

Not-So-Secret Weapon

Bombardiers took an oath to guard the Norden bombsight with their lives to ensure it didn't fall into enemy hands, but the secret was already out

By C.G. Sweeting

A jeep carrying an ordnance technician, escorted by two armed guards, arrived at the B-17 to deliver a “secret weapon” to its bombardier in December 1942. The special delivery was the famed Norden bombsight, considered the best in the world by the Allies, and always kept under tight security. The bombardier installed the device in his Flying Fortress’ nose, but was under orders not to remove the cover until his plane was airborne. This same procedure would be repeated at each bomber in the group as the crews prepared for another mission to Germany.

The B-17s formed up over their base in England, and while crossing the Channel the bombardiers armed the bombs. Flying in a box formation as they made their way through scattered flak and fighter cover over Belgium, they approached their target, the Schiess Defries Machine Tool Works at Düsseldorf, in good weather. As later chronicled in the October 1943 issue of *Flying* magazine, the destruction of that one plant in the raid would delay German war production for months.

On board the B-17F *Pretty Baby*, bombardier 1st Lt. Robert G. Abb, sitting in a chair facing the Plexiglas nose bubble, crouched over the Norden M-7 bombsight to make final adjustments. As the bomber approached its target, Abb called

out instructions over the intercom to the pilot, identified in the *Flying* article only as George, and crew members:

Target ahead... 'bout 15 degrees left... maybe six miles... watch that formation, George... stay in there tight and when I call for a level, that's what I mean, quick... watch toward the sun for fighters... lead group is going in now... Top turret! Fighter at 11 o'clock our level... they look like Fw-190s... Get that SOB Remmell!... now flak, closer... start evasive action, George... here he comes, top turret... c'mon, Remmell, hit him!... nice shooting... think you got him!

Approaching IP [the point beyond which the bombardier controls the flight], Give me a level, George... start the camera, Beezy... hold that level... watch the air speed... bomb bay doors open... steady, steady, just a little longer now, level dammit, level... hold 'er level... level!... steady!... bombs away!... Let's get the hell outa here!

Flak on the other side now... there goes a Fort out of formation ahead... bomb bay doors closed... camera off, Beezy... boy, the eggs were right in there, gang, swell bombing... look at the smoke down there... wotta mess!

Take over, George, and take 'er home!

The success of any bombing mission depends on accurate targeting. That much

was clear early in World War I, when small bombs dropped over the side of an airplane seldom scored a hit. Both the Germans and Allies developed rudimentary bombsights, and the U.S. Army Air Service and U.S. Navy began testing them in 1918, along with prototypes developed in America.

Bombs fall in a curved path; from 20,000 feet, for example, they must be released approximately 2½ miles from the target. Many factors contribute to accurate bomb-



In November 1944, the cover was officially lifted from the “secret” Norden bombsight.



NATIONAL ARCHIVES

Accompanied by armed guards, bombardiers in training at Albuquerque, N.M., in 1942 carry Norden bombsights to their B-18s.

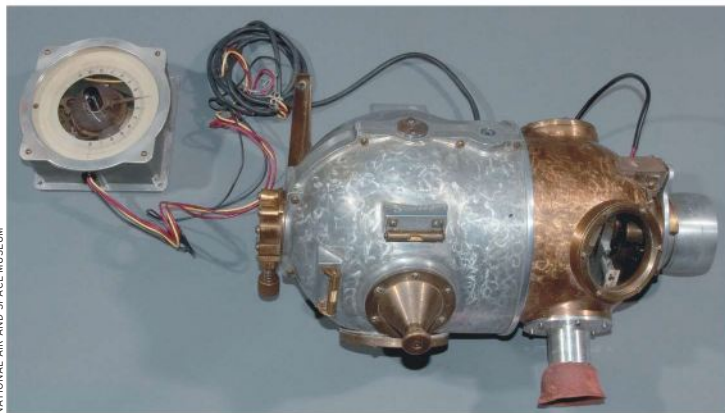
ing, including optical and mechanical principles; direction, movement and speed of the airplane; aerodynamics of the bombs; weather conditions; and enemy action.

From the early 1920s until 1929, the Navy used a bombsight known as the Mark III Pilot Directing Sight, and the Army Air Service (from 1926, the Army Air Corps) employed a similar model. In 1921 the Navy's Bureau of Ordnance assigned Carl L. Norden, a consulting engineer, to study the problems surrounding precision bombing. Two years later he began collaborating with another engineer, Theodore H. Barth, on an improved

sight, in cooperation with Captain Frederick I. Entwistle, assistant research chief at the Bureau of Ordnance. In 1927, after six years of work, they produced their first successful bombsight. The Navy had returned an ear-

lier prototype created by the team for modification, but the second version—a marvel of design—was quickly approved.

Forming a company known as Carl L. Norden Inc., Norden and Barth soon began manufacturing the Navy Mark XI, which would remain essentially unchanged throughout World War II. The Mark XI (or Mark 11) advanced aerial bombing to a semi-scientific level, substantially reducing the element of luck involved in bomb runs and making it feasible for bombers to occasionally score a direct hit on a warship or other target from 5,000 feet. The Navy continued to show interest



NATIONAL AIR AND SPACE MUSEUM

The first prototype of Carl Norden's bombsight was developed in 1923.

in bombsights for level bombing, but its emphasis had now shifted to dive bombing. The gyro-stabilized Norden Mark 15, issued in 1933, greatly exceeded the accuracy of its predecessors, allowing for precision bombing from high altitude.

The introduction of faster, higher-flying bombers to the Air Corps inventory during the early 1930s drove its requirement for a modern bombsight. The Air Corps tested and adopted the Navy Norden Mark 15, designating it the M-4. Although the Air Corps wanted to procure the bombsights directly from the Norden company, despite numerous arguments the Navy insisted that the Army order them through the Navy Bureau of Ordnance. Bombsights produced by the Sperry Corporation were also approved for limited procurement by the Air Corps. Due to security concerns, these were installed on the B-17Cs sent to the British Royal Air Force in 1941 instead of the Norden. The U.S. Army Air Forces would continue to use some Sperry S-1 sights during the war.

The Air Corps ordered the Norden for its



FRANK SCHERSHEL/TIME LIFE PICTURES/GETTY IMAGES

B-17F bombardier William Witt keeps a lookout for fighters.

new long-range, four-engine bomber, built by the Boeing Company in 1935 as the Model 299 and designated the YB-17. Improved models followed, including the B-17B, with turbo-supercharged 1,000-hp Wright Cyclone engines. In 1936 the B-17 was faster, at 252 mph, than the fighters then in Air Corps service.

Planners at the Air Corps Tactical School at Maxwell Field, Ala., began developing a

strategy for daylight precision bombing. They theorized that heavily armed bombers, flying in formation at high altitude, should be able to operate without fighter escort. Soon after the USAAF began operations from England in 1942, however, the Luftwaffe demonstrated that Allied bombers would still need fighter escort to avoid unacceptable losses.

Tests with Norden bombsights mounted in B-17s proved quite successful under ideal weather and visibility conditions. Bombardiers famously claimed they could drop a bomb into a pickle barrel from 20,000 feet, but the reality of combat would be quite different.

The press accorded the Norden bombsight a considerable amount of favorable publicity, some of it exaggerated, before and during WWII. No photos of the device were released, though, and the details of how it worked remained top secret. Even the name of the factory that manufactured the sight was classified.

The USAAF began precision daylight bombing from England using the improved Norden M-7 bombsight in 1942, but over



NATIONAL ARCHIVES

As the lead B-17G drops its bombs, following Flying Fortresses of the 324th Squadron, 91st Bomb Group, drop their ordnance on cue.

Norden M-9 Bombsight

The Norden bombsight improved accuracy by allowing bombardiers to adjust targeting based on airspeed, altitude, drift and ordnance type.

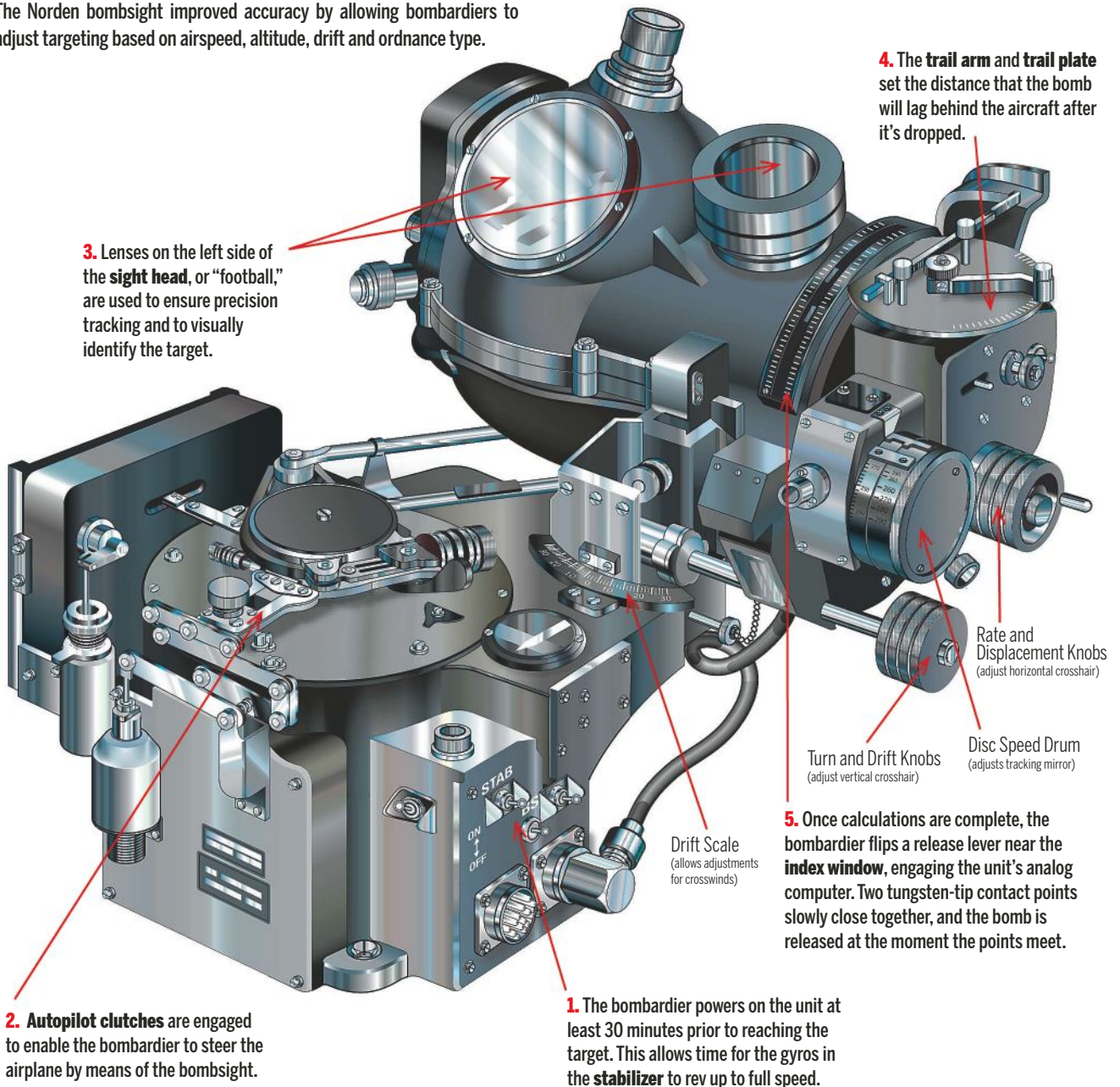


ILLUSTRATION BY STEVE KARP

the next few months the results proved disappointing. Targets in Germany and occupied Europe were often obscured by clouds or fog, and German flak and fighters took a heavy toll on the bomber formations. USAAF and RAF fighters could only escort the bombers for a limited distance, leaving them vulnerable over the targets. As a result of these factors, bombing accuracy suffered, with more than half the bombs dropped landing over 1,000 feet from their targets.

Colonel Curtis E. LeMay provided a partial solution to the problem by identifying the best bombardiers in each squadron and designating them as lead bombardiers. Bombardiers in the other squadrons would drop their bombs when the lead bombardier dropped his. LeMay also devised a staggered “combat box” formation that gave maximum fields of fire for mutual defensive support.

The real break came in late 1943, how-

ever, with the introduction of the long-range P-51 Mustang fighter, which when equipped with drop tanks could escort bombers all the way to Berlin. After Allied forces moved across France in 1944, accuracy was further improved via Oboe, a radar-navigation and blind-flying system using ground stations measuring distance to a radar beacon carried by the aircraft. Pathfinder aircraft, introduced on September 27, 1943, to mark targets with



Above: Germany's Lotfe 7 was simpler than the Norden sight. Right: Nazi agent Herman Lang copied the Norden's plans.



PHOTOS: WEIDER HISTORY GROUP ARCHIVE

smoke, also helped, as did H2X airborne radar, especially in winter. Furthermore, by 1945 bombing was being carried out at lower altitudes.

The improved Norden M-9 was introduced in 1943 for use by the Eighth Air Force's growing fleet of bombers. Accessories included the glide bombing attachment (GBA), which allowed the bombardier to perform vertical evasion maneuvers during a bomb run. Filter kits from Polaroid helped the bombardier see the target by cutting down on glare and haze.

The Norden featured two principal parts: the sight head and the base unit, or stabilizer, atop which the sight head was mounted. The stabilizer, holding the sight's electronics, incorporated automatic flight control equipment (AFCE) linked to an A-5 or C-1 type autopilot, and contained gyroscopes to maintain horizontal stability. An essential part of the autopilot, the stabilizer could still function without the sight head installed. It usually remained mounted inside the bomber's nose, while the sight head—dubbed the “football”—was removed after each mission and securely stored.

During missions, the Norden sight computed information fed in by the bombardier on bomb ballistics, ground speed, drift and trail (the airplane's distance from the target at bomb impact). Using a telescopic attachment on the sight, the bombardier

established and compensated for deflection to synchronize the instrument. Bombs were then released automatically when the bomber reached the point computed by the sight. The AFCE linked to the autopilot enabled the bombardier to control lateral movement of the plane through his adjustments of the sight.

Until late 1943, the Norden bombsight was always protected by exceptionally heavy security. Sights were normally stored in air-conditioned, dustproof vaults that were patrolled by armed guards. During training, USAAF bombardiers had to swear a solemn oath to guard the secret weapon with their lives (see sidebar below), and they were responsible for destroying it in the event of an emergency landing behind enemy lines. Whenever a bombardier or ordnance technician carried a sight out to an aircraft, two armed guards accompanied him.

After hundreds of Norden-equipped bombers were shot down over enemy territory during 1943, Allied officials knew that the Germans had surely studied the bombsight and learned its secrets. As a result, security was finally relaxed. When the war ended, details of the ingenious device were finally made public. But U.S. intelligence experts received a shock when they interrogated Luftwaffe personnel: The Germans had known the bombsight's secrets even before the war, thanks to a spy at Norden.

Herman W. Lang, a naturalized U.S. citizen, had been employed as a draftsman and inspector at the Norden factory during the 1930s. American authorities didn't know that he had served as Nazi stormtrooper in Germany between 1923 and 1927. Recruited as a member of the Duquesne Spy Ring, in 1938 Lang gained access to the plans for the bombsight and hand-copied the blueprints, which were then smuggled to Germany via ocean liner. He traveled to Germany for a “vacation” to assist Luftwaffe technical experts, receiving 10,000 Reichsmarks for his efforts. Lang returned to his job in America, but was later betrayed by a double agent, convicted of espionage and sentenced to 18 years in prison.

The Germans built a mock-up of the Norden sight and compared it to the new *Lotfernrohr 7*, or *Lotfe 7*, bombsight then being used by the Luftwaffe. The *Lotfe 7* was similar in operation to the Norden, but much simpler and easier to operate. It consisted of a single metal casing holding the majority of the mechanism, with a tube extending out the bottom containing a mirror that reflected the image of the target into a small telescope in the box. The mechanisms within combined the functions of the Norden's stabilizer and optics, moving the mirror to stabilize the

The Bombardier's Oath

Mindful of the secret trust about to be placed in me by my Commander in Chief, the President of the United States, by whose direction I have been chosen for bombardier training...and mindful of the fact that I am to become guardian of one of my country's most priceless military

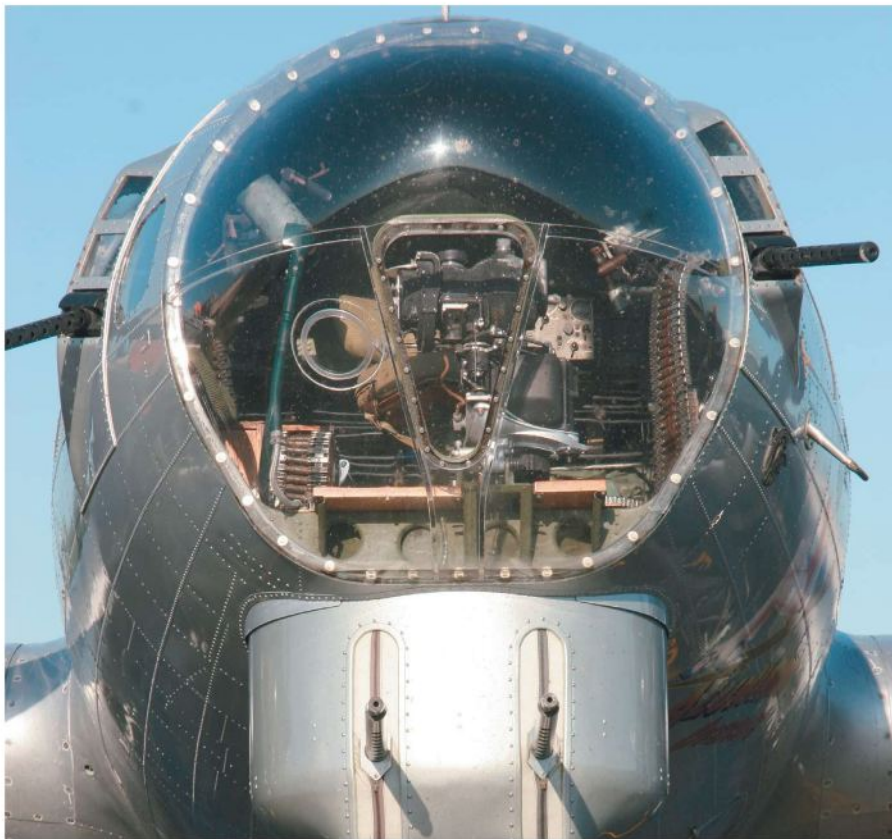
assets, the American bombsight...I do here, in the presence of Almighty God, swear by the Bombardier's Code of Honor to keep inviolate the secrecy of any and all confidential information revealed to me, and further to uphold the honor and integrity of the Army Air Forces, if need be, with my life itself.

A Norden bombsight is visible through the Plexiglas nose of *Aluminum Overcast*, the Experimental Aircraft Association's B-17G.

image, as well as tracking the target. The *Lotfe 7*'s controls were also simpler than the Norden's, consisting mainly of three large knobs to adjust aim.

The Luftwaffe decided their *Lotfe 7* was better than the Norden and gave the American device no further consideration. So despite years of extraordinary efforts by U.S. military and civilian authorities to keep the Norden bombsight secret, America's secret weapon was never secret—except to the American public. †

U.S. Air Force veteran C.G. Sweeting is a former curator for the National Air and Space Museum, where he was instrumental in securing the first Norden bombsight prototype for the collection. Further reading: The Legendary Secret Norden Bombsight, by Albert L. Pardini; The Mighty Eighth War Manual, by Roger Freeman; and Flying Fortress, by Edward J. Jablonski.



The view from *Aluminum Overcast*'s bombardier station. The crewman occupying this post would also operate the nose guns.

PHOTOS: GUY ACETO