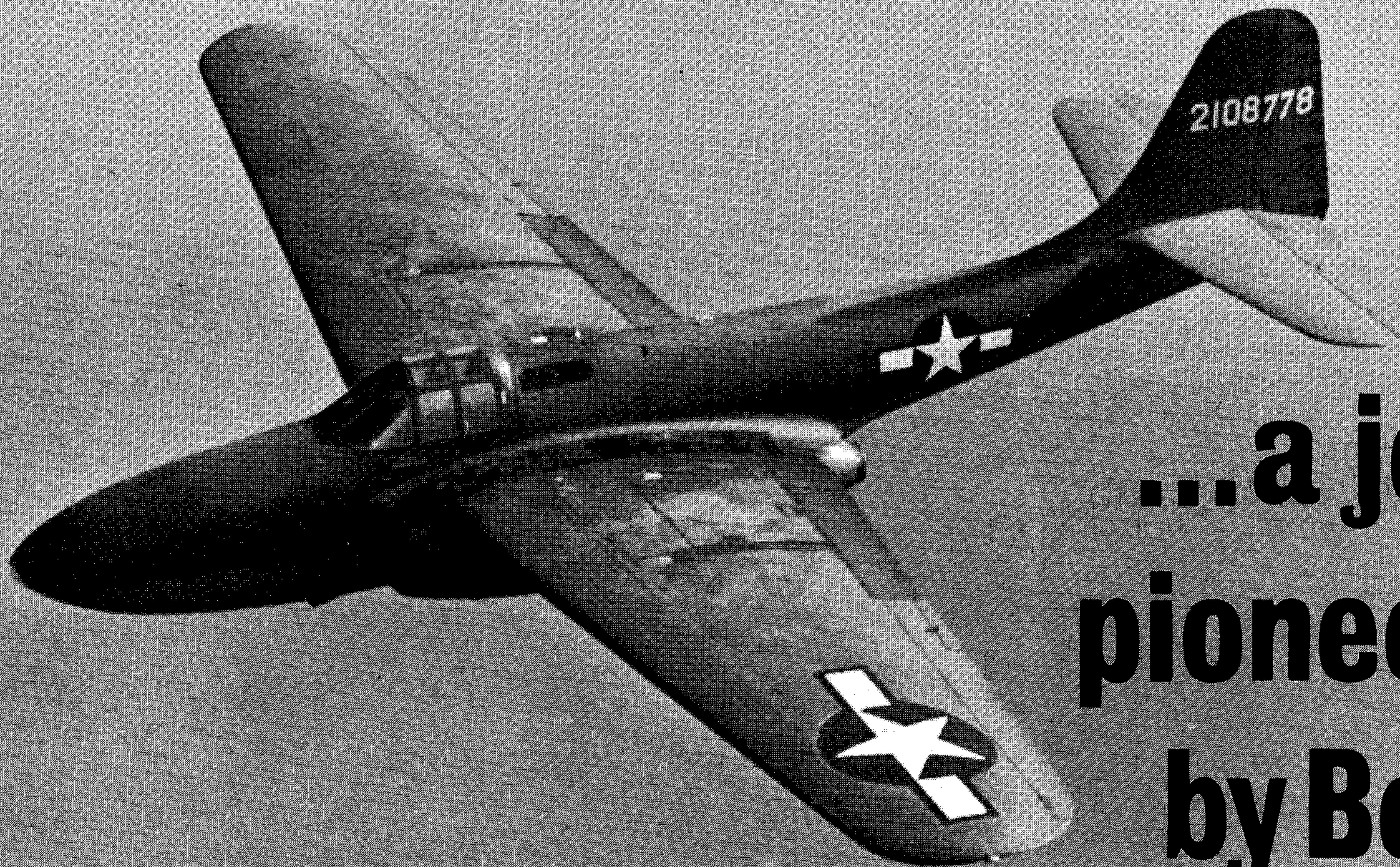
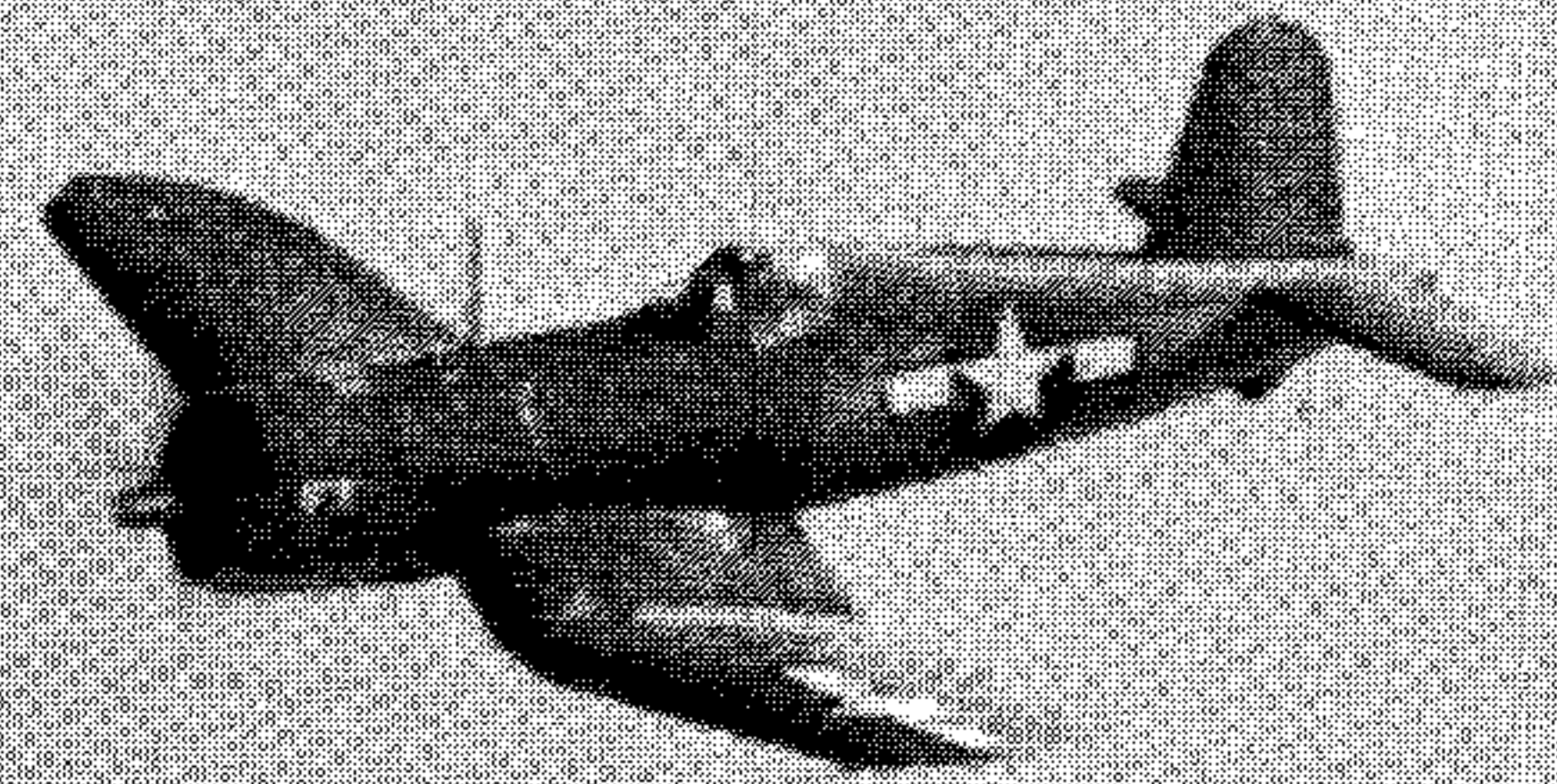


Airacomet...



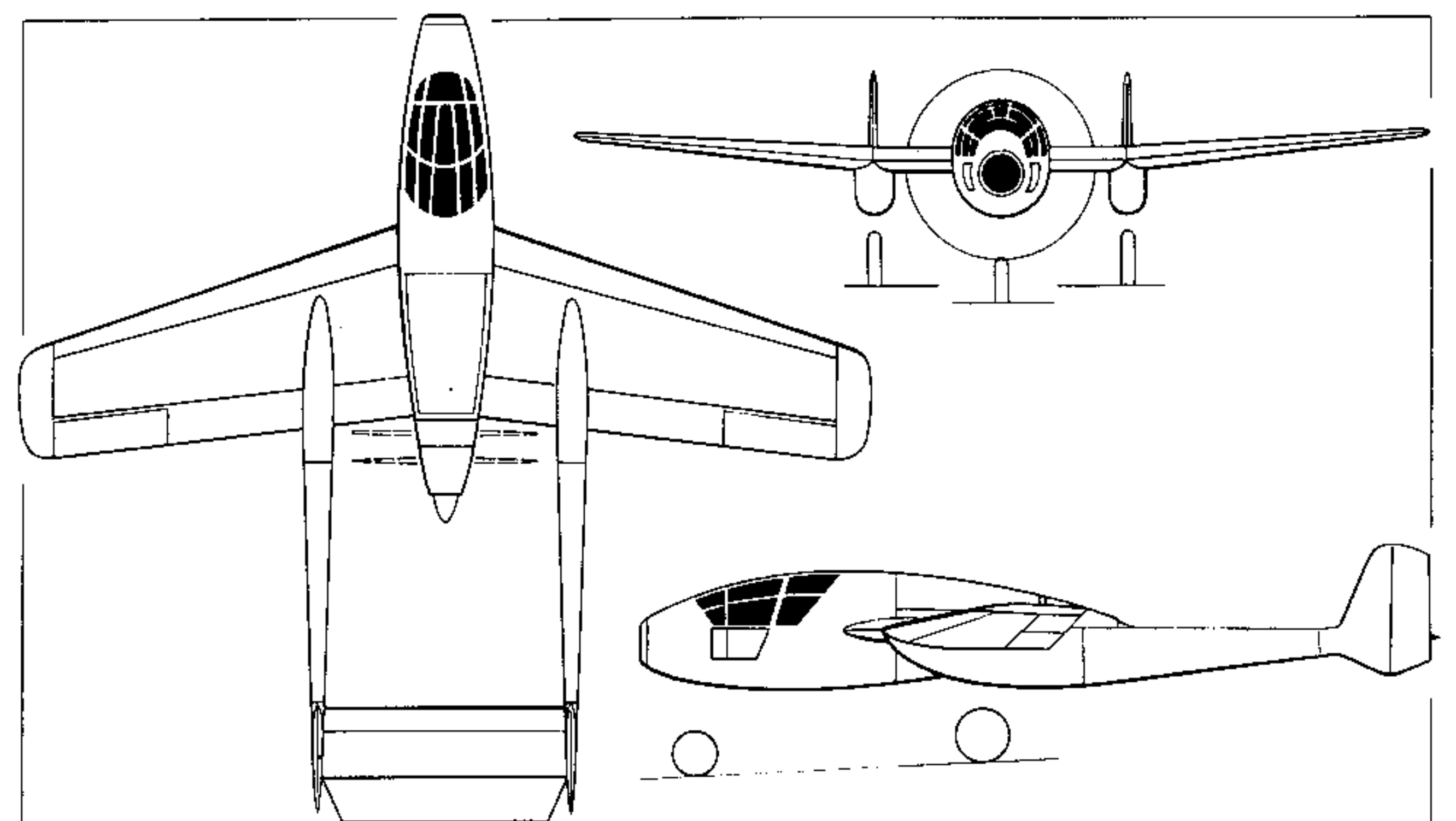
...a jet
pioneer
by Bell

MORE THAN one amateur do-it-yourself enthusiast, having lovingly laboured over a period of months or years to build in his bedroom or attic an aeroplane — or a yacht or some other tangible expression of his passion — has discovered, too late, that his house lacks doors or windows large enough to allow its egress to the open air. The scenario is one beloved of cartoonists, and it epitomises enthusiasm outrunning common sense. No doubt there were other factors that had to be taken into account, but would you believe that workmen had to knock a large hole in the outer brick wall of the factory in which America's first jet-propelled aeroplane was built, in order to manoeuvre the crated components of this historic machine out of the second-floor room in which it had been built and on to waiting railroad wagons? The Bell XP-52A was not, it is true, one of the most outstanding of its decade, but as well as being America's first jet, it was the first Allied fighter to fly that had been designed as such to take advantage of this radical form of propulsion. It surely deserved a more auspicious entry into the world than being surreptitiously manoeuvred through a hole in the wall by dead of night!

The reasons for the strange activities on the corner of Main and Rodney Streets in Buffalo, NY, in the early hours of 12 September 1942, were to be found, of course, in the extreme secrecy that surrounded any application of jet propulsion in those seemingly far-off days. The designation of the aircraft, XP-59A, was itself borrowed from an earlier Bell project, the XP-59, for a twin-boom fighter with a piston engine driving contra-rotating pusher propellers. Two XP-59 prototypes had been ordered by the USAAF but were cancelled on 1 December 1941, after the jet-propelled fighter had been

launched as the XP-59A. Thus, anyone coming across references to the XP-59A would be likely to assume that it was no more than a revised version of the earlier project.

The contract document that ordered the jet prototypes referred simply to "twin-engine single-plane interceptor pursuit models" with nothing to indicate their radical nature, and as a further concession to secrecy, no allocation of the usual serial numbers was made until after the prototypes had flown. Eventually, when a pre-production batch of 13 YP-59As was ordered, numbers were also allocated to the three XP-59A prototypes in sequence with the serials of the YP-59As, causing some confusion as the numbers of the earlier (*Heading photo*) The eighth of 13 Bell YP-59A Airacomet, accompanied by an F4U Corsair while undergoing evaluation at the US Naval Test Center, Patuxent River, in January 1944. (*Below*) A three-view drawing of the Bell XP-59, the unconventional piston-engined fighter that was cancelled when the XP-59A jet project went ahead.



aircraft were then later in sequence than those of the aircraft that followed. The high degree of security surrounding the project was also reflected in the decision to lease a special building in which to construct the prototypes, thus isolating it and those who worked on it from the other Bell employees at the main plant in Buffalo. The preliminary drawings were prepared in what had been the Pierce-Arrow plant on Elmwood Avenue, Buffalo, but prototype construction took place in a four-storey building owned by the Ford Motor Co, and it was from this building, with its window panes painted over and frames welded shut, that the XP-59A made its ignominious exit.

The initiative that led to the design and production of this aircraft by Bell Aircraft Corp was taken directly by Major General Henry H Arnold as Chief of the Army Air Force. In April 1941, he had witnessed Whittle engines under test in England and had seen the prototype Gloster-Whittle E.28/39 (Britain's first jet aeroplane) a few weeks prior to its first flight. Returning to the USA in May, Gen Arnold put in hand negotiations that led to America acquiring rights for General Electric to build and develop the Whittle-designed turbojet. On 4 September 1941, at a meeting of USAAF and GE representatives held at Wright Field, the decision was taken to proceed with construction of 15 engines and three airframes, and Bell was chosen to design the latter. This decision was communicated to Bell (represented by Larry Bell and his chief engineer Harland M Poyer) next day; until that moment, Bell was wholly ignorant of the availability of jet engines and had given no prior consideration to the design of a suitable aircraft to make use of such propulsion. Nevertheless, the company immediately agreed to tackle the task and accepted an extremely tight schedule that called for completion of the first prototype eight months from signing of the contract, which actually took place on 30 September 1941.

Bell had been chosen for this historic task for several reasons, among which were the facts that it was rather less overloaded with work on other fighters than were other manufacturers with fighter experience; that it was close to General Electric's facilities; that it had a small but highly respected and imaginative engineering staff plus the driving enthusiasm of Larry Bell himself for research and development of all kinds, and finally that it had some isolated facilities that would make it easier to preserve secrecy.

Despite a lack of fully detailed design and performance data on the engine, which was designated the Type I-A by General Electric in the first instance, Bell engineers worked quickly to establish the overall configuration of the XP-59A, which acquired the company designation of Model 27. Although the primary purpose of the aircraft was to investigate jet propulsion, it was also to embody suitability for use as a fighter, provided that no unforeseen snags arose with the power plant. The configuration chosen was a straightforward mid-wing monoplane of relatively low aspect ratio, with engines fitted in nacelles beneath the wing roots and flush against the sides of the fuselage, allowing a "straight-through" airflow. The flush-riveted light-alloy skinned wing comprised inner and outer panels and had two spars plus an auxiliary third spar in the inner panels, to which the main legs of the tricycle, electrically-actuated undercarriage were attached. The fuselage consisted of two main sections, the forward section having two built-up longitudinal beams with transverse bulkhead frames and stringers to reinforce the outer skin, and the aft section being a stressed-skin monocoque. All control surfaces were fabric covered and manually operated; fabric-covered flaps were electrically-operated.

Pressurisation and heating of the cockpit was by means of air bleed from each engine compressor and hot exhaust air was used to de-ice the cockpit canopies; access, in the XP-59As, was through a side-hinged canopy. Specified armament (fitted in the second and third prototypes) consisted of two 37-mm

M4 cannon in the nose with 44 rounds per gun. Fuel was carried in self-sealing tanks in the wings, the total capacity being only 290 US gal (1 097 l).

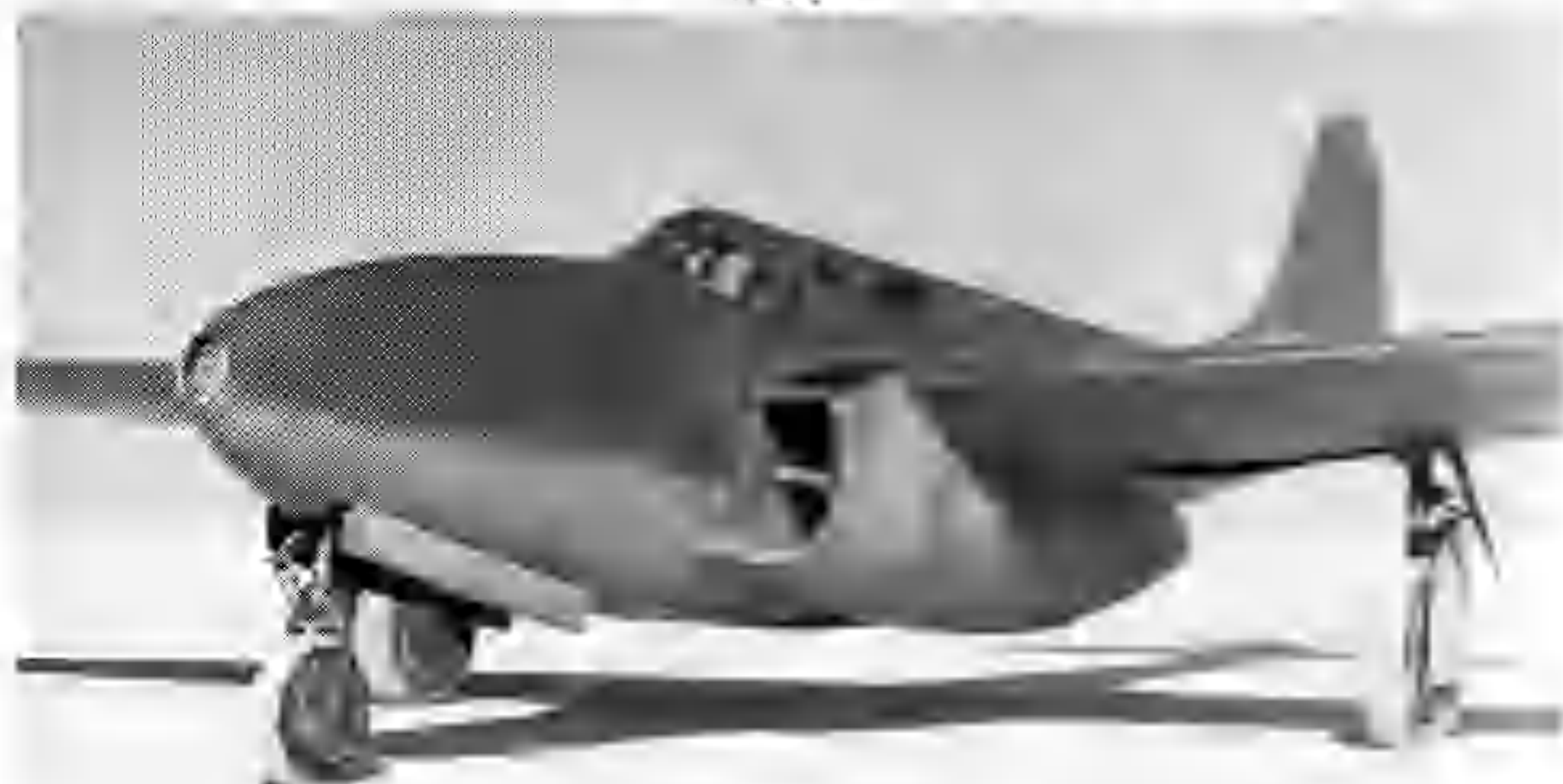
Construction of the first XP-59A began early in January 1942 in the four-storey factory Bell had leased from Ford, and after some delays caused by slippage in the engine delivery schedule, this airframe — packed in crates — was shipped out on 12 September 1942. Travelling by rail, it took seven days to reach Muroc, California, where a suitable test site had been selected in the Rogers Dry Lake, close to the USAAF Bombing and Gunnery Range — a site that would eventually blossom out as the Edwards AFB. There, on 1 October 1942, Bell's chief test pilot Robert Stanley made a tentative first flight, with undercarriage down and at a maximum height of 25 ft (7.6 m). Three more flights were made that day, at altitudes up to 100 ft (31 m), followed by four more on 2 October, one by a USAAF pilot, in which a maximum altitude of 10,000 ft (3 050 m) was reached. This record of eight flights in two days speaks well for the reliability of the I-A engines, but they were, inevitably, to prove to be the source of considerable trouble in the early days of testing and the XP-59A soon became known, unofficially, as "Miss Fire".

The ninth flight was not made until 30 October. By that date, the XP-59A had received some necessary modifications to the undercarriage, and had also been fitted with a rudimentary seat for a flight test observer in the armament bay ahead of the cockpit, with a hole in the upper decking and a small windscreen. Engine problems, including malfunctioning fuel pumps, overheated bearings, detached turbine blades and a tendency to "flame-out", slowed the pace of testing and by April 1943 only 30 flights had been made totalling 15.25 hrs on the first prototype, while the second — first flown on 15 February 1943 at Muroc — had totalled 13.75 hrs on 24 flights and the third had still to fly.

In this period, the Californian desert suffered unusually heavy rainfall, and flooding of the Rogers Dry Lake bed held up flight testing. To overcome this delay, the second XP-59A



Two views of the first of two Bell XP-59As, which entered flight test in October 1942. As the photographs show, this prototype was unarmed but provision was made from the outset of the design to install guns in the nose.



— fitted with dummy propeller and canvas covers to help preserve security — was towed 35 mls (56 km) along a public highway to Hawes Field (a satellite of what later became the George AFB) where it made one flight on 11 March. Because of worries about security, however, the aircraft was then moved to Harpers Lake, some few miles distant, where it remained until 7 April. Once this aircraft had returned to Muroc, the rate of flight testing began to accelerate, helped also by the third prototype which joined the programme late in April.

Bell, meanwhile, was into production of the service test batch of 13 YP-59As that had been ordered on 26 March 1943.

These aircraft were substantially the same as the prototypes in external appearance but had rearward-sliding, instead of sideways-hinged, cockpit canopies; they were intended to be powered by the improved General Electric I-16 (later J31) turbojet with a rating of 1,650 lb st (748 kgp) compared with the 1,300 lb st (590 kgp) or so actually produced by the I-A engines. The USAAF also directed that the final four YP-59As should each have an armament of one 37-mm cannon and three 0.50-in (12.7-mm) machine guns, all in the nose, instead of the two-cannon armament that would be retained by the first nine YP-59As.

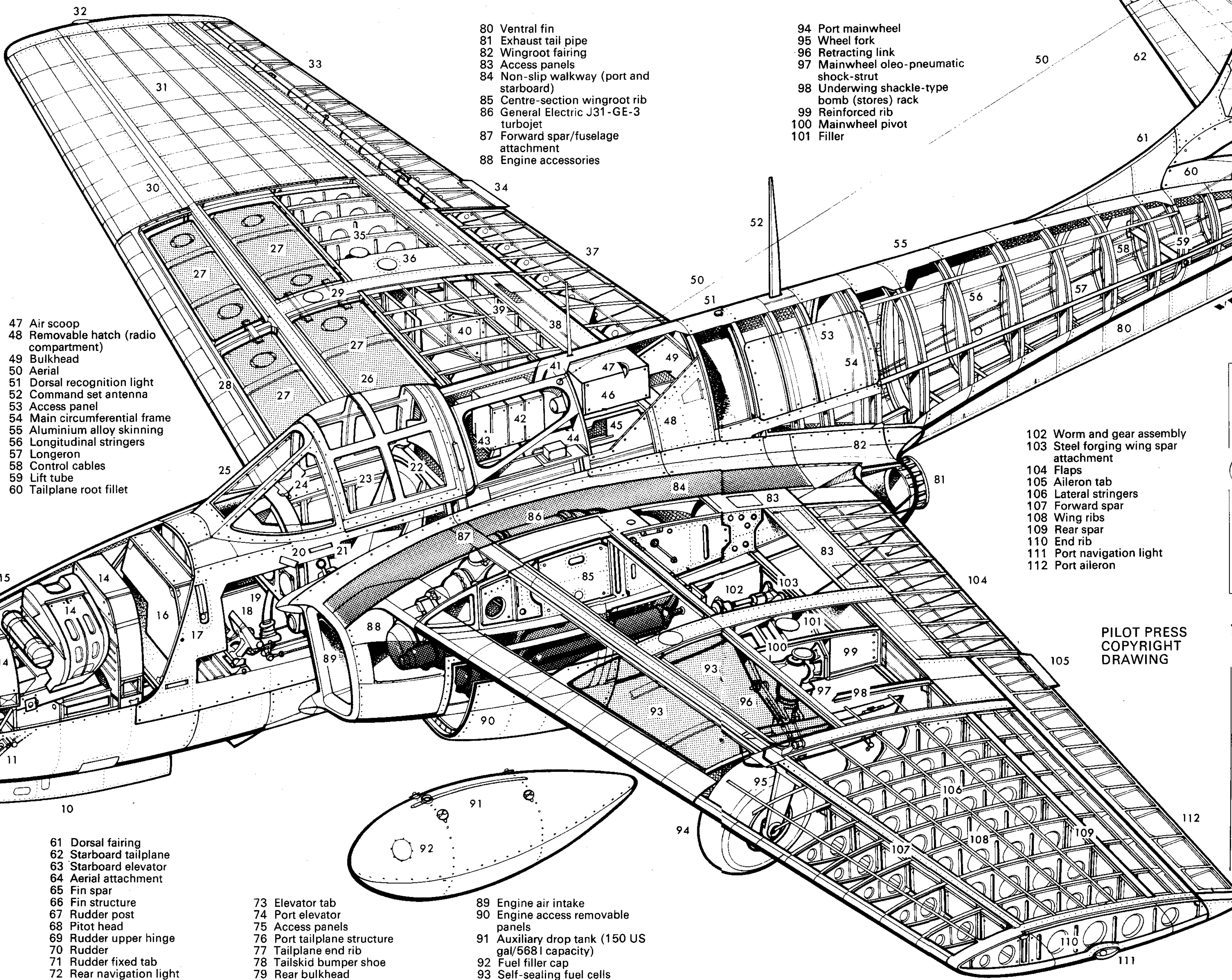
The first two YP-59As reached Muroc in June 1943, and the

first flight was made there (by the second aircraft) on 18 August 1943, I-A engines being fitted because the I-16s were not yet ready. With these lower-rated engines, the aircraft demonstrated a speed of 389 mph (626 km/h) at 35,160 ft (10,717 m) and 350 mph (563 km/h) at sea level, the gross weight being 8,900 lb (4,037 kg). Time to reach 30,000 ft (9,145 m) was 18.82 mins. Installation of I-16s in the YP-59A in due course increased the maximum speed to 409 mph (658 km/h) at 35,000 ft (10,675 m).

The first YP-59A was the second to fly, this event taking

Bell P-59A Airacomet Cutaway Drawing Key

- 1 Three 0.5-in (12.7-mm) machine gun barrels
- 2 37-mm cannon muzzle
- 3 Nose landing lamp
- 4 Nosewheel oleo-pneumatic shock-strut
- 5 Forward lift tube access plate
- 6 Torque link
- 7 Towing link
- 8 Retractable nosewheel
- 9 Cantilever strut
- 10 Nosewheel door
- 11 Retracting link
- 12 Nose gear access plate
- 13 Gun camera
- 14 Ammunition magazines
- 15 Removable panels
- 16 Forward bulkhead
- 17 External power supply
- 18 Rudder pedal assembly
- 19 Control column
- 20 External canopy release
- 21 Throttle switch
- 22 Pilot's seat
- 23 Removable panel
- 24 Gunsight
- 25 Bullet-resistant windshield
- 26 Hinged canopy
- 27 Self-sealing fuel cells (290 US gal/1 097 l capacity)
- 28 False (forward) spar
- 29 Butted skin joint
- 30 Forward spar
- 31 Wing skinning
- 32 Starboard navigation light
- 33 Aileron
- 34 Aileron tab
- 35 Wing ribs
- 36 Access panels
- 37 Flaps
- 38 IFF antenna spike
- 39 Rear spar
- 40 Starboard mainwheel well
- 41 Aerial lead-in



- 42 Receiver-dynamotor unit
- 43 Transmitter
- 44 Antenna relay
- 45 Modulator
- 46 Receiver-transmitter

- 47 Air scoop
- 48 Removable hatch (radio compartment)
- 49 Bulkhead
- 50 Aerial
- 51 Dorsal recognition light
- 52 Command set antenna
- 53 Access panel
- 54 Main circumferential frame
- 55 Aluminium alloy skinning
- 56 Longitudinal stringers
- 57 Longerons
- 58 Control cables
- 59 Lift tube
- 60 Tailplane root fillet

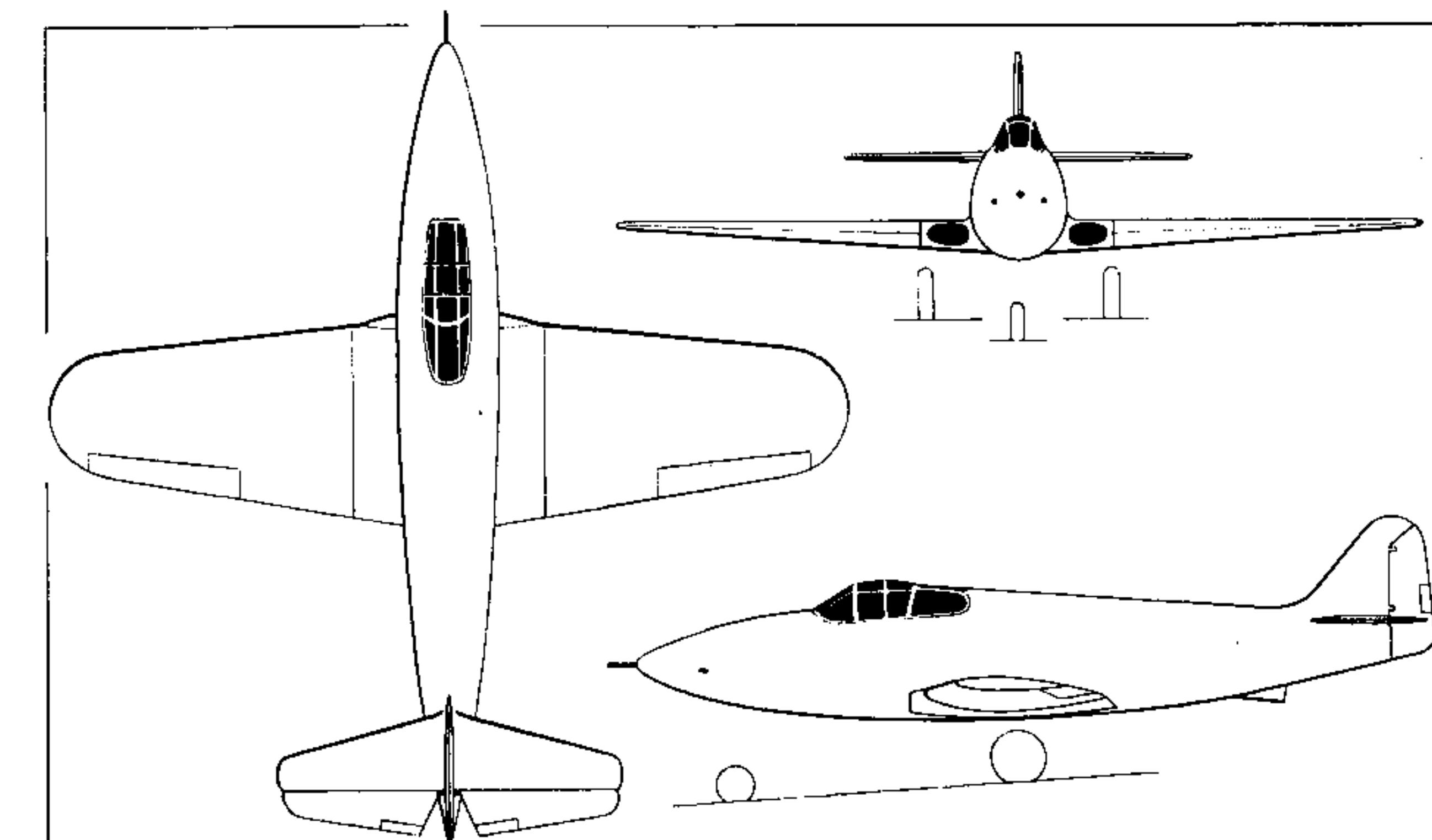
- 73 Elevator tab
- 74 Port elevator
- 75 Access panels
- 76 Port tailplane structure
- 77 Tailplane end rib
- 78 Rudder fixed tab
- 79 Rear bulkhead

- 80 Ventral fin
- 81 Exhaust tail pipe
- 82 Wingroot fairing
- 83 Access panels
- 84 Non-slip walkway (port and starboard)
- 85 Centre-section wingroot rib
- 86 General Electric J31-GE-3 turbojet
- 87 Forward spar/fuselage attachment
- 88 Engine accessories

- 94 Port mainwheel
- 95 Wheel fork
- 96 Retracting link
- 97 Mainwheel oleo-pneumatic shock-strut
- 98 Underwing shackle-type bomb (stores) rack
- 99 Reinforced rib
- 100 Mainwheel pivot
- 101 Filler

- 102 Worm and gear assembly
- 103 Steel forging wing spar attachment
- 104 Flaps
- 105 Aileron tab
- 106 Lateral stringers
- 107 Forward spar
- 108 Wing ribs
- 109 Rear spar
- 110 End rib
- 111 Port navigation light
- 112 Port aileron

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DRAWING



This rare three-view shows the basic configuration of the XP-59B, a single-engine derivative of the Airacomet design on which Bell did some work before USAF decided to entrust the development of a similar fighter to Lockheed.

Bell P-59A Specification

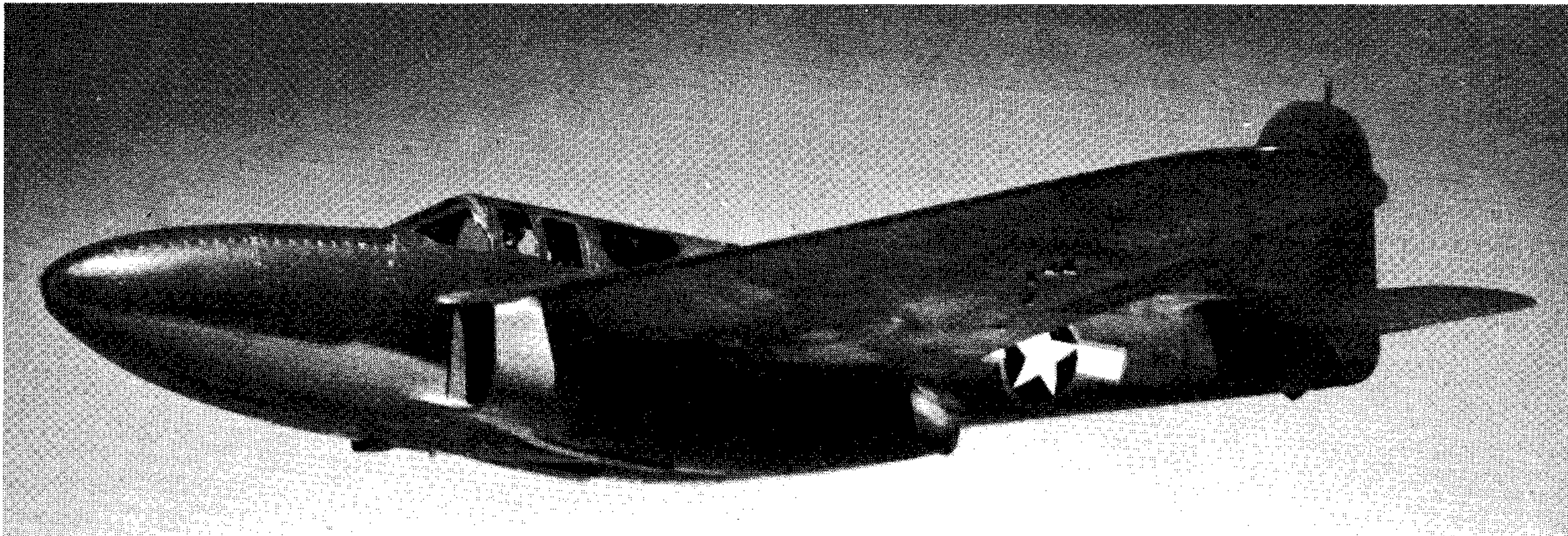
Power Plant: Two General Electric I-16 (J31-GE-3) turbojets each rated at 1,650 lb st (748 kgp) at 16,500 rpm. Fuel capacity, 290 US gal (1 097 l) in self-sealing tanks in the wings; provision for two 150 US gal (568 l) drop tanks under wings.

Performance: Max speed, 409 mph (658 km/h) at 35,000 ft (10 670 m); 376 mph (605 km/h) at 5,000 ft (1 525 m); cruising speed (60 per cent power), 298 mph (480 km/h) at 20,000 ft (6 095 m); cruising range, 240 mls (386 km) at 20,000 ft (6 100 m); range with drop tanks, 520 mls (837 km); rate of climb, 3,200 ft/min (16.3 m/sec) at 5,000 ft (1 525 m); time to 10,000 ft (3 050 m), 3.2 min; time to 20,000 ft (6 100 m), 7.4 min; time to 30,000 ft (9 150 m), 15.5 min; service ceiling, 46,200 ft (14 090 m).

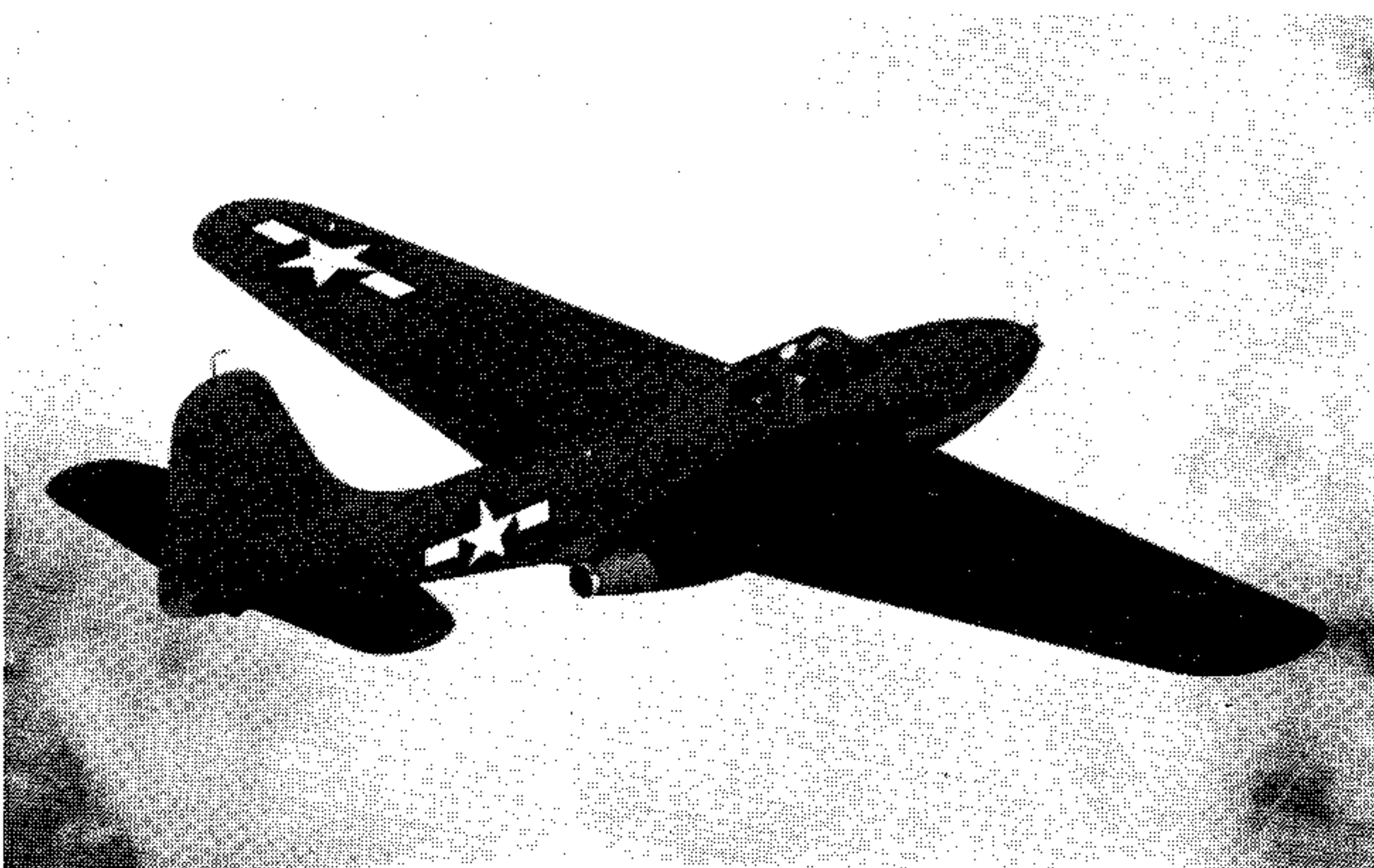
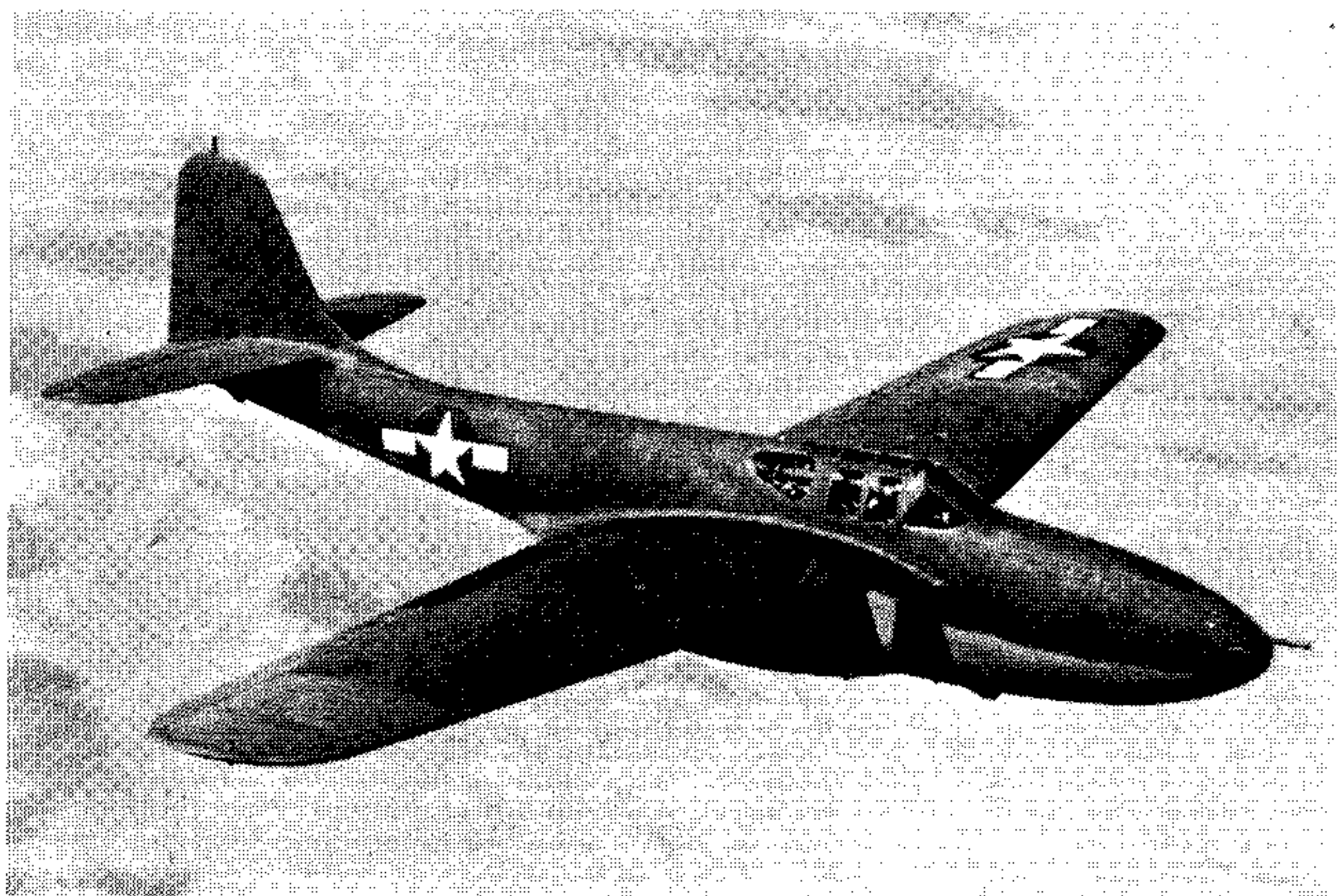
Weights: Empty, 7,950 lb (3 606 kg); normal loaded, 10,882 lb (4 909 kg); max overload, 13,000 lb (5 902 kg).

Dimensions: Span, 45 ft 6 in (13.87 m); length, 38 ft 1½ in (11.62 m); height, 12 ft 0 in (3.65 m); wing area, 386 sq ft (35.86 m²); dihedral, 3 deg 30 min; undercarriage track, 18 ft 6 in (5.64 m).

Armament: One 37-mm M4 cannon with 44 rounds and three 0.50-in (12.7-mm) machine guns with 200 rpg.



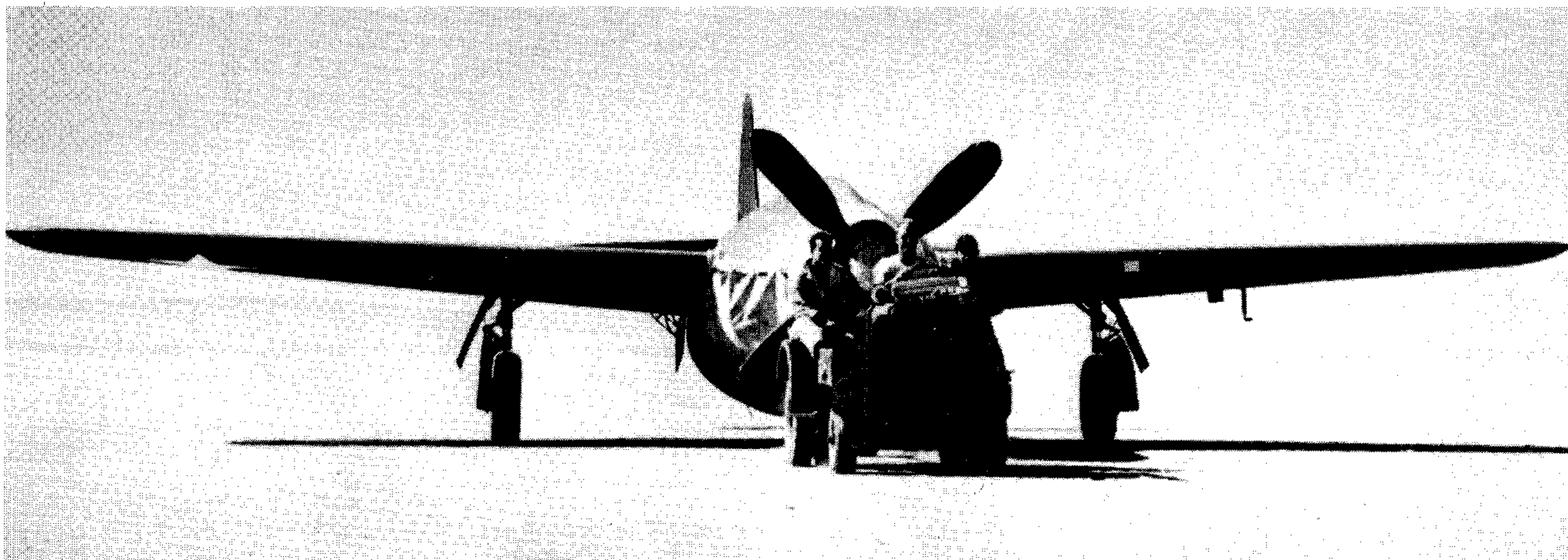
(Above) Another view of the first, unarmed, XP-59A at a later stage of flight testing. (Below left), two views of the second XP-59A, which incorporated the nose-mounted armament but still lacked — like the first example — an official serial number.



place at Muroc on 15 September 1943, and in due course aircraft nos 4, 5, 6 and 7 were also delivered to the Muroc test base for final assembly and flight test. At about the time flight testing of the YP-59A began, the USAAF adopted the name Airacomet for its new "fighter", continuing the series of "Aira..." names used for Bell types. The third YP-59A, meanwhile, had been shipped to Britain to permit evaluation of the Bell design alongside the Gloster Meteor (an example of which was sent to the USA in exchange). Assembled by Gloster at Moreton Valance, the YP-59A was flown for the first time in the UK, by Bell test pilot Frank H Kelley Jr, on 28 September 1943. In full RAF camouflage and with the serial number RJ362/G, this YP-59A was transferred to the RAE Farnborough by Wg Cdr H J Wilson (who had earlier visited Muroc to become the first Briton to fly the Bell jet fighter, in April 1943) on 5 November, but serviceability was poor and spares hard to come by; only 11 flights were made on it up to April 1944 and it was returned to the USA early in 1945, plans for a production model P-59B to be tested in England then being dropped.

Of the remaining YP-59As of the service test and evaluation batch, Nos 8 and 9 were assigned to the US Navy in November 1942, No 10 was converted to a drone to help in the development of radio control equipment for other aircraft, being lost on 23 March 1945 in a radio-controlled take-off, Nos 11 and 12 were assigned to NACA for full-scale wind tunnel tests, respectively at Langley Field and Cleveland, and the last, No 13, after being used for gunnery tests in April 1944, was converted to a drone controller, with a second cockpit in the nose as first developed for the XP-59A. The second-cockpit modification was also applied to the seventh YP-59A and the

(Below) The XP-59A is seen here crudely camouflaged with the help of a dummy propeller, for ground handling at the Rogers Dry Lake, Muroc, and other test sites used by the prototypes.

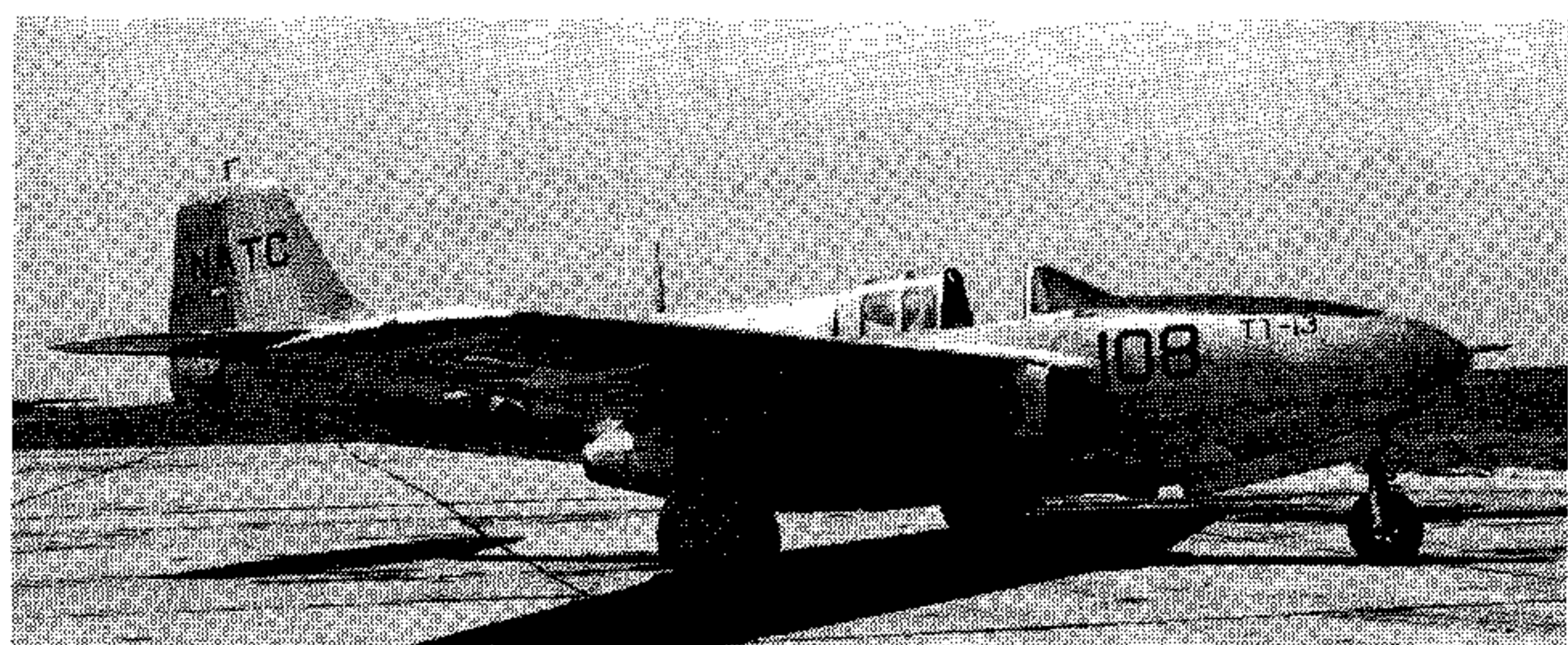
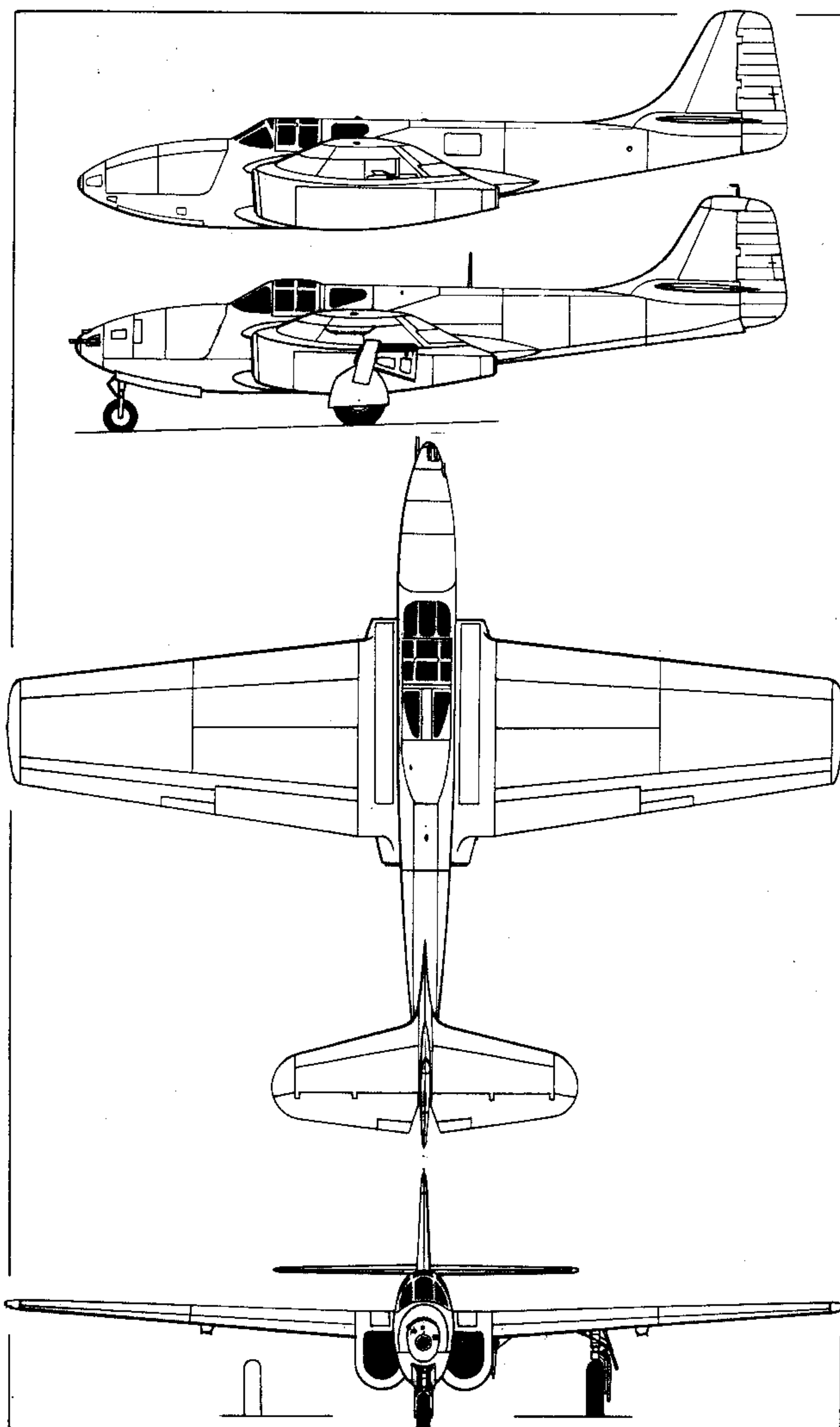


third XP-59A in the course of their testing at Muroc, to allow flight test observers to be carried.

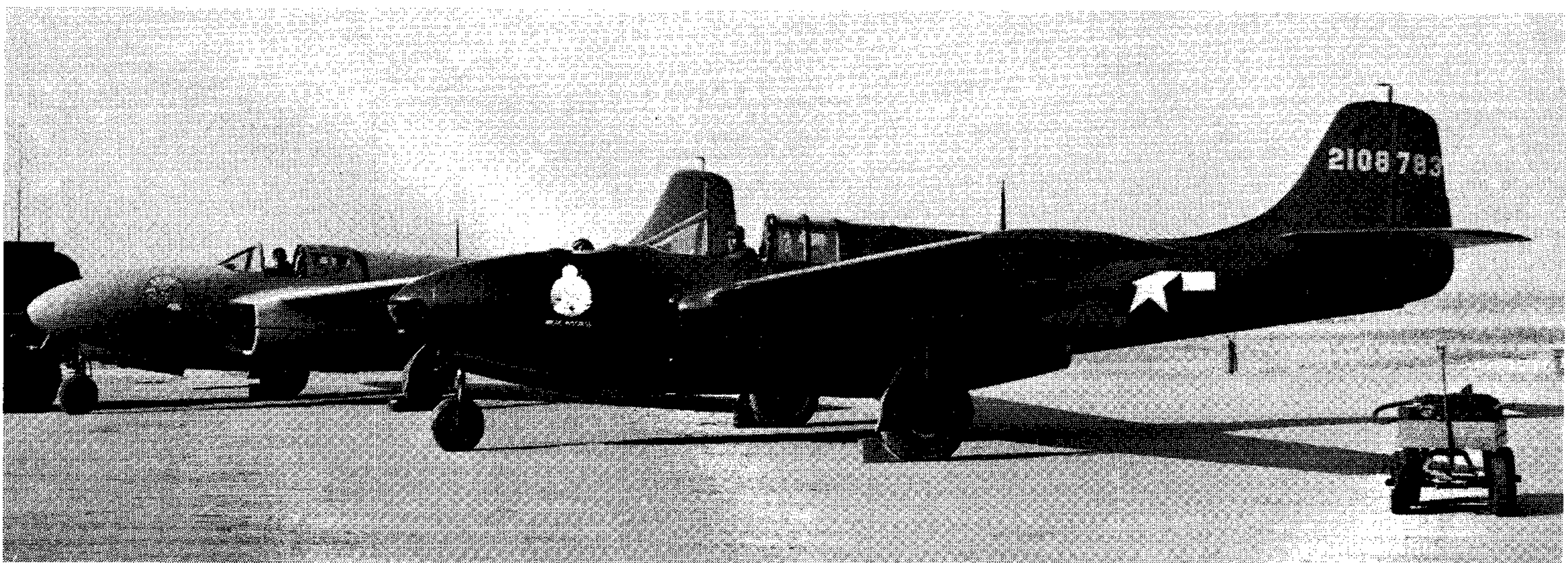
The gunnery trials with YP-59A No 13 covered the firing only of the three machine guns, in dives at speeds from 220 mph (354 km/h) to 340 mph (547 km/h), and they showed that poor directional stability at speeds above 290 mph (467 km/h) made the Airacomet a poor gun platform. Spinning trials were started late in December 1943 and led to the introduction of a small ventral fin to enhance the aircraft's spin recovery characteristics, this programme being completed on 11 February 1944. On the 5th of the same month, a two-week programme of accelerated service tests began at Muroc to assess the tactical suitability of the Airacomet, three YP-59As being flown in mock combat with a P-47D Thunderbolt and a P-38J Lightning. The Airacomet was found to be outclassed in performance and manoeuvrability by the piston-engined types and the report of the Army Air Forces Board on these tests concluded that the P-59 was not "operationally or tactically suited for combat" but would be "an excellent aircraft for ... research on jet power plants and pressure cabins" and "an excellent training ship in that its low wing-loading makes the airplane very safe ... and ... it has two engines".

Flight testing of the Airacometes came to an end at Muroc on 27 February 1944, by which time the three XP-59As and six YP-59As there had totalled 242.5 hrs with no major mishap. In June 1944, however, in the course of dive tests conducted by Bell test pilot Jack Woolams from the company's airfield at Niagara Falls, in the 10th YP-59A, the undercarriage extended suddenly and violently, breaking the downlocks, and a belly landing was made. In a continuation of the diving trials in a P-59A later that year, the entire tail unit of the aircraft broke away, Woolams escaping by parachute.

Bell had entered negotiations with the USAAF in June 1943 in respect of possible full scale production of its jet fighter, and a contract for 100 P-59As was eventually confirmed on 11 March 1944 — fewer than Bell had hoped but enough for a three-squadron Fighter Group and as many as General Electric could expect to power, in view of the then rather slow rate of engine production. In the course of YP-59A testing, a number of modifications had been evolved, all of which were to feature on the P-59A production model. These included squared-off wing tips that reduced the span from 49 ft (14.9 m) to 45.5 ft (13.9 m) and the area from 400 sq ft (37.16 m²) to 386 sq ft (35.86 m²); a squared-off fin and rudder plus the ventral fin already mentioned; strengthened aft fuselage; metal (in place of fabric) covered flaps and ailerons, the latter being pressure balanced; up-locks for the main undercarriage legs and repositioned pitot-static tube, from under the port wing to the fin. The engines were to be I-16s similar to those flying in the YP-59As.



(Above right) One of the production batch of P-59Bs wearing the markings of the Naval Air Test Center, Patuxent; it was allocated the BuAer serial 64108. (Below) A radio-controlled P-59B (farthest from the camera) and the final YP-59A modified as a drone controller, with extra cockpit in the nose.





Another view of the eighth YP-59A during its period of service with the US Navy, when it was assigned the BuAer serial 63960.

Delivery of the P-59As began towards the end of 1944, but by this time the USAAF had digested the report of the evaluation earlier in the year and had decided, on 10 October, to terminate production at 39 aircraft. Because it proved more expensive to cancel than complete some airframes then nearing completion, this figure was amended to 50, of which 20 were P-59As and the final 30 were P-59Bs,* distinguished by having an additional 66-US gal (250-l) bag tank in each outer wing.

**The designation XP-59B had previously been applied to a separate project for a new fighter based on the XP-59A design but featuring a single Whittle W2B or General Electric I-16 engine in the fuselage, with wing root intakes. Bell proved to be too heavily committed to development of the XP-59A, the XP-63 Kingcobra and the XP-77 light fighter to handle the XP-59B and responsibility for the single-engined jet fighter was transferred to Lockheed, which then went on to develop the XP-80 Shooting Star, as described in AIR ENTHUSIAST/ELEVEN.*



(Above left and below) Ground and flight views of Bell P-59A-1s, including (below) the first and (upper left) the second of the production batch of 30 aircraft.



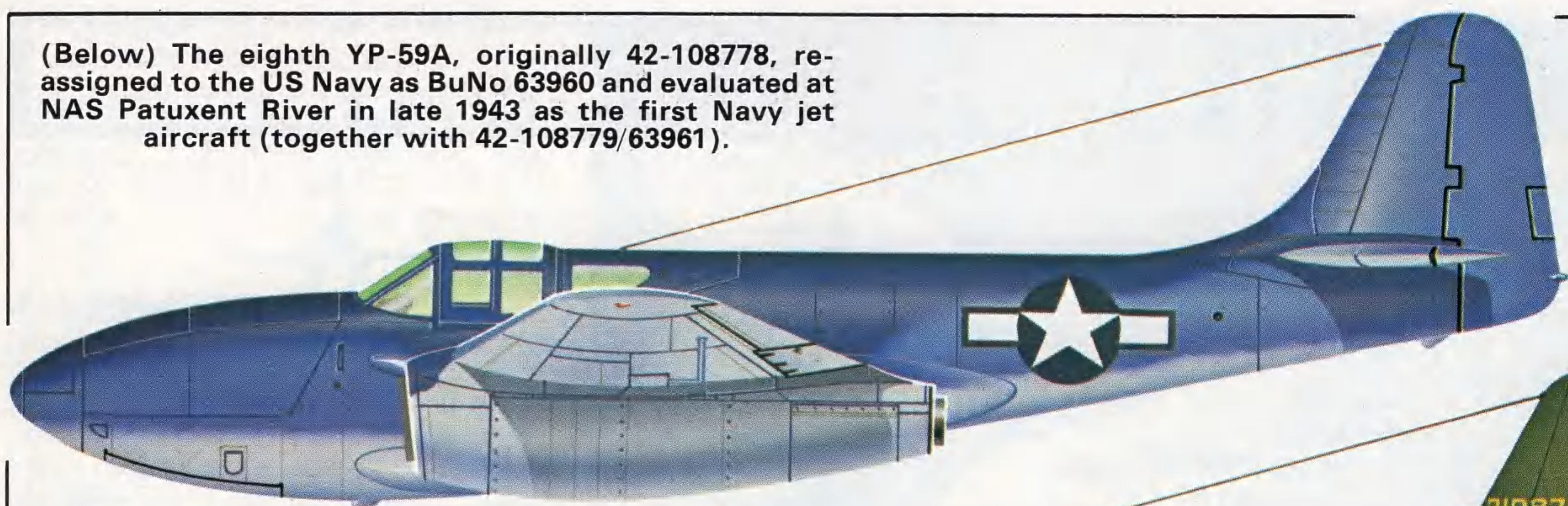
Delivery of the entire quantity was completed on 27 August 1945, although not all the P-59Bs originally had engines, some being stored by Bell until later in the year. Some P-59Bs were eventually fitted with 2,000 lb st (908 kg) J31-GE-5 engines.

Of the 20 P-59As, one was assigned to Wright Field, two to the AAF Proving Ground Command at Eglin Field, Florida, two to the Air Forces Board at Orlando, Florida, and one to the Extreme Temperature Operations Unit of the Cold Weather Test Unit at Ladd Field, Alaska, where it arrived on 9 December 1944 and flew 69 hrs 40 min with no major problems. The remainder of the batch (15 aircraft) went to the 412th Fighter Group of the Fourth Air Force, which had formed at Muroc on 30 November 1943 to work up as the USAAF's first jet unit and had then moved first to Palmdale, California, before going to Bakersfield, California, to receive the production Airacomet. Of the P-59Bs, three were assigned to the US Navy (which did not apply a separate designation to the type), one went to NACA and 19 eventually went to the 412th FG, the others remaining in storage or being used by Bell for miscellaneous tasks.

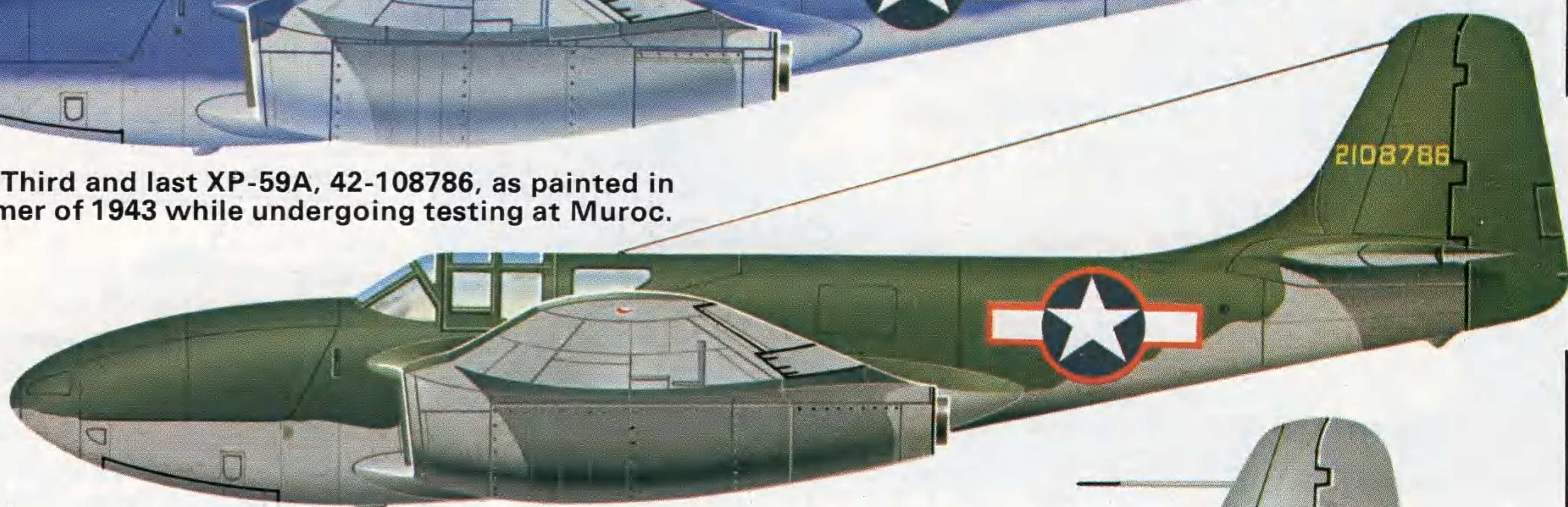
In July 1945, the 412th FG, including the 29th, 31st, 445th and 361st Fighter Squadrons, moved with its P-59As and P-59Bs to Santa Maria Army Air Field, California, where it also operated for a time the last of the YP-59As which — as already noted — had been converted to a two-seater as a drone controller and was used at Santa Maria to give flights to ground personnel. Transferring again, to March AFB, California, in December 1945, the 412th changed the status of the 361st FS to that of a Service Group, and the other three squadrons soon began to re-equip with the Lockheed P-80 Shooting Star; thus, the P-59 Airacomet saw little more than a year of active service and no combat deployment. By July 1946, no P-59s remained at March Field, and it is doubtful whether any of those in the hands of the Air Force flew after 1946, although one Airacomet was recovered for salvage and scrap at Muroc in October 1948, at which time it received the designation ZF-59B for administrative purposes. The three P-59Bs assigned to the US Navy survived a little longer, one being scrapped in December 1947 and another crashing in the same month but the third remaining in use until late 1949.

To a large degree, the Bell aircraft was unsuccessful in its planned rôle as a fighter, but it served its purpose well in proving the suitability of the gas turbine as an aircraft prime mover and providing a good trainer for pilots who would soon be graduating to jet fighters of much higher performance. The highest speed ever recorded, 425 mph (684 km/h), was less than had been expected — less, indeed, than promised for the original piston-engined XP-59 — but was just enough to hint at what could be expected of future generations of combat jet aircraft. □

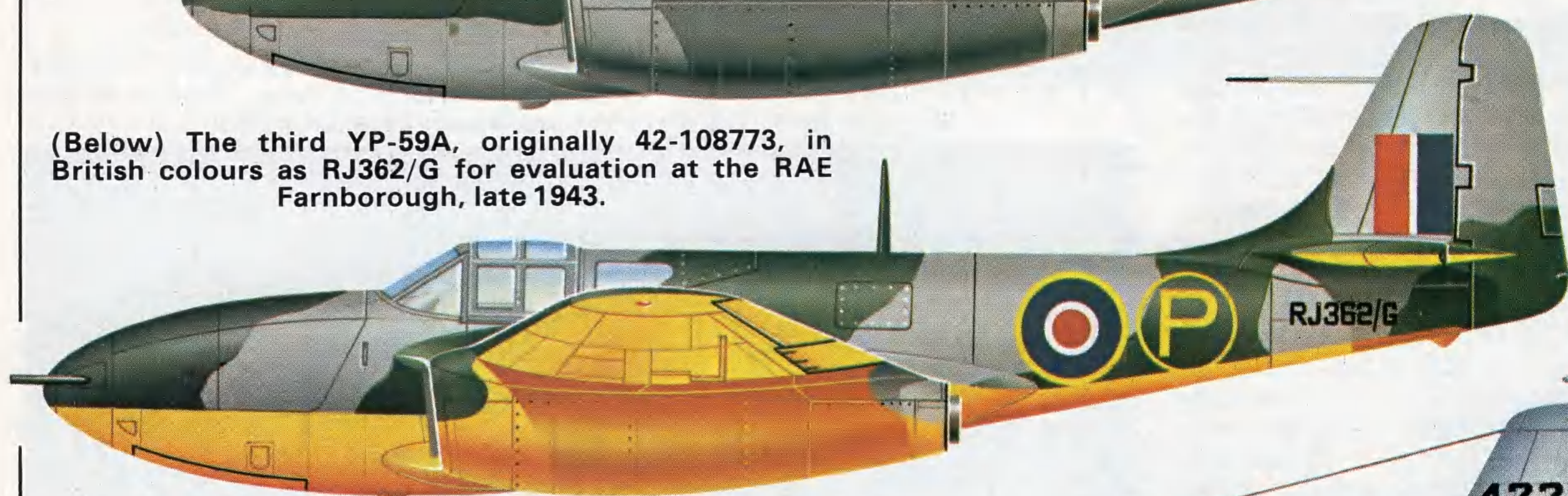
(Below) The eighth YP-59A, originally 42-108778, re-assigned to the US Navy as BuNo 63960 and evaluated at NAS Patuxent River in late 1943 as the first Navy jet aircraft (together with 42-108779/63961).



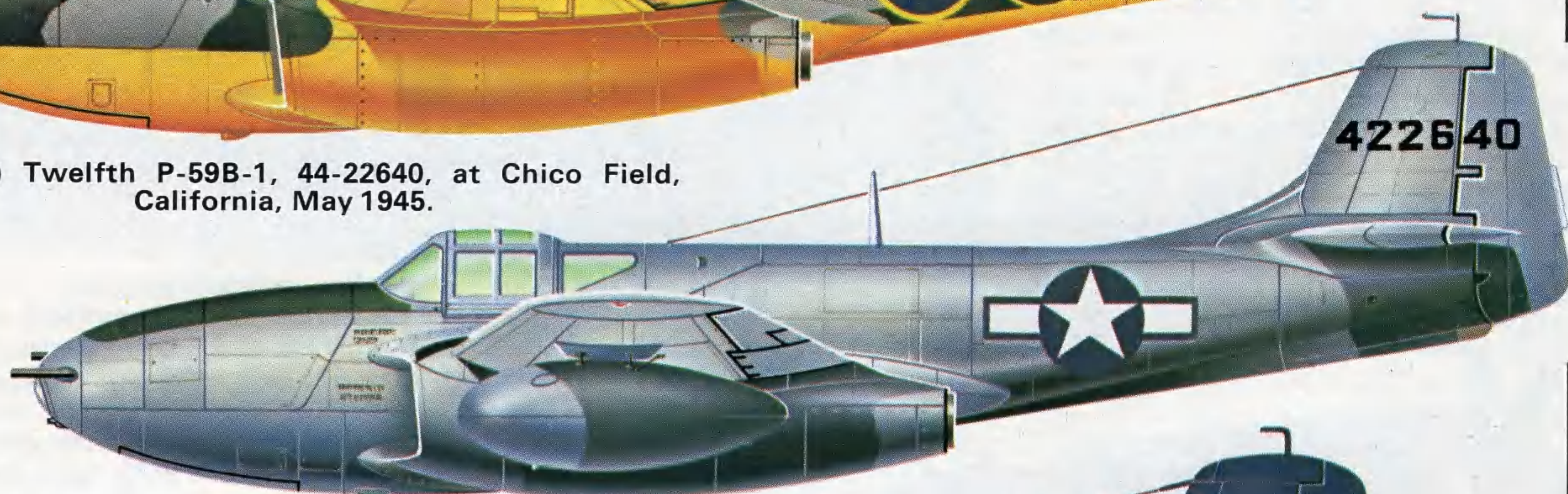
(Below) Third and last XP-59A, 42-108786, as painted in the summer of 1943 while undergoing testing at Muroc.



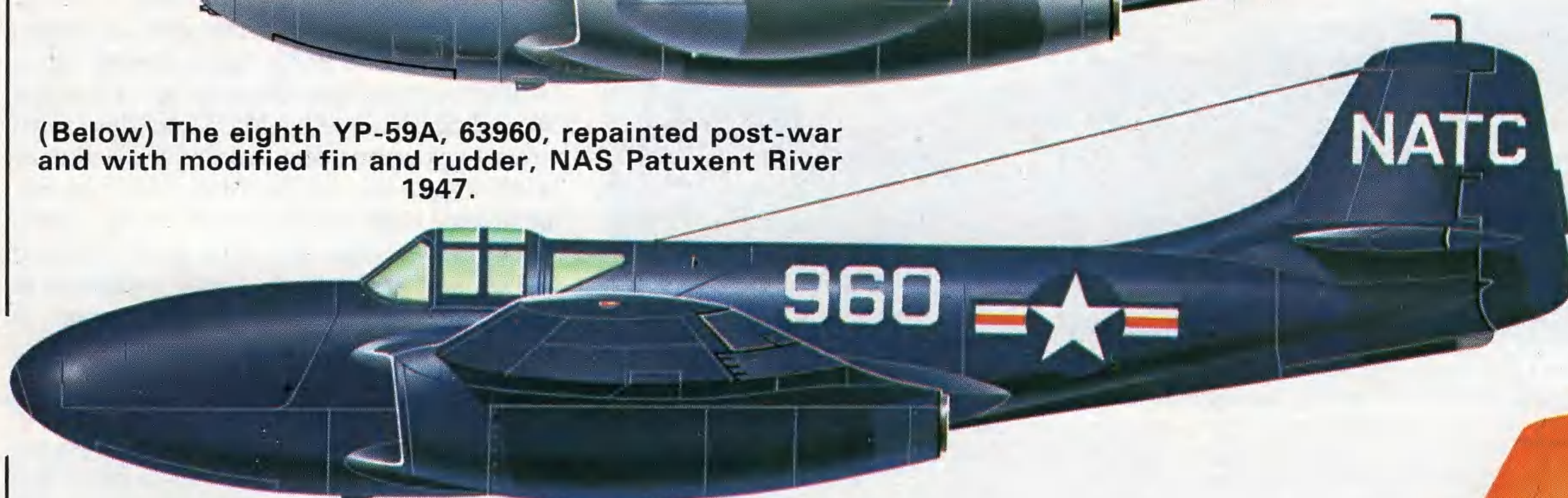
(Below) The third YP-59A, originally 42-108773, in British colours as RJ362/G for evaluation at the RAE Farnborough, late 1943.



(Below) Twelfth P-59B-1, 44-22640, at Chico Field, California, May 1945.



(Below) The eighth YP-59A, 63960, repainted post-war and with modified fin and rudder, NAS Patuxent River 1947.



(Below) Fifteenth P-59B-1, 44-22633, "Reluctant Robot", the second of two Airacomets flown as pilotless drones in 1944/45.

