

*Why the rifles jammed*

# M-16: A BUREAUCRATIC HORROR STORY

BY JAMES FALLOWS

**B**ETWEEN 1965 AND 1969, MORE THAN A MILLION American soldiers served in combat in Vietnam. One can argue that they should never have been sent there, but no one would argue that, once committed to battle, they should have been given inferior equipment. Yet that is what happened. During those years, in which more than 40,000 American soldiers were killed by hostile fire and more than 250,000 wounded, American troops in Vietnam were equipped with a rifle that their superiors knew would fail when put to the test.

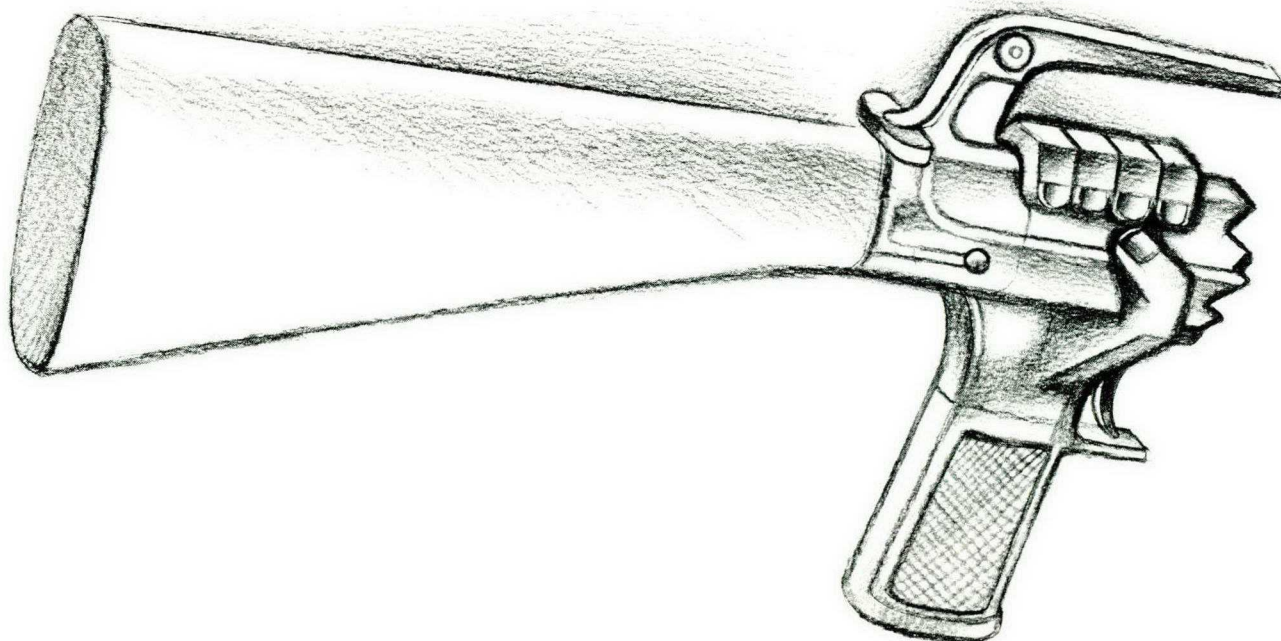
The rifle was known as the M-16; it was a replacement for the M-14, a heavier weapon, which was the previous standard. The M-16 was a brilliant technical success in its early models, but was perverted by bureaucratic pressures into a weapon that betrayed its users in Vietnam. By the middle of 1967, when the M-16 had been in combat for about a year and a half, a sufficient number of soldiers had written to their parents about their unreliable equipment and a sufficient number of parents had sent those letters to their congressmen to attract the attention of the House Armed Services Committee, which formed an investigating subcommittee. The subcommittee, headed by Representative Richard Ichord, a Demo-

crat from Missouri, conducted a lengthy inquiry into the origins of the M-16 problem. Much of the credit for the hearings belongs to the committee's counsel, Earl J. Morgan. The hearing record, nearly 600 pages long, is a forgotten document, which received modest press attention at the time and calls up only dim recollections now. Yet it is a pure portrayal of the banality of evil.

Nearly a century before American troops were ordered into Vietnam, weapons designers had made a discovery in the science of "wound ballistics." The discovery was that a small, fast-traveling bullet often did a great deal more damage than a larger round when fired into human or (for the experiments) animal flesh. A large artillery round might pass straight through a human body, but a small bullet could act like a gouge. During the early stages of the congressional hearings, Ichord asked Eugene Stoner, the designer of the original version of the M-16, to explain the apparent paradox of a small bullet's destructive power. The answer emerged in the following grisly exchange.

ICHORD: One Army boy told me that he had shot a Vietcong near the eye with an M-14 [which uses a substantially heavier bullet] and the bullet did not make too large a hole on exit, but he shot a Vietcong under similar circumstances in the same place with an M-16 and his whole head was reduced to pulp. This would not

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appear to make sense. You have greater velocity but the bullet is lighter.

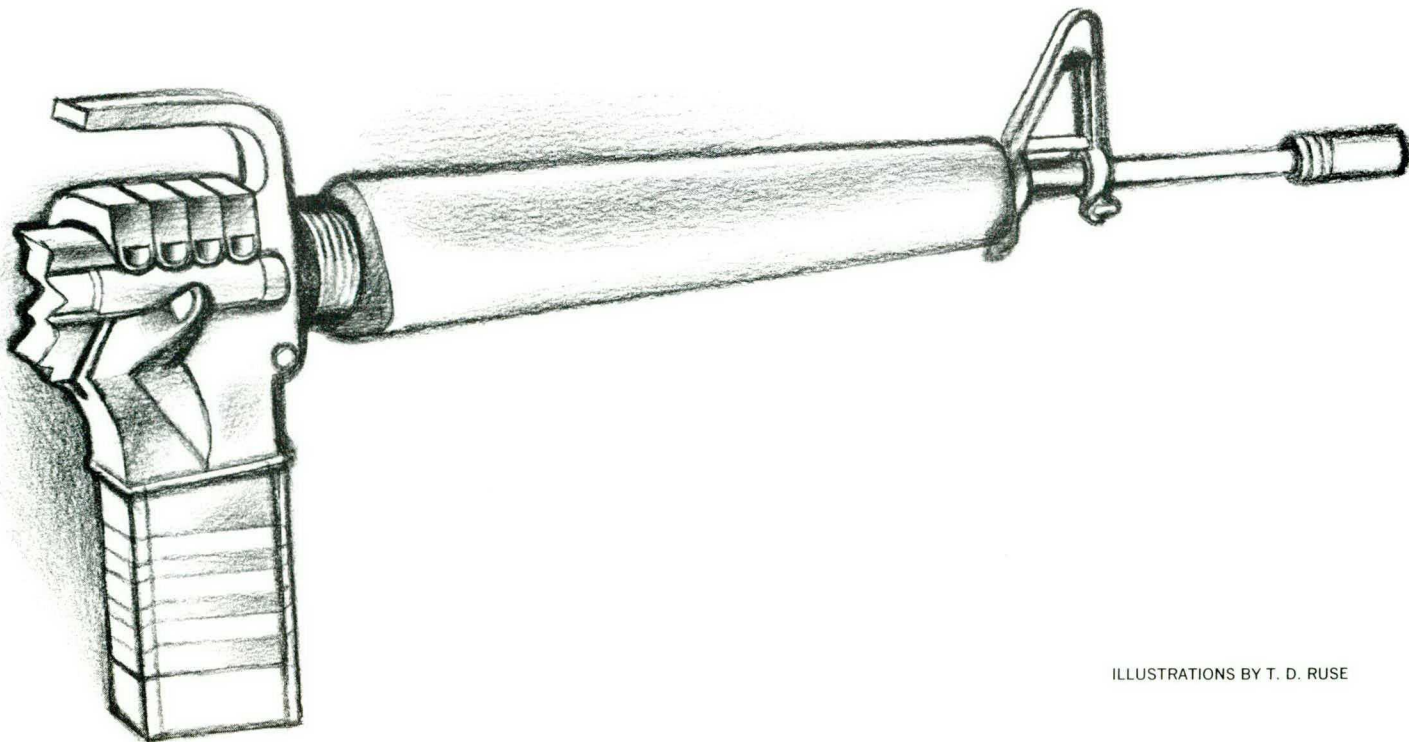
STONER: There is the advantage that a small or light bullet has over a heavy one when it comes to wound ballistics. . . . What it amounts to is the fact that bullets are stabilized to fly through the air, and not through water, or a body, which is approximately the same density as the water. And they are stable as long as they are in the air. When they hit something, they immediately go unstable. . . . If you are talking about .30-caliber [like the bullet used in the M-14], this might remain stable through a human body. . . . While a little bullet, being it has a low mass, it senses an instability situation faster and reacts much faster. . . . this is what makes a little bullet pay off so much in wound ballistics.

The farsighted Willard G. Wyman, the commanding general of the Continental Army Command, had asked Stoner to design a rifle precisely to take advantage of the "payoff" of smaller bullets. The AR-15, the precursor of the M-16, used .22-caliber bullets instead of the .30-caliber that had long been standard for the Army. As early as 1928, an Army "Caliber Board" had conducted firing experiments in Aberdeen, Maryland, and had then recommended a move toward smaller ammunition, perhaps of the .27-caliber range; but the Army, for reasons that were partly technical but largely traditional, refused then and for the next thirty-five years to change from the .30-caliber bullet, which it chose to describe as "full-sized."

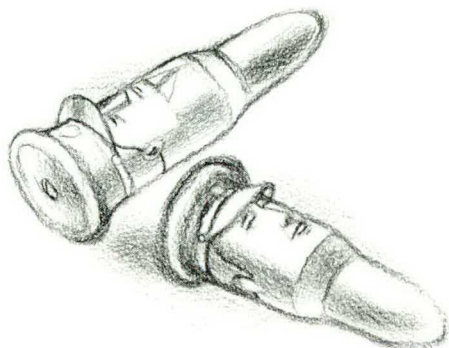
A second discovery about weaponry lay behind the design of Eugene Stoner's AR-15. In studies of combat units during World War II, S. L. A. Marshall found that nearly four fifths of combat soldiers never fired their weapons during battle. This finding prompted the Army to take a closer look at the weapons the soldiers

used. It turned out that one group of soldiers was an exception to this rule: those who carried the Browning automatic rifles (BARs). These were essentially portable machine guns, which could spray out bursts of continuous fire. (The rifles that the other soldiers carried, M-1s, were "semiautomatic," requiring a separate trigger squeeze for each round.) Within a combat group, firing would begin with the BAR man and spread out from him. The nearer a soldier with an M-1 stood to the BAR man, the more likely he was to fire. The explanation most often suggested was that the infantryman carrying a normal rifle felt that his actions were ultimately futile. John Keegan said in *The Face of Battle*, "Infantrymen, however well-trained and well-armed, however resolute, however ready to kill, remain erratic agents of death. Unless centrally directed, they will choose, perhaps badly, their own targets, will open and cease fire individually, will be put off their aim by the enemy's return of fire, will be distracted by the wounding of those near them, will yield to fear or excitement, will fire high, low, or wide." The normal infantryman could not see the enemy clearly or have any sense of whether he had made a hit. The BAR man, by contrast, had the sense that he could dominate a certain area—"hose it down," in the military slang—and destroy anyone who happened to be there.

After World War II, there was a demand from some officers for a new infantry weapon that would be light, reasonably accurate, and capable of fully automatic fire. The Army's response was to build the M-14, adopted in 1957. This was basically an automatically firing, less solidly made version of the Army's previous standard, the M-1. Like the M-1, it used a large, .30-caliber round. Its disadvantage was that it was virtually uncontrollable when on fully automatic fire. The explosive charge



needed to propel the heavy bullets was so great, and the rifle itself so flimsily built (in an effort to make it lightweight), that the kick was ferocious. A soldier who used it on automatic fire was likely to get a nosebleed, in addition to being unable to control the weapon's aim. It was with this rifle that American troops trained in the early and middle sixties, and it was the weapon they took to Vietnam in the first years of the war.



**T**HE M-14 WAS A PRODUCT OF THE ARMY'S OWN ARSENAL system—an informal congeries of weapons laboratories, private contractors, and Army officials which is often collectively known as the "ordnance corps." At various times in their history, the Army bureaus responsible for small-arms development have gone by different names, including, in the period relevant to this story, the Army Materiel Command and the Ordnance Department. The ordnance corps had been in charge of small-arms design for the Army for more than a hundred years. In questions of technology, it emphasized the outlook of the "gravel-bellies"—the sharpshooters and marksmen who measured a weapon by how well it helped them hit a target 400, 500, 600 yards away in peacetime rifle competition. "The M-14 had been developed on the premise that aimed fire, the fire of the marksman, was of the utmost importance in combat," a Rand employee named Thomas McNaugher wrote in a study of the M-16. "To the U.S. Army, it was more than a premise, it was a creed that had evolved over nearly a century since the service adopted its first rifle in 1855." Giving generous credit to the element of rationality in the ordnance corps' practices, McNaugher says that the marksman's philosophy was appealing because the "Ordnance Department, the agency that developed and produced the services' rifles and ammunition, preferred tactics that stressed slow and deliberate fire because it meant less waste of ammunition and hence less strain on the Department's supply lines and production facilities."

For the marksman's purposes, a large, heavy round was preferable, since it remained steady in flight and was less sensitive to wind. Hand in hand with this marksman's outlook went an insistence on rigid technical specifications. If a round didn't leave the muzzle at 3,250

feet per second, it was no good; if it couldn't be fired in the Arctic and the Sahara and perform just as well in either place, it was not fit for Army duty. These emphases had little to do with the experience of jungle combat, in which most fire fights took place at ranges of no more than thirty to fifty yards, and in which speed and surprise were so important that it might often cost a soldier his life to take the time to aim his rifle instead of simply pointing it in the right direction and opening up on automatic.

The ordnance corps was small-time, insular, old-fashioned. Its technical experts were divided into a number of subspecialties: internal ballistics (which concern the bullet's behavior before it leaves the weapon), external ballistics (the bullet in flight), wound ballistics, and other areas. Its organization was further fragmented among technicians at the arsenals and the research center and the military bureaucrats at the Pentagon. Historically, its first instinct, when presented with a new technical possibility, had been to reject it and stick to traditional solutions. Twice since the Civil War, American Presidents had had to force the ordnance corps to adopt new rifles that had come from outside its own shop.

There was also an air of coziness in relations between the ordnance corps and the rifle- and ammunition-makers who supplied it. "Sole-source" contracts, which gave one company a monopoly on the Army's business, were not unusual. One of the most important of these, which would prove to have an especially crucial effect on the development of the M-16, was with the Olin Mathieson Corporation, which since the end of World War II had been the Army's supplier of a kind of gunpowder known as "ball powder."

The ordnance corps had every reason to dislike the AR-15. It came from an outside inventor, and threatened to replace the M-14, a product of the corps' own arsenal system. It was not a gravel-belly's or a technician's rifle. And it used what was, by the standards of the corps, a laughably small round—a .22-caliber bullet, the kind kids used to shoot at squirrels. In the early fifties, the U.S. ordnance corps had fought a grueling battle against European governments in NATO, which wanted to have a small bullet adopted as the NATO standard. The ordnance corps' struggle to impose the .30-caliber bullet as NATO standard had been successful, but it had left much ill will in its wake. Having won that struggle, the Army was not likely to surrender meekly on the same point in its own home territory.

**A**T ABOUT THE TIME THE M-14 WAS ADOPTED AS THE Army's standard, Eugene Stoner was completing his work on the AR-15. Stoner was known as one of the great figures in the special calling of small-arms design. Like some of the other outstanding American rifle designers—including John Browning, inventor of

the Browning automatic rifle, who had to sell his weapon to foreign governments after rejection by the American ordnance corps—Stoner had never seen his models win easy acceptance by the Army. He was working for the Armalite Corporation when he finished developing the AR-15.

The rifle combined several advantages. One was the lethal “payoff” that came with its .22-caliber bullets. The smaller, lighter ammunition meant that the rifle could be controlled on automatic fire by the average soldier, because its kick was so much less than the M-14’s. The rifle itself was also lighter than the M-14. These savings in weight meant that a soldier using the AR-15 could carry almost three times as many rounds as one with the M-14. This promised to eliminate one of the soldier’s fundamental problems in combat: running out of ammunition during a fire fight. The rifle had two other, technical advantages. One was the marvelous reliability of its moving parts, which could feed, fire, extract, and eject 600 or 700 cartridges a minute and practically never jam. The other was a manufacturing innovation that drastically cut the cost of the weapon. The parts were stamped out—not hand-machined, as in previous rifles—and they could be truly mass-produced. The stock was made of plastic, which further cut the cost, and to traditionalists, this was one more indication that the AR-15 was not a real weapon. They said that you couldn’t use a plastic rifle as a club. Stoner’s reply, in effect, was that with the AR-15’s reliability and destructive power you wouldn’t need to.

The AR-15 was tested in 1958 at three military bases. The reports were favorable, but there were reservations from the ordnance establishment about the propriety of using such small-caliber ammunition. To reconcile the differences in opinion, the Army commissioned an extensive series of tests at its Combat Developments Experimentation Command, known as CDEC, at Fort Ord, California. These tests ran from the fall of 1958 until the spring of 1959, and were designed not to follow the usual marksman’s pattern but to simulate the conditions of small squads in combat. In the tests, the AR-15 was matched against the M-14 and another lightweight rifle, made by Winchester. The results, released in May of 1959, included these findings:

a. With a total combat weight per man equivalent to that planned for riflemen armed with the M-14, a squad consisting of from 5–7 men armed with the [AR-15] would have better hit distribution and greater hit capability than the present eleven-man M-14 squad. . . .

b. By opinion poll, the experimentation troops favor the [AR-15] because of its demonstrated characteristics of lightness in weight, reliability, balance and grip, and freedom from recoil and climb on full automatic. . . .

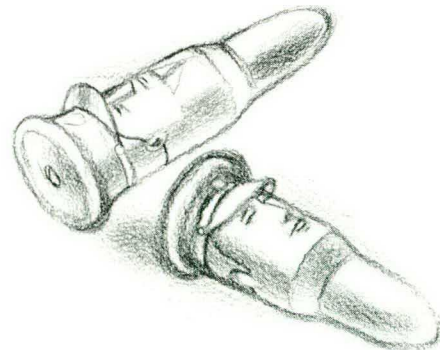
h. The attributes demonstrated by the prototype weapons of the lightweight high-velocity category indicate an overall combat potential superior to that of the M-14. Such advantages include . . . lightness in weight

of arms and ammunition, ease of handling, superior full automatic firing capability, accuracy of the Winchester and functional reliability of the Armalite [AR-15].

The report’s conclusion was that the Army should develop a lightweight rifle “with the reliability characteristics of the Armalite” to replace the M-14. “Concurrent with the adoption of a lightweight high-velocity rifle,” the report said, “serious consideration [should] be given to reduction in the size of the present squad,” in light of the increased firepower of the new weapons. The repeated references to the “reliability” of the AR-15 bear emphasis, in view of the weapon’s unreliability after it had been transformed into the M-16 and sent to war.

After the CDEC tests, the Army admitted the theoretical “promise” of the lightweight system but rejected it as a practical proposition. Emphasizing the importance of having all rifles and machine guns use the same ammunition, the Army ordered full production of the .30-caliber M-14.

However, advocates of the AR-15 enlisted the support of a redoubtable gun enthusiast, General Curtis Lemay, then the Air Force’s Chief of Staff. Based on his interest, the Air Force conducted further tests and inspections and declared the AR-15 its “standard” model in January of 1962. The Air Force then took a step that later had enormous significance. On the advice of the Armalite Corporation, which owned the design for the rifle, and of Colt, which had the contract to manufacture it, the Air Force tested the ammunition that the Remington Arms Company had developed for the AR-15. After the tests, the Air Force declared the ammunition suitable for its purposes. In May of 1962, it ordered 8,500 rifles from Colt and 8.5 million rounds of ammunition from Remington.



AT THIS POINT, DECISIONS ABOUT THE RIFLE MOVED from the world of tests and paper specifications to that of actual combat. In 1962, the Defense Department’s Advanced Research Projects Agency, prompted by staff members who were advocates of the AR-15, managed to get 1,000 AR-15s shipped to Vietnam for tests by soldiers of the Army of the Republic of Vietnam (ARVN). The rationale was that Vietnamese sol-

diers were too short and slight to handle rifles with full-sized ammunition. The reports were glowing, especially about the phenomenal reliability of the weapon. There were no broken parts reported in the firing of 80,000 rounds during one stage of the tests. In the whole period, only two replacement parts were issued for all 1,000 rifles. The report recommended that the AR-15 be shipped in bulk to South Vietnam as standard equipment for the ARVN soldier. But Admiral Harry Felt, then the Commander in Chief, Pacific Forces, rejected the recommendation, based on Army advice, saying that it would create a complicated logistics problem to have different rifles using different rounds in the war zone. The Joint Chiefs of Staff supported his decision.

Through 1962 and 1963, there followed a series of tests, evaluations, and counter-evaluations by the American military, the repeated theme of which was the lightness, "lethality," and reliability of the AR-15. The results of one test, conducted by the Defense Department's Advanced Research Projects Agency, were summed up in September of 1962 by the Comptroller of the department:

Taking into account the greater lethality of the AR-15 rifle and improvements in accuracy and rate of fire in this weapon since 1959, in overall squad kill potential the AR-15 rifle is up to 5 times as effective as the M-14 rifle. . . .

The AR-15 rifle can be produced with less difficulty, to a higher quality, and at a lower cost than the M-14 rifle.

In reliability, durability, ruggedness, performance under adverse conditions, and ease of maintenance, the AR-15 is a significant improvement over any of the standard weapons including the M-14 rifle. The M-14 rifle is weak in the sum of these characteristics. . . .

It is significantly easier to train the soldier with the AR-15 than with the M-14 rifle.

Three times as much ammunition can be carried on the individual soldier within the standard weapon-and-ammunition load. . . .

Meanwhile, the Army Materiel Command, home of the ordnance corps, was conducting its own evaluations of the AR-15. In these, too, there was consistency. The corps found little to admire in the AR-15, and many technical objections to it. It had poor "pointing and night firing characteristics"; its penetration at long distance was also poor. The ordnance corps' recommendation was to stick with the M-14 until a "radically" better model, based on advanced technology, emerged from research programs that the ordnance labs had recently begun.

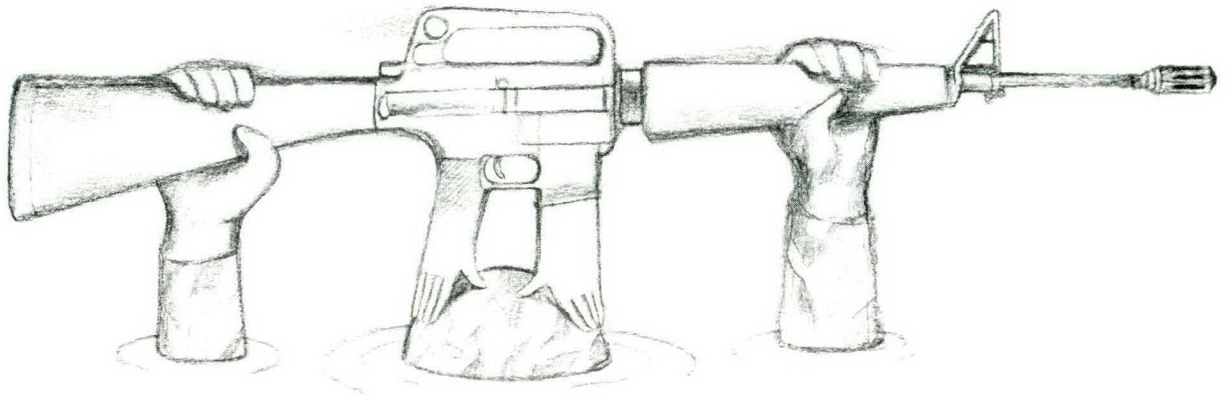
Early in 1963, with strong support from President Kennedy and Secretary of Defense Robert McNamara, the Special Forces (better known as the Green Berets) asked for and got approval to use the AR-15 as their standard issue, because they needed lightweight gear for mobility and stealth. The Army's airborne units in Vietnam also got it, as did some agents of the CIA. As the AR-15 attracted a greater and greater following among

units actually operating in Vietnam, Secretary of the Army Cyrus Vance asked the Army's inspector general to look again at the reasoning and evidence that had led the Army Materiel Command to reject the AR-15. His investigation found that the tests had been blatantly rigged. The M-14s used in the tests were all handpicked, hand-made, "matchgrade" weapons (suitable for marksmen's competitions), while the AR-15s were taken straight from the box. The ammunition for the M-14 had also received special care. The inspector found that various organizations of the ordnance corps had met beforehand to discuss how to fix the tests. They agreed to take a dry run through the tests, and then (according to the printed minutes of their meeting) include in the final evaluations "only those tests that will reflect adversely on the AR-15 rifle. . . ." The lines became more clearly drawn within the Pentagon, with the Air Force and the civilian leadership of the Defense Department (especially McNamara) in favor of the AR-15 and the Army ordnance establishment opposed.

As the fighting in Vietnam grew more intense, in late 1963, procurement of the rifle began, with 19,000 rifles for the Air Force and another 85,000 for the special Army units. Robert McNamara, in the interest of efficiency, designated the Army as the central procurement agency for all the services. It was at this point that the Army ordnance corps got hold of Eugene Stoner's AR-15, declared it to be inadequately "developed," and "militarized" it into the M-16.

The first of several modifications was the addition of a "manual bolt closure," a handle that would permit the soldier to ram a cartridge in manually after it had refused to seat properly by itself. The Air Force, which was to buy the rifle, and the Marine Corps, which had tested it, objected vehemently to this change. An Air Force document said, "During three years of testing and operation of the AR-15 rifle under all types of conditions the Air Force has no record of malfunctions that could have been corrected by a manual bolt closing device." Worse, they said, the device would add cost, weight, and complexity to the weapon, thereby reducing the reliability that had been its greatest asset.

Years later, during the congressional hearings, Eugene Stoner said that he had always opposed a closure device, because "when you get a cartridge that won't seat in a rifle and you deliberately drive it in, usually you are buying yourself more trouble." Colonel Howard Yount, who had been a project manager at the Rock Island arsenal in 1963 and who throughout the hearings bore the burden of explaining the ordnance corps' decisions, was asked how this change could have been justified. Not on the basis of complaints or of prior tests, Colonel Yount said. It was justified "on the basis of direction." Direction from where? a congressman asked. Direction from his superiors on the Army staff, was all he would say. The widespread assumption was that the late General



Earl Wheeler, then the Army's Chief of Staff, had personally ordered that the M-16 carry the useless handle, largely because previous Army rifles had had them. Eugene Stoner said that his only explanation for the Army's decision was that "the M-1, the M-14, and the carbine had always had something for the soldier to push on; [perhaps the Army thought] that this would be a comforting feeling to him, or something."

The next modification was to increase the "twist" of the rifle's barrel (the spiral grooving inside the barrel that gives the bullet its spin). The rate of twist was changed from one-in-14-inches to one-in-12. More twist made the bullet spin faster as it flew, and therefore made it hold a more stable path; but it likewise made the bullet more stable as it entered flesh, and thereby reduced, by as much as 40 percent, the shocking "lethality" that had so distinguished the AR-15. The Army's explanation for increasing the "twist" of the barrel was that otherwise the rifle could not meet its all-environments test. To qualify as "military standard," a rifle and its ammunition had to show that they would perform equally well at 65 degrees below zero and 125 above. On the basis of skimpy test evidence, an Arctic testing team concluded that the AR-15 did not do well on the cold-weather portions of its test. Supposedly, the rounds wobbled in flight at 65 below. The Army's reaction was to increase the "twist" and thereby decrease the "lethality," even though the rifle was due for shipment to the steaming jungles along the Mekong.

The final change was the most important. Like the others, it was publicly justified by a letter-of-the-law application of technical specifications, but it was apparently motivated by two other forces: the desire of some Army bureaucrats to discredit the AR-15, and the widespread tendency to overlook the difference between meeting technical specifications and producing a weapon that would perform reliably in the real circumstances of combat.

WEAPONS DESIGNERS SPEAK OF AUTOMATIC RIFLES as "resonant mechanisms," in which several different cycles must all work in harmony. One of the determining factors for synchronizing these cycles is the explosive characteristic of the powder in ammunition. Some powders explode very quickly, others build up pressure more slowly. Certain decisions follow from the explosion pattern—for example, the location of the "gas port" or the proper cycling rate for inserting and extracting the bullets. Eugene Stoner had designed his AR-15 around a powder known as IMR 4475 ("improved military rifle"). It was produced by Du Pont, which sold it to Remington to fill the cartridges. It is made of nitrocellulose, sometimes known as guncotton. IMR 4475 ammunition had been used in all the early tests of the AR-15; it was the ammunition that had proven so reliable in all field trials and had won the acceptance of the Air Force.

In June of 1963, the Army Materiel Command conducted tests at Frankford Arsenal that discredited the original IMR powder and brought about the most consequential modification made to the AR-15—and the one that, nearly twenty years after the fact, is still the most difficult to explain. (The Army's Armament Research and Development Command extended, and then withdrew, an invitation for me to interview technicians who had participated in the decision to abandon IMR 4475. A spokesman for the organization said, "These were the Army's decisions, so we feel the Department of the Army at the Pentagon should explain them." At the Department of the Army, virtually no one is left who held authority at that time. The only official explanations now available are the ones, couched in bureaucratese, that Colonel Yount offered when he was asked time and again by Representative Ichord's committee to justify what the ordnance corps had done.)

The decision about ammunition turned on the detailed specifications, known as the "technical data package," that the Army drew up when it converted the rifle into

the M-16. The data package included the requirements that the muzzle velocity of the rifle must average 3,250 feet per second (fps), plus or minus 40, and that the pressure within the firing chamber must not exceed 52,000 pounds per square inch.

Where had these specifications come from? Not from Eugene Stoner, or Armalite, or any users or testers of the rifle. Stoner had based his design on an off-the-shelf commercial cartridge packed with IMR powder, which had never attained the muzzle velocity that the Army now specified. Some Army officials claimed that the manufacturer advertised the bullet as having a 3,250-fps velocity; if so, they chose to believe commercials rather than the way the bullet actually performed. In all its previous tests, in the field trials that had made the Air Force and the Marines so enthusiastic about it, and in its successful performance in combat in Vietnam, the AR-15 with its original ammunition had produced a muzzle velocity about 100 fps below the newly specified level.

What, then, was the basis for the Army's decision? The congressional committee tried a dozen different ways to get Colonel Yount to answer that question. The closest thing to a response that the hearing records contain is the following paragraph, from the "Statement on Propellants for 5.56mm Ammunition," which the Army submitted after Yount's testimony:

In the course of the 5.56mm ammunition program, the Army could have elected to reduce the specified velocity, thus avoiding the necessity of developing new propellants . . . This would have reduced somewhat the range and effectiveness of the M-16 rifle. Instead, the Army chose to maintain the original [sic] ballistic performance, and utilize propellants which could meet these requirements consistently in mass production.

Once the Army had set these specifications, the result of its tests at Frankford Arsenal was predetermined: the original IMR powder would not do. To get the velocity up to 3,250 fps, it had to bring chamber pressure too close to the limit. In February of 1964, the Army sent out a request to the manufacturers to come up with substitute powders. A few months later, Du Pont said it would stop producing IMR, and Remington switched to the Army's supplier of "ball powder," Olin Mathieson. By the end of 1964, Remington was loading only ball powder in its cartridges for the rifle, which had been renamed the M-16. (Another kind of IMR powder, with explosive characteristics different from the original's, was eventually produced as alternate ammunition for the M-16.)

**B**ALL POWDER WAS FIRST ADOPTED BY THE ARMY EARLY in World War II, for use in certain artillery rounds. It differs from IMR in being "double-based" (made of nitrocellulose and nitroglycerine) and in several other ways. Its most important difference is its explosive char-

acteristics, for it burns longer and more slowly than IMR. Only one company in the United States produces ball powder and sells it to the Army. That is Olin Mathieson, which received contracts for some 89 million cartridges in 1964 alone, and far more as the war went on. More than 90 percent of the cartridges used in Vietnam were loaded with ball powder.

After the Army had made the decision to switch to ball powder, it sent a representative, Frank Vee, of the comptroller's office, to try to get Eugene Stoner to endorse the change. Stoner had not been consulted on any of the modifications to his rifle, not the bolt closure nor the barrel twist nor the ball powder, and he thought that all were bad ideas. He recalled for the congressional committee his meeting with Vee:

He asked me my opinion [about the specs requiring ball powder] after the fact. In other words, this was rather an odd meeting. . . . I looked at the technical data package and he said, "What is your opinion?" and I said, "I would advise against it. . . ."

I asked, "So what is going to happen?" And he said, "Well, they already decided this is the way they are going to go," meaning the committee. I said, "So why are you asking me now?" and he said, "I would have felt better if you had approved of the package."

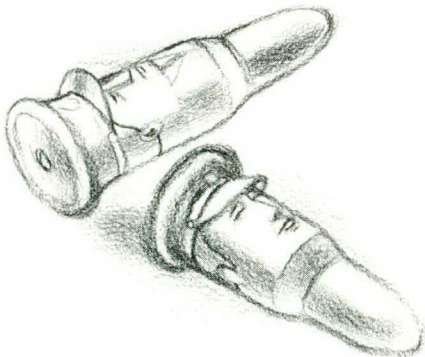
And I said, "Well, now we both don't feel so good."

The reason for Stoner's concern was that the change of powders destroyed most of the qualities he had built into his rifle. With ball powder, the M-16 looked better on the Army's new specification sheets but was worse in operation. There were two problems. One was "fouling"—a powder residue on the inside of the gas-tube chamber that eventually made the rifle jam. The AR-15 had been designed so that its gas port stayed closed through the combustion of the powder, but that was for a different powder. The new ball powder was inherently dirtier, and it burned longer; it was still burning when the gas port opened, so it burned into the gas tube. The other effect of ball powder was to increase the rifle's "cyclic rate." The AR-15, with all its interlocking mechanical cycles, had been designed to fire between 750 and 800 rounds per minute. When cartridges loaded with ball powder were used, the rate went up to 1,000 or more. "When the Army said, 'No, we are going to use our ammunition,' the cyclic rate of the weapons went up at least 200 rounds per minute," Stoner told the congressional committee. "That gun would jump from 750 to about 1,000 rounds a minute, with no change other than changing the ammunition."

The consequences of a higher cyclic rate were grave. What had been a supremely reliable rifle was now given to chronic jams and breakdowns. In November of 1965, engineers from Colt fired a number of rifles, some with the original IMR powder and some with ball. They reported: "For weapons such as those used in this experiment, none are likely to fail with ammunition such as [IMR], whereas half are likely to fail with ammunition

such as [ball powder].” In December, the Frankford Arsenal conducted another test for malfunctions. When M-16s were loaded with IMR cartridges, there were 3.2 malfunctions per 1,000 rounds, and .75 stoppages. When the same rifles were fired with ball propellant, the failure rates were about six times higher (18.5 and 5.2, respectively). Under the central procurement policy, the Army’s decision also forced the Air Force to switch to ball powder. The Air Force protested, pointing out that the rifles had been extremely reliable when loaded with IMR. One Air Force representative described a test in which twenty-seven rifles fired 6,000 rounds apiece. The malfunction rate was one per 3,000 rounds, and the parts-replacement rate one per 6,200 rounds. The rifle and its original cartridge worked fine, the Air Force insisted, even though they didn’t happen to meet the specifications of 3,250 fps from the muzzle.

In May of 1966, there was one more report, this one the result of an extensive and unusually realistic series of tests held by the Army’s CDEC field test organization at Fort Ord. (For example, the soldiers fired as squads, not as individuals; the targets resembled real battlefield targets, in that they were hard to see and obscured by brush and other cover; there was simulated fire from the targets themselves, done in a pattern resembling that of combat; soldiers were run through the course only once, to avoid their having any familiarity with it.) The conclusion was that the M-16 was more effective than the M-14 or the Soviet AK-47 (which was also tested), but that it was an unreliable weapon. The reason for the fouling, the jamming, and the breakdowns, the testers said, was the switch to ball powder. By that time the Army was ordering ball powder in greater quantities than ever, and shipping it to Vietnam.



**I**N 1965, AFTER THE YEARS OF THE ADVISERS AND THE Special Forces, American troops began full-fledged ground combat in Vietnam. The regular Army and Marine units carried the old M-14. On arrival, they discovered several things about their weapon. One was that in jungle warfare, the inaccurate, uncontrollable M-14 was no match for the AK-47, which their enemies used. Both were .30-caliber rifles, but the AK-47’s cartridges

had a lighter bullet and were packed with less powder, which reduced the recoil to an endurable range. They also saw that the old AR-15s that had been used by the Special Forces had been a big hit in Vietnam. Soldiers were willing to sacrifice several months’ pay to get hold of one on the black market.

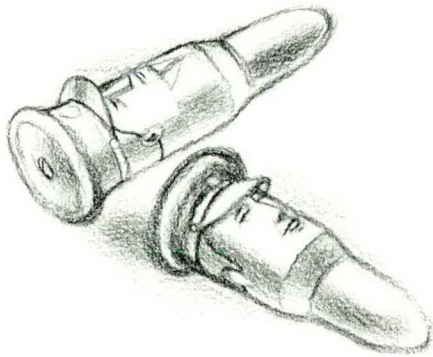
One of those who noticed these facts was William Westmoreland, then the commander of American forces in Vietnam. He saw that his men were doing very badly in the fire fights against the AK-47, and that the casualties were heavy. He also saw how the AR-15 performed. Near the end of December, 1965, he sent an urgent, personal request for the M-16, immediately, as standard equipment for units in Vietnam.

The ordnance corps met this request with grudging compliance. The rifle would be sent to Vietnam, but only as a special, limited purchase. It would not be issued to American troops in Europe or in the United States; it would not replace the M-14 as the Army’s standard weapon. Nor would it go to Vietnam under circumstances likely to show off its merits, because there was no backing off the requirement that its cartridges be filled with ball powder.

**T**HE CLIMACTIC STRUGGLE OVER BALL POWDER had occurred one year before Westmoreland’s request, in 1964. As test after test showed that ball powder made the rifle fire too fast and then jam, the manufacturing company finally threw up its hands. Colt said that it could no longer be responsible for the M-16’s passing the Army’s acceptance test. It could not guarantee performance with the ball powder. One of the test requirements was that the rifle’s cyclic rate not exceed 850 rounds per minute, and six out of ten rifles were far above that when using ball powder. Don’t worry, the Army said, *you can use whatever ammunition you want for the tests.* But we’ll keep sending our ball powder to Vietnam.

The Technical Coordinating Committee, which represented all services using the M-16 but was dominated by the Army, formally gave Colt permission early in 1964 to use any ammunition it had in stock for the acceptance tests. Colt received no new shipments of the original IMR ammunition after May of 1964, but by that time the company had several million rounds on hand. Beginning in 1964, Colt used IMR powder so that its rifles would pass the acceptance tests. The Army promptly equipped those rifles with ball-powder cartridges and sent them to soldiers who needed them to stay alive. The Army’s official reasoning on the matter was that since it did not recognize the theory that ball powder was the cause of the problems, why should it care which powder Colt used? Colt delivered at least 330,000 rifles under this agreement. After uncovering the arrangement, the Ichord Committee concluded:

Undoubtedly many thousands of these were shipped or carried to Vietnam, *with the Army on notice that the rifles failed to meet design and performance specifications and might experience excessive malfunctions when firing ammunition loaded with ball propellant* [emphasis in original]. . . . the rifle project manager, the administrative contracting officer, the members of the Technical Coordinating Committee, and others as high in authority as the Assistant Secretary of Defense for Installations and Logistics knowingly accepted M-16 rifles that would not pass the approved acceptance test. . . . Colt was allowed to test using only IMR propellant at a time when the vast majority of ammunition in the field, including Vietnam, was loaded with ball propellant. The failure on the part of officials with authority in the Army to cause action to be taken to correct the deficiencies of the 5.56mm ammunition borders on criminal negligence.



**T**HE DENOUEMENT WAS PREDICTABLE AND TRAGIC. IN the field, the rifle fouled and jammed. More American soldiers survived in combat than would have with the M-14, but the M-16's failures were spectacular and entirely unnecessary. When they heard the complaints, ordnance officials said it only proved what they'd said all along, that it was an inferior rifle. The official Army hierarchy took the view that improper maintenance was at fault. Officials from the Pentagon would go on inspection tours to Vietnam and scold the soldiers for not keeping the rifles clean, but there never seemed to be enough cleaning supplies for the M-16. The instruction leaflets put out by the Army told them that "This rifle will fire longer without cleaning or oiling than any other known rifle," and "an occasional cleaning will keep the weapon functioning indefinitely." Many in the ordnance establishment said the problem was that the rifle chamber was not lined with chrome—an expensive improvement that had not been necessary in the rifle's original version.

At last the soldiers began writing letters—to their parents or their girlfriends, and to the commercial manufacturer of a rifle lubricant called Dri-Slide. The Dri-Slide company received letters like the following:

December 24, 1966

Dear Sir:

On the morning of December 22nd our company . . . ran into a reinforced platoon of hard core Viet Cong. They were well dug in, and boy! Was it hell getting them out. During this fight and previous ones, I lost some of my best buddies. I personally checked their weapons. Close to 70 per cent had a round stuck in the chamber, and take my word it was not their fault.

Sir, if you will send three hundred and sixty cans along with the bill, I'll "gladly" pay it out of my own pocket. This will be enough for every man in our company to have a can.

—, Spec. Fourth Class

Parents in Idaho received this letter from their son, a Marine:

Our M-16s aren't worth much. If there's dust in them, they will jam. Half of us don't have cleaning rods to unjam them. Out of 40 rounds I've fired, my rifle jammed about 10 times. I pack as many grenades as I can plus bayonet and K bar (jungle knife) so I'll have something to fight with. If you can, please send me a bore rod and a 1¼ inch or so paint brush. I need it for my rifle. These rifles are getting a lot of guys killed because they jam so easily.

One man wrote to a member of the Armed Services Committee staff, recounting what his brother had told him about his experience in Vietnam:

He went on to tell me how, in battles there in Vietnam, the only things that were left by the enemy after they had stripped the dead of our side were the rifles, which they considered worthless. That when battles were over the dead would have the rifles beside them, torn down to attempt a repair because of some malfunction when the enemy attacked. . . . He said, "Part of me dies when I have to stand by and see people killed, and yet my hands are tied."

A letter that ended up in the office of Representative Charles W. Whalen, Jr., of Ohio:

I was walking point a few weeks back and that piece of you know what jammed 3 times in a row on me. I'm lucky I wasn't doing anything but reconning by fire or I wouldn't be writing this letter now. When I brought the matter up to the Captain, he let me test fire the weapon—well in 50 rounds it double fed and jammed 14 times. I guess I'll just have to wait till someone gets shot and take his rifle because the Captain couldn't get me a new one.

Another, from a Marine officer, was referred to Senator Gaylord Nelson of Wisconsin:

The weapon has failed us at crucial moments when we needed fire power most. In each case, it left Marines naked against their enemy. Often . . . we take counts after each fight, as many as 50% of the rifles fail to work. I know of at least two Marines who died within 10 feet of the enemy with jammed rifles.

My loyalty has to be with these 18-year-old Marines. Too many times (yesterday most recently) I've been on TF's awaiting medical evacuation and listened to bandaged and bleeding troopers cuss the M-16. Yesterday, we got in a big one. . . . The day found one Marine beating an NVA with his helmet and a hunting knife because his rifle failed—this can't continue—32 of about 80 rifles failed yesterday.

When investigators from the congressional committee went to Vietnam, they confirmed another report: that one Marine, who had the only cleaning rod in his squad, had been killed as he ran up and down the line unjamming his comrades' rifles.

THE TECHNICAL DATA THAT CAME OUT OF THE CONGRESSIONAL inquiry persuaded the members of the committee to release an unusually sharp report, charging that the M-16 had been sabotaged by the ordnance corps. Yet the most striking aspect of the testimony was its humdrum, routine tone. When representatives of the ordnance corps were pressed to explain their decisions, they fell back on citations from the rule books, like characters in a parody of bureaucratic life. They seemed to have a hard time remembering who was responsible for crucial decisions; they tended to explain things by saying, "the feeling was," or "the practice has been. . . ." They could list with careful, bureaucratic logic the reasonableness of each step they had taken: if you didn't have Arctic test requirements, you might not have adaptable rifles. If you didn't change to ball powder, you would have had chamber pressures over the allowable limits—which might have been dangerous for the troops. They seemed not to see a connection between these choices and the soldiers who were dying with jammed rifles in their arms. They were certainly aware of the M-16's troubles, and bowed to no one in their concern. What it proved, they said, was that the rifle had always been a risky experiment—especially (as they pointed out several times) when it was being used by the kind of soldiers the draft was scrounging up these days, who couldn't understand the importance of keeping their weapons clean. Four years after the hearings, in 1971, an M-16 project manager, Col. Rex Wing, wrote a history of the rifle in *Ordnance* magazine. The headline on the story said, "Although the Viet Cong greatly feared the M-16 when our soldiers first were equipped with it in Vietnam, malfunctions caused by improper maintenance led to its being downgraded in the press." The story contained no mention of the change in ammunition.

The committee could find no real evidence of corruption. Its report criticized one Nelson Lynde, Jr., a general who was in charge of the Army Weapons Command between 1962 and 1964. He approved purchases of the M-16 from Colt, and then accepted a job shortly after retirement with the parent company of Colt. The com-

mittee reprimanded General Lynde for an apparent conflict of interests—even though, as Lynde pointed out, the Army's counsel had not forbidden him to accept the job. The committee also urged an audit of the profits Colt had made on the rifle and of the "sole-source" relationship with Olin Mathieson. In 1980, I asked the committee's investigator, Earl Morgan, whether actual corruption—bribes, kickbacks—had been involved. "Oh, I'd be amazed if there wasn't some, knowing how that business is done," he said. "But we never found anything we could prove."

Perhaps the truest explanation of why things happened as they did is the most ordinary: that human beings could not foresee the way that chance and circumstance could magnify the consequences of their acts. The military supply organization, like most other organizations, is always full of power plays and bureaucratic games, which distract attention from the goals that in a rational world would always be pursued. Only occasionally does chance make the effects of these games catastrophic. Doubtless, thousands of military intelligence officers have lapsed in their attention to urgent dispatches; the handful who lapsed on December 6, 1941, were just unluckier than the rest. The ordnance corps was similarly unlucky. In late 1963 and early 1964, when the crucial decisions about the M-16 were being made, few people could have known that the U.S. would soon have half a million land troops in Asia, or that the soldiers would depend for their survival on a weapon that was the product of small-time bureaucratic squabbles. Most other squabbles had come and gone without costing soldiers' lives. The forlorn tone of one of the Army's last submissions to the congressional committee suggested the way in which the situation had gotten out of control:

From the vantage point of retrospect, it has sometimes been suggested that the peculiar behavior of ball propellant in the M-16 system should have been predicted. . . . Had the Army anticipated these developments, it is most unlikely that the course chosen in January 1964 would have been the same. A decision to reduce the velocity requirement, and continue loading IMR 4475 propellant would probably have been made instead.

The committee recommended that the Army immediately conduct a thorough, honest test of the two kinds of ammunition, with the strong suggestion that it should switch to IMR 4475. That never happened. Instead of going back to the original powder, the ordnance corps modified the ball powder and changed the mechanical "buffer" of the rifle, which slowed down the cyclic rate. That solved part of the jamming problem, but did not restore the rifle's original reliability or "lethality." (The change in the barrel "twist" was also never corrected.) Through every day of combat in Vietnam, American troops fired cartridges filled with the ball powder that was the legacy of the ordnance corps. And if American troops were sent into battle today, they would use the same kind of ammunition. □

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