

## Exhibit 18

To Defendants' Memorandum in Support of Motion for  
Summary Judgment

# Shooter's Bible<sup>®</sup>

## GUIDE TO

# AR-15s




**A Comprehensive Reference to One of America's Favorite Rifles**



- Photos, specifications, and prices
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- Details of the newest guns and optics



**Doug Howlett**

 To my dad, for sharing his love of the outdoors and hunting; my mom, for her help and support throughout my life and even on this book; and to my wife, Wendy, and kids, Logan, Cade, and Zenna, for their love and putting up with my long hours of work and travel away from home.

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# 1. History of the AR

For all of its popularity among the military, law enforcement, and civilian shooters today, the AR-15 almost never happened. Or at the very least, its development was almost dead before it really got the chance to fly. Dissatisfied with the overall performance of the M14 rifle that was in service at the time, the army in the 1950s sought the assistance of commercial gun manufacturers in developing a .22-caliber firearm capable of replacing it in combat.

As the military had crossed the bridge from a post-World War II era, the focus of many of the branches was on devising tactics, equipment, and machinery capable of countering the nuclear capabilities of our new Cold War enemies. Partially responsible for this task within the U.S. Army was the Operations Research Office (ORO), created after World War II. However, the ORO increasingly found itself attempting to solve non-nuclear-related challenges prompted by our country's engagement in North Korea. One such concern,

recounted in the late Edward C. Ezell's book *The Great Rifle Controversy*, one of the most detailed and comprehensive examinations of military small arms development in the United States between the close of World War II and the early 1980s, was that "ORO investigators discovered that very little was known about the nature of inflicting wounds on the human body in combat."

As a result, the Infantry Division of ORO began to study the issue by analyzing more than 3 million casualties from World Wars I and II, as well as from those that had occurred in Korea up to that point. For the first time, an analysis suggested that more soldiers were killed by randomly dispersed fire than carefully aimed shots, suggesting that a light-recoiling rifle that could rapidly launch multiple projectiles in a controlled, yet simultaneously spread pattern, could ultimately be more effective on the battlefield.

Following several years of studying the idea, the Continental Army Command (CONARC) decided to seek the development of a 5.56mm rifle. Both

✉ Marines exit a CH-53A Sea Stallion with Marine Heavy Helicopter Squadron 463, to begin a search-and-destroy operation seventeen miles southeast of Phu Bai, Vietnam, November 18, 1967. The AR in the form of the M-16 and M-16A got its first real test in the battle-grounds of Vietnam in the late 1960s and early 1970s. (DoD Archive Photo)





« Eugene Stoner, lead engineer for the ArmaLite Division of Fairchild Engine and Airplane Corp., is considered the creator of today's most popular rifle, the AR-15.

Winchester, owned by Olin, which now only manufactures the ammunition under that brand, and the ArmaLite Division of Fairchild Engine and Airplane Corp., which today is simply known as ArmaLite Inc. (Ironically, ArmaLite no longer owns the trademark for the actual AR-15 name. More on that in a moment.)

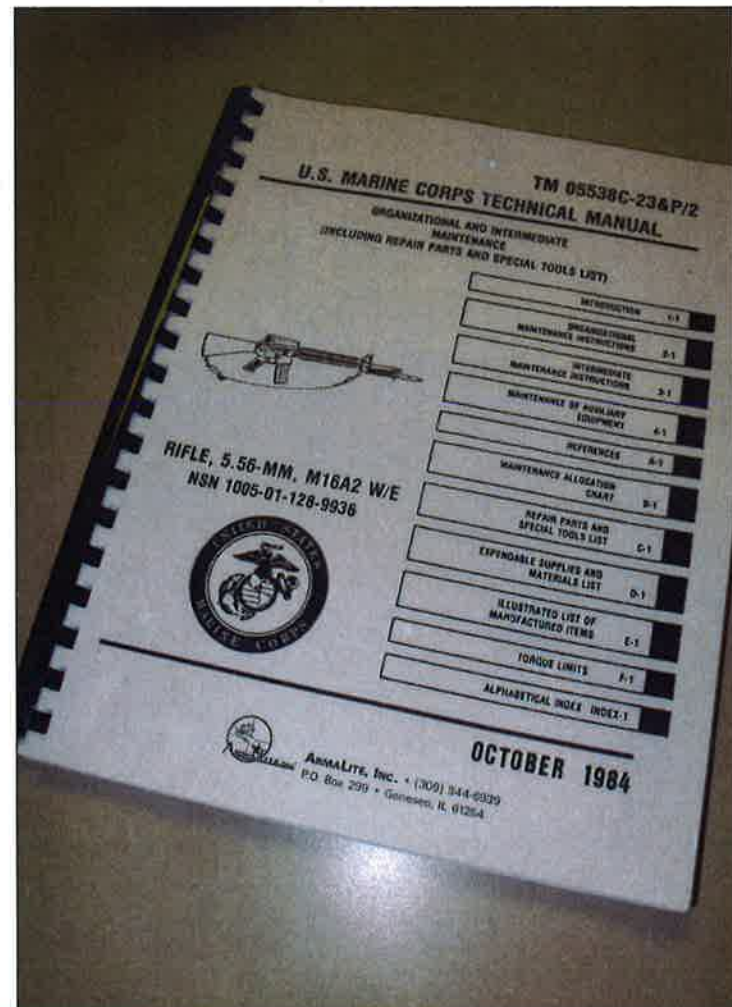
## ArmaLite's New Concept Rifle

According to a history of ArmaLite Inc., recognizing that there had been little done in the way of advancing fundamental small arms design and function in the past fifty years, Fairchild executives president Richard S. Boutelle, a gun enthusiast, and Paul S. Cleveland, corporate secretary, wanted to focus on developing fine sporting arms for the commercial market with the hope that their work would catch the eyes of military leaders and provoke some interest. However, shortly after establishing the ArmaLite Division, the company was invited by the U.S. Air Force to submit a rifle design that would replace the branch's survival rifle. Within a matter of weeks, ArmaLite submitted a rifle dubbed the AR-5 to the air force for evaluation. The rifle was built around the .22 Hornet. The air force adopted the rifle, which was officially designated the MA-1 Survival Rifle. This success forced the company to rethink its original decision to pursue the commercial market; ultimately, they changed course and focused exclusively on developing arms for the military.

From there, three people involved with ArmaLite came together to alter the course of modern firearms as we know them. According to ArmaLite, it was the

idea of George Sullivan, a chief patent counsel for Lockheed Corporation, to use the "latest technical advances in plastics and alloys" to build firearms that were lighter and more functional than then-available models. In fact, Sullivan, a tinkerer himself, had begun work on some of his ideas in his garage following World War II. Charles Dorchester directed and coordinated all of ArmaLite Division's development programs and would later go on to run the entire company. But perhaps the most recognizable of the three, someone who would go on to change history and be the one whom historical scholars credit for the birth of the AR platform, was Eugene Stoner. Stoner, who had served as a marine during the war and was considered an ordnance expert, was made chief engineer of the ArmaLite Division in 1954. He had been working on developing small arms independently since the war

☞ This 1980 manual for the U.S. Marine Corps M16A2 can still be used to understand the general workings of today's modern AR rifle.



as well. It is Stoner's patents that "form the basis of much of ArmaLite's work," according to the company's historical records.

In 1955, the army was looking to update or replace the service rifle of the time, the M1 Garand and was considering two versions: Springfield Armory's T-44, merely an updated version of the Garand, and the T-48, a version of the 7.62x51mm FN FAL, which was developed and manufactured by Fabrique Nationale de Herstal, known today primarily as FN Herstal. The FAL would ultimately go on to be adopted as the primary service rifle used by many NATO countries, including Belgium, Great Britain, Canada, and Australia.

To compete with these firearms, Stoner took a new approach in the firearms design of the day and created the AR-10. The first version of the AR-10 was made with aircraft-grade aluminum receivers, which kept the weight down considerably. When empty, the rifle weighed less than seven pounds. The receivers could be made from such lightweight material because the bolt locked into a steel extension that attached to the barrel, not directly in the receiver itself. Stocks, pistol grips, and fore-ends were all plastic, as compared to the wood grain furniture more common to guns of the day. Unfortunately, despite capturing the attention of more than a few military leaders intrigued by the firearm's unique design, the ArmaLite Division had gotten involved too late to adequately compete. An article that first appeared in the May 1962 issue of *American Rifleman* magazine noted that the initial AR-10 had also fallen prey to flaws with its original composite steel-aluminum barrel and a complicated flash suppressor.

According to Ezell, however, one of those leaders intrigued by the AR-10's design was CONARC's commander, General Willard G. Wyman. In 1957, Wyman personally asked Stoner to design a 5.56mm rifle for the army, similar to the AR-10. That scaled-down rifle would go on to become the AR-15.

The first AR-15s had steel barrels and an army-developed BAR-type flash suppressor. And while Stoner's design has been called genius by many, the real genius may have been found in the engineer's ability to borrow features from a number of popular and proven European gun designs and combine them in a single platform. The now-ubiquitous hinge design of the AR,

not unlike that of a break-open shotgun, was similar to a design used in the Czech ZH or ZB 29 rifle and adopted in the FN. The rear sight was built into the rear of the carrying handle like the British EM-2, the hinged cover on the ejection port resembled that of the German Sturmgewehr 44, the locking system was similar to the one used in the Johns Semiautomatic Rifle from the 1940s, and the straight stock, designed to better accommodate recoil and manage multiple shots, was similar to a number of auto and semi-auto rifle designs getting some play at the time, including, as Ezell pointed out, the Harvey T25.

Stoner's gas operating system, which employed—and still does on direct impingement ARs—a tube beneath the front sight that directs gas back to the bolt in order to cycle rounds during firing, had been used in both the Swedish M42 Ljungman and the French MAS-1949.

"Stoner's achievement in the AR-15 was the combination of all of these ideas into an attractive package," wrote Ezell. Of course, once designed, the rifle still had to win favor with the military, a battle that almost ended the AR-15's role in history right there.

To begin, ArmaLite was so small that it didn't have a full research facility or the staff to completely develop a fully tested prototype. Instead, they had to rely on military testers, many of whom had their own prejudices against this new weapon and did it few favors to discover if it could actually serve soldiers well. There were some key leaders in the army who simply didn't like the fact that the new gun hadn't been developed within the branch's own usual channels. Others simply didn't like the new configuration of the gun, much as some traditional-minded hunters view the firearm even today. Rain tests conducted on a sample of the rifles originally suggested that shooting the guns with water in the barrels could result in burst barrels—something that was believed at the time to be "characteristic of high-velocity rifles having a bore diameter of less than .25 caliber," according to Ezell. ArmaLite strengthened the barrels in response, but still concerns over the hazard persisted. Arctic tests conducted on the rifles to determine how they would perform in freezing weather also proved disappointing to testers, though the Winchester .224 rifle still being considered at the time also failed in this respect. In the end, the test



« From routine patrols to special forces operations, today's M16/M4 is used in some variation by every branch of the military. Here a U.S. Army soldier provides security for his team during a foot patrol while training at Camp Atterbury Joint Maneuver Training Center, Indiana in 2011. The soldier is assigned to the Second Battalion, Nineteenth Special Forces Group. (DoD photo by Staff Sgt. David Bruce, U.S. Army)

board reviewing the new rifles suggested that a .223 (5.56mm) round was "not a suitable replacement for the 7.62 NATO round," and that development of a heavier .258-caliber (6.35mm) cartridge be pursued (Ezell). In light of the recommendations, Army Chief of Staff General Maxwell Taylor ruled that the branch would continue procuring the heavier and already NATO-approved 7.62 M14 rifles.

## Second Chance

After all of the expense in developing the AR-15, the decision was a tough financial blow to a struggling small company such as Fairchild, which had already begun to search for another company to license the production of both the AR-15 and the AR-10. The company had invested \$1.45 million in the AR-15 project alone, an amount that would be fairly cheap by today's corporate standards but which could be a backbreaker for any small company, then or now. Fairchild decided to recoup some of the costs of the protracted project by selling the manufacturing and marketing rights to what was then called Colt's Patent Firearms Manufacturing Company, but is better known today simply as Colt's

Manufacturing LLC, or Colt. The company bought the rights to both firearms (a version of the AR-10 had already been sold to the Dutch and was being marketed in Southeast Asia where conflicts were erupting in what was then a little-known country called Vietnam) for \$75,000 cash payment and a guarantee of a 4½ percent royalty on all future sales.

In *The Black Rifle: M16 Retrospective*, by R. Blake Stevens and Edward C. Ezell, the authors note that at the time, Colt was also suffering financially as a result of dried-up military and civilian markets following WW II. The company also hadn't retooled its manufacturing facilities in nearly a century. The Maryland-based firm of Cooper-MacDonald, which through one of its principals, Robert "Bobby" W. MacDonald, already promoted the Dutch AR in Southeast Asia, worked with both ArmaLite and Colt and had been the connection that brought the sale of the ARs together. Interestingly, Cooper-MacDonald made more off the sale of the guns to Colt than Fairchild, netting \$250,000 and a 1 percent royalty on all future gun sales.

MacDonald, who had extensive contacts in Southeast Asia and saw the AR-15 as an ideal gun for the "smaller statured" fighters of the region, immediately began



➤ The AR-15/M16 was originally considered a short-term solution to small arms needs in the military. But since its introduction in the 1960s, the AR is still serving America's men and women in uniform. Here, a U.S. Army soldier with Charlie Company, 2nd Battalion, 502nd Infantry Regiment, 101st Airborne Division, aims his M4 carbine over a wall while securing an open field in Char Shaka, Kandahar province, Afghanistan, on April 27, 2011. (DOD PHOTO BY SPC. JACOB WARREN, U.S. ARMY)

marketing the gun in that part of the world and, under orders from Colt, to the U.S. military once again. They wanted to see the AR-15 given another chance.

Initially, army representatives refused. But Colt had better luck when they decided to bypass the branch and seek other military buyers. Ultimately, Air Force Vice Chief of Staff General Curtis LeMay, who witnessed a demonstration of the guns, suggested that the air force test the AR-15 as a replacement for the M2 carbines used by its sentries. The tests proved positive, and the air force placed an initial order for 8,500 rifles (Ezell). Sometimes it just takes that one lucky break to get the door to open wider than your foot and allow you to walk on through.

Studies by the Department of Defense, who agreed to give the gun another look, also proved favorable, causing questions to be asked all the way up the chain of command as to why the disparity between the army's original findings and the reports coming out about the gun then. Indeed, both Secretary of Defense Robert

McNamara, and even President John F. Kennedy, had questions. Ultimately, the army was forced to reevaluate the rifle, the result in 1963 being that the decision was made to end procurement of the M14. At the same time, McNamara ordered the purchase of 85,000 AR-15s for the army and 19,000 for the air force, who was already using some of the guns (Ezell).

The purchase was initially intended to be a one-time deal—enough to fill the gap until another weapons testing program was completed and a new firearm developed, but history proves that did not become the case. To meet demand for the growing conflict in Vietnam, the army ordered more of the rifles and reclassified it as the M16.

## Not Done Yet

Once the AR-15/M16 made its way to soldiers' hands and was finally being tested on the battlefield, problems began to arise. While the overall opinion





« The M16/M4 has found service around the globe. Here Lance Cpl. Scott Fleckenstein and his fellow marines of the Twenty-sixth Marine Expeditionary Unit establish a security perimeter in a muddy soccer field at Sokolac, Bosnia and Herzegovina, on March 28, 1998. (DoD photo by Senior Airman Michelle Leonard, U.S. Air Force)

“The chamber on the .223 was not chrome plated. It got so hot that cases were sticking; and with all of the gunk and powder, the gun would jam up,” says Murphy. “The gun was marketed as one that didn’t need cleaning, which was bunk. You have to always clean a gun.” The cleaning of magazines was also found to be crucial, as they would fill with grime and quit feeding rounds into the chamber during firing. Indeed, when asked about how often he cleaned his M4, the military’s modern, shorter version of the original M16 design, one recently retired Navy SEAL who has seen action in both Afghanistan and Iraq said simply, “Every chance you get. Your life depends on it.”

As more troops began carrying the new rifle into Vietnam, training and cleaning procedures—for both the rifle and its magazine—improved. With them came fewer reports of malfunctioning guns. In fact, the lack

was that most soldiers liked the design and concept of the rifle, it was hindered by malfunctioning problems in the field, during combat. Reviews revealed several causes for this, including ammunition that didn’t function properly in the rifle because of its high-residue powder. To generate higher muzzle velocities, the army had insisted on a faster-burning ball-type powder for use in the field instead of the cleaner-burning powder Stoner had used in developing the rifle. The army also failed to secure chrome-lined barrels and chambers in the rifles, which better resisted heat and fouling as well as corrosion and pitting. Perhaps most egregiously ignored was the lack of proper cleaning supplies and quite simply a failure to properly train troops with the new rifle and enforce its frequent cleaning.

In fact, according to former long-distance AR competition shooter John Murphy, who has shot ARs extensively and studied their history, the original M16 was originally billed as a gun that didn’t require much care or cleaning.

AR rifles, whether civilian versions or military ones, are designed to be tough and take a beating in all environments including water as Marine Cpl. Robert D. Adams proves as he struggles through a water-filled ditch on the endurance course at the Jungle Warfare Training Center at Okinawa, Japan, in 2001. (DOD PHOTO BY LANCE CPL. JOHN HOELLWARTH)





⚡ Pfc. Brian Ashavranner of Bravo Company, First Battalion, Eighth Marines, engages the enemy with his M16A2 service rifle from a roof at the military operations in urban terrain (MOUT) facility during Urban Warrior Limited Objective Exercise 2 on April 29, 1998, at Camp Lejeune, North Carolina Urban Warrior is the U.S. Marine Corps Warfighting Laboratory's series of limited objective experiments examining new urban tactics and experimental technologies. (DOD PHOTO BY LANCE CPL. DONALD R. STORMS, U.S. MARINE CORPS)

of proper cleaning seemed to fix much of what the initial concerns about the M16 were. Improvements in the propellant used in the military-issued ammunition also reduced reports of problems with the guns.

Over the years, the gun design has undergone a number of improvements and variations as requested by various branches of the military—and even by some civilian engineers and shooters—including the addition of a forward assist, to aid in locking the bolt forward in rare instances when it fails to do so; flat-top receivers; heavier barrels; adjustable windage rear sights; selector switch functions that reduced full-auto firing to the firing of three-round bursts; a gas piston operating system as an option to the direct impingement design; and other minor tweaks including adjustments in stock length, thickness of barrels, stock design, and functionality. Where the military design has wandered, the civilian market has followed.

One of the most notable changes in the rifle over-time occurred with its rifling. Original models often had a 1:14-in. or 1:12-in. twist for use with the lighter 55-grain bullets employed for combat at the time. This worked great for shooting targets under 300 yards, and indeed, most combat engagement occurred at 100 yards or less. This was usually due to terrain features and limitations more so than any inability of the shooter. However, for long-range shooting—ranges out to 600 yards, as was required in high-power competition matches or sniping—the gun was inadequate. The 1:12-in. twist was unable to stabilize longer, heavier bullets needed for long-distance shooting.

In “The Making of a Match Rifle,” published in the July 1999 issue of *American Rifleman* by shooting editor Glenn M. Gilbert, the author recounts how improvements in this area evolved following the adoption by NATO of a standard 5.56mm round loaded with a

The visibility of the AR as part of our nation's war on terror in Afghanistan and Iraq is a key reason the gun is enjoying an all-time popularity. Here Corporal Kelly P. Baker, a rifleman and team leader with the Second Squad, First Platoon, Company C, First Battalion, Fifth Marine Regiment, uses his radio to talk to his fellow marines during a recent patrol. (Photo by: Cpl. Tom Sloan) >>



heavier 62-grain bullet, and which was fired from a barrel with a 1:19-in. twist. That bullet was designed by FN. In response, "the Army quickly developed a copy of the 62-grain FN bullet and standardized it as the M855 in 1981."

The rifling in the barrel of M16 was soon tightened to a 1:7-in. twist in order to accommodate the heavier bullet as well as tracers that were planned for the newly rifled firearms. Overtime, the twist rate and development of longer bullets in the 77- and 80-grain arena solved the long-range dilemma and produced a rifle that both military sharpshooters and civilian competitors could rely on. And indeed, once those problems were solved, the AR became a preferred gun of many competitors, including John Murphy.

"The Marines were the first ones to successfully carry the ARs to Camp Perry in 1994, and they cleaned everyone's clock with the new twist rates and the longer bullets," says Murphy.

Gilbert sums the AR's evolution up in his article by writing, "The AR-15 has come a long way. Long

derided as a plastic toy, it is now the benchmark in accuracy among semi-auto rifles." It is this mix of both short-range application and long-range accuracy, combined with the multiple levels of personalization and functionality, that have many experts predicting that the heyday of the AR is still only beginning.

Using a civilian vehicle for cover, marines from Charlie Company take aim at opposing forces at the military operations in urban terrain facility at Camp Lejeune, North Carolina, on January 20, 1998, during Urban Warrior training. (DOD PHOTO BY STAFF SGT. DAVID J. FERRIER, U.S. MARINE CORPS)

