Vultee BT-13 Valiant

BT-13 Valiant

BT-13 Valiant in flight

Role	Trainer
Manufacturer	Vultee Aircraft Corporation
Designer	Richard Palmer
First flight	March 24, 1939
Introduction	June 1, 1940
Retired	August 5, 1945
Produced	1939 - 1944
Number Built	11,537
Primary users	United States Army Air Forces United States Navy

The Vultee BT-13 Valiant was an American World War II-era basic trainer aircraft built by Vultee Aircraft for the United States Army Air Corps, and later US Army Air Forces. A subsequent variant of the BT-13 in USAAC/USAAF service was known as the BT-15 Valiant, while an identical version for the US Navy was known as the SNV and was used to train naval aviators for the US Navy and its sister services, the US Marine Corps and US Coast Guard.

Design and development

The Vultee BT-13 was the basic trainer flown by most American pilots during World War II. It was the second phase of the three phase training program for pilots. After primary training in PT-13, PT-17, or PT-19 trainers, the student pilot moved to the more complex Vultee for basic flight training. The BT-13 had a more powerful engine and was faster and heavier than the primary trainer. It required the student pilot to use two way radio communications with the ground and to operate landing flaps and a two-position Hamilton Standard variable pitch propeller. It did not, however, have retractable landing gear or a hydraulic system. The large flaps are operated by a crank-and-cable system. Its pilots nicknamed it the "Vultee Vibrator."
Due to the demand for this aircraft, and others which used the same Pratt & Whitney engine, some were equipped with Wright power plants of similar size and power built in 1941-42. The Wright-equipped aircraft were designated BT-15.

The Navy adopted the P&W powered aircraft as their main basic trainer, designating it the SNV. The BT-13 production run outnumbered all other Basic Trainer (BT) types produced.

It was back in 1938 that Vultee Aircraft's chief designer, Richard Palmer, began the design of a fighter. At this time the USAAC issued a requirement and design contest for an advanced trainer for which substantial orders had been promised to the victor. Palmer began to adapt his design concept from a fighter to that of an advanced trainer and the result of this was the V-51 prototype.

Vultee BC-3 prototype in flight

The aircraft made its maiden flight on 24 March 1939 as a cantilever low-wing monoplane of all-metal construction. Despite the use of metal throughout the design the control surfaces remained fabric-covered. The prototype was powered by a Pratt & Whitney R-1340-S3H1-G Wasp radial rated at 600 hp (447 kW) driving a two-blade variable pitch metal propeller. Other features included an enclosed cockpit for the crew of two, integral fuel tanks in the wings, and a hydraulic system for the operation of the flaps and retractable main landing gear.

The V-51 was entered into the USAAC competition as the BC-51 during May 1939. The USAAC instead chose the North American BC-2, but purchased the BC-51 prototype anyway, designating it the BC-3. Despite the disappointment, Palmer was not finished yet. He continued to refine the design of the VF-51 into the VF-54 in an attempt to meet the expectation of an export market for just such a trainer. The VF-54 used the same basic airframe as the VF-51, but was fitted with a lower powered engine. No export sales were made.

From this design, evolved the VF-54A. Instead of retractable gear, it had fixed gear very nicely faired and a revised power plant of a Pratt & Whitney R-985-T3B Wasp Jr. radial rated at 450 hp (335.5 kW) and the Vultee BT-13 Valiant was born.

The USAAC was made aware of the improvements made to the aircraft and in August 1939 the type was ordered as the BT-13. The initial order was for 300 aircraft with a Pratt & Whitney R-985-25 radial and the first of these was accepted by the USAAC in June 1940.

Vultee BT-13 on runway at Minter Field, California, 1 March 1943.

The BT-13A was produced to the extent of 7,037 aircraft and differed only in the use of a Pratt & Whitney R-985-AN-1 radial engine and lack of landing gear fairings. There were 1,125 BT-13B's produced and differed from the A model in having a 24-volt, rather than the original 12-volt electrical system.

The next variant was actually designated BT-15 because Pratt & Whitney found it impossible to keep up production of the R-985 engine. Instead a Wright R-975-11 radial was substituted into the 1,263 aircraft produced.

The US Navy began to show an interest in the aircraft as well and ordered 1,150 BT-13A models as the SNV-1. In addition, the Navy ordered some 650 aircraft designated as SNV-2, roughly equivalent to the BT-13B.

Once in service, the aircraft quickly got its nickname of "Vibrator." There are several explanations given for this nickname. 1: Because it had a tendency to shake quite violently as it approached its stall speed. 2. During more adventurous maneuvers the canopy vibrated. 3. On takeoff, the aircraft caused windows on the ground to vibrate. 4. The two-stage propeller had an irritating vibration in high pitch. The BT-13 served its intended purpose well. It and its successors were unforgiving aircraft to fly, but were also extremely agile. Thus the BT-13 made a good aircraft to help transition many hundreds of pilots toward their advance trainers and fighters yet to be mastered. The BT-13 was not without its faults. The tail was held on with only three bolts and, after several in-flight failures, the Navy restricted the aircraft from aerobatic and violent maneuvers. The Navy declared the SNV obsolete in May 1945 and replaced it in the basic training role with the SNJ (AT-6). The Army also replaced the BT-13 with the AT-6 before the end of the war.

After World War II, virtually all were sold as surplus for a few hundred dollars each. Many were purchased just to obtain their engines, which were mounted on surplus biplanes (such as Stearmans) to replace their less powerful engines for use as crop-dusters. The BT airframes were then scrapped. Today, some "BT's" (collectively, BT-13s, BT-15s and SNVs) are still flying, though in very limited numbers (and none in military or government service).

MAPS BT-13A Valiant – Serial Number 41-21882

The Vultee BT-13A Valiant that is part of the MAPS collection was built by the Vultee Aircraft Company in Downey, California and accepted by the Army Air Corps on May 11, 1942. The cost of the airframe to the Army Ari Corps was $18.082.00. The Valiant was initially assigned to the Jackson Army Air Base in Jackson, Mississippi. The field was activated on May 1, 1942 and was used by the United States Army Air Forces' Flying Training Command as a basic flying training airfield (Army Air Forces Pilot School, Miscellaneous Fields for Basic and Advanced Single and Twin-Engine training). Among the operational training squadrons were the 735th Basic Flying Training Squadron to which 41-21882 was assigned on May 14, 1942. The aircraft arrived at the Jackson Army Air Base in June of 1942.

It remained part of the 735th Basic flying Training Squadron and amassed a total of 3,324 flying hours until November of 1943. 41-21882 was then reassigned to Gunter Field in Montgomery, Alabama for basic aviation training duties under the 27th Flying Training Wing, Army Air Forces Training Command.

The BT-13A remained at Gunter until June 11, 1944 when it was assigned to McKellar Field near Jackson, Tennessee.

In May of 1945 41-21882 was dropped from the active Army Air corps inventory and disposed of as surplus. It was purchased by Plains Flying Service, Amarillo, Texas in June of 1946. When Plains Flying Service was purchased in January of 1995, the BT-13 was sold to Plains Aero Services also located in Amarillo, Texas. At this time, it was converted for use as an aerial spray platform.

In June of 1966, the aircraft was sold to Air Pest Patrol, Inc., located in Henderson, Kentucky. Four years later, (May 1970) the Valiant was again sold – this time to Mid-Continent Aircraft Corporation, Haiti, Missouri. Later that year, it was re-sold to a private owner in Lyons, Kansas.

In July of 2002, the BT-13A was acquired by the Military Aircraft Restoration Corporation (MARC) and placed on loan to the Historical Aircraft Squadron, Fairfield County Airport, Lancaster, Ohio.

In January of 2012, the aircraft was placed on loan to MAPS by MARC and moved to Ohio for restoration.

Variants

BT-15

BC-3

Vultee Model V.51 with retractable landing gear and a 600hp P&W R-1340-45, one built, not developed.

BT-13

Vultee Model V.54 with fixed undercarriage and a 450hp P&W R-985-25 engine, 300 built.

BT-13A

As BT-13 but fitted with a 450hp R-985-AN-1 engine and minor changes, 6407 built, survivors re-designated T-13A in 1948.

BT-13B

As BT-13A but with a 24-volt electrical system, 1125 built.

BT-15

As BT-13A with a 450hp Wright R-975-11 engine, 1693 built.

XBT-16

One BT-13A was re-built in 1942 by Vidal with an all-plastic fuselage as the XBT-16.

SNV-1

BT-13As for the United States Navy, 1350 transferred from USAAF.

SNV-2

BT-13Bs for the United States Navy, 650 transferred from USAAF.

T-13A

Surviving BT-13As were re-designated in 1948, due to dual allocation of T-13 with the PT-13 in practice they were still known as the BT-13 to avoid confusion.

Popular culture

N56478, a Tora! Tora! Tora! BT-15, "Val" at the "Wings Over Houston" airshow in October 2007

One notable post-war "variant" of the BT's are the "Tora" aircraft. In 1968 Twentieth Century Fox purchased nine BT-13/15 and modified them for use in the motion picture "Tora! Tora! Tora!". The "Val" dive bombers seen in this film are actually BT-13 and BT-15. The "Zero" fighters and "Kate" torpedo bombers are mostly Harvard IV's. After the film, these aircraft were sold to private owners. Many are still flying, several of them as part of the Commemorative Air Force's "Tora! Tora! Tora!" squadron, which performs air battle reenactments at air shows. Several "Tora" aircraft also appeared in the later "Pearl Harbor" film.

Specifications (BT-13A)

General characteristics

- **Crew:** 2
- **Length:** 28 ft. 10 in (8.79 m)
- **Wingspan:** 42 ft. 0 in (12.80 m)
- **Height:** 11 ft. 6 in (3.51 m)
- **Wing area:** 239 sq. ft. (22.2 m^2)
- **Empty weight:** 3,375 lb. (1,531 kg)
- **Gross weight:** 4,496 lb. (2,039 kg)
- **Powerplant:** 1 × Pratt & Whitney R-985-AN-1 nine-cylinder air-cooled radial engine, 450 hp (340 kW)

Performance

- **Maximum speed:** 180 mph (290 km/h; 156 kn)
- **Range:** 725 mi (630 nmi; 1,167 km)
- **Service ceiling:** 21,650 ft. (6,599 m)
- **Time to altitude:** 9.2 minutes to 10,000 ft. (3,000 m)