You may have a lot of ammo, but the fying target is small and fast. This MG-34 with aerial sights on an MG-42 anti-aircraft tripod has a better chance than most.

Aerial Gunnery
The Ultimate Challenge

Actually, the ultimate challenge is shooting down a plane that's shooting at you. But machine gunners at several western shoots can try their hands at the nearest thing—shooting at fast-darting radio-controlled planes.

By Richard MacLean

Today incoming aircraft or missiles are shot down with the touch of a button. Gatling-type guns such as the Phalanx Close-In Weapon System (CIWS) or surface-to-air missiles such as the RIM-116 Rolling Airframe Missile (RAM) defend the U.S. fleet. Similar systems protect aircraft, tanks, high-value ground installations and combat troops. But in earlier conflicts, it was not about sophisticated electronics: it was all about well-trained individuals using guns and a lot of skill and luck.

For example, the 1952 Emmy award-winning television documentary, *Victory at Sea*, portrayed the World War II kamikaze attacks on the Pacific Fleet off Okinawa in Episode #25, "Suicide for Glory." In watching the actual naval film footage of the attacks, one wonders how a single kamikaze could make it through.

But make it through they did: more than 10% of all U.S. naval casualties during the entire war and the destruction of 3,500 enemy planes were the results of this one battle. So effective were these suicide attacks that the full extent of their efficacy was kept secret until well after the war.

The reality is that it is extremely difficult to shoot down a fast-moving aircraft the old-fashioned way—with a gun. And the degree of difficulty varies tremendously depending on the platform from which the shooting is done. Scoring hits from a quad-mounted .50 Cal Browning or 40mm Bofors off of a pitching ship at sea is difficult.

But even more challenging is defending a bouncing bomber in the freezing, rarified atmosphere of 30,000 feet with the only thing between you and a 20mm cannon projectile is an aluminum skin. Nearly 300,000 brave individuals were trained to do just that. More men graduated from gunnery schools during the war than any other Air Force specialty except for maintenance.

Kelsey McMillan's father, S/Sgt. William Beaird, was one such graduate. "I was really curious to learn about what he went through as a B-24 tail gunner stationed in England and flying 35 missions over Europe. Even before the real dangers started, he faced tremendous pressure. I could not believe the amount of complex information he was expected to learn and retain in six weeks of aerial gunnery school."

Kelsey is the 8th Air Force, 389th Bomb Group Historian (the same outfit that her father flew with), and her painstaking research led to a 2005 article published in *Bomber Legends* magazine. It is the definitive account of the rigors of aerial gunnery training.

Training for Aerial Warfare

At the beginning of World War II, the U.S. Army Air Force had only one gunnery school located at the Las Vegas Army Airfield. By the end of the war, it had six, including two in Arizona. Training programs were also expanded from four to six weeks and modified continually as weapon, aircraft and gunnery simulator technologies advanced.

Initial training was spent on subjects such as aircraft silhouette recognition, weapons and ammunition familiarization as well as identifying malfunctions, field stripping and repairing machine guns. Students practiced these hands-on exercises blindfolded and wearing gloves to simulate the difficulty in performing these actions when wearing flight suits, goggles and oxygen masks.

They also received lessons in the complex physics of air-to-air gunnery, in which bullets never travel in a straight line. Gravity is an obvious factor and so too are the movements of the bomber and the attacking fighters in estimating deflection, but there are even differences when the firing is at 90° angles to the aircraft.

The USS Missouri about to be hit by a Japanese A6M "Zero" kamikaze, Okinawa, April 1945. A 40mm gun crew is in action in the lower foreground. (National Archives)

Once they'd mastered shotgunning from a solid surface, firing from fixed mounts on moving vehicles added new challenges for rookie aerial gunners during WWII.

Clockwise rotating bullets passing through the slipstream on the right will drop several feet at 1,000 yards relative to the drop on the left. Towards the end of the war, computing gun sights helped perform these estimations, but at the beginning, students had to be familiar with as many as 10 different sights in use and do it the traditional way—in their heads.

Tracers, linked 1 in 10, also were used at the beginning of the war to assist in nighttime training to correct aim. But the subtle differences in aerodynamics between these and the other rounds were enough to cause a difference in trajectory as the tracer content burned. Their use for training by the U.S. Army Air Force was discontinued after the first year.

Before sporting clays was invented, trainees practiced with shotguns from varying heights to simulate high and low angles of enemy airplane attacks. (Kelsey McMillan)

Tracers were, of course, used for aerial combat in all theaters. For example, the British used tracers linked 1 in 4 for aerial gunnery throughout the war and developed dim ignition tracers so as not to blind gunners at night.

Target shooting progressed along four levels of difficulty. First came firing from stationary positions at fixed targets; next came moving targets such as clay pigeons or airplane silhouettes on moving belts; then moving targets from moving platforms; and finally, air-to-air target shooting in a plane. Again, estimating range, speed and defection as measured in "rads" was central to this training. Near the end of the war, early versions of simulators were developed that may seem crude by today's standards, but were state-of-the-art back then. Everything is relative, however.

Looking even further back to World War I, training was nonexistent at the beginning of the war. Airplanes were for forward observation and scouting, not bombing, strafing and aerial warfare. Pilots and observers flying over enemy lines might be met with gunfire from the ground and even obscene gestures. To defend themselves (and their honor), some carried bricks, pistols, hand grenades and/or rifles. Semi-auto pistols could be problematic, since the ejected cartridges could hit the observer or pilot or even damage the airplane fabric covering. Some used "cartridge collectors," a wire basket-type device, on their pistols.

Those early days of urbane air warfare soon changed. As described in Volume I of Lt. Col. George M. Chinn's authoritative *The Machine Gun*, two enterprising British pilots placed a Lewis machine gun aboard their aircraft and went looking for the enemy. Not long afterward, they spotted a German Albatros and attempted to close the distance.

Seeing that they could not get closer than 1000 yards, one of the aviators unloaded a 47-round drum at the plane. They missed (as stated at the beginning: it's difficult!), but the event made history as the first record of a machine gun being used in aerial warfare.

Ironically, the initial outcome of this encounter was a directive that pilots were not to engage in such activities, since it would distract them from their primary responsibility: scouting and observation. Nonetheless and before this order was rescinded, British aviators had brought down a few German aircraft with rifle and pistol fire and on one occasion, buckshot.

The first recorded "kill" in air-to-air combat using a machine gun occurred behind British lines at Le Quesnoy in northern France. Before the end of 1914, British planes were arriving in France armed with a single Lewis gun.

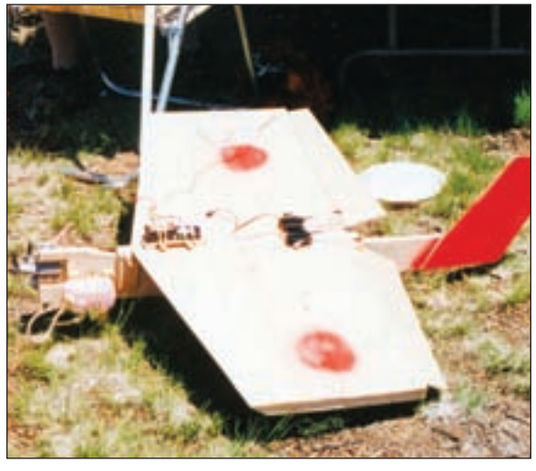
Aerial sights, mounts, firing systems synchronized with the propeller and tracers used in aerial combat were all in their infancy. For example, in 1915 a British engineer named James Buckingham developed an incendiary bullet filled with phosphorus that left a trail of white smoke when it was fired. This became known as a "smoke tracer." Meanwhile, the Royal Laboratory (RL) at Woolwich, England had developed the first "flame tracer" for use by the Royal Flying Corps and Royal Naval Air Service.

London-based Tony Edwards, the world's leading expert on the .303 cartridge, states that, "The RL tracer was not very successful as it only gave an erratic white trace out to 100 yards. This Royal Laboratory tracer was replaced in 1916 with the Sparklet Mark VIIT which traced for about 800 yards and then by the SPG Mark VIIG in late 1916 which was the most commonly found tracer of World War I. The VIIG was very successful with over 72 million were made in World War I alone. It was still in service at the beginning of World War II and a variant of the Buckingham was used at the Battle of Britain."

Today, the early Buckingham rounds are highly desirable specimens within the cartridge-collecting community. Tony continues, "If my colleagues witnessed any of these rare rounds being shot at radio-controlled airplanes, they would be extremely upset. I tried my hand at shooting down model airplanes in Arizona back in the 1980s using twin Vickers on an anti-aircraft pintle mount. Great fun and we did bring one down."

Experiencing History

For most, reading about ballistics is certainly not as much fun as actual target shooting. The knowledge and theory are important, indeed essential, but *[Cont. to page 46]*



Shooters initially fired at commercial radio controlled planes, but these were expensive and hard to repair. They were replaced by simple balsa wood target planes.

Replacing balsa wood with Styrofoam blocks cut cost even more. These planes are almost invulnerable to bullets passing through the wings: you need to hit a vital part.

[Cont. from page 44] trigger time is the key. Shooting an airsoft replica machine gun can be fun, but shooting the real deal is far more exciting. Reading about the challenges of aerial gunnery is fascinating, but actually doing it is another matter entirely.

Today it is possible to experience a small sliver of what it was like in bygone days using radio-controlled (RC) airplanes and guns, as briefly mentioned earlier and described in detail later. It is tremendously challenging and fun. But real aerial gunnery was anything but; it was terrifying and often deadly.

Capt. Forest Fouts was one of the ones who survived. He trained in aerial gunnery at Laredo, Texas. He served as a lead bombardier and nose gunner where the Norden Bombsight was mounted on B-17s. Based initially in North Africa and later in Foggia, Italy, his squadron bombed refineries, rail yards and industrial facilities in Austria and Germany.

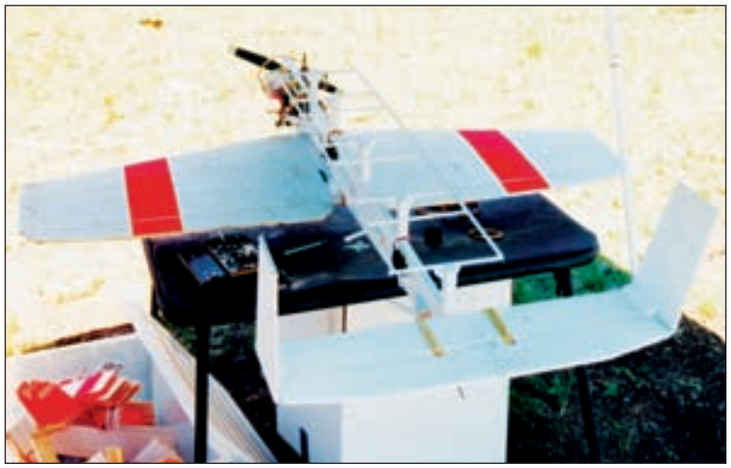
"I had two .50 caliber Brownings in the nose and the aircraft had a total of 13. I started flying bombing missions over Europe in 1943 and there were still German fighters flying and attacking, mostly Messerschmitts. It was really tough to shoot down attacking fighters. I was never able to hit one, nor was anyone on my bomber. Our squadron of 28 bombers was able shoot down a few, including at least one jet, a Messerschmitt Me 262.

"Towards the end of my 35 missions, the fighters were less of a threat because we bombed their factories and refineries and we had good fighter support from P51s and P38s. The primary danger was from the anti-aircraft guns, particularly around Vienna, Munich and Salzburg. Initially they had 88mm anti-aircraft guns and later 128mm. You could tell the difference from the color of the burst, with the 128s white instead of black. Our maps indicated 400 batteries around Vienna alone and each had up to eight guns."

It was the result of anti-aircraft flak that Capt. Fouts was awarded the Silver Star and a Purple Heart for bravery during a bombing run over one of the few remaining refineries in Germany on March 22, 1945. The lead bomber is responsible for lining up the entire formation and, "When I dropped my bomb load, this was the signal for all the other bombers to drop theirs." On that day, the Germans had deployed an effective smoke screen and he asked the pilot to circle the target in hopes of seeing a visual avenue of approach for the formation.

The first, aborted run received intense enemy fighter attack and anti-aircraft flak, but the second one was even more intense since, by then, the Germans were well-prepared. Anti-aircraft flak grew more accurate and his plane was hit numerous times including one burst that shattered the Plexiglas nose, knocking the then-Lieutenant Fouts away from his bombsight. As the citation states, "Though partially blinded by glass particles and dazed from the concussion of the burst, the gallant officer resumes position and accurately synchronized on target." Almost 80% of the formation's bombs landed right on target.

When told of the opportunity to shoot model airplanes he commented, "I had no idea that there were places you could go to shoot Brownings at radio-controlled airplanes. I would love to try my luck at that, especially standing on firm ground and without anyone shooting at me."



When using the Generation X airplane with balloon release mechanism, the object was to shoot the balloons as they were released individually and not the plane itself.

Evolution of RC Target Shooting

Radio-controlled devices have been around for nearly 100 years. Not surprisingly, some of the earliest RC applications were for military use. Custom model airplanes first appeared in the 1950s. By the 1960s, with the advent of transistors, proportional servos, integrated circuits and mass production, RC airplanes finally became cheap enough to shoot at.

Eric Lutfy, owner of Thunderbird Cartridge Company and a senior veteran of machine gun shoots in Arizona, reports that RC airplanes were used at a number of private shoots as early as the mid 1960s. The key factor was to get enough people together to pool resources and hire someone to fly sacrificial planes. The first generation planes were essentially inexpensive commercial model airplanes. Eric also began to experiment with airplanes made from cut blocks of Styrofoam. By the 1970s and into the early 1990s, the planes—and interest in shooting at them—had progressed to the second generation design made from a few sheets of balsa wood glued together.

The issue with the second generation balsa wood design was that they would shatter into several pieces on ground impact, making it difficult to glue them back together. That led to the third generation of RC target planes, which were flying Styrofoam delta wings coated with clear tape to add some fuel resistance to the surface with components such as tails attached by hot glue. Bullets passed through the delta wings and they were very cheap and easy to construct. But, as with balsa wood, they would sustain extensive damage on ground impact.

During the 1990s, some enterprising RC flyers experimented with a number of novel designs—generation X. One of the more noteworthy was a flying platform that would release balloons one at a time by RC command. Another design was a flying delta wing towing a reactive target made with Tannerite. The object was to hit the target and not the plane, and in both cases, this notion proved impractical in all the excitement.

Fourth Generation

The current and fourth generation target plane was developed by Kevin Davis of Arizona. "I wanted a plane that could be cut from sheets of corrugated plastic and stapled together. The wing structure is very strong, yet its hollow design allows room for the receiver and servos. These airplanes can be stacked in my truck and the tail screwed in place at the site. Reactive targets can also be placed in the interior at the site."

Hits through the wing are nonlethal. Kevin states, "The most common fatal hit is through the gas tank since it is under pressure from the engine's *[Cont. to page 48]*

Fourth generation airplanes made from corrugated plastic are ready for assembly at the Big Sandy Shoot site. It's easy to bring a load of these and assemble onsite.

[Cont. from page 46] exhaust manifold. Depressurization immediately cuts off the fuel supply. Hits to the engine, receiver or servos are less common since they are smaller. Depending on what is hit, I can quickly get a downed plane back in action."

Kevin has been flying RC planes for 35 years with the last 10 spent aerial target shooting. He currently works for a major aerospace contractor. Long before the Predator Unmanned Aircraft System started making headlines, the U.S. military approached his company to explore warfare applications of modern RC airplanes. So well-known was his experience in RC planes that he was assigned to this research project during its early stages.

This extensive expertise pays off in other ways besides creative new designs. These planes can travel as fast as 135 mph and fly in winds as strong as 35 mph. In the safety meetings that kick off each event, the shooters are reminded to be fully aware of the dangers of what is described as a missile with a "spinning surgical blade on the front." Kevin can immediately detect when something is amiss and guide the plane away from the line. No one has been seriously injured at any of these events. The most notable incident occurred before Kevin's tenure: an errant plane went through the rear window of a vehicle.

Another important skill is to be able to maintain the airplane as it is flying safely below the backstop, a range of hills in the distant background. Kevin has also developed a technique to conduct night flights by using glow sticks strategically placed to indicate the plane's orientation. This is really popular with the tracer shooters.

R. Lee (Gunny) Ermey examines a fourth generation airplane at the April 2009 Big Sandy Shoot. These planes are fast, elusive and hard to hit, though many like to try.

Nighttime gunnery is possible with the use of glow sticks strategically placed (inset) to allow the pilot (Kevin Davis, kneeling) to orient and maneuver the plane.

Why Arizona?

Arizona became the center for airplane target R&D thanks to several factors. The most critical is the availability of vast stretches of public and private land without trees or significant ground cover that would obscure the presence of people who may wander into harm's way. Since a .308 round can be dangerous out to three miles, an abundance of barren hills is also necessary to provide a reliable backstop. If tracers are used, the ground also has to be barren enough to inhibit fires.

The coordination required to cordon off vast stretches of land, especially if it is forested, are not within the reach of most shooting events. The Cheyenne Wells Machine Gun Shoot is the rare exception where there are sufficient resources applied to do just this.

Another location with both the topography and the resources is the Northern Rockies Machinegun and Cannon Shoot. Anyone can launch an airplane and shoot at it. But it takes very specific conditions to do this safely and not endanger others or subject the RC operator or shooters to possible criminal charges.

The second factor is that Arizona does not restrict the ownership of fully automatic (NFA) weapons beyond federal requirements and just as important, there are chief law enforcement officers who will sign the ATF transfer forms. It is possible to knock down these airplanes with pistols and rifles (it has been done with a 98k Mauser), but the hit probability is low and it can be a bit frustrating. This gun-friendly environment has allowed machine gun enthusiasts to congregate and share the costs associated with such exotic target shooting.

For example, a fourth generation plane costs around $150, not to mention the cost of transferable NFA weapons. As readers might expect, another early innovator of this form of shooting was Mike Dillon, founder of Arizona-based Dillon Precision Products.

The Arms Race

Just as the airplanes have evolved, so too have the techniques to shoot them down. Rifles, pistols, submachine guns, machine pistols and beltfeds are all used to varying success. Not surprisingly, what works the best is what has performed well in the past to down real airplanes: high cyclic rate machine guns, specialized sights and some form of gun mount. The obvious objective is to get as much lead out on the target in the few seconds that the plane flies within range. Shotguns are not allowed at the Big Sandy Shoot since they shift the odds too far in favor of the shooter.

According to Kevin, shooters typically do not give sufficient lead. At approximately 200 yards, [Cont. to page 50]

The most vulnerable part is the fuel tank, but a hit to the servos, receiver or the engine can put a plane out of action. These are small targets on a fast-moving plane.

This AN-M2 aircraft Browning was manufactured by Savage and has original sights, spade grips and is mounted on Generation II AA adaptor system made by Beltfed Shooters.

These twin AN-M2 aircraft Brownings are mounted on a rare twin gun adapter manufactured by Bell Aircraft. Note EOTech sight and custom mount with counterbalance.

If you really want to multiply hit potential, select a Dillon Aero M134D Gatling gun firing at 3,000 shots per minute. This makes it easier, but still not a simple shot.

[Cont. from page 48] the lead for a .308 is roughly 35 feet. Considering that the plane may be moving at 100 mph and the vital parts are only a few inches across, one fully appreciates how difficult it can be. But some have grown quite proficient through a combination of low- and high-tech methods.

For example, one shooter uses an M249 Squad Automatic Weapon (SAW) suspended by a bungee cord from the frame of the overhead canopy. A few have original MG34s or 42s mounted on MG42/53 anti-aircraft tripods—the original Axis setup. Others use adaptors for mounting 1919A4 or A6 Brownings to these mounts.

The purists on the "Allied side" have original Browning 1917 tripods with anti-aircraft extensions. New commercial mount designs by companies such as Beltfed Shooters are also in use and still others have developed mounts of their own design and construction.

Several companies now supply anti-aircraft "spider ring" sights of varying designs. Other shooters are adapting the very latest in technology such as C-More and EOTech sights with heads-up displays and holographic imaging. Original, high cyclic rate .30 caliber AN-M2 aircraft Brownings can be observed in action, even in twin mounts. Twenty-six hundred rpm from such a setup is striking, only outdone by the mini-guns that may also be in action.

Much of the fun at these shoots is to walk the line and examine the weaponry in use, both original guns and the innovative new mounts and sight designs. With such firepower present, there is no need for Tattoo to ring the bell and shout "De Plane! De Plane!" to announce an approaching airplane; a roar of gunfire erupts that passes like a wave moving down the shooting line. This is not Fantasy Island 1977, but fantasy guns 2009. Indeed, actor R. Lee Ermey (a.k.a., "Gunny") was present at the March 2009 Big Sandy Shoot to film a segment for his new series, Lock N' Load on the History Channel starting in July 2009.

Credit Where Credit is Due

Paul Uitti, an ensign flying Grumman TBF and later General Motors TBM low level bombers in the North Atlantic and the Bermuda Triangle attacking German U-boats, also was at the March 2009 Big Sandy Shoot. Paul provided some personal observations, "I am amazed that they could shoot down these model airplanes. Last year, four were shot down at night and the next day there were debates over who got the hit."

He had what few have had on the firing line: firsthand experience on the difficulty of shooting down real airplanes—in this case, his own. "In attacking submarines, I would fire rockets and my two .50 cal. Brownings and the U-boats did not stick around. It was very unusual for them to stay surfaced long enough to shoot back at us. My primary concern was not getting shot down, but landing on the aircraft carriers at night with very little lighting because of the blackout conditions. Most of our fights were at night when the U-boats surfaced to recharge their batteries."

Ed Hope and Kenton Tucker, who operate the Big Sandy Shoot, recognize the sacrifices that combat veterans such as Ensign Uitti, Capt. Fouts and S/Sgt. William Beaird made in preserving the freedoms that permit such shoots and expressions of the Second Amendment. "We owe them a lot. World War II veterans with aerial combat experience have a Browning and a free belt of ammunition waiting for them at our shoot to try their hand again at aerial gunnery."

Sadly, before this article went to press Ensign Uitti passed away in December 2009. Fortunately he had the opportunity to tell his story. But there are thousands of other WW II combat veterans with stories that need to be told. Let's give them that opportunity and another occasion to put bullets downrange.

For those who want to try their hand at aerial gunnery and do not have machine guns or those who do but do not want to go through the paperwork process to take them across state lines, there are rentals available at all three shoots. The Big Sandy flies fourth generation planes and the Cheyenne Wells and Northern Rockies shoots fly first generation commercial balsa and fiberglass airplanes. It is recommended to call in advance to make sure that the wind conditions permit flying.

Sources

RC Airplane Shooting
Big Sandy Shoot
Hosted by MG Shooters, LLC
602-327-7933 • *http://www.mgshooters.com*

Cheyenne Wells, Colorado Machine Gun Shoot
Hosted by the Rocky Mountain Fifty Caliber Shooting Association
303-934-1915 • *http://www.rmfcsa.org*

Northern Rockies Machinegun and Cannon Shoot
Hosted by Wyoming NFA Shooter's Club
307-267-5077 • *http://www.wyomingnfa.com/701.html*

Anti-Aircraft Sights (Reproductions)
Midwest Industries, Inc.
262-896-6780 • *http://www.midwestindustriesinc.com*

International Military Antiques
908-903-1200 • *http://www.ima-usa.com*

Hard-Core Mfg.
724-816-1477 • *http://hard-coremfg.com*

Specialty AA Tripods
Beltfed Shooters • *http://www.beltfedshooters.com*