15 would cost as much as the provision of new M14s, and that the carbine was an available, cheaper and better weapon. (He also was opposed to ARPA's Project AGILE operating, even indirectly, in his command area and not enthusiastic about providing support to land force activity in Vietnam.)

After repeated urgent request, and delayed responses from CINCPAC, the Chief of MAAG, LGen McGarr, sent a request to the Secretary of Defense direct with copy to Felt and to ARPA.* This message was held up and not distributed to the SecDef by a Navy officer in the Joint Staff. After several months delay, in early December 1961 ARPA recommended, and the DepSecDef approved, the procurement of 1,000 AR15s and their provision to Vietnam for test.** The weapons that Felt had been advised could not be procured for two years, together with ammunition and repair parts, were contracted for, procured and in Vietnam within 53 days of Mr. Gilpatrick's approval.

*18 August 1961, Chief MAAG message (DA IN 141474).

11 September 1961, Chief MAAG message (DA IN 149139)

15 September 1961, SecDef message to Chief, MAAG, Vietnam.

22 September 1961, State/Defense message to the US Embassy, Saigon (State/Defense 337).

24 September 1961, CINCPAC to DA. (DA IN 154247).

29 September 1961, DA TO CINCPAC (DA IN 903365).

9 October 1961 DA to CINCPAC, (DA 983914)

20 October 1961, Chief MAAG to SecDef and others (DA IN 163724)

20 October 1961, CINCPAC to Chief, MAAG (DA IN 163856)

2 November 1961, CINCPAC to USARPAC (DTG 022120Z Nov)

(Footnotes continued next page - 37A)

(Footnotes continued from preceding page - 37)

17 November 1961, Chief MAAG to CINCPAC (DA IN 174086)

23 November 1961, CINCPAC to MAAG (DA IN 177042)

1 December 1961 CINCPAC to Chief MAAG

7 December 1961 Chief MAAG to OSD (DA IN 181318)

DDR&E memo for Director ARPA, subj: AR-15 Rifles for Test in SE Asia, dated 11 December 1961.

**DDR&E memo for SecDef, subj: AR-15 Armalite Rifles for Test in SE Asia, dated 7 December 1961.

During visits to Southeast Asia, General Lemnitzer opposed the testing of the AR15 to determine its suitability for use by the Vietnamese, and he and Admiral Felt insisted on the inclusion of the M2 (automatic) M2 carbine in test. After a visit to Thailand, the Chief of MAAG there sent him a message saying that in view of General Lemnitzer's views expressed to him about the AR15 he had disposed of those he had requested for test.

At the third Secretary Defense Conference in Hawaii in March 1962, Lemnitzer and Felt objected to the Secretary of Defense to the field testing, then underway.*

The ARPA Field Test Report

The test-report** was submitted in July 1962. It covered a comparative test of the AR15 with the M1 rifle, BAR, M1 carbine, Thompson submachine gun, and (added during the Test), the M2 carbine, for suitability for use by the Vietnamese. The test was a combination Service test and combat troop test. It was conducted by an officer supplied by the MAAG in cooperation with Vietnamese officers, using Vietnamese troops. The report concluded that the AR15 was capable of replacing to advantage any and all of the tested weapons. It recommended that the AR15 be considered for adoption by units operating in the jungle for extended periods. The combat portion of the test produced lethality data, with photographs, indicating that the .223 caliber bullet was producing extraordinarily lethal wounds. Cases were reported of deaths occurring from wounds, such as a hit in the buttocks or in the arm, that with other weapons would not normally be fatal. These

*March 1962 Memo for SecDef from DDR&E (Brown), "Fact Sheet Item 3, Para 29, Third SecDef Conference" w/1 Incl.

**31 July 1962 - Res and Dev Field Unit, ARPA, OSD (VI), "Report of Task No. AR-15 (G)" w/1 Atch.

results were from the AR15s with the 1 turn in 14 barrel rifling twist and the original ammunition. As will be seen, in resisting the adoption of the weapon, the Army was to change this barrel twist as well as the bullet shape in ways that would reduce expected lethality.

General Wheeler also received information on the reports of the unusual lethality of the AR15 weapon system from a trusted source.*

General Harkins' Request for 20,000 AR-15s

Based on the test report, in October 1962 General Harkins, who had succeeded Lt General McGarr in Vietnam, requested that he be provided 20,000 AR-15 rifles through MAP to equip ranger and special high priority units.** *** The request ultimately was denied because the JCS under Army and International Security Affairs' (ISA) pressure disapprove it.**** Admiral Heinz, the International Security Affairs' Regional Director, admitting his responsiveness to Admiral Felt, described the AR-15 in an evaluating memo as "just a better mousetrap." The equipping of the ARVN with the AR-15 was not to begin for another four years; and, at that time, it was to be delayed because of a shortage of weapons.

* 19 October 1962, Ltr to Gen Wheeler, Chief of Staff, Army, from Colonel J.H. Moore

** 22 August 1962, Ltr from MAC(V) to CINCPAC and ARPA

*** 19 October 1962, Msg from MACV (Gen Harkins) to DA (Gen Wheeler) and others with correction

**** The SECDEF concurred in the JCS action

III

Air Force Adoption of the AR-15

General LeMay was able to use interim reports of the results of the ARPA test in Vietnam to renew his request to procure the AR15 for the Air Force. Office of the Secretary of Defense authorized him to present his request to a Congressional Committee. Just prior to this on 24 April 1960, in answering a request from Carl Vinson for information to reply to Macdonald who was complaining about the Army inaction on the AR15, the Chief of Army Legislation and Liaison replied with information attempting to discredit Macdonald's letter and supplying some misleading information on the AR15. The letter also stated that the National Rifle Association's magazine would shortly publish an article on the AR15 that should assist Mr. Vinson's office in evaluating the claims of Mr. Macdonald.*

National Rifle Association (NRA)

During the hearings, the Committee was generally divided between those supporting the Army view that the Air Force should not be authorized to procure the AR15, those supporting the Air Force, and those who had no fixed views. In the midst of the hearings, the May 1962 issue of the American Rifleman** was published. It contained a detailed article by retired Colonel Harrison,

*24 April 1962, Letter Representative Carl Vinson to Mr. Macdonald, w/2 Incls.

**May 1962, American Rifleman Article, "The Armalite AR-15 Rifle", by Walter J. Howe and E. H. Harrison.

Ordnance Corps (technical editor of the magazine) and W. J. Howe purporting to prove on the basis of informal "tests" by the NRA staff and technical computations that the AR15 had serious defects that were fundamentally in-correctible. A main contention was that the bullet was unstable in cold weather due to insufficient spin resulting from the 1 twist in 14 inches barrel twist and that both a change in the barrel twist and in the ammunition would be required to correct this.

As will be seen, the allegation that the AR15 bullet would be unstable at low temperatures and that changes would have to be made in the bullet and barrel twist that would reduce its lethality and, therefore, its lethality advantage over the M14 rifle would be eliminated, would soon be "supported" in a Ballistics Research Laboratory study by Mr. Carns.

LeMay immediately provided a copy of the article to the Committee. Because of the known long time use by the Army of the National Rifle Association, and its magazine, for Army policy purposes* the Committee concluded that the article had been planned by the Army and jointly written by the Army and the National Rifle Association Staff. It immediately approved the procurement of the AR15 by the Air Force.

General LeMay withdrew permission for Air Force units to provide transportation for National Rifle Association personnel and teams to national and international matches. National Rifle Association traditionally had enjoyed free Air Force air transportation. A later private admission of fault and plea by the National Rifle Association President to LeMay brought no change while LeMay was in office.

*Under the Army Civilian Marksmanship program, which is supported with appropriated funds, the Army has long supported the National Rifle Association marksmanship program with weapons, ammunition and facilities; and the American Rifleman staff has been dominated by retired military officers.

Adoption of AR-15 by Navy Seals and Sale of Test Quantities Abroad

During this period, as a result of the activities of the Cooper-Macdonald Corporation, the Navy conducted a Service test* of the AR15 for use by its Seal Teams and the weapon was adopted for these units. The weapon also was procured in test quantities by the United Kingdom Far East Land Forces and the Singapore Police, both actions that were to lead to later procurements.

*22 May 1962 - Seal Team Two, Amphibious Force, US Atlantic Fleet, US Naval Amphibious Base, Norfolk, Va. "US Navy Service Test of Automatic Rifle, Colt, Armalite AR-15, Caliber .223; Report of" with 3 Indorsements.

CHAPTER VI - THE HITCH REPORT AND SOME RELATED MATTERS

I

Mr. Vance's Initial Actions as Secretary Army

In the fall of 1962, Mr. Vance, then General Counsel of the Department of Defense, was designated to become the new Secretary of the Army. He had had Office Secretary of Defense staff responsibility for the reorganization of the materiel side of the Army that the Secretary of Defense had requested. In becoming Secretary of the Army he would have general supervisory responsibility over the implementation of the reorganization. He decided to use in case of the Army rifle program as a way to initially assert his authority as Secretary of the Army. He had learned of the AR15 from the ARPA test report and had examined the M14 - AR15 issue sufficiently to decide that he had a valid case. Upon taking up his new duties, one of his first actions was to request the Army Staff to provide him by 1 October 1962 with an analysis of four alternatives, all involving termination of production of the M14.*

The Hamlett Paper

The resulting paper,**prepared under supervision of General Hamlett, the Army Vice Chief of Staff, rejected out of hand any alternative except

*8 September 1962, Memo for Chief of Staff, Army from Secretary Army (Vance) "Rifle Procurement Program" w/1 incl.

**29 September 1962, Memo for Secretary Army from Gen. Hamlett, "Rifle Procurement Program" w/9 Incls.

continued full production of the M-14. The paper gave as its reasons that the AR15 was a special purpose weapon with design deficiencies, that the AR15 had been developed for commercial requirements and that to "militarize" it would be very costly and time-consuming, the M14 was highly effective, that it would upset NATO for the US to change weapons because of NATO standardization commitments, that the SPIW was the best follow-on to the M14, that the ARPA test report was biased and irrelevant, and that the M1 rifle inventory situation was so tenuous that the M1 assets should be considered only an emergency source.

A Consolidation of the Themes

Concerted command opposition to the AR15 began from this date. The allegations of the Hamlett paper became a strategy of resistance to the AR15 and to civilian authority that was raising questions about what was the "Army's business". The allegations of the Hamlett paper, together with specific alleged design deficiencies; e.g., that the weapon had a dangerous "water-in-the-barrel" weakness, that the bullet had insufficient penetrating power and deflected too much in brush, and that the bullet was deflected by wind at cold temperatures, were to be constantly appearing themes. To these later were to be added the equally unsupportable contentions that the bullet was unstable at low temperatures requiring a change in barrel twist that would reduce lethality, that the weapon would have excessive chamber pressure without a change of cartridge propellants, and that the weapon was unsatisfactory without a manual bolt closing device, and others.

Quantitative Requirements

Army statements as to the quantity and adequacy of the M1 rifle assets also were to vary widely over the next several years: they were adequate when procurement of a weapon other than the M14 was concerned and inadequate when recommendations were made for procurement of more M14s.

The SPIW

In the 1950s the John Hopkins Operations Research Office (ORO), in the work previously mentioned, identified 3 promising ammunition concepts for obtaining improved small arms fire effectiveness -- duplex (2 bullets from the same cartridge, .22 (.223 caliber) and flechette. The theory of the SPIW was to seek even lower muzzle impulse and higher cyclic rate than the .223 caliber AR15 by use of a fin stabilized needle-like, very light-weight flechette. At the time of the Hamlett paper the SPIW was only a concept and it was highly questionable that it was within the state-of-the-art. The use of forced engineering development of the SPIW as a tactic to hold off the AR15, was not to be helpful to a concept that should have been deliberately investigated.

II

The Hitch Report

During the first DoD budget review in 1961 of the new Administration, the new Secretary of Defense had directed his new Comptroller to study the M14 rifle program in time for the 1962 budget review. Secretary McNamara's

attention had been attracted to the M-14 program because of Congressional investigations of prolonged production difficulties. As a result, in the early fall of 1962, Mr. Hitch directed that a cost-effectiveness analysis be conducted. Completed by one man in ten days on 27 September 1962, this study* compared, for effectiveness and cost, the M14, AR15, and AK47 rifles using data from an extensive survey of principally Army test literature.

Report Conclusions

The study concluded that the AR15 was significantly more effective than the M14 as well as cheaper; that the Soviet AK47 was more effective than the M14; that the M14 was only marginally superior, at best, to the World War II M1 rifle and BAR system that it replaced, and that, on the data available, the AR15 cartridge was markedly more lethal than that of the M14. The study also showed that data in the test reports did not support Army Staff statements that the AR15 had a dangerous water-in-the-bore problem, that the .223 caliber bullet had stability problems in cross-winds at Arctic temperatures, that the .223 cartridge did not meet Army military characteristics for penetrating power, and that the cartridge was inferior in brush penetration. Finally, the study questioned that useful interchangeability actually existed under NATO standardization. It pointed out that the United States had forced the 7.62mm NATO round on NATO, that not all countries had accepted it and that the Germans had already notified their intention to abandon it.

*27 September 1962 - OASD (C-SA), "A Comparison of AR-15 and M-14 Rifles (Effectiveness and Cost)"

Action of Secretary of Defense

On 5 October 1962, this report* was sent to the Secretary of Defense by the Comptroller with the recommendation that Mr. McNamara treat the report for information at that time because the Secretary of the Army was already examining the Army rifle program. However, the Secretary ignored this advice.

On 12 October, he sent a memorandum** to the Secretary of the Army saying that he had seen certain evidence that the AR15 and AK47 were superior to the M14. He asked for the views of the Department of the Army, the evidence on which they were based, and if the evidence were true, what action was recommended.

*5 October 1962, Memo Hitch to SecDef, "M14 Rifle" w/2 atchms (27 Sept Hitch Report and Vance directive to Army Staff to study several alternatives). Copies of the report also were provided informally to the Army, the Chief of Staff of the Air Force,*** **** and the Commandant of the Marine Corps.

**12 October 1962, Memo for SA from SD, no subject, w/1 Incl.

***17 October 1962, Memo Hitch to LeMay, no subject, w/attachment.

****26 October 1962, Ltr from Gen LeMay to Mr. Hitch

CHAPTER VII - 1962 WORLDWIDE COMPARATIVE RIFLE TESTS

Mr. Vance's response was that he had directed the Army to conduct a worldwide test on the M14, AR15, and AK47 rifles. He would provide the Office of the Secretary of Defense with the results by 15 January 1963.*

The Test List

Under a scheme devised by the Army Staff, the following tests would be undertaken: The newly-formed Army Combat Development Command under IGen Daly would conduct troop tests on a common plan at Ft. Irwin, Cal. (desert), Ft. Carson, Colo. (mountains), Canal Zone (jungle), and Alaska (Arctic). The US CONARC Infantry School at Ft. Benning, Ga. would conduct a special squad test. The newly-formed Army Materiel Command, under Lt General Besson, would conduct Engineering Tests in Alaska and at Aberdeen (D&PS), and a user test at The Infantry Board (The Boards had just been transferred to Army Materiel Command). Army Materiel Command also would conduct a lethality test using live goats. BRL would conduct a study using data from the results of all Army Materiel Command tests. In addition, an abbreviated NATO ammunition interchangeability test was conducted in Seventh Army. The testing scheme was planned and directed by DGen Richardson in the Office of the Deputy Chief of Staff for Plans and Operations (DCSOPS) whose principle project officer was LTC Kopcsak. He

*5 November 1962, Memorandum Secretary of the Army to Secretary of Defense "Rifle Effectiveness" w/1 Incl.

coordinated project officers in the other Army staff sections. These included LTC Debroche in the Office of the Chief of Research and Development (OCD) and LTC Christy in the new Office of the Assistant Chief of Staff for Force Development (ACSFOR). All of these officers were inveterate M14 advocates. LGen Johnson (later Chief of Staff) was the Deputy Chief of Staff for Plans and Operations. There also was close coordination between these officers and the personnel of the former small Army Office of the Chief of Ordnance -- Mr. Bonkemyer, Dr. Carten, and Dr. Cosgrove.

Concurrently, Mr. Vance privately asked Mr. Hitch for permission to task designated analysts in the Comptroller's Systems Analysis Division for personal analytical assistance because there was no analytical staff in the Army Secretariat or in the Army Staff.

Direct Control by Army Staff

The test planning was directed and coordinated by the Army Staff dealing directly with the testing agencies to a degree that the Commanding Generals of Combat Development Command and Army Materiel Command were often by-passed. The only plan of test provided by the Army Staff to Mr. Vance was the common plan for the Combat Development Command worldwide troop tests* As submitted, it omitted testing for the effects of systems weight (fire duration), automatic fire, and grenade launching, areas where the M14 had a decided disadvantage. Mr. Vance succeeded in having these omissions partly corrected.

* 29 October 1962 - Hqs USACIC, "Plan of Test for Comparative Evaluation of AR-15 and M-14 Rifles" with 1 Atch: 31 Oct 62 CDC ltr to Distribution (Test Cmdrs and Agencies, "Comparative Evaluation, AR-15 and M-14 Rifles (U)" transmitting plan of Test).

The new Commanding General of the Army Materiel Command, concerned about the ability of his agencies to conduct objective tests under the circumstances, provided for Cooper-Macdonald to provide technical representatives at the various tests. He also privately consulted with ARPA. However, the Combat Development Command prohibited technical representatives from being present. One result was that it was concealed that a bad lot of ammunition provided by Remington had, in fact, disqualified the results of the Caribbean troop tests. It also was not possible to learn later what had been the fault with the ammunition.

The Army Materiel Command's Infantry Board Test

The Infantry Board, now subordinated to the Army Materiel Command's Test and Evaluation command, concluded in its report* that the AR15 would not be satisfactory until all deficiencies were corrected. (A long list was provided - most of them not substantiated by the report). Even if the deficiencies could be corrected, the weapon would be suitable only as a submachine gun and for special operations roles. The M14 should be retained for the basic rifle role and the M14 (USAIB), a weapon devised by Captain Gosney, the Test Officer, with Army support was superior to the AR15 in automatic fire and should be adopted to fulfill the automatic M14 role. This was the M14 with a straight wooden stock and pistol grip, a strap for holding down the weapon in automatic fire, and a muzzle suppressor. (With no further test

*7 December 1962 - USA Infantry Board, "Report of Project No. 3008, "Comparative Evaluation of AR-15 (Annalite) and M-14 Rifles (U)"

the Army equipped the Infantry with them, 2 per squad, a total of 8,000 weapons.* They were in fact less effective than the M14(Ms) they replaced.)

The Aberdeen Engineering Test

The conclusions of the Engineering Test Report** tended to be ambiguous and noncommittal. The test data show the AR15 to be the superior weapon, but this, as in other test reports, was not pointed out. The civilian test officers, apparently to protect themselves, noted in the report that the M14 rifles selected for the test appeared to be more accurate than typical and that LTC Debrocke of the Office of the Chief of Research and Development had called and directed that they conduct, in a way specified by him, a special water-in-the-barrel test of the AR15 only. The test data showed, that contrary to what had been alleged, the AR15 was slightly superior to the M14 in resistance to deflection in brush. Only one AK47 was used and it was tested separately and superficially so that comparisons could not be made.***

The Arctic Engineering Test

The Arctic Engineering Test was unable to find instability in the AR15 at low temperatures.**** Serious attempts were made to so do. Under daily

*During this period other attempts were made in cosmetic modifications of the M14 to make it appear suitable for roles it could not perform. Folding stock M14 "carbines" were devised, a short barrel M14 "guerrilla" gun was made up for the Army by H&R, and duplex ammunition was standardized without testing or procurement.

**December 1962. Development and Proof Services, Aberdeen, "Report on Comparative Evaluation of AR-15 and M-14 Rifles. Report No. DPS-799".

***December 1962 - Aberdeen Development and Proof Services, Infantry and Aircraft Weapons Division, "Report No. DPS-800. Report on Test of Rifle, Assault, 7.62 Model AK 47, Soviet (J) (Hendricks). 33-001

****December 1962. U.S. Arctic Test Board, "Report of Test of Project No. ATB 33- w/1

pressure from Washington, the tests were moved higher and higher on a glacier to get colder temperatures. However, the persons directing this effort apparently did not realize that the reduction in air density with increase in altitude would tend to offset the effects of decreased temperature! The Arctic testing continued for several months after the conclusion of the Fall 1962 rifle tests in an attempt to prove the instability of the bullet, with no result.* Like other tests of this series, the AK47 was superficially tested and downgraded.**

The Lethality Test

A hasty lethality test was conducted at Edgewood Arsenal using live goats. A report was submitted before the animals had been autopsied, finding that there was no significant difference between the AR15 and the M14 in the wounds observed. An apparent purpose of this report*** was to disprove the lethality observations of the ARPA test report. A special lot of M14 ammunition, with a different bullet construction than the current standard one, that had been flown in for use in the test was discontinued on General Besson's personal order when the Office of the Secretary of Defense informed

*25 January 1963 - Letter Arctic Test Board to CG TECOM "Report of Test of Project No. ATB 33-011, Evaluation of Bullet Stability in AR15 Rifle, w/1 Encl: Semiautomatic Firing Accuracy Data.

**28 March 1963 - Message USAATB, Ft. Greely, Alaska, to CG TECOM, "Report of Test of Project No. ATB 33-011, Continuation of Evaluation of Bullet Stability in AR15 Rifle.

***28 October 1962 - Informal letter report on results of lethality test of AR-15/M-14 Rifles, signed by Col Rafferty, TECOM, LTC Allen, OCRD, Captain Gosney, USAIB, LTC Dawson, CDC, Captain Young, CDC.

him of it. No control was exercised to shoot the goats in comparable places at each range with each weapon. Only one rifle of each type was used except that a different M14 rifle was used at short range than long range without explanation. This much of the lethality test was provided to Mr. Vance and the Office of the Secretary of Defense at the time.

Aberdeen-Edgewood then completed a formal test which included the autopsy reports of the shooting of the goats, the results of gelatin block shooting, and theoretical computations. This report was completed in November.* In January a parallel test was completed using a single AR15 with 1 twist in 12 inch barrel (the barrel twist that Aberdeen was claiming was needed to adequately stabilize this bullet at -65° based on Colonel Harrison's "American Rifleman" article). A test was also conducted with "dum dum" AR15 bullets (bullets with their tips cut off) and of bullets tipped** by aluminum plate before hitting the target. (The Army alleged that the ARPA test results had been achieved with altered bullets. In response

*November 1962 USACRDL, "A Wound Ballistics Assessment of the M-14, AR-15 and AK-47 Rifles (U)."

**10 December 1962 (received OSD 9 April 1963), CRDL paper (Dziemian), "Wound Ballistics Tests with the Tipped AR-15 Bullet (U)" with goat wound charts and photos with one attachment: 9 April 1963 Memo for ASD(C), "Rifle Test Reports" (forwarding one copy of the November 1962 CRDL lethality test report asked for by Hitch on 6 April 1963 after non-receipt on SecDef's request of February for the Fall 1962 test reports). Also, an identical report on 7.62mm bullet, dated 31 January 1963.

ARPA asked for and received certificates* ** from Army officers in Vietnam that the ammunition had not been altered. MAC(V) also sent a message*** that the .223 caliber ammunition had not been altered and that the reported lethality effects were factual.

Although the Secretary of Defense requested the Secretary of the Army to provide him with copies of all of the test reports, the lethality tests reports were not provided to Mr. Vance and the Secretary of Defense until April 1963, after several requests. Therefore, the results of the tests other than the initial goat shoot already described will be treated in a later chapter.

NATO Ammunition Test

The NATO ammunition interchangeability test was a one-day test conducted in Seventh Army on telephone instructions from LTC Kopcsak, DCSOPS.*** Its apparent purpose was to shoot down the questions raised by the Hitch report about NATO standardization. The report concluded that there was no problem. Ammunition from only one lot each of 5 countries was used and in the M14 only. A valid test would have used a larger sample of ammunition and cross-tested it in the several US and NATO weapons. In fact, as will be seen, at this time the US had not succeeded in qualifying any US ammunition to NATO interchangeability specifications.

*16 November 1962, Ltr Mr. Phelps (ARPA) to Col Brooks (ARPA R&D Unit VN) w/1 Incl.

**29 November 1962, Certificate of Major Bartlet. (Also 29 November Capt Scofield and 1 Dec Maj Baldwin).

***December 1962. Hqs VII U.S. Army, "Report of Field Test. Effectiveness of NATO Ammo in the U.S. Army Rifle M-14".

The BRL Evaluation Study

The Ballistics Research Laboratories (BRL) conducted an evaluation study* based on data taken from the reports of the other tests and theoretical computations. The conclusions of the report tend to exaggerate the effectiveness of the M14 and the SPIW and minimize the significance of the AR15, although the data show the AR15 is 4-times as effective as the M14. The report erroneously finds the conceptual SPIW, which it compares as though it were a real weapon, the only rifle of the 3 that is more effective in automatic fire than in semiautomatic fire. Supporting the thesis of the American Rifleman article and laying groundwork for degrading the reliability by changing the barrel twist to 1 turn in 12 inches, the study also concludes that although empirical data are not available, theoretical data indicate that the AR15 with the 1 turn in 14 inches barrel twist would be unstable at -65°F, hedging on at just what temperature the bullet becomes unacceptably unstable and noting that at low temperatures the bullet should become stable in about 100 feet of travel.

This was a pretty tangled web considering that soldiers cannot fight at -65°, the alleged ballistics dispersions due to instability are less than the human tactical aiming errors, the alleged ranges at which the dispersion occurs are so close as to probably be an advantage rather than a disadvantage, and the data are theoretical. None the less, the barrel twist would be changed on this evidence and 2,000,000 rifles, a war, several "reviews" and four years later the decision would continue to rest on the same theoretical data.

* BRL Technical Role 1482. "Comparative Effectiveness Evaluation of the M-14 and other Rifle Concepts (U)" December 1962

TECOM'S Evaluation

Based on its evaluation of the Engineering and Service Tests, the Army Materiel Command Test and Evaluation Command found that the AK47 to be much inferior to the M14; recommended that the AR15 not replace the M14 Army-wide and that the SPIW be placed in expedited development. Fifty copies of the report were provided direct to DCSOPS.*

General Besson's Evaluation

✓ The various Army Materiel Command reports went directly to the Army Staff. However, General Besson made his own report in a letter to the Chief of Staff** which hedged on the reports of his test agencies. He concluded that the deficiencies of the AR15 were minor and correctible, that it was the more effective weapon because of the effects of lighter weight, that if the Army were not already in production on the M-14, the AR15 might have been the better weapon, and that the weapons should be considered for issue to Aberdeen and special forces.

The CDC Troop Tests - The Headquarters Report

On the Combat Development Command side, the results of the tests were confusing because of the haste in which they were conducted. However, much

*12 December 1962. CG TECOM (BGen Ryan) letter to CG AMC (Besson) (letter drafted by Col. Moorman/Mr. Morrow), "Letter Report on Comparative Evaluation of U.S. Army Rifle 7.62mm; Armalite Rifle Caliber .223, AR-15; Soviet Assault Rifle, AK-47".

✓ **21 December 1962, (date on draft), No subject, prepared by Dr. Payne

of the data were salvaged by having CDCEC assist in the integration and analysis of test results of the several reports. The Infantry School, in a confusing report of its squad test, found the M-14 to be superior and the AR15 to be unsatisfactory.* The Headquarters, Combat Development Command report** was waffled, but not clearly favorable to the AR15. There were some reliability problems with the AR15, most of them attributed to one lot of ammunition that was withdrawn during the test. The problems with this ammunition were not described.

General Daly's Evaluation

General Daly, like General Besson, made his personal evaluation of the data by official letter.*** His overall conclusions were similar to those of General Besson. He went further to suggest that the M14 procurement should be slowed and the existing assets be concentrated in NATO, with the AR15 to be considered for procurement for other areas after issue to an assault unit, airborne units, and special forces.

In another letter forwarding the Infantry School report he set aside some of the conclusions as invalid and pointed out that the significant result was that the 6-man AR15 squad has scored as more effective than the 11-man M14 squad.

*20 December 1962. USA Infantry School, "Rifle Evaluation: (Also titled on cover "Evaluation Exercise - December 1962-20 December 1962)" with one attachment: 21 December 1962 Hqs. CDC letter to DCSOPS, "Rifle Evaluations (U)".

**14 December 1962 USACDC, "Comparative Evaluation of AR 15 and M 14 Rifles".

***20 December 1962 - USADC (Lt Gen Daley), "Rifle Evaluation Study".

The Army Staff Evaluation Study

On 9 January 1963, the Army Staff published its evaluation study* of the results of the world-wide tests. It ignored the evaluations of General Besson and General Daly and it drew conclusions that were contrary to most of the data in the various test reports. It concluded that the M14 was the only weapon suitable for Army use. The AR15 was unsatisfactory because of low reliability, poor pointing and night firing characteristics; inability to penetrate both sides of a helmet at -32°F; its adoption would violate NATO standardization and probably impede future standardization; its lighter weight was not a dominant factor; and it would be unacceptable even if its deficiencies could be corrected. It also found that the AK47 rifle is essentially only a submachine gun; foreign NATO ammunition fires effectively in the M14; the M14 (USAIB) is more effective than the M14(M) in automatic fire; a six-man AR15 squad is not actually more fire effective than a larger M14 squad. It recommended continued production of the M14 and that the eventual follow on to the M14 should be the SPIW which should be developed with a procurement target date of 1 January 1965.

It may be noted from this summary of the 1962 rifle tests that the Army Staff dealt directly with the Army Materiel Command and the Combat Development Command test agencies in the planning, conduct, and reporting of the tests; that the conclusions of most of the test agencies and headquarters were

*9 January 1963, DA study made under monitorship of DCSOPS, "A Comparative Evaluation of US Army Rifle 7.62mm, M14, Armalite Rifle Caliber .223, AR15, Soviet Assault Rifle AK-47".

inconsistent with the data contained in the test reports and that these conclusions tended to form a pattern; that both the Commanding General of Combat Development Command and the Commanding General of Army Materiel Command were concerned about the objectivity of their test agencies to the extent that they made separate personal evaluations of the test results and drew conclusions that contradicted those of their test agencies and intermediate headquarters, but that were supported by the test data; and that the Army Staff evaluation study drew on the pattern of unsupported conclusions of the test agencies and ignored the conclusions of the Commanding Generals of the Army Materiel Command and Combat Development Command.

The IG Investigation

As the testing had proceeded, Mr. Vance became increasingly concerned about the objectivity of the test. In December 1962 he directed his General Counsel, Mr. Pierpont, using the Army Inspector General under Mr. Pierpont's personal control, to investigate the Army Staff and the test agencies.* Certain Staff records were impounded and visits were made to test agencies. Among others, Cooper-Macdonald was called to testify before the Inspector General and did so with courage and without consideration for its future business opportunities with the Army.

General Wheeler's New Study and Recommendations

As a result the Army Chief of Staff, Gen Wheeler, immediately conducted his own evaluation of the test report in his personal office. His own evaluation,

*See Ichord HLG Investigating Subcommittee Report of 19 October 1967 for Secretary of the Army's 21 December 1963 directive to the Inspector General.

contradicting the findings of the already published report of the Army Staff, found the AR15 equal to or superior to the M14 in the important qualities and that the AR15 deficiencies were minor and correctible. On 14 January 1963* he recommended to the Secretary of the Army that the Army procure 50-100,000 AR15 rifles for airborne and special forces, continue procurement of limited quantities of M14s, and accelerate development of the SPIW.

The Army Strategy Line

This position was to provide the basis of the Army rifle strategy for the next several years -- limiting of the AR15 to special purposes and delaying its procurement while buying out the M-14. At this time the SPIW was still a paper weapon and its standardization by 1965 was an impossibility. However, it would provide a rationale for not procuring the AR15 as the replacement for the M14.

The Formal Conclusions of the Inspector General's Investigation

With Wheeler's action the Inspector General's investigation was quietly phased down. The part of the report that was published found that the testing of the Infantry Board under TECOM and the Infantry School had reflected bias and corrective action was directed.** Unpublished actions

*Wheeler Memo for Secretary of Army dated 15 January 1963.

✓ **18 March 1963, BOM to Gen Wheeler from SGS, "Report of Investigation on Comparative Evaluation of the M14, AR-15 and Soviet Assault Rifle" w/5 Incls.

included the retirement of one General Officer and the suspension of the personnel of the Small Arms Office of the former Chief of Ordnance from small arms work. The fault was higher up, but Mr. Vance was satisfied that he had made his point with the Army Chief of Staff.

Mr. Vance's Action on the Wheeler Recommendations

On 15 January 1963, the day after General Wheeler made his changed rifle recommendations to Mr. Vance, Mr. Vance sent a memorandum to the Secretary of Defense concurring in General Wheeler's recommendations on the comparative test of rifles.* Thus Vance, technically at least, accepted the Chief of Staff's recommendation to continue procurement of the M14. While Mr. Vance continued for some time to follow through in the case of the AR15 rifle, there are indications that, believing he had made his point as to who was boss, he was less interested in the rifle. This lack of clarity on what the Secretary of the Army had recommended, beyond the procurement of a quantity of AR15 rifles, was to confuse the Army Staff and to encourage attempts to procure additional M14 rifles.

*15 January 1963, Memorandum for Secretary of Defense from Secretary of the Army (Vance) "Comparative Evaluation of the M14, AR-15 and Soviet AK-47 Rifles" w/3 incl: "Rifle Evaluation," 9 January 1963, (DCSOPS report) (Wheeler Memo for SA dated 14 January 1963).

CHAPTER VIII - FROM APPROVAL TO PROCUREMENT CONTRACT
(Jan - Nov 1963)

The main events of this period were the attempts of the Army Staff and the Army Materiel Command to delay the procurement of AR-15 rifles that the Army had recommended. The period also included the Marine Corps' test of the AR-15 and the problem of defective caliber .223 ammunition supplied by the Remington Company. It also saw the development of the Stoner family of caliber .223 weapons, and the uncovering of the NATO ammunition interchangeability problem.

The Sequence of the Procurement Planning Decisions

The Secretary of the Army recommended procurement of 50-100 thousand AR-15 rifles on 15 Jan 1963. On 21 January,* the Secretary of Defense requested JCS recommendations on the AR-15 recommendation and the JCS concurred on 2 February.** On 25 January, he sent a memo to the Army and Navy deferring awards for further contracts for production of M-14 rifles.***

On 13 February, by memo to the Secretary of the Army, he approved the procurement of the Army recommended AR-15 rifles, stating that the use of the aluminum magazine and the 1 turn in 12 inches barrel twist (1-in-12 twist) appeared to be advisable and directing the provision of a production

* Memo for the CJCS, "Rifle Procurement Programs" w/o encl, dated 21 Jan 63

** Memo for SD from JCS (JCSM-99-63) "Rifle Procurement Program" w/o encl, dated 2 Feb 63

*** Memo to SA & SN from SD w/o encl, dated 25 Jan 63. This action, however, did not cancel existing contracts. Involving several hundred thousand rifles, these continued for about a year until they were completed. The suspension of further contracts was a courageous action. However, the continuation of the procurement wasted over a hundred million dollars and provided the Army with enough M-14s to continue to resist the acquisition of a better system.

base adequate for the requirements of all Services and General Harkins.* The weapon was to be produced in a single configuration, modifications were to be held to a minimum and be concurred in by all Services, and the weapon designer, Stoner, was to be consulted in any changes to the weapon system - instructions that were to be ignored by the Army. The Army would be the procurement agent for all Services (the Air Force had been procuring the AR-15).

On 11 March, he asked the Army for an ammunition standardization and production plan and directed that the ammunition be standardized within the design parameters of the AR-15 weapon/ammunition system. This latter instruction was not followed as will be seen. On 22 March, with indications that the Army was speeding up the disposal of M-1 rifles and generating requirements for M-14s in foreign countries, the Secretary of Defense prohibited the extension of the M-14 weapon system to new areas.** On 5 April, the Secretary of the Army forwarded a production base plan for 85,000 rifles for the Army and 19,000 for the Air Force for FY 64 and 35,000 for the Air Force for FY 65.*** Attempts**** in April and May# to obtain anticipated requirements on which a more adequate production

* Memo for Secretary of the Army from Secretary of Defense, "Rifle Procurement Program (U)" w/encl (missing), dated 13 Feb 63

** Memo for Secretary of Defense from Hitch "Small Arms Programs (C)" w/1 encl (missing), dated 22 Mar 63

*** Memo for Secretary of Defense from Secretary of the Army (Vance), "Standardization and Procurement of the AR-15 Rifle" w/tabs, dated 5 Apr 63

**** Memo for Mr. Bundy (Dep Asst SECDEF(ISA) from Mr. Davis (Dep Asst SD(I&L)), "Estimate of ISA Rifle Requirements" w/o encl, dated 26 Apr 63

Memo to Secretary of Defense from Hitch, "Production Base Planning" w/1 encl, dated 10 May 63

base could be made were unavailing. The Army Chief of Staff* and ISA supported JCS in recommending against the 20,000 AR-15s for General Harkins, and the Marine Corps** was reluctant to state requirements for the AR-15 in the face of Army opposition. In addition, ISA declined to state its future requirement for rifles for Allies, MAP, or foreign sales. The failure to lay down an adequate production base at this time was to greatly increase the cost of procuring the M-16 and to delay its issue to Allies in the Vietnam War.

In May, the Secretary of Defense announced before a Congressional committee that no additional M-14 procurement was planned. Prior to this time, the Secretary of Defense instruction had been only that new procurement was suspended.

On 27 June, the Secretary of Defense acted on the rifle production base plan.*** With a rapidly produced Army list of alleged deficiencies requiring modifications, he required the submission by 3 July of modifications concurred in by all four Services as absolutely essential, continued the joint Technical Coordinating Committee, asked for a schedule of actions to procure, and required monthly progress reports. On 9 July,

* The Chief of Staff and the Secretary of the Army had different positions on the provision of AR-15s to General Harkins as expressed in a paper provided to OSD by Mr. Vance.

** Memo for Secretary of Defense from Secretary of the Navy, "Rifle and Ammo Production Base Planning" w/2 encl, dated 20 May 63

*** Memo for Secretary of the Army from Secretary of Defense, "Action on Rifle Production Base Plan" dated 27 Jun 63

the Secretary of the Army replied to the Secretary of Defense's 27 June memo providing a list of agreed modifications and stating that the bolt closing device was essential, although the other Services disagreed. He recommended a schedule of testing this modification that would delay procurement.* On 26 July, the Secretary of Defense approved the modifications with the exception of the bolt closing device for which he authorized further experimentation without holding up procurement actions. On the barrel twist (1-in-12 versus 1-in-14), he asked for a redo of the fall 1962 lethality tests. He designated Deputy Assistant Secretary of Defense (I&L), James Davis, as his representative in this and other AR-15 weapon system acquisition matters.**

Two months later, on 12 October 1963, the Secretary of the Army reported that two modifications remained to be settled: the bolt closing device and an inadvertent fire (ammunition primer sensitivity) problem. The other Services did not agree as to the need for the bolt closing device. He recommended tests of the modifications and further delay of procurement until about 20 December.***

On 25 October, the Secretary of Defense directed that the Army test the two modifications while initiating all planned procurement at once. He authorized the Army to procure its weapons with the bolt closing device

*9 July 1963, Memo for Secretary of Defense from Secretary of Army (Vance) "Action on Rifle Production Base Plan (U)" w/5 incls.

**26 July 1963 - Memo for SA from SD, "Action on AR-15 Rifle Modifications (U)" w/1 Incl.

***12 October 1963, Memo for Secretary of Defense from Secretary of Army (Vance), "AR-15 Rifle" w/3 incls.

(thus contradicting his previous instruction that there would be only one weapon configuration) and directed the Army to procure the Air Force weapons without it.* He acted on the advice of his staff who pointed out that this was the third slippage; and that, unless the contract was let by 1 November, the Colt production line must shut down. November also was the date a decision must be made to reorder M-14's or let the line run out, and the Army would pressure to keep the M-14.**

On 8 November, Mr. Vance reported that the Colt contract had been let on 5 November.*** On 16 December, the Army authorized the bolt closing device in Army procurement,**** and on 23 December the Deputy Secretary of Defense approved the inadvertent fire ammo modification and procurement of the ammunition.# It had taken 8 months to let a contract with a company that was already producing the rifle (nine months for others that already were producing the ammunition) and the "improvements" that had been made in the weapon system in the process would decrease effectiveness and increase costs. The principle alleged deficiencies for which modifications were considered essential by the Army are described in paragraphs that follow.

*25 October 1963, Memo to Secretary of Army, subj: "AR-15 Rifle" signed by Secretary of Defense.

**25 October 1963, Memo for Secretary of Defense from Hitch, "AR-15 Rifle" w/1 Incl.

***8 November 1963, Memo for Secretary of Defense from Secretary of Army (Vance) "AR-15 Rifle".

****30 December 1963, Memo for ASD(C) from ASA(I&L) (Ignatius), "Action on Rifle Production Base", -w/1 Incl.

#23 December 1963, Memo for Secretary of Army from Deputy Secretary of Defense

II

Alleged Deficiencies

The Secretary of Defense's February 1963 decision to approve procurement of the AR-15 rifles quickly produced an Army list of deficiencies for which modifications were considered essential before contracts could be let for procurement. The need for a single rifle that would be useful to all possible future users and the need to deal with Army developed deficiencies led to the SECDEF directive that modifications must be held to essential ones and be agreed to, through a Technical Coordinating Committee,* by all four Services. The Army list, coordinated by Assistant Secretary of the Army (I&L), Mr. Ignatius, included pointing qualities in night sighting, chamber configuration, cold weather stability (barrel twist), inadvertent fire (primer sensitivity), and bolt closure device.

Magazine Malfunctions

Malfunctions were caused during the tests by steel magazines supplied by Colts in lieu of the aluminum magazine designed by Stoner for the weapon. It was agreed to change back to the aluminum magazine.

Night Firing

A modification to improve night firing supposedly was required because of poor "pointing" characteristics resulting from the high sights. The Air Force was assigned the responsibility to correct this deficiency. Its development and testing of experimental modifications showed that the deficiency did not exist and in time the Army let the requirement drop.

* SECDEF required the coordinating committee, which still is in use. However, an attempt to clarify its functions was headed off by the Army Staff through Ignatius. The resulting lack specified functions for the Army Chairman, who also was the AMC Rifle Project Manager, and of specified voting procedure sometimes enabled the Army to manipulate the committee.

Chamber Configuration

This requirement developed from bullets allegedly sometimes separating from their cartridges and sticking in the barrel throat when an unfired cartridge was extracted. To the limited extent this condition existed, probably was due to weakly crimped ammunition provided by Remington. It was not clear that there was any actual design dimensional interference. The Army stated that there was dimensional interference and that there might have to be changes to both the weapon and the ammunition. However, with the other Service members of the Technical Coordinating Committee watching closely, the chamber was standardized on SAAMI tolerances with no harm to the weapon.

Inadvertent Fire

This alleged deficiency resulted from a very few cases in the 1963 Marine Corps AR-15 test (described later in this chapter) where a round fired on closing of the bolt without a loaded magazine in the weapon. This loading of a single round without the magazine was a peculiarity of a part of a Marine Corps marksmanship training course. Moreover, the occurrences were within permissible limits of ammunition specifications. After first attempting to require changes in the weapon, the Army ultimately gained Technical Coordinating Committee approval of an obviously too large decrease, proposed by Frankfurt Arsenal, in the primer sensitivity of the cartridge. This was to cause a high rate of miss fires in production cartridges fired in the AR-15(M-16)* until 1966 when the Army quietly eliminated this ammunition condition in expanded wartime production.

*May 1966. CDCFC, "Small Arms Weapon System (SAWS) Field Experiment".
Two Volumes.

Bolt Closing Device

Soon after the Secretary of Defense approved the Army's request to procure a quantity of AR-15 rifles, the Army Chief of Staff directed the Commanding General of the Army Weapons Command to personally inform the President of Colts, Mr. Scott, that the AR-15 would not be produced while he was in office unless a bolt-closing device was added to the weapon.* By bolt-closing device was meant a feature that would permit the firer to force the bolt closed manually if for some reason the recoil spring did not fully close the bolt. Such a requirement would imply last minute changes in sensitive parts of the weapon. The effect of this action was to put the Army Staff into high gear in devising "deficiencies" that required correction prior to procurement. It also became the principle means by which procurement was delayed 8 months.

No malfunctions had been recorded that such a device could correct and no test agency had recommended it. Other widely used weapon systems - including the US BAR and the FN rifle - used the nonrecoiling operating handle principle of the AR-15. It also could be questioned that manual pressure should be applied to the bolt if the recoil spring does not fully chamber the round; this could make a simple malfunction worse. The AR-15 operating handle design also had other advantages, such as working equally well with left or right handed firers. Finally, the modifications also would violate the Secretary of Defense's instruction that the weapon be procured in a single configuration, unless the other three Services would agree in the Technical Coordinating Committee that the modification should be included.

* Report of Ichord M-16 Rifle Investigating Subcommittee, 18 Oct 68, and others.

When referred to the Technical Coordinating Committee, the other Services strongly opposed the inclusion of a bolt-closing device in the weapon on the grounds that it was unnecessary, might damage the weapon's design, could contribute to malfunctions, and would add increasing cost. Promising test data, which it did not provide, to the Air Force and Colts to support the development and testing of prototypes, the Army directed Colts and Springfield Armory to prepare prototypes. Some were prepared that would weaken the receiver and expose the recoiling parts to dust and mud. After further testing, the other Services continued to reject the modification. Finally, after allowing the Army to delay the Army and Air Force procurement contract twice for further development and testing of the modification, as mentioned previously, the Secretary of Defense required the production to start without it, with the Army authorized to retrofit the bolt-closing device to its weapons. The Army incorporated one of the bolt-closing devices into production about a month later. The Air Force version of the AR-15 was designated the M-16 and the Army version (with bolt-closing device) the M-16E1.*

Events since the 1963 decision to include the bolt-closing device in the Army weapon - the CDCEC field experiment and the extensive use of the weapon in the Vietnam War - have not developed any evidence of the need for this device; and it is possible that it worsened some of the malfunctions that accrued in Vietnam with the change to Ball powder. The device has cost \$4.50 per weapon, or roughly 9 million dollars, to date. This is 4% of the cost of the weapon and about as much as the cost of the royalties.

* Actually the XM16E1, as the Army did not give the weapon a nonexperimental designation until 1967.

Barrel Twist

This alleged deficiency, it will be recalled, originated in May 1962 NRA American Rifleman article and a substudy of the BRL evaluation study of the Fall 1962 comparative rifle tests. The gist of this study was that at temperatures near -65°F the spin of the caliber .223 bullet from the AR-15 1-turn-in-14-inches barrel twist was insufficient to adequately stabilize the bullet in flight through the air. This instability would degrade accuracy to the extent that a 1-in-12 inches twist would be required.

The argument was specious because for reasons given in the preceding chapter. However, it would justify a change of the barrel twist which would degrade lethality relative to the M-14.

It was previously mentioned that a report of a comparative lethality test of the M-14 with the AR-15 with the 1:14 barrel twist was completed in November 1962 and a supplementary report of the AR-15 (1:12 twist) in Jan 1963; and that these reports had been withheld from the Secretary of the Army and Secretary of Defense until April 1963. The full lethality report, when received, showed the AR-15 (1:14) to be slightly superior to the M-14 in lethality at realistic ranges and the AR-15 (1:12) to be slightly less lethal than the M-14.

When the reports were examined in the Office of the Secretary of Defense, it was apparent that the data on firings at live goats had been set aside and largely theoretical data* substituted without this having been made clear, and that the results were sensitive to a number of highly questionable assumptions.

* Gelatin block data inserted into an unverified formula.

For example, the results could be dramatically reversed in favor of the AR-15 if an instantaneous incapacitation criterion rather than a 30-sec delay criterion were used. Based on the Army test there was no way to tell what the lethality of the weapons really was or how much the lethality of the AR-15 actually is degraded by a 1:12 barrel twist, although on the basis of practical evidence it would appear to be large. As a result, in his 26 July 1963 action on rifle modifications submitted to him by the Secretary of the Army, the Secretary of Defense directed that with respect to change in barrel twist, the lethality test be done.

On the basis of this instruction, the Technical Coordinating Committee was scheduled to consider the lethality-barrel twist question on 18 September.* In preparation for this review, BRL (Mr. Carn) submitted a study to the Committee on 6 September.** This study merely repeated the theoretical data and conclusions of the 1962 BRL substudy. On 10 September, just prior to the scheduled Committee meeting, the Deputy Secretary of Defense sent a memo to the Secretary of the Army rescinding the requirement that the Army redo the lethality test.*** The rescinding memo was prepared by Dr. Payne of Systems Analysis. He advised that, on the basis of discussions he had with Dr. Spirazza and Mr. Carns of BRL, the "final report"

*18 September 1963, "Minutes of the Technical Coordinating Committee Meeting AR-15 Rifle and Ammo. Held at Hqs. Army Materiel Command, 18 Sept 63".

**6 Sept, Ltr BRL (Mr. Carns) to CG, USAWpnsCom., "Recommended Twist Rate for AR-15 Rifle (U)" w/8 Incls.

***10 Sept 1963, OSD Memo for SA from SD, "Rifle Lethality Tests",

would take care of most of the problems (It did not). Dr. Payne shortly thereafter became Chief of Operations Research in the Army Secretariat.

The rescinding of this instruction had serious consequences because it signaled to the Army that it could safely adopt the 1-in-12 twist without further questioning by the Office of the Secretary of Defense. It also lost the opportunity to correct serious deficiencies in BRL lethality literature and methodology having broader implications than the AR-15. It resulted in the procurement of several hundred thousand AR-15s with 1:12 barrel twist for the war in tropical Vietnam; and it thereby probably traded off 10 to 35% of the systems lethality at useful temperatures for a 1 mil increase in accuracy at -30° to -65°, temperatures generally too cold for infantry combat. As will be seen in later chapters, several attempts were made to reopen the issue without success.

III

The Marine Corps Test

Early in February 1963, General Shoup, Commandant of the Marine Corps, decided to conduct a test of the AR-15 to determine its suitability for use by the Marine Corps. The two-month test was conducted at Quantico and Lejeune, without Army participation to obtain an independent evaluation and avoid Marine Corps involvement in the Army controversy.*

The report** avoided conclusions and recommendations to maintain the Marine Corps options, although the data and findings showed the AR-15 to be

* General Shoup cited that he well remembered the consequences to the Marine Corps of the Army's retaliation over the Johnson rifle.

** USMC Rifle Board, "Comparative Eval. of M-14 Rifle and AR-15 Rifle, dated Mar 63. A Report of Tests Conducted Feb-Mar 63," w/1 Atch: 10 Jun 63
See Navy Memo for SECRET, "Marine Corps Rifle Evaluation Reports

superior to the M-14. General Walt, then the Director of the Landing Force Development Center and the Test Director, was deeply impressed with the AR-15 rifle - caliber .223 cartridge weapon system. He also became fully aware of the controversy in the Army over the AR-15 and the undercurrents in the Army Materiel Command and its contractors. During the test he met Mr. Stoner and learned of the Stoner 63 family of .223 caliber small arms weapons being developed by Stoner for ARPA. General Walt felt the family-commonality idea had much merit. Also by opting for the Stoner, the Marine Corps could avoid internal Army AR-15 controversy and come up with a weapon family that was "the Marine Corps' own."

The Remington Ammunition Problem

At the outset of the test, the quality of the .223 caliber ammunition provided by Remington made testing virtually impossible. Since he could not turn to the Army, General Shoup requested and received technical assistance from the Office of the Secretary of Defense and the Air Force.* ** Independent tests conducted on coded lots of ammunition - both current lots and lots manufactured in earlier years - at White Laboratories showed that the current ammunition did not meet Remington's specifications as Remington claimed and that the factory technical test data provided to the Office of the Secretary of Defense by Remington on the current lots was erroneous.*** **** # At one meeting, when pressed by two government

* Notes used in mtg with LGen Garrity USAF DCSLOG in his office w/Burdette (Remington), Army representative, and others on the Remington Ammo problem, dated 26 Feb 63, w/2 encls: 25 Feb 63 draft giving general history of the problem and 26 Feb 63 draft giving specifics.

** Memo to General Shoup from Hitch "Ammo for Rifle Test" dated 28 Feb 63

*** HP White Firing Record (2 pages) (Velocity and Pressure Data on Lots A-16-P and A-15-P Cal .223 ammo, dated 14 Feb 63)

**** Memo for General Shoup, no subject, dated 4 Mar 63, no incl. (Follow-up to Hitch memo of 28 Feb. Gives White lab data on the ammo)

USMC Rifle Board, "Comparative Eval. of M-14 Rifle and AR-15 Rifle, dated Mar 63. A Report of Tests Conducted Feb-Mar 63," w/1 Atch: 10 Jun 63 See Navy Memo for SECDEF, "Marine Corps Rifle Evaluation Reports."

officials as to why Remington was providing ammunition that even had visual defects,* Mr. Rurdette of Remington replied that it had been conveyed to Remington that the Army would prefer the .223 caliber cartridge not to succeed. (Remington was a major producer of 7.62mm NATO ammunition for the Government both on its own military lines and as the operator of a government plant, and it sold the cartridge commercially as well.) Pressure had to be brought on Remington step by step to correct the ammunition to complete the test. However, some months later ARPA had to require Remington to replace 375,000 rounds procured for the Stoner 63 weapons' development and testing.

Some unverified difficulties of ammunition a few months previously in the fall 1962 rifle tests and those showing up extensively in the Marine Corps' test now were the first difficulties experienced in 15 million rounds of caliber .223 ammunition most of which were manufactured by Remington. This ammunition had been used in almost continuous technical and tactical tests since 1958 including its use in 1,000 rifles in Vietnam and 1,250 rifles in Indonesia. In the Marine Corps' test, while there were some chamber pressure problems, there were a wide variety of other defects as well. All were the result of suddenly unbelievably bad quality control.

Soon Remington, although partly owned by DuPont, the maker of IMR powder, was to help support the Army's rationale of the need to switch to Ball powder, a change that it was about to make quietly. Remington's interests in manufacturing ammunition for the Army were stronger than whose powder was used.

* Such as variations in bullet size and shape and the wrong cartridge case:

IV

(NATO Ammunition Interchangeability)

The 24 Apr 1963 Study

On 4 April 1963 the Secretary of Defense sent the Secretary of the Army a memo asking for a detailed study of the interchangeability of NATO 7.62mm ammunition.* The requirement for the study, expressed in terms of specific questions to be answered, caused consternation in the Army Staff and in the Army Materiel Command. For several years, Secretaries of the Army and Chiefs of Staff had, as Congressional witnesses, cited as a fact the accomplishment of NATO ammunition standardization and used it as a basis for annual justification of M-14 rifle and M-60 machine gun procurement. In addition, a main Army Staff argument against Army adoption of the AR-15 had been the claimed achievement of NATO standardization which the AR-15 supposedly would upset. Mr. William Davis was one of the Directors of the study. (It will be recalled that he was a Director of the 1959 AR-15 Engineering Test at Aberdeen. He was now at Frankfurt Arsenal. Later he would be the Chief Engineer for the AR-15 at Colts and then Assistant AR-15 rifle program project manager to Colonel Yount at Rock Island Arsenal.) The study was to be submitted by 15 May. It was completed on 24 April and submitted to the Secretary of Defense on 21 June.**

* Memo for Secretary of Army from Secretary of Defense, "Interchangeability of 7.62mm Ammo (U)," dated 4 Apr 63.

** Memo for Secretary of Defense from Secretary of Army (Vance), "Interchangeability of 7.62mm Ammo (U)" dated 21 June 63, w/2 Encl: (1) Final report (2) Answers to questions asked by SECDEF.

General Conclusions

As previously described, in 1952 the US had forced the 7.62mm cartridge on its NATO partners. The study* showed that NATO had adopted the US cartridge, formulated NATO specifications, and designated the US (Frankfurt Arsenal) as the NATO test agency to determine the qualification of member countries' ammunition. However, ten years later the United States had not submitted any of its ammunition for test. In fact, of the several billion cartridges that had been manufactured, it did not possess any NATO-qualified 7.62mm ammunition, although it was now (Apr 1963) near to submitting one cartridge-type for test. Not all lots of US ammunition would interchange satisfactorily even among the US weapons.

The information, but not necessarily the conclusions of the study, also showed that NATO ammunition interchangeability did not exist on more than a limited and unreliable basis at best for several reasons. There was only a limited NATO qualification of ammunition among the several countries,** and France had not agreed to ammunition standardization. Although there were 25 different NATO small arms weapons, and nearly all imposed different requirements on ammunition*** because none had been originally designed for 7.62mm NATO ammunition, only one weapon of each nation was used in determining ammunition qualification. (In the case of

* DA Report made under Sponsorship of ODCSLOG, "Report on Interchangeability of 7.62mm NATO Ammunition" dated 24 Apr 63.

** A few ammunition lots of some ammunition types of some countries.

*** For example, differing hardness of brass for expansion and extraction and differing chamber pressures.

the US, for example, this was the M-60 machine gun.) There were weapons, including the UK BREW gun and the US M-63 machine gun, that could fire only selected lots of NATO qualified ammunition. Finally, the effects of ammunition interchangeability among NATO machine guns were negated because belt links and feed mechanisms had not been standardized.

The Reasons for the Problem

There were several reasons for the lack of NATO qualification of its ammunition by the United States. Initially, the Ordnance Corps had made no effort to do so. US knowledge of how to control the hardness and grain structure of brass, needed to provide cartridge cases that would function in a variety of weapons, was behind the general practice in Europe. The Ordnance Corps had not standardized primers. A fundamental cause was Ordnance Corps' adoption of Ball powder as the cartridge propellant.

Initially, ammunition loaded with Ball powder did not provide consistent accuracy.* After several years when accuracy improved, the Ball powder ammunition could not meet the NATO hot storage criteria -- it could be expected to produce excessive chamber pressures in hot climates. The problem finally was solved against UK resistance by NATO partially relaxing the requirement under US pressure.

Ball Powder

Much of the US problem of NATO qualification of its small arms ammunition stemmed from the Ordnance Corps decision to adopt Ball powder

*(For several years the Marine Corps found it necessary to buy its M-14 ammunition from Canada because the combination of US ammunition and the M-14 rifle degraded its rifle marksmanship training in its East and West Coast divisions unacceptably.)

and procure it exclusively for its small arms ammunition, a decision that it made concurrently with the adoption of the 7.62mm NATO cartridge.*

Ball powder had been invented by an Ordnance employee who took the process to Olin Mathieson where it was patented. A major advantage of the process was that it could use salvaged IMR powder as part of its chemical materials, and it was safer and easier to handle in the manufacturing process. However, Ball powder was not sufficiently developed at this time it was adopted (or some years later). In addition, in adopting Ball powder on a sole source basis from Olin Mathieson, the Ordnance Corps dealt all other US companies out of the military small arms powder business.

The General Accounting Office investigated and found that, under the sole source arrangement, the Ordnance Corps was allowing Olin to overcharge the Government. It directed the Army to recover several million dollars. The Ordnance Corps, having close ties with Olin, off-set the effect of the order by supplying the latter with free salvage IMR powder until IMR powder sources ran out in about 1967. The defensive reaction of the Ordnance Corps to the questionable decision to adopt Ball powder, and to its relationships with Olin Mathieson, complicated and delayed NATO standardization, because Ordnance would not back off Ball powder and use a more suitable one. The commitment to Ball powder may also have contributed to the later decision to change the propellant in the .223 cartridge to Ball powder, a decision that would seriously degrade the performance of the AR-15.

* US Ordnance had used Ball powder in some cartridges earlier but not exclusively.

Briefing of NATO Small Arms Panel

Although the NATO Ammunition Interchangeability Study was submitted on 21 June, the Army guidance to its representatives to the NATO Small Arms Panel meeting 1-5 July in Paris was to affirm the M-14 as the standard rifle, interest the Panel in the SPIW, and not to mention the AR-15.* Because the other nations were aware of the 1962 Fall test and could observe that the US was, in fact, procuring a quantity of AR-15s, the existing suspicion of duplicity of US small arms policy toward NATO, dating from the forced adoption of the US 7.67mm NATO cartridge, was not alleviated.

M-73 Machine Gun

The Army NATO interchangeability paper also contained a history of the problem with the M-73 at the request of the Secretary of Defense. It showed that this weapon had been adopted in 1958 in a known unsatisfactory condition without test. When adopted, the weapon would function at all only on a single lot of ammunition. It had multiple fundamental design difficulties. In 1963, these still had not been solved and no solution was expected until at least 1965. (It is not clear that a solution has been found in 1970.)

V

The Stoner 63 Weapon System

After the Army had rejected the AR-15 in the period 1958-1962, Mr. Stoner, the inventor of the AR-15, decided to develop a "punch press" family

* Memo to General Hamlett (Acting Chief), "Small Arms Panel Meeting" w/2 encls, dated 23 Jun

small arms weapons in caliber 7.62mm NATO. The system would use materials and techniques especially suitable for manufacture and maintenance in underdeveloped countries. He had despaired of selling weapons to the US Army, and of selling weapons elsewhere in caliber .223 if the Army did not adopt the caliber .223 cartridge. The Stoner 63 family consisted of a rifle, automatic rifle, carbine/submachine gun and machine gun, with commonality of components. He planned to develop the system first in caliber 7.62mm NATO and later a scaled-down version in caliber .223

In 1962, ARPA interested Stoner in developing his Stoner 63 family first in .223 caliber. On 4 March 1963, it contracted for the first 25 machine guns.* It wanted them for AGILE evaluation for possible use of ARVN forces with the AR-15 that already had been tested. Because of the resistance of the Army to the AR-15, ARPA planned to have the Marine Corps test the weapons before sending them to its joint US-Vietnamese test center in Vietnam.

As mentioned earlier, General Walt, the CG of the Marine Corps Landing Force Development Center, (MCLFDC), became interested in caliber .223 weapons during the Marine Corps' test of the AR-15 and he met Mr. Stoner during that test. By the Fall of 1963 firing demonstrations of the Stoner 63 family already were drawing attention in the Services and OSD. During 1964, the MCLFDC, under General Walt, was to test the complete Stoner family of weapons and to become interested in it for the Marine Corps general use.

* 4 Mar 63, Procurement Contract Cadillac Gage Co. - ARPA (25 developmental Stoner 63 MG with accessories, spare parts and ammo).

CHAPTER IX - FROM FIRST ARMY PROCUREMENT THROUGH THE SAWS TESTS
Nov 1963 - Jul 1966

This period saw Senator Stennis inquire into the Army rifle program, the beginning of problems from the Army adoption of Ball powder in the AR-15, General Westmoreland's request for AR-15s (M-16s) in lieu of M-14s for the US forces in Vietnam, and the 1965-66 worldwide Small Arms Weapon Systems (SAWS) tests.

I
Stennis Inquiry

Immediately after the letting of the M-16 procurement contracts, on 3 December 1963 Stennis sent a letter to the Secretary of Defense asking a series of questions about the Army rifle program and why the M-14 procurement had been terminated.* A few days later, he followed up with a request for copies of the Hitch Report, the US Marine Corps AR-15 Test Report, and the DCSOPS 1962 Evaluation Study. (These reports then were SECRET). He also asked if OSD had concurred in all of the Army's rifle program actions.** On 24 July 1964, through a staff member, he asked that the DOD reexamine the validity of the conclusions of the Hitch Report in the light of later testing and, if necessary, to update them.

* Ltr from Stennis to Secretary of Army (Vance), w/o encl, dated 3 Dec 63.
** Ltr Chairman Stennis to Secretary of Defense w/o encl, dated 5 Dec 63.

These requests were partly inspired by elements in the Army Staff seeking a Congressional investigation. However, the inconsistencies among the three test reports were not favorable to the Army. A critical joint review by OSD and the Army Secretariat of the conclusions of the Hitch Report resulted in no changes except to find the lethality of the two weapons equal (rather than AR-15 superior) based on later Army lethality test data.* However, as it will be seen, even on this point the original Hitch Report conclusions were to prove essentially correct.

II

The SAWS Study

In the face of mounting criticism from OSD and the Marine Corps over Army inaction on its rifle program and of Marine Corps interest in the Stoner 63 weapon system, General Johnson, the Army Chief of Staff, in December 1965, issued a directive for a massive Army-wide 18 months long SAWS study with Marine Corps participation.** During the same period, the Marine Corps conducted a troop test of the Stoner 63 system, completing it in January 1966. A major Army motivation for the study was to blunt the OSD and Marine Corps pressure and gain time for the development of the SPIW so as to avoid adoption of either the M-16 or the Stoner 63 systems.

* Ltr McGiffert to Kendall (General Council, Preparedness Investigating Subcommittee) w/1 encl (updating of Hitch Report), dated 12 Aug 64.

** The initial instruction to the Army Staff was dated 12 Nov 65.

As in the 1962 tests, the study would involve the major test and evaluation agencies of the Army Materiel Command, Combat Developments Command (CDC) and USCONARC, as well as overseas commands. The overall study was to be managed by Headquarters, Combat Developments Command with the Combat Developments Command Infantry Agency being its primary coordinating agency. The Office of the Assistant Chief of Staff for Force Development (ACSFOR) had the primary responsibility in the Army Staff. The ACSFOR and his action officer (Lt Colonel Christy) strong elements in the Combat Development Command headquarters, and the Combat Developments Command Infantry Agency acted in coordination and were proponents of the existing Army position of retention and additional procurement of the M-14 pending future availability of the SPIW which should be the follow-on to the M-14. Because of the Combat Development Command Experimentation Center's (CDCEC) independence there was resistance to its conducting a field experiment on the part of ACSFOR and the Infantry Agency.

The major components of the study were AMC Engineering and Service tests, and cost studies; troop tests in Europe, Alaska, Hawaii, and the Canal Zone; a CDCEC field experiment; and an Infantry Agency computer simulation. The Infantry Agency controlled the development of common test plans and test criteria and was responsible for the integration of the final study.* The Infantry Agency also attempted to extend its control over CDCEC experimental design but was unsuccessful.

* Office Chief of Staff, Army, Report "Small Arms Weapon Systems Analysis" dated 18 Oct 66. (Prepared October 1966; edited for publication June 1967) Hereafter, called the 18 October OCSA SAMS Report.

The weapons to be fully tested were the existing 7.62mm weapons, the Colt 5.56mm family (M-16 and a new AR offered by Colts), and the Stoner 63 5.56mm system (rifle, AR, MG). The SPIW and certain conceptual weapons devised by the Ballistics Research Laboratories (BRL) were to be evaluated without testing. SPIW was not to be tested (although 20 million dollars already had been spent on its development, officially for planned standardization in 1965,* and second generation firing prototypes were in existence). Prototype H&R (modified German G-3) and Armalite AR-18 5.56mm weapons were to be given limited military potential testing.**

Results

Much of the test data were useless because of the effects of the guidance imposed by the Infantry Agency for the Engineering, Service, and Troop tests, and the computer simulation. On the one hand, no common definition of effectiveness (measures of effectiveness) was provided. On the other hand, weapons were required to be tested at some ranges that were far longer than those that are usable in combat, a criterion that the Infantry Agency assumed would favor the heavier caliber 7.62mm systems but, in the event, did not.*** Lack of competence of local commands to plan and conduct controlled tests also reduced the value of the data.****

* Changed during the SAWS tests to 4th Quarter of 1968 and dropped from engineering development in November 1966.

** OCSA SAWS Report

*** For example, rifles were tested for their ability to erode concrete at 1000 meters and machine guns were tested at 1,500 meters. In Alaska it was necessary for the test command to build parapets to elevate firers to see the prescribed ranges over flat terrain and in Hawaii it was necessary to fire out to sea!

**** OCSA SAWS Report

Through TECOM notifications to all of the test agencies and test commands, the Stoner machine gun was restricted below a useful tactical firing rate because of alleged cook-off danger, bulky goggles were prescribed because of alleged danger to eyes, and those firing the left-hand ejecting carbine were required to wear a shield on the left arm. CDCEC conducted its own exploratory firing of the test weapons. It found these safety limitations baseless and accepted the responsibility of ignoring them. However, the other test agencies did not. The Army Materiel Command also procured and distributed to the test agencies defective belt links for the Stoner machine gun.*

Engineering Service and Troop Tests

The results of the Engineering tests, Service tests, and troop tests were conflicting and unclear. However, the data generally favored the M-16, Stoner system, and existing 7.62mm system, in that order. US Army, Pacific, US Army, Europe, and US Army, Alaska characterized the tests as inconclusive, US Continental Army Command comments were critical of the test design and conduct, and US Army Test and Evaluation Command found it necessary to caveat the test report of the Infantry Board.**

The Computer Simulation

A computer simulation costing one million dollars was developed and conducted under direct supervision of the Infantry Agency by CARO (Booz-Allen Applied Research), using input data supplied by the Ballistics

* CDCEC, "Small Arms Weapon System (SAWS) Field Experiment" dated May 1966
(Two volumes)

** OCSA SAWS Report

Missile Laboratories. The conclusions of the simulation study came up with the existing Army position that squads armed with the SPIW were the most effective, followed by the 7.62mm weapons, and the 5.56mm weapons, in that order. However, the results offered a number of anomalies. For example, the computer, in fact, ranked the SPIW, in various mixes, from first place to tenth. It was impossible for the computer simulation to be valid for several reasons. The inherent resolution capability of a computer is too gross for small arms combat and for the decision process.

(For example, terrain had to be generalized into 50-meter squares.)

There were other disqualifying problems: for example, all weapons had unlimited ammunition, weapons were 100% reliable, and suppressive fire had no effect on the results. Notwithstanding these an even greater difficulty was that the Ballistics Research Laboratories (BRL) input data provided for the simulation was theoretical, although this was not pointed out. Probability of a-kill-per-trigger-pull (P_K/TP) data, for example, bore little relationship to empirically obtained data for the existing weapon systems and were speculative for conceptual weapons.* During the later Department of the Army review of the SAWS tests, BRL attempted to withdraw from publication the study paper on which it had provided these performance data to the Infantry Agency.**

* OCSA SAWS Report

** BRL Memo Report No. 1764 "Effectiveness of Small Arms Weapon System (SAWS)" dated July 1966

The CDCEC Field Experiment

The purpose of the CDCEC experiment was to determine the relative effectiveness of rifle and machine gun squads armed with the candidate and Soviet weapons.* Ten nine-man rifle squad mixes in each of six tactical situations and four seven-man machine gun squad mixes in each of four tactical situations were evaluated. Squad size, organization, and weapon system weight were held constant. The several tactical situations were designed to be, when taken together, representative of combat. Training and squad personnel selection was controlled; and to balance out differences in light, time of day, changes in vegetation and personnel differences, six squads were fired for each weapon mix in a controlled matrix. Measures of effectiveness were hits as a function of time, near-misses (suppression), and sustainability (fire duration within ammunition afforded by systems weight). Three million dollars of original target instrumentation was used on computer controlled ranges to insure exact replicability of target behavior between runs and accurate recording of results. Targets were designed so that they gave off realistic cues of combat - such as sound, and muzzle flash. The experiment entailed 7,000 man-months of effort in one year. The Infantry Agency and elements in higher headquarters opposed the comparison of the M-14 with the Soviet AK-47 so that the majority of

* US 7.62mm (M-14, M-14A1, M-60MG), Soviet 7.62mm (AK-47, RPD, DPM), Colt 5.56mm (M-16E1, Colt AR), and Stoner 63 (Stoner rifle, AR, MG).

the Soviet weapons and ammunition finally were obtained by CDCEC out of channels from Vietnam. This was the most detailed and scientifically supported small arms field experiment conducted to date in the free world.*

Results

The results of the experiment included the following. Squads armed with the 5.56mm weapons were markedly superior to squads armed with the other weapons. Those armed with the Colt 5.56mm weapons were superior to those armed with the Stoner 5.56mm weapons primarily due to lighter systems weight (greater sustainability). The commonly held view that the M-14/M-14A1** were superior to the M-16 at long ranges, in pointing firing, and in night firing were disproven. Squads armed with the M-14 were more effective than squads armed with the M-14 and two M-14A1's (the current standard squad) and than squads armed entirely with the M-14A1. The latter squad was the least effective of all the squads tested. The Stoner machine gun was potentially as more effective than the M-60 machine gun as the 5.56mm rifles were more effective than 7.62mm rifles; and because of light system weight it was feasible of incorporation in either a machine gun squad or a rifle squad. Lethality considerations, developed in an accompanying study, did not change these conclusions. The lethality study, which included a review and analysis of BRL wound ballistics literature

* CDCEC "Small Arms Weapon System (SAWS) Field Experiment" dated May 1966
(Two volumes)

** M-14 (USAIB)

✓ and a period of years, found as the SECDEF had suspected in 1963, that the BRL methodology was basically defective. BRL did not reply to the draft lethality study* that CDCEC sent it for coordination and neither CDC nor AMC followed up the matter when they received the CDCEC final report.

* Apr 1966, Frankford Arsenal "15th memo Report on XM16E1 (or AR-15) Rifle/Ammunition System. Investigation of Alternate Propellents for use in 5.56MM Ball and Tracer Ammunition"

Reliability

✓ To go back in time for a moment, in June 1963 Frankfurt Arsenal reported in a Technical Coordinating Meeting that in establishing a military specification for the 5.56mm ammunition, some difficulty with excessive chamber pressure might ensue in quantity manufacture of ammunition if an Army proposed muzzle velocity specification of $3,250 \pm 40$ foot per second were adopted. It suggested dropping the muzzle velocity slightly,* pointing out that a 50 FPS reduction should allow a 3-4000 PSI reduction in chamber pressure with a loss of only 13 yards in equivalent terminal impact at 400 yards.** *** It is not clear - even after a Congressional investigation - what happened to the recommendation. However, it was not adopted and the Army proposed muzzle velocity/chamber pressure specification was adopted and adhered to.

The Meaning of the Specification

The Army took the 3,250 PFS nominal muzzle velocity, which the weapon never had had, and converted it into a specification that it knew the IMR powder, for which the weapon was designed, could not meet. It then used the chamber pressure problem it was able to claim this created to justify the change to Ball powder. This was done in a way that the Army could claim that it had not made the change to Ball powder, but rather that the ammunition loading companies, with whom it had a confluence of

*However, the recommendation was hedged; it was made conditional upon the use of the more slender "type B" (Sierra) bullet. In 1968 during the Ichord investigation the Army claimed that this meant that the recommendation was conditional upon further extensive experimentation and further change in barrel twist. (However, the Sierra bullet was the original Stoner cartridge design. It was changed gradually in manufacturing by Remington to the "type A" bullet. Sierra type bullet could be expected to hold up its velocity better at ranges and to be more lethal.)

**25-26 Jun 63, "AR-15 Technical Cmte Mtg Held at Springfield Armory 25-26 Jun 63"
***Frankford Arsenal, "Third Memo Rpt AR-15 Rifle/Ammo System. Investigation of Bullet Configuration" dated 18 Jun 63

interest,* had made it because JMR powder could not meet the specification. As will be seen, the result of the change to Ball powder was to trade-off a few yards in equivalent impact from an arbitrary muzzle velocity that the weapon had never had, and performed highly effectively without, for a 6-to-12 fold increase in weapon malfunction rate.

Because Ball powder had a different burning speed (time-pressure curve) than the IMR powder for which the weapon was designed, its use had to cause serious and subtle difficulties for the weapon. These were difficulties that would be known in advance to any weapons or ammunition engineer, just as surely as an automotive engineer would know the effects of putting gasoline in a diesel engine. However, no tests were conducted in the advance of the change to Ball powder to learn these effects, and the designer was not consulted or informed. The difficulties that one would expect to occur (and which were to occur) and their causes are explained in the following paragraph.

Excessive Cyclic Rate

The cyclic rate would be speeded up by the slower burning powder by as much as 200 rounds per minute above the 800 round per minute design cyclic rate. This would cause numerous types of malfunctions and parts breakages** in the weapon because of timing changes and impact load changes (impact loads go up as the square of the velocity). The faster cycling also would shorten design dwell(delay)time of the bolt in opening. This,

* Olin was the sole source of Ball powder and both Olin and Remington operated cartridge plants for the Government, as well as their own military and commercial lines. Moreover, both had heavy commitments to production of the 7.62mm NATO round.

** Failures to feed, double feed, failures to extract, failures to eject, failures of the bolt to remain back after the last round, etc., and

in turn, would cause cartridges to stick in the chamber because the over-accelerated bolt would be attempting to extract the cartridge while the cartridge case was still expanded against the chamber with gas pressure, causing the extractor to shear through the cartridge case rim and leaving the cartridge jammed in the chamber. This mistiming (too rapid opening of the bolt) also would cause some gas and carbon to be blown back into the chamber, rather than out the bore, thus etching successive cartridge cases and increasing the tendency of the cartridge case to stick in the chamber.

Fouling

In addition, the greater tendency of the Ball powder to foul the weapon -- especially a weapon that was actuated by gas vented through the bolt carrier -- would further complicate the situation. Ball powder was known to be dirtier than IMR -- apparently because of the coating used to control burning speed of the powder grains -- and for lots to vary widely in their dirtiness.* When the military specifications for the powder were drawn up in the Fall of 1963 in a way that would require Ball powder, they contained no fouling test requirement for either the powder or the ammunition.** *** In addition, at some point**** the special electrolite finish on the bolt and

* Frankfort Arsenal "Tenth Memo Report on AR-15 Rifle/Ammunition System. Investigation of Alternate Propellants for use in 5.56MM M193 Ball Ammunition" with 1 encl, dated 15 May 64

** House Armed Services Press Release, "Army's 'Unbelievable' Mismanagement Caused M-16 Rifle Problems, Armed Service Subcommittee Found", 19 Oct 67

*** "Report of the Special Subcommittee on the M-16 Rifle Program of the Armed Services Committee of the House of Representatives" dated 19 Oct 67

**** Dec 7 1965

bolt carrier, that was specially designed to protect the weapon from any carbon accumulation, or erosion, from the gases, was removed and a Parkerized finish substituted. This change, also, was not coordinated with or known to Mr. Stoner, the designer of the weapon.

The significance of the changes implied in the military specifications were unknown to the Secretary of the Army and to the Secretary of Defense.

Mr. Vee of Office of the Assistant Secretary of Defense (Installations and Logistics) who monitored the Technical Coordinating Committee for the Office of the Secretary of Defense knew something of the proposed actions, but apparently did not fully understand their significance until too late.*

Lack of Fouling Test

In the Spring of 1964, after receiving reports from Colts of malfunctions resulting from fouling in acceptance testing, the Technical Coordinating Committee included a fouling test requirement in the military specification for the ammunition. However, it applied only to each preproduction lot as a condition of powder acceptance -- not to each lot of ammunition. This was tantamount to no test at all and continued to favor the acceptance of Ball powder.

Use of IMR to Pass Rifles

Colts also reported that in a sample of 10 rifles 6 would not pass the Government factory acceptance test for cyclic rate with Ball powder. From

* Released 19 Oct 67. "Hearings before the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services of the House of Representatives 90th Congress, First Session. May 15, 16, 31, June 21, July 25, 26, 27, Aug 8, 9, and 22, 1967."

approximately that time until December 1966 Colonel Yount, the Army Materiel Command Rifle Project Manager, authorized Colts to use the original IMR cartridge to pass the rifles in factory acceptance testing with both he and Colts knowing that they would not pass with Ball powder and that a very high malfunction rate would result in the field. The malfunction rate was worsened because the pas port size was left unchanged, leaving the weapon calibrated for IMR powder when it would be firing Ball powder. A letter between Mr. Wm Davies who was now the Chief Engineer at Colts and Colonel Yount as well as the Ichord investigation makes it clear that the use of IMR powder was deliberate and that they knew the consequences to the weapon of using Ball powder in a weapon designed for IMR.* Over 300,000 weapons were so accepted, with the majority of them going into use in the growing war in Vietnam. These facts and the other implications of Ball powder were not known to the users until uncovered by the Combat Development Command Experimentation Center test.

Combat Development Command Experimentation Center Tests

To return to the period of the SAWS testing, Combat Development Command Experimentation Center experiment disclosed the problem of high malfunction rate and parts breakage caused by excessive cyclic rate and fouling of the ammunition. It determined that the problems were due to the change to Ball

*28 March 1966 Colts' Inc. report "Effect of Ammunition Variables on Acceptance Testing of M16/XM16E1 Rifles (Third Partial Report)".

powder and that Colts was being permitted to use the IMR powder rather than Ball powder for factory acceptance testing of the weapons. It also was noted that because the Army was loading the tracer ammunition with IMR powder while using Ball powder in ball ammunition, the differences in gas port requirements created unwarranted and almost insurmountable problems for any designer of a 5.56mm machine gun. These difficulties were reported in October 1965 to Colonel Yount, the Army Materiel Command Rifle Project Manager. He and experts from Frankfurt Arsenal were invited to Combat Development Command Experimentation Center and witnessed the deficiencies and examined the materiel and the data.

The Combat Development Command Experimentation Center also obtained cyclic rate measuring equipment and cartridges with the original IMR powder, and it ran comparative technical type tests, with Ball powder cartridges and IMR powder cartridges, for both cyclic rate and fouling. The tests showed a malfunction rate 6 times as high with Ball powder as with IMR, a rate that would be expected to be even higher under field conditions.* Frankfurt Arsenal then conducted a similar test with similar results, but vague conclusions.

The Combat Development Command Experimentation Center experiment also disclosed that the Stoner machine gun was experiencing excessive stoppages due to belt links that had been manufactured to dimensions that were different from the design drawings, under contracts let by Army Materiel Command.

*May 1966. CDCFC, "Small Arms Weapon System (SAWS) Field Experiment". (Hereafter referred to as SAWS Experiment.)

Combat Development Command Experimentation Center obtained belt links that were manufactured according to the design drawings and they functioned well. The 5.56mm weapons also experienced a high rate of misfires with the 5.56mm ammunition. This was determined to have been caused by the gross change in the primary sensitivity specification, described earlier.*

In November, Dr. Payne, Chief of Operations Research in the Army Secretariat, was informed as well as an officer in the Office of the Assistant Chief of Staff for Force Developments. (Payne sent a memo to a LTC in the Chief of Staff's Office.)** In December, LGen Harrell, the Commanding General of Combat Development Command, was briefed at Combat Development Command Experimentation Center and a message was sent to his headquarters. This message stressed the urgency of corrective action because of the anticipated effects of these deficiencies in Vietnam. In February, LGen Harrell sent a letter*** to General Besson, the Commanding General of the Army Materiel Command, notifying him of the problem as a matter of command interest.

The Combat Development Command Experimentation Center interim field experimentation report of 31 January 1966 and the final report of May 1966

*SAWS Experiment.

**28 November 1965, Memo for Director, Coordination and Analysis. (Attn: LTC Jank) w/o incl.

✓ *** Letter, Command General, Combat Development Command to Commanding General Army Materiel Command, dated 17 February w/1 Incl: "Synopsis of Problem Areas...".

contained a chapter with detailed data and evaluation of the reliability problems. The report noted that the 5.56mm weapons were markedly superior in effectiveness to the 7.62mm weapons in spite of these stoppages, which had not been excluded from the weapon scores, and that the ammunition deficiencies, in its judgment, were readily correctable.

No formal action was taken by Army Materiel Command or the Army Staff on any of these reports. Weapons continued to be accepted at the factory based on tests using IMR cartridges. Instead of changing back to the original IMR powder from the Ball powder, Army Materiel Command began to test a new buffer to attempt to adapt the weapon to Ball powder. It also shut down production of the original IMR powder and began a search for "IMR" powder, as additional Ball powder that would have characteristics similar to Ball powder.* This would give the appearance of seeking alternative powders, insure the retention of Ball powder, whatever the outcome, and give the appearance that the original IMR powder was being continued through confusion of the term IMR.

IV

The Infantry Agency Recommendations

In its final study, based on the reports of all the test and evaluation agencies, the Infantry Agency concluded that there was no requirement for additional weapons, if any were required the M14 should be procured, and replacement for the M14 should be the SPIW, which was coming along well,

*Released 19 October 1967. "Hearings before the Special Subcommittee on the M14 Rifle Program of the Committee on Armed Services at the House of Representatives, 90th Congress, First Session. May 15, 16, 31, June 21, July 25, 26, 27, Aug 5, 9 and 22, 1967".

and a conceptual SPIW machine gun. No mention was made of the reliability problems caused by the 5.56mm ammunition, problems that had been reported by TECOM as well as Combat Development Command Experimentation Center.

General Westmoreland's Request for M16s

On 6 December 1965, more than midway through the SAWS testing period General Westmoreland sent a message to the Secretary of Defense requesting that the United States and allied maneuver elements in Vietnam be supplied with M16 rifles. Up to this point only the Airborne and special forces units that had been equipped with them in the States had them; and with the buildup of United States forces in Vietnam the other units had the M14. He stated in his request that units armed with the M16 were successful while those armed with the M14 were taking high casualties. The Secretary of Defense approved the request without further reference to the Army Staff. On 7 December a letter order contract for 100 thousand M16s was let with later expansion to 400 thousand weapons. At the time of the Westmoreland request, the Army maintained it had no requirement for additional M16s (although it still was trying to buy additional M14s) and the Colts line was funning out from its FY 64 production. This request and the Secretary of Defense's prompt approval was a turning point because it meant that the M16 was the Army's rifle for the war and it saved the production line. It also, no doubt, influenced the Headquarters, Combat Development Command's decision on the SAWS study submitted to it by the Infantry Agency.

The Combat Development Command's SAWS Recommendations

On 30 August 1966 the Commanding General of the Combat Development Command forwarded its SAWS study. In an ambiguous letter* he approved the conclusions and recommendations of the Infantry Agency except that (1) he did not agree that overall the M14 is as effective or more effective than the M16; (2) if any rifle procurement is required it should be satisfied by procurement of M16s; and (3) final decision to adopt the SPIW must await further evidence. He noted the conflict between the conclusions of the Combat Development Command Infantry Agency computer simulation and the Combat Development Command Experimentation Center field experiment. In submitting this letter LGen Harrell had to run counter to the strong elements of his own staff, who with the Assistant Chief of Staff for Force Development and the Infantry Agency, had had another solution in mind.

*30 August, Ltr CDC to ACSPOR, "Army Small Arms Weapons System Program (SAWS) (U)" w/1 Incl: SAWS summary and main report (missing).

CHAPTER X - THE DEPARTMENT OF THE ARMY SAWS REVIEW AND DECISIONS

July 1966 - May 1967

This period saw the conduct of the Department of the Army SAWS review study in the Office of the Chief of Staff, the Chief of Staff's SAWS decisions and recommendations, and their watering down, lack of coordination between the Army and Office of the Secretary of Defense, continuation of pressures in the Army to procure the M14, failure to address the reliability (powder) and lethality (barrel twist) problems, and difficulties with our Southeast Asian allies because of shortage of M16s.

I

(SAWS Review and Decisions)

The Initiation of the SAWS Review

Early in July 1966, after a briefing by the Combat Development Command Infantry Agency on the Combat Development Command SAWS study, the Secretary of the Army asked that a new analytical office, recently established in the Office of the Chief of Staff to serve the Chief of Staff and the Secretary of the Army, conduct an independent review and analysis of the SAWS study. The Assistant Chief of Staff for Force Development, LGen Polk, opposed the independent analysis on the grounds that the obvious answer, being confirmed by the Combat Development Command SAWS study, was to maintain the M14 while waiting for the SPIW. The Office of the Chief of Staff Army Study (OCSA Study) began in late July in advance of the formal receipt by the Department of the Army of the Combat Development Command SAWS Study.

Continued Attempts to Procure the M14

In spite of the Secretary of Defense's 3-year-old decision not to procure more M14s, Westmoreland's approved request that the United States and allied combat forces in Vietnam be equipped with the M16, and the equipping of the United States forces in Vietnam which was well underway, efforts continued within the Army to reopen M14 procurement. In August the Deputy Chief of Staff for Logistics reported that the rifle position was deteriorating, but that all M16 rifle production capacity was excess to mobilization requirements.* Later in August, in a reply to the Chief of Staff, who asked what M16 rifle procurement might be necessary to avoid M1 rifle issue, MGen Miley, Office, Deputy Chief of Staff for Logistics, (now Deputy Commanding General of Army Materiel Command) replied that the shortage was due to a shortage of M14s not M-16s. Additional M-16 procurement was unavailable and he was separately recommending withdrawal of 60,000 M-14s from Reserve components.** In September, General Miley asked subordinates in the Office of the Deputy Chief of Staff for Logistics what was the current status of rifle assets relative to requirements and why was not the Army procuring the M14 rifle. The reply noted that the Army had originally included 115,000 M14 rifles in the June 1966 supplement.***

*DCSLOG memo to ASAC(I&L), "Retention of M14 Rifle Production Base", 17 Aug 1966

**23 August, Memo for CofSA from Gen Miley (ODCSLOG), "Availability of M16 Rifles (U)".

***29 September, DCSLOG Fact Sheet (Draft), "The Rifle Program".

ACSFOR SAWS Recommendations

On 1 October, the Assistant Chief of Staff for Force Development (ACSFOR) submitted its recommendations on the Combat Development Command SAWS study.* It recommended procurement of the M16 as necessary to maintain the authorized inventory level (AAO) while expediting the development and adoption of the SPIW (and a companion SPIW machine gun) and retention of the M60 machine gun. Only a small additional procurement of M16s would be required. As in the case of the Infantry Agency and Headquarters, Combat Development Command, no mention was made of other types of small arms weapons or of the M16 reliability problem caused by the change to Ball powder. In concurring to the Assistant Chief of Staff for Force Development on the Combat Development Command SAWS recommendations, the Office of the Chief of Research and Development (OCRD) commented that there were only minor engineering problems with the SPIW. These were of a magnitude that might result in only one or more month's slippage in the new planned type classification data of fourth quarter Fiscal Year 1968.** At the time this comment was made, the SPIW program was, in fact, failing.

SECDEF Request for an M-16 Distribution Plan

Having been unable to get a clear answer to two previous requests as to what was the Army's rifle program, on 18 October, in a meeting with the Secretary of the Army, the Secretary of Defense requested that a plan be prepared for the distribution of the M16 to the United States Army forces

*1 October, (approximately), ACSFOR memo to Chief of Staff, "Small Arms Weapons Systems (SAWS) Study".

**10 September (?) 1966, OCRD memo to ACSFOR, "Small Arms Weapons Systems (SAWS) Study".

and allies. This plan was to include: US allied forces in Vietnam, US forces in Korea; Southeast Asia backup forces in Continental United States (CONUS); Thai and Korean maneuver battalions not in South Vietnam.*

Submission of the OCSA SAWS Study

On the same date, the Office of the Chief of Staff, Army, (OCSA) SAWS study was submitted to the Chief of Staff with a copy to the Secretary of the Army.** The conclusions about the relative effectiveness of the weapons were similar to those of the Combat Development Command Experimentation Center SAWS Field Experimentation Report and rested largely on that data. Similar conclusions also were drawn in the lethality substudy which independently uncovered the defects in BRL methodology and testing. (Again, no action was taken.)*** In addition, findings were made on submachine guns and grenade launchers and that action should be taken to replace the long unsatisfactory M-73 tank machine gun. A key weapon conclusion was that the engineering, production, and cost feasibility of the SPIW had not been demonstrated. The study also concluded that because of the change to Ball powder the reliability of the M-16 was much lower than it should have been, and that in new procurement the barrel twist should be changed back to 1:14 from 1:12 to restore lethality unnecessarily lost in the original change.

* 18 October, Secretary Resor Memo to CofSA (Meeting w/McNamara, Vance and Resor, 17 October.)

** 18 October 1966, "Small Arms Weapons Systems Analysis: A Review and Evaluation"

*** Payne commented that the study was too hard on BRL and Spirrazza

The study found that among program alternatives, costed over a 14-year period, the preferred program alternative, considering effectiveness, cost, and risk, was to procure the Colt 5.56mm weapon family* with the Stoner machine gun, maintaining at first a mix of Stoner and M60 machine guns. A production base adequate for all Services, MAP, and foreign sales should be established; and a coordinated MAP, NATO, and foreign sales program should be adopted. None of the Army assets and requirements documents were accurate or reliable, and the Army rifle inventory position was precarious.

During the Office Chief of Staff, Army, SAWS study, pressure was brought to bear by DDR&E through Bell and Yates of DDR&E and Poor of the Army Secretariat to avoid an unfavorable decision on the SPIW.

The 7 November Chief of Staff Decisions

After a preliminary meeting with his deputies and the Commanding Generals of Army Materiel Command and Combat Development Command, on 7 November the Chief of Staff issued a staff memorandum announcing his SAWS decisions. With minor exceptions, these followed the conclusions of the Office Chief of Staff, Army, SAWS study. The M16 rifle would become standard A and replace the M14 rifle and then the M14. The M60 machine gun would be retained but work would continue on the 5.56mm machine gun. The SPIW would be dropped back to exploratory development. A production base would be established that would be

*Rifle, small number of submachine guns, and refined XM148 grenade launcher.

adequate to replace the .30 caliber and 7.62mm weapons and meet the known and anticipated requirements of other Services, allied forces in Southeast Asia, and MAP. An inclosure spelled out the barrel twist and powder (reliability) problems to be corrected.*

The Chief of Staff was faced with decisions that he did not want to make, but could not easily avoid. He had stalled for 18 months with the Combat Development Command SAWS study. Now there were mounting pressures from the Secretary of Defense for a rifle program because of the war. Moreover, the independent analysis, having been requested by the Secretary of the Army, could not be easily ignored. In making his decision he was squeezed between the opposition of senior members of his staff to backing off the M14 fight (and his own disposition to continue it) on the one hand, and the existence of the Office Chief of Staff study, the growing commitment to the M16 in Vietnam, and the increasing number of Army officers who accepted the superiority of the M16 based on their Vietnam combat experience, on the other hand.

These were strong decisions but reluctantly made. The Chief of Staff was to water them down in the face of opposition from those members of his staff who continued to support the M14 and, to some extent, to encourage this process.

11 November Sec Army Response on Distribution Plan

On 11 November the Secretary of the Army sent a response to the Secretary of Defense's suggested M16 rifle distribution plan.** Parts of this response

*7 Nov 66 Army Chief of Staff Memo, Army Small Arms Weapons Systems (SAWS) (U).

**11 Nov 66, Memo for SecDef, "Army Rifle Distribution".

) implied the continuing of past rifle policies, tending to ignore the Chief of Staff's 7 November decisions and recommendations. (The response also tended to water down the Secretary of Defense's distribution plan). This memorandum was prepared between the Office of the Assistant Secretary of the Army for Installations and Logistics and the Deputy Chief of Staff for Logistics (DCSLOG of the Army Staff.

21 November Recommendations to Secretary of the Army

Following interim recommendations on 7 November, on 21 November, the Chief of Staff sent to the Secretary of the Army his findings and recommendations on SAWS, together with a proposed memorandum to the Secretary of Defense. He emphasized the need for a one-rifle small arms family and for an adequate production base. He recommended the procurement of 3.4 million M16s over a period of five years, visualizing three facilities. Of this procurement, 1.9 million rifles would be for the Army and 1.5 million for the other Services MAP, and foreign sales. He also concluded that the ammunition deficiencies caused by the adoption of Ball powder needed to be corrected and that possibly the barrel twist needed to be changed.*

The Army Staff had finally recommended a sound and coordinated rifle program based on superior weapons -- the program that should have been recommended in January 1963. However, the Secretary of the Army was to submit less adequate recommendations to the Secretary of Defense.

*21 November 1966, Chief of Staff Memorandum to Secretary of the Army, "Findings and Recommendations on SAWS".

Fiscal Year 1968 Budget Recommendations

On 28 November, the Chief of Staff approved a proposal from MGen Miley (Office, Deputy Chief of Staff for Logistics) to include in the budget submission, through the Office, Assistant Secretary of the Army (Installations and Logistics) channels, recommendations on Fiscal Year 1968 budget and on future production and procurement planning that were substantially different from the Chief of Staff's 7 November decisions and 21 November recommendations to the Secretary of the Army. The Deputy Chief of Staff for Logistics plan did not provide adequate capacity for the other Services, allies and MAP; it did not appear to accept as firm the decision to replace the M-14 rifle; and it proposed 2 facilities instead of 3 at higher unit costs for the second facility.*

Secretary of Defense Directs a Second Source

On 16 December the Secretary of Defense sent a memorandum to the Secretary of the Army directing the establishment of a second production source and that the second source be a strong competitor. It commented ambiguously that the level of negotiations with Colts for the proprietary rights to the M16 might have to be raised and noted that the Army estimate of the cost of the rights is too high.** *** The memorandum did not make it clear

*28 November 1966, Memorandum for Chief of Staff, Army, from Deputy Chief of Staff for Logistics (Miley), "Procurement Plan for XM16E1/CARF family of Weapons."

**Correctly, General Miley and Gen Anderson had been including in budget estimates that the rights would cost 9 million dollars

***16 December, Memorandum for the Secretary of the Army from the Secretary of Defense, "Army Rifle Distribution."

how a second source could provide competition when the capacity of the two sources was not planned to exceed the acknowledged requirement (and was less than the actual requirement).

Secretary of the Army SAWS Recommendations

On the following day the Secretary of the Army finally sent his recommendations* on the SAWS study to the Secretary of Defense, submitting them a month after he had received the Chief of Staff's recommendations and after the Fiscal Year 1968 budget decisions had been made. His decision may have been influenced by informal Secretary of Defense guidance on the size of the Army budget to be submitted for Fiscal Year 1968 and a private memorandum from Payne to the Secretary of the Army reviewing the Office Chief of Staff Army SAWS study.**

By delaying and submitting less adequate recommendations than the Chief of Staff, the Secretary of the Army had encouraged opposition in the Army Staff, enabled the Chief of Staff to back off some of his recommendations, and miscued the response of the Secretary of Defense. Aside from the apparent desire of the Secretary of the Army to shift rifle program costs into another budget year, this appeared in part to be due to the degree of control the Arsenal system had gained over Army and Office Secretary of Defense logistics staffs and to the loss of independent review capability over rifle programs that had occurred in the Office Secretary of Defense Staff.

*Memorandum from the Secretary of the Army to the Secretary of Defense, dated 17 November 1966.

**Payne's memorandum did not see any need for additional M16s and found no case for the 5.56mm machine gun.

The Arsenal system was able to strongly influence decisions in the Office of the Deputy Chief of Staff for Logistics; Office, Assistant Secretary of Army (Installations and Logistics); and Office, Assistant Secretary of Defense (Installations and Logistics) through MGen Miley (Ordnance Corps), MGen Anderson (Ordnance Corps), and Army officers under Ignatius, respectively. As to the Office of the Secretary of Defense, DDR&E, with Bell and Yates in charge of its Ordnance Office, it had never had an independent small arms review capability. With the departure of Deputy Assistant Secretary James Davis and the arrival of Secretary Ignatius, who placed Army officers in key positions, the Office of the Assistant Secretary of Defense (Installations and Logistics) lost its small remaining independent analytical capability. Somewhat earlier than that, the Office of the Assistant Secretary of Defense (Systems Analysis) -- the staff that had played the analytical and Office of the Secretary of Defense coordinating role in rifle programs under Mr. Hitch -- had lost and not replaced its rifle program interest and competence.

The Secretary of the Army's memorandum invited the additional delay of a Secretary of Defense request for additional information and a study. This was not long in coming.

The Deputy Secretary of Defense Memorandum

By memorandum on 14 January 1967, the Deputy Secretary of Defense (Mr. Vance) approved the recommended objectives of the Secretary of the Army's 17 December memorandum "except for" replacement of the caliber .30 weapons, and 7.62mm weapons pending (1) comprehensive cost-effectiveness evaluation

of one family versus 2 family versus 3 family system, (2) distribution schedule (3) NATO implications, and (4) coordination of details of barrel twist and propellant changes with the Technical Coordinating Committee. The last item, rather negatively worded, should be accomplished by 1 May, the others by 1 August 1967 - the next budget year.*

The Office Chief of Staff, Army, SAWS study already had accomplished the first three of these requirements and action had been initiated in the Chief of Staff's 7 November decisions to accomplish the fourth. However, the Secretary of the Army had not provided the Office of the Chief of Staff, Army, SAWS study or the Chief of Staff's recommendations to the Office of the Secretary of Defense. Moreover, the Deputy Secretary of Defense, who already knew that it was politically impossible to reissue M1 (.30 caliber) rifles and who had tried, as Secretary of the Army, to get the Army to take the course of action that it was now recommending, now was delaying that action. The reason was the desire to shift the expenditures to another budget year and because Army officers in technical channels (Office, Deputy Chief of Staff for Logistics; Office, Assistant Secretary of the Army (Installations and Logistics); Office, Assistant Secretary of Defense (Installations and Logistics), rather than the chain of command were tending to control the decision process.

Chief of Staff Response

On 31 January 1967, the Chief of Staff, taking the opportunity presented by the Deputy Secretary of Defense's study requirement, assigned the responsibility

*14 January, Memorandum for the Secretary of the Army from the Secretary of Defense, "Army Rifle Program" w/1 attach: 17 December Memorandum from the Secretary of the Army to the Secretary of Defense (SAWS recommendations).

for the new cost-effectiveness study to the Assistant Chief of Staff for Force Development,* tending to appease the Army Staff for his decisions on the M16 by downgrading the original study. The resulting study would be a watered-down version of the original to go with the watered-down decision that had been made. However, the Office of the Chief of Staff study had its effect and the original SAWS decisions would, in the end, be implemented.

II

Reluctant Implementation

In addition to the watering down of the Chief of Staff's SAWS recommendations by the Chief of Staff and the Secretary of the Army and the tactics, the decisions were accompanied by delaying and eroding actions elsewhere in the Army Staff. The Assistant Chief of Staff for Force Development, for example, immediately drew up, recommended, and very nearly got the Chief of Staff to approve, a basis of issue (BOI) for the Colt weapons that would have converted 80% of the planned procurement of 1.9 million M16 rifles into carbine/submachine guns.** Both the OCOSA SAWS study and NATO Ambassador Cleveland pointed out the need for prompt notification of NATO of the US M-16 rifle decisions.*** However, it took from 7 November 1966 until

* 31 January, Chief of Staff Memorandum "Army Rifle Program."

** 14 November 1966, Assistant Chief of Staff for Force Development Memorandum to Chief of Staff, Army, "Army Small Arms Weapons Systems (SAWS)."

*** 6 December (received Department of the Army 10 December) DAIN 657052 (8625) message from Ambassador Cleveland, Paris, to Department of the Army, info: State, "NATO Standard Rifle Ammo."

25 April 1967, through a succession of delaying actions, for the Assistant Chief of Staff for Force Development to get out a reduced notification to NATO reflecting the concurrent weakening of the SAWS decisions.* ** The Chief of Information (CINFO) release and the NATO release were held up for months on the grounds that no information could be released while negotiations were going on with Colts for the proprietary rights for the M16 - while the rights themselves were not being negotiated for in good faith. Although CINFO continued to press for the release, it was not until 10 May 1967 -- 10 years after its development and 4 years after its first procurement by the Army -- that the release finally was made of the adoption of the M16A1 as the standard Army weapon.***

The reason for fighting against the notifications and for attempting to weaken them was that the decision to adopt the M16 could still be overturned in the DOD if a public announcement were not made. However, once an announcement was made to the Congress, the public, the troops, and NATO, the decision would be irreversible.

NATO and Foreign Sales

The OCSA SAWS study in October 1966 and US NATO Ambassador Cleveland in December 1966 recommended that the NATO problem be handled by proposing the

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- * 24 Apr, Joint State/Defense message to American Embassy, Paris, "US Army Rifle Program."
 - ** 25 April message DA 811401 to MAC(V) and others from Department of the Army M16A1 Rifle Distribution.
 - *** 10 May 1967 SecDef message 4964 to all Commanders of Unified and Specified Commands, "M16A1 Rifle (Joint State/Defense Message)."

5.56mm cartridge as an additional NATO standard cartridge and that NATO should be notified promptly to avoid any impression of bad faith. The reluctance of the Army Staff to notify NATO of the SAWS decisions was reinforced by a message from General Lemnitzer independently of Cleveland. Lemnitzer predicted disruptive consequences within NATO if anything was done to qualify US support of the 7.62mm NATO cartridge.

This argument was a little passé. By 1967 the Western European countries had their commercial ammunition companies already tooled up to produce 5.56mm ammunition.* Several had already developed or were developing 5.56mm rifles,** and most had tested the M16. All were waiting for the US to formalize its de facto standardization on the M16 that they had observed with the buildup of US forces in Southeast Asia. The long rifle controversy within the Army had already lost much of the weapon standardization, foreign sales, and gold flow advantages that the US rights of invention, investment, and proving of the weapon in war should have brought the US Government and the taxpayer. From 1965 on the only military service in the world that did not know that the US had, in fact, standardized on the M16 rifle was the US Army.

III

Proprietary Rights and Single-Source Considerations

With its first procurement in 1963 of the M16 rifle, the Army should have obtained the proprietary rights to the rifle. The Air Force already

*Even to US military specifications.

**Germany, Belgium (FN), Switzerland.

had adopted the weapon, the Army was making an initial buy, and the weapon had demonstrated its utility for Southeast Asian allies. Because the weapon was a proprietary item, the rights would be needed if and when a multi-source procurement capability was required, for reasons of capacity, safety and competition. Moreover, the time for the Government to negotiate for the rights was before it had demonstrated high value.

Ignatius' Decision -

However, at the time of the planning for the 1963 procurement, Assistant Secretary of the Army (Installations and Logistics) Ignatius issued instructions to cease negotiations for the rights on the grounds that the officially intended purpose of the procurement was a one-time buy. This was not entirely true, and in 1967 he was closely quizzed on his decision by the Ichord M16 rifle investigation subcommittee.* **

While avoiding negotiating for the rights the Army made attempts at the same time, in 1963, to get a set of drawings for the M16. Colts was deeply suspicious of the Army's motives. It felt that the Army might give the drawings to Springfield Armory to "militarize" them in a way that would change tolerances and introduce difficulties to the extent that the procurement could never succeed. However, Colts offered a set of the drawings to OSD if OSD would take responsibility for them.

*19 October 1967. "Report of the Special Subcommittee on the M-16 Rifle Program of the Armed Services Committee of the House of Representatives". (Ichord report)

**Released 19 October 1967. "Hearings before the Special Subcommittee on the M16 Rifle Program of the Committee on Armed Services of the House of Representatives 90th Congress, First Session, May 15, 16, 31, June 21, July 25, 26, 27, August 8, 9 and 22, 1967". (Ichord hearings)

Reasons Army Avoided Rights

The avoidance of obtaining the proprietary rights was a natural result of the Army's resisting adoption of the M16 rifle: any action that would further procurement was to be avoided. The same motives affected the production itself at Colts. Although the Secretary of Defense had asked for a fully adequate production base, the Army limited procurement to a single non-subsidized base.* The Army made every effort to prevent and delay production from starting. After that it tried to insure there would be no follow-on procurement. It was only the small Air Force annual procurement and General Westmoreland's request in 1965 that saved the production base.

1964 Colts Offer

In October 1964 Colts offered the rights free to the Army after the procurement of 540,000 rifles, with the Army to get \$10 credit toward that end with each rifle purchased. The Army did not take up the offer. With the initiation of the procurement of 450,000 M16s for Westmoreland in December 1965, the Army still did not make a serious effort to get the proprietary rights; and, on the other hand, Colts' position was strengthened.** ***

Beginning of Negotiations

After the SAWS decisions, in December 1966 the Army Materiel Command began, for the first time, to negotiate seriously for the rights. Feeling

*Neither Colts nor the Army wanted any Government subsidy of the base, but for different reasons.

**Ichord report.

***Ichord hearings.

that MGen Anderson, Office Assistant Secretary of the Army (Installations and Logistics), who had been in de facto control all along, was manipulating the Army position, that the Army Materiel Command had to negotiate, in a manner to prevent successful negotiation, Army Materiel Command prepared its own Army negotiating position. However, General Anderson continued to intervene.* At the same time hints were passed to OSD and the Congress that Colts was being unreasonable. When President Striehman of Colts Industries tried to see the Deputy Secretary of Defense, Mr. Vance, Mr. Ignatius blocked his visit.

Anderson's Reverse Engineering Offer

During this period Anderson sent letters to Winchester-Olin and to TRW asking for proposals to reverse engineer the M16 rifle -- that is, to produce a technical data package from a copy of the weapon so that the Army could seize the rights, produce the weapon, and leave it to Colts to seek recourse in the courts. The offer to TRW was sweetened by a suggestion that the Army might contract to TRW to adapt the weapon to Ball powder and let TRW patent the changes. Winchester responded affirmatively, while TRW promptly said that the proposal was not within its business ethics.**

The Army finally purchased the rights on 30 June 1967 for 4.5 million dollars in cash and a guarantee to procure 632,500 rifles from Colts through April 1970.***

*Yount

**Yount, TRW

*** Ichord Report

Second Source

Thinking on the related subject of a second source was unclear in both the Army and OSD. With its existing base already amortized Colts would be built to the planned production capacity of 50,000 rifles per month more quickly and at a cheaper unit price than by creating a second source. Moreover, the claimed competition could not result from two sources unless they were, between them, to have more capacity than needed; and this was not the intent. Had a multi-source base been laid down in 1963 when it could be seen that it was needed, the benefits of competition and economy of scale -- and political dispersion too -- could have been realized. In 1967 the production capacity could be increased, but the chance for economic efficiency already was lost. As to security of the base, the benefits from a second source, while a factor to be considered; were not overriding. There are ways to disperse facilities within a single source. Moreover, OSD has not worried about the problem with missiles, aircraft, or tanks -- or with Ball powder for the weapon system's ammunition. This issue was not cost or security of the base -- the Army and OSD(I&L) wanted to insure that if there were additional production, it would not go to Colts.

IV

Reliability and Lethality - Continued

This section traces the tortured implementing actions on the reliability (powder) and lethality (barrel twist) problems contained in the Office, Chief of

Staff, Army SAWS study and the 7 November SAWS decisions memorandum of the Chief of Staff. It will be seen that the Army Materiel Command, the Army Staff, and soon the Chief of Staff undertook to stall and divert corrective action and that the Army Secretariat and OSD made only pro forma responses.

OCOSA Study

The OCOSA SAWS study, submitted to the Chief of Staff on 18 October 1966, identified the powder and the barrel twist problems. Accompanying recommendations also called the problem to the attention of the Chief of Staff, as did members of his office at the time.*

7 Nov Decision Memorandum

On 7 November the Chief of Staff's SAWS decision, as previously mentioned, contained an inclosure directing investigation and action by the Army Materiel Command on problems of excessive cyclic rate and fouling caused by Ball powder, cycling mismatch of ball and tracer, stoppages and loss of accuracy due to tracer fouling of the bore, and barrel twist.** Already, having seen the draft 7 November Chief of Staff Memorandum, within a few days the Rifle Project Manager was circulating in the Pentagon a letter from Fremont, the Colts' engineer, to Wm Davis, (who had been the Colts engineer and now was Yount's deputy) that it was impossible to manufacture

* 18 October 1966, Office Chief of Staff, USA, "Small Arms Weapons Systems Analysis: A Review and Evaluation".

** 7 November 1966, Army Chief of Staff Memorandum "Army Small Arms Weapons Systems (SAWS) (U)."

1:14 barrels to acceptable tolerances in production quantities and that if they could be manufactured they would not meet accuracy specifications.*

Recommendations to SecArmy

On 7** and 21 November*** the Chief of Staff included the need for action on the barrel twist and powder problems in his SAWS conclusions and recommendations to the Secretary of the Army and proposed SecArmy memoranda to SecDef.

On 15 November Colonel Yount privately informed an officer in the Office of the Chief of Staff that there were serious reliability problems with the M16 in Vietnam and that he had had a technical team from his office investigating them for a month at the request of MACV. The stoppage rate was unacceptably high in nearly all units and worst in the 1st Division (then commanded by MGen Depuy). There was evidence of inadequate training in the care and cleaning of the M16 and inadequate cleaning materials in the supply system. In addition to better cleaning discipline, the team was recommending a new buffer to slow the cyclic rate and chrome plating of the chamber. On 29 November the Chief of Staff was informed and given another review of the data on the reliability problem contained in the SAWS study and other reports. IGen Engler, Deputy to Westmoreland, was there. He said he knew about the problems, but that the Army Materiel Command team had told him that it was due to poor cleaning of the weapons by the troops and that the problem had been solved. The staff members explained that while poor cleaning would worsen the problem, this was not the primary cause of the problem which was due to the use of Ball powder in a weapon designed and calibrated for DFR.

*2 Nov 66. Colt (Fremont) ltr to AMC OPM(R) (Mr. Davis) with 1 atch.

**Memo Chief of Staff to SecArmy, "Findings on Small Arms Weapon System (SAWS)" dated 7 November 1966.

***21 Nov. Chief of Staff, Army Memo to SecArmy. "Findings and Recommendations"

and that the problem was not solved. The following day the Chief of Staff was provided with the extracts from the reports he already had received.* He then directed that General Miley look into, and report to him on, the problem. No report was made to OSD or to the other Services.

Miley's Report

On 12 December General Miley reported the results of an 8 November briefing of General Besson, reflecting the "aggressive and positive approach" of the Army Materiel Command on the problem. The powder change had been made because the IMR powder could not meet the chamber pressure/muzzle velocity specifications in production; the AF directed the Army to procure Ball powder (proven to be untrue by the Ichord investigation although Mr. Auman, the AF representative and a former Army Ordnance employee, tend to go along with this the Army position in his testimony); the Army has continued to look for alternative powders without much success (but ones with the qualities of Ball powder) General Besson had directed expediting the new buffer (the existing test results did not indicate the buffer would adequately solve the problem,** and this solution would result in risky modifications to the rifle to use the Ball powder rather than changing back to the IMR); he also had directed reexamination of the muzzle velocity specification (this was never done)***. The Chief of Staff asked Miley for monthly progress reports.

*30 Nov 66. Memo to Gen Johnson, M16E1 Rifle Reliability

**20 Dec. Work Request Reply, "Evaluate Buffer for 5.56mm XM16E1, Rifle Proposed by Colts' Industries"

***12 Dec. Memo for Chief of Staff, Army from Stöckfisch, "Discussion with Stöckfisch on SAWS".

Buffer Data

On 20 December the Army Materiel Command published a test report on the proposed new buffer for the M16 rifle to correct the cyclic rate problem caused by the Ball powder. Although dated 20 December the work had been accomplished April-May 1966. These data were used to justify the buffer. However, the data showed that with the buffer that malfunctions with Ball powder still were unacceptably high and that in this test malfunctions with Ball powder were 20 times as high as with IMR.*

The idea of the buffer was to slow the cyclic rate by increasing the mass of the buffer. This would make the weapon useable only with Ball powder (or with "IMR" powder developed to have the same time/pressure characteristics). It would slow the closing cycle but not necessarily the critical opening cycle. It also would not correct the problems of the fouling effects of Ball powder. The buffer was partially justified by the Army Materiel Command on the grounds of alleged lack of durability of the original buffer - a condition that resulted only because of the higher-than-design impact forces resulting from the use of Ball powder.

DepSecDef

On 14 January 1967, in replying to the Secretary of the Army's SAWS recommendations, the Deputy Secretary of Defense (Vance) directed that any changes in barrel twist or propellant be coordinated with the Technical Coordinating Committee and be reported by 1 May 1967.**

*20 Dec, Work Request Reply, "Evaluate Buffer for 5.56mm XM16E1, Rifle Proposed by Colts' Industries" (Buffer for 5.56mm XM16E1 rifle) w/10 Tables and 1 sketch.

**14 Jan, Memo for SA from SD, "Army Rifle Program" w/1 Atch: 17 Dec SA Memo to SD (SAWS recommendations).

SGS

On 31 January the Secretary of the General Staff authorized submission of barrel twist and powder problem proposals to the Joint Technical Coordinating Committee for decision in response to the Vance memorandum prior to Chief of Staff or Secretary of the Army approval; and he authorized ACSFOR to bypass the requirements of the 7 November decision memorandum in replying to the Vance memorandum.*

PM Twist Review

On 31 January the Office of the Rifle Project Manager provided a review of the barrel twist requirement in response to the 7 November decision memorandum and a 29 November letter from DCSLOG. The paper began with extracts from the May 1962 American Rifleman article. It found the original BRL (Carns) justification study of the 1:12 twist still valid without providing any new information. It reported that Colts had stated that it could not manufacture acceptable 1:14 barrels in production quantities and that the other Services were against change if no new data were presented. The paper recommended no change.* More than 4 years had passed since the original BRL theoretical study on which the change to 1:12 twist was based, and the weapons now were in a jungle war. However, no testing has been accomplished to verify the theory, except the Arctic testing in 1963, previously mentioned, which provided no evidence to support it.

*31 January, Chief of Staff memorandum, "Army Rifle Program"

Payne Paper to Under Secretary

On 10 February 1967 Dr. Wilbur Payne, Chief of Operations Research in the Office of the Under Secretary of the Army, provided a paper* to the Under Secretary informing him that there was a powder and barrel twist problem, and providing him with his views about them. He concluded that the change to 1:12 twist from the original 1:14 probably had reduced lethality 35-45% and that the change from the original IMR powder to Ball was causing excessive malfunctions due to both fouling and excessive cyclic rate. He also mentioned as a possible problem the tracer lighting in the barrel. He proposed a memorandum from the Under Secretary of the Army to the Chief of Staff that would require a review of these problems and a general report of their current status. Proposals for further modifications should be submitted for review in the Office of the Secretary of the Army prior to submission as Army recommendations to the Joint Technical Coordinating Committee.

The paper was an excellent recapitulation of the problem. It did not mention that the weapons had been acceptance tested at the factory using IMR powder knowing that they would not pass with Ball powder, or the urgent need for corrective action on the reliability problem in view of the weapons being in the hands of troops in combat.** Payne also was to testify before the Ichord Committee that the malfunctions in Vietnam were not predominantly caused by the change to Ball powder and to state in a report to DDR&E, as the basis for a report to SecDef, that there was no evidence of malfunctions due to fouling.

*10 Feb, Payne Memo for USA, "M16 Rifle Modification" w/Encls.

**It will be recalled that Payne had concurred in the original change to the 1:12 twist and had been responsible that the SecDef instruction to redo the BRL lethality tests had been rescinded, an instruction that would have gotten to the bottom of the twist problem.

By memorandum to the Chief of Staff on 21 February the Under Secretary requested a briefing by 15 March on the status of modification efforts.*

Technical Coordinating Committee Review

On 2 March, the Technical Coordinating Committee reaffirmed that the barrel twist should remain unchanged after a briefing by Carns of BRL, who presented the same data that he had in 1963.** Monthly test reports were provided to the Committee that attribute some malfunctions to Ball powder fouling and also found some fouling due to tracer deposits. (Two weeks later Yount was to state in his briefing to the Under Secretary of the Army that there was no evidence of these conditions). The Committee tentatively approved the chrome plating of the chamber (ostensibly to correct chamber erosion, but actually to attempt to offset the fouling effects of Ball powder). Tentatively Frankfurt Arsenal did not see the need for standardizing the 5.56mm cartridge case.***

AMC Review

On 14 March 1967, the Army Materiel Command reported by letter to the Deputy Chief of Staff for Logistics its review of the question of the rifling twist as required by the 7 November Chief of Staff Memorandum and a 29 November DCSLOG letter. It listed alternatives such as no change, changing the bullet,

*USA Memo to C/S, 21 Feb, "Modifications to the M16 Weapon Systems".

**Dr. Payne and Mr. Yee attended but the minutes do not show that they said anything about twist.

***31 March, USAWECOM, PM, Rifles, "Minutes of M16/M16A1 Rifle Technical Coordinating Committee Meeting on 2 March 1967," w/Incls.

or changing the twist and the bullet. It presented no evidence over that available in 1963, although one paragraph was tantamount to an admission that the 1:14 twist was superior for P_k^* above -30°F . It stated that the AF and Marine Corps would oppose the change. It concluded that the decision had operational implications beyond Army Materiel Command's purview and that until "the current guidance" was changed it would continue the 1:12 twist. (In the absence of conclusive evidence of the need the Air Force and the Marine Corps naturally would oppose the change. By this time they had reason to be deeply suspicious of Army changes). This "review" had taken 4 months.

AMC Briefing of the Under Secretary

On 17 March 1967 Colonel Yount, the Army Materiel Command Rifle Project Manager, and Mr. Carns of BRL briefed**the Under Secretary of the Army McGiffert on the powder and barrel twist problems in response to the latter's request to the Chief of Staff of 21 February. The written briefing contained the following points: If the new "IMR" powder that the Army Materiel Command was trial loading as an additional powder to Ball, did not meet the military chamber pressure-muzzle velocity specification, Yount would recommend a permanent 50 to 60 percent per round reduction in the muzzle velocity requirement. The effects of such a reduction in muzzle velocity on terminal weapon effects would be minor (true). The main effect of the excessive cyclic rate was one minor type of malfunction. The Army Materiel Command had no evidence that Ball

*Probability that a hit kills.

**M161A Briefing Presented to Under Secretary of the Army McGiffert on 17 March 1967.

powder fouling was causing malfunctions. The reliability problems in Vietnam were due solely to lack of training in maintenance and to corroded chambers. The results of the tests of the new buffer (to slow the cyclic rate) and of the chrome plating of the chamber (supposedly to prevent chamber erosion) were all favorable. Cold stability data showed that a 1-12 barrel twist was required if a criterion of not more than 1 mil ballistics error to -65°F was to be maintained and this was a realistic criterion. "Bright" tracer was not fouling the bore and affecting accuracy. Yount also cited as "product improvements" a list of changes that were made to the rifle because of difficulties caused by Ball powder. Most of these statements were misleading or false.

The Under Secretary asked to be provided, through the Chief of Staff, with a memorandum outlining the Army's proposed research and test program on barrel twist, bullet design, and propellant and reexamining the acceptance criterion for low temperatures.* Mr. McGiffert's request for a research and test program may have been well-intended. However, it was an open invitation to drag out and avoid a solution to the problem. At this point, very specific action would have been required.

Chief of Staff Response

On 11 April 1967 the Chief of Staff sent a memorandum to the Under Secretary of the Army providing him with a vague and lengthy research and test program in response to this request. General Johnson flatly stated

*The Secretary of Defense had asked the same question about the cold weather criterion in 1963 and received, after much delay, an unresponsive answer.

that ball propellant was suitable in respect to all characteristics, including fouling.* There were no test data to support this statement. On the contrary, the Chief of Staff had been provided with test reports and expert advice indicating that the statement was not true. He also knew that there were serious reliability problems with the weapon in combat in Vietnam that could be precisely explained by the problems that Ball powder would be expected to produce.

Reply to DepSecDef

On 22 April 1967 the Chief of Staff forwarded to the SecArmy a proposed reply to that part of the DepSecDef's 14 January memorandum on barrel twist and powder. The reply was similar to that provided to the Under Secretary of the Army. Prior to dispatching this reply, the Chief of Staff received a review from an element of his office recommending more positive action. After conferring with General Besson alone, he modified the letter in a way that weakened it further. As a result of the meeting General Besson was to submit a proposed additional letter of instruction from the Chief of Staff to himself.

Instruction to CG AMC

On 16 May General Johnson approved the instruction that General Besson submitted. It specified suspense dates for individual technical investigations. It also directed that, if the results indicated any need for change in either the rifle or the ammunition, supporting technical analysis and recommendations were to be provided by 31 January 1968.

*C/S Memo for Under SecArmy, "Modifications to M16/M16A1 Weapons System, dated 11 April 1967.

Summary

It had taken 6 months after the publication of the inclosure to the Chief of Staff's 7 November SAWS decisions that identified the reliability and barrel twist problems, to get out this incomplete and inadequate set of instructions. The barrel twist change had been made in 1963 to "optimize" the weapon for fighting in temperatures below -30°F . In the succeeding 4 years there had been no evidence produced to support the need for the change and several hundred thousands of the weapons were committed to combat in tropical Vietnam. The damaging change to Ball powder had been made in 1964. It had been discovered and fully reported, together with test data, in 1965. In the Fall of 1966 the predictable serious reliability problems had shown up with the M16 in combat in Vietnam. The concurrent SAWS review and other actions had provided to the Chief of Staff and SecArmy adequate information to identify and initiate prompt correction of the problem. Now, after 6 more months, 31 January 1968 had been set as the date to decide what, if anything, should be done.

What was really going on was that, having caused serious malfunctions in the rifle by changing to Ball powder for reasons that could not stand examination, the Army was blaming the resulting problems in Vietnam on lack of troop cleaning discipline in the field and was stalling while making the necessary changes to adapt the weapon to Ball powder. This would maintain the fiction that the weapon system that the Army had not wanted always had been basically unreliable. It also would avoid having to admit fault in

having changed the powder. Stalling also would avoid making any change at all in the barrel twist. The change back to 1:14 twist, like the powder change, would be an admission of fault that could raise questions of intent.

While this stalling was going on, the Army M16 reliability problem in Vietnam had been suppressed, but not solved. It would break out again with the issue of the M16 to the US Marine Corps in Vietnam.

V

Shortage of Weapons for Allies

While the late 1966-early 1967 debate was going on over the SAWS decisions and how much additional production capacity was needed, a shortage of weapons already had occurred. The way in which it occurred illustrates the interdependence of the quantitative requirements for rifles for US forces, Allies/MAP, and foreign sales.

In September 1966, the Army drew 60,000 M14s from reserve units and issued M1 rifles in their place in order to make up for a shortage of rifles in the expanding active forces.* The shortage existed because the Army continued to maintain that only the M14, the rifle that it had been prohibited from procuring since 1963, fulfilled a rifle requirement in the Army inventory, and it declined to procure M16s. Moreover, requirements and production capacity had been inadequately planned for US forces alone, let alone for Allies/MAP, and foreign sales. The Secretary of Defense

*12 September, DCSIOG SS to ASA(I&L), (Filed 14 May 67) "Request for Authority to Withdraw Mission Essential Items to Support Activation Schedule."

had tried to lay down such a base in the spring of 1963 but had not been supported.

In early November when the Army Times proposed to publish a critical item on the need to reissue M1 rifles, General Wheeler, the Chairman of the Joint Chiefs of Staff, requested General Westmoreland, CG MACV, to suspend the scheduled issue of M16s to ARVN, Vietnam Marine Corps and ROK Army and Marine Corps units until all US units could be equipped with a "preferred" rifle (M14 or M16). Two months later, CINCPAC reported that delay in issue of M16s to the ROK units in Vietnam was getting sensitive because the Korean Government had been informed these units would be equipped by April.* The provision of M16 rifles had been part of the deal of the Korean Government providing combat units for Vietnam.

In March, after newspapers had reported the sale of 20,000 M16s to the Singapore Government, General Bonesteel, CG 8th Army, reported that the Korean press was upset over the sale.** He suggested that the distribution be arranged so that Allied troops got a fair share for their combat troops before US rear echelon troops were equipped.***

*11 February, CINCPAC message (66058) to JCS, "Issue of XM16E1 Rifles".

**While there were good foreign policy reasons for the State Department to approve this sale, it happened because in 1964 and 1965, the years in which it was being negotiated by Cooper-Macdonald, Colts had no new US Government orders except the small annual procurement for AF. After the Ichord investigation, the sale to Singapore was changed to Singapore producing M16s under license from Colts.

***CINCUNC/CG 8th Army, letter to Chief of Staff, undated.

MAC(V) reported on 21 April resumption of issue to Allies in Vietnam would begin on 24 April 1967, issue to US combat maneuver elements having been completed 19 April* - this was part of the issue that General Westmoreland had requested in December 1965.

There had been enough rifles to go around but it was a near thing and had there been a hot war there might have been a disaster. The Tet Offensive was to drive home the lesson again and to hasten the provision of a more adequate base. There had been enough rifles this time, if a little late, only because the Secretary of Defense had intervened in December 1965 to require the procurement of 400,000 M16s for Vietnam. The weapons were available only because Colts could expand its production, not because Army or OSD had taken steps to expand the base.

*21 April message DA IN 159149 (MACV) to CINCPAC info JCS and others, "M16 Rifle Distribution to non-US Units".

CHAPTER XI - THE ICHORD INVESTIGATION

I

In the Spring of 1967 there were continuing Congressional complaints from soldiers in Vietnam and their relatives about serious malfunctioning of the M16 in combat. In May the introduction of the M16 into combat by the Marines brought alleged loss of life in a battle on Hill 881 that was widely reported by the Press* and TV.** On 10 May Chairman Mendel Rivers of the House Armed Services Committee announced that he had appointed a subcommittee under Representative Ichord to investigate the alleged M16 reliability problem and the sale of M16s to Singapore.*** The Subcommittee asked for Colonel Crossman**** to be called to active duty as an advisor. Initially it believed, as it was told by the Army, that there was no problem with the M16 and that its job was merely to investigate and make a public statement

*UPI report from Da Nang of USMC LGen Walt's press conference of 11 May. In meeting with the Press on the Hill 881 incidents, Walt backed the M16 and blamed any trouble primarily on the failure of individual Marines to clean the weapon. He could hardly do otherwise at that moment as a combat commander responsible for the morale of his troops and their confidence in their weapon. Privately, he was furious and said "They changed the weapon, didn't they?" He had tested the M16 in 1963.

**Transcript of 9 May Chet Huntley NBC news program reporting serious USMC reliability problems with the M16 in combat on Hill 881 in Vietnam.

***Release by House Armed Services Committee Chairman Rivers, "M16 Rifle Investigation," 10 May 1967.

****Colonel Crossman accompanied the Subcommittee to Vietnam. His advice to the Subcommittee was the same as the Army position.

that would restore any loss of troop confidence in the weapon. However, after a trip to Vietnam and some weeks of investigation, it drew the conclusion that there was a problem and that the only logical explanation was that the Army had deliberately damaged its own weapon and was covering it up by blaming it on the troops. It then began to investigate in earnest.

Scope

The Subcommittee conducted intensive hearings between 15 May and 22 August 1967. Field investigations were conducted at CONUS military bases, in South Vietnam, and at several military hospitals. Visits were made to Colts and to 2 former M14 producers.

27 July Army Statement

On 27 July the Army sent the Subcommittee a statement* covering the Army line on the malfunctions; i.e., it had been necessary to change to Ball powder because IMR could not meet the military specifications. The Air Force had required the change in its cartridges; and the cartridge companies, not the Army, had made the change in the Army ammunition. Attempts were being made to develop satisfactory IMR powder for use in addition to Ball powder and progress was being made. A buffer was being adopted primarily to replace the unsatisfactory original buffer. Chrome plating of the chamber was being accomplished to prevent chamber erosion. The malfunctions in Vietnam were due to training problems and had no connection with the change to Ball powder.

*Ichord Hearings.

These problems were temporary and had been corrected. The Army had no evidence that Ball powder caused malfunctions due to fouling. IMR powder had been used in acceptance testing only because regulations required the use of the nearest available cartridges. Payne and Wm Davis participated in the drafting of this statement.

7 July Supplementing Statement

As the Subcommittee accumulated documents and testimony contradicting the Army statement, on 7 July a supplemental statement was issued modifying the first one to the extent of saying that, in retrospect, the change to Ball powder had not been a good decision. However, it had been made on what was reasonable evidence at the time, and the problems that it had caused were corrected now.*

Brooks' Statement

On 15 August Assistant Secretary of the Army (Installations and Logistics) Brooks submitted a statement that, because there had been Ball powder in Vietnam for some time before the reliability problems were reported in the Army units in the Fall of 1966, the malfunctions could not have been caused by Ball powder.*

Ignatius Informed

On 27 July Assistant Secretary of Defense (Systems Analysis) Enthoven sent a special staff member to privately provide Ignatius the background of

*Ichord Hearings.

the reliability problem in the event he did not know. Ignatius was informed of the cause of the problem in technical detail, the test evidence, the fact that the rifles had been knowingly accepted at the factory with IMR powder, and the consequences of loss of soldier and Marine lives and confidence in the weapon in Vietnam. Ignatius asked what his visitor thought should be done. It was suggested that any sure correction now would require a high priority review and recommendations by a committee, independent of Army influence, reporting to the Secretary of Defense personally. A major problem would be to establish the present condition of the rifle, in which many piecemeal changes had been made because of the effects of Ball powder.

Nitze's Instruction

On 31 July on Ignatius' advice, DepSecDef Nitze published a memorandum directing a technical evaluation by DDR&E, with the assistance of the Services, by 9 August, and a combat survey in Vietnam by OASD(Admin), with the assistance of the Services and JCS, by 30 September. An overall report would be submitted by DDR&E to DepSecDef by 15 October 1967.* ** This put the solution, in fact, in the hands of the Army and DDR&E, while giving the appearance of an independent review.

*31 July 1967. Memo to Secs of Military Departments, Chairman JCS, the DDR&E, etc. from Nitze, "Evaluation and Survey of the M16 Rifle".

**This package is referred to hereafter as the Nitze Study.

The 9 August DDR&E Technical Evaluation

The input for the DDR&E technical evaluation was prepared by the Army (Payne) with minor inputs from the Air Force and the Marine Corps and submitted as a draft to Bell and Yates in DDR&E.* The front of the report conveyed that there was no reliability problem with the M16 except improper maintenance by soldiers, now corrected while appendices provided unevaluated accurate facts mixed with irrelevant material that only an expert could sort out. The DDR&E report, drafted by Bell and Yates, was submitted by Foster to Nitze on 9 August.** It drew a similar conclusion to the Army input study, dropped out the qualifications in the appendices, and made vague recommendations.

Enthoven Informs McNamara

On 12 September, Enthoven met privately with the DepSecDef and the SecDef and gave them a short unsigned memorandum on the reliability problem. The memorandum stated that there was a significant reliability problem, that it was not due primarily to poor maintenance, but rather to the use of Ball

* Undated (probably shortly before 9 August 1967). Memorandum to Bell (DDR&E) from Payne (Office of OR, DA), "Transmittal of Draft M16 Paper", w/draft paper with 3 Annexes.

**9 August 1967. Memorandum for DepSecDef from Foster, "Evaluation and Survey of M16 Rifle".

powder in weapons accepted with IMR powder. The corrective actions reported by the Army might not be sufficient or rapid enough. The Ichord Subcommittee seemed to be aware of the facts. The memorandum suggested that SecDef not commit himself to the DDR&E 9 August report*, that a memorandum be sent Sec Army asking some pointed questions, and a board with an outside expert staff be appointed reporting directly to SecDef with a 60-day deadline for a specific solution.

As a result of this meeting, SecDef asked Foster to take corrective action, and Foster asked for assistance from Enthoven. On 12 September Foster, with his Deputy Finn Larsen present, was provided with the same information, but in more detail, as had been Ignatius, Nitze, and McNamara. Foster asked for papers on a recommended solution, questions for SecArmy, and how to prevent this type of problem in the future. On 19 September he was provided with a proposed reply to DepSecDef setting aside the DDR&E 9 August evaluation and providing an accurate explanation of the causes of the reliability problem. This memorandum also inclosed a proposed memorandum from SecDef to SecArmy containing a list of questions to be answered by the Secretary of the Army and a request for test reports. A separate paper contained 10 suggestions for preventing the problem in the future. Foster did not use the proposed memorandum or modify his 9 August memorandum to Nitze although the papers may have had some effect.

*If SecDef had accepted and approved the reports that were being prepared for him under the Nitze memo - reports that contained the Army version of the reliability problem and the problem in Vietnam - the responsibility for these problems would have shifted to the SecDef.

Vietnam Survey Report

The report of the Vietnam survey required by the Nitzce memorandum was completed on 30 September 1967. The survey* was conducted by an Air Force Major General in the Directorate of Inspection Services, OASD(Admin) using project officers supplied by the Services. One of the officers supplied by the Army was an Army Materiel Command LTC who had participated in the original Ball powder decision. The survey and the report did not address whether the adoption of Ball powder, and consequent excessive cyclic rate and fouling, was the principal cause of the problem. Rather, the survey concentrated on training and cleaning equipment problems. The report concluded that these were the primary causes of the problem which, however, had already largely been corrected prior to the team's arrival in Vietnam.**

The first summary conclusion of the report was that the overall performance of the M16 rifle in Vietnam, in spite of reliability problems due to accelerated issue to rapidly expanding forces, "had the revolutionary impact of dramatic improvement in combat capability of US ground maneuver units in all types of operations." It is interesting to compare this conclusion with that of the Army Staff evaluation of 1962.

*30 September 1967. Report, OASD (Admin) Directorate of Inspection Services, "M16 Rifle Field Survey Vietnam Aug-Sept 1967".

**The report also contained some interesting incidental information: the malfunction problems were greatest in February-March 1967 (they were supposed to have been largely corrected by the end of November 1966); one division had a large replacement of barrels due to a policy of firing a high percentage of tracer ammunition; troops used the bolt assist device but no data had been gathered on whether it is helpful or harmful, although maintenance personnel report a problem of corrosion and rusting.

Foster's Recommendations to Nitze

On 17 October Foster forwarded to Nitze the Vietnam survey report, a summary of it and of his technical evaluation submitted earlier, and his recommendations.* His two summaries were inconsistent with each other. That of the survey report found the problem to be primarily due to inadequate care and cleaning of weapons and ammunition, now in hand; and modifications had made a better weapon. No evidence could be found that any Marines were killed on Hill 881 because of weapon malfunctions.

Changed Findings and Conclusions of the Technical Evaluation

The summary of the technical evaluation, on the other hand, found that the principal causes of the malfunctions had been due to excessive cyclic rate resulting from the change to Ball powder; and, in addition, there were malfunctions caused by fouling. Cyclic rates were now satisfactory with the new buffer and with either IMR or Ball powder. The chrome chamber also had improved the rifle which now had a satisfactory malfunction rate. As to barrel twist, the present rifle was accurate and highly lethal, but tests were underway to see if lethality could be improved without loss of accuracy. M16 rifles had been acceptance tested for extended periods of time with IMR propellant even though Ball propellant was in use in Vietnam, and it was known that the rifles would fail in the acceptance test if Ball propellant were used.

*17 October 1967. Memo for SecDef from Foster, "Evaluation and Survey of the M16 Rifle".

This summary was not, in fact, a summary of the 9 August report. That report, prepared by the Army and the Ordnance representatives in Foster's office, had drawn quite different conclusions. Foster wrote this new summary himself without superceeding or changing the 9 August report.

The Nitze Study Recommendations

Foster made 4 recommendations. An even greater emphasis should be placed on rifle and ammunition maintenance in Vietnam. The development of a disposable magazine should be accelerated. Army studies and experiments on lethality of the projectile should be accelerated. The Army should immediately investigate the reason for the continued use of IMR powder for acceptance testing of rifles that would fail if used with Ball powder. The impact of the last two recommendations were softened by preceding text.

On 18 October 1967 the SecDef forwarded the report, the 2 summaries, and the recommendations to the SecArmy and directed that the recommendations be carried out.*

*18 October 1967. Memo for SecArmy from SecDef (McNamara) "Evaluation and Survey of the M16 Rifle with 2 Atchs: 17 October Memo for SecDef from Foster (DDR&E), same subject, with 1 Atch: 30 September 1967 report of OASD(Admin) Directorate for Inspection Services, "M16 Rifle Field Survey Vietnam August-September 1967".

Ichord Subcommittee Press Release and Report

The following day the Ichord M16 rifle Investigating Subcommittee made a press release on its completed report and released the report and the report of hearings.

Ichord Press Release

The press release* charged that the Army changed the powder in 1964 without adequate testing. The resulting increasing in cyclic rate and fouling were the primary causes of the reliability problem in Vietnam. Army officials, as high as the Assistant Secretary of Defense for Installations and Logistics, knew that over half the rifles would fail to pass the acceptance test using the new powder and allowed the manufacturer to use the original powder to get the rifles accepted. The failure on the part of officials with authority in the Army to take corrective action on the ammunition deficiencies bordered on criminal negligence. The Subcommittee was not convinced that modifications will solve all of the malfunction problems. It recommended objective testing by an independent organization. The Services were negligent in failing to provide adequate supervision in care and cleaning of the weapon. The Subcommittee criticized sole source

*19 October 1967. House Armed Services Press Release, "Army's 'Unbelievable' Management Caused M16 Rifle Problems, Armed Services Subcommittee Found".

procurement and called for a GAO audit of Colts and Olin. It criticized the sale of M16s to Singapore when US forces had a shortage of rifles. It called upon SecDef and SecArmy to take such actions as necessary to avoid such mismanagement of Army weapons in the future.

Ichord Report

The Report contained a history of the rifle problem (including an extract from the report of Vance's 1963 IG investigation of the Army), the results of the June 1967 Subcommittee visit to Vietnam, a summary of high points of the hearings, and 31 findings and recommendations. It was a thorough and generally accurate report. It was well documented, in some cases with documents not previously known to OSD.*

Ichord Report of Hearings

The Report of the Hearings** contained testimony of Brooks***, MGen Anderson****, Stoner, Auman, Macdonald, Ito #, Yount, Payne, Ignatius,

*19 October 1967. "Report of the Special Subcommittee on the M16 Rifle Program of the Armed Services Committee of the House of Representatives".

**Released 19 October 1967. "Hearings before the Special Subcommittee on the M16 Rifle Program of the Committee on Armed Services of the House of Representatives 90th Congress, First Session. May 15, 16, 31, June 21, July 25, 26, 27, August 8, 9 and 22, 1967".

***Assistant SecArmy for Installations and Logistics.

****Director of Procurement, Office of Asst SecArmy for Installations and Logistics

#A Colts technical representative.

Vee, Barnes*, Davis, Benke** and others. Most of the Army witnesses evaded had faulty memories, or changed testimony when confronted with Subcommittee's facts; and, from the testimony, some clearly lied. Brooks, Anderson, Yount, and Ignatius were particularly poor witnesses. Subcommittee was able to extract documents from individuals as they got themselves into difficulty.

Stoner gave the history of the development of the AR15, testified that he advised against the change to Ball powder when asked after the fact by Vee, explained how failures to extract were caused by the change to Ball powder. He testified that the new buffer probably would not slow the extraction phase even though it would slow the cyclic rate. He had not been consulted on the design changes in the M16. Subcommittee was aware that in asking Stoner to testify it was placing him in the middle and obviously wanted to protect him.

On the Army position, put forward by Yount and others, that the Air Force had required the Army to procure Ball powder, the Subcommittee forced the Air Force witness (Aumen, a former Army Ordnance employee) to admit this was not accurate. Several expert witnesses testified that the bolt-assist devi

*Army Materiel Command General Counsel.

**President of Colts.

was unnecessary and potentially harmful. Yount testified it was added by direction and that the need had not been supported by test data. Macdonald, when pressed, identified General Wheeler by hearsay as the one who directed its inclusion. Macdonald and Benke provided detailed information on the origin and amounts of the royalties.

As mentioned earlier, Army submitted a written statement explaining the adoption of Ball powder and, under fire, it submitted a second one, partly retracting the first, admitting that excessive cyclic rate was a problem and that, in retrospect, the Ball powder decision was a poor one. Army witnesses denied that there was any evidence that Ball powder fouling was a problem. However, expert witnesses (and Army test reports cited by the Subcommittee) contradicted their testimony. Yount listed as the 10 most significant "product improvements" changes mostly caused by the adoption of Ball powder or otherwise harmful. As mentioned earlier, Ignatius based his defense of not going after the proprietary rights and of not establishing multi-source procurement on the grounds that neither the DA nor SecDef intended that the 85K Army M16s be more than a one-time buy.

The Subcommittee brought out the history of bad faith in negotiating for the proprietary rights. Dr. Payne was criticized for not sticking to his guns (apparently for taking a weak position on the M16 in DA after leaving OSD), and the Subcommittee got from him his November 1965 letter to LTC Janks,

his February 1967 paper to the Under Secretary of the Army, and his December 1966 memorandum reviewing the OCSA SAWS Study. This apparently was as close as the Subcommittee got to the existence of the Fall 1966 OCSA SAWS Study. Army witnesses implied that the Combat Development Command SAWS study, supplied to the Subcommittee, was the DA decision document.

Public Reaction

Following the release of the report there were many newspaper articles and editorials highly critical of the Army's handling of the M16 rifle reliability problem.* ** The Army's countering line also showed up in the press. A senior officer in Saigon had not noticed that the change in powders, as found in the Ichord investigation, was connected with the problem.***. Army and Marine Generals privately were blaming the M16 reliability problem on SecDef who they said forced the weapon on them without adequate testing. ****

*25 October 1967. Philadelphia Inquirer, "The M16 Mess." It is shameful for men to die "sacrificed to bureaucratic indifference or worse".

**22 October 1967. Denver Post, "Army Culpable in M16 Failures".

***25 October 1967, New York Times, "US Command in Saigon Overhauls M16 Rifle:."

****30 October 1967. Newsweek (The Periscope). "Inside Story. McNamara: Under the Gun?"

Subcommittee Follow-Up

On 25 October Chairman Rivers sent a letter to SecDef forwarding the Ichord report and asking him what actions he intended to take. He also asked for a copy of the "15 October Nitze Study". At the same time Rivers directed that the Ichord Subcommittee continue to follow the situation.

By 2 November the Subcommittee declared it would start making critical one-minute speeches on the floor of the House, directed at both the Army and SecDef, if there were not an indication soon of some action on the Ichord recommendations. The Army also had just let a large contract to Olin for more Ball powder ammunition without word to the Subcommittee that it intended to take any action on the powder problem other than the originally reported modifications to the weapon. On 9 November Rivers wrote SecDef a second letter pressing for action and referring to a letter from a constituent reporting 17 out of 19 M16s failing in a fire fight.

DoD Response Nr. 1 - Panama Test Announcement

On 18 November Nitze informed Rivers that OSD would conduct an M16 operational reliability test in Panama using a USMC company-sized unit and WSEG as Executive Agent. The letter said that modified (meaning that the original rifle would not be included) rifles using both types of powder (meaning Ball and a new, not the original, IMR). The letter implied that the Panama test was not necessary, but was being done to accommodate the Committee. On 21 November Ichord addressed the floor of the House. He reviewed the Subcommittee findings that the primary problem was the result

of the change to Ball powder. The Subcommittee was not yet convinced that the Army's modifications to the weapon had fully corrected the problem. A key recommendation of the Subcommittee had been that DoD direct an immediate test by an organization independent of the Army. He announced the Panama test. The Subcommittee would follow it, reserving judgment until fully advised on the scope of the tests.* **

The Nature of the Panama Test

The Panama test, like the Nitze Study, gave the appearance of independence from the Army while, in fact, it was not. Control over the objectives, scope, and basic design of the test was exercised by Yates, the Army's Agent in Foster's Ordnance Office, although Gibson, a Polaris missile expert, nominally was in charge. The Army provided the support for the Marine test, and Army officers in WSEG supervised the test.

The test plan did not include the original M16 and the original IMR powder as a basis for comparison.*** Reliability was not defined in a way that it could be related to effectiveness. The ammunition sample size was

*This reservation had crept in since the Rivers' press release earlier in the day. The Subcommittee was beginning to have second thoughts because of the design of the test implied in the Nitze letter.

**21 November 1967. Congressional Record - House, "Report on the M16 Rifle"

***According to Gibson, the original weapon and powder were not to be included because the real work was being done in the Army Arsenal System and Foster "does not want to dig up history".

too small. There was no provision for technical side tests for measuring the cyclic rate of the weapons. The data collection arrangements were poor and there was insufficient time for preparation. The test was to be completed on 1 February with the report to be submitted by 10 February.*

SecDef Withdraws IMR Powder

On 29 January, before the test was completed, DoD reported in a news release that SecDef had directed the Army to suspend the use and manufacture of IMR powder because data from the Panama test indicated that the malfunction rate for the IMR was substantially higher than for the Ball. The release did not point out that the IMR was not the original IMR (thus seeming to contradict the findings of the Ichord Subcommittee) and that the rifles used had not been the original rifles, but rather rifles modified to fire the Ball powder ammunition.**

The Subcommittee was upset at SecDef's action. It met with Foster at once on 30 January. Foster said that the decision and the release were handled in his absence, and without his knowledge, by his Deputy, Finn

*December 1967. WSEG "M16 Test Plan" w/2 Atchs: 1. 20 November 1967 Foster memorandum to SecArmy, Commandant USMC, Director WSEG setting forth the responsibilities of the addressees and establishing a 1 February 1968 target completion date; 2. 11 December 1968 memorandum from Foster to DepSecDef informing him he has reviewed the test plans and established 10 February for submission of the final report.

**29 January 1968. OASD(PA) News Release.

Larsen, direct with the SecDef. He said he would put out a correcting release, but he did not. Instead, he sent a letter on 31 January to the Subcommittee explaining that the DoD news release could be misinterpreted. The press immediately picked up the release and noted that it contradicted the Ichord findings that Ball powder was at fault.

On 1 February Ichord addressed the floor of the House to set the record straight. He reviewed again the Subcommittee's findings and placed in the record his remarks, the 29 January OSD news release, and the "correcting" letter to himself from Foster. However, the decision stood and the release was not withdrawn.*

At one stroke the Army-Foster maneuver had clouded the critical findings of the Ichord Committee, seemingly blamed the problems on the original weapon system which the Army had now "fixed", and eliminated any powder challenges to Ball powder procured sole source from Olin Mathieson. The Army, through its agents on Foster's staff, was able to involve Foster; and the Army and Foster together had out-manuevered the Subcommittee in the matter of the IMR powder withdrawal. To a large extent this was possible because McNamara, in the last years of his administration of the DoD had delegated his authority, without supervision, to DDR&E and Assistant Secretaries of Defense. On the other hand, overall, the Subcommittee's investigation, report, and follow-up were skillfully and courageously done and resulted in substantial corrections.

*1 February 1968. Congressional Record - House.

DoD Response Nr. II - Foster's Report to Rivers

On 15 February Foster sent a letter to Rivers responding to the latter's 25 October letter to the SecDef requesting response to the Ichord report. The letter inclosed a DDR&E report on the rifle problem and a 9 February memorandum from Larsen to SecArmy on actions on the Ichord report.

The letter included the points which follow. There were some mistakes and errors of judgment and resistance to change. However, this was due largely to need for urgency of getting weapons for Vietnam. The Ichord report was correct and helpful in some respects. The superior fire power of the M16 had saved American lives and tipped the scales toward victories for our forces in battle.

Thereafter there are few accurate statements in the letter. The present reliability performance of the rifle was excellent. The most serious malfunction -- failure to extract -- was due to inadequate care and cleaning rather than to the effects of Ball powder. The malfunctions due to increased cyclic rate of Ball powder were of a less serious type and generally were acceptable. Immediate steps had been taken to provide the modified buffer when the cyclic rate problem was identified. It was not possible to demonstrate a causal relationship between the fouling characteristics of Ball powder and malfunctions. The use of Ball powder was not the Army's fault because the ammunition manufacturers chose not to load IMR, and this was

done because the IMR could not meet the pressure/velocity specification. The project manager did use IMR ammunition to accept weapons that would not pass or function properly in the field with Ball powder. However, he acted within the scope of his authority and the Technical Coordinating Committee had determined the malfunction rate to be acceptable. The Commanding General of the Army Materiel Command had immediately ordered this practice to stop when he learned of it.

The letter listed actions underway that it considered to be consistent with the Subcommittee's objectives. It cited the Panama test as being in line with a Subcommittee recommendation and promised a final report on the precautionarily withdrawn "IMR". DDR&E was making a long-term examination of the DoD approach to development and test of small arms weapons, propellants, and ammunition.*

The DDR&E report forwarded by this letter was a 25-page report containing a 14-page history of the development, testing, and introduction of the M16 weapon system, followed by replies to the Subcommittee's 31 findings condensed to 14. There were few accurate statements in the report which was the Army position under DDR&E cover. The main points were as summarized in

*15 February 1968. Letter to Honorable L. Mendel Rivers, Chairman, Armed Services Committee from Foster w/2 Atchs: 1. February 1968 DDR&E report, "An Appraisal of the M16 Rifle Program". 2. 9 February 1968. Larsen Memorandum for Secretary of the Army, "Actions on Recommendations on Ichord Report".

the letter, except that there was no general admission of mistakes or errors in judgment.*

The Larsen memorandum summarized reports desired and due dates on miscellaneous actions underway on Ichord report items. Barrel twist (Army report due March 1968) was one item. Two of the items were being investigated by "an Army Chief of Staff Study".**

Subcommittee Reaction to Foster Report

The Subcommittee again was upset. It met with Foster on 21 February to suggest he restudy his report to Rivers. When they said his report was not objective he said he had gone over it in detail. He thought he had made a good compromise between the position the Army wanted to take and the one DDR&E wanted to take. He said, however, he will willing for one of them to go over the report with a member of his staff, but the meeting did not take place. He provided them with a copy of the Panama Test Report which said DDR&E was about to release to the Army. (The Army had already seen it.) The Subcommittee noted deficiencies in the test.

Panama Test Results

The Subcommittee was right. The test did not include original IMR powder and original weapon, define reliability in terms of effectiveness, or attempt

*February 1968. DDR&E Report, "An Appraisal of the M16 Rifle Program".

**9 February 1968. Memorandum for SecArmy from Larsen, "Actions on Recommendations of the Ichord Report".

to determine the causes of the malfunctions. These were faults deriving from the DDR&E directive. The conditions of the test and the climate were not severe enough to be representative of combat and the Vientam environment, understressing the weapon system. The test data did not support the conclusions of the report. They showed that neither the Ball powder (for which the buffer was designed) nor the new "IMR" were well matched to the modified weapon. Weapons with the Ball powder showed the effects of too high cyclic rate and those with "IMR" of too low cyclic rate. The chrome chamber modification increased the malfunctions with Ball powder and decreased them with the "IMR".* While the "IMR" had many more malfunctions than the Ball, the Ball had 4 times as many serious malfunctions.

II

Aftermath of the Investigation

In late October 1967 in response to SecDef's directive on the findings of the Nitze Study, the Army initiated an IG investigation and quickly cleared Colonel Yount.

Army Audit Trail Study

The Chief of Staff also established an 8-man committee in his office to complete by 15 March an "audit trail study" of all Army and OSD rifle decisions for many years back, for the ostensible purpose of developing a

*Other Army and Air Force tests were showing the same results.

reply to the Ichord Subcommittee. The committee visited Vietnam twice and completed its "close-hold" report on 1 June 1968. However, at that time General Johnson was in the process of retiring.

Although the committee concentrated its work in Vietnam on the problems of troop training and cleaning and maintenance, its findings are interesting to compare with the reports of the Army and DDR&E to the SecDef and to the Ichord Subcommittee. Although the reliability of the weapon had improved, sixty-seven percent of the M16s still had failures to extract after the corrective modifications had been made to the weapons in Vietnam. Eighteen percent of the weapons certified to have the modifications did not have them. Many of the soldiers armed with the M16 in Vietnam had not received any training with it.* There still were shortages of cleaning equipment and materials.

Ball Powder Improvement?

If the weapon were to be adopted to Ball powder rather than to return to IMR powder, a logical course of action would be to attempt to reduce or eliminate the fouling characteristics of Ball powder. LGen Betts was asked by a Congressional Committee if this were being done and replied in the negative. However, an Army report would indicate that this may have been quietly accomplished.

*Basic training had been conducted with the M14 and not all received transition training when assigned to Vietnam.

Lethality

The Army's lethality review found in 1968, on the basis of extensive combat wound ballistics data from Vietnam, that the M16 with the 1:12 barrel was 10% more lethal than previous Army data had shown.* With respect to changing back to the more lethal 1:14 barrel twist, it was maintained that this was not practicable now because the Army Materiel Command supposedly had allowed Colts to manufacture barrels by a method that resulted in twist variations of as much as an inch. The Army was going back to a slightly more pointed bullet with tight quality control on bullet shape.** This was a convenient finding because it justified retention of the 1:12 on the basis that it was more lethal than expected, on the one hand, and that it was not possible to change to 1:14 on the other; and it did not require an admission that there had been no basis for the original BRL studies on either lethality or barrel twist. The story that barrel twist cannot be controlled in production to better than 1 inch in 12 inches is not credible. On the other hand, it is likely that the 10% increase in lethality is an understatement. The new finding, based on combat data, supported the original Hitch report lethality estimate. The latter had been based on the practical evidence of the small amount of wound data then available from Vietnam and observation of the effects of shooting at cans filled with water, watermelons, soap, and clay.

*The determination was made by the comparison by BRL of its expected wound tracts with actual wound tracts.

**The original Stoner bullet had been more pointed. As pointed out earlier, the more pointed (slender) shape should be more lethal and hold up its velocity better with range. Earlier the Army had claimed that the more slender bullet could not be used without further reduction in barrel twist.

Future Rifle Program

In Foster's report to Rivers he said that he was taking steps to improve the future rifle program. This resulted in a three-pronged effort: DDR&E provided some additional funds for Army small arms R&D; it encouraged the Army to set up a special Army Materiel Command small arms weapon system agency at Aberdeen under an Ordnance Colonel; and ARPA in September 1968 established a future small arms weapons panel of mainly outside experts.

The new small arms agency may have been a step backwards. It enabled the Army Materiel Command to weaken the rifle project manager concept without providing anything effective in its place. ARPA, so far, has not shown much skill in exploiting the new panel vis-a-vis the Services on the small arms problem. However, with better ARPA management leverage could have some effect. In fact, ARPA leverage of sending the AR15 to Vietnam for test and procuring test quantities of the Stoner 63 system, under Project AGILE, is where it all started.

II

Second and Third Source Negotiations

It will be recalled that in mid-December 1966, in connection with the SAWS decisions, the SecArmy recommended, and the SecDef directed, the establishment of a second source of procurement for the M16 rifle. With the implementation in the hands of those who had opposed the standardization of

the M16, the steps to acquire an expanded base were to be interminably slow, and to be speeded up only by the January 1968 Tet events. Again, the delay was a near-thing and could have had tragic consequences.

It took the Army Materiel Command from December 1966 until 1 June 1967 to negotiate for the production rights and technical data package. A bidders' conference was not scheduled until September and then slipped to October. A solicitation then was made for a second source multi-year procurement of 167,000 rifles. On this schedule the proposed contract would be let after the first of the year with first production not anticipated before August 1969.* In November, the second source contract had slipped to June.**

With the enemy Tet offensive in South Vietnam in January 1968, urgent decisions were made to increase the size of the US forces in Vietnam and to arm additional South Vietnamese forces with the M16. As a result the Army decided in March 1969 to let a contract to GMC and to expand the existing source at Colts to 50,000 rifles per month. Later in the month the Army changed the decision to two additional sources rather than one and to triple M16 production.*** It had taken 16 months since the SecDef's decision for the Army to select a contractor, and the number of sources and the planned production rate was virtually the same as those recommended in the OCAS Study in October 1966.

*Ichord Report.

**29 November 1967. Army Times, "M16 Pact Slated for Mid-June".

***31 March 1968. The Sunday Star (Washington), "M16 Rifle Output Sped to Update Saigon Army".

Distribution

The actual production and distribution of weapons naturally lagged behind the procurement decisions. On January 1968, at the time of the Tet offensive, apparently only one South Vietnamese division and the Rangers had actually been equipped with the M16 rifle.* On 23 April the new SecDef Clifford announced that by July 1968 all South Vietnamese combat elements would have the M16 and by November 100,000 more would be issued to the Regional and Popular Forces.** In June 1968 the Army said that the ARVN had enough M16s for most combat maneuver battalions. It had taken 2½ years to attain the scope of issue promised to Westmoreland in December 1965.. Moreover, all of this production had been from unplanned expansion of the original, single source, as would be that for some months to come.

III

The Procurement Investigations

In mid-March 1969 the Army gave advance notice to the House Armed Services Committee that it had just negotiated a non-competitive contract with GMC (Hydromatics Division), as the "third" production source. In

*29 January 1968. New York Times, "Enemy Firepower Said to Increase". (Increase from 19 enemy battalions equipped in 1965 with AK47 to all the enemy's operational battalions plus a further 50 undermanned battalions now. South Vietnamese Army is out-gunned. So far 1 South Vietnamese division and the rangers have the M16.)

**23 April 1968. New York Times, "Clifford Expects Saigon to Take on More of Fighting".

view of the urgent need for production as a result of the Tet offensive, it had decided to expand Colts production to 50,000 rifles per month and to jump over the second source contracting, due to be completed in the summer, to let a contract at once for a third source. The contract was for 25,000 rifles per month with production to begin in October 1969. Hydromatics was one of the four leading contenders in the on-going second source evaluations.

As a result of immediate Congressional objections to this non-competitive contract in the face of three other second source contenders, the Army quickly changed its decision to let the second and third source contracts in April from among the four second source contenders. These were GMC-Hydromatics (Detroit), Harrington and Richardson (Massachusetts), Maremont (Maine), and Cadillac-guage (Detroit). H&R was a company with close relations with the Ordnance Corps. It had had an unsatisfactory production record with the M-14 and a bad reputation in the resulting Congressional Investigations. Maremont was the manufacturer of the M60 machine gun. Cadillac Guage, a subsidiary of Excelsior Corporation, owned the rights to the Stoner 63 weapon system.

In the process of selecting the winners, the Army sent letters to all four companies notifying them that they were technically qualified. It also sent them a message dropping the penalty provisions for late deliveries and dropping the \$4.5 million limit on new facilities. It sent two of the companies letters notifying them not to bid because the

award would be made on a basis other than cost. It then awarded the contract to the two highest bidders at first year costs that were $2\frac{1}{2}$ (H&R) and 3 (GMC) times that of the current price at Colts.* The GMC bid at \$56 million was \$20 million more than Marcmonts.**

Both the Ichord and Stennis Subcommittees investigated. The Army justified its procedure on the basis that the need for the procurement was urgent and that it had more confidence in the two companies it had selected. It also said that the prices were subject to renegotiation if the costs were less than anticipated.

The Stennis Subcommittee concluded that the eliminating of companies before prices were considered was wrong and unnecessary. GMC had been selected at a \$20 million price increase over others who had been found competent by the Army's own evaluation. The removal of price as a factor was not even plausibly supported by the reasons advanced by the Army. The Ichord Subcommittee came to similar conclusions. The GAO found the Army procedure technically not illegal, and Ichord requested the GAO to prepare legislation to make it so.***

*Colts had financed its own base and amortized it. Its first year unit price in 1962-63 was about the same as its current price.

**10 May 1968. The Washington Post, "Penalties Waived. Rifle Contract Terms Disclosed".

***18 June 1968. Congressional Record - House, "M16 Procurement".

* * * * *

In preparation for the Fiscal Year 1971 program and budget the Army requested M16 rifles to replace the remaining M14s to achieve a one-rifle small arms family. In reviewing the request the Office of the Assistant Secretary of Defense (Systems Analysis) concluded that the M14 was actually better for some troops than the M16 and would be as good for others and that the M16 had a slightly lower per round effectiveness than the M14. OASD(SA) now was arguing for the M14 over the M16 in ignorance of the testing and evaluation that had been done in 1962 and since and in which it had played a key role; and the Army was countering by arguing that light-weight, and high rate of fire were important and that the M16 was more lethal than the M14!* Matters had come a full cycle. However, like other good and bad programs before it, the M16 program probably now had a momentum of its own....

*Memorandum for SecDef from SecArmy, "Draft Major Program Memorandum on Land Forces, dated 14 May 1969", dated 5 July 1969, inclosure 4 (supplementary comments).