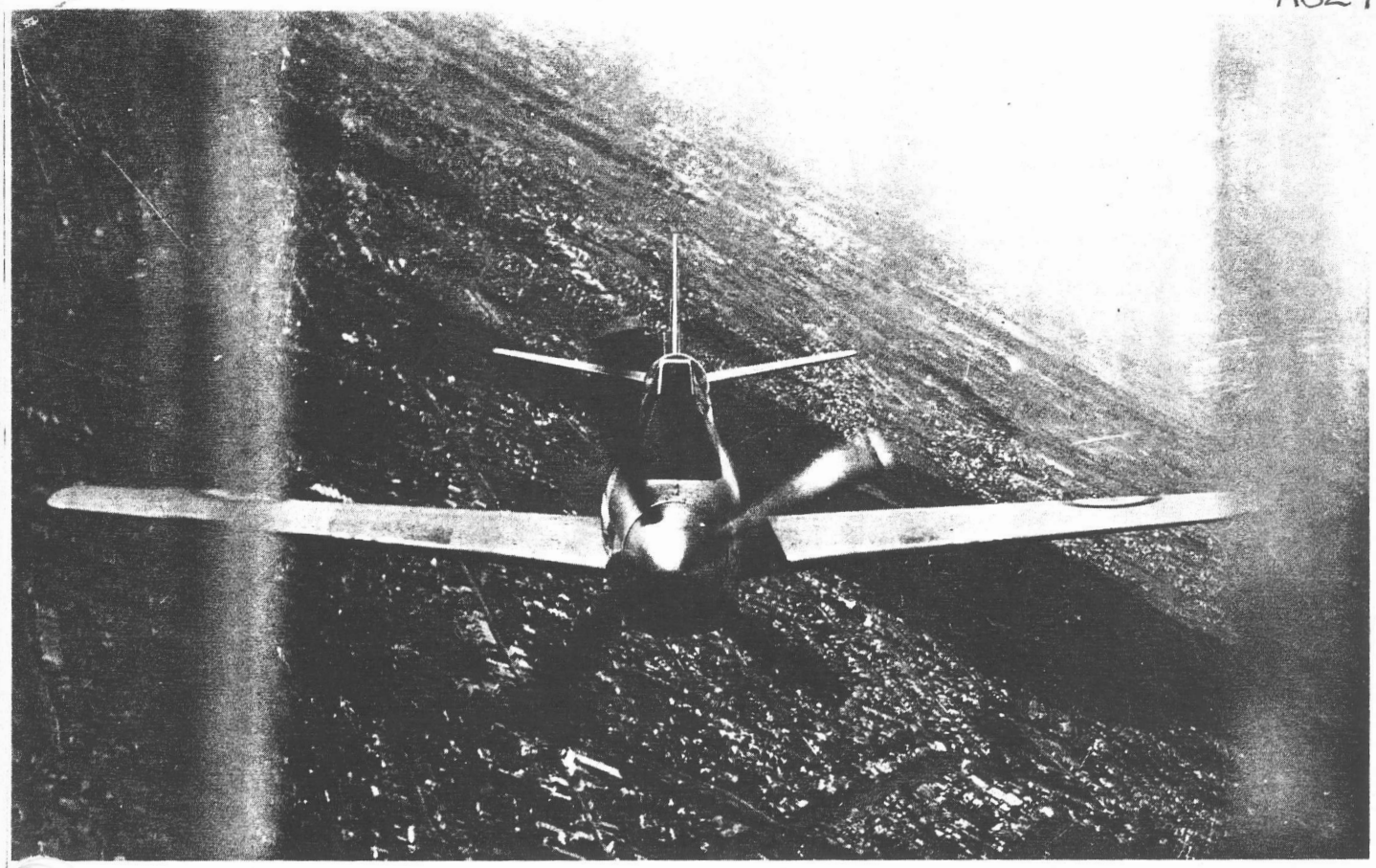

Antipodean Finale

A BADLY CALIBRATED airspeed indicator? Some artistic licence in presentation of the facts on the part of an enthusiastic press agent? A contemporary press release alleged that a thoroughly conventional propeller-driven fighter had clocked 502·2 mph (808,21 km/h) in level flight over Melbourne, and this twenty-one years before Darryl Greenamyer, flying a much-modified Grumman Bearcat under ideal conditions at Edwards AFB, California, was to establish an international speed record for piston-engined aeroplanes at 482·46 mph (776,45 km/h)!

The exact speed that *was* attained on that morning of 25 May 1948 will probably never be established with certainty, but there can be no doubt whatsoever that the fighter was moving very fast indeed, or that its Rolls-Royce Griffon was singing a fitting swansong for an epoch; the era of the piston-engined fighter. The aeroplane concerned in this flight was the Commonwealth Aircraft Corporation's CA-15, which, already an anachronism when it had begun taxying trials at Fishermen's Bend on 12 February 1946, had acquired an unusual distinction three weeks later, on 4 March — that of being the *last* piston-engined single-seat fighter prototype* to initiate a flight test programme.

The fact that the CA-15 was an anachronism at the time of its début — a fighter powered by a piston engine born at a time when its contemporaries among the world's fighter prototypes were without exception turbine powered — was certainly not the fault of the Commonwealth Aircraft Corporation, and reflects no discredit on the company's achievement in evolving this warplane. If anything, the CA-15 reflected the extraordinary tempo attained by combat aircraft development in the mid 'forties. It compared favourably with any *piston*-engined fighter extant and was better than most. Had it appeared two years earlier it could well have achieved fame for itself and fortune for its manufacturer, but two years in the mid 'forties comprised 24 *long* months; enough time for the latest in warplanes to become outmoded.

The ideas that crystallised in the form of the CA-15 stemmed from the success of trials with the Boomerang in 1942 (see February issue), this success having prompted the RAAF to formulate a requirement for a more ambitious fighter; a high-performance long-range medium-altitude warplane. Initially, the CAC team focused its attention on an improved, more powerful derivative of the Boomerang, but a close investigation of the project revealed the fact that the basic airframe could not accommodate the substantial increases in weight and power envisaged without virtual redesign, and owing to more pressing commitments the project was shelved.

During the course of 1942, the decision had been taken to manufacture the Merlin-engined version of the North American Mustang under licence at Commonwealth Aircraft's facilities at Fishermen's Bend, and in the following year the first of a series of engineering and production teams was to be sent to North American Aviation to prepare for this programme, but the RAAF requirement formulated in 1942 still remained. In 1943, therefore, the CAC design team resumed studies for what had now become a potential successor to the Mustang under contract CA-15, this contract number subsequently being utilised as a "designation" for the aircraft as it was never officially named, although at one time it was *unofficially* referred to as the Kangaroo.

Both CAC and the RAAF were anxious that the fighter to

* *The piston-engined Lavochkin La-11 prototype commenced its flight test programme after the CA-15 but this was to all intents and purposes a progressive development of the La-9, and not an entirely new type.*

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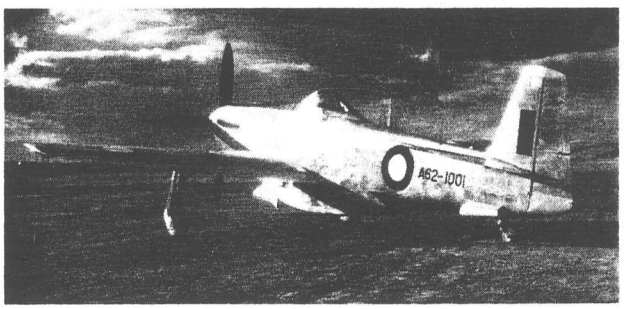
be evolved under contract CA-15 would embody the latest structural and aerodynamic refinements, and numerous conferences were held between manufacturer and potential user to finalise the details of the specification, but so many were the capabilities being demanded of the new fighter — the now-proven performance potential of the Merlin-engined Mustang had resulted in considerable upgrading of the RAAF's requirements — that these dragged on until 1944, when the details of the specification were finally firmed up. Contract CA-15 now called for an all-metal stressed-skin aircraft with a flush-riveted semi-monocoque fuselage and a two-piece wing employing a laminar-flow aerofoil section derived from the NACA 66 series. The fighter was designed around the 18-cylinder two-row Pratt & Whitney R-2800-10W Double Wasp turbo-supercharged radial which possessed a military rating of 2,000 hp boosted to 2,300 hp with water injection. The R-2800 was to be fan cooled, and the turbo-supercharger and intercooler were to be mounted behind the engine, the exhaust gases from the turbo combining with cooling air from the fan to be ejected from an efflux duct below the fuselage and thus provide a measure of supplementary thrust.

Changing horses

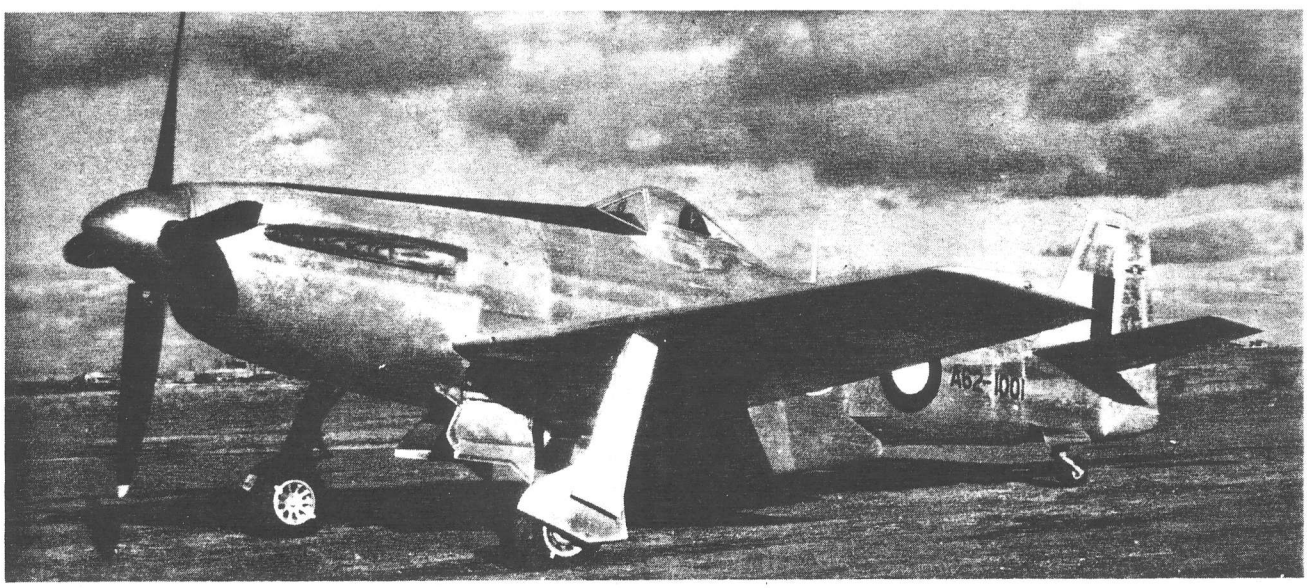
Shortly after prototype construction began, the CAC team was informed that for some inexplicable reason the Pratt & Whitney engine was unavailable, and, finally, in 1945, after consideration of various possible alternative power plants, it was decided to install a Rolls-Royce Griffon 61 liquid-cooled 12-cylinder Vee engine with a two-speed two-stage supercharger as an interim measure pending introduction of a Griffon with a three-speed supercharger. This changeover could obviously not be effected without major redesign of the forward fuselage, and, at this time, another problem arose as a result of differing opinions concerning the armament installation. Various combinations of 20-mm cannon and 0·5-in (12,7-mm) machine guns were examined with inconclusive results, until it was eventually decided to install an interim armament of six 0·5-in (12,7-mm) weapons in the prototype.

As hostilities in the Pacific had meanwhile terminated, little urgency was now attached to the CA-15 programme, the prototype (A62-1001) finally being rolled out early in 1946. Despite having been intended initially for a bulky air-cooled radial and subsequently adapted to take a liquid-cooled in-line Vee, the new fighter was not unattractive æsthetically, even if, in side profile, its figure displayed a somewhat unfashionable fulsomeness. From other angles it possessed a noticeable, albeit superficial, resemblance to the P-51D Mustang. The fuselage was an all-metal semi-monocoque structure with four longerons to which the engine mount was bolted, and pressed flanged formers of dural sheet riveted to the stringers. The low-drag, laminar-flow wing, with maximum thickness at 45 per cent chord, was a two-piece structure joined on the fuselage centreline, and comprised formed sheet metal spars and ribs, and flush-riveted metal skin. The metal-skinned ailerons extended over 48 per cent of the span and had shrouded nose balances with fabric seals, and the space between the ailerons and the fuselage was occupied by hydraulically-operated flaps which had a 20 deg setting for take-off and a 50 deg setting for landing. The horizontal surfaces of the flush-riveted all-metal tail assembly were set at a 9 deg dihedral angle.

The Griffon, which was carried by sheet metal bearers, drove a 12 ft 6 in (3,81 m) diameter Rotol constant-speed airscrew with compressed wooden blades, and the cooling system comprised a Morris-type single-row intercooler followed by a three-row main radiator with a matrix area of 5·8 sq ft (0,54 m^2) and a thermostatically-controlled variable efflux, a liquid-cooled heat exchanger for the oil system being incorporated in the intercooler system. Fuel was divided between wing tanks accommodating 220 Imp gal (1 000 l) and a fuselage tank containing 40 Imp gal (182 l), and this could be supplemented by two 100 Imp gal (454,6 l) drop tanks. The undercarriage employed the Dowty Live-Line hydraulic system, the mainwheels retracting inwards into the fuselage, their wells being enclosed by fairing plates attached to the mainwheel legs and hinged flaps attached to the fuselage. The pilot was seated over the wing trailing edge at the apex of the rather deep fuselage under a free-blown,



Possessing from some angles a superficial resemblance to the P-51D Mustang, the CA-15 was an outstanding aeroplane from several aspects but was already an anachronism when its flight test programme began.



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aft-sliding canopy which provided extremely good all-round visibility. Provision was made for the canopy, headrest, and rear armour to be jettisoned in an emergency.

No faults but no chance

When CAC test pilot Jim Schofield pulled the CA-15 off the Fishermen's Bend runway for its maiden flight on 4 March 1946, he had no idea that his mount was to be the *last* new piston-engined fighter prototype to fly. Manufacturer's trials, which were to continue until 27 June, revealed the fact that the CA-15 was remarkably free from the usual faults displayed during the initial tests of a new combat aircraft. It possessed extremely pleasant handling characteristics and no apparent vices, but the CAC team was well aware that its newborn stood no chance, the gas turbine having supplanted the piston engine as a fighter power plant during the CA-15's gestation.

With the completion of CAC testing, the CA-15 was delivered to No 1 APU at RAAF Laverton where familiarisation flights and calibration and performance tests were commenced, but on 10 December 1946, an hydraulic failure necessitated a crash landing in which this unique prototype was extensively damaged. Six months elapsed before, in June 1947, it was returned to CAC for repairs. The RAAF had, of course, drawn up plans to introduce jet fighters and, in the interim, had the services of a thoroughly competent piston-engined fighter in the shape of the P-51D Mustang. An analysis of the full capabilities of the CA-15 was therefore of purely academic interest, but it was agreed that CAC should repair the prototype, a task understandably conducted in a leisurely fashion.

Thus, almost a year elapsed before, on 19 May 1948, the CA-15 was returned to the RAAF for a resumption of flight testing, a week later *allegedly* achieving that phenomenal speed over Melbourne. The RAAF is somewhat more cautious than the contemporary press release in its claims for the speed capabilities of this second and, in all probability, last fighter to be conceived and built "down under", but, nevertheless, allowing for the usual service taciturnity, there would seem to be little doubt that the CAC fighter was quite an aeroplane. The official test programme continued in a desultory fashion until early 1950. APU pilots echoing CAC test pilot Jim Schofield's opinions as to the CA-15's pleasant behaviour and viceless characteristics. Climbing and range trials came well up to expectations, and the speeds *officially* attained included 448 mph (721 km/h) at 26,400 ft (8 047 m) in combat power and 432 mph (695 km/h) at 32,700 ft (9 967 m) in rated power. Of what the CA-15 would have been capable had it ever been fitted with the Griffon with three-speed supercharger is now only a matter for speculation, but as the last *genuinely* new piston-engined single-seat fighter prototype it certainly compared favourably with any warplane in the same category and was undoubtedly better than most. CAC's design team was not highly experienced, but it performed an outstanding job with the CA-15 which, but for a quirk of fate . . . . ! □

Commonwealth CA-15 Specification

Power plant: One Rolls-Royce Griffon 61 12-cylinder liquid-cooled Vee engine rated at 1,540 hp for take-off, 2,035 hp at 7,000 ft (2 134 m), and 1,820 hp at 21,000 ft (6 400 m).

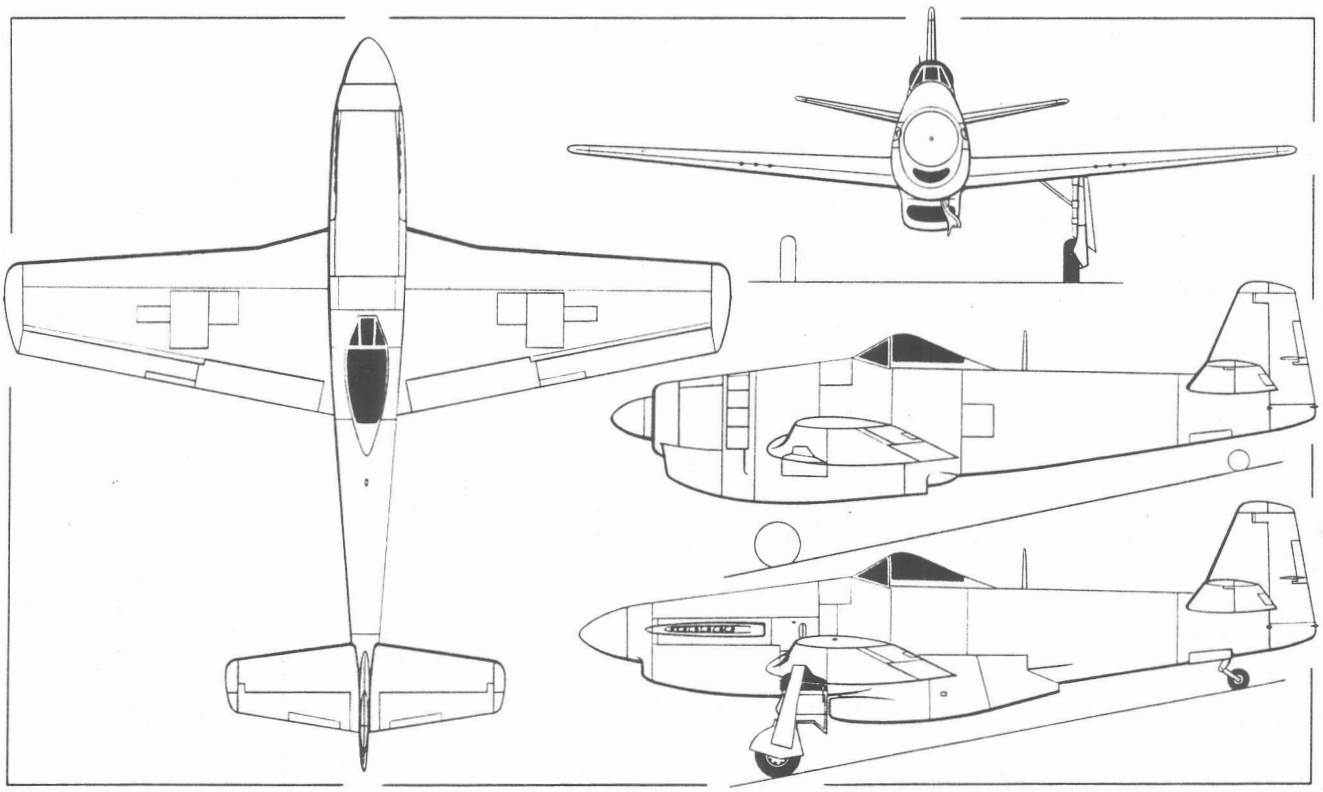
Armament: Six wing-mounted 0·5-in (12,7-mm) Browning machine guns with 280 rpg, plus (provision for) 10 rocket projectiles, two 500-lb (226,8-kg) or two 1,000-lb (453,6-kg) bombs underwing.

Weights: Empty equipped, 7,540 lb (3 420 kg); normal loaded, 10,764 lb (4 882 kg); max overload, 12,340 lb (5 597 kg).

Performance: Max speed, 368 mph (592 km/h) at sea level, 448 mph (721 km/h) at 26,400 ft (8 047 m), 432 mph (695 km/h) at 32,700 ft (9,967 m); range (with max external fuel), 2,540 mls (4 088 km) at 5,000 ft (1 524 m); initial climb, 3,650 ft/min (18,54 m/sec); time to 20,000 ft (6 096 m), 5·5 min; service ceiling, 39,000 ft (11 887 m).

Dimensions: Span, 36 ft 0 in (10,97 m); length, 36 ft 2½ in (11,03 m); height, 14 ft 2¾ in (4,34 m); wing area, 253 sq ft (23,50 m²).

The upper sideview (below) illustrates the original CA-15 design with the R-2800 Double Wasp radial air-cooled engine.



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Antipodean Follow-up

NOTWITHSTANDING the statements in the interesting article "Antipodean Finale", (AIR ENTHUSIAST — October 1972) that "the Commonwealth Aircraft Corporation CA-15 allegedly achieved 502·2 mph", and that the "exact speed attained . . . will probably never be established with certainty", the fact is that the aircraft did indeed record the quoted speed. The source of uncertainty may perhaps have been the reference that I made to this aircraft in a series on "Aircraft of the RAAF" in *RAAF News*. Dealing with the CA-15 in the April 1966 issue, I showed a photograph of the aircraft "in flight over Melbourne where, according to a contemporary press release, a record speed of 502·2 mph was attained on 25 May 1948".

The answer to the enigma lies in the original press release, which was not reprinted fully in *RAAF News* because of lack of space. Whereas it was stated in AIR ENTHUSIAST that the "fighter had clocked 502·2 mph (808,21 km/h) in *level* (my italics) flight over Melbourne . . .", the press report as contained in the *Melbourne Argus*, 26 May 1948, reveals the true circumstances as follows:

"This Australian-built CA-15 fighter in a test flight yesterday flew at 502·2 mph — believed to be the highest speed ever attained in Australia by a single-engined aircraft. It was piloted by Flight-Lieut J A Lee Archer in a twofold test and exhibition flight over Melbourne. It reached top speed after pulling out of a 4,000 ft dive. In ordinary level flying it flew at 450 mph — 20 mph more than the Mustang's top speed".

Accounts published previously of the performance of the CA-15 are based generally on the reports of CAC test pilot Jim Schofield who carried out the manufacturer's trials between 4 March and 27 June 1946. These tests accounted for 18 hr 3 min of engine running time, and included 16 hr 35 min flying time. In contrast it is interesting to compare the calibration and performance trials conducted by the Royal Australian Air Force at No 1 Air Performance Unit, Point Cook. The RAAF flights occurred between 27 July and 10 December 1946, and flying time amounted to 43 hr 25 min. The test pilots were Wg Cdrs J H Harper and G D Marshall, Sqn Ldrs D R Cuming, G C Brunner, C W Stark and G H Shiells, and Flt Lt J A Archer. Harper, Cuming and Brunner also flew the aircraft during the contractor's trials when a number of defects were removed.

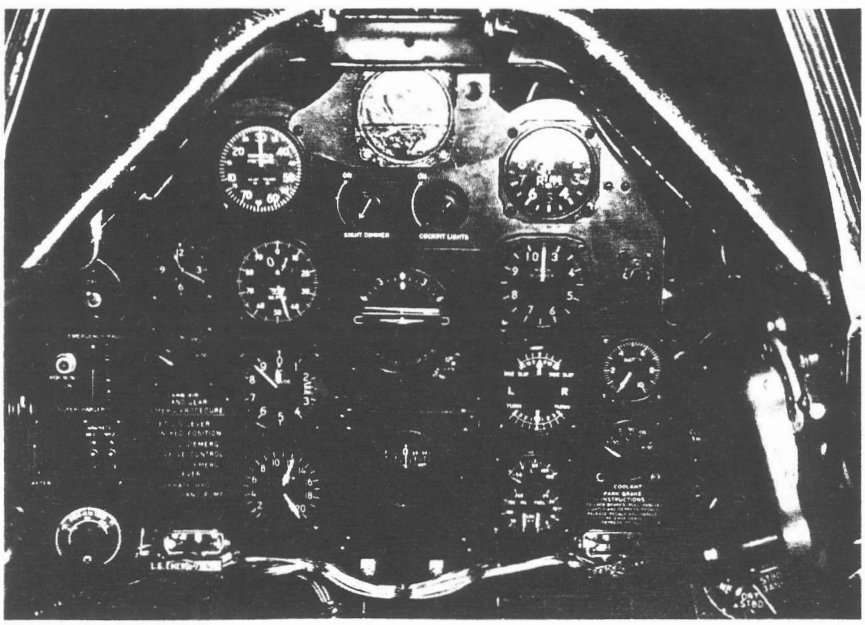
The official tests produced performance figures corresponding with those published in your article, except that the maximum rate of climb achieved was 4,900 ft/min (24,9 m/sec) from sea level to 7,600 ft (2 316 m), flying without guns or ammunition, and was estimated to be over 4,000 ft/min (20,3 m/sec) if the latter were fitted. The range with normal fuel of 220 gal (1 000 l) worked out at 1,150 mls (1 850 km), the figure you quote being with external fuel tanks. One small error in your specification table concerns the max power of the Griffon 61, which was 2,305 hp (not 2,035 hp) at 7,000 ft (2 134 m).

In level flight the ailerons were light at normal speeds, and became firm at higher speeds. The elevators were firm at all speeds, and both the ailerons and elevators were powerful and positive. The rudder was firm at normal speeds, became heavy at high speeds, and was also powerful and positive. However, the rudder proved to be the worst control of the three and the pilot was aware of it all the time if he altered power settings or speeds. The trimmers were powerful but a little too sensitive and it was easy to over-trim the rudder at high speed which induced a big yaw. The flaps were quite effective although slow in operation, taking about 30 seconds to lower or raise. Unfortunately the canopy did not have a clear vision panel for use in bad weather which was a disadvantage because, apparently, the canopy was not to be opened in flight.

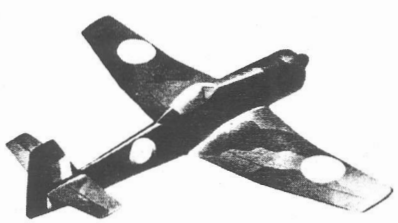
Stalling tests revealed that there was little warning of the stall, which took the form of flight buffeting over the tail surfaces. Recovery was quick and normal. With flaps and undercarriage up, and power off, the stall occurred at 97 mph (156 km/h) ASI. With flaps and undercarriage down the speed reduced to 90 mph (145 km/h). In both cases control was good down to the stall, and then the port wing and nose tended to drop fairly slowly.

One official report, dated 29 May 1947, summed up the flying characteristics of the aircraft in the following terms — "In general the CA-15 is a very pleasant, straight forward aeroplane, easy to fly and with no apparent vices. The view in flight is very good, particularly over the nose. At present handling is marred by the excessive change of rudder trim with variation of power and/or speed. When this is cured a very pleasant aeroplane should result".

After the crash-landing in December 1946 the CA-15 was repaired by CAC at Fishermen's Bend. It was reissued to the RAAF on 19 May 1948 when it was delivered to No 1 Aircraft Depot at Laverton for the Chief Technical Officer's inspection. On the 20th it was transferred to the Aircraft Research and Development Unit (ARDU), RAAF Laverton, the day after Flight Lieutenant Lee Archer flew the aircraft over Melbourne. But this newsmaking flight was to be the twilight performance of this promising machine, and only a limited flying test programme continued until 1950. The writing on the wall appeared in Air Board Agendum No 9530, 7 February 1950, which recommended cessation of flying because it was uneconomical to maintain the aircraft due to lack of spares. In addition, the Department of Supply and Development was requesting return to the United Kingdom of the two Griffon engines which were supplied on loan. Finally, on 1 May 1950, the CA-15 was transferred from ARDU to No 1AD for conversion to components.



(Above) The CA-15 after it crash-landed at RAAF Point Cook on 10 December 1946, after a failure in a pressure gauge had allowed all the hydraulic fluid to drain out of both the main and the emergency hydraulic systems. (Below) The CA-15's cockpit showing the flying instrument panel. The throttle, propeller controls, fuel levers, and u/c, flap and trim selectors were grouped on the left and electrical and hydraulic controls on the right side of the cockpit.



Two previously unpublished pictures of a wind-tunnel model of the original CA-15 design