

BRAD WHITE
#216

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The Thor BJ-1b Duster is
30 years old this month.

Here's a look back at one of
the most successful U.S.
homebuilt
sailplanes.

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The DUSTER AT 30

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and fly his own machine. As an aeronautical engineer and former airframe designer, Hank knew it would be easy to get the modest cross-country performance he wanted. Keeping it buildable, practical and affordable were going to be the real challenges.

In the early 60s, Hank met Ben Jansson, an aerodynamicist with Saab. Ben shared Hank's enthusiasm for the small sailplane concept, and they quickly sorted out the essential characteristics for a new glider. Over a period of 2 years, they designed and built the BJ-1 "Dyna Mite" in Hank's garage. Flying for the first time from El Mirage in August 1966, the BJ-1 delivered — it performed well, was fun to fly and easy to rig. And, at a total out-of-pocket cost of \$800, it was affordable

REFINEMENT

Although the BJ-1 was a success in the eyes of its builders, it was not ready to market. Four years of flying had shown the need for refinements. Ben Jansson had returned to Sweden, leaving Hank Thor to carry out the development of the Duster.

It was like starting from scratch. The Dyna Mite had been built from rough sketches. Thor invested 1,400 hours doing airload and structural calculations and preparing detailed design drawings. The basic plywood structure was simplified and lightened to permit the substantial payload increase many potential pilots would need. The Jansson-developed airfoil, a "Wortmannized" NACA 4415 non-laminar section was retained, but span was increased to 42' 8". The cockpit profile was lowered significantly, reducing drag.

The result was a new glider with a best L/D of 28, a two-point increase over the Dyna Mite. Although Ben Jansson was no longer involved, Thor retained the original "BJ" designation as a reminder of the role he had played. No doubt this helped initial marketing efforts (photos of the Dyna Mite were used in early Duster ads), but it has

In May 1971, *Soaring's* readers were first introduced to the BJ-1b Duster, a new 13-meter sailplane, optimized for the enthusiast builder. Designer H. Einar "Hank" Thor described his success with his BJ-1 design, and outlined his vision for a small glider that would deliver simplicity, docile handling and cross-country performance, all at a modest price. Now, in the Duster's thirtieth anniversary year, we have an opportunity to look back.

BACKGROUND

In 1971 NASA was still launching Apollo astronauts to the moon. Schweizer had just delivered the 50th 1-34, a total of 500 1-26s had been sold, and Libelles were dominating Standard-class contests. Some were noting with alarm the spiraling cost and complexity of sailplanes, and the rapid obsolescence of competition machines. Ed Replogle wrote of the need for a new 13-meter class, and Australia was sponsoring a one-design competition for 13-meter gliders.

Also in 1971, Hank Thor put the finishing touches on the drawings for the BJ-1b Duster. This small wooden glider

represented 8 years of work, all directed toward creating a new design that would improve on the ubiquitous Schweizer 1-26. In August 1971, just a few months after the initial BJ-1 article, the first Duster ad appeared in *Soaring*. Thor's California Sailplanes sold numbered plan sets; DSK (Duster Sailplane Kits) founded by Jim Maupin and Norm Barnhart, sold kits to registered plan owners. For an even \$2,000 — about half the cost of a used 1-26 — a builder could be on his way to a new Duster.

ORIGINS

The 1-26 was a nimble, responsive and forgiving sailplane, but with a best L/D of 21.5, its performance was limited. While Hank Thor had completed successful badge and Diamond flights in the 1-26, he realized how challenging such flights were — most soaring days are less than ideal, and pilots don't want to be limited to a 10-mile radius around the field. A simple, compact sailplane with a best L/D in the high twenties would have obvious appeal.

SSA membership had been growing steadily and Hank correctly assumed that he was not alone in his desire to build



Duster #278 N7014R is owned by Bob Fingerle (in the cockpit) and Joel Gregonski, (standing).

caused many, even *Jane's All the World's Aircraft*, to overlook Hank Thor's primary role.

THE DUSTER GOES ON THE MARKET

Hank Thor selected the name "Duster" for his new design. Plymouth's muscle car of that name had become popular, and Hank enjoyed the car's cartoon logo — a caricatured dust devil with eyes. In August 1971 the first ad for the Duster plans and kit appeared in *Soaring* and the first "real" Duster, N11BJ, built by Jim Maupin and Norm Barnhart took to the air. The ad emphasized the key features: amateur construction from wood, medium performance, low cost, and garage storage. It did not mention Hank's hope that the Duster

would prove popular enough for a one-design class.

Every feature reflected Hank Thor's desire to make the best possible cost/performance/utility tradeoffs. No component was over 18 feet, mindful that it would probably be built and stored at home, most likely in a garage. The wooden structure matched the tools and skills of many amateur builders. (Jim Maupin once claimed that it could be built with only a sabre saw, disc sander and 3/8" drill.) The plywood skin made fast assembly possible, and gave a smooth exterior. The canopy was a plexiglas flat wrap, eliminating the need for molding.

The rotating trailing-edge air brake gave adequate glide path control, while avoiding the complexity of spoilers on top of the wing. The unique spoiler configuration allowed the trailing edge to move upward, providing a one-inch slot between the wing and the brake in the fully-open position. This served to attenuate any flap effect, avoiding the need for a revised piloting technique.

The fixed center section of the wing kept the outer panels light, and made the Duster easier to rig. The wing had a high aspect ratio (17.4) for a wooden home-built glider, which gave it the look of a "real" sailplane, especially in the air. Everything was optimized to make the Duster appealing to the motivated enthusiast builder.

In 1973 the Duster Sailplane Association was formed, and the Dust Rag newsletter provided a sense of iden-

tity for builders. The idea of one-design competition began to appear in early newsletters. By 1974, over 150 sets of plans had been sold (in the US and 10 other countries), and a handful of Dusters had flown.

PERFORMANCE

As completed Dusters began to log time in the air, they demonstrated the performance that was Hank Thor's initial objective. One year, at the Region 12 Championships, pilot Walt Mooney finished ahead of the bottom third of the rankings while flying the Duster prototype from El Mirage, beating gliders like the 1-34, the Cirrus, and the Libelle. This said more about Mooney's piloting than it did about the Duster, yet it was an obvious encouragement to builders.

It was JJ Sinclair who first demonstrated, unequivocally, that the Duster was a bonafide soaring machine. Piloting his BJ-1b, he qualified for the distance, duration and altitude legs for his Silver and Gold badges. Diamond Altitude and Diamond Goal soon followed. Through sheer tenacity, he squeaked out a 7-hour 37-minute, 315-mile flight in his Duster for his Diamond Distance. JJ told his story in the June 1977 issue of *Soaring*. Duster completions peaked that year, and another 8 sailplanes joined the fleet.

MODIFICATIONS

Due to the care taken developing it, the Duster's basic design was sound and workable. Hank Thor believed that any sense that the Duster needed improve-

October, 1966. BJ-1 designers Ben Jansson (in cockpit) and Hank Thor with the Dyna Mite at El Mirage Field in California. At this point the only BJ-1 was finished in silver dope.

The cockpit sport canopy configuration was rarely seen on the duster, although it was shown on the BJ-1b promotional 3-view. The plexiglass windscreen was set at a 35° angle to horizontal. The wood was eventually cut back to allow more light to illuminate the instruments.



Duster #257 is owned by Peter Raphael and Terry Whitford in Australia. VH-HDT sports the wildest color scheme ever applied to a Duster.



The world's newest Duster was completed in March 2000. Here it is in flight during the January 2001 Vintage Gliding group rally at Baccus March Airfield.

proof-of-concept glider is included. (The list, posted on the Duster Web, undoubtedly has some omissions. Please contact the author with additional information.) A total of 371 registered sets of plans were sold. The best information available today suggests that DSK sold at least 169 Dusters in kit form. This yields a completion rate of approximately 40% — excellent by homebuilder standards.

CONSTRUCTION

The time required to complete a Duster varied greatly. Hank Thor's initial estimate was 800-900 hours. Two editors of the *Dust Rag* reported different experiences: Bob Walters spent 950 hours spread over 13 months, and Doug Bell took 1,600 hours over 8 years. One exceptionally meticulous builder reported 3,400 hours! The record for longest elapsed time is held by Terry Whitford and Peter Raphael from Australia, who reported completing their Duster in March of 2000.

Many were indeed built at home in the garage, and stored there when not flying. The 7-foot wing stub permanently mounted to the fuselage made the Duster easy to rig, and kept the wings light. It also made it a bit of a challenge to enclose a Duster trailer. An open trailer for a design intended to fit into a garage in the first place is a fair trade, even today.

FLYING THE DUSTER

The Duster proved easy to handle on the ground and fast to rig. The most common comment is that it took half the time of the familiar 1-26, from trailer to flight line. Every builder seemed pleased with the performance and handling. First flight accounts trace a predictable sequence of emotions, beginning with uncertainty at takeoff, guarded relief on tow, elation during the flight, and a deep sense of accomplishment at day's end.

The transition from nose-dragger Schweizer to tail-dragger Duster seemed to pass without a hitch. Each pilot devel-

oped a technique for avoiding wing drop on take off. JJ Sinclair's was to keep all the controls centered on the takeoff roll, until the tail came up. Everyone expressed a wish for more effective spoilers, and occasionally, a bit more cockpit vent air. All seemed pleased with the performance of their little wooden sailplane. It penetrated better than a 1-26, and at the same speeds, the L/D was several points higher. It compared favorably with a Blanik. A look at current SSA Sports Class handicaps bears this out. The "DSK Aviation" Duster handicap suggests that it does a shade better than both the Blanik, and 15-meter Schleicher Ka-8 — very respectable performance for a garage-built 13-meter glider that promoted itself on the basis of cost.

CARE

A Duster does require reasonable care. Its wooden construction, once one of its greatest assets, is today probably its single greatest liability. This was not a problem for original builders — after a couple of years constructing a Duster, they needed no added incentive to treat their Dusters with care. They knew that a wooden glider remembers its roots — literally. If it is not kept out of the rain and the sun, it will "return to nature" — Duster to dust, so to speak. The challenge is to instill the same sense of