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Drawn by: A.A.P LLOYD & G.CAMPBELL-THOMAS.
Traced by: A.A.P LLOYD.

De Havilland CHIPMUNK.

AIRCRAFT DESCRIBED

De Havilland

CHIPMUNK

No. 261 — The De Havilland DH C-1 Chipmunk described by Charles W. Cain and drawn by G. Campbell-Thomas. and A. A. P. Lloyd



Air to air shot from the 1950's. R.A.F. Chipmunk T.Mk.10 in silver with yellow (trainer) bands.

WE RECKONED that the best person to thrust our brand-new investigative pocket recorder at — to get the magic of a 'Chipmunk' taped for our select readership — would be a 'One-ton Budgie' owner who just also happened to be a practising aeromodeller. Wouldn't that be something to crow about?

"So, Mr Ralph Steiner of Arkley, Herts., owner of 'Chipmunk' Bravo-Bravo-Mike-November, Founder and Secretary of the international *Chipmunk Club* and lapsed aeromodeller, the question is: Why the 'Chipmunk'?" The owner of G-BBMN (construction no. C1-0300, ex-RAF serial WD359) answered in a trice: "A 'Chipmunk' carrying an instructor and pupil can take-off and climb to 4,000 feet, execute two spins, two loops, two rolls and two rolls off the top all above 3,000 feet and then land all within 19.5 minutes using 2.75 Imp. gallons of fuel. And that's official from the makers" Hmmm! But investigative journalism is all about fearlessly exposing frailties; the hand mike waved accusingly. 'Vices?' the tone was forgiving of such brashness. "None to speak of; a very forgiving aircraft with early warnings if one is a naughty boy. It's got the ideal character for a good primary trainer."

Taking a realistic view of things, to start knocking the 'Chippie' would be to take on not only the *Chipmunk Club* but also the countless ab initio pilots who now have greying temples and uniforms heavy with Service authority. And, by no means least, those thousands of young hopefuls in cadet forces for whom the 'Chipmunk' has provided them with their very first taste of 'real flying' — and is still so doing. "It's getting on for 40 years since the first

'Chipmunk' flew. And, in one form or another, it's going to be flying happily into the twenty-first century!" says Ralph Steiner and he should know. Quite a thought, eh?

The Chipmunk arrives

If Chief Designers play a critical role in the creation of new aircraft, then the 'Chipmunk' owes much to W. J. Jakimiuk who was born in the Polesia region of Poland in 1902. Majoring in mathematics at Wilno University, W. J. Jakimiuk then went to France's École Supérieure d'Aéronautique and gained his diploma in 1929. From 1931 and until the German invasion of

September 1939, he worked in the design bureau of P.Z.L. and, progressively, on the famous gull-wing fighter monoplanes, the P.7 (production engineering), P.11 and export P.24 series (development engineering). He was also involved in the 1938 two-motor transport prototype, the P.44, and the radial-motor, low-wing monoplane prototype fighter, the P.50.

From Poland, W. J. Jakimiuk joined France's S.N.C.A.S.E. plant, travelling there via Romania, Yugoslavia and Italy. With the fall of France imminent, in June 1940, he made the sea journey to join the design office of De Havilland Aircraft of Canada. Immediately, he was involved in



Fully aerobatic, bubble-canopy DH C-1B-2 Chipmunk Mk.2 CF-CHY, in November 1949.

Canadian built DH C-1B-2, with Gipsy Major 10, full aerobatic clearance to 9g stress factor.



'Mosquito' production engineering problems at the Downsview plant, Toronto.

When the prospect of creating a replacement for the doughty but obsolescent DH.82 'Tiger Moth' was first mooted, W.J. Jakimiuk must have recalled his P.Z.L. metal-airframe philosophy years. For this was to be something new at Downsview where, between 1940-45, deliveries attained were 1,747 'Tiger Moths' and 1,135 'Mosquitos' (wooden construction) and 375 'Ansons' (mixed metal and wood). In the event, the DH C-1 was to be of all-metal construction with stressed skinning and only the control surfaces (wings and tail assembly) and the mainplane sections aft of the generously skinned leading-edges were

to be fabric-covered. Metal covered detachable wingtips were also incorporated.

With the approval of the parent British company, from preliminary drawings of October 1945, in just over seven months the prototype CF-DIO-X was hand-built in record time. From England, DH's chief production test pilot, W.P.I. (Pat) Fillingham flew in to undertake the initial flight-test programme. The first flight took place from Downsview Airport on May 22nd, 1946. Pat Fillingham submitted reservations about longitudinal control and for a brief period a chunkier fin and rudder was tested. The familiar 'Mosquito' shape was reinstated after minor engineering changes.

After the loss of the second prototype (CF-DFJ-X) on January 19th, 1947, during spinning trials and despite the adoption of a bigger area rudder (noticeable because of vee cut-out at the base of the curved trailing-edge), the legend persisted. As the *Chipmunk Club's* Secretary puts it: "The spin recovery query was finally dispelled by the addition of strakes on the side of the fuselage like those on the 'Tiger Moth'. This was followed by a complete programme of test flying, all carried out in Australia."

Crossing the Atlantic

The 'Chipmunk' was more than a local 'all-metal' milestone for *DH Canada*: it was to become the first Canadian design to be selected for manufacture overseas, first in England and then in Portugal. The first steps were taken by shipping to the parent *DH* factory at Hatfield the tenth and eleventh examples. By November 1948, the pair (now G-AJVD and G-AKDN) were being subjected to RAF service trials with 'local preference' instrumentation and Gipsy Major 10s in place of the *DH Canada*-installed Gipsy Major ICs.

Those Aeroplane & Armament Experimental Establishment tests at Boscombe Down resulted in the basic Anglicised 'Chipmunk'. The Gipsy Major was to be a Mk.8 in place of the Mk.10 Srs.2 which would be applied to the Mk.20 export version of the RAF's standard 'Chipmunk' T.Mk.10.



Later, Gipsy Major 8s were to be brought up to the Mk.10 Srs.2 standard for the Air Registration Board's approved and subsequent civilianised variants, the 'Chipmunk' Mk.21, 22/22A and 23. For the RAF, who would then order an impressive 740 T.Mk.10s out of a total Hatfield and later Chester production of 1,000 Chipmunks,¹ there were to be a few changes. Chief of these were to be a reinforced centre section and wing main spar to permit a maximum 10g stress (9kg in Canadian versions) for aerobatics, and a slight forward resiting of the main undercarriage legs — and a provision for a built-in landing light on the port leg's sleeve.

Whereas the RCAF's *DHC-1B-2 Series 2 & 5* 'Chipmunk' 2s (only three RCAF Mk.1s existed to DHC 1A-1 limited-aerobatics specn.) were to be fitted with the delightful bubble or blown cockpit canopy, the RAF's T.Mk.10s and the export T.Mk.20s had to be content with the original built-up 'glasshouse'. By now it was too late as the blown canopy was not compatible with the British airframe. Following the release in 1956 of RAF-surplus T.Mk.10s, *Bristol Aircraft Ltd.* made a brave attempt to encourage civilian operators to indulge in a 'glamour kit' comprising a one-piece canopy and smart accessories like spats of glass fibre for main and tail wheels. The company gave this facelift to a surplus T.Mk.10, G-AOTM, and this encouraged a second (G-APOY) to be *Bristol* refashioned in 1963. The latter was sold to Norway and the

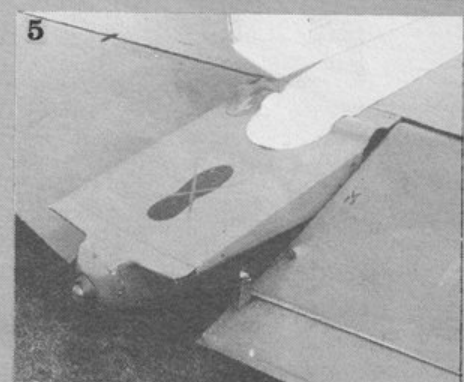
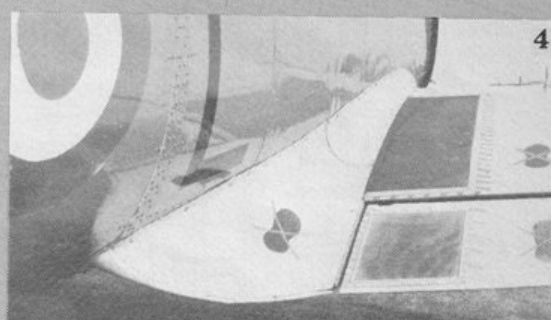
Above, the Aero Bonner Chipmunk 200, winner of the 1973 Kings Cup Air Race, photo from M. J. Hooks.

former is currently N122DH and owned by a *Chipmunk Club* member of Bedford, MA. Other blown canopy variations have existed in North America and Australia.

What happened to Chief Designer W. J. Jakimiuk? He was invited to join the Hatfield team to smooth out any wrinkles in the production of the RAF 'Chipmunk'. In Canada he left a further legacy because he had been in at the start of *DH Canada's* second highly successful local product, the *DHC-2* 'Beaver' light cargo plane. With his work on the T.Mk.10 concluded, W. J. Jakimiuk went back to France and *SNCASE* (Sud-Est) and designed the S.E.5000 'Baroudeur' swept-wing interceptor which was flown for the first time on August 1st, 1953. When the Anglo-French 'Concorde' programme was set in motion, W. J. Jakimiuk served as one of the eight French directors towards the end of a distinguished career in aviation.

Of the Portuguese 'Chipmunk' production there is little to say. The government

The De Havilland T.Mk.10 standard Chipmunk in close-up: 1 — showing fully open cockpit, 2 — dorsal fin and anti spin strakes, 3 — landing light only on port undercarriage leg, note root-stall inducing strip on wing leading edge, 4 — wing-root fillet and rivet pattern on fuselage, 5 — elevator trim tab on starboard side only.



factory, OGMA began turning out T.Mk.20s under licence in 1952 and produced at least 60, some of which remain in service with the Air Force today. The first T.Mk.20s were UK purchases in 1951; all 10 being allocated to the Army.

Civilianising the Chipmunk

With the advent of RAF-surplus T.Mk.10s in 1956 there came the need to have Air Registration Board Certificates of Airworthiness. Four civilian marks came

Below, one of the few crop-spraying conversions, the Agricultural Chipmunk Mk.23. Note outer wing leading edge slots and single seat canopy.

There have been three mid-1950s bubble-canopied *Sasin Aerostructures SA-29 'Spraymasters'*. As *Aerostructures*, the company then began a programme of replacing Gipsy Major engines with *Avco Lycoming O-360 'flat-fours'*. Not approved was their installation of wingtip tanks but a belly tank seems to have been successful.

In England, too, engine power has occupied 'some attention. As already mentioned, the RAF GSA (RAF Gliding & Soaring Association) has advanced the use of the *Avco Lycoming O-360 'flat four'* to give the 'Chipmunk' more pull as a glider tug. However, the sprinkling of tow-equipped T.Mk.10s of the RAF's Air Experience Flights have remained Gipsy Major-powered. The 13 Air Experience Flights in the UK and N. Ireland² have around 50 'Chipmunks' to give air experience to the nation's ATC/CCF cadets. Two novel

Design data:

De Havilland DHC-1 'Chipmunk' T.Mk10 (NB: Data generally as supplied by *DH Hatfield* for 1956-57 *Jane's All the World's Aircraft*.)

Category: Enclosed, all-metal, enclosed tandem-seat primary trainer will full military aerobatic stress factor to 10g.

British Services use: Initially for RAF University Air Sqns. from 1950; also Reserve Flying Schs. of the RAF Volunteer Reserve; pilot training of National Service pilots of the RAF; Primary Flying Training Sqn, Light Communications Flts., Air Experience Flts. and other misc. units. Also Royal Navy's Britannia Naval College AEF and Army Air Corps.

RAF Serials: WB549-WB768 (200 a/c); WD282-WD397 (100); WG271-WG491 (150); WK506-WK643 (100); WP772-WP988 (150) & WZ845-WZ884 (40). Last T.Mk.10 (WZ884) delivered October 1st, 1953. (Note: These RAF serials are for both Hatfield & Chester production runs; the serial batches have built-in 'breaks' so that straightforward subtraction would not arrive at the final T.Mk.10 production total of 740).

Powerplant: One *De Havilland Gipsy Major* 8 air-cooled, four-cylinder, inverted inline delivering a max. of 145-hp at 2,300 rev/min (direct-drive) at sea-level. Fuel grade AVGAS 100/130 Octane. Propeller by *Fairey*, LHT (left-hand tractor) metal blades, diameter 6.75ft & pitch 5.01ft. Spinner Type FC2 Mk.2 (later, modified Mk.5) by *Fairey*.

Dimensions: Span 34ft 4in; length 25ft 5in; height (top of windshield) 7ft 0in; wing area 172sq.ft; tailplane span (incl. elevators) 11ft 11in (area 17sq.ft); elevators 14sq.ft; rudder height from base 4ft 2in (area 6.8sq.ft); fin area 5.9sq.ft. Main wheel track 8ft 11in.

Weights: Empty 1,425 lb; loaded (normal) 2,014 lb, (max.) 2,100 lb.

Performance: (Max. permissible 2,100 lb) Max. at sea-level 138 mph; cruise 119 mph; climb rate 840 ft/min; Service ceiling 15,800ft; range (18 Imp. gal capacity) 280 miles at 116 mph at 5,000ft; endurance 2.3hr; (quoted for T.Mk.20).

Acknowledgements

For those eager to have closer acquaintance with currently flying 'Chipmunks' in the UK (but seek airfield/owner permission first!), the best source of reference is the *Air-Britain* 280-page 'United Kingdom & Ireland Civil Registers 1984'. And for the military examples, past and present, seek out J. J. Halley's 114-page *Air-Britain* 'ROYAL AIR FORCE Aircraft WA100-WZ999' published in 1983.

To those patient helpers who have responded to often impossible questions, the author extends his most grateful thanks: Messrs J. F. Brindley, B. Martin, B. Rigelsford and J. J. Halley, M. J. Hooks, J. D. Oughton and 'Mr Chipmunk Club Secretary', Ralph F. Steiner.

FOOTNOTES

¹ Several sources inadvertently carry forward '735' and '1,014'; the 'Chipmunk' saga is a veritable quicksand of 'facts'.

² No. 13 AEF in N. Ireland originally had a 'Chipmunk' but servicing problems have led to its replacement, uniquely for these Flights, by a BAe 'Bulldog' T.Mk.1.

into being. The Mk.21 is the ARB-approved civil mark of the export T.Mk.20 of which G-AMUF, G-AMUH and G-ANWB are the only current British register examples. The dozens of Mk.22s with current Cs. of A. are all RAF-surplus with Gipsy Major 8 engines brought up to Major 10 Srs. 2 standard. The Mk.22A sub-variant indicates replacement of the two mainplane 9 Imp. gallon fuel tanks with two for 12 Imp. gall. each. Our drawings show a Mk.22 in G-BBMN: about a dozen Mk.22As are listed in the current Civil Register (examples being G-ALWB and G-ARMC). The Mk.23 was an attempt to create a single-seat crop duster/sprayer in the late 1950s. Five T.Mk.10s were given Mk.23 status of which two crashed, two are now glider tugs with the RAF GSA (G-AOTF and G-ATVF) and one, the original prototype sprayer (G-APOS) was eventually sold in December, 1968, to become N8345 and is at present owned by yet another *Chipmunk Club* member who lives in Stone Mountain, GA.

Australia, too, has tried to make a market for a 'Chipmunk' agricultural aircraft.

powerplants are worthy of note. The first is the 118 shaft-hp *Rover TP-90* turboprop seen in G-ATTS at the 1966 SBAC 'Farnborough Show'. Having been reconverted to Gipsy Major, G-ATTS is now resident in Waco, TX, as N2247. The second powerplant is the turbocharged, liquid-cooled, 200-hp 'Super Sapphire' in the Shoreham-based *Aero Bonner 'Chipmunk 200'*, G-ARWB, which was first flown on July 2nd, 1979.

And finally, more Lycomings

The Royal Thai Air Force may seem to be an exotic note to end on but the RTAF has been a good customer, having purchased at least 22 *DH Canada 'Chipmunks'* between 1949-50 and more than 40 British export T.Mk.20s. Of these, 15 are currently in service with the RTAF and civil pilot training with the new designation of RTAF-4 'Chandra' (Moon). In addition to converting to 180-hp *Avco Lycoming IO-360 'flat-fours'*, these RTAF-4s have bigger and more angular vertical tail surfaces. Truly, the 'Chipmunk' story has still a long way to go before it is complete.



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