ZERO
Myth, Mystery, and Fact

A test pilot compares the A6M5 Zero to U.S. fighters

BY CORKY MEYER

Anyone who grew up in the 1920s and 1930s learned very quickly that “Made in Japan” meant cheap price and poor quality. Almost everything bought in the five-and-dime stores had that tag. It seemed impossible to purchase anything imported from Japan that would not wear out or break after a very short useful life.

A classic warrior in a golden sky, this Zero recalls the glory days of 1941–1942 when the Mitsubishi fighter represented the empire of the rising sun across most of the Pacific Ocean. (Photo by John Dibbs/planepicture.com)

That fact and the secrecy of the Japanese in the years before WW II regarding their military buildup anesthetized all of us regarding their real might. The average American believed that in battle, Japanese military forces would crumble as fast as their products had. We were obviously wrong. They overran country after country and their air forces were superior to anything that could be put against them. Americans learned to respect the term "Jap Zero" as defining the epitome of aerial superiority. Just one day after December 7, 1941, "Made in Japan" had an entirely different meaning.

When I arrived at Grumman on November 11, 1942, and started flying the Wildcat fighter, I was immersed in the life-and-death struggle that the Wildcat, the only U.S. Navy fighter, was having with the Zero. All we heard from the communiqués was that we couldn't build and deliver the Wildcat fast enough. The story was still very fresh in everyone's mind how "Grummanites" had volunteered to work around the clock for seven days after the Battle of Midway to deliver the much-needed 39 additional Wildcats to the fleet to replace some of the aircraft lost during that pivotal battle. The reason that Grumman could not deliver more at that time was that we had run out of engines. So, I felt somewhat ambivalent when I had the chance to fly the vaunted Zero in October of 1944 at the Joint Services Fighter Conference at the Patuxent Naval Air Test Center.

Many historians have insisted that the Zero was either a copy of the Vought 143 (which the Japanese had purchased) or the Hughes Racer. They did look similar, but the Zero used a much different design philosophy to get its weight lower than any other fighter of the time. Japanese designers reduced the loads on the structure by designing to very restrictive dive speeds and by dispensing with armor protection and self-sealing tanks. They gained further weight savings by moving the wing-fold point nearly out to the wingtips. But that greatly limited the number of aircraft that could be placed on a carrier owing to the long folded wingspan.

Out of the hangar

My first impression of the Zero was that it looked every bit the fighter. It had very trim lines. Except for the canopy bulge, the engine was the biggest volume in the design, and the slim fuselage behind it made it seem smaller than it was. It was, to my eyes, the best-looking fighter at the '44 Fighter Conference. It certainly had a magnetic drawing power to fighter pilots because of its reputation for unparalleled agility in dogfights.

During my walk-around, I noticed that there were one-inch bamboo rubbing devices attached to the wheel fairings that the tires picked up, to close the wheel well doors as the gear retracted. The Japanese were certainly using all the endemic materials at hand. Another item I noticed was that the Nakajima Sakae 21 engine had an exact replica of the Pratt & Whitney logo, complete with the eagle, with "Nakajima" in Japanese script, but with the words "Dependability and Reliability" in English. I did feel more at home with the Zero after seeing that mark of excellence.

The Zero was the only aircraft that had a pilot to assist in checkout. Because of the Zero's rarity, Commander Andrews, the Navy project pilot, would not let a pilot start the engine until he was satisfied with his competence.

We started our cockpit checkout in the cool hangar. As we were talking, the airplane was dragged out into the hot sun. I had previously noted that the fabric was drooping between the ribs of the ailerons, but had forgotten to ask Commander Andrews about it. Soon, there were a lot of audible, metallic scraping noises. Commander Andrews then suggested that the fabric would become taut, and the metallic working would stop after the airplane had become acclimated to the higher temperature outside the hangar. That is the only time I have ever "heard" an engineering weight savings.

This Type 52a Zero did not have self-sealing fuel tanks and pilot armor protection. That was to cost them 145 pounds in the Type 52c, which was just being delivered to Japanese squadrons when the Fighter Conference was going on. That weight penalty, plus others to come—without an increase in horsepower—started an inevitable decline in the Zero's combat agility.

Its 8G maneuvering limit was the same as our fighters, but the maximum diving speed of our Zero 52a was only 355 knots. The reduced airframe material sizes resulting from lower dive speed loads reduced the gross weight by several hundred pounds. That lower gross weight accounted for much of the Zero's outstanding dogfight maneuvering performance. In comparison, the Wildcat had a 400-knot dive speed limit. The F6F-3 Hellcat had a 420-knot speed that was subsequently raised to 455 knots in the F6F-5.

Workmanship on the Zero was superb and comparable to American quality. This was most amazing to us in light of the prewar Japanese products we all had come in contact with.

An A6M5 with cannon and auxilliary fuel tank. (Photo courtesy of Peter M. Bowers collection)

An Interesting Cockpit For a Six-Foot-Three Pilot

During the cockpit checkout, I noted that all the engine instruments and several of the flight instruments were calibrated in metrics, like kilograms/square centimeters (oil pressure) and meters (altimeter). I asked Commander Andrews to make pencil marks where the respective needles were supposed to be in flight so I would not have to remember so many unfamiliar readings.

To my surprise, I found that the cockpit was large enough to make my six-foot-three body feel comfortable from the seat bottom to the canopy. My feet, however, seemed tucked under me even with the rudder pedals full forward. This was uncomfortable, but certainly not unflyable. Even though visibility on the ground was only fair over the nose, the seat could be raised so that my eyes were several inches above the top of the open canopy for superb taxi visibility. Fighter-required visibility in the air was excellent, especially to the rear.

Another non-American feature that must have given the Japanese pilots mixed emotions was the protrusion of the two 7.7 mm-type 97 (.30 caliber) gun butts, six inches into the cockpit on either side of the instrument panel. I'm sure these gave the pilots a very macho feeling when firing with the racket, the nearness of the action, and the ability to clear gun jams. With all the gunsmoke, I do hope the Japanese pilots had good oxygen masks with 100 percent flow. The gun butts must have been most disconcerting and disfiguring in a crash. The rest of the cockpit interior was reasonably well laid out and easily adaptable. However, I had just flown in the messy Seafire cockpit, so any other cockpit looked great.

Engine operation throughout the flight was very similar to American engines, as one might expect with the "engine label" attached.

A Great Dogfighter

Once the Zero started rolling on takeoff, performance was impressive. It was considerably above its minimum takeoff speed when it left the ground after a 700-foot roll, and because its climb speed was 20 knots below the Hellcat, the angle of climb was stupendous. The only problem seemed to be that it took way too long to get to 10,000 feet altitude, until I remembered that the altimeter indicated meters, not feet. At 3,500 meters indicated altitude, I realized I was already well above 10,000 feet!

As a test pilot, my training had always dictated that stall characteristics must be checked first to see just how much talent I would need to land safely and smoothly. In all configurations the stalls were gentle, with little or no wing dropping, and accelerated stalls in either the clean or landing condition were as good or better than in the Hellcat. The most interesting aspect of stalls was the airspeed. It was 20 knots less than the heavier wing-loaded American airplanes—a great tribute to the weight-saving program of the Zero's designers. It was apparent that inexperienced Japanese pilots would feel quite comfortable in the Zero. Our pilots flying P-40s, by contrast, had to cope with miserable stall characteristics that killed all too many young pilots in training and combat.

Prior to WW II, combat airplanes were rated on their turning performance—the ability to get on the other pilot's tail for the kill. Without another airplane to compete against, testing this quality is difficult to quantify. I had learned to use the loop maneuver to check this ability when evaluating a fighter without an adversary. Actual combat is not as well

The Zero's unrivaled agility is evident as the large ailerons require little deflection to induce an impressive rate of roll at airspeeds under 200 knots. (Photo by John Dibbs/planepicture.com)

A line of Zeros prepares for takeoff. (Photo courtesy of Peter M. Bowers collection)

simulated but it comes very close. I started the first loop in the Zero at 150 knots from level flight. I completed it 1,800 feet higher than I started! It was my first loop, and I was not pulling it in nearly as tightly as I could have, since I did not use its very low wing loading and stall speed properly, but it was still impressive.

My next loop was started at 120 knots, and by tightening the loop to stall-warning buffeting on the last half, I pulled out 1,200 feet above my starting altitude! For comparison, a Wildcat needed a minimum start speed of 160 knots, and it would end the loop several hundred feet below the starting altitude. It was easy to see why the Zero had gained such a fabulous reputation when it sucked the enemy airplanes into circling, dogfight combat. If the Zero was behind his enemy he could pull inside of him and get a good deflection shot. If he was being tailed, he could pull it in tighter than the enemy and stall him out before he could get a shot. If the Zero pilot was out of ammunition, he could climb away in turning flight in complete safety. Our pilots learned the hard way not to fight the Zero on its own terms. (The Grumman Bearcat was the only airplane that could have bested the Zero at any speed, but it was just two weeks too late for combat.)

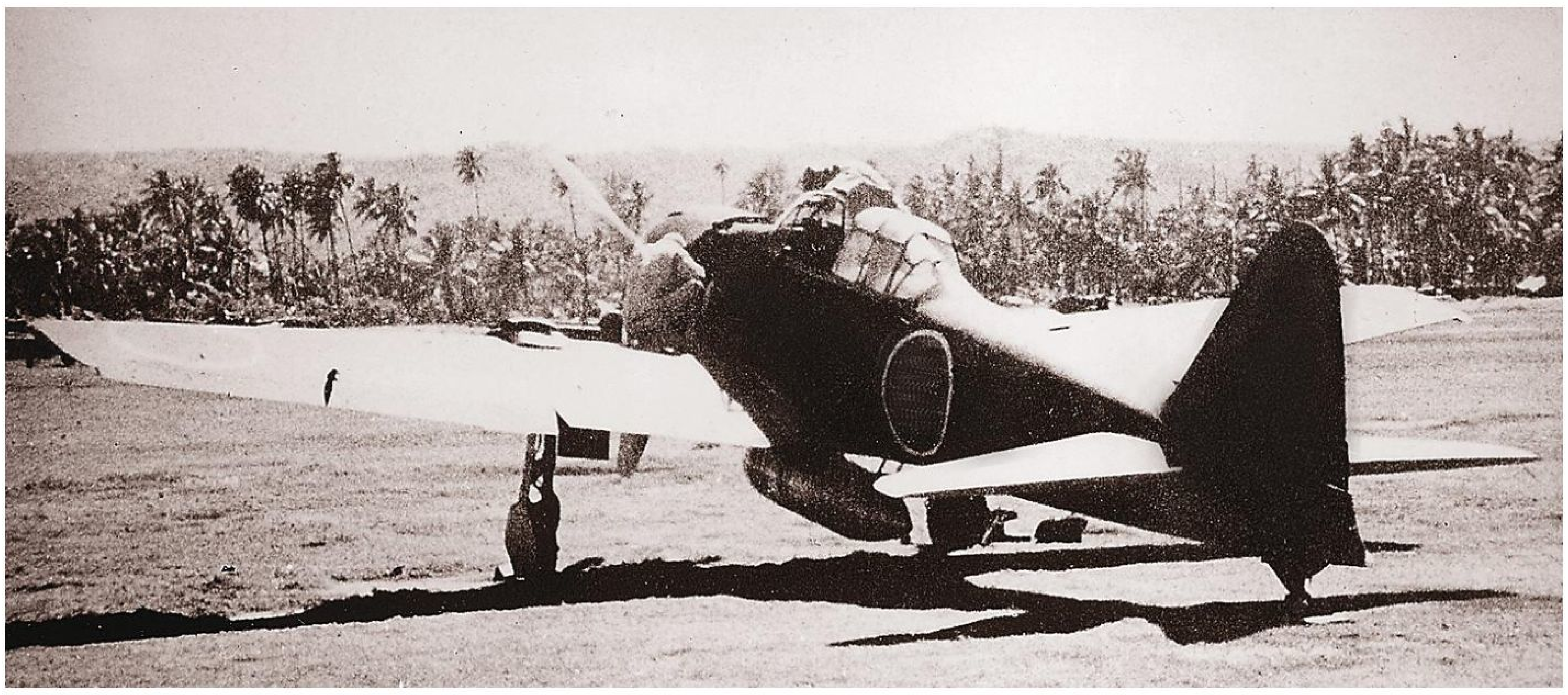
Dogfighter On A Short Leash: Very Inferior Limit–Dive Capabilities

Because the Zero's high-speed level performance was well known, I did not spend time and fuel checking it. I next looked into the flight characteristics of the higher dive speed regimes. The weaknesses of the design were to stand out starkly. At 200 knots indicated, the rolling stick forces were building up much faster than one would have expected for an airplane with a limit speed of only 355 knots. The elevator maneuvering stick forces became quite heavy, and this rapidly eroded the Zero's turning superiority. The airplane was showing itself to be a "lead sled" much faster than I thought it should. At 240 knots indicated airspeed, the stick seemed to be in cement, both for rolling and pulling Gs. The rudder forces, however, were still very light and grossly out of balance with the other controls. I still cannot understand the rationale for the very low rudder forces when the ailerons, and especially the elevator, were practically useless. It was easy to see that the 355-knot dive-speed limit was not much use for evasion when the pilot could not effectively use the ailerons or elevator. A lot of Zeros were shot down soon after American pilots learned that the Zero could not be maneuvered when diving at over 250 knots.

In comparison, both the Wildcat and the Hellcat had much more manageable stick forces up to their higher dive-speed limits. The 52c Zero had heavier wing skins and structure to permit a dive speed of 400 knots. Unless the control forces had also been decreased by a large factor, it is difficult to see how this increase in dive speed would have assisted Zero pilots even during kamikaze attacks.

Test pilots and engineers had worked hard to make the Zero's flight-handling characteristics user-friendly in the dogfighting arena. I immediately felt as though I had flown the Zero many times before. The balance of the controls, the cockpit visibility, the smoothness of the engine, the location of all the instruments, and the gentle stall characteristics made this one of the few fighter airplanes I had evaluated that demonstrated almost all of the required qualities for successfully putting a low-time pilot into combat with the needed confidence to survive.

A clipped wing version of an A6M Zeke 32. (Photo courtesy of Peter M. Bowers collection.)



This Zero was captured on Saipan in June of 1944, and was the one tested by Corky Meyerduring the Joint Fighter Conference at the Naval Test Center, Patuxent, Maryland, October 22, 1944. It still flies—with its original Sakae 31 engine—in Chino, California, at the Planes of Fame Museum. (Photo courtesy of Corky Meyer collection)

A Zero Old Wives' Tale

Many aviation historians have written that when the first Japanese Zero was found in the summer of 1942, the secrets learned from its comparative flights with American fighters dictated the design of the Grumman Hellcat. Historical facts tell a vastly different story.

During the first year of WW II, when the Japanese Zero was outclassing Navy Grumman F4F Wildcats and Army Air Corps P-40s, P-38s and P-39s by its agility and numbers, our armed forces wanted a Zero in the worst way to find out its performance and maneuverability secrets.

Although Petty Officer Koga was killed when his A6M2 Zero overturned during his emergency, wheels-down landing on Alaska tundra, it took the Navy five weeks to salvage it and another seven weeks to get it to NAS North Island in San Diego, California, for major repairs and to locate a replacement propeller. The comparative test flights in which the "secrets" were learned by U.S. Navy and Army Air Corps pilots were not completed until December of 1942.

The Hellcat configuration was firmly fixed on January 7, 1942, by a Navy contract for 1,264 aircraft to be constructed ASAP! The F6F-3 Hellcat made its first flight on June 23, 1942—the same month as Koga was killed. It was in full mass production by time the American flight tests of the Zero were completed. Twelve Hellcats were delivered to the Navy by the end of 1942. An additional 2,545 Hellcats were delivered in 1943. Grumman broke the record for the most aircraft produced in one month when they outdid the North American P-51 delivery record by delivering 604 Hellcats in March of 1944.

Because of the almost impossible mass-production buildup rate required by the Navy contract, small changes could be block incorporated only every three to six months. Major model changes required 18 to 24 months to inject into the rapidly moving production line. Only minor changes were made in the F6F-3 Hellcat until the introduction of the F6F-5 model in July 1944. (The F6F-4 was the only experimental airplane with an engine that was unsuitable for production.)

The Zero secrets arrived about a year and a half too late for the Hellcat, but were certainly used in the super-agile F8F-l Bearcat whose design was just being started in December of 1942.

ONE ON ONE
U.S. Fighters vs. Zero

In November of 1942, Koga's Zero had been extensively repaired. A Hamilton Standard propeller exactly like the Zero's was fitted because the Zero prop was a copy of a Hamilton Standard. Koga's Zero 21 had the Sakae 12 engine of 940hp.

Then, flight-comparison tests were flown between the Zero and the current American fighters. The airplanes in this evaluation all had at least 270hp greater than Koga's. The Zero 52a that I flew had a 1,130hp Sakae 21 engine.

To cancel the temperature or turbulence differences that might happen if tests were done separately, flight tests were flown in formation (up to the point where the planes could keep up with one another). All of the Army Air Corps aircraft were their latest versions. The Navy did not compare the Zero to the Hellcat because there were only three Hellcats flying in November 1942.

The following is quoted from the Intelligence Summary Report; statements in parenthesis are the author's comments.

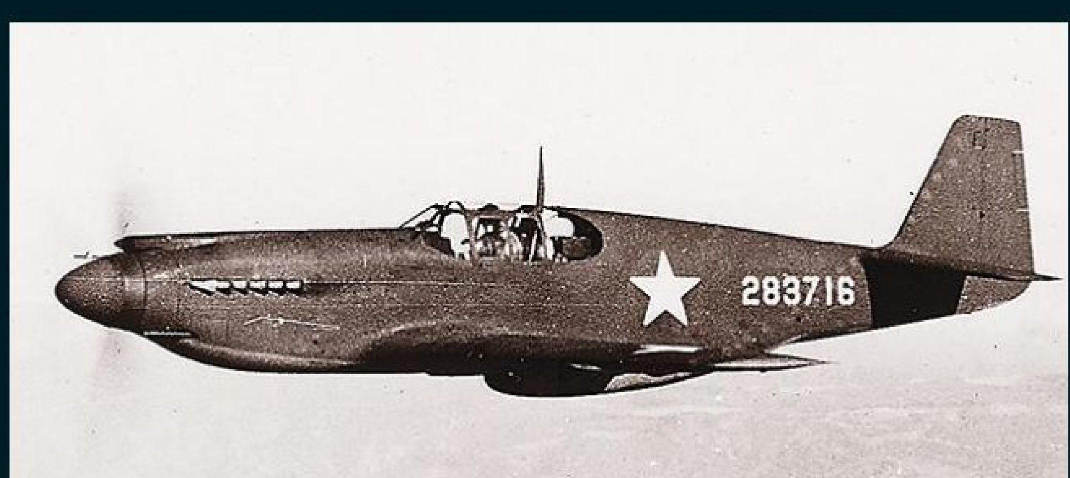
P-38F vs. Zero 21

Both aircraft took off together. The Zero was at 300 feet when the P-38F became airborne. The Zero reached 5,000 feet about six seconds ahead of the P-38F. In level flight, acceleration starting at 200mph, the Lightning accelerated away from the Zero quite rapidly. Climbing from 5,000 feet to 10,000 feet, the Zero was about four seconds ahead of the Lightning. Comparable accelerations at 10,000 feet gave the same results as at 5,000 feet. Climbing from 15,000 to 20,000 feet, the P-38F started gaining on the Zero at 18,200 feet. At 20,000 feet and above, the P-38F was superior to the Zero in all maneuvers except slow-speed turns. One area where the P-38F was superior to the Zero was high-speed reversal of turns. Above 25,000 feet the P-38F was superior to the Zero in all conditions except slow-speed turns.

ONE ON ONE — U.S. Fighters vs. Zero

Airacobra P-39D-1 vs. Zero 21

In a formation takeoff climbing to 5,000 feet, the Zero was at 4,000 feet when the Airacobra reached 5,000 feet. In level flight starting at 230mph at 5,000 feet, the Airacobra had a marked acceleration away from the Zero. Climbing from 5,000 to 10,000, the Airacobra reached 10,000 six seconds ahead of the Zero. Starting from 220mph level at 10,000, the Airacobra again accelerated markedly away from the Zero. Climbing from 10,000 feet to 15,000, the Zero gained an advantage from 12,500 feet and began to pull away from the Airacobra. Climbing from 15,000 feet to 20,000 feet, the Zero took immediate advantage and walked away from the Airacobra. The climb was discontinued as the Airacobra was running low on fuel. On a straight climb from takeoff to 25,000 feet, the Airacobra maintained the advantage until 14,800 feet and from then on, the Zero pulled ahead reaching 25,000 feet five minutes ahead of the Aircobra.



P-51A Mustang vs. Zero 21

During the takeoff, the Zero reached its climbing speed six seconds before the Mustang, and reached 5,000 feet six seconds ahead of the P-51A. At 5,000 feet in level flight at 250mph, the Mustang accelerated sharply away from the Zero. Climbing from 5,000 to 10,000 and to 15,000 feet, the Zero accelerated away from the Mustang in rate of climb. In level acceleration at 10,000, the Mustang accelerated sharply away from the Zero, but at 15,000, the Mustang's advantage became slightly slower than at 5,000 or 10,000 feet. At all altitudes tested, the P-51A could dive away from the Zero at any time. The tests were concluded at 15,000 feet because the Mustang's engine failed to operate properly above that altitude.

P-40F Warhawk vs. Zero 21

The tests were not completed with the Warhawk because the P-40F's Packard Merlin engine could not obtain maximum engine operation. (An observation: the Zero kept performing for every flight while both the Allison and Packard engines couldn't keep up, even with the optimum maintenance of flight testing. Although it was in production by late 1941, no 2,000hp P–47 participated in these evaluations.)

F4F Wildcat vs. Zero 21

The Zero was superior at all altitudes above 1,000 feet in speed, climb, service ceiling, and range. Sea level speeds were the same for both aircraft. In a dive, both airplanes were the same except that the Zero's engine cut out during pushovers. There was no comparison between the turning circles of the two aircraft due to the relative wing loadings and the resultant low stalling speed of the Zero. In view of the foregoing, the F4F in combat with the Zero must be dependent on mutual support, internal protection, and pullouts or turns at high speeds where the minimum radius is limited by structural or physiological effects of acceleration (assuming that the allowable acceleration of the F4F is greater than the Zero's.) However, advantage should be taken where possible of the F4F's superiority in pushovers and rolls at high speeds, or any combination of the two. (This may sound bad, but the 1,200hp Wildcat had a kill-to-loss ratio in the Pacific war of 9 to 1. The 2,000hp Corsair had only an 11 to 1 kill-to-loss ratio.)

F4U-1 Corsair vs. Zero 21

The Zero was far inferior to the Corsair in level speeds and diving speeds at all altitudes. It fell short in climbs starting at sea level, and above 20,000 feet, the Zero could not stay with the Corsair in high-speed climbs. The superiority of the F4U-1 was very evident and would persist even when carrying heavier loads. In combat with the Zero, the Corsair could take full advantage of its speed along with its ability to push over and roll at high speeds if surprised. Due to its much higher wing loading, the F4U-1 had to avoid any attempt to turn with the Zero, except at high speeds, and could expect the latter to outclimb the Corsair at moderate altitudes and low speeds. In this case, the Corsair should be climbed at high speeds and on a heading which would open the distance and prevent the Zero from reaching a favorable position to attack. After reaching 19,000 or 20,000 feet, the Corsair had superior performance in climb and could choose its own position for attack.

Summary

Don't fight with the Zero at low speeds. Keep the speed up on the attack. Push over, dive, and roll away because the Zero can't follow such maneuvers. The Zero 21 only had a 355 knot dive speed, and all the other U.S. aircraft had dive-speed limits of over 400 knots.

Koga's Zero Epilogue

Several museums have reported that they possess Koga's original airplane, but sad to say, the record shows that an SB2C Helldiver taxied into this Zero 21 in the summer of 1944 and chopped it to pieces from tail to cockpit. It was a total loss. The Zero that was used for flight evaluations during the 1944 Fighter Conference, however, is not only on display, but still flying at the Planes of Fame Museum in Chino, California.

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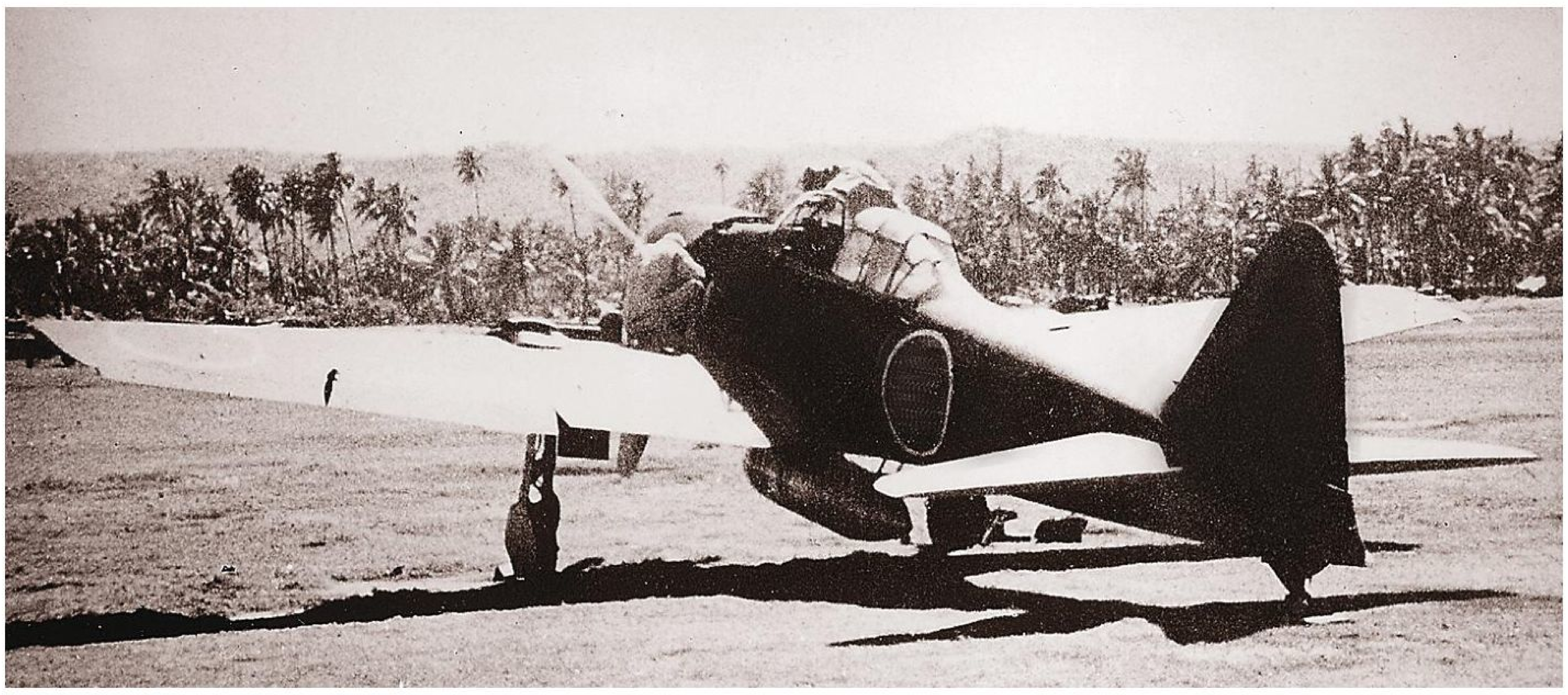
In comparison, both the Wildcat and the Hellcat had much more manageable stick forces up to their higher dive-speed limits. The 52c Zero had heavier wing skins and structure to permit a dive speed of 400 knots. Unless the control forces had also been decreased by a large factor, it is difficult to see how this increase in dive speed would have assisted Zero pilots even during kamikaze attacks.

Test pilots and engineers had worked hard to make the Zero's flight-handling characteristics user-friendly in the dogfighting arena. I immediately felt as though I had flown the Zero many times before. The balance of the controls, the cockpit visibility, the smoothness of the engine, the location of all the instruments, and the gentle stall characteristics made this one of the few fighter airplanes I had evaluated that demonstrated almost all of the required qualities for successfully putting a low-time pilot into combat with the needed confidence to survive.

A clipped wing version of an A6M Zeke 32. (Photo courtesy of Peter M. Bowers collection.)



This Zero was captured on Saipan in June of 1944, and was the one tested by Corky Meyerduring the Joint Fighter Conference at the Naval Test Center, Patuxent, Maryland, October 22, 1944. It still flies—with its original Sakae 31 engine—in Chino, California, at the Planes of Fame Museum. (Photo courtesy of Corky Meyer collection)

A Zero Old Wives' Tale

Many aviation historians have written that when the first Japanese Zero was found in the summer of 1942, the secrets learned from its comparative flights with American fighters dictated the design of the Grumman Hellcat. Historical facts tell a vastly different story.

During the first year of WW II, when the Japanese Zero was outclassing Navy Grumman F4F Wildcats and Army Air Corps P-40s, P-38s and P-39s by its agility and numbers, our armed forces wanted a Zero in the worst way to find out its performance and maneuverability secrets.

Although Petty Officer Koga was killed when his A6M2 Zero overturned during his emergency, wheels-down landing on Alaska tundra, it took the Navy five weeks to salvage it and another seven weeks to get it to NAS North Island in San Diego, California, for major repairs and to locate a replacement propeller. The comparative test flights in which the "secrets" were learned by U.S. Navy and Army Air Corps pilots were not completed until December of 1942.

The Hellcat configuration was firmly fixed on January 7, 1942, by a Navy contract for 1,264 aircraft to be constructed ASAP! The F6F-3 Hellcat made its first flight on June 23, 1942—the same month as Koga was killed. It was in full mass production by time the American flight tests of the Zero were completed. Twelve Hellcats were delivered to the Navy by the end of 1942. An additional 2,545 Hellcats were delivered in 1943. Grumman broke the record for the most aircraft produced in one month when they outdid the North American P-51 delivery record by delivering 604 Hellcats in March of 1944.

Because of the almost impossible mass-production buildup rate required by the Navy contract, small changes could be block incorporated only every three to six months. Major model changes required 18 to 24 months to inject into the rapidly moving production line. Only minor changes were made in the F6F-3 Hellcat until the introduction of the F6F-5 model in July 1944. (The F6F-4 was the only experimental airplane with an engine that was unsuitable for production.)

The Zero secrets arrived about a year and a half too late for the Hellcat, but were certainly used in the super-agile F8F-l Bearcat whose design was just being started in December of 1942.

ONE ON ONE
U.S. Fighters vs. Zero

In November of 1942, Koga's Zero had been extensively repaired. A Hamilton Standard propeller exactly like the Zero's was fitted because the Zero prop was a copy of a Hamilton Standard. Koga's Zero 21 had the Sakae 12 engine of 940hp.

Then, flight-comparison tests were flown between the Zero and the current American fighters. The airplanes in this evaluation all had at least 270hp greater than Koga's. The Zero 52a that I flew had a 1,130hp Sakae 21 engine.

To cancel the temperature or turbulence differences that might happen if tests were done separately, flight tests were flown in formation (up to the point where the planes could keep up with one another). All of the Army Air Corps aircraft were their latest versions. The Navy did not compare the Zero to the Hellcat because there were only three Hellcats flying in November 1942.

The following is quoted from the Intelligence Summary Report; statements in parenthesis are the author's comments.

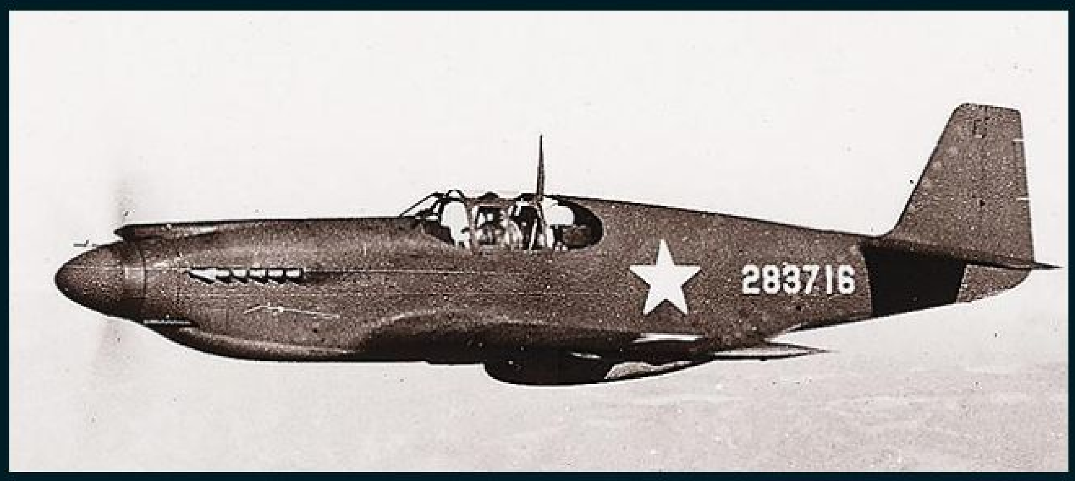
P-38F vs. Zero 21

Both aircraft took off together. The Zero was at 300 feet when the P-38F became airborne. The Zero reached 5,000 feet about six seconds ahead of the P-38F. In level flight, acceleration starting at 200mph, the Lightning accelerated away from the Zero quite rapidly. Climbing from 5,000 feet to 10,000 feet, the Zero was about four seconds ahead of the Lightning. Comparable accelerations at 10,000 feet gave the same results as at 5,000 feet. Climbing from 15,000 to 20,000 feet, the P-38F started gaining on the Zero at 18,200 feet. At 20,000 feet and above, the P-38F was superior to the Zero in all maneuvers except slow-speed turns. One area where the P-38F was superior to the Zero was high-speed reversal of turns. Above 25,000 feet the P-38F was superior to the Zero in all conditions except slow-speed turns.

ONE ON ONE — U.S. Fighters vs. Zero

Airacobra P-39D-1 vs. Zero 21

In a formation takeoff climbing to 5,000 feet, the Zero was at 4,000 feet when the Airacobra reached 5,000 feet. In level flight starting at 230mph at 5,000 feet, the Airacobra had a marked acceleration away from the Zero. Climbing from 5,000 to 10,000, the Airacobra reached 10,000 six seconds ahead of the Zero. Starting from 220mph level at 10,000, the Airacobra again accelerated markedly away from the Zero. Climbing from 10,000 feet to 15,000, the Zero gained an advantage from 12,500 feet and began to pull away from the Airacobra. Climbing from 15,000 feet to 20,000 feet, the Zero took immediate advantage and walked away from the Airacobra. The climb was discontinued as the Airacobra was running low on fuel. On a straight climb from takeoff to 25,000 feet, the Airacobra maintained the advantage until 14,800 feet and from then on, the Zero pulled ahead reaching 25,000 feet five minutes ahead of the Aircobra.



P-51A Mustang vs. Zero 21

During the takeoff, the Zero reached its climbing speed six seconds before the Mustang, and reached 5,000 feet six seconds ahead of the P-51A. At 5,000 feet in level flight at 250mph, the Mustang accelerated sharply away from the Zero. Climbing from 5,000 to 10,000 and to 15,000 feet, the Zero accelerated away from the Mustang in rate of climb. In level acceleration at 10,000, the Mustang accelerated sharply away from the Zero, but at 15,000, the Mustang's advantage became slightly slower than at 5,000 or 10,000 feet. At all altitudes tested, the P-51A could dive away from the Zero at any time. The tests were concluded at 15,000 feet because the Mustang's engine failed to operate properly above that altitude.

P-40F Warhawk vs. Zero 21

The tests were not completed with the Warhawk because the P-40F's Packard Merlin engine could not obtain maximum engine operation. (An observation: the Zero kept performing for every flight while both the Allison and Packard engines couldn't keep up, even with the optimum maintenance of flight testing. Although it was in production by late 1941, no 2,000hp P–47 participated in these evaluations.)

F4F Wildcat vs. Zero 21

The Zero was superior at all altitudes above 1,000 feet in speed, climb, service ceiling, and range. Sea level speeds were the same for both aircraft. In a dive, both airplanes were the same except that the Zero's engine cut out during pushovers. There was no comparison between the turning circles of the two aircraft due to the relative wing loadings and the resultant low stalling speed of the Zero. In view of the foregoing, the F4F in combat with the Zero must be dependent on mutual support, internal protection, and pullouts or turns at high speeds where the minimum radius is limited by structural or physiological effects of acceleration (assuming that the allowable acceleration of the F4F is greater than the Zero's.) However, advantage should be taken where possible of the F4F's superiority in pushovers and rolls at high speeds, or any combination of the two. (This may sound bad, but the 1,200hp Wildcat had a kill-to-loss ratio in the Pacific war of 9 to 1. The 2,000hp Corsair had only an 11 to 1 kill-to-loss ratio.)

F4U-1 Corsair vs. Zero 21

The Zero was far inferior to the Corsair in level speeds and diving speeds at all altitudes. It fell short in climbs starting at sea level, and above 20,000 feet, the Zero could not stay with the Corsair in high-speed climbs. The superiority of the F4U-1 was very evident and would persist even when carrying heavier loads. In combat with the Zero, the Corsair could take full advantage of its speed along with its ability to push over and roll at high speeds if surprised. Due to its much higher wing loading, the F4U-1 had to avoid any attempt to turn with the Zero, except at high speeds, and could expect the latter to outclimb the Corsair at moderate altitudes and low speeds. In this case, the Corsair should be climbed at high speeds and on a heading which would open the distance and prevent the Zero from reaching a favorable position to attack. After reaching 19,000 or 20,000 feet, the Corsair had superior performance in climb and could choose its own position for attack.

Summary

Don't fight with the Zero at low speeds. Keep the speed up on the attack. Push over, dive, and roll away because the Zero can't follow such maneuvers. The Zero 21 only had a 355 knot dive speed, and all the other U.S. aircraft had dive-speed limits of over 400 knots.

Koga's Zero Epilogue

Several museums have reported that they possess Koga's original airplane, but sad to say, the record shows that an SB2C Helldiver taxied into this Zero 21 in the summer of 1944 and chopped it to pieces from tail to cockpit. It was a total loss. The Zero that was used for flight evaluations during the 1944 Fighter Conference, however, is not only on display, but still flying at the Planes of Fame Museum in Chino, California.