



The early radio compartment gunner's station was the least effective of the B-17s defensive armament with limited ammunition and field of coverage. (Photo courtesy of Stan Piet)

BEHIND THE BROWNINGINGS

BOMBER GUNNERS TELL THEIR TALES BY MARK CARLSON

High in the clear azure skies over Europe, parallel lines of white contrails were raked in lacy streams behind hundreds of bombers as they flew towards their assigned targets. Aboard each plane were 10 young men. Six of them were charged with protecting their plane, their squadron, their group, and most of all, each other from the savage attacks of German fighters. They were the air gunners of the United States Army Air Forces.

The bombers were stacked in tight formations of 54 planes in three groups. The formation was developed to maximize the effectiveness of bombing and gunnery. Every group covered 1,000 feet in width and 600 feet from the lead to the rear. At least 234 guns covered the sky around the group. They used the reliable and tough Browning AN-M2 .50 caliber heavy machine guns. Gunners worshiped their "wonderful fifties"

and even gave them pet names like "Kraut Widowmaker" and "Mrs. Deuce." "It was a great gun," recalled Staff Sergeant Frank Bushmeier of the 100th Bomb Group. "We had two sights, a ring and crosshairs, and the other was the reticle sight with an orange circle and red dot. We knew how to use them against fighters."

The Luftwaffe had developed a healthy respect for the B-17's bristling armament. After making mock attacks on captured Fortresses and studying the results, they learned an attack from almost straight above would be virtually invulnerable to the bomber's guns. That is where the tight box formation paid off. Even as that fighter was coming down on its target, the guns of eight other bombers were able to track it.

Shoo-Shoo Shoo Baby is one of the few surviving B-17s that actually saw combat. Painstakingly restored in every detail, it is on display at the Museum of the Air Force in Dayton, OH. (Photo by Budd Davisson)



Nose armament on the B-17F continually evolved on the production line and in theater, but the twin side window guns became standard on the B-17F-50. (Photo courtesy of Stan Piet)



Often several gunners claimed the same kill

“Every guy said ‘I got a probable,’” said waist gunner Bruce Richardson, “but it’s hard to say for sure. Maybe someone else gets him. But when they blow up in your face then you’re sure.”

“After one mission over Germany,” said 100th BG bombardier Joe Armanini, “we read in the papers that we’d shot down 400 German fighters. Crap,” he scoffed. “If we’d been that good, there’d be no Luftwaffe left.”

The other way to attack a B-17 was head-on from ‘twelve o’clock high.’ But that too had its dangers. A *Gruppe* of 36 to 48 fighters flew

out of gun range parallel to the main bomber stream until they were well ahead. Then they circled in and, in line abreast, flew straight at the lead bombers. But with a combined closing speed of perhaps 400mph it left few seconds in which to aim, fire their guns and do a split-S maneuver to break away. The fighter might fire 250 rounds, only 15 to 20 of which were cannon shells.

Robert Mathiasen of the 100th said, “Over Berlin we’d look forward and see 200 fighters coming at us. We lost a lot of planes on that mission.”

Peripheral vision, reflexes, vigilance and their ability to think fast were critical to their survival.

Below left and right: Frontal defensive armament locations were as varied as the threat and crew needs dictated till the introduction on the late F & G models standardized the twin cheek positions and the Bendix chin turret as seen here on the 5000th B-17 built by Boeing since Pearl Harbor. (Photo courtesy of Stan Piet)



Taking it on the chin

The most obvious feature of the B-17G was the “chin” turret. With twin remotely operated Brownings, the A-16 electrically powered turret provided protection against head-on attacks. It carried 375 rounds per gun, enough for about 30 seconds of firing. Originally, the chin turret had been part of the failed Lockheed-Vega YB-40 “escort bomber” version of the Fortress. Only 20 were built. But the chin turret survived and appeared on the last B-17Fs and all subsequent B-17Gs. (see “When is a ‘G’ not a ‘G?’ from “The Unlucky Seventh Mission” *Flight Journal*, April 2011). How effective the chin turret was still a matter of debate. While it did provide extra firepower for one of the Fortress’s two most vulnerable quarters, it may only have intimidated an attacker during the few crucial seconds of his approach. Hitting a small fighter in such a short time was almost impossible. Armanini said, “I preferred the older F model with the two side and nose guns. That chin turret was kind of hard to aim. I really liked being able to see down the barrel to fire the guns.”

The bombardier was a “part-time” gunner, since his primary job was to see the plane through the bomb run to the bomb release.

The later model B-24 Liberators and Navy PB4Y-2 had an Emerson electric bow turret. It rotated 75 degrees on either side of the ship’s centerline and the guns elevated to 60 degrees up and 55 down. This gave a very wide cone of protection to the Liberator. In fact, one of the highest-scoring air gunners was Seaman First Class Richard Thomas, who shot down five Japanese fighters with the PB4Y-2 bow turret.

The navigator often had other duties that kept him from fighting the Luftwaffe. In addition to plotting and navigating to and from the target, he sometimes acted as mission photographer, first-aid medic and kept a log. “I never once fired my guns on any of my 23 missions,” said 92nd Group navigator Don Stull.

The view from the top

For overhead attacks, the Sperry No. 645473-E power-operated, direct-sighted turret was installed on the B-17E. The turret’s fire covered an annulus, a doughnut-shaped area 1,200 yards in diameter, but its guns could only elevate to 85 degrees so there was an unprotected cone directly above the plane. The flight engineer doubled as the top turret gunner. He sat on a bicycle-style seat between the guns. The turret itself was suspended on a ring set into the roof of the bomber just behind the pilots. Hand controls rotated and elevated the guns. Five hundred rounds of ammo per gun was fed from two boxes. Sperry recom-



mended the shells be on Type M2 Extra Flexible links in order to minimize jams, but this was not always done.

Flight engineer Stanley Lawruk of the 92nd BG said, “In the top turret I had a view of the whole sky. I did most of the calling out of the fighters and where they were coming from.”

Since the flight engineer was also responsible for keeping the bomber’s systems working after battle damage, he often had to leave his guns unattended. Splicing control cables, transferring fuel and repairing electrical circuits demanded that he turn over the turret to another gunner, often the radio operator.

Pilot Stephen King of the 379th Group recalled, “On one mission, a fighter was coming from the front. It started shooting at us and I didn’t hear anything from the top turret. I got on the interphone and yelled, ‘Ray, why aren’t you

Field mod of twin-50s was incorporated into this B-17F to deal with head-on attacks. (Photo courtesy of Stan Piet)



Top: Introduced on the B-17E, the Sperry top and belly power turrets with computing sights provided an effective defense against high-speed Luftwaffe fighter attacks. (Photo courtesy of Stan Piet)

shooting?' He said, 'I'm waiting until I can get a good bead on him!' I yelled, 'Goddamnit! Scare him away!'

According to the list of highest-scoring air gunner "aces" of World War II, five of the top eleven were in the top turret, or nearly 50%.

The least effective gunner position was the B-17 radio operator. A large window in the compartment ceiling was fitted with a Browning in a vertical swivel mount. The gunner had to squat to sight up the barrel.

Don Hammond of the 100th BG said, "We were trained in what they called 'burst control.' I'd hit the trigger and it would fire about 12 rounds. But I couldn't hit anything with it. I could shoot the tail pretty good but I thought we needed it. The Germans went by so fast on the head-on attacks that I never saw them. I never got off a shot. It was a waste to carry that gun and ammo, but I

guess I felt better having something to shoot back with."

On the ball

The most intriguing gunner position was the ball turret. Built by Sperry, the same company that perfected the gyro-compass and other critical flight instruments, the Model 645705-D ball turret was a marvel of engineering. Typically, the ball gunner was the shortest man on the crew, but there were gunners who stood nearly six feet tall. "When I first saw the ball turret," said 91st BG gunner Dan McGuire, "I said, 'You gotta be crazy to get into that thing.'" The ball gunner sat in a nearly fetal position, looking through a round panel of armored glass between his feet. The twin fifties were on either side of his legs. Pulling on two cables charged the guns. The ammo boxes were on the turret's yoke, so they could be replaced by the flight engineer. Twin belts fed the guns and spent shells were ejected into the slipstream.

The gunner used his right foot to key the plane's interphone, as both his hands were on the elevation and azimuth controls, twin joystick levers just over his head. The left foot controlled the K-4 computing gunsight range reticle.

While the turret used hydraulic power, it could be hand-cranked in an emergency. "That ball was my office," said Ed Silverstone of the 100th. "But I was kind of isolated there. The ball turret could drop 90 degrees and turn full circle. The guns were zeroed at about 600 yards, and every fifth round was a tracer. That gunsight was easy to use and it really worked great. If you could get a German plane in between the lines on the gunsight you were almost guaranteed a kill."

"We had excellent computing sights in the ball," commented Bob Mathiasen. "It figured out deflection and all that stuff. If you knew how big a target was, like a Ju 88, which had a longer wingspan than a Messerschmitt, their wings touched the outer ring of the sight and you fired at that moment. For a smaller plane you got them in the inner ring at about 600 yards. Over Berlin there were plenty of them to shoot at. I got an Fw 190 confirmed kill. He was coming at us and I zeroed in on him and got him in the cockpit."

McGuire remembered, "I brought down two Me 109s at once from the ball. I had put about 200 rounds into one and finally he went over and lost control. He plowed into another fighter and they both went down. I didn't know this until after the mission when a waist gunner said, 'Hey, you got both of them.' But I wasn't officially credited with two kills."

Silverstone commented, "My parachute was on

a shelf just above the turret and if we had to bail out I'd crank the turret down, open the hatch, climb out and clip on the chute and jump with the rest of the crew. I was always afraid that if we were hit and there was no bail out going I'd never know it. So on one mission, I think it was the first Berlin mission, I told the radio operator and the waist gunners to take something metallic and rap on my hatch so I'd know to get out. I said, 'If I see you guys bailing out and falling away and you didn't tell me about it, I might make your trip a lot shorter than you intended.'

"The radio compartment was just forward of

the ball turret. So on this mission, we're fighting off German planes and I hear something rapping on the turret! I cranked the turret down and hit the deck. I jumped up and looked and saw everybody in their positions, fighting the Germans. What I'd heard was empty cartridges from the radio gunner falling and banging on my turret. So I got back to work."

The waist gunners had the most freedom of movement but they also had to move quickly during an air battle. As they manhandled their heavy Brownings back and forth, up and down to keep enemy fighters in their sights, they had to

The B-24's unique nose turret gave a large field of fire but although the top turret overlapped it, there were still areas a fighter could attack where neither gun position could get at them. (Photo by John Dibbs/planepicture.com)



BOMBER GUNSIGHTS

Early in WW II, gunners on American heavy bombers typically manned five stations: top turret, belly (ball) turret, left and right waist, and tail. The B-17G and B-24H (and later Liberators) had nose turrets. Originally waist and tail guns were manually aimed, as gunners manhandled single or twin Browning M2 .50 calibers. The optics varied, including ring and bead "iron" sights and reflector sights with a reticle projected on glass.

Whether glass or metal sights, the rule was, "A fighter's not a duck — aim between the fighter and your tail." The counter-intuitive wisdom was due to the bomber's forward motion. Aiming ahead of an interceptor resulted in over-deflection, placing a burst well in front of the enemy. Think of the string of bullets as a fire hose combined with the bomber's forward speed. Aiming behind the attacker had the effect of "dragging" the stream of slugs into the target.

How much to hold behind the fighter depended on range, bomber versus target speed, and altitude. The AAF advocated zeroing most guns at 500 to 600 yards, requiring the gunner to hold high, on, or low as the fighter approached. It was more art than science.

From 1943 onward, lead-computing sights were available, beginning with the belly turret. The gunner placed his reticle on the fighter, adjusted the sighting ring to match its wingspan, and continued tracking. The internal gyroscope determined the amount of lead by the rate of precession, yielding a firing solution. But the gunner had to be smooth on the controls for azimuth and elevation.

When fighters attacked from straight ahead or astern the gyro sights were negated. With a zero target aspect it was not possible to aim behind the attacker, so the gunner was only concerned with elevation. Furthermore, often in a pursuit curve a fighter got "sucked" astern, giving the tail, top and belly gunners a low-deflection shot.

Without specifying all turret models, B-17 tests for 12-round bursts at 600 yards showed the ball turret the most accurate with all rounds going into a 15-foot circle. The top turret held 21 feet; enclosed waist positions 26; and the tail 45 feet. The chin turret put all rounds into 23 feet, considerably better than the E and F model Forts' "cheek" guns

at 34 feet. B-24 figures were comparable except the more stable tail turret was 35 feet.

The B-29 Superfortress was a different creature, as all gunner stations but the tail were remotely controlled with gyro sights.

—Barrett Tillman



Consider the hazardous environment of a fully protected B-17F waist-gunner who had to deal with penetrating cold, spent cartridges, and an opposing gunner to maneuver around. (Photo courtesy of Stan Piet)



Swivel mounts and fuselage-mounted ammo boxes and flexible feed chutes helped clean up the waist gunner's crowded environment. (Photo courtesy of Stan Piet)

stoop and squat. That required a lot of strength in their legs and back. In the early B-17s and most of the B-24s, the waist windows were open. An icy blast of subzero wind howled through the plane. There were wind deflectors set just forward of the windows.

Handling a flexible mount machine gun to sight, track, fire at and hit a fighter zipping past at

more than 350mph required as much muscle as mental agility and quick reflexes. "The gun wasn't difficult to manipulate," said a 44th BG B-24 gunner, "but the kick made accurate aim difficult."

An 8th Air Force gunner said, "I saw an Me 109 coming in. My gun was jammed. I had to do something fast. I knew that it would be fatal to pick up the cover of my gun and attempt to fix

HOW DID WE NOT SHOOT OURSELVES?

There were a number of power turret protections, but the flexible guns (waist, cheek, etc.) did not have interrupters. B-17 and B-24 ball turrets had a button switch sometimes visible from the outside at the top dead center of the circular window. This switch would engage a cam plate fixed to the fuselage that would cut out the firing of the guns if the ball gunner swept forward and endangered the propeller arcs. Predictably, the cam for a B-24 looked different than the cam for a low-wing B-17. Also, top turrets like the Martin 250 (B-24, B-26 Marauder, others) had fire interrupters to halt firing in proximity to prop arcs and tail surfaces. I have a Martin 250 manual that features drawings that show how to set the interrupters for each kind of bomber. The issue was wing flex, so the drawing shows the bomber at rest on the ground with an outline of how high the wing would be expected to flex in flight loads. When B-25s introduced a tailgunner in a raised doghouse, the Bendix top turret guns were baffled with two angled steel plates mounted to the top of the fuselage aft of the turret. Normally, these plates were covered with streamlined aluminum bumps. The B-29 had similar tail gunner dorsal cook-off protection installed in the base of the vertical fin. —*Frederick A. Johnsen*



Not all aircraft in service had external deflectors as shown on this B-25H behind the top turret. Their function was to protect the tailgunner, when the top turret guns were stowed facing aft, in the event a round "cooked off" due to the guns being hot.

it. Then I did the only thing there was to do. I waved my gun up and down and back and forth as if I was tracking him and I guess Jerry thought I was firing at him. He turned off his main course enough to miss us.

The waist gunners, directly opposite one another in the early B-17, had to contend with constantly bumping into one another as they swung their guns. While this was more of an annoyance than a true problem, there can be little doubt that some kills were missed when a badly timed bump threw off a gunner's aim. Later models had staggered waist windows with the starboard one set forward of the port window. It gave the gunners more room. Waist gunners wore flak helmets and vests, and curved armor plates were fitted below the windows.

Tail-end Charlies

The development of the tail position is one of those often apocryphal stories in military history. Some sources say the first tail guns were added in the early Pacific war by sawing off the tail cone of a B-17D and fitting in a single .30 caliber machine gun. But the truth is that Boeing was already working on a practical tail turret design by the time the U.S. entered the war, and used it on the B-17E and F models. The original design had twin fifties that were hand-operated by the gunner, who sat on his knees and sighted through a remote "peashooter" set just outside his armored glass. The tail was a very tight space to be in, and visibility was limited. The guns were set so far away from the gunner that it required real strength to move them while firing.

Rich Tangradi of the 99th BG said, "When I got out to our airplane, I went into my tail position. I checked my ammunition. A box on each



side, each holding 600 rounds. They were loaded with one tracer, two armor piercing and two incendiaries. I put the guns in their slots and lifted the receiver, put in the belt, then slammed and locked it. They could be reloaded in flight."

By the end of 1943, the B-17G was fitted with a new tail turret, known as the "Cheyenne," named for the United Airlines Cheyenne Modification Center in Wyoming. As in the chin turret, it first saw use on the YB-40. While the old

SSgt Harold Goodwin, tail gunner on B-17F s/n 41-24577 VK+D Hell's Angels of the 358th BS, sits in his position behind "Kay" and "Ethel" ready for action. (Photo courtesy of Jack Cook)

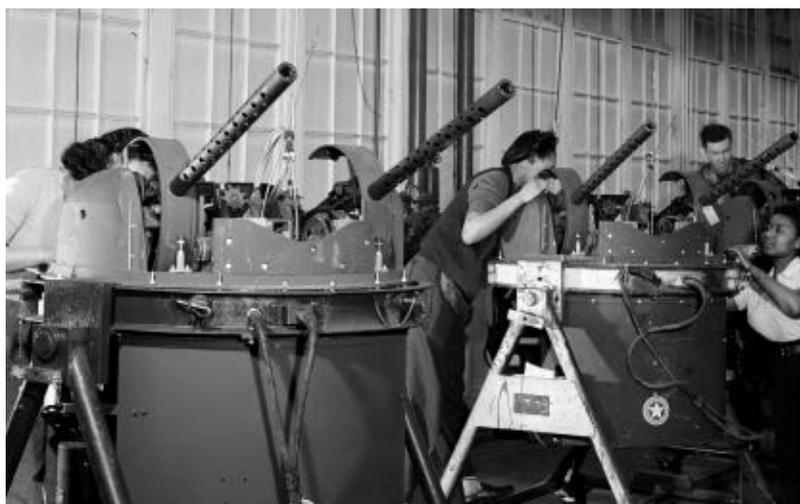


From this vantage point, it's obvious that this was a very dangerous position for a fighter because, including the dorsal gun, a total of seven fifty-caliber Brownings could be trained on it. As soon as the fighter was directly astern, only the two tail guns could be brought to bear. (Photo by Budd Davisson)



Above left: Gunners assigned to the 12th BG at Karachi, India, brush up their gunnery skills on a Bendix turret trainer during December 1944. (Photo courtesy of Jack Cook)

Above right: Martin and Sperry training turrets were mounted on truck bodies at training facilities to give gunners ground experience in mastering the art of powered aerial gunnery. (Photo courtesy of Stan Piet)



Above left: Armorers from the 91st BG use a mechanical linker to prepare ammo belts for their B-17s. **Above right:** Over 40,000 highly effective Martin 250CE power turrets were assembled in an abandoned foundry building on Sinclair Lane in Baltimore beginning late in 1941. (Photos courtesy of Stan Piet)

design allowed an azimuth of 30 degrees to either side, 40 degrees elevation and 15 depression, that only gave the gunner roughly one-sixth of a full circle's arc. The Cheyenne design increased this to 160 degrees in traverse, almost straight out to either side. In elevation, the guns could reach 70 degrees up and 40 down. This, of course, gave the gunner a much broader cone of fire, and must have been a rude surprise to the first Luftwaffe fighters to make a rear attack on them. The old peashooter was replaced by an N8 reflector sight, while a bicycle seat was fitted for the gunner.

The B-24 had a true powered tail turret built by Consolidated which, like the Emerson on the nose, gave nearly 150 degrees of traverse. They had two speeds, fast for moving the turret to an approaching target and slow for careful aiming.

USAAF tail gunners had some of the highest number of credited kills, most often due to the slower rate of closure when attacking from the rear, allowing time for the gunner to line up his shot.

"I got a kill over Regensburg," said Tangradi. "If you were 'Tail-end Charlie' you attracted a lot of attention, no matter what group you were in."

A 94th Bomb Group tail gunner recalled a mission over Bremen. "I never saw so many different types of enemy fighters trying to get our group. There were Me 410s, 210s, 110s, 109s, FW190s and Ju 88s. About 150 in all, and all of them trying to outdo each other. It must have been Iron Cross Day. All our guns were going at the same time. It felt like the ship would come apart. I fired at anything within range. I know I hit a few as I saw several break off and dive. But we made it back okay."

As the last bombers passed out of Axis territory, the gunners finally began to catch their breath. Their wonderful fifties had done their job, and even though many of them were sure they had brought down one or more German fighters, what really mattered was they and their buddies were still alive. And that is the only true victory in war. †