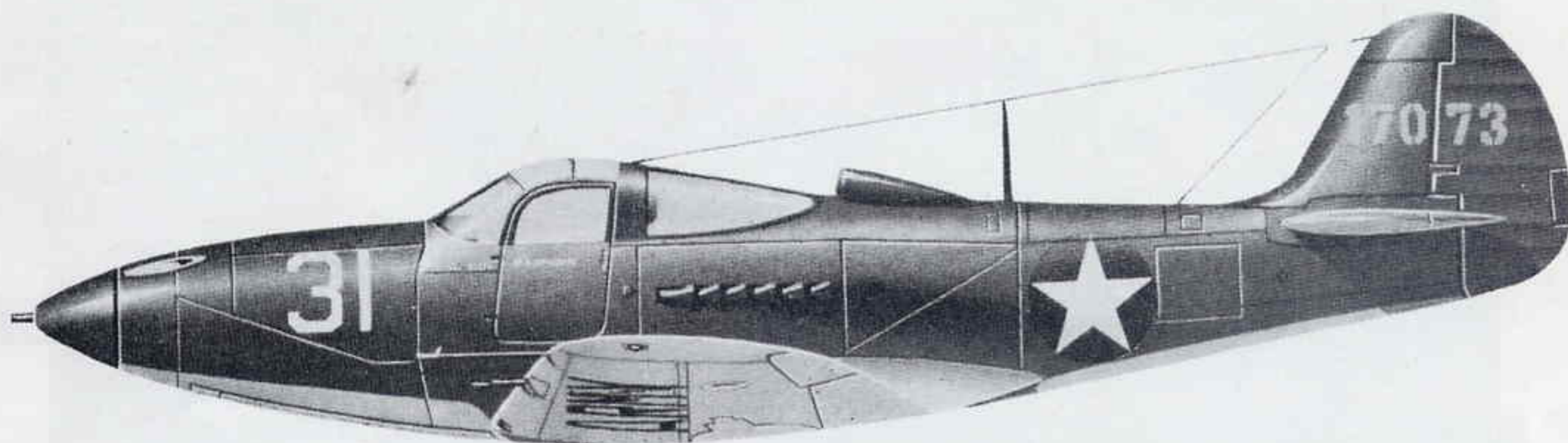
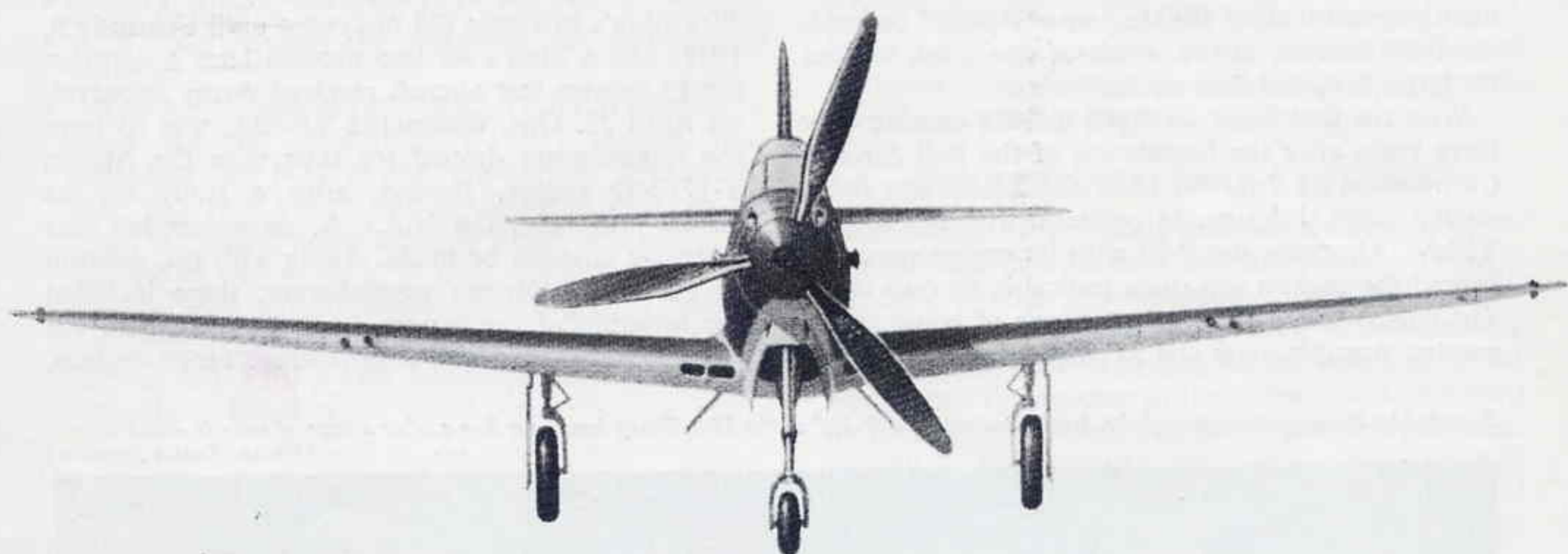


PROFILE

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THE BELL P-39 AIRACOBRA



The Bell P-39 Airacobra

by Jay Frank Dial

“THE Iron Dog”—a disheartening description for any aircraft designer to hear applied to his creation; and for Larry Bell and Chief Designer Robert J. Woods it must have been doubly depressing to hear this unflattering nickname for their sleek and beautifully streamlined P-39. Yet like many other aircraft, the P-39 fell victim to rapidly changing combat conditions and an almost complete reversal of operational requirements, and was doomed to earn this typically wry pilots’ verdict.

It was designed for one of the largest calibre guns ever carried by a single engined aeroplane; and was visualized as being equipped with a turbosupercharger which would make it a “pursuit airplane” in the “400 m.p.h. class”. Without the supercharger and with the drastic rise in weight forced by the equipment requirements of the then new “fighter” concept, the P-39 became, in the words of one pilot, “suited for large, low, and slow circles.”

With the first flight on April 6, 1938 coming only three years after the foundation of the Bell Aircraft Corporation on July 10, 1935, the XP-39 was Bell’s second original design. In common with the strange YFM-1 Airacuda, the P-39 with its engine mounted behind the cockpit was quite radical in its own right. The engine fulfilled the design ideals of being of the greatest possible mass and as close as possible to the

aircraft’s centre of gravity; this lessened the moments of inertia, increased manoeuvrability and permitted the moving of the maximum fuselage cross-section well aft of the nose.

The position of the P-39’s engine caused some psychological problems for those who flew it; the thought of that engine poised to grind the pilot into the ground in the eventuality of a crash, and of all those gears, shafts and assorted pieces of machinery flailing away down below tended to loom rather large in the minds of many pilots. Evidently these fears were misplaced; a study of several crashes showed that the engine stayed where it was supposed to, the cabin area remaining largely intact despite the wide dispersion of other parts of the aircraft.

The first public announcement of the prototype Airacobra’s existence did not come until February 9, 1939; and a little over two months later a contract for 13 Service test aircraft received Army approval, on April 23. One, designated YP-39A, was to have the supercharger deleted for tests with the Allison V-1710-37 engine. Instead, after a study of the XP-39 prototype, the N.A.C.A. recommended that extensive changes be made. Along with the deletion of the exhaust-driven supercharger, these included the lowering of the canopy line, the placing of the coolant radiator in the wing/fuselage centre-section,

Dwarfed by the majestic scale of the Arctic landscape, a P-39F of the 54th Group heads for home after a tour of duty in Alaska.

(Photo: Leslie Spoons)





An R.A.F. Airacobra in inverted flight shows the central radiator exit door and the two oil cooler doors.
(Photo: Bell Aerospace Corp. via F. H. Maupin)

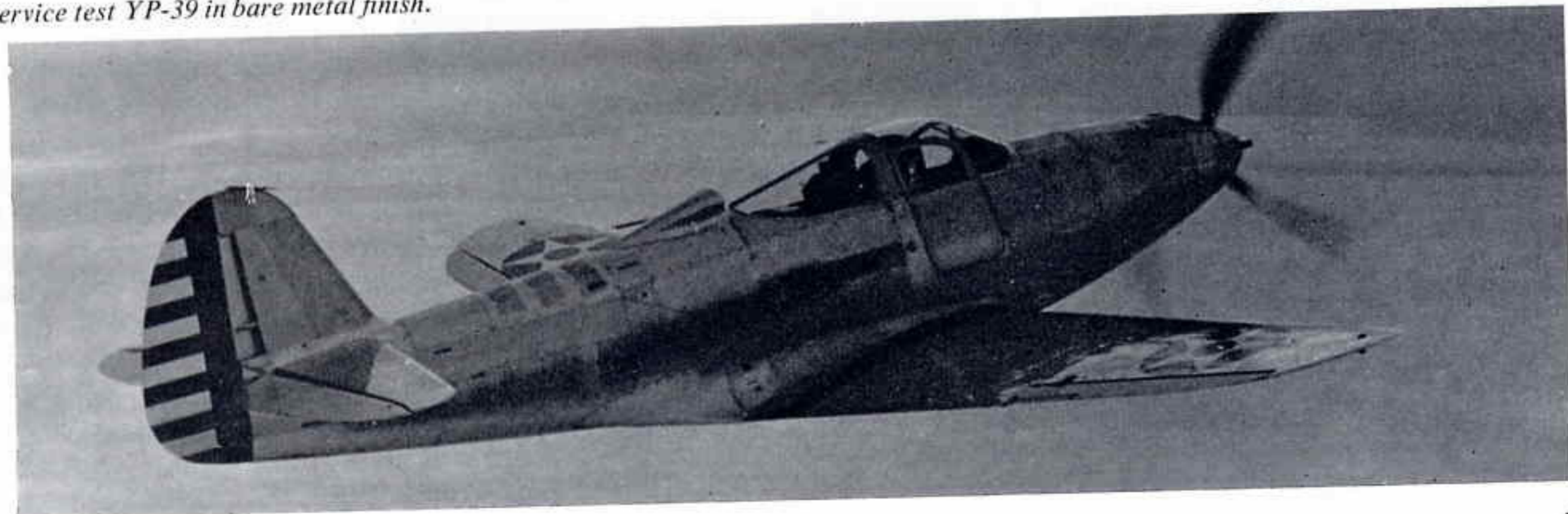
the addition of the now-familiar carburettor air scoop behind the canopy, and of fairing doors to cover the power portion of the main gear wheels when retracted. With these changes the prototype was redesignated XP-39B.

The Army then decided that all aircraft were to be fitted with the low-altitude V-1710-37 engine, thus relegating the P-39 to the low-altitude operational rôle. The first YP-39 was delivered on October 12, 1940. Although never actually fitted, armament for the XP-39 was to be a 37 mm. cannon in the nose together with two .50 calibre machine-guns in the cowl synchronized to fire through the airscrew arc. In the Service test YP-39s two additional .30 calibre guns were placed between the .50 cal. weapons.

The Bell XP-39, 38-326, converted to YP-39B configuration.
(Photo: Bell via Maupin)



Service test YP-39 in bare metal finish.



(Photo: Bell via Maupin)

Even while these aircraft were being built, it still remained for Bell to secure full production for the Airacobra; in theory the order could have been awarded to any aircraft manufacturer. In his efforts to secure the contract Larry Bell devised a 30-minute sound film detailing the potential of both company and aircraft. This novel step resulted in a \$2,839,000 contract being placed on September 14, 1939. Coming at a time when Bell Aircraft had built a grand total of 15 aircraft in its entire history, the five-plane-per-day production rate envisaged in the contract seemed quite a task. Eventually P-39 production reached a 20-plane-per-day level.

Originally ordered as 80 "P-45s", the first batch were delivered as 20 P-39Cs, retaining the four cowl machine-guns of the service test aircraft, and 60 P-39Ds with four .30 cal. guns in pairs in the wings and nose armament of one 37 mm. cannon and two .50 cal. machine-guns. With these equipment additions, the weight began to creep upward. Gross weight of the prototype was 6,204 lb., rising to 7,235 lb. in the YP-39. The weight was cut to 7,180 lb. in the P-39C but soared to 8,200 lb. with the advent of the D variant. Together with the low-altitude engine, the increased wing loading severely restricted the aircraft's performance above 15,000 feet.

STRUCTURES AND SYSTEMS

The fuselage of the Airacobra was of all-metal structure divided into forward and aft sections. Primary structure of the forward section consisted of two beams running longitudinally with a horizontally placed upper deck extending to the bulkhead aft of the engine. Easy access to the systems was permitted by removable cowlings over the engine compartment, as well as for the radio equipment, armament and cockpit areas. The aft fuselage, of all-metal oval monocoque structure, was bolted to the forward section and could be detached for shipping.

The low-placed cantilever wing was of N.A.C.A. 00015 section at the root developing into N.A.C.A. 230099 section at the tip. The all-metal wing structure consisted of stamped and pressed ribs and bulkheads with flush-riveted aluminium stressed skin covering. Frise-type ailerons were constructed with all-metal frames covered with fabric. Split trailing edge flaps extended from the ailerons to the fuselage centre-section.

The tail unit was conventional in construction, with all-metal fixed surfaces and metal framed,



P-39Q-10 "Little Rebel", probably of the 347th Fighter Group, lands on Makin Island in the Gilberts on December 13, 1943.
(Photo: U.S.A.F.)



The P-39D flown by 1st Lt. W. F. McDonough, who destroyed two of the 23 Japanese aircraft shot down over Wau, New Guinea on February 6, 1943.
(Photo: U.S.A.F.)

A P-39C of the 39th Squadron, 31st Pursuit Group, being rearmed; note details of the .30 cal., .50 cal., and 37 mm. cannon guns in the cowling and nose.
(Photo: Bell)



fabric covered movable surfaces; all trim tabs were adjustable from the cockpit.

The three-bladed propeller was turned by an eight foot extension shaft consisting of two flanged sections 48 in. long and 2½ in. in diameter. The independent propeller gearbox, with separate lubrication system, was attached to the forward end of the longitudinal fuselage beams. The engine-mounted reduction gearing drove the shaft via a flexible splined coupling mounted at the forward end of the crankcase; self-aligning ball bearings supported the shafting at the centre, and the thrust bearings of the reduction gearbox supported the extension shaft at the engine.

The single-stage engine-driven blower was geared off the crankshaft at a 9.6/1 ratio. On take-off with the engine running at 3,000 r.p.m., the blower turned at 28,800 r.p.m. The carburettor fed directly to the supercharger which compressed the mixture into the

intake manifold. With an automatic manifold regulator linked to an aneroid barometer for altitude compensation, a constant manifold pressure was maintained despite altitude changes. However, caution had to be exercised with regard to carburettor icing. The action of the automatic regulator was so smooth that unless carburettor heat was properly employed there was a chance that ice would build up in the carburettor throat gradually, with the regulator adjusting for it, until it reached the point where compensation was impossible. Then, with the engine running rough, it would take full carburettor heat and a fair length of time before the engine would pick up again.

Propellers on early versions were three-bladed Curtiss Electric types, employed as a constant speed system or a fixed position adjustable pitch system, selectively operated by a cockpit switch. General Motors Aeroproducts "AeroProp" equipment was fitted to P-39F, J and K versions, reverting to Curtiss Electric with the P-39L. The P-39Q-21 and -25 mounted a four-bladed airscrew. In the P-39Q-10 propeller settings were linked to the throttle for automatic adjustments.

The tricycle-type landing gear was electrically operated; emergency retraction or extension was by a ratchet handcrank. Each main gear, fitted with a 26-in. high-pressure six-ply tyre, had multi-disc hydraulic brakes fitted within the cast magnesium wheels. Main wheels retracted inwards and were covered by gear strut fairings and wheel doors. The non-steerable nose gear, with 19-in. six-ply heavy duty smooth contour tyre, was not fitted with brakes. Self-centring during extension and retraction, the nose strut folded rearward, being covered by main doors and a small strut door.

Due to the tricycle nose gear, flaps were not required for normal take-offs, nor even recommended for initial familiarization flights. When used for take-off, flaps were extended to ¼ position and the aircraft would fly itself off the ground with little assistance. Without flaps a mechanical take-off was recommended the pilot easing the machine off at 105 m.p.h. I.A.S.

Total fuel capacity in most versions was 120 U.S. gallons; P-39N capacity was 86 gals. increasing to 110 in the P-39Q-1, reverting to the earlier 120 gal. tankage in the Q-10 variant. The fuel system consisted of six cells built into each wing outer panel with an engine-driven fuel pump and an electric booster pump. Fuel management called for starting, take-off and an initial 20 min. flight time at the reserve position, allowing space for fuel returned from the carburettor at the rate of ten gallons per hour. Fuel pressures ranged from 14-16 lb. in early versions to 16-18 lb. in the later sub-types.

External jettisonable fuel tanks of 75, 150, 175 and 225 gallon capacity could be carried. With the 175 gallon tank installed, minimum cruise speed was 175 m.p.h., 180 m.p.h. being recommended. With the 75-gallon tank fitted the maximum permitted dive speed was 280 m.p.h. I.A.S.

The engine, operating a scavenger pump to maintain a dry sump crankcase, had an oil capacity of 6.5 gallons. Operating at a normal pressure of 60-70 lb., 7.5 gallons was required for the additional flight



P-39D, 41-6733, of 39th Sqn., 31st Pursuit Group during the 1941 Carolina Manoeuvres. The pilot is 2nd Lt. J. C. Robertson.
(Photo: U.S.A.F.)



This bare-metal Airacobra is probably the YP-39 with four cowling guns, fitted with the fin fillet standard on the P-39D.
(Photo: A. G. Simmons)

endurance gained with the use of the 75-gallon fuel drop tank. The propeller reduction gearbox was lubricated by a separate system with a two-gallon capacity; normal pressure ranged from 60 to 70 p.s.i. An engine oil dilution system was utilized for cold weather operations. The introduction of fuel into the oil system prior to shutting down would thin the oil sufficiently to avoid congealing on restarting. For normal operation and ground temperatures of 5° to -7° Centigrade, the dilution switch was held on for four minutes; for temperatures ranging from -7° to -30° Centigrade (20° to -20°F) a further four-minute period was required after a 15-minute lapse. For even colder weather the engine would be restarted after 20 to 30 minutes and given a third four-minute dilution; the oil cooler shutters could be closed, the oil temperature regulator turned off and heat applied to the engine and accessory bays for at least two hours. If necessary, the oil could be drained off and preheated to 93°C, and poured back into the tank a few minutes before starting. The oil coolers were located in the wing root/centre-section and were supplied with air from the outer wing root inlets.

With the exception of the hydraulic brakes all systems in the P-39 were electrically operated; the major systems being the starter, landing gear and flaps. The 24-volt, 34 amp./hour (5 hour rate) battery was housed in a sealed rubber-lined aluminium box between the two cowling guns in the aircraft nose. One battery case connection vented through the top of the cowling; the other, with acid spill neutralized in a drain bottle, was vented at the bottom of the cowling. Caps for the 12 battery cells employed conical lead weights which dropped and sealed the cap vent to prevent acid spillage during inverted flight.

The maximum discharge rate of the 76 lb. battery was 288 amps for 1 minute.

The 28-volt engine-driven generator was rated at 50 amps per hour. While the four heaviest current requirements (starter, landing gear, flaps and landing lights) drew power far in excess of either the battery or generator ratings, these needs were only for short periods during any given flight; pilots were, however, cautioned not to operate flaps and undercarriage simultaneously. Normal current draw was 10-20 amps; the landing gear drew from 60 to 100 amps during operation.

THE P-39 IN SERVICE: THE PACIFIC

The 31st Pursuit Group was the first operational unit to receive the P-39 Airacobra. Flying with the "Blue Forces" of the First Army in the September-November 1941 "Carolina Manoeuvres", the 31st, together with the U.S.A.A.C. units, first tested techniques and procedures which stood them in good stead in the early years of actual warfare. Most notable of these was the first test at Marston, North Carolina, of the pierced metal "Marston Mat" runway.

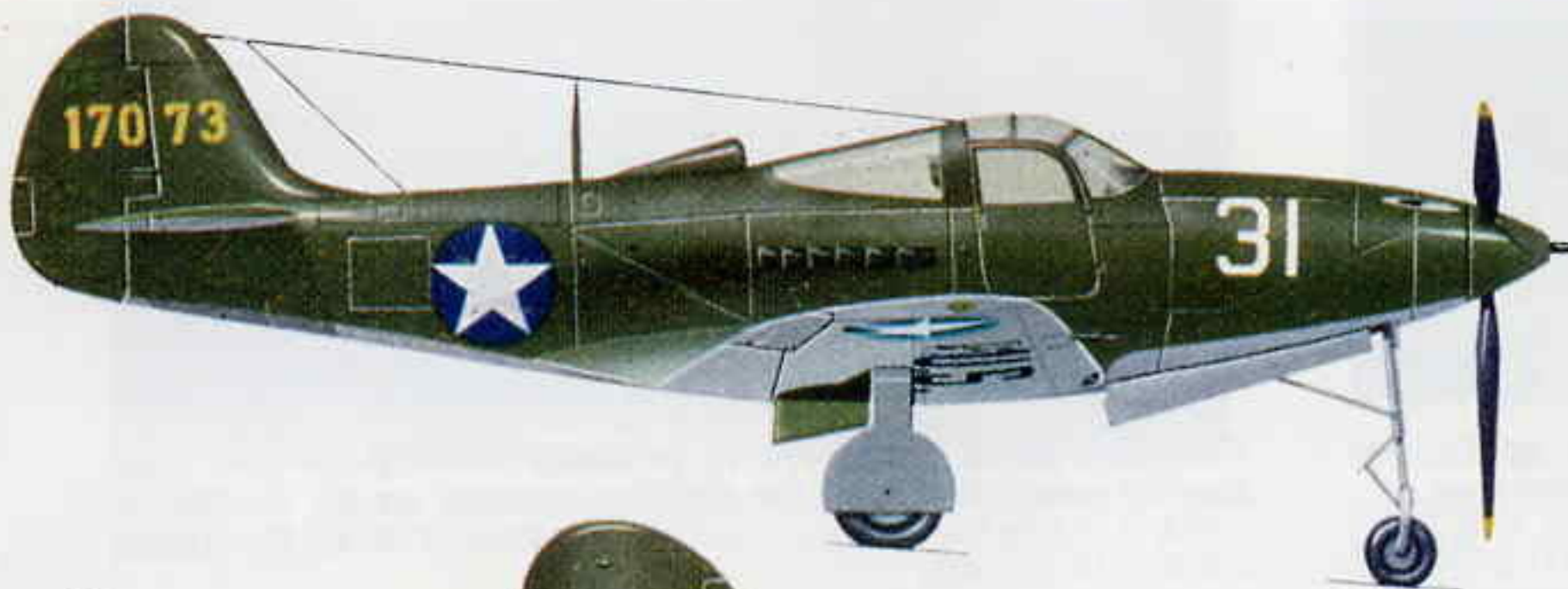
The 8th Pursuit Group* was the first to take the P-39 into combat. After Group Headquarters was established in Brisbane, Australia on March 6, 1942, detachments were sent to forward bases in New Guinea. In July the 8th was joined by the squadrons of the 35th Fighter Group; originally attached to the 31st F.G., the 39th, 40th and 41st Fighter Squadrons were transferred to the 35th F.G. and as such went into action in New Guinea.

*In May 1942 all Pursuit Groups were redesignated as Fighter Groups.

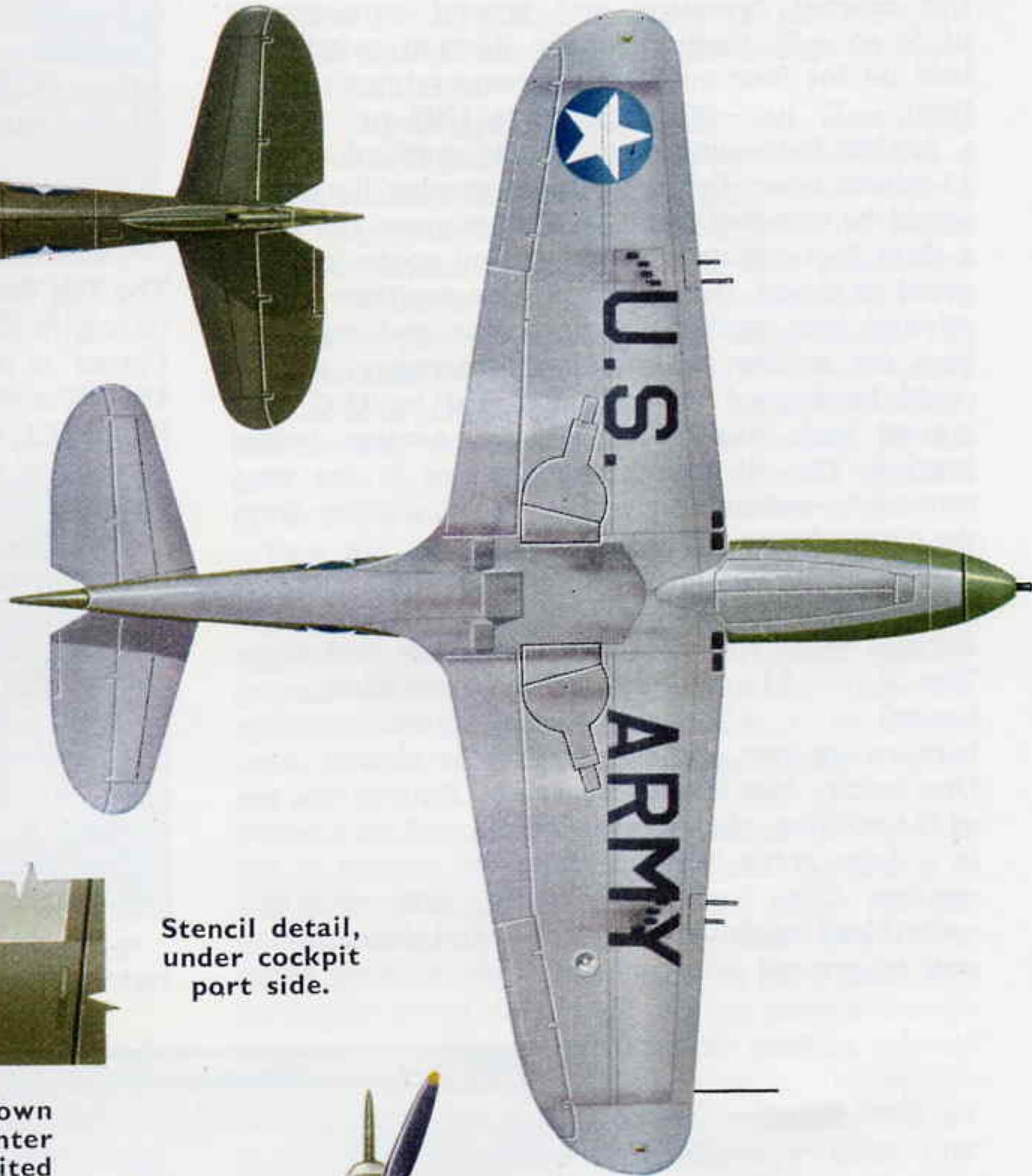
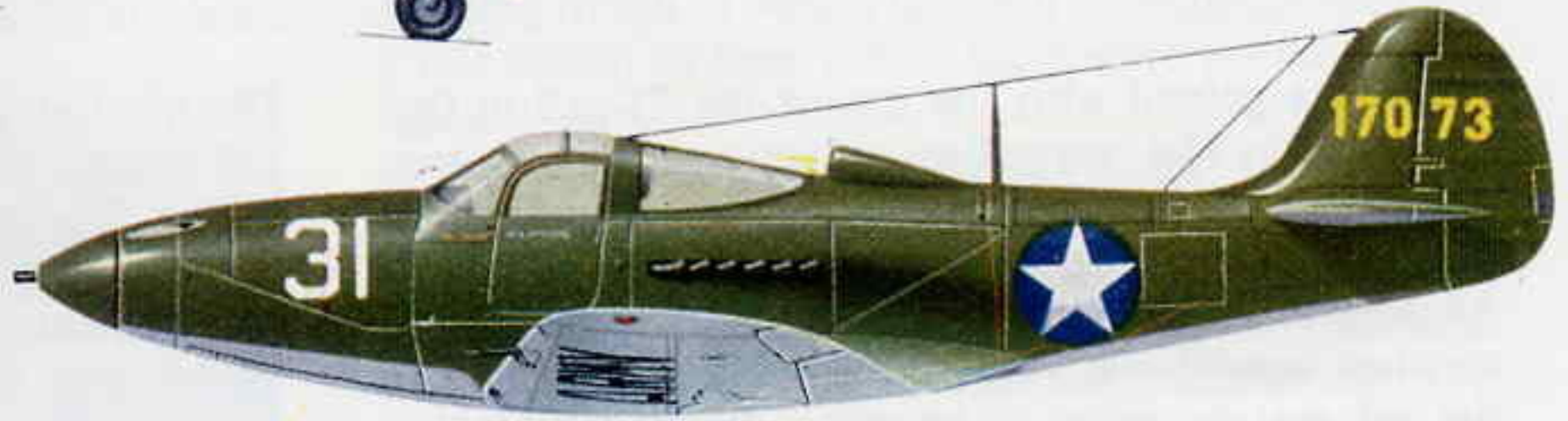


P-39s and P-40s probably of the 8th Fighter Group, at Barokoma in the Solomons. The nearest aircraft is P-39N, 42-8903.
(Photo: A. G. Simmons)

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57th Fighter Squadron insignia carried for a short period after the unit's arrival in Alaska but not officially authorised.

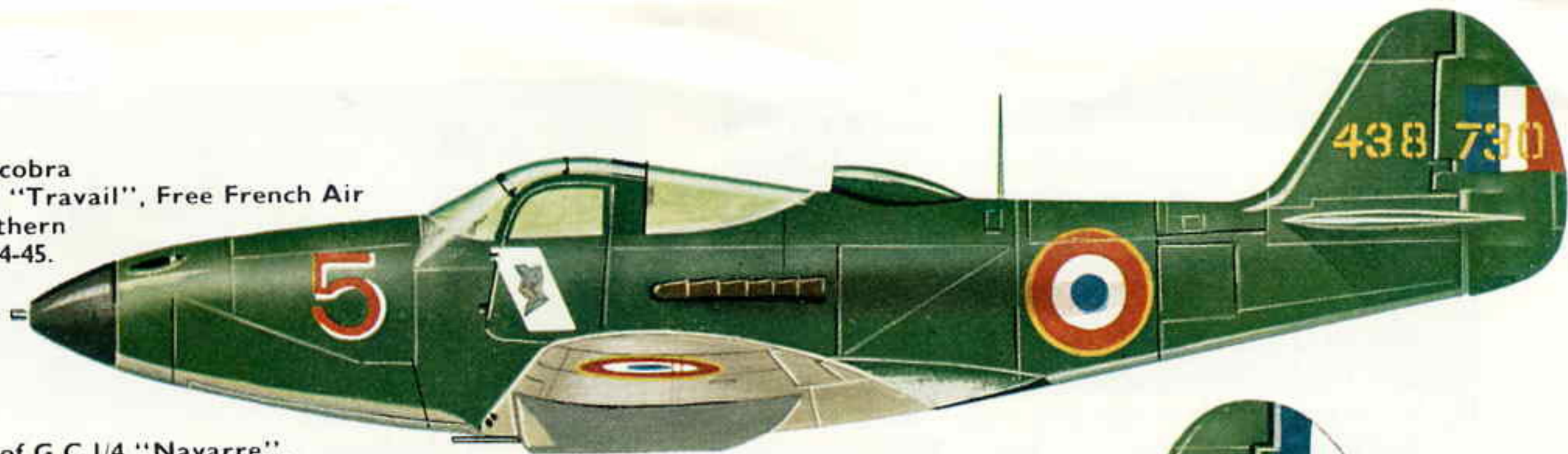


Stencil detail, under cockpit part side.

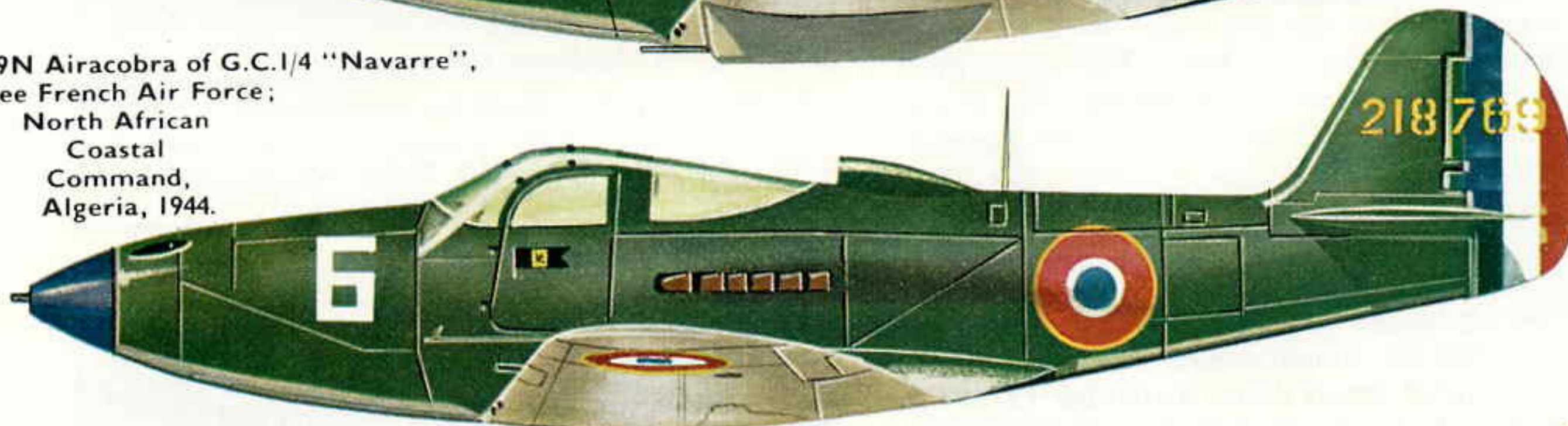
BELL P-39D AIRACOBRA, 41-7073, flown by Lt. Leslie Spoonst of the 57th Fighter Squadron, 54th Fighter Group, United States Army Air Force; Alaska, June - December 1942.



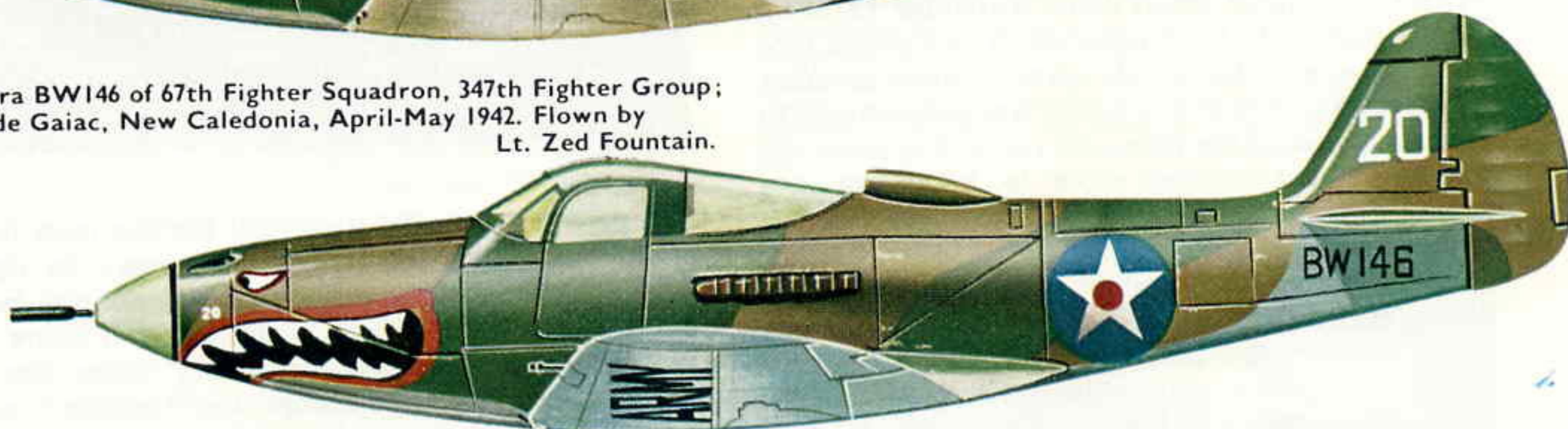
P-39Q Airacobra of G.C. 11/6 "Travail", Free French Air Force; Southern France, 1944-45.



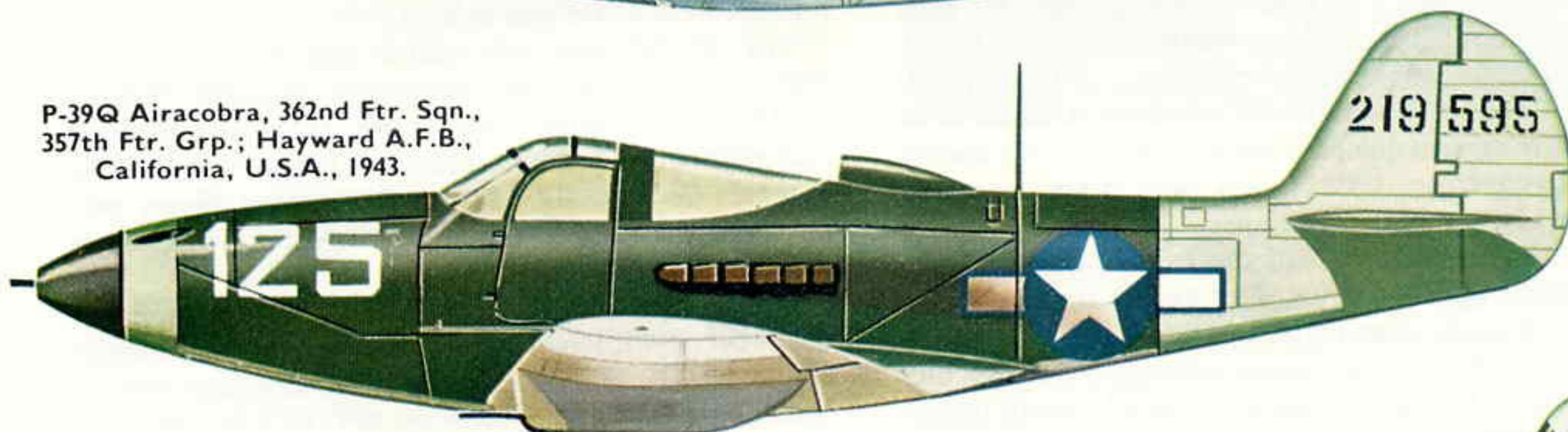
P-39N Airacobra of G.C.1/4 "Navarre", Free French Air Force; North African Coastal Command, Algeria, 1944.



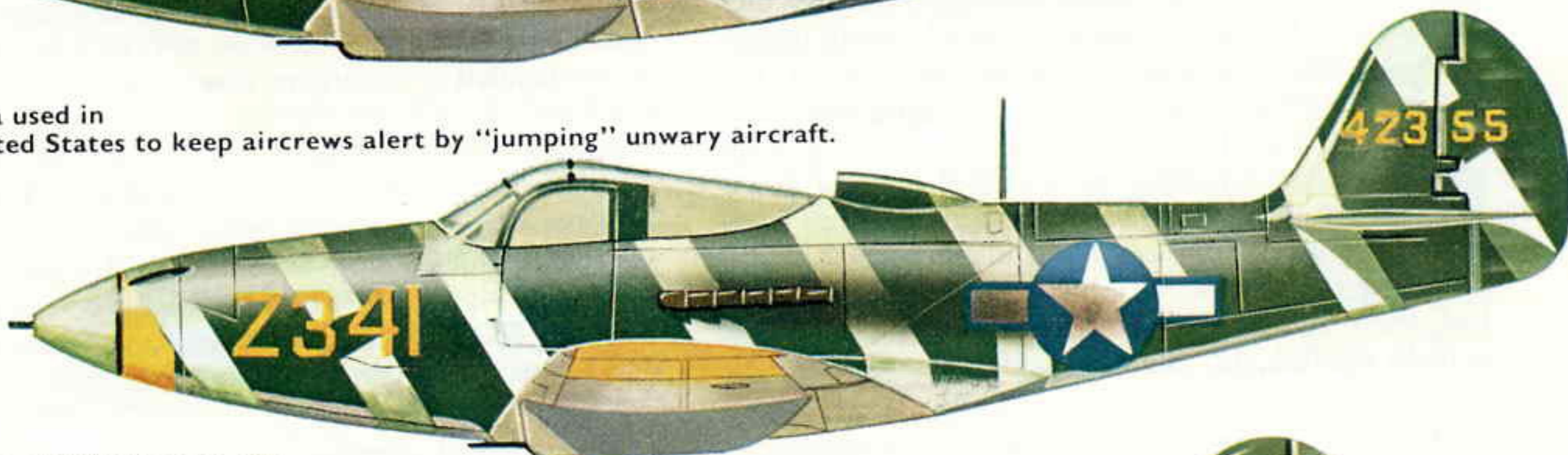
P-400 Airacobra BW146 of 67th Fighter Squadron, 347th Fighter Group; Paines de Gaiac, New Caledonia, April-May 1942. Flown by Lt. Zed Fountain.



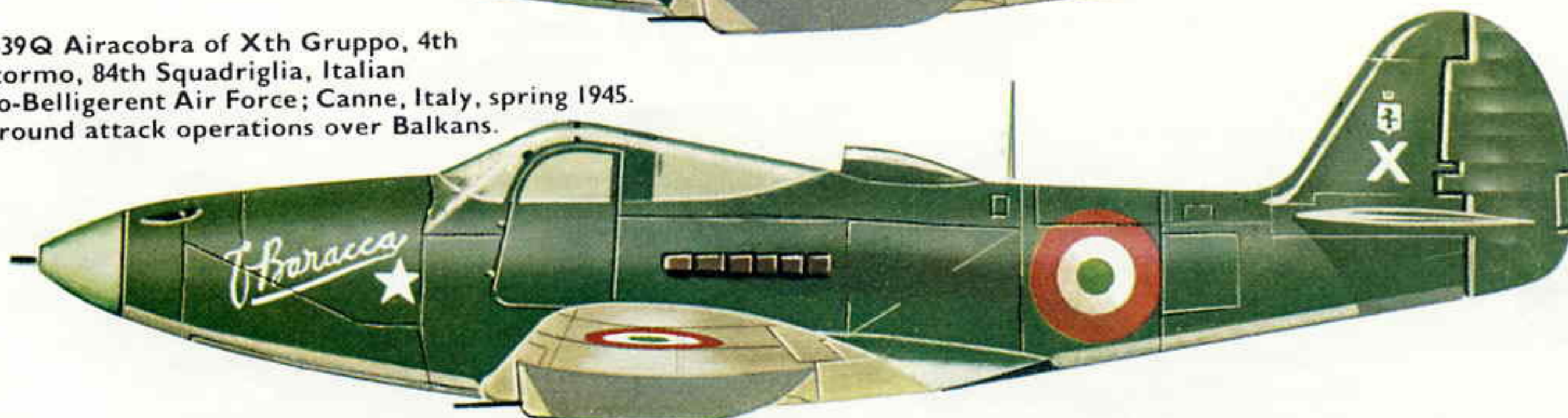
P-39Q Airacobra, 362nd Ftr. Sqn., 357th Ftr. Grp.; Hayward A.F.B., California, U.S.A., 1943.



P-39Q Airacobra used in United States to keep aircrews alert by "jumping" unwary aircraft.



P-39Q Airacobra of Xth Gruppo, 4th Stormo, 84th Squadriglia, Italian Co-Belligerent Air Force; Canne, Italy, spring 1945. Ground attack operations over Balkans.



The 347th Fighter Group initially received 46 aircraft carrying British serials in the *BW108* to *BW183* range, and retaining the original British upper surface camouflage of dark earth and dark green (see "European Operations" below). Assembled from crates along with the U.S. contract P-39D-1s fitted with 20 mm. cannon to match, the unit began training at Tontouta Air Base on New Caledonia. Aircraft of the 67th Fighter Squadron, led by Capt. D. D. Brannon, flew the 350 miles over water to Guadalcanal on August 22, 1942. The squadron's first victory was scored the following day when Capt. Brannon and his wingman Lt. Fincher shared a Zero kill between them.

Early flights showed a lack of manoeuvrability; but the real need at the time was for dive-bombing capability and in this rôle the P-39 was well regarded. In addition to full standard armament, a bomb of 100, 350 or 500 lb. weight could be carried. In a 347th F.G. combat report dated November 13, 1942, 1st Lt. Wallace L. Dinn reported "The P-39D-2 type plane is a splendid attack plane." Since accuracy and success of any diving attack was proportional to the enthusiasm of the pilot, this resulted in some low pull-outs. After securing a 500 lb. bomb hit on a Japanese cruiser, Lt. J. J. Jacobson registered a pull-out altitude of —40 feet! Altimeter checking after his return to Henderson Field indicated an 80 ft. error, the true pull-out altitude thus being 40 ft. *above* the ocean! Lt. Dinn felt that the P-39 would have been a good altitude fighter if it had a two-speed blower and four free-firing .50 cal. wing guns. Late P-39Q versions were fitted with two .50 cal. guns in underwing fairings in place of the four .30 calibre weapons. Luckily, the usual circumstances of combat over Guadalcanal were contacts with enemy aircraft covering task forces and thus normally occurred below 10,000 ft.

The tricycle gear enabled the P-39 to operate from extremely rugged airstrips. During the time spent on New Caledonia one flight operated P-400s from a 2,800 ft. widened dirt road without any difficulty whatsoever. This ability came in useful during operations on the "Canal". With a no-flap stall at 105 m.p.h., approaches were made flat and fast until Japanese rifle fire forced them up. The resulting steep approach, accompanied by a full-flap, gear-down sideslip into the strip while under continual fire from enemy positions led to some thrilling landings!

Unless the engine was hit and Prestone coolant lost, the P-39 held together through anything. During a night landing, Lt. Martin C. Haedtler of the 67th



A P-39C of the 31st Pursuit Group; note lack of wing guns.
(Photo: A. G. Simmons)

P-400s of the 67th Sqn., 347th Fighter Grp. on Guadalcanal; the nearest aircraft carries the British serial BW167.
(Photo: A. G. Simmons)



Squadron hit three bales of steel landing mats in a crash that removed the right main gear, the right wing, the prop and the gearbox; the cannon was bent into a hook that proved useful when it came to towing the Airacobra off the runway. Other than a stretched neck from the abrupt stop, Haedtler's only injuries were aches and bruises.

The aircraft was very stable and flew with little maintenance. Combat experience showed that it could operate with little more than an airspeed indicator and gearbox pressure gauge intact. The controls became stiff during high speed dives, and later models had servo aileron boost to counteract this tendency.

During the 67th Fighter Squadron's training the dive speeds with 100 lb. water-filled practice bombs reached 600 m.p.h. I.A.S. Whether this was due to Mach error in the system is not known, manuals recommended a maximum dive speed of 475 m.p.h. I.A.S.

As newer aircraft types came into service the P-39s were gradually withdrawn from combat. The 347th F.G. was the last Pacific-based unit to give up the Airacobra, finally converting to P-38 Lightnings in August 1944. (The last unit in the European Theatre was the 332nd F.G., which employed the type in operations in Northern Italy until late 1944.)



In-flight study of P-39D-2, 41-28405, of the 47th Sqn., 54th Fighter Group returning from Alaska circa January 1943.
(Photo: Leslie Spoons)

NORTH TO ALASKA . . .

While hardly typical of most operations, the experiences of the 54th Fighter Group are fairly indicative of the early war situation.

Lt. Leslie Spoons of Fort Worth, Texas, graduated from flight training on December 12, 1941, just five days after "the Day of Infamy", and joined the 54th Group late in January 1942. Assigned to the 57th Squadron, he came under the command of L. F. Stetson at Paine Field, Washington. A veteran of 15 years' commissioned service as a pilot, Stetson was still only a First Lieutenant; and promotions were not the only commodities in short supply at that time. While the Group was well supplied with pilots, mostly former class-mates, it had not a single operational combat aircraft. In addition to a Stearman or two and an AT-6 or BC-1 used for gaining flight time, each squadron had about three *old* P-40s, none of which were airworthy. After a few weeks each squadron received *one* brand-new P-39 direct from the factory; all pilots were checked out and got in a couple of hours flight time.

Bad weather in Washington state forced a move to Harding Field, Louisiana, where the Group underwent considerable training; one rarity in the programme was aerial gunnery, by no means standard training at that time. In early May, informed of an imminent "manoeuvre", the unit prepared to move on once more.

In what was to be the first instance of the complete operational deployment of a unit by air, the pilots of the 42nd Squadron flew their aircraft to Alaska to reinforce the 28th Composite Group; the 56th Squadron flew to Santa Ana and the 57th to San Diego, taking up patrol duties on their portions of the Californian coast. The Group's ground personnel were deployed to their various locations by airline-piloted C-47s. Later named the 28th Bombardment Group, the 28th Composite operated P-38s, P-40s, B-26s and LB-30s between 1941 and 1943. It had been reported that some of the 54th's "broken" P-39s were repaired and flown after being left behind.

After the Japanese attack on Dutch Harbour, Alaska, on June 4 the remaining squadrons of the 54th Fighter Group flew up as additional reinforcements. The headquarters of the 42nd Squadron were at Kodiak while the pilots operated from Adak Island; on June 21 the 57th moved into Kodiak and

"Whistlin' Britches", the P-400 flown by Zed Fountain of "Patsy Flight", 67th Sqn., 347th Grp. from the airstrip near Paines de Gaiac on New Caledonia. The "sharkmouth" was first applied by "Patsy Flight". (Photo: Lt. Barclay Dillon)



Three P-39s in interesting markings; (top) a machine with the insignia of the 31st Pursuit Grp., on the door; (above) a 40th Pursuit Sqn. aircraft with white "exercise" crosses temporarily applied; and (below) AH574, seen at a Royal Navy dump near Portsmouth, England in the mid-1950s. The quartered discs are camera reference point markings, indicating use in a filmed test programme, in this case carrier landing trials.

(Photos: D. W. Lucabaugh Collection and Merle Olmsted)



the 56th went to Nome. Procedure was for the 42nd to remain at Adak while pilots were rotated into it for combat duty.

In the course of their brief foray into history, the 54th Group encountered numerous Japanese types, all of which were simply reported as "Zeros". There were some well-known names in the Group; a replacement pilot who joined the 56th Squadron was one Thomas B. McGuire, and Gerald R. Johnson was with the 57th. Both were later to gain fame in the Philippine-based 49th Fighter Group, scoring 38 and 22 kills respectively. One of their mates in both the 54th and 49th Groups was Wallace R. Jordan, who scored six kills; and the 45th's Group Executive Officer was Major (later Brigadier-General) Charles M. McCorkle who was to command the 31st Fighter Group in Africa and end the war with 11 victories.

Operations in the Aleutian Islands were extremely rugged; and the Airacobra's tricycle undercarriage was most useful. At Adak it was quite common to encounter a 30 m.p.h. cross-wind at 90° to the runway; it *never* blew parallel to the strip. Under winter conditions the P-39 was a breezy airplane, there being no engine in front to heat the air that filtered into the cockpit. The situation was not aided by the fact that the aircraft heaters had been disabled; they operated from the fuel system and were rumoured to thin the mixture and damage the engine. Numerous ingenious methods were employed to solve the problem. Everything that could be taped over was taped over,

An ex-R.A.F. order P-400 (Airacobra I) being assembled "from the crate" at Tontouta airfield on New Caledonia in the spring of 1942. This 67th Sqn., 347th Grp. machine is BW167, before the application of the "sharkmouth".

(Photo: Lt. Barclay Dillon via Martin C. Haedtler)



including the left-hand door. (The P-39 was almost unique in being a "right-hand" type, with hand holds on the starboard side.) Lt. Spoons "acquired" unused canvas summer tent caps and covered the gun ports in the cowl by placing the canvas under the cover plate and trimming the excess; these could be shot through if necessary. Many pilots stuffed newspaper into the legs of their flying suits for insulation.

During the operation against the Japanese at Kiska Island, the 54th Group's total score was about 20 enemy aircraft for the loss of one pilot. The C.O. of the 42nd Squadron, Maj. Miller, was the only P-39 pilot to be shot down; due to fuel shortage the other aircraft on the mission were forced to leave the area after he baled out into Kiska Harbour. The PBY rescue aircraft had already left the vicinity and it is not known if Maj. Miller was captured or if he survived the war.

The mixed armament of 37 mm. cannon and .30 and .50 calibre machine-guns resulted in sighting problems. While all could be bore-sighted for a specific impact point at a given range, the dissimilar trajectories caused bullet dispersion at other ranges. In an attempt to compensate for this effect early aircraft were fitted with "Christmas Tree" sights; horizontal lines across a vertical line indicated the various impact points.

Captain A. T. Rice was one 54th Group pilot who was not particularly bothered by this, on one mission at least. With all his other guns out of action, Rice destroyed two Japanese floatplanes (there was no airfield on Kiska) using only the 37 mm. gun. Four shots were fired at one target, two at the second. Only two shells hit, but with high explosive 37 mm. ammunition one hit was more than enough; but considering the "Roman Candle" rate of fire of the weapon, Capt. Rice's marksmanship is impressive.

Having been attached to the 11th Air Force on temporary duty (TDY) pilots of the 54th Fighter Group began their trip to the United States, in small groups of six or eight aircraft, at the beginning of January 1943.



White-tailed P-39Q of the 362nd Sqn., 357th Fighter Grp. at Hayward, California in the summer of 1943.

(Photo: Merle Olmsted Collection)

EUROPEAN AND FOREIGN SERVICE

The first foreign order for Airacobras had come in the shape of a \$9,000,000 French contract for 200 aircraft. Two million dollars of this sum was in cash, most welcome at a time when although large orders had been received, the expansion required to fulfil them was putting a strain on Bell Aircraft's budget.

France's fall under the onslaught of the German *Blitzkrieg* prevented any of these aircraft being delivered, but eventually French pilots were to receive nearly the same total of 200 machines. The first Free French unit to receive the type was G.C.III/6 "Roussillon", which began to equip with P-39Ns in April 1943. N and Q models also served with at least three other French units before the end of the war; these were G.C.I/4 "Navarre", G.C.I/5 "Champagne", G.C.III/5 "Ardennes" and probably G.C.II/3 "Dauphine" also. Disbanded during the Vichy period, G.C.II/6 "Travail" was reformed with P-39s in July/August 1944. Remaining in French service as late as 1947, P-39s flew coastal patrols in the North African theatre in 1943, and ground attack missions in Southern France and Italy during the last two years of the European war.

The British took on the lapsed French order for 200 machines and in all ordered 675 Bell Model 14s, under the name "Caribou". Renamed Airacobra I, they reached only one Royal Air Force squadron—



A P-39D-2 of the 67th Fighter Squadron (41-38400) in flight over Guadalcanal.

(Photo: Lt. Barclay Dillon via Martin C. Haedtler)



67th Sqn. P-400 and pilots. "Hell Bells" was flown by Lt. Ferguson, third from left; second from right is Lt. Martin C. Haedtler. Note the squadron insignia painted on the cockpit door; doors and name panels above the exhaust stacks were interchangeable from aircraft to aircraft, and this was often done to retain the insignia on new machines.

(Photo: Chicago Tribune)



Personnel gather round a line-up of R.A.F. Airacobra Is at Duxford, base of No. 601 Sqn., the only R.A.F. unit to operate the type. This photograph is dated October 1941. The Airacobra was not a success in the North-West European sphere of operations; No. 601 Sqn. soon converted onto Spitfires.

(Photo: H. T. Alder)

No. 601 "County of London" Sqn. Having converted from the faithful and popular Hurricane, the pilots were expecting a really up-to-date aircraft as a replacement; and their first disappointment came when, having received 11 aircraft by the end of September 1941, they discovered the top speed to be 30 m.p.h. less than they had been led to believe.

At this time the Air Fighting Development Unit were operating from the same airfield as No. 601 Sqn., namely Duxford; and the squadron pilots had ample opportunity to test their new mounts against other contemporary types including captured German Messerschmitt Bf 109Es and Fs as well as the twin-engined Bf 110. In climb tests the Airacobras were left standing by Hurricanes, Spitfires and Bf 109s and also by the then new Typhoon. Above 15,000 ft. they all flew rings around the P-39.

The small high pressure tyres caused difficulties during operations from the usual R.A.F. grass airstrips; dirt and debris tended to clog the electrically-operated landing gear and flaps. Unfamiliarity with tricycle undercarriages led to long landing runs and consequent overheating and brake failures. American practice was to ignore the tricycle undercarriage and land in a normal tail-low attitude, holding off until the nose wheel touched of its own accord; brakes were applied only then. Other prob-

lems occurred during firing trials; quantities of gun-gas filled the cockpit and at times reached lethal concentrations. During night trials the pilots were blinded by muzzle flashes; doubly dangerous when the aircraft were committed to collision courses. American aircraft were often fitted with flash-hiders for cannon and cowl guns.

The only R.A.F. Airacobra operation was on October 9, 1941, when four aircraft left Duxford and strafed barges on the French coast after refuelling at Manston.

In a foretaste of the P-39s most widespread use, a group of Russian pilots were taken to Duxford and flew No. 601's aircraft. After the squadron moved to a base near the city of York, two British pilots were killed due to their aircraft entering uncontrollable flat spins. Although a pleasant plane to fly, it required trim adjustment during differing flight regimes to compensate for the use of ammunition and fuel and the aft movement of the centre of gravity; aerobatics were prohibited in tail-heavy aircraft. After the above-mentioned crashes whatever little pilot confidence remained vanished completely, and No. 601 gratefully re-equipped with Spitfires.

Of the 675 machines ordered, 212 which reached England were sent on to Russia, the first of a total of 4,747, more than half the entire production of the P-39. Highly regarded by the Russians for its ground-attack capability, the P-39 was nicknamed "Little Shaver"; "shaving" was the current Soviet Air Force slang for ground-strafting. The first batch was followed by a large porportion of the P39-N and P-39Q production runs.

Of the 179 British-ordered aircraft retained in the United States for U.S.A.A.C. service and redesignated P-400, many were sent to Australia and New Caledonia. Operating in mixed units with P-39Ds, they bore the early weight of the Japanese advances, supporting the Australian ground forces in New Guinea and the epic American struggle for Guadalcanal.

The next, though hardly successful European operation came when the 31st Fighter Group, re-formed with the 307th, 308th and 309th Squadrons, began operating from England. With headquarters established at Atcham, the 31st conducted one combat operation against Hitler's Europe. Twelve aircraft took part; six returned. The Group re-equipped with Spitfires.

When World War II descended upon Pearl Harbour on December 7, 1941, the United States, in the words of Major Alexander P. Seversky, "did not have a combat aircraft worthy of the name." A harsh judgement; but the P-39 and P-40 were the only halfway-modern fighter types operational with the Army Air Corps. Together with the Navy's Grumman Wildcat they bore the brunt of the early fighting in the Pacific. They were not the best in the world; some probably considered them a little less than nothing; but they were all there were to be had. The Japanese considered the P-39 a hard aircraft to shoot down; but that is hardly a compliment, either. All in all, the career of the P-39 could be summed up like this: with its tough hide, and the spirit of its defiant pilots in the face of overwhelming odds, it bought enough time for the full might of the United States to be geared for war.

P-39 UNITS

U.S. ARMY AIR CORPS/U.S. ARMY AIR FORCE

Pre-War Units

8th Pursuit Group
16th Pursuit Group
31st Pursuit Group

Operational Units—Second World War

| | | | |
|-----------------------|----|----|-----------------------|
| 8th Fighter Group | .. | .. | New Guinea |
| 15th Fighter Group | .. | .. | Hawaii |
| 18th Fighter Group | .. | .. | Guadalcanal |
| 31st Fighter Group | .. | .. | England (one mission) |
| 32nd Fighter Group | .. | .. | Canal Zone |
| 35th Fighter Group | .. | .. | New Guinea |
| 36th Fighter Group | .. | .. | Canal Zone |
| 53rd Fighter Group | .. | .. | Canal Zone |
| 54th Fighter Group | .. | .. | Alaska—Aleutians |
| 68th Recon. Group | .. | .. | Africa |
| 81st Fighter Group | .. | .. | Africa |
| 318th Fighter Group | .. | .. | Hawaii |
| 332nd Fighter Group | .. | .. | Italy (1944) |
| 342nd Composite Group | .. | .. | Iceland |
| 347th Fighter Group | .. | .. | Guadalcanal |
| 350th Fighter Group | .. | .. | Africa |

Groups Trained with P-39 in U.S.A.

10th Recon. Group
20th Fighter Group
21st Fighter Group (activated April 24, 1944)
33rd Fighter Group
52nd Fighter Group
56th Fighter Group
339th Fighter Group
357th Fighter Group
363rd Fighter Group
367th Fighter Group
404th Fighter Group
405th Fighter Group

Replacement Training Units (RTU)

48th Fighter Group
59th Fighter Group
328th Fighter Group
338th Fighter Group
369th Fighter Group

P-39 VARIANTS

| Model | Quantity | Remarks |
|---------------|----------|---|
| XP-39 | 1 | Prototype. Flew April 6, 1938. |
| YP-39 | 13 | Service test models. Armed with 1 × 37 mm. in spinner, 2 × .30 + 2 × .50 in cowling. |
| YP-39A | (1) | Ordered as XP-39 without turbo-supercharger with V-1710-31 altitude engine. Delivered as YP-39. |
| XP-39B | (1) | Prototype, converted. |
| P-39C | 20 | Among 80 ordered as P-45; 37 mm. in spinner, 2 × .30 + 2 × .50 in cowling. Remaining 60 delivered as P-39D. |
| P-39D | 429 | Self-sealing tanks. 1 × 37 mm. in spinner, 2 × .50 in cowling, 4 × .30 in wings. V-1710-35 (1,150 h.p.). |
| P-39D-1 | 336 | 20 mm. cannon replacing 37 mm. |
| P-39D-2 | 158 | 37 mm. cannon. 1,325 h.p. V-1710-63 engine. |
| XP-39E | 3 | Laminar flow wing tests. V-1710-47 engine. |
| P-39F | 229 | D with AeroProducts "AeroProp" replacing Curtiss Electric. |
| P-39G | (1,800) | Delivered as P-39K, L, M, and N. |
| P-39J | 25 | P-39F with 1,100 h.p. V-1710-59 engine. |
| P-39K | 210 | V-1710-63 engine (1,325 h.p.) "AeroProp". |
| P-39L | 250 | Curtiss Electric prop. |
| P-39M | 240 | V-1710-83 engine (1,200 h.p.). Curtiss prop., gearing change. |
| P-39N | 2,095 | V-1710-85 engine (1,200 h.p.) "Aero-Prop". |
| P-39Q-1 to 20 | 3,696 | 37 mm., 4 × .50 (2 in cowling, 2 in wing fairing). |
| P-39Q-21 & 25 | 309 | 4 blade prop. |
| P-39Q-30 | 400 | 3 blade prop. |
| P-400 | 179 | Retained from British orders. Operated with British serials. |

P-39 SERIAL NUMBERS

| Model | Numbers | Quantity | Approved |
|----------|-------------------|---------------|----------------|
| XP-39 | 38-326 | 1 | Oct. 7, 1937 |
| YP-39 | 40-027 to 039 | 13 | April 27, 1939 |
| YP-39A | | (1) | |
| XP-39B | 38-326 | (converted 1) | |
| RP-39C | 40-2971 to 2990 | 20 | Oct. 12, 1939 |
| P-39D | 40-2991 to 3050 | 60 | Oct. 12, 1939 |
| | 41-6722 to 6841 | 120 | Sept. 9, 1940 |
| | 41-6842 to 7052 | 211 | Sept. 13, 1940 |
| | 41-7057 to 7058 | 2 | Sept. 13, 1940 |
| | 41-7080 to 7115 | 36 | Sept. 13, 1940 |
| P-39D-1 | 41-28257 to 28406 | 150 | June 11, 1941 |
| | 41-38220 to 38404 | 185 | Sept. 17, 1941 |
| | 41-38563 | 1 | Sept. 17, 1941 |
| P-39D-2 | 41-38405 to 38562 | 158 | Sept. 17, 1941 |
| XP-39E | 41-19501 to 19502 | 2 | April 11, 1941 |
| | 42-71464 | 1 | Oct. 27, 1941 |
| P-39F | 41-7116 to 7344 | 229 | Sept. 13, 1940 |
| P-39J | 41-7053 to 7056 | 4 | Sept. 13, 1940 |
| | 41-7059 to 7079 | 21 | Sept. 13, 1940 |
| P-39K-1 | 42-4244 to 4453 | 210 | Aug. 25, 1941 |
| P-39L-1 | 42-4454 to 4703 | 250 | Aug. 25, 1941 |
| P-39M-1 | 42-4704 to 4943 | 240 | Aug. 25, 1941 |
| P-39N | 42-4944 to 5043 | 100 | Aug. 25, 1941 |
| | 42-8727 to 9126 | 400 | Aug. 25, 1941 |
| P-39N-1 | 42-9127 to 9726 | 600 | Aug. 25, 1941 |
| | 42-18246 to 18545 | 300 | Feb. 21, 1942 |
| P-39N-5 | 42-18546 to 19240 | 695 | Feb. 21, 1942 |
| P-39Q-1 | 42-19446 to 19595 | 150 | Feb. 21, 1942 |
| P-39Q-5 | 42-19596 to 20545 | 950 | Feb. 21, 1942 |
| P-39Q-10 | 42-20546 to 21250 | 705 | Feb. 21, 1942 |
| P-39Q-15 | 44-2001 to 3000 | 1,000 | Oct. 2, 1943 |
| P-39Q-20 | 44-3001 to 3850 | 850 | Oct. 2, 1943 |
| | 44-3859 to 3860 | 2 | Oct. 2, 1943 |
| | 44-3865 to 3870 | 6 | Oct. 2, 1943 |
| | 44-3875 to 3880 | 6 | Oct. 2, 1943 |
| | 44-3885 to 3890 | 6 | Oct. 2, 1943 |
| | 44-3895 to 3900 | 6 | Oct. 2, 1943 |
| | 44-3905 to 3910 | 6 | Oct. 2, 1943 |
| | 44-3915 to 3919 | 5 | Oct. 2, 1943 |
| | 44-3937 to 3940 | 4 | Oct. 2, 1943 |
| P-39Q-21 | 44-3851 to 3858 | 8 | Oct. 2, 1943 |
| | 44-3861 to 3864 | 4 | Oct. 2, 1943 |
| | 44-3871 to 3874 | 4 | Oct. 2, 1943 |
| | 44-3881 to 3884 | 4 | Oct. 2, 1943 |
| | 44-3891 to 3894 | 4 | Oct. 2, 1943 |
| | 44-3901 to 3904 | 4 | Oct. 2, 1943 |
| | 44-3911 to 3814 | 4 | Oct. 2, 1943 |
| | 44-3920 to 3936 | 17 | Oct. 2, 1943 |
| | 44-3941 to 4000 | 60 | Oct. 2, 1943 |
| P-39Q-25 | 44-70905 to 71104 | 200 | March 4, 1944 |
| P-39Q-30 | 44-71105 to 71504 | 400 | March 4, 1944 |

BELL P-39D SPECIFICATION

Type: Single-seat medium-altitude interceptor pursuit fighter.
Power Plant: One Allison V-1710-35 engine developing 1,150 h.p. at 3,000 r.p.m. at high boost.

Armament: One 37 mm. cannon firing through the propeller hub, two .05 calibre Type M-2 machine-guns installed in the forward fuselage ahead of the cockpit, synchronized to fire through the propeller arc, and four .30 calibre free-firing machine-guns installed in pairs in each outer wing panel.

Dimensions: Span, 34 ft.; length, 29 ft. 9 in.; height, 9 ft. 3 in.; wing area, 214 sq. ft.

Weights: Empty weight, 5,462 lb.; normal loaded weight, 7,650 lb.

Performance: Maximum speed, 335 m.p.h. at 5,000 ft., 360 m.p.h. at 15,000 ft.; climb to 5,000 ft., 1.9 min., to 20,000 ft., 9.1 min.; service ceiling 32,100 ft.; maximum range (clean) 600 ml. at 10,000 ft. at 231 m.p.h. (with one 145.7 Imp. gal. drop tank), 1,100 ml. at 196 m.p.h.

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