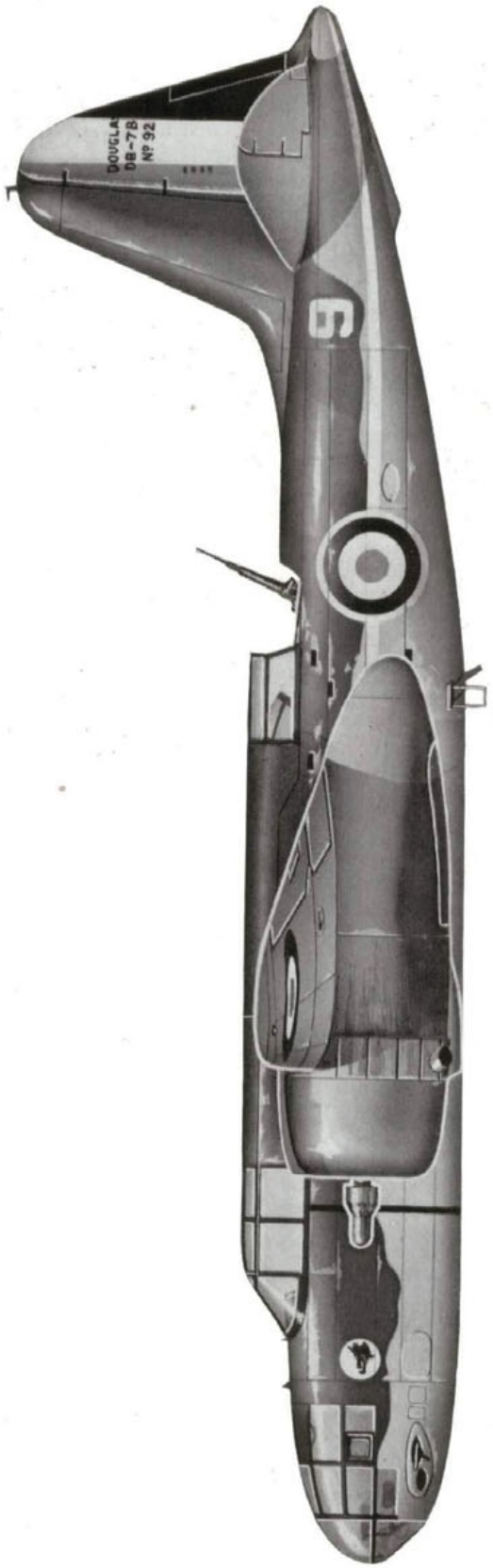
PROFILE
PUBLICATIONS

The Douglas A-20 (7A to Boston III)



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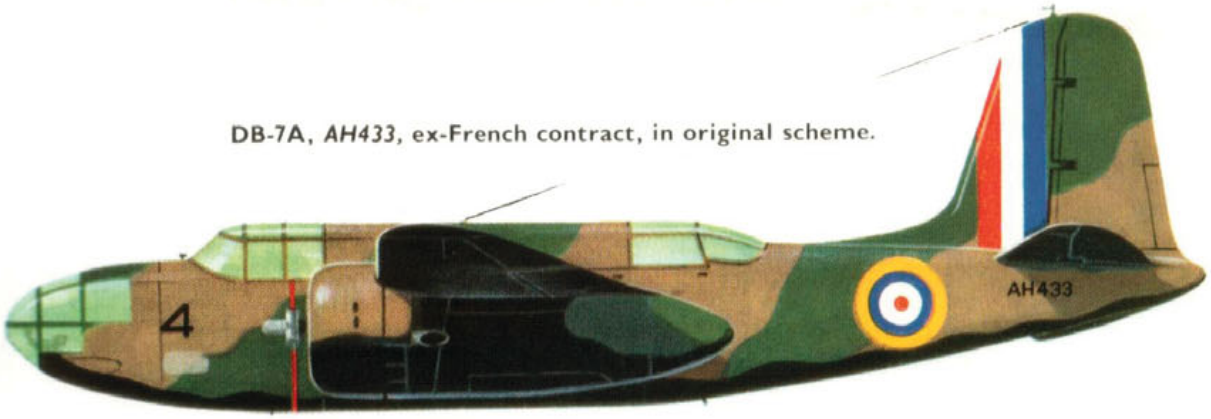
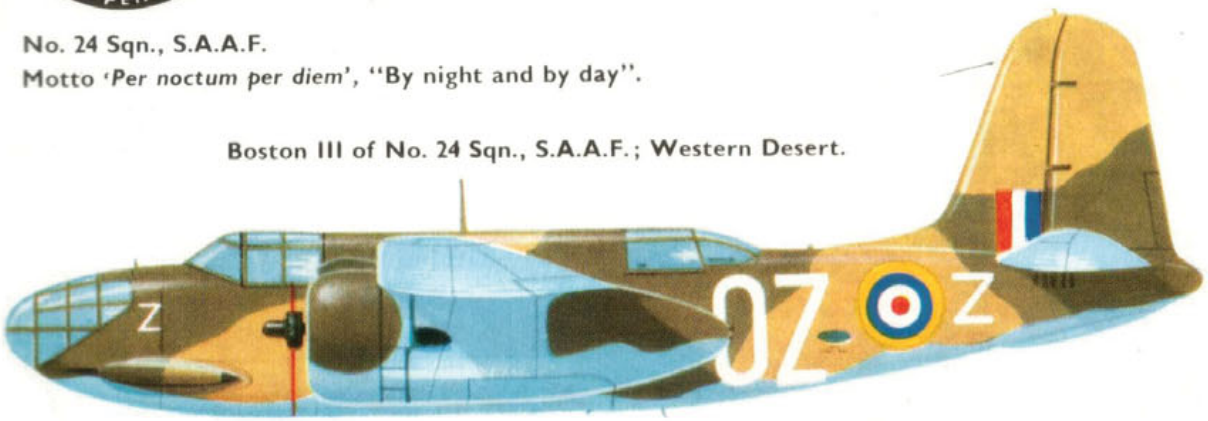
DB-7A, *AH433*, ex-French contract, in original scheme.



Boston III, *AL701*, flown by Flight Lieutenant Carlisle of No. 107 Squadron R.A.F.; Great Massingham, U.K., 1942. Churchill "V" sign under cockpit.

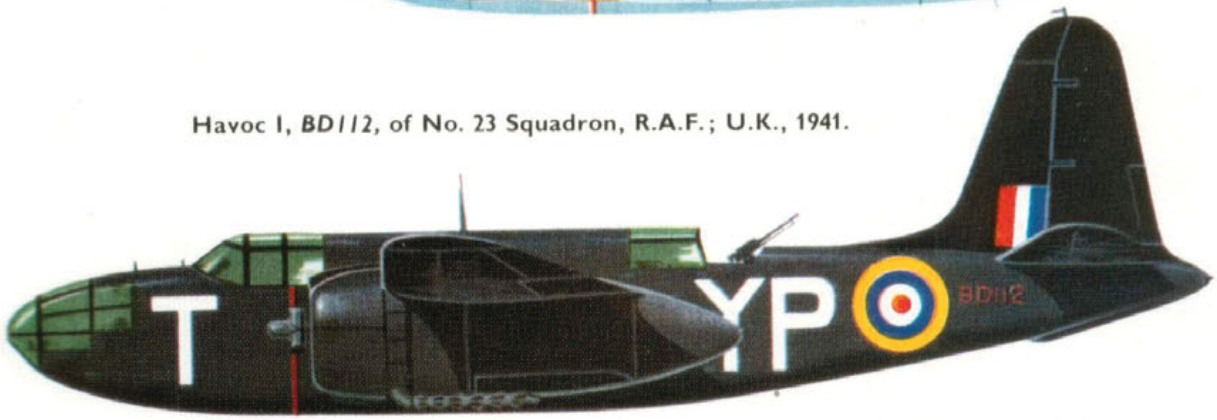
No. 24 Sqn., S.A.A.F.
Motto '*Per noctum per diem*', "By night and by day".

Boston III of No. 24 Sqn., S.A.A.F.; Western Desert.



Boston III, No. 24 Sqn., S.A.A.F.; Western Desert.

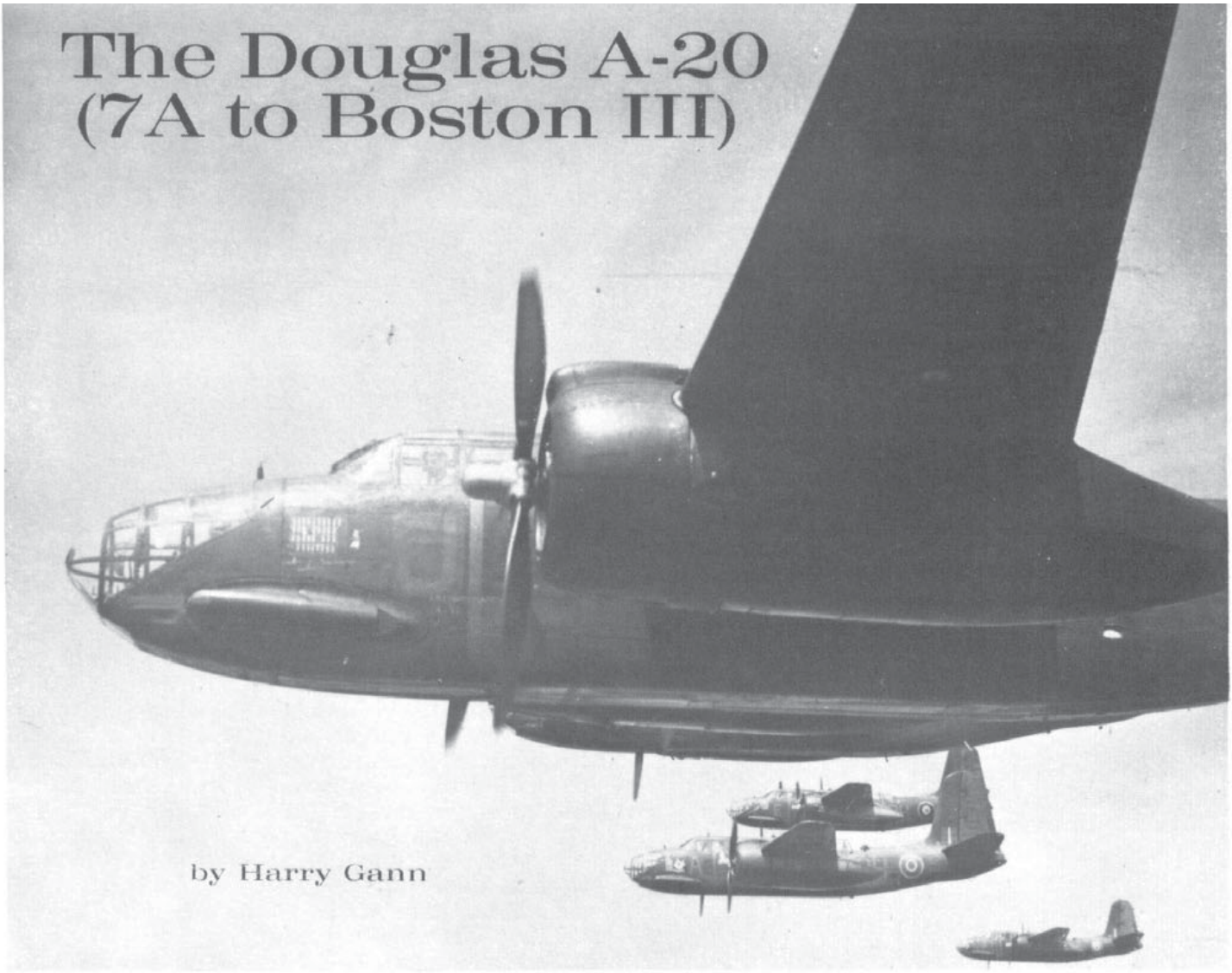
Havoc I, *BD112*, of No. 23 Squadron, R.A.F.; U.K., 1941.



Boston III of No. 418 Sqn., R.C.A.F.; U.K., 1942. Serial *W8268*.

The Douglas A-20 (7A to Boston III)

by Harry Gann



Boston III's of No. 88 Squadron R.A.F. on a raid over Northern France; the style of national markings dates this photograph as being taken after June 1942. (Photo: Imp. War Mus.)

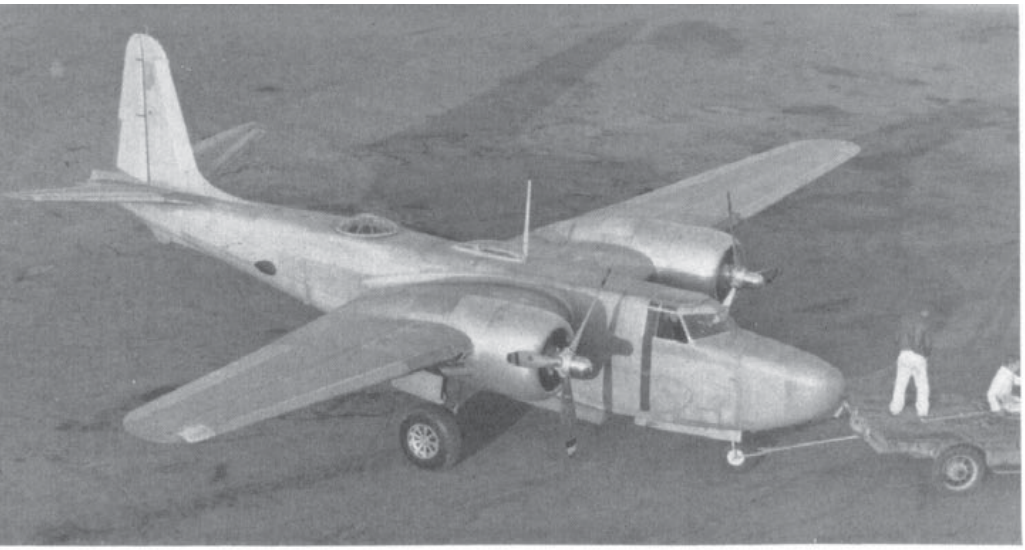
While the DB-7/A-20 series of aircraft encompasses many models, the subject of this Profile *is limited to the DB-7 series. The author and publishers wish to acknowledge the assistance of P. J. R. Moyes, Jean Cuny and Arthur Pearcy who provided supporting data.*

In the early 1930's the United States Army Air Corps became interested in the concept of a multi-engined attack aircraft. A half-hearted attempt at this concept was investigated shortly after the end of World War I with a twin engine triplane designed by the Engineering Division of the U.S. Air Corps and designated GAX. Service tests indicated that this slow, awkward Liberty-powered vehicle was anything but satisfactory for the mission. Smaller single engine aircraft became the accepted configuration: first fabric covered biplanes with liquid cooled engines and then the sleek metal structured, air-cooled radial engined arrangement of the A-17 aircraft. The Curtiss A-14/A-18 aircraft signalled the turn to the multi-engined concept.

However, there was no combat experience to draw upon. Possibly the aircraft could serve many functions, such as tree-top strafing of the enemy's bases, artillery emplacements, tanks, supply dumps and lines of communication. Then maybe it could be used at medium altitude as a conventional bomber. Still another job could be to function as eyes of the ground troops as an observation platform.

These formulations were studied by the Douglas Aircraft Company and a decision was made to proceed independently on a design study until military requirements could be assimilated and sorted out for more definite requisites. Upon this basis, design of the model 7A attack bomber began. The aircraft was to gross 9,500 pounds, carry a crew of three and be capable of 250 miles per hour speed with two 450 horsepower Pratt and Whitney Wasp Junior engines. To accommodate the observation-attack functions expected, an interchangeable bomb bay and observation compartment was to be incorporated. Engineering work began in March, 1936 and continued until stopped in December when the design was more than 50 per cent completed. At this time changes in tactical requirements became eminent although they were not definitely spelled out until well into 1937.

In the fall of 1937, the Army announced a formal design competition based on intelligence gained during the Chinese and Spanish wars. The minimum requirements included a 1,200 mile range with a 1,200 pound bomb load at an operating speed in excess of 200 miles per hour. Douglas revised the 7A design by eliminating the observer's compartment and enlarging the bomb bay. The pure attack version would carry six calibre ·30 and two calibre ·50 nose mounted guns. An alternate fuselage nose was to be provided to carry a bombardier and bomb sight. Power was increased to the Pratt and Whitney



The 7B after the first flight, showing new tail layout; the plexiglass housing aft of the cockpit is an antenna fairing.
(Photo via the author)

R-1830C engine developing 1,100 horsepower. The designation was changed to 7B. Submitting preliminary designs to the Air Corps in July, 1938 were Bell with their model 9, Stearman with the X-100, and Martin with the 167F and Douglas with the 7B. As a result of these promising designs, the companies were invited to build sample aircraft. Bell declined but North American joined the remaining companies with its NA-40 to build prototypes.

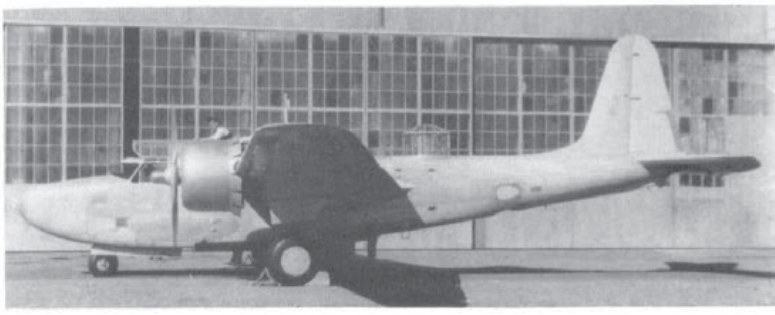
The 7B was completed and then test flown on 26th October 1938 and immediately proved itself in the flight test programme. Despite the outwardly neutral attitude to the impending hostilities in Europe, the French Government was secretly given permission to evaluate the aircraft for possible orders to restaff their air arm. This became known to the world when the 7B crashed during a test flight on 23rd January, 1939 at the Los Angeles airport. The pilot, John Cable, was killed while the other crewman survived. Eagle-eyed newsmen discovered that the survivor was a French citizen. Despite the resulting protest of the isolationists, the French Government was allowed to place an order for 100 aircraft on 15th February, 1939.

To provide the reader with a perspective of the events that affected the DB-7 aircraft, the following chronology is provided:

26th October 1938, 7B first flight; 23rd January 1939, 7B crashes; 15th February 1939, France signs contract for 100 DB-7 aircraft; 24th June 1939, U.S. Orders A-20 aircraft; 17th August 1939, DB-7 first flight; 3rd September 1939, World War II starts; 14th October 1939, France orders additional 170 DB-7 aircraft; 20th October 1939, France orders 100 DB-7A aircraft; 31st October 1939, France accepts first DB-7 in California; January 1940, French DB-7's arrive at Casablanca; 20th February 1940, England orders 150 DB-7B aircraft; 17th April 1940, England increases order to 300 DB-7B's; 10th May 1940, German offensive begins against the French; 18th May 1940, France orders DB-73 aircraft; 31st May 1940, French DB-7 aircraft fly first combat missions; 25th June 1940, France collapses; 26th July 1940, DB-73 contract formally taken over by England and changed to DB-7B. Undelivered DB-7 and DB-7A aircraft also assigned to England; 30th July 1940, DB-7A first flight; August 1940, first diverted DB-7's arrive in England; 6th September 1940, A-20A first flight; 20th November 1940, DB-7A first acceptance; 30th November 1940, A-20A first delivery; 10th January 1941, DB-7B first flight; May 1941, first DB-7B's arrive in England.

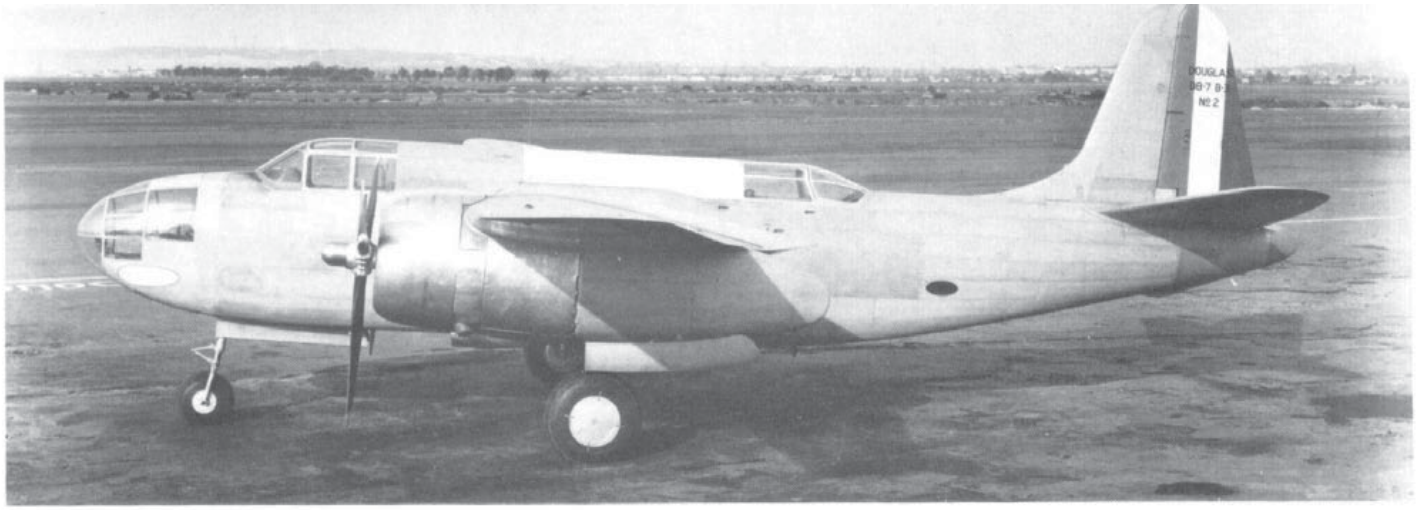
FRENCH DB-7 AIRCRAFT

The French *Armée de l'Air* was the most powerful military air agency on the European continent at the start of the 1930's. However, the frequent government changes and general apathy coupled with the Air Staff's lack of insight on the proper use of air tactics allowed the advantage to slip away. Conflicting requirements on the types of aircraft needed resulted in the design and fabrication of many prototype aircraft but indecision on production forced the retention of obsolete aircraft in first line squadrons. Also, the nationalization of the French aircraft industry in the middle 1930's served only to disorganize the industry and removed the stimulation to provide better aircraft and the associated weapon systems. The Munich crisis in September, 1938 shook the French Air Ministry from their lethargy and they directed the industry to begin full scale production. In spite of tremendous efforts by the French aircraft builders, it was quite evident that their Air Force would have to be bolstered from an outside source. The only source of help was the



The 7B being readied for its first flight; the initial tail configuration is shown. After the maiden flight the horizontal tail was moved forward to stiffen the structure.
(Photo via the author)

The alternative bombardier nose of the 7B is shown here.
(Photo via the author)



The second DB-7 of the French batch; the tail lettering DB-7 B-3 indicates "DB-7, three-seat bomber." (Photo via the author)

United States, who was trying to maintain a neutral attitude. Receiving permission from the sympathetic U.S. government, the French Air Commission was formed to procure suitable American warplanes. Thus the stage was set for the procurement of the Douglas-built twin engine attack bomber.

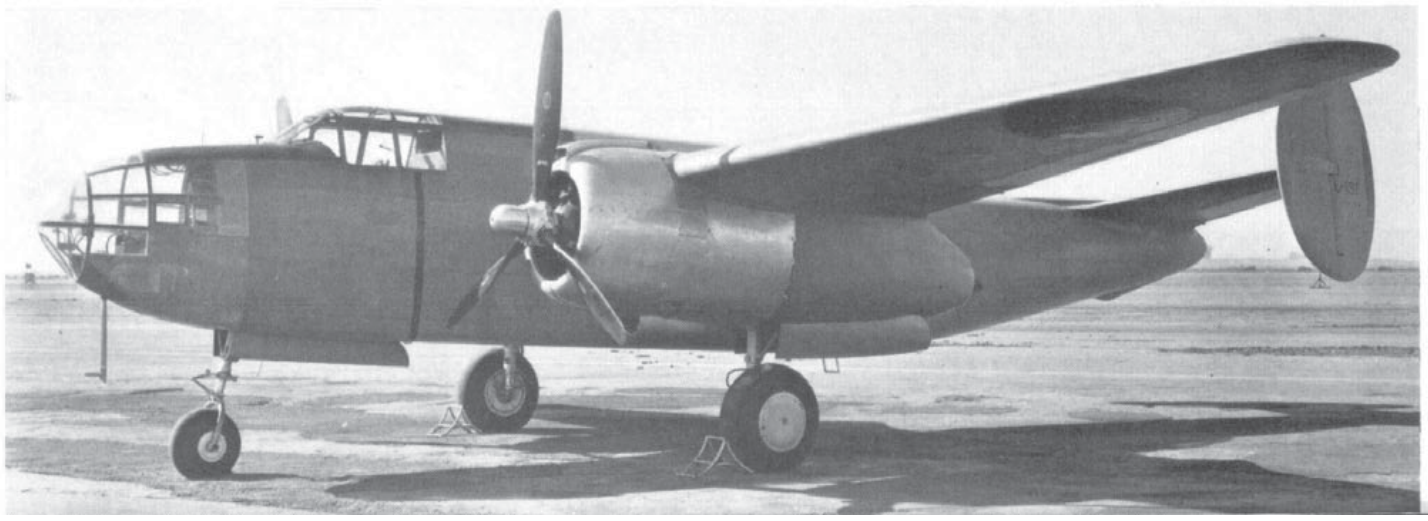
The crash of the 7B, despite its tragic aspects provided an opportunity to revise the design to more nearly align its performance to the French requirements as well as newer U.S. Army Air Corps desires. The contract for 100 DB-7 aircraft signed by the French Air Commission and Douglas Aircraft Company on 15th February 1939, was followed by the Air Corps contract for A-20 aircraft in June. First flight of the DB-7 took place on 17th August 1939, an incredible feat of six months from complete redesign, fabrication, and flight. First acceptance by the French Air Commission in the United States was in October, 1939. A contract for an additional 170 aircraft was signed on 14th October 1939. It called for the substitution of 1,200 horsepower Pratt and Whitney two-speed engines for the 1,100 horsepower single-speed engines specified in the earlier contract. However, late delivery of these engines did not allow the installation until the 31st aircraft of the second contract.

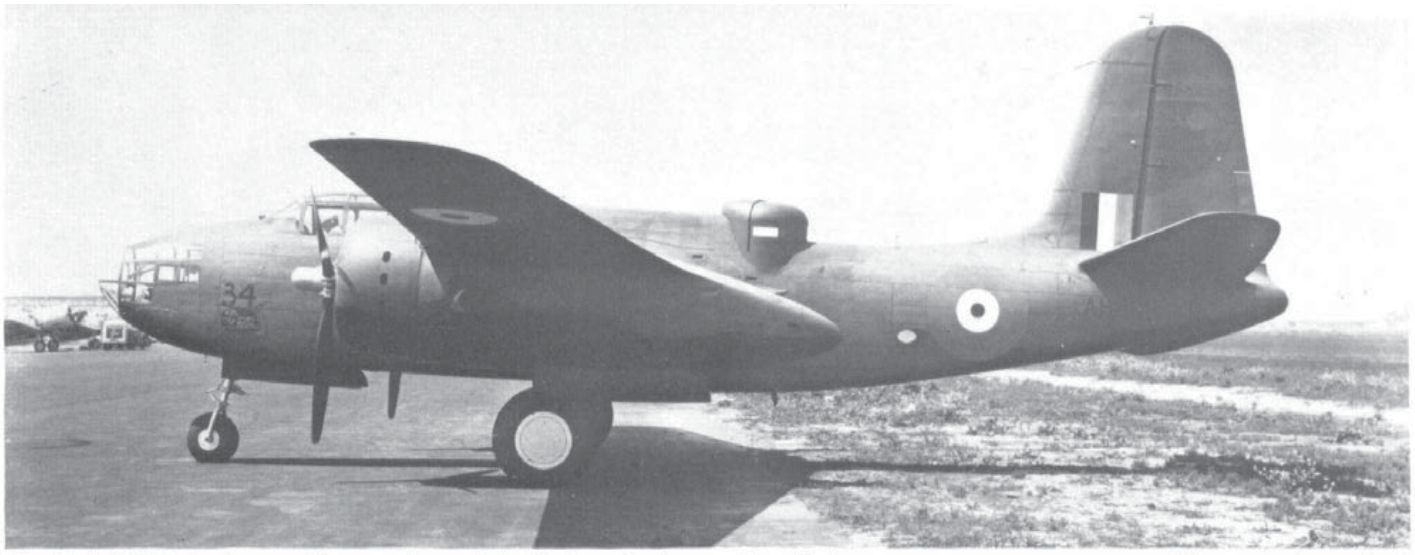
When Mr. O. Borrel of the French Air Commission requested a study to determine if additional power would be practical in improving performance, the DB-7A was conceived. This was brought about by using the Wright R-2600 engine installation that was being designed for the A-20A. In order to keep the production line flowing, only the necessary changes were made to the basic DB-7 design to install the Wright engine and still provide adequate control and stability. These changes consisted of: the Wright engine installation and the lengthened nacelles and the landing gear truss and landing gear of the A-20A, increased vertical tail area to reduce the aerodynamic effects of increased power, and local beef-up of the structure where necessary as a result of the increased power and weight. A contract for 100 DB-7A aircraft was signed on 20th October 1939.

Despite the initial acceptance of the DB-7's in October, red tape and shipping difficulties combined to delay the receiving of the aircraft by the *Armée de l'Air* until January, 1940 at Casablanca. After assembly and flight testing, training began to equip the first and second squadrons of the 19th and 32nd Bombing Groups (GB I/19, GB II/19, GB I/32, and GB II/32). When the German *blitzkrieg* against France started on 10th May, all operational aircraft were quickly shifted to France in an effort to contain the advancing German forces. While the aircraft were delivered in natural aluminium finish as specified, they were quickly painted a tactical camouflage upon their arrival. This camouflage consisted of irregular patches of light green and buff on the upper surfaces of the wings, tail and fuselage. The undersides were painted grey. Red, white, and light blue cockades were painted above and below the wing tips and on the sides of the fuselage. Red, white, and light blue stripes were painted on the rudder with the light blue strip next to the rudder hinge post.

The initial action of the DB-7's occurred on 31st May near San Quentin. However the momentum of Hitler's troops could not be slowed and the DB-7 aircraft did not get the opportunity to distinguish themselves.

The 131st DB-7 was the test vehicle for the proposed twin tail. (Photo via the author)





The 34th DB-7A is shown with a mock-up of the Boulton-Paul turret installation. (Photo via the author)

By the time of the French capitulation in June, some 60 aircraft had been assembled and accepted in French North Africa. Approximately 135 additional aircraft had been accepted at the California based Douglas plant and were at various points in transit. Eventually 200 of the French contracted DB-7 aircraft and all of the DB-7A aircraft were diverted to England.

Many members of the French fighting forces did not choose to accept Marshal Petain's surrender terms and escaped to England or the Middle East. One unit of Free French was the *Groupe de Bombardement* No. 1 (GB 1). Known as the "Lorraine" Group, it continued the struggle against the Axis powers as a part of the R.A.F. in Libya using Lysander and Blenheim aircraft. In January, 1943, it was re-assembled in England as No. 342 Squadron and equipped with Boston IIIA's (A-20C aircraft). D-Day found this unit extremely busy softening-up the German positions. It was later re-armed with Boston IV's (A-20G aircraft) and in November, 1945 returned to *l'Armée de l'Air*.

ENGLISH DB-7 AIRCRAFT

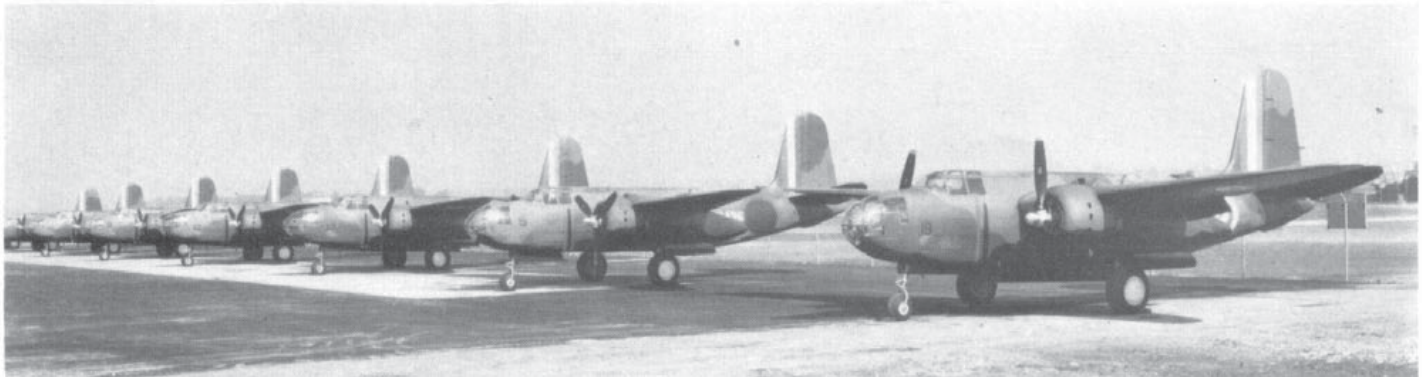
With the impending World War II only a matter of time, England too was forced to go to the American manufacturers to supplement its own industry's aircraft production. The English requirements for an attack airplane were vastly different than those of the French. Owing to the country's geographical location, greater range was a prime requirement if aircraft were to perform their mission. Therefore, the aircraft ordered by the British, the DB-7B, was more nearly like the A-20 configuration chosen for use by the U.S. Army Air Corps than the French DB-7 aircraft. A contract for 150 aircraft was signed on 20th February 1940 with options for an additional 150 aircraft. This option was exercised in April. Initially these aircraft were to be called Bostons but later they were referred to as Boston III's to distinguish them from the DB-7 Boston I and DB-7A Boston II aircraft taken from the French contracts.

On 18th May 1940, the French Air Commission had contracted for 480 aircraft designated by Douglas as DB-7C's. At the request of the French, these aircraft were redesignated DB-73. Half of the production was to be undertaken at the Seattle plant of Boeing Aircraft Company and the balance at the Santa Monica facility of the Douglas Aircraft Company. With the fall of France, England assumed the contract, changing the design specification to conform to that of the previously contracted DB-7B aircraft. An additional DB-7B aircraft was produced to replace the first DB-7A (AH430) which crashed and was destroyed on a test flight, thus 781 DB-7B aircraft were built at the English behest. However, many were diverted to the U.S. Air Corps or Russia after the U.S. entered the War.

The DB-7B specification was based on that of the A-20A except for the installation of British type armament, bombing equipment, radio and oxygen equipment. Provision was made for an extra crewmember (making four in all) to man the lower rear gun position. In the course of the construction of the DB-7B aircraft, 95 design changes were made as dictated by combat requirements such as the installation of emergency desert gear for the Middle East theatre of operations. Some thought was given to replacing the aft upper gun installation with a four gun Boulton-Paul turret. A mock-up was flight tested in a DB-7A airframe and proved feasible but a shortage of the turrets prevented production installation.

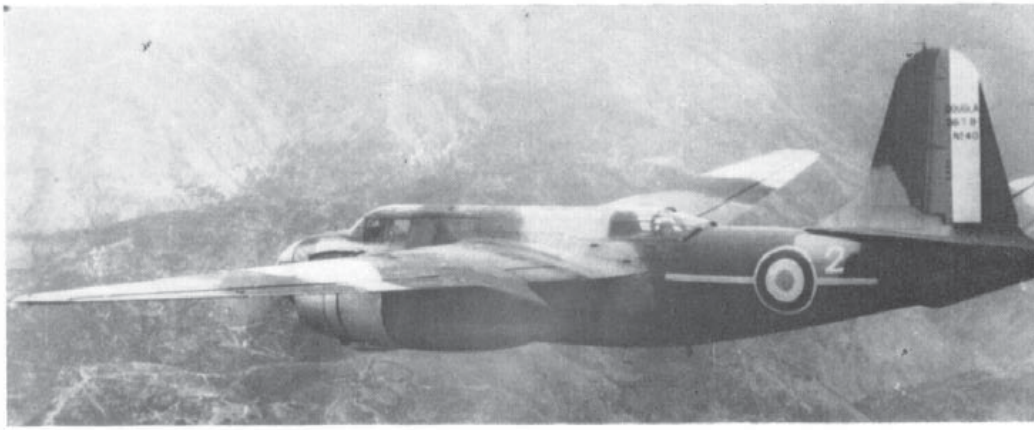
The first of the Douglas-built twin engine attack bombers to arrive in England were not the DB-7B's. The French-ordered DB-7 aircraft began arriving in

A line-up of DB-7A's awaiting shipment to designated ports for delivery to England. (Photo via the author)



Two French DB-7's of 2nd Escadrille, G.B.I/19 at Blida, Algeria, late in 1940. (Photo via Jean Cuny)

The DB-7 flown by Col. Deluze of G.B.I/19. (Photo via Jean Cuny)

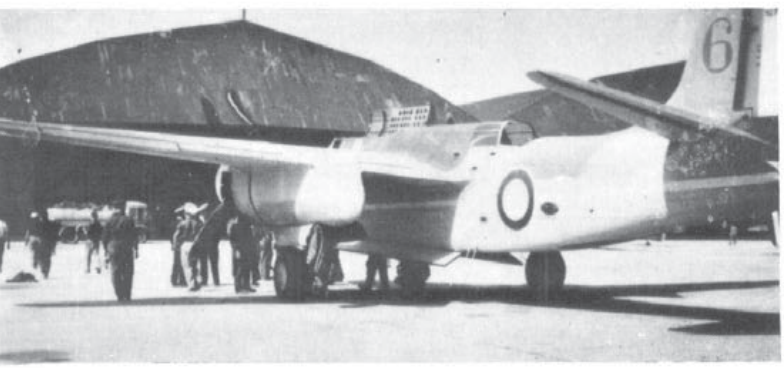


late 1940, shortly followed by the DB-7A aircraft. Without modifications, these aircraft could not use either British guns or bombs. The instruments and the instruction manuals were labelled in the French language. Also the radios were not compatible with those used by the English forces. Even their proposed mission, that of short range, high speed attack bomber operating in close support of the land forces, no longer had a place in the new phase of the war. Bombers and reconnaissance aircraft operating from the British Islands needed a great range to reach the Germans.

The paramount need at that time was for fighter planes with sufficient firepower to combat the German night bombers over England. The choice of the DB-7 for night defence was obvious for the basic requirements of the night fighter were good performance, a tricycle undercarriage to facilitate night landings and most important, a stable gun platform. In addition, the aircraft had to possess the equipment to search out the enemy plus the means to destroy it when it was located. The DB-7 aircraft did not have the special equipment for airborne interception but it could be added.

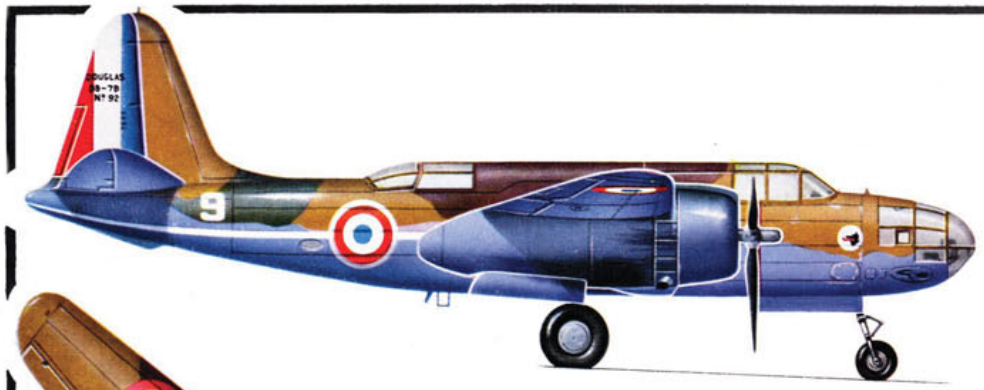
It is interesting to note that in April, 1940, a month and a half after the signing of the contract for the first English DB-7B aircraft, Wing Commander J. F. X. McKenna and Squadron Leader G. F. W. Heycock were allowed to fly one of the French DB-7 aircraft. In a secret report to the Aeroplane and Armament Experimental Establishment at Boscombe Down, they reported that "The aeroplane is very pleasant to fly, has no vices and is very easy to take-off and land. Handling with one engine out is exceptionally good." They further reported in a summary of flying characteristics: "The aeroplane represents a definite advance in the design of flying controls. The designer has achieved controls which, while being light enough to obtain full movement at quite high speeds, are in no way overbalanced for small movements. As a result the aircraft is extremely pleasant to fly and manoeuvre. The tricycle undercarriage makes take-off, landing and ground handling very simple, and pilots should be able to fly the type successfully with the minimum of instruction."

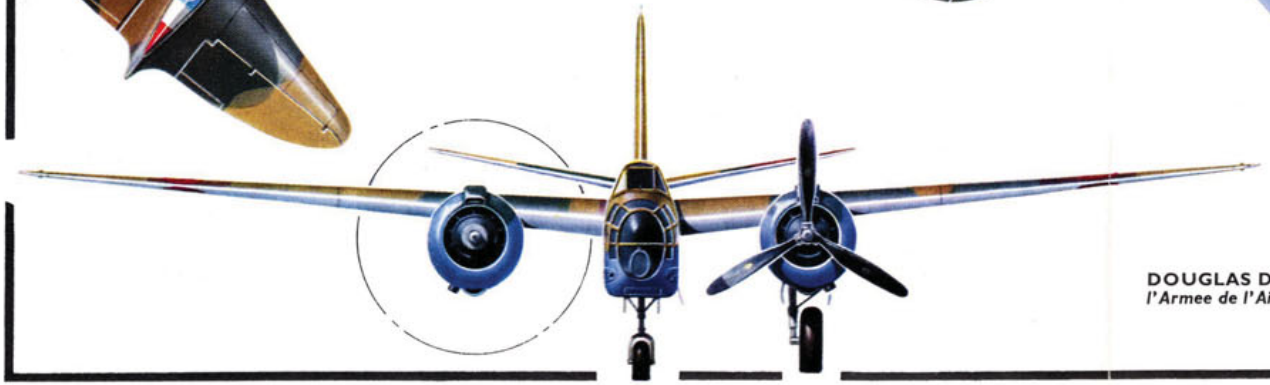
DB-7 of G.B.I/32 in Casablanca during 1941. (Photo via Jean Cuny)

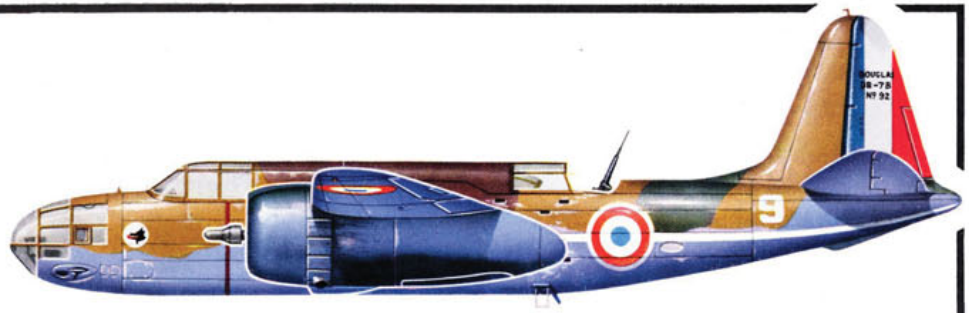


The first 16 aircraft to arrive in England were those with the single speed lower rated engines. These were labelled Boston I's and used for pilot training as they were the only twin-engined tricycle undercarriage aircraft available to the R.A.F. The following aircraft were modified to the night fighter configuration by placing a solid gun nose mounting eight calibre ·303 machine guns in place of the four-gun glass nose. Most of the late DB-7 and DB-7A aircraft were modified to this standard and called Havoc I NF.1's. With the deliveries of the DB-7B aircraft to England in the spring of 1941, many of these Boston III's were converted to Havoc II NF.2's with twelve-gun noses. On both versions of the Havoc, the bomb load capability of 2,000 pounds was retained, making the heavily armed Havocs superb intruders. Some Havocs were further altered by installing 2,700 million candlepower search-lights in a shortened nose. Working in conjunction with escort fighters, these "Turbinlight" aircraft would search out and illuminate enemy aircraft for the guns of the escorting fighters.

One of the first English units to use the Douglas

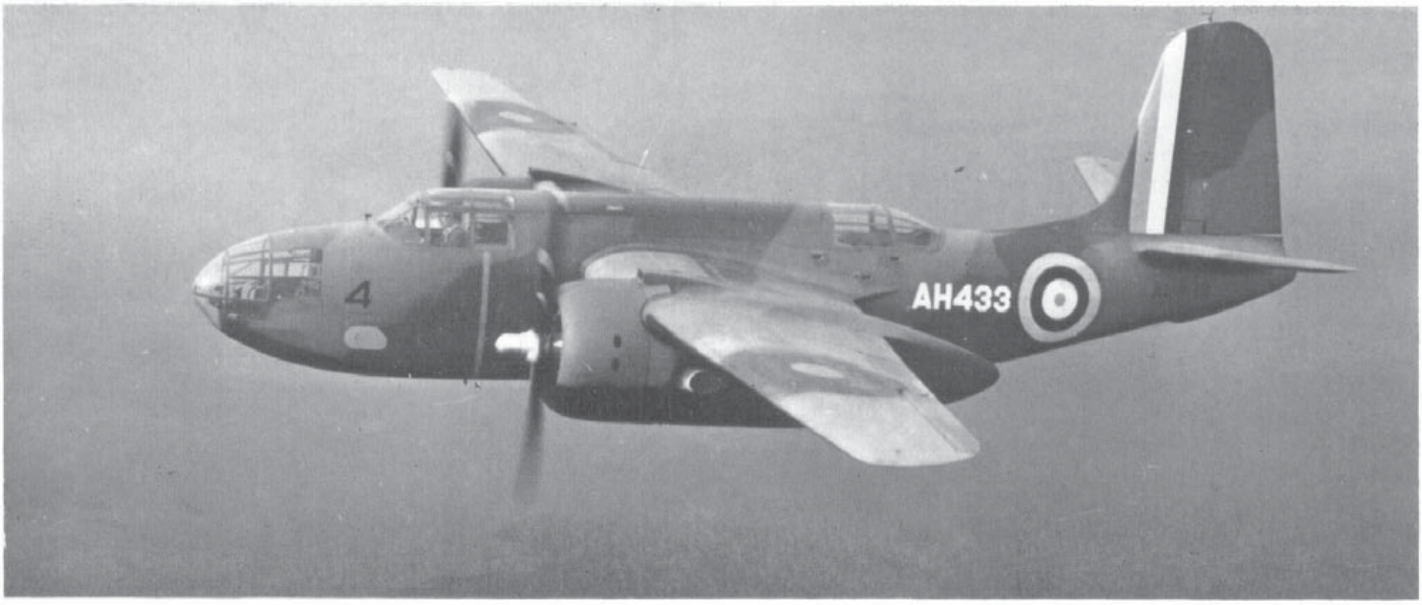






DOUGLAS DB-7B, No. 92, of 2nd Escadrille, G.B.I/19; *l'Armee de l'Air*, 1939/40.

G.B.I/19, 2nd Escadrille; during 1940 insignia became that of 2nd Esc., G.B.II/19.

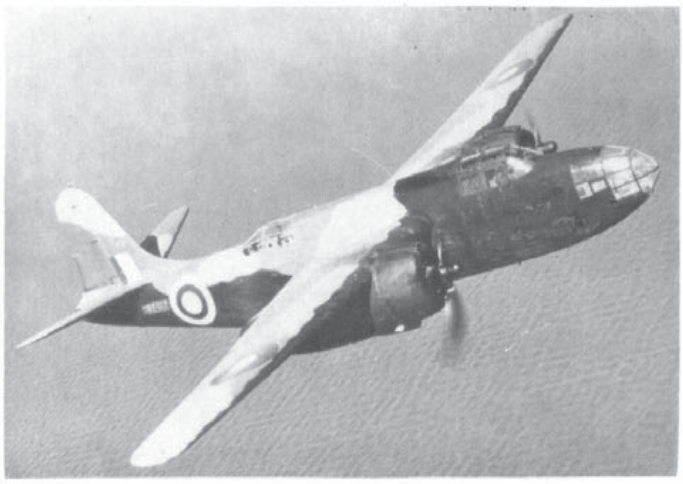


After the R.A.F. took over the French DB-7A contract, the specification was altered to include British camouflage.
(Photo via the author)

aircraft in action against the *Luftwaffe* was No. 23 Squadron which sent into action a mixed fleet of Beaufighters and Bostons in October, 1940. By April, 1941, No. 23 Squadron had received a full bag of Havoc I's and specialized in night intruder work. Roaming the French sky, they disrupted the German operations by shooting at airborne aircraft and bombing those on the ground. Later the squadron was outfitted with Boston III's and continued their night harassment.

Wing Commander A. F. Carlisle, who flew Bostons with the R.A.F., records the following impressions of their service and characteristics.

The first squadron to receive Boston III's was No. 88 Sqn. of No. 2 Group, Bomber Command at Attlebridge near Swanton Morley; in August 1941, six aircraft were allotted. Numbers, including one replacement, were *W8332*, *W8337*, *Z2200*, *Z2230*, *Z2231*, *Z2232* and *Z2262*. Two DB-7s had been on strength for some time; these had Pratt & Whitney Twin Wasp engines and were originally ordered by the French Government. However, the Squadron continued to operate its Blenheim IV's until November 1941 and by the end of the year the full complement



A DB-7 Boston I in flight. (Photo: Imp. War Mus.)

of about sixteen Boston III's had arrived. At this time* Boston IIIs were to be seen at Burtonwood having a special nose section fitted containing twelve ·303 Browning guns to make them into Havoc night fighters, and some became "Turbinlights".

**21st August 1941*

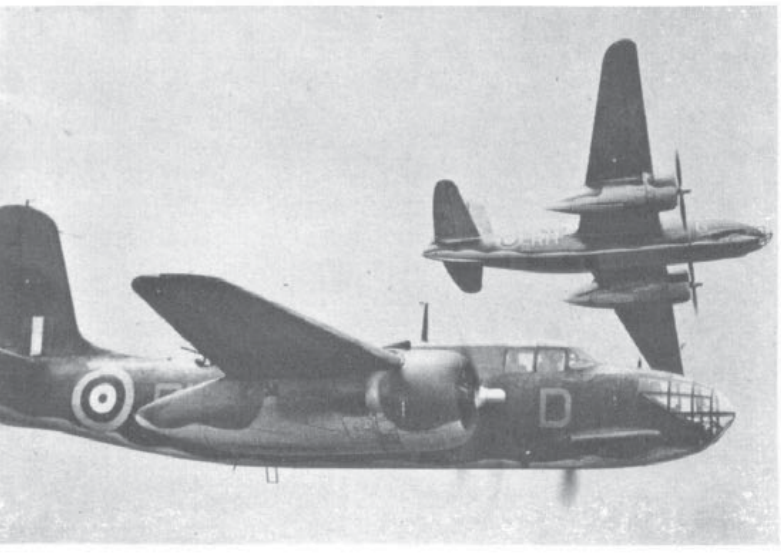
Bostons of 107 Squadron R.A.F. photographed at Great Massingham in April 1942. (Photo: A. F. Carlisle)

In February 1942 No. 107 Sqn. reformed at Great Massingham with the Boston III which type was also being issued to No. 226 Squadron at Swanton Morley. When No. 342 (*Lorraine*) Squadron, Free French Air Force formed at West Raynham in April 1943 from what had previously been known merely as the *Lorraine* Squadron, it too was armed with Bostons —Mk. IIIA's. In August and September of 1943 Nos. 88, 107 and 342 squadrons moved to Hartford Bridge (later Blackbushe) as No. 137 Wing, Second Tactical Air Force. In the previous spring Boston IIIA's were issued as replacements, the Boston III's being sent to the Middle East. By mid-1944 some Boston IV's were in the squadrons; these had a one-piece Perspex nose and were heavier, similar to the A20's of the American 9th Air Force based in Suffolk. In October 1944 No. 137 Wing, comprising now only two Boston squadrons (Nos. 88 and 342) with No. 226 on Mitchells, moved to Vitry-en-Artois, France. Being Lend-Lease, the aircraft were handed back (scrapped) very soon after the war ended.

First operational use of the Boston III was by No. 88 Sqn. on 12th February 1942, when two flights took part in the search for the *Scharnhorst* and *Gneisenau* which had steamed up the channel; no contact was made. The normal rôles which began in March were "Circus" operations—escorted medium level day bombing against airfields, ports or V.1 sites—or low level attacks against power stations and factories. In addition some night intruder and interdiction was done. The Boston did go to Germany and Holland in the early days, but these were exceptions, and targets were normally in France and Belgium. Two special operations involving Bostons were the low level daylight attacks on the Matford works at Poissy; and the raid on Philips Radio works at Eindhoven on 6th December 1942. Mention should also be made of the smoke-laying off the Normandy beaches in 1944. Whether the Boston was operationally suitable for the European Theatre is questionable but it filled the gap between Blenheims and Mosquito VI's, and was immensely popular with the crews who flew in it.

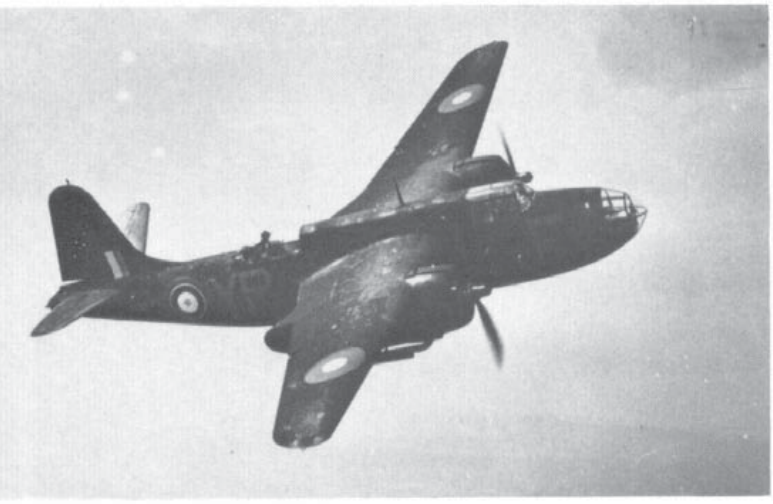
To crews who had been operating or training on Blenheims, the Boston III was a very pleasant surprise indeed. Twice as powerful, it carried twice the load (2,000 lbs.), weighed 22,287 lbs. loaded, was utterly reliable, very strong and 80 m.p.h. faster, at 315 m.p.h. low down. Instruments, hydraulics and electrics were standard American types which are now well known but then seemed to be of exceptional quality. The cockpit floor was carpeted in green foam rubber and all pipes and wires were concealed; sun curtains, tinted vizors and a curved glass screen outside the bullet proof slab gave it the air of an expensive car. Starting engines seemed to call for a four-handed pilot, two switches (later one) for each inertia starter had to be held down while hand wobble and priming pumps were operated and the mixture control for the pressure carburetter (Stromberg) moved at the moment of firing! A Boston always demanded its full take-off run and could not be pulled off at less than 110 m.p.h. Undercarriage retraction was fairly quick owing to the hydraulic accumulator, and initial rate of climb was very good. On one occasion when an engine seized solid during the take off run the pilot (F/O. Horton of No. 88 Sqn.) was able to complete a circuit and land, showing what an outstanding single-engine performance the aircraft possessed.

Boston III's of No. 88 Squadron R.A.F.
(Photo: Imp. War Mus.)



Flying Officer Crump of No. 107 Sqdn. boards his aircraft; Gt. Massingham, April 1942. Note details of gunner's position.
(Photo: A. F. Carlisle)

The view from the cockpit (in which the pilot sat centrally) was very good. The controls gave a feeling of smooth stability rather than manoeuvrability; with low-geared aileron control (by British standards), the aircraft was not vicious and gave docile warning of the stall. The Boston III was wonderful for low flying; in a fighter affiliation exercise it was found that a Spitfire V could only keep up for a few minutes before overheating, whereas a Beaufighter was very slightly faster. Higher up, in spite of having two-speed superchargers, performance was not so good. Landing required care on the approach to get the speed down, and flaps moved slowly and were not very effective; in several instances fast landings on grass airfields in rain led to accidents after skidding 1,000 yards or more. In such cases the navigator was very badly placed; having only the perspex nose in front of him and an armour plate bulkhead at his



A machine of No. 23 Sqdn. and (below) *a Boston dropping its load over Charleroi, France.* (Photos: Imp. War Mus.)

back, he could not move out of the nose section or even see the pilot; however, his cockpit like the others was beautifully appointed. Film taken from this position when low flying has been used in documentaries and conveys something of the sensational ride it afforded.

The rear cockpit in which a wireless operator/air gunner (and sometimes an under-gunner) flew was also completely separate, although they could just see the pilot's back and pass messages by a pulley system if two intercom circuits and call lights failed. Basic dual control was fitted in this cockpit comprising only stick, pedals and throttles, but it was of no practical use. Rear armament was twin ·303 Brownings free mounted but with electric traversing; and a drum-fed Vickers 'K' gun could be fired downwards through the bottom hatch. Forward armament was four fixed ·303 Brownings, two each side of the nose. The outer pair were in blisters which could be removed and blanked off. The bomb load was four 500 lb. bombs or small bomb containers, or four S.C.I. tanks for smoke. A long range tank could be fitted in the fuselage above the bomb bay; there was no provision for carrying external stores. For night work flame-damping extensions were fitted to the huge exhaust pipes and were most necessary. Later, the Boston IIIA had separate exhaust stubs clustered around the back of the cowling.

Bostons were also used by the First Tactical Air Force in the Middle East and Italy; squadrons were Nos. 18 and 114. The latter finished the war with Boston IV's and V's and moved to Aden.

Many of the Commonwealth countries were supplied with the DB-7 type aircraft. R.C.A.F. squadrons began intruder sorties in the spring of 1942 using Boston III aircraft. In the summer of 1942, the Canadian and English forces both started their famous train hunts making it difficult for the enemy to move troops and freight on the rails. South African pilots found the Boston III's to their fancy in routing Rommel's forces in the Middle East. In one period during the desert campaign, one S.A.A.F. Boston squadron made six raids known as "Boston Tea Parties" against enemy airfields in a twenty-four hour period.

RUSSIAN DB-7 AIRCRAFT

Of the total of 7,479 DB-7/A-20 type of aircraft built from 1938 through October, 1944, Russia received 3,600. This was almost twice the number supplied to England and substantially more than the 1,962 aircraft delivered to American units. The majority of the Russian delivered aircraft were lend-lease A-20 type but records indicate that about 20 of the DB-7B aircraft were diverted to Russia.

TECHNICAL DESCRIPTION

The 7B aircraft was a twin engine, shoulder wing monoplane with the engine nacelles equally faired around the wing. Weighing 15,200 pounds loaded, the three place aircraft would top 304 m.p.h. at 5,000 feet with its two Pratt and Whitney R-1830-S6C3-G engines developing 1,100 horsepower at takeoff. A range of 1,350 miles could be attained at a cruising speed at 161 miles per hour. A gun nose or a glazed bombardier nose could be installed depending on the mission requirements. Armament in the attack version consisted of two ·50 calibre and six ·30 calibre machine guns fixed in the nose and a single ·30 calibre flexible gun in a retractable dorsal turret and a single calibre ·30 flexible gun in a retractable ventral turret. Two thousand pounds of bombs could be carried internally.

In the design of the 7B, particular attention was given to the pilot's visibility and ground handling. It was to give the pilot the best possible vision that the cockpit was moved forward of the propeller arc resulting in the characteristic long nose of the series. In the interest of safety during landings, particularly upon short field or with cross wind, a nosewheel type landing gear was selected. The design was based on several years of extensive test experience on a special Douglas OA-4 Dolphin amphibian and was also incorporated on the DC-4, DC-5 and the B-19 aircraft being built at that time by Douglas.

The DB-7 aircraft was a complete redesign using only the wing and landing gear design of the 7B. The fuselage was raised with respect to the wing, thus becoming a mid-wing monoplane with underslung engines. In general, the design was quite conventional consisting of aluminium alloy semi-monocoque fuselage and fixed surface structures, with fabric-covered movable surfaces. In order to facilitate shipping, repair, and maintenance, all larger units were designed to be quickly removable; thus an entire airframe could be disassembled and crated for either rail or sea shipping.

The wing structure consisted of a single spar, all-metal construction of aluminium alloy and could be

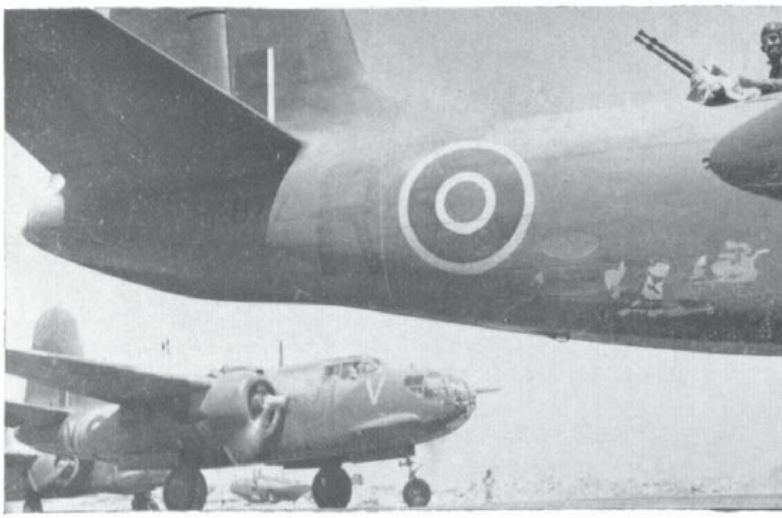
An aircraft of No. 24 Squadron, South African Air Force on a desert airstrip; the squadron played a leading part in the North African fighting. (Photo: Imp. War Mus.)

broken down into six major parts: (1) the left and right inboard panels which attach to the fuselage and extend out to a point approximately five feet outboard of the engine nacelles; (2) the left and right outboard wing panels; and (3) the left and right wing tips.

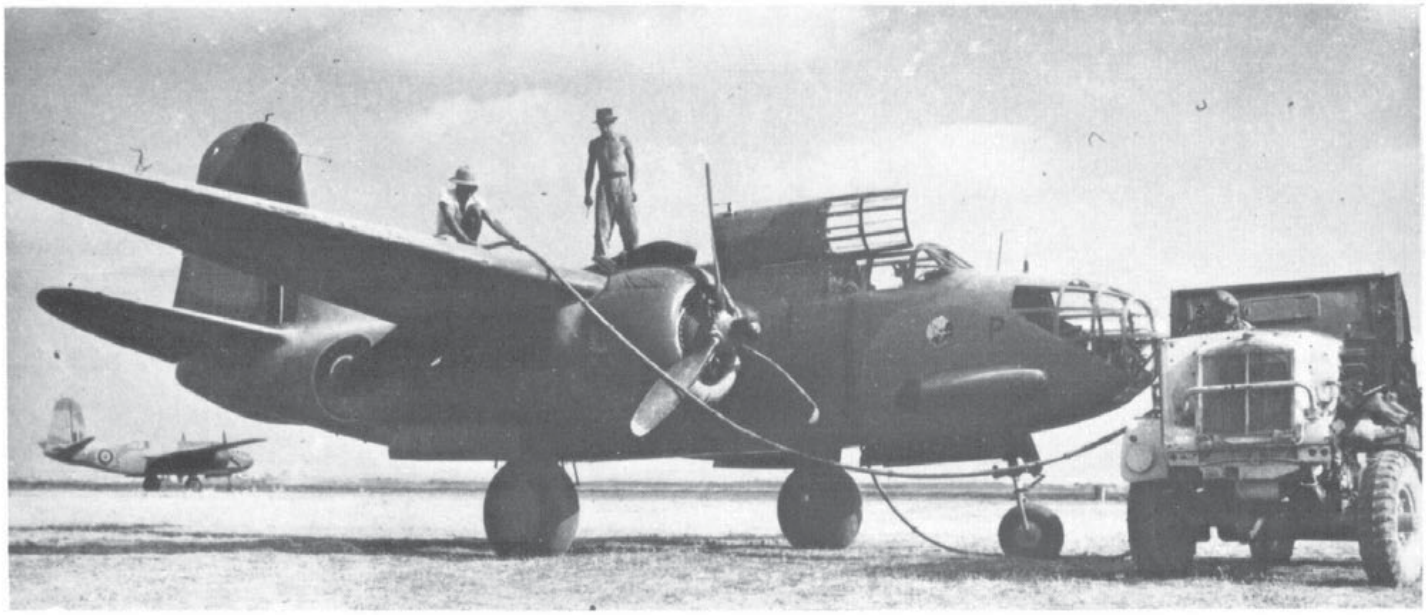
The fuselage was a semi-monocoque structure of high strength aluminium alloy. The bombardier's compartment was in the nose of the airplane and a door in the bottom provided egress. The pilot's compartment was entered by a side hinged hatch in the roof. The rear gunner's compartment was aft of the wing with a single flexible 7·5 mm. machine gun in both dorsal and ventral positions, each supplied with 500 rounds of ammunition. Forward firing guns consisted of four 7·5 mm. fixed machine guns each with 500 rounds of ammunition. Bombs were carried in two internal bays. A typical load would contain two vertical racks for 16 fifty kilogram bombs or two horizontal racks for eight 100 kilogram bombs.

For emergency operation, minimum dual controls in the rear gunner's compartment consisting of stick, rudder pedals, throttle and mixture control were provided.

The DB-7A aircraft was a minimum change version of the DB-7 with increased power as the major difference. The 14-cylinder Wright Cyclone R-2600-A5B air-cooled radial engine which developed 1600 horsepower for takeoff was substituted for the Pratt and Whitney engines. The fuselage was un-



Bostons of No. 24 Sqdn., S.A.A.F. on Malta. (Photos via A. Blake)



Marked in D-Day livery, machines of No. 88 Sqdn. R.A.F. prepare for smoke-laying sorties over the invasion beaches in June 1944.
(Photos: Imp. War Mus.)

changed except for some local beef-up due to weight and the power increase. While the horizontal tail was unchanged, the vertical tail area was increased from 45 square feet to 63 square feet.

The DB-7B aircraft resembled the DB-7A aircraft externally, but internally it was completely new. The bombardier nose was extended six inches and approximately 25 per cent. more plexiglass added for greater visibility. The main wing attachment fittings in the fuselage were made from steel forgings in place of dural as was used in the DB-7A. Both the wing structure and fuselage structure were redesigned for the additional design gross weight requirement, which was increased from 16,000 to 19,750 pounds.

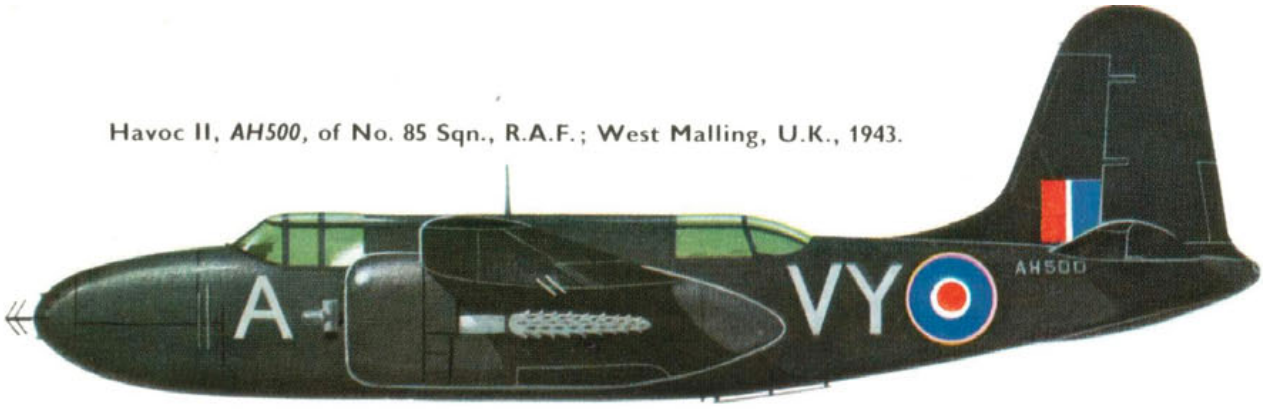
The nose armament consisted of four fixed Browning ·303 calibre machine guns, two of the guns being installed in streamlined "blisters". The rear upper gun station was changed to provide a twin flexible ·303 calibre unit while the lower station consisted of a single Vickers ·303 calibre flexible gun. The bomb bay was extended aft in order to accommodate British type chemical tanks for smoke-screen laying and small bomb containers. The fuel tanks in the wings were enlarged to 395 gallons capacity from the previous 325 gallon and changed to self-sealing type. The technical features of the DB-7 series are summarized on back page.

MAJOR MODIFICATIONS

With the thought of improving the rearward arc of fire, one aircraft was flight tested with a twin tail arrangement. This configuration was considered for introduction on all aircraft including the A-20 series in October, 1939. In June, 1940 permission was given by the French Air Commission to modifiy one DB-7 aircraft to thoroughly investigate the ramifications of such an alteration. The 131st DB-7 (c/n 2318) was selected and test flights commenced 26th July 1940. Twenty one test flights were made to determine the effect on single engine control, control forces, stability, trim, buffeting, and speed loss. The test flights indicated that stability was improved slightly, buffeting increased and speed was decreased 3 to 5 miles per hour. It was decided not to introduce this change into production and the twin-tailed aircraft left the factory 11th November 1940 for fly-away delivery to the R.A.F. who had assumed responsibility for the aircraft after the French surrender. The aircraft reverted to the single tail configuration after arrival at the Lockheed re-assembly facility at Liverpool.

The installation of the four gun Boulton-Paul power turret was considered for installation in the DB-7B aircraft. To determine the effect on stability and control, it was decided to flight test a mock-up of the turret on a DB-7A aircraft. In January, 1941,

Havoc II, *AH500*, of No. 85 Sqn., R.A.F.; West Malling, U.K., 1943.

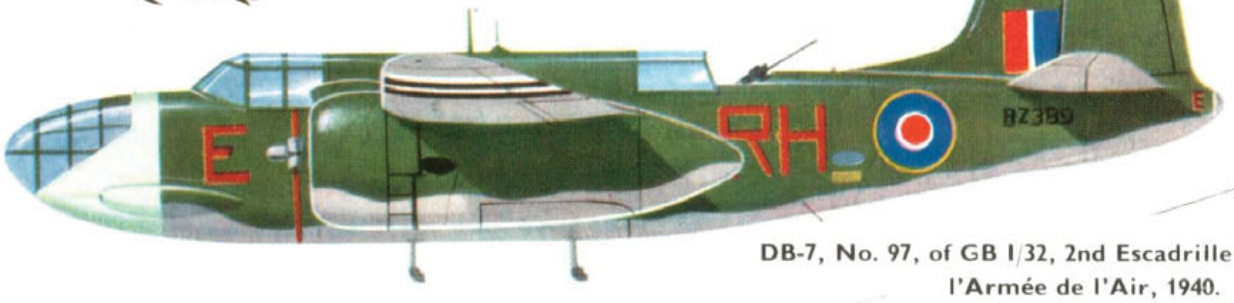


Boston III, *BZ377*, of No. 88 "Hong Kong" Sqn., R.A.F.; U.K., 1944.

GB II/19, 2nd Escadrille.

Boston III, *BZ389*, of No. 88 "Hong Kong" Sqn., R.A.F.; laid D-Day smoke screen on Normandy beaches, subsequently operated with 2nd T.A.F.

GB I/32, 2nd Esc.



DB-7, No. 97, of GB I/32, 2nd Escadrille; l'Armée de l'Air, 1940.

GB I/19, 1st Esc.; starboard side presentation.

Cross of Lorraine.

DB-7, No. 100, of GB I/19, 1st Escadrille; Vichy Air Force, 1942.

Boston III of No. 342 "Lorraine" Sqn., Free French Air Force, 1944. Note absence of fin flash.

Arms of Lorraine.

the British Air Commission selected DB-7A aircraft number 34 (c/n 2983, AH463) as the suitable test vehicle. In a test flight 14th April 1941, R.A.F. test pilot Wing Commander Clarkson indicated that the configuration was entirely suitable for operational usage. However, the installation was not considered for production in DB-7B aircraft because of the turret shortage and AH463 was returned to standard configuration and delivered.

CODE LETTERS AND EXAMPLES OF AIRFRAME NUMBERS OF U.K.-BASED BOSTONS

No. 88 Sqn., 'RH'

Mk. III
W8332
Z2230 'C'
Z2231
AL690

No. 107 Sqn., 'OM'

Mk. III
W8329 'M'
Z2252 'M'
AH740 'A'
AL702 'F'

No. 226 Sqn., 'MQ'

Mk. III
W8371 'F'
Z2266 'S'
AH740 'S'
AL703 'S'

Mk. IIIA
BZ196 'E'
BZ214 'T'
BZ357 'S'
BZ389 'E'

Mk. IIIA
BZ203 'G'
BZ285 'G'
BZ371 'S'
BZ394 'S'

Mk. IV
BZ405 'E'
BZ428 'S'
BZ449 'S'
BZ553 'S'

No. 342 'Lorraine' Sqn., 'OA'

Mk. IIIA
BZ259 'S'
BZ275 'S'
BZ290 'S'
BZ312 'E'

Mk. IV
BZ443 'B'
BZ451 'S'
BZ538 'S'

No. 13 O.T.U., 'SL'

Mk. IIIA
BZ298
BZ356

SPECIFICATION

	DB-7	DB-7	DB-7A	DB-7B
Engine	P & W R-1830-SC3G	P & W R-1830-S3C4-G	Wright R-2600-A5B	Wright R-2600-A5B
Supercharging	single speed	two speed	two-speed	two-speed
Normal gross wt., lbs.	15,150	15,150	16,700	20,320
Crew	3	3	3	4
Take-off over 50 ft. obst., ft. ...	1,290	1,180	1,560	2,400
Max. speed at sea level, m.p.h. ...	280	293	308	311
Critical altitude, ft.	9,650	15,200	12,500	12,500
Max. speed at critical alt., m.p.h.	305	322	344	338
Service ceiling, ft.	31,650	33,800	32,000	27,600
Landing speed, m.p.h.	86	86	97	95
Range at capacity load, st. miles...	462	462	490	525
Fuel capacity, U.S. Gal.	325	325	325	395
Normal bombs, lbs.	1,000	1,000	1,049	1,000
Max. bombs, lbs.	2,080	2,080	2,129	2,000
Wing span, ft.	61·3	61·3	61·3	61·3
Length, ft.	47	47	47	47·5

TABLE 1

C/N		Registration		Q'ty.	Model	Customer	Acceptance Dates		Remarks
From	To	From	To						
292	—	—	—	0	7A	Design Study	—	—	El Segundo Douglas C/N's
379	—	—	—	1	7B	Proposal	crashed		El Segundo Douglas C/N's
431	530	No. 1*	No. 100	100	DB-7	France	31-10-39	16-2-40	El Segundo Douglas C/N's
2288	2382	No. 101*	No. 195	95	DB-7	France (France)	22-4-40	3-7-40	Santa Monica Douglas C/N's
2383	2457	*	*	75	DB-7	England (France)	8-7-40	3-9-40†	Santa Monica Douglas C/N's
2950	—	AH430	—	0	DB-7A	England (France)	crashed		Santa Monica Douglas C/N's
2951	3049	AH431	AH529	99	DB-7A	England	10-10-40	13-2-41	Santa Monica Douglas C/N's
3300	3449	W8252	W8401	150	DB-7B	England	4-4-41	3-7-41	Santa Monica Douglas C/N's
3450	3599	Z2155	Z2304	150	DB-7B	England	12-7-41	8-9-41	Santa Monica Douglas C/N's
3600	3839	AL668	AL907	240	DB-7B	England	8-9-41	19-11-41	Santa Monica Douglas C/N's
4149	—	AH740	—	1	DB-7B	England	—	—	Santa Monica Douglas C/N's
2130	2203	AL263	AL336	74	DB-7B	England	30-10-41	—	Boeing C/N's
2718	2883	AL337	AL502	166	DB-7B	England	—	31-3-42	Boeing C/N's

* *DB-7 assigned following numbers: AE457-AE472; AW392-AW414; AX848-AX851; AX910-AX918; AX919-AX975; BB890-BB912; BD110-BD127; BJ458-BJ501 (only 37 aircraft in this block assigned); BK882-BK883; BL227-BL228; BT460-BT465; BV203; DG554-DG555; DK274-DK277.*

† *Twin-tailed DB-7 delivered 11-11-40.*

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