

# Fork-Tailed *Oddballs*

**Marvels and might-have-beens**

BY FREDERICK A. JOHNSEN





**There's the P-38 Lightning known** and loved by generations — a large, yet lithe twin-engine, twin-boom fighter with an informed sense of streamlining that inspired descriptions like “three bullets on a knife.” The P-38 marched through the war generating alphabetical models through “M” totaling around 10,000 copies.



The Night Lightning or “M” variant of the P-38 evolved late in the war after field modifications suggested a production version based on the P-38L. A raised cockpit for the operator of the AN/APS-6 radar and night cockpit upgrades were featured in 75 examples delivered. Performance was similar to the “L,” considerably besting its P-61 cousin, but only a handful arrived in Pacific combat areas with no reported enemy encounters recorded. (Photo courtesy of Stan Piet)



## FORK-TAILED ODD BALLS



Translucent nose on a Pathfinder P-38J (44-23139) accommodated radar. (Photo courtesy of Lockheed)

But it would be facile to leave the Lightning at that. The P-38 was a product of creative, yet disciplined thinkers like Kelly Johnson. How ironic that the elliptical twin tail appearance of the dumpy Hudson bomber was an icon of grace and style when applied to the P-38 and even the swooping Constellation airliner. Johnson's P-38 team tweaked those signature tail shapes into something that followed slender booms radically housing the turbo-superchargers that gave the Lightning its punch at altitude. Modern tricycle landing gear, centrally mounted armament, and propellers rotating in opposite directions against the norm telegraphed the P-38 team's willingness to innovate.

Not only could the P-38 deliver on its promise as an aggressive fighter, but serendipitously its large airframe gave the Lightning adaptability and flexible mission possibilities unattainable in smaller pursuits like the contemporary Bell P-39 Airacobra.

If the innovative Lightning design was promising enough to earn lucrative prewar orders for Lockheed, the eager P-38 team soon learned



sobering lessons from testing as well as combat when war began. A variety of factors made the time ripe for experimenting with one-off Lightning variants to address technical and tactical problems. The United States entered a global war of unknown length in 1941. Americans euphemistically spoke of wartime necessities "for the duration," the impossible-to-calculate length of the war ahead. In that atmosphere, the creative designers of the P-38 were both encouraged and compelled to experiment with their product to optimize its contributions to the ultimate Allied victory. Lt. Gen. Jimmy Doolittle endeavored to winnow out P-38s and even B-24s from his mighty Eighth Air

P-38 upswept tail booms photographed in December 1942 explored high-speed flight issues. (Photo courtesy of Lockheed)





P-322 Lightning in RAF markings shows smooth booms lacking turbosupercharger exhaust, with the shorter exhaust stack visible at the wing-nacelle junction. (Photo courtesy of Lockheed)

Force in favor of P-51s and B-17s. Yet there is a curious kindred adaptability shared by both of the capacious airframe types that Doolittle shunned, while P-51s and B-17s strayed less from their one primary mission. Both Lightnings and Liberators ended the war with a reputation for adaptability.

Embracing an aircraft that was both fast and big, Lockheed set about taming the P-38's foibles and expanding its résumé.

### Lightnings at Sea?

Lockheed contemplated two variants of the P-38 for the U.S. Navy. Contemporary drawings show one version used inline engines in smooth booms without superchargers; another truncated the front of the booms with shorter air-cooled radial powerplants. One drawing depicts wings that folded at the outer edges of the flaps to stow Lightnings aboard aircraft carriers. The notional radial-engine P-38 addressed an evident Navy preference for air-cooled engines, due at least in part to the simplified systems and logistics requirements those engines placed on their isolated aircraft carrier hosts.

But navalized P-38s were not to be, although four unarmed photo reconnaissance AAF F-5B Lightning variants were used by the Navy in North Africa under the distinctive naval nomenclature FO. (F was for Fighter; O was the letter assigned by the Navy to indicate aircraft from Lockheed's Plant B.)

### Boom or bust

Lockheed engineers played with the twin booms of their creation for two distinct reasons. If American factories were far enough from combat to render them inviolate from enemy attack, they also were distant enough to present a logistical problem when delivering fighters thousands of miles overseas, especially to Pacific fronts.

One concept called for mounting a pair of large seaplane floats to the P-38 for overwater delivery

Below: **Lucky! 4**, an F-5B operated by the 28th PRS, was fitted with dual 310 gal. drop tanks modified for use as litters for the high-speed evacuation of seriously wounded soldiers in the Caroline Islands. Also, note the excellent view of the camera ports. (Photo courtesy of Stan Piet)





# Smile for the Camera: Lightning Photo Variants

**HIGH ALTITUDE, LONG RANGE, SPEED, AND SPACE** for cameras were ideals sought in dedicated photo reconnaissance aircraft of World War II. The P-38 had them in abundance. The Lockheed team recognized it, and began work on a photo version before American entry in World War II.

Nomenclature of the era used the letter F to designate Air Force photographic aircraft. The F-3 was a scarce photo version of the Douglas A-20 Havoc; F-6 would denote camera-equipped Mustangs. F-4 and F-5 were reserved for around 1,400 evolving variants of the P-38 stripped and fitted to the recon mission, making photo Lightnings the most widely used of the F-series in World War II.

The first 99 F-4 photo Lightnings were basically P-38Es mounting four cameras in the nose, an autopilot, and a drift meter to help ensure proper tracking on photo passes. Some photo Lightnings were built that way from the ground up; many others were fighters modified to photo standards. The work was assigned to Lockheed's modification facility at Love Field in Dallas, Texas.

Lockheed made the first F-4 deliveries to theAAF in March 1942. Twenty follow-on F-4As were based on the P-38F. Then, even though the host airframe kept the nomenclature P-38, the photo derivatives changed to become F-5A, or, if they used intercoolers, F-5B, based on the P-38G. There followed 128 F-5Cs, derived from the P-38H. Photo Lightnings hit their stride with more than 700 F-5Es from P-38J and L-model airframes. The creation of F-5s closed out with the F and G models, still based on P-38J and L, respectively. Different camera installations marked the main distinctions between F-5Fs and Gs.

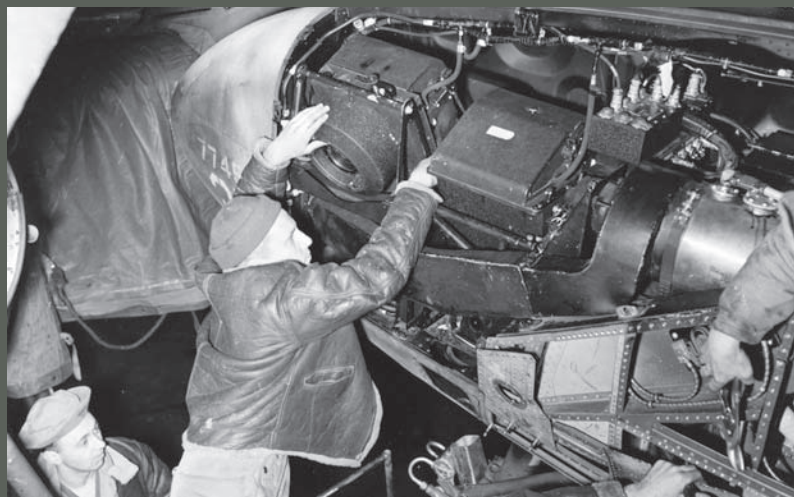
Early F-4s packed four K-17 cameras for vertical imagery; subsequent F-4s added oblique cameras



Lockheed F-5B photo Lightning shows evidence of synthetic haze paint under the wing, where lighter top coat was applied more heavily than on upper surfaces. Radio mast on top of nose, lack of gun barrels, and flattened lower nose surface help identify this as a photo Lightning. (Photo courtesy of Lin Hendrix collection via SDAM)



F-5G Lightning *Miss Virginia G* of the 21st Photo Recon Sqd. taxis out of its hardstand prior to mission during 1944. The paint has been removed from the spinners and the leading edges of both wings to save weight and decrease drag in order to increase Lightning's speed. (Photo courtesy of Jack Cook)



T/Sgt. Robert Dout of Daytona Beach, Florida, removes a K-17 oblique camera from a 7th PG F-5B in November 1943. (Photo courtesy of Stan Piet)



Fresh K-17 cameras are loaded into F-5A 42-12778 *Dim View* assigned to Lt. Walter D. "Dale" Shade of the 13th Photo Recon Sq, 7th PRG. (Photo courtesy of Stan Piet)

to the mix. The K-17 cameras, fitted with lenses of various focal lengths, gave Lightnings the ability to record predetermined amounts of territory from mathematically calculated altitudes. Trimetrogon photography used simultaneous images made from a vertical camera and two oblique cameras covering a swath beneath the reconnaissance aircraft that enabled accurate target mapping.

Unarmed, the photo Lightnings depended at least in part upon speed and the "little airplane, big sky" concept for survival.

Haze paint was applied to photo Lightnings in an effort to render them less visible. Haze paint was a clever use of an oil-based white paint sprayed over a dark blue or black base. The resulting finish reflected light in the blue and violet wavelengths, while absorbing other colors of the spectrum. Although imperfect, haze paint showed promise in tests, and was applied to F-4s in 1942. The white top coat was applied heavier in shadow areas, to boost its effect. Irregularities in application of the paint, plus unavoidable degradation of the finish due to weathering, could diminish its effectiveness.

Haze paint gave way to standard olive and gray camouflage until the resurrection of the blue concept in 1943, called synthetic haze paint. Synthetic haze paint started with a dark base coat called

Sky Base Blue, top coated with a lighter Flight Blue haze. Later in the war, F-5s flew in natural metal finish, probably coinciding with the AAF dictum to eliminate camouflage paint at the factories starting in October 1943. Some photos of F-5s in Europe show a lighter overall paint scheme, possibly Photo Reconnaissance (PR) Blue applied in England.

The roster of Lockheed Lightnings in civilian postwar service included a number of F-5Gs that earned their keep working for survey companies. Some of them later received fighter noses when restored as warbirds.

**Mission complete!** Pvt. Peterson removes film canisters from the nose of the 5th PRG "Photo Lightning" and hands them off to Capt. Brooks, the Group's intelligence officer. (Photos courtesy of Jack Cook)

**Ready for a recon mission over Sicily during 1943, Sgt. Hogstad, the crew chief of this 5th PRG F-5 Lightning, assists the pilot Capt. Humbrecht into the cockpit while Pvt. Peterson loads the cameras with film.**



**P-38H-5-LO (42-67086) was fitted with a wooden test nose for the future droop-snoot model designed by Lockheed's George McCutcheon. The location is Langford Lodge, Northern Ireland, in 1943. (Photo courtesy of the Robert F. Dorr collection)**



legs. To keep the horizontal tail out of the pounding sea spray, it was redesigned with an upsweep that raised the horizontal stabilizer about 18 inches while placing it 24 inches farther aft. The redesign worked, but the perceived need went away as shipping lanes to Australia became ever more inviolate after Midway.

But the demon of compressibility at high dive speeds caused problems for the P-38, as it did for other fighters of the era. Loss of elevator function was ultimately addressed on postwar supersonic aircraft by employing horizontal stabilizers of variable incidence; wartime experiments with the P-38 centered on another set of upswept tail booms to treat high-speed issues.

### Dive flaps to the rescue

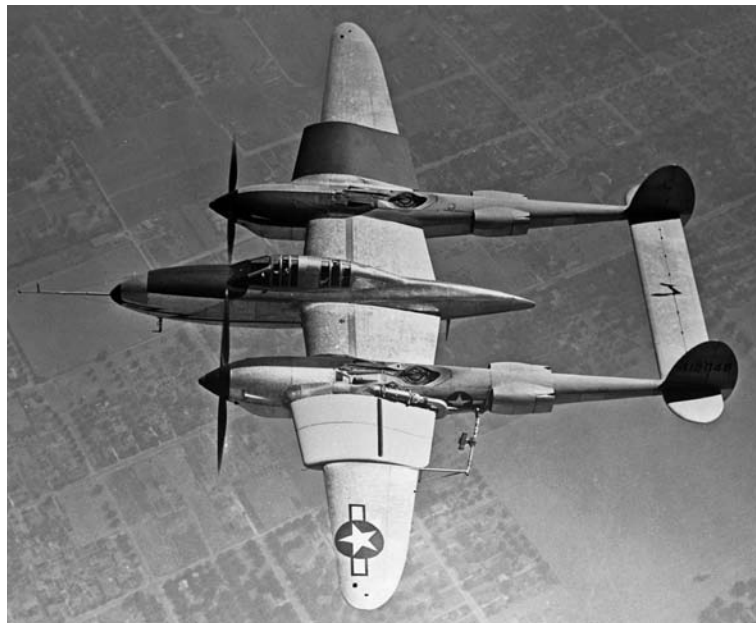
The ultimate answer to P-38 compressibility dive issues was found in underwing dive flaps that altered the center of lift, and made high-speed dives manageable. They were not braking devices, but rather altered airflow in significant ways that returned the diving P-38 to the pilot's controllability. Dive flaps were introduced during P-38J production.



Dive flaps altered airflow at high speeds, giving the P-38 pilot a way out of compressibility problems. (Photo by Frederick A. Johnsen/AIRAILIMAGES)

### Offset second cockpit

The availability of the non-combat-worthy original P-38 (sans model letter) gave the aeromedical research laboratory at Wright Field a perfect fighter airframe with which to explore the effects of flying a twin-engine fighter from a cockpit significantly offset from the aircraft's centerline. That was a boon to the nascent P-82 Twin Mustang project then underway. The lopsided Lightning was fitted with a second cockpit atop the left nacelle toward the aft area of the wing. Though not equipped with flight controls, the offset cockpit provided its test passenger with maneuvering accelerations that might be expected in the upcoming P-82.



P-38E "Swordfish" tested aerodynamics for the P-38 as well as for other aircraft, with gloved wing sections, and later drop models. (Photo courtesy of Lockheed)

### Less Lightning

Before America joined the war, the French and British sought fighters including P-38s to bolster their defenses against Germany. The U.S. government agreed, with one crucial caveat: turbo-superchargers were to be held in reserve for American aircraft only. This distinction that would later fall by the wayside, but not until the foreign Lightning Is were built for England (after the fall of France) with exhaust ports closer to the engines, and smooth sheet metal where the turbos normally resided in the booms. As designed, the foreign Model 322 Lightnings had both Allison engines turning in the same direction.

The resulting fighter, sometimes derisively called the castrated Lightning, would not do for the British. Instead, the AAF took 140 of them for use as trainers, calling them P-322s to note their differences from production AAF P-38s. The P-322s went through a Lockheed modification center established in Dallas, Texas to prepare them for stateside AAF service. At that time, the engines were swapped with counter-rotating models, and typically only two .50-caliber machine guns were fitted. The AAF P-322s received an interim modification to the horizontal stabilizer in an effort to mitigate compressibility issues, and their performance was limited to a top speed of 330mph and an absolute ceiling of 24,000 feet.

### "E" for Effort

Lockheed used a P-38E (41-2048) as a testbed for various projects, during which this Lightning received a modified ribbed cockpit canopy enclosing two people with dual controls. The fuselage pod on this E-model was lengthened behind the wing, tapering to a narrow point, and the pilot moved forward. The elongated



streamlined pod was envisioned by the NACA to help tame buffeting and compressibility issues; pilots liked its diving characteristics. As a testbed, 41-2048 sometimes flew with gloved wing sections outboard of the nacelles providing actual flight data. This Lightning also dropped models of the Lockheed XP-90 jet fighter and performed work to assist development of the gargantuan R6V Constitution transport for the Navy. After Lockheed, the long-nose testbed flew for civilian survey duties before entering storage. It suffered a fatal crash in 1962.

## Droopsnoot

In a curious wartime turnabout that sometimes saw bombers outfitted as fighters and fighters equipped as bombers, a few P-38s received sleek Plexiglas noses housing a bombardier and his precious Norden bombsight. Eighth and Fifteenth Air Forces embraced these modified Lightnings, forever known by the unflattering nickname Droopsnoot.

The attraction included the ability of a lead Droopsnoot to cue an accompanying formation of fighter P-38s, all carrying underwing bombs, and all attacking a target with a frugal expenditure that kept bigger bombers reserved for bigger targets. Planners also figured that, at least initially, such P-38 Droopsnoot bomber formations would draw less notice from German anti-aircraft defenses than would a typical bomber formation.

The Droopsnoot bombardier typically entered his compartment from an overhead hatch, and also had at his disposal an escape exit beneath him. His aluminum office with a view included the bombsight, a PDI (pilot's directional indicator),

and a panel to his left with bomb indicator, arming, and selector switches. An altimeter, free-air temperature gauge, airspeed indicator, and clock furnished the necessary inputs to enable proper use of the Norden. Interphone radio with the Droopsnoot pilot, and the ability to transmit to other aircraft in the formation when the pilot set the radio accordingly, connected the P-38 bombardier to the world. Other amenities including a crash pad, armor plate, heating duct, relief tube, and bombing window defroster in the nose. In place of the removed 20-millimeter cannon's ejector chute, a K-24 camera could be mounted to record strike photos.

A 1944 AAF evaluation of Droopsnoot said altitudes tended to range between 10,000 and 20,000 feet. The evaluation noted: "On missions of 200 to 250 miles, two 500-pound or two 1,000-pound general purpose bombs have been loaded, and some missions carried two 2,000-pound bombs without difficulty. A combination of external tanks and bombs is used when the range of the mission makes it necessary." Eighth Air Force determined a P-38J with wing leading-edge fuel tanks could carry one 1,000-pound bomb and a 300-gallon gas tank providing a range of between 700 and 800 miles at 20,000 feet and 220 mph.

Bomb release by the P-38 formation was best accomplished by the Droopsnoot bombardier giving a second-by-second radio countdown leading to mass release; other techniques included visual bombing by the other Lightnings as the Droopsnoot released his ordnance, and even a VHF radio hook-up described by the AAF: "When

Not to be left out, the USN studied the P-38 as a way of providing a long-range fighter for the fleet. Several variations were envisioned with the radial-engined (presumably R-2800s) F5L being favored. Contemporary drawings show it with the wing panels folding just outboard of the booms. (Illustration by Tom Tullis)

This RP-38 mounted a second cockpit on the left boom for physiological tests using an off-centerline crew position. Position of this cockpit necessitated deletion of turbos and use of short exhaust stacks. (Photo courtesy of AAF via Frederick A. Johnsen)







The XP-58 Chain Lightning, resembling a P-38 on steroids, was one of several robust warplanes designed in response to Elliott Roosevelt's call for a "convoy fighter" that could carry out ultra long-range missions. (Photo courtesy of the Robert F. Dorr collection)

the indices (on the Norden) cross, all bombs in the formation are dropped; manual release is retained in the event of failure."

By war's end, Eighth Air Force's infatuation with Droopsnoot waned. Pilots who weren't trained in bombers had to optimize formations for accurate drops. An Eighth AF report explained: "Although the P-38 is a stable aircraft, it was not designed for this type of work and its speed makes it very difficult to maintain a sufficiently stable platform while making the corrections indicated by the bombardier to the pilot through the PDI." Droopsnoot accuracy was considered adequate for airfields and dispersal areas, less so for pinpoint targets.

### Pathfinder

The AAF took the two-place P-38 into new territory with Pathfinder aircraft that used H2X radar to map targets for traditional bomber formations.

disadvantage in attack approaches when compared to Black Widows armed with a moveable top turret instead of only fixed forward-firing guns.

### And then some...

P-38s were evaluated as glider tugs. Gen. Robert Cardenas recalled proving the concept with a P-38 and a CG-4 when he was a captain: "You had a glider plug at the tail end of each boom then you ran a cable between the plugs and the tow rope ran along the cable so it did not matter if the glider was off center. You could also tow more than one glider. I liked it because you had real firepower in the nose of the aircraft so when you cut the glider loose you could go down and clear the space below." General Cardenas added: "I towed a CG-4A from the factory in Saint Paul, Minnesota, to Pinecastle, Florida nonstop to try to get approval of using P-38s by the Fighter Command General." Though the concept looked promising, the AAF

## THE CREATIVE DESIGNERS OF THE P-38 WERE BOTH ENCOURAGED AND COMPELLED TO EXPERIMENT WITH THEIR PRODUCT TO OPTIMIZE ITS CONTRIBUTIONS TO THE ULTIMATE ALLIED VICTORY.

Bulkier nose adaptations made Pathfinders less aesthetic than Droopsnoots, yet perhaps more effective in the long run.

### Night Lightning

Even after Northrop developed a successful purpose-built P-61 Black Widow night fighter, other existing types were modified for nocturnal work. Earning a place as the last Lightning model, the 75 P-38Ms were converted from day fighter P-38Ls. Salient recognition features of the P-38M were a raised second seat behind the pilot for the radar operator, a chin mounted external radar pod, and typically gloss black paint. If the P-38M addressed one shortcoming of the P-61 — intercept speed — the night Lightnings were at a

decided its finite number of trained P-38 pilots and aircraft would not tow gliders in combat.

The P-38K tested paddle blades similar to those on some production P-47s; test pilot Tony LeVier recalled the test K-model had a high rate of climb. Skis were fitted to a P-38J. And those huge drop tanks lent themselves to becoming personnel carriers.

The gods of AAF nomenclature decided a Lightning-like variant powered with Continental engines and given a pressurized cockpit was to be called the XP-49. A truly radical departure, the larger XP-58 Chain Lightning, used V-3420 engines. It sported a power turret plus interchangeable nose armament as large as a 75-millimeter cannon. Spanning 70 feet, it was said to reach 430mph. ✈