

DATA BASE



DHC-1B-2-S5 Chipmunk RCAF 18076 was taken on strength in November 1956. CHRIS SANDHAM-BAILEY

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IN-DEPTH
PAGES

DE HAVILLAND CANADA CHIPMUNK

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A pair of Chipmunk T10s, WG479 and WK643, in operation with the RAF's Elementary Flying Training School at Swinderby. DUNCAN CUBITT/KEY

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Pat Fillingham aloft over the English countryside in DHC-1 prototype CF-DIO-X, after shipment to de Havilland at Hatfield. KEY COLLECTION

The Chipmunk has its origins at the Downsview, Toronto, offices of the de Havilland Canada Aircraft Company (DHC), established in 1928. As the Second World War ended, the British parent firm recognised that the stalwart Tiger Moth, having been training pilots for nearly a decade-and-a-half, was becoming long-in-the-tooth and would soon require replacement. However, its design capability was heavily invested at the time in development and production of the Vampire, Venom, Dove and Comet.

As early as 1943, drawings of a bush-plane — at the time the predominant DHC thinking — and a trainer could be found in the office of DHC's chief engineer, Wsiewolod Jakimiuk. History has it that Francis St Barbe, one of the UK firm's directors, saw the model of the trainer during a visit to Downsview and stated, “If you can make a good trainer, I will sell it.”

An internal memorandum from W. Doug Hunter, DHC's

director of engineering, on 26 November 1945 sets the scene, making clear the importance to DHC of achieving production within a very tight timescale. “It is hoped”, he began, “that the following facts regarding the decision to design and build the Chipmunk in this country will show the necessity for each and every one of us to apply the utmost effort”. He described how

“The Chipmunk was not a response to any formal government or military specification”

St Barbe and his fellow directors in Britain were fully supportive of DHC using its own design personnel, and encouraged the workforce by saying, “We must show by making a success of our first project that we are capable of assuming responsibility for original design and by so doing ensuring the success and future prosperity of the Canadian de Havilland Company”. Hunter's memo set 31 March 1946 as the target completion date.

DHC-1 lore states that the design was referred to during its development phase as the ‘Jaki’, since it sounded like ‘Jakimiuk’, which subsequently led to formal assignment of the Chipmunk name in the days approaching its first flight. However, Hunter's reference in that November 1945 company memo to “the Chipmunk” definitely reveals otherwise.

Initial testing in Canada

Although intended as a Tiger Moth replacement, the Chipmunk was not a response to any formal government or military specification. Key design decisions were driven by the economics of the time. With a surfeit of DH82 components available, the airframe was based around the de Havilland Gipsy Major 1C engine and inherited many of the Tiger's

cockpit components, plus tandem seating, some use of fabric construction and a tailwheel undercarriage, though it also employed more modern concepts: a low monoplane, greater use of metal construction and enclosed cockpits.

Pat Fillingham was sent from the UK to make the maiden flight. Though one might question the politics of this, Russ Bannock, DHC's operations manager and chief test pilot, had only taken up his role on 1 May 1946. The decision also demonstrates the importance of the Chipmunk from head office's perspective. Fillingham took CF-DIO-X aloft on 22 May, returning 45 minutes later to tell the design team they had a winner. His only handling observation was that it lacked sufficient trim for landing. Such was the company's confidence that a second flight, the following day, was conducted as a press demonstration. Following this, Fillingham requested only that the tailplane incidence be decreased by half a degree.

Over the first 10 hours of flight-testing, Fillingham reported a list of items for attention: excessive engine vibration, resolved by installing firmer — not softer — rubber mounting blocks; a forward centre of gravity, overcome by the use of lighter engine bearers; insufficient rudder authority during aerobatics, which, after some trial modifications of both fin and rudder, saw a return to the original profile; the aforementioned lack of elevator trim, for which a larger trim tab and modified trim control gearing was recommended; and a reduction of the maximum flap deflection from 40 to 30°.

Another early flight test observation concerned the stall, which tended to happen somewhat abruptly, despite the use of the US 35B wing profile. This was seen to be an undesirable trait for a trainer, although aileron control was sufficient to catch the wing drop. Stall strips, measuring 32in, along the inboard leading edge of the wing solved the problem.

Aircraft two, CF-DJF-X, joined the test programme on 30 June, incorporating a number of modifications from initial trials. By the end of October, approximately 40 hours of testing had been accomplished and Fillingham returned to the UK. Bannock thus hired an experienced ex-Royal Canadian Air Force colleague, Charlie Stockford, to support test-flying activities.

Progress with the Chipmunk had not escaped head office's attention and it was arranged that ‘DIO-X’ be shipped to Hatfield, this occurring on 20 November. This left ‘DJF-X’ as the sole test specimen, although by the end of January 1947 the third, fourth and fifth airframes had been built, destined for DH companies worldwide — number three for Argentina, the other two for South Africa.

The programme suffered a major blow on 19 January when Stockford failed to fully recover ‘DJF-X’ from a spin. Although he recovered from his injuries, DHC management felt the accident had been due to pilot error and Stockford was “released from flying duties”. This led to George Neal becoming the



TOP: CF-DIO-X at Downsview in 1946 with a crowd of proud DHC fellows. Company executive A. F. ‘Sandy’ MacDonald is second from the right; then come Chipmunk designer Wsiewolod Jakimiuk, manager Phil Garratt and Doug Hunter. VIA LARRY MILBERRY



ABOVE: The winter weather is no barrier to test-flying as a pair of early Chipmunks, second example CF-DJF-X in the background, prepare for a sortie from Downsview. VIA LARRY MILBERRY

back-up test pilot to Bannock and aircraft six being hastened off the line to become the test article. But despite this accident, formal flight-testing had been completed and the Canadian Department of Transport granted type approval for the DHC-1 on 5 February 1947.

Further demonstrators were taken off the line during April, numbers 10 and 11 being shipped together to the UK, while 13 and 14 went to India. During May two initial flights were made with a Gipsy Major Mk10 engine and manual variable-pitch propeller. Though initially publicised by DHC as the preferred engine/propeller combination, engineering problems led to this configuration being dropped. Further work focused on addressing observations made to date. Some were quite

easily accommodated, some required modest redesign and others, though valid criticisms, went unresolved through the type's production life. One visible change was to adopt a single elevator trim tab, on the starboard elevator, from aircraft 14 onwards. Of comfort to pilots such as this writer, number 17 was used for drop-testing at up to 12ft per second (fps) to verify the airframe's operating limit of vertical loads of 9fps.

An early, if not perpetual, problem for the Chipmunk was its useful load. The prototype had a maximum all-up weight (MAUW) of 1,780lb, limited to 1,562lb for unrestricted aerobatics. With full fuel and oil, this limit could not be met with two crew members and parachutes on board, thereby limiting the type's potential as a fully aerobatic trainer.

Flight tests during June 1947 led to a revised certification at an MAUW of 1,930lb, but the aerobatic limit was unchanged. This MAUW increase was achieved by strengthening the wing spar and attachment points, and a redesigned fuselage centre-section. It was the basis of the DHC-1B, gaining certification in March 1948, whereupon the original DHC-1 was recertified as the DHC-1A. Downsview and Hatfield worked closely to test and gain approval for the Gipsy Major 10 Mk1-3 and Fairey-Reed 94103AX11 propeller, which was beneficial to the parent company's push to interest the RAF in the Chipmunk. When the DHC-1B-2 arrived, the Chipmunk was finally capable of unrestricted aerobatics at its MAUW.

Test-flying was not limited to Canada and the UK. In

Australia, aircraft 22, at the time registered as VH-BFT, was evaluated by the Royal Australian Air Force Central Flying School from December 1947-January 1948. Its report listed 19 points which were considered in need of being resolved before what it called “a pleasant and satisfactory aeroplane to fly” could be acceptable. The RAAF finally opted for a home-grown trainer, the CAC Winjeel, not least as a matter of national policy.

The first production DHC-1B-2, c/n 63-101, coupled the B-1 airframe with a Gipsy Major 10 Mk1-3 engine, increased-area rudder and elevators, strengthened canopy (still of the greenhouse design) and wing-root stall strips reduced from 32in to 18in. DHC took this aircraft on a promotional tour of RCAF stations, during which many service pilots had the opportunity to evaluate the type. Bannock’s further promotion of the Chipmunk again paid off. In mid-1950 an RCAF specification

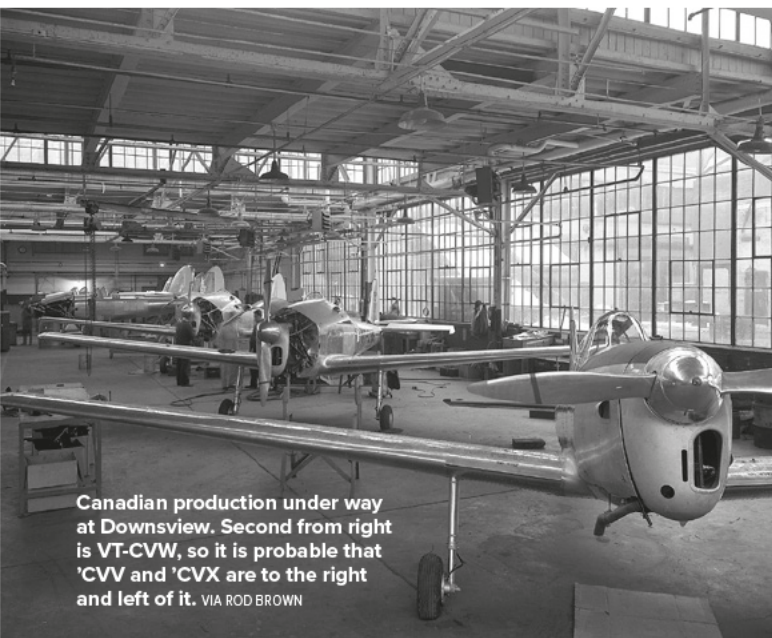


Old and new trainers flying together: the first DH82C Tiger Moth, CF-BNF, first flown in December 1938 and used throughout the war by DHC as a ‘hack’ and experimental aircraft, formates on the eighth Chipmunk, CF-FHI, on 27 August 1947. VIA LARRY MILBERRY

was issued for the procurement of the Chipmunk, subject to 20 specific modifications being incorporated. One was the feature most typically associated with Canadian Chipmunks, the bubble canopy.

The final RCAF order incorporated changes and modifications made during operation of the -S3 type, plus a further 20 amendments. Though many of them might be called cosmetic, significant were the

installation of the Gipsy Major C1G, an increase in MAUW to 2,000lb and the replacement of the aluminium fairings and tail-cone with fibreglass. This upgraded aircraft was given the type suffix -S5, and 60 were



Canadian production under way at Downsview. Second from right is VT-CVW, so it is probable that ‘CVV’ and ‘CVX’ are to the right and left of it. VIA ROD BROWN

procured. Canadian production ended with c/n 217-255, delivered to the RCAF as 18079.

UK evaluation and development

Having arrived in the UK, CF-DIO-X was reassembled for a second maiden flight on 15 January 1947, again with Fillingham as pilot. Following some promotional exposure, on 15 April ‘DIO-X’ was briefly evaluated by the Aeroplane and Armament Experimental Establishment (A&AEE). It was found to exhibit excellent flying qualities and to be suitable for service requirements, subject to certain cockpit arrangements being resolved. Shortly after, aircraft 10 and 11 followed, being registered as G-AJVD and ‘KDN’ respectively, despite which all three operated for some time under their Canadian export certificates of airworthiness.

G-AKDN became the subject of the first installation of the Gipsy Major 10, which brought a number of advantages over the earlier 1C: reduced likelihood of over-speeding the engine, a 24-volt electrical system, generator, electric starter, and a vacuum pump obviating the need for a venturi. The early instrument panels were plywood with a basic suite of instruments, particularly so in the rear, and were retained by leather or metal straps. By August, though, ‘KDN’ at least had a full panel, meeting

RAF specifications in both cockpits.

The Air Ministry issued specification T8/48, entitled ‘Design & Manufacture of Chipmunk Elementary Trainer’,

“It exhibited excellent flying qualities and was suitable for service requirements”

on 21 May 1948. Among the specific requirements was a Gipsy Major 8 engine, which explains why Chipmunk T10s were delivered with cartridge starters, not the electric starter

provided with Gipsy Major 10s (a weight reduction of 3lb).

During April-June 1948 DH test pilots undertook a series of trials, principally using ‘KDN’. These investigated handling and stability at varying centres of gravity, further featuring fuel tank tests and spinning. ‘KDN’ then went to the A&AEE, and ‘JVD’ became the subject aircraft for modification in response to the in-house trials. Its elevator chord was increased, likewise its rudder and elevator travel, and the fuel gauges were positioned further outboard so as to be more easily read by a pilot tightly strapped-in. The rear cockpit

marginally further forwards and with greater rake, providing improved ground handling stability.

The A&AEE performed extensive Chipmunk trials from June-December 1948, including an assessment of serviceability as well as handling and performance, using ‘KDN’ and later ‘JVD’. The sole competitor, the Fairey Primer, was also tested during November and December. The Chipmunk was identified in an Air Ministry memorandum as being “slightly though definitely superior” in its flight handling and maintenance, though the Primer was easier to repair. Nevertheless, the memo’s writer had “no hesitation in advising [the Ministry of Supply] to order the Chipmunk”. DH accepted a contract for the first 200 examples on 25 February 1949, the initial one, WB549 (c/n C1-0001), getting airborne on 26 August.

The first five aircraft produced were diverted from immediate

DATAFILE

GEORGE NEAL: THE ‘CHIPPIE’ MASTER

Born in 1918, George Arthur Neal got himself his private pilot’s licence in 1936. He joined ‘de Hav’ in 1937, as an apprentice in its engine department. During World War Two, on leave of absence from DHC, he wrangled his way into pilot training in the Royal Canadian Air Force, following which he served as an instructor and flight commander in eastern Canada until the end of the war. He returned to DHC’s engine shop in 1946, but in the winter of 1947 an unfortunate flight-testing accident gave George an opportunity. The test pilot survived but did not return to flying, and George became the back-up to DHC’s chief test pilot.

His immediate task on the Chipmunk was extensive spin testing to assure the Department of Transport that there were no difficulties with spin recovery. George went on to assume piloting responsibility for flight-testing, development, demonstration and marketing for all models of the DHC-1, as well as for any and all modifications to any model at any time. With his engineering knowledge and experience, some changes were directly proposed by him, and in essence all



The late, great George Neal with his personal Chipmunk, CF-JAG, during 2006. ERIC DUMIGAN

required his functional approval for incorporation.

George became the company’s chief test pilot in 1948 and director of flight operations in 1975, positions he held until his mandatory retirement at age 65, flying every type produced by DHC. He also acted as host to VIP visitors and took great pleasure in demonstrating ‘the poor man’s Spitfire’, as the Chipmunk is commonly known, to Douglas Bader on a visit to Toronto by the wartime ace.

In essence it was Neal who, over an eight-year period, orchestrated the DHC-1’s development from the impressive but limited

characteristics it showed at the outset to the superlative credentials embodied in 1956’s last model. It was this latter variant he owned personally, in the form of CF-JAG, and revelled in flying as frequently as possible.

George Neal logged 15,000 flying hours in 150 types of aircraft. He passed away in 2016, just 12 months after being named by Guinness World Records as the world’s oldest active licenced pilot. Maj Gen Robert Fassold, surgeon-general, RCAF (Ret’d)

CHIPMUNK PRODUCTION

Country	Quantity	Construction numbers
Canada	217	1 to 62, 63-101 to 217-155
Great Britain	1,000	C1-0001 to C1-1014, excepting C1-0955 to C1-0968 inclusive
Portugal	66	OGMA-1 to OGMA-66
Total:	1,283	

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A busy day at the Hawarden factory airfield near Chester, with the first two Chipmunks for Iraq in the foreground and RAF Chipmunks, Norwegian Vampires, a Hornet and Sea Hornet surrounding them. VIA ROD BROWN

delivery to the RAF for additional flight tests, production of pilots' notes, servicing and maintenance schedules, and flying instructor training. All eventually entered RAF service, with the exception of WB549, which was assigned to the Empire Test Pilots' School at Boscombe Down.

Although since early testing it had been observed that a greater rudder area would be desirable

for a number of reasons, and in spite of the Canadian decision to adopt the broad-chord version in 1949, British Chipmunks were still coming off the line fitted with the original rudder. WB550 (c/n C1-0002) was sent to Boscombe Down in early 1950, during which it was affirmed that the larger-area rudder should be used. Even so, it still took until October 1951 for aircraft to be built with that

change embodied. Modification to short-chord RAF aircraft did not take place until late 1954. This was the last substantial change to the British (and the Portuguese) Chipmunk, aside from ongoing modifications made to accommodate accruing operational experience and maintenance lessons.

One significant feature of British- and Portuguese-built machines is that many

components relating to fixed flying surfaces — attachment brackets, attachment bolts, mainplane spars — are 'lifed' and a fatigue life record has to be maintained according to the characteristics of each flight. The worst case is a factoring of 'times four' of actual flight hours to fatigue hours when aerobatics constitute a significant proportion of flights taken. Canadian Chipmunks are not subject to such restrictive requirements.

As a sad footnote, prototype CF-DIO-X, which had been registered as G-AKEV, suffered an ignominious fate. After use by DH at Hatfield as a development aircraft, concluding with Gipsy Major 50 engine trials, it became a source of spares for the other Canadian-built aircraft and was eventually scrapped at Panshanger in 1953.

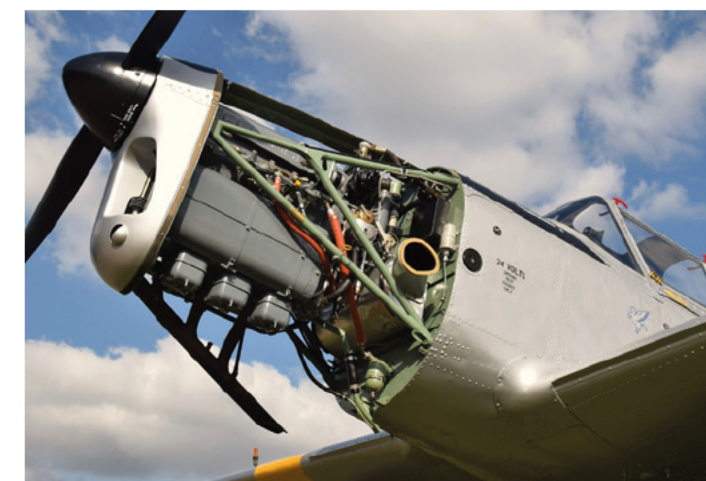
Portuguese production

Portugal also established a modest production line. In 1951, 10 aircraft — designated as the Chipmunk T20 — were shipped by sea from the UK and assembled by Oficinas Gerais de Material Aeronáutico (OGMA), receiving serials 1301 to 1310. The formation of the Força Aérea Portuguesa (Portuguese Air Force, FAP) in 1954 led to OGMA turning out a further 60 airframes under licence. Serial 1301 (c/n C1-0261) was disassembled and used as a reference model for building construction jigs, before being returned to service. The first OGMA-produced aircraft (FAP 1311, c/n OGMA-1) flew on 10 September 1955. To address attrition a further six airframes were built, the last of which made its maiden flight on 13 February 1961. It was the last Chipmunk to be produced anywhere in the world, ending a production life-span of almost 16 years.

Portugal also made arguably the last formal production modification, when in 1997 the FAP decided to put seven Chipmunks back into service as trainers and OGMA was tasked to bring each airframe up to the modification status of the Lycoming-powered Mk22 variant produced in the UK.

TECHNICAL DETAILS

Delving under the skin of Wsiewołod Jakimiuk's masterpiece



ABOVE: The subject of a long-term restoration at Duxford, which concluded with a maiden flight in December 2015, the Loweth Flying Group's WK522/G-BCOU is the subject of our Chipmunk walk-around. The overhead rear view offers a good look at the control surfaces, which were originally fabric-covered — and are on '522 — but can sometimes be metal-covered in the modern day. With cowlings off, we can see the Gipsy Major 10 Mk2 engine, carried on a bearer on each side, and fixed-pitch Fairey-Reed propeller. In the front cockpit, a modern Trig radio and transponder have been fitted, these being visible atop the coaming, while the instrument panels are in primer green versus the service 'coal-hole' black. DAVID WHITWORTH

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AMERICAN CHIPMUNKS?

One obvious potential market for DHC was that south of the border. In early September 1946 Russ Bannock had demonstrated the Chipmunk to a US Army Air Forces captain visiting Downsview. Two early B-2-S3 models (c/ns 103-141 and 104-142) were evaluated by the US Air Force at Randolph AFB. While the handling characteristics were not arguable, the engine presented a barrier. In 1951 DHC tested a 200hp Lycoming O-435-A in

aircraft six, fitted with a fixed-pitch McCauley propeller. It improved performance little, other than increasing cruise speed by approximately 15kt. George Neal thought a constant-speed propeller might have seen improvements, but there was apparently every discouragement from head office to depart from using DH engines, and the project never progressed further. The -S5 model therefore brought about the end of development of the Canadian production Chipmunk.

The DHC-1 Chipmunk is a two-seat, single-engine, low-wing cantilever monoplane of metal construction, with full dual controls. The fuselage consists of two major sections. The forward one, which accommodates the tandem cockpits, is built around four main longerons carried on pressed formers. These longerons are interspaced with a series of modified Z-section stringers to

distribute the loads over the skin. The firewall forms the front of this section, which terminates immediately aft of the rear cockpit.

The cockpits are enclosed by a fixed windscreen, incorporating a crash pylon (which also serves as a lifting point capable of taking the weight of a complete airframe and powerplant), and a single sliding canopy. Until the -S3 entered production, all

Canadian models, and all British- and Portuguese-built airframes had a 'glass-house'-style framed canopy with two Plexiglas panels each side; Canadian -S3 and -S5 models used a single-piece blown canopy. The seats are fixed 'bucket'-type affairs, which can accommodate either a cushion-style parachute or conventional seat cushion. The rudder pedals have three positions, allowing 5in of adjustment both fore and aft.

The main wing attachment fittings pick up on a built-up U-shaped belt frame located beneath the front cockpit seat. This frame transmits the spar loads across the fuselage. The remaining wing attachment point at the leading edge picks up a similar built-up frame forward of the front instrument panel.

The rear fuselage is a straight-tapered conical section, the skin of which is single-



Demonstrating the Royal Danish Air Force’s unique ski-borne Chipmunk operations is Mk20 serial P-144, in service with the service’s Flyveskolen (Flying School). RDAF

SPECIFICATIONS: CHIPMUNK T10 AND MkS20-22	
POWERPLANT	
One de Havilland Gipsy Major Mk8 (T10) or Gipsy Major Mk10-2 (Mks20, 21, 22, 22A), all 145hp	
DIMENSIONS	
Span:	34ft 4in (10.46m)
Length:	25ft 5in (7.75m)
Height over canopy (tail down):	7ft 0in (2.13m)
Gross wing area:	172.5 sq ft (16.0 sq m)
WEIGHTS	
Empty (typically):	1,525lb (691.7kg)
Max take-off:	2,100lb (952.5kg); in utility category, 2,200lb (997.9kg)
PERFORMANCE	
Maximum speed:	122kt (140mph, 226 km/h) at sea level
Cruise speed:	90kt (104mph, 167km/h)
Range:	300nm (345 miles, 555km) with 18-Imperial gallon capacity, 400nm (460 miles, 740km) with 24-Imperial gallon capacity
Service ceiling:	15,800ft (4,800m)

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DEALING WITH THE ‘DRIPSY MAJOR’

Being inverted, the DH Gipsy Major engine suffers a couple of specific oil-related problems: the possibility of oil seeping past the piston rings potentially causing hydraulic lock, quite apart from oil loss and plug fouling, and retaining a ‘bath’ of oil in the rocker box covers, which will (and does) get expelled. The operating manual indicates that oil consumption of up to five (Imperial) quarts per hour is acceptable. Little wonder the engine is oft referred to as the ‘Dripsy Major’.

Although DHC-1A models used the Gipsy Major 1C, subsequent versions employed either the 1G/10 Mk1-3 (142hp) or its development, the 8 (10-2 when modified for civilian use — 145hp). The 10 Mk2 has a capacity of 6.124 litres, a 6:1 compression ratio, a max continuous rpm of 2,400 and a max sustained rpm (20 seconds) of 2,675, and accessories not found on the 1C.

During late 1949 the first ever Chipmunk was temporarily fitted with a Gipsy Major 50 developing 195hp. Owing to the increased

engine weight only the rear cockpit could be occupied, denying the opportunity to carry an observer. Eight hours 45 minutes of flight time was accrued, reaching a maximum altitude of 25,500ft (a service ceiling of 28,000ft was envisaged). A “quite remarkable” initial climb rate of 1,800 to 2,000ft per minute was achieved, and even at 25,000ft it was still 400ft per minute. However, the trials were plagued by continuous poor ignition once at altitude and eventually it was determined to proceed no further.

Later, in 1951, testing of the 160hp Gipsy Major Series 30 engine was conducted with G-ALWB (c/n C1-0100). This was a major redesign of the engine. During seven hours 20 minutes of testing, with a manually variable propeller, it was found that the engine was generally smoother than the standard-installation version, the 10-2. It is understandable, though, that this engine was never used in production. Its greater weight required 20lb of permanent ballast in the aft fuselage plus 20lb in the rear seat when flown solo.

curvature throughout. It is a semi-monocoque structure consisting of pressed formers, modified Z-section stringers and a stressed skin. The rear of the bulkhead of this section is strengthened to take the tailplane front attachment, the rudder post and the tailwheel strut fittings. A detachable tail-cone and fillets fair in the empennage. The fuselage sections are joined by each being riveted to a reinforcing band, which encircles the fuselage immediately aft of the rear cockpit and provides a means of separating the fuselage sections for repair or replacement.

The mainplanes are fully cantilevered, consisting of an all-metal D-nose box beam incorporating the single main spar, the nose ribs and the leading-edge skin. The D-nose absorbs all wing stresses as well as the undercarriage loads. Pressed aluminium ribs attach to the rear of the D-nose, with fabric covering. False spars are used to carry the flap and aileron hinges. The ribs at these points are additionally strengthened. Slotted flaps and ailerons extend along the full span of the mainplanes. The control surfaces are of pressed metal ribs and spars with a fabric covering. A metal trailing-edge tab is fitted to the starboard aileron only. The ailerons are internally mass-balanced.

The wings attach directly to the fuselage at three points; the top and bottom of the main spar

are bolted to the aft fuselage belt frame, and the forward attach point to the forward belt frame. The walkway adjacent to the fuselage extends across wing and flap, and is metal-skinned and rubber-covered. Additional ribs beneath the walkway take the load of personnel.

The wing is a blend of two basic airfoils, NACA 2415 and USA 35B. The latter is a high-lift section located near the tip, resulting in increasing camber towards the tips. This and an aspect ratio of 6.82 gives good stalling characteristics and effective ailerons, while the moderate taper ratio of 2.1-to-1 gives a good lift distribution of 10.3lb/sq ft. Flaps are hand-operated by a lever in each cockpit, with deflections of 0, 15 and 30°, although the Canadian prototype and early pre-production models extended to 40°.

The metal fin is attached to the fuselage at two points. The rudder post, which is the rear spar of the fin, is extended down and is bolted to the rear face of the aft bulkhead. This further stiffens the bulkhead for the attachment of the tailplane struts and the tailwheel yoke. The fin forward spar attaches to a fuselage bulkhead.

The front spar of the all-metal cantilever tailplane is secured to the rear bulkhead by a pair of hinged fittings. The rear spar is supported by two struts which pick up on rear bulkhead attachments. The rudder and

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CANADA VERSUS BRITAIN

Few seem to be aware of how different Canadian-built Chipmunks are from their British brethren. This table identifies the principal dissimilarities between the two most common Canadian and British variants of the DHC-1. More than 40 can be readily identified — here we limit the differences to those sufficient to show the two models are cousins but not siblings. *Rod Blievers*

CANADIAN DHC-1B-2-S5 CHIPMUNK	BRITISH DHC-1 CHIPMUNK T10
Cockpit	
Apart from the bubble canopy, the windscreen has a much narrower (more ‘pointy’ at the top) cross-section; lower canopy rail system, not compatible with UK canopies	Framed canopy, with ‘blown’ rear cockpit side panels; entire windscreen/canopy cross-section is much broader (‘flatter’) at the top
Shoulder harness anchored to a horizontal tube at the back of each seat	Shoulder harness anchored to a central point behind the seats — very dated
Fitted with more modern-looking instruments; electrical switch panel mounted atop the front cockpit plus the vital magneto switches also on the coaming (hence visible to groundcrew); coamings parallel to the instrument panel	DH fitted Air Ministry-supplied ‘1940’-style instruments; switch panel and magneto switches hidden away on port sidewall, invisible to groundcrew; deeply overlapping coamings that sweep down and aft
Both the large throttle with push-to-talk radio button and the control column pistol grip are more satisfying in tactile terms	Tubular control column with push-to-talk atop and tiny throttle/mixture controls
Interior finished in silver and/or yellow — seemingly roomier	Interior finished in a claustrophobic black
Spinner and cowlings	
Two-part spinner, nose portion attached by a central bolt	Single-piece spinner
Cowling deeper aft (facilitating airflow around the larger shrouded oil tank) giving pronounced 4in step where cowl meets lower fuselage; two air scoops to port	Cowling shallower in side view, very small step (1in) at rear; single air scoop on port side cowl
No priming access holes on port-side cowl (Canadians got a cockpit-mounted primer)	Priming access holes on port-side cowl
Front cowl has vertical slot intake directly below spinner; additional nose cowl panel effectively pushes outboard edge of the large air intake forward, so when viewed from the side both edges are parallel	No vertical slot, but small ‘cupped’ intake on lower port nose bowl; large intake outboard edge sweeps down and aft, viewed from side; no vertical intake or additional panel
Tubular heater air intake (lower starboard side of nose bowl), a near vertical exhaust stack emerging through a circular aperture in lower cowl	Oblique exhaust stack exiting through large slot in the lower cowl; modified 1979 to Canadian configuration
No demisting air intake	Windscreen demisting air intake on top of starboard cowl
Fuselage and tail group	
Ground power access is a small hatch on the side below the rear cockpit	Larger circular ground power plug, port side immediately aft of cowl
On the opposite side is a (cockpit-cooling) air scoop; smooth fuselage underside	Triangular NACA-type air scoop directly below rear cockpit
Rear fuselage — lifting hole is aft of bulkhead, with a static port forward; above this, dorsal fin has an obvious reinforced area to mount an antenna	Lifting hole located forward of bulkhead; no static port (it’s part of the pitot mast)
No anti-spin strakes (ever)	‘Anti-spin’ strakes fitted after 1958
Tail-cone top reinforced by corrugations, with a very blunt end	Smooth tail cone top; rear nav light has a streamlined fairing
More angular elevator balance horns, increasing tailplane span by 9in	Narrower elevator horns, outboard end rounded
Wings and undercarriage	
Fuel gauge/cap area flush with upper surface, while gauge is inboard and streamlined cap outboard; static vent tube located further outboard	Mounting plate stands proud of the wing upper surface, solid brass fuel cap now positioned inboard; provision of grounding point behind plate, static vent being not so far outboard
9in stall strips on leading edge only (to reduce buffeting over bubble canopy when spinning); navigation lights are positioned at one-third of the wingtip chord	32in-wide stall strips; navigation/position lights inset into leading edge of wingtip
The pitot is subtly longer, and of an inverted ‘L’ shape	Shorter pitot of an inverted ‘T’ shape
Main gear legs more vertically raked and mounted further aft, so mainwheel ground contact point is 4in aft	Gear legs mounted 1.5in further forward and raked further forward (the difference is subtle)
Gear legs unfaired	Gear legs are faired
Landing light a large under-wing retractable unit mounted outboard of port gear leg	Port leg incorporates small landing light immediately below mainplane leading edge
No identification light	Downward ID light under starboard wing, inboard of gear leg

DATAFILE	
CHIPMUNK VARIANTS	
Designation	Key distinguishing features
Canadian production versions	
DHC-1A-1	Gipsy Major 1C engine, fully aerobatic at 1,580lb all-up weight; 49 built
DHC-1A-2	Gipsy Major 10 Mk1-3 engine, only partially aerobatic; 12 built
DHC-1B-1	Gipsy Major 1C engine, fully aerobatic; single example only
DHC-1B-2	Gipsy Major 10 Mk1-3 engine, fully aerobatic; 48 built including 22 for Royal Egyptian Air Force carrying suffix -S1 and 18 for Royal Thai Air Force suffixed -S2 (-S signified a 'special order' and was used internally by DHC, though for the -S3 and -S5 this was incorporated in the formal type approval; -S4 reserved for Chilean Air Force but contract cancelled)
DHC-1B-2-S3	DHC-1B-2 for RCAF Refresher Flying Training Plan; blown canopy introduced; Gipsy Major 10 Mk1-3 engine; 46 built
DHC-1B-2-S5	DHC-1B-2 for RCAF; Gipsy Major C1G engine; 60 built
DHC-1-2B	DHC internal designation allocated for test and development of a Lycoming O-435-A installation (aircraft number 6)
British production variants	
Chipmunk T10	Gipsy Major 8-engined, fully aerobatic, for UK military; 747 built including seven delivered to Ceylon (Sri Lanka)
Chipmunk Mk20	Military export version of T10, powered by Gipsy Major 10-2; 225 built
Chipmunk Mk21	Mk20 equipped to civil standards; 28 built
Chipmunk Mk22	T10 converted for civilian use; redesignation of Gipsy Major 8 (military) to civilian 10-2 status
Chipmunk Mk22A	Mk22 with 24 Imperial gallons fuel
Chipmunk Mk23	Five converted T10s powered by Gipsy Major 10-2 and with agricultural spray equipment; outboard leading-edge slats installed; max all-up weight 2,420lb
Portuguese production variants	
Chipmunk Mk20	Military version powered by Gipsy Major 10-2; 10 assembled from UK production, followed by 66 built by OGMA; seven subsequently updated with 180hp Lycoming O-360, notionally designated Mk20/L
Post-production variants	
RTAF-4 Chanthra	Fifteen (at least) British-production Thai aircraft modified by Royal Thai Air Force Science and Weapon Systems Development Centre with reprofiled fin and rudder, replacement of entire forward fuselage with new cockpits and bubble canopy, powered by Continental IO-360
'DHC-1/A1'	Australian designation for Aerostructures Sundowner, two conversions as a touring aircraft (the first never formally registered) fitted with Lycoming O-360, metal wing skinning and (first example only) wingtip tanks and clear-view canopy
'DHC-1C'	Australian designation for first Chipmunk in Australia (c/n C1-0474) re-engined with Continental O-470
Masefield variant	Proposed modifications to Mk20, 21, 22 and 22A, to include single-piece canopy and wing luggage compartments; single example with all mods
Sasin SA-29 Spraymaster	Three Australian-operated Chipmunks converted into single-seat agricultural spraying aircraft
Scholl Super Chipmunk	Three Chipmunks progressively modified in US by Art Scholl as aerobatic aircraft, the last sporting retractable undercarriage; Super Chipmunk used as generic term for Chipmunks under 'experimental' certification with varying range of airframe modifications
Chipmunk Mk22 (Lycoming)	UK conversions to 180hp Lycoming O-360-A4A for use as glider tugs, dubbed 'Supermunks'; 14 to date; single O-540 conversion known as 'Mightymunk'
Turbo Chipmunk	Single Mk22A (G-ATTS, c/n C1-0765) fitted by Hants and Sussex Aviation with 116shp Rover 90 turboprop and extra fuel capacity

Compiled by Rod Brown

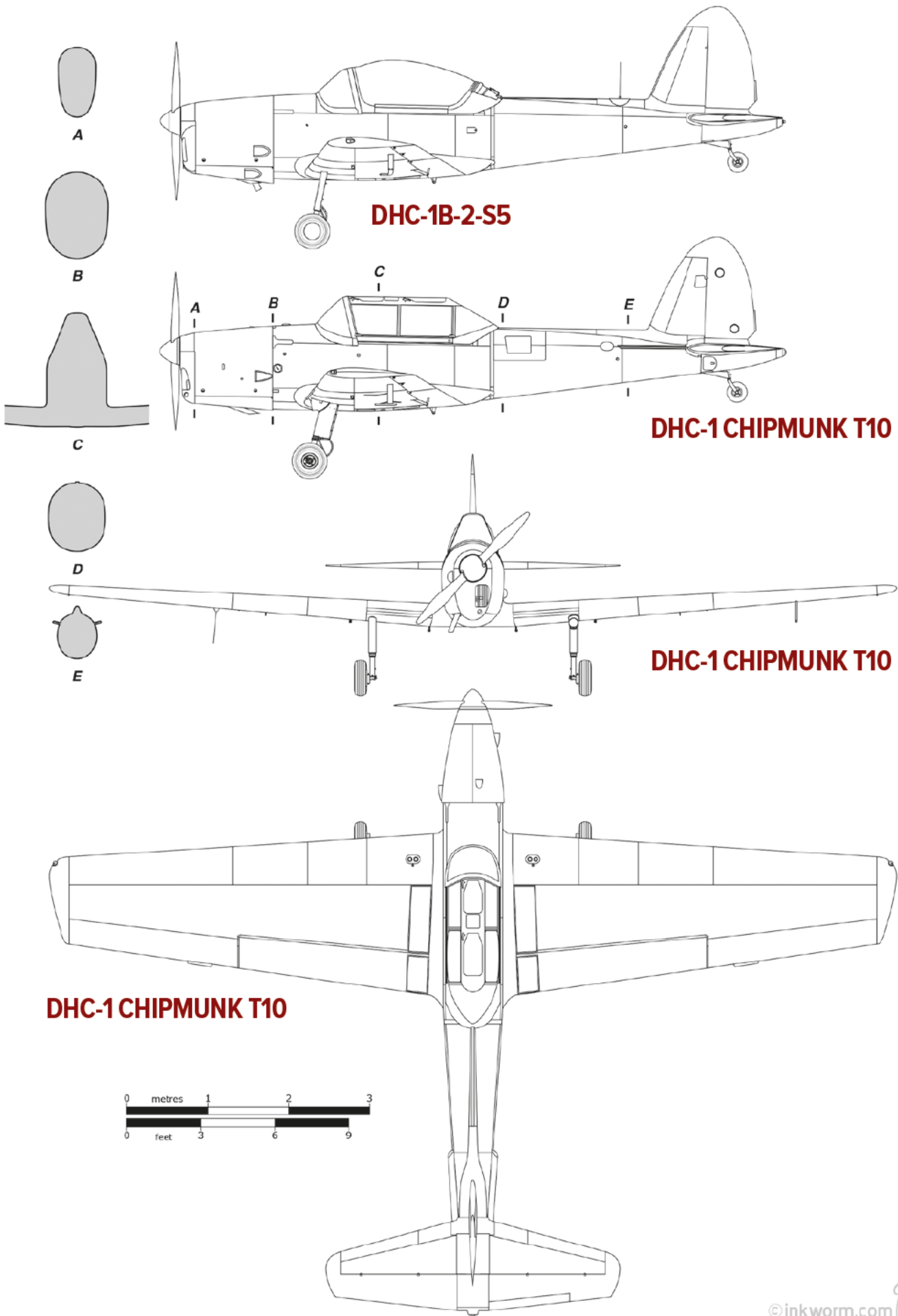
elevators have metal ribs and spars and are fabric-covered. These are aerodynamically and mass-balanced.

The conventional cantilever fixed main undercarriage is secured to brackets riveted into the upper skin of the wing D-nose, with the wheel being mounted on a cantilever axle. Hydraulic brakes are operated by levers in the cockpits for normal use and differential operation is effected by the rudder bars for ground manoeuvring. Rubber 'doughnuts' act as the energy-absorbing medium. A fully castoring tailwheel is mounted on levered suspension and also uses rubber shock absorption.

The single fuel tank in each wing feeds through a non-return valve into a fuel cock mounted below the forward cockpit, operated by a push-pull control in each cockpit. A single line takes fuel through a gascolator to a pair of engine-mounted mechanical fuel pumps and thence the carburettor. Inboard of the undercarriage mounting the D-nose contains a Pliocel flexible fuel cell, the capacity of which varies by model.

All production aircraft had a variant of the Gipsy Major engine (see separate panel). Early models used a 1C version with a wooden propeller, but subsequent derivatives had metal props. Though a manually variable-pitch propeller (set by a hand crank in the cockpit) was tested, production aircraft had a fixed-pitch Fairey-Reed propeller, most commonly the A66753/X1, though Portuguese models were given wooden props made in-country. The engine is carried on a bearer on each side, bolted to the upper fuselage longeron, supported by a diagonal welded beam bolted to the lower fuselage longeron.

An oil tank is installed on the lower forward firewall, having a capacity of 3.5 Imperial gallons (15.9 litres) on Canadian aircraft and 2.4 gallons (10.9 litres) on others. Oil is drawn through a suction filter before passing through an oil pump into a Kuno filter and on into the engine galleries. On aircraft equipped with a Gipsy Major 1G or 10, oil returns to the tank via two scavenge filters, each with a dedicated oil pump.



Bubble-canopied DHC-1B-2-S5 RCAF 18025 in the first iteration of in-service colours, as worn during this machine's early use at RCAF Station Centralia. It was in this very aircraft that the writer had his first taste of Chipmunk flying with the owner/pilot, the late Maj Gen Bob Fassold (RCAF Ret'd)

VIA VIKING AIR



Royal Canadian Air Force

From August 1946, Russ Bannock, an ex-RCAF wing commander with well-established air force contacts, used numerous opportunities to demonstrate the Chipmunk to elements of the RCAF, visiting HQ Training Command at Trenton, Uplands, Rockcliffe (home of the RCAF Test and Development Flight) and the Ottawa Flying Club. In February 1949 these efforts bore fruit in an order for three DHC-1A-1s for 444 Air Observation Post at RCAF Station Rivers, Manitoba. They were to cost CA\$9,450 each, excluding spares.

Aircraft 23 to 25 entered RCAF service as serials 18001 to '003 for trials purposes. In 1952 they were upgraded with Gipsy Major 1G engines and new radios, remaining in service until 1959. Fifty-seven DHC-1B-2-S3 models were ordered by the RCAF and

received from 1950-52, of which 16 went into air force service. Serials 18004 to '019 were allocated across the range of c/ns 113-151 to 157-195, though not in a strict order. The remainder were 'loaned' to Canadian flying clubs under the Refresher Flying Training Plan (RTFP), which intended to supply 600 reserve qualified flying instructors per

annum. Nineteen flying clubs were eventually engaged in the RTFP, flying 31 aircraft from late 1950 until 1958. Of the latter, a few were written-off; some subsequently went into service with the RCAF and the remainder into storage. Sixty -S5 models were ordered and delivered to the RCAF in 1956, entering service with serials

18020 to 18079. RCAF Station Centralia, Ontario, was the Chipmunk 'Mecca' and 46 of these aeroplanes went directly there for use by the Primary Flying Training School. At one point it had a total of 60 -S3 and -S5 model Chipmunks.

A number of Chipmunks, mainly -S3s but mistakenly also half-a-dozen -S5s, were auctioned-off by Crown Assets in 1964. The remaining -S3s and all the other -S5s followed in 1971-72 on retirement of the type from service with what was now the unified Canadian Forces. All its Chipmunks — or CT-120s, as the type was officially designated when the RCAF was merged into the CF — went into storage before disposal, in the process of which the engines were removed from the airframes. Buyers had to bid on airframes and engines separately and then have the aircraft put together. The DHC stalwart's main replacement was the Beech CT-134 Musketeer.



Chipmunk RCAF 18026 in operation with the Primary Flying School at Borden. With a revised serial, 12026, it was retired by 3 Canadian Forces Flying Training School at Portage la Prairie. DND VIA PAT MARTIN



Chipmunk instructors from Southampton University Air Squadron, then stationed at Hamble, demonstrate their formation prowess during a summer camp to St Mawgan in August 1956. AEROPLANE



Riding along in a Birmingham UAS Chipmunk formation out of Shawbury in September 1971, WD331 in the lead, all aircraft displaying the dayglo stripes adopted for conspicuity purposes. ADRIAN M. BALCH

Royal Air Force

RAF Chipmunk deliveries commenced in February 1950, with aircraft from the Hatfield production line being assigned to the Oxford and Cambridge University Air Squadrons, and to London UAS and No 22 Reserve Flying School the

following month. With some 14 UAS and 21 RFS units requiring replacements for their ageing Tiger Moths, DH delivered Chipmunks at the rate of 24 per month. Further orders would see a total of 740 procured by the UK government.

In June 1950 the Korean conflict created a demand for

short-term service pilots. It was duly decided to form five Basic Flying Training Schools and three Advanced Flying Training Schools with Chipmunks. These came on-stream from January 1951. Such was the need for aircraft that some RFS Chipmunks were passed to these outfits and the RFS strength

reconstituted with Tiger Moths drawn from storage. In order to further ensure this requirement was met, the wartime Rhodesian Air Training Group (RATG) was used effectively as a back-up to UK training. Some 70 Chipmunks were shipped from the Hawarden plant to Durban and thence by rail to their

DATAFILE

GATOW'S INTELLIGENCE-GATHERERS

ostensibly, the Chipmunks assigned to the RAF Gatow Station Flight had as their purpose refresher and continuation training for officers on ground tours at this West Berlin base. The truth was rather less prosaic. These unassuming trainers were, as is now well-known, among NATO's most productive gatherers of photographic intelligence relating to Warsaw Pact military deployments around the divided German city.

For Britain, France and the USA, upholding the right — as enshrined in post-war agreements — to fly throughout the airspace of the Berlin Control Zone, including the Soviet sector, was crucial. This covered a 20-mile radius, and allowed observation from the air of numerous Soviet and East German military facilities. The first Chipmunk assigned to Gatow arrived in 1954, and photographic sorties began two years later. A second aircraft joined the Station Flight during 1968, and with American and French light aeroplanes conducting similar missions, much valuable imagery was obtained.

In the case of the Chipmunks, the photographic effort was carried out by BRIXMIS, the British Commanders'-in-Chief Mission to the



The last two Gatow Station Flight Chipmunks, WG466 and WG486, overfly the Glienicke Brücke on the River Havel in Berlin, famed as the location of numerous Cold War spy exchanges. VIA PHIL WILKINSON

Soviet Forces in Germany. Many of the results were viewed with great interest at the highest levels. Often it was able to capture the first imagery of new Soviet equipment in service outside the USSR itself, such was the obvious strategic importance of Berlin. It was potentially risky, not least since the Soviets came to know exactly what the main purpose of the Chipmunk flights was, but only once was damage sustained as a result of hostile action — in 1976, when a bullet passed through the propeller spinner of one of the aircraft.

Airframes were subject to regular rotation in and out of Gatow. When BRIXMIS was disbanded in December 1990, the conclusion of the Cold War and German unification having brought an end to its purpose, the last two Chipmunks on strength were WG466 and WG486. They soldiered on until June 1994, when Allied forces withdrew from Berlin. However, '466 would return soon afterwards, becoming an exhibit in the city's Alliiertenmuseum in the Zehlendorf district. It is now back at

Gatow, on loan to the Militärhistorisches Museum. Its former sister-ship, '486, is — as described elsewhere — operated by the Battle of Britain Memorial Flight. **Ben Dunnell**

operating bases in Rhodesia, Heany and Gwelo.

With the signing of a Korean armistice in July 1953, the Air Ministry decided to shut all RFS, BFTS and AFTS units in the UK, plus the RATG. These closures were phased and completed within a year. The Tiger Moths were sold almost immediately, while some 200 Chipmunks were retained in store until early 1956 when they started being disposed of. Sales of these low-houred aircraft continued into 1957, mainly to UK flying clubs but with some 70 going to Australia. Ironically, the RAF received its last Chipmunk just a month before the first sell-offs began.

Flying experience for Air Training Corps and Combined Cadet Force personnel was enlarged in 1958 when 13 Air Experience Flights were established, using 60 Chipmunks mostly released from storage.

Chipmunks were operated at virtually all RAF stations not only to ensure an economical way of keeping desk-bound aircrew current but also for local communications. This included overseas bases in



The last day of Air Cadet air experience flying in Chipmunks, marked by No 5 AEF at Cambridge on 31 March 1996. As WP920 taxis out, so the Bulldog at right heralds the final change-over. BEN DUNNELL

Germany, Malta, Cyprus, Aden, Kenya, Singapore and Malaya. Aside from the intelligence-gathering task of the RAF Gatow Station Flight in Berlin (see box), No 114 Squadron employed the Chipmunk on the front line in Cyprus during the conflict against the Greek separatist movement EOKA. Based at Nicosia, its aircraft flew more than 660 hours between December 1958 and March 1959 on such missions as reconnaissance, convoy cover and direct air support.

The UASs flew the Chipmunk until 1975, when it was

progressively replaced by the Scottish Aviation Bulldog T1. This created the opportunity to review the status of the remaining Chipmunks, retaining the lower-time airframes and offering the rest for sale.

The Chipmunk was in RAF use from 1950 through to 1996. During this period large numbers could be seen in use at places like the RAF College Cranwell, Linton-on-Ouse with No 1 Flying Training School, the Central Navigation and Control School at Shawbury, Church Fenton with the Primary Flying Squadron, Primary

Flying Training School and No 2 FTS, the Central Flying School at Little Rissington, the Initial Training School at South Cerney, and Swinderby with the Flying Selection Squadron and Elementary Flying Training School. When equipped with the Shackleton AEW2, No 8 Squadron at Lossiemouth employed the type as a taildragger continuation and refresher trainer. The end of March 1996 saw the final Chipmunk flight by an air cadet being conducted by No 5 Air Experience Flight at Cambridge, whereupon the AEFs were all merged into University Air Squadrons, flying the Bulldog.

In the late 1960s several Chipmunks stored at Shawbury were reduced to spares and the forward cockpits issued to Air Training Corps units as 'PAX' (passenger) trainers, known colloquially as the 'Chippax'. These enabled cadets to practice cockpit ingress/egress while wearing the bulky seat parachute. Several remain with ATC units even now, 25 years after the last air experience sorties on the type.



TOP: The 'royal Chipmunk', WP903, at Little Rissington for the Royal Review of the Central Flying School on 16 June 1969. ADRIAN M. BALCH

ABOVE: The Prince of Wales heading out for a Chipmunk training sortie from Oakington. ALAMY

DATAFILE BY ROYAL APPOINTMENT

Chipmunk WP903 (c/n C1-0770) was built at Hawarden in 1952 as a T10, seeing regular RAF service until 1958, when it was put into storage. The machine emerged two years later when, after a deep service and a respray into the Queen's Flight's 'Guards Red' colour, it became the training mount for Prince Michael, Prince William and the Duke of Kent, operating from Benson. In 1961 it received a unique red rotating beacon, nicknamed 'the Parrot' due to its profile.

A four-year sabbatical from 1964 ended when the aircraft was required for another prestigious posting: training Prince Charles. His first flight in '903 was at Tangmere in July 1968, with continued instruction under the tutelage of Sqn Ldr Philip Pinney. The Prince's first solo followed at Bassingbourn, after 14 hours 30 minutes' flying time. Having amassed 80 hours spanning 101 flights, he was awarded his preliminary flying badge by Air Marshal L. Major, and with a wooden Chipmunk model from the groundcrew.

Having served with distinction, '903 returned to storage in October 1969 and was demobilised in March 1974. As G-BCGC, it became the workhorse of the RNAS Culdrose Gliding Club until 1996, and a sale to a private owner. In 2001 Joe Wright, a UK-based pilot and instructor, seized the opportunity to keep '903 in the UK. With new fuel tanks and engine, it moved to RAF Henlow. Further cementing its future, Wright sold the aeroplane in 2009 to the Chipmunk Flying Group, seven pilots who, with Joe's continued support, maintain and fly this historic aircraft. Visitors to the Shuttleworth Collection often get a glimpse of it at Old Warden, '903's new home since Henlow closed. *Flt Lt Robert Brinkley, RAFVR(T)*

DATAFILE

'NORTHERN VENTURE'

In 1997 the RAF's Exercise 'Northern Venture' recognised the 50th anniversary of the first flight of the DHC-1 with a round-the-world tour. An attempt to complete the exercise in 1996, the actual year of the 50th anniversary, had been obliged to turn back for reasons beyond its control.

Sqn Ldrs Tony Cowan (expedition leader), Ced Hughes and Bill Purchase shared the duties of flying two Chipmunks, WP833 (c/n C1-0714) and WP962 (c/n C1-0809). Fg Off Tony Severs piloted the support Turbine Islander, which also carried engineer David Gill and support materiel. Each Chipmunk was modified for the trip by the installation of a 24-Imperial gallon auxiliary fuel tank, Garmin GNC-250, a long-range VHF antenna and transponder.

On 20 May 1997 the Chipmunks departed eastbound from London City Airport. A four-week traverse of the Russian Federation saw the team crossing the Bering Strait, and the international dateline, thus experiencing Friday 13 July twice. In Russia, many fields described as grass were in fact mud or gravel, and on numerous occasions an absence of Avgas meant the Chipmunk wing tanks would be refuelled from the Islander (a supply of Avgas was maintained on board) and Mogas would be uplifted into the auxiliary tank for use during cruise flight. Legs exceeding three hours were not uncommon, and on 3 June the flight from Omsk to Kemerovo lasted four hours 55 minutes.

Arrival at Nome, Alaska, reinstated access to creature comforts, but didn't alleviate the long legs, challenging terrain and adverse weather crossing North America. The team's stop at Downsview was the scene of a gathering of de Havilland types, including Moths and Chipmunks. Pressing on, the journey around — rather than over — Greenland necessitated an epic 90nm flight along the Søndre Strømfjord with a 200ft cloudbase and a no-option airfield



Crossing the Bering Strait, WP833 (nearest) and WP962 hop the international date line from Friday 13 July to... Friday 13 July.

VIA BILL PURCHASE

(Kangerlussuaq, formerly Bluie West 8) at the end. Not the average Sunday afternoon bumble.

'Northern Venture' took 63 days to cover 16,223nm, requiring 169 hours 10 minutes of flying. A near-constant 'pucker factor' was the absence of diversionary airfields — many legs simply reached a 'go/no-go' point. Despite this, only three weather aborts were executed. Incredibly, the team arrived home at the Royal International Air Tattoo at Fairford precisely on their long-planned date, 18 July 1997.

WP962 is on static display at the RAF Museum in Hendon. WP833 continues to fly, in southern California. The full story of the journey is captured in the revised edition of Bill Purchase's book *Around the World at 90 Knots*, available from WP833-LLC.aero/ATW90kts.

Royal Navy

In 1966 the Britannia Royal Naval College at Roborough, Plymouth, acquired Chipmunks previously stored at Kemble's No 5 Maintenance Unit. These totalled 16 aircraft, of which 12 supplemented and eventually replaced their DH82 predecessors. The other four variously served with 771 and 781 Squadrons at Culdrose and Lee-on-Solent for communications work and as glider tugs, plus the station

flights at Culdrose, Lossiemouth and Yeovilton. The Chipmunks continued in service until November 1994 and most RN pilots over this period would have been graded in them. WP904 gained recognition for being the aircraft in which Prince Andrew made his maiden solo flight during April 1979.

Though no convincing proof has surfaced, rumours are sometimes heard that Roborough's 'old and bold' civilian instructors landed Chipmunks on HMS *Eagle*, when

the decommissioned carrier was at anchor awaiting disposal. Though likely apocryphal, the fact that poles were apparently placed on deck to dissuade would-be aeronautical borders gives a certain tantalising edge to the story.

The Royal Navy Historic Flight received WK608 (c/n C1-0617), using it as a tailwheel trainer and occasional support/display aircraft. Following the RNHF's disbandment, it has been placed on the civil register as G-CLNI and is expected soon to fly again

under the auspices of the Navy Wings Heritage Flight.

Army Air Corps

In 1953, 11 new-build Chipmunks began replacing the Tiger Moths of the army's Light Aircraft School at Middle Wallop. They were transferred to the Army Air Corps when it was established on 1 September 1957. Ex-RAF Chipmunks supplemented the fleet, to a peak of 21 aircraft, before March 1997 when the Basic Fixed-



The Britannia Royal Naval College's WP809 awaits its next training sortie at Roborough in 1970. PETER R. MARCH



Four Chipmunks of the AAC's Basic Fixed-Wing Flight. PETER R. MARCH



The most recognisable AAC Chipmunk was WP964, known as the 'Spitpunk' on account of the camouflage scheme applied to help train forward air controllers. PETER R. MARCH

Wing Flight was disbanded. The original 11 spent their entire service with the army. WD325 (c/n C1-0263) went to the AAC Historic Aircraft Flight. That organisation has since been civilianised as the Historic Army Aircraft Flight, and will imminently restart operating the Chipmunk as G-CLWK.

Portuguese Air Force

Initial deliveries to Portugal went in 1951 to the Esquadra

de Instrução Elementar de Pilotagem, the equivalent of an RAF elementary flying school. It was based principally at Aveiro, with some aircraft operating out of Sintra, though a few of these were transferred to Portela, the military part of Lisbon Airport, in the mid-1950s for liaison duties. Following Portugal's 'Carnation Revolution' in 1974, reorganisation of the FAP resulted in Esquadra 101, stationed at Ota, becoming its sole Chipmunk operator. A



succession of demobilisation sales, to the UK and US, left the squadron with just 30 aircraft by the end of 1986. In 1989 a fleet of SOCATA TB-30 Epsilons began to arrive to replace both the Chipmunks and the Cessna T-37s which had provided the next, jet-mounted, stage of FAP pilot training. Part-payment for the Epsilons was in the form of six Chipmunks. Seven others, however, stayed in use with the Sintra-based Academia da Força Aérea (AFA, Air Force Academy) as glider tugs. Ironically, a 1997 review of flight training requirements led to the return to training duties of those seven Chipmunks, which were given 180hp Lycoming engines. They continued to be assigned to the AFA, operated by Esquadra 802 'Águias' ('Eagles'). Although one was lost in a 1998 accident, the other six remain in FAP service today, as covered in the April 2020 *Aeroplane*.

On civvy street

Canadian aircraft 18 was the first-ever civilian sale, to Loxham's Flying Services in Blackpool, UK. Chipmunk sales in Britain were hindered by the Air Registration Board's initial reliance on recognition of Canadian certification, and when British production began the ARB was reluctant to grant certification to an aircraft built to a military specification. It was not until May 1956 that the first full UK certification was issued, subject to an extensive list of modifications. These delays undoubtedly reduced the volume and pace of Chipmunk sales, both at home and abroad. Because of this, early-release RAF aircraft went to operators

outside the UK, rather than the home market. Naturally, many Chipmunk sales were to flight training organisations. Two early-production aircraft went to Australian flight schools in late 1951, while Air Service Training at Hamble took six during 1952. Airways Aero Associations (AAA), a British Overseas Airways Corporation (BOAC) subsidiary, purchased 15 Chipmunks in 1956, largely in response to having been given a contract to train Lufthansa aircrew, operating from Bremen. Fourteen of the aircraft were registered to Lufthansa and the programme continued until May 1969. Additionally, the termination of the Rhodesian Air Training Group in 1953 released 62 aircraft, many going to flying clubs across Africa. None of its aircraft had more than 1,000 hours, while some still had zero! To meet an increasing need for aircrews, AAA established the College of Air Training at Hamble in 1960. UK currency restrictions at the time prevented



Erratum: Eire 14 (GB) 12 supplied direct, two through civilian procurement to account for attrition

OTHER MILITARY OPERATORS

Country	Quantity/Source	Notes
Belgium	2 (CAN)	For evaluation; the Stampe was selected instead
Burma (Union of Myanmar)	10 (GB)	
Ceylon (Sri Lanka)	12 (GB)	
Colombia	1 (GB)	For evaluation; no follow-on orders received
Denmark	27 (GB)	The Royal Danish Air Force is the only service to have operated Chipmunks on skis
Egypt	22 (CAN) 34 (GB)	
Ghana	14 (GB)	
Indonesia	12 (GB)	For government of Indonesia
Iraq	21 (GB)	
Jordan	2 (GB)	Allocated service serials suggest other aircraft may have been acquired indirectly, for example from Egypt or Iraq
Kenya	9 (GB)	Ex-RAF, gifted by UK government
Lebanon	3 (CAN) 3 (GB)	
Malaya	12 (GB)	Ex-RAF
Saudi Arabia	12 (GB)	Physically the last Chipmunks to leave Hawarden production line
Syria	30 (GB)	
Thailand	18 (CAN) 48 (GB)	15 British models were converted to RTAF-4 Chanthra type
Uruguay	10 (GB)	
Zambia	6 (GB)	Four ex-RAF, two through civilian procurement

the acquisition of US trainers, so an initial six ex-RAF Chipmunks were purchased through the government and in 1965 a further 11 were loaned. All were converted to Mk22 standard before delivery. They served until 1968 when currency restrictions were lifted. The 11 loaned aircraft were returned and put into store, following which all but two became the source of the Air Cadets' 'Chippax' procedural trainers already mentioned. The college disposed of its last Chipmunk in 1973. March 1958 saw DH's final Chipmunk model, the Mk23, an attempt to capture the crop-sprayer market. WB680 (c/n C1-0128) was purchased from the Air Ministry as the conversion prototype, becoming G-APMN, but it was written-off following an engine failure and WP893 (c/n C1-0763) was acquired from the same source to replace it. Sales never materialised and the aircraft was stored until Bill Bowker of Farm Aviation

DATAFILE

'CHIPPIES' ON THE BBMF

The only two Chipmunks remaining on the UK military register are the RAF Battle of Britain Memorial Flight's WG486 (c/n C1-0536) and WK518 (c/n C1-0555). The need to instruct modern pilots, without taildragger time, to fly the most priceless airworthy pieces of our national aviation heritage led to WK518 being acquired in 1983 from Manston and WG486 from Laarbruch, where it spent a year after the closure of Gatow, in 1995.



A beautiful study from December 2020 of both BBMF Chipmunks, WG486 and WK518, in formation. The history of '486 is notably interesting — it served on the front line with No 114 Squadron in Cyprus, and then again with the Gatow Station Flight. Today the two aircraft sport the markings of Bristol UAS and the University of London Air Squadron respectively. RICHARD PAVER

So, how does the BBMF train ham-fisted jet jockeys on these delicate vintage machines? Firstly, they need an introduction to 'tail-dragging' and the problems associated therein, namely the causes of tail swing and trying to land when the nose blocks out all sight of the runway ahead of you. These pilots are highly experienced on very complex fighters, with plenty of mental speed and capacity. However, in these modern-day thoroughbreds, the rudder pedals are little more than footrests. Developing fast feet is the first thing new pilots must master to prevent a ground-loop and the shame of denting one of the BBMF's beautiful aircraft. Crosswind effects, torque and prop-wash are common to all propeller-driven aircraft but with a tailwheel we also get asymmetric blade effect and gyroscopic precession, more notably as the tail rises on take-off, when the throttle setting is greater than on landing. That is where the Chipmunk comes into its own. It is a great trainer, as it will bite if you let things get out of hand. New BBMF fighter pilots will spend the first 10 hours in the front seat of the Chipmunk, mainly practising good old 'circuits and bumps' under as many different conditions as possible, particularly maximum crosswinds. They also fly aerobatics and carry out lots of practice forced landings (PFLs). The BBMF teaches a couple of non-standard Chipmunk techniques: reduce the threshold speed by 5kt — early-model Spitfires will float like a paper bag in the wind if fast over the hedge — and do not apply any handbrake during the downwind checks, so as to encourage using the rudder rather than the brake to

stop any swing that develops on landing. PFLs are also taught in two ways: the standard Chipmunk constant sight-line approach from high and low key, but also a 'fighter PFL' flown at 110kt from 3,000ft. Once proficient in the front seat, the new pilot then flies as much as 15 hours in the rear seat to get used to landing without much forward visibility. Finally, after 25 hours, the pilot does a flying ability test with OC BBMF and, assuming all is satisfactory, progresses to the Harvard or T-6 — sourced from third parties — to get used to something with a bit more power, weight, inertia and complexity. The sorties flying the Harvard are very similar to the Chipmunk test, but this time consist of just one hour in the front cockpit, then one hour in the back, concentrating on engine handling, stall recovery and of course touch-and-goes to the grass and hard strips. Assuming satisfactory progression, the pilot is approved to get into a Hurricane. The first flight in the Hurricane is very a much sensory overload — the sound of a Merlin, the smell of old leather and Avgas, the unfamiliar controls and the sheer joy, and trepidation, of finally getting into a real fighter, all coupled with the knowledge that people fought and died for their country in these machines. It is a busy sortie — stalling, displays, PFLs and a go-around — but the smile on the face at the end of the flight has to be seen to be believed. The Hurricane's handling is more akin to the Harvard than the Chipmunk, being quite heavy on the controls and relatively easy to keep straight on landing, but after 10 hours or so in the Hurricane it is time for the Spitfire and a new first. The early-model Spitfires are the most beautifully balanced machines, so light on the controls in all axes and an absolute joy to fly, but the landings can be quite skittish with such a skinny undercarriage. It is then that you see the benefit of all that training in the venerable 'Chippie'. Sqn Ldr Al Pinner MBE RAF (Ret'd), OC BBMF from 1 January 2006 to 6 November 2009



One of the College of Air Training's 'Chippie' complement was Mk22A G-ARMD, which is still extant. CHRIS SANDHAM-BAILEY

purchased it, together with the rights to build a further three. These were used exclusively by Farm Aviation, the subject of a future *Aeroplane* article.

Some other conversions and modifications were attempted in the UK but only one progressed further than a single fully specified exemplar. A formal programme to install Lycoming O-360-A4A engines into Chipmunks used by the RAF Gliding and Soaring Association has seen 15 conversions completed. Nine remain operating across the UK, while one has been exported to the US.

From Canadian production there were few major civilian sales, the Refresher Flying Training Plan having served that need. Although 91 RCAF Chipmunks were auctioned-off, only about 25 remain on the Canadian register. Many went to the USA, sometimes directly from auction, but most by resale — often quickly.

Of the Portuguese Chipmunks, some 20 are understood to be in private ownership, across both hemispheres. Two are still in Portugal.

Despite the RAAF's decision not to procure the type, the

Chipmunk had a prominent

In 1950 the Newcastle Aero Club — later given the Royal prefix, becoming the RNAC — acquired the DH Australia (DHA) demonstrator, the 22nd Canadian aircraft, while the Royal Aero Club of New South Wales imported the 18th Canadian machine from the UK. The following year the Royal Aero Club of Western Australia ordered two Mk21s, which were ready for operation in January 1952. DHA saw the opportunity for Chipmunk sales, and in August 1950 ordered a Mk21 from the UK. It arrived in December 1951 and was used as a demonstrator for some time before being sold to the RNAC in November 1953. This aircraft, c/n C1-0153, was in fact the first Mk21 built, and survives as VH-AKW.

From 1953, when various RAF units began to be disbanded, a deluge of Chipmunks were imported into Australia specifically for flying schools and clubs, principally from the UK, and via South Africa (ex-RATG). In 1960 there were 71 Chipmunks registered in Australia, of which all but five

were for training purposes; another four were commercially employed. Soon after this, however — as had happened in Britain — availability of more operationally efficient American types saw the phasing-out of the Chipmunk as a commercial trainer.

Two interesting conversions were attempted in Australia. One, the SA-29 Spraymaster, took inspiration from the Mk23 but was an independent design, begun by Sasin Aircraft Service in 1953. Three of them were built but it would be a stretch to suggest that it was a commercial success. The other was intended to be a touring version with increased power and luggage capacity, work on which started in 1967. A first example (c/n C1-0486) was never formally registered, and a second was certificated but with less ambitious changes.

In a bizarre twist, during the early 1960s the Royal Victoria Aero Club was contracted to provide initial training and grading for Royal Australian Navy aircrew. A fleet of 12 aircraft was assembled, finally putting the Chipmunk into quasi-military service in Australia.

Modified Chipmunks

Probably the most renowned of Chipmunk modifiers — though he wasn't the first — is the late Art Scholl, who created three Super Chipmunks. Among these, the RCAF's first aircraft, number 23, was sold without an engine and ultimately became Scholl's N13Y, fitted with a Lycoming GO-435-C2B and a Bellanca retractable main undercarriage. The only Chipmunk ever to have retractable gear, this airframe now hangs in the Boeing Aviation Hangar at the Smithsonian's Udvar-Hazy Center in Chantilly, Virginia.

Another 'Super', C1-0501, has evolved almost beyond being a Chipmunk. This aircraft, the second SA-29 conversion, was damaged in 1970. Its restoration led to a Super Chipmunk modification being started in Australia and completed in the USA, where it emerged with substantial structural changes and a Lycoming IO-540 powerplant. Although a committed purist, your writer will admit to considering this aircraft to be a singularly unique and delightful Super Chipmunk, today registered N7DW.



A trio of Lycoming-powered RAF Gliding and Soaring Association Mk22s, G-ATVF, 'BCSA' and 'BCKN', at Cottesmore during the Royal International Air Tattoo 2001. BEN DUNNELL



The great Art Scholl at the helm of his Super Chipmunk, N13Y, taking off from Toronto Island Airport on 5 September 1971. LARRY MILBERRY

INSIGHTS

"Simply the finest aircraft you can fly"

A Chipmunk was being refuelled at a seemingly-deserted airfield in the US Mid-West when a truck pulled-up, its driver dismounted and without preamble issued this declaration. And it simply cannot be denied.



The author flying his immaculate Chipmunk T10, WP833, over California in early 2017 with auxiliary fuel tank dry-installed. The Exercise 'Northern Venture' veteran is now registered N833WP.

FRANK B. MORMILLO

While you can joke about the propeller 'turning the wrong way', or the weird brakes, or the reverse-functioning mixture control, or even the 'possibility' that there's some oil on the underside, it is

hard to fly a Chipmunk and not get out of it without a huge smile on one's face and a feeling of satisfaction, if not excitement.

The Chipmunk's controls are beautifully harmonised in all three axes, requiring just fingertip control in most flight regimes.

Even when flying aerobatics, a firm single hand on the stick is sufficient to apply full control in any axis or manoeuvre, and the aircraft has no ugly tendencies when in unusual attitudes. It is an honest aeroplane, even when deliberately treated egregiously

just to see what its tolerance limits actually are. Its stall strips offer the pilot more than ample warning of any impending stall, normal or accelerated, and even when sideslipping the aircraft has to be seriously mishandled before it will 'break'. Even then, ➤

DATAFILE

SPINNING: THE UNWARRANTED SHADOW

Spinning continues to be, to this day, a subject of discussion and concern, despite ample evidence that the Chipmunk recovers in every rational configuration. Following Charlie Stockford's accident in January 1947, in order to demonstrate to the Canadian DoT the type's safe spin characteristics, in May George Neal (flying) and Russ Bannock put aircraft 22 through a series of spins in nine combinations of canopy position and flap settings, from each of which it recovered without difficulty.

Testing was also conducted in the UK, the Royal Aircraft Establishment recommending rear fuselage strakes as a means to aid spin recovery. These were tested by de Havilland (March 1958) and the RAF (May-June 1958), and as a consequence modification H231 was published that August prohibiting spinning unless strakes were fitted. Though test pilots noted that strakes had a marginal effect on spin recovery, perhaps effecting recovery a half to three-quarters of a turn sooner, it was recognised that they reduced stick buffet, which itself may have been a cause of improper pilot recovery inputs. This modification applies only to British and Portuguese-built aircraft.

What is essentially the seminal publication on Chipmunk spinning is the Australian Department of Civil Aviation (DoCA)'s *Aviation Safety*

Digest of June 1960 which, following a fatal accident, concluded, "there is no justification for a belief that the Chipmunk is in any way unsuitable or unsafe for both dual and solo training in spinning exercises."

This Australian report was reproduced by de Havilland in the UK in its Technical News Sheet No 142. It was endorsed by John Cunningham, then chief test pilot, who stated that the DoCA document "bears out to a remarkable degree the findings of tests carried out at Hatfield". The report reiterates that the Chipmunk does not readily spin and will prefer to enter a spiral dive unless opposite aileron is also applied on entry, and subsequently neutralised. It also makes clear that while the broad-chord rudder may help with spin entry, it does nothing to improve recovery. Understanding of the findings and recommendations is something with which any Chipmunk pilot in command should be fully familiar.

It is to be noted that the Australian DoCA's tests with number 22 were without strakes, or the extended-chord rudder or the enlarged elevators, which were embodied from aircraft 63 onwards. One cannot help but conclude that Chipmunk spin accidents are a result of pilot misunderstanding or error, for whatever reason.

DATAFILE



The Royal Thai Air Force itself developed the RTAF-4 Chanthra, a Continental-powered modification. Now retired, this one is preserved in the RTAF Museum at Don Mueang. ADRIAN M. BALCH

RESTORATION AND PRESERVATION

Worldwide there are in excess of 400 Chipmunks surviving, of which it is estimated that approximately 80 per cent are airworthy or close to being so. This total includes those in museums, private hands and what few earn their living in any sense.

As already noted, the prototype was destroyed in 1953, but a number of noteworthy Canadian pre-production models have survived. The oldest is aircraft 3, LV-NRY, restored to airworthiness in Argentina during 2017. It was originally sent there as a company demonstrator. The sixth airframe, DHC's Lycoming O-435 testbed, is stored in Canada, potentially to be restored, and number 11, probably the best-known pre-production example, is discussed separately. Number 22/VH-BFT, the original Australian demonstration aircraft, survives, now as VH-MCC. Viking Aircraft in Canada, which holds the type certificate for Canadian Chipmunks, has in its custody George Neal's personal mount, CF-JAG (c/n 189-227). The first UK-built aircraft, WB549, has been restored to airworthiness in private hands and is now for sale, and the RAF's initial example, WB550 (c/n C1-0002), was donated to the National Air Force Museum of Canada in recognition of the design's origins. In Portugal, the last Chipmunk built, 1376 (c/n OGMA-66), is on static display in the Museu Industrial das OGMA in Alverca.

There is a strong 'keep it stock' sentiment among current Chipmunk owners and operators, and probably two-thirds are preserved in the schemes they were during their military service. Many, therefore, retain RCAF, RAF and FAP markings, but it is noteworthy that examples have been restored in genuine Royal Malaysian Air Force (FM1022/VH-BBK, c/n C1-0226) and Egyptian Air Force (1655/F-AZNS, c/n C1-0942) colours, giving a broader representation of the Chipmunk's place in aviation history.

As the fleet ages and spares in serviceable condition become harder to source, the purist

doctrine can be hard to hold onto. Some changes for the sake of operational efficiency/reliability can be effected without manifestly altering the appearance of the aircraft. The result of replacing the original BTH magnetos with Slick hardware is mostly tucked away inside the cowling; supplanting the Dunlop brakes with a set of Cleveland manufacture is only obvious to the aficionados (and they will notice), but at least the pilot will have a set of brakes which really can hold the aircraft at a full static run-up. Forsaking the original tailwheel for a more durable Scott installation is practical while not easily identifiable; so too replacing fabric on the mainplanes with metal. Each of these modifications tends to have reduced maintenance costs once installed with little change to the elegant lines of the stock Chipmunk. Beyond that there are options for installing engines of greater power (such as the Ranger 6 and flat-four and -six powerplants) and modifying the airframe in much more obvious ways, especially under administrations which do not limit such modifications to non-aerobatic flight. It should be noted, however, that changes like those are inclined to engender genteel internecine within the Chipmunk community.

Although still a desirable 'mini-warbird', the costs of maintenance and overhaul are increasing as spares inventories diminish. In addition, insurance premiums are rising disproportionately. Not that this stops some enthusiasts from taking on very significant restorations. WP915 (c/n C1-0790) was damaged by two tornadoes during 2020, but it has recently been purchased with the intention of it being put back into the air. The necessary parts are being located, and it is one of many being restored around the globe.

Unlikely though it may seem, the world's population of airworthy Chipmunks is actually growing slowly. It is clear, therefore, that the type continues to enjoy great popularity, remaining close to many people's affections.

the ailerons' effectiveness allows a prompt recovery. With proper understanding and application of entry and recovery techniques, spinning presents no threat to its occupants.

One cautionary point is to ensure the brakes are fully released before executing any aerobatics, since hydraulic pressure in the lines can significantly restrict rudder travel. The flaps are effective, full (30°) enabling a steepened approach while keeping the speed low, and if a go-around is required a positive rate of climb can be achieved with full flaps still deployed. This is very convenient, since flap operation requires the right hand while the left is managing throttle and trim, hence a change of stick hand is necessary. Changes to flap setting do not cause a marked change in pitch attitude, and with slow application and release a smooth transition is easily achieved. It will, however, float in ground effect considerably if landings are attempted flapless and without appropriate speed management.

“If the design has an Achilles heel at all, it is the DH Gipsy Major engine”

If the design has an Achilles heel at all, it is the Gipsy Major. Absent a constant-speed propeller (CSP), the throttle needs nursing through aerobatics to avoid over-speeding the engine on the 'downhill' portion of manoeuvres, most of which require an initial dive to gain sufficient speed to complete the intended figure. Without an inverted fuel system, the engine will become rough at any time the g falls off — which, in this writer's experience, can bring a Top Gun pilot to a point of near-panic!

Add an engine with greater power and a CSP and things begin to get better, particularly if anything beyond a 'normal' flight profile is anticipated. Nowhere is this more apparent than in the USA, where there are many Super Chipmunk conversions, the most powerful of which have engines in excess of 300hp. Most



ABOVE: Classic 'Chippie' aeros, courtesy of former RAF example ZK-SAX at Wanaka, New Zealand. COLIN HUNTER/AIRTEAMIMAGES.COM

ABOVE RIGHT: The ultimate Chipmunk conversion has to be N7DW, owned by Mark Meredith and based at Annapolis, Maryland, but here giving a display at Leesburg Executive Airport, Virginia, in September 2019. AARON HASSE



of these have also been subjected to major airframe modifications, these typically being reduction in span, an increased-area rudder (with a totally different profile) and ailerons, greater control

surface travel, metal reskinning of the mainplanes and, of course, cowling reprofiling. A handful are used for display flying, not just as private mounts. Such conversions demonstrate the

inherent qualities and integrity of the Chipmunk design and to fly them is to realise that, apart from having enhanced performance, 'they handle just like a Chipmunk'.

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The author is indebted to Rod Blievers, Robert Brinkley, Rod Brown, Bob Fassold, J. Munkelt Gonçalves, Al Pinner and Bill Purchase for their assistance.

DATAFILE

A SPECIAL CHIPMUNK

Number 11 was initially test-flown at Downsview by George Neal on 24 March 1947, bearing its constructor's number as a registration. Registered as G-AKDN, it played a pivotal role in the UK's decision to acquire the type. In its three years as a de Havilland test and demonstration aircraft, 'KDN' was flown by numerous A&AEE pilots and four of DH's top test pilots of the day: Pat Fillingham, John Cunningham, Geoffrey Pike and John Derry. It was also raced, winning the 1952 Goodyear Trophy and the 1953 King's Cup. During the latter, in the hands of Pat Fillingham and his wife Sonja, 'KDN' achieved an average speed of 142mph. George Neal once noted that it was "very light and the fastest Chipmunk I've ever flown."

Having served its purposes for the company, in October 1950 Geoffrey de Havilland presented 'KDN' to the London Aero Club. It subsequently passed into other private hands. In 2000 'KDN' was purchased by Phil Derry, nephew of John Derry. Derry was later approached by two Canadians, keen to return the aircraft to Canada. After assuring Derry they wanted nothing but to preserve the aeroplane and its heritage, a sale was agreed and the aircraft was shipped to Saskatoon in 2002. There it was restored to its original DHC company livery and reflighted by George Neal on 17 May 2004, almost exactly 57 years after he first took to the air in it. Though now back in Canada, 'KDN' continued to operate under its British registration, the only formal registration this aircraft has ever carried in its life.

With the passing of one of its two Canadian owners, in late 2015 'KDN' was shipped back to the UK. It spent six months being displayed at various 2016 events, starting with the Chipmunk 70th anniversary at Old Warden, where it was one of the stars of the show. A highlight of the event was Sonja Fillingham once again flying in 'KDN'. At the end of the year the aeroplane was sold into the



That most legendary of airworthy Chipmunks, G-AKDN, during the type's 60th anniversary celebrations at Downsview 15 years ago. ERIC DUMIGAN

custodianship of Ken Large and is now based at Teesside International Airport.

G-AKDN retains the original canopy, short-chord rudder, ex-Tiger Moth throttle, control sticks and brake assembly, undercarriage and lack of 'eyebrows' over the instrument panels as well as having many hand-formed fairings. As a result of its evaluation role it gained a Gipsy Major 10 in lieu of the original 1C and had anti-spin strakes installed. This unique mix of pre-production and post-evaluation features affords it the unique 'DHC-1A-1 Chipmunk (Modified)' type certificate.

Though we will never see CF-DIO-X again, G-AKDN is a very close semblance. It is the most significant surviving pre-production example of the type, with an outstanding provenance.

Despite having been in virtually continuous operation since manufacture, it has a comparatively low 3,000-hour total time since new and no fatigue life restrictions.