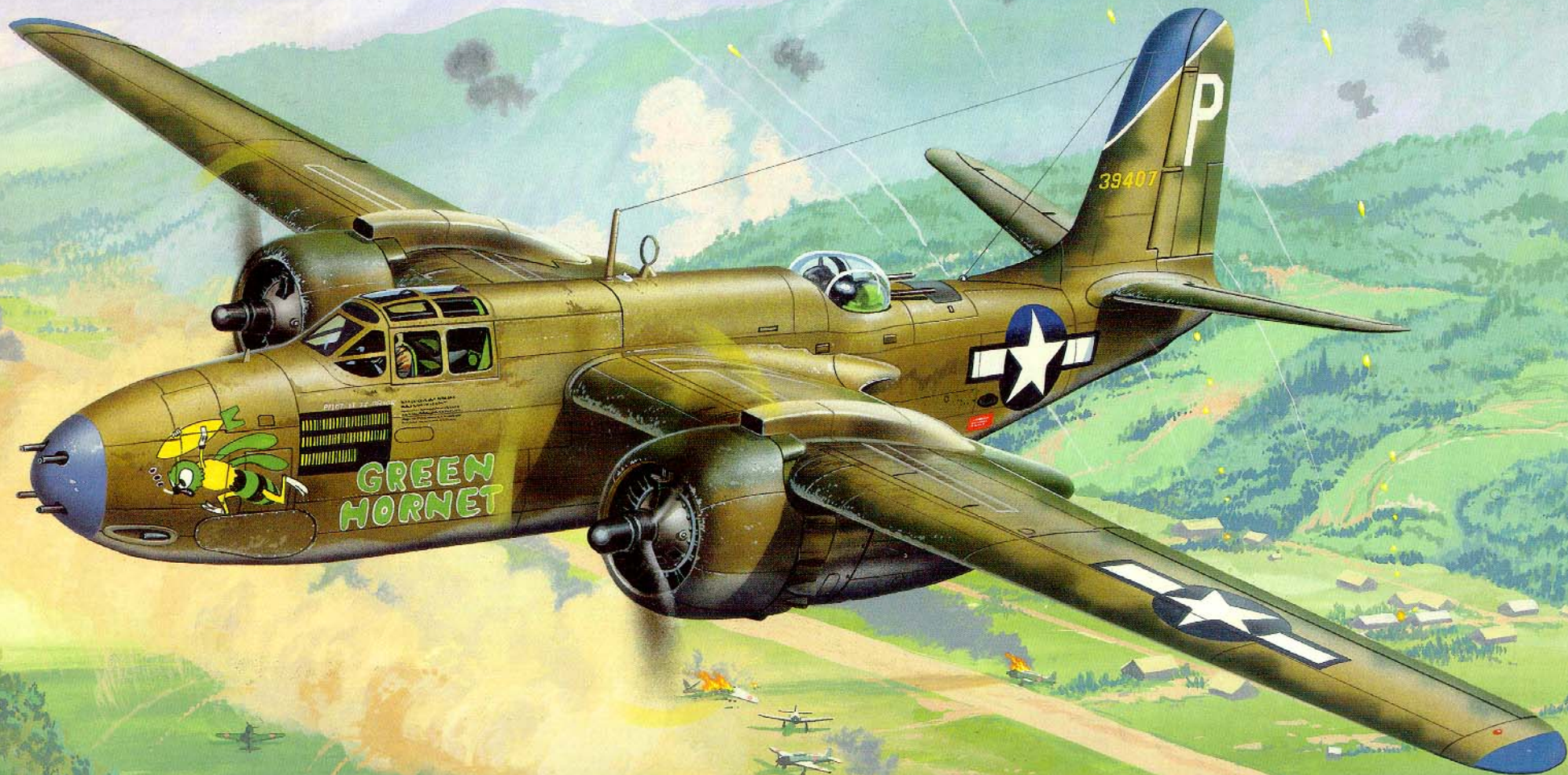


A-20 HAVOC

in action



Aircraft Number 144
squadron/signal publications

DON GREER

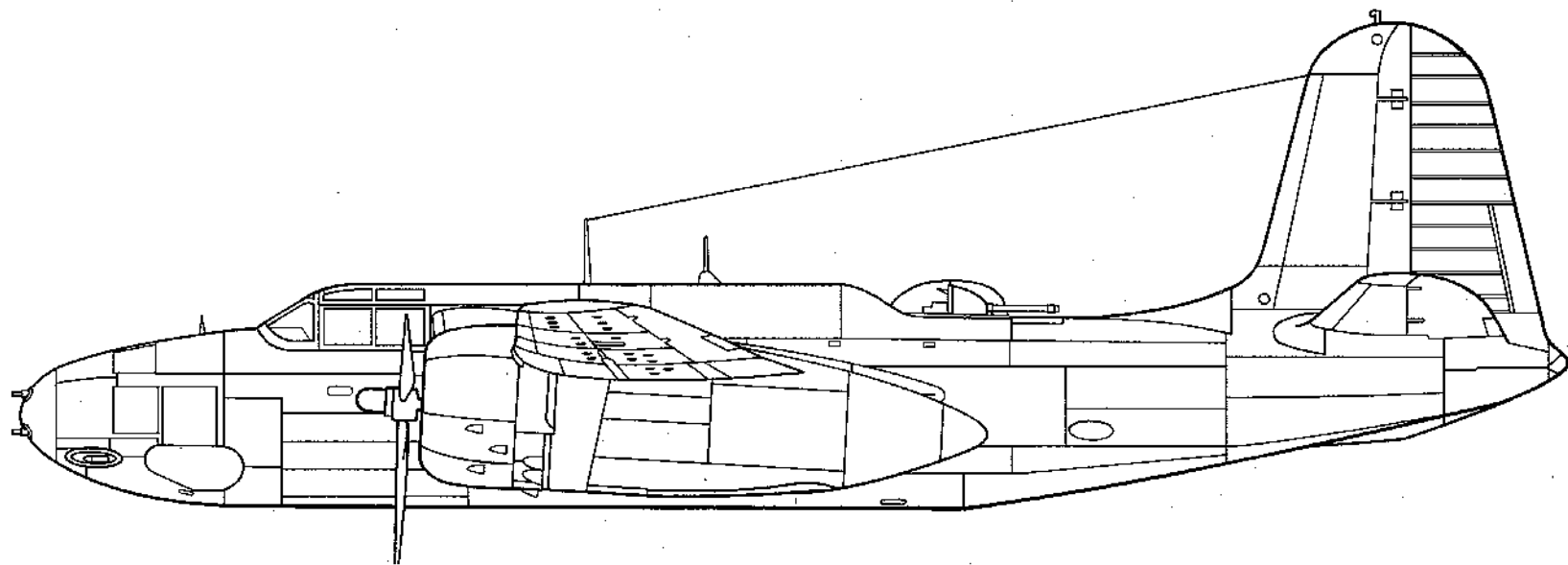
A-20 Havoc

in action

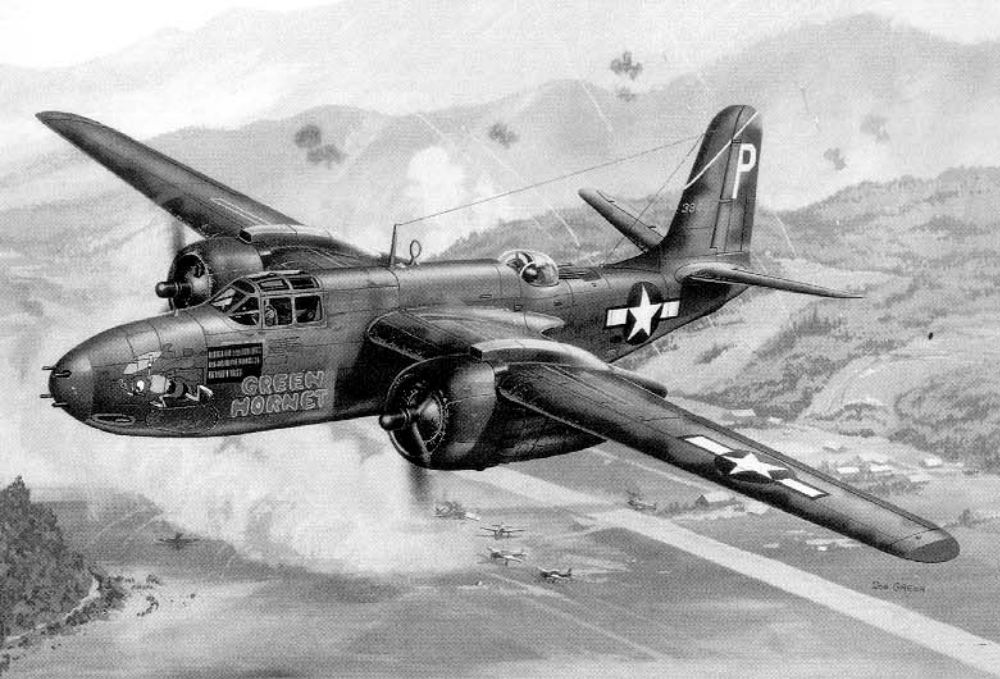
By Jim Mesko

Color by Don Greer

Illustrated by Joe Sewell



Aircraft Number 144
squadron/signal publications



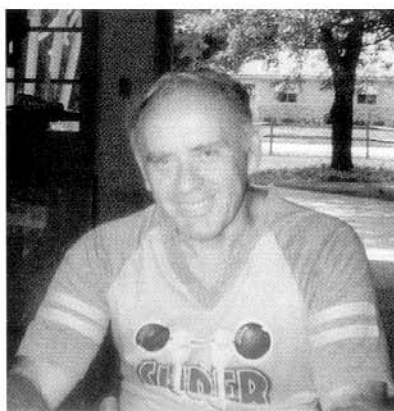
An A-20G of the 675th Bomb Squadron, 417th Bomb Group strikes Japanese positions on Halmahera Island, Dutch New Guinea. The aircraft was named GREEN HORNET and flown by Lieutenant John Pryor.

Dedication: To Peter Mesko, 12 June 1917- 5 June 1994

This book is dedicated to the memory of my father, who passed away one week before his 77th birthday after a ten year struggle with heart disease. His valiant struggle during this time showed the true nature of human courage and inspired all who knew him and loved him. May he now rest in peace with God in heaven. Jim Mesko



(1944 - Philippines)



(Akron - 1990)

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Tom Draper	Air Force Museum and Staff

The Douglas A-20 Havoc was one of the most aerodynamically clean aircraft to see service in the Second World War. This A-20G-20 was the final culmination of the line and featured a heavy nose armament of six .50 caliber machine guns, a rear power operated gun turret and could carry a two ton bomb load over 1,000 miles at a top speed of over 300 mph. In addition, its handling characteristics and maneuverability were well liked by the crews of the various Allied air forces which used it. The Havoc played a very important role in the eventual defeat of the Axis, particularly in the early days of the war. It was undoubtedly one of the finest warplanes used by either side in the course of the war. (USAF)



Introduction

During the 1930s, the fragile peace which had existed following the First World War gradually gave way to armed conflict in many parts of the world. Japan, taking advantage of political unrest in China, took over Manchuria, then invaded China itself to gain new markets and bases for future expansion. Italy did the same in tiny Ethiopia, conquering the small backward country in a hail of bombs and shells against a brave but futile resistance. Germany, smarting from her defeat and the Versailles Peace Treaty, began, under the rule of Adolph Hitler, to rearm and openly violate the terms of the peace accord. Then in 1936, civil war broke out in Spain, with Italy and Germany providing support for Franco's Nationalists rebels, while the USSR sent aid to the Loyalist movement. All three countries used Spain as a testing ground for their new equipment and gained valuable information which proved extremely useful in modernizing their armed forces.

Unfortunately, the United States chose to ignore these signals in general, feeling that if we did not interfere in these events, the country would not become involved. But, a few individuals in the military and industry realized that such a view placed the country in jeopardy and began making plans to modernize the U.S. military for what they viewed as our eventual participation in a world conflict.

Douglas Aircraft Company was one such far sighted firm and in early 1936 began working on a twin engine, private venture project in anticipation of an Army Air Corps requirement for a light attack and observation aircraft. Under the capable hands of Jack Northrop and Ed Heinemann, the new aircraft, designated the Model 7A, quickly took shape. The new aircraft was powered by two Pratt & Whitney R985 Wasp Jr. engines which were mounted in nacelles on the shoulder wing. The aircraft was very slim with a tricycle landing gear and provision for a pilot and one crewman. The top speed was expected to be in excess of 250 mph. Provisions were made for it to carry a number of flexible and fixed .30 caliber machine guns, a light bomb load, or as an alternative, a glazed lower mid-section reconnaissance or observation in place of the bomb bay. When the design was approximately fifty percent complete and a mock-up had been built, new information reached Douglas concerning what the Air Corps was looking for, and it was decided to shelve the Model 7A in favor of a completely new design.

The initial Douglas design which was the forerunner of the A-20 was the Model 7B. The Model 7B evolved out of a paper design, the Model 7A, which was only built as a mock-up. The Model 7B came in two versions which had different noses. The "A" nose was solid and could carry six .30 caliber machine guns and two .50 caliber machine guns. The shiny teardrop shaped piece of metal on the fuselage under the cockpit is where a blister could be mounted on the glass nosed version to carry .30 caliber machine guns. (McDonnell-Douglas via Merritt)



Based on information coming out of the Spanish Civil War, the Army wanted an aircraft which would have a range of 1,200 miles, fly at 200 mph and carry a 1,200 pound bomb load. It then invited companies to submit designs for such an aircraft during late 1937, requiring that they be ready for submission in July of 1938. In January of 1938, Jack Northrop quit Douglas to form his own company and Heinemann along with project engineer, Weidenheimer began work on a revised design, the Model 7B.

Using the Model 7A as a start point, they refined and upgraded the earlier design. Alternate nose sections were designed, one clear for a bombardier and his equipment, and one solid for a battery of six .30 caliber machine guns and two .50 caliber machine guns. These interchangeable noses allowed the design team to do away with the observation station in place of the bomb bay. In addition, the clear nose model could carry machine guns in "blister" packages on the fuselage on either side of the nose. New engines, 1,100 hp Pratt & Whitney R-1830 S3C3-G radials, were substituted for the original R985s, nearly tripling the available horsepower. These new engines allowed the aircraft to carry a 2,000 pound load at anticipated speeds much higher than the initial Army requirement.

Satisfied with their design, Douglas submitted it to the Army Air Corps. After looking it over, the Army invited Douglas, and the other competitors, Bell (Model 9), Martin (Model 167F), Stearman (X-100) and North American (NA-40) to build, at their own expense, prototypes of their designs. Bell declined to participate, but all the others began work on their prototypes in order to reach a 17 March 1939 deadline.

The DB-7 progressed rapidly and by late October of 1938, the aircraft was ready for flight testing. On 26 October, the first flight took place, followed by a series of company flight tests. The new design proved to be exceptionally maneuverable, fast, and exhibited no serious handling vices. The U.S., however, still vacillated between isolationism and rearming to meet the threats coming out of Europe and Asia, and despite being impressed with the 7B, nothing concrete was done by the government toward acquiring the aircraft.

While all this was going on, a French Purchasing Commission was touring various U.S. aviation companies looking for new or existing designs to purchase for the Armee de l'Air in order to match the expanding aerial might of the new German Luftwaffe. Informed about the new Douglas design, members of the commission were able to obtain permission to witness performance trials, although this was kept secret in order not to raise any diplomatic problems or give the isolationist forces more fuel for their fire. Impressed with what they saw, the com-

The Model 7B, nose was glass enclosed and could carry a bombardier and the needed equipment for low level attack missions. The machine gun blister below the cockpit carried two .30 caliber machine guns. The one and only prototype carried U.S. Army Air Corps markings and crashed in January of 1939, with a French observer aboard. This caused quite a political stir since at the time the U.S. was still officially neutral. (McDonnell-Douglas via Merritt)



mission asked for, and received permission to participate in the flight tests. As a result, throughout December of 1938 and into January of 1939, various members of the commission took part in flight tests, again this being kept secret. Unfortunately, during one such test on 23 January, to show off the aircraft's single engine handling characteristics, an engine failure resulted in the 7B going into a tight spin at low altitude. The Douglas test pilot, John C. Able, was able to bail out, but his parachute only partially opened and he died on impact with the ground. The French observer, Captain Maurice Chemidlan, trapped in the spinning aircraft, survived the crash, although with serious injuries. Spectators rushed to the scene and carried off the Frenchman on a makeshift stretcher made from the remains of the vertical tail section. The media, however, soon discovered the presence of a foreign observer on the aircraft, and soon the cry went up from the isolationist forces. General Henry "Hap" Arnold, bore the brunt of this controversy and for nearly a year, he was under constant scrutiny by isolationist officials in Washington.

While the crash of the prototype was a serious setback, the French, desperately in need of modern aircraft, placed an order for 100 aircraft, which was later increased to 270. The French requested that certain changes be made, including an increase in the aircraft's range and payload, additional armor, and French instruments and weapons. These requests, coupled with flight data, made Heinemann approach Donald Douglas about the possibility of revising the design in order to improve it. Douglas finally acceded to his request and work began on the revision, designated the DB-7, for Douglas, Bomber Seven.

The first major redesign was in the fuselage which was narrowed and deepened which lowered wing resistance and allowed more fuel to be carried. Unfortunately, this did not allow the crew to change places in the air, and if the pilot was severely injured or killed, neither the bombardier or gunner could take over the controls. To alleviate this, a second set of controls was fitted to the gunners station with limited instrumentation to provide some chance of making it back to base. These were of such limited value, that on later models they were eliminated. In place of interchangeable nose sections, a compromise was reached with a series of clear panels and a glass nose for the bombardier and four fixed machine guns fitted slightly behind and below the nose. Right behind the trailing edge of the wing, the top of the fuselage dipped down to form a gunners position which was covered with a sliding glass canopy and fitted with a single machine gun. Below that was fitted a ventral gun position also fitted with a single machine gun, all armament on the aircraft being French 7.5MM Chatellerault machine guns.

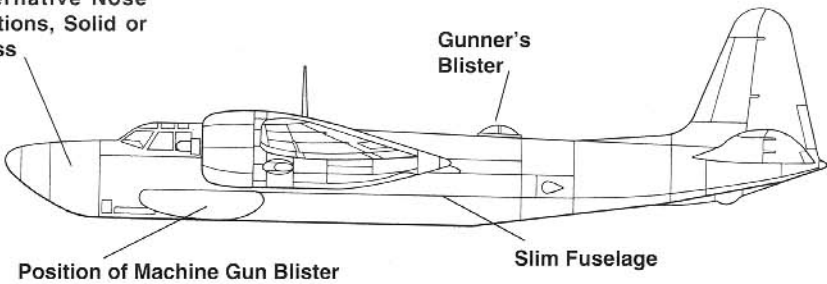
With this revision of the fuselage, the wings were mounted near the middle of the fuselage rather than at shoulder position. In order that the landing gear not become extremely long, the engine nacelles were moved to an underslung position on the wing. The nose wheel leg, however, did need to be lengthened to compensate for the additional height of the fuselage off the ground. A slightly different engine, the Pratt & Whitney R-1830-SC3-G replaced the earlier 7B power plant and the nacelles were enlarged to handle the new mount and slightly revised landing gear.

By mid-August of 1939, the DB-7 was ready for flight and production was soon underway at the Douglas El Segundo, California plant. The first production DB-7 rolled off the assembly line in October and the French ordered an additional 170 aircraft in the same month. These were to be equipped with the more powerful Pratt & Whitney R-1830-S3C4-G radial fitted with a two stage supercharger. Due to engine shortages, these were not readily available, and the French, desperate for aircraft, agreed to allow Douglas to use the older engines to keep the production line open.

Design Development

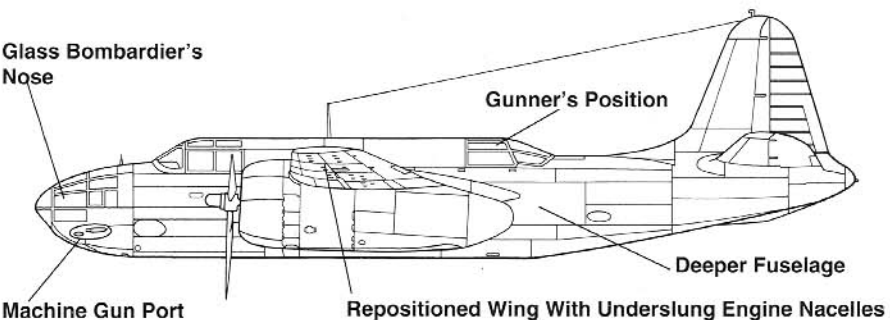
Model 7

Alternative Nose Sections, Solid or Glass



DB-7

Glass Bombardier's Nose

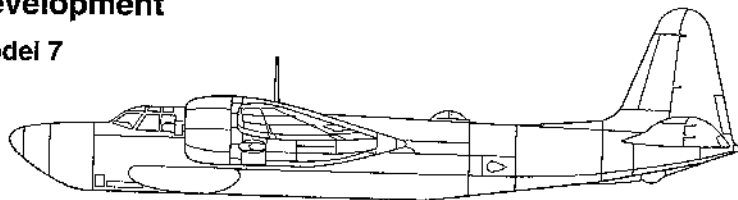


With the crash of prototype the company redesigned the basic aircraft and came up with the more potent DB-7, which had more powerful engines and combined the two noses into one. One of the early production model sits on the ramp at the Douglas El Segundo facility in California prior to a flight check. (USAF)

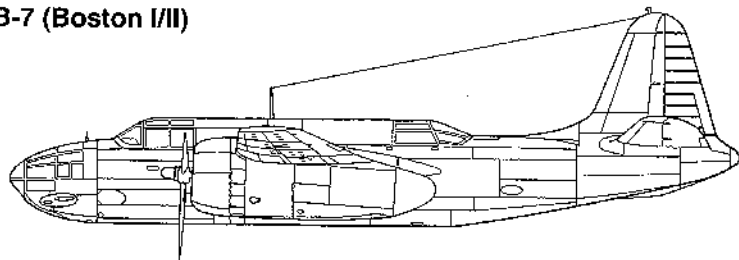


Development

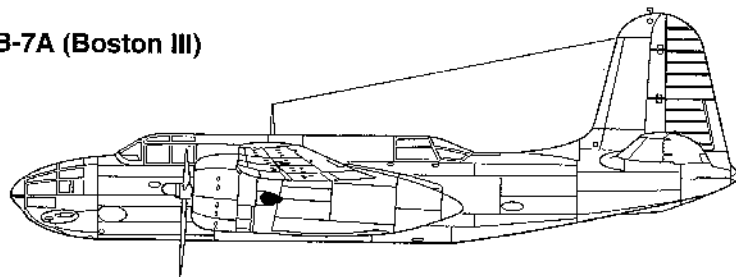
Model 7



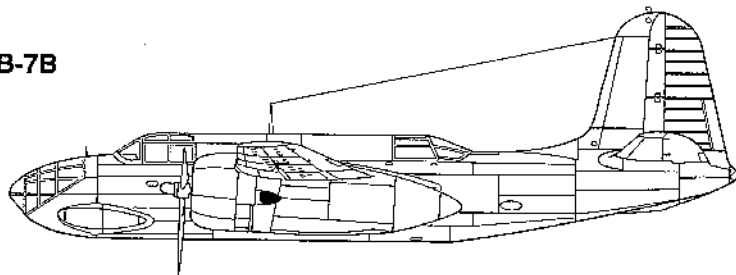
DB-7 (Boston I/II)



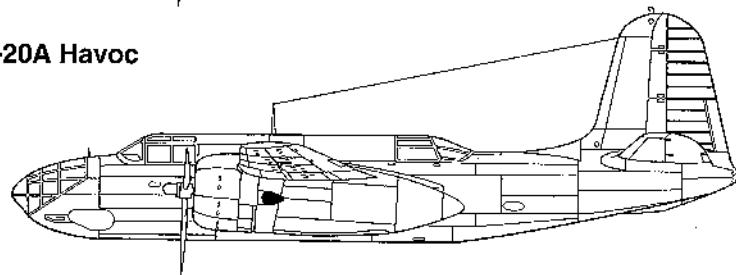
DB-7A (Boston III)



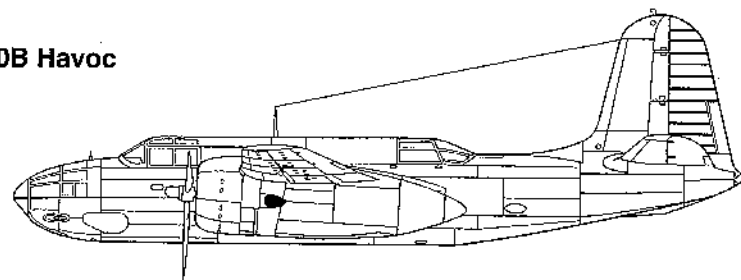
DB-7B



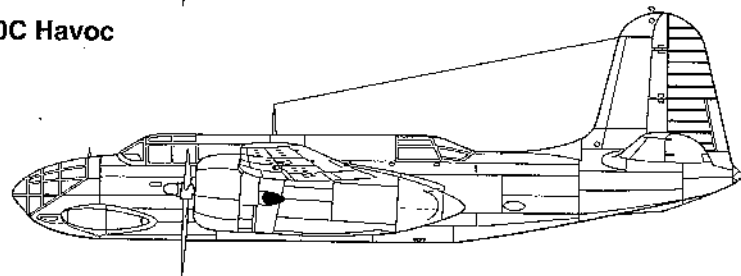
A-20A Havoc



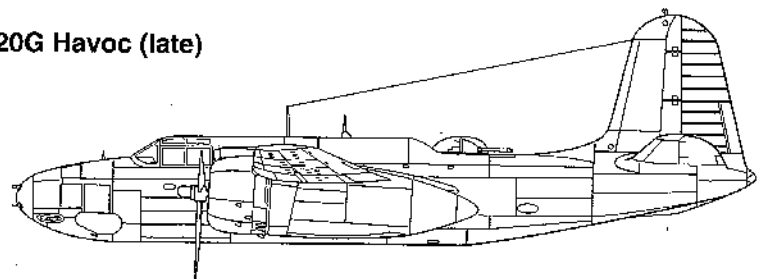
A-20B Havoc



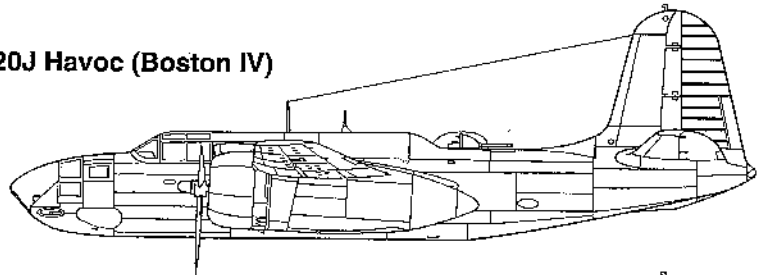
A-20C Havoc



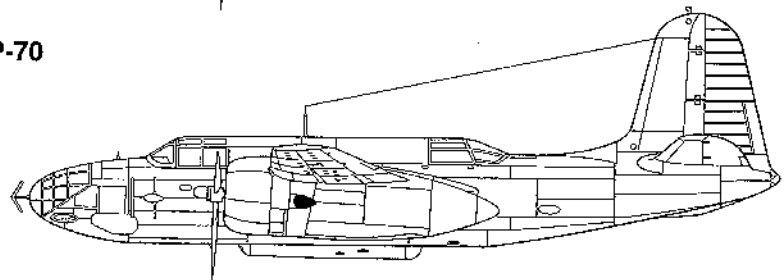
A-20G Havoc (late)



A-20J Havoc (Boston IV)



P-70



DB-7A

While the French were pleased with the initial performance of the DB-7, they also wanted to see if its overall performance could be improved with more powerful engines. As a result, a third order for 100 aircraft was given to Douglas for aircraft fitted with different engines. The engine specified was the 1,600 hp Wright R-2600-A5B radial. These were export models of those being used for one of the American versions of the DB-7, the A-20A. The only significant change in the overall design was in the nacelle and tail area. Due to the size of the new engines, the nacelles were lengthened, which resulted in a more pointed appearance compared to the shorter, rounder DB-7 nacelle. Cooling slots were also added to the cowlings and the intakes and exhausts were also redesigned. The increased power of the Wright engines caused serious concerns about directional stability, control and structural integrity. In order to compensate for this, the vertical fin and rudder were increased in size and additional internal strengthening was added to the tail area. Another solution that was tested was twin tail surfaces, which were fitted to two aircraft to see if control and stability could be improved. It was also tried to see if the twin tail arrangement would allow a better field of fire for the rear gunner. After some testing, it was found that the twin tails offered no significant benefits and the aircraft were converted back to standard single tail configuration.

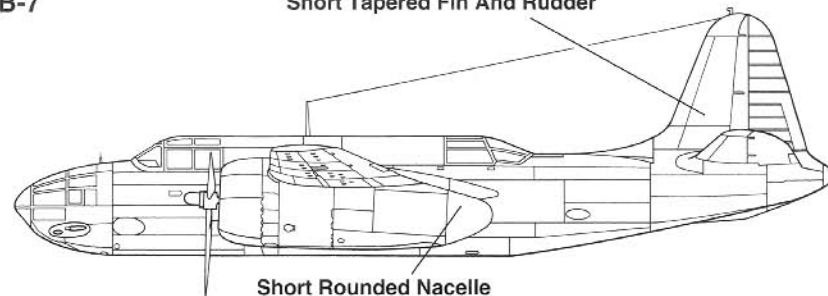
Two other minor changes also took place. A new landing gear was substituted in place of the original design due to a better design and to ease maintenance. A fixed machine gun was also mounted in the aft section of each engine nacelle for rear defense. Later, tests with these showed that they were of little value and were rarely, if ever fitted.

Eventually, the French were to place a series of orders for this new variant, designated the DB-7B, but very few of the aircraft ordered reached France prior to the fall in the spring of 1940. The bulk of the order was diverted to the British where the aircraft were designated as the Boston. Roman numerals were used to differentiate the various types with the DB-7s becoming Boston Is or IIs, while the DB-7A received no Boston designation.

Nacelle And Fin Development

DB-7

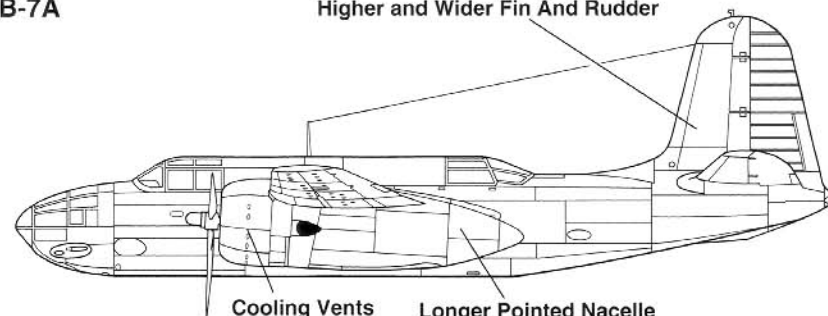
Short Tapered Fin And Rudder



Short Rounded Nacelle

DB-7A

Higher and Wider Fin And Rudder



Cooling Vents

Longer Pointed Nacelle

DB-7A was a more powerful version of the DB-7 powered by 1,600 hp Wright R-2600-A5B radial engines. This resulted in an increase in the engine nacelle length and a larger tail to handle the additional power. This line-up of DB-7As was taken over by the British after the fall of France.(McDonnell Douglas via Merritt)



DB-7B

The British, like the French, were in desperate need of modern aircraft to match the might of Hitler's Luftwaffe. The new Douglas aircraft caught the attention of the British Purchasing Commission, which, like its French counterpart was touring various aircraft manufactures. While impressed with the DB-7, they inquired about having certain changes made in the DB-7A being built for the French, which would make it suitable for British service. The only major outward change was a rearrangement of the nose transparency so that instead of a stepped arrangement, the glass would go back on a diagonal angle which would improve visibility. They also wanted British weapons and instruments fitted to the aircraft. While the change in instrumentation was easy, problems arose with changing the weapons in the nose. It was found that the British machine guns would not fit inside the fuselage and so a teardrop fairing was used to cover them, resulting in little added drag. Satisfied with these changes, the British ordered 150 aircraft in February of 1940 and another 150 in April. These aircraft were designated as DB-7Bs and were very similar in overall appearance to U.S. Army Air Corps A-20s and A-20As.

The French also placed an order for this type under the designation DB-73, apparently so numbered as not to confuse their aircraft with the British DB-7Bs. These aircraft were equipped with French instruments and weapons, but with the fall of France, none were ever delivered.

The British decided to name the Douglas bomber the Boston and used Roman numerals to designate different models. The DB-7B became the Boston III as the British had taken over earlier French aircraft orders which became Boston Is and IIs. Some of the Boston IIIs were fitted with special flame dampers over the exhausts and equipped with a ventral gun pack under the fuselage containing four 20MM cannon. Aircraft which were so modified were designated as Boston III Intruders.

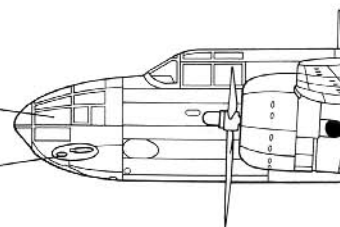
British interest in the DB-7 series resulted in an order for a version similar to the DB-7A but with a different type of nose, British weapons and instrument arrangement. The new nose made the aircraft slightly longer, but otherwise the aircraft was externally identical to the French model. (McDonnell Douglas via Merritt)

Nose Development

DB-7A Boston I/II

Stepped Bombardier's Nose Glazing

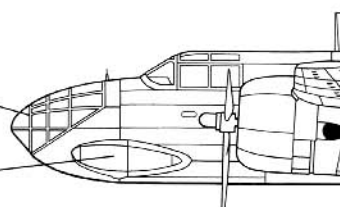
Machine Gun Port



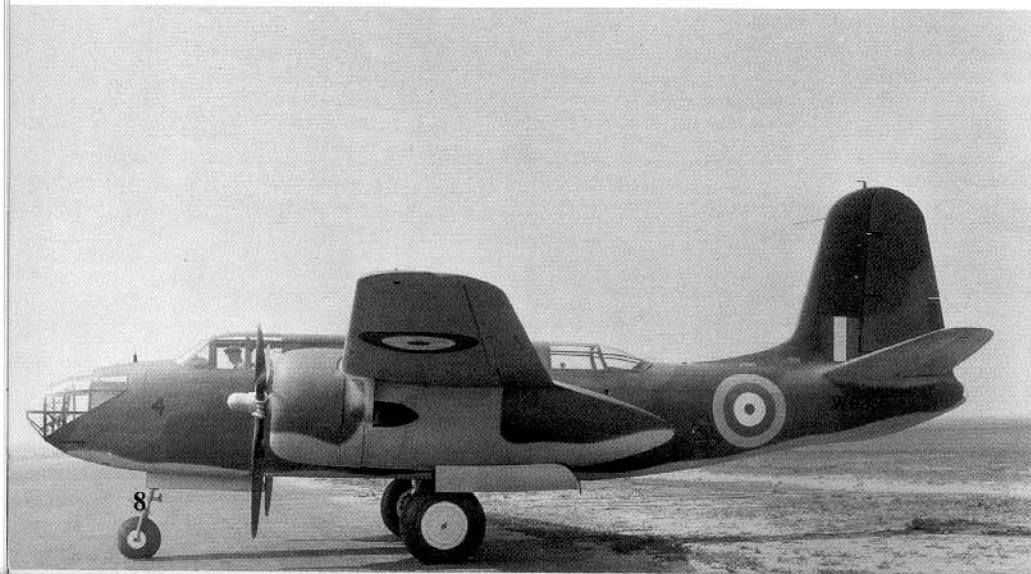
DB-7B Boston III

Diagonal Bombardier's Nose Glazing

Machine Gun Blister



The British chose the name "Boston" for this new aircraft and later, when they began to receive earlier French versions, used Roman numerals to designate different models. The DB-7B became the Boston III. The gunner in the rear was enclosed during flight by a sliding glass canopy that he opened when in a combat zone in order to bring his single (later twin) machine gun to bear. The small dark oval object in front of the roundel is a small side window just above the ventral machine gun position which was fitted with a single machine gun for lower defense. (McDonnell Douglas via Merritt)



A-20

While the French were the first to place an order for the new Douglas design, the U.S. Army Air Corps had finally decided that the basic DB-7 design best met their 1938 specification for an attack aircraft. As a result, the Army placed an order for the aircraft in June of 1939. Certain changes were specified for the U. S. variant, including more powerful engines and some of these were to be equipped with turbosuperchargers. Those fitted with the superchargers were to be designated as A-20s and these roughly corresponded to the DB-7B. The aircraft were powered by Wright R-2600-7 engines, but the supercharger installation was extremely bulky and problems arose with cooling. As a result, the Army decided to drop the supercharger, since the mission of the aircraft would be low-level attack, which did not require high altitude performance.

Sixty-three A-20s were ordered and all but three of these were eventually converted to night fighters, one serving as the prototype XP-70 and the remainder as P-70s. These were fitted with the British AI Mk IV radar in the nose and four 20MM cannon were fitted in a ventral pack under the fuselage. The remaining three were initially outfitted as photo-reconnaissance aircraft under the designation XF-3 (one) and YF-3 (two), which were later used to test various armament configurations. All of these were fitted with turbosupercharged Wright R-2600-11 engines for better altitude performance.



The remaining three A-20s were converted to F-3 photo reconnaissance aircraft and used for a variety of jobs and experiments. The last of these was assigned to the 2nd Reconnaissance Squadron at Ladd Field in Alaska during August of 1942. (USAF)

The Army finally became interested in the new Douglas bomber and placed orders for two similar variants. The A-20 was very similar to the DB-7B, but was supposed to be fitted with a turbosupercharger in the nacelles for high level performance; however, this idea did not prove practical and was dropped. Eventually, all the aircraft except three were converted to night fighters. The large turbosupercharger was located directly under the wing on the side of the nacelle. (Air Force Museum)



A-20A

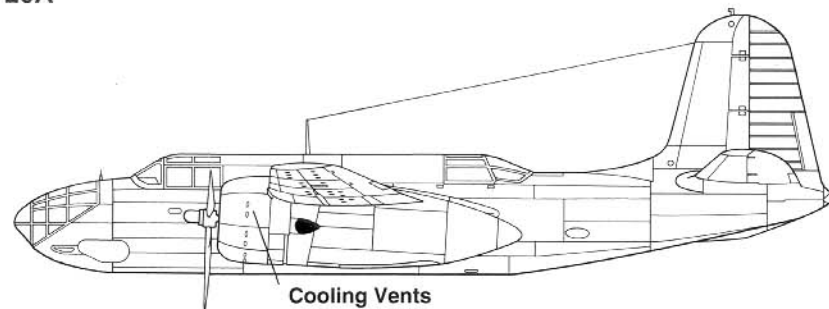
The A-20A was very similar to the A-20 except for the bulky turbosupercharger. They were fitted with a slightly less powerful engine, the Wright R-2600-3, which produced some 1,600 hp. This engine was similar to those used on the French DB-7A and British DB-7B (Boston III). Outwardly there was little to differentiate the Boston III and A-20A. Early aircraft had cooling vents along the sides of the engine cowling like the DB-7A, but these were later deleted as they proved to be of little use. Machine guns could be mounted alongside the nose in teardrop shaped fairings and aft firing machine guns could be fitted in the engine nacelles, but these were rarely actually installed. A single or twin machine gun could be fitted in the gunners upper compartment and a single ventral gun was installed for downward defense.

Production of the A-20 began during late 1940, and the first aircraft off the assemble line rolled out in December of that year. The initial order of 123 aircraft was later increased by and additional twenty aircraft, these being fitted with the more powerful Wright R2600-11 engines, although no designation change was made.

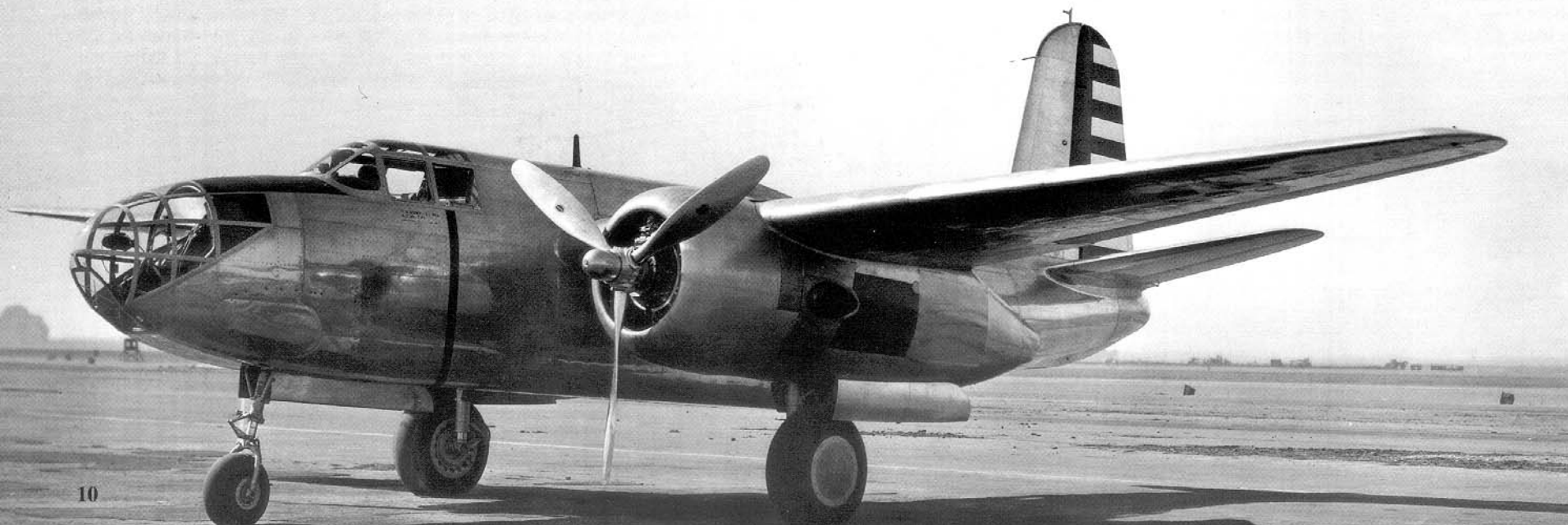
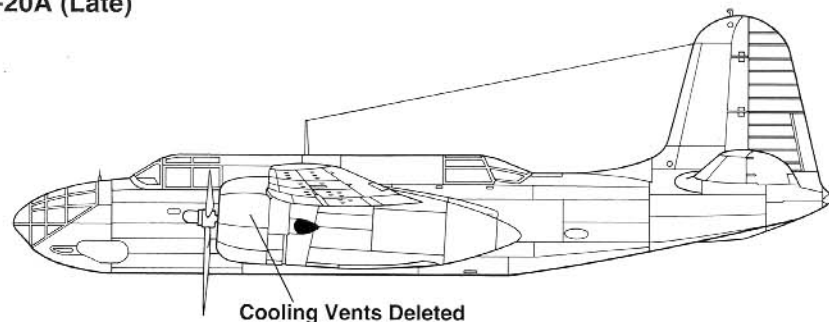
One A-20A was also used for a short time under lease by the U.S. Navy which needed a high speed utility aircraft to tow targets at realistic speeds for aerial gunnery. Designated the BD-1, the Navy was very impressed with the aircraft and asked the Army if additional aircraft could be obtained. Unfortunately, all the aircraft were already assigned, but the Army suggested that some aircraft could be diverted from the A-20B contract if the Navy was interested. It was, and eventually a number of these aircraft, designated BD-2s, were assigned to Marine Corps utility units.

The A-20A was almost identical to the A-20 except for the lack of turbosuperchargers on the engine nacelles. This was the first model of the series to see service in the attack role and was nearly indistinguishable from the DB-7B. (McDonnell-Douglas via Merritt)

A-20A



A-20A (Late)



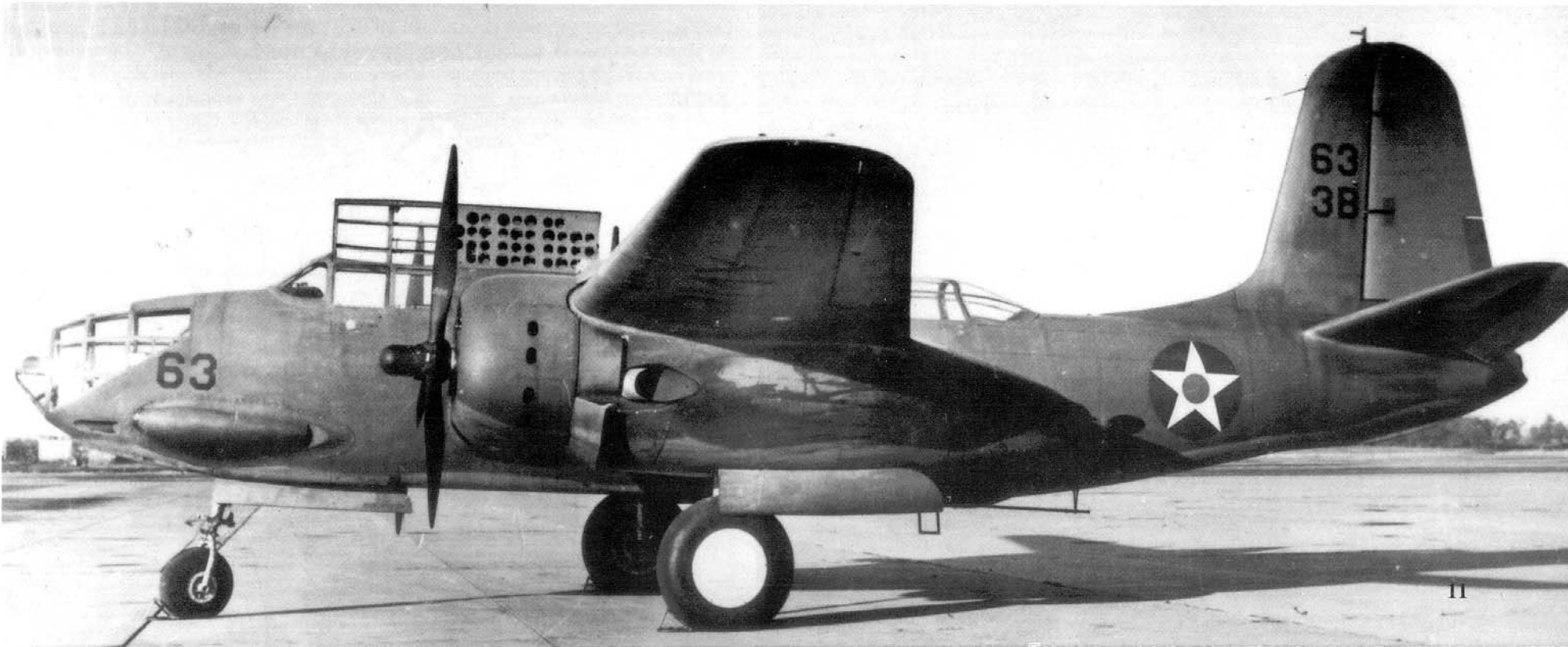


The A-20A went into service in the Spring of 1941 with the 3rd Bomb Group (3rd BG). These early aircraft have the cooling vents on their cowlings and Natural Metal propeller blades (which later were painted Black). None of these aircraft have machine guns fitted in the nose. (USAF)



The Army liked the new plane because it had no unusual handling characteristics and was far superior to anything then in service. Early aircraft were delivered in Natural Metal with the U.S. insignia carried only on the upper and lower wings. (USAF)

Some early model A-20As had cooling vents cut into the sides of the engine nacelles, as had been done on the DB-7A, but these were later deleted since they proved to be of little practical value. The oval object on the nose is a blister covering a .30 caliber machine gun.



A-20B

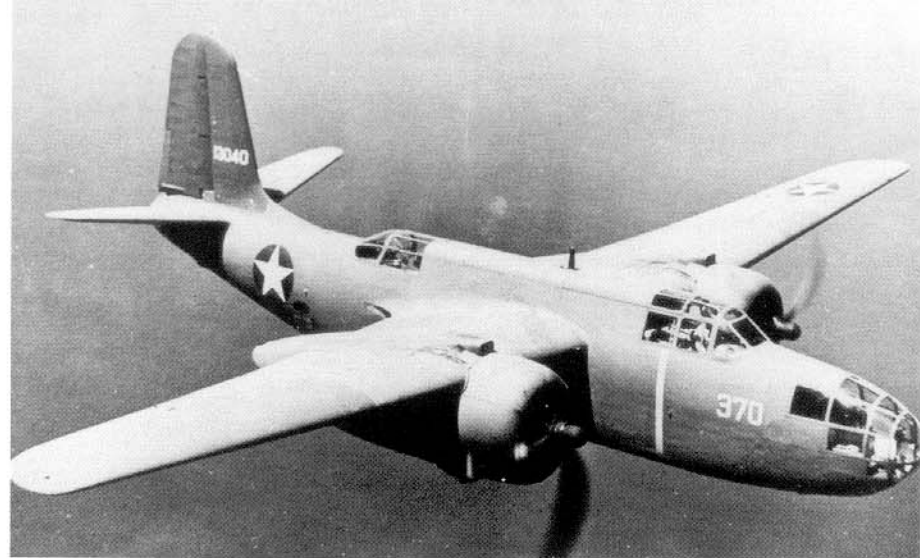
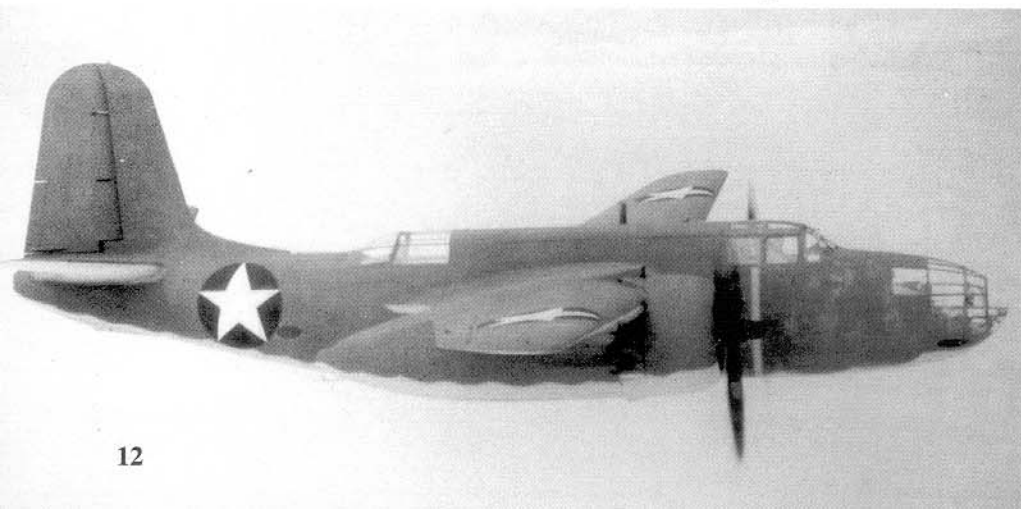
In general appearance the A-20B bore a very close resemblance to the DB-7A with the stepped glass arrangement in the nose. Powered by Wright R2600-11 engines, the A-20B was the first of the series to also use .50 caliber machine guns in the nose and in the top gunner's position. It could also carry the aft mounted machine guns in the engine nacelles (although these were rarely fitted). The bomb bay was also modified for better bomb carrying and provisions were made for mounting a 200 gallon auxiliary fuel tank in the bomb bay for extended ferry range.

This version was the first for which the Army Air Corps placed a large order, 999 being contracted for in October of 1940. In addition, a reconnaissance version, the O-53, was also called for, 1,489 being ordered at the same time as the A-20Bs. These aircraft were to be identical to the A-20B except for the provision for reconnaissance equipment. It was eventually realized that other aircraft were better suited for the reconnaissance mission and no O-53s were actually built. To handle the anticipated orders, Douglas geared up its Long Beach facility and all A-20Bs were built there.

The A-20B; however, did not see extensive service in the USAAC, as the majority of the order, some 665 aircraft, were sent to Russia under the Lend-Lease Agreement. This decision was due to two main deficiencies in the design, the lack of self sealing fuel tanks and poor armor protection. These deficiencies came to light based on combat reports filtered back from the battlefields in Europe and Asia. An additional eight aircraft were also transferred to the Navy for use as high speed target tows, under the designation BD-2.

There was also an XA-20B, but this was an A-20A which was modified in mid-1941 with three General Electric gun turrets. These were fitted in the nose and in the dorsal and ventral positions. Power operated, these turrets were equipped with .30 caliber machine guns, but tests with the arrangement did not prove successful. Work on this project stopped but it appears that the aircraft was later used to test a 37MM cannon, which was mounted in the nose, under the designation XA-20F. This aircraft was fitted with General Electric remote control turrets in the dorsal and ventral positions, each armed with twin .50 caliber machine guns.

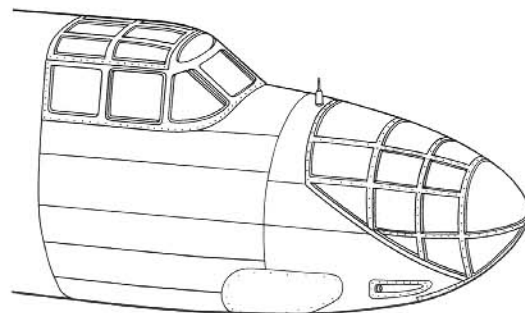
Eight A-20Bs were turned over to the Navy for use as high speed target towing aircraft. These were operated by the Marine Corps and received the designation DB-2.



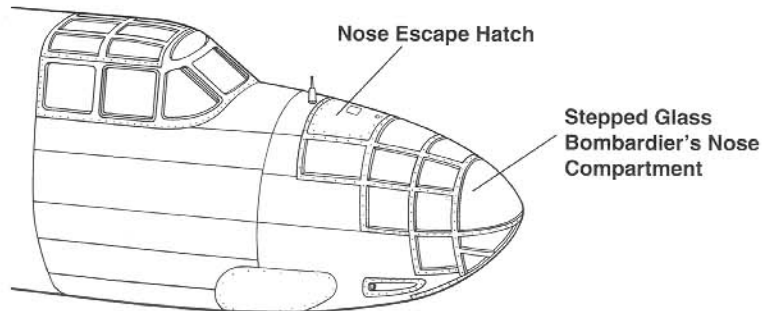
The A-20B was externally very similar to the French DB-7A and was the only American model to feature the stepped glass bombardier's glazing in the nose area. Aside from that, they were very similar to the other U.S. models in service in their outward appearance. They did lack self-sealing fuel tanks and were not as well armored as later models and many were subsequently sent to Russia under Lend-Lease. (USAF)

Nose Development

A-20A



A-20B



A-20C

In an attempt to standardize production and to benefit from field reports, the A-20C was introduced on the production line during early 1941. The aircraft was powered by Wright R-2600-23 engines instead of the earlier R-2600-3 or -11 versions and self-sealing fuel tanks and additional armor was added. The extra weight resulted in a slight drop in top speed from 350 mph on the A-20A to 342 mph for the A-20C. This was not considered significant in view of the increased survivability which the new features gave the aircraft.

The British DB-7B bore a very close resemblance to the A-20C and was given the designation Boston III or IIIA. Aircraft built for the British were constructed by Boeing and differed from the Douglas aircraft in their electrical systems, air intake layout and exhaust stacks.

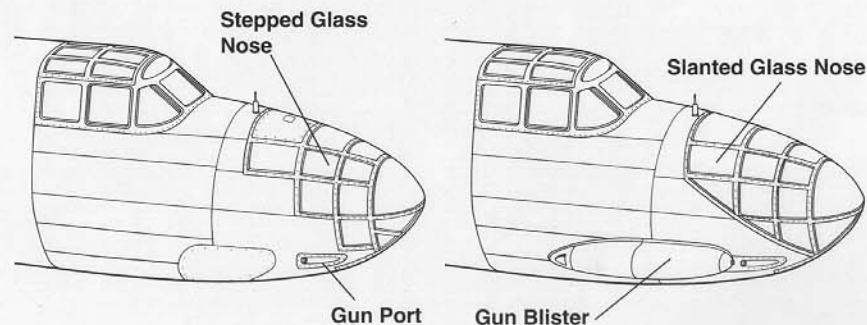
The A-20C reverted back to the nose arrangement of the A-20A instead of the stepped layout of the A-20B. The familiar tear dropped shaped blister was used to add an additional gun on the nose and the impractical nacelle machine guns were finally deleted. The rear gunner's twin mount was retained as was the ventral gun position. While U.S. aircraft were fitted with .30 caliber machine guns, the British versions were armed with .303 inch weapons. Provisions were made for some of these aircraft to be fitted with shackles under the fuselage for carrying a standard Navy torpedo, but as far as is known, this feature was only used operationally by the Russians. Late production A-20Cs also were fitted with an extra fuel tank in the bomb bay which raised the total fuel capacity to 540 gallons.

Production of the A-20C was carried out at the Douglas Santa Monica plant where 808 were manufactured and, under contract by Boeing at its Seattle facility, where another 140 were turned out. A large part of the British order was later diverted to the USSR under Lend-Lease and some of the British order was taken over by the USAAC following the attack on Pearl Harbor, when U.S. forces were found to be grossly under strength in modern aircraft. In American service, the A-20C was used primarily as a trainer and test aircraft. Various armament and turret arrangements were tried, along with various other unusual configurations, including at least one which was used to test an aircraft's ability to withstand frangible bullets when used as a gunnery target.

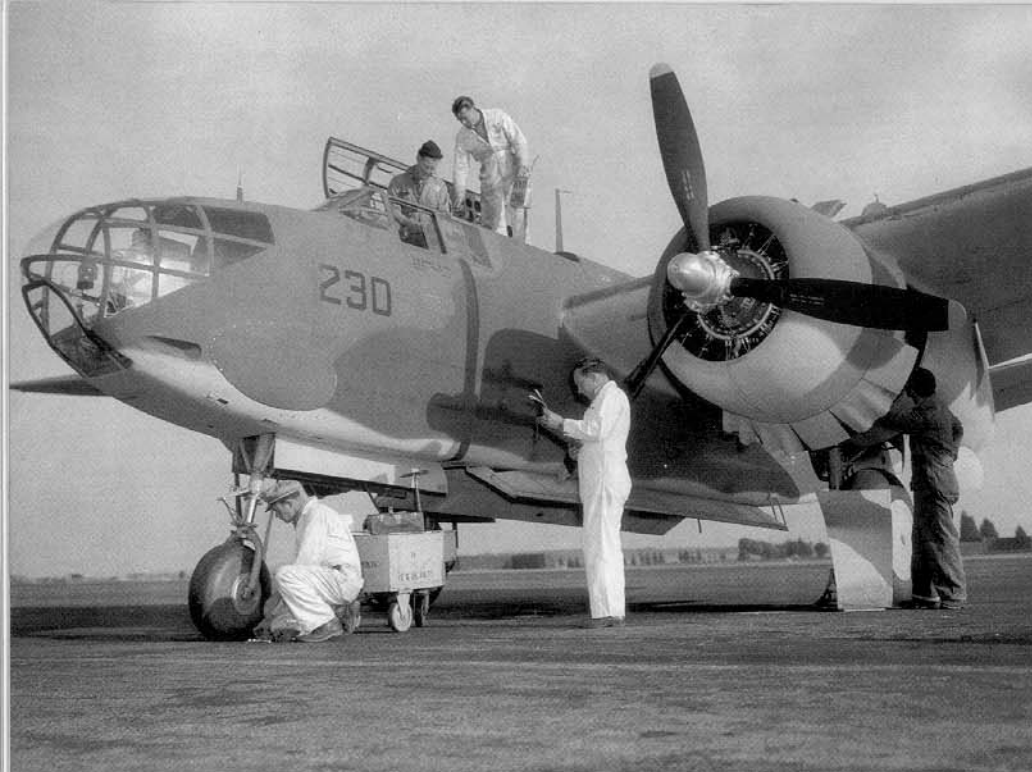
Nose Development

A-20B

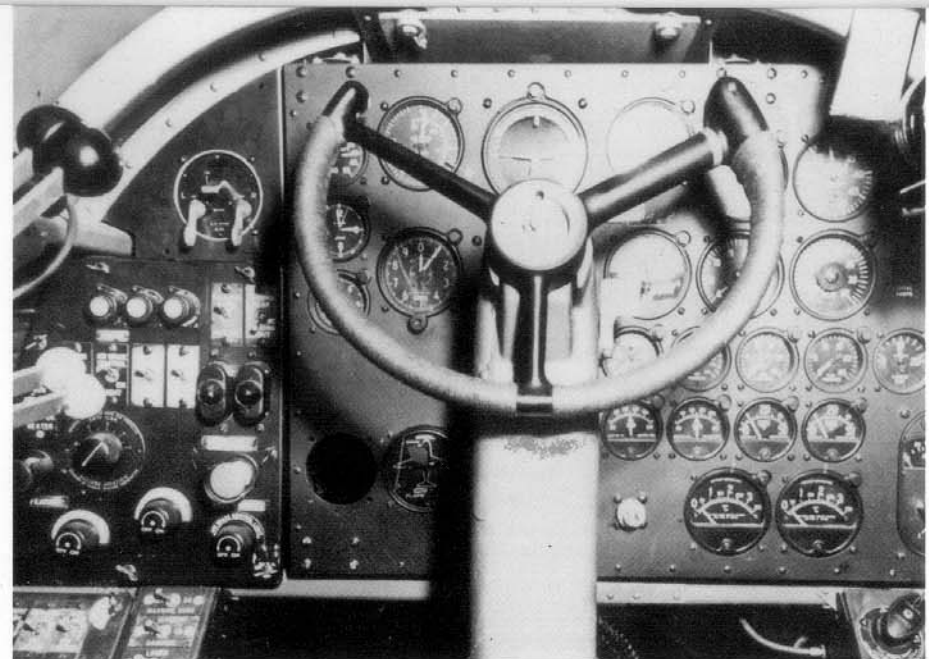
A-20C



The largest portion of A-20 production took place at the Douglas Santa Monica plant where 808 were produced. Boeing built an additional 140 at their Seattle plant under license from Douglas. There were only minor differences between the two types, mainly in the electrical system and the exhaust and intake arrangement. (USAF)

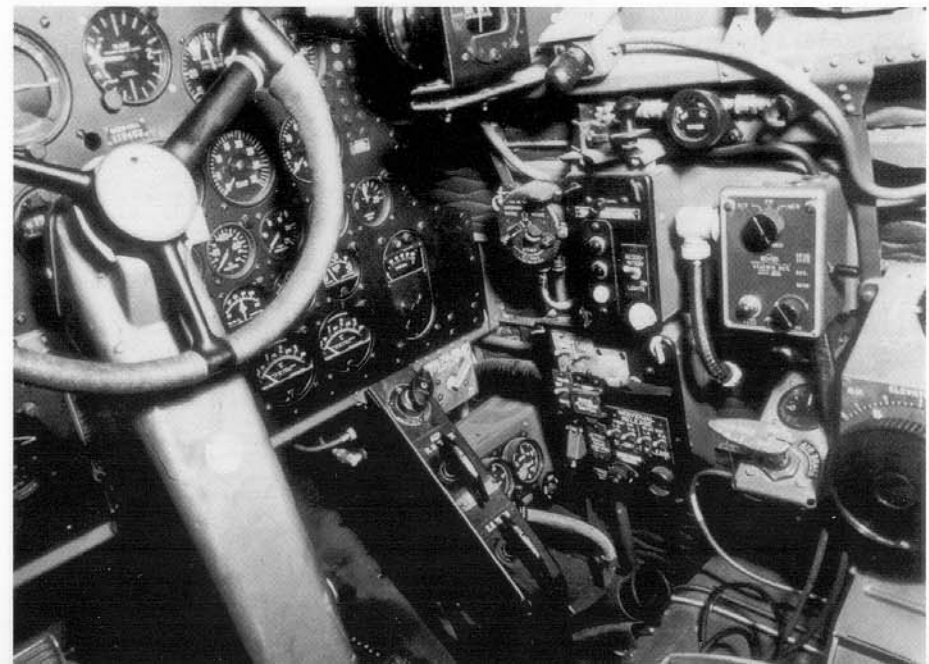
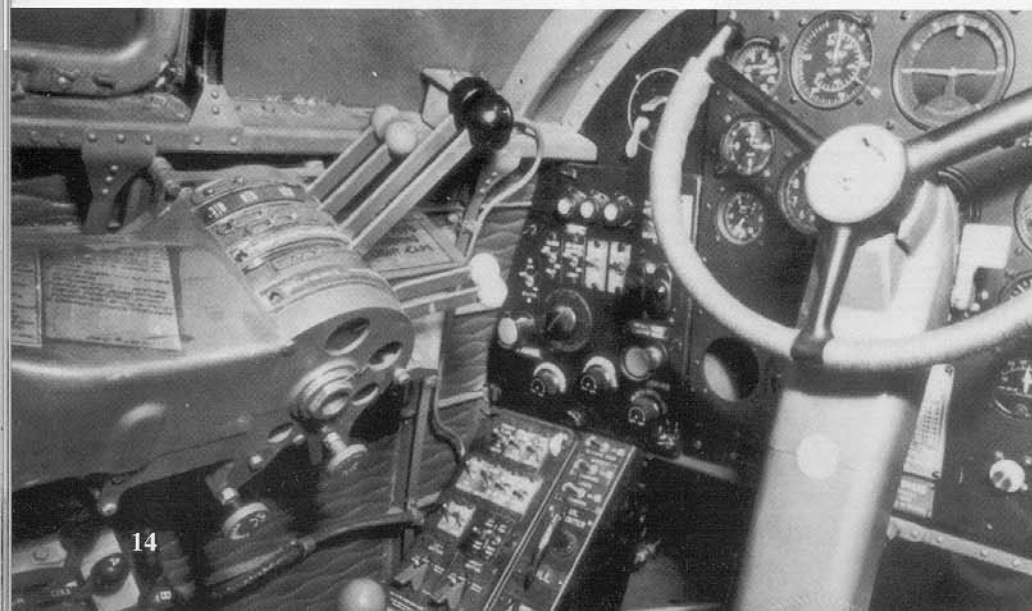


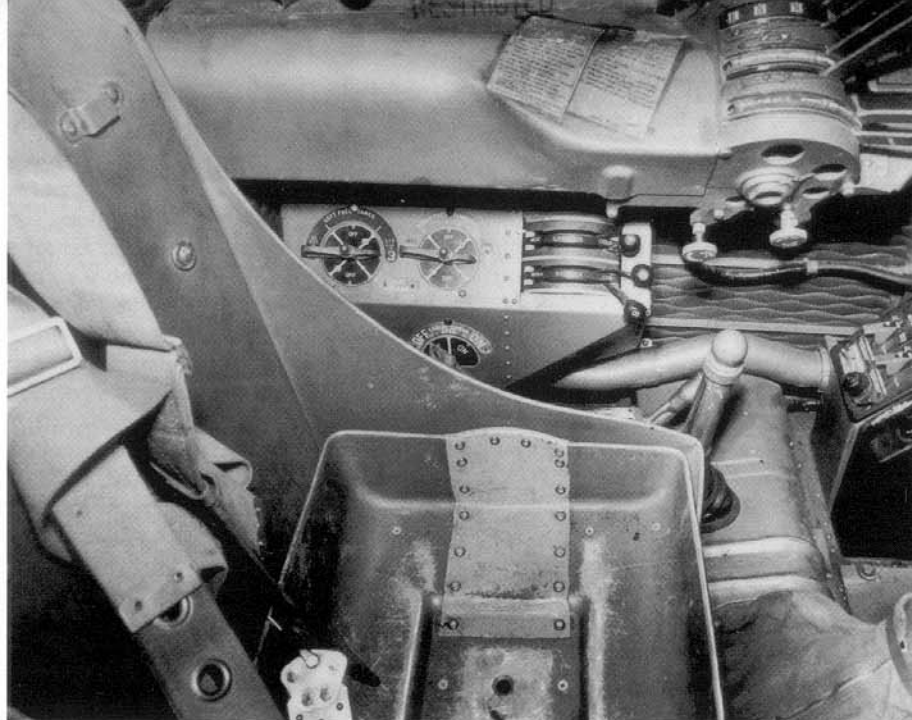
Douglas ground personnel go over an A-20C at the Douglas Santa Monaco plant. The plane carries a British type camouflage pattern and may be one of the ones taken over by the U. S. when there was a critical need for combat aircraft early in the war. When the A-20C was introduced in 1941, it and its British counterparts, the DB-7B, were almost identical on the production line aside from some minor differences. This helped to facilitate production and this variant was the first large run of aircraft produced (eventually 948 were built). (McDonnell-Douglas via Merritt)



The A-20 cockpit was relatively spacious and well laid out. There was very little difference between the cockpits of various models, except for the purely French machines which had their throttle controls reverse of the standard British and U. S. pattern. Due to the narrow fuselage there was no way for either the bombardier or gunner to take over if the pilot was killed or injured although some early models had rudimentary controls in the rear for the gunner, which were later removed as being impractical. (Air Force Museum)

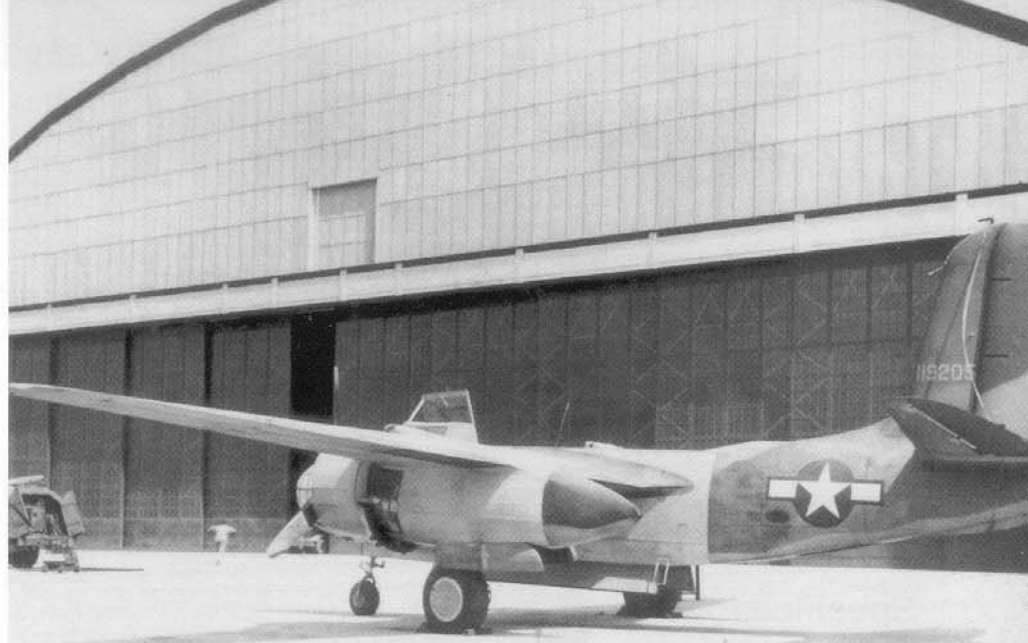
Below left: Throttles, propeller controls and left front console. Above: Control wheel and instrument panel. Below: Right front console.





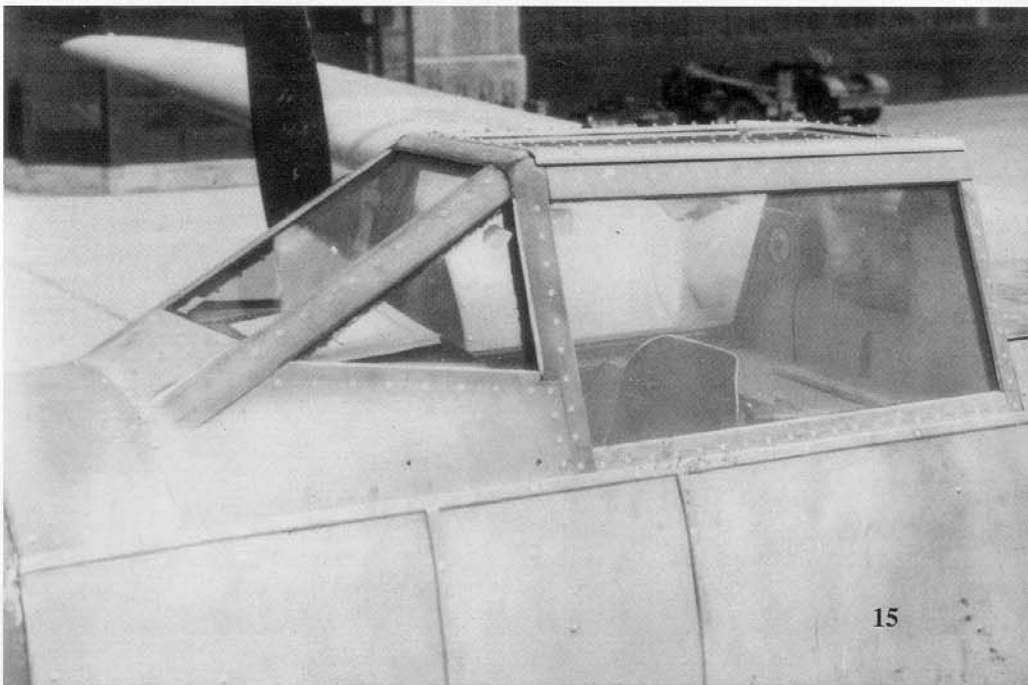
Above: Left rear console and pilot's seat.

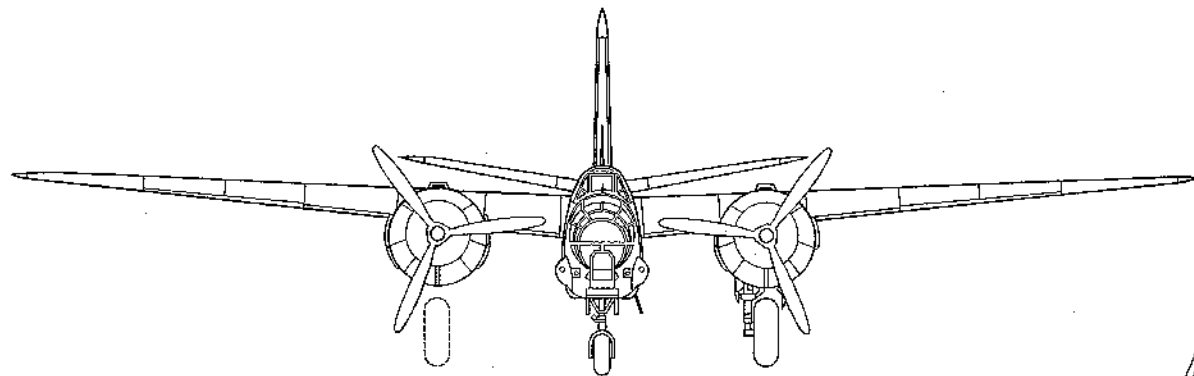
Below: Right rear console and pilot's seat. The cockpit interior was painted in Zinc Chromate Green.



One of the more interesting variations of the A-20C was this aircraft which was modified to test the use of frangible bullets in gunnery practice. The entire top fuselage from the cockpit back to the gunner's area was removed and covered over. The center section of the fuselage, wings, and engine area was then covered with armor to withstand the frangible bullets. (Air Force Museum)

The cockpit area was heavily plated with armor and special glass was used to protect the pilot. Entry was gained through a top panel which opened to the right. Other than the actual modification, very little else is known about the project. (Air Force Museum)





Specification

A-20C Havoc

Wingspan.....61 feet 4 inches (18.69 m)

Length.....47 feet 3 inches (14.4 m)

Height.....17 feet 7 inches (5.35 m)

Maximum Weight.....24,500 pounds (11,113 kg)

Powerplant.....Two 1,600 Hp Wright R2600-23 radial engines.

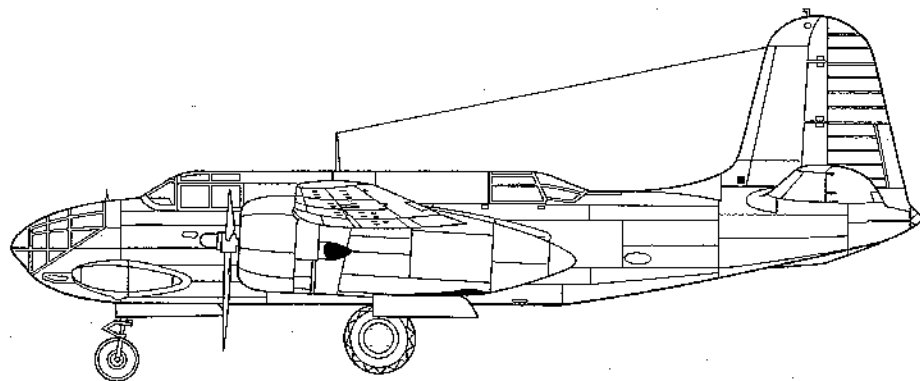
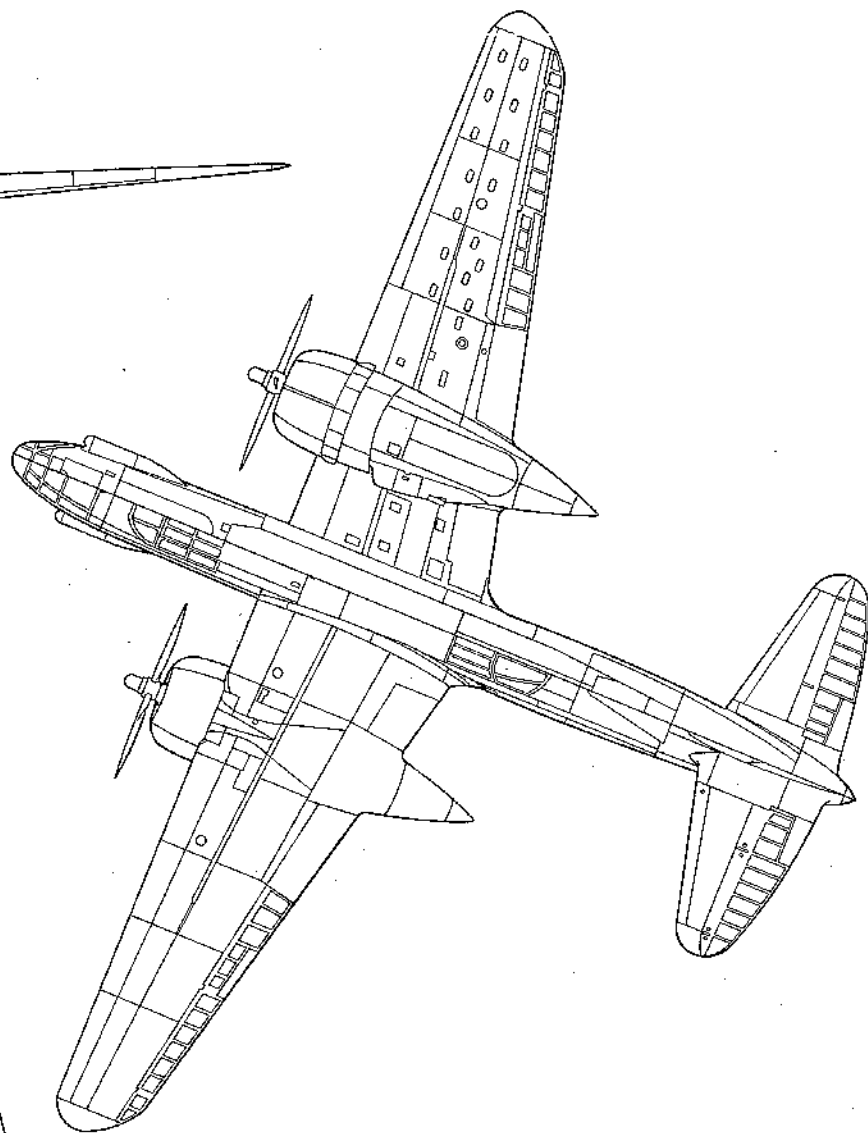
Armament.....Four forward firing .30 caliber machine gun and two .30 caliber machine guns in rear cockpit. One .30 caliber machine gun in ventral position.

Speed.....342 mph (550.3 kph)

Service Ceiling.....25,320 feet (7,717.5 m)

Range.....745 miles (1,199 km)

Crew.....Three



A-20D/E/F

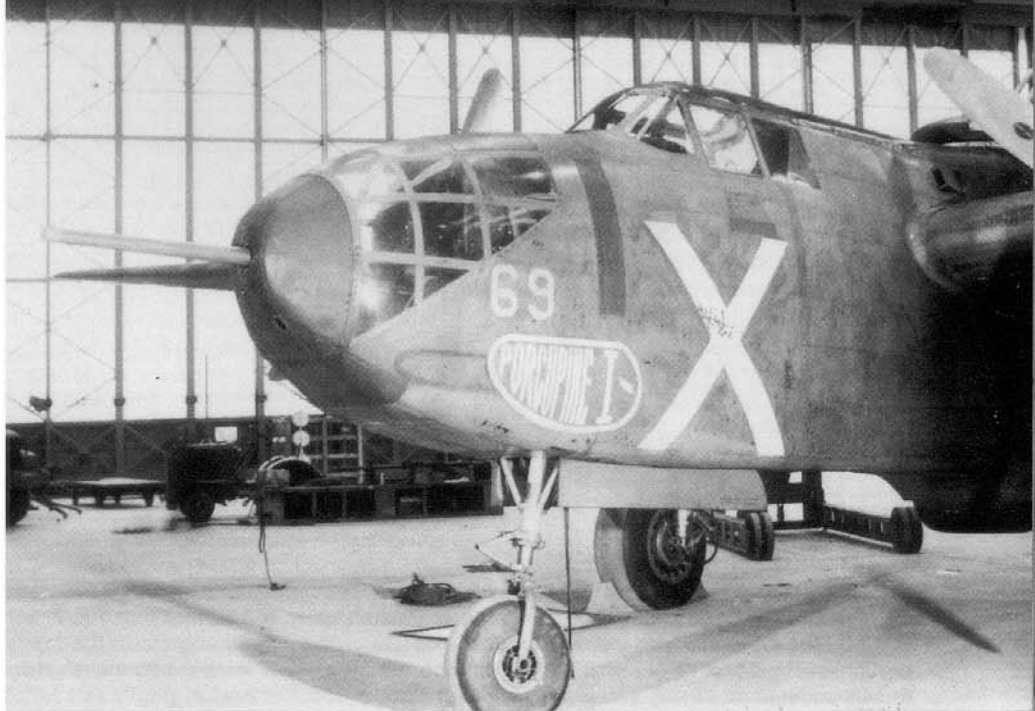
The A-20D was a projected lightweight version of the A-20B with more powerful R-200-7 engines fitted with turbosuperchargers. In addition, larger fuel tanks were added, but these were not of the self-sealing type and were a definite hazard in a combat situation. It is not known if this project ever got beyond the design stage, particularly since the turbosupercharged A-20 was such a failure.

The A-20E designation was given to A-20A airframes which were lightened, and used for training and various experimental projects. It is believed that many of these were the late production A-20As fitted with R2600-11 engines.

The single A-20F was an A-20A fitted with upper and lower General Electric remote controlled turrets in the rear and a single 37MM cannon in the nose. This may have been the same A-20A which had been designated as the XA-20B and fitted with three remote controlled turrets, one in the nose, dorsal and ventral positions, although this has not yet been confirmed. Data from these tests may have been used in development of remote control turrets for the A-26 and B-29 projects.

(Right) This A-20A was fitted with a pair of remote control gun turrets and a 37MM cannon in the nose under the designation A-20F. Although the aircraft was never used operationally, it did provide valuable information for later projects under development at Douglas. (Air Force Museum)

This Havoc is possibly the same aircraft with the upper turret removed. This Havoc may have been the same aircraft which was initially designated the XA-20B, prior to the introduction of the actual A-20B series. (Air Force museum)



A-20G Havoc

The A-20G was a significant change in the general development of the Havoc series from earlier variants. The glass nose was replaced by a solid nose armed with four 20MM cannon and two .50 caliber machine guns. This new nose made the A-20G slightly longer than earlier variants and provided a substantial increase in forward firepower. This change came about mainly from combat experience in the South Pacific where large numbers of glass nosed A-20s had been fitted with field modifications to increase their forward firepower during low-level strafing missions. Unfortunately, the 20MM cannons had a tendency to jam and after 250 aircraft were completed in this configuration, the four cannons were replaced by .50 caliber machine guns. Most of the cannon armed aircraft were eventually given over to the Russians under Lend-Lease.

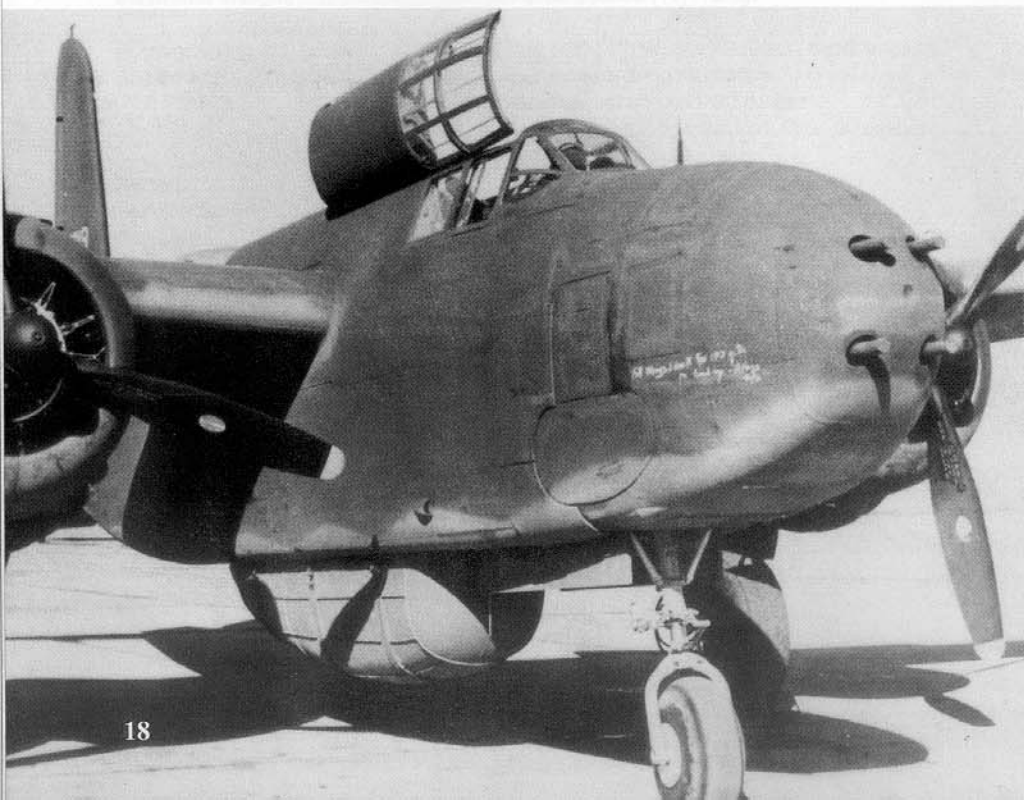
Like the earlier variants, the initial A-20Gs were fitted with a single hand held .50 caliber machine gun in the rear dorsal position, while either a .30 or .50 caliber weapon was fitted in a tunnel position underneath the rear compartment. After production of 750 aircraft (Blocks A-

The A-20G was perhaps the epitome of the Havoc line. It, and the variants which were based on it, were produced in larger numbers than any other A-20 type. There were a number of changes which made the A-20G very different in appearance from earlier models. The most obvious change was a new solid nose which housed either four 20MM cannon or .50 caliber machine guns along with two .50 caliber machine guns in the lower portion of the nose. Most of the 20MM cannon armed aircraft were eventually sent to Russia under Lend-Lease. (Air Force Museum)

20G-1, G-5, G-10, and G-15), a new variant was produced armed with an electrically driven Martin turret in place of the upper gun position. This change was introduced with the A-20G-20 block aircraft. To accommodate this new turret the fuselage had to be widened slightly (six inches). Armed with two .50 caliber machine guns, this turret substantially increased the A-20s rearward defense. At the same time the .50 caliber machine gun was also standardized for use in the ventral position.

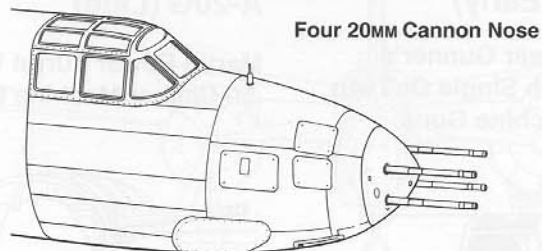
In addition to these external changes, numerous internal modifications were made to improve the A-20s combat effectiveness. Two seventy gallon fuel tanks were added which helped increase the aircraft's range to 1,100 miles. More armor plate was added, improved bombing and navigational equipment was installed and late production aircraft were fitted to carry four 500 pound bombs on underwing racks carried under the outer wing panels. Besides these wing racks, it was found that the internal bomb load could also be doubled from 2,000 to 4,000 pounds, giving the Havoc even more of an offensive punch. As a result of this increased weight, there was a slight deterioration in performance, but the overall increase to the A-20Gs combat capabilities more than compensated for this loss. Eventually, 2,850 A-20Gs were produced at the Douglas Santa Monica assembly plant, making this the single largest production of the Havoc series.

The other major modification made to the A-20G series was a power operated gun turret in place of the old hand-held machine gun armament used on earlier models. The Martin power operated turret had twin .50 caliber machine guns and substantially increased the defensive firepower of the aircraft against enemy fighters. The lower ventral machine gun was also kept. Early A-20Gs did not have this turret and many were either sent to Russia, used in training, or converted to night fighters. The ammo belt for the lower gun can be seen through the side window. (McDonnell Douglas via Merritt)

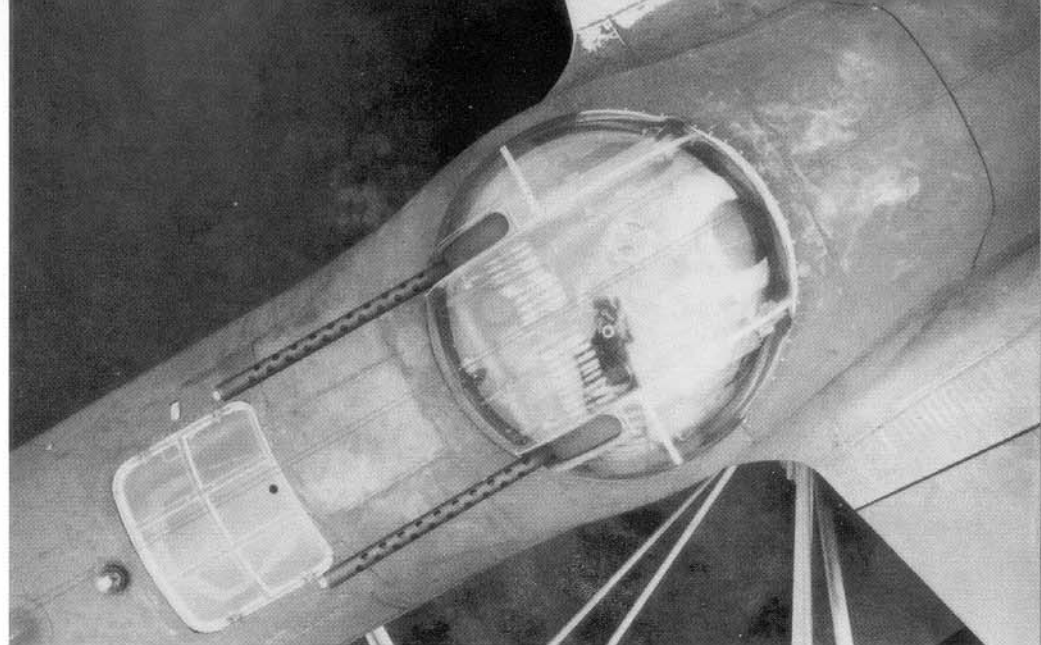
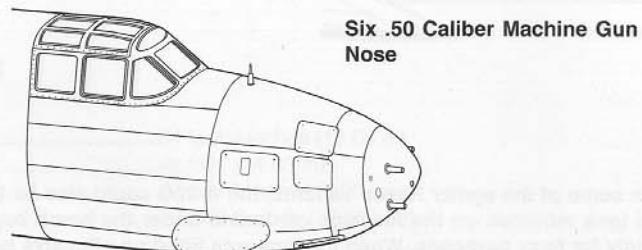


Nose Armament Development

A-20G (Early)

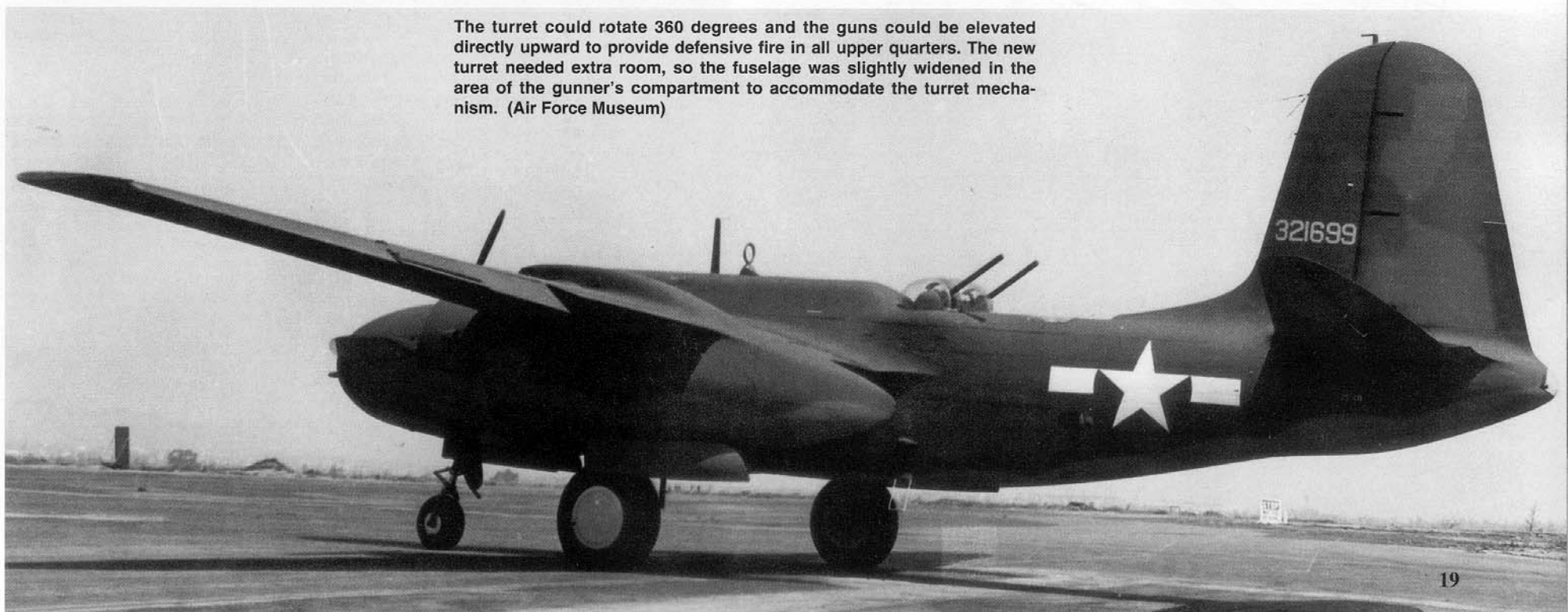


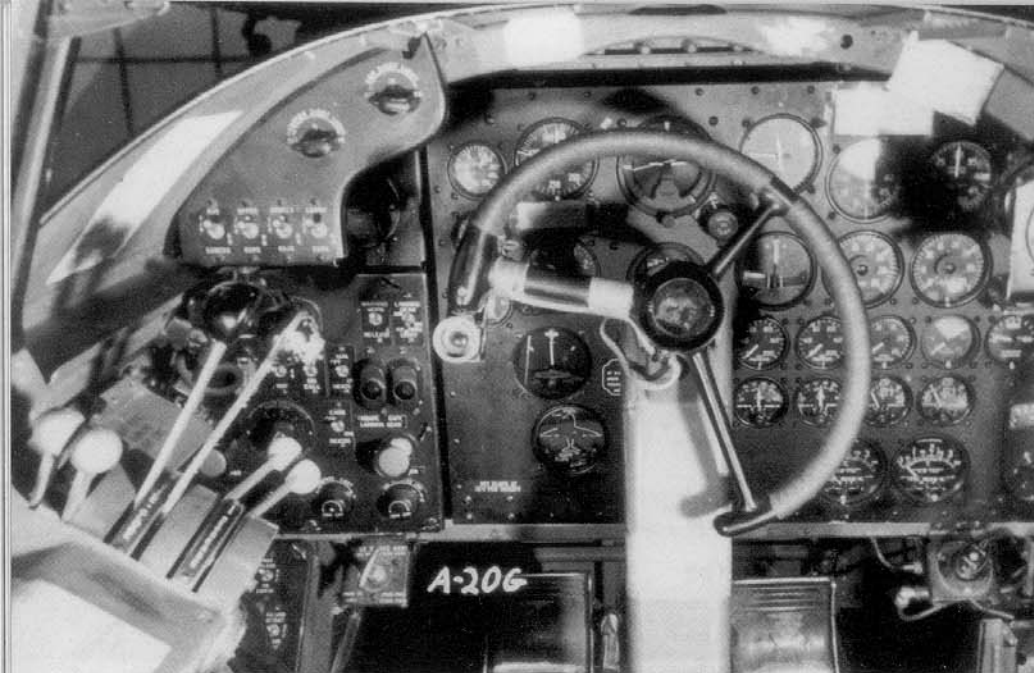
A-20G (Late)



The Martin power turret provided excellent all-round visibility for the gunner for upper and rearward defense, although there was a significant blind spot directly under the aircraft. This was covered, in theory, by the ventral gun position. The fuselage around the turret was slightly bulged to accommodate the turret's systems. (Air Force Museum)

The turret could rotate 360 degrees and the guns could be elevated directly upward to provide defensive fire in all upper quarters. The new turret needed extra room, so the fuselage was slightly widened in the area of the gunner's compartment to accommodate the turret mechanism. (Air Force Museum)





The cockpit arrangement of the A-20G was changed only slightly when compared to earlier models. The round object on the one end of the control hand wheel is the firing button for the nose mounted machine guns. The levers on the left are the throttles, fuel mixtures and propeller controls. (Air Force Museum)

Rear Gun Position

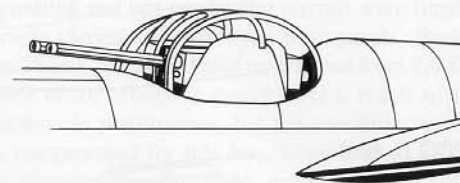
A-20A-G (Early)

Enclosed Rear Gunner's Cockpit With Single Or Twin Flexible Machine Guns

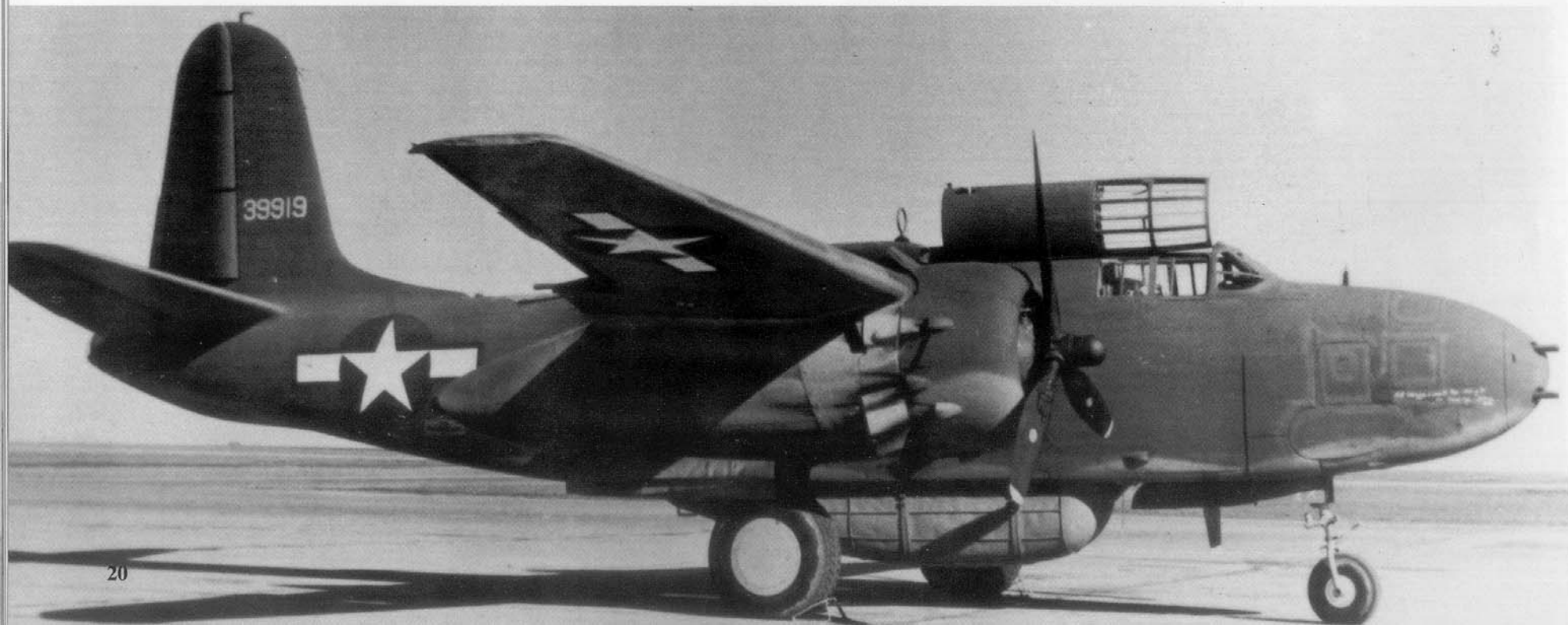


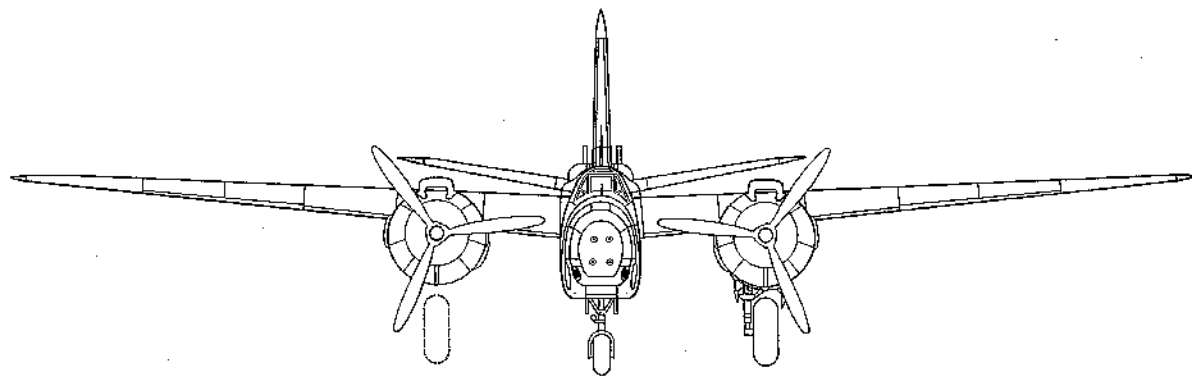
A-20G (Late)

Martin Power Turret With Twin .50 Caliber Machine Guns



Like some of the earlier Havoc variants, the A-20G could also be fitted with a long range fuel tank mounted on the fuselage centerline under the bomb bay. This tank was used mainly for ferry purposes. When the tank was fitted no offensive bomb load could be carried. (Air Force Museum)





Specification

A-20G Havoc

Wingspan.....61 feet 4 inches (18.69 m)

Length.....48 feet (14.63 m)

Height.....17 feet 7 inches (5.35 m)

Maximum Weight.....27,200 pounds (12,337 kg)

Powerplant.....Two 1,600 Hp Wright R2600-23
radial engines.

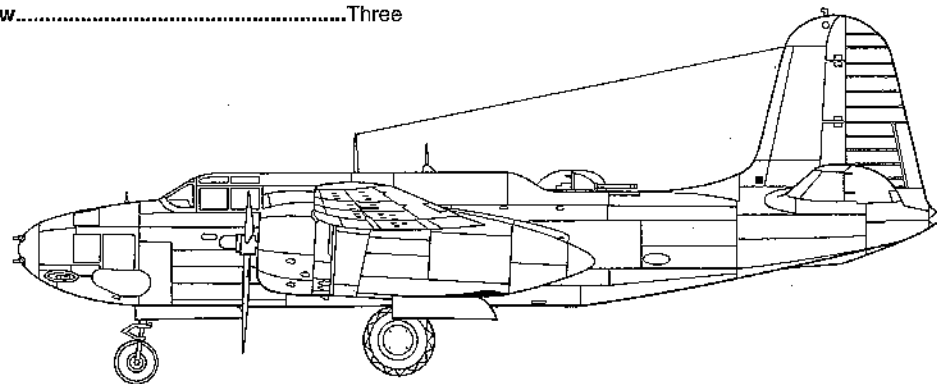
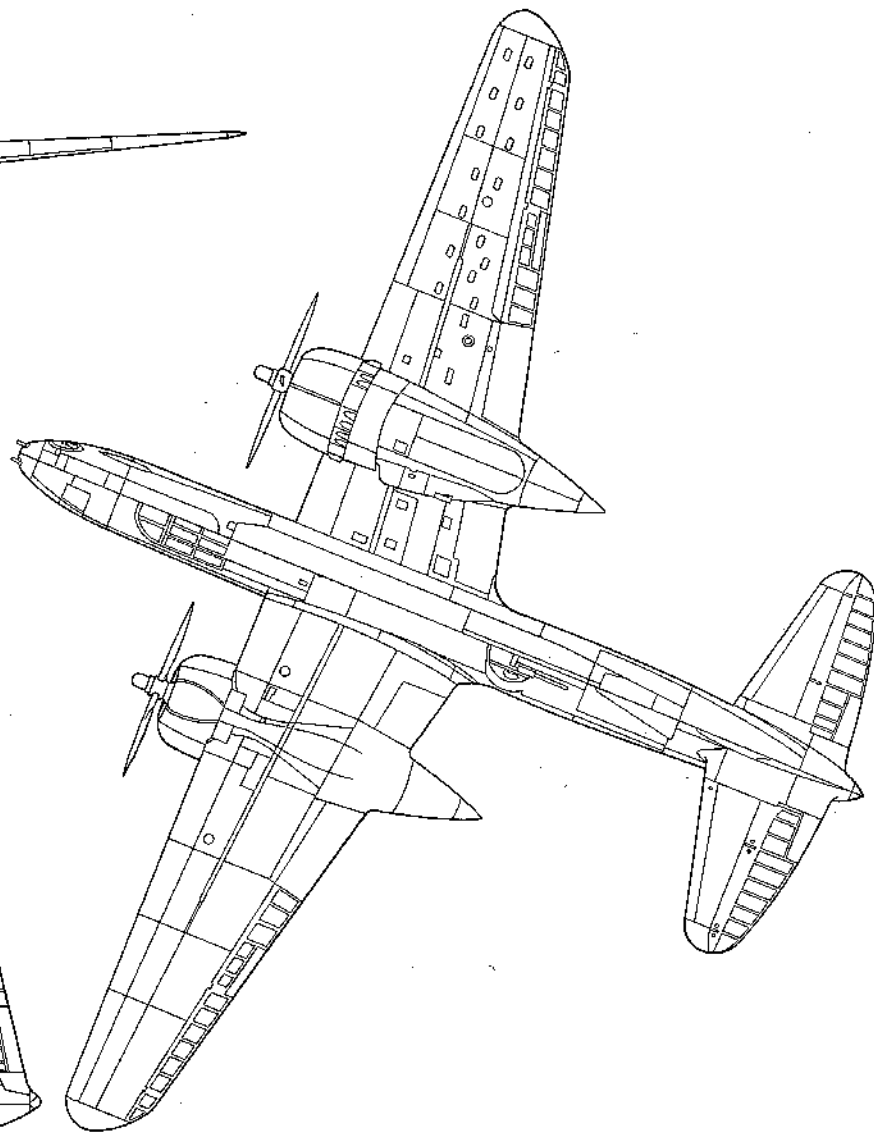
Armament.....Six forward firing .50 caliber
machine guns and Two .50 caliber
machine guns in rear turret. One
.30 caliber machine gun in ventral
position.

Speed.....342 mph (550.3 kph)

Service Ceiling.....25,800 feet (7,863.8 m)

Range.....1,000 miles (1,609 km)

Crew.....Three



A-20J

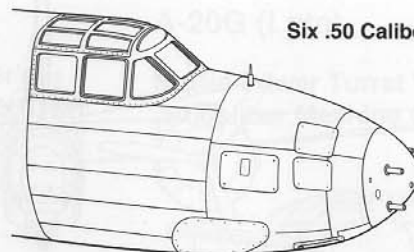
After the introduction of the A-20G, the Army realized that the lack of a clear nose for a bombardier and navigational equipment reduced the Havoc's versatility in the European theater of operations. Subsequently, Douglas was asked to produce a glass nosed variant for use as a lead-ship, which would locate targets for flights of solid nosed aircraft, which would then drop their ordnance on signal from the leader. Unlike earlier glass nosed variants, this Havoc featured a molded, frameless nose transparency which slightly increased the aircraft's overall length. Designated the A-20J, the aircraft carried a Norden bombsight in the nose and only the two side mounted machine guns. Aside from the length increase, the A-20J was identical to the late production A-20G.

A total of 450 A-20Js were produced by Douglas with close to half of these going to the Royal Air Force or Russia. As the American A-20 units in Europe gradually transitioned to the new Douglas A-26, the A-20Js were retained as lead-ships until the glass nosed A-26C were acquired for this mission.

The A-20J was basically an A-20G fitted with a glass nose to serve as a lead bomb ship for flights of the solid nosed A-20Gs. They also were used as navigation ships to find the targets since they were equipped with full navigation equipment. (McDonnell-Douglas via Merritt)

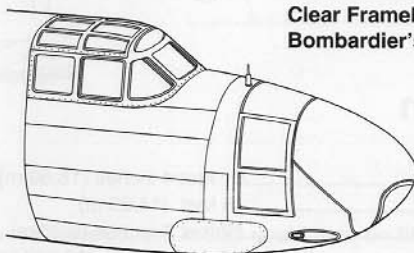
Nose Development

A-20G (Late)



Six .50 Caliber Machine Gun Nose

A-20J



Clear Frameless Blown Bombardier's Glass Nose

While the A-20Js did not have the solid nose they did retain their lower nose mounted .50 caliber machine guns, although they rarely were used in the strafing role. Sometimes, these weapons were removed to lighten the aircraft if there was no apparent need for them. This A-20J was assigned to the 410th Bomb Group, 9th Air Force. (USAF)



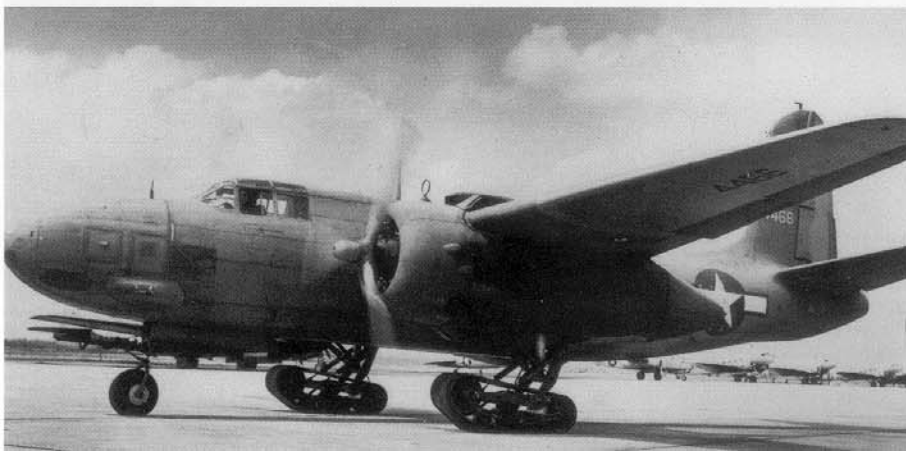
A-20H/A-20K

Late in the production run of the A-20G, more powerful Wright R2300-29 engines were substituted for the R2300-23 which increased takeoff and emergency power slightly. To differentiate these more powerful models from the A-20G they were designated as the A-20H. A similar engine change for the glass nosed A-20J resulted in the A-20K. Eventually, 412 A-20H and 413 A-20Ks were produced, these being the last Havocs to come off the production line. Aside from the engine change, there was no other noticeable changes to distinguish these from the earlier A-20G and A-20J. A large number of these late production aircraft were supplied under Lend-Lease for the RAF and Russia, including ninety A-20Ks taken on charge by the British.



The A-20H/K models were basically up-engined versions of the A-20G/J. There was no significant external difference to distinguish the versions from one another. This particular aircraft was slated to be preserved after the Second World War, but it eventually was disposed of. The Air Force museum was subsequently forced to look for one and finally managed to find one which had been converted for civilian use. (Air Force Museum)

Perhaps the most unusual experiment carried out with the A-20H/K was this special landing gear which was fitted to see if it would improve the aircraft's ground handling performance in mud, sand and snow. (USAF)



The caterpillar mechanism used on the main landing gear did help rough field performance, but since U.S. forces had become very adapt at repairing captured airfields, there was no need envisioned for the device and the Havoc was converted back to standard landing gear. (USAF)

British Night Fighters and Intruders

When France fell in June of 1940, a large portion of DB-7s which had been ordered by the French were as yet undelivered. These were transferred, in an agreement between the French and British Purchasing Commissions, just prior to the freezing of all French assets in the United States by the U.S. government. In addition, a small number of Belgium aircraft were also transferred to British control.

Since the British had already decided to name the aircraft the Boston, this name was used on those aircraft transferred from the French as well. Due to various differences between variants, they decided to differentiate the variants by using a Roman numeral after the name. Early DB-7s became Boston Is, while later model DB-7s were known as Boston IIs.

Unfortunately, the British did not feel these early variants were suited for use as day bombers and many were converted to either intruder or night fighters under the designation Havoc. Some thought had been given to using the names "Moonfighter" or "Ranger", but eventually Havoc was selected. As intruder aircraft, the DB-7s were only slightly modified, a new exhaust being added to cut down on the tell-tail flame on the engine nacelle which made an excellent aiming point for German gunners. These aircraft received the designation Havoc I (Intruder).

Those DB-7s which were used as night fighters were known as Havoc I or Havoc II (Nightfighter) depending upon which type of engine the aircraft was fitted with. The early DB-7s were fitted with the British AI Mk IV radar in the nose along with four .303 inch machine guns. They proved fairly successful during the Battle of Britain and as a result, the British decided to increase their firepower. Martin-Baker designed a nose which could carry twelve .303 inch machine guns and this was fitted to a DB-7A which became the Havoc II (Nightfighter).

While development of a nightfighter was taking place, other work was underway to strengthen Britain's night time aerial defenses. Tests were run on the idea of trailing a long cable (2,000 feet) with a mine attached to it in front of German bombers. It was thought that

A Havoc I (night fighter) in the early camouflage scheme of Green and Brown upper-surfaces over Black undersurfaces. This aircraft eventually was converted to the Turbinlite configuration for hunter/killer night fighting operations. (Scutts)

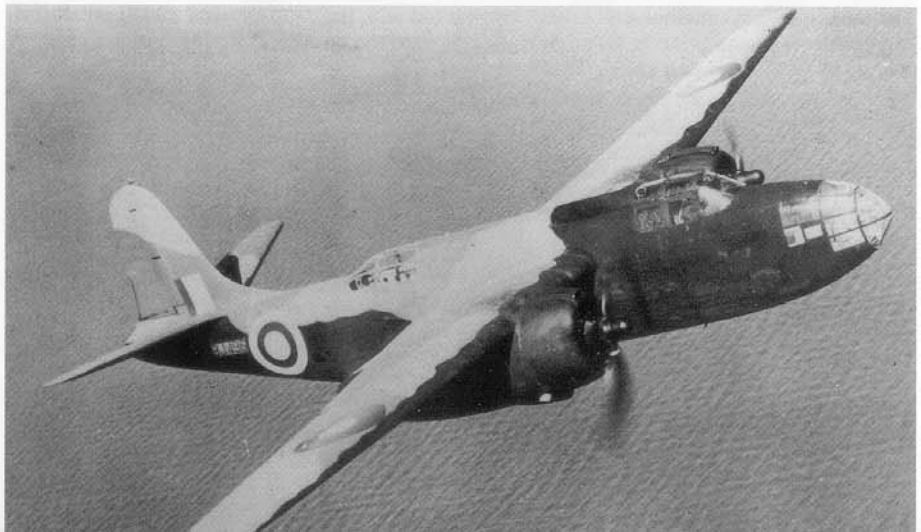


A Turbinlite conversion in an unusual camouflage scheme of Green and Gray rather than the more common overall Black finish. This may be due to the fact that it was attached to a Polish training unit in England. The unusual nose configuration housed the aerial searchlight which was used to illuminate German intruders so that an accompanying Hurricane could destroy it. (Polish Association via Scutts)

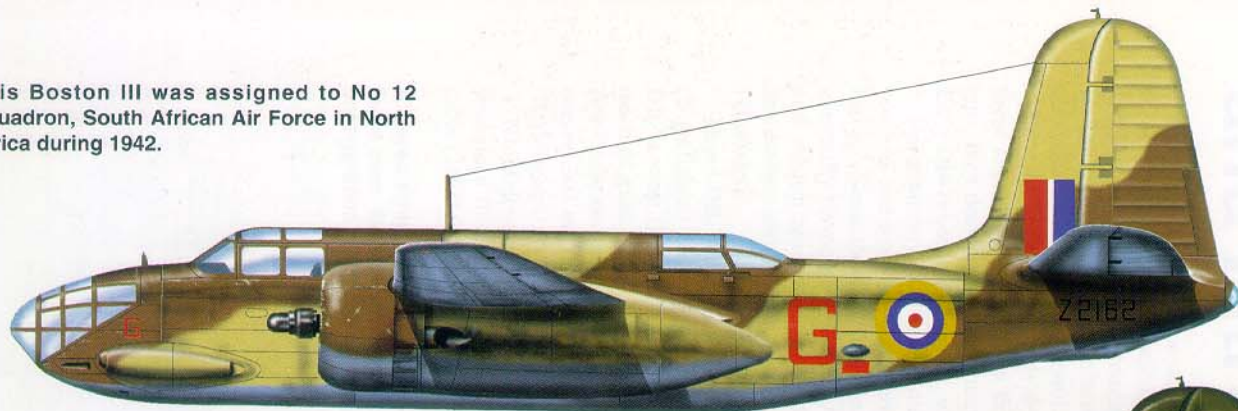
the cable would become entangled in the engine which would pull the mine up into the aircraft, causing the bomber's destruction. Eventually, a flight was formed in December of 1940 to test the concept with the aircraft assigned being designated as Havoc IIIs. This was later changed to Havoc I (Pandora), but only one bomber was downed and the concept was dropped.

Perhaps the most bizarre of all the ideas was the one to mount a huge 2,700 million candle-power searchlight in the nose of a DB-7. Batteries for it were to be carried in the back of the bomb bay and due to its size and weight, no armament could be carried. Designed by Wing Commander W. Helmore in conjunction with General Electric of England, the idea was to have the aircraft locate a target with its radar and then illuminate it for a pair of Hurricanes which were part of the Hunter/Killer team. Designated either Havoc I or II (Turbinlite), these aircraft achieved only limited success. As a result, the ten squadrons which were formed were disbanded as newer Beaufighters and Mosquitoes came off the production lines.

An early Havoc I (Intruder) which was later used for camouflage trials related to night colors. At the time the aircraft was assigned to No 23 Squadron. (RAF)



This Boston III was assigned to No 12 Squadron, South African Air Force in North Africa during 1942.



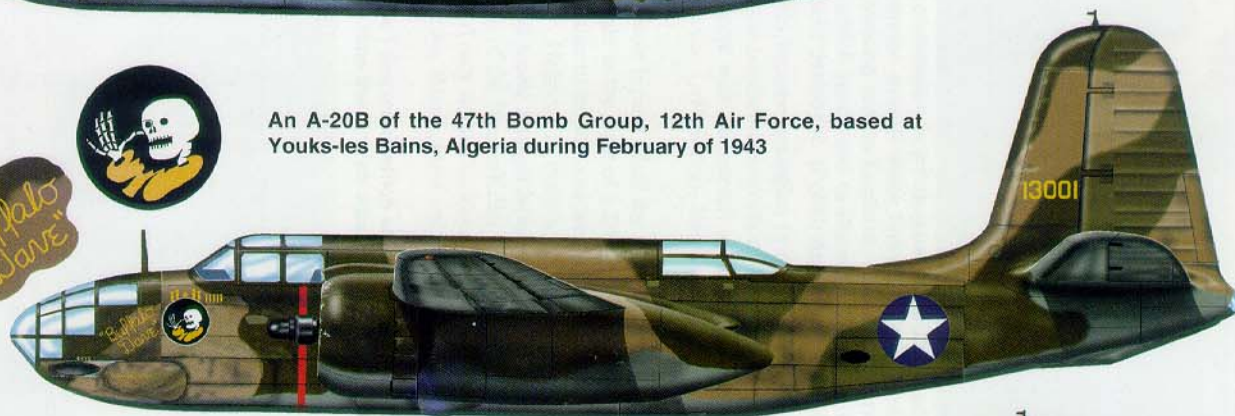
A Boston III of No 107 Squadron, RAF during December of 1942.



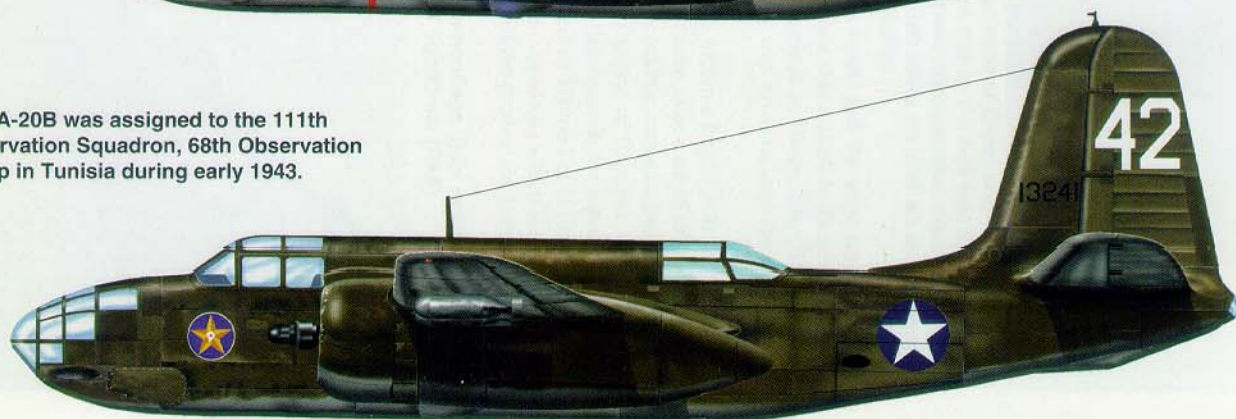
This A-20A of No 22 Squadron, RAAF is believed to hold the record for combat sorties. She flew a total of 186 sorties during her career.



An A-20B of the 47th Bomb Group, 12th Air Force, based at Youks-les Bains, Algeria during February of 1943



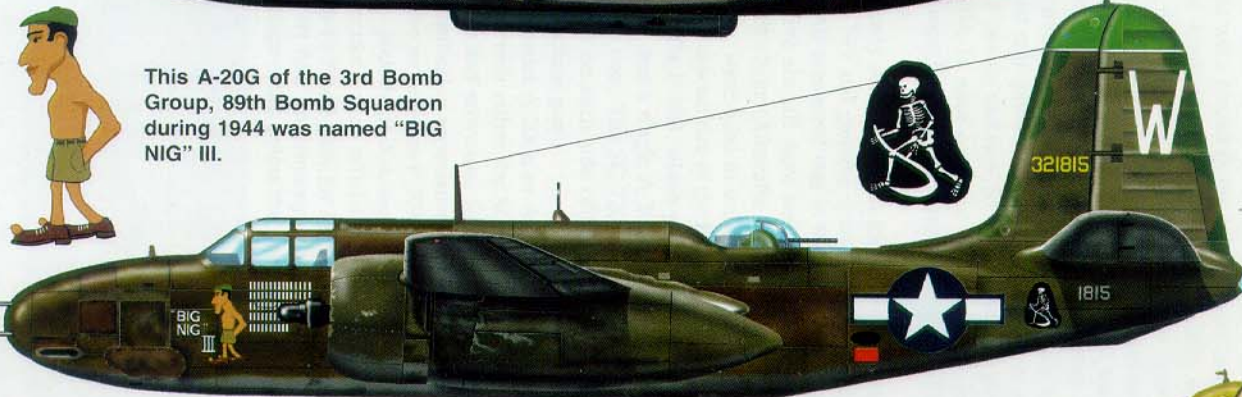
This A-20B was assigned to the 111th Observation Squadron, 68th Observation Group in Tunisia during early 1943.



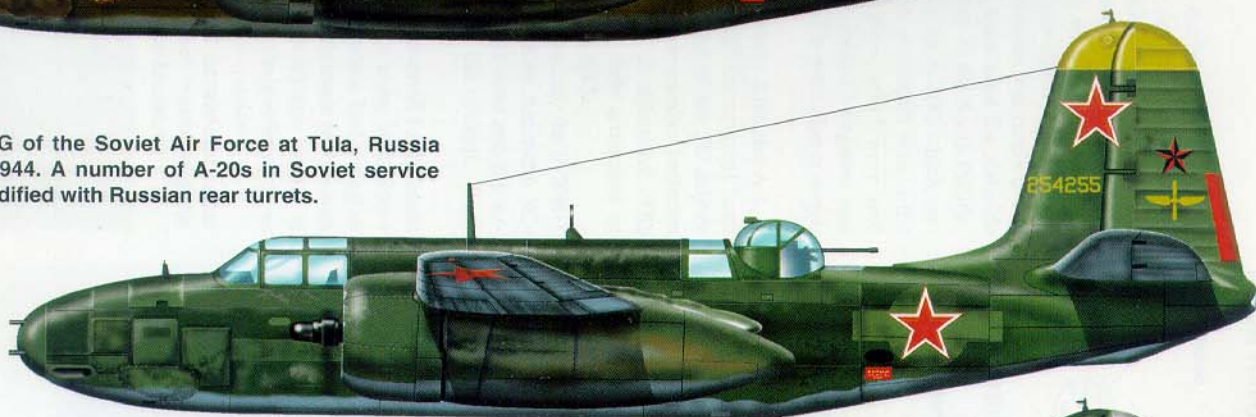
A P-70 of Detachment A, 6th Night Fighter Squadron at 3 Mile Airstrip, Port Moresby, New Guinea during May of 1943.



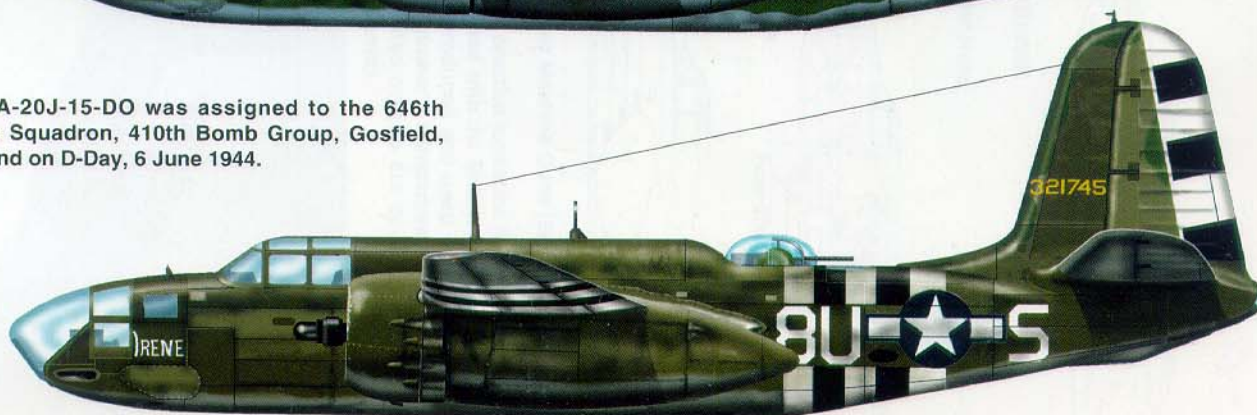
This A-20G of the 3rd Bomb Group, 89th Bomb Squadron during 1944 was named "BIG NIG" III.



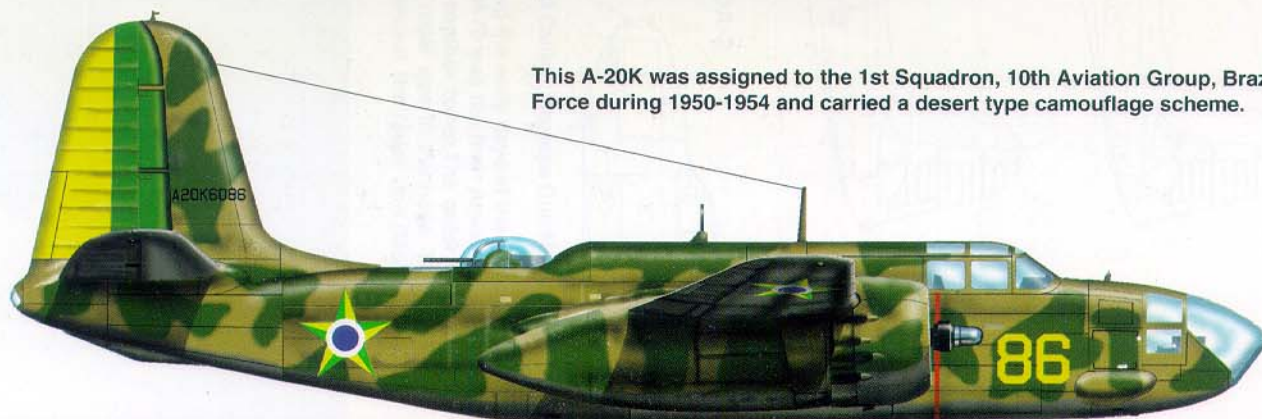
An A-20G of the Soviet Air Force at Tula, Russia during 1944. A number of A-20s in Soviet service were modified with Russian rear turrets.



This A-20J-15-DO was assigned to the 646th Bomb Squadron, 410th Bomb Group, Gosfield, England on D-Day, 6 June 1944.



This A-20K was assigned to the 1st Squadron, 10th Aviation Group, Brazilian Air Force during 1950-1954 and carried a desert type camouflage scheme.



P-70 Nighthawk

The need for a night fighter prompted the Army to modify one of the initial A-20s to this role as the XP-70. A British AI Mk IV radar unit was placed in the nose and a ventral tray containing four 20MM cannon was fitted under the bomb bay as forward firing armament. The radar operator and his equipment were placed in the rear gunners compartment. While the design was not exactly what the Army was looking for, particularly with regard to rate of climb and altitude performance, it was all that was available at the time and fifty-nine additional A-20s were modified as P-70 Nighthawks (although this official name was rarely used). Fitted with Wright R-2600-11 engines, the majority of these aircraft were used for stateside training, although a few saw service with the 6th Night Fighter Squadron in the South Pacific.

The next night fighter variant was the P-70A-1, which was basically an A-20C which carried its radar in the bomb bay and rear gunners compartment. All the armament was in the nose and consisted of four 20MM cannon and two .50 caliber machine guns, which were used to sight the cannons. These P-70A-1s were equipped with Wright R-2600-23 engines, and thirty-nine were eventually built, most being used as trainers. Some P-70s were also converted to this configuration in the field.

The P-70A-2 was basically an early A-20G without the rear power turret. Like the A-1, it carried the radar unit in the bomb bay and gunners compartment, although the original hand held machine gun was retained. All armament was in the nose, consisting of six .50 caliber machine guns. A total of sixty-five aircraft were built, but whether this number includes seven, which were converted at Brisbane, Australia by the 419th NFS, is unknown. The majority of the A-2s, like the A-1s, were used in training, where either their armament or radar was removed. A small number saw service in the Pacific with the 6th NFS.

The final variant of the series was the P-70B, which was also broken down into the P-70B-1 and P-70B-2 variants. The P-70B-1 was a single A-20G-10 which carried an American SCR-720 radar unit in place of the British one. The SCR-720 was mounted in the nose and the aircraft carried its armament in blisters on each side of the fuselage below the cockpit. Each blister contained three .50 caliber machine guns.

The P-70B-2s were either early model A-20Gs or A-20Js that were converted to the night fighter configuration and equipped with either the SCR-720 or SCR-729 radar sets. Some retained their rear gun turrets, some had provisions for gun blisters and some had a similar nose to the P-70B-1. Many were identical in appearance to P-70A-2s, which made recognition more difficult. Eventually, 105 were modified as P-70B-2s and most, if not all, saw service in training units. In the training role, both the P-70A and P-70B were sometimes referred to as TP-70As and TP-70Bs, but whether that was an official designation or not is unknown.

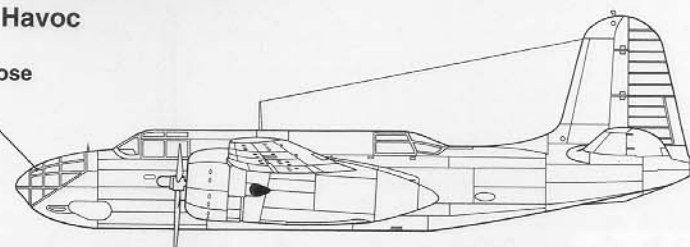
The only P-70B-1 was an A-20G-10 fitted with an American SCR-720 centimeter radar housed in the nose. The aircraft had an armament of six .50 caliber machine guns housed in blisters along the fuselage sides below the cockpit. (Air Force Museum)



Nightfighter Development

A-20A Havoc

Glass Nose

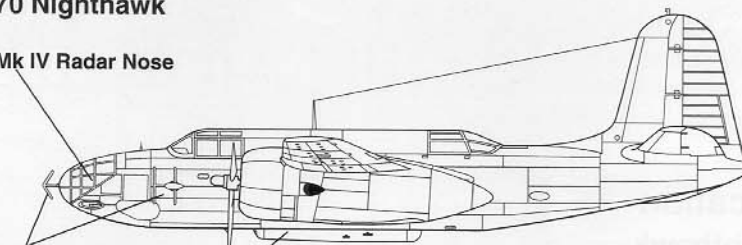


P-70 Nighthawk

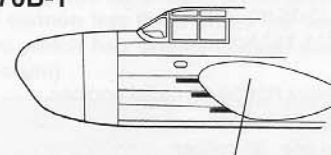
AI Mk IV Radar Nose

Radar Antennas

Four 20MM Cannon Pack

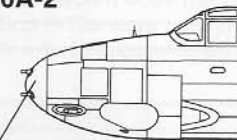


P-70B-1



Three .50 Caliber Machine Guns (Each Side)

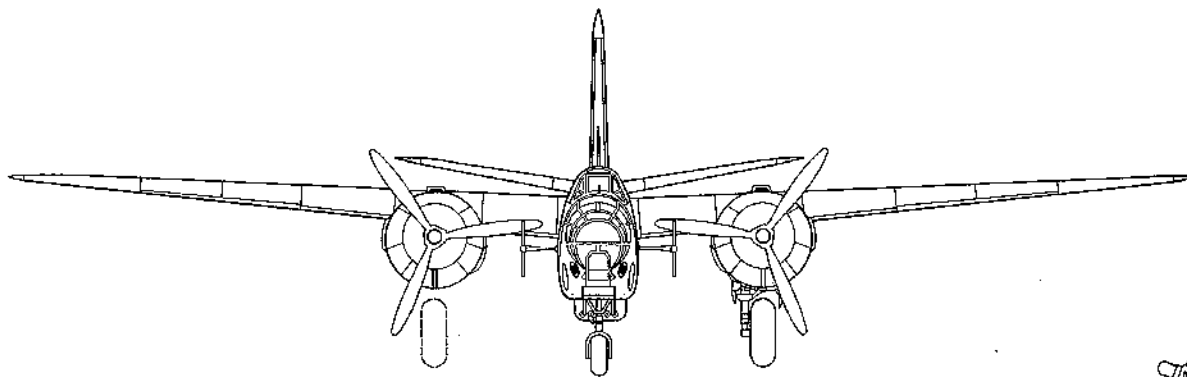
P-70A-2



Six .50 Caliber Machine Gun Nose

A pair of P-70s practice formation flying stateside during the early days of the night fighter program. Fitted with the British AI Mk IV radar, the P-70 was the first American night fighter to be produced and used in operations in a combat zone. The radar operator occupied the gunner's compartment while the bulky radar was in the nose. The glass nose was painted over to cut down on glare and conceal the radar unit. (McDonnell-Douglas via Merritt)





Specification

P-70 Nighthawk

Wingspan.....61 feet 4 inches (18.69 m)
 Length.....47 feet 3 inches (14.4 m)
 Height.....17 feet 7 inches (5.35 m)
 Maximum Weight.....24,500 pounds (11,113 kg)

Powerplant.....Two 1,600 Hp Wright R2600-23 radial engines.

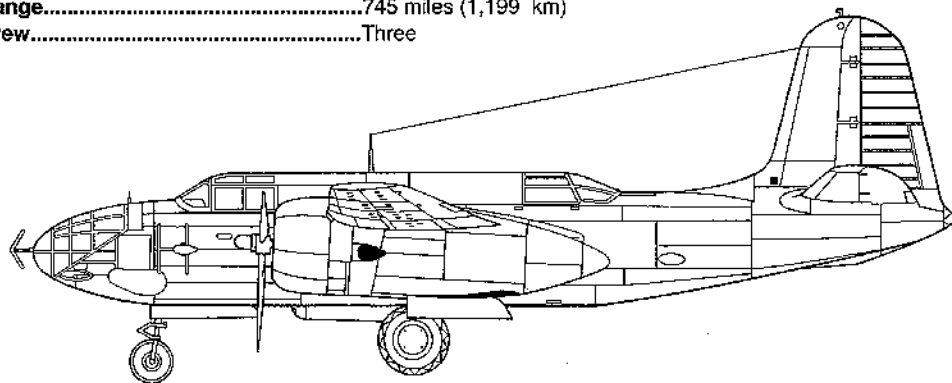
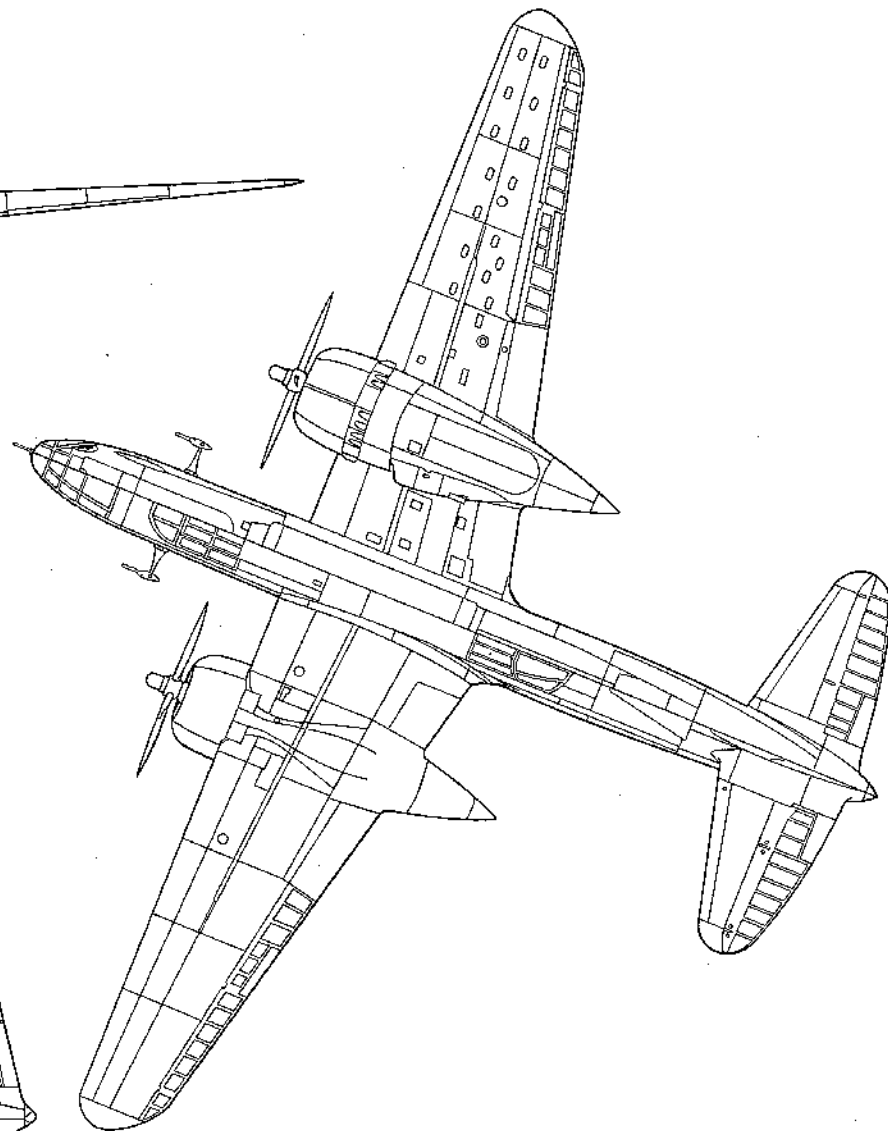
Armament.....Two forward firing .50 caliber machine gun and one .30 caliber machine gun in rear cockpit. One .30 caliber machine gun in ventral position. Four 20mm cannon in ventral pack.

Speed.....342 mph (550.3 kph)

Service Ceiling.....25,320 feet (7,717.5 m)

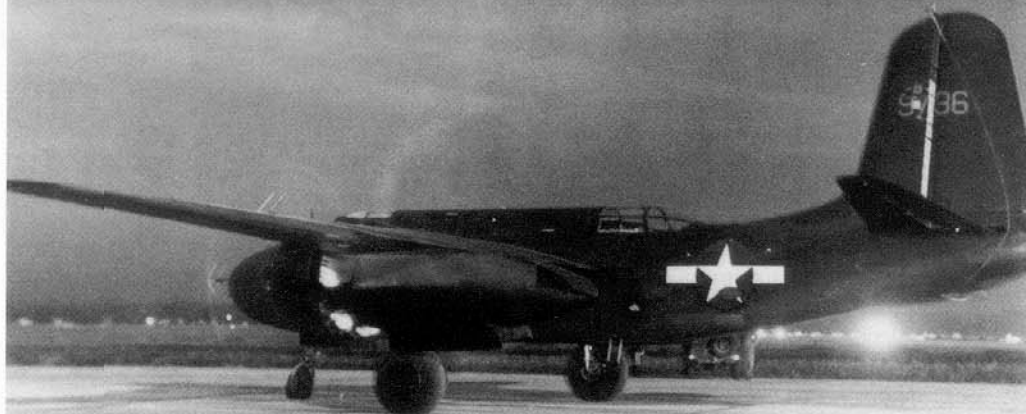
Range.....745 miles (1,199 km)

Crew.....Three





The second P-70 in flight with the ventral cannon tray installed under the fuselage. This tray contained four 20MM cannon and their ammunition supply. The aircraft was painted in overall Black with White individual aircraft numbers. Most of these early nightfighters were used as trainers, although a few saw service in the Pacific with the 6th NFS. (Air Force Museum)



The first P-70 prepares to take off on a night test flight. There are two antennas on top of the wing and an arrow shaped antenna on the nose. The aircraft does not have the ventral cannon tray fitted under the bomb bay area. The first P-70s were converted from the A-20 which had originally been slated to operate with a turbosupercharger. (Air Force Museum)



Combat Service

The French were the first to take the DB-7 into combat. Following the declaration of war against Germany in September of 1939, the new aircraft slowly reached French hands, and despite the urgency of the time, only sixty-four were in squadron service when the Germans launched their massive attack through the Ardennes in May of 1940. These were committed piecemeal in a vain attempt to stop the German Blitzkrieg, but to no avail.

While the DB-7s did a creditable job, intense ground fire and fighter attacks downed at least eight aircraft and just prior to the end of hostilities all serviceable aircraft were flown out of France to North Africa, where they formed the nucleus of four light bomber squadrons in Algeria and Morocco. When the British attacked the French Fleet in North Africa to keep it from falling into German hands, DB-7s from GB 1/32 carried out a retaliatory strike against Gibraltar, but did no damage and suffered no losses.

A large portion of the French order had yet to be delivered, and an agreement was reached between the British and French Purchasing Commissions in the United States to divert the remaining aircraft of the French order to England (this included some aircraft which were slated for Belgium from the French order). These French aircraft began arriving before the DB-7Bs, which the British had ordered, and were placed in service as night fighters and intruders under the name Havoc, since the British felt that these early variants were unsuited for use as day bombers.

In both roles, the modified DB-7s performed well. As intruder aircraft they carried out low

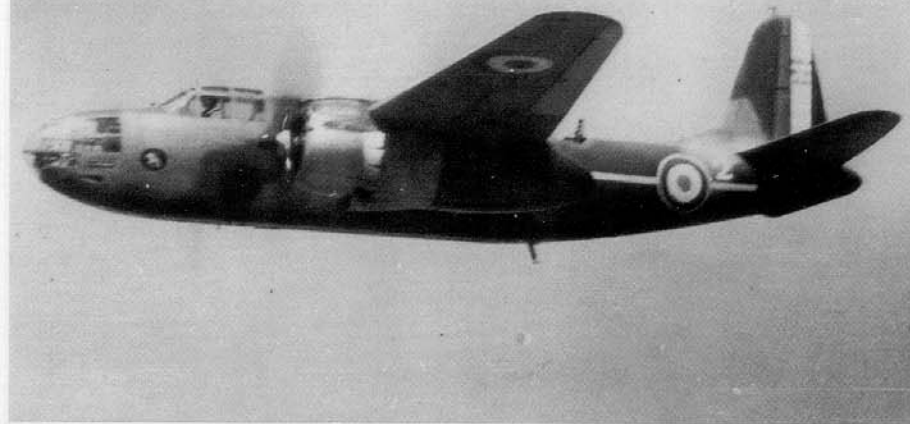
The crew of this DB-7 warm up their engines as they prepare for takeoff from a forward airstrip during the Spring of 1940. The French were the first country to take the new Douglas design into active service. Their piecemeal commitment in action, however, resulted in high losses and low damage to the Germans. (Cuny)



A small flight of DB-7s make one of the last French Air Force sorties against the Germans in the Spring of 1940 prior to the cessation of hostilities. When an armistice was declared, all flyable aircraft were flown out of the country to unoccupied territory in North Africa. (CAC via Cuny)

level missions against German air bases and lines of communications in France. The noted American writer and war correspondent, Quentin Reynolds, even went along on one such mission to bomb the Le Bourget airport at Paris and wrote about it in his book on the Battle of Britain. Such attacks caused confusion at German air bases and undoubtedly caused numerous problems for returning German bomber crews all out of proportion to the numbers of RAF aircraft actually involved. As night fighters, the Havocs were used as both fighters and Turbinlite aircraft. The Turbinlite worked with a pair of Hurricanes as a Hunter/Killer team with the Turbinlite aircraft illuminating the targets for the Hurricanes after it found them with its radar. The regular night fighters did fairly well, but the Turbinlite aircraft were not very effective and as newer night fighters, such as the Beaufighter and Mosquito came into service, they were gradually replaced.

Late in the Summer of 1941, British ordered DB-7Bs began arriving in England and these were used to replace the Bristol Blenheim, which had equipped the light bomber units. Their first major action was in early 1942, when they took part in attacks on the German warships SCHARNHOST, PRINZ EUGEN and GNERSENAU, when they made their famous channel dash during Operation CERBERUS. Following this they began to carry out low level daylight operations against German targets in France and the Low Countries. Operating with heavy escorts, they tried to entice the German fighters to come up so that the Spitfires could engage



In North Africa, four Vichy bomber units were eventually fully equipped with DB-7s, two in Algeria and two in Morocco. This aircraft is from GB I/19 which was based in Algeria. (Cuny)

them. While not completely successful, the Bostons proved to be very capable bombers and were able to take numerous hits and still return to base. Their rugged construction and ability to return to base with heavy damage endeared them to their crews and they were one of the more effective aircraft that the RAF employed in the low level offensive role.

While the Boston was making a name for itself in Europe, a small number were sent to North Africa. Initially used for reconnaissance, they suffered numerous losses until it was decided to use them in their intended role. Unfortunately, the small number available were often committed without fighter support and suffered severe losses. Eventually, enough aircraft were available to equip two South African squadrons, which played a major part in hindering Rommel's victorious advance after the British defeats at Gazala and Tobruk. They helped give the British the breathing room they needed to allow the Eighth Army to set up a defensive line at El Alamein. Stopped at this line, the Afrika Corps was forced to go on the defensive and the Boston squadrons provided excellent ground support throughout the

A DB-7 from an unknown French unit makes a shallow dive during a routine patrol. The white stripe along the fuselage was one of the early recognition markings used to identify Vichy French aircraft. (Cuny)

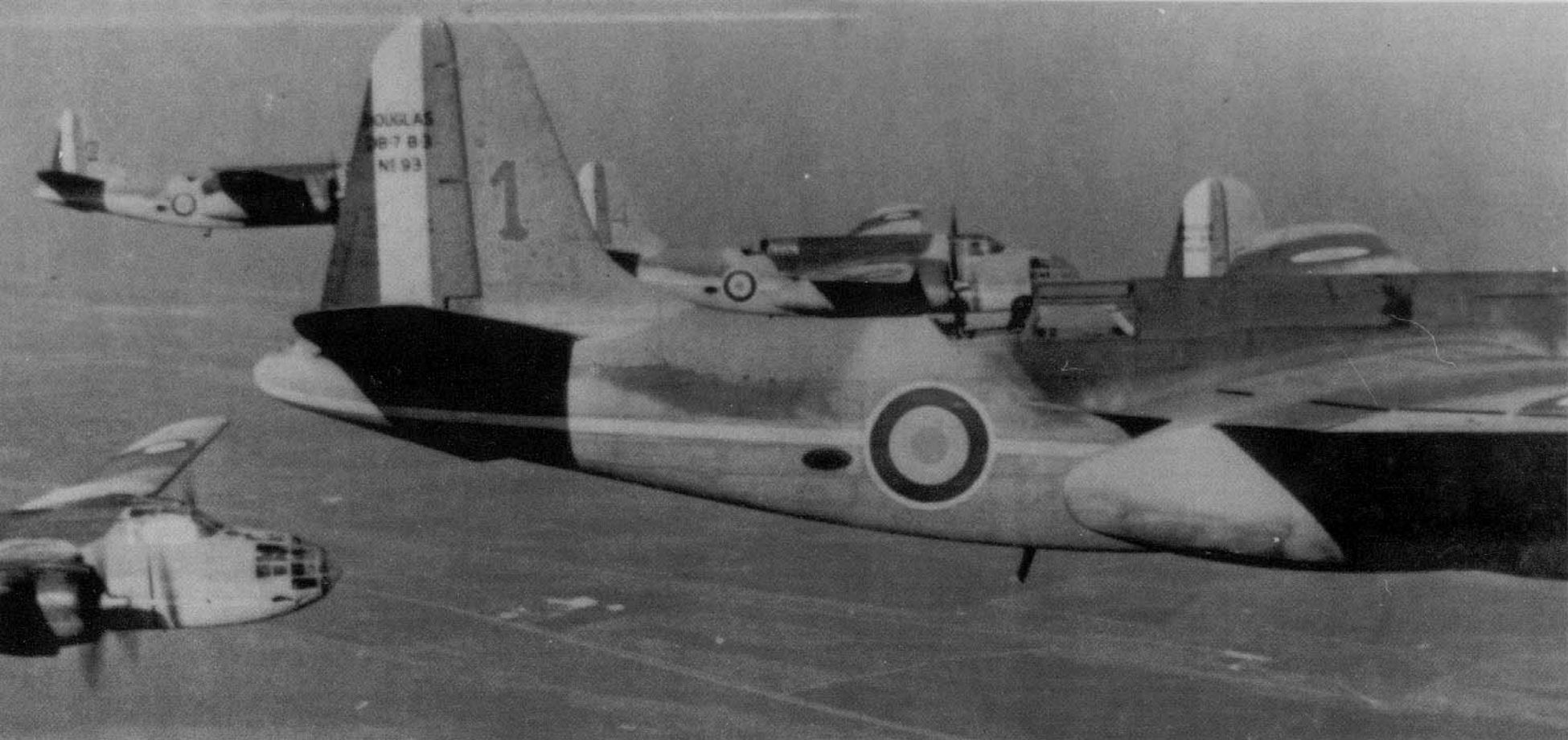


Summer of 1942. When Rommel was finally forced to retreat, they did much to hinder his withdrawal by carrying out attacks against his vehicles, supply points and lines of communication. Eventually, when German forces were cornered in Tunisia, the Bostons kept up a constant rain of bombs on enemy troops, tanks and defensive positions until the final capitulation of all Axis forces in May of 1943.

The first combat sorties for the A-20 in American service was at Pearl Harbor, where a number were damaged or destroyed in the surprise attack on 7 December 1941. As the Japanese made their way down through the Pacific, no A-20s were able to get into the air against them. A few were shipped to the Dutch on Java, but only one got into the air before the islands fell and at least one was assembled and tested by the Japanese. By the Summer of 1942 despite victories at the Coral Sea and Midway, Allied forces were in desperate straits and short of aircraft. A few A-20s finally arrived for use by the 89th Bomb Squadron, 3rd Bomb Group. Under the guidance of the legendary Major Paul "Pappy" Gunn, these aircraft were modified to carry four .50 caliber machine guns in the nose and were used for low level strikes on Japanese ships and airfields. These aircraft were the first "gunships", a development that revolutionized aerial warfare in the South Pacific. Using another new weapon, the parafrag (a small bomb with a parachute attached to slow its decent) the A-20s carried out devastating attacks against the Japanese and helped stop their advance. In conjunction with B-25 Mitchell gunships and Royal Australian Air Force Bostons and Beaufighters, the A-20s of the 3rd Bomb Group annihilated a Japanese convoy in the Battle of the Bismarck Sea. This victory effectively broke the back of Japanese sea power in the area.

In Europe, the first American mission against the Germans was flown in a British Boston. A number of other missions were flown in the same manner, American crews in British aircraft. The first sizable commitment of A-20s under American control, occurred following Operation TORCH, the Allied invasion of North Africa in November of 1942. It was during the initial phases of this operation that a number of Vichy French DB-7s were destroyed by U.S. Navy F4F Wildcats before French forces surrendered. Once the Allies had gained control of the airstrips, A-20s were flown in and provided valuable tactical support to U.S. and British ground units, particularly during the Kasserine Pass defeat. Their support helped save the day and eventually the Germans were forced back into a small perimeter in Tunisia, where they surrendered in May of 1943. Following this victory, the A-20s were used to soften up Sicily and Italy as the Allies established a toe-hold on the European mainland. Due to the nature of the campaign which followed, the single U.S. A-20 unit, the 47th Bomb Group, was used to strike German and Italian supply routes and front-line defenses. They also did experimental work with radar directed bombing until replaced by another Douglas aircraft, the A-26 Invader.

While the war in North Africa and Italy had been going on, plans were made to build up a tactical air force for the invasion of Europe. Three A-20 Bomb Groups, the 409th, 410th, and 416th were assigned to the 9th Air Force to prepare the way for the invasion forces. Due to the heavy German ground fire, low level attacks against fixed targets were halted and the attacks now took place at medium level. At low level the dense flak led to prohibitive losses among the A-20 units. Using glass nosed A-20Js and A-20Ks as lead-ships, flights of solid nosed A-20Gs and A-20Hs would attack targets, releasing their bombs on command from the lead-ship. Other missions against road traffic were less dangerous and by D-Day, the Germans were unable to effectively move during daylight hours due to Allied bombing. When the Allied forces finally established themselves ashore and began to move inland, the A-20 groups provided close tactical support, especially to General George S. Patton's 3rd



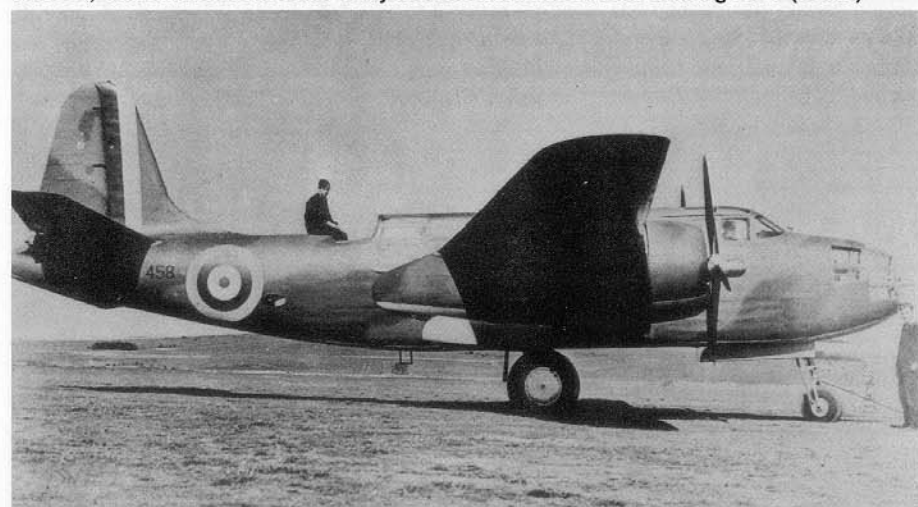
A flight of Vichy Air Force DB-7Bs, possibly of GBII/32 in Morocco, carry out a training flight during early 1941. At a later date, Red and Yellow stripes were added to the forward part of the tail and engine nacelles as a recognition marking. The rudder stripes are (from the rear) Red, White, and Blue. (Cuny)

Army during the rout of Germany forces in the Summer of 1944.

The Germans; however, were not yet defeated, and in December of 1944, Hitler unleashed a powerful Panzer army through the Ardennes Forest, just as he had done in May of 1940 against the French. This time, A-20s were used to strike at the German forces, and they carried out massive, concentrated attacks and, as American ground units regrouped and held their ground, the German attack faltered, then fell apart as the Allied forces struck back along the flanks of the attack. By January, the Germans were in full retreat under constant aerial assault. By now, the A-20s were being replaced by the newer A-26 Invader, although a shortage of glass nosed A-26Cs kept a number of glass nosed A-20s in service a while longer. The 410th Bomb Group retained their Havocs for night bombing missions and they were the last unit to convert to the A-26, doing so in the Spring of 1945, just prior to the end of the war.

In the Pacific, the Japanese expansion had been stopped and slowly the Allies built up strength. Newer A-20Gs began to arrive and, not only did they replace older A-20s with the 3rd Bomb Group, they were used to equip two additional units, the 312th and 417th Bomb

The British had also ordered the DB-7, but before they began to receive their own Bostons, aircraft from the French order (which had been transferred to the British just prior to the fall of France) began to arrive in England. This DB-7 was converted to a Havoc I, while most of the other early models were used in the training role. (USAF)



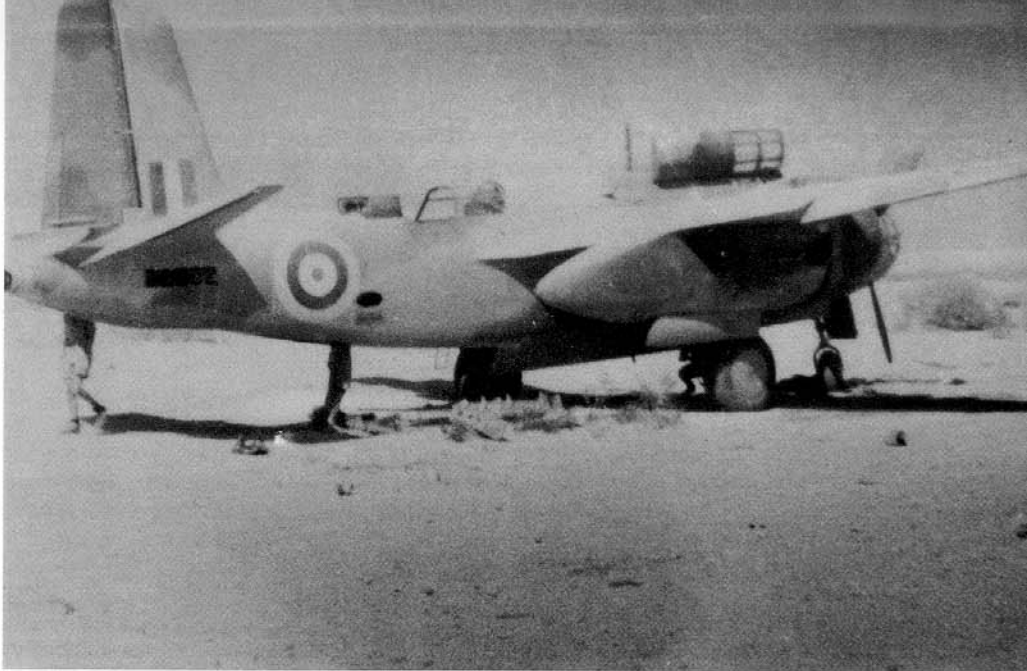
Groups, which were used as low level attack units.

Starting in New Guinea, the Allies slowly moved from there up toward the Philippines, after by-passing Japanese bases that were left to wither and die due to a lack of resupply. At low level the A-20s were unbeatable. Japanese airfields and ships were hit swiftly by the low flying aircraft before the Japanese had time to react. Their heavy firepower, maneuverability, speed and bomb load made them the ideal weapon for pinpoint strikes against aircraft, hangars and supply dumps. In formation, their forward firepower could overwhelm shipboard anti-aircraft weapons and at low level they could skip their bombs into the sides of transports and destroyers with deadly accuracy. On a number of occasions, entire Japanese convoys were literally wiped out when A-20 formations attacked them using skip bombing tactics. Once the Philippines were successfully secured in late 1944 and early 1945, the A-20s switched their targets to the island of Formosa, where there were many Japanese factories producing much needed war equipment. Against determined air and ground defenses, the A-20 groups hit these targets with pinpoint accuracy, seriously curtailing the island's contribution to the Japanese war effort. By the Summer of 1945, Allied forces were gearing up for the invasion of Japan and some of the A-20 units were in the process of re-equipping with the A-26. These plans came to a halt with the Atomic bomb attacks and the A-20 units stood down.

Following the end of hostilities, a few A-20s were kept for miscellaneous duties for a short time, but most of the A-20s were declared war surplus and melted down for scrap. The replacement for the A-20, the A-26 Invader, could trace its heritage directly back to the A-20.

While the A-20 gained fame for its attack and bombing roles, it also served as the Army's first night fighter in the Southwest Pacific as the P-70. Unfortunately, the P-70 was really not suited for this role, but at the time, it was the only U.S. aircraft able to perform as a night fighter. It was used by four units with various degrees of success over New Guinea and the Solomons against Japanese night raiders. Besides operating as strictly night fighters, they also flew night intruder missions and provided cover for PT boats against Japanese float planes.

As American production geared up, standard U.S. models began to appear in British service. These A-20Cs are being serviced prior to a mission in support of the British 8th Army. Two RAF squadrons of A-20Cs (Boston IIIs) provided invaluable ground support to British ground units and caused tremendous losses to German motor transportation units.



In British service the DB-7 was named the Boston. It was used for a variety of roles over occupied Europe and also saw service with a number of Commonwealth air forces. This Boston III was either from No 12 or No 24 Squadron, South African Air Force, which supported British ground forces against Rommel's Africa Korps.

Perhaps their biggest accomplishment; however, was that they were used to train hundreds of pilots and radar operators who manned the later P-61 Black Widow, the first U.S. aircraft designed from the outset to be a night fighter.

Throughout the war the A-20 was used by nearly every Allied air force in every theater of operations. They fought along side U.S. units in Europe, and included every type in production, including some original French DB-7s, which were used to bomb by-passed German pockets in southern France.

In the Pacific, Australian Bostons flew wing-to-wing with American A-20 Havocs against Japanese forces and one Aussie Boston named "She's Apples" is believed to have set a record of 186 missions during her service career. It was the Russians; however, who used the most A-20s, receiving nearly half of the total production under Lend-Lease. These were used in every conceivable role, from low level strafers, to torpedo bombers. Nearly all the early A-20Gs with their four 20MM cannon armament, were sent to Russia and these were used for tactical support of armored units. Some A-20s had their rear gun turrets replaced by a Russian unit, which gave the aircraft a rather unusual profile compared to the standard A-20. Many of the aircraft were ferried directly to Russia via Iran or Alaska rather than taking a chance on sending them via sea, where a number had been lost to German U-boats. Despite the widespread use, little has appeared about the A-20 in Russian service and when the war ended, they were quickly phased out of service.



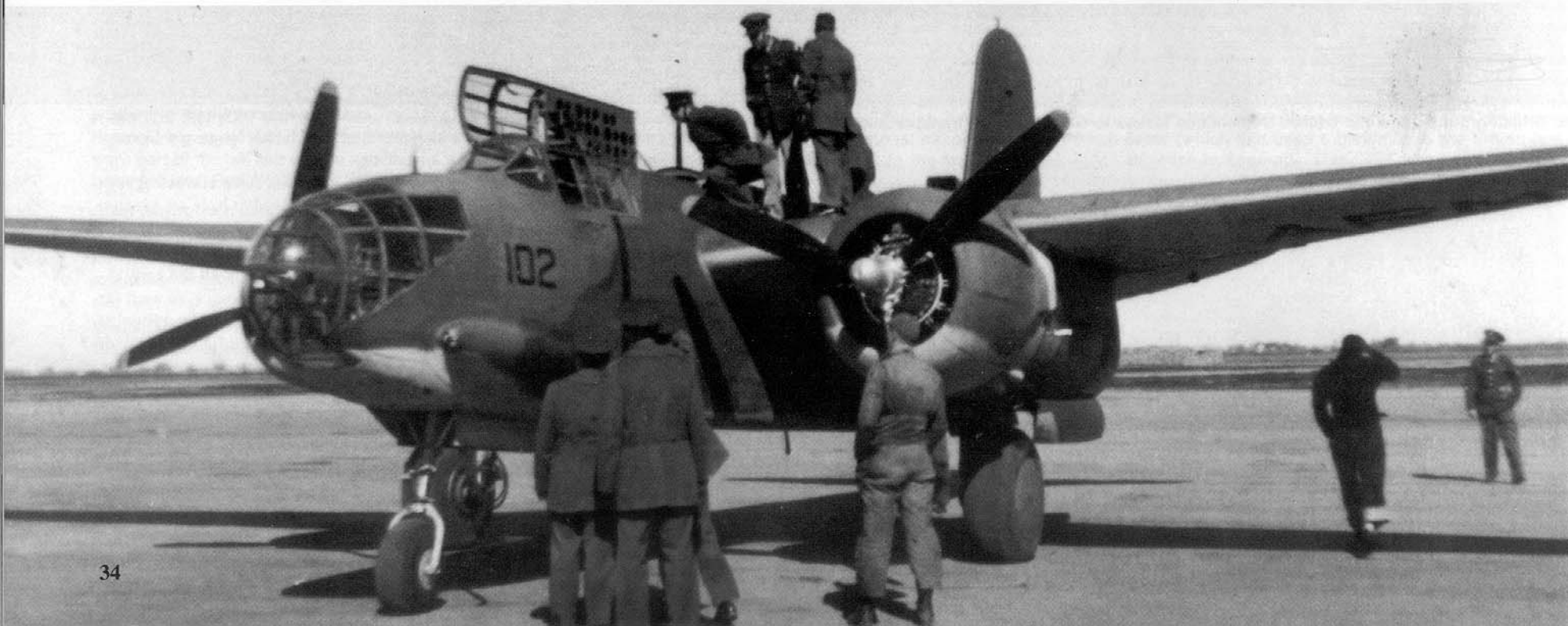


As America geared up for war, production of military aircraft increased tremendously. These A-20s await final checks before being turned over to the Army Air Corps. Unfortunately, the industrial might of the U.S. did take some time to get into motion and during the early days of the war, only small amounts of war material actually got overseas. (NASM)



An A-20A takes off during the large scale war games held in the southern U.S. during late 1941. It has a temporary White cross painted on the wings and fuselage to designate it as an enemy aircraft. A great deal of information was gleaned from these games, but much of it would prove to be useless in light of actual combat experience. (Air Force Museum)

A group of cadets examine an A-20A Havoc, which had been requisitioned from the British order during 1940, at Stockton Field, California. At this time the A-20 was one of the most modern aircraft in American service. (Air Force Museum)





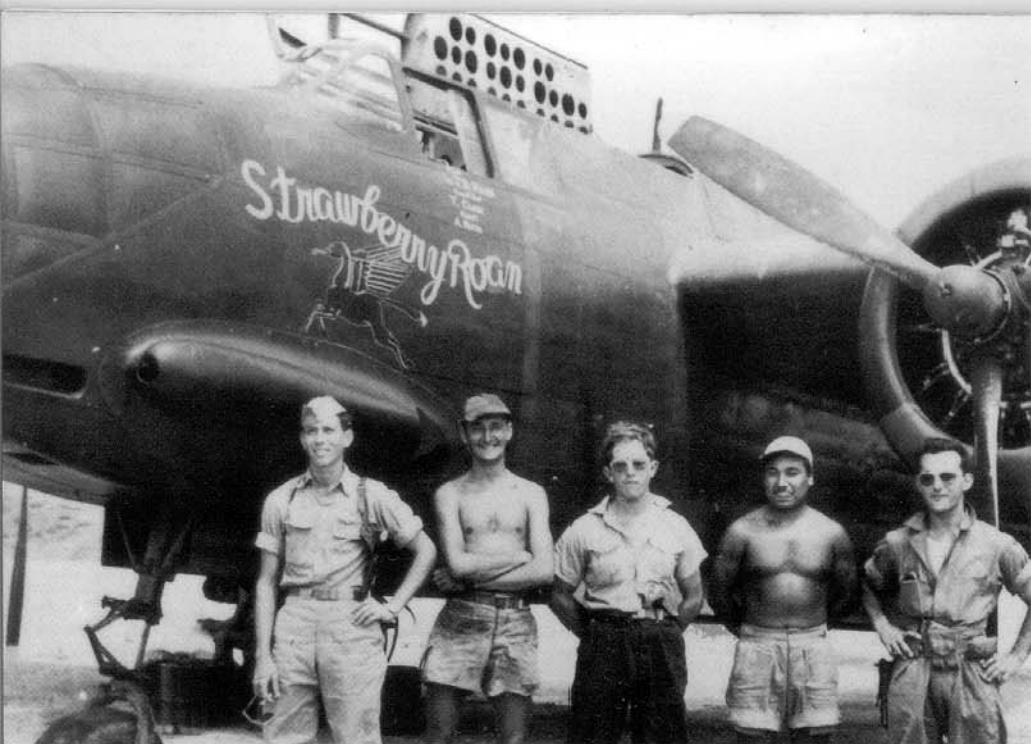
An A-20B Havoc flies low over the Florida countryside during a training flight from the Army Air Force facility at Orlando, Florida. A large number of A-20Bs were used for training due to deficiencies in the design, such as a lack of self-sealing fuel tanks. (USAF)



A group of Navy and Marine Corps personnel examine a DB-2, the Navy version of the A-20B, which was used as a high speed target towing aircraft. Eight of these were received by the Navy and operated by the Marines. (NASM)

A large number of the A-20Bs were also given to the Russians under the Lend-Lease agreement. These aircraft are parked on the runway at Abadan, Iran awaiting pick-up by Russian Air Force crews, who will ferry the aircraft to the Soviet Union. (USAF)





In the Pacific the Japanese sneak attack caught the U.S. and Allied forces off guard and inflicted numerous reversals before the area began to stabilize in mid/late 1942. The 3rd BG took their A-20As into combat against the Japanese during the late Summer of 1942 at New Guinea. The crew of *Strawberry Roan*, pose in front of their aircraft with their ground crew. During the early days in the Pacific supplies were hard to come by and nearly everything, including clothing, had to be scrounged up. (Air Force Museum)

While the war was going on in the Pacific, U.S. forces were also getting into the war in Europe. This A-20B prepares to take off for a mission against German targets in France during 1943. Combat experience with the A-20B showed that the aircraft did not have the needed protection to survive in an intense aerial combat situation and it was quickly taken out of combat service. (Klimek)



My Baby had completed 39 missions by late 1942 or early 1943. The cooling vents on the cowl indicate that this was an early A-20A. It appears that the glass nose has been painted over indicating that the ship has been converted to a gunship with four .50 caliber machine guns being mounted in the nose. There were only enough A-20s to equip one squadron of the 3rd BG, a situation which did not change until early 1944. (Air Force Museum)

It is believed that this A-20B was flown by the 67th Tactical Reconnaissance Group. The aircraft was based at Ibsley Air base during 1943. (Klimek)





A British Boston, which was repossessed by American forces for training purposes, carries large "Buzz" numbers on the fuselage side in White. One of the key reasons for the success of the U.S. forces over the Axis forces was America's ability to mass produce large numbers of competent pilots while the enemy was forced to keep their pilots in constant service due to a poor turnout of replacement pilots. (Air Force Museum via Taylor)



In early 1944 three A-20 groups were sent to England to strengthen the 9th Air Force as it prepared for the invasion of Europe in the Spring or Summer of 1944. These groups were the 409th, 410th and 416th Bomb Groups, each of which had its own tail markings and fuselage codes. The Yellow tail and 7G identify this aircraft as being from the 641st BS of the 409th BG. (Air Force Museum)

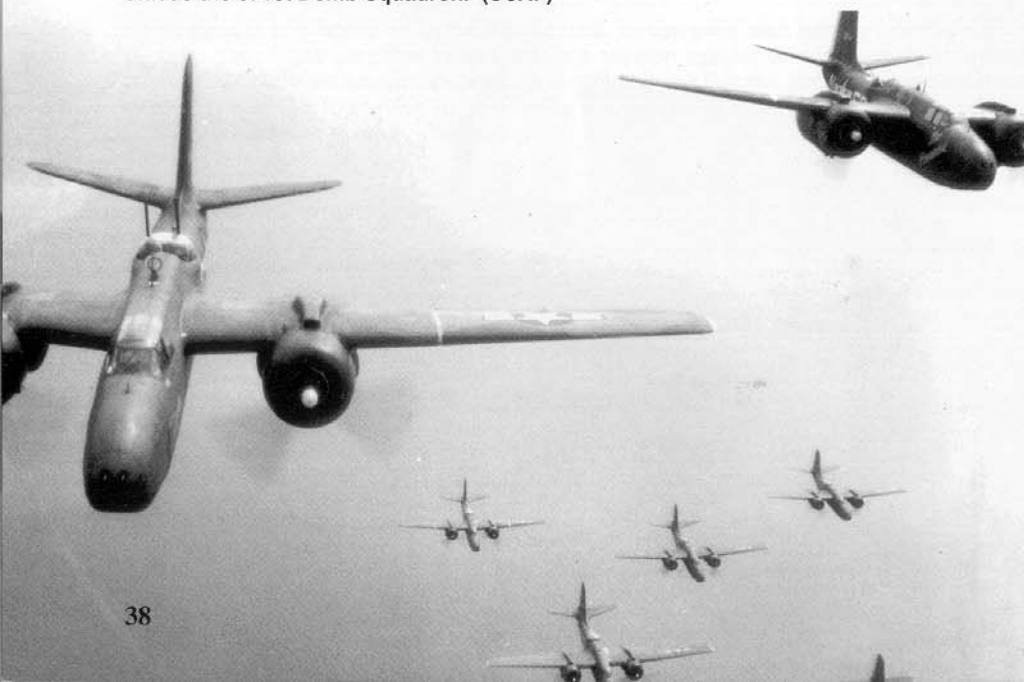


A line-up of A-20B Havocs on a Burmese airfield. This is a bit of a mystery since the A-20 was not used operationally in the China-Burma-India (CBI) theater of war. (Simecek via Squadron Signal)

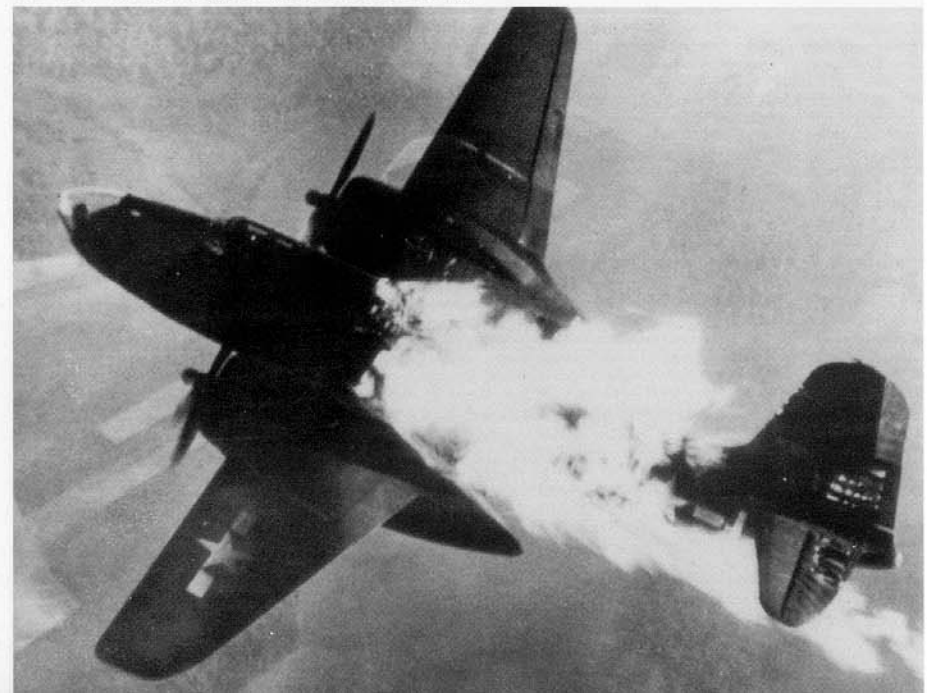


The White and Black tail was used by the 410th BG which sometimes also painted their cowlings in the group colors. The 7X fuselage code indicates this Havoc was from the 645th BS. (USAF)

These A-20G Havocs from the 416th BG head for a target in France prior to D-Day. Although it is difficult to spot, the fuselage identification code is 5C which identifies the unit as the 671st Bomb Squadron. (USAF)



Missions were carried out at medium altitudes due to heavy flak at low levels, but there was still a risk. This lead ship A-20J was hit by flak and caught fire. Since the glass nosed Havocs carried the bombardier, the German gun crews concentrated their fire on them in order to disrupt the bombing pattern. It is unknown if this crew got out before the ship was destroyed. (Air Force Museum)





Other crews were more fortunate as the A-20 proved to be a rugged aircraft capable of getting its crews home in one piece. This A-20G from the 646th BS, 410th BG made a fairly good belly landing in England following a hit over the continent. If there is no major structural damage the aircraft could be repaired and returned to service. (USAF)

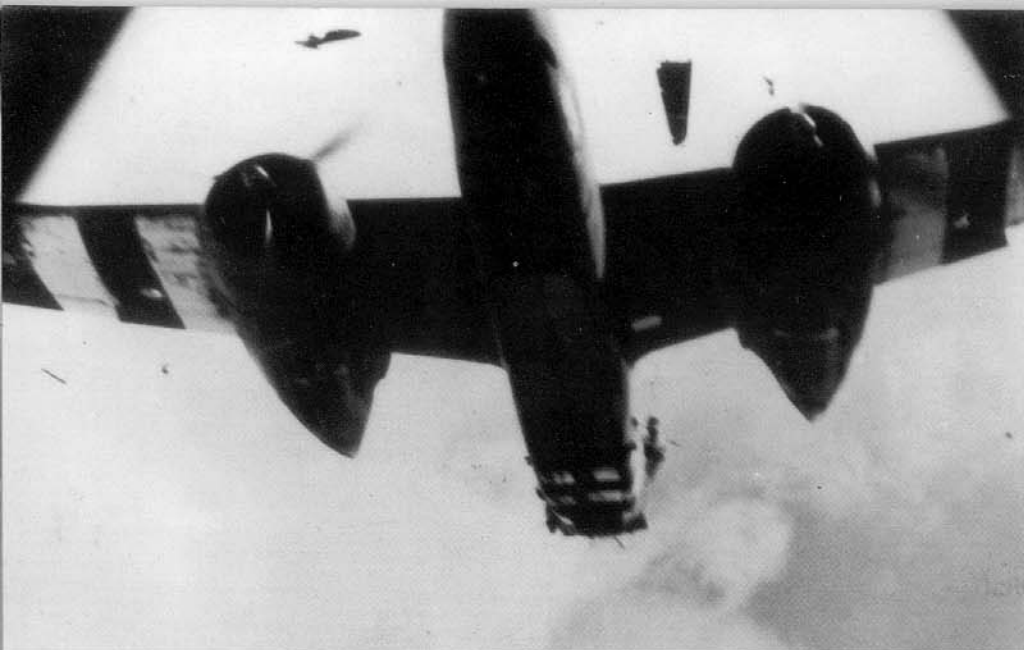
Just prior to D-Day all Allied aircraft had invasion markings painted on their wings and fuselages. The Black and White stripes were not always done neatly in the haste to get the aircraft ready in such a short time. (Air Force Museum)



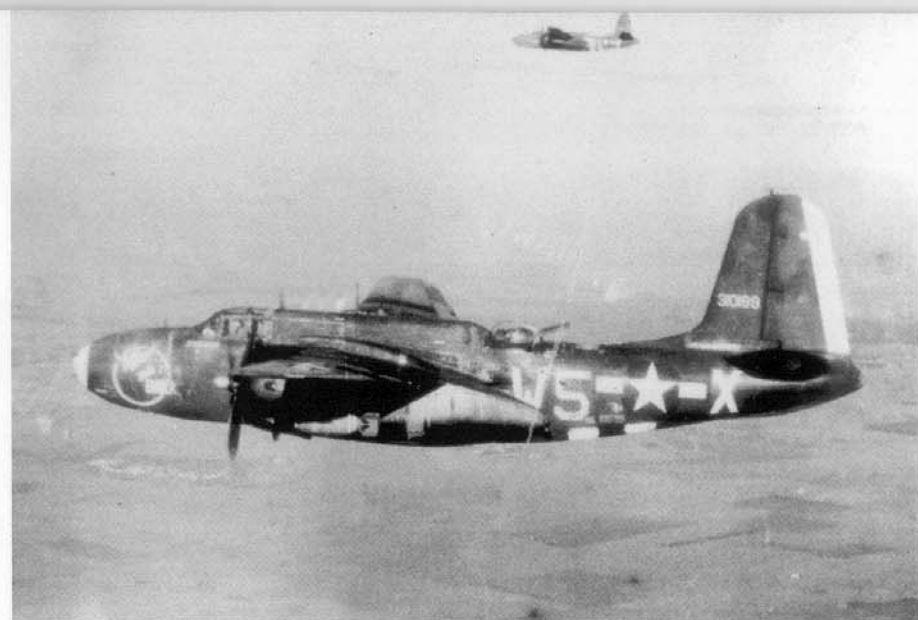
This A-20G-35 suffered major structural damage to the nose, fuselage, engines and wings. It was probably stripped of all useful material and consigned to the scrap heap, but at least it got its crew home in one piece. (USAF)

The fuselage invasion stripes did not cover the national insignia of squadron codes. The aircraft is from the 644th BS of the 410th BG. The gunner keeps his turret rotating as he scans the skies for any sign of German fighters. (Air Force Museum)



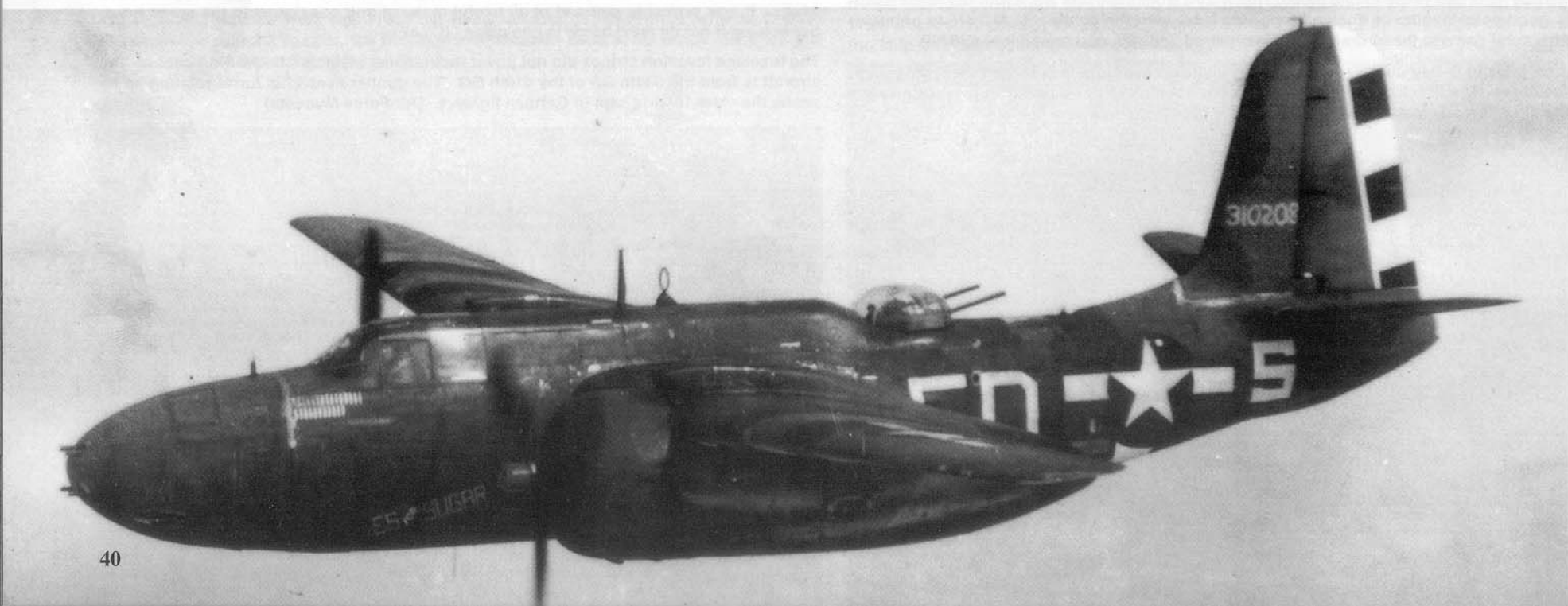


This A-20 was hit by a flak burst in the tail. The Havoc remained airborne for a few seconds before it plunged earthward with its tail knocked off. Portions of the rudder and tail can be seen above each wing. The crew did not get out. (USAF)



A 409th Bomb Group A-20G-35 from the 640th BS heads toward a target with bombs loaded on the underwing racks. The nose cap is believed to be Yellow to match the Yellow tail stripe. (Air Force Museum)

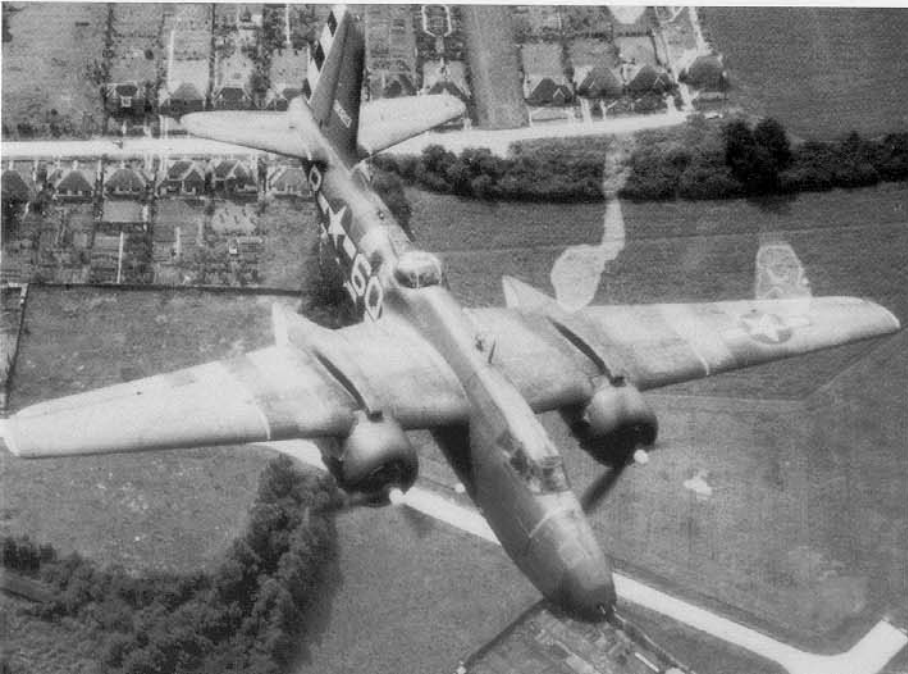
"ES for Sugar", an A-20G-35 Havoc of the 644th BS, 410th BG heads for home after a successful mission over France. By this stage of the campaign the invasion stripes on top the wings and fuselage have been removed to cut down on their visibility from above. (Klochrin via Squadron/Signal)





This A-20J-15; THE REAL MCCOY, leads a flight of solid nosed A-20G Havocs toward their target during September of 1944. The cowlings fronts have been painted a bright Blue, indicating the aircraft was from the 646th BS of the 410th BG. (USAF)

Not long after D-Day, crews painted out the upper wing and fuselage White stripes since they were a good aiming point for enemy gunners. This 647th BS Havoc heads toward a target in France from its base in England. (USAF)



MISS SUE, a glass nosed A-20J, managed to make it back to England after being hit over its target in France. Unfortunately, in a crash like this the bombardier's chances of survival were not very good as can be judged by the way the nose has been crushed. (USAF)





This 410th BG A-20G of the 647th BS heads for a target near the German border as the Allies push out of the Normandy beachhead area in the late Summer of 1944. The 9th Air Force provided excellent close air support and caused tremendous losses for the retreating German units. (USAF)



A group of A-20s of the 416th Bomb Group sit in the dispersal area of Villiroche airfield after it was taken over from the Germans. The clear-nosed A-20J has obviously led a large number of missions from the mission markings carried on the nose in front of the nose art. (USAF)

Once the Allies had cleared the Germans out of the beachhead area they began to move aircraft into the captured airfields and built additional ones. A group of A-20s taxi out for a mission in the Fall of 1944. It appears that none of the aircraft are carrying any tail markings. All the Havocs are fitted with underwing bombs. A glass nosed A-20J or A-20K is at the right. (USAF)





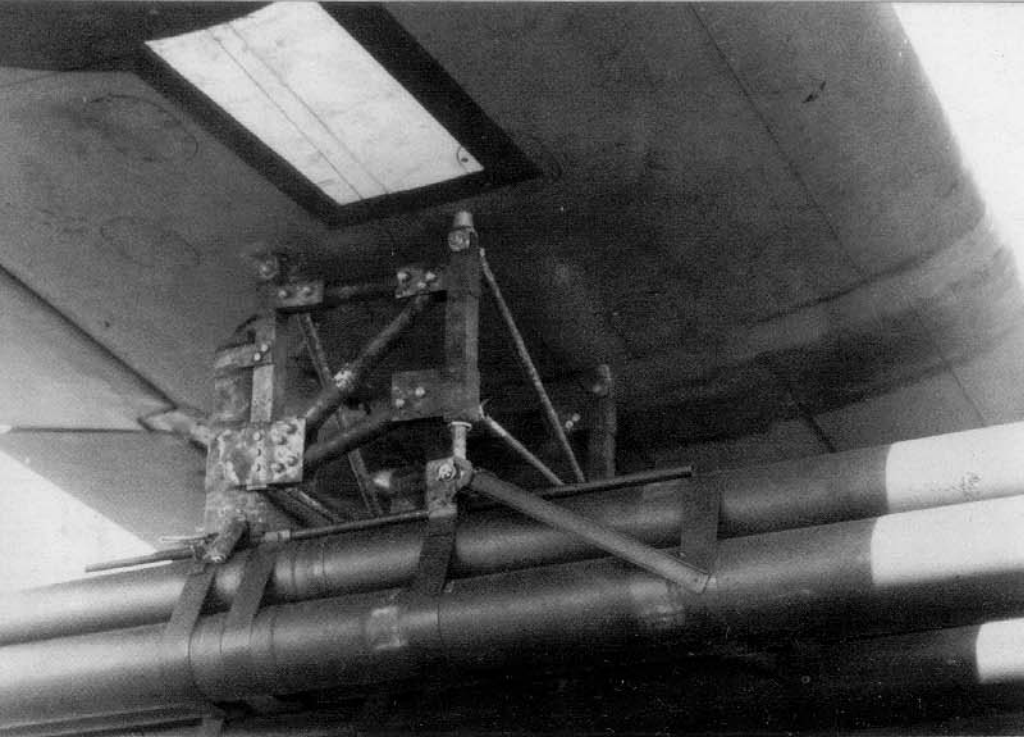
While enroute to its target a 647th Bomb Squadron A-20G-35 flies above the solid overcast. Conditions such as these made the use of a glass nosed leadship a necessity in order to find a target. The aircraft is carrying a 500 pound bomb on the underwing rack. (USAF)

Low altitude missions were extremely dangerous. On 22 July 1944 this A-20 piloted by LT James Knarr was hit over Kokoi in Dutch New Guinea. The plane went straight into the water narrowly missing the Havoc at the left. Neither Knarr or his gunner, S/Sgt Charles Retchly ever had a chance of survival. (USAF)

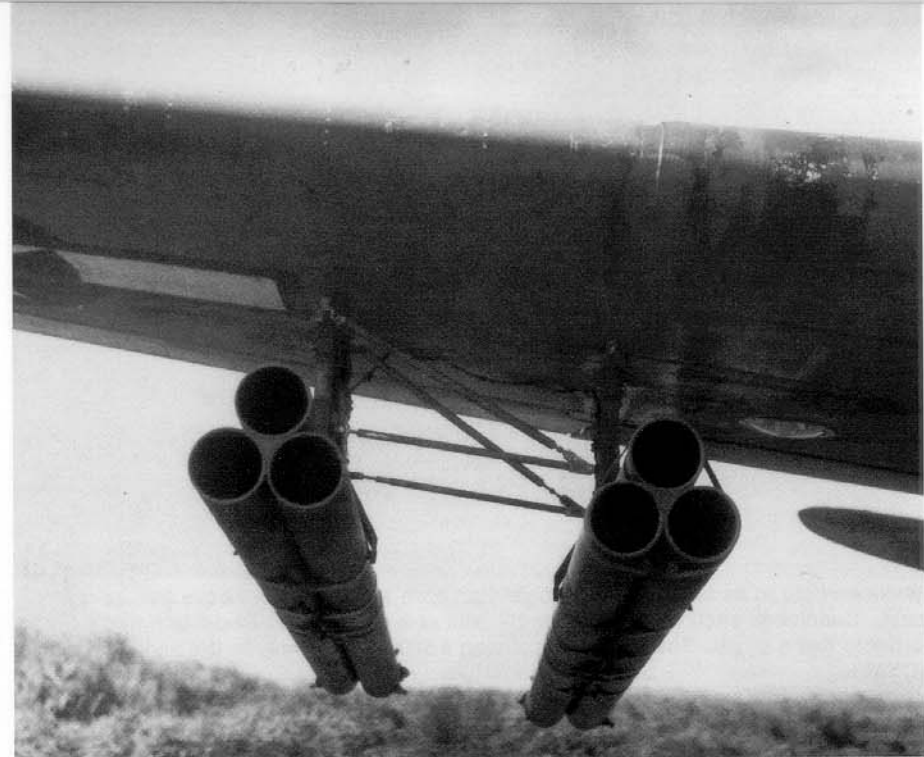


When the Germans launched their surprise offensive in mid-December 1944 in the Ardennes, inclement weather made air support almost impossible. When the skies cleared the Allied air forces struck the German columns with a vengeance. The 410th BG, in particular, did an outstanding job and received a Distinguished Unit Citation. These Havocs, cleared of snow and ice, sit by an airfield in France as their crews prepare to board them for a strike against German positions during the later stages of the battle. (USAF)





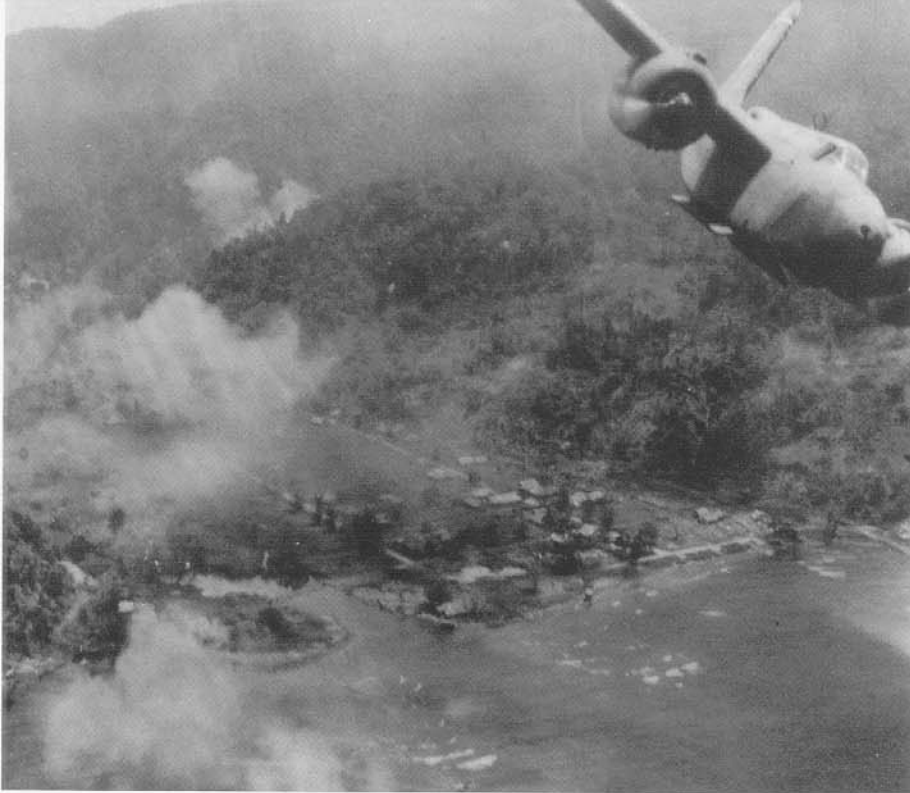
One of the more unusual armaments tried on the A-20 in the Pacific were these rocket tubes mounted under the outer wing panels. They proved to be too heavy and their complicated mount caused too much drag. They were not practical and were never used on a wide scale. (USAF)



These rocket launcher tubes each held an M8, T-30 4.5 inch spin stabilized high explosive rocket. The A-20 could carry twelve rockets. These proved to be more trouble than they were worth and were not often used. (USAF)



Bomb bay doors open, an A-20 strikes the Japanese airfield at Hollandia. In late 1943, newer models of the A-20 began to reach the Pacific theater and the Allies began to push the Japanese back. The A-20s proved very valuable in the low level strike role and, unlike Europe, the Havocs were used mostly low down since Japanese flak was not nearly as intense as it was in Europe. (USAF)



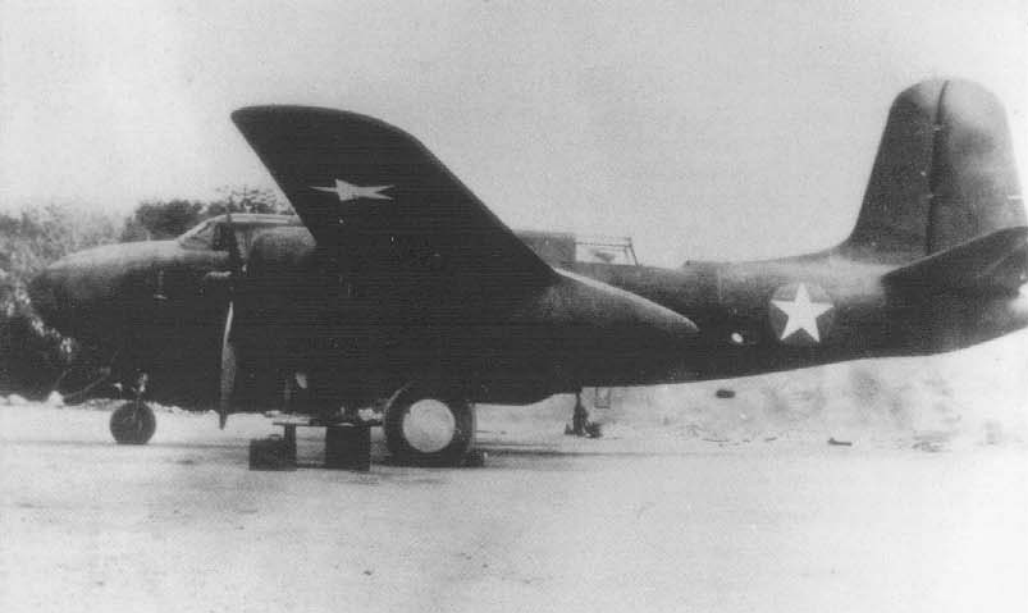
The Havocs proved particularly good at hitting small targets and Japanese coastal shipping. This A-20 has just released its bomb load on some Japanese lighters in Humbolt Bay. The aircraft is from the 3rd Bomb Group. (USAF)



Ground crews work on the engine of *Kay*, an A-20G of the 417th Bomb Group. The Group used a different colored slanted tail band on the forward portion of the vertical fin to identify its four squadrons. (USAF)

The front A-20 is from the 388th Bomb Squadron, 312th Bomb Group which used a small heart for its squadron identification. The other squadrons within the group used a club (386th), a diamond (387th), and a spade (389th). The A-20 in the background with the missing tail cone is from the 3rd BG. (Australian War Memorial)





This P-70 of the 6th NFS, Detachment "B" saw service on Guadalcanal against Japanese night intruders with limited success. P-70s were also used to provide night cover for Navy PT boats which carried out nightly missions against the Tokyo Express and barge traffic coming down the slot. (Air Force Museum)



An A-20 from the 90th BS, 3rd BG comes in for a landing at Dododura, New Guinea, one of the main Allied bases in the area. The 3rd BG was one of the earliest users of the A-20 and established an outstanding record with the aircraft. (USAF)

A 417th BG A-20 shares a runway dispersal area with other 5th Air Force aircraft toward the close of the war. This unit was the only one of the three to stay fully equipped with the A-20 right up to the end of the war. (Air Force Museum)



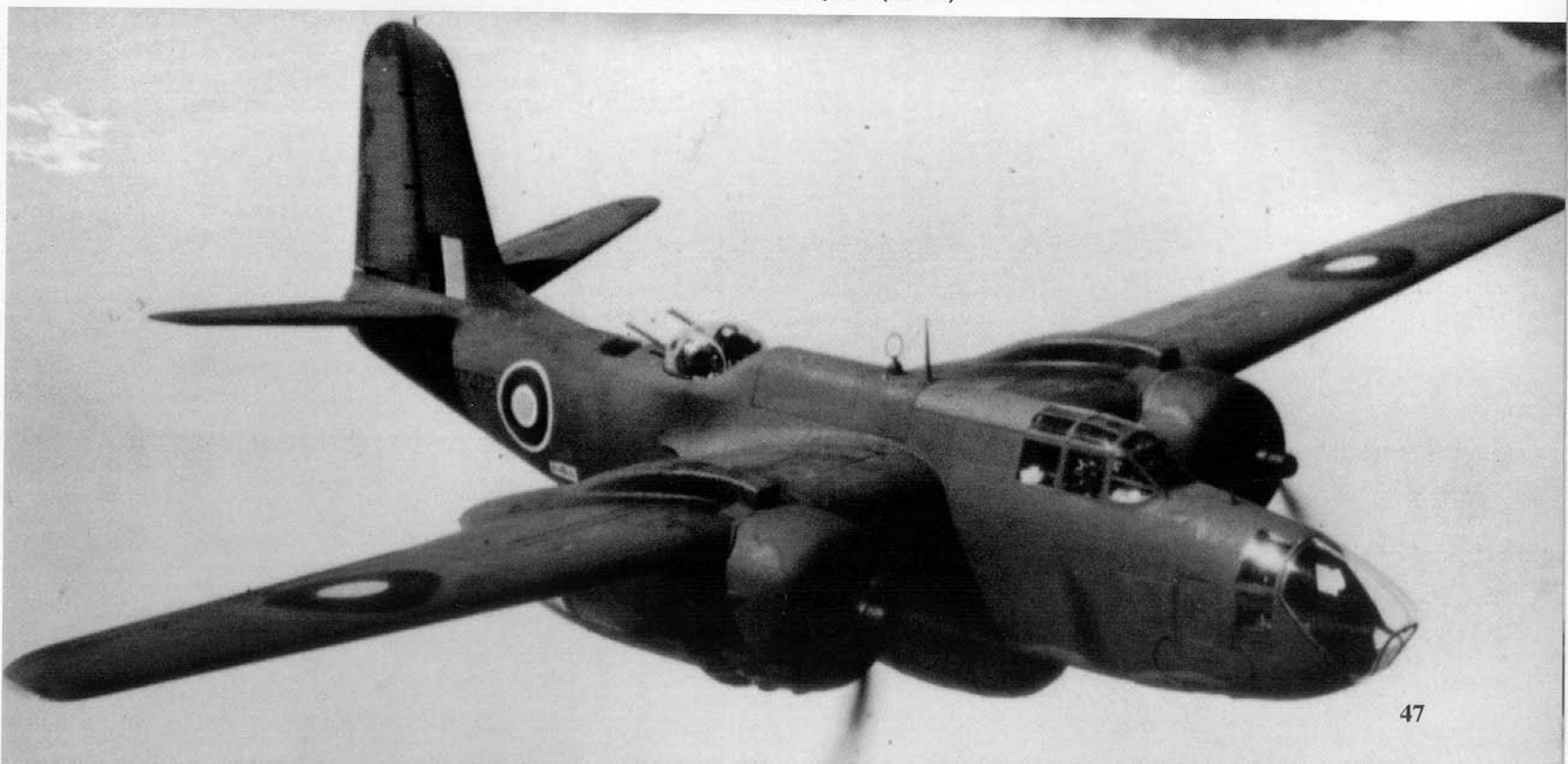


End of the line for the GREEN HORNET, the Havoc featured on the cover, and one of the most colorful A-20s of the war in 1945 at an unknown location. (Draper via Squadron/Signal)



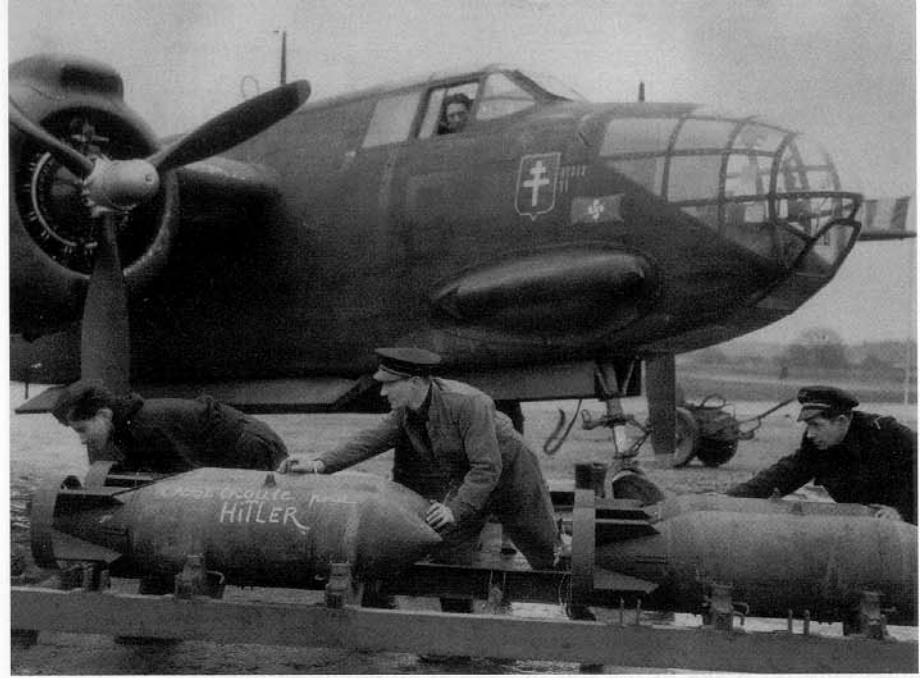
British air crews stand in front of a Boston III somewhere in England during 1943. Gradually the RAF replaced their earlier aircraft with later A-20 variants or with the superb deHaviland Mosquito. (Scutts)

The British received 169 A-20Js under Lend Lease and gave them the designation Boston IV. These were used by five RAF squadrons, Nos 13, 55, 88, and 114. Additionally, the Boston IV was used by No 342 Lorraine Squadron. The Boston IV entered RAF service in the Summer of 1944. This aircraft was fitted with the long range ferry fuel tank under the fuselage. Since it carries no squadron codes, this is probably a new production aircraft on a delivery flight. (Ward via Scutts)



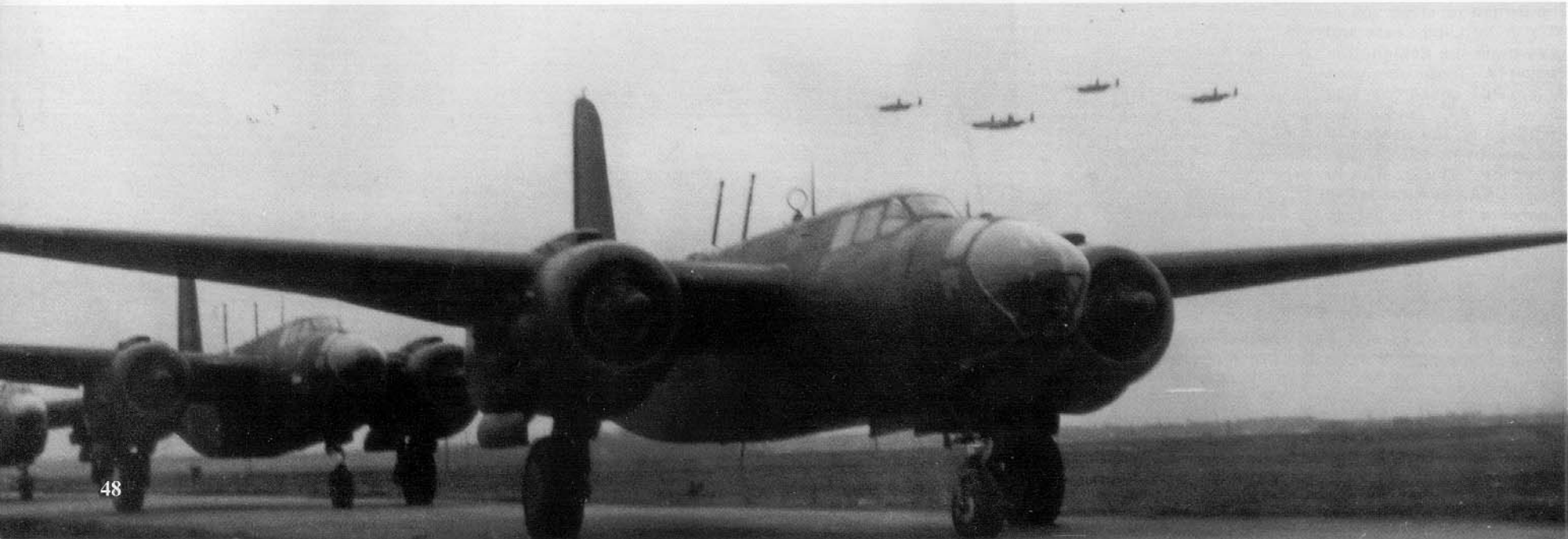


During the Normandy invasion period and subsequent breakouts, numerous German positions were left intact behind the advancing Allied ground forces. The French used some older DB-7s to help reduce these positions. The stripes on the fuselage and wings are Black and White Invasion stripes. (ECPA via Cuny)



Ground crewmen prepare to load 500 pound bombs aboard a French Boston III from No 342 Lorraine Squadron. This squadron saw extensive service prior to D-Day and was used to hit German V-1 sites along the French coast. (Cuny)

The French received a number of the later model A-20Js (Boston IV) from the British in late 1944. A flight of these aircraft from No 342 Squadron prepare to take off from a field in France during 1945. (ECPA via Cuny)

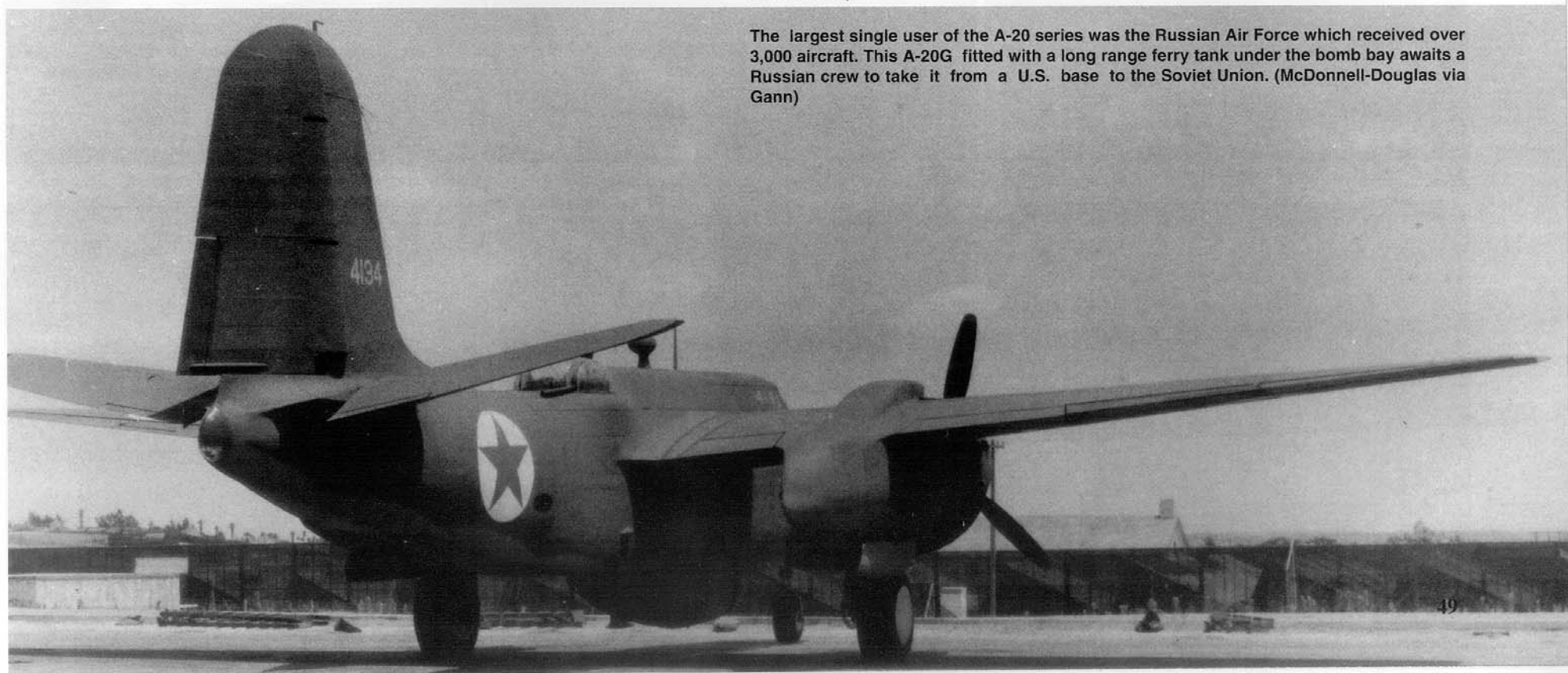




A Boston III of No 342 Lorraine Squadron heads inland over the Normandy beach-head in the late summer of 1944. The upper invasion stripes on the fuselage and wings have been removed by this stage of the fighting. (ECPA via Scutts)



The A-20 quickly disappeared from service with most air forces following the end of the war but in Brazil they soldiered on into the 1950s before being scrapped. During this period they flew in a number of different camouflage schemes including this one of Sand with Green mottle and Gray undersides. The rudder stripes were Green and Yellow. (via Nick Waters)



The largest single user of the A-20 series was the Russian Air Force which received over 3,000 aircraft. This A-20G fitted with a long range ferry tank under the bomb bay awaits a Russian crew to take it from a U.S. base to the Soviet Union. (McDonnell-Douglas via Gann)

