Research Notes on the

de Havilland DH100 Vampire

Compiled by John Griffin

Part 1/1

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DE HAVILLAND D.H.100 VAMPIRE F.I

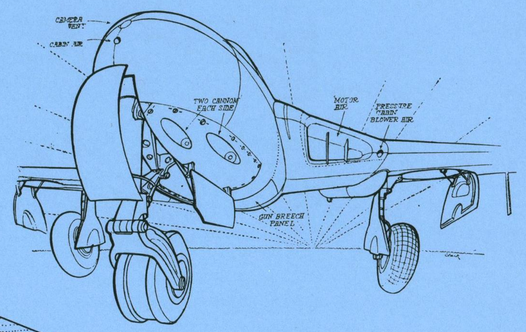
The de Havilland D.H.100, originally to be known as the Spider-Crab, was designed to Air Ministry Specification E.6/41 and was the second type of jet fighter to enter service with the Royal Air Force. LZ548/G, the prototype D.H.100, was first flown on September 20, 1943, by Geoffrey de Havilland Jr, from Hatfield, Herts.

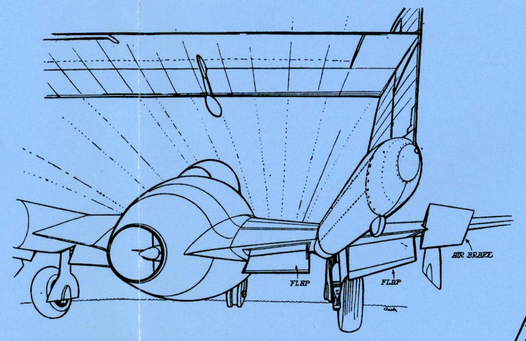
Production of the Vampire F.I was undertaken by the English Electric Company Ltd at Preston in Lancashire and TG274/G, the first production F.I, was first flown on April 20, 1945, from Samlesbury. Between April 1945 and August 1947, 188 F.Is were delivered to the RAF, the first entering service with 247 Sqn at RAF Chilbolton (later moving to RAF Odiham) in March 1946.

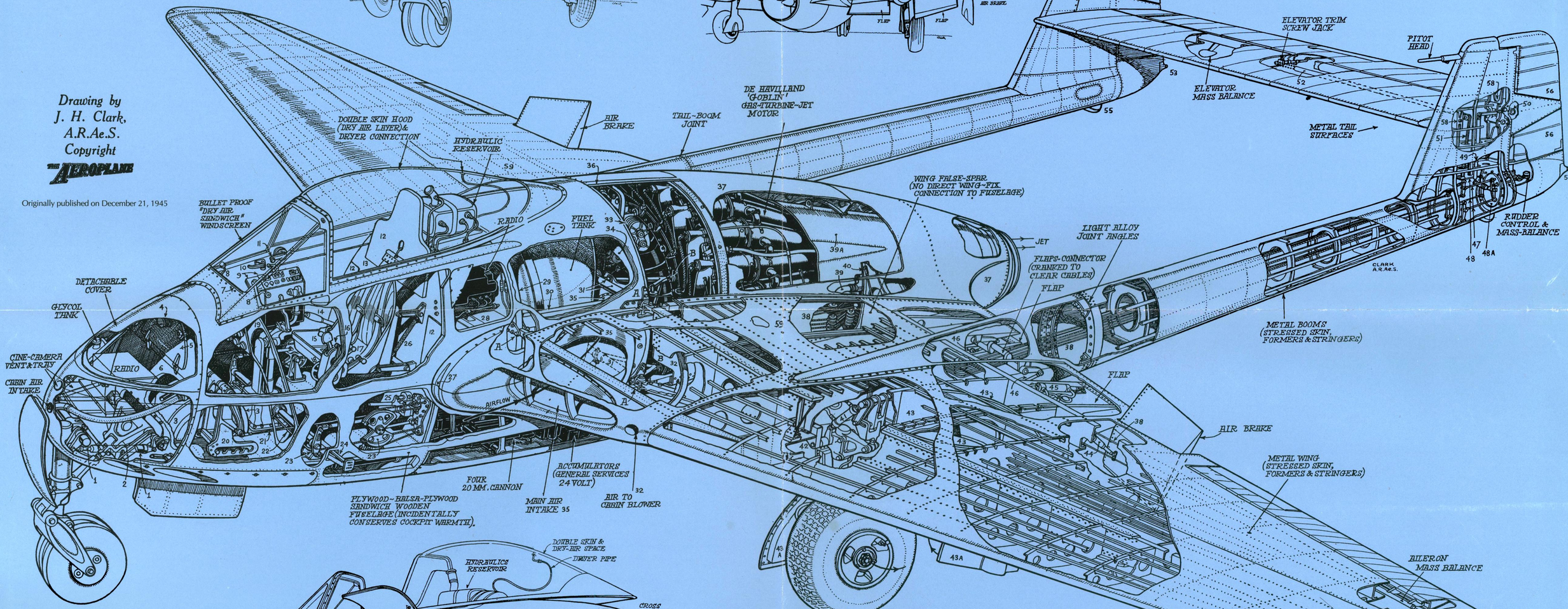
D.H.100 Vampire F.I data

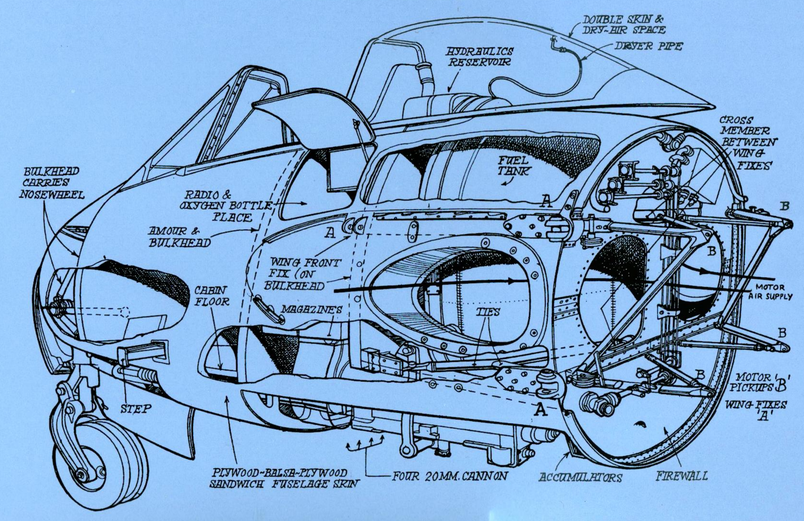
Span	40ft 0in
Length	30ft 9in
Height	8ft 10in
Wing area	266ft²
Empty weight	6,373lb
All-up weight	10,480lb
Initial climb rate	4,300ft/min
Max speed at 20,000ft	540 m.p.h.
Range	730 miles

The Vampire F.I was powered by one 3,100lb-thrust de Havilland Goblin 2. Armament was four 20mm Hispano cannon









Drawing by J. H. Clark, A.R.Ae.S. Copyright THE AEROPLANE

Originally published on December 21, 1945

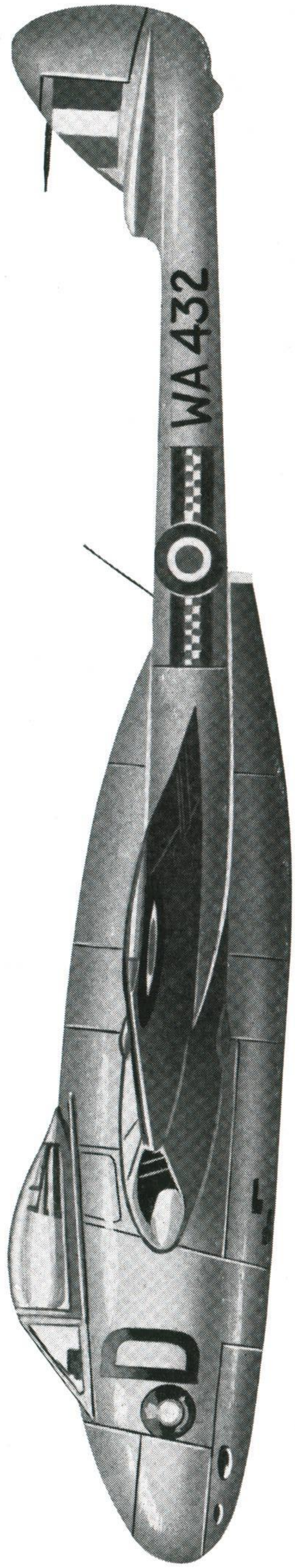
KEY

1 Nosewheel operating ram
2 Latch
3 Wheel well
4 Pressure cabin round testing lug
5 Hinge-down armour door to back of instrument panels
6 Armoured wooden bulkhead
7 De-icing spray
8 Windscreen dryer pipes
9 Mach indicator and lights, gun sight, extinguisher, starter, boost pump, switches, etc
10 Hood jettison gear
11 Hood wind-back gear
12 Armour
13 Wooden bulkhead
14 Seat-raising gear
15 Throttle
16 Hood seal lever
17 Undercarriage and flaps selector levers
18 Tail trim control
19 Instrument dash
20 Adjustable rudder pedals
21 Rudder cables
22 Aileron cables
23 Elevator controls
24 Retractable step
25 Pump
26 Seat support rubber cord
27 Slight indentation preserves airflow over wing (prevents fuselage airflow breaking away and going round into duct)
28 Magazines
29 Wooden bulkhead picks up wooden front fix
30 Horizontal wooden member (integral with fuselage) ties front and rear top wing fixes
31 Tubular cross tie between wing fixes, and motor mount connections
32 Air inlet to cabin blower
33 Cabin blower
34 Metal bulkhead (firewall)
35 Motor air intake (passes through firewall 34)
36 Inspection door
37 Metal casing shrouds engine and jet tube and is lightly connected to wing and rib
38 Aileron, rudder, elevator and elevator trim cables run behind false spar
39 Gun heating pipe from muff around jet tube
39a Light casing around jet tube (part of motor unit)
40 Clip securing fairing 37
41 Undercarriage operating jack
42 Undercarriage hinge
43 Undercarriage wheel well
43a Wheel well half-doors
44 Air brake operating jack
45 Flap jack
46 Flap interconnection rods
47 Rudder linkage
48 (Similar) Elevator linkage
48a End bracket carries linkage arms 47 and 48
49 Lead-loaded (mass balance) connector rod from elevator linkage to elevator shaft 50
50 Elevator shaft
51 Elevator trim cables
52 Guide tube in tailplane houses 51
53 Tail navigation lights
54 Rudder mass balance
55 Tail-down bumpers (skid pads)
56 Upper and lower rudder pieces on common shaft
57 Wingtip navigation lights
58 Tailplane fix
59 Wing fuel tanks
A, A, A Three wing fixes
B Four engine pick-ups

AEROPLANE MONTHLY

PROFILE PUBLICATIONS

The de Havilland Vampire Mk. 5 & 9



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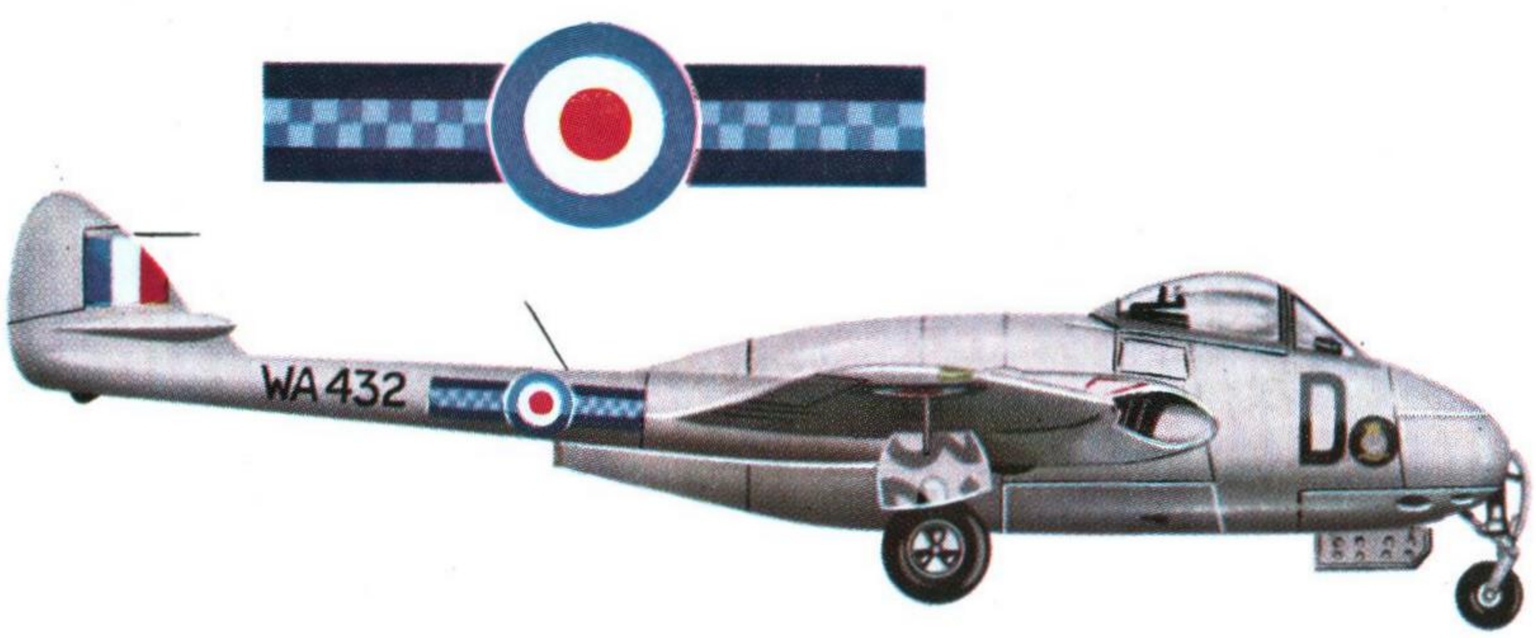
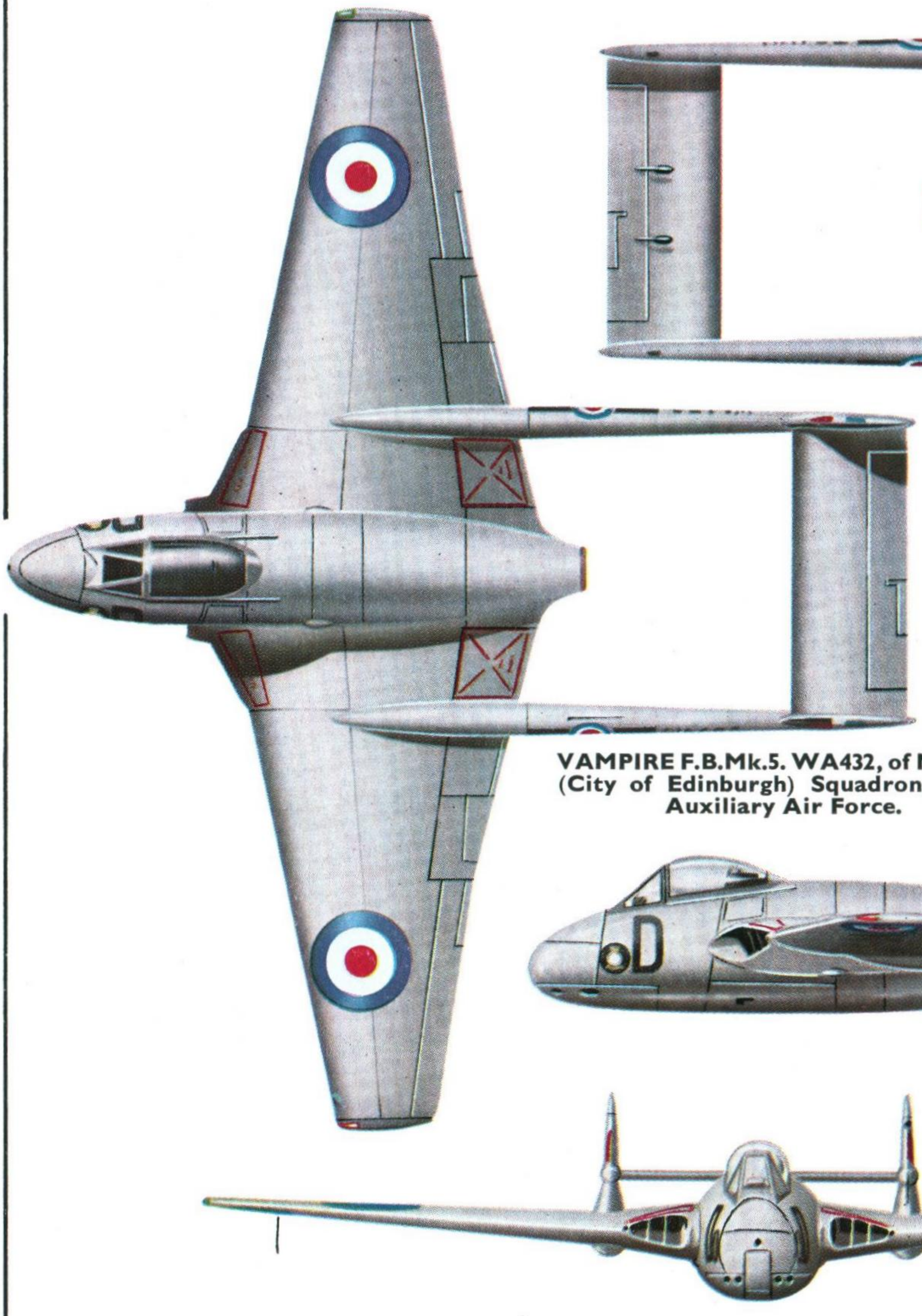
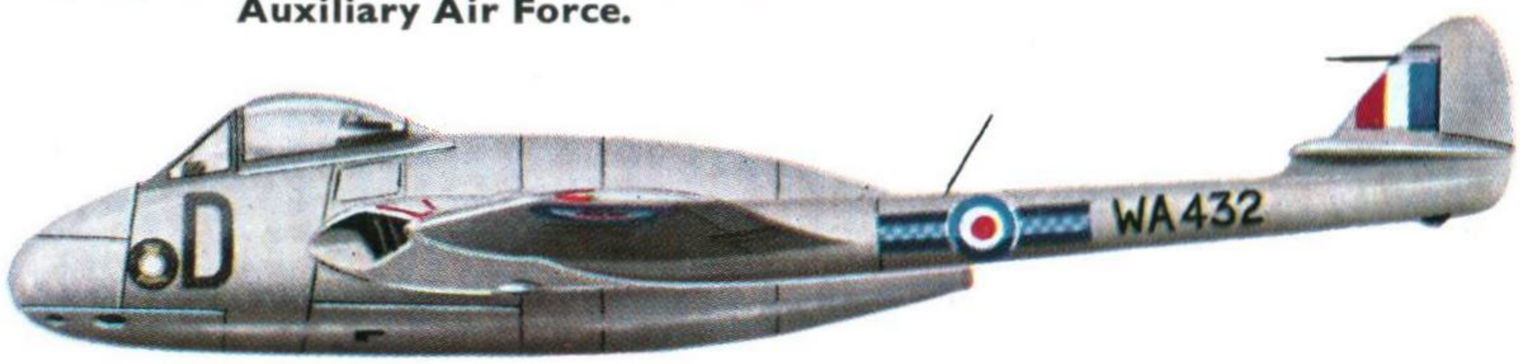
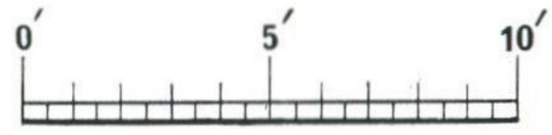
TWO SHILLINGS



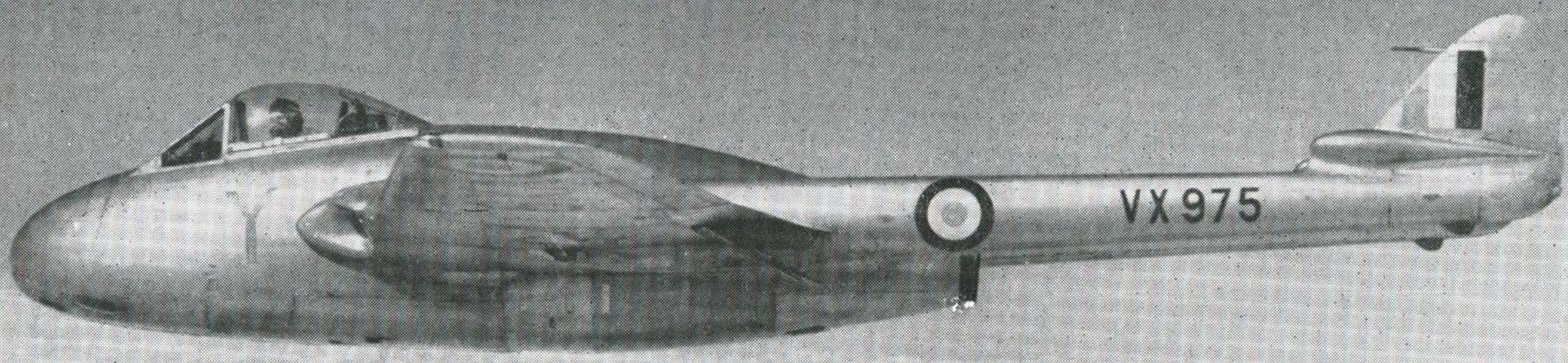


VAMPIRE F.B.Mk.5. WA432, of No. 6033 (City of Edinburgh) Squadron, Royal Auxiliary Air Force.





The de Havilland Vampire Mk. 5 & 9



by Francis K. Mason

No. 247 (Fighter) Squadron Vampire F.B.5 flying from Odiham in May 1951. The unit letter on the nose was red with black edging—the Squadron colours. (Photo: via R. Ward)

Fondly referred to by many post-war pilots as the "aerial kiddy car", the Vampire day fighter was certainly the last unsophisticated single-engine front-line aircraft to serve with Britain's Fighter Command. To qualify this distinction, one must first point out that all its flying controls were manually-operated without recourse to or necessity for power assistance. No radar was fitted and the fighter consisted of a simple airframe, "first generation" jet engine, and four 20-mm. Hispano guns aimed by a gyro gunsight. Only the twin boom layout set the Vampire aside as being unconventional among its contemporaries.

Detail design of the de Havilland D.H. 100 Vampire commenced early in 1942 after acceptance of proposals submitted to Air Ministry Specification E.6/41. Though this called for an experimental prototype, provision for gun armament was included in the design from the earliest days, the newly-established four 20-mm. Hispano gun battery being housed in the underside of the fuselage nacelle. Power was supplied by one D.H. Goblin I jet engine which employed a single-sided centrifugal compressor and produced 2,700 pounds thrust.

Construction was composite metal and balsa/ply, the fuselage nacelle continuing the wood application used in the successful Mosquito design which entered R.A.F. service in mid-1942. Three prototypes, *LZ548/G*, *LZ551/G* and *MP838/G* (characterised by tall triangular vertical surfaces generically similar to that of the Mosquito) led the way to a production order for 120 Mark Is being placed on 13th May 1944, and this was later increased to 300. Only about half-a-dozen production aircraft flew before the end of W.W.II, but, unlike so many other wartime British aircraft, production plans for the Vampire survived the post-war axe. Mark Is (with square-topped tail surfaces) entered R.A.F. service in 1946 as pure interceptors and also equipped squadrons of the Second Tactical Air Force in Germany, often replacing wartime generation fighters such as Typhoons, Mustangs and Tempests. On 3rd July 1948 they were the first jet aircraft to enter peacetime service with the Royal Auxiliary Air Force when they replaced Mosquitos on No. 605 (County of Warwick) Squadron.

Vampire Is were also supplied in various versions to Canada, Switzerland and Sweden, and thence by various routes to Austria and the Dominican Republic.

Vampire II was the designation applied to three experimental Nene-powered Vampires, *TG276*, *TG280* and *TX807*, identified by dorsal intakes demanded by the double-sided compressor of the Rolls-Royce engine. The latter aircraft was shipped out to Australia where (as *A78-2*) it performed much of the development work for the subsequent Nene-powered Vampire F.Mk.30.

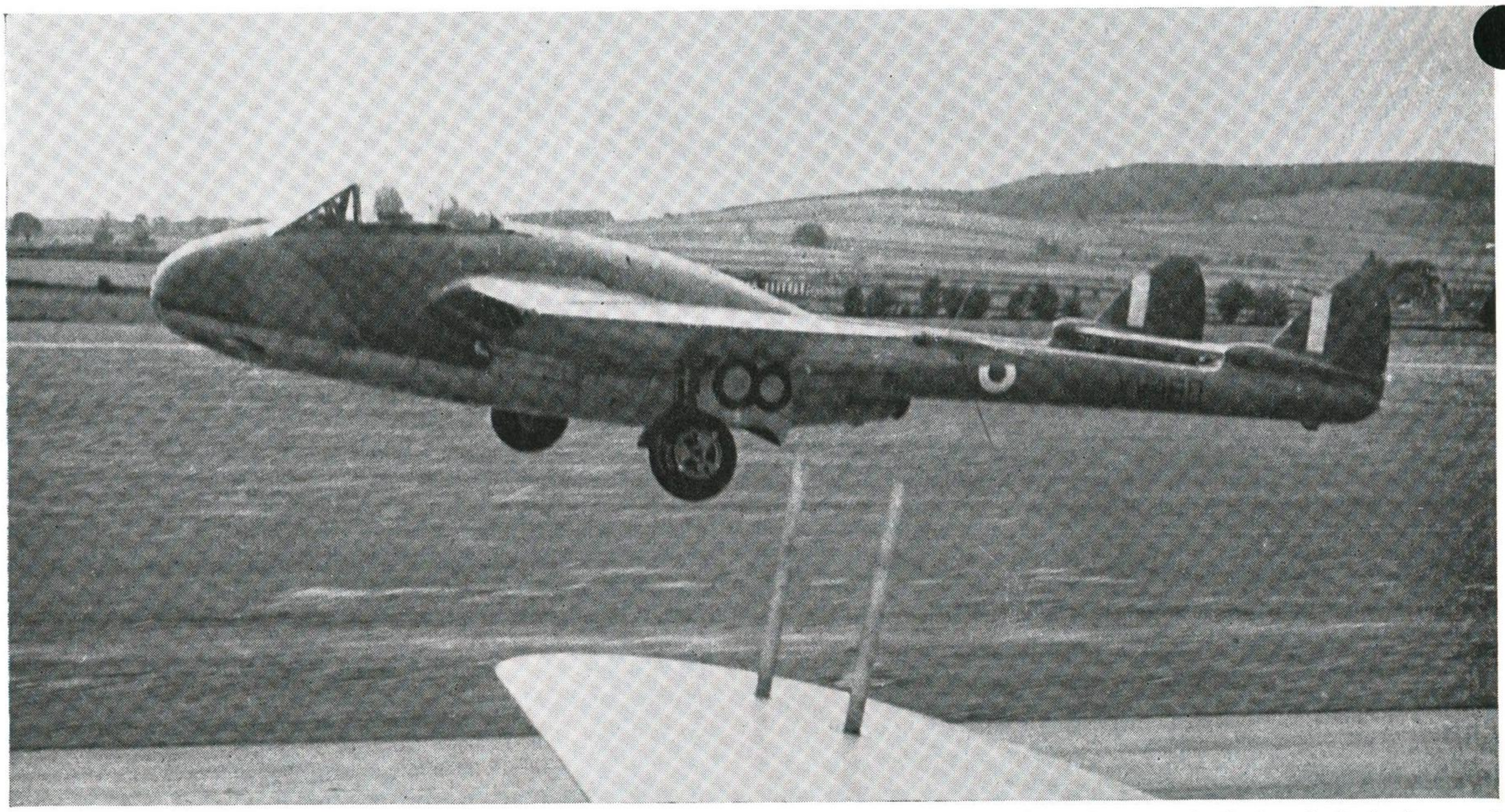
The Vampire III represented an attempt to increase the effectiveness of the design in the environment of increased radar warning range, anticipated shortly after the end of the war. The first-generation jet fighter was widely characterised by a chronic lack of range, in the case of the Vampire I only about 700 statute miles. The early Vampires had used Mosquito-type underwing slipper tanks, but the Mark III introduced wing tankage and provision for 100- or 200-gallon drop tanks. Developed to Spec. F.3/47, the Vampire 3 (so designated after the change to arabic numerals) entered R.A.F. service late in 1947 and remained with the R. Aux. A.F. until well into the nineteen-fifties. The type was also characterised by alterations to the tail unit: the tailplane was lowered and the vertical surfaces were changed to conform more nearly to the well-known de Havilland outline.

The Vampire 3 made history when six aircraft of No. 54 (Fighter) Squadron became the first British jet aircraft to cross the Atlantic, refuelling in Iceland, Greenland and Labrador.

Re-design of the Vampire wing to accommodate pylon-mounted drop tanks inevitably led to the carriage of other stores and hence adaptation of the design for ground-attack duties. With low-level performance of prime importance, the wing span was reduced by two feet so that the wing tips were square cut (trials with this wing were carried out on Vampire I, *TG444*), and the provision of strongpoints for bombs and rockets was accompanied by greater strength factors and thicker wing skinning. The increased wing loading in turn resulted in greater sinking speeds on landing and this demanded undercarriage legs of increased travel. Thus was evolved the Vampire F.B.Mark 5.

THE VAMPIRE 5

The first production Vampire F.B.5 flew on 23rd June 1948 and by the end of the year was replacing Vampire 3s in Fighter Command. Next they started to replace Mosquitos in R.A.F. Squadrons in Germany and later joined Mark 3s in service with the



Air-to-air take-off view of an early Vampire 5; mainwheels are just commencing retraction, the nosewheel already locked up and covered.

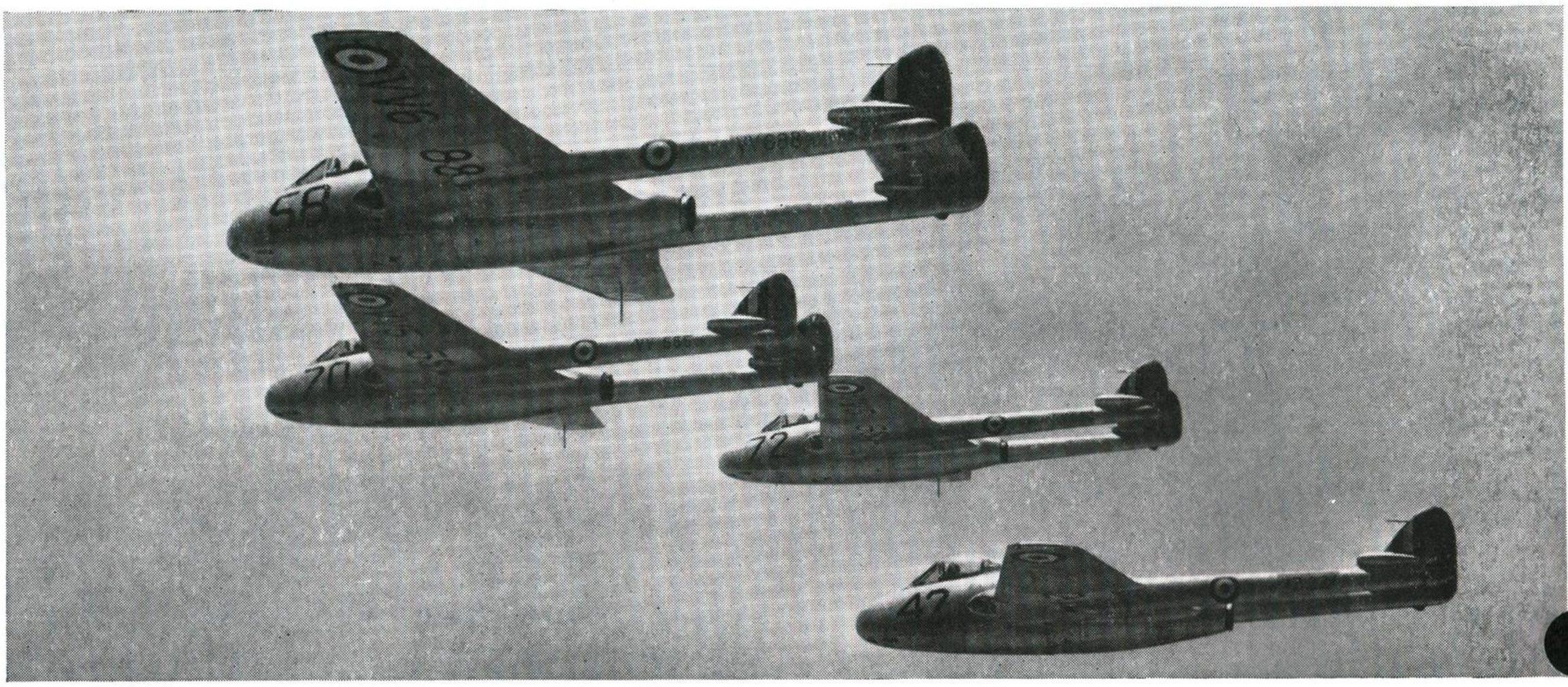
R. Aux. A.F. It was however in Germany that the Vampire served in the largest numbers for, with the increased tension following the Berlin Airlift and with a war being fought in Korea, the R.A.F. faced increased responsibilties in Europe. By 1954 Vampire 5s had served with or were serving on Nos. 3, 4, 5, 11, 16, 20, 26, 67, 71, 93, 94, 118, 145, 234 and 266 (Fighter) Squadrons of the 2nd Tactical Air Force.

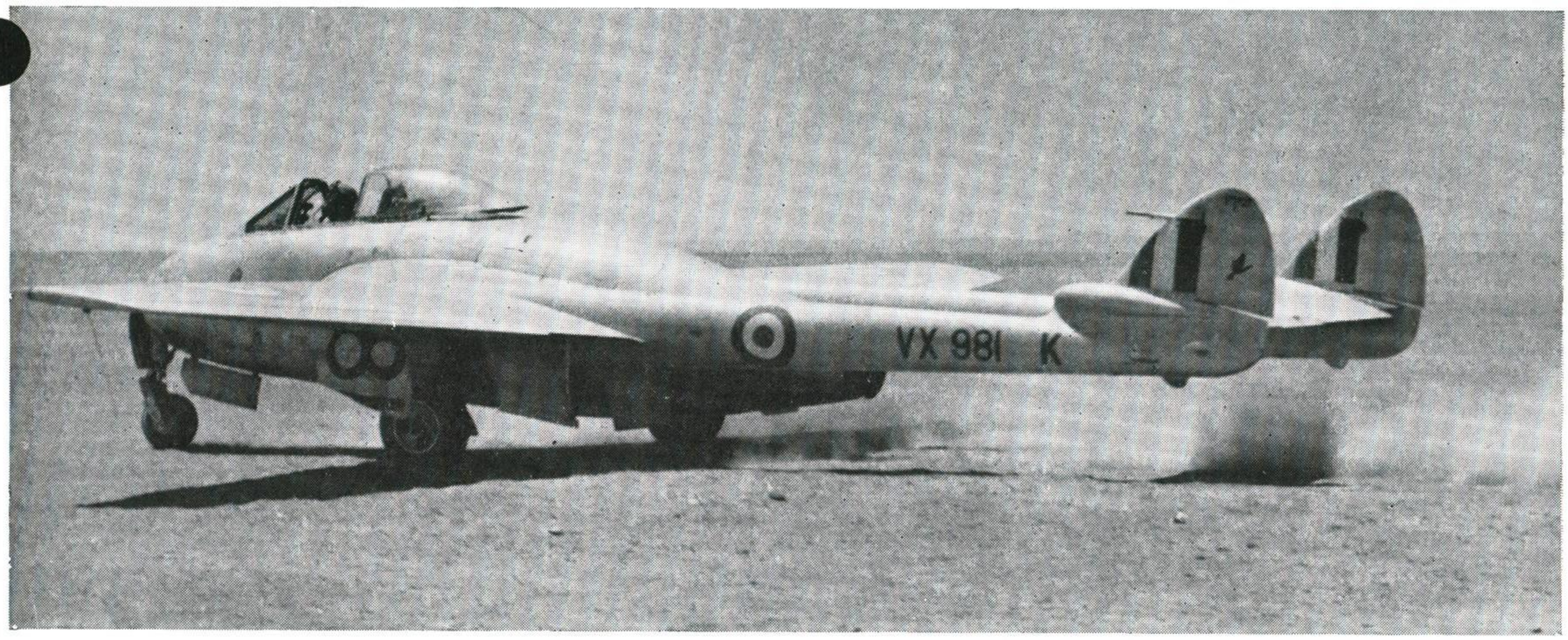
At home, Vampires served in Nos. 11 and 12 Groups in the south of England with Nos. 54 and 247 (Fighter) Squadrons at Odiham, and also Nos. 72 and 130 Squadrons. With the Auxiliaries, they served on Nos. 501, 502, 601, 602, 603, 604, 605, 607, 608, 609, 612, 613 and 614, and were still serving on these Squadrons when the R. Aux. A.F. was disbanded in 1957.

The Vampire 5 also served in the Middle and Far East, and it was in the latter area that their weapons were discharged in anger. No. 32 (Fighter) Squadron had operated Vampire 3s from Nicosia since 1949, and carried out tropical trials with the type; in January 1951 the Squadron moved to Shallufa and converted to Mark 5s. The month previously No. 60 Squadron, based at Tengah, Singapore, took delivery of Vampire 5s and very soon the new aircraft were in action against the terrorists at large in the jungle, using their rockets and bombs to good effect.

By 1953 the Vampire was becoming outdated in the Regular Air Force at home. (At the same time the Meteor 8 only managed to remain relatively effective by the addition of spring tabs and other minor improvements.) On being replaced by Meteor 8s, Vampire 5s were relegated to Flying Training Command, serving with Advanced Flying Schools Operational Conversion Units and the School of Air Armament.

One of many Vampire 5 formation teams, this group was flown by instructors from R.A.F. Swinderby during the mid 1950's.
(Photo: Ministry of Defence)





A No. 6 Squadron Vampire 5 raising the dust on take-off during air exercises in Jordan in 1950. No. 6 Squadron was at that time normally based in the Suez Canal Zone.

THE VAMPIRE 9

Experience with Vampire 3s and 5s in tropical climates during 1949-51 illustrated the need to provide the pilots with refrigeration equipment. The result was the inclusion of a Godfrey refrigerator unit in the starboard wing intake fillet, resulting in the fillet being extended about eight inches forward.

At the same time it had also been demonstrated that the performance of jet aircraft suffered in the high ambient temperatures of the tropics, and experience with Vampires exported to tropical countries had engendered the development of the ...prated Goblin 3 which, with dual fuel booster pumps, ...veloped 3,500 pounds thrust. This engine was also adopted in the Vampire F.B.Mk.9.

The first Vampire 9s to go into R.A.F. service overseas were ferried out by pilots of R.A.F. Transport Command to Nos. 28 and 60 Squadrons in the Far East during January 1952 where they gradually replaced F.B.5s.

Shortly afterwards Vampire 9s equipped the Middle East Squadrons, Nos. 6, 8, 32, 73, 213 and 249 based at Nicosia, Shallufa, Habbaniyah, Khormaksar and in the Suez Canal Zone. Aircraft of No. 8 Squadron, based in Kenya, took part in the prolonged policing operations against the Mau Mau terrorists.

With the introduction of the Venom F.B.1 during 1954 and 1955, the Vampire 9s were brought home and joined earlier versions on training units.

In its day the Vampire was an excellent transitional training aircraft. In service with Operational Conversion Units at Valley in Anglesey, and Chivenor, North Devon, they were used to "convert" pilots from the North American Harvard to operational fighters such as the Gloster Meteor 8 and North American Sabre. They were also used to convert night fighter pilots from Mosquitos to the Vampire 10.

Among jet fighters, they were forgiving aeroplanes. During an air gunnery sortie from Chivenor a pilot returned to base with the target flag wedged in his starboard air intake. Another pilot, misjudging his approach to the Chivenor runway, undershot and rubbed the Vampire's belly on a threshold sand dune; realising his wheels were still retracted, he opened up and went round for a conventional landing. A more senior officer had a disconcerting experience during take-off when, just before unstick, the control column fouled his dinghy pack between his legs, causing the

The "weathercocking" action by 3-inch rockets well demonstrated by a Vampire 5 of the 2nd Tactical Air Force during air-to-ground firing practice.

A No. 8 Squadron Vampire 9 taking-off from R.A.F. Khormaksar, Aden.

dinghy to inflate; faced with rapidly diminishing living space, the pilot drew his revolver and blew a hole in the offending dinghy. Unfortunately he also holed his foot! Thereafter many R.A.F. pilots carried small knives sewn into the sleeves of their flying overalls.

Perhaps the luckiest escape from a Vampire 5 was that of Plt. Off. Roger Dimmock who, flying as No. 2 on a low-level flight over the Irish Sea, accidentally touched the water and immediately flamed-out. Performing the inevitable ditching was an act of instant self-preservation, but the aircraft promptly dived under the surface and came to rest on the sea bed about 30 feet down; quickly releasing his harness and hood, Dimmock shot to the surface in the cockpit air bubble.

THE VAMPIRE AT SEA

Ever since Lt.-Cdr. E. M. Brown, R.N.V.R., had performed the first-ever deck landings and take-offs by a pure-jet aircraft in the third Vampire prototype on H.M.S. *Ocean* on 3rd December 1945, the Admiralty maintained a close interest in the Vampire as a possible standard naval fighter. That this never came about was not so much the fault of the aircraft as the opinion that carrier operations were not sufficiently flexible to allow combat application of jet aircraft at sea. On the one hand deck handling techniques did not lend themselves to the disruption caused by jet blasts, and on the other the critically short range and endurance of early jet fighters created a navigational burden upon the pilot such that the interceptor could only be regarded as "fleet top cover".

When the Air Ministry issued a specification covering the Vampire 5 with increased range in 1947, the Admiralty ordered 18 examples with which to intro-

Above: *A Vampire F.B.5, WA 332, of No. 7 F.T.S., based at Valley, Anglesey.*

Left: *This No. 60 Squadron Vampire 9 demonstrates the characteristic "torching" effect during engine flight at night.*

Echelon formation of No. 8 Squadron Vampire 9s in flight near Aden in 1954.

duce jet operating techniques to operational pilots and deck crews. Honours for the first British jet fighter to reach operational status however fell to the Supermarine Attacker.

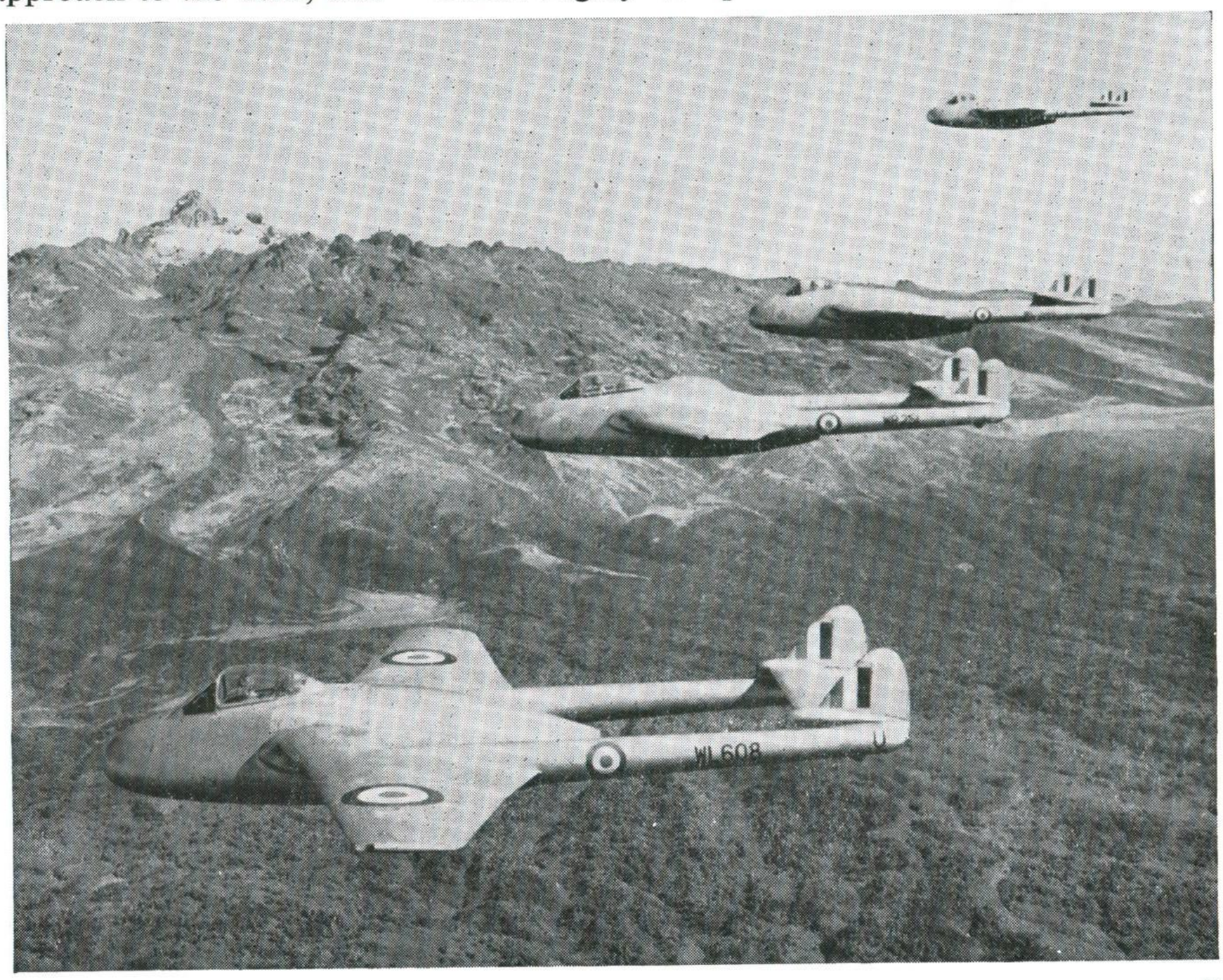
First of the naval Vampires to fly—designated Sea Vampire F.20—was *VV136*, on 15th October 1948. Production machines were delivered to No. 700 Squadron at Ford and No. 702 Squadron at Culdrose, and also to No. 787 Squadron, replacing de Havilland Sea Hornets. During the course of deck trials Lieutenants G. Baldwin, D.S.C., and K. Shepherd of the Carrier Trials Unit performed more than two hundred landings at sea.

The Sea Vampire was distinguishable from the R.A.F. version in being equipped with a Vee-frame arrester hook installed *over* the engine jet pipe, so that when lowering it passed through the jet flow. Air brakes and landing flaps were enlarged to give better low speed control for the approach to the deck, and load factors were increased to cater for greater deck landing loads.

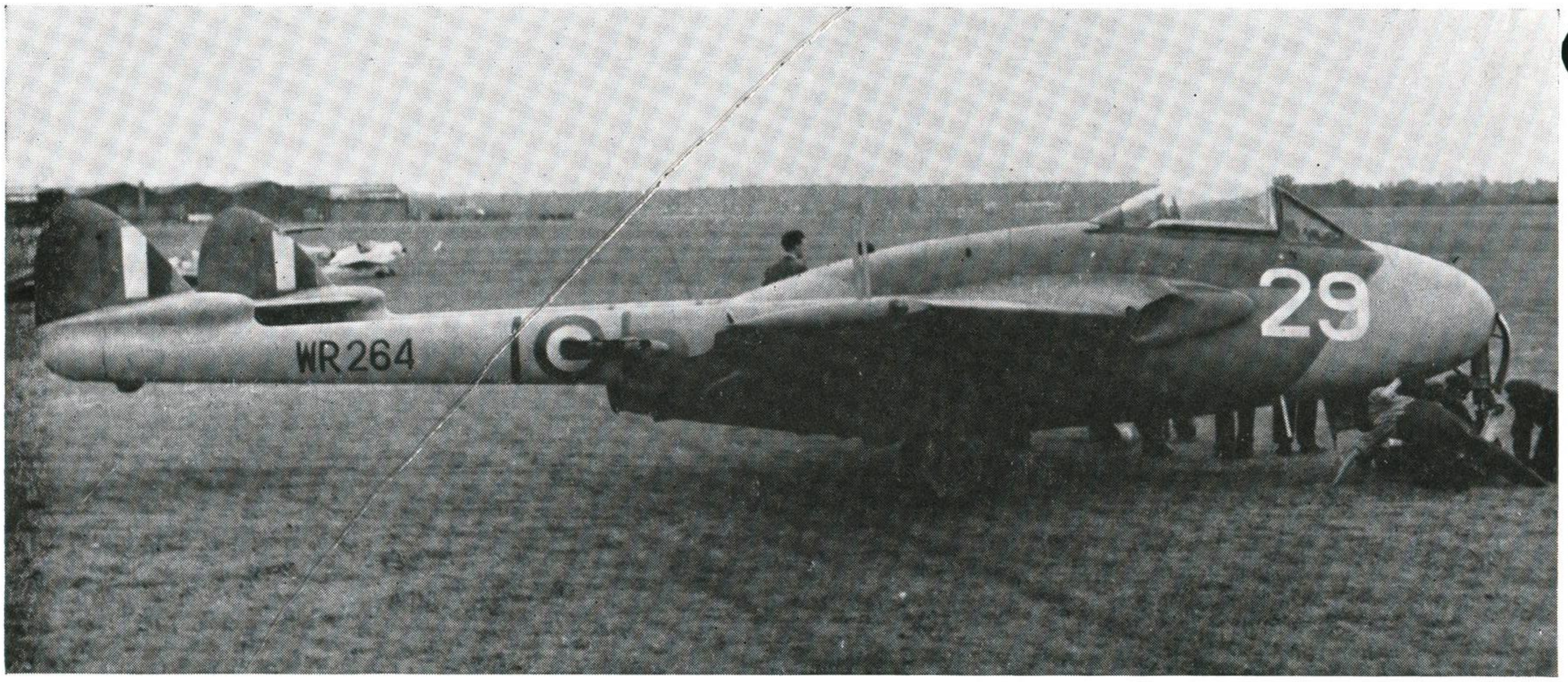
A development was the Sea Vampire F.21, of which three examples were produced, and this was used both at the Royal Aircraft Establishment, Farnborough, and on H.M.S. *Warrior* for undercarriage-less landings. With strengthened undersides the aircraft were flown on to rubberised deck surfaces with wheels retracted, the purpose being principally to accelerate deck handling simply by bodily manhandling the fighter out of the path of following aircraft.

VAMPIRES FOR EXPORT

Though not strictly akin to the Vampire 5, the Australian Nene-powered Vampire F.B.31 was developed from the Mark 3 through the Australian F.30 by modifications equivalent to those of the R.A.F.'s F.B.5. Eighty Vampire 30s were built, of which 29



No. 8 Squadron Vampire 9s on patrol over Mau Mau territory during the operations of the early 1950s.
(Photo: Ministry of Defence)



Fairey-built Vampire F.B.9, WR 264, *of the Royal Air Force College.*

became Mk. 31s. One other was converted to the Mark 32 which in effect corresponded to the R.A.F. Mk. 9 with cockpit conditioning added.

The principal export variant was the Vampire 6, powered by the Goblin 3. One hundred Mark 6s were licence built in Switzerland by a consortium comprising the Federal Aircraft Plant at Emmen, Pilatus and Flug und Fahrzeugwerke A.G.

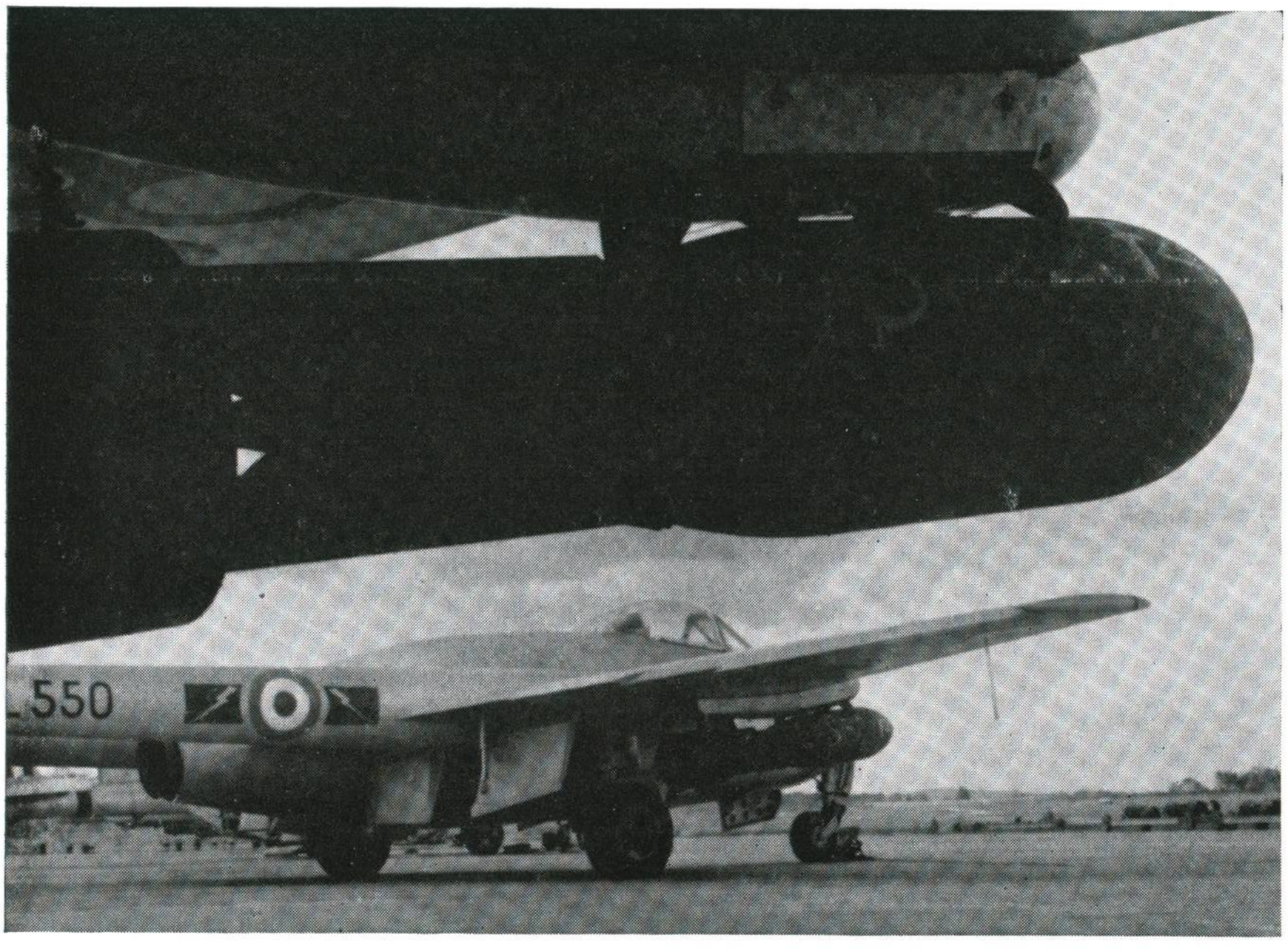
Sweden ordered the Vampire F.B.50 based on the Mk. 5, while the Goblin 3-powered F.B.52 was sold to Finland, Norway, Egypt, Iraq, Lebanon and Venezuela. twelve standard Mark 5s were diverted to the Indian Air Force and 27 went to the South African Air Force. Overseas licence production included 80 F.B. Mk. 52As produced by Macchi and Fiat in Italy, and 67 standard Mark 5s assembled in France by S.N.C.A. du Sud-Est.

At the time of writing some Vampires are still airworthy in Venezuela, Finland and the Lebanon.

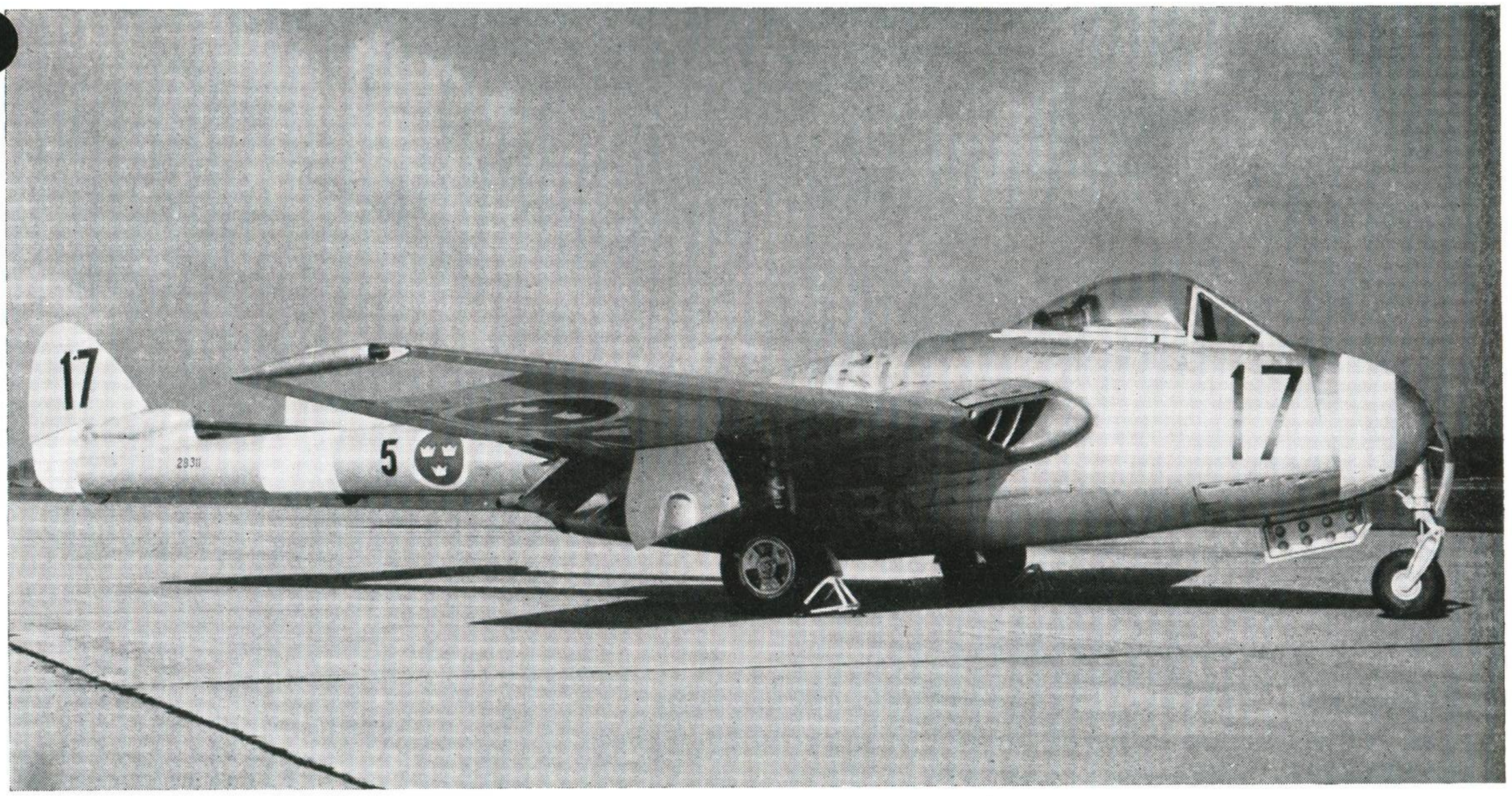
FLYING THE VAMPIRE

Undoubtedly the outstanding feature of the Vampire's handling characteristics was its incredible lightness and sensitivity of control. Ailerons were finely balanced and high rates of roll were possible though reversal was startling in its onset. The elevator was also highly effective and large accelerations resulted from relatively slight movements of the control column. On the other hand the rudders, on account of their small area, demanded coarse movement to be of much consequence.

Take-off. So simple were the Vampire's systems that only six take-off Vital Actions were necessary: trim neutral, high and low pressure fuel cocks "on", booster pump "on", flaps selected as required and air brakes "in". When flown clean, acceleration on take-off was sprightly and the aircraft could be lifted from the runway at about 110 knots. When carrying drop



Underwing 500-lb. bombs on Vampire F.B.9s of No. 60 Squadron, Tengah, Singapore.
(Photo: via D. Ward)



J28B Vampire of V.5 in natural metal finish. Numerals were painted black and panels were of orange-red dayglow. The Wings equipped with Vampires were F.8, F.9, F.15 and F.18. (Photo: Bo Widfeldt)

Swedish Vampires allocated to F.5 of the Swedish Air Force (full unit markings not yet completed). (Photo: Bo Widfeldt)

tanks or bombs it was necessary to retract the wheels quickly otherwise the airflow between the stores and wheel fairings would build up and cause the doors to stay open. As no nosewheel brake was included, the still-rotating nosewheel entering its recess immediately below the pilot often caused so much noise and vibration that the uninitiated momentarily anticipated instant catastrophe.

In the air. Engine handling took some getting used to. Pilots experienced in piston engine handling had to learn to anticipate speed demands earlier as the power response from the Goblin was considerably slower, and any rapid throttle movement might cause engine surge, flame out or, at worst, a burst compressor.

Due to the relatively good power/weight ratio of the single-seat Vampire, the aeroplane was tremendously manoeuvrable within the 400-500 m.p.h. speed range. At lower speeds, however, steep turns required coarse use of rudder to maintain height, and it was uncomfortably simple to stall in relatively shallow turns. The stall was likely to be accompanied by quite sharp wing-drop, but a surprising amount of aileron control existed right down to the stall, albeit with marked control buffet. One was advised to recover quickly while use of the most effective elevator could be maintained. Though by no means dangerous, the spin could be embarrassing owing to blanking of the diminutive rudders and the necessity to use coarse elevator control resulted in the aircraft pointing at *terra firma* for an uncomfortable length of time while speed built up!

Aerobatics in the Vampire were sheer joy and were strangely akin to those of light sporting aircraft, apart, of course, from the airspeed and amount of sky used. With judicious engine handling, the Vampire was the last British jet fighter to be capable of accurately precipitated hammer stalls, stall turns and wingovers.

At the upper end of the speed range, the Vampire behaved in singular fashion with the onset of compressibility, and from M=0·71 up to 0·76 the aircraft displayed increasing porpoising and wing buffet until at M0·79 the aircraft would suddenly "break" up or down with the likelihood of a wing drop, giving the sensation of an "incipient" flick roll. Recovery from high Mach runs was simple with use of the air brakes, though below 250 knots these were of little real value.

Should a flame-out occur in flight, a forced landing was unavoidable as no re-light system was provided. Ditching was not recommended and, if over water, the pilot was advised to vacate his cockpit.

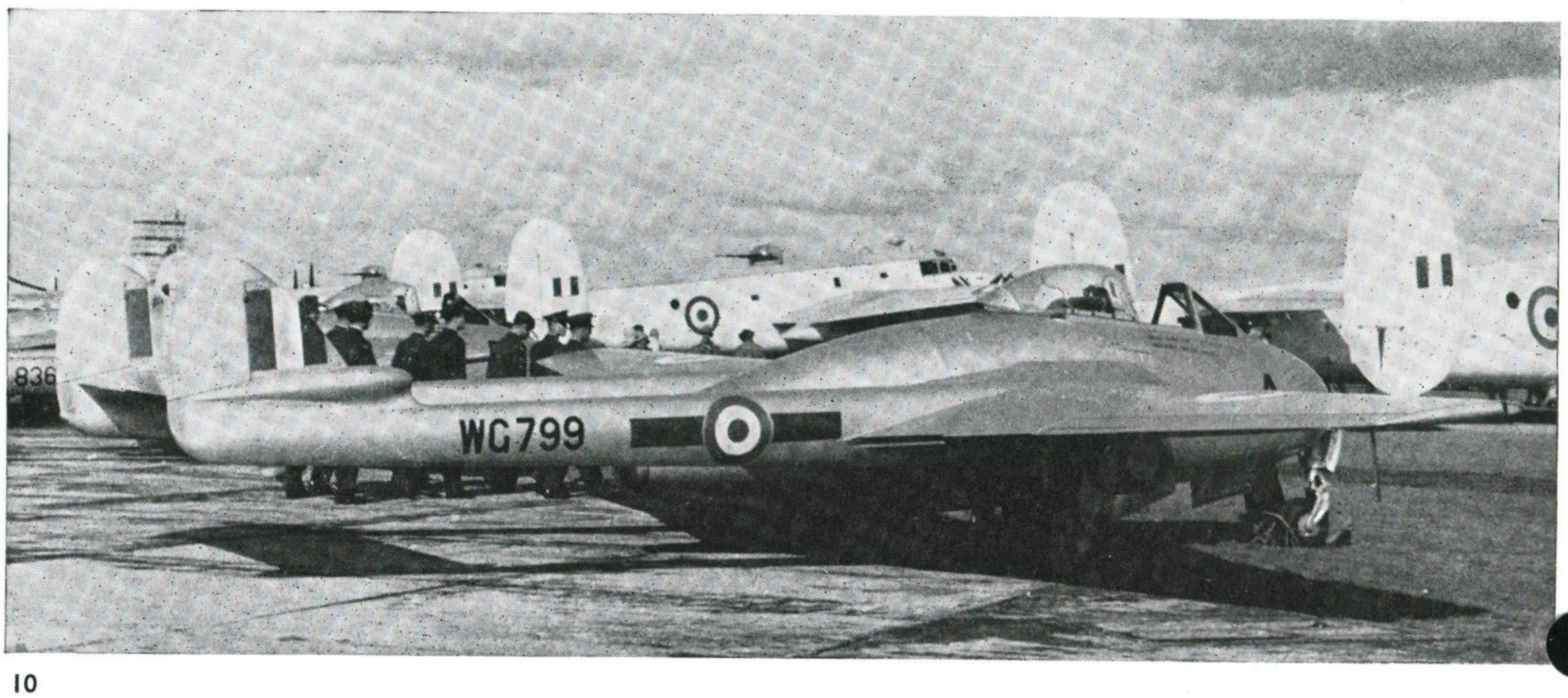
Landing. Landing vital actions, like those for take-off, were minimal: wheel brakes checked off, landing gear indicated down (three green lights), flaps fully down on final approach, and air brakes in. After turning on to the final approach at about 105 knots, speed was reduced so as to cross the runway threshold at about 95. Stall with gear down and power on would occur at little above 75 knots, so that touchdown would be aimed at at about 10-15 knots above this when landing without stores. Owing to the sluggish engine response, power-on approaches were recommended in order to obtain quicker acceleration in the event of a go-round. The low landing weight meant that wheel locking could easily occur when using the brakes, and careful braking was necessary if constant tyre replacement was to be avoided! Anti-skid devices were not fitted.

The cockpit. By later standards, the cockpit was distinctly untidy. The fuel gauges were virtually invisible without moving the control column back! And then some mental arithmetic was required to tot up the fuel remaining in the various tanks. Although not required in flight (except in the event of a forced landing), movement of the low pressure fuel cock demanded double-jointed fingers as the lever was carefully concealed behind the throttle! Despite these shortcomings, view from the cockpit was superlative, and this together with the small size of the Vampire contributed to a feeling of being an integral part of a delightfully sensitive flying machine.

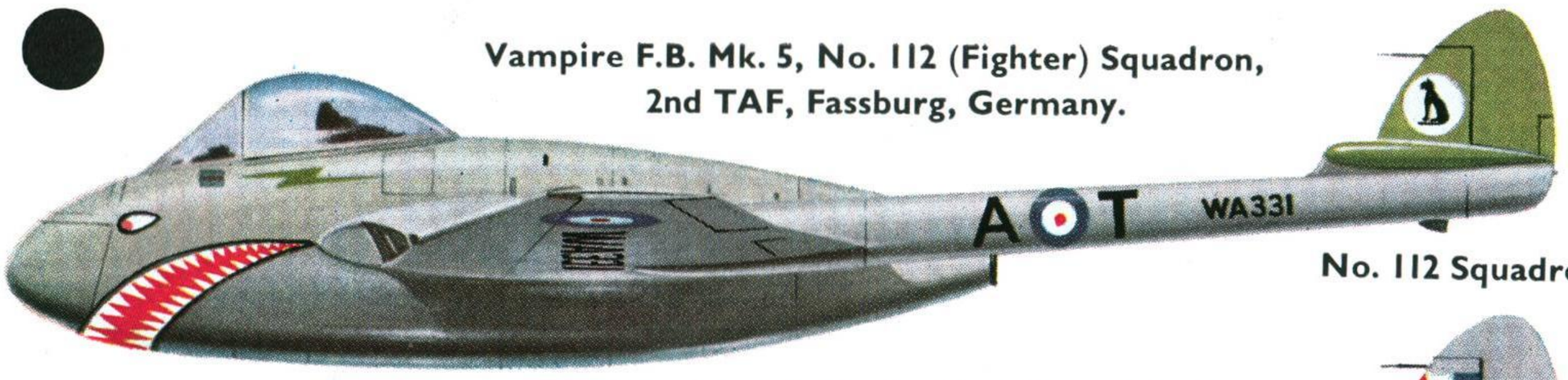
VAMPIRE 5 PRODUCTION

Manufacture by English Electric Co. Ltd., Samlesbury:
VV214–VV232, VV443–VV490, VV525–VV569, VV600–VV611, VV614–VV640, VV655–VV700, VV717–VV736; 220 aircraft, of which *VV718, VV720–VV723, VV725–VV736* were diverted to the Indian Air Force.
VX461–VX464, VX471–VX476, VX950–VX990, VZ105–VZ155, VZ161–VZ197, VZ206–VZ241, VZ251–VZ290, VZ300–VZ359;

Later production Vampire 5 of No. 614 Squadron, Royal Auxiliary Air Force.

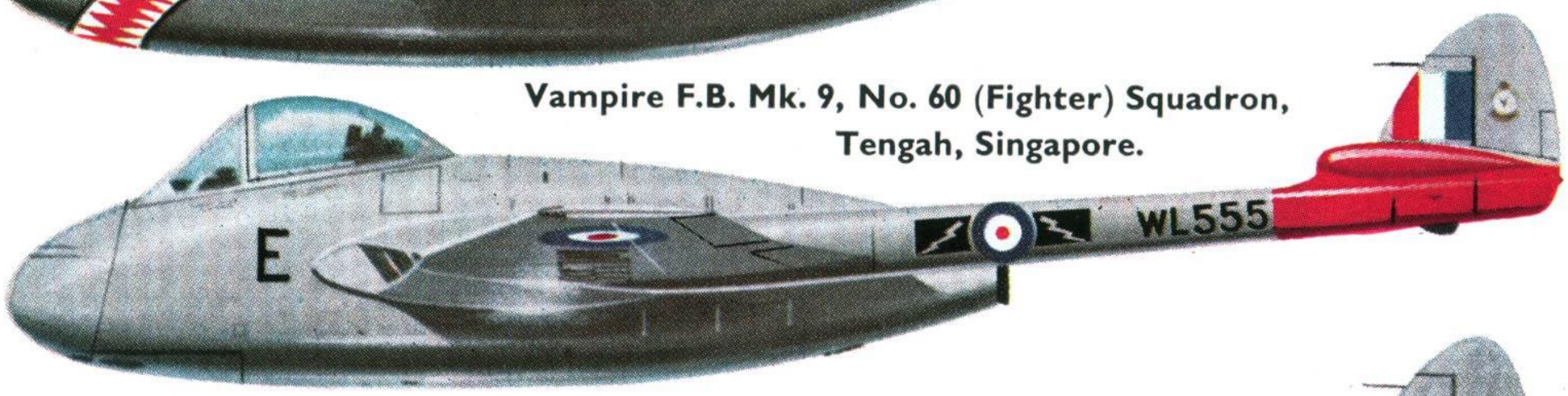


Vampire F.B. Mk. 5, No. 112 (Fighter) Squadron,
2nd TAF, Fassburg, Germany.



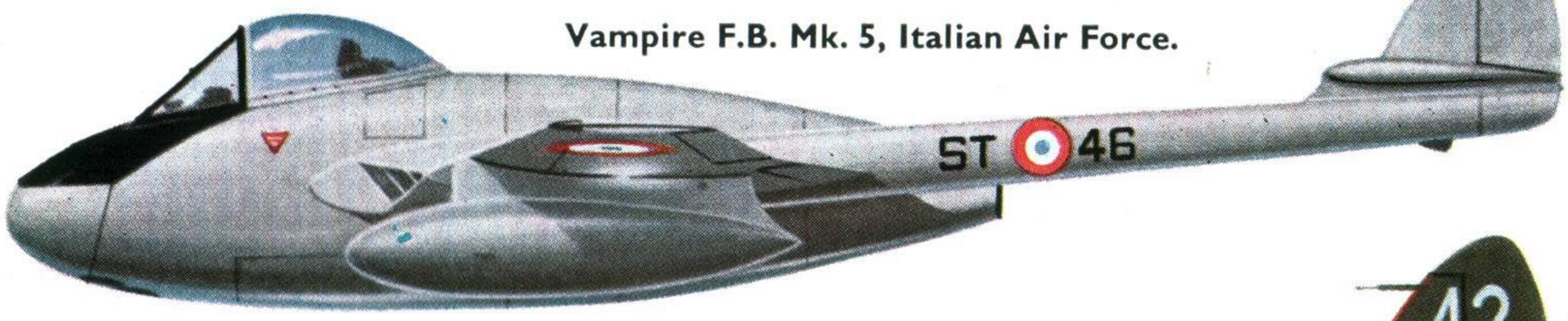
No. 112 Squadron.

Vampire F.B. Mk. 9, No. 60 (Fighter) Squadron,
Tengah, Singapore.



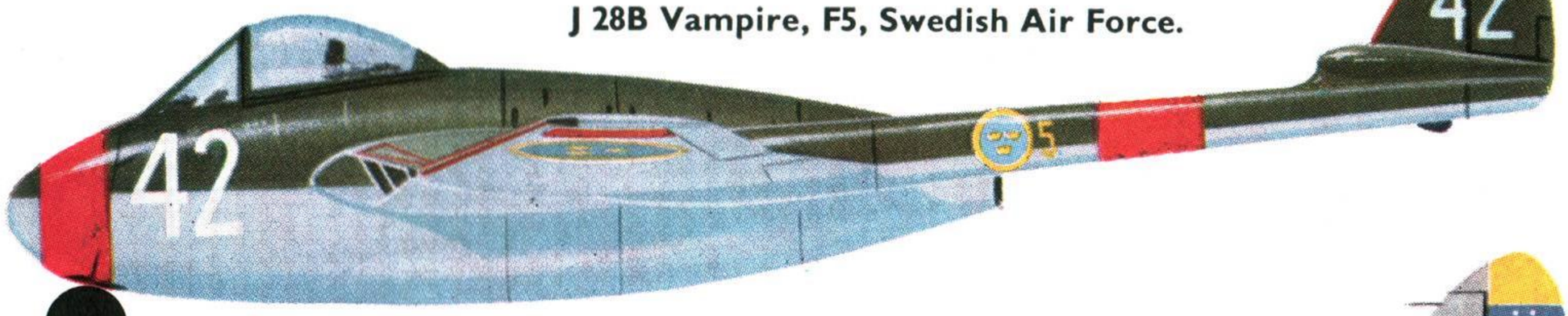
No. 60 Squadron.

Vampire F.B. Mk. 5, Italian Air Force.



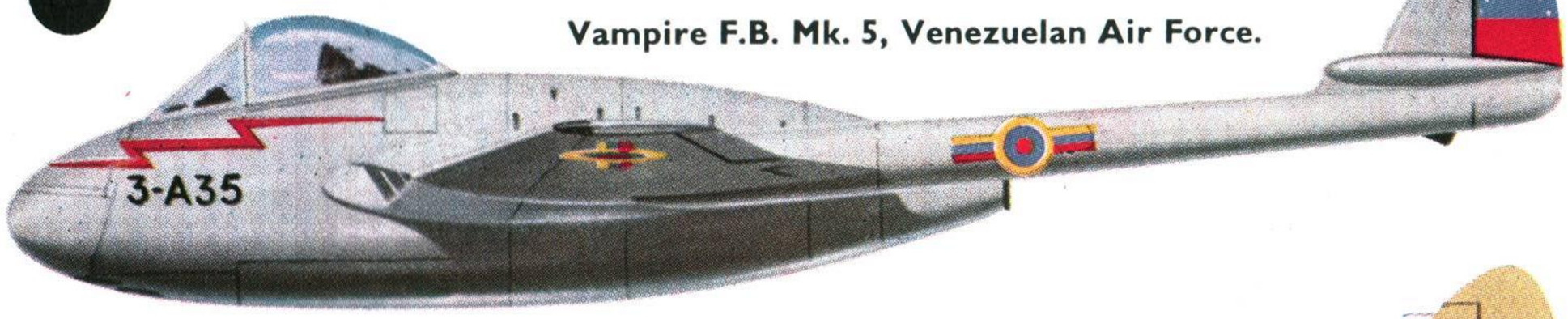
Swedish Air Force.

J 28B Vampire, F5, Swedish Air Force.



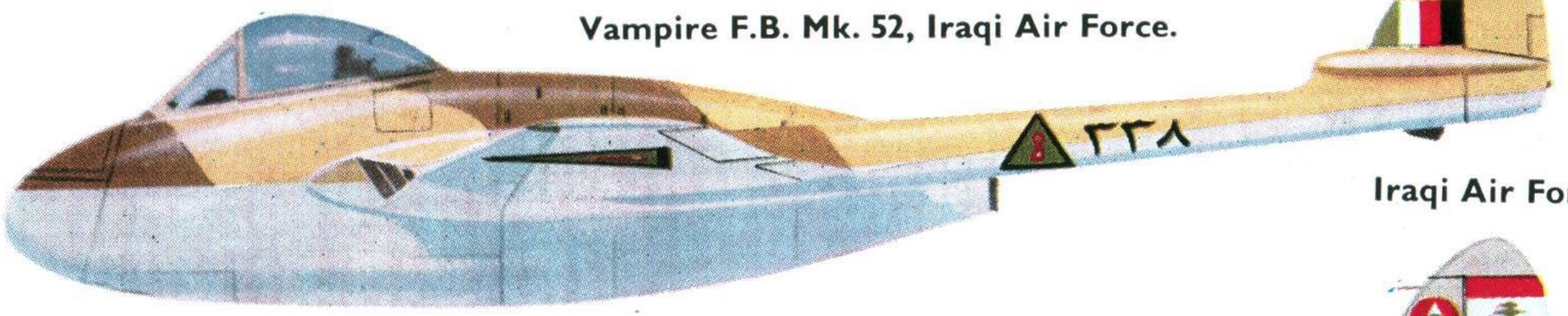
Venezuelan Air Force.

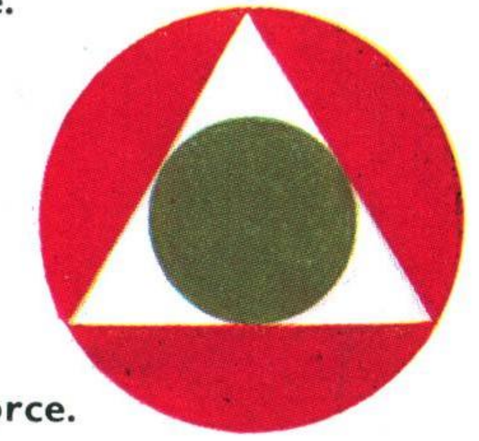
Vampire F.B. Mk. 5, Venezuelan Air Force.



Iraqi Air Force.

Vampire F.B. Mk. 52, Iraqi Air Force.

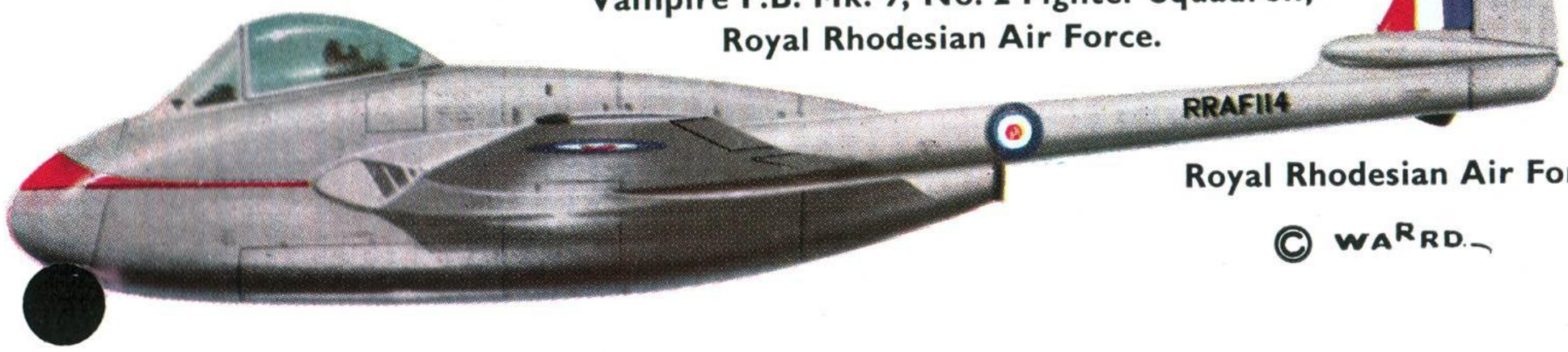




Lebanese Air Force.

Vampire F.B. Mk. 52, Lebanese Air Force.

Vampire F.B. Mk. 9, No. 2 Fighter Squadron,
Royal Rhodesian Air Force.



Royal Rhodesian Air Force.

275 aircraft, of which *VZ252–VZ256* were transferred to the Italian Air Force and became *MM6000–MM6004*. *WA101–WA150*, *WA159–WA208*, *WA215–WA264*, *WA271–WA320*, *WA329–WA348*, *WA355–WA403*, *WA411–WA460*, *WE830–WE849*; 339 aircraft.
WG832–WG847; 16 aircraft.
Total English Electric production: 850 aircraft.
Manufacture by de Havilland Aircraft Co. Ltd., Hatfield and Broughton.
VZ808–VZ852, *VZ860–VZ877*; 63 aircraft, of which *VZ810*, *VZ814*, *VZ817* and *VZ820* were transferred to the French Air Force.
WG793–WG807, *WG826–WG831*; 21 aircraft.
A78–1 to *A78–41*; 41 aircraft for the Royal Australian Air Force.
NZ5721–NZ5738, *NZ5750–NZ5778*; 47 aircraft for the Royal New Zealand Air Force.
201–210, *248–254*; 27 aircraft for the South African Air Force.
Total de Havilland production: 299 aircraft.
(*Note:* Some of the above aircraft were transferred to the Egyptian and Venezuelan Air Forces).

VAMPIRE 9 PRODUCTION

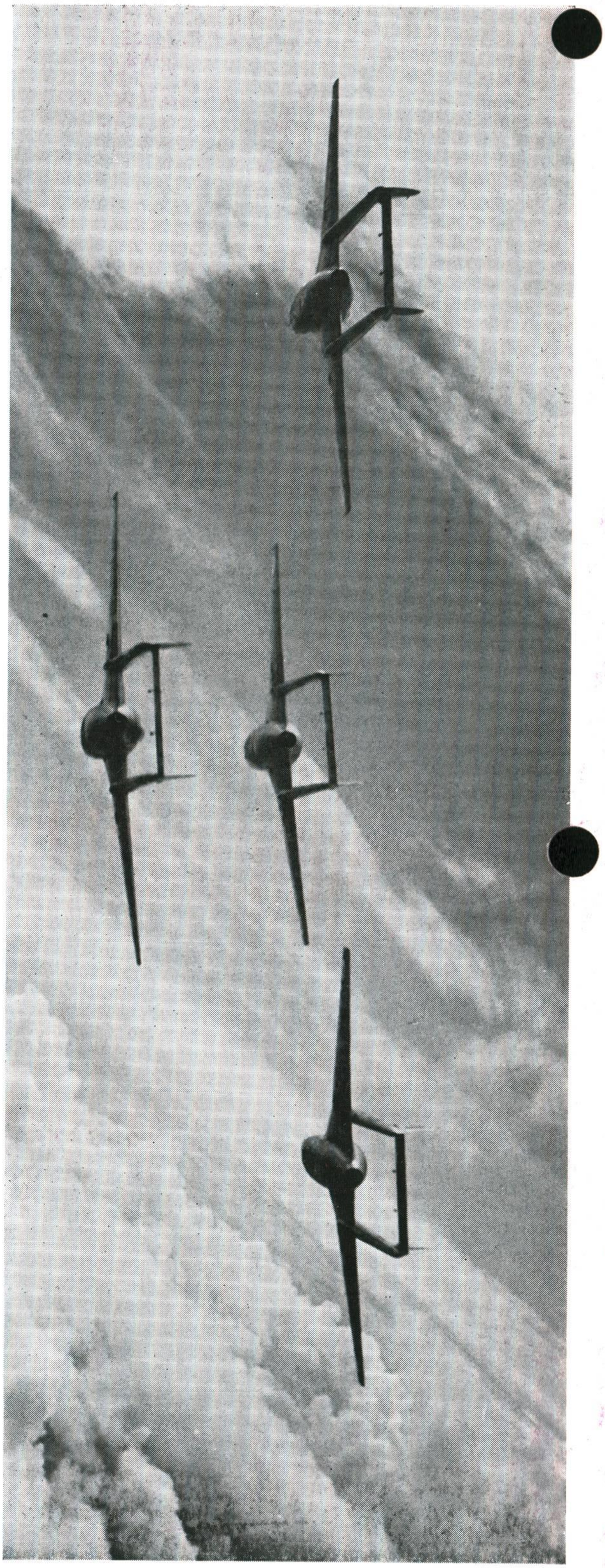
Manufactured by de Havilland Aircraft Co. Ltd.
WG848–WG851, *WG865–WG892*, *WG922–WG931*, *WL493–WL518*, *WL547–WL587*, *WL602–WL616*, *WP990–WP999*, *WR102–WR111*, *WR114–WR158*, *WR171–WR204*; 223 aircraft.
26 aircraft in batches between *WX200* and *WX260:* of the above aircraft 15 were transferred to the Royal Rhodesian Air Force (becoming *101–115*) and 10 to Jordan (becoming *F–600* to *F–609*). Two additional aircraft, *CF510* and *CF511*, were built for Ceylon.
Total de Havilland production: 251 aircraft.
Manufactured by the Fairey Aviation Co. Ltd., Ringway.
WR205–WR215, *WR230–WR269:* 51 aircraft.

SERVICE ALLOCATION

R.A.F. Units equipped with Vampire F.B.5s and F.B.9s.
Fighter Command (1st line equipment) Nos. 54, 72, 130 and 247 (Fighter) Squadrons.
Fighter Command (2nd line equipment) Nos. 23, 25, 29 and 151 (Fighter) Squadrons (night fighter squadrons).
Advanced Flying Schools at Valley and Western Zoyland.
Flying Training Schools: No. 1, Linton-on-Ouse; No. 4, Worksop; No. 5, Oakington; No. 7, Valley; No. 8, Swinderby.
Operational Conversion Unit, Chivenor.
2nd Tactical Air Force, Germany (1st line equipment): Nos. 3, 4, 5, 11, 16, 20, 26, 67, 71, 93, 94, 118, 145, 234 and 266 (Fighter) Squadrons.
Middle East (1st line equipment): Nos. 6, 8, 32, 73, 213 and 249 (Fighter) Squadrons.
Far East (1st line equipment): Nos. 28 and 60 (Fighter) Squadrons.
Royal Auxiliary Air Force: Nos. 501 (County of Gloucester), 502 (Ulster), 601 (County of London), 602 (City of Glasgow), 603 (City of Edinburgh), 604 (County of Middlesex), 605 (County of Warwick), 607 (County of Durham), 608 (North Riding), 609 (West Riding), 613 (City of Manchester), 614 (County of Glamorgan).
Central Flying School.
Central Fighter Establishment (Day Fighter Leaders' School, Air Fighting Development Squadron).

SPECIFICATION

	Vampire F.B. Mk. 5	Vampire F.B. Mk. 9
Powerplant	3,100 lb. s.t. de Havilland Goblin 2	3,350 lb. s.t. de Havilland Goblin 3
Dimensions		
Span	38 ft. 0 in.	38 ft. 0 in.
Length	30 ft. 9 in.	30 ft. 9 in.
Height	8 ft. 10 in.	8 ft. 10 in.
Wing Area	262 sq. ft.	262 sq. ft.
Weights		
Tare	7,253 lb.	7,283 lb.
All-up	12,360 lb.	12,390 lb.
Performance		
Max. Speed	535 m.p.h.	548 m.p.h.
Initial climb rate	4,050 ft./min.	4,800 ft./min.
Combat ceiling	40,000 feet	42,800 feet
Combat range	1,170 miles	1,220 miles



Vampire 5 aerobatic team from the Merryfield Advanced Flying School. (Photo: Ministry of Defence)

Photo
J. Flesher
from
D. Binns

1965

Vampire BT-H

Deseronto
1951

• APR • 60

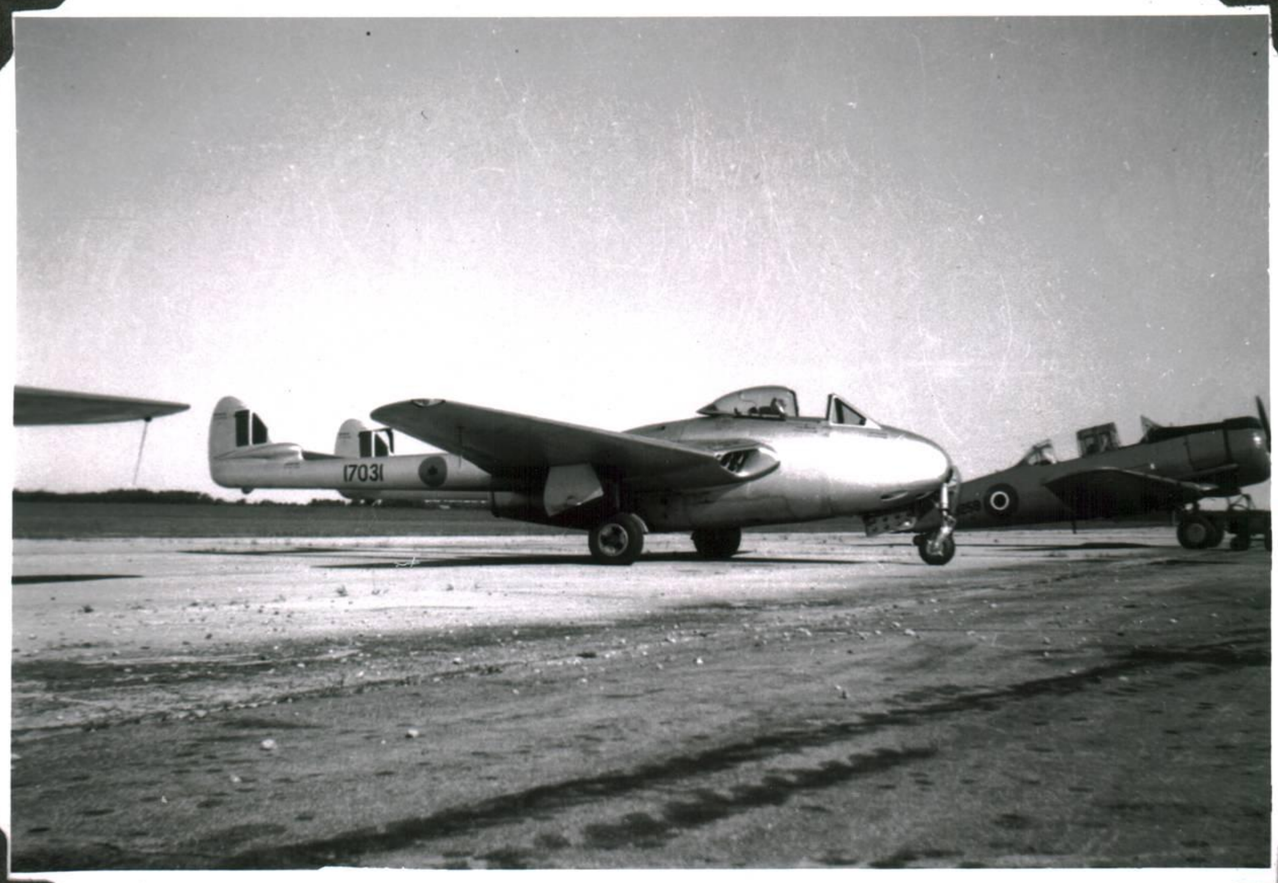


Photo Chief Thomas.

D. H. Vampire # 17031

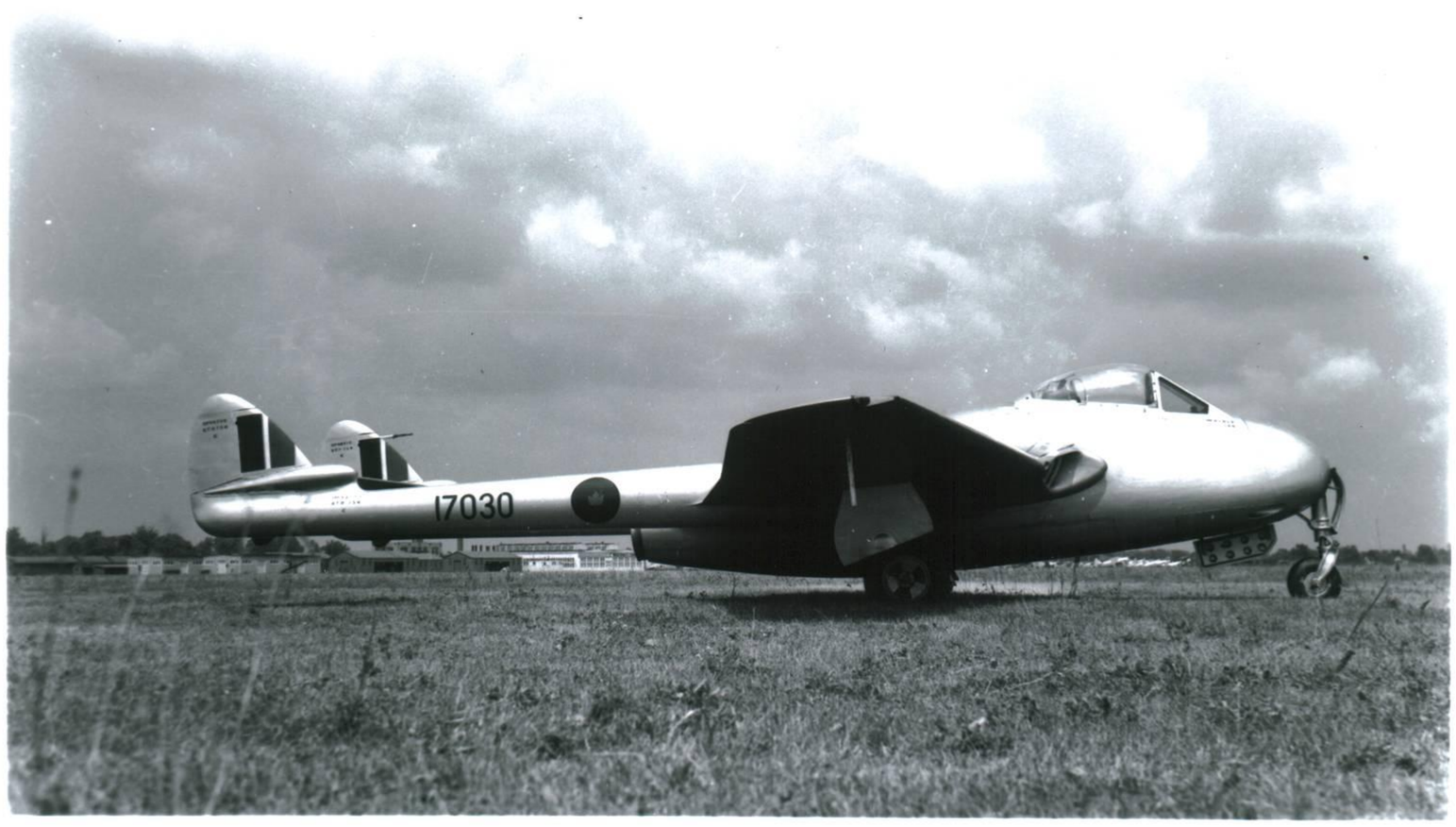
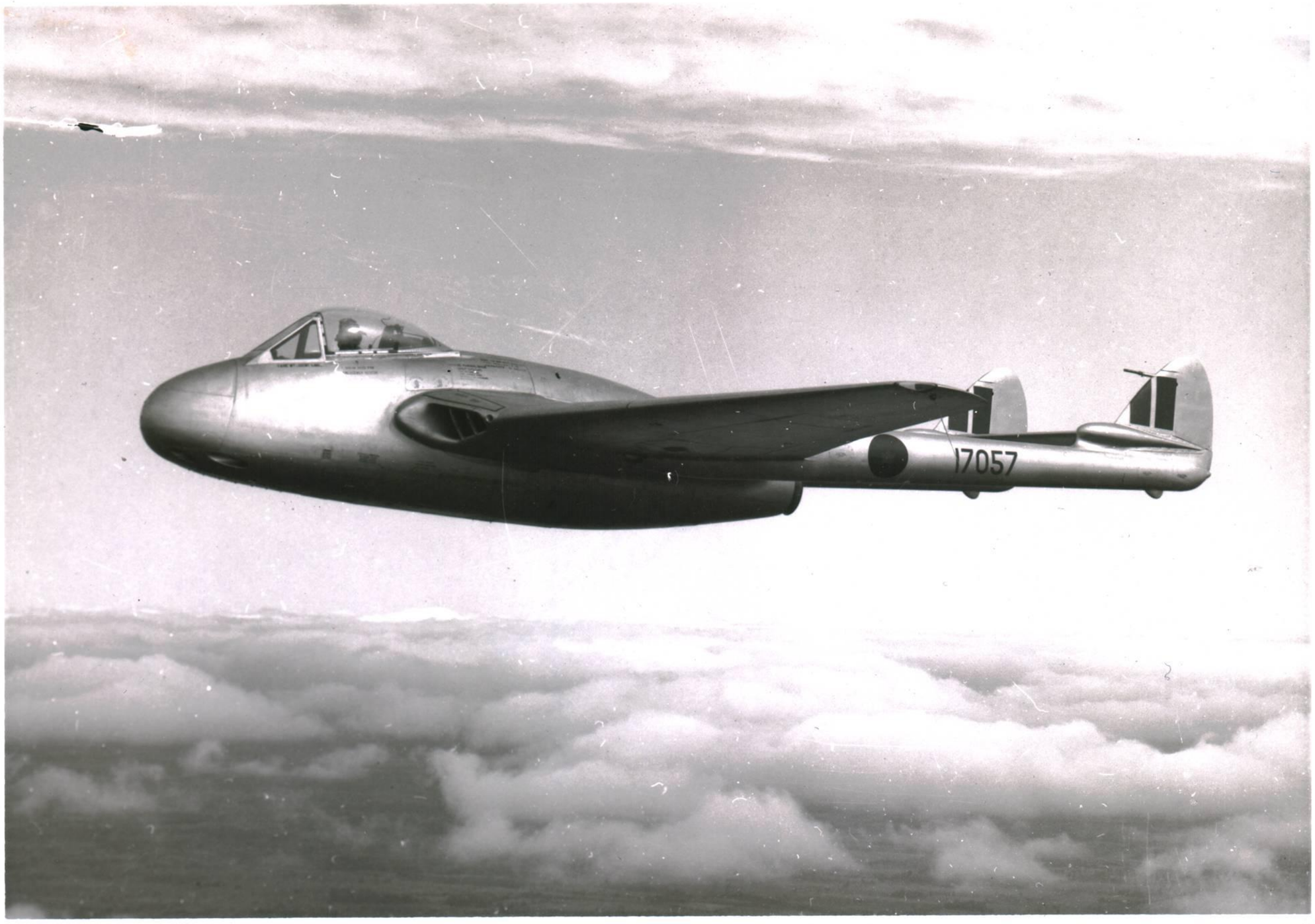


Photo
B. Gibbens

PL 38752

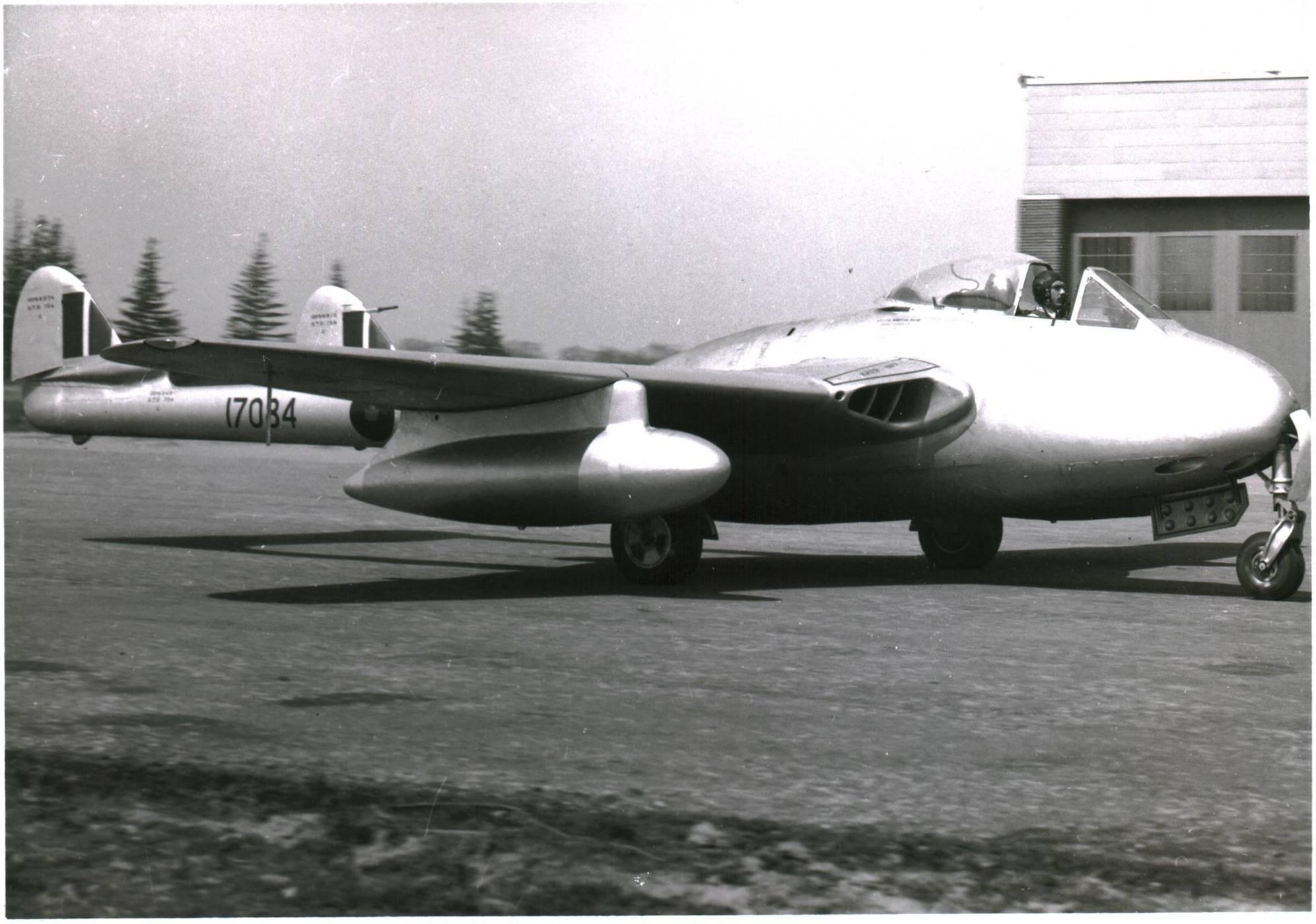
PL 38747



PL 39269

Master Photo Book

PL 39270

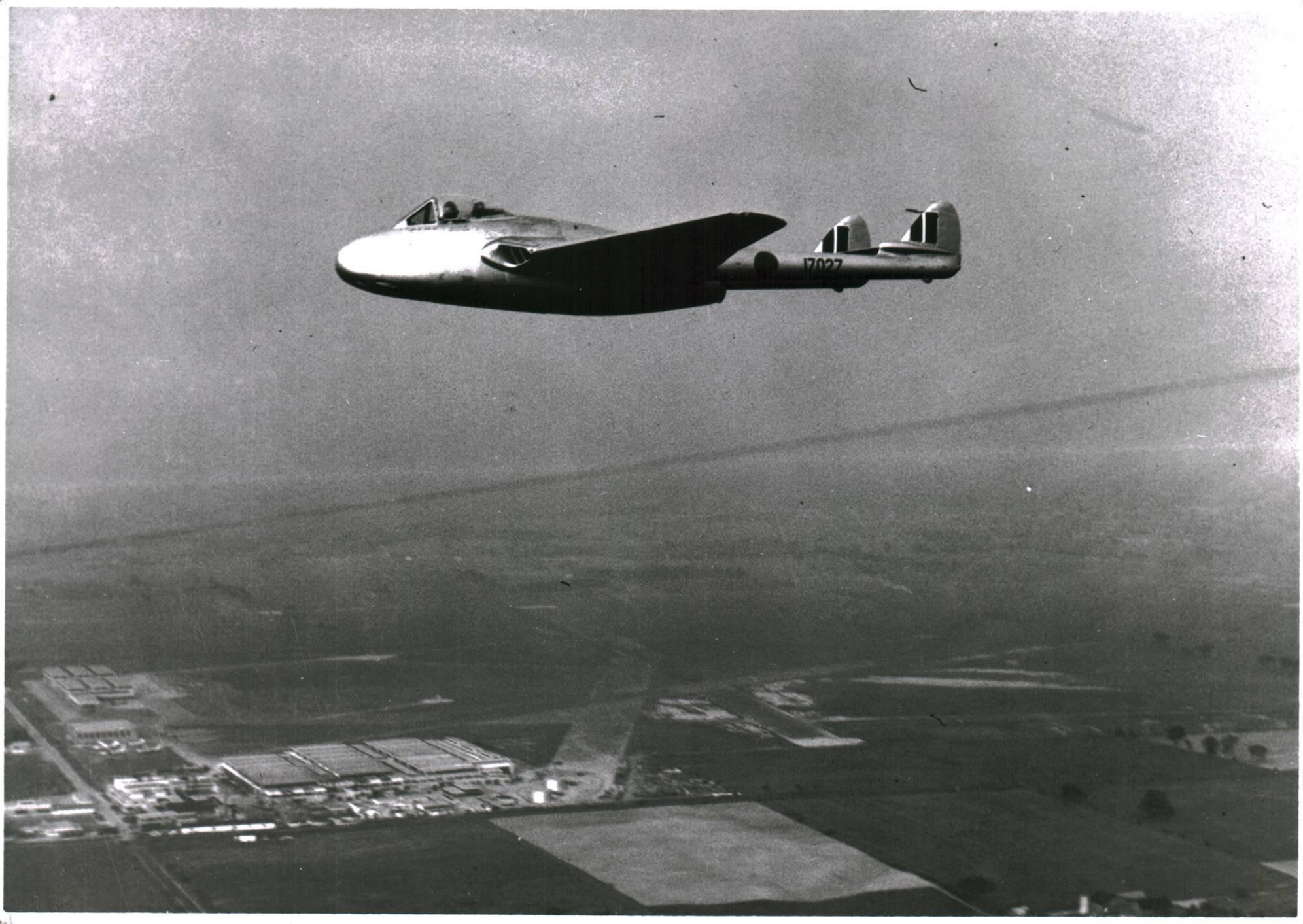


PL 39725

PL 39700

Vampire #17027

PL 39062



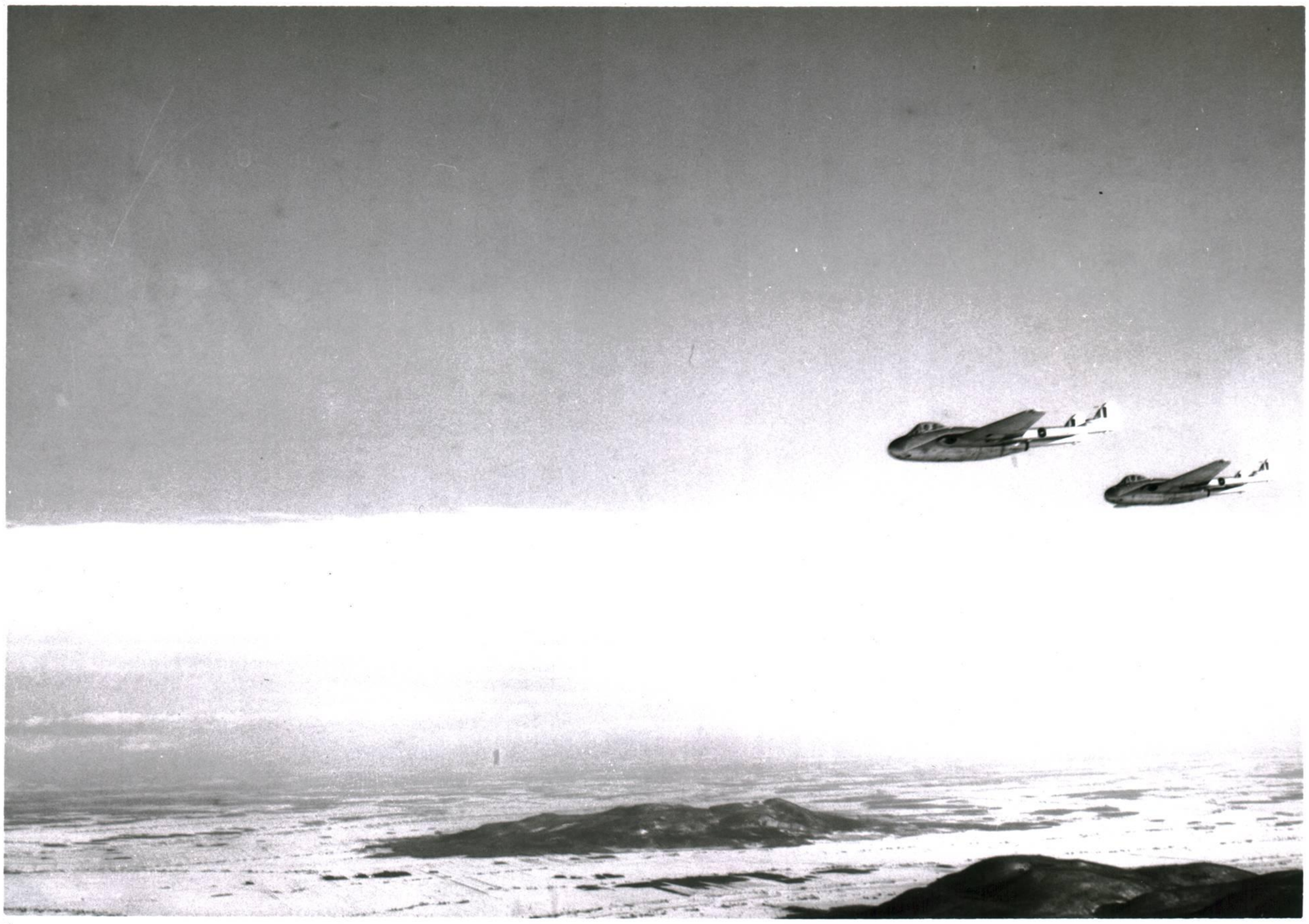
Vampire #17027

PL 39059

NL 39030

400 Squadron 2/c. 17036 NL 39056

17013 17033 PL 39683



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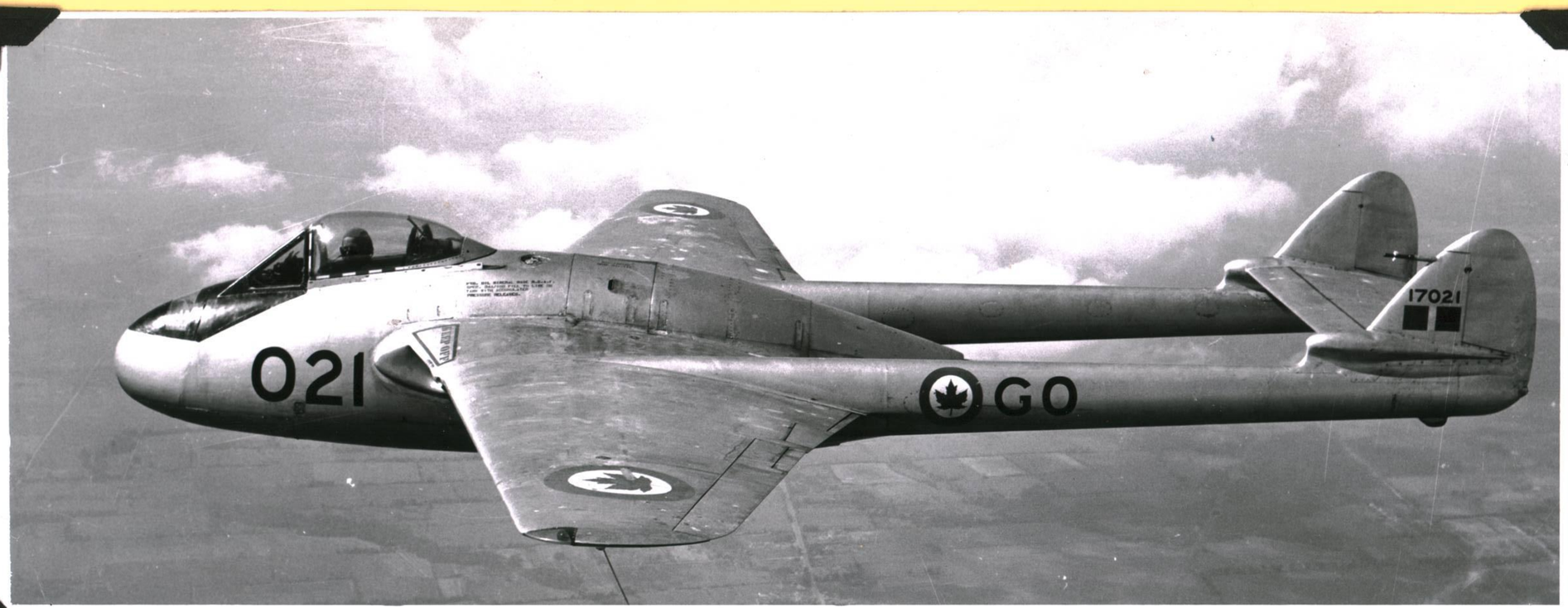
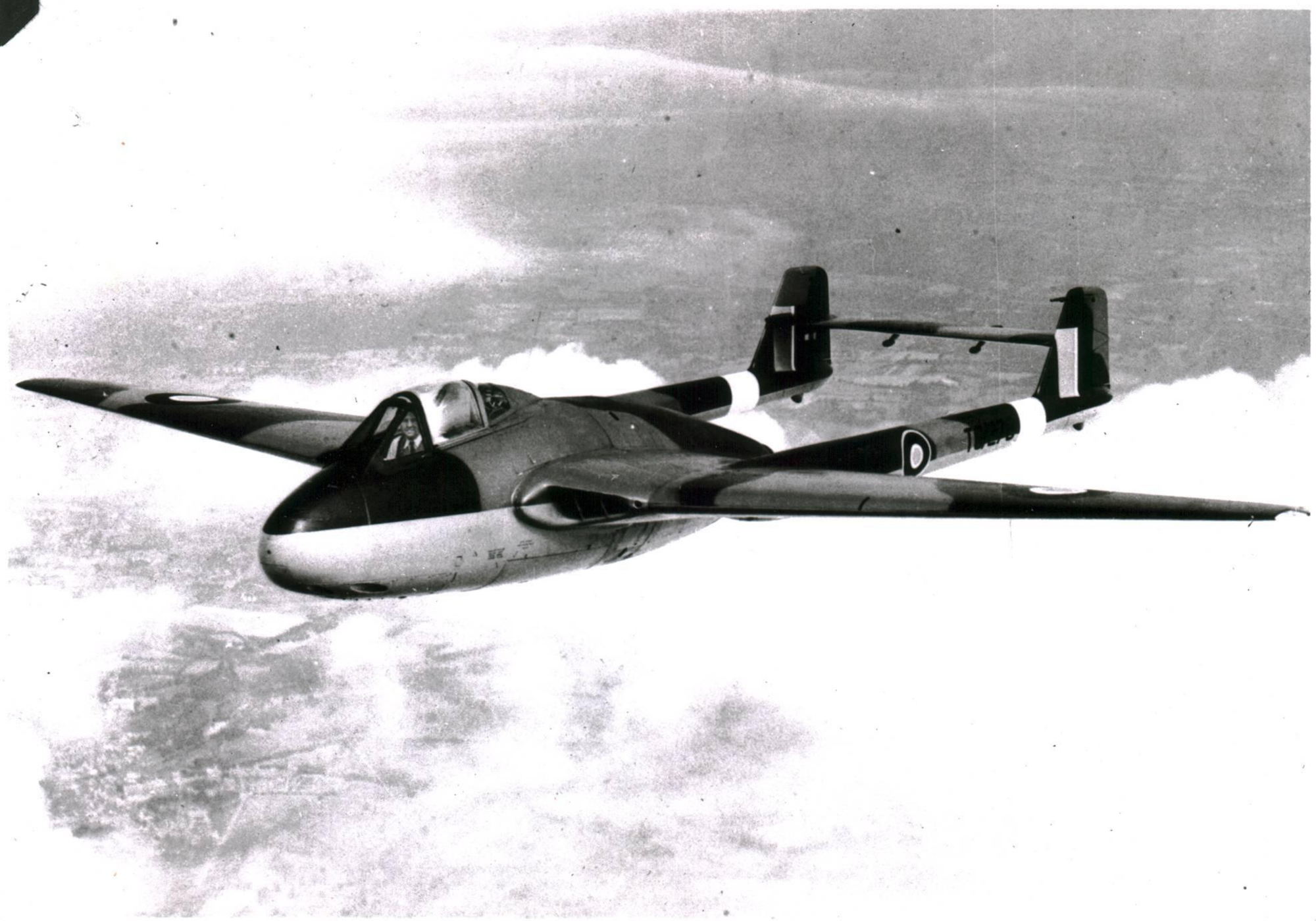
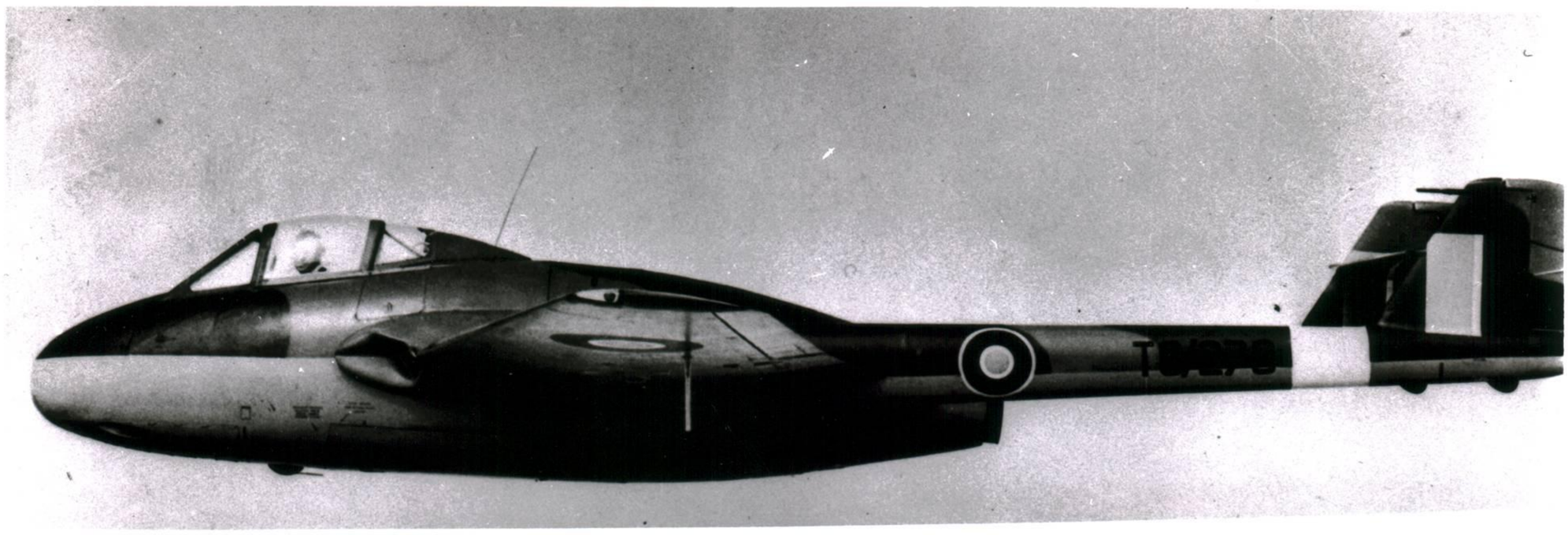


PL 65304

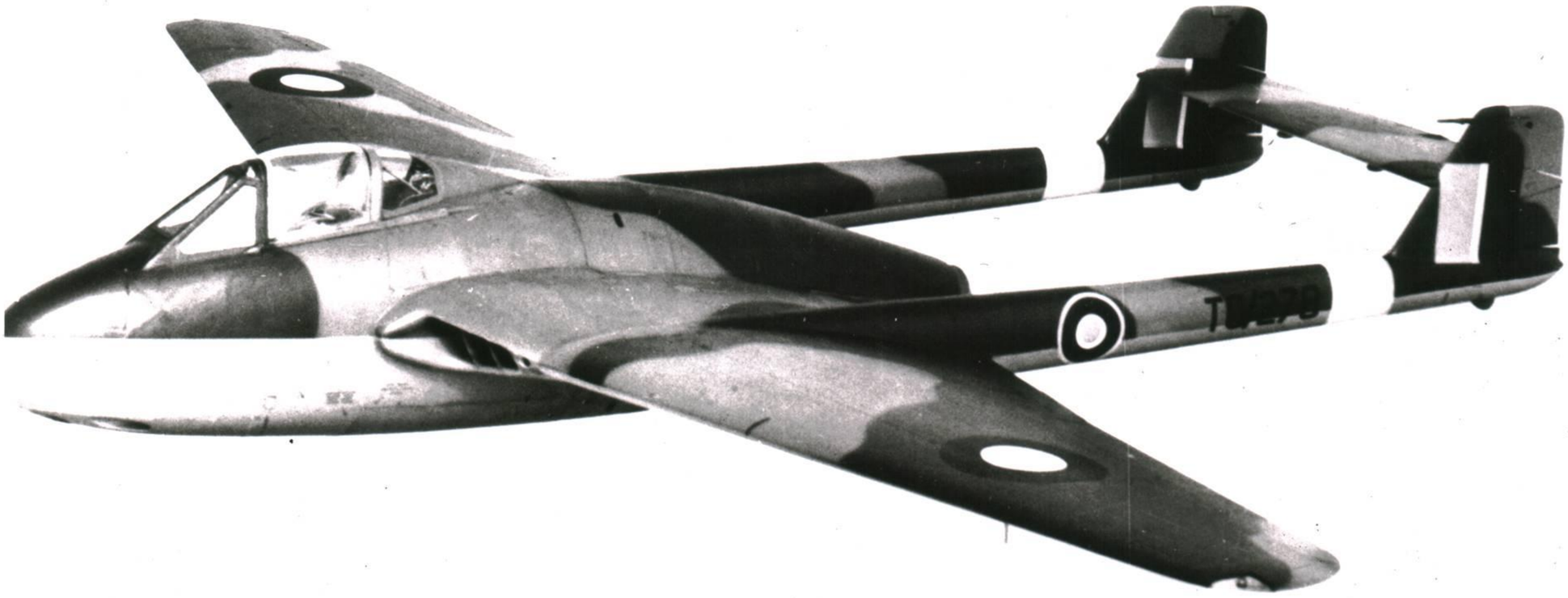


Vampire MK I TG/278 PL 38102

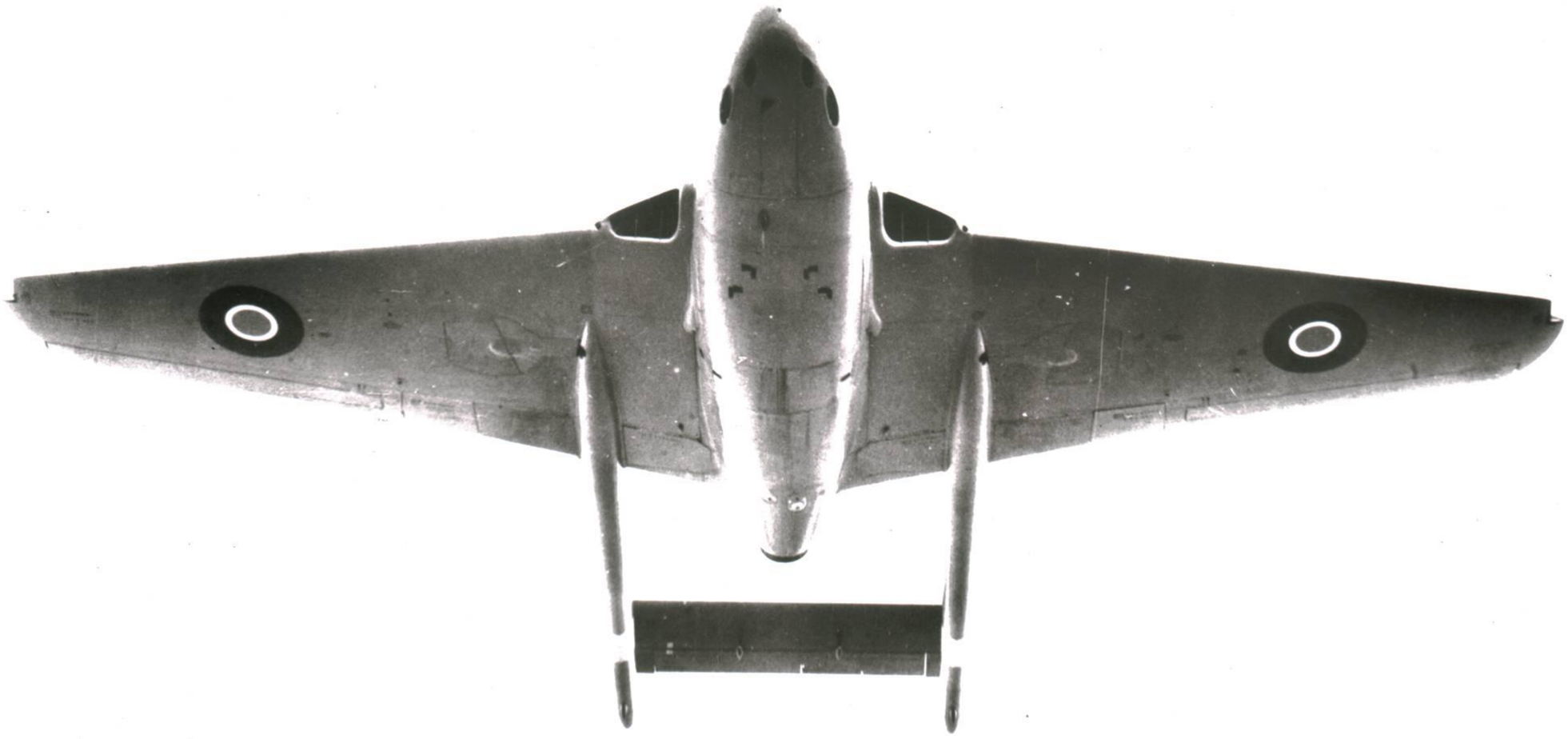
PL 38103



PL 38104

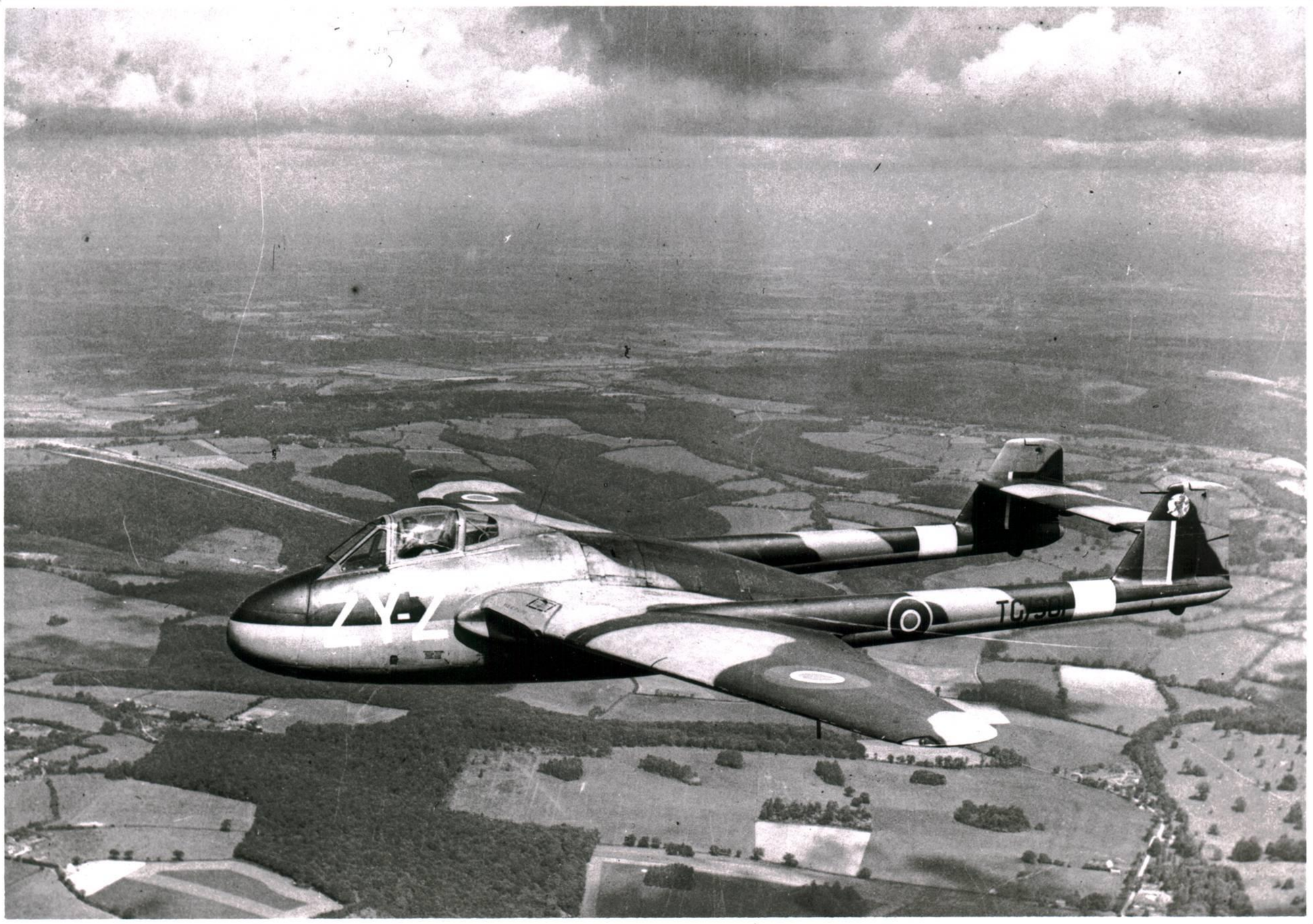


PL 38105



Vampire MK I

PL 38106

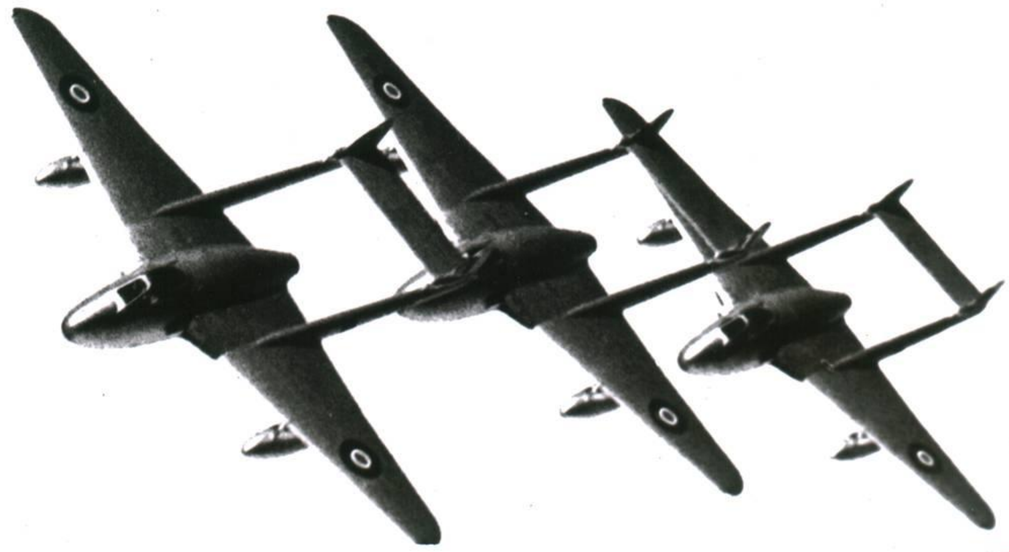


ZY-Z

TG/381

PL 38516


TG/372



PL 39032

W.E.E. TG/372 PL 39630

Lubrication

Airframe lubrication was tested visually and by measurement of Friction Loads on moving surfaces. Results were satisfactory.

Controls

Control cable tensions were tested down to -25°C. Tensions were decreased by approximately 50% at that temperature, but no loss of motion resulted.

Hydraulic System

The Hydraulic System was tested for operation of services at -35°C. Flap operation times increased, the hydraulic hand pump became stiff, and two hydraulic hoses leaked.

Pneumatic System

The Pneumatic system was tested down to -39°C. Loss of air pressure was nil with Parking Brakes "off", but severe with Parking Brakes "on". Rate of build up of pressure was little affected by variations in temperatures.

Undercarriage

The main undercarriage became unserviceable through fluid leaks at temperatures below -22°C. The nose wheel assembly was unaffected. Taxying on ice was too fast at idling RPM for proper control but in 4" deep snow with 1 ft. drifts, handling was good. Tire pressures dropped 10 lbs. p.s.i. after overnight exposure at -39°C.

Cockpit Heating

Cockpit heating was satisfactory in flight but provided no heat at low R.P.M. on the ground.

Icing

Icing occurred on air intake screens during ground running under conditions of damp mist at -19°C.

Engine Tests

General

The engine was exposed down to -43°C and run at -39°C after preheating.

VAMPIRE

SUMMARY OF TESTS

TG 372

The aircraft, Vampire MK I No. 7.G.372, was assembled during December and first flown on January 1st, 1947. Tests during the first fourteen days of January were mostly of a temperate nature, for comparison against results obtained during similar tests to be made at low temperatures.

During the test season, the aircraft was flown for 22 hours, and in addition, the engine was ground run on tests for 10 hours, 40 minutes.

Due to the fact that the engine oil, Intava 620, was unsuitable for cold starts at low temperatures, it was necessary to preheat the engine prior to starting at temperatures below -10°C. Starts for the major part of the winter were consequently "warm" starts, and of little value for acquiring data on the starting characteristics of the engine at low temperatures.

Towards the close of the winter, it was decided to attempt "cold" starts, using DTD 44D with Intava 814 additive as lubricating oil, 'shutting down', immediately idling R.P.M. were reached, in order to prevent damage to the engine. Only two starts were possible, due to the fact that prevailing temperatures were by then generally too high for the purpose. These starts were made successfully at -33.5°C and -30.5°C respectively.

The Shock Absorber Struts of the main undercarriage collapsed repeatedly at temperatures below -22°C. This became a major limiting factor to low temperature operation of the aircraft throughout the winter, and tests were much curtailed in consequence.

Airframe Tests

General

During a flight at 25,000 feet, OAT -31°C, the perspex in the cockpit canopy failed and shattered.

Snow was found to drift into the interior of the mainplanes during dispersal.

Dry Air Pipes to the windscreen and Canopy, became excessively hard at low temperatures.

Blistering of the fuselage finish occurred.

The Filler Compound cracked and became brittle at low temperatures.

Winter Exper Estb.

Photo:

from
W. Wheeler

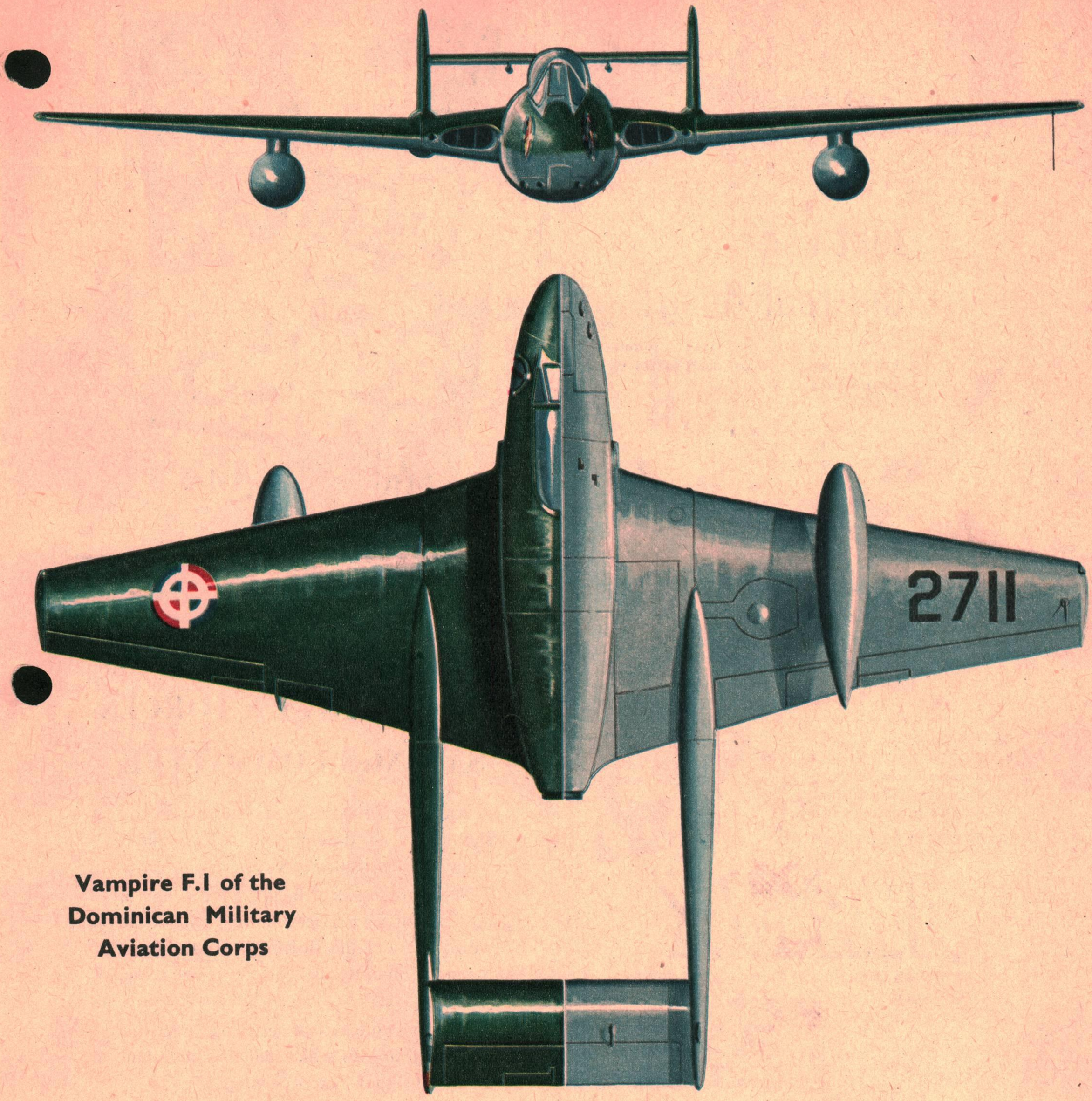
Master Photo Book

D.H. Vampire TG 372

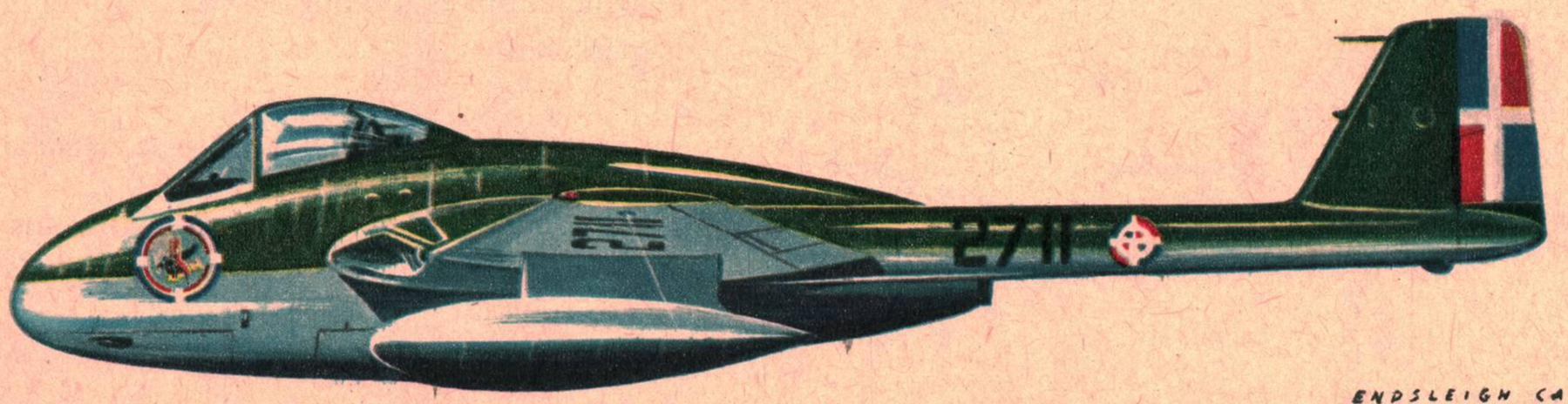
W.E.E.

Photo
P. Gardiner

D. H. Vampire CF. RLK ex



Vampire F.1 of the Dominican Military Aviation Corps



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Vol. XV, No. 5
Feb 1960

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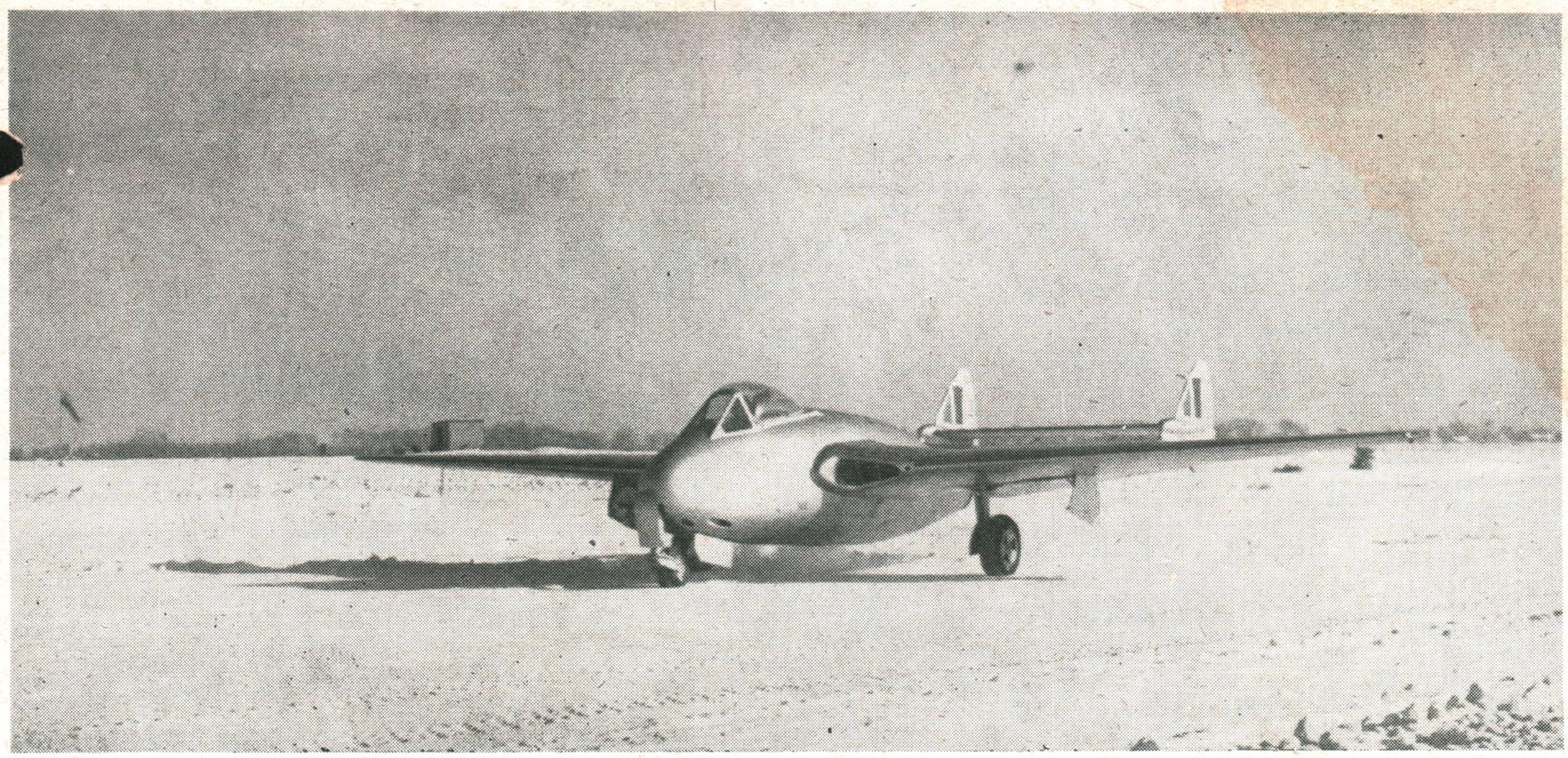


(Aircraft and Airport photos)

RCAF VAMPIRES ARE ON THE JOB

Canada's air force moves up into the 500-mph class with the addition of these sleek little jet-propelled de Havilland fighters—First of the initial order of 85 delivered, with "substantially larger numbers" to come

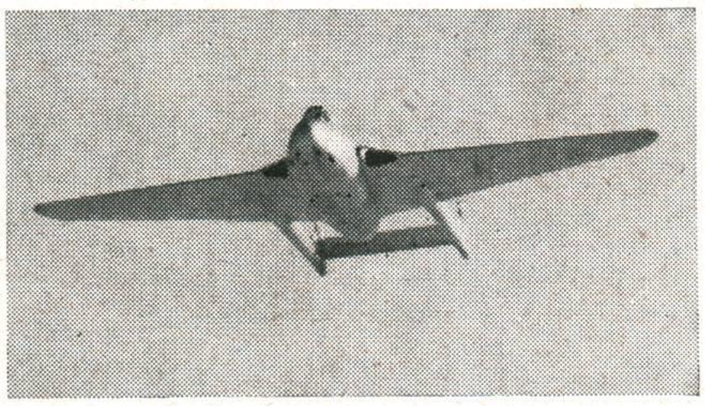
By ALBERT TURNER
Editor, Aircraft and Airport

The Goblin wound up with a scream, there was a brief flash of silver trailed down the runway by a feathery cloud of snow, and seconds later a white speck blended into the blue sky over Downsview.

Those few words, describing an incident which lasted almost as long as it takes to tell it, sum up the moment in which Canada's air force became in reality a postwar power, and the first of the RCAF Vampire jet fighters took to the air.

The actual occasion may not be chronicled in history, for there were no bands playing and no brass on hand to witness it, but it was certainly the passing of an important milestone in the growth of our nation to full stature in the air world. It was the first flight in Canada of the first standard jet fighter on the strength of the Royal Canadian Air Force.

This "preview" flight which took place at the Downsview plant of de Havilland just after the New Year was comfortably settled in, probably will be eclipsed by an official "first" flight at a later date when this aircraft and others have been duly handed over to the R.C.A.F. by The de Havilland Aircraft Limited of Canada. For the little group of workers and those other of us who were fortunate enough to witness the test flight, however, it was the making of history.



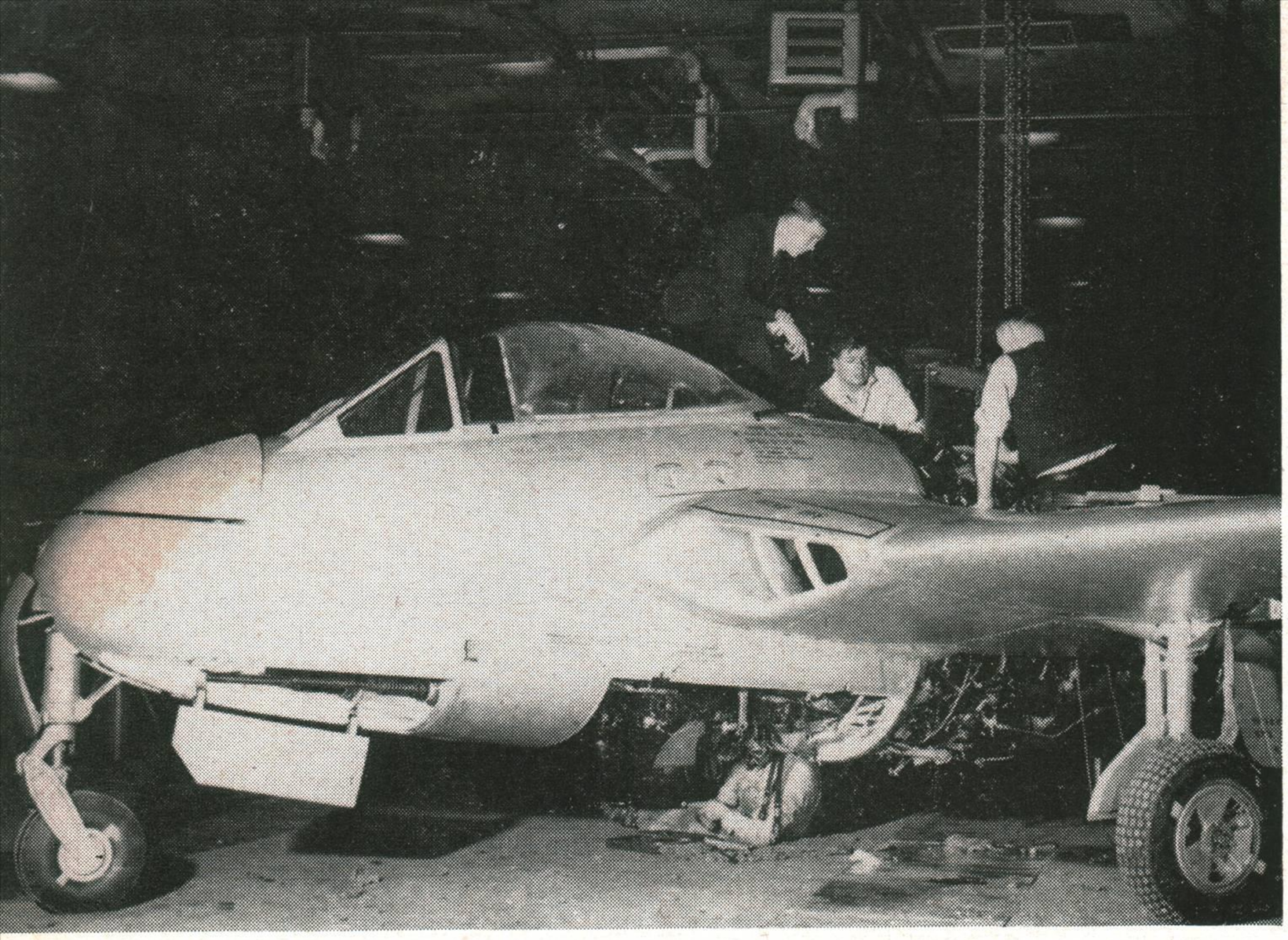
THE TAKEOFF—Climbing over the heads of watchers, the first jet is caught by the speedy lens of Holley Batt, de Havilland staff photographer, who was quick enough on the trigger to catch the speedy Vampire.

THE "OFFICIAL" FIRST

First official demonstration for the RCAF was witnessed by Air Marshall W. A. Curtiss, Chief of Air Staff, who visited Downsview on January 17 to see the Vampire perform. Very much impressed, the CAS made a detailed inspection of the machine, and asked a host of questions.

Like all test flights and "firsts" in aviation, the event was not without its snags. There were the usual delays for weather, the wait for proper fuel and hold-up for radio adjustment, but when the time came it was a sparkling bright, typically Canadian winter day.

The flight was unheralded, but within a few minutes from the first screams of the Goblin unit as it started, there was a goodly handful of de Havilland and R.C.A.F. spectators



Last, but by no means least important, component to be added is the Goblin II jet unit, shown here being attached under the watchful eyes of the specially trained crews who are now assembling Vampires at the rate of three a week.

on hand to marvel as the packed snow curled up and disappeared in the searing blast of the jet exhaust.

With Russ Bannock, de Havilland's operations manager at the controls, the Vampire squealed out the runway for the take-off. Seconds later the little ship returned and was airborne with a swoosh before it reached the halfway mark, soaring past the watchers at about 500 feet before climbing out of sight against the clear blue of the sky.

Elusive Customer

For the next 30 minutes, except for a close run over the field, when everybody in the crowd instinctively ducked, the Vampire proved an elusive customer as it was put through its initial tests at the hands of Russ Bannock. Up to 15,000 feet in no time, the tiny fighter sparkled like a snow flake against the blue sky and defied detection time and again in the winter sun.

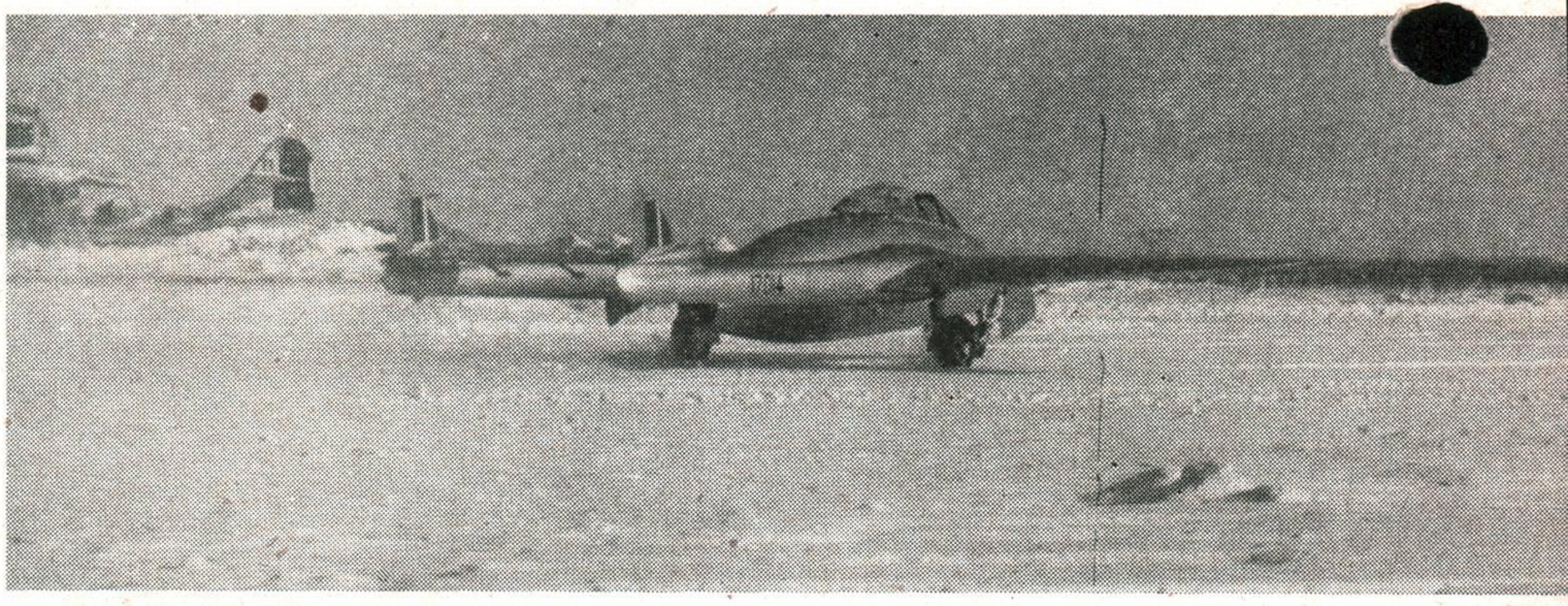
It was from out of nowhere that it swept in over the field at about 500 m.p.h. to climb seemingly straight up to 5,000 feet before the watchers could catch their breath and almost before the sound of the jet had passed us.

In spite of these phenomenal performance qualities, the Vampire lands around 85 m.p.h., and stalls at about 60, making it an ideal aircraft for pilots being introduced to jet propelled types. It was partly the wide performance range of the Vampire which prompted its choice as standard fighter for the R.C.A.F., and for use in training pilots of the permanent and reserve forces.

Much Like Harvard

According to those who have flown the Vampire, her physical characteristics are not unlike the Harvard.

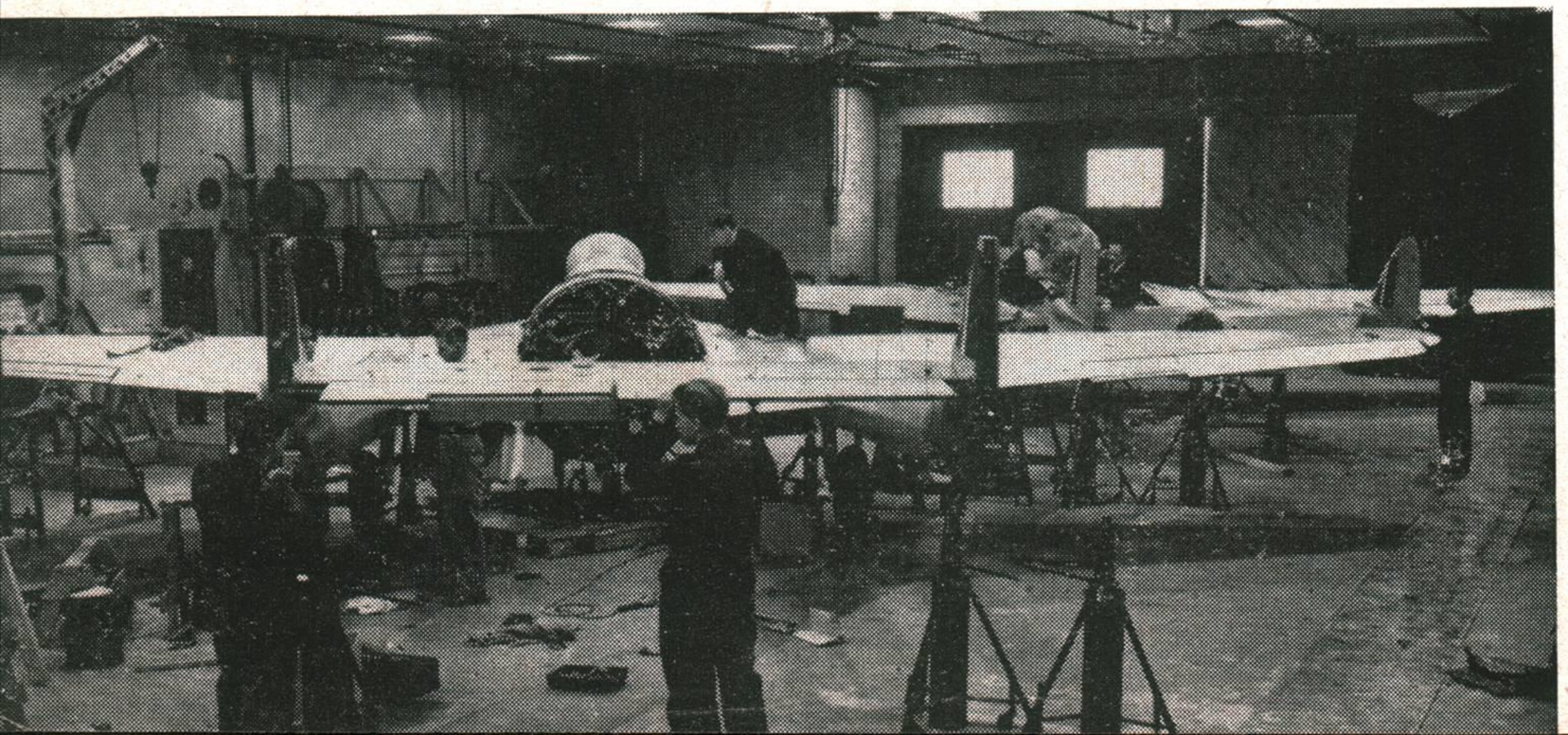
There are 85 Vampires now on order for the R.C.A.F., with, according to Hon. Brooke Claxton, Minister for National Defence, "a considerably large number to be ordered." While the first few ships delivered to the air force will be held at the Central Flying School, at Trenton, where flying instructors are trained, subsequent deliveries will be directed to R.C.A.F. interceptor wing and auxiliary fighter squadrons based at Montreal, Toronto, Vancouver and Winnipeg (and probably in that order.)



TOP—Ready to go! The first ship, after careful inspection and run-up tests, taxis out for the takeoff. Low as it seems to sit while taxiing, the Vampire appears almost to touch the ground at the moment of becoming airborne.

Eventually, it is expected, all R.C.A.F. units will be converted to jets. This conversion, of course, will be spread over a considerable length of time, and will not be completed until work is finished on the R.C.A.F. twin-jet, long range fighter which is now being developed in great secrecy at Malton by A. V. Roe Canada Limited.

In charge of jet training for the



LEFT—The Vampires are assembled in a specially planned workshop at the Downsview plant of The de Havilland Aircraft Limited of Canada. Here is a general view of one side of the assembly shop with two of the ships in process.

R.C.A.F. will be S/L William Foster, DFC, of Guelph, who recently graduated with top honors from the R.A.F. test pilot school at Farnborough, England.

While there may not be many jet trained pilots in the air force at the moment, there is no lack of ground crews. Last of a series of classes of air force personnel attending the special Vampire Ground Instructional School (*Aircraft and Airport,* May 1947) conducted at the de Havilland plant, is now completing instruction on airframe. Engine classes finished some time ago.

Trained in England

In charge of the school are R. V. Corlett and A. Davidson, de Havilland engineers specially trained on the Vampire in England and who last winter took part in the cold weather tests with the Vampire at Edmonton. Air force personnel completing the de Havilland course, will instruct at stations across Canada wherever Vampire aircraft are operated.

Chief test pilot and operations manager for de Havilland in Canada, Russ Bannock, former RCAF Wing Commander and CO of 418, City of Edmonton Squadron, climbs out of the cockpit after the first flight. Russ first flew jets in England in the closing months of the war.

TOP—Some idea of the heat blast coming from the jet exhaust cone may be gained from the way the snow is melted behind the ship as it is run up on the apron. The snowbank behind the plane has almost disappeared.

The R.C.A.F. Vampires, arrival in Canada of which was announced in last month's *Aircraft and Airport* are the Mark III, equipped with the Goblin II jet engine providing 3500 pounds static thrust. The ships mount four 20 mm. cannon, have pressurized cabin and ceiling of 44,000 feet. Rate of climb is 5,000 f.p.m., with maximum speed of 540 m.p.h. Duration is 1.65 hours.

The Vampires, which came by sea are brought by rail to the Downsview plant of de Havilland, where they are unloaded by the air force and assembled by de Havilland. A specially set-up assembly shop has been readied for the Vampires, and it is expected they will be turned out at the rate of three per week when the machinery gets rolling.

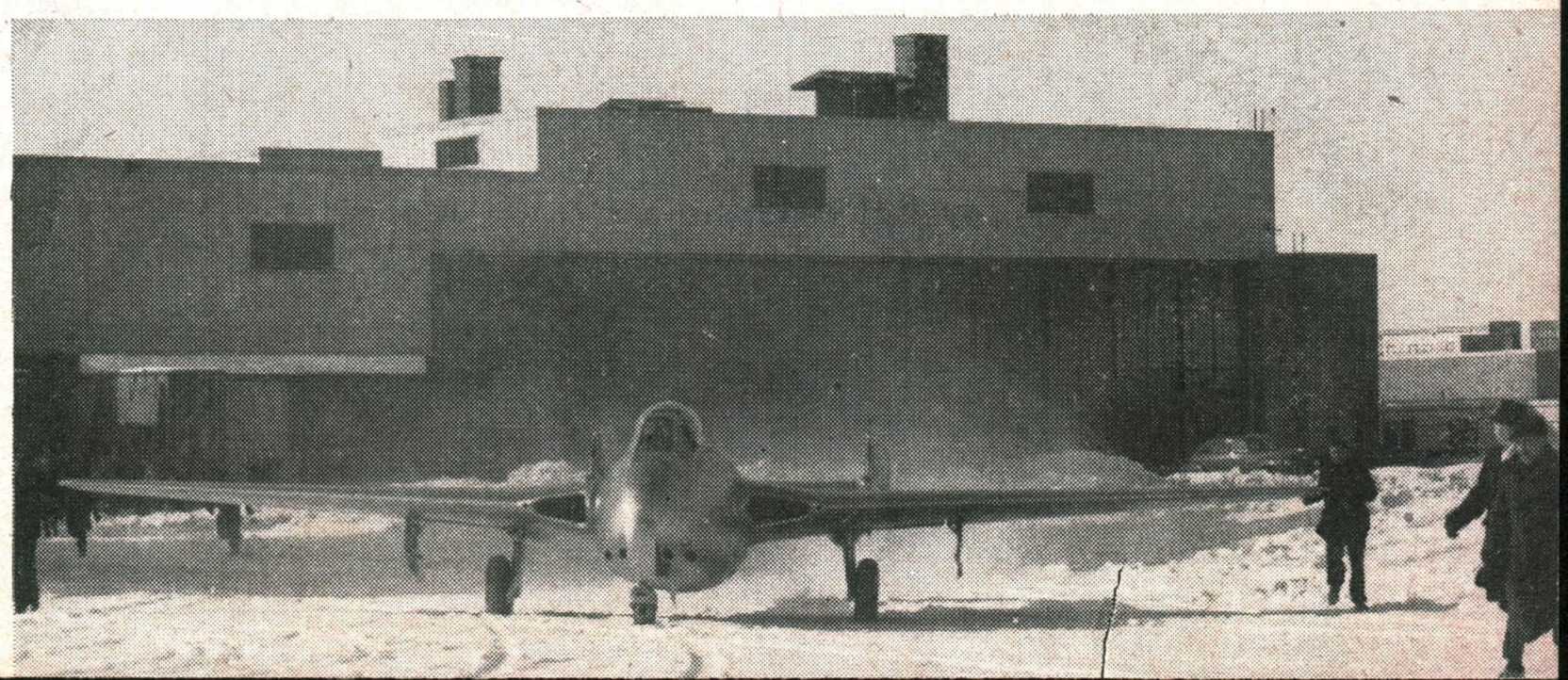
Most of the machines have little more than an hour's time on them, with the checkout in the U.K. being held to a minimum because of the critical fuel condition. Every machine is being given a thorough check and test flight at Downsview, of course before handing over to the R.C.A.F.

Flying operations at de Havilland are in charge of Russ Banock, assisted by George Neale, de Havilland test pilot.

V-P Flies Too

There are probably less than a dozen men in Canada who have experience on jets, and P. C. Garratt, vice-president and general manager of the de Havilland Aircraft Limited of Canada, holds the distinction of being the only Canadian civilian pilot to have flown the vampire. A seasoned

(Continued on page 46)



RIGHT—Any spectators standing in line with the tail cone when the aircraft turned the corner were showered with snow and sand whipped off the tarmac. Even hard-packed snow rolled up in the blast.

Names of all points touched by the Cubs were painted on the right side. Here Ed Patey, of Lethbridge, is adding the last stop before the 13-hour flight to Burbank.

Fly 23,000 As Cu

George Truman and Cli record trip with Piper S fliers made life member

With completion of the Truman-Evans flight around the world in Piper Super Cruisers, there are few more field left for the light plane to conquer, and it might truly be said the air age is with us.

Visiting 20 countries and 47 cities on their 23,000 mile trip which took some 240 hours flying time in nearly four months, the intrepid Piper pilots can be said to have accomplished what they set out to do—to show to the world at large that small planes can accomplish a lot of things only big aircraft are supposed to be able to do.

They flew the little planes through all kinds of weather, through winter and summer climates, and on long and short hops over all kinds of country. Not only did they prove the quality of their aircraft, but they also proved their own mettle as pilots.

It is fitting that the final hop of their trip should be from a Canadian airfield to their home field at Burbank, California. To the city of Lethbridge went this honor, and on behalf of Canadians everywhere, the people of Lethbridge proved Royal hosts to the fliers.

When George W. Truman and Clifford Evans dropped into Lethbridge on their way home, they were greeted at the airport by Mayor J. A. Jardine; E. R. McFarland, president of the Flying Club, and M. B. Wilkinson, president of the Lethbridge Board of Trade.

Also on hand was a flying guard of honor from south of the border in the person of residents of Cutbank, Montana, who had flown up to Lethbridge to greet the world travellers.

Truman and Evans, who, incidentally, are now life members of Lethbridge Flying Club, spent two days in the city and were feted in the Club Mess at a small banquet where each spoke briefly.

Proved Flying Safe

"We feel that we have proven, beyond the shadow of a doubt, that small planes, when properly cared for and flown without taking foolhardy chances, are truly safe transportation whether it is around the world or across the country," they declared.

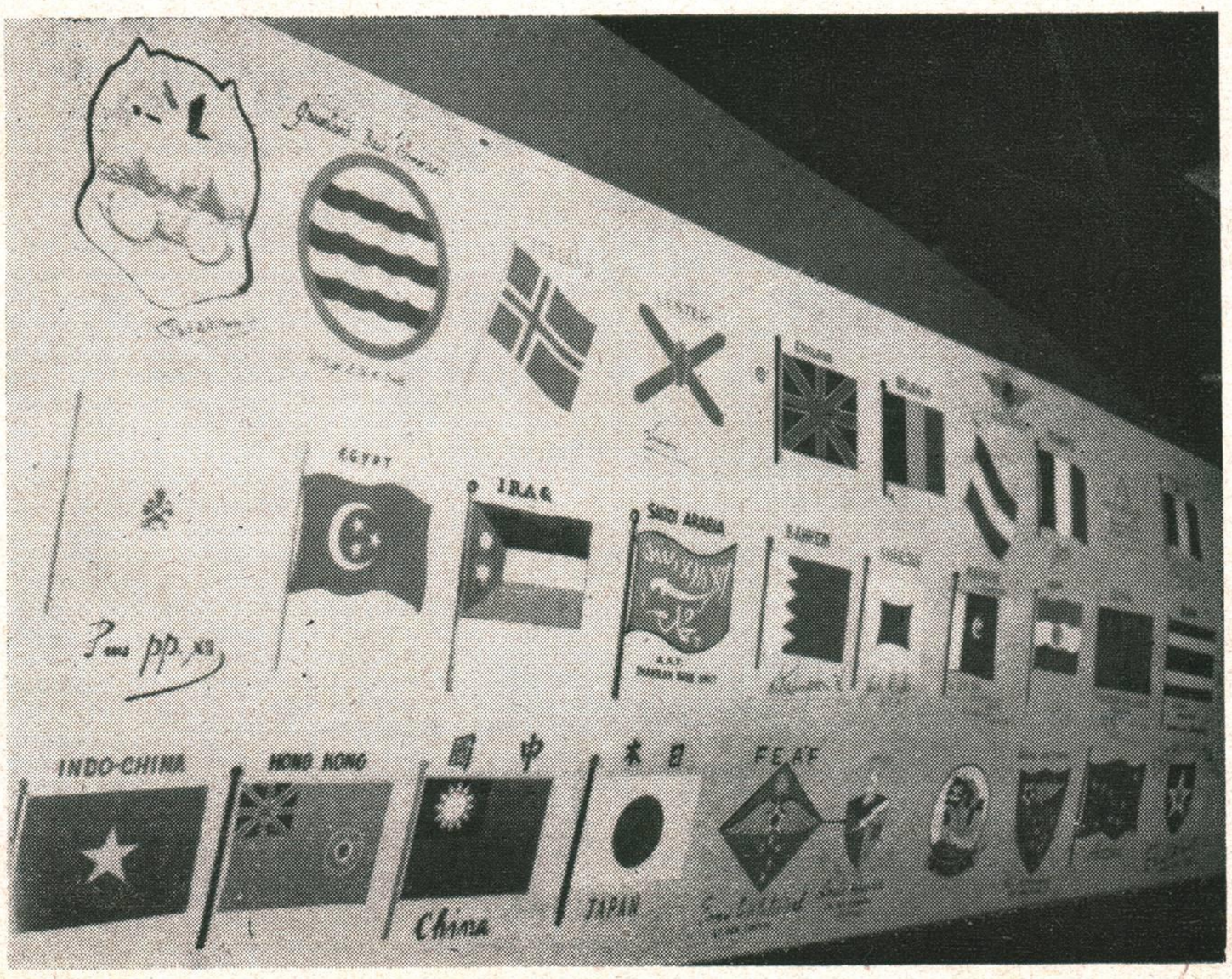
The idea of their flight was born a year before they actually started, the fliers admitted, when a chance remark was dropped in the office of the Washington, D.C., flying school where both men were instructing. They felt that a successful flight around the world in their Super Cruisers would do a great service to the aircraft industry, particularly the light plane manufacturers.

They took off from Teterboro, N.J., on August 9, and after an eventful trip landed at Burbank, Cal., on Nov. 26. The last leg, from Lethbridge to Burbank, some 1275 miles, was made in 13 hours, 20 minutes, nonstop.

First For Lethbridge

While purely coincidental to their world flight the pair also made history in a small way for Lethbridge in that it marked the first occasion that round-the-world fliers had stopped at Kenyon field.

Credit to any trophy collection is this array of emblems painted on the left side of each of the aircraft, denoting the ports of call on the round-the-world trip.



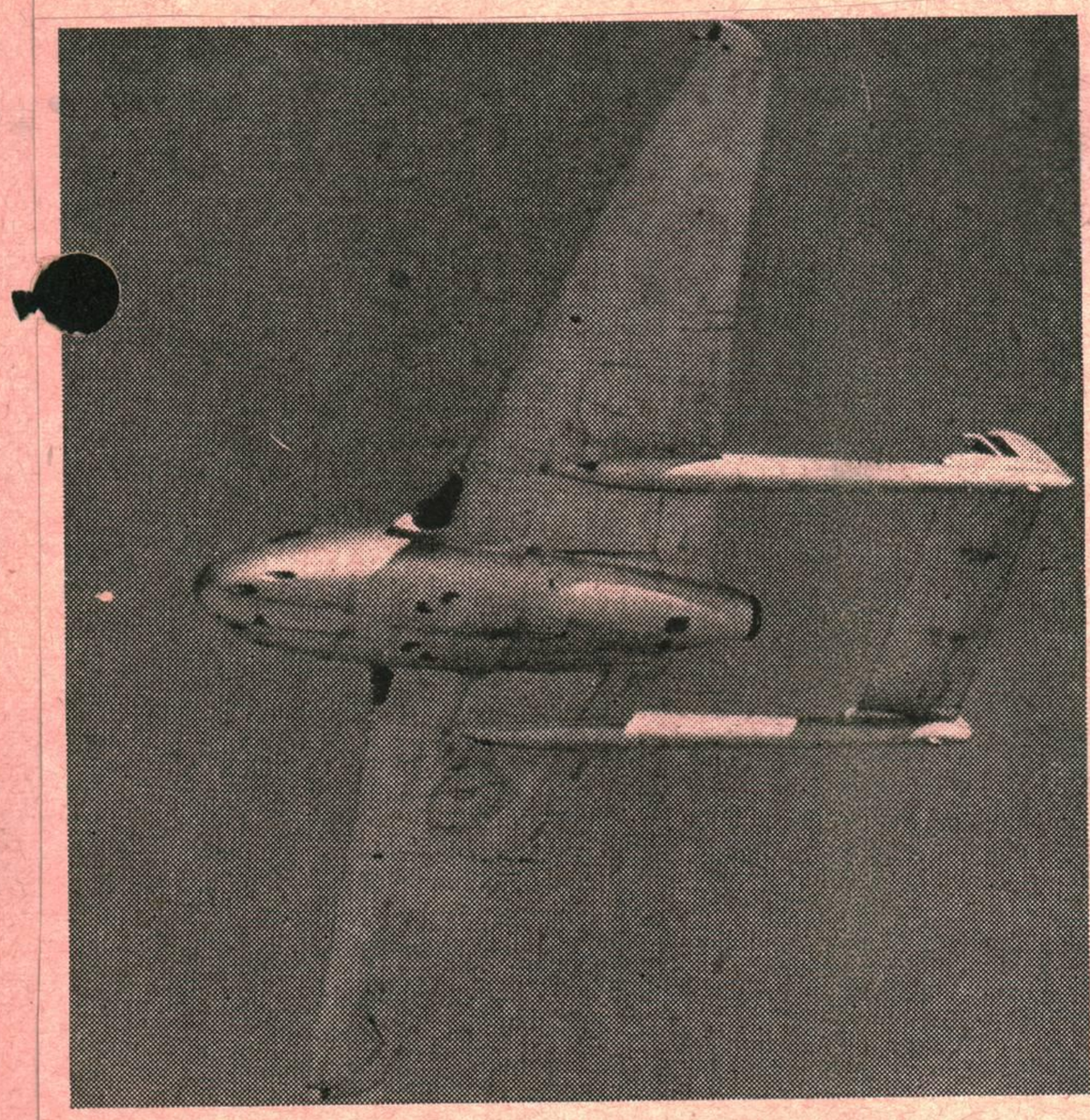
J. Beilby

change in direction of the airflow, the greatest increase in velocity of the flow and as a result, greater changes in pressure. The high-speed airfoil has comparatively small camber to both top and bottom sections.

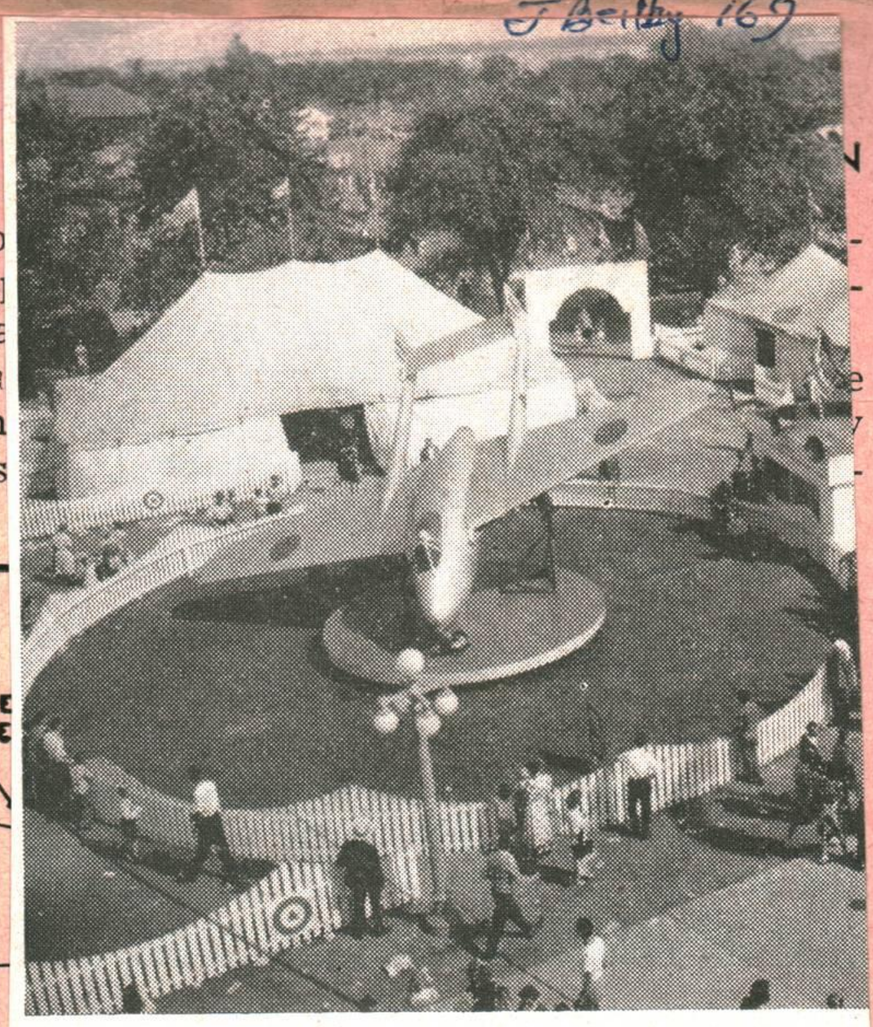
There is, however, one feature common to all airfoils: as the angle of attack increases the lifting power also increases. However, this applies

However, as we ease back to crease the angle of attack our s is also affected. It falls off stea until at the critical or stalling a a certain speed will be noted on airspeed indicator. This is the s

The **Vampire III** taxiing in after the demonstration. De Havilland claims that cold weather does not hinder the efficiency of the Goblin II engine, which has been successfully flight tested in the Vampire at 60 deg. below zero. Note the new design of the fins and rudders.

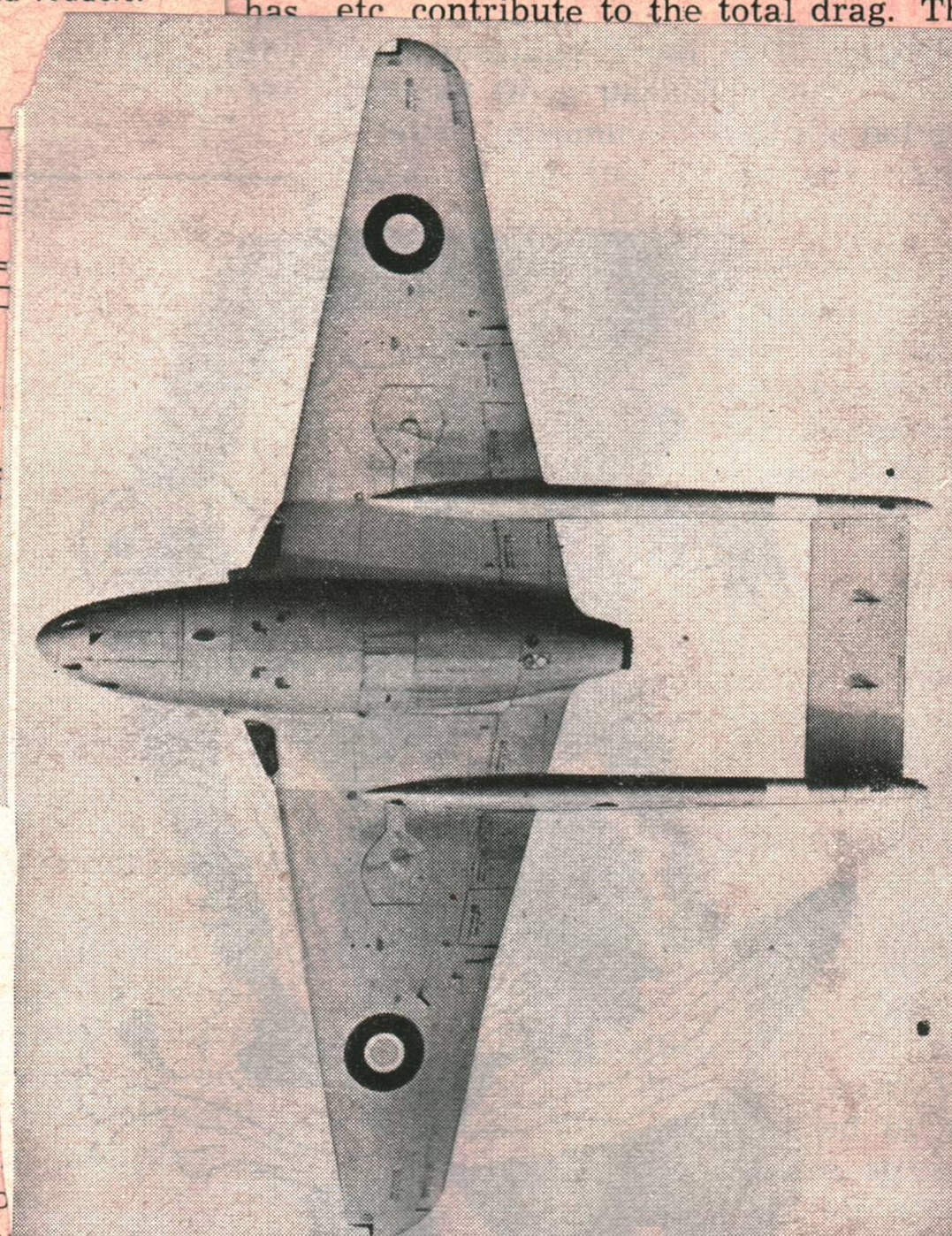


The first RCAF **Vampire** zooms low over the de Havilland factory at Toronto during its demonstration to Air Force officials.

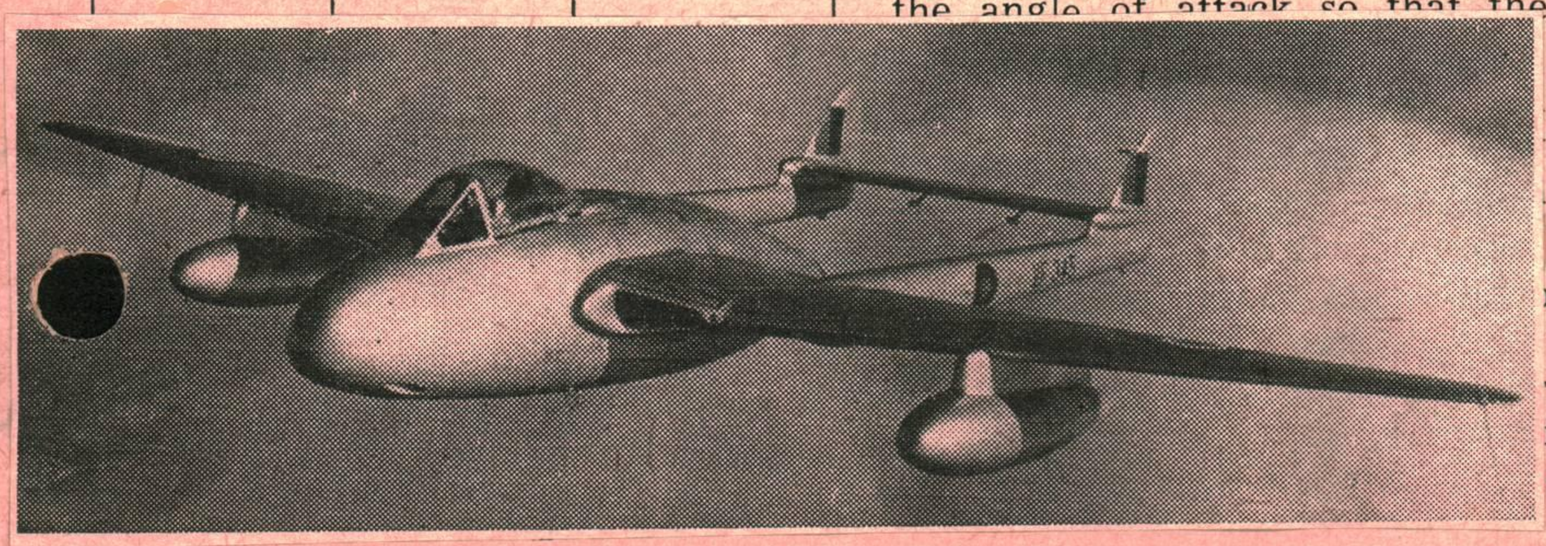


The RCAF exhibit was probably the most complete

DIRECTION OF MOTION



(degrees)	tion	of 50 m. p. h.



orms craft in such a manner that its lift or reaction is forward.

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Parasite Drag—All parts of the aircraft, particularly such things as fixed undercarriages, struts, oil coolers, etc. contribute to the total drag. The

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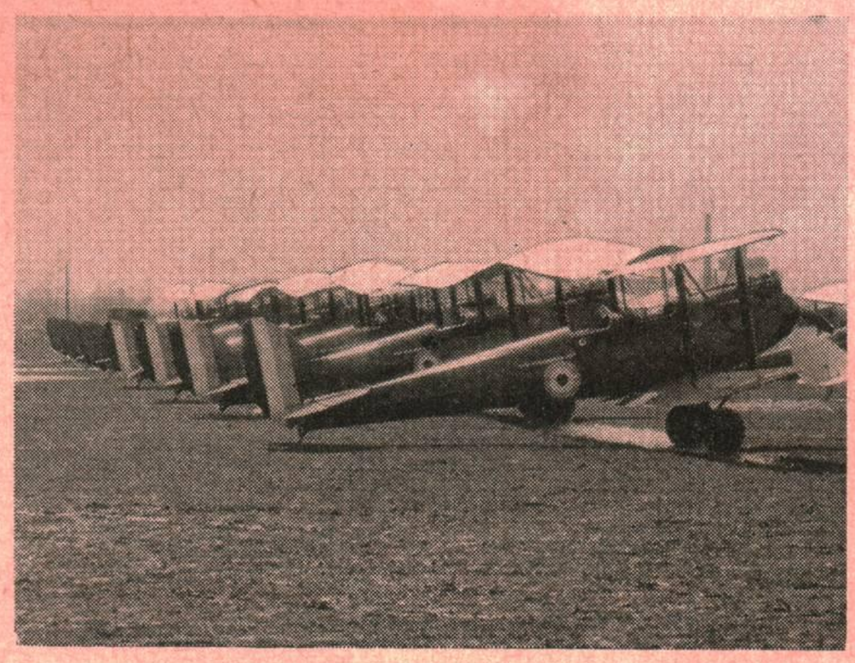
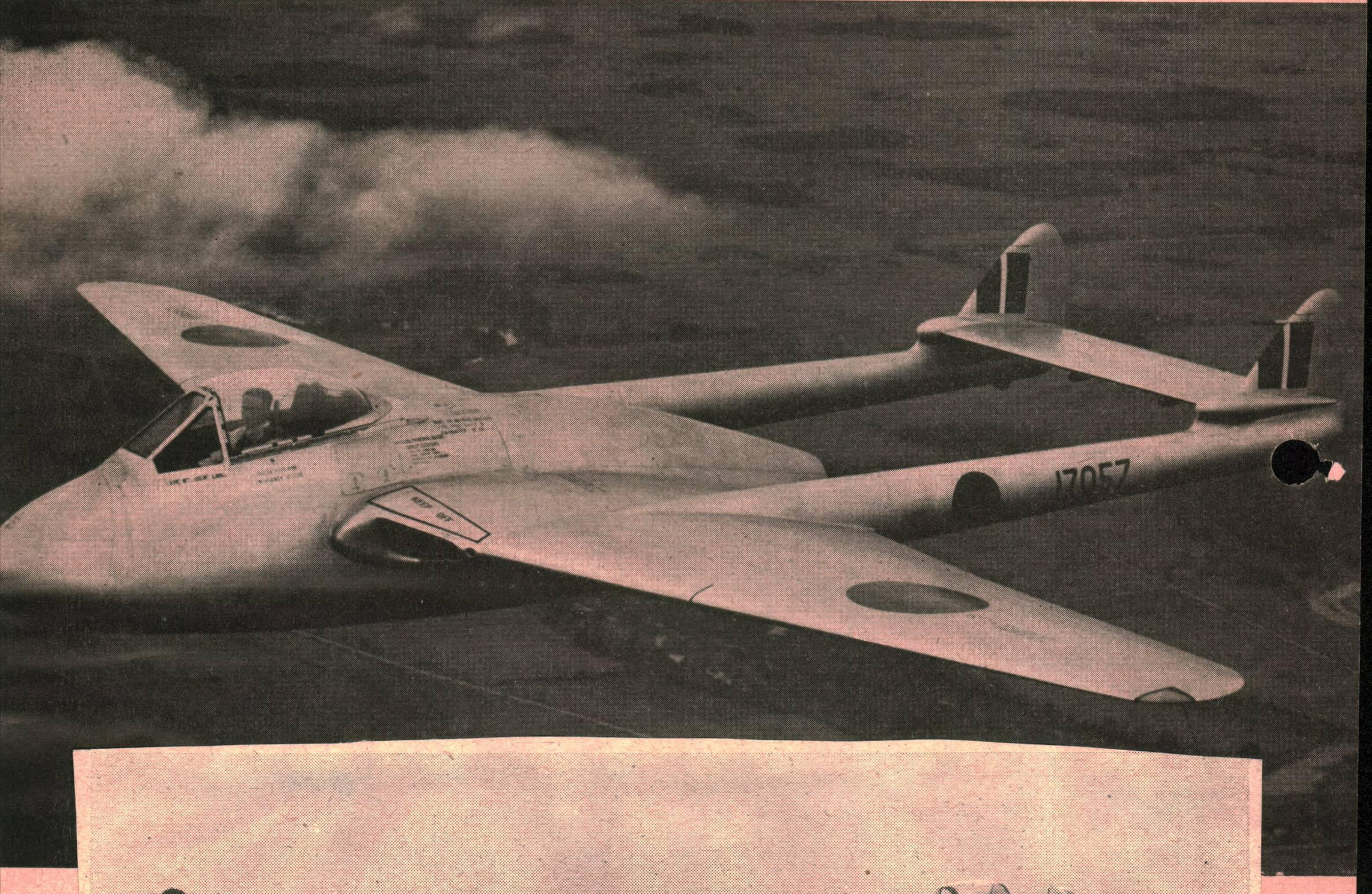
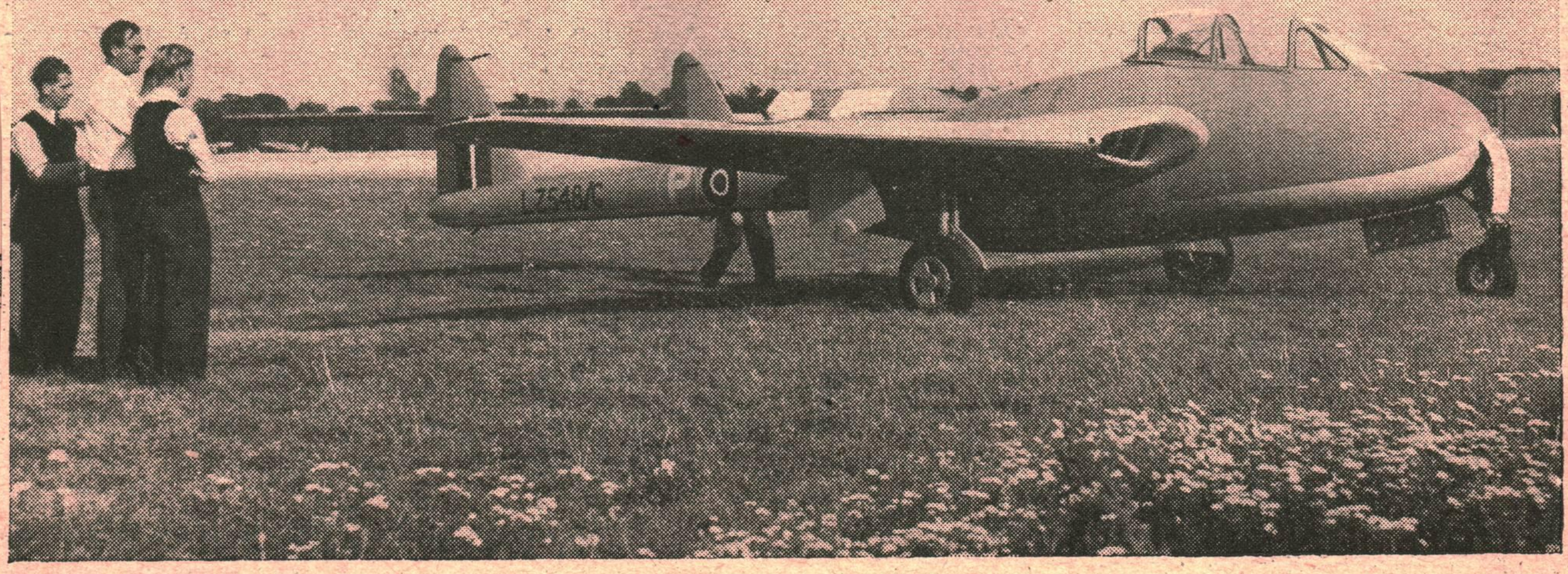
(Fig. 33) makes it possible to determine the approximate air speed required to prevent stalling at any particular angle of bank.

Thus, it is obvious that the normal stalling speed of an aircraft is by no means a safe indication while manoeuvring. This applies not only to the banking aircraft but to all circumstances where the wing loading is increased, for example in pulling out from a dive.

Streamlined drop tanks are being installed on the RCAF H-H Vampire fighters, as shown in this illustration. Actually, the tanks would not be dropped except under actual combat conditions when the pilot might shed them to allow full aerobatic performance of the aircraft.







WELL-GROOMED : The prototype Vampire a few days before the first flight in September, 1943 ; on the left are Mr. Geoffrey de Havilland and some of the staff. It is interesting to note that the prototype had the characteristic "D.H." fin and rudder outline which has disappeared in the production model.

J. Bell Hay 170

An RCAF Vampire on exhibit

Aviation played a prominent though not extensive, role in the recent Canadian National Exhibition in Toronto.

By far the most impressive feature was the daily flying displays by four Sea Furies, two Sea Hornets and a Sea Vampire of the Royal Navy's 806 Squadron, and a flight of four Vampire jets from the RCAF Station at Trenton. The naval squadron, which prior to its appearance at the CNE had participated in the official opening ceremonies of New York's International Airport at Idlewilde, put on a show of low-level formation and solo aerobatics that kept crowd interest at a peak.

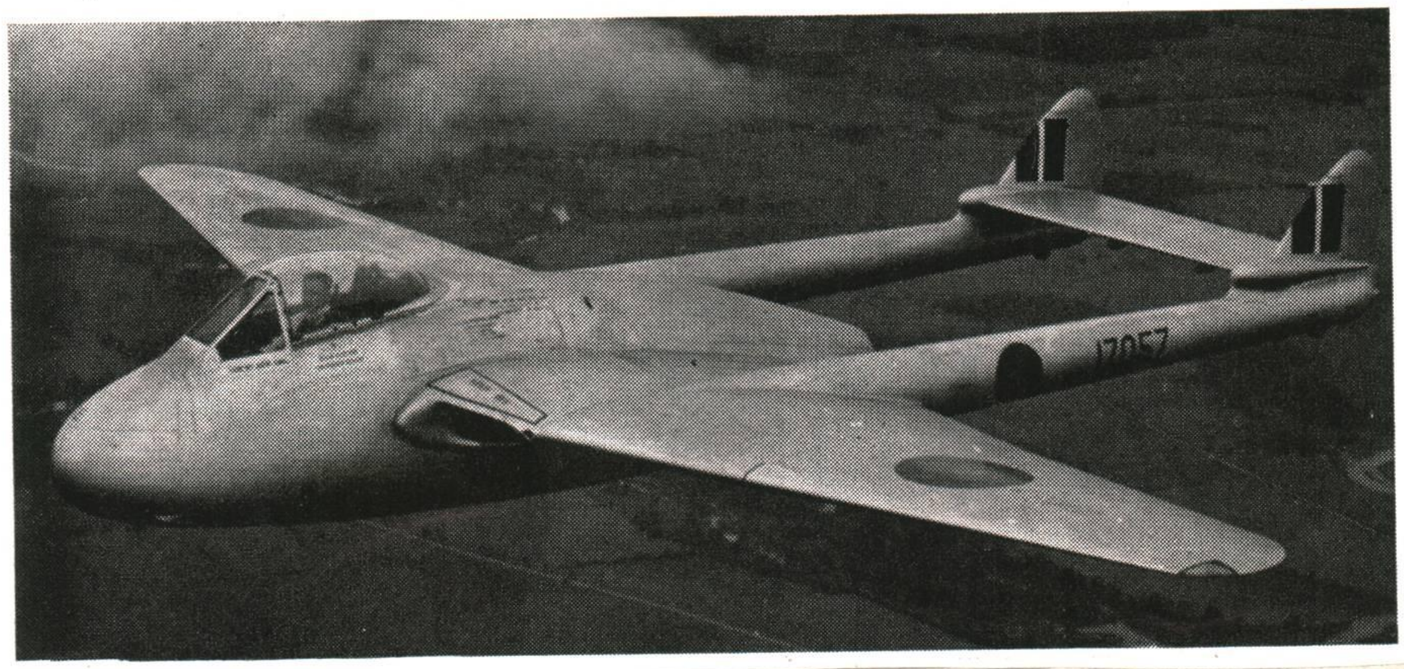
With precision born of constant practice together, the Navy aircraft performed such manoeuvres as inverted flying of a Fury about 30 ft. above the water; rolling three Furies in tight vic formation and line astern quite low; looping a Hornet with both propellers feathered, starting the loop at about 100 ft.; tight echelon formation of two Hornets, each with a prop feathered, etc.

A Bell Model 47-D helicopter attracted attention when it landed on the stage before 24,000 grandstand customers nightly. TCA was featured in a stage production at the same show. The backdrop featured two large reproductions of the North Star in airport surroundings and the large cast was costumed as TCA personnel from stewardesses to mechanics.

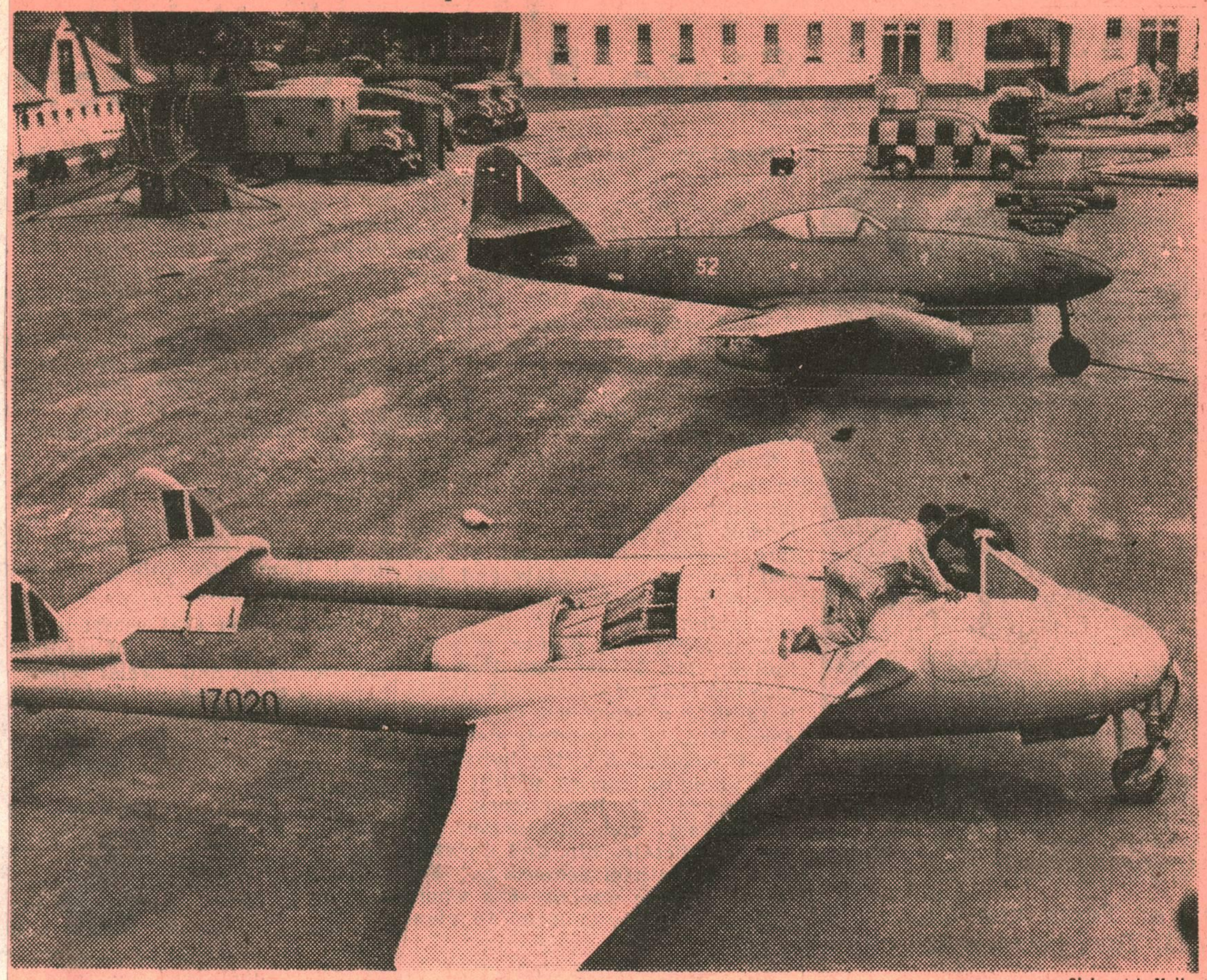
A Convair 240 was exhibited by American Airlines at the near-by Island Airport. Static aviation exhibits in the grounds were scattered and varied. The RCAF display featured a Vampire mounted

F. Bailey 172

Vampire Jets For Business

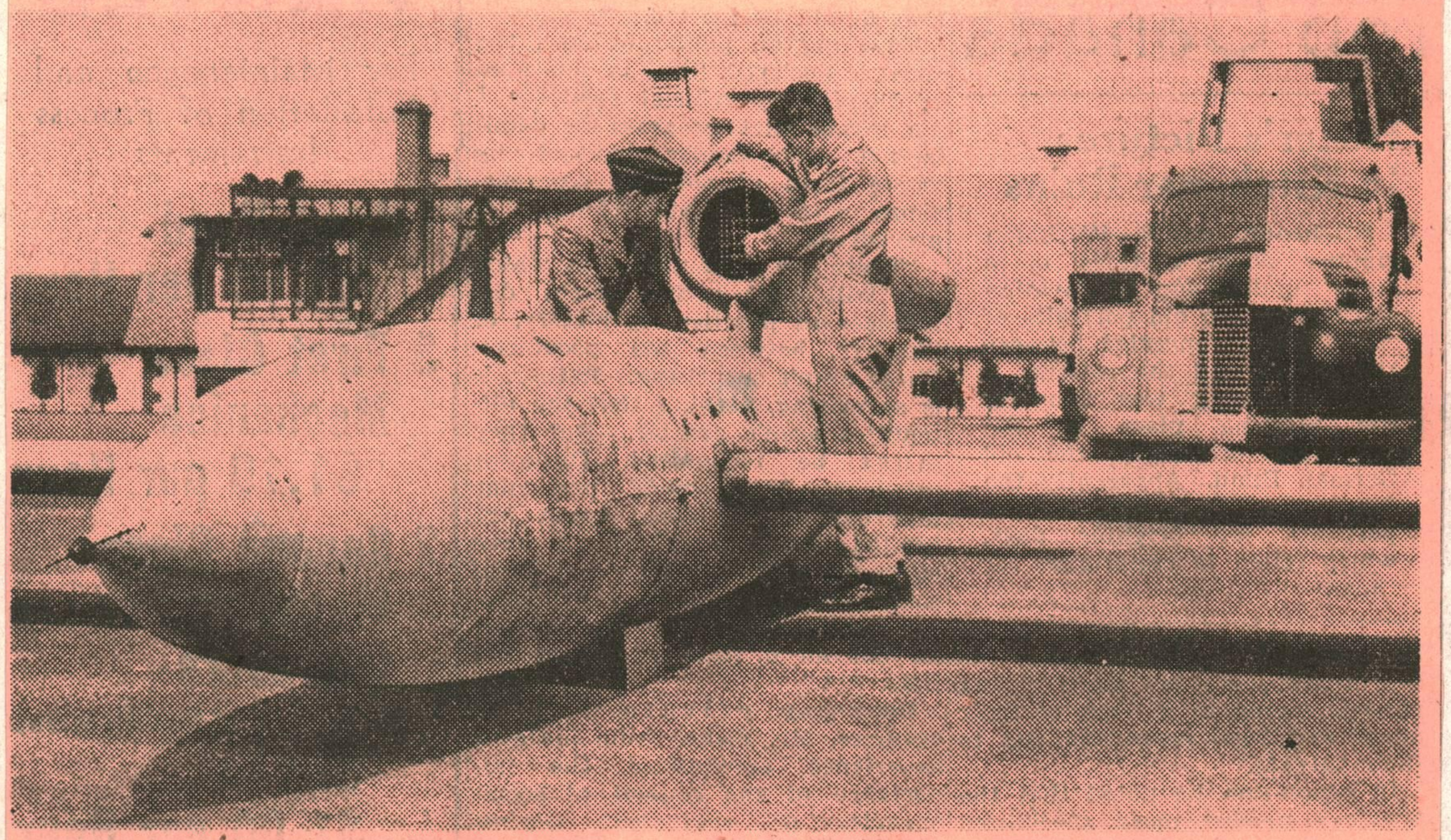


RCAF Holds Open House Across Canada

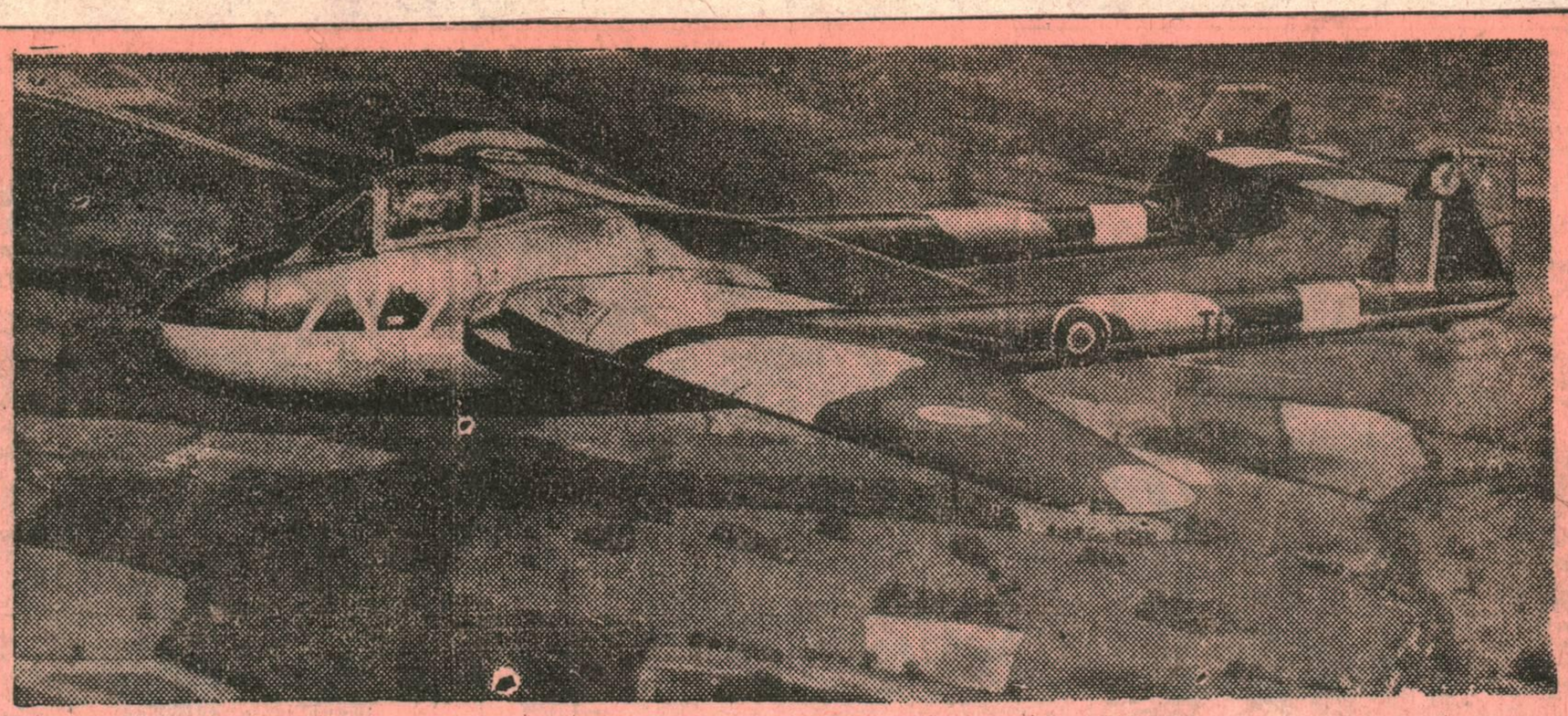


—Globe and Mail.

Air Force Day will be held on Saturday throughout the Dominion to give civilians an opportunity to see Canada's peacetime air force and its equipment. Vampire jet (in foreground) and German ME 262 (background) will be on display at RCAF Station, Toronto, on Avenue Rd.



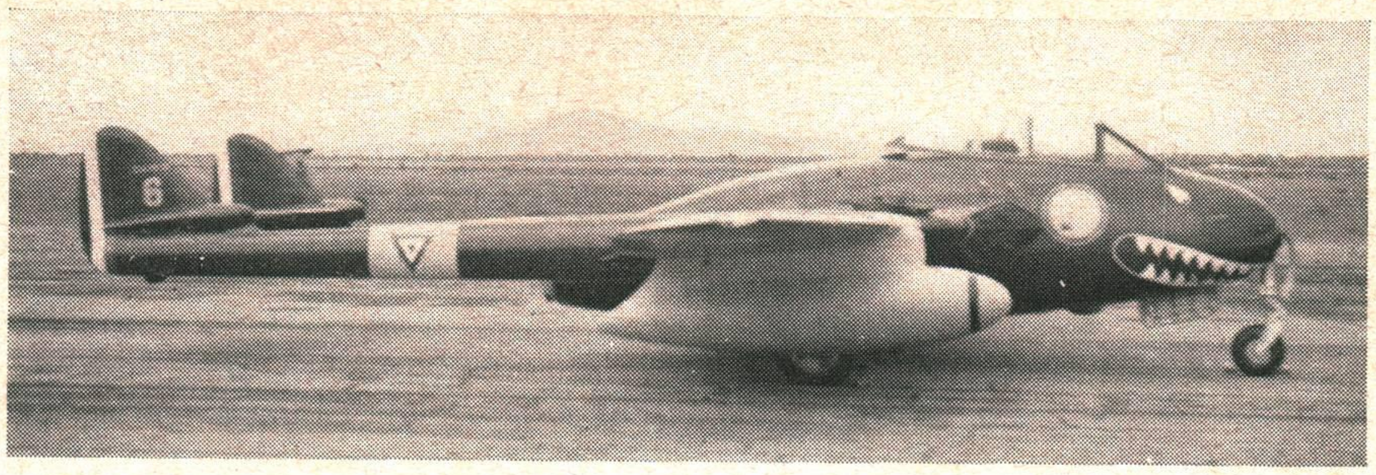
Buzz bomb which fell on London and Southeast England during the last two years of war will also be on exhibition. D. L. Dygert (right) explains to LAC. R. J. Dillabough how motor worked.



UNHURT IN CRASH — When his jet plane crashed into a swamp near the village of Wagaming, 125 miles north of Port Arthur, Wing Cmdr. Summerville is reported to have escaped injury Wednesday. The Vampire was being flown from Toronto to the West Coast for the Vancouver RCAF Squadron.

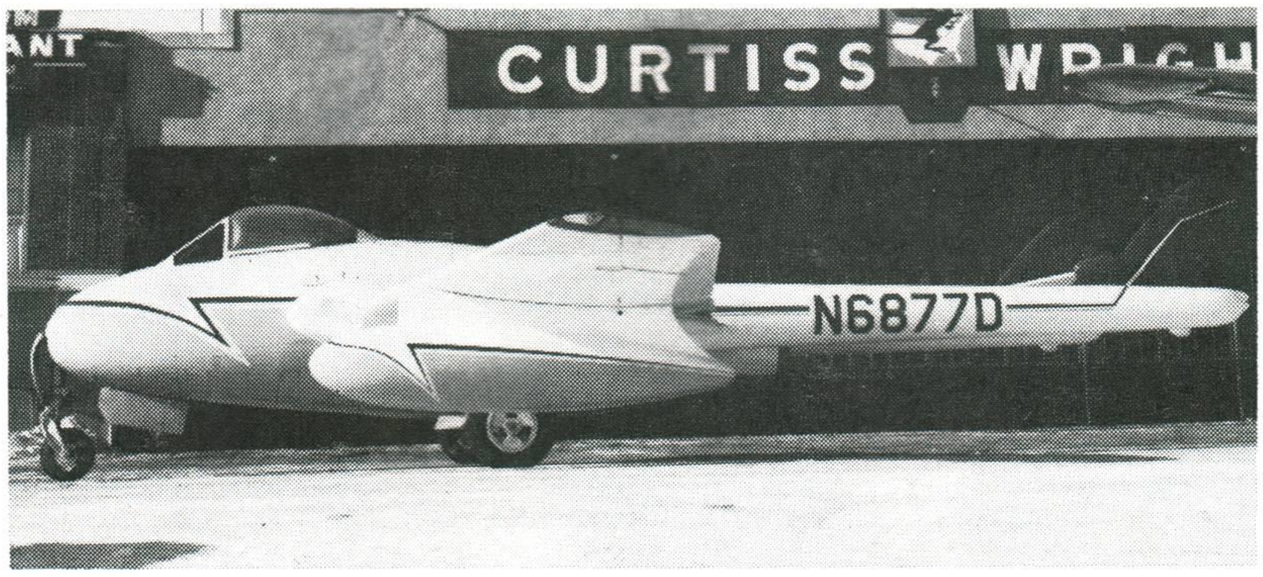
SIX JET FIGHTER planes are shown below as they arrived in Montreal from England Friday. They are now in Trenton where they will remain for a few days. Fliers shown (Top) have made a place for themselves in aviation history books. Pilots of the RAF Vampires which made the Atlantic crossing are (Left to Right), L. S. Evans, E. W. Wright, R. W. Oxspring, F. C. Woolley, W. C. Wood and R. I. Skinner.


GJ



STILL GOING STRONG.—This gaily painted Vampire Mk. III is one of 15 ex-R.C.A.F. aircraft purchased by Mexico as the first step towards modernization of its air force. The Vampires are the first jets to be operated by the Mexican Air Force.

"Aircraft" June/61



PRIVATE VAMPIRE: This ex-RCAF Vampire is now privately owned and operated in the U.S. by the Ken Cook Co., publishers, Milwaukee, Wis. Pilot Ken Cook reports that the Vamp's original RCAF serial number was 17069, and that it served with 438 and 411 squadrons, both auxiliary units. Difficulty has been experienced in getting certification by U.S. authorities, and it is being operated in the "experimental" category.

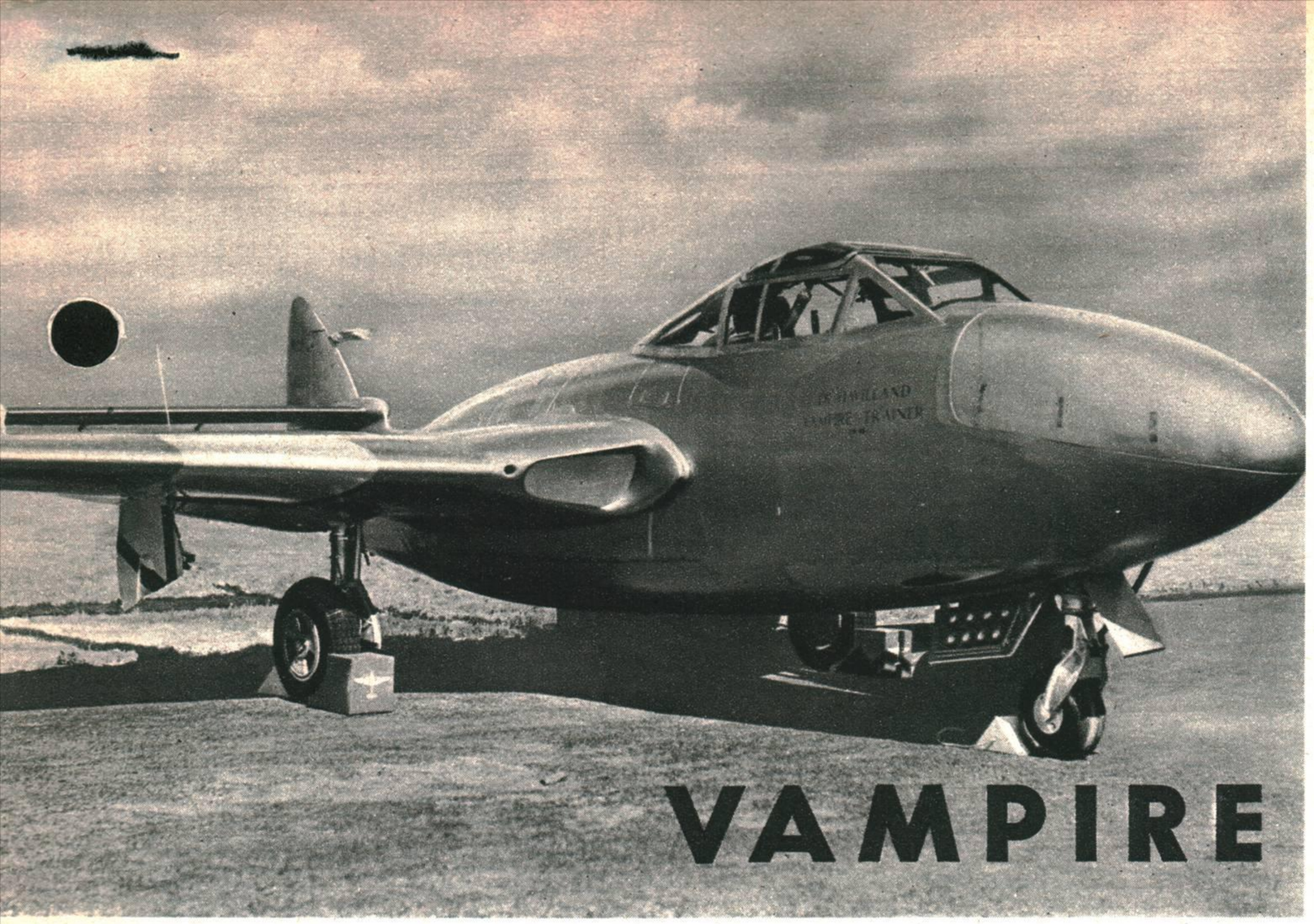
Mexican Air Force de Havilland DH-100 Vampire

Mexican air force de Havilland DH-100 Vampire Mk. III is one of a group of 15 purchased as surplus from the Royral Canadian Air Force. Aircraft will form Mexico's first jet fighter squadron; are being overhauled by Fliteways, Inc., West Bend, Wis.

AVIATION WEEK, January 2, 1961

The Aeroplane Jan 23/59

Right, used by a commercial organization in Indiana as an executive aircraft is this D.H. Vampire 3, ex-R.C.A.F., one of a batch purchased from the Canadian Government.



The Vampire Trainer was seen for the first time in public at the S.B.A.C. show last September. ("*Flight*" *photograph*).

VAMPIRE TRAINER

Details of the New de Havilland D.H. 115 Two-seat Side-by-side Instructional Aircraft, Developed from the Night Fighter

THERE has recently been a good deal of outspoken opinion on the production of military equipment (or the means of making that equipment) for foreign countries. Certainly, aircraft have not been too directly involved in the acrimony, and we only mention the matter as being in some way relevant to the genesis of the subject of this article, the D.H. 115 Vampire Trainer.

Had it not been for foreign buyers, it is quite possible that the Vampire Trainer—and with it the Vampire Night Fighter and the Venom—might never have existed as such. When, some seven years ago, de Havillands had the enterprise to design the original Vampire, their production commitments for the various types of Mosquito and Hornet were such that they could not undertake quantity production of the new design, and the Vampire was, in fact, produced by the English Electric Company. De Havillands, however, realized that, with the tailing-off of Mosquito and Hornet production after the war, the Vampire offered an attractive fighter solution to the air-defence problems of many friendly foreign governments; and, after some discussion with the Ministries concerned, the company undertook the manufacture of Vampires.

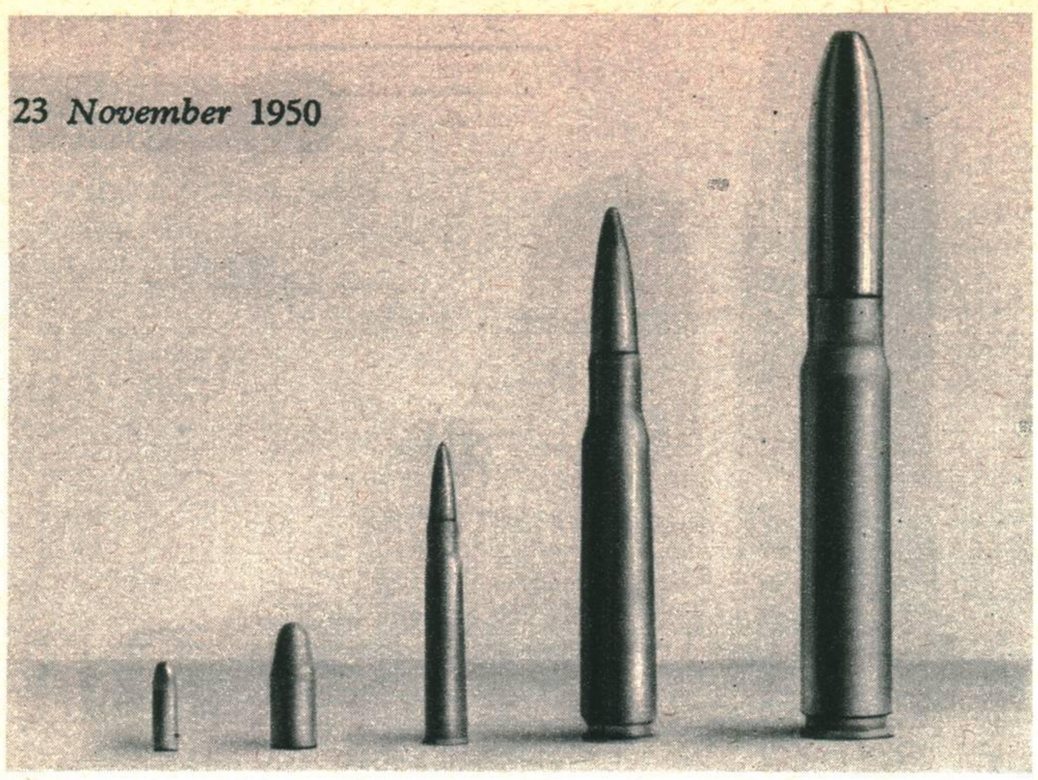
Certainly, some of the Vampires produced by de Havillands have gone to the Royal Air Force, but the production for foreign Air Forces—no fewer than 12 of them—has resulted not only in the obtaining of several million pounds' worth of overseas trade, but also—and in the ultimate analysis, perhaps even more important—it has resulted in de Havillands amassing sufficient experience with the design to enable them to undertake the successful development of variations on the basic theme.

By installing a Ghost in a modified Vampire airframe, and by extending the span, the world's altitude record was pushed up to only a trifle short of 60,000ft. The Ghost engine installation, and the high-altitude characteristics of the record Vampire provided data which, together with a modified wing, have resulted in the development of the Venom. Again, by wedding a Mosquito night-fighter cabin and nose to the basic Vampire, the night fighter was evolved; and, as an extension of the theme, by modifying the night fighter cockpit still further, the Vampire Trainer has been evolved, while a night-fighter Venom has also been produced. Thus, quite aside from the ordinary Vampire *per se*, four vastly important logical derivatives have come into being in a manner which might well never have occurred had not de Havillands had the courage and obstinacy to undertake Vampire production themselves.

As to the Vampire Trainer itself, the prototype was seen by thousands of interested spectators in the "static park" of the S.B.A.C. show at Farnborough in September. It was hurriedly prepared by Airspeeds at Christchurch and, after the show, was taken back to the experimental department of this associate company in the de Havilland Enterprise for finishing-off various installations preparatory to the first flight. This was made on November 15th.

We have referred to the Trainer's direct parentage by the night-fighter Vampire, but the accouchement was conducted by Airspeed, Ltd. Given a mock-up of the night fighter from Hatfield, a section of the Airspeed design team at once got down to the job of modifying the D.H. 113 design to provide a wider cockpit with full dual control, dual instrumentation and side-by-side seats. (In the night fighter, as in the Mosquito, the seats are staggered.) During a conference at which Mr. R. E. Bishop, chief designer of de Havillands, and Mr. George Miles, chief designer of Airspeeds, were present, it was decided to go ahead with the project; very shortly after this, there arrived from Hatfield a Vampire night-fighter fuselage. Work was at once started on widening and deepening the canopy rails, letting in laminated longerons, and extending the lower part of the nose by the addition of ply laminations.

At shoulder level, the Trainer's cockpit is 44in wide—i.e., 6in wider than that of the Mosquito: it is therefore quite comfortably roomy.



Calibre comparison : (left to right) 0.22in ; 0.455in revolver ; 0.303in ; 0.5in ; 20 mm. The two last-named rounds have "rimless" cases.

fired with a perfect aim. This "technical" dispersion—peculiar to the gun, its installation, and its ammunition—must be multiplied by a "personal" factor peculiar to the man concerned. For an average marksman, this factor approaches a value of 0.5.

In the Luftwaffe, an evaluation of films taken during actual air combats proved that average shots achieved aiming dispersions of 10 to 12 per mille of the firing distance, whilst good marksmen had 8 per mille aiming dispersion only.

A four-engined medium bomber may present, from the position of attack, a target area of, say, 300 sq ft. The lethal area calculated on the basis of technical burst-dispersion and the personal factor may be, for the range at which fire is opened, 7,000 sq ft. Then, at best, no more than $(300/7{,}000) \times 100 = 4.5$ per cent hits can be expected of all the shells fired during this burst. For a 20-sec burst from four 20 mm guns, about four hits could thus be reasonably expected. Actual air-combat experience has yielded dispersion values of 2 per cent of the range with 20 mm guns, i.e., the diameter of the lethal circle at 600 yards' range was not less than 72ft, or about three-quarters of the span.

"Fire density" means the number of shells which penetrate the lethal circle within a given unit of time. High fire-density and small dispersion are, for a given projectile, guarantees of success in air combat.

Self-propelling missiles, such as rockets, have energy of motion imparted to them because of the thrust force; when the force ceases, they behave like gun-fired projectiles. The thrust force prevents neither drop nor dispersion; but the trajectory becomes flatter because of the retention or increase of the speed. Salvo-firing experiments with the original model of R.4/M proved a technical dispersion of approximately 10 per mille over ranges of 200 yards. Improved types exhibited substantially less.

The "time of flight," i.e., the interval between ignition of the propellant charge and impact on the target, is another factor important for probability of destruction. The flying target moves over considerable distances whilst the projectile is under way. The greater the range over which the fire is opened, and the slower the projectile, the less the probability of a hit. As to manœuvrability, the faster the target the less capable will it be of changing its course quickly, so the use of automatically computing sights is a quite practical method of coping with the situation. The ideal case is, of course, the pilotless aircraft, which is unable to take evasive action.

The preceding reference to dispersion concerned firing from an aircraft in the direction of flight. Queer things happen when firing at an angle to this direction: aerodynamic forces then deflect the projectile, because it enters the air stream obliquely. With a fast spinning shell, a Magnus cross-force results from the circulation.

When leaving the muzzle, the shell's trajectory is determined by three imposed motions: translation along the barrel; velocity of the muzzle in respect to the air at rest; and rotation due to spin. Deflections of the shell due to aerodynamic forces produce, in turn, gyroscopic effects. When these deflections can no longer be neglected (i.e., in view of high aircraft speeds and long ranges), due allowance must be made in the technical dispersion if the barrel does not point in the direction of the intercepter's motion. Semi-flexible gun installations—which, because of reduced manœuvrability, might eventually become necessary for supersonic intercepters—present particular problems in the adaptation of automatic computing and triggering sights.

The trajectory of a rocket, too, greatly depends upon the motion of the "platform" from which it is launched. Supersonic missiles, like the R.4/M, preferably have initial guidance, such as launching tubes or rails; the optimum length of these is critical. Also, the attitude of the rail in respect to the path of the launching aircraft has an effect upon the subsequent trajectory. Spinning rocket-missiles produce higher dispersion than fin-stabilized, unrotated ones.

A major disadvantage in intercepters flying near their critical Mach number is their lack of steadiness in yaw. Present-day high-speed intercepters suffer from "snaking," i.e., from undamped yawing oscillations. This presents a great difficulty in air combat. Somewhat belated steps are now taken to provide gyroscopic "auto-stabilizer" devices to suppress snaking and give a steady gun platform. These devices (an experimental model by the R.A.E. was recently shown at Farnborough) allow the pilot free use of the rudder for taking aim.

(*To be continued*)

FACILITATING FLIGHT-RESEARCH

A USEFUL flight-test research tool has been developed by Blackburn and General Aircraft, Ltd., to supplement the scope of the automatic observer. Known as the Pressure Scanner, the device is basically a selector valve, into which run pipes from each point at which pressure is to be measured, and from which are connected a number of pipes to the pressure-recording instruments. The input ends of the pipes connected to the instruments are carried on a moving member in the scanner, which is driven in controlled steps across the ends of the pipes from the vents. By this means, each instrument is connected successively to a number of vents, so allowing the pressures at a large number of separate points to be individually recorded by a small number of instruments.

The instrument panel is photographed by a camera automatically timed so that the exposure is made just before the moving member transfers from one row of pipes to another. Instrument lighting is synchronized with the camera to reduce the electrical load, and the time allowed for the instrument reading to settle (three seconds) is more than enough to avoid lag in any normal length of pipe connecting the scanner to the vent. Such a scanning speed allows individual pressure measurements to be made at the astonishing rate of 300/min, while using only 30 instruments.

FLEXIBLE BEARINGS

IN the orthodox flexible bearing, inner and outer metal elements are usually bonded by an intervening rubber sleeve, the elasticity of which permits partial movement of one element in relation to the other. In an unusual modification of this method, seen in the patented Clayflex bearing, there is the important difference that the rubber sleeve is not adhesively bonded to the metal; instead, it is stretched to a greater axial length before assembly, with the result that it assumes a permanently "active" state in which it tries to return to its former, larger diameter. This tendency, however, is prevented by the metal sleeves, so that a constant radial pressure is exerted which effectively prevents any creep between metal and rubber, provided the approved angular movement (up to 70 deg, according to bearing type) is not exceeded. If it is exceeded, the rubber will not tear; the bond is, in effect indestructible.

For bearings intended to work in the presence of certain oils and other liquids, and in extremes of temperature, special synthetic elastic elements are used instead of natural rubbers.

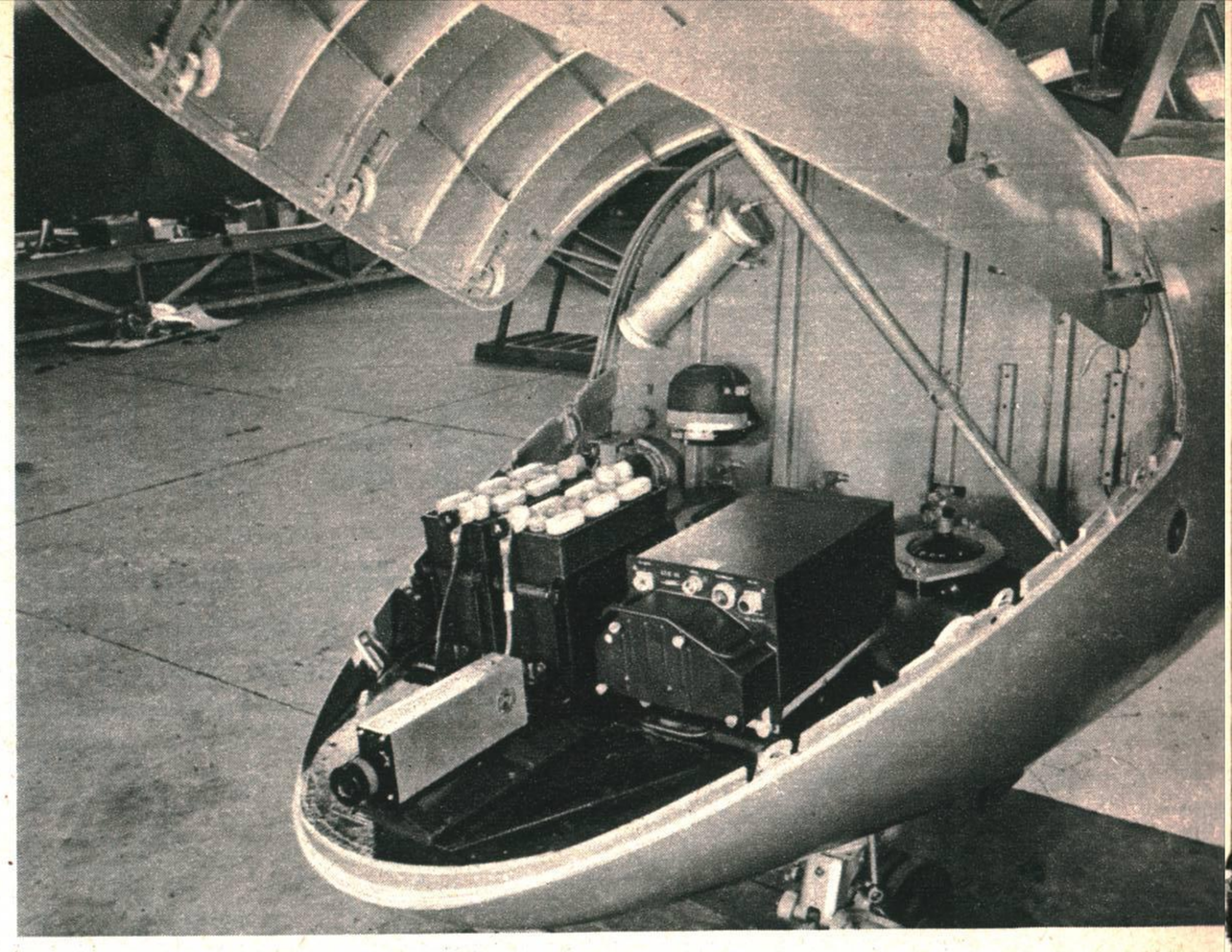
Some of the hundreds of standard Clayflex bushes, together with various special applications, are illustrated in a catalogue issued by the makers, Howard Clayton-Wright, Ltd., Wellesbourne, Warwickshire.

The cockpit and nose-profile changes aside, and with one or two detail exceptions, the Trainer can be regarded as a two-seat Vampire 5. It has the same wings and booms as the 5, but has a Goblin 3 power unit which differs from standard Vampire practice only in that the pressure for the cabin is tapped from the engine compressor instead of being supplied by a separate cabin supercharger: the differential is 2.75lb/sq in. There are also slight deviations in the tail surfaces, made necessary by virtue of the extended nose and, by the same token, these changes apply also to the D.H. 113 night fighter. They are as follows: the elevator trim tab has been increased in span (although the chord remains the same) to provide nearly 50 per cent greater area, the rudders have both been heightened so that they are of greater aspect ratio, whilst the tailplane tips have been extended so that they now project outboard of the fins. The increased nose area and the c.g. shift relative to the Vampire 5 make it understandable that some compensation would be necessary in the tail surfaces to counteract the consequent influences on directional and longitudinal stability. In the night fighter, the nose compartment, of course, houses the radar equipment, but in the Trainer this stowage volume is given over to radio, batteries, oxygen bottles and, in the extreme nose, a G.45 cine-gun camera: in the prototype, two four-channel V.H.F. sets are installed, but these are likely to be supplanted by a single ten-channel set in production aircraft.

With a cockpit which, at shoulder level, is 44in wide—i.e., an inch wider than that of the Airspeed Oxford, and 6in wider than that of the Mosquito—an entirely new form of canopy had to be devised. The framework is of welded tube, with glazing flats welded on, and on each side of the large, single-piece optically correct front screen are flanking direct-vision panels. The front screen is a four-ply Triplex unit, the two inner, $\frac{3}{8}$in-thick panels of which are fronted and backed by $\frac{3}{16}$in-thick panels, all four being sandwiched with Vinal interlayers. In common with the remainder of the canopy, the direct-vision panels are glazed in Perspex, and are of a rearward-sliding type similar to those used on the Ambassador.

Access to the cockpit is provided through the roof panel, which, hinged at the rear centre-point, is locked by a pair of turnbuttons on each side, actuated from an internal lever mounted in the centre of the upper front-screen rail. A flush-retracting handle in the fairing at the rear of the hood is tied-in to the turnbutton linkage so that the hood can be opened from outside. For emergency jettison, a small hydraulic jack is embodied inside the hood, and connects into the external release-handle linkage to the turnbuttons. The jack is quite small, but is, nevertheless, amply sufficient to release the hood in flight—a job which, due to the increased friction on the turnbuttons as a result of the air load on the hood, might be beyond the power of a man's wrists even in the compelling circumstances of an emergency. Upon release, the leading-edge of the hood lifts somewhat, and when being jettisoned would be whipped back by air pressure and so break a shear point in the hinge.

In relation to the very short time taken to produce the prototype, the excellence of the Vampire Trainer's cockpit layout is most marked. We have seen all too many cockpits that have been the result of months of deliberation, but, even so, have still been mediocre. The Trainer, however, has a cockpit which actually looks inviting; it is admirably laid out, uncluttered and—perhaps the secret of its success—is absolutely straightforward. The seats are standard 25/40 g S.B.A.C. buckets, the centre of the pupil's seat being offset 10in to port of the fuselage centre-line, whilst that of the instructor's seat is offset 11in to starboard, this asymmetry—which is completely unobtrusive—being necessitated by the pupil's throttle-box and the elevator quadrant on the port side. Both seats are carried on horn-arms off lateral torque-tubes supported in extruded pillars, each seat being individually adjustable by a handle on the right-hand horn-arm, and located fore-and-aft by a pair of radius struts off the rear bulkhead. Behind and between the seats is a built-up box pillar carrying wing-tank jettison control, ground/flight master switch control, cabin pressurization control, and cabin temperature control.



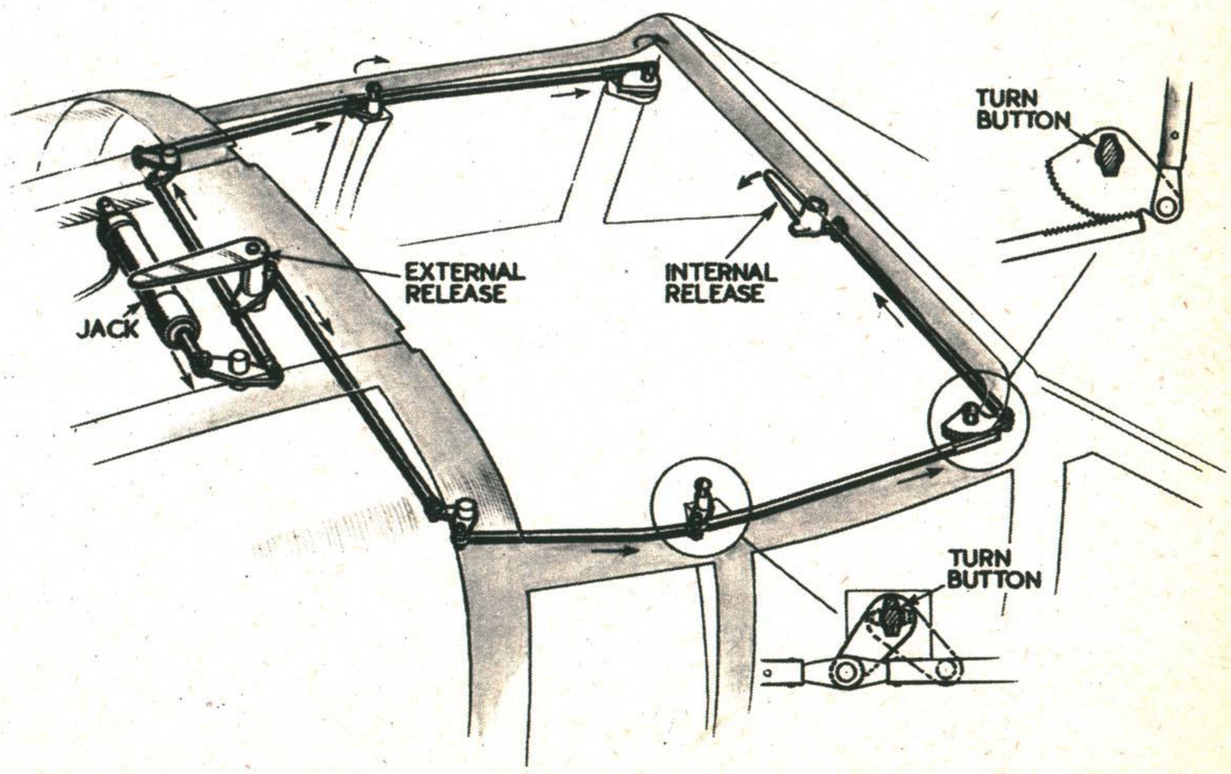
The alligator nose offers magnificent accessibility.

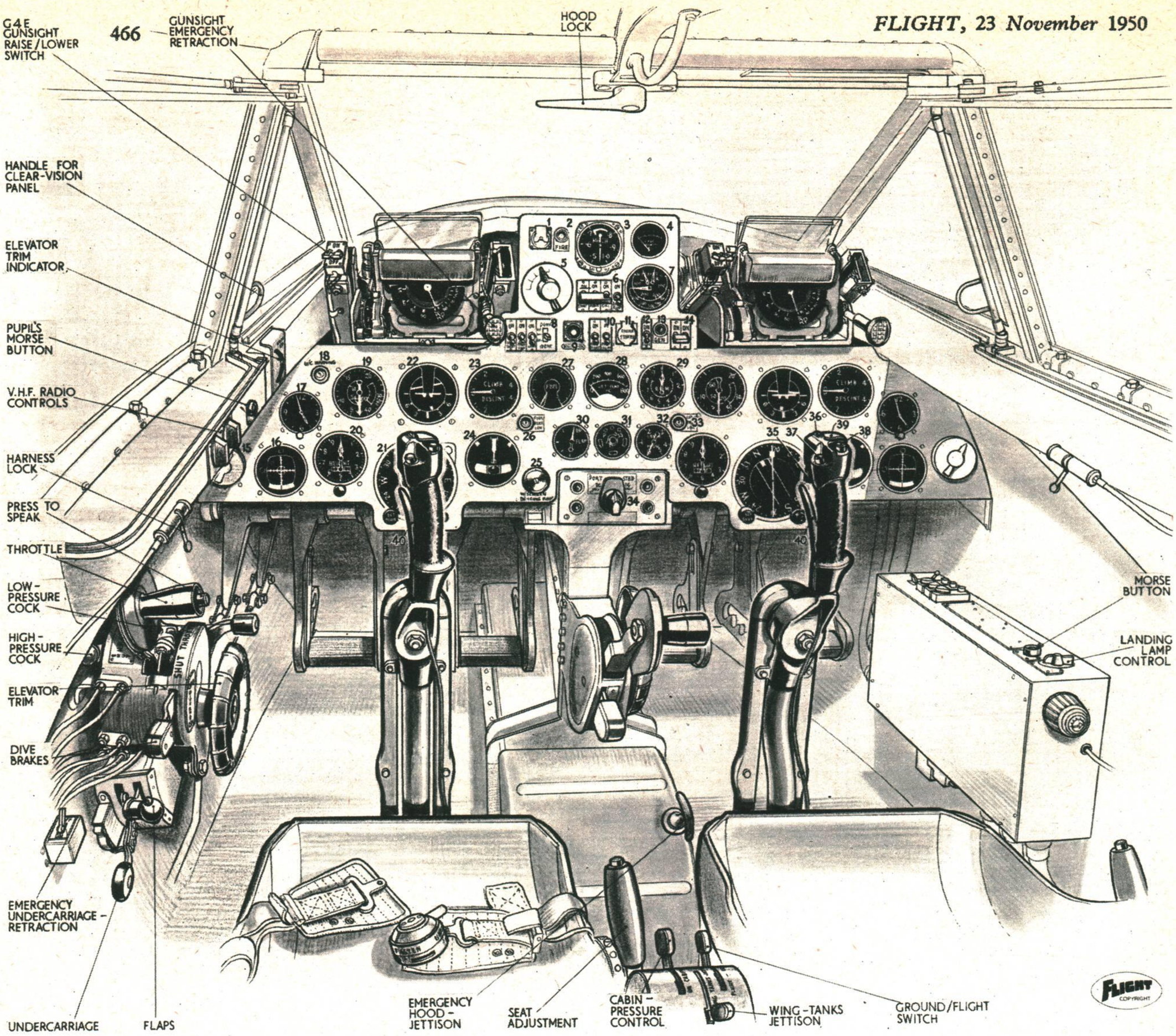
Wrist-action control columns are fitted. Instead of the spade-type grip used in the ordinary Vampire, the latest Dunlop moulded grip is used, and an extraordinarily neat and comfortable unit it is. The brake lever curves upward and outward from the base of the grip proper, and in the head of the grip are press-button and trigger-type switches for camera, guns, and bombs; R.P.s are fired by the gun button, after individual selection on a separate switch. For dual-control purposes, the control columns are linked by push/pull tubes to a bridging cross-tube behind the dome of the nosewheel well, which projects about 7in above floor level and runs back into the cockpit roughly to the front of the seats. Universal shafts extending rearward from the base of the columns carry sprockets for cross-linkage chains, and the port tube also carries cable anchor wheels from which the aileron cables run out to port, round Tufnol fairlead pulleys, and so, together with the elevator and rudder cables, rearward through a cast gland-box for pressure retention.

Rudder pedals of standard Vampire-Mosquito-Hornet type are hung from a pair of torque tubes bridging the cockpit, and although four feet have to be catered for, the spacing of the pedals is not too constricted. The pedal centres are, in fact, of the order of 14in, and pilots who fly the Trainer from either seat should be quite comfortable.

Interconnection of the engine, elevator trim and dive-brake controls is rather complex. The throttle, high-pressure and low-pressure cocks and the elevator trim control have an endless Teleflex system running back from the pupil's throttle-box to Teleflex pressure joints on the rear pressure bulkhead. Off one side of the throttle and elevator trim circuits, insert sections are taken in cable and

Detail of hood-locking system. The jack is purely for hood-jettison in an emergency when manual strength might be insufficient.





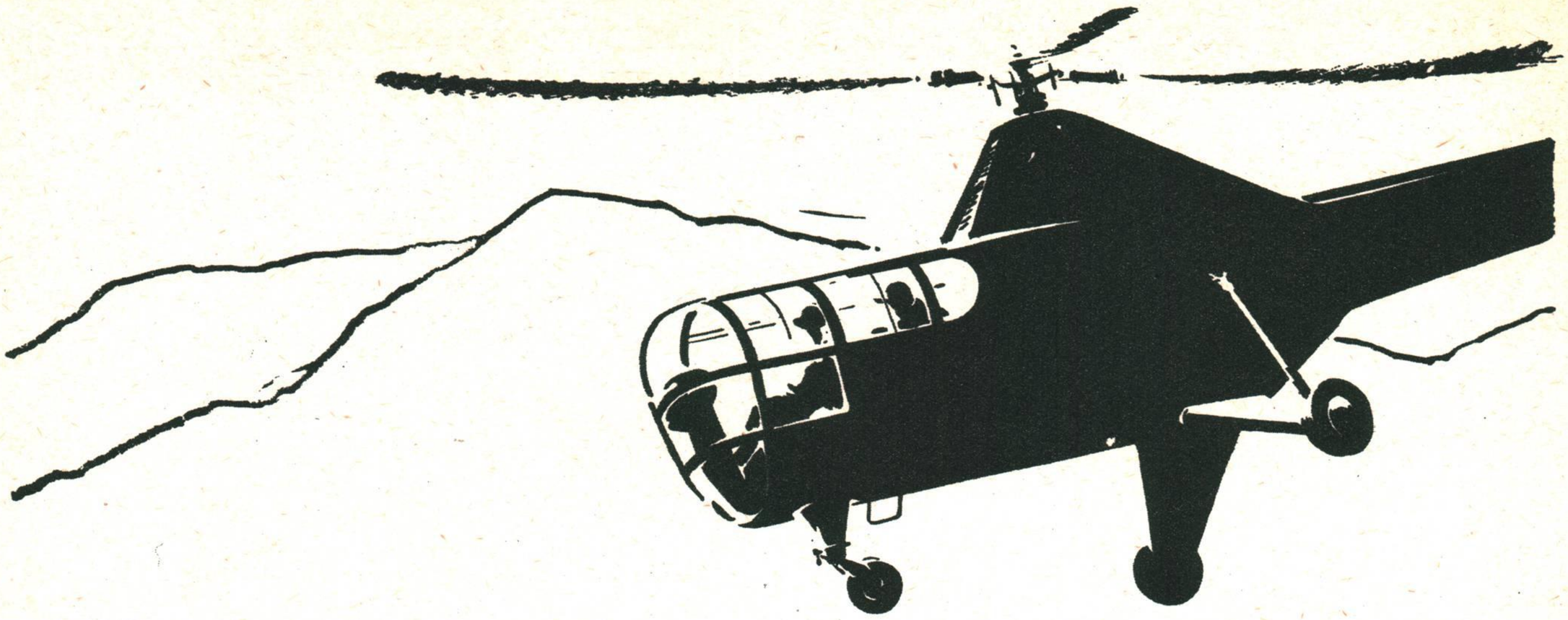
(1) Fire-suppression button; (2) Fire warning; (3) Machmeter; (4) Rear-bearing temperature; (5) Gunsight dimmer; (6) Left to right: Switches—start, master, compass, booster pump; (7) Brake pressure; (8) Left to right: Switches—Gunsight, pitot-head heat, navigation lights, downward identification lights; (9) Booster coil; (10) Pump-isolating, auxiliary start; (11) Starter button; (12) R.P. pairs/salvo; (13) Generator warning; (14) R.P. master selector; (15) Gunsight selector; (16) I.L.S. ndicator; (17) Clock; (18) Undercarriage warning; (19) Air-speed indicator; (20) Altimeter; (21) Gyrosyn repeater; (22) Artificial horizon; (23) Rate of climb; (24) Turn-and-slip; (25) Windscreen de-icing pump; (26) Fuel-pressure warning; (27) Fuel contents; (28) Jet-pipe temperature; (29) Tachometer; (30) Flap position; (31) Undercarriage position; (32) Cabin pressure; (33) Cabin pressure warning; (34) Gyrosyn controller; (35) Gun-firing switch; (36) Guns—fire/safe; (37) Camera button; (38) Bomb button; (39) Bomb-button safety shroud; (40) Brakes.

This view of the cockpit from the pupil's seat makes clearly apparent the neatness and convenience of the whole layout.

VAMPIRE TRAINER . . .

chain down to a pair of co-axial torque tubes behind the pupil's seat. Leads from the instructor's throttle-box are taken down to the inboard end of these torque tubes. The dive-brake interconnection is made in a somewhat similar fashion, except that the whole transmission is by push-rods linking to a third (outermost) co-axial torque tube with take-off to a hydraulic selector valve which, together with those for undercarriage and flap control, is located at the base of the pressure bulkhead beneath the gland-box.

The primary flight-instruments are fully duplicated, and are embodied on a single panel spanning the cockpit, with the engine and auxiliary service instruments occupying the central area. A separate panel standing above the centre of the main board carries the engine and auxiliary service switches, a vacuum gauge and a machmeter, and is flanked by the Mark IVE gyro gun-sights in their M.L. Aviation retractable mountings. The blind-flying instrumentation differs from standard in that the A.S.I.s are of limiting-safe-speed type; G.IVB Gyrosyn compass repeaters do the duties both of compass and directional gyro; and I.L.S. indicators are embodied. The limiting-safe-speed A.S.I.s have a small window in the instrument face indicating the Mach number, and this is translated to an I.A.S. equivalent by a small needle sweeping a separate little scale at semi-radius. On installation, the instrument is set to the known limiting Mach number of the aircraft and, by virtue of the barometric compensation embodied, varies the indicated Mach number and its I.A.S. equivalent according to the obtaining conditions. So long as the main indicating needle does not move round to a value exceeding that of the smaller limiting-speed needle, the aircraft is flying within its safe speed range. The Gyrosyn compass installation has the master unit and variation-setting corrector tucked away behind the port seat, and a small control panel is mounted on a pedestal immediately forward of the instructor's throttle-box. As already mentioned, each pilot has a repeater indicator, and the central knob of the control panel can be turned to select port or starboard indicators alternative to the central "off" position. With the "off" position selected, each of the indicators acts as a normal slow-rate directional gyro, but when one or other is selected on the central control knob, that unit is compass-monitored and becomes, in fact, the ordinary Gyrosyn unit, whilst its fellow remains as a directional gyro indicator. Each indicator is provided with a "lining-up" knob and a setting knob, the former for lining-up the gyro according to the magnetic heading, when the instrument is being used as

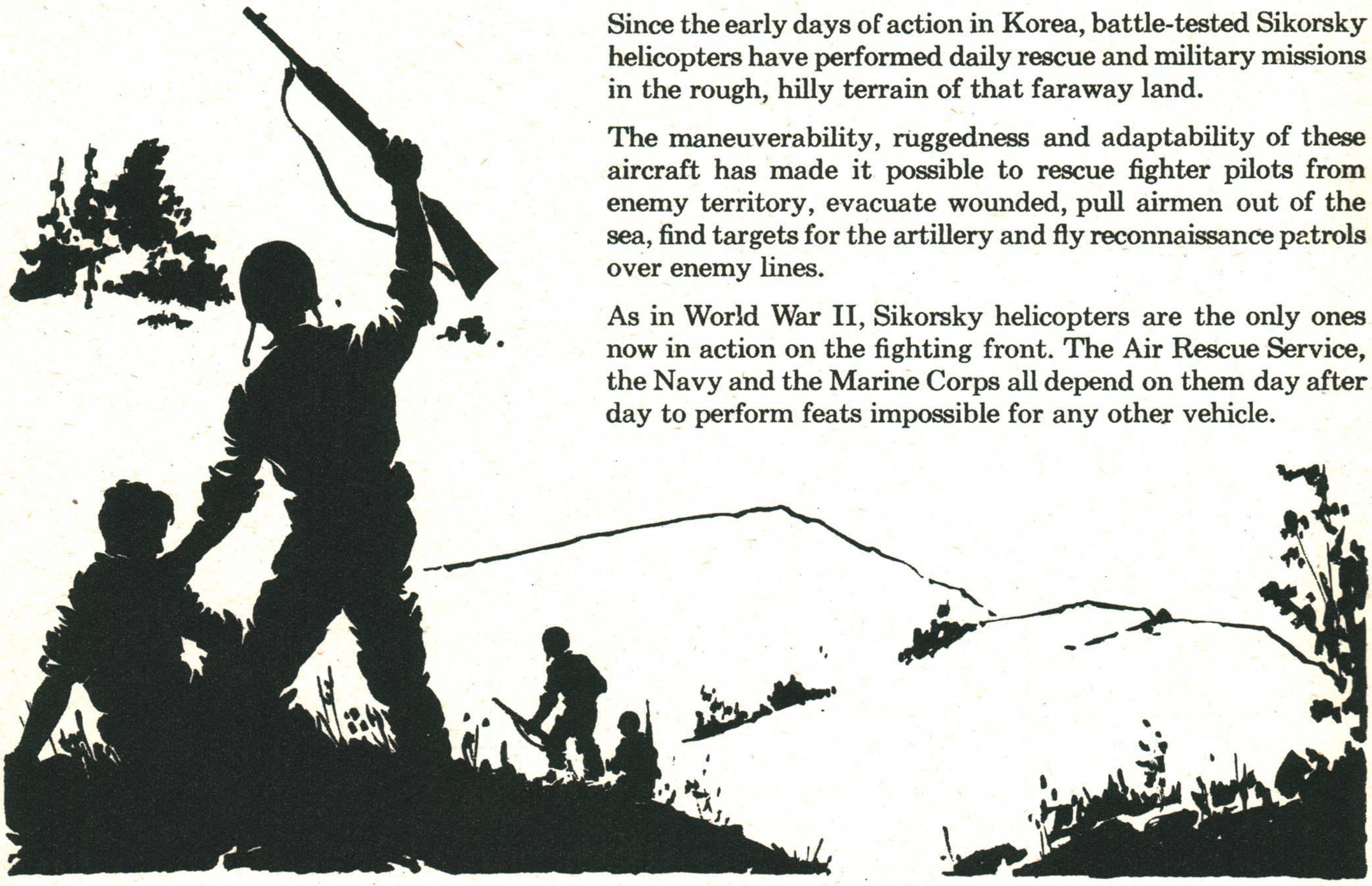


SIKORSKY HELICOPTERS at the front in Korea

Since the early days of action in Korea, battle-tested Sikorsky helicopters have performed daily rescue and military missions in the rough, hilly terrain of that faraway land.

The maneuverability, ruggedness and adaptability of these aircraft has made it possible to rescue fighter pilots from enemy territory, evacuate wounded, pull airmen out of the sea, find targets for the artillery and fly reconnaissance patrols over enemy lines.

As in World War II, Sikorsky helicopters are the only ones now in action on the fighting front. The Air Rescue Service, the Navy and the Marine Corps all depend on them day after day to perform feats impossible for any other vehicle.



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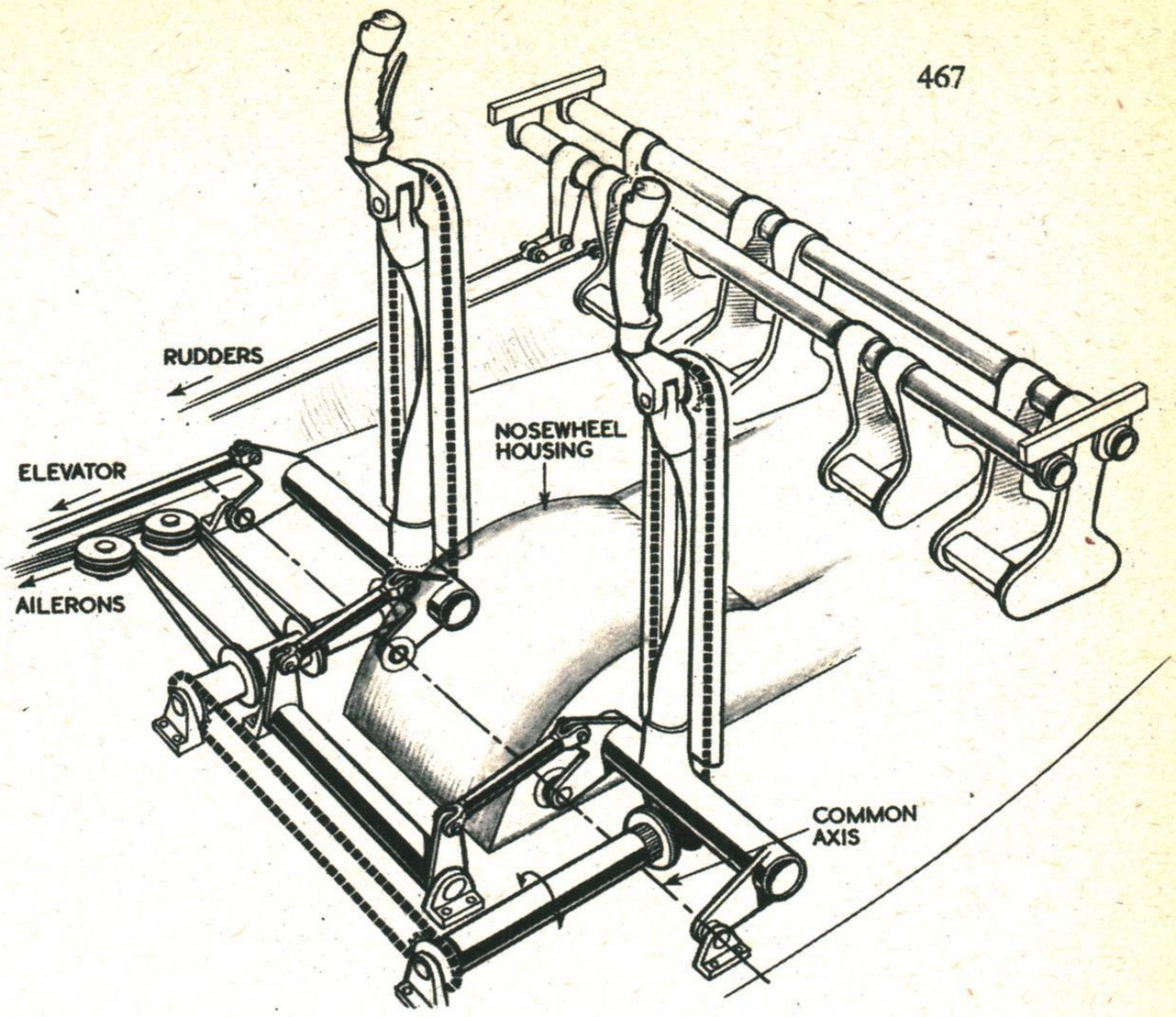
a Gyrosyn, whilst the setting knob is employed only when the instrument is functioning as a normal directional gyro.

Each gyro gun-sight can be used independently of the other, the master control is within the reach of each pilot, and each sight has its individual selector switch; the range control is conventionally embodied on each throttle. On the left-hand side of each mounting is a switch for raising or lowering the sight, and a red emergency knob at the lower right of each mounting is provided so that, if an electrical failure occurs with the sight extended, a wire is snapped and the sight automatically retracted.

It is difficult to assess an aspect of fighter-pilot training which is more important than gunnery, in which term, of course, must be included R.P. and/or bomb attacks, and in this regard, the side-by-side pupil/instructor relationship afforded by the Vampire Trainer is nothing less than ideal. The use of standard Vampire 5 wings enables the Trainer to carry the eight rockets or two 1,000-lb bombs of the Mark 5, in addition to the fuselage armament of four 20 mm Hispano cannon, each with 150 rounds. Thus, not only does the aircraft provide training potential matched precisely to the operational ability of the single-seat Vampire fighter-bomber but, if necessary, in an emergency, the Trainer can be immediately used in full-blooded operational roles. At the present time there is a distressing lack of training aircraft in which gunnery instruction can be given to pilots at high speed and, even more important, at high altitude. The Vampire Trainer should fulfil this vital requirement admirably, for its stability limitations at its operational ceiling should be in no wise inferior to those of the Vampire 5.

De Havillands refer to the 115 as an "all-purpose" jet trainer, and they are not overstating the case. In addition to training in gun-, rocket-, and bomb-sighting, air combat and fighter navigation, which are implicit in the layout and equipment of the aircraft, the Trainer is also eminently suitable for employment as an advanced trainer, and for the ever increasingly important work of jet conversion. So straightforward and docile are the flying characteristics that it was seriously suggested to us that the trainee pilot might well go straight on to the Vampire Trainer from an *ab initio* type such as the Chipmunk or Prentice. Another and, we should think, extremely valuable use for the new aircraft, will be deck-landing training —all that is needed is the fitting of catapult and arrester hooks and retention tongue. For the young pilot being initiated into the difficult art of deck-landing, we can visualize no more comforting and confidence-instilling arrangement than to be able to essay the venture with an old hand sitting by one's side. To some extent, the same thing applies to initiation into the forbidding realms of compressibility. The excellent control characteristics throughout its speed range for which the Vampire is world-famous means that the handling of the Trainer at high Mach numbers well suits it to this employment. Curiously, despite the large flat area of the front screen, the Trainer has a greater maximum speed at the higher altitudes than has the single-seat Vampire: these, of course, are estimated figures, but the design people concerned have a reputation for conservative estimation, and justify the increased maximum on the grounds that the fuselage has a better fineness-ratio.



Detail of dual control articulation and cross-linkage.

In brief, the performance of the Vampire Trainer can be summarized as follows: The operational ceiling of 40,000ft can be reached in 16.3 minutes, and when the aircraft is fitted with two 100-gallon drop tanks, the operational ceiling is reduced to 34,000ft, which can be reached in 17.5 min. The maximum level speed is 467 kt at sea-level, and 452 kt at 40,000ft.

At a Mach number of 0.7, at 40,000ft (395 kt), the radius of steady turn is 1.95 nautical miles. At the same speed and altitude, the aircraft can achieve a minimum radius of turn of 0.95 n.m. At lower altitudes, these figures will naturally be considerably improved.

The endurance at altitude with allowances for take-off, climb and descent, is approximately two hours without drop tanks and three hours with. Without drop tanks, the aircraft has a still-air range of 730 n.m. at 30,000ft, and 345 n.m. at sea-level. With drop tanks, the corresponding figures are 1,080 n.m. and 540 n.m.

For practice ground-attack duty with eight 25-lb R.P.s, a practical radius of action of 100 n.m. at 5,000ft can be achieved, whilst leaving an ample fuel margin at the end of the flight. Without external equipment, the limiting Mach number at high altitudes is nearly 0.8 and, without drop tanks, 0.7. The maximum true level speed of which the Vampire Trainer is capable (without external equipment) is 477 kt at 20,000ft, this being equivalent to a Mach number of 0.775.

C. B. B-W.

TESTING SUPERSONIC AIRSCREWS

THAT supersonic airscrews are receiving a good deal of consideration in the U.S.A. is implicit in the announcement that the world's first supersonic-airscrew spin-pit will be in operation early in 1951 at the Aeroproducts division of the General Motors Corporation, Dayton, Ohio. The pit takes the form of a steel cylinder of 12ft 10in diameter, 7ft 10in high, which is sunk below ground level with an airtight seal to a concrete base, and a steel-dome roof.

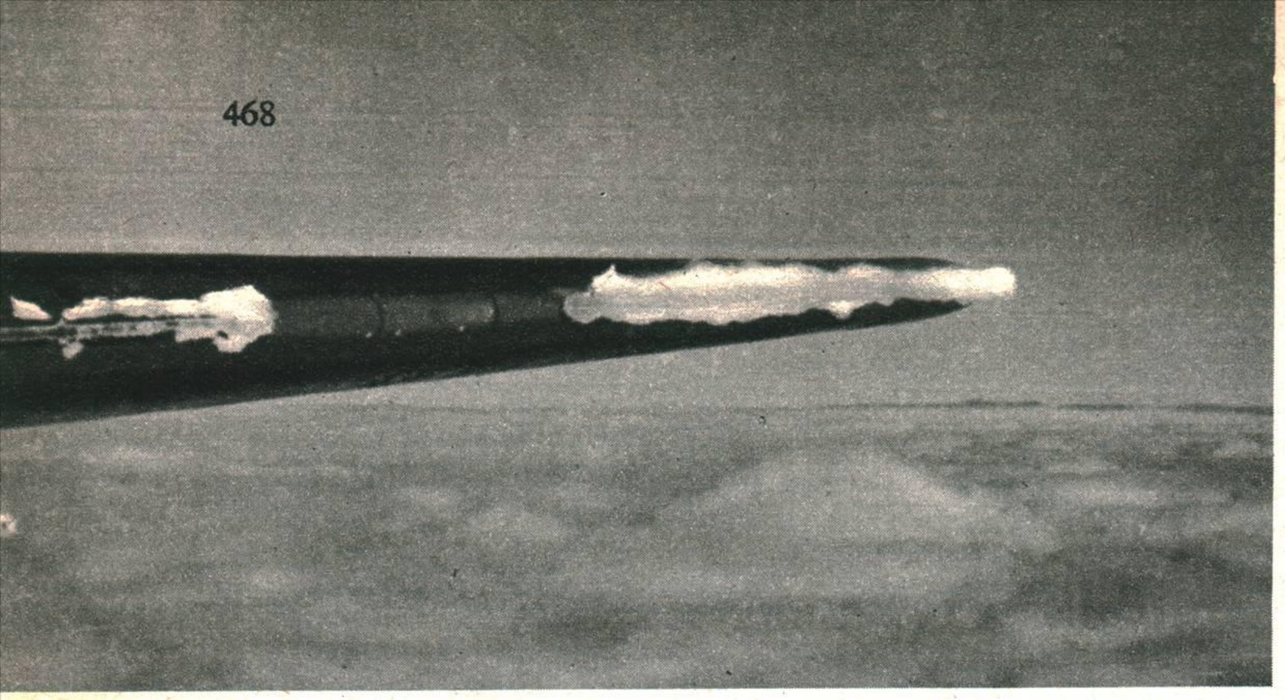
By evacuating the chamber down to 0.01 atmosphere (i.e., 99 per cent vacuum) an engine of only 450 h.p. is sufficient to rotate test airscrews at relatively high r.p.m. The test specimen is rotated in a horizontal plane, by means of a vertical driveshaft through the dome from a right-angled gearbox.

It appears that tapered blades of very thin section form the basis of present Aeroproducts studies. Illustrations of comparative sections at a 20in-radius show the supersonic blade to have a t/c ratio of about 4.83 per cent, by comparison with a t/c of 22.55 per cent for a conventional subsonic blade.

EARLY WARNING OF ENGINE FAULTS

A NEW-TYPE instrument known as an engine-performance indicator has been developed by the Consolidated-Vultee Aircraft Corporation, its purpose being to give advance warning of impending engine failure. Comprising a compact detector unit, linkage, and an indicator dial for the cockpit, it is installed adjacent to the carburettor, where it performs a function described as "measuring the distances to right or left to which the engine is displaced when the airscrew is rotating."

The cockpit unit is basically a voltmeter graduated in b.h.p., and the accuracy of the indication is said to be greater than that of any device of this kind previously developed. Should the engine show signs of rough running or power loss prior to a failure, the needle on the gauge immediately oscillates and a warning light glows on the panel, thus giving the engineer time to check operation and, if need be, feather before serious damage occurs. (It is often difficult at present to detect an incipient failure in time to save the engine from complete destruction with, in extreme cases, loss of the airscrew and reduction gear.)



These photographs of the port and starboard tailplanes of the Viking in which the B.E.A. de-icing flight trials were conducted clearly demonstrate the effectiveness of the Porosint panel distributors as against the standard strip-type distributors (immediately inboard) and also indicate, by the ice accretion on the unprotected outer portions of the leading edges, the severity of the icing conditions encountered.

ECONOMICAL DE-ICING

Results of a B.E.A. Investigation of the Porosint Fluid-distributor

THE advent of both the surface-combustion heater and the gas turbine has provided two heat-sources of considerable attraction for de-icing purposes, so it is not surprising that thermal anti-icing has lately tended to overshadow the erstwhile standard methods of protection by chemical and mechanical means. Nevertheless, thermal systems are not light, and all share the necessity for incorporating the distributive ducting in the aerofoil leading edges as an inherent part of the structure. (It is not practicable to apply a thermal system to an existing structure; at the very least, the whole of the leading edge would need to be rebuilt in a considerably modified form.)

This does not apply to the latest development in the well-known chemical system established by T.K.S. (Aircraft De-Icing), Ltd. A new sintered-bronze known at Porosint has made possible not only the protection of wings and tail surfaces without severe structural modification but, in addition, has shown an efficiency better than twice that of the existing strip-insert-type distributor. Porosint is made by Sintered Products, Ltd., for T.K.S., and an extraordinary material it is; seemingly smooth both in appearance and to the touch, it has, in fact, millions of tiny pores through which the special "Kilfrost" de-icing fluid can exude. With panels of the porous material fitted along the leading edges, the prevention of dangerous ice-accretion is simply a matter of switching on the pump which delivers the fluid to the panels.

Between January 3rd and March 7th this year, a series of 27 separate icing-investigation flight-trials was undertaken by British European Airways with a Viking aircraft manned by Captain D. Mason, 1st/Off. Kuttelwascher, and R/Off. Crisp (flight crew), Mr. H. J. Jauncey (B.E.A.), and Messrs. D. G. Thorpe and J. H. Andrews (T.K.S.). Two independent observers, Mr. J. R. Leach (Vickers-Armstrongs) and Mr. R. Burdett (Air Registration Board) were also carried on the majority of flights. The main objects of the tests were to determine the minimum flow-rate which would prevent a serious build-up of ice in known icing conditions; to determine the correct technique for the satisfactory operation of the T.K.S. strip-insert distributors as normally fitted to Viking aircraft; and to test the new T.K.S. Porosint panel distributor in natural icing conditions.

How well these objects were achieved is made apparent in the comprehensive and valuable report of the flight trials issued by B.E.A. The report is certainly valuable to B.E.A., for it shows that a reduction of some £8,000 per annum can be effected in the operating costs of the present fleet of aircraft. It also implies that a considerable weight-saving—346 lb per aircraft—becomes available for revenue-producing payload. These advantages are a direct result of the reduction in fluid-flows as determined by the flight trials. T.K.S. themselves had long been of the opinion that the rates of flow ordinarily used were wasteful, and this belief the results of the flight trials amply confirmed. Whereas the previous recommendation was for 1 pint/hr/sq ft of frontal area to the wings and 2 pints/hr/sq ft for the tail surfaces, the report recommends that these rates should be reduced to 0.66 pint/hr/sq ft both to the wings and tail surfaces. In each case, the frontal area is measured at the maximum thickness of the aerofoil section.

Spectacular as these savings are, even greater savings would be achieved by the use of Porosint panels in place of the existing standard strip-insert distributors. It is stated in the B.E.A. report that the Porosint panel gives "equal if not slightly better results on half the flow-rate of the standard distributor." The reason is that only sufficient fluid to maintain a wet surface is necessary: any excess pumped out achieves no visible improvement and is wasted.

The action of the fluid is to destroy the bond of the ice and thus facilitate its removal by the airflow. It was established during the flight trials that, with the Porosint panel distributors, in certain conditions (usually between zero deg C and −3 deg C), the de-icing power of the liquid is sufficient to prevent entirely any ice-accretion. In conditions of low-temperature rime-icing it is, perhaps, more common for a de-icing cycle to establish itself. When this happens, the first icing droplets penetrate the protective film of liquid and become partially lodged. The subsequent layers which bond externally then act as a protection against further dilution of the fluid, and the resulting concentration at the interface rapidly destroys the adhesion of the ice, which then becomes detached and is blown off.

Porosint offers such little resistance to fluid-flow—its porosity is approximately 35 per cent—that to permit efficient pumping it is necessary to have some restriction interposed in the fluid-feed system. This necessity is turned to good account by providing a mat of bronze strips placed between the Porosint and the corrugated backing-plate: fluid is pumped through the plate, the corrugations of which act as distributor channels, whence the fluid can seep through the very fine channels formed in the bronze-strip mat and so reach the rear surface of the Porosint.

Construction

Each panel is fabricated by spot-welding the components together. The partial solidification at the spot-welds has practically no adverse effect, for the welds are very small, and even if a relatively large area of the panel were not fed with fluid—for example, as a result of local blockage—the capillary action inherent in Porosint would result in seepage of the fluid across the blocked area from the surrounding wet areas.

In that it is necessary only just to exceed the range of stagnation movement in order to provide full icing protection, there has so far been no need to make Porosint panels in widths greater than 6in; widths up to 12in could, however, be provided if required. Individual Porosint panels are 12in long and are made up in 6ft group-lengths which are adequately fed by a single input pipe. With a total thickness of 0.11in, the addition of Porosint panels to a leading edge involves no aerodynamic penalty, and the method of fixture, by marginal strips, is simplicity itself. Alternatively, the panels can readily be embodied as an integral part of the leading-edge structure during the building of the surface, and thereby maintain fidelity of the design contour whilst involving virtually no structural complication. On the score of physical strength, Porosint is tough, despite its extraordinary properties, and its life is not likely to be materially less than that of the aerofoil surface it serves. Maintenance costs are an extremely important factor to the airline operator, and in this regard Porosint panel distributors show up exceedingly well, for they should require negligible attention.

FROM SEA HAWK TO VAMPIRE

A project for conversion addicts

By Derek L. Whiting

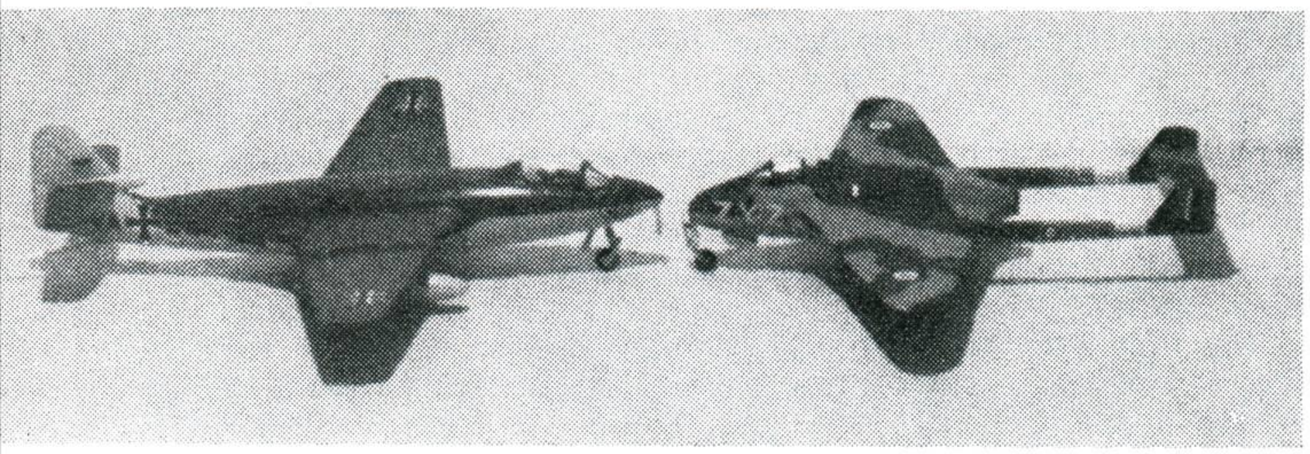
THE Vampire was the second 'jet' to see service with the RAF, but unlike its contemporary the Meteor, it did not see active service, the first squadron forming in 1946. These early Vampires had the three-piece cockpit canopy, but later versions, although still Mk Is, had the one-piece blown hood.

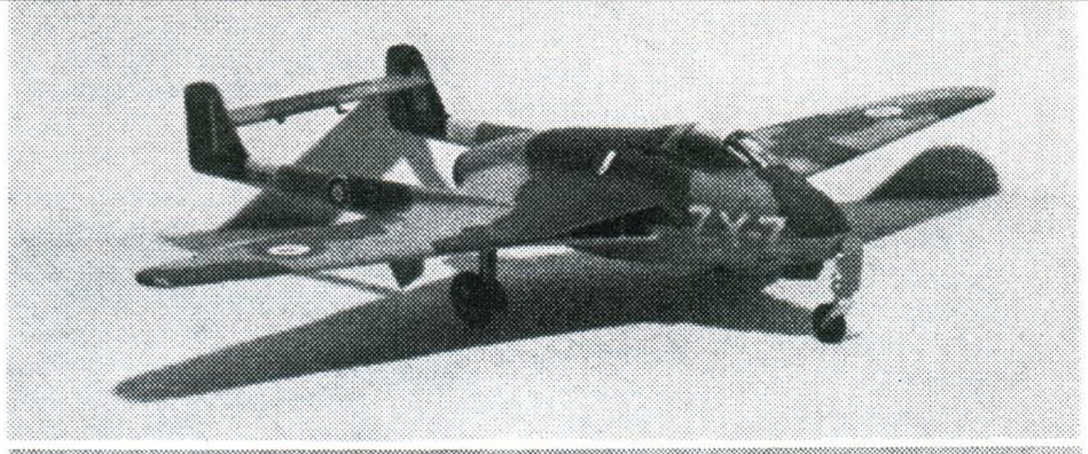
I chose the earlier version, as this was actually built during the war years, but of course the modeller can choose whichever version appeals most. Both types are shown on the drawings. The basis of this conversion is the Airfix Armstrong Whitworth 'Sea Hawk' kit which, apart from a similar forward fuselage and wing root intakes, bears little resemblance to the Vampire. It does, however, have a wing shape which can be fairly easily altered; also the undercarriage and cockpit cover can be used after little alteration.

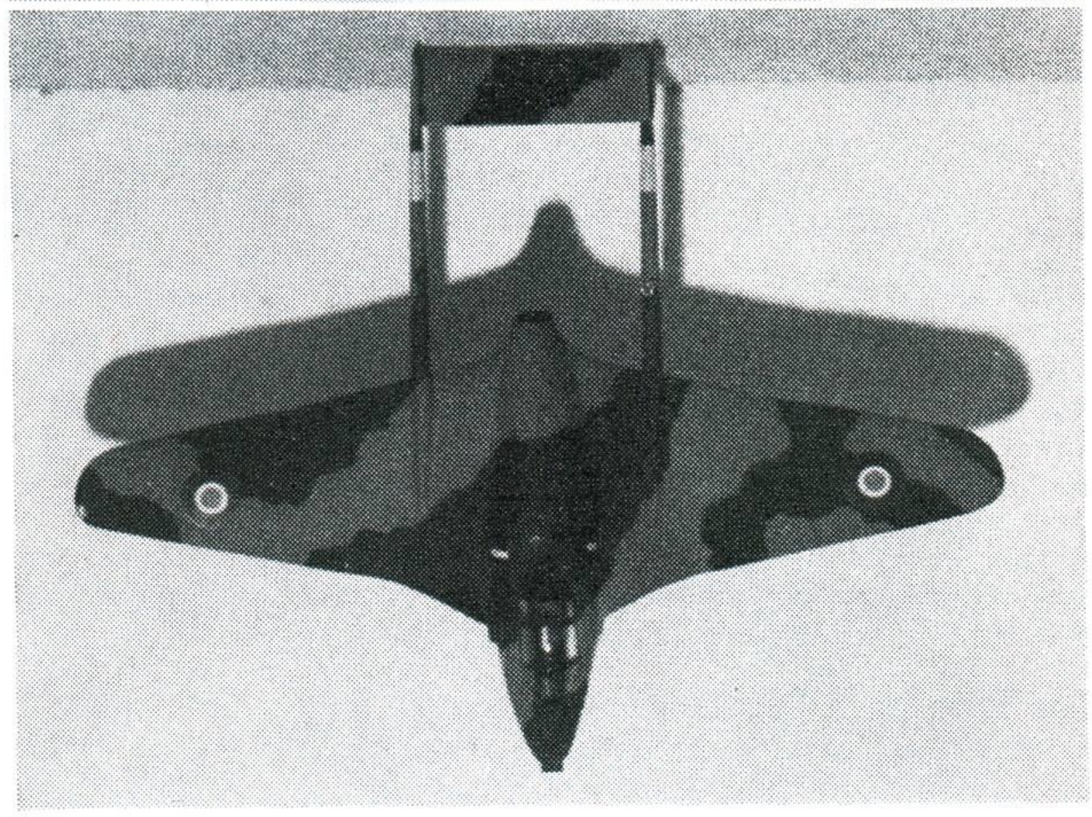
Commence construction by cementing the two fuselage halves together after painting the cockpit interior and adding as much lead as possible to the nose. The seat has to be fitted in an upright position. When dry, cut the front portion off at a point 46 mm from the nose. Now a new rear fuselage has to be made, either from wood or, if you wish to use Brummer Stopping as I did, proceed as follows: Cut one piece of plastic to the side profile and two pieces of the plan view (allowing for the upright piece) all from 40 thou plastic card. Cement these into open rear end of body, cruciform style as per sketch. Add the jet orifice. This is a ring of plastic cemented in place. Next, partly fill the spaces with pieces of scrap sprue, etc, and when this has dried, smear a little cement over this 'hard core' and build up the outline with the Stopping. Allow to set hard (about two days to make sure), and then file and sand to shape. When finished, rub a coat of styrene cement over the Stopping and when dry polish down with a piece of part-worn 0400 wet and dry paper used dry.

Smear cement round the nose area and build up with Brummer. File and sand to the new shape when set hard. Re-shape the cockpit canopy by filing the flat panels for the windscreen, and if you have elected to model the three-piece style, this can now be filed and sanded to shape. Restore the transparency with metal polish. If you prefer working in wood, the existing nose will have to be cut off and replaced with a block of wood. Fit the canopy temporarily with just a touch of cement. Build up the area around the windscreen with Stopping and when dry, file and sand to shape.

Assemble wings as per kit instructions and leave to dry out, then cut the jet pipes off together with the rear section of wing centre section. Cut off the leading edges from the intake apertures (check all these angles by laying the Sea Hawk wing over the Vampire plan), re-shape the tips after first cutting a section from the wing trailing edge in the aileron area (again reference to drawing will show where), then file and sand to airfoil section.







Above: *Two views of the completed model show marking scheme described in text.*

Fill existing aileron outlines with Stopping or body putty after running a little liquid cement along the grooves. Sand flush when dry, and then etch-in the new aileron outline using a straight-edge and the point of a needle file. Cut a piece of 30 thou plastic to fit the gap in the rear of the wing, obtaining the shape from the drawing.

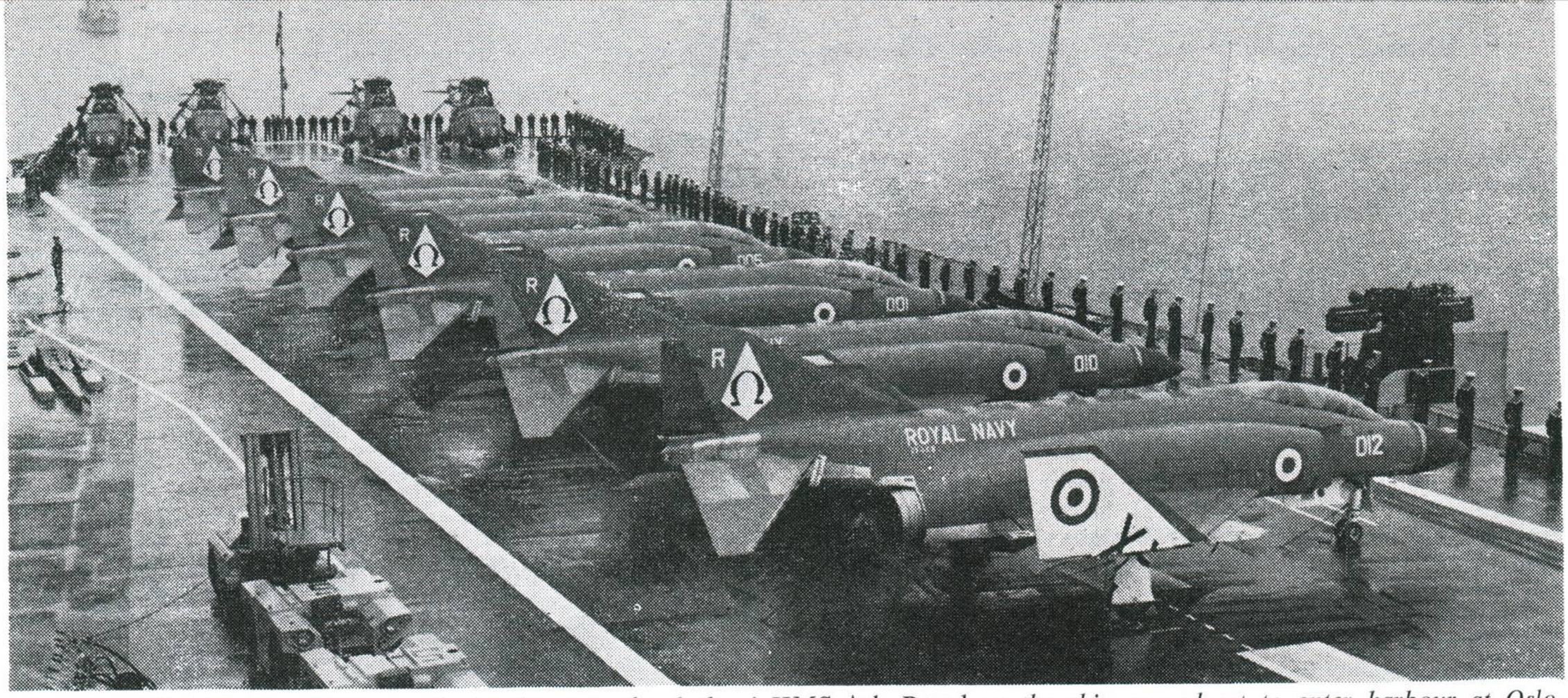
You will by now have discovered that to obtain the correct outline of the wings, it will be necessary to mount the wings with the whole wing angled away from the fuselage, in order to obtain the correct wing taper, only the rear half of the wing roof being in contact with the nacelle. The gap at the front is partly filled by piece 'A'. The new wing root/intake pieces are now cut from 40 thou plastic and cemented in place. Fill the remaining gaps with plastic and cover the whole joint area with Stopping. The rear centre section is now fitted. Again a choice of wood or plastic and Stopping. Shape to wing contour and finish shaping the wing root/fuselage joint. Cut and fit the baffles inside the intakes. Only the outer ones are needed, as the rib inside the wing is virtually in the correct position. The photos show one half in its rough state and the other half finished, which should clearly illustrate the foregoing instructions.

The two tail booms come next. These are cut from plastic card laminated together to the correct width. The two centre laminates are cut with the fin/rudder integral. File and sand to shape. It is advisable to make the wing cut-out a little smaller than shown, and then carefully file and sand a small amount at a time until a snug fit is obtained on the wing. Make and shape a new tailplane from plastic, etching in the elevator outlines. Cement the booms in place on the wings, and before the cement has set, add the tailplane. Check that everything is aligned and leave to set hard. Fill any gaps and joints, smooth with 0400. Carefully lift off the canopy and give a final polish before fitting permanently in place.

Prepare the front undercarriage leg/wheel unit, filing the tyre to a flat profile, and file a groove round the centre of the tyre to represent the anti-shimmy tyre fitted to the full size. Mark out the positions for the undercarriage wells and paint black or zinc chromate green. (Solid colour transfer sheet can, of course, be used for wheel wells.) It is unfortunately not possible to hollow out the wheel wells.

The cannon blast-troughs can now be etched in, again using the point of a needle file. A small hole is bored to take the front undercarriage leg (if Stopping has been used, a needle file spun between the fingers is better than a drill and should prevent the

Continued on page 203



Aircraft of No 892 Sqn, FAA, neatly lined up on the deck of HMS Ark Royal *as the ship was about to enter harbour at Oslo, Norway, after having taken part in the NATO exercise 'Northern Wedding'.*

RAF GATOW on the edge of the British sector of Berlin, is an airfield that looks almost deserted, but it has a capability of maintaining a large number of operational aircraft. All of the necessary facilities are there. The air traffic building is of the most modern design; the ten large hangars are waiting to be occupied, and the parallel runways, although a relic of the Berlin Air Lift led the way to current thinking on aircraft handling at busy airports. Apart from a small flight of Army Siouxs and two Chipmunks, no aircraft remain at Gatow for more than 24 hours and the reason . . . a quick look just beyond the perimeter fence and even the most casual observer can see the 'goon' boxes occupied by the Russians and their East German colleagues watching all movements on the airfield.

RAF Gatow is the airhead for British Forces stationed in Germany in the 'island' city of Berlin. I recently spent a week there and can report that the feeling of isolation is all but complete. For Berliners, the way out is through the British, French and American airlines that run regular scheduled services through nearby Templehof, for others there is the road and rail link with the west, but for all intents and purposes Berlin is cut off from the rest of Allied Europe.

Britain, France and America intend to hold on to their foothold in the east and to do this they must maintain their forces in Berlin. Almost all supplies for the garrison come in by air apart from heavy material such as coal, oil and most foodstuffs. The Berlin blockage of the late 'forties proved that a city of several million people could be supplied by air and the three airfields belonging to the western powers are kept at full operational readiness in case they are needed again.

Nowadays, incidents are few but when trouble does arise the Allies send aircraft down one of the three Berlin air corridors to maintain their right to free and unlimited access to the city by this means. The only remaining link between the Russians and the West is in fact the International Air Traffic Consortium which controls the vital air lanes into Gatow, Templehof or the French airfield Tegel.

Gatow, like Templehof, is in a strategic position. It differs from its American contemporary, however, in that it has always been used for military purposes. When Hitler came to power in 1933 one of his first aims was to circumvent the provisions of the Treaty of Versailles which, after World War I had denied Germany the right to re-arm to any dangerous extent. Thus, in 1934 he set up a combined Sportschule, Forestry and Agricultural Experimental Institute which was astride the Gatow-Kladow road near Berlin.

The building project was completed in record time, even by comparison with the highly mechanised methods of today and, as an airfield of its day was a very bold concept with ten hangars and six miles of perimeter. This operation was not wholly a front because such an Institute did exist as many of the remaining buildings prove. It is, however, significant that the airfields built for the use of the Institute in other parts of Germany were later to become important military establishments and some of the Institute's aircrews were members of the National Socialist Flying Corps. They were later to reveal their true identity as fully-trained Luftwaffe officers.

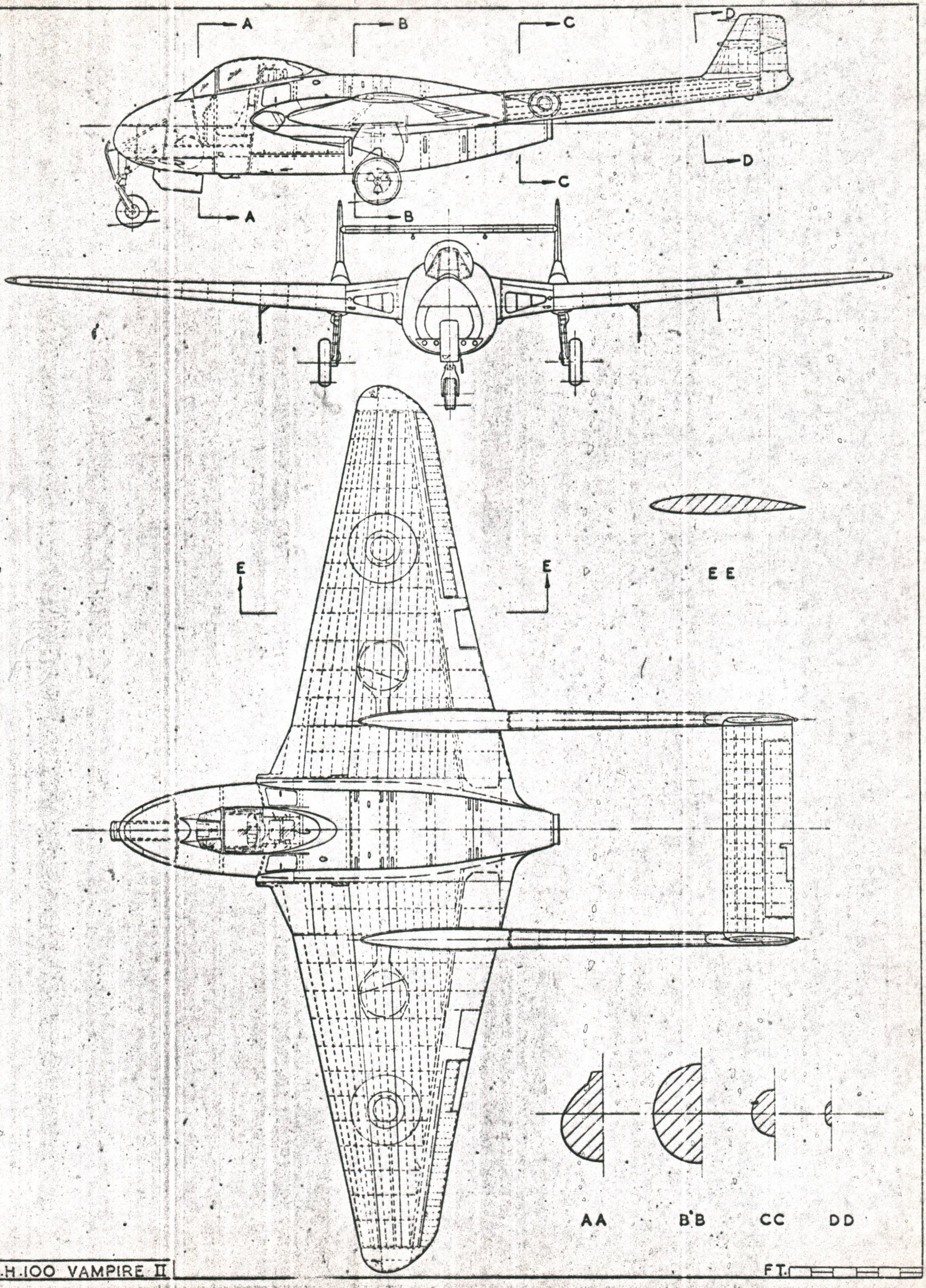
As soon as Germany had built up sufficient strength to defy the signatories to the Treaty of Versailles the 'front' organisations disappeared and then an efficient fighting machine emerged. Over-night Gatow became the Cranwell of the Luftwaffe; a Flying Training School and also the base of the Reichluftfarhtministerium Communications Squadron. The present-day RAF Gatow Hospital across the road from the airfield housed the Air Force Staff College.

Gatow operated in its training role for most of the war period—indeed right up to the final chaotic weeks when the rapidly contracting Third Reich resulted in a miscellany of aircraft flying into the airfield. Despite its close proximity to the centre of Berlin it was only bombed on one occasion in November 1943. In this raid one wing of what is now the Warrant Officers' Married Quarters was destroyed as well as other small buildings.

One of the last wartime users of Gatow was Speer, the Armaments Minister who was later to serve 20 years in Spandau Prison. Speer flew in on April 23, 1945, only eight days before the complete occupation of the city. He took off again in a light aircraft which landed in the broad avenue leading up to the Brandenburg Gate and visited Hitler in the Chancellery bunker. Optimistically he had the aircraft wait for him in spite of the heavy shelling—optimistically that is because he had flown in to report that he had not carried out Hitler's order of a 'scorched earth' policy in the remains of Germany. Instead of being shot he was allowed to go.

Another visitor at this time was General Ritter von Greim who was, on April 26, 1945, piloted by the celebrated woman pilot Hanna Reitsch, and landed at Gatow and made his way to Hitler's bunker where he was made Commander-in-Chief of the Luftwaffe in place of Goering. He probably had misgivings about being summoned to Berlin to receive such an obviously short-lived honour.

At the end of the War the Russian Air Force occupied Gatow for a short time but under the final settlement of Sector boundaries the airfield was placed just within the borders of British administration and the Russians eventually withdrew.



D.H.100 VAMPIRE II

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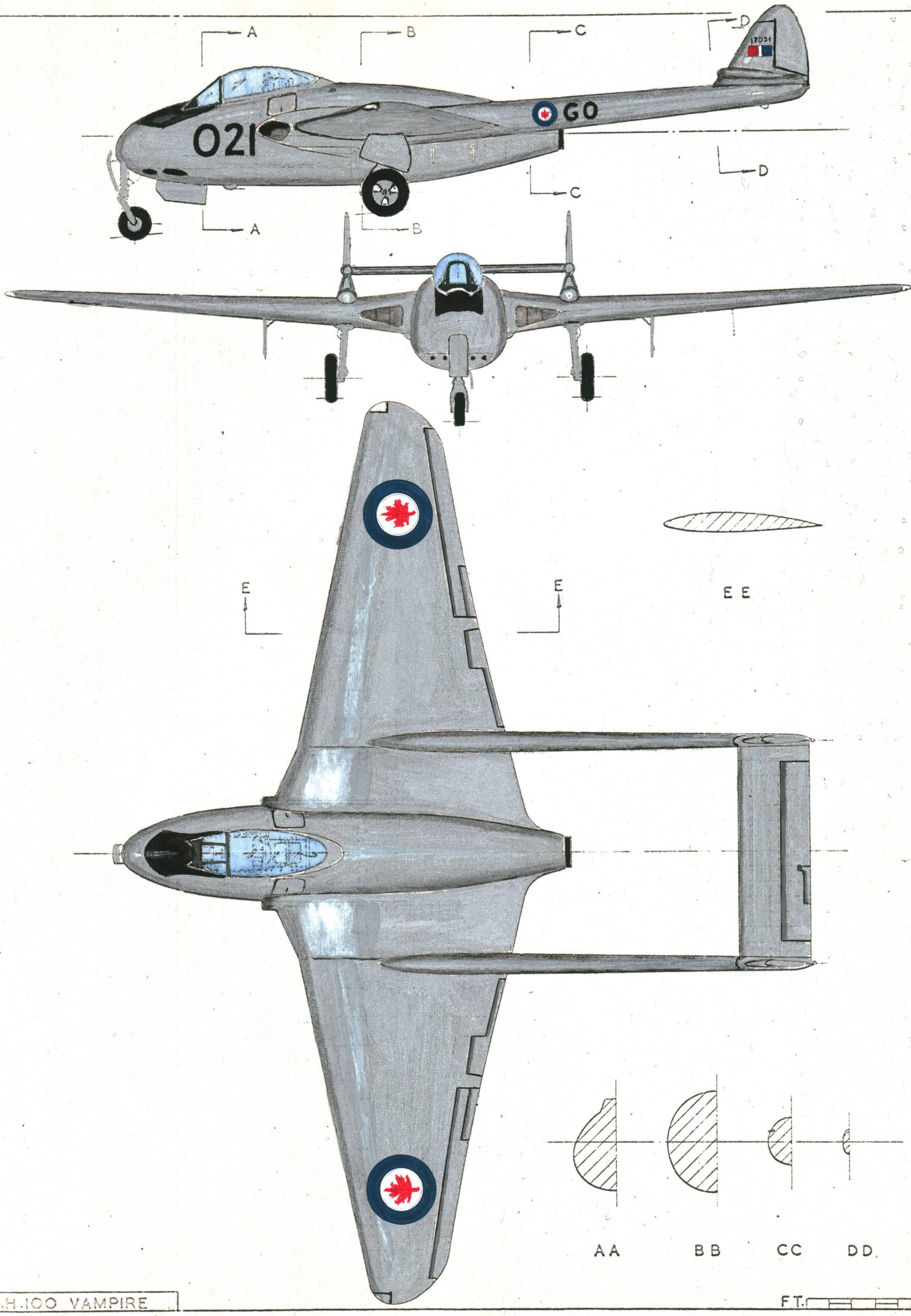

D.H.100 VAMPIRE

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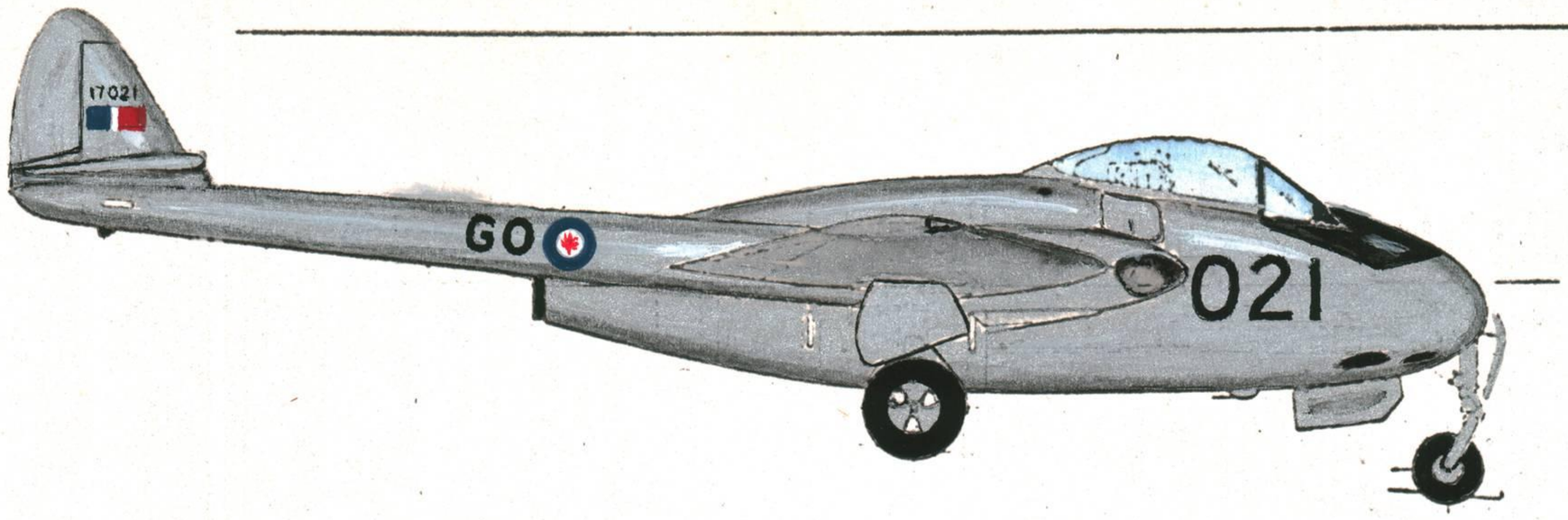
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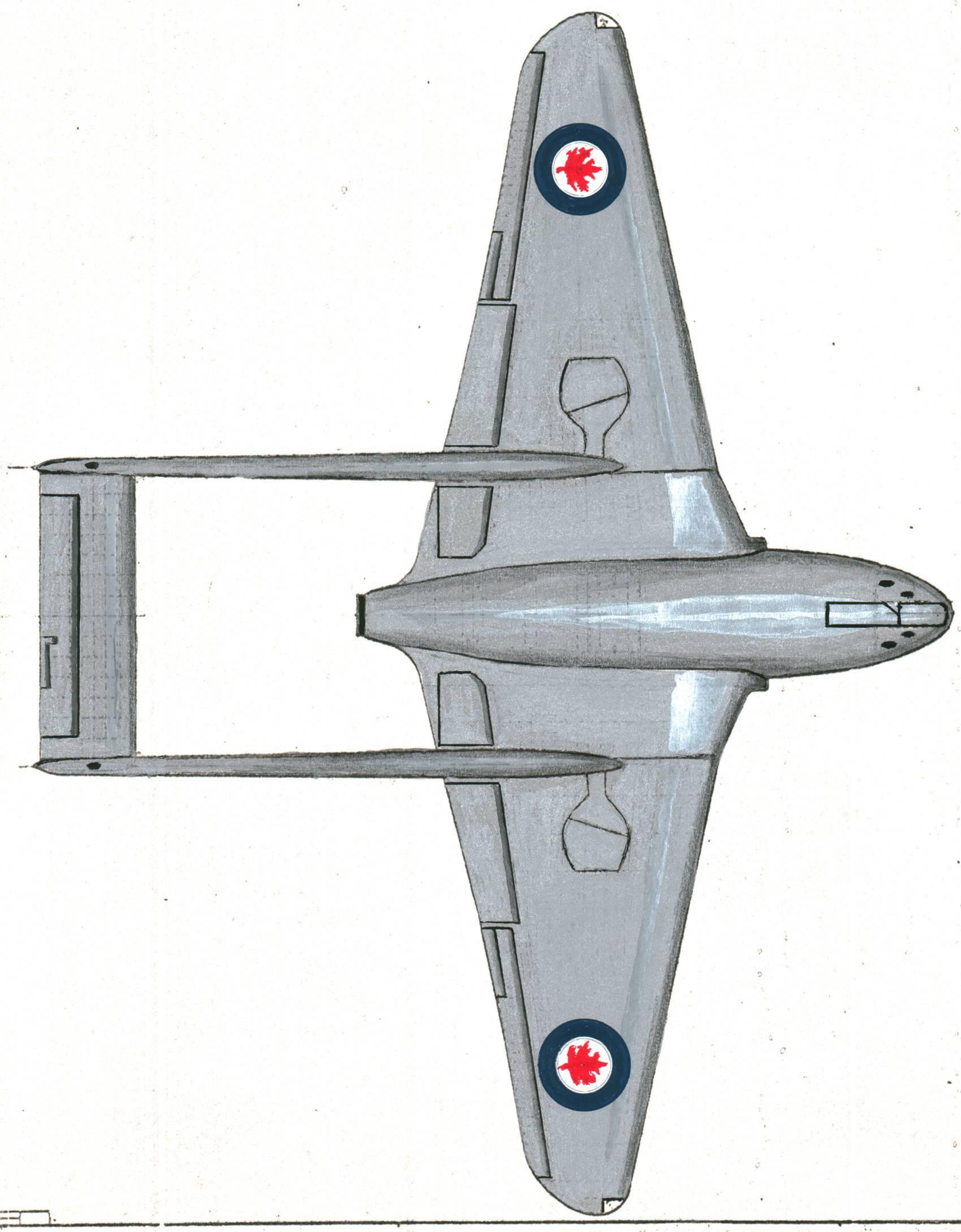
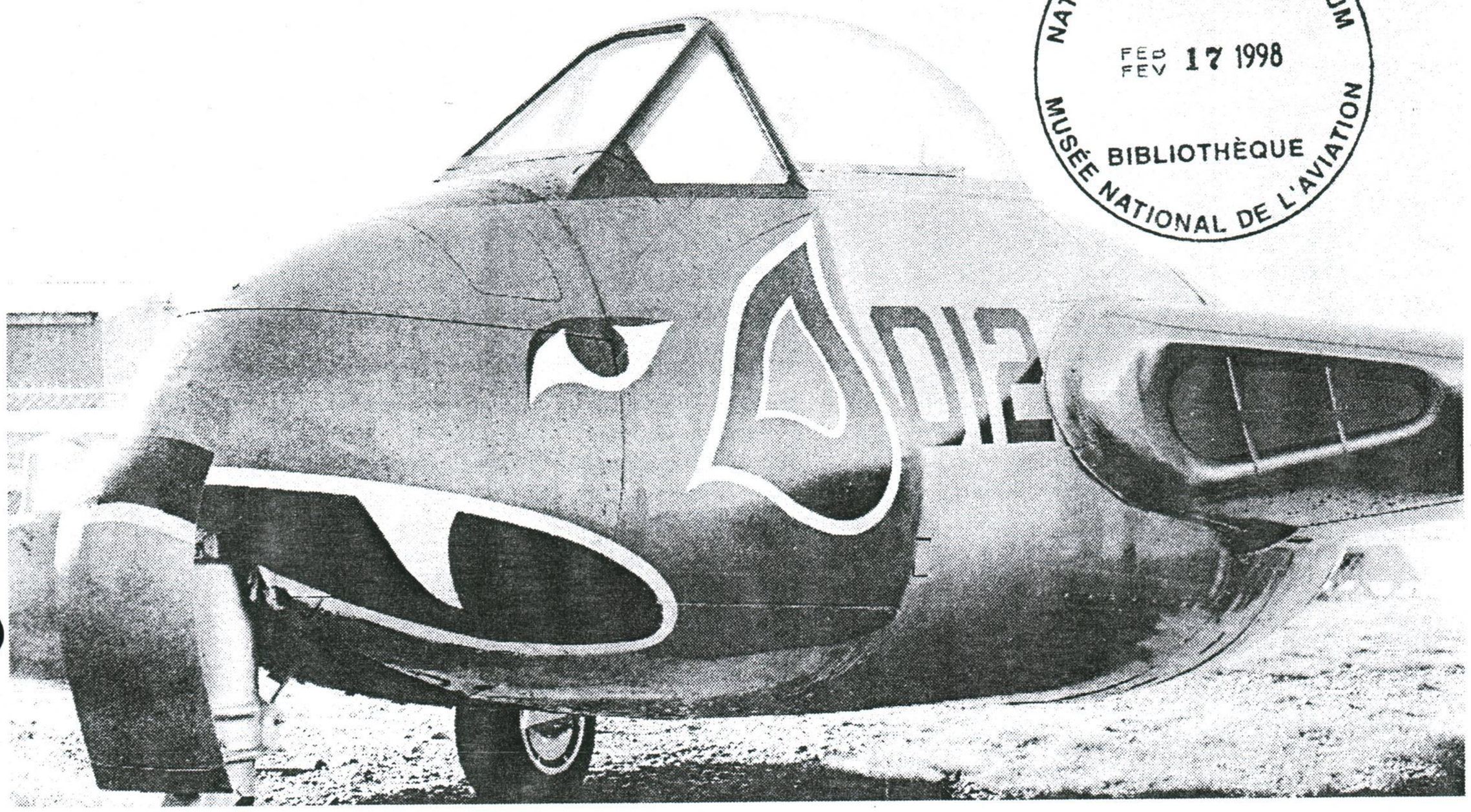


CANADIAN MUSEUM OF FLIGHT NEWSLETTER

ISSUE 56

Spring 1998



Strategic Planning Workshop

On Saturday, January 10, the directors of CMF took part in a "Strategic Planning Workshop" supervised by member Bruce Prior. We will not examine Bruce's qualifications; suffice to say he has had extensive experience in the field. The following is a condensation of the day's activity, complete versions are available at the office.

I have attached a report of the day's discussions and conclusions for your reference and future use. Everything has been transcribed exactly as written on the flip charts except that the Strengths, Weaknesses, Opportunities and Threats have been re-ordered on the basis of the votes. There's valuable information here because it's an accurate reflection of the board's understanding, perceptions and concerns.

I offer a few comments, based on my observations on Saturday and on my experience with such workshops.

A director is a manager. Try not to bestow directorships on members simply as reward for their past services unless you and they are confident that they can shift gears and manage a new and different set of responsibilities (I realize this could be difficult depending on your rules for elections and appointments).

A director is a manager. The traditional functions of management, as true today as they were almost 100 years ago when they were first stated, are

see ***Workshop****, page 4*

Editorial

C.R. Goguillot

Due to some changes in staff and a large amount of backlogged work, I will, for this issue only, be your temporary editor. Please note the "temporary".

If the world was perfect, and we had no problems, it would be really easy to write an editorial in the newsletter of a fine organization like the Canadian Museum of Flight. The world isn't perfect, and I believe we do have some problems.

I chanced upon an article written by Jack Meadows in the March 1990 issue of "Wingspan" magazine, in which he describes our museum as having six hundred and fifty members, the need for more full-time staff and with a budget of 10 MILLION dollars over the next 5 to 7 years.

Well, the 5 to 7 years have passed, we have a fraction of the staff, and don't approach a budget of 10 million dollars.

Blame it on "the move" - maybe, partly. Blame it on the unavailability of government support: maybe - partly. Blame it on the lack of space - we have more, although inadequate. During the shutdown we ignored donors and potential volunteers - maybe. I don't have the glib answer, but the facts are that we have found it necessary on several occasions to close the gift shop on weekends due to lack of volunteers, and we can not always supply tour

see ***Editorial****, page 4*

100 Squadron

T. McNulty
Photo

17051 AA-P Malton 16 Sept 50

Ron Wylie

AB-E

BQ-D

401 SQ

438 Sqn

Ron Wylie

17062

400 Squadron

Photos:- from R. Wylie

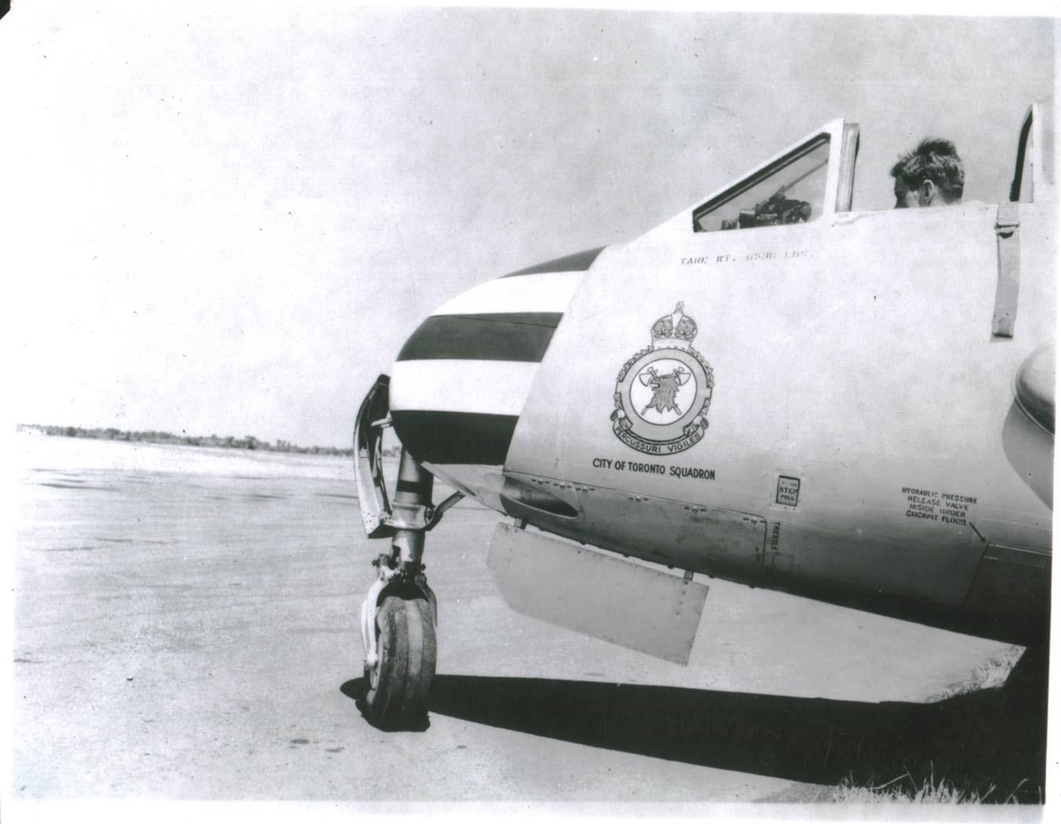
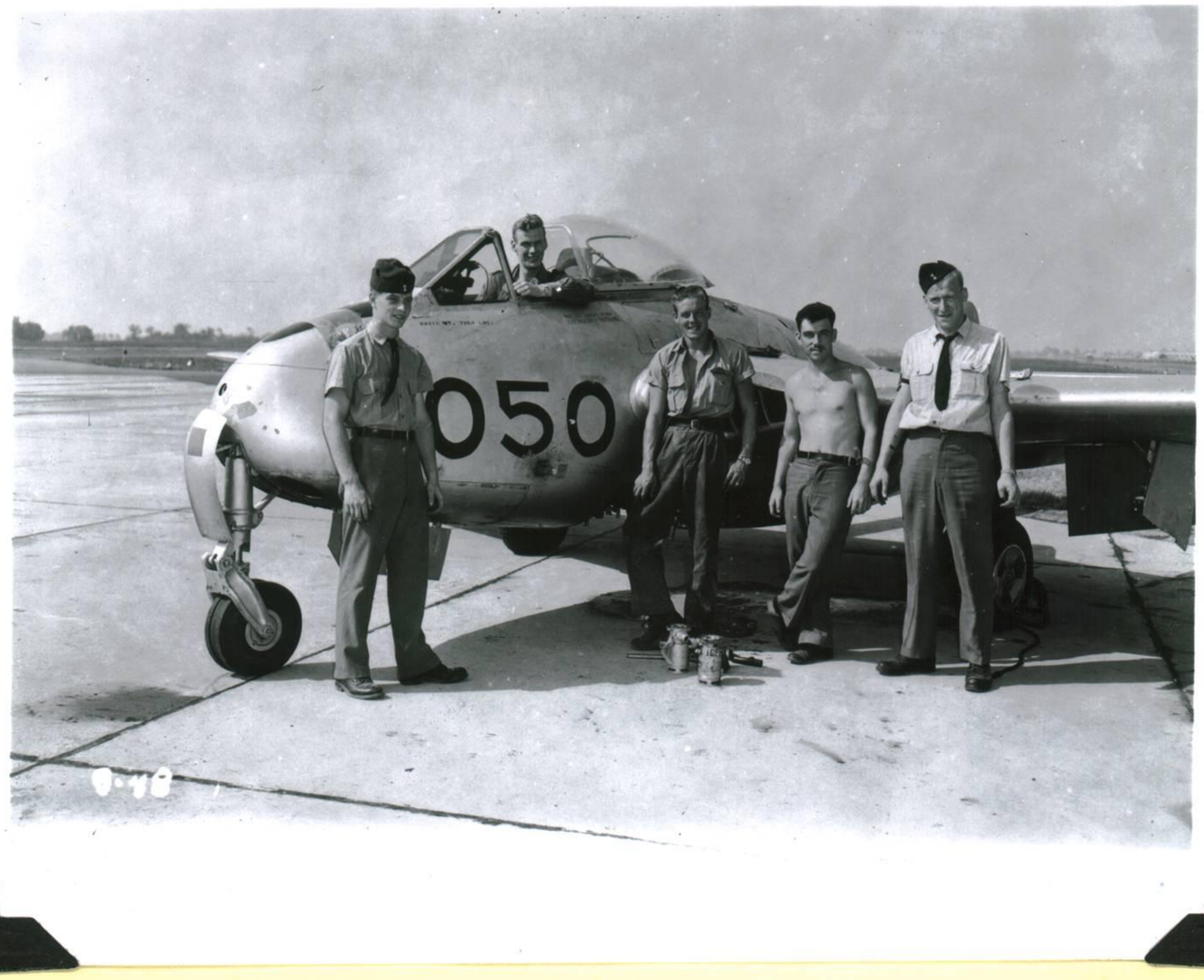


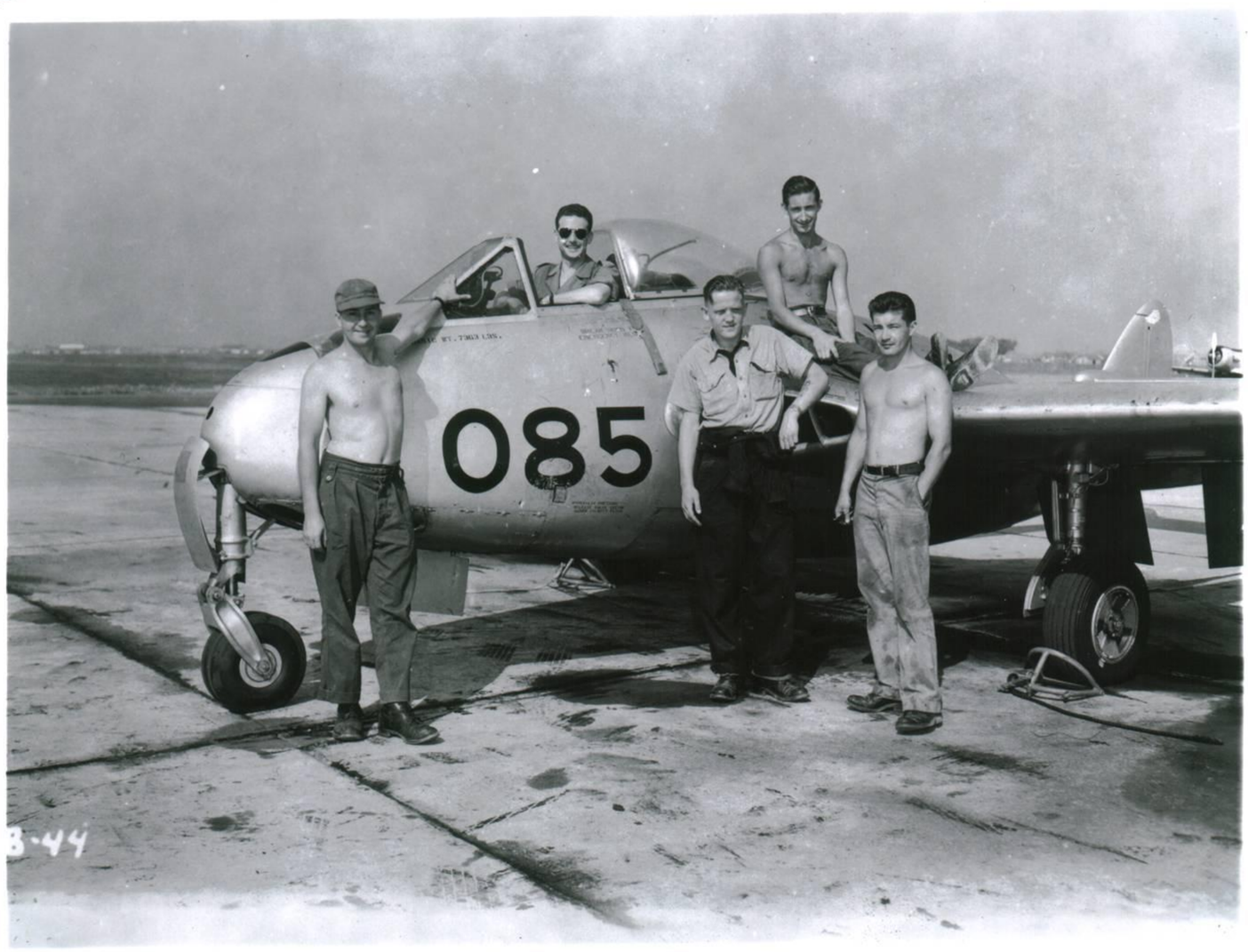
Photo
from
R. Wylie

Ron Wylie

Photos.

from R. Wylie

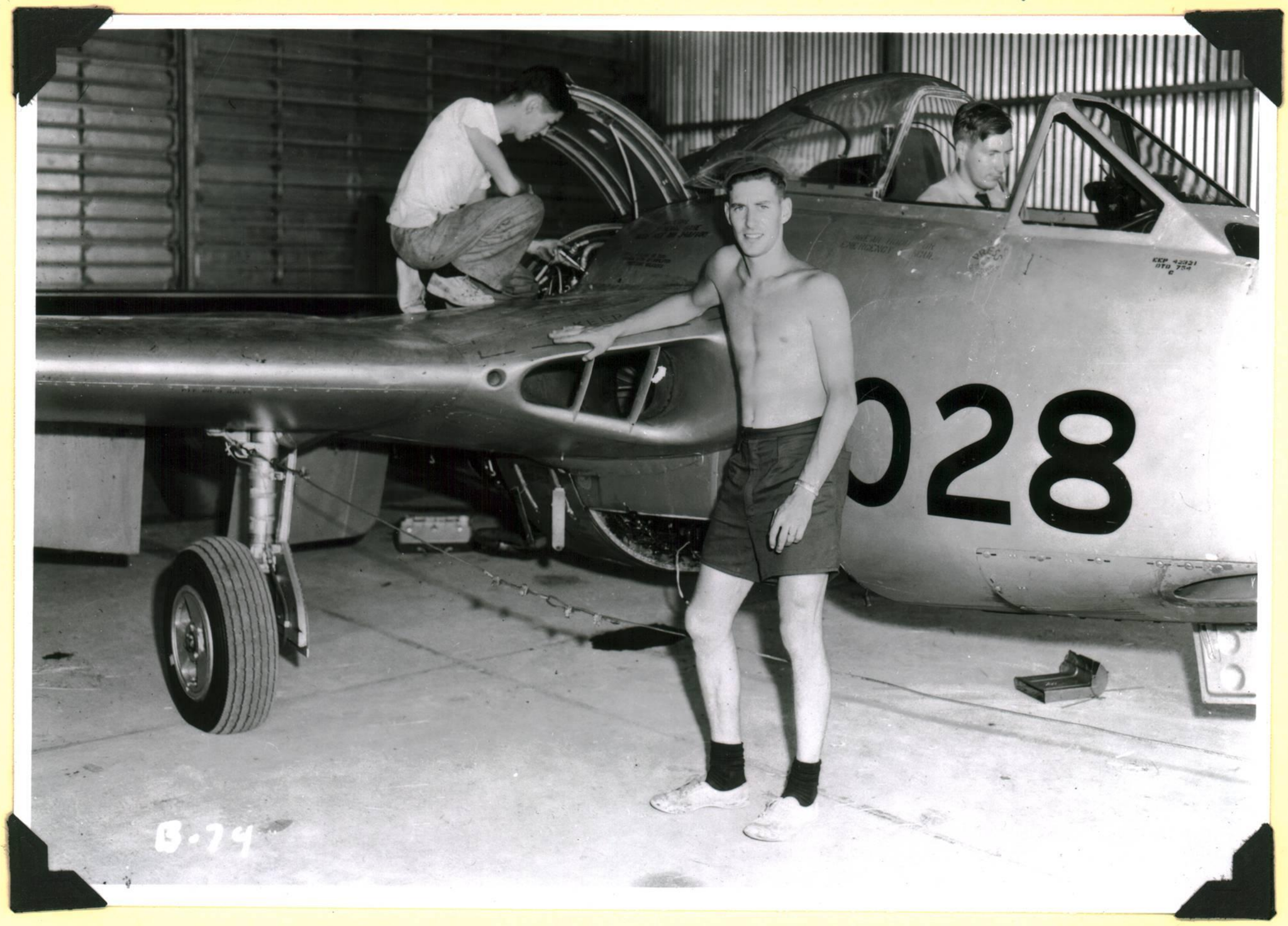




Photos from 400 Squadron Album

Ron Wylie

Ron Wylie



Note two versions of 028

Photos from 400 Squadron Album.

John Ellis
22 Oct 76

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61D	30	
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84	36	
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86D	55	

AIRCRAFT OF THE NATIONAL AVIATION MUSEUM

TYPE de Havilland D.H. 100 Vampire MK.3

MANUFACTURER	CONSTRUCTION NO.	ENGINE(S)
English Electric Co. Ltd., Preston, Lancs., England	EEP 42392	de Havilland Goblin 2 #1627
	REGISTRATION 17074 (RCAF)	
DISPOSITION: Storage - National Aviation Museum		

HISTORY

Manufactured by English Electric for RCAF, #17074	1948
Taken on RCAF strength	27 Aug 48
#1 (F) Operational Training Unit, St. Hubert, Que.	Aug 1948
#421 (F) Sqn., Chatham, N.B.	23 Nov 49
#442 "City of Vancouver" Sqn., (Auxiliary), Vancouver, B.C.	17 Nov 53
Stored Reserve, Lethbridge, Alta.	6 Nov 56
Transferred to Museum	6 Feb 64

A.J.S. 1 Aug 86

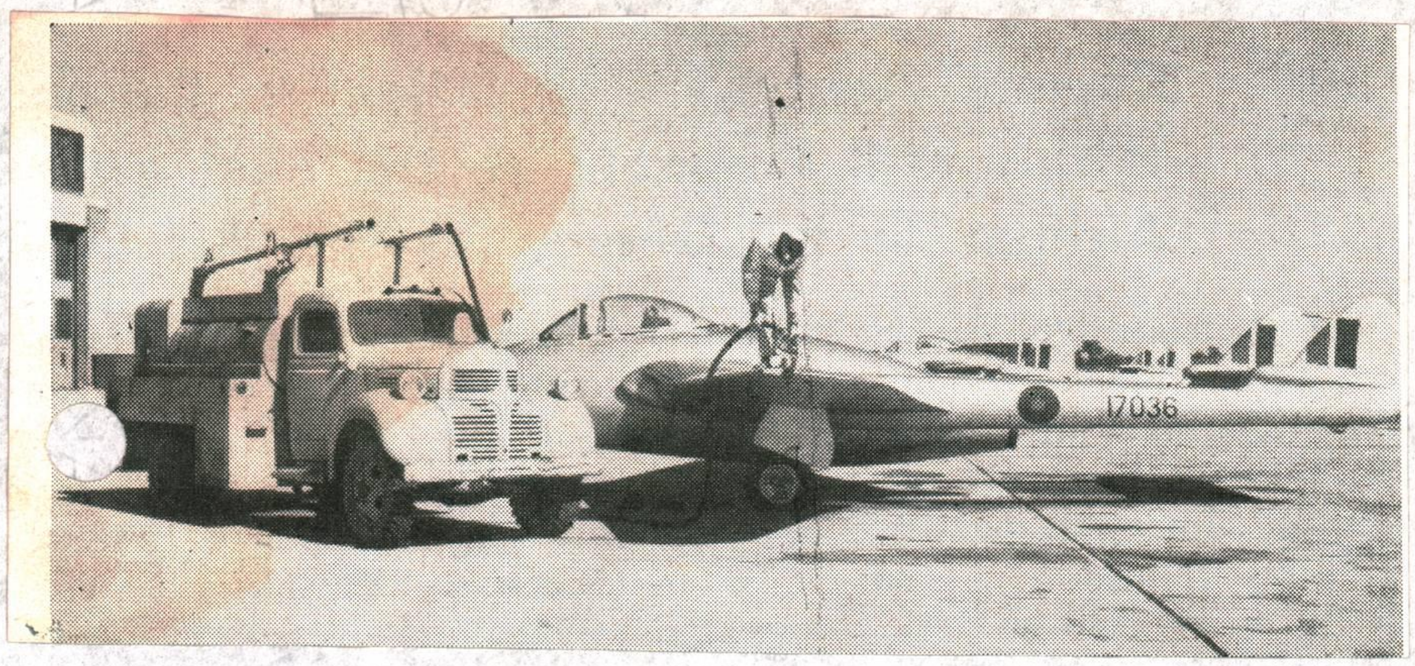
de Havilland Vampire 17058

SR No. 6 RD	23 April 1949
14 October 1949	421 FS Chatham
6 March 1950	6RD ?
4 March 1950	No. 12 TSU de Havilland
12 October 1950	AF OTU Chatham
29 March 1952	No. 12 TSU
20 May 1952	400 Sqn. Toronto
12 January 1953	No. 12 TSU
4 May 1953	400 Sqn.
25 August 1953	C&PE Rockcliffe
5 August 1954	ADC
4 May 1956	RR Station St. Hubert
25 September 1956	APDAL Storage Station St. Hubert

Overhaul Data

6 March 1950	Repairs at 6RD
4 April 1950	Repairs de Havilland
29 March 1952	P400 Inspection de Havilland
12 January 1953	Necessary wing change and repair de Havilland
15 August 1955	Change and repair for refinishing de Havilland
25 April 1956	APDAL Storage St. Hubert

4 March 1958	Sold to:	Formetal Division	?????
		Flightways Inc.	
		Box 153	
		Westbend, Wisc.	?????
		U.S. A.	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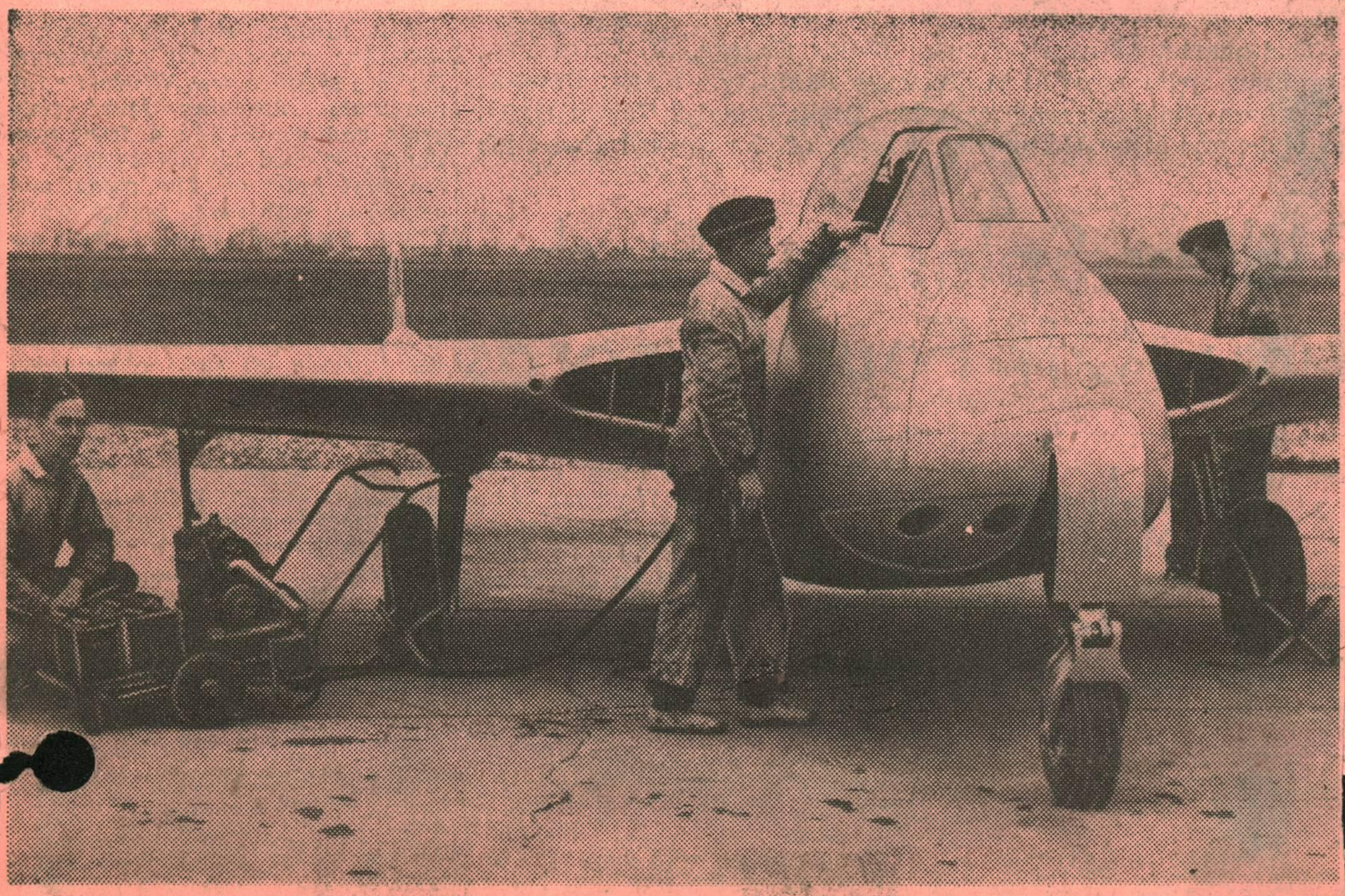
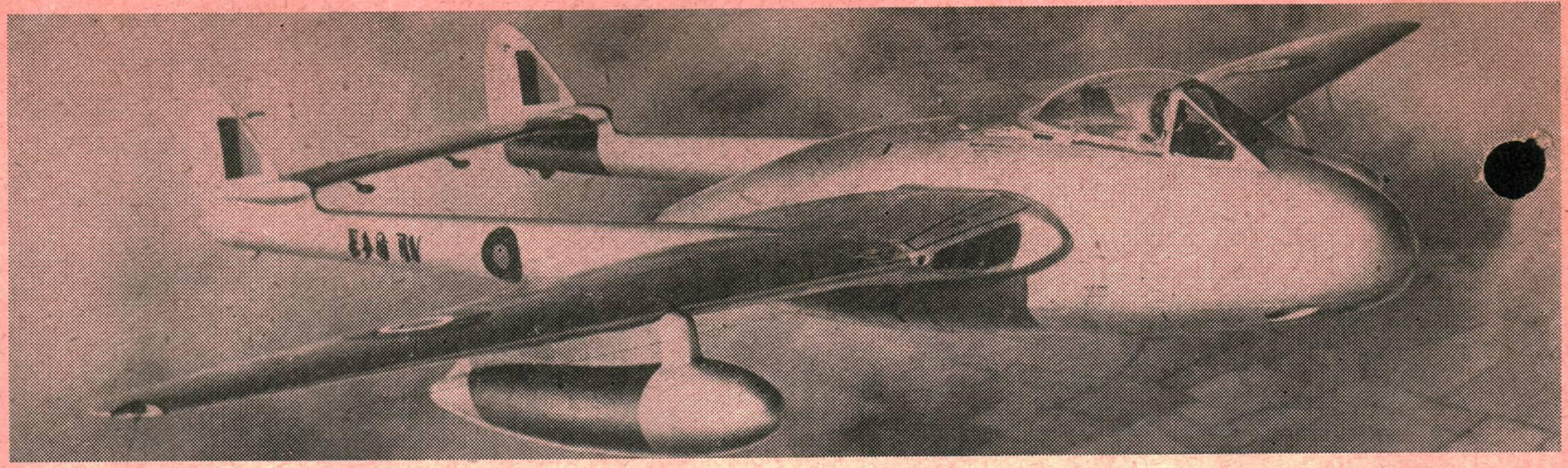
Jet plane circles over hangars of the City of Toronto 400 (Auxiliary) RCAF Squadron, while pilots and ground crew crane their necks to watch the Vampire right and Flt. Lt. G. Collinge



Squatting close to the ground, one of the two Vampires now assigned to the squadron is given a check over by crew before taking off. Airman at left kneels beside starting batteries while airman at right rear of plane holds fire extinguisher.



One of the six Vampire II fighters which made history as the first jets to cross the Atlantic.

Ocean-crossing Vampires Complete American Tour

THE Canadians who were fortunate enough to see the aerobatic teams of the RAF 54 Vampire squadron in action will not soon forget this superb display of flying skill. Even more significant, however, was the achievement of flying six jet fighters across the Atlantic and back. The Vampire pilots thrilled crowds at Montreal, Toronto, Trenton and New York. But there was more serious business transpiring behind the scenes. During their week at New York, the RAF pilots were aloft every morning on tactical exercises with B-29 Superfortresses of the USAAF. Earlier, at Andrews Field, South Carolina, they had flown defense and tactical exercises with F-80 Shooting Stars and F-84 Thunderjets of the U.S. Air Force 9th Group. Before departing for the return flight to England, W/C Wilson-Macdonald, Force Commander of the Vampire flight expressed full satisfaction with the combined manoeuvres. Just for the record, the east-west crossing was made in 8 hrs. 18 min. air time from Stornoway in northern Scotland via Iceland and Greenland to Goose Bay. Total distance was 2,202 miles. The MK. III Vampires with Goblin II engines each had two 100-gal. drop tanks, giving them a 1,100-mile cruising range. The entire effort was a good show.

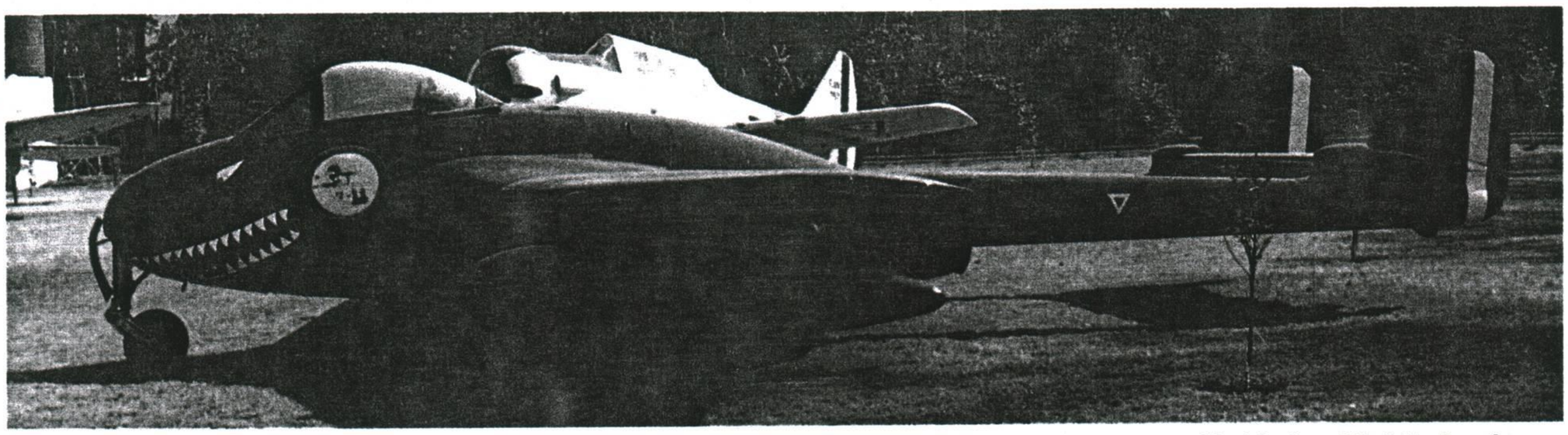
Above—S/L R. W. Oxspring, D.F.C., leader of the Blue aerobatic team.

Some of the Vampire pilots (left to right): Pilot I. Evans, S.; P.I. Wood, W.; P.II Skinner, R. J.; S/L Oxspring, R. W.; F/L Woolley, F. G.; F/L Wright, E.W.; and F/L Colquhoun, C. I.

LOS VAMPIROS MEXICANOS

Mexico's First Steps in the Jet Age - de Havilland Vampires

Author's collection



One of the three Vampires preserved in Mexico. Mk 3 No 5 at the New Mexican Air Force HQ building Mexico City, January 1994.

Santiago A Flores

CONSULTING the acclaimed publication *De Havilland Aircraft Since 1909* by A J Jackson (revised and updated by R T Jackson, Naval Institute Press, US edition, 1987) it is possible to find out just who operated de Havilland Vampire fighters and trainers around the world. Yet, much to the amazement of Mexican aviation enthusiasts, their country is not listed as an operator, even though the *Fuerza Aérea Mexicana*'s (FAM) first jet squadron in the 1960s consisted of Vampire F.3 fighters and T.11 trainers.

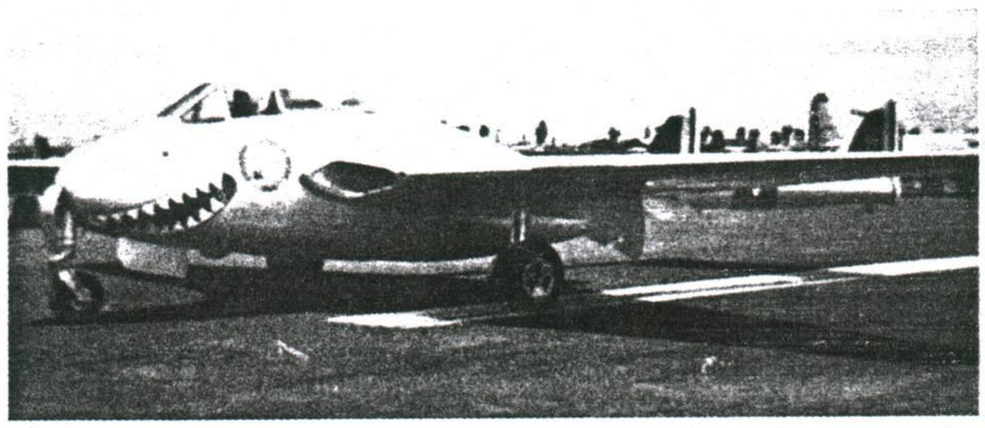
It may also come as a surprise to many to learn that the Mexican Mk 3s had previously flown with the Royal Canadian Air Force (RCAF) and had been sold by an American company when the surplus jet trainers failed to 'take-off' in private ownership. The Mk 11s came from Britain's RAF — and one of them was the first production model to enter service with the RAF. These acquisitions marked the transition to the jet age for the Mexican Air Force — today, it falls to the Lockheed T-33s and Northrop F-5Es and 'Fs to provide Mexico's combat and strike capabilities.

Canadian Connection

A total of 85 Vampires were delivered to the RCAF between 1948 and 1950. They were built for the RCAF in a contract dated June 13, 1946, the first aircraft flying on June 3, 1947. Construction of the entire batch was carried out by English Electric at their Preston, Lancashire, plant with test flying undertaken at Samlesbury. They received RCAF numbers 17001 to 17042 and 17044 to 17086. After their retirement, 27 were sold to Fliteways Inc at West Bend, Wisconsin, possibly in early 1958.

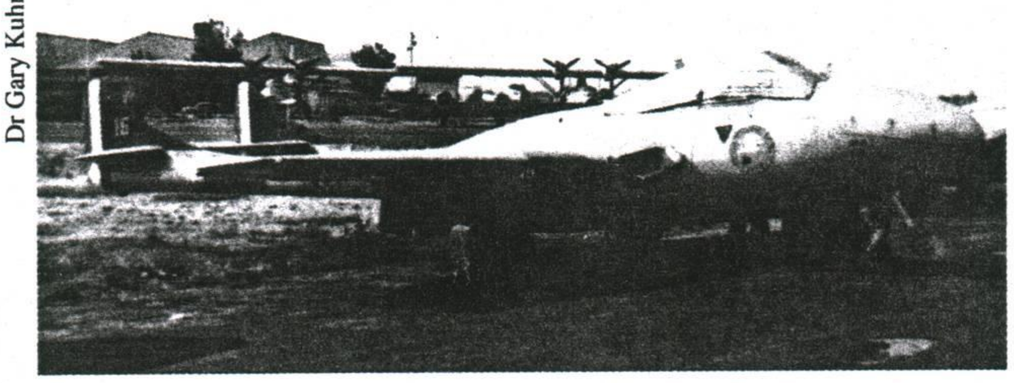
The President of Fliteways Inc, Merle C Zuehlke, wanted to introduce these former military jets onto the private market as fast *hacks* or executive aircraft — some had already been sold to private owners. However, the American Federal Aviation Administration (FAA) was not keen on the idea of Cessna/Piper Cub pilots zipping about in jets, and so introduced a number of restrictions. New Vampire F.3 owners suddenly found that they could only register them in the experimental/exhibition category — as was the case with N6877D (formerly 17069, constructor's number EEP 42387) — which meant that every flight had to be authorised ahead of time, be made under Visual Flight Rules conditions, and be registered on a flight plan. Intended destinations, be they airports or runways, also had to be approved by an FAA safety agent before a flight could take place. Not surprisingly the FAA killed the market stone dead in the US, leaving Fliteways with a number of Vampires it could not sell.

Manuel Ruiz Romero



Mk 3 No 13 taxiing by a Lockheed T-33A during their final years of operations - this aircraft is preserved at BAM-5 at Zapopan, Jalisco Mexico.

Dr Gary Kuhn



One of the two Mk 11 trainers, No 16, at Mexico City international airport, December 1963 - note the two PBYs and C-45 of the Mexican Navy in the background.

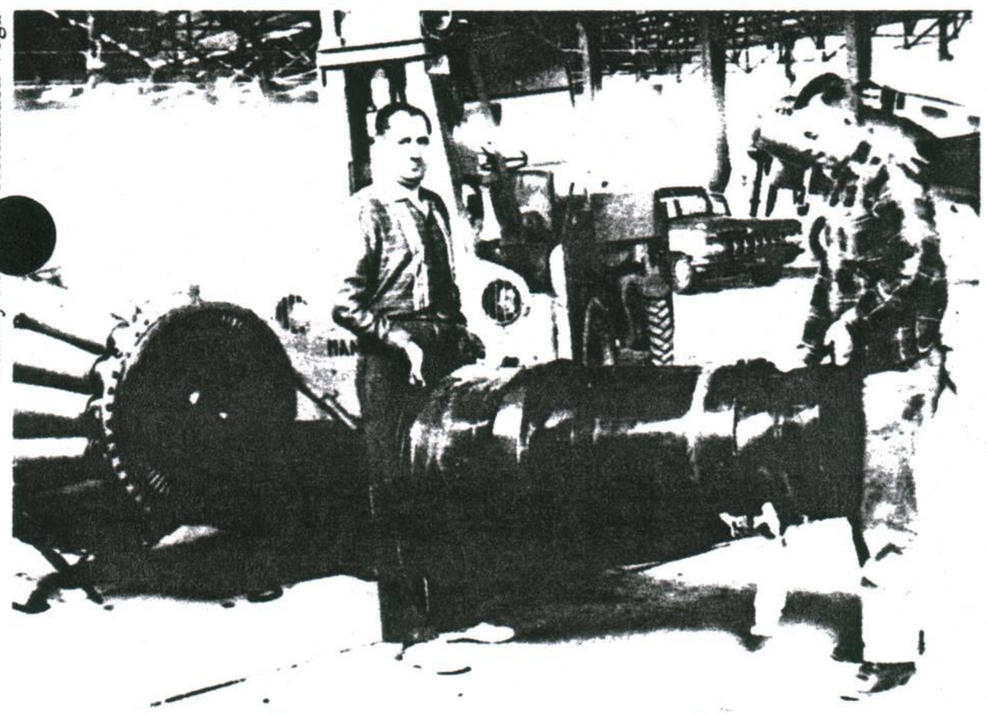
Mexican Purchase

At about the same time (1960) the Mexican Air Force was looking for a fighter aircraft, a search initiated by the then chief Gral de Div P A Roberto Fierro Villalobos. Indeed, the FAM had been without a fighter since 1958, when the last Republic P-47D-35-RA Thunderbolts of *Escuadrón Aéreo de Pelea* 201 (see *AE*46) had been retired. They had been replaced by the first order of North American T-28A Trojan trainers, but these could only offer very limited strike capability. This shortfall could have proved disastrous if Mexico, provoked over a 1959 shipping incident, had gone to war against Guatemala and found itself up against the North American P-51D Mustangs of the small but better equipped *Fuerza Aérea Guatemalteca*. The Mexican Air Force could only muster one 'bomber' squadron with Beechcraft AT-11 Kansans, about seven 'fighter' squadrons with North American AT-6/T-6 Texan trainers and one T-28A unit. Post-war financial constraints meant that the serviceability of these aircraft was questionable — the average Mexican pilots had completed insufficient flight time.

It is possible that General Fierro found out about the Fliteway Vampires via an Englishman living in Mexico, Emerich Salzberguer, who reportedly flew with the RAF during World War Two, and owned and operated an aero photographic company called *Aerotecnica de Mexico*. Over the years he had apparently employed a number of civilian and military pilots, one of them being Tte Col P A Fernando Hernandez Vega, who would go on to play an important role in the purchase of the Vampires.

Lt Col Hernandez Vega had received his wings as a *Teniente Piloto Aviador* (Lt Pilot Aviator) in 1941 and during World War Two flew anti-submarine patrols in the Pacific and later in the Gulf of Mexico. In 1944 he and five other pilots were sent to NAS North Island, San Diego, California, for dive-bombing training on the Douglas SBD Dauntless. He was then selected to join the *Escuadrón Aéreo de Pelea* 201 of the Mexican Expeditionary Air Force and went on to fly 47 missions in Republic P-47s during the liberation of the Philippine Islands.

Family Fe[illegible] Hernandez Vega



Technicians from Fliteways assembly one of the Goblin engines at BAM-1, Santa Lucia. Note Beechcraft F2B FZB-5501 of the Photo Recon Squadron behind.

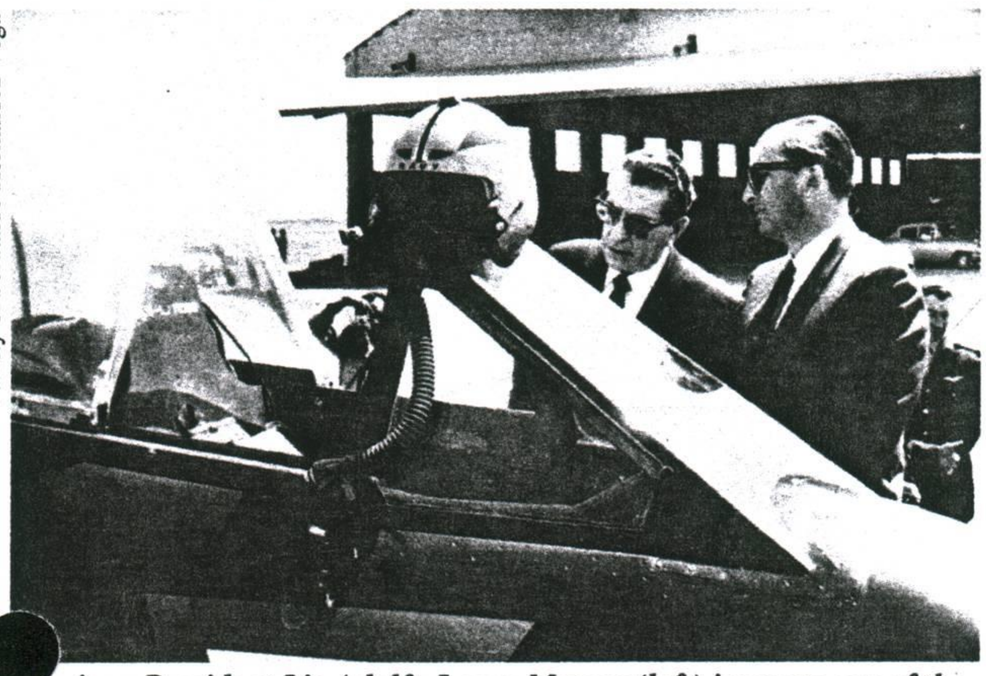
After returning to Mexico, he was promoted to Captain 2° Class on November 20, 1945 and spent the next 17 months as assistant to the Mexican military attaché in Washington DC, Gral de Div Leobardo C Ruiz. During this time he took the opportunity to fly many USAF types at Bolling field, like the AT-6 and P-51 Mustang. On July 4, 1947, upon the completion of five weeks training, he became the first Mexican military pilot to fly a jet fighter, a Lockheed F-80 Shooting Star based at Andrews AFB, Maryland. It was in December 1960, while Vega was serving as commander of *Escuadrón Aéreo de Reconocimiento Fotografico* (Photo Recce Squadron), that he was ordered by Gral de Div Agustin Avila Olachea, Secretary of National Defence and Gral Fierro to go to West Bend, Wisconsin with Tte Guillermo Romero Parra to oversee the delivery and overhaul of the 15 Vampire F.3s purchased by the Mexican Government. The aircraft were eventually painted in an overall English Green (FS36081) and the FAM insignia was added to the wings and under the cockpit on both sides — the tricolour was also painted on both rudders. The aircraft received the vague serial numbers [illegible]AM-1 to FAM-14 because they had not yet been assigned to a specific [illegible]ssion or squadron.

The aircraft were flown to Mexico in groups initially by Minnesota Air National Guard pilots, but this idea was abandoned after the local ANG Commanding Officer suffered an engine blow-out in FAM-4 (N6875D, formerly RCAF 17019). This was later repaired at a cost of $9,000 for a new wing, nose landing gear, new engine, electrical system and hydraulic system. It is reported that Mr Leo Geib of West Bend ferried most of the aircraft in Mexico and helped to check out the Mexican pilots. One group of FAM Vampires (FAM-13, FAM-6 and FAM-1) were photographed during their stopover at Love Field, Dallas, Texas in February 1961, as they made their way to Mexico.

Into Service

It was reported in the Mexican Air Force magazine *Anuahuac*, that by February 14, 1961, 12 of the 15 Vampires had been delivered to BAM-1 (*Base Aérea Militar* — Military Air Base No 1) at Santa Lucia, outside Mexico City.

Family of Fernando Hernandez Vega



Mexican President Lic Adolfo Lopez Mateos (left) inspects one of the Vampire fighters at BAM-1 Santa Lucia. Note the US Navy-type helmet and lack of gunsight on the aircraft.

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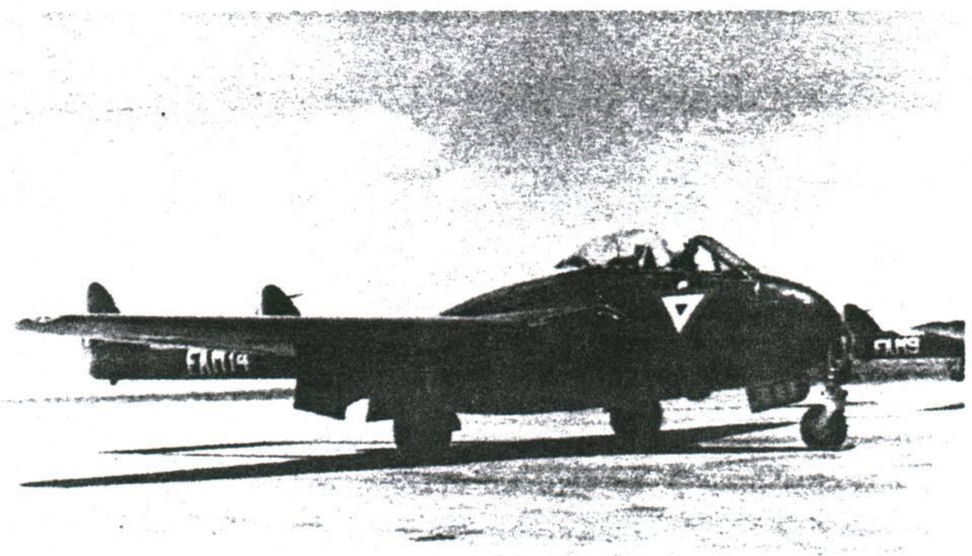

One of the first Vampires destroyed in a accident was FAM-14 shown here in an early colour scheme with FAM-9 next to it at BAM-1.

Eventually all 15 were delivered, but it appears that one was damaged en route at Acapulco, Guerrero — repairs to FAM-6 cost $2,000 and required, among other things, new landing gear. Only 14 Vampires were flown operationally, the 15th aircraft was possibly used as a spares source. The number FAM-15 was later allocated to one of the two Mk 11 trainers.

The *Escuadrón Aéreo* 200 was chosen to receive the Vampires because it was widely regarded as a 'ghost squadron' existing solely on paper (the unit was first mentioned in American Intelligence reports in 1951). The *Escuadrón* was eventually equipped in 1956 with a mixed bag of Douglas A-24B dive-bombers and AT-6 trainers and based at Pie de la Cuesta, Guerrero, near the famous resort town of Acapulco. Later (around 1959) the squadron received its T-28As.

Escuadrón Aéreo 200 was chosen initially to serve as an operational training unit for the transition to Vampires (its T-28As were passed down to *Escuadrón Aéreo* 202). On February 1, 1961, *Escuadrón Aéreo* 200 transferred from 5° *Grupo Aéreo* (Air Group) then at BAM-6 Puebla to BAM-1 Santa Lucia. Its place was taken by *Escuadrón de Bombardeo Ligero* 101 (Light Bomber Squadron) with its Beechcraft AT-11s which transferred from 1° *Grupo Aéreo*, BAM-1 to BAM-6, Puebla.

In April 1961, *Escuadrón Aéreo* 200 was officially designated as the first jet fighter squadron, with the following mission: "Day Fighters of double purpose, assigned to missions of air defence [interceptions] and tactical support to ground units."

A total of 23 officers and 35 ground personnel were trained by a group of Fliteways Inc instructors. The group was led by William A Korbell, Major USAFR, who as a 1st Lt assigned to the 39th FIS 51st FIG was credited with the destruction of a MIG-15 over Korea on August 20, 1952. As there were no two-seater trainers, the Mexican pilots had to familiarise themselves with the Vampire through ground school training, followed up with cockpit checks and taxiing. Col Hernandez Vega took part in the training schedule and set about translating the Vampire flight manual into Spanish.

On May 22, 1961, Col Hernandez Vega flew Vampire FAM-2 from BAM-1 Santa Lucia on a local flight at 1052-1105 hours — this was the first solo flight undertaken by a Mexican pilot. The event was witnessed by the base personnel, the instructors, Gral Fierro and Gral de Div P A Gustavo G Leon Gonzalez, Commander of BAM-1.

Col Hernandez Vega — as explained in his biography — helped to train, "...without cost to the government, 21 officers and two high-ranking ➢

Fuerza Aérea Mexicana Vampire F.3s				
FAM Serial	**c/no**	**Engine no**	**US civil**	**RCAF**
1	EEP42308	5671	N6870D	17016
2	EEP42403	1762	N6868D	17085
3	EEP42309	1629	N6873D	17017 (?)
4	EEP42311	1428	N6874D	17019
5	EEP42346	5268	N6875D	17040
6	EEP42396	1759	N6867D	17078
7	EEP42385	1612	N6879D	17067
8	EEP42363	1487	N6862D	17065
9	EEP42345	5670	N6871D	17039
10	EEP42350	5600	N6866D	17044
11	EEP42244	1147	N6865D	17002
12	EEP42365	1740	N6872D	17017
13	EEP42304	1517	N6882D	17012
14	EEP42323	1635	N6861D	17030

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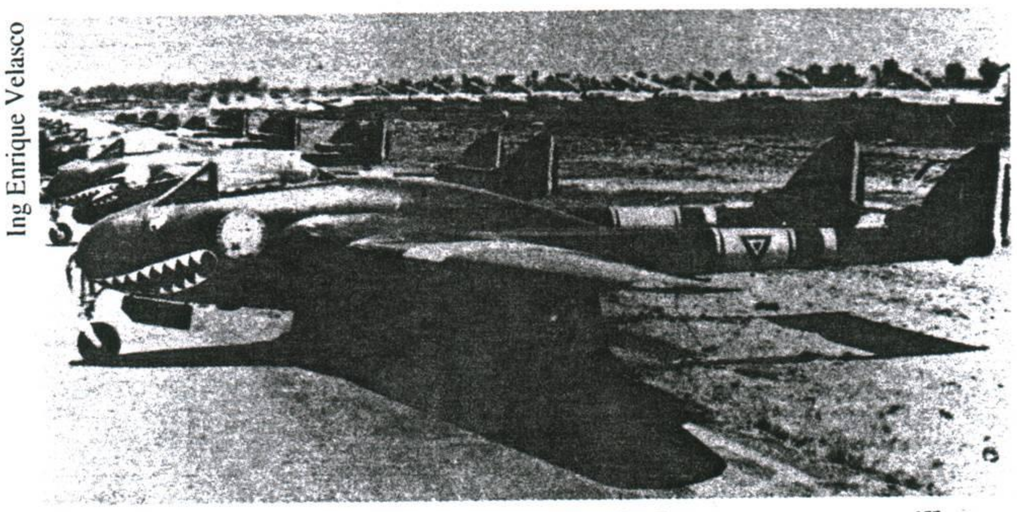

A line-up of F.3s and T-33As. Vampire No 1 sports an extra tailboom stripe to show that it is the Squadron Commander's aircraft.

pilots in jet aircraft without any incident." One of the two high-ranking pilots became the first Commanding Officer of *Escuadrón Aéreo Jet de Pelea* 200 (200th Jet Fighter Squadron) Tte Col P A Graco Ramirez Garrido Alvardo, whose father was once the Mexican ambassador in Colombia, where he embarked upon his flight training. After receiving his wings Garrido Alvardo joined Pan American Airways, and later joined the air force, joining Hernandez Vega in *Escuadrón Aéreo* 201 in the Philippines in 1945.

Operational Roles

At the same time as *Escuadrón* 200 was working up to operational status, the air force acquired 15 ex-USAF Lockheed T-33A jet trainers for a second jet squadron. The chosen unit was *Escuadrón Aéreo* 202, which in turn transferred its T-28As to other squadrons.

The Vampires made their public debut on February 24, 1961 — Mexican Flag Day — at BAM-1 during which they featured in the static display. Their first flying appearance before the public came on September 16, 1961, at the annual Independence Day military parade — 12 Vampires participated led by Tte Col P A Garrido Alvardo. Then on September 30, 1961, a flight of four Vampires went to the city of Morelia, Michoacan, to fly over the civilian-military parade to mark the birth of Mexican independence hero D Jose Maria Morelos y Pavon.

By October 1961 plans were approved for the creation of a *Commandancia de Grupo Aéreo Jet de Pelea* (HQ Jet Fighter Group) with *Escuadrón Aéreo Jet de Pelea* 200 (Vampires) and *Escuadrón Aéreo Jet de Pelea* 202 (T-33As). In the same month, six Vampires were sent to Guadalajara, Jalisco BAM-5 at Zapopan, home of the Military Aviation School to undertake training flights. On January 1, 1962, the 7° *Grupo Aéreo Jet de Pelea* (7th Jet Fighter Group) was created with a HQ group and *Escuadrón* 200 at BAM-1, while *Escuadrón* 202 was assigned to Mexico City International Airport, until further orders. Its first Group Commander was Tte Col P A Graco Ramirez Garrido, the leader of the T-33A squadron.

The jet squadrons had been located so because the BAM-1 runways had been upgraded to facilitate the jet aircraft. However, around December 1963, both units were seen operating from the military side of Mexico City International Airport, with 14 T-33As, ten Vampires and two Mk 11 trainers.

Prior to sale in the US, the RCAF had demilitarised the Vampires. FAM personnel had been sent to the United Kingdom to purchase the armament, the 4 x 20mm Hispano cannon, for each aircraft. Mexican technicians re-armed and re-configured the Vampires to military specifications.

Two-Seaters

One thing that the *Escuadrón Aéreo Jet de Pelea* 200 lacked was a suitable training aircraft to convert pilots to the Vampires. By 1962 the Mexican Air Force had acquired two de Havilland Vampire T.11 two-seat trainers, one being WZ414 which was the first production Mk 11 to enter service in the RAF in 1952. It had been built by de Havilland at Christchurch and spent some time at the Aeroplane & Armament Experimental Establishment at Boscombe Down and with the Empire Test Pilot School. It was declared a non effective airframe on January 29, 1960 and sold to Shackleton Aviation on January 5, 1962. The other was XD439 (built by de Havilland at Chester) which was delivered to the RAF in 1954, and had once served at the Central Navigation and Control School at Shawbury. It was retired to 19 Maintenance Unit at St Athan on May 11, 1959 and was sold to Shackletons on the same date as WZ414.

Their date of arrival in Mexico is not known, but they received the squadron

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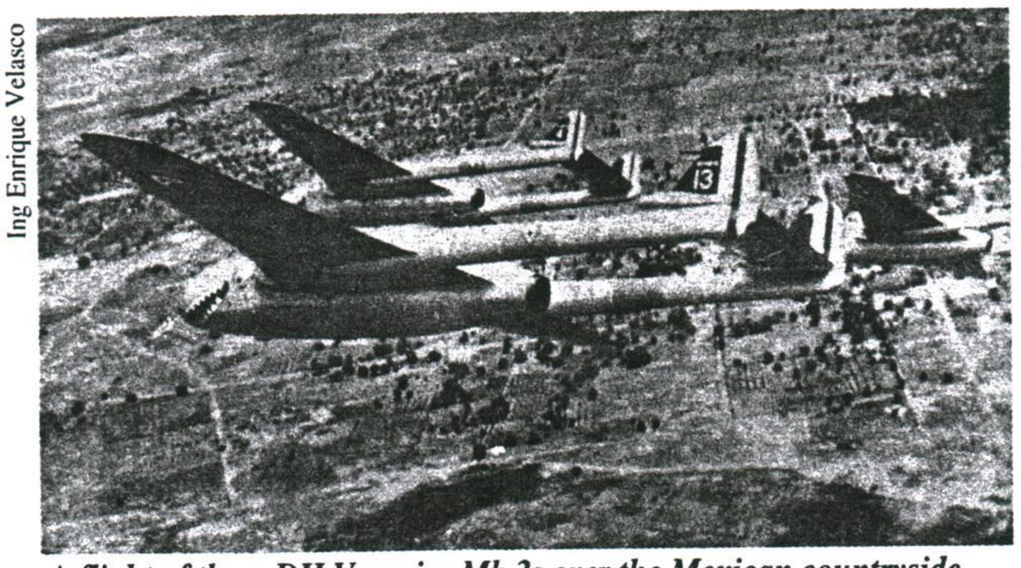

A flight of three DH Vampire Mk 3s over the Mexican countryside. Nearest are No 4 and No 13 — which is today preserved at BAM-5 Zapopan, Jalisco.

number FAM-15 and FAM-16 (although it is not known which was which) — early photos show both aircraft in FAM markings with their RAF serial numbers still painted on their tail booms and the squadron insignia added under both sides of the cockpit.

Markings

The squadron insignia is a story in itself — it consisted of a *fantasma* (ghost) dressed in flight gear complete with *bonedome* helmet, oxygen mask, and a jet pack on its back. It is depicted flying out of a haunted castle holding a machine-gun in its hand. This ghost first appeared in flight gear, with the A-24s, AT-6s and T-28s.

As to the colour scheme, most likely after the unit was designated a jet fighter squadron, it changed to a dark green with yellow stripes on both tail booms and wings — a shark's mouth and eyes as well as the ghost insignia was applied under the cockpit on both sides. The FAM letters were removed and the lettering 'DH-MK-III' painted on the vertical stabiliser on both rudders, with the individual number beneath it. During their time in service the Vampires were used extensively for training, sometimes engaging in mock dogfights against their rival T-33s — other duties included gunnery practise, parade flyovers and participating in annual military manoeuvres.

Retirement

The Vampires suffered from a high accident rate; which possibly contributed to their retirement from service. Talking to a former Vampire pilot, he explained that one of the disadvantages was the lack of an ejection seat (which the T-33 had) — the only way to successfully bale out of a Vampire was to

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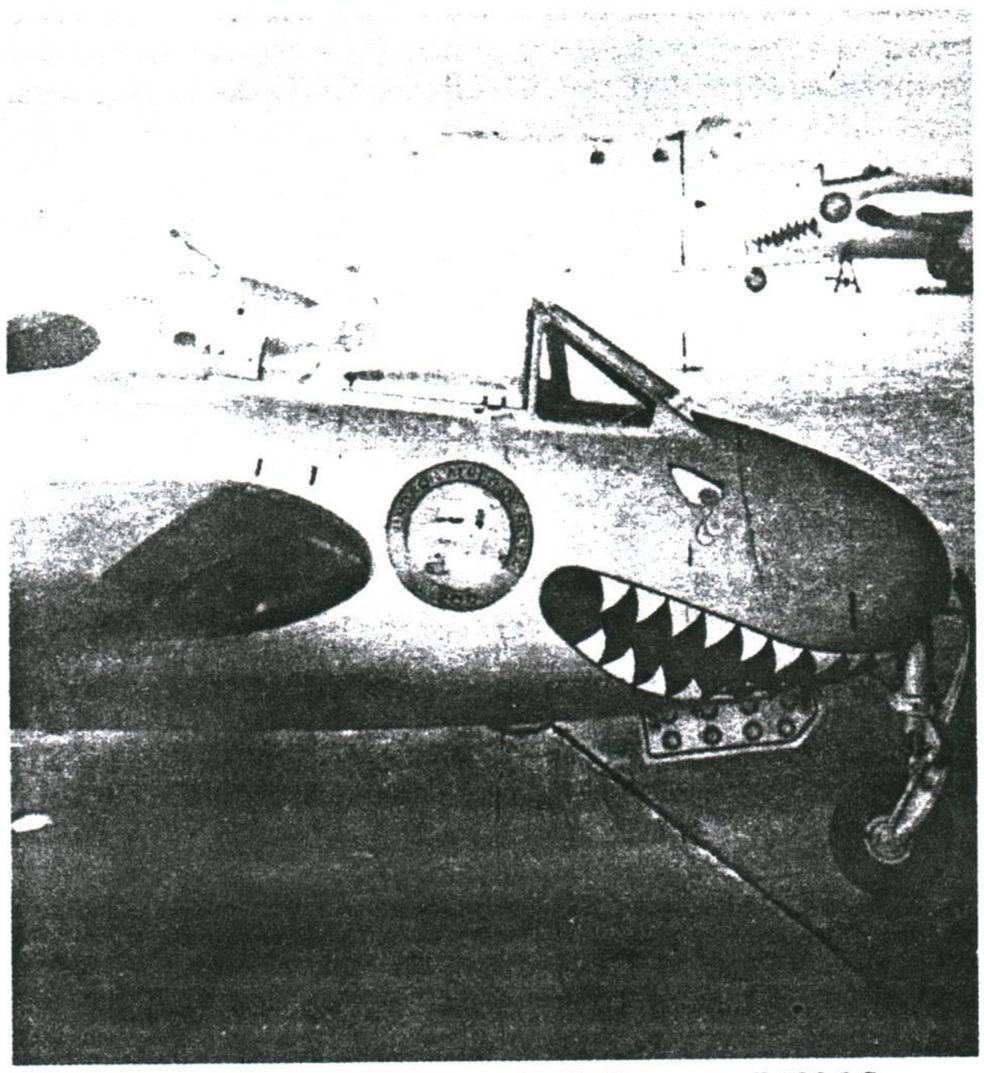

The surviving Vampire fighters inside of a hangar at BAM-1 Santa Lucia after their retirement from service. Note the tear drops painted on the 'eyes'.

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The Squadron insignia of* Escuadrón Aéreo Jet de Pelea *200 as applied to the Mk 11 trainers was far more detailed than those on the fighter counterparts.

turn it upside down. The first reported loss was Vampire No 14 at BAM-1, Santa Lucia, when the left landing gear collapsed upon landing; it belly landed causing both external tanks to ignite. Fortunately the Mexican pilot managed to leap out of the cockpit and make a mad dash for safety, meeting his rescuers on the way.

Two more Vampires, No 3 and No 9, were reported lost in landing accidents (no dates known). The first was another landing gear failure, and the latter a brake failure — reportedly while being flown by the same pilot, who survived both incidents uninjured. A fatal accident occurred on December 22, 1966, when Vampires No 8 (flown by Tte P A Rodolfo Garcia Rincon) and No 3 (by Tte P A Angeles Lomeli), took off on a training mission about 20 miles (32km) from the city of Pachuca, Hidalgo. The former pilot failed to pull out of a dive and was killed.

In 1966 or 1969 (the exact date is not known) a number of accidents are believed to have occurred during the annual military manoeuvres near Mexico City. During a flight of three Vampires, one suffered an engine failure — the pilot tried to glide back to BAM-1, but landed short in a field (with his ernal tanks in place) the aircraft bounced and hit the ground again, breaking nose gear. As he hit a ditch both main legs bent under, leaving the Vampire to scrape along ground — it did a 180° right turn and went backwards about 100ft (30m) leaving both external tanks behind. When it finally came to a stop, the pilot looked down to see earth where the cockpit floor should have been. The entire underside have been scraped off, yet the pilot miraculously only sustained bruising to his right shoulder.

Two days later tragedy struck — No 7 or No 12 was lost in a accident killing Capt P A Martinez Galvino. After take-off the pilot lost cabin pressure, so he attempted to return to base by making a sharp turn — one of his external

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Newly-arrived Vampires FAM-12 and FAM-10 parked in the area of the* Escuadrón de Reconocimiento Fotografico *at BAM-1 Santa Lucia, Mexico. Note Beechcraft BHB-1517 on the right.

tanks fell off and the Vampire flipped over and crashed into Lake Texcoco.

In 1970 fears over safety, grounded the Vampires — even the Mk 11 trainers were considered to be unsafe as there were no more stocks of cartridges for their ejection seats. This occurred during the tenure of Gral Brig P A Jose Vergara Ahumada, as chief of the air force and came at about the same time as the Vampire colour scheme changed from dark green to a overall aluminium with international yellow wings and tailboom stripes.

For many years the surviving F.3s and the two T.11s were stored in one of the hangars at BAM-1 — their sorry fate was highlighted when a sympathiser painted tears in the eyes of the Mk 3.

It was later reported that some of the F.3s were sent as training aids to the Aviation Mechanic School at BAM-5 at Zapopan, Jalisco. Others provided background scenery for the 1969 Mexican movie *Aguilas de Acero* (Iron Eagles) filmed at BAM-1.

Years later some of the aircraft were scrapped — one of the Mk 11s met a similar demise, but the cockpit section went to a private collector in Mexico City. The other Mk 11 is preserved at the main army base inside Mexico City — where, for many years, there was also Mk 3 No 5 acting as gate guard, wearing an incorrect camouflage scheme. It was removed in 1992, restored and painted in the correct colour scheme and markings, then put on display in the grounds of the new Mexican Air Force HQ building in Mexico City in company with a T-33A, T-28A, P-47D and an AT-6. No 13 is on display at the Military Aviation School (*Colegio del Aire*) at BAM-5 at Zapopan, as a tribute to the first jet fighters of the *Fuerza Aérea Mexicana.*

The author would like to thank the following: the family of Gral de Div Fapadema Fernando Hernandez Vega, Sr Manuel Ruiz Romero, Hector Davila Cornejo, Ing Enrique Velasco, Hector Lara Feranadez, Carlos L Vazquez, Dan Hagedorn, Dr Gary Kuhn, Jerry Vermon, the Royal Air Force Museum, San Diego Aerospace Museum, Planes of Fame Air Museum, and the Federal Aviation Administration.

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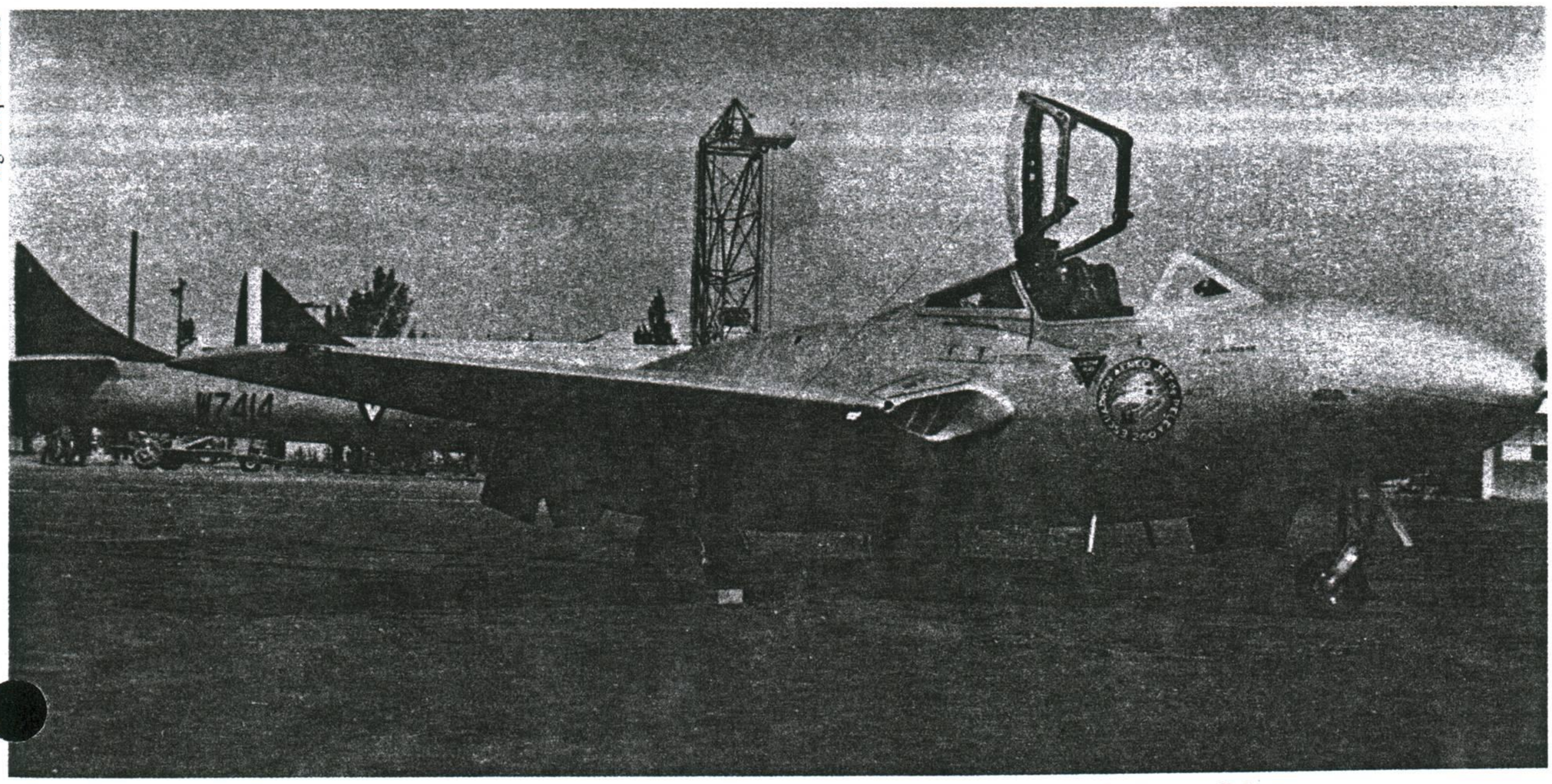


Mk 11 WZ414 (ex-RAF) after its arrival in Mexico, possibly* circa *1962, to help transition pilots to the single-seat fighters.

EEP-42313 17021

EEP-42389 17071

EEP-42380 17062

EEP-42387 17069

EEP-42392 17074 (NAM)

DeHavilland Vampire Aircraft on the 05 Sep 81 U. S. Civil Aircraft Register

(Subtitled: Oh, how inaccurate it can be!!!)

N4LJ.....S/n 17031 — Albert C. Hansen, P.O. Box 112, Mojave, Calif. 93501
FAA code 2801502

N6860D.....S/n 17058 — George D. Arnold, P.O. Box 43, Peru, Indiana 46970
FAA code 28015
Obsolete information.
This aircraft has been back in Canada for probably more than 10 years. Was in posession of the Air Museum of Canada, at Calgary. Then, some time prior to publishing of Leslie Hunt's book in 1974, it was obtained by Don Campbell, and moved to Kapuskasing, Ontario. On 19 Sep 82, it arrived in Surrey, B. C. to join the collection of the Canadian Museum of Flight and Transportation.

N6863D.....S/n 17020 — Sale reported.....11515 West North Ave., Milwaukee, Wisc. 53226
FAA code 2801502
Obsolete information.
Was in the posession, for many years, of the aviation trades school(Gateway Technical Institute) at the Kenosha, Wisc. airport. In 1977, it was obtained by the Canadian Warplane Heritage, and moved to the Hamilton, Ontario airport, where it is still located. Ex-442 Sqn., Ross/Dodwell mid-air.

N6864D.....C/n EEP42313 — Listed, but no info given on owner.
RCAF 17021
Last heard of in New Orleans, La., owned by Poelman Aircraft Co. Inc. Fate unknown???

N6876D.....S/n 17083 — John E. Morgan, 291 Reno Ave., Las Vegas, Nevada 89109
FAA code 2801512
Fate unknown???

N6878D.....S/n 17072 — John T. Downing, P.O. Box 85, Cumming, Ga. 30130
FAA code 2801512
Correct info., I beleive. Ex-Al Letcher aircraft.

N6883D.....C/n EEP42389 — Flight Research Inc., Box 796, State College, Miss 39762
FAA code 2801512
RCAF 17071
Ex-Al Letcher. Beleived to be owned by Shawn Roberts, of Mojave, Calif., who works for "Flight Systems".

N6885D.....C/n EEP42380 — Letcher and Associates, Fox Airport, Lancaster, Calif. 93534
FAA code 2801512
RCAF 17062.
Located at Mojave, Calif....along with N4LJ and N6883D.

NOTE: FAA coding: 2801502 is "deHavilland Vampire"
2801512 is "deHavilland Vampire Mk. 3"

Exists, but not on register: N6881D(RCAF 17018) at Ed Maloney's Planes of Fame, Chino, Calif.

J. E. VERNON, P.ENG.
3489 LAKEDALE AVENUE
BURNABY, B.C., CANADA
V5A 3E2

SEP 20 1982

#21 Spuzd a.k.

421 Sqn. U.K. Vampires (51-52)

PL51422 VZ278
418
421
429
420
419

PL51881
882
918
919
832
PL51440 x

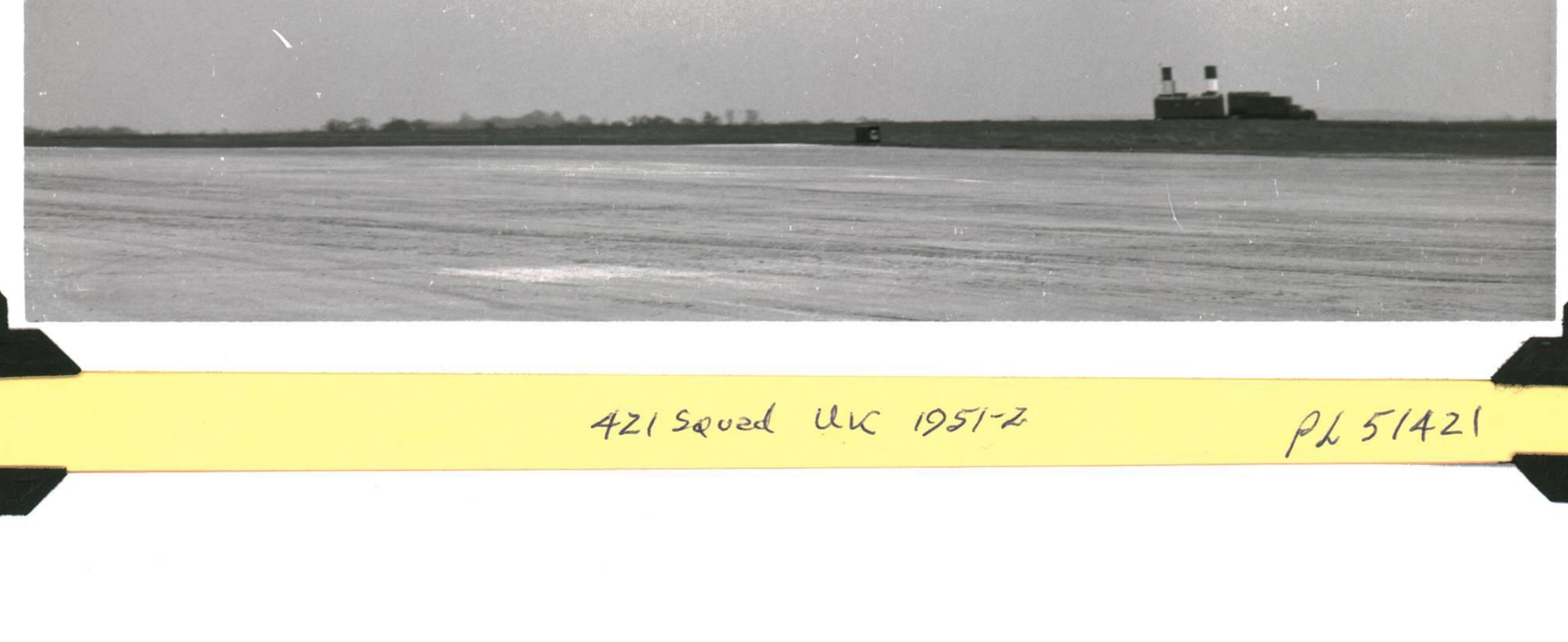
421 Squad U.K. 1951-2

PL 51422

PL 51418

421 Squad UK 1951-2

PL 51421

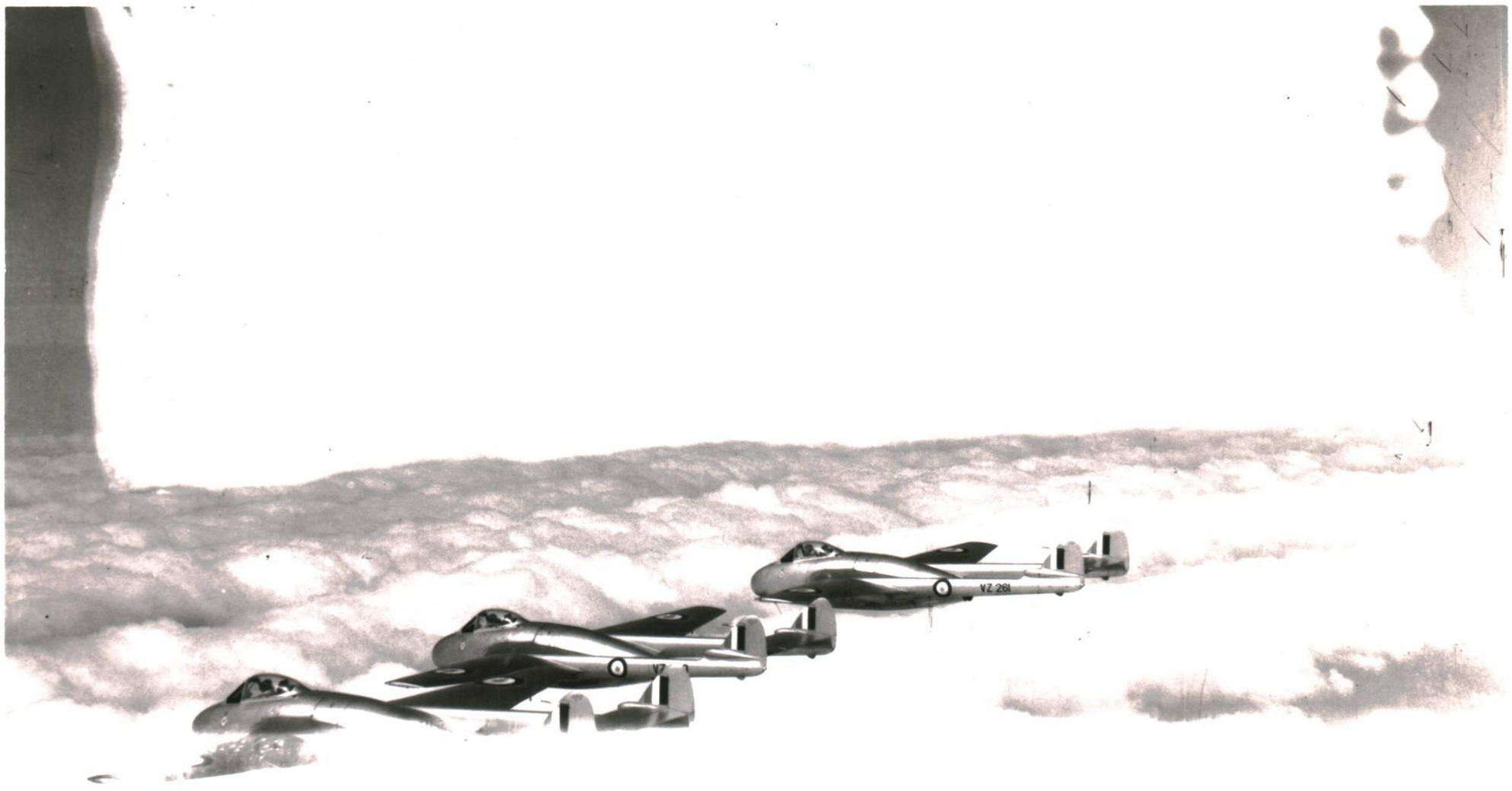


PL 51429

421 Squad UK. 1951-2

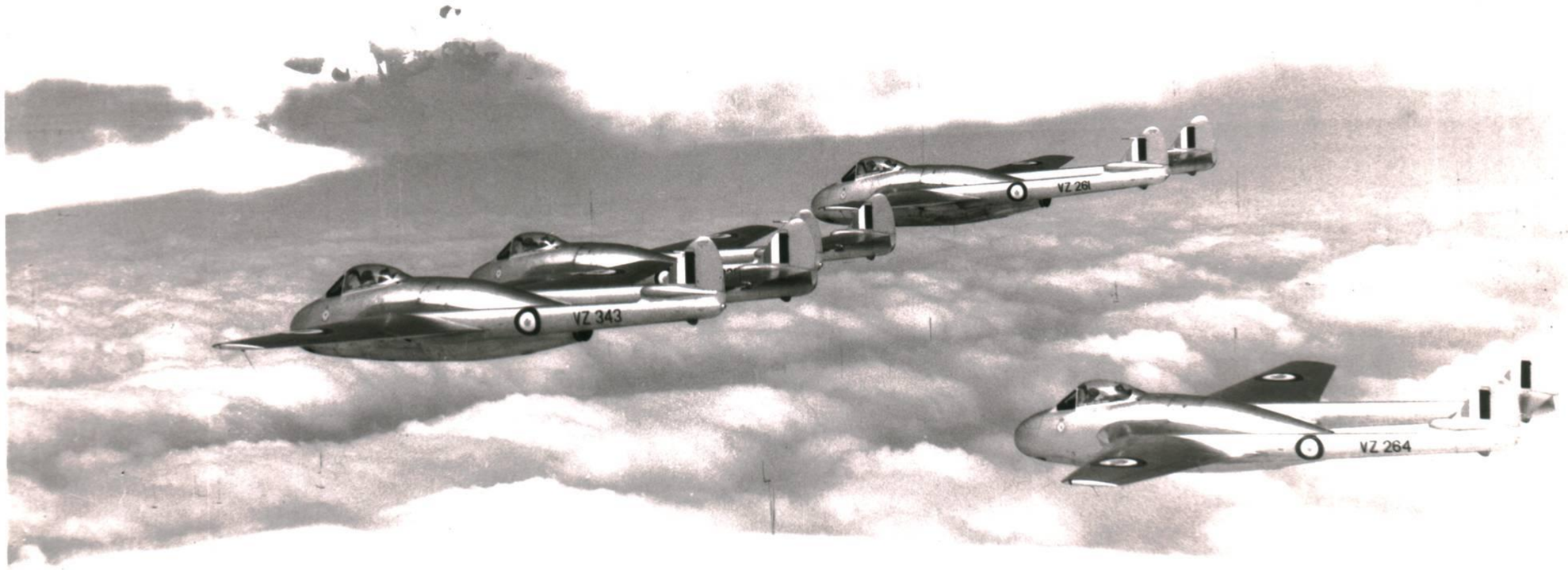
PL 51420

PL 51419

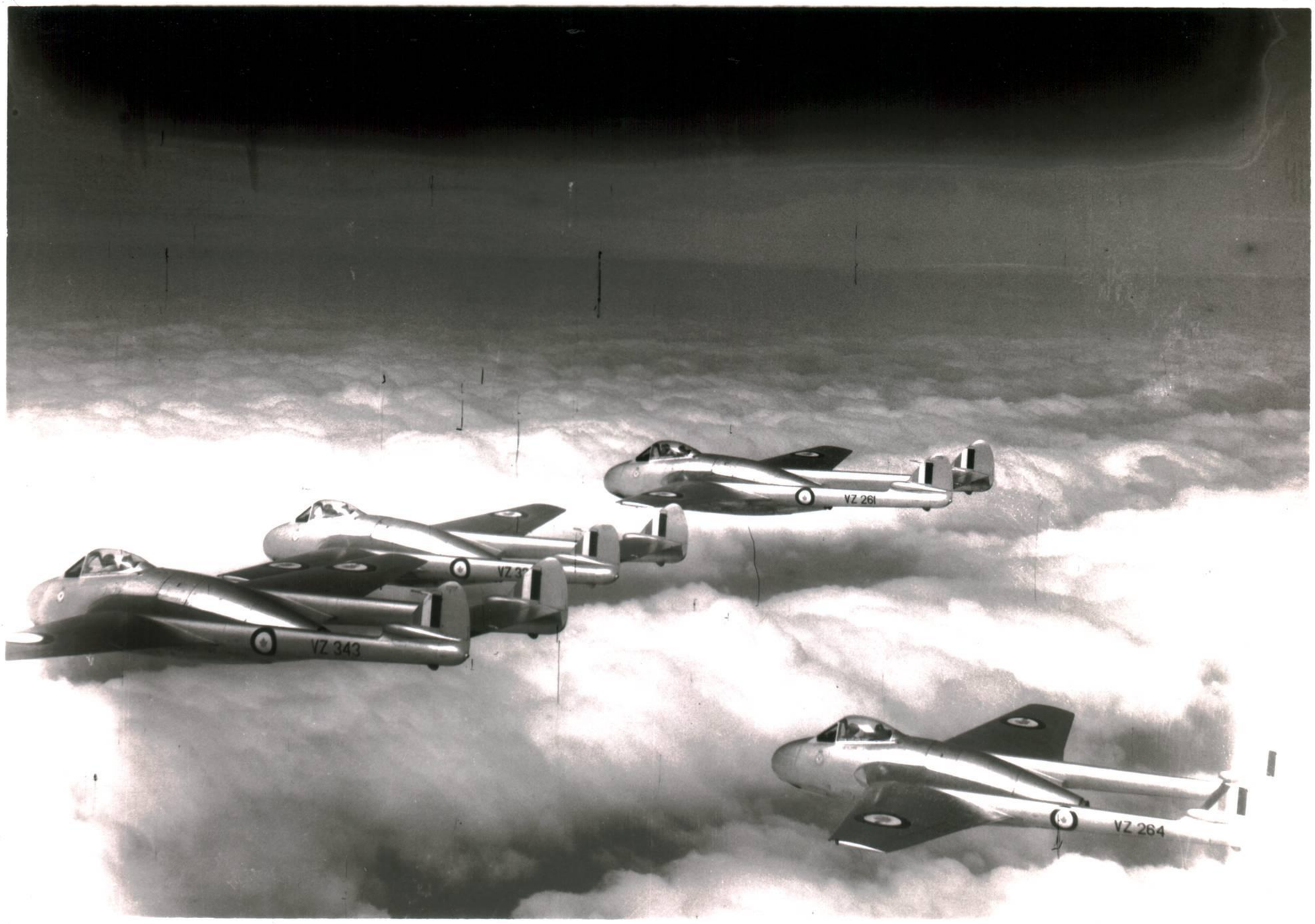


421 Squad UK 1951-2

PL 51881

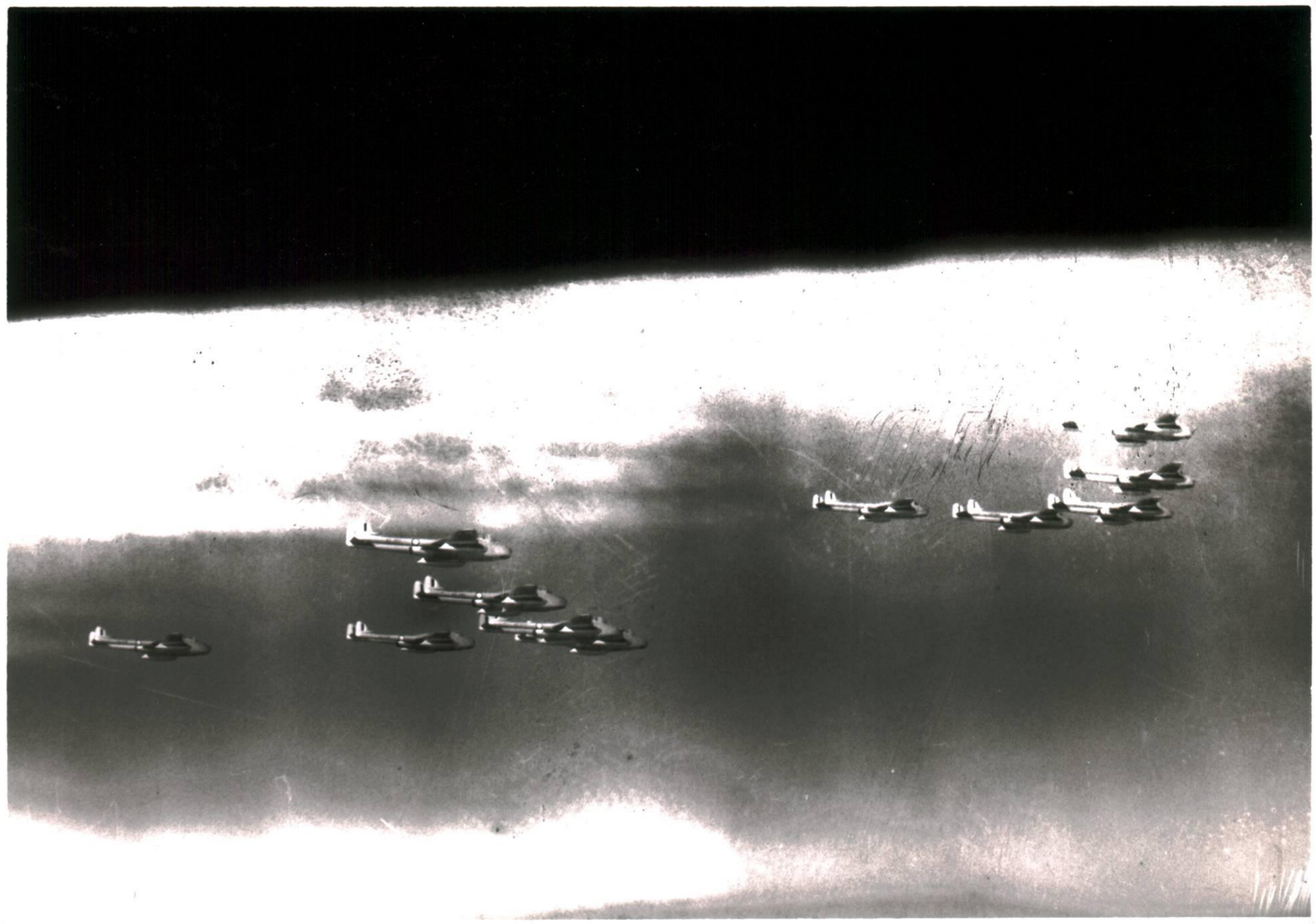


PL 51882



421 Squad UK 1951-2

PL 51918



PL 51919

PL 51832

VZ 336

PL 51440

421 Squadron UK 1951-1952