

# THE *Dauntless*

Carrying a thousand-pound bomb, carrier-based Douglas Dauntless turns toward its Wake Island target, smoking in the background.

By **GAITHER LITRELL**

Western Editor of FLYING

*Obsolescent when war began, the Dauntless carried, with honor, the brunt of the early Pacific battles.*

"... Only development of planes with greater speed and range induced the Navy to cease production of what probably was the most destructive single air weapon in its arsenal.

(Signed) James Forrestal,  
Secretary of the Navy."

**T**HIS high tribute from the Secretary of the Navy has just been given to an airplane that generally is credited by Naval aviation with paving the way for winning the Pacific war.

Yet this "most destructive single air weapon" was obsolescent when it was

making these great victories possible!

Affectionately known to pilots as "The Clunk," this outdated plane, whose production has just been completed with 5,936 built, is the Douglas SBD dive bomber—the Douglas *Dauntless*.

As long as men discuss the great battles of the Pacific, the story of the *Dauntless* will be told. It will go something like this:

From December 7, 1941, to the summer of 1944, *Dauntlesses* had flown more than 1,190,000 operational hours. Twenty-five per cent of all operational hours flown off aircraft carriers were by the

*Dauntless*. This also includes the time accumulated by other type planes operating from small carriers that do not carry *Dauntlesses*. The plane has run up 26 per cent of all Marine Corps operational flying hours.

In a recount of their part in the war, the *Dauntlesses* will be remembered most vividly for their work in the great holding battles from the Coral Sea engagement, May, 1942, up to the last big Jap strike against Guadalcanal in November, 1942.

In that seven-month period, *Dauntlesses* are officially credited as follows:

Sinking of 14 enemy aircraft carriers, 14 enemy cruisers, six enemy destroyers, 15 transports and cargo ships, and scores of smaller craft. Additionally, in co-operation with Grumman *Avengers*, surface gunfire and submarines, they destroyed two more carriers, one patrol ship, damaged three other carriers, five patrol ships, 11 cruisers and five transport and cargo ships.

Throughout all their missions—from the

## EVOLUTION OF THE DAUNTLESS



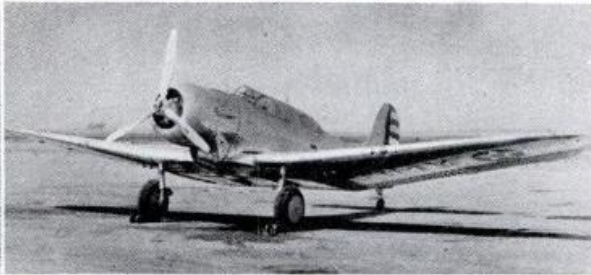
The XBT-1, first of the series. Note especially the extended landing wheel nacelles, the small tail surface, small engine.



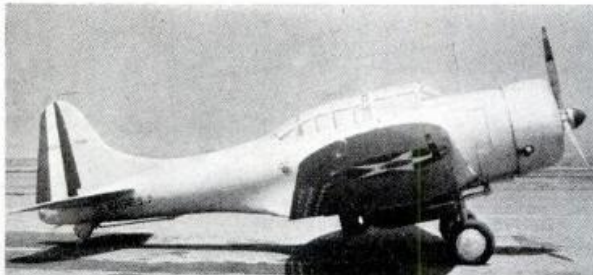
This BT-1 was used for testing a tricycle landing gear that did not prove satisfactory. Landing wheel nacelles are gone.



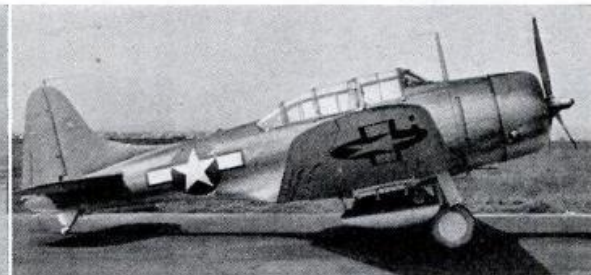
The XBT-2 had a fully retractable landing gear and a larger engine—a Wright Cyclone replacing Pratt & Whitney engine.



This is the Army's version—the A-17A. It had a wingspread 6½ feet greater than BT-1, other dimensions also differed.



After tests, control surfaces were redesigned. The Navy changed its designation system and the BT-2 became SBD-1.



Latest version, SBD-6, weighs 9,288 pounds where the first BT-1 weighed 6,830 pounds. Horsepower rose from 750 to 1,200.

attack on Pearl Harbor to the recent re-taking of Guam—the *Dauntlesses* are revealed by the Navy to have maintained a lower ratio of losses per mission than any other carrier-based plane.

*Dauntlesses* mixed it up with Zeros the first day that Japan became an armed enemy of the United States. One *Dauntless* operating from the U.S.S. *Enterprise*, which was in the proximity of Hawaii at the time, is credited with destroying the first enemy plane of the war.

With the Grumman *Wildcats* and Douglas *Devastator* torpedo planes, the *Dauntlesses* were given the task of delaying the onrushing Japanese drive until our aerial military might could be revived with new, better planes.

First offensive venture of the *Dauntlesses* came only three months after Pearl Harbor, when Adm. William F. ("Bull") Halsey, Jr., took a small task force into the Marshall and Gilbert Islands in February, 1942.

From the decks of the "Big E," squadrons of *Dauntlesses* climbed to rendez-

vous, approached their targets and peeled off one by one, hitting Jap ships, hangars, airstrips and troop bivouacs with 1,000-pound bombs.

The same force hit Marcus and Wake Islands in March, 1942.

Admiral Halsey received a Presidential citation for that brave, boldly-executed operation. With the entire ship's crew mustered top-side, the Admiral was presented with the decoration.

About this time all was not going well at Naval air stations on the mainland. The Navy needed dive bomber pilots but not enough *Dauntlesses* could be spared from combat.

At San Diego, pilots assigned to the fleet were in their last stages of advanced training. They needed to familiarize themselves with the *Dauntlesses* but none were available. Then one morning the air station field was dotted with 18 battle-worn SBD's flown in during the night. And for two weeks the new pilots had a chance to gain a few minutes flying time

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John K. Northrop conceived the prototype, later sold factory to Douglas.

"Oliveto, at the present, is down to one of the strips we had to evacuate, salvaging some of our planes. Doing a damn good job too. That guy is fearless. All he thinks of is what a shame, and out he goes and brings in another badly needed ship. He is OK. Waugh is OK now and is out of the hospital. I guess you know he cracked up an L-5 on the take-off coming out of a small field . . . broke his jaw, quite a few cuts and abrasions, but now he's full of vinegar, ready to get back on the job. . . ."

"Speaking of short field landings and take-offs, anyone can put them in, but getting out is the question. Make the field rough, a little soft in spots, not too wide, say ten feet, and from 200 to 300 steps in length and you have the ideal short field in Burma. Oh, I forgot to mention, there must be trees on both sides from 30 to 75 feet in height and those same trees on both ends of the strip, although you can cut a path through them for an approach."

Staff sergeant-pilots are being trained

now to take up the work begun by these early pioneers of the First Air Commando Group. They will do their job with the same carefree willingness that has thus far characterized all enlisted liaison pilots. It is well to remember all that the "L" on their wings signifies, for when our troops invade Japan, our commanding general will probably land on a Tokyo street in a Flying Jeep—and it will be piloted by a staff sergeant-pilot of the AAF who, a few hours before, may have been doing K.P. END

## The Dauntless

(Continued from page 31)

in these planes until a carrier heading for the Pacific battle area stopped by San Diego, picked up the 18 planes and headed to sea.

Production of the *Dauntless* had begun again at the Douglas El Segundo plant, however, and, in late March, 1942, the first of the new batch of *Dauntlesses* were coming off the line. Training caught up to schedule soon thereafter and new squadrons were sent to the war zones.

In May came the Coral Sea battle, where the *Dauntlesses* sank one Jap carrier, badly damaged several others and scored hits and near misses on other shipping. Tulagi Harbor was the next surprise action of *Dauntlesses*, flown from the U.S.S. *Yorktown*. Dive bomber pilots and their gunners here taught the Japs that *Dauntlesses* were also tough babies in a dog-fight. Their guns shot down several Zeros in this engagement.

Then came the Battle of Midway. It was a triumph for the *Dauntless*. In that historic engagement of June, 1942, *Dauntless* planes operating off the *Enterprise*, the *Hornet* and the *Yorktown* dive-bombed and sank at least four enemy carriers and damaged many other warships of the Japanese fleet. Never before had one type of aircraft done so much damage to capital warships.

*Dauntlesses* which had fought their way through the violent fighter and anti-aircraft opposition were returned to Pearl Harbor after the battle. Here the pilots and ground crews became aware of the sturdiness of the *Dauntless*. Many had gaping wounds in their wings, fuselages and tail surfaces. It seemed incredible that an airplane could absorb such punishment and still manage to return to the carrier for a landing.

In the summer of 1942 the carrier fleet moved into the South Pacific. There the *Dauntlesses* carried on the tedious work of flying long search patrols ahead of the fleet and hovering in protection over the task forces hour after hour. The *Dauntless* bore the flying burden.

In the fall of 1942, the U.S. Marines landed on Guadalcanal, with *Dauntlesses* spearheading the attack. When Henderson Field was secured, *Dauntlesses* landed and began operations as shore-based bombers and patrol planes. Marine Corps pilots put them to work in as trying a test as any aircraft has undergone.

With only a few *Dauntlesses*, the Marine flyers covered the long stretches northwest of Guadalcanal, flying night

and day to spot the "Tokyo Express," the enemy's fast-moving cruiser and destroyer forces which attempted to carry replacements almost daily from Bougainville to Guadalcanal.

Usual procedure followed by *Dauntless* Marine pilots was to take off in the afternoon from Henderson Field and attack the "Tokyo Express" in clear daylight. At night they would attack docks where the ships that had withstood the afternoon bombings were unloading troops. And then in the mornings the *Dauntlesses* would fly out to attack the Jap ships as they headed back to Bougainville.

This 'round-the-clock operation permitted only the barest minimum of upkeep. The worst days for the *Dauntlesses* were over by the end of 1942, when more and more planes of different types were poured into the Pacific area. The *Dauntless* no longer had to carry the terrific load virtually alone.

The *Dauntlesses* still had an active part to take, though. When the drive started up the Solomons chain, these planes were given the hazardous job of pinpoint objective bombing, such as gun emplacements, barges, fortifications, radio communication centers and stubborn points of resistance. As the Marines continued to advance, so did the *Dauntlesses*, operating from one new landing field after the other.

When the carrier offensive was renewed in the summer of 1943, *Dauntlesses* were the old reliables once again. But this time they were strictly on the offensive in the Central Pacific. They took part in the first small-scale carrier strike at Marcus Island on September 1, right up on and through the attacks on Wake, the Gilberts, the Marshalls, Truk, Rabaul, Palau, Hollandia, Saipan and Guam.

And the *Dauntless* was considered obsolete! No one knows that better than E. H. Heinemann, *Dauntless* project engineer and currently chief engineer of the Douglas El Segundo (Calif.) plant, where the last *Dauntless* was just completed. He says:

"The *Dauntless* was a pre-war combat plane and has been repeatedly considered obsolescent. As late as June, 1941, it was stated by high-ranking officers that it was dead and that there would be no further orders. While it is true that performance is not all that is desired, it still is the only unrestricted dive bomber in service in this country."

The *Dauntless* was conceived back in

1934. At that time John K. Northrop, one of the leading aeronautical geniuses of the nation, headed the Northrop Aircraft Company, Inc. (this later became Douglas' El Segundo division and is not to be confused with Northrop Aircraft, Inc., now in operation at Hawthorne, Calif.). Northrop was personally in charge of the engineering department and shop. Associated with him was Ed Heinemann.

That year the company received an invitation from the Navy Department, Bureau of Aeronautics, to bid on a dive bomber. The company also was in the throes of developing a plane for the U.S. Army which later became known as the A-17A.

Northrop selected Heinemann as project engineer on the Navy job and Heinemann prepared the initial drawings and bid. Those were tense, exciting 18-hour working days for Northrop and Heinemann. The dive bomber bid was on a competitive basis, with Northrop arrayed against the engineering talents of Brewster, Vought, Curtiss and Great Lakes aviation companies.

It was a gratifying triumph for these men when the Navy Department accepted their bid and awarded Northrop a contract for one experimental XBT-1 dive bomber. Engineering work and the experimental model were completed in 1934 and 1935. After six months of tests and incorporation into the plane of the Heinemann-designed perforated, or "Swiss cheese" type dive flaps, the first XBT-1 was delivered to the Navy at Anacostia in December, 1935.

Meanwhile the other companies were eliminated because the Brewster was late in completion and developed so many difficulties that only a few were built, although it was reported faster than other planes designed. The Great Lakes design was a biplane which was eliminated because it was of much less advanced design. The Vought had the best performance but was seriously handicapped in diving because it relied upon the propeller as a dive brake. This was a constant source of trouble and required that the plane be operated under serious restrictions. The Curtiss was also a biplane which had been under construction in earlier design for several years. It was purchased in moderate quantity but was discontinued because of obsolescence.

"The difficulties of designing a successful dive bomber can be understood," explains Heinemann, "when it is considered that of the five original competition con-



Capt. Albert "Pinky" Stainback, veteran United Air Lines Pilot, practices in the Link Trainer

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tenders only the *Dauntless* was sufficiently successful and rugged enough to endure this length of time. Furthermore, the famous Curtiss *Helldiver*, the result of a design competition held in the summer of 1939, has only recently come into service."

After conducting its own tests on the XBT-1 for two months, the Navy accepted it as a satisfactory service type and a contract for 54 BT-1's was awarded in 1936.

"I remember how our small company was striving for business at that time," Northrop recalls, "and what a tremendous boost it gave all of us when the contract was awarded. Why, 50 airplanes then was comparable to an order for 500 today!"

Although it was not the same airplane the BT-1 was similar in many respects to the A-17A and the engineering done in advance on the A-17A served as a guide in the construction of the BT-1. Both were of multi-cellular monocoque structure; had the same aerodynamic characteristics and airfoil sections; the same engines, and similar flaps, although the BT-1 incorporated improved flaps which served as dive brakes.

The A-17A's had a wing spread of 48 feet, whereas the BT-1 had a span of 41½ feet, the wings purposely shortened for carrier operation. Other dimensions differed correspondingly.

During 1937, while the delivery of BT-1's was being delayed by a company strike, engineering was begun to convert the BT-1 into a new model designated the XBT-2. This airplane had a fully retractable landing gear and a Wright *Cyclone* engine instead of the Pratt & Whitney engine installed in the BT-1's. It was flown in April, 1938, and delivered to the Navy for trials. It is interesting to note that, in 1938, experiments with a BT-1 carrying a tricycle landing gear were conducted. The gear was abandoned as unsuitable shortly after.

Northrop assisted in the development of the XBT-2 but in the latter part of 1937 he sold his stock in the Northrop Company to Donald Douglas, who turned the plant into what is today the El Segundo division of the Douglas Aircraft Company, where all *Dauntlesses* were produced. Northrop left Douglas on January 1, 1938.

A contract was obtained for a production quantity of BT-2 airplanes in February, 1939. With this order came a change in the Navy designation. The plane became the SBD-1, forerunner of the current SBD series. It meant "scout bomber, Douglas."

As the result of operating experience and tests conducted with BT-1's, new stability and control specifications were established, making it necessary to redesign all control surfaces of the *Dauntless* in 1939. Many airplanes under partial construction were affected. It was necessary under this new requirement for the company to run exhaustive flight test programs, during which 21 different sets of tail surfaces and 12 sets of lateral control surfaces were constructed and tested.

These tests resulted in the *Dauntless* becoming a criterion for stability and control for this type of craft, but it caused a considerable delay in production. Deliveries were not started until May, 1940.

Success of this model resulted in contracts being awarded for the SBD-2, SBD-3, SBD-4, SBD-5 and the SBD-6. Changes in the model numbers can be accounted for by such relatively minor changes as voltage of the electrical system, increased power in the power plant, additional fuel tanks, etc.

Meanwhile the Army had become interested and had placed an order for several hundred A-24 attack bombers, which were SBD's all over again with the exception of the landing hook needed by *Dauntlesses* for landings on aircraft carriers. These orders were filled at the Douglas plant in Tulsa, Okla.

The *Dauntless* today is a low-wing monoplane arrangement with aluminum alloy semi-monocoque construction. Its span is 41 ft. 6¾ in.; length is 33 ft. 1¼ in.; and height is 15 ft. 7 in. Wing area is 325 sq. ft., loading is 29.3 lbs. per sq. ft. It has two-place tandem cockpits provided with sliding transparent enclosures. Self-sealing fuel tanks are carried in both center and outer wings.

Gross weight of the *Dauntless* is 9,288 pounds, whereas the BT-1's were 6,830 pounds. *Dauntlesses* are equipped with a Wright R-1820-60 *Cyclone* engine, developing 1,200 h.p., while the BT-1's carried an R-1535 Pratt & Whitney engine developing 750 h.p.

Top speed of the *Dauntless* is more than 230 m.p.h., compared with 219 m.p.h. of the BT-1. Terminal velocity of

the *Dauntless* without dive brakes is over 400 m.p.h., while the use of dive brakes (one on the upper and one on the lower surface of the wing) reduces the velocity to under 300 m.p.h., thus improving dive-bombing accuracy and permitting closer approaches to moving targets. Rate of climb is over 1,400 ft. per min., cruising speed is 185 m.p.h. at 14,000 feet.

A bomb rack and displacing gear are provided under the fuselage for carrying and displacing either one 500-pound, or one 1,000-pound bomb in vertical dives; one rack also is provided on each outer wing for bombs in all sizes from 100 to 500 pounds, as well as depth charges and chemical tanks.

Two .50-caliber fixed machine guns are mounted in front of the pilot, one on each side of the instrument board and synchronized to fire between propeller blades. Two .30-caliber flexible machine guns are mounted in the rear cockpit, with both pilot and gunner protected by

armor plate. The BT-1's mounted only one flexible .50-caliber machine gun.

Handling characteristics of the *Dauntless* are outstanding. Because of their high maneuverability they have been used on occasion as fighters against attacking Jap planes. Stability and control is maintained down to within five m.p.h. of the stalling speed, which is 78 m.p.h. There are few combat planes in which this rare condition exists.

The *Dauntless* series is the first upon which perforated dive flaps were used. The purpose of the holes in the flaps is to break up the eddies that flow off the trailing edge of flaps in order not to cause excessive tail buffeting. Fixed leading edge wing slots are provided to obtain aileron control after a wing stall.

Range of the *Dauntless* fully loaded is over 1,000 miles, while the service ceiling is 25,200 feet. Wing loading is 29.3 pounds.

To show how cost declines in aircraft

building with volume production, it is revealed that it cost more than \$85,000 to produce the XBT-1, while the 5,936th—and final—*Dauntless* to come off the line cost approximately \$29,000.

Now that the *Dauntlesses* have more than fulfilled their purpose and are being replaced aboard carriers by newer and better aircraft, Heinemann and other Douglas engineers are engaged in designing more advanced craft for the Navy. They thought a short time back they had the answer in what was designated the BTD—bomber torpedo Douglas—but the Navy contract on the gull-wing, bomber-torpedo plane was cancelled after a few were constructed because too much time would elapse before they could be taken into combat in sufficient numbers.

There is one thing that is almost a certainty, though. And that is that no other plane in our aerial arsenal will store up so many surprises for the enemy as did the *Dauntless*. END

## Re-converting the Aircraft Worker

(Continued from page 39)

the country. This is an intangible factor, impossible to measure or analyze, but it can have a significant effect on the future of flying.

There are, of course, many other factors which cannot be measured at present that will influence the trends of events in aviation. Before looking more closely at these pros and cons, I want to stress the controlling importance of the general level of economic activity in the post-war period. Our aviation industry will find its future inseparably linked with the living standards we reach and maintain after V-Day. If we can establish high levels of peacetime production and employment, aviation will take its place in the forefront of American industry.

Figures on peacetime employment and production show this relationship as well as the growth of the industry.

NUMBER OF ESTABLISHMENTS, WAGE EARNERS, AND VALUE OF PRODUCTS IN THE AIRCRAFT AND AIRCRAFT PARTS INDUSTRY IN THE UNITED STATES

Year	Number of Establishments	Wage Earners	Value of Products
1914	16	168	\$ 789,872
1919	31	3,543	14,372,643
1921	21	1,395	6,641,988
1923	33	2,901	12,945,263
1925	44	2,701	12,524,719
1927	70	4,422	21,161,853
1929	132	14,710	71,152,924
1931	101	9,870	40,278,278
1933	64	7,816	26,460,092
1935	79	11,384	45,347,030
1937	92	24,003	106,568,254
1939a	125	48,638	279,496,844

Source: U. S. Census of Manufacturers, 1939.

a The industry as defined by the Bureau of the Census in 1939 includes the production of aircraft engines which in previous years was included under the "engines, turbines, water wheels, and windmills" industry. In 1937, the only year for which separate figures on aircraft engines are available, there were 13 establishments and 6,381 wage earners in this industry. The products were valued at \$43,131,502.

It is interesting to note that the 1939 production of small planes for civilian use totaled less than 2,000. Obviously the post-war demand for private planes could expand to several times its pre-war level without using more than a

fraction of the nation's wartime capacity for producing aircraft.

The volume of post-war commercial flying, both passenger and freight, defies accurate prediction but there are signs that the increase will be substantial. Three major airlines have recently ordered four-engined passenger planes to cost more than \$50,000,000. These giant airliners will fly from coast to coast in about 8½ hours—Chicago and New York will be less than three air-hours apart. An early objective is air cargo handled at rates between five and 10 cents per ton-mile—a rate which would open the air lanes to many new commodities. Here, too, expansion will depend largely on the degree of prosperity in the post-war period.

The demand for military planes will have at least two and probably three distinct phases. The first will begin when Germany surrenders and it may well involve an immediate and very considerable cut in overall aircraft production.

The second phase will follow the final defeat of the Axis. Production requirements are going to depend on the sort of peace that is concluded and the kind of foreign policy that the United States pursues after the war. Closely connected with this is the question of our national military policy—how large an air force will we want to maintain? Will we have some form of compulsory or large scale voluntary military training and how much stress will be put on the air arm in such a program?

Taking these factors into consideration it seems quite certain that the post-war demand for military planes will be greater than that of the pre-war period but much smaller than during the war.

Still another variable is presented by the policy to be followed in disposing of our surplus military planes once the war is over. Will a large number overhang the market? Again, rapid technical advances in aircraft design may render many of them obsolete at a very early date.

But even an accurate forecast of civilian and military demands for aircraft would not erase all of the question marks that surround the future of aviation.

For one thing, we want to know what the job prospects will be for aircraft workers outside this industry. Once more we need to know what the general level of business and industry will be. For obviously it is going to be less difficult to fit them into an economy that provides 56 to 58 million jobs than one employing, say, 50 millions.

Apart from this broad relationship there are several other factors that must be considered. One is the heavy concentration of aircraft workers in certain areas and communities, many of them facing sharp cutbacks in other war industries as well. Even after V-E Day some communities will have an unemployment problem until dismissed war workers spread out again in a more normal peacetime pattern.

Another important consideration for the aviation industry hinges on the policy to be followed in the operation and disposal of Government-owned and privately-operated war plants. According to a survey by the U. S. Bureau of Labor Statistics among a group of 397 such plants, 87 were engaged in the manufacture of aircraft or parts and employed nearly half a million workers in September, 1943. More than 210,000 of these wage earners were women—about the same percentage of women that were employed in the industry as a whole. There were 472,519 women among the 1,310,799 employed in airframe, engine and propeller plants during December, 1943.

How many of these girls and women can be considered as belonging to the normal peacetime working force? In other words, what part of this group will voluntarily quit the labor market once the urgent need for war production has ended? We dare not assume, as a good many people appear to, that enough women will give up their jobs to solve the problem for millions of returning vet-