

The triumphs and tragedies encountered by de Havilland Australia in production of the Mosquito – and the key role played by one man

WORDS: BRIAN VAN DE WATER



LEFT: A portrait of John Mills from the immediate post-war period. Mills was a key figure in Australian Mosquito production.

VIA STEVE MILLS

MILLS *and the* 'MOSSIE'



To call the Royal Australian Air Force of 1937 a 'force' in the truest sense of the word could be viewed as a misnomer. Small numbers of Hawker Demons and Avro Ansons made up its offensive and defensive strength, and the country's aircraft manufacturing capability was non-existent. This situation was the result of a government policy since 1919 which assumed that, in the event of hostilities, Australia's needs would be met by aircraft supplied by British factories.

But by 1941 Australia had created a thriving aviation industry, initiated by industrialist Essington Lewis. With the support of the federal government, he founded the Commonwealth Aircraft Corporation (CAC) to manufacture the Wirraway, which entered service in 1939. After that came the Government Aircraft Factory, which built the Bristol Beaufort to the tune of 746 examples.

Rising to the occasion too was Sydney-based de Havilland Australia (DHA), set up in 1927 by Hereward

de Havilland — brother of Sir Geoffrey. A sales and service outfit, it assembled Moths from components shipped over by the parent company. During 1937, general manager Maj Allan Murray Jones started to assemble a team of graduate engineers in order to expand the capabilities of the small organisation. First to be employed was John Mills, a graduate in science and engineering who, at the age of 22, had little practical experience. He was posted to Hatfield to spend almost two years circulating through the manufacturing and design departments. A notable experience was a flight in a DH94 Moth Minor in the hands of young test pilot John Cunningham, as a result of which Mills returned to Australia with a complete set of drawings for the aircraft. From those, DHA later produced 41 Moth Minors for RAAF training purposes.

Back home, he was appointed works manager to develop the in-house production of Tiger Moths, a programme that supplied 1,085 examples for the Empire Air Training Scheme. In 1940, DHA created its Propeller Division with John Mills as technical manager. By the end of 1941, its workforce had grown to more than 1,000, and in excess of 2,000 propellers were produced during the war years.

The RAAF still lacked a single-seat fighter as of 1941. In a previously untold story, a concerned Murray Jones created a design group, led by John Mills, to develop a locally produced fighter. The proposed engine was the Pratt & Whitney R-1830 being manufactured by CAC for fitment to Beauforts. Design proposal ADH-1 for an aircraft utilising a fabric-covered steel tube fuselage and wooden wings was completed and presented to the RAAF, but rejected. Unknown to DHA, the government had decided in late 1941 to build the Mosquito in Australia in order to fill the fighter gap. Ironically, CAC, responding to the desperate need for a fighter in February 1942, came up with the Boomerang (see 'Database', *Aeroplane* August 2016) several months after the similar machine proposed by DHA.

The government nominated DHA in late 1941 to manufacture the Mosquito FB40. John Mills travelled back to Britain the following January to obtain technical data and gain production experience. He went via the USA where — through the office of the Australian ambassador, Sir Richard Casey — Packard was contracted to supply Rolls-Royce Merlin engines.

Having experienced all major aspects of Mosquito manufacturing, Mills returned to Australia in July 1942, "with a heavy briefcase, plus protective strap, containing all the precious material about the top-secret Mosquito on microfilm. Naturally I had to take special precautions, especially on overnight stops. A covering letter from

the Prime Minister worked wonders whenever the contents of the briefcase came under question."

John Mills was put in charge of Mosquito production. With the aid of advisors sent from the parent company, drawings were produced from the microfilms, a bill of materials compiled, specialist teams assembled, and the laborious task of selecting more than 100 sub-contractors initiated. The final division of work saw the manufacturing of most metal components and minor wood assemblies being sub-contracted, leaving DHA to concentrate on the wing and fuselage.

The unlikely location chosen for fuselage construction was the fourth floor of the Bradford Mill building in an inner Sydney suburb, some 30km (18.5 miles) from the eventual final assembly site at Bankstown airfield. DHA produced sample wings before sub-contracting production to the local General Motors Holden (GMH) factory, a move that later resulted in a major problem. GMH insisted on controlling all aspects of manufacturing, including quality control.

All spruce and balsa for the primary structure was imported, but Australian timber was employed in many elements of the secondary structure. Initially, it was planned to use local coachwood ply in the wing skins and spar webs. This decision was later reversed, as related by Merv Waghorn, an engineer seconded from Hatfield who was delegated to make design changes: "The shear strength and shear [modulus] tests I did on coachwood demonstrated that, although it met the same specifications as [4 x 3] birch ply, it could not match [the] results achieved on birch ply at Hatfield using identical test conditions. I therefore made the decision to increase the spar web thickness for coachwood, the first major modification to the Mosquito developed in Australia.

"This proved to cause problems because it reduced the chordwise dimension of the space into which the wing tanks were fitted and required reduction of the chordwise dimension

'Mills returned with a briefcase containing the material on microfilm'

of the tank doors, so that they were not interchangeable with those on English and Canadian Mosquitos and made them hard to install. Before production was under way, the plan of using coachwood was abandoned and we used imported birch ply throughout, so the whole modification was unnecessary."

The integrity of glued joints in the Mosquito's wing in the hot and

LEFT: An impressive line of de Havilland Australia-built Mosquito FB40s in service with No 5 Operational Training Unit, RAAF, at Williamstown in New South Wales. In the foreground is A52-62, later converted to PR41 standard and re-serialised as A52-324. VIA HARS





TOP: The fuselage production plant, on the upper floor of a disused mill building in a Sydney suburb, was somewhat primitive. VIA HARS

ABOVE: A row of completed Mosquito FB40 fuselages following delivery to Bankstown. Nearest the camera is A52-43, delivered in November 1944. VIA HARS

humid conditions experienced in and to the north of Australia was of major concern right from the start. Some predicted that the glue would turn to paste, causing catastrophic structural failures.

In response, DHA issued a lengthy, reassuring technical bulletin, but it is doubtful whether the wording inspired complete confidence! The final paragraph said: "It is to be admitted [...] that the durability of this type of construction under the severe climatic conditions prevailing in our tropical areas has not yet been satisfactorily proven. It is not anticipated, however, that any major difficulties will arise which attention to careful maintenance cannot solve. First batches of aircraft from local production will be fabricated using Casein glue; later batches will, however, largely employ Urea Formaldehyde glue of the best proven type, and it is anticipated that such aircraft will be far more resistant to the high humidity conditions pertaining in the tropics."

A site at Bankstown airfield just outside Sydney was chosen for construction of the final assembly building, completed in early 1943. The first Mosquito to get air under its wheels in Australia was a 'pattern' aircraft shipped from Hatfield and flown at Bankstown by Sqn Ldr Bruce 'Tin Leg' Rose, RAAF — who had lost a leg after striking the propeller of a Beaufighter from which he was baling out — on 17 December 1942. It was powered by Rolls-Royce-manufactured Merlins, replaced by Packard Merlins in March 1943.



The enthusiasm, dedication and efforts of the DHA management and staff were rewarded when Wg Cdr Gibson Lee took the first Australian Mosquito, FB40 serial A52-1, into the air from Bankstown on 23 July 1943. It was only 12 months after John Mills had returned from Hatfield. With all major problems seemingly

resolved, 370 examples were ordered by the RAAF. DHA predicted the delivery of 50 by the end of 1943, and a production rate of 50 per month through 1944. Unfortunately, these forecasts proved to be wildly optimistic. Only one aircraft had reached the air force by early 1944, and a grand total of 18 locally produced Mosquitos had been delivered as of the end of that year.

Attempts to ramp up production encountered major obstacles. Among them were sub-contractor delays, faulty materials, a twist in the starboard wing associated with the fuel tank door, a shortage of labour — both skilled and unskilled — at a time when other industries were at full stretch meeting wartime orders, plus production stoppages and aircraft groundings following the structural failure of two Mosquitos.

The first occurred on 19 June 1944 during a demonstration flight at Bankstown involving A52-12, the 12th aircraft off the production line.



ABOVE: Bankstown's final assembly facility, with wings produced by General Motors Holden being mated to fuselages.

VIA HARS

John Mills was the intended passenger, but he relinquished his seat at the last moment to Peter Rockingham, DHA's supply manager. Piloted by Hubert Ross Walker, a test pilot seconded from CAC, the aircraft broke up at low altitude "during pull-out from a high-speed dive", as witnessed and reported by Mills. Both occupants lost their lives.

The wreckage was subject to intensive investigation, focusing, of course, on the glued joints, but Mills concluded: "there had not been any glue joint failure, each fracture showing timber coming away with the glue intact and maximum glue strength had been maintained. We concluded that there had been flutter starting at the wingtip causing tip failure and progressive peeling of the wing surface which continued rapidly."

Merv Waghorn wrote later, "a long cable was sent to Hatfield describing in detail how our wing appeared to have disintegrated and we expected a response expressing criticism of

our competence. To our surprise, the cable in reply was quite short, did not criticise us, and stated that 'we note your wingtip broke up progressively whereas sometimes it comes off in one piece', our first realisation that structural failures of Mosquitos had occurred elsewhere.

"An interim modification was developed to the wingtip attachment comprising a bolt passing vertically through the tip of each spar locking the Bakelite bolt strips to the spar. This diminished the likelihood that a

possibility. It consisted of a 1/16in plywood strip running from the rear spar right around the leading edge and about 1.5in wide, glued to the wing skin and wingtip skin."

There were indeed similar failures elsewhere. No 82 Squadron, RAF arrived in the Burma theatre with training commencing in late 1944. That November, the port wing of Mosquito FBVI HP919 disintegrated on a low-altitude practice bombing mission. Both occupants, Flt Lt A. Parker and navigator Alf Newman,

***"The aircraft broke up at low altitude
"during pull-out from a high-speed dive"***

fluttering wingtip would start peeling off the wing skin but did nothing about the fact that the wingtip was attached to the wing for only about half its chord and hence could still flutter. Later on I introduced a further modification to preclude this

were killed on impact. This was almost certainly the type of failure alluded to by the parent company in its reply to Waghorn's report on the similar Australian mishap.

A major quality deficiency was then discovered on a wing just delivered



ABOVE: Numerous FB40s nearly ready for flight-testing at Bankstown. VIA HARS

BELOW: The completion of the first Mosquito flight in Australia. Pattern aircraft DD664, a MkII, was shipped over from Hatfield and took to the air from Bankstown on 17 December 1942. The pilot, Sqd Ldr Bruce Rose, can be seen descending from the cockpit; just visible at the foot of the ladder is John Mills who is apparently assisting Rose. VIA STEVE MILLS

from GMH, leading to a temporary crisis in relations between the two companies. John Mills recorded: “we discovered that some wings delivered from GMH were defective when wing MM121 was damaged by a crane and, during the repair, it was discovered that there had been faulty fitting of the top spar cap to the spar web. All aircraft were grounded around July/August 1944 for detailed inspections which included samples trepanned from the top skin and windows cut in the front spar to enable the wing/spar glue joint to be checked.”

Merv Waghorn was sent immediately to GMH where, he reported, “I quickly saw that they were not following the correct procedure before gluing the heavy timber cap on the top of the front spar. The proper procedure was to dry-fit it with the surfaces to be glued coated with blue chalk. It then had to be planed by hand until the chalk demonstrated by registering on the spar top that the clearance was small enough to give a

good glue joint. They were just taking the component as it came from one of the sub-contractors, coating it with glue, and whacking it into place.

“I immediately spoke to the man in charge of wing production and told him to stop assembly as he was making unsafe wings. This led to an argument and I was soon wafted into the office of the chief executive, a big, fierce man who made it clear that stopping a GMH production line was a heinous crime, almost unthinkable, and he got very angry. He rang Murray Jones who arranged for John Mills to visit GM to resolve the issue.”



A very tall man, Mills was well known for his amiable and friendly nature, but when required he could call on his commanding presence to assert his viewpoint or requirements. By then, with a year’s experience in dealing with sometimes recalcitrant sub-contractors, he was embroiled in discussions with the GMH chief executive, but the outcome was not in doubt. GMH agreed to Mills and DHA chief inspector Bill Isbister taking up temporary residence at its factory, followed by the permanent positioning there of three DHA inspectors.

Unfortunately, further problems at GMH were uncovered following a second — fatal — structural failure. On 31 January 1945, serial A52-29 broke up while flying from Williamtown, north of Sydney, with the RAAF. Again DHA launched an investigation. It found, “our inspections of glue joints between the top upper skin to front and rear spar booms indicate that wings up to serial

49 may be unsatisfactory and remedial action should be taken before any further flying.”

Between then and May 1945, 31 Mosquitos were inspected, of which only six were declared satisfactory. Enhanced production methods were introduced, but rectification work to the affected aircraft caused further delays to the whole programme.

The first two structural failures related above were both witnessed by a handful of individuals, but a third had a much larger audience. Although the aircraft in question was not DHA-produced, the very public event must have shaken confidence in the structural integrity of the Mosquito.

DHA was contracted in 1945 to assemble 12 Mosquito FBVIs for No 618 Squadron, RAF. One of them, HR576, took off from Bankstown for an air test on 2 May 1945. It was piloted by Flt Lt David Rockford accompanied by LAC Charles Boydell, who was enjoying the privilege of a flight in a Mosquito. Instead of operating over the usual countryside test zones, Rockford headed towards Sydney. At 11.30hrs, both wings separated from the fuselage over the densely populated suburb of Petersham. The wings — each complete with engine — spiralled down. Fortuitously they landed on roads instead of houses, while the fuselage shattered and the cockpit area containing the pilot impacted in the schoolyard of Petersham Girls’ School, just outside two classrooms where 60 students were at lessons. The passenger was thrown out and landed some distance away.

Wreckage examination found no evidence of structural deficiencies. This, coupled with the nature of the failure, led to the finding: “it was strongly



suspected that a too vicious pull-out from a dive had caused disintegration, possibly caused by unauthorised and misjudged aerobatics.”

In late 1944 John Mills, now aged 29, became chief engineer of DHA. He moved to the corporate headquarters, now in the city of Sydney. Travelling via the Qantas ‘double sunrise’ Catalina service across the Indian Ocean, he also made his third visit to Hatfield, where he compared notes on wing manufacture and spent time with Ronald Bishop, the Mosquito’s chief designer, discussing future de Havilland developments. However, Australian Mosquito production was still handicapped by line stoppages and groundings, compounded by changing requirements from the RAAF on the role of the aircraft. Australian-made examples would play only a minor operational role before the end of the war in August 1945.

The first wartime activity by DHA-built Mosquitos was in photo-reconnaissance to the north of Australia. The configuration of 23 such aircraft was changed from FB40 to PR40/41 standard during production and, with No 87 Squadron, they progressively become operational in small numbers from May 1944. These aeroplanes were supplemented in mid-year by 76 imported from British factories, of which 23 were PRXVIs.

DHA Mosquito A52-2 completed nine operational PR sorties in June 1944 covering Java, Borneo and the Philippines, including one long-range return flight of 3,600km (2,235 miles). The first recorded offensive action by a DHA-built FB40 was in March 1945, when A52-526 of No 1 Squadron, flown by Plt Off A. Barras, strafed barges on the New Guinea coast. However, the squadron did not reach full strength until July 1945, so combat missions were few in number.

As for structural durability, in the course of a few weeks of operation



by No 1 Squadron, “the steamy wet conditions in Labuan (Borneo) had a marked effect on Mosquito serviceability due to extreme adverse effects on wing fabric which began to lift, and to plywood which started to swell on some aircraft. As a result, the squadron was ordered back to Australia”. Two No 87 Squadron Mosquitos flew from Labuan in January 1946, “the extreme wet conditions causing undesirable effects similar to those encountered by No 1 Squadron the previous year”. While structural failure was not imminent as a result of these defects, prolonged operation in the tropical climate would obviously have led to serious deterioration not repairable in the field.

These problems were confined to manufacture and operation under wartime conditions. DHA manufactured a total of 212 Mosquitos and the aircraft served with distinction post-war, predominantly on photo-reconnaissance and mapping duties in the relatively dry environment of southern Australia. There were no major structural problems by the time No 87 Squadron recorded the type’s final operational flight in RAAF service in 1953.

DHA’S LEGACY

Post-war, DHA manufactured 190 Vampires between 1949 and 1960, and designed and produced the Drover 10-seat feeder airliner. It was later involved in various sub-contractor programmes until 2000 when the company, now named Hawker de Havilland, was purchased by Boeing. Today HdH is in the forefront of structures technology, manufacturing composite and alloy components for a range of Boeing and Airbus aircraft.

After the Boeing purchase, the entire DHA archives dating back to 1927 were placed in storage with an uncertain future. Fortunately, retired HdH staff recovered the voluminous files, including a complete set of Mosquito drawings. They were transferred to the Historical Aircraft Restoration Society facility at Illawarra airport south of Sydney, where they are being digitised by a team of ex-HdH people and are available for historical research. The drawings are now a valuable source of reference for current and completed Mosquito restorations.


John Mills was appointed chief engineer of British Commonwealth Pacific Airlines (BCPA) when it was founded in 1946. He remained in that post until BCPA amalgamated with Qantas in 1954, becoming engineering production manager and later spending two years with Boeing as Qantas’ resident engineer co-ordinating the production and delivery of the carrier’s first 707. He subsequently occupied other executive roles in Qantas Engineering. Mills died on 30 March 2016, at the age of 101.



TOP: An air-to-air study of A52-1, the first DHA-manufactured Mosquito FB40.
BAE SYSTEMS

BELOW: Mosquito PR41 A52-306 of No 87 Squadron was photographed at Bankstown in 1952. AEROPLANE





MOSQUITO Masterpiece

Mosquito TIII TV959 has come a long way since being a static exhibit with one wing sawn off. This is the story of its return to airworthiness for the Flying Heritage Collection – complete with an exclusive pilot's eye view

WORDS AND PHOTOGRAPHY: GAVIN CONROY

Monday 26 September 2016 was another historic occasion at Ardmore, New Zealand. On that day, the Flying Heritage Collection's de Havilland Mosquito TIII TV959 roared into the sky in the hands of Dave Phillips, following a rebuild that started back in 2011. It increased to three the world's airworthy population of the type.

Following closely behind the Mosquito during that first flight was Spitfire IXT MH367 as chase aircraft, with the author in the rear seat to document the occasion. The Mosquito accelerated quickly and it took some time to catch up. When we finally caught it, we flew line-astern in close formation to inspect the undercarriage and make sure it was up correctly, to check that the gear doors were closed, that there were no oil/glycol leaks, and so on. Following that inspection, Dave — who had Keith Skilling with him in the right-hand seat — performed some stalls, tested different flap configurations and cycled the gear a couple of times while we flew close by to keep an eye on things.

Having spent 30 minutes in the air, Dave returned to Ardmore and finished off with a landing that could only be described as a 'greaser'. It was an impressive feat considering that his last flight in a Mosquito was in early 2013,

at the controls of FB26 KA114 — now with the Military Aviation Museum in Virginia Beach, USA.

A few minor adjustments needed to be made following the first flight. The aeroplane then went on to fly three further times for more testing, and for the images that accompany this story. It was dismantled in late October and shipped to its new home with the Flying Heritage Collection at Paine Field in Everett, Washington State.

TV959's return to the skies took place nearly four years to the day since Mosquito KA114 flew for the first time on 27 September 2012 following restoration by Avspecs and Glyn Powell's team. To have two 'Mossies' flying in such a short space of time must count as one of the most significant triumphs in the warbird world to date.

Some people thought that KA114 would never fly, that it was too difficult a job. Not so, however, for a bunch of Kiwi engineers and American-based warbird owner and collector Jerry Yagen. There looked to be the possibility of a Mosquito flying again before the rebuild of KA114, following many years of research by Glyn Powell, but it took Jerry's backing, along with the trust and friendship he has with Warren Denholm of Avspecs, to finally see a 'Wooden Wonder' being rebuilt to fly.

BELOW: Keith Skilling and Warren Denholm flying Mosquito TIII TV959 during its last post-restoration test flight out of Ardmore. The cameraship was a Yak-3 piloted by Graeme Frew, with the rear canopy removed.





TOP LEFT: Some of the Avspecs team nailing on the outer skin to complete the main part of the wing structure.

TOP RIGHT: The new fuselage for TV959 taking shape in Glyn Powell's facility.

ABOVE LEFT: Arrival of the fuselage at Ardmore on 17 February 2015.

ABOVE RIGHT: The end of July 2015, and it's nearly time to mate the wings to the fuselage.

RIGHT: The completed cockpit, showing well the TIII's seating arrangement and dual controls.

As KA114 was being restored, the engineers had huge challenges to overcome. Jerry Yagen stayed committed, even tracking down components himself as work progressed. Jerry always said that a rebuild like this could only be done in New Zealand due to the multitude of skilled people, their 'never give up' attitude, their 'number eight wire' mentality when it comes to creative problem-solving, and a Civil Aviation Authority that works with restoration teams on projects like this.

The Mosquito is a very complex aircraft that could not be rushed. Not only were these guys re-creating history with KA114, but they were also reverse-engineering components when originals were not available. The

learning curve was huge, which in the end made rebuilding TV959 a more straightforward proposition. Many pieces of the puzzle were joined with KA114, which could be regarded as the 'pioneer' aircraft. When KA114 flew for the first time in 2012 it had taken around eight years from the beginning to the first flight. TV959 took just five, and the next Mosquito won't even need that long.

TV959 was the perfect donor aircraft. It had been on display at the Imperial War Museum in Lambeth for many years, hanging from the ceiling with one wing section cut off to save space, but nearly all the original metalwork was in the airframe. Ownership changed in 1992 from

the IWM to The Fighter Collection, and then during 2003 to the Flying Heritage Collection, who stored it for several years. The FHC commissioned Avspecs to bring TV959 back to airworthy status in 2011. By that stage it was clear that KA114 was going to fly — it was just a matter of when.

Glyn Powell completed all the woodwork on KA114, but on TV959 he built the fuselage while Avspecs completed the wing and the entire fit-out. Glyn had built Mosquito fuselage moulds from scratch many years earlier. He had always wanted to see a Mosquito fly in New Zealand again. Now he has seen two.

So good was TV959's condition that the first thought was to restore the original fuselage with a new wing, but such was the age and state of the wood and glues, which had sat for decades, that it was decided to build a new fuselage from scratch. As work on that got under way, Avspecs was busy completing the wing and restoring many of the parts that came from TV959. It had far more original parts than KA114, so that alone sped up the project. Where possible parts were cleaned, inspected and painted before being put back into the aeroplane. A lot of work was done on both sets of cowlings, with fittings and fixings being refitted.

The fuselage arrived at Avspecs in February 2015. When the fuselage and wing are completed they are joined together for a few days, everything



lined up and foundation work put in place. Both sections are then taken apart again, and over the next few months the fuselage fit-out takes place. The silver dope is added, and once no more can be done to the fuselage it and the wing meet again, this time permanently.

Anyone who has stood next to a Mosquito knows how tall the aircraft stands. Access is difficult, so the next part of the restoration involves the machine being put into a level 'flying' position. It is only when work on the propellers, undercarriage and so on needs to begin that the aircraft is brought down into a conventional ground attitude, standing on its undercarriage.

As TV959 is a dual-control TIII version, the team had difficulty fitting out the instrument panel inside the tight confines of the cockpit, so they came up with the idea of building a custom-made stand. They assembled the entire panel on a work bench before putting everything into the aeroplane. This approach saved a lot of time, not to mention many bumped heads and grazed knees getting in and out of the aircraft. It was just one of many occasions when Avspecs thought 'outside the box' to make the whole process easier, thus reducing time and expense.

All the flying controls and associated equipment were overhauled and reinstated, putting TV959 back into full dual-control configuration. As this was going on, a massive plumbing job was proceeding in the fuselage, along with the engine installation. The Merlins were overhauled by Vintage V12s of Tehachapi, California, while back in New Zealand the complex set of four radiators was built by Replicore in Parua Bay, and the props overhauled by Safe



Air in Blenheim. These companies were involved with the rebirth of KA114, too.

A network of different companies in New Zealand builds significant components for the type, the latest additions being full sets of brand-new exhaust stubs. A remarkable range of skills and experience can be found in this tiny country, to the extent that it must be considered the world leader in Mosquito restoration.



Engine runs began in the middle of August 2016. They ran flawlessly, so that was another big job ticked off. Undercarriage retraction testing and many other pre-flight checks were completed that month, and in

September TV959 was granted its airworthiness certificate following a two-day inspection by the New Zealand Civil Aviation Authority. The aircraft was given the fitting registration ZK-FHC for test-flying in New Zealand.

Dave Phillips made the maiden post-restoration flight of KA114, and had the same honour this time. Beforehand, he spent hours in and out of TV959, preparing for every eventuality. Keith Skilling needs no introduction either. He and Dave shared the testing of KA114 and each flew around 20 hours in that aeroplane, vital experience when the time came to fly another 'Mossie'.

One major surprise was the colour scheme chosen for TV959 during its flight test programme. Warren Denholm confirmed earlier in 2016

ABOVE: The next Mosquito project for Avspecs, FBVI PZ474, having its wing and fuselage trial-mated in mid-October 2016.

BELOW: The No 75 Squadron, RNZAF markings with serial NZ2337 were only worn during the Mosquito's flight-testing in New Zealand.





ABOVE: Overhauled by Vintage V12s in California, the Merlin 25s fire into life on TV959 during August 2016.

that he wanted to add the markings of No 75 Squadron, Royal New Zealand Air Force, to the aircraft. The overall silver dope finish was a close match to the original, and — with the blessing of FHC — Marty Canlon of Tauranga produced the large-format decals. The markings were added about two hours before the aircraft's public roll-out.

So, TV959 now had a real New Zealand connection. The aircraft

world, apart from those coming out of New Zealand.

Contrary to some reports, at the time of writing Avspecs was not working on any other Mosquito rebuilds apart from PZ474. Some sources have suggested that the company is building at least one complete aircraft for UK-based owners — in fact, it may be helping as a parts contractor or providing advice, but that is all. One feels the time has

standards, and able to remain airworthy for decades.

There are several different airframes or parts collections in the UK that would make for perfect donor aircraft, so the opportunity certainly exists. A period of two years is needed to build the wing and fuselage, and another two years (possibly less depending on the donor aeroplane) to fit the airframe out. For anyone able to finance such a project, there is currently no queue after PZ474, so it is the ideal chance to put a plan in place. The sooner the wood work is started the better.

It won't be long before four Mosquitos are flying in North America. In fact, this will probably be the case at some point in 2018. How nice it would be to have one back in UK skies...

'A remarkable range of skills and experience can be found in New Zealand'

depicted was NZ2337, a Mosquito FBVI destroyed in a hangar fire at Ohakea in June 1950. Its code letters were YC-F, which, when viewed on the port side, read F-YC — as close as Warren could get to FHC. It was a nice way to honour one of the most historic and important squadrons in the RNZAF. When the aircraft arrives at its new home, the FHC staff will paint it in its final World War Two-era scheme, so stay tuned in early to mid-2017 to see the end result.

With KA114 and now TV959, two Mosquito restorations from Avspecs are flying in the USA. A third will be completed in 2018, and it is heading to the States as well. Work on this airframe, Mosquito FBVI PZ474, has commenced. The fuselage and wing underwent a trial fitting just a week after TV959 made its last flight in New Zealand. It could be completed and flying within two years.

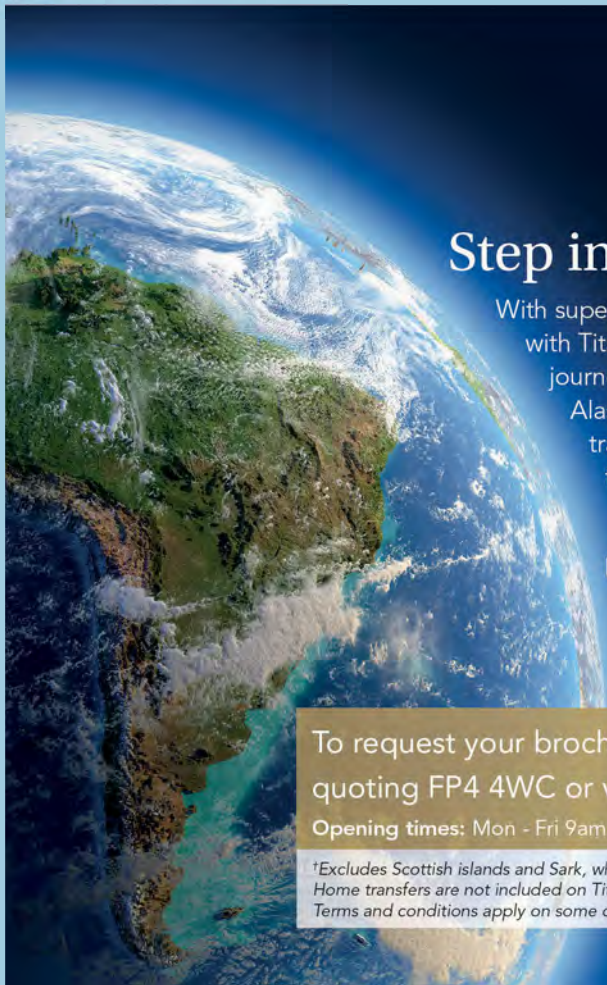
Although other 'Mossies' are being restored to fly, progress has been slow. Apart from the airworthy VR796 in Canada, it will be many years before a further example flies anywhere in the

come for a collector or syndicate to pool the necessary funds to have a Mosquito rebuilt in New Zealand and bring it 'home' to Britain as a finished, flying aircraft built to the highest

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RIGHT: A very satisfied Glyn Powell after TV959's successful maiden post-restoration flight. JILL PHILLIPS





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From the COCKPIT

WORDS: DAVE PHILLIPS

TV959 was the first Mosquito I ever saw in the flesh. It was 1982, and looking at it hanging from the ceiling of the Imperial War Museum in London with one wing sawn off it seemed obvious to me that it would never fly again. I lamented the fact that I would probably never get to see such an attractive and charismatic aircraft in the air.

But life is full of surprises. Fast forward 30 years, and thanks to the efforts and perseverance of Glyn Powell, the entrepreneurial skills of Warren Denholm and his Avspecs team, and the leap of faith taken by Jerry Yagen, not only did I get to see a Mosquito in flight, I did so from the inside. That was Mosquito FB26 KA114, which took to the air in 2012. Fully three years and 364 days later,

I was to repeat this experience with Mosquito TIII TV959.

Keith Skilling and I were lucky enough to be able to share the test-flying of both aircraft. Flying with Keith is always agreeable, for there are few current aviators who have his breadth of expertise with World War One and World War Two aircraft. In particular, his long acquaintance with, and knowledge of, the Merlin engine



ABOVE: A chance to enjoy the Mosquito's superb handling over the lush New Zealand landscape.

— its nuances, sounds and personality — is enlightening and reassuring.

I think we both felt a very strong sense of responsibility not only to the owners of these aircraft, but also to the craftsmen who recreated them, and the classic aircraft community as a whole.

Stewart (ex-Royal Canadian Air Force) in particular was very useful.

George removed much of the threat of the swing on take-off that the Mosquito has something of a reputation for. By using his 'zero-boost' technique — running the

approach made a deep impression. New Zealand has relatively few long runways, but it is a good idea to go and find one of them if you do have to shut an engine down, as the only comprehensive cure for 'low and slow' syndrome is to locate a runway long enough to cater for a 'hot and high' approach.

Further preparation involved consideration of options should any of the systems fail — engine-related, electrical, pneumatic, hydraulic and so forth. We practised raising and lowering the flaps and landing gear with the hydraulic hand pump, a lengthy process and a good substitute for going to the gym. We equipped ourselves with a stand-alone VHF system, a GPS for back-up speed indication, and a chase aircraft — a two-seat Spitfire IX, so as not to spike the Merlin symphony. The Spitfire represented the ultimate in independent air speed indication, if we flew in formation with it. It also acted as the photo ship, so we could prove afterwards that it all really did happen.

'A lot of time was spent in the cockpit to become familiar with the aircraft'

They are such precious creations; the possibility of any harm coming to them did not bear thinking about.

Preparation for the first flight of TV959 was straightforward as we had been through the whole process four years earlier. The most valuable resources then were the veterans who had much time on the Mosquito, and the many pilot report-type articles in back issues of magazines like this one. There was a lot of good advice from these sources, but the counsel of David Ogilvy (ex-RAF, Skyfame and Shuttleworth Collection) and George

engines up to zero boost (30in of manifold pressure on an American aircraft) on the brakes, then immediately going to take-off power upon brake release — symmetrical take-off power is established at the very beginning of the roll, and any subsequent swing is easy to deal with. Touch wood.

David's very lucid discussion on the consequences — frequently fatal — of getting a little low and a little slow on a single-engine



As the aircraft neared completion, a great deal of time was spent in the cockpit to become familiar with it. While the basic control layout is the same as with KA114, there are plenty of differences. The major one, of course, is the dual control fit. The observer's seat in an operational Mosquito is set lower and slightly aft of the pilot's seat, allowing more freedom of movement for both crew members. With the TIII, however, the seats are side-by-side, putting the crew shoulder-to-shoulder in the narrow cockpit. For this reason, the large switching console on the right-hand cockpit wall — housing electrics, radiator flap controls and fuel gauges — has been removed, its contents being redistributed on the instrument panel in front of the right-seat pilot.

I recently read a wartime RAF Mosquito pilot's autobiography in which he mentioned how one of the bigger-built squadron pilots preferred to fly a particular aircraft as he reckoned it had more room. He was rubbished by the rest of the unit until

they checked with a tape measure and found that it was indeed 2in broader at the shoulders than other airframes. It seems that the aircraft built by the London Transport Company were a little wider, presumably due to a slightly imperfect fuselage mould.



The dual control installation on the Mosquito trainer — stick, rudder, throttles, and brakes — is a triumph of engineering, fitting as it does into the very small amount of space available. Climbing aboard is a nightmare as there is almost nowhere to put your feet and knees as you enter the cockpit. By pulling a pin on the base of the right-hand side control column you can decouple it and push it forward to the instrument panel. The only practical value of this is to allow the pilot in the right seat an easier exit while bailing out, as the left-seat pilot can retain pitch control with his still-connected control column.

Starting the engines was a little more complicated with this aircraft as its Merlin 25s have a pressure carburettor. Electric boost pumps are used to prime the engines, but the fuel shut-off valves — awkwardly located on a bulkhead behind both pilots — have to remain closed until the engine fires to avoid flooding the carb. The cockpit is so cramped that you cannot simply reach behind to open the valve. Your arm has to pass over the head of the other occupant, and then down behind the seats to open or close the valve. The best division of labour seems to be to get the right-seat pilot to start the engines, with his easy access to the throttles, magnetos and boost pumps, while his left-seat colleague opens the shut-off valve as soon as the engine starts.

I suspected that pneumatic braking from the right-seat control column on TV959 would be difficult and unreliable since it was an 'add-on', with a long bicycle cable snaking down the control column and disappearing under the instrument

BELOW: Both Dave Phillips and Keith Skilling relished the opportunity to once again fly an Avspecs-restored Mosquito.





ABOVE: Ex-Royal New Zealand Air Force pilot Dave Phillips in the 'hot seat'. Prior to flying TV959, he prepared meticulously for every eventuality.

panel. However, it is every bit as good as from the left-hand side.

TV959's first flight was delayed time and again by poor weather and/or the absence of Keith and I due to work or, in Keith's case, a prior commitment to fly an Albatros D.Va replica over the Western Front in France for a WW1 commemoration. I warned him before he left that quite a high proportion of Albatros pilots who did this in the past did not come back. In fact, his aircraft was subsequently brought down, but not by enemy fire. Fortunately, Keith survived the campaign and was on hand for the Mosquito's first flight in late September.

Taxiing, run-up and take-off were all very similar to '114. Once airborne, '959 needed no trim adjustments at all, and power-off stalling was very benign — a slight nodding in pitch with negligible wing drop. This is worth reflecting upon: a big, hand-built

Likewise, the only technical problems arising were minor teething issues, resolved after one flight. This from an aircraft with eight possibilities for a fluid leak (hydraulic, fuel, oil and two lots of coolant) and brand-new electrical and pneumatic systems. The overall finish is that of very high-quality furniture, such that you only reluctantly climb aboard with your shoes on. If Avspecs ever start making cars, then I want one.



Airborne handling was lively with nice control harmony. Configuring the aircraft for landing, we were again reminded of the colossal drag increase that occurs when the landing gear and flaps are lowered. As a consequence, the final approach is flown with what would be regarded as a cruise power setting in many aircraft.

'Airborne handling was lively with nice control harmony... The test schedule was completed with very little fuss and bother'

wooden aircraft, with a large gyroscope on each wing and a somewhat modest fin and rudder... and, just like its predecessor, it flies hands-off with no trim required and stalls rather like a Cessna 172. I think the guys who built and rigged it deserve an enormous accolade.

It is tempting to leave the final flap selection until late in the approach, as if an engine failed there would be a bit less drag to contend with. However, flap extension causes a very marked nose-up trim change, and if you don't keep up with it the resulting tail-heaviness can be conducive to allowing

the speed to fall — adding to your grief should an engine fail, and perhaps destabilising your approach. Further insurance could be gained by utilising a steeper approach path and a higher threshold crossing height, but this would be uncomfortable at Ardmore airport, Avspecs' home. The 4,000ft runway is adequate but not luxurious for a Mosquito.

Crossing the threshold at 105kt, the throttles are positively closed, turning the props into spoilers, and the aircraft settles onto the main gear with little tendency to bounce and a satisfying exhaust crackle from both engines. Normally — but not always — there is little tendency to swing until the tail drops and aerodynamics reluctantly give way to brakes as the primary 'keep straight' mechanism. Differential braking is then required, but it is virtually impossible to apply exactly the right amount, and a dance begins with rudder and brakes, making corrections to the corrections until you slow to taxi speed.

The air test schedule was completed quickly, with very little fuss and bother. Almost before the engines had cooled, the next project, an ex-RNZAF Mosquito, was wheeled into the workshop for mating of the fuselage with the wings. This third aircraft is — like its two predecessors — destined for a home in the USA. Hopefully the 'production line' will remain open until there are also Mosquitos resident in Europe and the southern hemisphere.



TV959: history at a glance

1945 Built at Leavesden; delivered to RAF on 29 August as TV959

1945-63 Served with various units: in order, No 13 Operational Training Unit, No 266 Squadron, No 54 OTU, No 228 Operational Conversion Unit, No 204 Advanced Flying School, Home Command Examination Unit, Fighter Command Communications Squadron and No 3 Civilian Anti-Aircraft Co-operation Unit

1963-64 Allocated to Imperial War Museum; stored at Exeter

24 June 1964 Transported to RAF Bicester

Many accounts of TV959's history – including that in the news pages of the October 2016 issue of this magazine – have referred to the aircraft as taking part in the making of '633 Squadron', wearing serial MM398 and code letters HT-P. However, Alan Johnson of Air-Britain casts doubt on this. "I think this arises from a magazine report at the time which does not seem to be born out by the facts", he writes.

"As a much younger man I spent some time at Bovingdon in 1963 watching the filming of '633 Squadron' but the only TIII (with its flat fighter-type windscreen) I remember there was TW117, which is now in the museum at Gardermoen, Norway. Likewise, the other ex-No 3 CAACU TIII, RR299/G-ASKH, did not appear in '633 Squadron' as it was flown to Hawarden on 12 July 1963 and did not fly again until 8 September 1964. It did, however, take part in the later filming of 'Mosquito Squadron'.

"I believe that 'MM398/HT-P' was in fact Mosquito TT35 RS715, which was found by Stuart Howe at the MGM Studios [at Borehamwood] in 1973, still wearing those markings. My notes suggest that TV959 remained at Exeter after being allocated to the IWM in 1963 until it left by road for Bicester on 24 June 1964". If any reader can confirm this either way, please do get in touch. *Ben Dunnell*

BELOW: Both of No 3 CAACU's Mosquito TIIIs airborne out of Exeter, TV959 nearest the camera with RR299 leading the break. TV959 was on strength from 1959-63. *AEROPLANE*

1965-89 Displayed in the IWM's main building in the London borough of Lambeth

1989-92 Stored by IWM at Duxford

1992 Purchased by The Fighter Collection as potential restoration project

2003 Sold to the Flying Heritage Collection, but stored until 2011

2011 Arrived at Avspecs for rebuild

26 September 2016 Flew for the first time following rebuild

November 2016 Shipped to the Flying Heritage Collection in Seattle, Washington



ABOVE: On display at the IWM at Lambeth, sans starboard wing for space reasons. *AEROPLANE*

