

PIONEER JETS OF WORLD WAR II

THE LUFTWAFFE WASN'T ALONE

BY BARRETT TILLMAN

The history of technology is replete with a concept called “multiple independent discovery.” Examples are the incandescent lightbulb by the American inventor Thomas Edison and the British inventor Joseph Swan in 1879, and the computer by Briton Alan Turing and Polish-American Emil Post in 1936.

During the 1930s, on opposite sides of the English Channel, two gifted aviation designers worked toward the same goal. Royal Air Force (RAF) Pilot Officer Frank Whittle, a 23-year-old prodigy, envisioned a gas-turbine engine that might surpass the most powerful piston designs, and patented his idea in 1930.

Slightly later, after flying gliders and savoring their smooth, vibration-free flight, German physicist Hans von Ohain—who had earned a doctorate in 1935—became intrigued with a propeller-less gas-turbine engine. Despite Whittle’s head start, both visionaries ran their prototype jets in April 1937.

Jets 101

Turbine (jet) engines operated on two differing principles, as explained by Dr. Richard P. Hallion, historian emeritus of the U.S. Air Force. “Centrifugal turbojets used large-diameter compressor wheels that, essentially, flung the incoming air outward in a swirling flow pattern towards their rim, compressing it before mixing the air with fuel.

“Axial turbojets had smaller-diameter air compressors stacked in a row along the engine shaft, compressing the incoming flow in stages and then mixing it with fuel. Potentially more efficient than centrifugal-flow designs, axial-flow engines were more difficult to perfect but produced more thrust for their size and engine weight than centrifugal ones.”

During the late 1930s, the German air ministry contracted with four manufacturers for gas-turbine engines, including

Heinkel, which absorbed some Junkers engineers. Each factory opted for axial compressors. Ohain and Whittle, however, independently pursued centrifugal designs, and both encountered problems, even though both were ultimately successful. Ohain’s design powered the Heinkel He 178, the world’s first jet airplane, flown in August 1939. Whittle, less successful in finding industrial support, did not fly his own engine until May 1941, when it powered Britain’s first jet airplane: the Gloster E.28/39. Even so, he could not manufacture his subsequent designs, which the Air Ministry handed off to Rover, a car company, and subsequently to another auto and piston aero-engine manufacturer: Rolls-Royce.

Ohain’s work detoured in 1942 with a dead-end diagonal centrifugal compressor. As Dr. Hallion notes, however, “Whittle’s designs greatly influenced American turbojet development—a General Electric-built derivative of a Whittle design powered America’s first jet airplane, the Bell XP-59A Airacomet, in October 1942. But even though centrifugal-flow engines powered many of the first American, British, French, Soviet, and Swedish jet airplanes, the future belonged to the more efficient, quicker-to-respond, axial-flow turbojet, which opened up the era of the supersonic jet fighter and bomber.”

“Axial-flow engines were more difficult to perfect but produced more thrust for their size and engine weight than centrifugal ones.”

The Jet Race

After Heinkel’s successful demonstration in 1939, progress lagged for a German jet partly because the war went in Adolf Hitler’s favor. But Messerschmitt persisted, designing an advanced twin-engine airframe that was first tested with a piston engine in April 1941.

Messerschmitt’s chief test pilot, Fritz Wendel, flew the all-jet version at Leipheim Airfield in July 1942. The original tailwheel was subsequently moved to the nose, producing a tricycle gear that became standard for jets. When *Luftwaffe* fighter general Adolf Galland strapped into a prototype in April 1943, he savored the smooth, vibration-free sensation

The Gloster Meteor never went nose to nose with the Me 262. However, the much faster Messerschmitt could have used a "slash and dash" form of attack to best the tighter-turning Meteor. This aircraft now flies with the Temora group in Australia. The Me 262 is part of The Collings Foundation collection. (Photo of Me 262 by David Leininger, photo of Meteor by John Dibbs / planepicture.com)



of jet flight and enthused, “It was as if the angels were pushing.”

About that time, Allied intelligence sources learned of the nascent Me 262 Schwalbe, prompting a scramble to bridge the technology gap.

American Jets

In April 1941, Maj. Gen. Henry Arnold, chief of the Army Air Corps, had seen British tests and returned home with Power Jets W.1 engine information, eventually leading to the General Electric J31.

Arnold always stressed Air Corps’ relationship with industry, and Larry Bell’s New York firm rolled out America’s first jet aircraft 18 months after Arnold’s trip to the UK. The multitasking Robert Stanley, who had helped design the DC-3, flew the XP-59A at Muroc Army Air Field in October 1942. Only 66 of these planes were built, but they showed the way to America’s turbine-powered future.

In March 1944, a squadron of the 412th Fighter Group began flying production P-59s at Muroc (and later at Palmdale, California) with two more squadrons assigned. The commanding officer (CO) was Col. Homer A. Boushey. With an engineering degree from Stanford University, Boushey was an early jet and rocket test pilot in 1941.

Shooting Stars

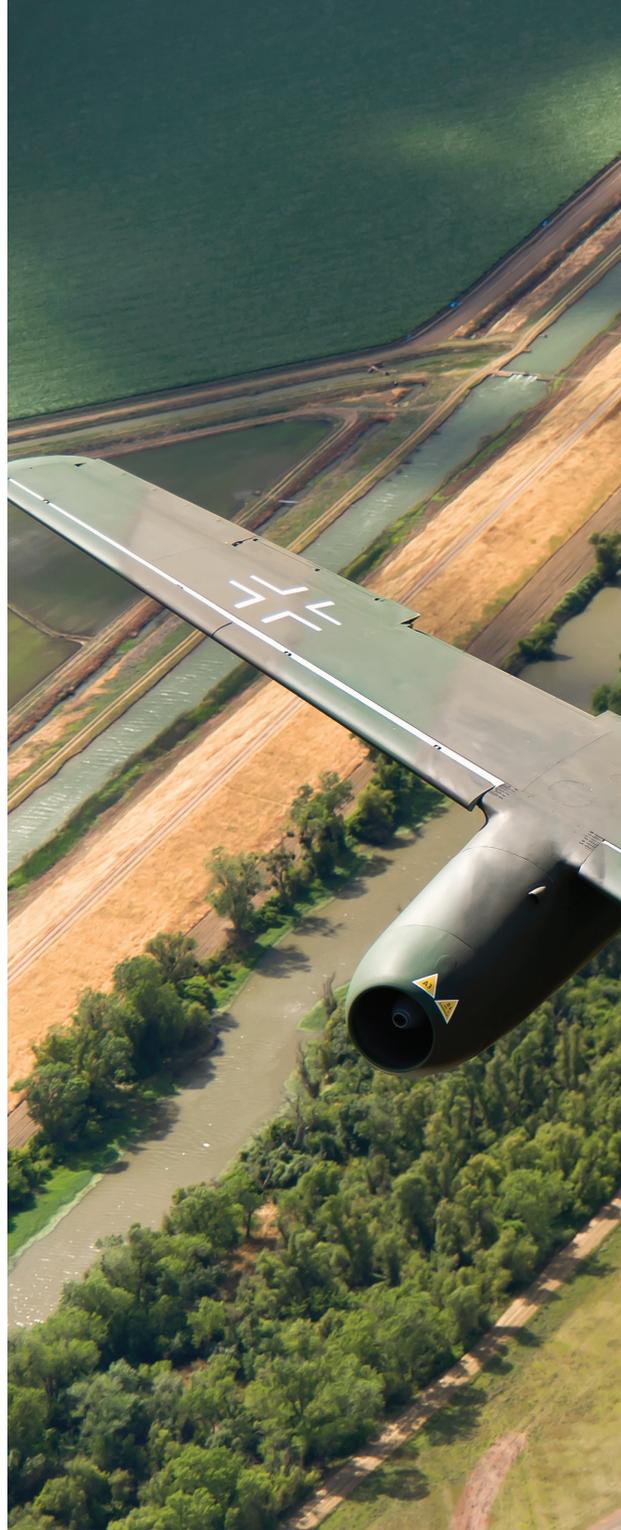
The Lockheed jet, designated P-80, was designed around Britain’s Halford H-1B engine, subsequently produced as the de Havilland Goblin. Without having an engine on hand, Clarence “Kelly” Johnson’s design team used the H-1’s dimensions and broke with the current jet-design format by drafting the P-80 with a single engine in the fuselage—the first jet of that configuration. As it developed, the U.S. derivative J36 did not pan out, leading to the adaption of the Allison J33.

In barely four and a half months, Lockheed produced the first aircraft, with delivery to Muroc before the end of 1943.

The Shooting Star’s first flight in January 1944 was in the experienced hands of Milo Burcham, one of the fabulous 1930s’ crop of airmen who adapted to almost any new technology. A prewar endurance flier and aerobatic talent, Burcham had joined Lockheed in 1941, conducting production test flights before being promoted to lead the company’s office in Britain. There, he mainly focused on RAF Hudson bombers and Army Air Force (AAF) P-38s before returning to Burbank, California, and the Constellation airliner program.

Burcham, the former airshow star, put on a dazzling demonstration for military officials at Muroc, later producing the P-80’s claim as the first American aircraft to clock 500mph in level flight.

The Army ordered 13 preproduction YP-80s in March 1944, a typical number for evaluation.



The Shooting Star, however, was dangerous—or, more accurately, its engine was dangerous, leading to three serious losses. In October, Burcham perished in a YP-80, apparently a victim of the engine’s fuel pump.

Five months later, in March 1945, legendary test pilot Tony LeVier jumped from another YP when a turbine blade sheared with disastrous consequences. He fractured his spine but eventually recovered.

Then in early August, Maj. Richard Bong, P-38 pilot and America’s leading ace, sustained engine failure after takeoff from Burbank. Still new to the jet with about four hours in type, he neglected



to turn on the auxiliary fuel pump. He bailed out over North Hollywood, too low for his chute to open.

None of the three losses were attributable to the aircraft. Pilots learned the hard way to pay extra attention to the engine.

Following formal acceptance of the type in February 1945, the AAF ordered 344 production P-80As. In all, 83 P-80s were delivered by the end of July 1945, with 45 assigned to the 412th Fighter Group.

The Navy received P-80s in June 1945, leading to carrier tests the next year. By then, the Navy had begun evaluating two other aircraft: Ryan's

dead-end FR-1 Fireball, with a jet augmenting a Wright radial (flown in June 1944), and McDonnell's promising twin-engine FD-1 Phantom (flown in January 1945), which entered service in 1947.

Britain's other notable jet was the twin-boom de Havilland Vampire, flown in September 1943, but at war's end, only about six had been delivered. In late 1945, it made the world's first jet landing on an aircraft carrier.

Jets in Combat

In April 1944, the *Luftwaffe* formed *Erprobungs-kommando 262*, an operational development unit

"White 1," a replica Me 262B-1C, was built by Stormbirds of Everett, Washington, and is based at the Houston Hobby Airport in Houston, Texas, where it is operated by The Collings Foundation. It is an exact reproduction of "White 35," which was handed over to the U.S. Navy after WW II. This aircraft, sat outside in the elements at NAS Willowgrove in Pennsylvania for decades before being rescued by the late enthusiast/entrepreneur Steve Snyder. He had it reverse-engineered to give birth to a handful of nearly exact flying Me 262s. (Photo by David Leininger)

that also trained new jet pilots. Based near the Messerschmitt plant at Augsburg, EKdo 262 provided a nucleus of Turbo pilots and ground crews.

Probably the first encounter between the 262 and Allied aircraft occurred over Bavaria on July 25, 1944. An RAF reconnaissance Mosquito PR XVI flown by Flight Lt. A. E. Wall and Pilot Officer A. S. Lobban circled Munich at 28,000 feet, completing their photo run, when Lobban fortuitously checked their tail.

Closing fast was *Ltn.* Alfred Schreiber, a former twin-engine fighter pilot now with EKdo 262, the jet test unit. Wall shoved his throttles to the stop, expecting to outrun the German. No joy. He lowered his nose for more downhill speed, but the mystery plane opened fire at long range, about 800 yards. The German continued closing, and Wall resorted to high-speed maneuvering to escape the 30mm cannon fire.

After avoiding repeated passes, Wall plunged into a providential cloud deck and escaped his assailant. In pulling high Gs, the outer access door of the “Mossie” had blown off, prompting the German to claim damage. Rather than risk a return to Britain with abused Merlins, the RAF crew landed in Italy.

Schreiber claimed at least four more kills before dying in a landing accident in November.

Eighth Air Force fighters clashed with Me 163 rocket fighters several times in 1944, claiming seven. The Komet never posed a serious threat to heavy bombers, however, contrary to the Turbo 262.

Ironically, the AAF’s first jet kills involved no gunfire. On August 28, two pilots of the Eighth Air Force’s 78th Fighter Group (FG) grasped a chance over Belgium. Maj. Joseph Myers and Lt. Manford Croy chased a KG.51 Turbo to ground level. Before they could shoot, the jet pilot chopped his throttles and crash-landed. The Thunderbolts briefly fired at the wreck, as Myers reported, “It skidded over several fields and came to rest and caught fire. The e/a was burning brightly, giving off great clouds of black smoke.”

The German sergeant pilot survived.

The next American success was another “cost-efficient” kill by a Ninth Air Force P-47. On October 2, a flight of the 365th FG latched onto another KG.51 jet, which outpaced one of the Jugs. The other three clung on, pursuing their quarry to the ground. It caught a wingtip and cartwheeled to destruction—killing *Oberfeldwebel* “Ronny” Lauer, who had escaped the 78th FG six weeks before.

The RAF’s first jet kills were credited to five pilots of No. 401 Canadian Squadron, who shared a 262

Heinkel's He 162 Volksjaeger (People's Fighter) was an extremely lightweight, mostly wood fighter that was originally designed to be flown by low-skilled pilots including members of the Hitler Youth. The craft had been rushed into production and equipped several frontline units, but it was constantly frustrated by Allied bombing raids. It was reputed to be capable of nearly 500mph, and postwar test pilots said it was extremely well designed and flew well, but its structure was prone to failure. (Photo courtesy of Stan Piet)





Two YP-80As from Operation Extraversion fly near Mount Vesuvius sometime after their arrival in late January 1945. Attached to a P-38 unit at Lessinia, Italy, they were kept under tight security, with test and maintenance work done by Lockheed reps. Their presence and intended use are still not clear, but if the war had persisted, operational P-80 units would have been fielded to counter late-war German jet operations. (Photo courtesy of Stan Piet)

Shooting Stars to Europe

Despite a shortage of aircraft, the AAF was keen to evaluate preproduction YP-80s in combat theaters and sent two each to Britain and Italy in early 1945. The jets were supported by P-38 units with Lockheed technical representatives on hand.

The Eighth Air Force hosted two senior test pilots, Col. Marcus Cooper and Maj. Frederick Borsodi from Wright Field near Dayton, Ohio. Borsodi's initial flight from Burtonwood on January 28 was the first by any American jet outside the United States. On the next sortie, however, a tailpipe failure led to catastrophic failure, and Borsodi died in the crash.

Cooper's YP-80 was loaned to Rolls-Royce for evaluation and returned to the States, where it succumbed to engine failure in November 1945.

Simultaneous with the European Theater of Operations program, two YP-80s arrived in the Mediterranean Theater of Operations (MTO). The Shooting Stars were attached to the First Fighter Group at Lessinia, Italy, benefitting from Lockheed tech reps supporting the group's P-38s.

A war within a war had been waged in the MTO for several months before the jets' arrival. RAF Mosquitos, AAF F-5 Lightnings, and

Arado 234s flew recon missions in the region, all concerned with outpacing would-be interceptors. "Rumor control" held that the YP-80s were sent to Italy to catch the *Luftwaffe* jets, but no encounters resulted. Even today, some of the operation remains mysterious as the jets were off-limits to all but designated personnel. Maintenance was reportedly performed only by company representatives.

In any case, the Shooting Stars returned to the United States, and one was written off in a forced landing that August.

Arriving late in the war, jet-assisted takeoff (JATO) bottles were attached to everything from an ERCO Ercoupe to the Martin Mars. The P-80 was a natural for JATO, with its slow-spooling centrifugal engine and extended full-weight takeoffs. (Photo courtesy of Stan Piet)



on October 5. Led by a Malta veteran, Squadron Leader Rod Smith, the Spitfires bounced a jet of KG.51 over Holland and exploded it in midair.

In July, Maj. Walter Nowotny, the 23-year-old 250-victory ace, assumed command and slowly built the unit now bearing his name. He claimed eight victories in the jet before disappearing on November 8, variously reported as the victim of P-51s or of friendly flak.

Other jet units followed, including III/KG.51 and I/KG.54, which followed Hitler's mandate for jet bombers. Neither *Gruppe* achieved much success in that role, with KG.54 especially taking heavy losses.

Early in the new year, JG.7 was established as a pure fighter wing under veteran *Oberst* Johannes Steinhoff, a widely respected leader. He absorbed elements of Nowotny's command, but mainly the wing operated as one effective *Gruppe*.

Next was JV 44, a bob-tailed "wing" led by exiled *Ltn. Gen.* Adolf Galland, previously chief of the *Luftwaffe* fighters. After repeated clashes with Hitler and Hermann Göring, Galland was sent off to die as an example to the collapsing *Reich*. He declined to cooperate, although he finished the war with a leg wound inflicted by Ninth Air Force Thunderpilot pilot, Lt. James Finnegan.

Recalling his last mission, Galland wrote, "Out

of the fastest fighter in the world into a bomb crater—an utterly wretched feeling!" He cadged a ride on a tow tractor, grateful beyond words for the devotion of a mechanic.

Available German records indicate 175 Me 262s shot down by Allied aircraft and antiaircraft gunners versus 191 credited to American and RAF fighters. Additionally, the AAF credited fighter pilots with seven Me 163s and 13 Arados.

An accounting of the war's most significant first jet flights demonstrates how progress shifted over a two-year period:

<i>Me 262</i>	<i>All jet flight July 18, 1942</i>
<i>Bell P-59</i>	<i>October 1, 1942</i>
<i>Gloster Meteor</i>	<i>March 5, 1943</i>
<i>Arado 234</i>	<i>June 15, 1943</i>
<i>Lockheed P-80</i>	<i>June 10, 1944</i>
<i>Nakajima Kikka</i>	<i>August 7, 1945</i>

Of the five operational wartime jets, only the Messerschmitt, Arado, and Gloster reached combat. With some 1,400 produced, only the 262 served in quantity. However, a shortage of engines, fuel, and trained pilots limited operational use to perhaps 200 at a time, divided between bomber and fighter units flying both in the west and east.

How would the P-80 and 262 compare in

"Rhapsody in Rivets" P-80A-1-LO 44-85069 was assigned to the 412th FG and part of the 1946 "Project Comet," showcasing the new AAF jet program across fighter bases in the United States. It was also utilized by Col. William H. Councill, head of Wright Field's fighter test division, in the first nonstop transcontinental jet flight in January 1946. (Photo courtesy of Stan Piet)



The Navy arranged for the delivery of two YP-59As to the flight test center at Patuxent River, Maryland, in December 1943. The Navy found the design lacking in any usefulness for naval operations, but several examples were acquired in anticipation of receiving the first North American FJ-1s in early 1947. (Photo courtesy of Stan Piet)



America's First: The Bell P-59

In October 1943, after flying 125 combat missions in 18 months, I was sent home to teach new fighter pilots the finer points of P-38 combat flying while defending California. I was the last 80th Fighter Squadron pilot left in the group from the original cadre that landed on New Guinea in 1942. I began my combat flying in Bell P-39s, and I guess I never got over playing with Bell-built tricycle-gear airplanes when I became one of first five pilots selected to fly the P-59, the first jet that the Army Air Force accepted. Our test group consisted of one pilot from each of the theaters of combat operation, and to supplement our pilots and planes, we had 48 enlisted men, all technical or master sergeants with nine to 20 years of service. It was a handpicked crack outfit.

In April 1945, our first order was to pick up the brand-new P-59s at the Bell plant in Buffalo, New York, and fly them back to our base, which was secret at the time, near Oildale, just outside of Fresno, California. Once we got them to base, we were to determine if the new jets were, in fact, combat ready. But getting them to Oildale turned out to be a herculean task.

When you fly a brand-new airplane, things don't always work as planned. To begin with, it took us 12 separate flights to get the jets from New York to California. The other problem was we had to land at specific bases because, at the time, they were the only ones supplied with JP-1 jet fuel. Our checkout at the factory was less than comprehensive. We were shown how to start the jet engines and then we were given a tech manual to study. With no two-seaters, we were on our own. But we were all experienced fighter pilots, so it was just another day

at the office.

To say that the P-59 Airacomet gulped fuel is an understatement. In less than 44 minutes, we practically ran our tanks dry, burning more than 900 gallons of fuel, an outrageous consumption rate. At sea level, we burned more than 14 gallons per minute, but at 40,000 feet, it was down to 4 gallons per minute. The problem was that it took a lot of fuel to climb to that altitude. But as far as flying the new jet, it was actually a very easy airplane to operate. I always told other pilots that if you could fly a Piper J-3 Cub, then you would have no problem in this jet; it was that easy to fly. There was no torque; it was highly maneuverable; and with its signature Bell tricycle landing-gear configuration, it was easy to land as well.

Unfortunately, the P-59 was far from a combat airplane. Although it carried a huge punch in the nose—one 37mm cannon and three .50-caliber machine guns—the P-59 wasn't very fast, actually about as fast as a P-38. The other problem was that you literally felt as if you were sitting inside an oven while strapped in the cockpit. We were always soaking wet after each short flight, riding just above two very hot engines. Bell only built 66 P-59s, and although none became operational, it still ushered in the jet age for the United States. Boy, what we could have done with them back in early 1942! After our evaluations of the P-59 were complete, the five of us were turned over to begin flying the Lockheed P-80 Shooting Star, when we began transitioning returning propeller-driven fighter pilots into the jet age. Now, that was a fighter!—Maj. Norbert C. Ruff, USAF, Retired, as told to Jim Busha



Gloster Meteor F.3s of 74 Squadron at RAF Bentwaters. The F.3 established the first officially recorded jet speed record of 606mph on November 7, 1945. The F.3 accounted for some 210 of the nearly 4,000 Meteors that were built. (Photo courtesy of Joe Gertler)

combat? Col. Harold Watson's team ("Watson's Whizzers") retrieved several German jets after V-E Day and returned them to the United States. Consequently, the AAF compared the P-80 and Me 262, concluding, "Despite a difference in gross weight of nearly 2,000 lbs, the Me 262 was superior to the P-80 in acceleration, speed and

approximately the same in climb performance. The Me 262 apparently has a higher critical Mach number, from a drag standpoint, than any current Army Air Force fighter."

The Messerschmitt's critical Mach was 0.83 or slightly higher versus about 0.80 for the Lockheed. The P-80, however, had a superior roll rate.

Gloster's Meteor

Gloster had led the allies with its E.28/39 experimental jet, first flown in May 1941. Rated at 340mph, the two prototypes were "proof of concept" types, leading to far more capable aircraft. That was the twin-engine Meteor.

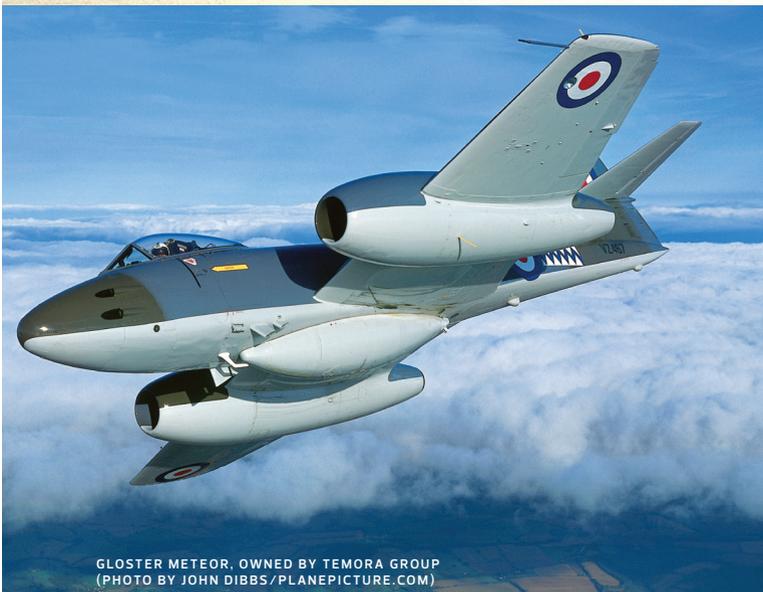
The Mark I first flew in March 1943, five months after Bell's XP-59. But only 20 were produced, entering service in July 1944 with No. 616 Squadron, previously flying Spitfire Mk VIIIs.

At Manston, "Six-Sixteen" was immediately committed to combat, intercepting V-1 buzz bombs. Meanwhile, RAF test pilot Roland



The broad, fat-wing planform of the Meteor definitely ties it to propeller-driven aircraft design and limited its speed. It did, however, produce a forgiving airplane that could maneuver well. (Photo by John Dibbs/planepicture.com)

Meteor versus Me 262



GLOSTER METEOR, OWNED BY TEMORA GROUP
(PHOTO BY JOHN DIBBS/PLANEPICTURE.COM)



ME 262, OWNED BY FLUGMUSEUM MESSERSCHMITT,
MANCHING, GERMANY (PHOTO BY BRIAN SILCOX)

WW hat if the first jet-versus-jet combat occurred five or six years before the Korean War? It could have happened. The Luftwaffe fielded the first Messerschmitt 262s in the summer and fall of 1944, within weeks of the RAF's initial deployment of Gloster Meteors.

First flown in July 1942, the 540mph Messerschmitt jet equipped fighter, bomber, and reconnaissance units starting in mid-1944. Meanwhile, the twin-engine Gloster enjoyed a far quicker path to service, barely 16 months from March 1943 to July 1944.

Though the Meteor represented a revolutionary advance in

Allied aircraft design, its performance was comparable to or even inferior to most piston fighters.

The Me 262A was rated some 100mph faster than the Meteor Mk I and easily outclimbed the British fighter. The German Jumo engines produced nearly 2,000 pounds of thrust versus the 1,700 pounds of Rolls-Royce jets, affording a lower power loading. The Meteor's far lighter wing loading, however, would have permitted it to outmaneuver the German at any altitude. Both had cannon armament: The Germans had 30mm weapons and the British 20mm.

Meteors flew with only No. 616 Squadron during the war, occasionally chasing down V-1 buzz bombs.

SCHWALBE AND METEOR, SIDE BY SIDE

	Me-262A-1	Meteor Mk I
Length	34.7 feet	41.2 feet
Wingspan	41.0 feet	43.0 feet
Wing area	234.0 sq. feet	374.0 sq. feet
Weight, empty	8,400 lb.	8,139 lb.
Weight, loaded	15,720 lb.	13,819 lb.
Engines	Jumo 004B turbos (1,980 lb. each)	Rolls-Royce W.2B turbos (1,700 lb. each)
Velocity (max)	540mph	436mph (at 15,000 feet)
Range	650 miles	500(?) miles
Service ceiling	37,500 feet	34,000 feet
Climb rate	3,900fpm	2,500fpm (at 10,000 feet)
Wing loading	67.1 lb./sq. ft.	36.9 lb./sq. ft.
Thrust-to-weight ratio	0.28	0.40
Armament	Four 30mm cannon	Four 20mm cannon
Amount produced	1,430	3,940
First flight	April 18, 1941 (piston)/July 18, 1942 (jets)	March 5, 1943



War does not wait for winter. Mechanics carry out maintenance on a lineup of Arado Ar 234 B-2s jet bombers of III./KG 76 at Burg near Magdeburg in December 1944. (Photo courtesy of EN-Archive)

Beamont, who downed 32 “doodle bugs” flying Hawker Tempests, pushed the type to compressibility at 630mph although the flight was not officially monitored.

In direct comparisons, Meteor I proved 10 to 25mph faster than Spitfire XIV, Tempest V, and Mustang III at 15,000 feet, but the reciprocating engines easily outclimbed it, the Spit by over 60 percent.

In September 1944, the CO of No. 616 Squadron, Wing Cmdr. Andrew McDowell, reported to the air staff. The Battle of Britain double ace wrote, “With regard to the future use of the Meteor I, it would seem to be most suited for low attack and high-speed photo reconnaissance, but its limited endurance is a disability in the latter role.

“Now that flying bomb attacks are confined to air launchings at night, the Meteors are no longer

required in an anti-Diver role. Nor are they required for ADGB [Air Defense Great Britain] for interception. They might be useful in the Tactical Air Force despite their present limitations, but the number of aircraft is limited.”

The report concluded that the first Mk IIIs were expected in September 1944, but they did not arrive until January 1945. A detachment went to Belgium before the squadron was reunited in the Netherlands in April. There, No. 616 flew ground-attack missions until V-E Day three weeks later.

The First Bomber

In 1940, the German air ministry requested proposals for a turbine-powered bomber, but only Arado responded. Professor Walter Blume, a Great War fighter pilot who later earned an engi-



units, with one “Blitz” making the *Luftwaffe*’s last sortie over Britain in April 1945.

The Japanese Jet

Nakajima was the Japanese Army’s primary source of aircraft, notably the Ki-43 “Oscar,” Ki-44 “Tojo,” Ki-84 “Frank,” and Ki-49 “Helen” bomber. But the Imperial Japanese Navy chose the company for the nation’s first jet.

The Kikka (or “Orange Blossom,” sometimes called “J9N”) resembled the Me 262: a twin-engine, nosewheel single-seater. Propulsion was the greatest challenge, as Japan had no experience building jets. The designers, therefore, developed the Tsu-11, a “thermojet” based on the ducted-fan principle with a marginal afterburner. The designers subsequently chose an axial-flow design similar to the BMW 003: the Ishikawa Ne-20, producing about 1,000 pounds of thrust.

Armament was two 30mm cannon, with provision for an 1,100-pound bomb.

The Kikka was evaluated at Kisarazu Naval Air Station on the east shore of Tokyo Bay. On August 7, 1945, a week before Tokyo surrendered, Lt. Cmdr. Susumu Takaoka completed a 20-minute flight. The engines were typically slow to spool up, however, and takeoff could be risky. Several days later, a rocket-assisted takeoff had to be aborted, and the Kikka was damaged when overrunning a drainage ditch. The war ended before repairs were made.

A second prototype was nearing completion, with perhaps 20 other airframes in construction.

Jet Review

Often lost in the emphasis on testing and combat was the matter of jet fuel. America’s JP-1 was pure kerosene, while JP-2, though easier to refine, was seldom produced. The postwar JP-3 was more widely distributed but was hampered by a high evaporation loss.

British jet fuel was largely derived from “illuminating kerosene”—paraffin lantern fuel. Meanwhile, the *Luftwaffe* found an acceptable mixture of diesel diluted with gasoline.

More important, early jets suffered from metallurgy and operating restrictions, as it was easy to overheat or mishandle the turbo powerplants.

Throughout WW II, total jet aircraft production was probably less than 2,000—a drop in the airy ocean of some 375,000 combat types from the United States, Britain, and Germany. But in an astonishingly short time—barely five years—jets leapt from a supporting role to center stage in the world’s air forces. Pilots flying Mach 2 fighters today owe their modern marvels to a generation of engineers and airmen quickly fading from memory.

Thanks to Dr. Richard P. Hallion.

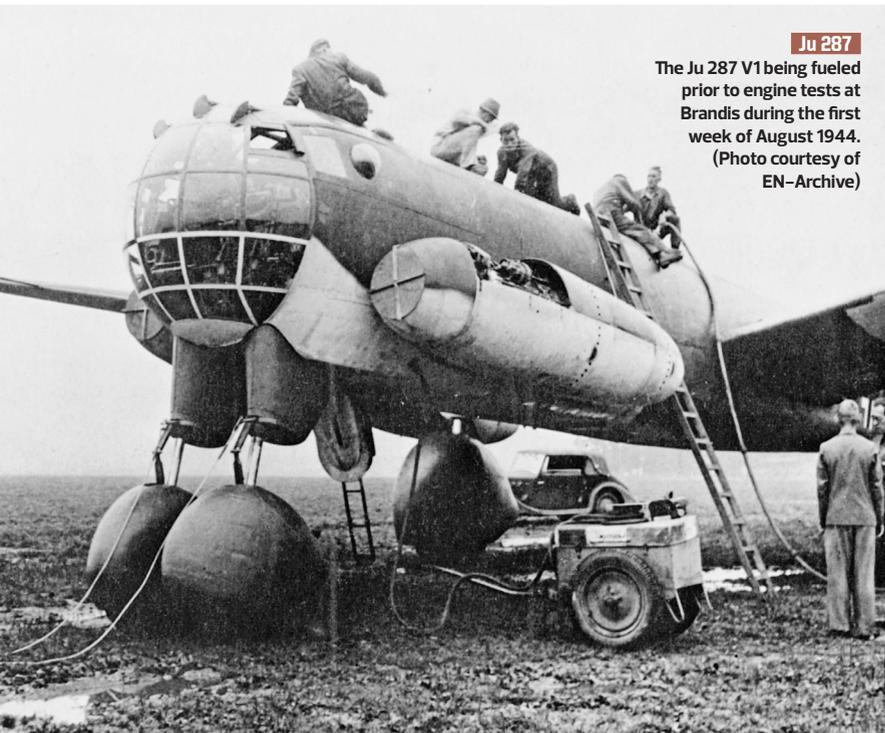
neering degree, had been the company’s chief engineer since 1933. His team produced a sleek twin-engine, single-seat design with the Jumo 008 engine, which became the Arado 234. After design changes largely focused on the landing gear, it flew in June 1943. Hitler was delighted—he had longed for a jet “Blitz Bomber.”

Arado’s estimated a top speed of 480mph, although most sources cite a proven figure of 460mph. The airframe, however, was too slender for an internal bomb bay, requiring external ordnance.

The Blitz went operational in September 1944, but its service was severely limited. The stated loadout was 3,300 pounds of bombs, yet only one bomber wing, KG 76, deployed the jet. Most of the 214 produced went to reconnaissance

Also-ran Jets of WW II

Viewed from this end of history, it would be easy to assume that the Me 262 was the only jet flown during WW II, which couldn't be further from the truth. The Schwalbe was certainly the only jet in full operation, but almost every combatant nation had jet-aircraft programs underway. When the war came to an end, some of those programs had barely yielded a single prototype, while others produced the fighters and bombers that would form the backbone of the first postwar jet air forces. The following listing is not all-inclusive, but it gives an idea of the breadth of jet propulsion research during the war. ✈



Ju 287

The Ju 287 V1 being fueled prior to engine tests at Brandis during the first week of August 1944. (Photo courtesy of EN-Archive)



Ho 229

The Horten Ho 229 V3 at the Douglas factory in Chicago after the wings had been attached. (Photo courtesy of EN-Archive)



Mitsubishi Ki-200

The prototype of the Japanese MXY8 Akikusa, which was a development of the German Messerschmitt Me 163 rocket-powered aircraft after the Nippon-German Technical Exchange Agreement in the summer of 1944. (Photo courtesy of EN-Archive)



de Havilland Vampire

The RAF's de Havilland Vampire first flew in 1943 and followed the Gloster Meteor into service in 1946, serving as a trainer until the 1960s. (Photo courtesy of EN-Archive)



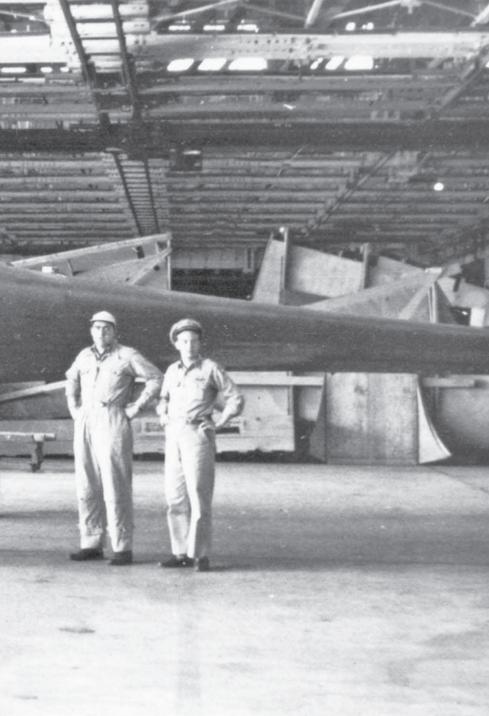
FH-1

The U.S. Navy's first pure jet was McDonnell's FH-1 Phantom, operational in 1947. With the 1950s F-4, the FH retroactively became the "Phantom I." (Photo courtesy of Stan Piet)



Ryan Fireball

A dead-end concept was Ryan's mixed prop and jet Navy fighter, the FR-1 Fireball, only operational with two squadrons. (Photo courtesy of EN-Archive)



Mikoyan-Gurevich I-250

The Mikoyan-Gurevich I-250 (N) was a ramjet-powered aircraft, and during its first flight in March 1945, it exceeded 497mph in level flight with both engines working at full power. (Photo courtesy of EN-Archive)



Nakajima Kikka

The Nakajima Kikka was Japan's first jet-powered aircraft, which was developed late in WW II. The first prototype made its first flight on August 7, 1945, and was retired on August 15, 1945. (Photo courtesy of EN-Archive)

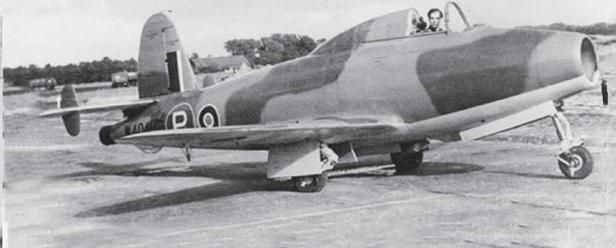


XP-83

Bell's twin-engine successor to the P-59 Airacomet was the XP-83, flown in early 1945 with only two prototypes built. (Photo courtesy of EN-Archive)

Gloster E.28

The Gloster E.28/39, serial number W4041, was the first British jet-engined prototype aircraft to fly and was designed mainly to test the Whittle jet engine. This later led to the development of the Gloster Meteor twin jet-engine aircraft. (Photo courtesy of EN-Archive)



P1101-Oberammergau

The Me P1101V1 was surprisingly discovered by U.S. troops at the secret Messerschmitt factory in Oberammergau, southern Bavaria. The aircraft was later brought to the Bell Aircraft Works in Buffalo, New York, in August 1948 and fitted with an Allison J-35 jet engine. (Photo courtesy of EN-Archive)



V-1 Reichender

The Fieseler Fi 103 R-IV was a piloted development of the V-1 flying bomb. It used the same Argus pulse-jet power, and testing began in the summer of 1944. Although the flights were successful, nerve-racking incidents caused by the high speed occurred during landing, which required great piloting skill. (Photo courtesy of EN-Archive)