13 IN-DEPTH PAGES

A flight of No 12 Squadron, Royal Australian Air Force Vengeances flying from Merauke, Dutch New Guinea, on 23 December 1943. RAAF MUSEUM ARCHIVE

VULTEE VENGEANCE

WORDS: JAMES KIGHTLY

Intended for the RAF, Northrop-built Vengeance Ia EZ856 was diverted to the US Army Air Forces, but retained its RAF camouflage and serial. CHRIS SANDHAM-BAILEY

How Vultee built the closest thing there was to an American 'Stuka'

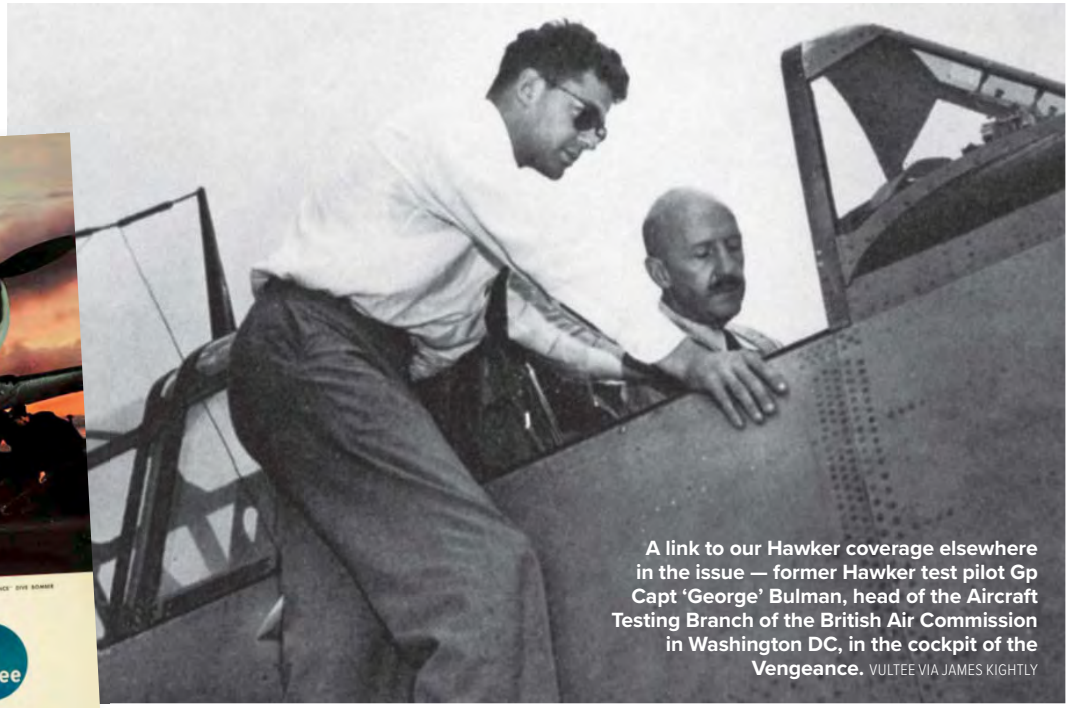
The first Vengeance was AF745, soon painted in RAF camouflage. KEY COLLECTION

The V-72 Vengeance dive-bomber was developed independently by Vultee without any American orders. It was intended originally for France, which was invaded before any were supplied. Flown by the British Commonwealth, France, Brazil and the USA, it was remarkable that none of these customers *wanted* dive-bombers, and its use was limited by doctrinal inflexibility. Nevertheless, on the rare occasions when it was employed in that role, ground troops found it the best at cracking enemy defences.

The Vultee Aircraft Company became a separate concern in November 1939 after several years as a subsidiary business, latterly when Gerard 'Jerry' Vultee was in partnership with engineer and test pilot Vance Breeze within the Vultee Aircraft Division of the Airplane Development Corporation at Downey, California. But Jerry Vultee did not to live to see his name appear on an independent company. On 29 January 1938, the 38-year-old Jerry and his wife Sylvia Parker were killed in the crash of his Stinson SR9C, NC17159, which he was flying in a snowstorm near Sedona, Arizona. He was returning to California after trying to sell V-11 aircraft to the US Army Air Corps. Donald P. Smith, vice-president of the company, wrote for *Time*, "Caught in a local snow-storm and blizzard with no training in blind or instrument flying, he was unable to find his way out."

Jerry Vultee was succeeded by Richard Palmer as president and general manager. Palmer had started in aircraft design as a draughtsman for Lockheed in 1929, but was laid off after cutbacks due to the depression, having risen to become Lockheed's chief engineer.

> **"The Ministry of Aircraft Production bypassed RAF requirements, taking over French orders"**



A link to our Hawker coverage elsewhere in the issue — former Hawker test pilot Gp Capt 'George' Bulman, head of the Aircraft Testing Branch of the British Air Commission in Washington DC, in the cockpit of the Vengeance. VULTEE VIA JAMES KIGHTLY

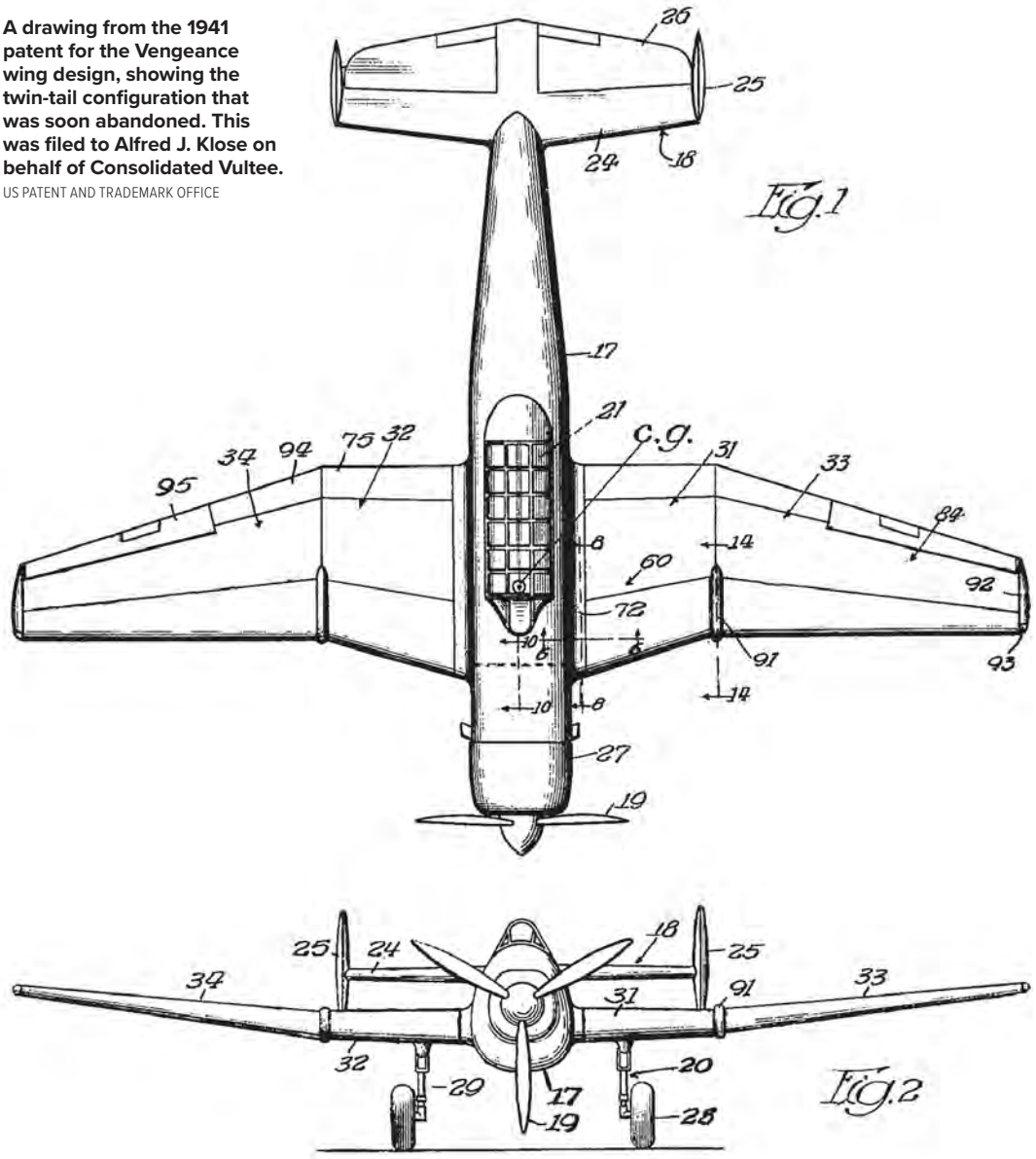
He got a job with an earlier subsidiary incarnation of Vultee as its chief engineer, but was hired by Howard Hughes to further develop (with Glenn Odekirk) the exceptional Hughes H-1 racer, before returning to Vultee. In November 1941, Vultee acquired majority ownership of the Consolidated Aircraft Corporation, and on 17 March 1943 the two companies were fully merged, becoming the Consolidated Vultee Aircraft Corporation with headquarters in San Diego.

European interest

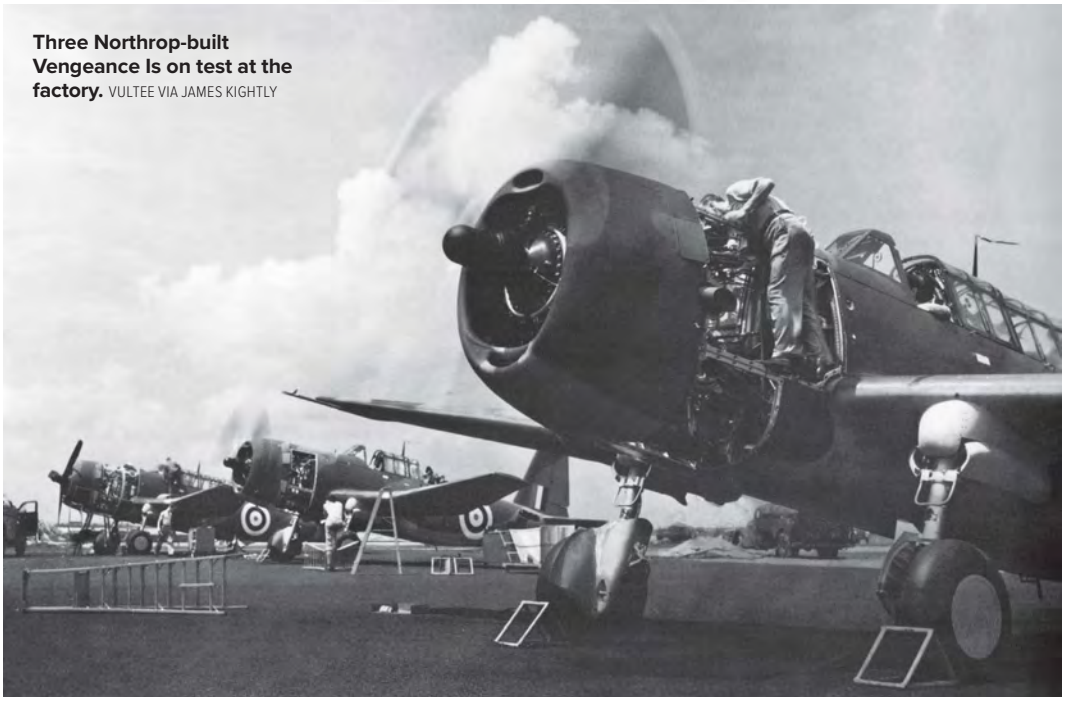
In 1939 and 1940 France and Britain were shopping in America for military aeroplanes, and US manufacturers were open for business. A French purchasing commission led by Col Paul Jacquin was looking for aircraft for the Armée de l'Air, and Vultee had experience building the V-11 family of attack bombers, predominantly for export to the Soviet Union, China, Brazil and Turkey. It was asked to develop a new dive-bomber, and Vultee's design team led by Palmer offered the V-72 powered by the Wright R-2600 Cyclone. France ordered 300, but was invaded by Germany before any flew. The stunning efficiency of the Junkers Ju 87 'Stuka' as a critical Blitzkrieg tool to break defences was a hard lesson for those on the receiving end. After the collapse of France, and due to pressure from Lord Beaverbrook, the UK's Ministry of Aircraft Production bypassed RAF requirements, taking over and extending French orders for the V-72.

The first V-72, c/n 4101, was rolled out from the factory at Downey with just RAF serial AF745 painted on, but was soon camouflaged into the US equivalents of standard RAF green, brown and sky. As far as can be ascertained, its maiden flight took place in July 1941, rather than at the end of March as often stated. Although there was no prototype as such, few changes were needed, though the second example, AF746, was apparently built with a

A drawing from the 1941 patent for the Vengeance wing design, showing the twin-tail configuration that was soon abandoned. This was filed to Alfred J. Klose on behalf of Consolidated Vultee. US PATENT AND TRADEMARK OFFICE



Three Northrop-built Vengeance Is on test at the factory. VULTEE VIA JAMES KIGHTLY



The Vengeance production line in Nashville, Tennessee had been built as a Stinson plant. LIBRARY OF CONGRESS

twin tail — similar to the early Ju 87s. Flexibility concerns during taxi tests by Vance Breeze meant it was quickly rebuilt with a conventional empennage.

By this time the type had been named Vengeance by Vultee, not by the British. Britain had placed orders for 200 from Vultee, to be built in a new factory originally constructed for subsidiary company Stinson in Nashville, Tennessee, and another 200 from Northrop Aircraft. Due to minor equipment and servicing differences, confusingly, the Vultee machines were designated as the MkII and the Northrop examples as the MkI. The first Northrop-built Vengeance, AN838, flew on 30 November 1941. By then a US order for 200 more had been placed, part of the new Lend-Lease arrangement for British use, and designated as the MkIa (or A-31-NO by Northrop). Vultee-built aeroplanes built in a second batch under the same requirement were designated as the MkIII, or A-31-VN. The V-72 had gained the Army Air Forces' A-31 designation as part of the Lend-Lease requirements, the US Army having minimal interest in dive-bombers.

Production proved slow. In March 1942 an allocation and delivery progress report included mention of just 12 aircraft having been accepted by the factory as of 10 March.

DATAFILE VENGEANCE MODELS

Model	Number built	Details
MkI	200	V-72 licence-built by Northrop and ordered directly for Britain, powered by 1,600hp R-2600-A5B
MkIa	200	Northrop-built aircraft purchased under Lend-Lease, powered by 1,600hp R-2600-19, otherwise similar to Vengeance I. USAAF designation A-31-NO
MkII	501	Vultee-built aircraft purchased directly by Britain. Small differences from Vengeance I
MkIII	200	Vultee-built Lend-Lease aircraft. Similar to MkIa. USAAF designation A-31-VN
MkIV	579	A-35B supplied under Lend-Lease to RAF and RAAF, with 4° wing incidence. 458 supplied to RAF and 121 to RAAF
TTIV	Converted from MkIV	Target tug modification after delivery. Armament removed and winch and drogue equipment fitted
A-35A	99	Manufacturer's designation V-88. Redesigned version for AAF and Lend-Lease, with 4° wing incidence. Powered by 1,700hp R-2600-13 or -8. Four forward-firing .50-calibre M2 Browning machine guns and one .50 for rear cockpit
A-35B	831	Modified A-35A with six forward-firing .50 machine guns
TBV-1 Georgia	0	Proposed US Navy A-35B — cancelled

America on board

After the Pearl Harbor attack, the AAF suddenly requisitioned large numbers of types intended for foreign customers, to increase its combat aircraft strength. The A-31 was among them. When the first examples were taken over, US stars were simply added over the RAF roundels, some even carrying American and British serial numbers simultaneously.

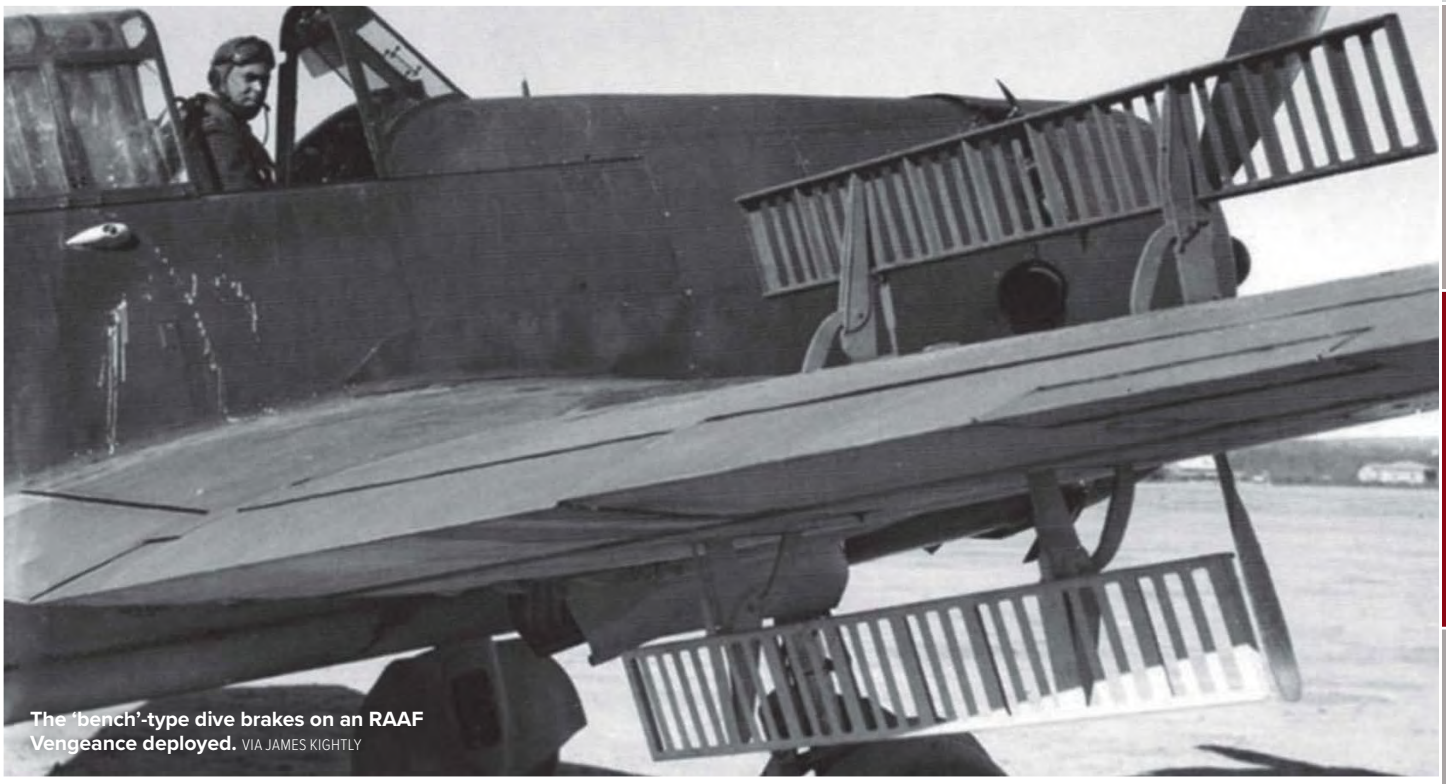
American adoption of the type, further to British and Commonwealth experience, resulted in a number of changes, together with new designations: A-35 for the US and MkIV for Britain and the Commonwealth. Most notable was the incorporation of wing incidence (previously set at zero) on the recommendation of an American test pilot. This improved the view over the nose as the aircraft's angle of attack became more conventional, but at a cost to dive bombing accuracy. The .30-calibre guns were upgraded to .50 — four in the wings with 425 rounds per gun — while the gunner had a single .50 with 400 rounds. The radio controls were rearranged for the pilot, rather than the gunner's use. Designated as the A-35A, 99 were built.

Following these revisions, the armament was increased to six .50 wing guns, and the fuel system was improved with a mechanical (engine-driven) fuel pump being installed. Minor changes to the tail surfaces reduced the force required for dive pull-outs. A 1,700hp Wright R-2600-13 or -8 was fitted, giving a slight increase in power. This became the A-35B, 831 being built. Of 562 allocated to the RAF as the Vengeance IV, 104 were Series 1 aircraft with the -13 engine and 458 Series 2s with the -8 powerplant. Another 141 Vengeance IVs went to the Royal Australian Air Force, but all efforts to improve the type were wasted as none were used as dive-bombers, the majority of MkIVs being converted to target tugs. These had their armament removed, and windmill-powered winch drogue equipment and tail protection fitted.

Northrop completed its production of Vengeances in November 1943, while the last example to come off Vultee's Nashville line did so in May 1944. Latterly, though there was little need for the aircraft, factories were kept building Vengeances to keep their workforces engaged until the next production type came along. In February 1943, Maj Gen Davenport Johnson, the AAF's director of military requirements, declared the A-31 to be "a shining example of the waste of material, man-power, and time in the production of an airplane which this office has tried to eliminate for several months."

TECHNICAL DETAILS

It may not have looked like it, but the Vengeance was actually an innovative design



The 'bench'-type dive brakes on an RAAF Vengeance deployed. VIA JAMES KIGHTLY

The Vengeance was a two-seat, mid-wing, cantilever monoplane dive-bomber of all-metal, stressed-skin, semi-monocoque construction. It had an internal fuselage bomb bay, fully enclosed with longitudinally double-hinged and hydraulically operated bomb doors. Two bomb crutches swung the bombs clear of the propeller arc. Wing racks could also be fitted. The large fuselage was of roughly oval cross-section. Throughout all production variants, it was powered by various models of the 14-cylinder double-row Wright R-2600 Cyclone air-cooled, geared and supercharged radial engine, with a Hamilton Standard Hydromatic three-bladed constant-speed airscrew. The engine was mounted on welded steel tube engine bearers, and the cowl equipped with pilot-controlled cooling gills.

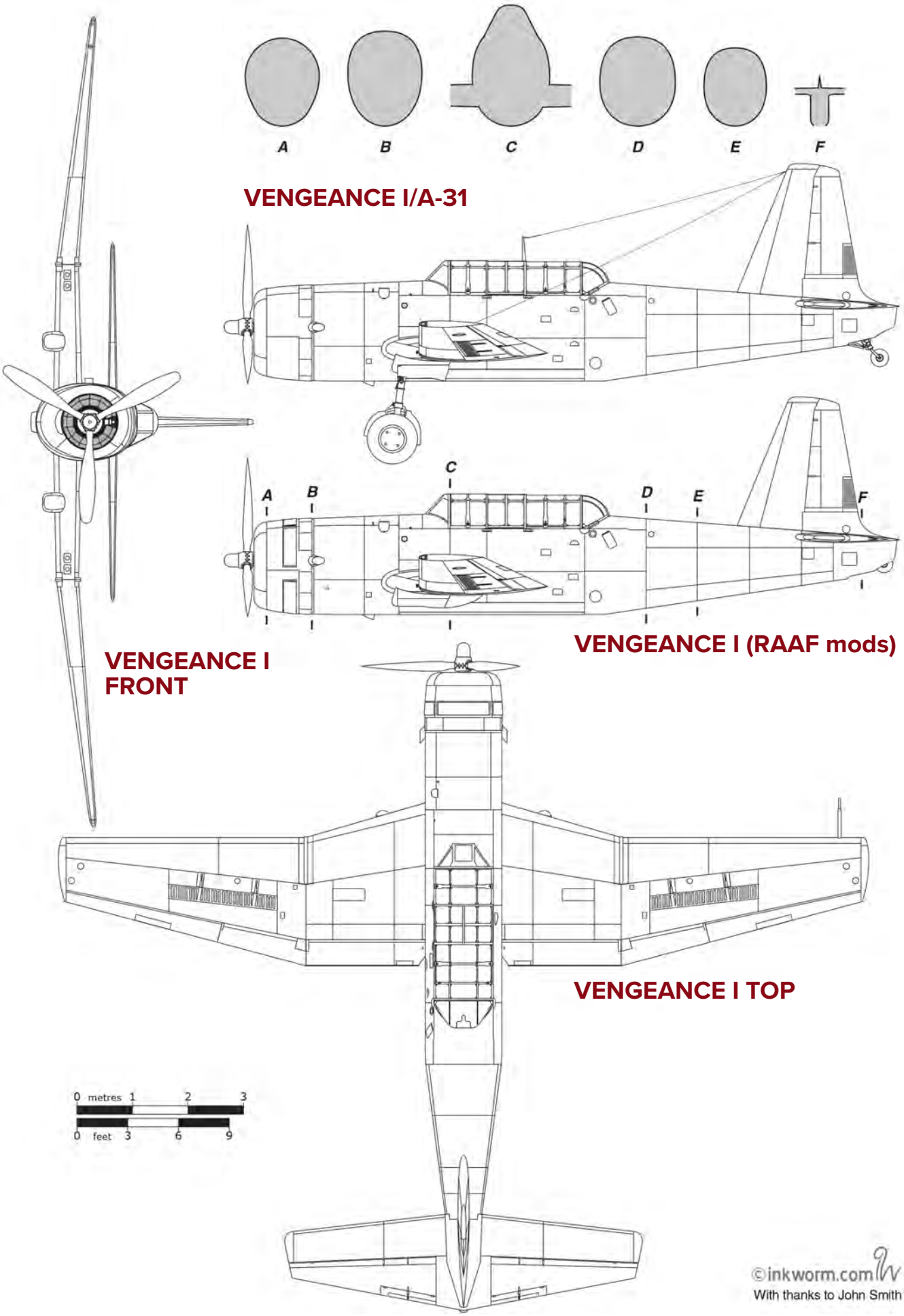
The wing was set at 0° of incidence, meaning the aircraft was able to be aimed directly at the target in a dive. A compromise effect was that it flew notably nose-high, restricting the forward view. This was changed to 4° incidence in the A-35/Vengeance IV. The Vengeance's unusual wing planform — sometimes incorrectly explained as a centre of gravity 'fix' — was actually an innovative design. This plan view gave the impression of an inverted gullwing, though only the outer sections had conventional dihedral. Linked 'bench seat'-type dive brakes were fitted under and above the outer panels of the wings, while the hydraulically operated undercarriage retracted backwards, twisting through 90° into wing recesses. The retracted legs were enclosed inside external fairings.

The expansive tandem two-seat crew positions were enclosed by a long 'glasshouse' canopy, the pilot also having a floor viewing port through the bomb bay. The observer's position featured limited dual controls and instrumentation, a radio and a flexible gun mounting with small armour plates on the gun mount. The observer's seat was fixed facing aft on the A-35/MkIV, having been rotatable in earlier models. The large, angular fin and rudder was set forward to the tapered tailplane, with a semi-retractable tailwheel at the very end of the fuselage. Tail control surfaces were fabric-covered, and the ailerons and conventional, slotted flaps metal-skinned. Trim tabs were fitted to the rudder, port elevator and both ailerons, with spring tabs adapted on the final model.

SPECIFICATIONS: VENGEANCE I

POWERPLANT	One Wright R-2600-A5B-5 Twin Cyclone, 1,700hp	
DIMENSIONS	Span: Length: Height:	48ft (14.63m) 39ft 6in (12m) 13ft 7in (4.13)
WEIGHTS	Loaded:	12,480lb (5,661kg)
PERFORMANCE	Maximum speed: Cruising speed: Service ceiling: Range:	279mph (449km/h) 250mph (402km/h) 20,000ft (6,000m) 1,200 miles (1,931km)
ARMAMENT	Four 0.30in-calibre guns in wings and twin 0.30in-calibre guns in rear cockpit; bomb load 2,000lb (907kg)	

The spacious cockpit of an RAF Vengeance pictured post-war at No 307 Maintenance Unit in Lahore, with Cpl John Parr at the controls. GEORGE WOLSELEY


A
B
C
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VENGEANCE I/A-31
A
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VENGEANCE I (RAAF mods)
VENGEANCE I FRONT
VENGEANCE I TOP
0 metres 1 2 3
0 feet 3 6 9
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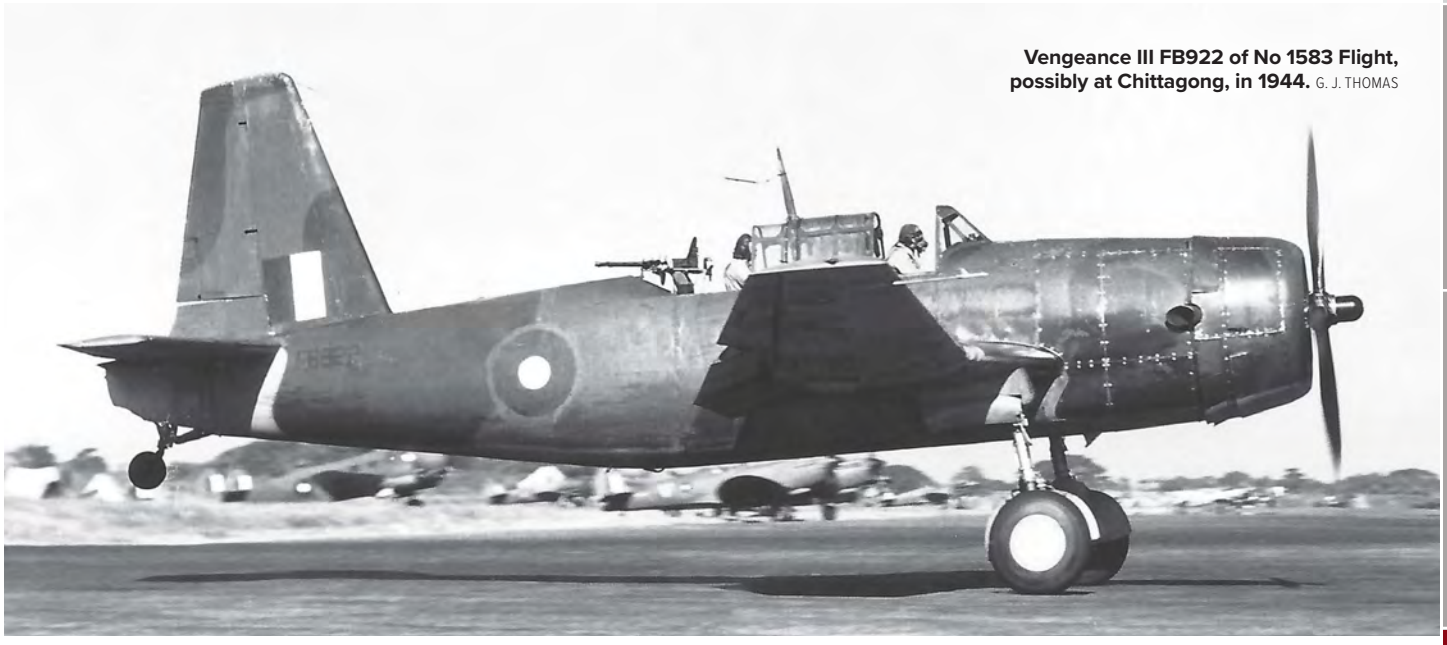
With thanks to John Smith

The Vengeance was a good dive-bomber — but senior officers didn't want to use it



Vengeance III FB922 of No 1583 Flight, possibly at Chittagong, in 1944. G. J. THOMAS

Britain

By the time the Vengeance was ready for operations with the RAF it was decided it could best be used to advantage in the Far East, ultimately against difficult jungle targets in Burma. Several ex-Bristol Blenheim squadrons — a couple already having faced the Japanese, others arriving later from the Mediterranean — were selected and deployed to India to work up.

The first RAF squadrons on type, Nos 82 (United Provinces) and 110 (Hyderabad) Squadrons, replaced their Blenheims with Vengeances in October 1942. Both stationed at Cholavaram, Madras Presidency, they undertook anti-submarine patrols over the Bay of Bengal until being deployed to front-line duties. Slow deliveries initially limited each unit to eight aircraft while they worked up at Quetta, Balochistan and Cholavaram. After training, an average pilot in a high dive — rather than a shallow dive or at low level — could drop two internally carried 500lb and two wing-mounted 250lb bombs within about 250 yards. Unlike a fighter-bomber, they had sufficient penetration to blast any deep bunker. In open country, strafing targets of opportunity on the run-out also became routine.

No 110 Squadron's first dive-bombing missions were flown on 19 March 1943 against a Japanese headquarters at Htizwe, Burma. It became clear that the flexibly mounted American .30-calibre machine guns jammed frequently, and the units requested a switch to well-proven .303 Brownings instead, these being delivered for each unit in April. The use of American-calibre guns in these British-operated aircraft seems remarkable, but illustrates how problematic reliable supply was. The Vengeances were never to face attack by enemy fighters in the air, but strafing at their Dohazari base on 23 March caused minor damage to two aircraft.

> "An average pilot in a high dive could drop two 500lb and two 250lb bombs within about 250 yards"

Nos 45 and 82 Squadrons joined No 110 Squadron in March 1943 as part of the India-based No 168 Wing, developing close support techniques with the army. Meanwhile, No 84 Squadron moved to Ceylon to counter a Japanese invasion threat, and 45 operated from Salbani, West Bengal. 84 had finally received Vengeances at Quetta in December 1942, having waited six months since the withdrawal of its Blenheims in June. On 12 May, 110 moved to Chittagong, 82 joining it at the month's end.

The onset of the monsoon season limited activity, and cloud made shallow dive-bombing runs essential, if less accurate. A photo-reconnaissance Spitfire force-landed in Japanese territory at Alethangyow landing ground and was destroyed by a Vengeance raid to stop the aircraft falling into enemy hands. Vengeances were heavily deployed in support of the second Arakan campaign during 1943-44, now wearing the new two-blue South-East Asia Command roundels.

For the first time, 'boxes' of 12 VDBs — the nickname used locally by the units for Vengeance dive-bombers — attacked Japanese strongpoints from October 1943 onwards, escorted by Hawker Hurricanes. Flt Sgt R. G. Holding's Vengeance was lost on the 17th, believed hit by ground fire; he and Flt Sgt J. W. C. Barnard were killed. The 250lb and 500lb general-purpose bombs were augmented by 500lb NITI (nose instantaneous, tail instantaneous) bombs fitted with an extension rod for maximum above-ground blast and fragmentation in the jungle. Vengeances also acted as pathfinders for Wellingtons dropping 4,000lb high-explosive bombs.

Minor losses increased, one aircraft being damaged on the ground during a Japanese air raid at Kumbhirgram on 11 November, while a No 45 Squadron example was hit by ground fire two days later, the crew surviving. One aircraft was hit by enemy fire during a dive-bombing raid against the Japanese at Akyab (Sittwe) on 17 December, causing one undercarriage leg to jam in

Sqn Ldr Gill and Flt Lt Hawke in No 84 Squadron Vengeance I AP137 over Jaffna on 29 May 1943. A. P. GILL

the retracted position while the other refused to retract. The crew decided to bail out, doing so successfully. A Vengeance pilot was killed on 2 January 1944 after he bailed out when his engine caught fire en route to a target, though overall serviceability matched other types, despite printed claims to the contrary.

Meanwhile, on the Arakan front No 82 Squadron was attacking the Akyab port facilities up to three times a day. On 15 December 1943 Flt Lt Metherill's Vengeance caught fire, crashed and blew up, killing both crew. As the Japanese were pushed back, No 8 Squadron, Indian Air Force joined the fight. Up to 24 Vengeances would be dispatched on a mission, with as many as 50 sorties a day. Heavily dug-in Japanese troops at Razabil were targeted during 26 January 1944's Operation 'Wallop' by a combination of aircraft using 145,250lb of bombs: 12 Vengeances from No 82 Squadron marked the objective, which was attacked in turn by 12 AAF B-24 Liberators, 10 B-25 Mitchells, four more B-24s and finally 12 further Vengeances from No 8 Squadron, IAF. Notably, the B-24s achieved 50 per cent hits on the 1,000 by 600-yard target area, the B-25s 70 per cent and the Vengeances 100 per cent. Many Japanese still survived by retreating to the deepest bunkers.

The Japanese 'Ha-Go' tank attack in the Arakan area on 3 January 1944 was blunted by the now seasoned Allied forces. No 82 Squadron flew 37 formation attacks for the advancing army in February, but at a cost. On 9 March two VDBs collided, the tail of one being severed and one of the two crews killed. Shortly afterwards there were two separate forced landings with the death of one crew. No 45 Squadron was withdrawn at the end of January to convert to Mosquito FBVIs, and No 84 Squadron was deployed to blunt the next Japanese attack. It lost one Vengeance, flown by WOs Owen A. Keech (an American) and E. R. Watkins, when it blew up during a dive on target.

In April, No 110 Squadron flew 55 individual strikes in 542 sorties, dropping 703,000lb of bombs — 2,319 in total. Close co-operation with the 14th Army was demonstrated in striking a well-fortified hill at Buthidaung. After a two-hour shelling, six-aircraft waves of Vengeances attacked. The last wave did not release its bombs, so the soldiers were able to attack before the Japanese defenders were ready.

DATAFILE

Painted canary yellow, a 721 Squadron Vengeance TTIV flies around Hong Kong during 1946. WWW.ROYALNAVYRESEARCHARCHIVE.ORG.UK

FIGHTING THE MOSQUITOS

Perhaps the oddest Vengeance use was by a detachment from No 110 Squadron in May 1944, recalled to India from the Burma fighting after a rest and re-equipment with the Vengeance IV. Two groups of Vengeances were sent to Takoradi on Africa's Gold Coast to test anti-malarial mosquito spraying. Due to serviceability issues, most of the aircraft dropped out en route, though no crews were injured. Eventually the 11 Vengeances reassembled to undertake the trials. The DDT and oil mix was organised by the Porton Detachment from the Chemical Defence Experimental Station at Porton Down, Wiltshire. The Vengeances were not ideal, having to fly nose-high and above 220mph. While the trials were judged successful, the number of mosquitoes killed was not as high as had been hoped, and the unit was shut down.

However, this was not the end of the type's employment for this purpose. In Hong Kong during 1946, the Royal Navy's 721 Squadron used three ex-RAAF Vengeance target tugs with RN Mobile Malaria Hygiene Unit No 1 to eradicate a local mosquito infestation.

its final sorties on 19 May 1944, No 110 Squadron following suit on 1 June. The last Vengeance operations over Burma were carried out by No 84 Squadron on 16 July 1944 against a dump.

Fundamentally, the RAF high command was implacably opposed to the dive-bomber concept. According to dive-bomber expert Peter C. Smith, "the British Air Ministry had resolutely set their collective faces against the concept in any shape, manner or form, and had fiercely opposed the purchase and use of the Vengeance". Official accounts even suppressed unit successes because they did not fit with air force doctrine.

> **"Overall serviceability matched other types, despite printed claims to the contrary"**

As types like the Republic Thunderbolt became available, the Vengeance became surplus to requirements. The P-47 required only one pilot and was able to strafe and self-escort, offsetting the loss of accuracy compared with the Vengeance. The onset of the monsoon season also prevented high-altitude dive run-ins. No 82 Squadron flew

By the time the majority of Lend-Lease examples were being delivered, largely the ultimate Vengeance IV, the type had been withdrawn from front-line use. Most MkIVs were converted for target-towing duties in the UK and overseas under the designation Vengeance TTIV, with all armament removed. Target-tug units that flew the Vengeance included Nos 288, 289, 291, 567, 577, 587, 595, 631, 667, 679, 691 and 695 Squadrons, RAF, as well as 721, 733 and 791 Squadrons of the Royal Navy's Fleet Air Arm.

India

In mid 1942, the Indian Air Force had only four squadrons equipped with Westland Lysanders and Hawker Audaxes, together with five coastal defence flights flying obsolete types. As the allies geared up, some existing units were to be re-equipped with Hurricanes, while in December 1942 the coastal defence flights were disbanded and their personnel transferred to the newly established Nos 6, 7 and 8 Squadrons, with 7 and 8 getting Vengeances.

No 7 Squadron was formed at Vizagapatam under Sqn Ldr Hem Chaudhuri. Training at Bhopal and Campbellpur (now Attock, Pakistan) included high and low-level bombing, and dive-bombing techniques with dummy and live bombs. Gunnery was undertaken against air and ground targets. The squadron's first operational sortie, over Waziristan, was carried out from Miranshah on 3 December 1943 by Fg Off K. L. Bhatia, followed by another on the 21st, the target being a mountainside cave. Further missions were flown against the villages of Charkane and Dhammkani on 31 January 1944, punitive attacks on locations where the residents had already been advised to evacuate. That March, the unit transferred to Uderbund airstrip, 12 miles from Kumbhirgram, for deployment on the Burma front. During this move, on the 19th, a formation heading to Delhi flew into a dust storm, and three aircraft were lost along with four aircrew. A tragic ground mishap on 15 March had killed seven crew

ABOVE LEFT TO RIGHT: Getting airborne from Amarda Road on 20 May 1944 is Indian Air Force Vengeance I AP114; conditions on some of the forward airfields from which Indian Vengeances operated were decidedly primitive. KEY COLLECTION

members when a 500lb bomb exploded during rearming.

The first strike by the squadron as a whole was on 28 March 1944, led by Chaudhuri against a target on the Chindwin river. Two days later, as the battle for Imphal and Kohima was gearing up, it mounted a 12-aircraft sortie, alongside the RAF's major air operation to reinforce and supply the Imphal valley. April saw 344 sorties, one Vengeance failing to return in overcast visibility. The observer, Fg Off J. B. Dordi — who had bailed out on the pilot's instruction — returned two days later, having trekked through jungle to an army post. No trace of pilot E. H. Dadabhoy or the aircraft was ever found.

Operations continued until the monsoon struck in May and rendered operations nigh on impossible. Remarkably, the squadron averaged 16 sorties a day whenever it could fly. The Manipur river bridge was damaged on 25 May, while another accident occurred on 30 May when a Vengeance flown by Fg Off Engineer attempted to formate with some AAF B-25s and was shot at, killing air gunner Sgt Ball instantly.

Prior to its withdrawal from the front line on 11 June, the squadron managed 108 more missions. Sqn Ldr P. C. Lal took over command before the unit moved to Chara, where it received Vengeance IIIs. The new MkIIIs saw no action — only involvement in army co-operation exercises — before the squadron's personnel went to Peshawar on 16 November to convert to Hurricanes, leaving the Vengeances at Allahabad. During the 18 months that No 7 Squadron operated the type, 15 Vengeances were lost, four of them on operations.

No 8 Squadron was formed with personnel from the disbanded No 5 Coastal Defence Flight at Trichinopoly in December 1942, the first aircrew being allocated during March 1943. Unlike No 7 Squadron, a large number of pilots were newly commissioned from training with little flying experience. The commander, Sqn Ldr Niranjan Prasad, was an Indian Army officer seconded to the air force. He had operational experience on Lysanders in the first Burma campaign. Having trained at Chara — with, in December, a number of RAF, Royal Canadian Air Force and other Commonwealth aircrew posted to the squadron — 8 was deployed to the Burma front, at Double Moorings near Chittagong.

> **"Remarkably, No 7 Squadron, IAF averaged 16 sorties a day whenever it could fly"**

The initial operation was mounted on 15 December 1943, when a formation of six Vengeances, each with a 1,000lb bomb load, attacked Japanese lines of communications at Apakuwa. The aircraft were manned by three Indian (including the CO) and three Commonwealth crews. As recalled by one Indian veteran of the squadron, C. G. I. Phillips, "Niranjan Prasad said he always wanted to lead an Indian squadron into action first."

The pattern continued for subsequent missions, sometimes with as many as eight aircraft operating daily. On occasion, such as the aforementioned Operation 'Wallop' on 26 January 1944, the Indian Vengeances were part of a complex attack with RAF Vengeances and AAF B-25s and B-24s. In January, the squadron flew 217 operations, followed by 270 in February. It also moved to a strip at Mambur.

On 24 March 1943 the CO, Prasad, was abruptly posted out to Air HQ, with rumours of a strained relationship between him and his RAF flight commander. The operations record book notes, "One could see [a] gloomy atmosphere all around the camp". Three days later New Zealander Sqn Ldr I. R. A. Sutherland DFC arrived to assume command, but tension between the RAF and Indian personnel was noted by an Indian airman, T. J. Thomas, in his memoirs: "The atmosphere in the Squadron was not all that good. There was intense anti-British feeling... The turmoil in Indian politics kept this hatred alive. By this time a New Zealander took over the command of the squadron and we had as Adjutant a Bengali [flying officer]. They were at loggerheads, we knew. Though no love was lost between the RAF and IAF elements, when it came to a question of keeping the aircraft flying, both elements put in their best."

In March the squadron dropped nearly 189,000lb of bombs during 222 sorties. The squadron changed its bomb fusing practice, mixing impact fuses with various delayed-action fuses, to cause maximum disruption at the target after bombing. Furthermore, these were delivered in a pattern pre-arranged with the army units being supported.

The squadron suffered its first — and only — operational loss on 16 May 1944, when Fg Off H. E. Dougherty and Sgt Khan failed to pull out of an attack run and were killed. The May monsoon affected its efforts and only 209 hours were flown, while in June the Vengeance Ias and IIs were exchanged for MkIIIs. The combination of the conversion and the monsoon caused operations to tail off until the unit was withdrawn in the first week of July. It went to Samungli in the North-West Frontier province and was earmarked for Spitfire conversion, the first Indian unit to do so. Moved to Amarda Road on 15 October, the Vengeances were handed over to No 309 Maintenance Unit in Jodhpur.

As a codicil, in August 1945 the Spitfire-equipped unit undertook some of the last dive-bombing attacks of the war against hold-out Japanese troops in the Sittang area, the squadron diary noting, "Probably these good results can be attributed to the tradition of this squadron being originally a 'Dive-

Bomber' squadron — the spirit of the Vengeance still lingers!"

Several other RAF and Indian Air Force establishments in India operated Vengeances. These included No 320 MU at Drigh Road, No 152 Operational Training Unit in Peshawar (later No 151 OTU), No 22 Anti-Aircraft Co-operation Unit, IAF (later No 1 Target Towing Flight), No 1331 Conversion Unit, No 1340 Special Duties Flight, and Nos 1579, 1580, 1581 and 1582 Flights. The Air Fighting Training Unit at Amarda Road and Nos 225, 226 and 227 Group Communication Flights had Vengeances on strength.

Australia

When the Japanese attacked across the Pacific in December 1941, Australia was caught with no fighter aircraft at all and mostly obsolete bombers. The inadequate numbers of the few modern types, such as the Lockheed Hudson in Malaya, were quickly overwhelmed. The very obvious efficacy of German Ju 87s in the Mediterranean was evident to the Australians there, and the shock of Japanese navy and army dive-bombers showed they were a weapon to have, but once again air force doctrine was set firmly against them.

Australia had ordered Brewster Bermudas (and Curtiss A-25 Shrikes, the US Army's version of the SB2C Helldiver), but in an agreement with the British during October 1941 the RAAF took over 297 Vengeances from RAF orders instead, at a unit price of A£90,000. Ultimately, 400 Vengeances were ordered for Australia. In May 1942 the first five were erected at Bankstown, New South Wales, assisted by Vultee staff, but desperate pleas for more went unfulfilled as the Americans diverted production to their own needs. Further examples did not arrive until April 1943, when the immediate threat of invasion had passed.

Nos 2 and 4 Operational Training Units converted crews to type, and two US Navy pilots were attached to advise on dive-bomber tactics. No 12 Squadron was the first RAAF Vengeance unit in action, initially on shipping patrols off the Northern Territory and later Queensland, and on 18 June 1943 undertaking an operation against Selaru island in the occupied Netherlands East Indies.

That August, Lt Gen George Kenney, commander of the Allied Air Forces in the South-West Pacific, requested the RAAF dispatch a squadron of dive-bombers to New Guinea for use against pinpoint targets in the Huon Gulf area. The semi-trained No 24 Squadron was rushed to Dobodura without the normal infrastructure as it was expected to be a brief deployment. Each aircraft carried a groundcrewman as well as the two aircrew. They arrived on 2 September and flew their debut combat mission on the 7th, complicated by bad weather and difficulty finding their base. On 18 September, 14 Vengeances joined a strike on Finschhafen to assist a landing by the Australian Army, and during September and October the type played a significant role in halting a major Japanese counter-attack. However, operations were limited by equipment shortages. Kenney's deputy Brig Gen Ennis Whitehead said in understandable frustration, though inaccurately, "we have never gotten a mission out of that unit". Some issues were due to the crews having only partly trained in non-tropical southern Australia. Finally, in December, the squadron operated against Japanese positions on New Britain and New Ireland ahead of the American landings in western New Britain.

No 10 Operational Group was created around the Vengeance-equipped attack component of No 77 Wing. It was established on 13 November 1943 to act as a mobile strike force supporting

TOP: A very rare colour image of pre-service RAAF Vengeances, their national markings still at this stage including a red element. RAAF HERITAGE

ABOVE: Newton Field near Nadzab, New Guinea is where the Vengeances belonging to B Flight, No 21 Squadron are pictured in February 1944. RAAF MUSEUM ARCHIVE

DATAFILE

Vengeance Ia A27-54 in its film guise as a 'Stuka'. CHRIS SANDHAM-BAILEY

PLAYING THE ENEMY

In a bizarre event, Vengeances became unlikely film stars in Australia during April 1944 when No 21 Squadron examples stationed at RAAF Base Camden, New South Wales, were adorned with German markings and swastikas to imitate Ju 87s for the movie *The Rats of Tobruk*, directed by Charles Chauvel. Other military units in the area were also called upon, providing tanks — suitably modified to depict German equivalents — and soldiers, while the Currans Hill area played the part of the Tobruk battlefield.

TOP: A well-known portrait of No 12 Squadron Vengeance A27-209 *Dianne* flying off the coast of New Guinea in December 1943. RAAF MUSEUM ARCHIVE

ABOVE: The black and yellow-striped underside denotes a target tug Vengeance, its identity unknown. RAAF MUSEUM ARCHIVE

Allied ground units advancing on the Japanese. Commanded by Wg Cdr E. G. Fyfe, the wing consisted of three squadrons: 21, 23 and 24, newly equipped with Vengeances, and escorted by No 78 Wing's Curtiss Kittyhawks. No 24 Squadron made its maiden operational flight on 17 January 1944, the two other units joining battle on 18 February.

The following day, No 24 Squadron bombed the Japanese at Hansa Bay. This long-range operation required a refuelling stop at Dumpu, a challenging prospect as each Vengeance was fully loaded with two 500lb bombs and two 250lb anti-personnel bombs. A follow-up attack against on Hansa Bay on the 24th was met by intense anti-aircraft fire, Vengeance A27-274 having a shell pass through the rear bulkhead of the bomb bay and out of the tail without exploding, to the relief of Plt Off Porter and Flt Sgt Addison. Fg Off Burnell and army liaison officer Capt W. Watson were killed when their aircraft crashed near the target, and pilot Sgt F. McDonald and Fg Off C. McAllister were executed after being captured.

A major anti-Japanese air force effort started on 26 February with 36 Vengeances — 12 from each squadron — attacking the airstrips at Alexishafen and Madang. The raids were repeated on the 28th with no less than 33 Vengeances. After a break of a few days while they bombed Japanese retreat routes, the airstrips were again heavily attacked, and on 8 March the Vultee dive-bombers joined a combined operation against a Japanese camp 10 miles north of Alexishafen. After the landings at Hollandia, it was found that the air effort had completely neutralised the Japanese bases there and resulted in the destruction of more than 500 Japanese aircraft on the ground.

> **"Australia's use of the type was not regarded by high command as more than an unwanted experiment"**

Despite this success — and to the crews' surprise — the Vengeance squadrons were withdrawn in March on the orders of American commander Gen Douglas MacArthur, after only 15 days operating in New Guinea. Eventually they were replaced in combat by RAAF Beaufighter, Boston and Beaufort squadrons. The Americans wanted their airfield space for what they saw as more useful, longer-range AAF aircraft than the RAAF Vengeances.

In all, 342 Vengeance Is, IIs and IVs operated with the RAAF. Apart from the squadrons noted above, they were flown by Nos 3, 4, 5, 6, 7 and 8 Communication Units, by other outfits in the target-towing role, and for experiments with No 1 Air Performance Unit. Several were issued to the Royal Australian Navy as hulks for firefighter training. The last 58 on order were cancelled.

Ultimately, as with the RAF and Indian Air Force, Australia's use of the Vengeance was never regarded by high command as more than an unwanted experiment, despite valiant work by the crews. It is notable that other types including obsolete Commonwealth Wirraways were instead in limited dive-bombing use to the war's end. The RAAF Vengeance squadrons were re-equipped with Liberators, obviously a major change from a two-crew tactical light bomber force to multi-crew long-range heavy bombers, but more in line with the air force's independent strategic aspirations. Its Air Power Development Centre summarised the issue common to all nations' poor use of the Vengeance: it "demonstrates the need to align force structure, doctrine and equipment."

USA

The pre-war Army Air Corps had ignored dive-bombers entirely, despite having to provide 'A' for 'attack' designations for overseas Lend-Lease dive-bomber orders, and in notable contrast to the US Navy's promotion of the concept. On America's shock entry to the war, the Army Air Forces scrambled to divert any military aircraft in the nation to their own service, sweeping up some previously unwanted types. These included Vengeances built for British Commonwealth use, already with the A-31 designation. The AAF also acquired, renamed and tested US Navy types including the Douglas A-24 (SBD-3 Dauntless) and Curtiss A-25 (SB2C Helldiver), as well as limited numbers of the A-36A dive-bomber version of the North American Mustang.

Again, though, air force doctrine simply had no place for the A-31 two-seat dive-bomber and it never saw combat service, though it was promoted in propaganda during exercises. The nearest American-operated A-31s and the later A-35s got to combat was training attack squadron pilots before they converted to P-47 Thunderbolts. Otherwise, diverted into secondary roles with all armament removed, they towed targets for aerial gunnery training, a number of them flown by Women's Airforce Service Pilots (WASPs).

France

As noted earlier, no V-72s were delivered to France prior to the German invasion. But in March 1943, A-35s were transferred to the Free French Armée de l'Air to equip three dive-bomber groups in North Africa.

Sixty-six A-35As were supplied without the maintenance

Six of the A-31s transferred to the Army Air Forces from British orders and used for gunnery training are led by AF829. KEY COLLECTION

The A-35's Armée de l'Air service in North Africa was little short of disastrous. KEY COLLECTION

The Vultee XA-41, the Vengeance's proposed successor, was a good design for a role that no longer needed bespoke aircraft. VULTEE VIA JAMES KIGHTLY

modifications previous operators had found essential. Inexplicably the French did not undertake the modifications either, with the result that the three Groupes de Bombardement (GB I/32, II/62 and I/17) were frustrated by massively excessive oil consumption: a mere 25 aircraft used 30 litres of oil per flying hour, and several force-landed as a direct result. Other problems, including cracks in the landing gear legs, resulted in the type being grounded. Serious disenchantment by the crews and the commanders was understandable. The Americans, keen to offload a type they really did not want themselves, tried to foist another 36 Vengeances onto the French rather than the 100 Douglas A-24s they had ordered, but thanks to the intervention of the chief of the French Air Mission in Washington, pointing out the problems and limited use for training, the proposed substitution was reversed.

In just over 10 months of conversion training with GB I/32, the Vengeances acquired a terrible reputation and were not even considered for use on operations. With only five left usable at the end of that period, the units re-equipped — to their relief — with the Douglas DB-7 and Martin Marauder. The second escadrille of GB I/17 'Picardie' was supplied with 10 hand-me-down A-35s from the other units, but found the same problems and understandably quickly replaced them with A-24s, which it used in combat against the remnant German Atlantic Pocket hold-outs during the autumn of 1944. The final French use of the A-35 was the employment of three or four as target tugs by the mixed Escadrille 'Saumur' within Groupe de Transport (GT) 2/15 'Anjou', between January and September 1944.

> "The French Vengeances acquired a terrible reputation and were not considered for use on operations"

Brazil

The newly constituted Brazilian Air Force (Força Aérea Brasileira, or FAB) received 28 A-31s from a batch diverted from a British order between August and December 1942. They sported their allocated RAF serials, from AN581 to AN608, but we re-serialled post-war as 6000 to 6027. During 1944 five A-35s were added, being numbered in 1946 as 6056 to 6060. They were employed on maritime patrol duties, a role for which they were far from ideal, even if their engines had been reliable. Like most other Vengeance operators, the Brazilian crews found the same massive oil consumption problem with the Twin Cyclones due to piston ring issues. Brazil's Vengeances also suffered from failures of the electric fuel pumps, and the reliable supply of spares from American stocks was also a problem. Only 11 Vengeances were serviceable at one stage.

In August 1944 the 1º Grupo de Bombardeio Picado (GBP, or Dive-Bomber Group) was established at Santa Cruz airfield with the Vengeances and earlier Vultee V-11-GB2s. A second such unit was unable to become operational due to the 41 A-35s intended for it having the same problems as the previous Vengeances and rust being found across the entire batch. The final 29 A-35Bs produced went to the FAB, while the last straw was the 4th Ferry Group's attempt to bring in A-35B-VN models, several mechanical failures causing accidents and the type being grounded on US-advised orders. The remaining Vengeances became derelict at Caravelas airfield.

The tail end

The first Vengeance, RAF serial AF745, was converted by Vultee as the Model 85, AAF designation XA-31A, with serial 42-35824. It was intended to test the Pratt & Whitney R-2600, but that never happened. Instead it was delivered, engineless, to Pratt & Whitney in East Hartford, Connecticut, and fitted with the 28-cylinder, four-row, 3,000hp Pratt & Whitney XR-4360-1 Wasp Major as the XA-31B. The machine was further reconfigured with a fixed undercarriage, oil coolers in the wings and an air intake on the cowling top. After an engine failure it crashed in a Connecticut tobacco field on 15 September 1942, coming to rest inverted and with the experimental powerplant completely torn off.

The XA-31C was a Vengeance III, AF759, modified as a testbed for the 2,200hp Wright R-3350 Duplex Cyclone. Five more Vengeance IIIs (AF756, AF792, AF845, AF887 and AF904) became the YA-31C type to test R-3350 engines specifically for Boeing B-29 Superfortress development. A proposed US Navy version of the A-35B was designated as the TBV-1 Georgia, but cancelled.

The Consolidated Vultee XA-41, or Model 90, was a replacement bomber prototype developed to use the 3,000hp Pratt & Whitney R-4360 Wasp Major. It achieved 353mph at 15,000ft and carried 3,000lb of bombs internally, plus up to 4,400lb externally. Four 37mm cannon and four .50-calibre machine guns were the fixed, forward-firing armament. A cleaner design than the V-72 — itself tidy enough — a notable improvement was the single crew position being moved forward and raised, offering an improved forward view. A prototype flew on 11 February 1944. It showed useful performance and was able to out-turn a P-51 Mustang, but the AAF by this time was using attack twins and single-seat fighters instead of dive-bombers, and no orders followed.

Passed to Brazil from a British order, A-31 AN585 served with the 1º Grupo de Bombardeio Picado at Santa Cruz airfield in Rio. VIA SANTIAGO RIVAS

One of the many propaganda photos of an AAF Vengeance, pulling into its dive. USAF

Flt Lt G. J. B. MacPherson of No 12 Squadron, RAAF, wanted to see what would happen if he didn't use the dive brakes. "I dived it vertically from 15,000ft without the dive brakes and registered 500mph before pulling out. Even at that speed it was completely steady and easily controlled. With dive brakes extended, the Vengeance was a remarkably steady machine. It was designed to dive vertically and terminal velocity was 300-310mph with dive brakes. The speed would be reached soon after entering a vertical dive, following which the aircraft could be trimmed to hold its diving attitude, leaving the pilot free to concentrate on his target without further trim adjustment. If, on lining up on the target, the pilot found the dive to be past the vertical, this could be simply corrected by [rolling] the aircraft through 180° in a matter of seconds."

Capt Eric 'Winkle' Brown stated of the MkIV, "the natural dive angle seemed to be about 70°, which feels to the pilot more like 90°". He was unequivocal in his verdict: "After the Ju 87, the Vengeance IV is the best dive bomber I have flown". However, Brown was critical of its poorly arranged trim controls and random instrument panel layout.

MacPherson added, "Despite its weight, the Vengeance was fully aerobatic, although it was naturally much heavier on the controls than a fighter and it 'washed-off' speed in aerobatics more rapidly. It would loop from straight and level flight — 215mph at normal cruising power — and I have performed up to half-a-dozen consecutive loops without any undue loss of altitude…"

In action, Joseph O'Leary of No 110 Squadron, RAF, recalled what happened after a Vengeance formation had slipped into echelon starboard: "Mechanically I go through my drill: canopy shut, check bombs open, bomb switches 'live', trims neutral, 2,100rpm, mixture rich, gyros caged, cowl gills closed, straps tight. The first three go down. A few seconds later [number] 4 [in the formation] goes over, settles in the dive and pushes his brakes out. 5 puts his out as he rolls over. I put mine out, throttle back to a third and then roll. This gives us an extra bit of spacing for safety. After that, it's simply 'doin' what comes nacherly'. Rolling over, throw my head back and look straight down on the dust cloud over the jail — or what's left of it. Then it's just a matter of sighting down the yellow line and 'flying' it onto the target. Feet braced on my big fat rudder pedals, I sense the dive is as near vertical as dammit — you can feel it with practice. Topper has done us proud, for this is a follow my leader operation, and if he's off vertical then the whole thing will be a mess.

"I can see 4 and 5 ahead for a few moments, then 4 pulls away from my field of vision. Bomb flash. I'm snatching quick glances at my altimeter, which is spinning like a broken clock, one sweep of the 'big hand' every two or three seconds. 5 pulls away, keep line on target, bomb flash, 5,000 feet, check line, 4,000, check, 3,500, press button [on the throttle grip] and pull, pull, pull for dear life…"

DATAFILE

SOLE SURVIVOR

One complete Vengeance Ia, A27-99 (previously EZ999 and never used in service), survives at the now private Camden Museum of Aviation in New South Wales, while components of Vengeance IIa A24-247 and others are held by the Illawarra-based Historical Aircraft Restoration Society as a possible future restoration project.

The sole surviving complete Vengeance, MkIa A27-99, in the private Camden Museum of Aviation in New South Wales. STEVE LONG/ CAMDEN MUSEUM OF AVIATION FOUNDATION