

# HOME BUILT

BY BOB ABERLE | PHOTOS BY RAY JUSCHKUS & BOB ABERLE

All flight shots were taken at the SEFLI field in Calverton, NY, on the east end of Long Island. The Swallow 2 surely looks like the real thing in the air. The entire purpose of “fantasy”-scale aircraft is to provide realism in flight, while not spending a lot of time on the building process.



Bob's bride of 48 years, Irene, holds the park-flyer version of the Swallow 2 to give you a feeling for the actual size of this model.

## Swallow 2

The perfect project for the first-time scratch-builder

**T**he inspiration for this model came from an article in the April 2010 issue of our sister publication *Flight Journal*. The full-size aircraft originated in Germany in 1927 and was known as the Klemm L.25. In the early 1930s, this same basic plane ended up in Great Britain as the British Aircraft Co.'s “Swallow 2.” It reminded me of the popular PT-19 U.S. Army Air Force trainer. Its high-aspect-ratio wing practically made the aircraft a powered glider, and I thought it would also

make a perfect RC sport/trainer aircraft.

I first built a micro version with 75 square inches that weighed only 2.1 ounces; it appeared in the May 2010 issue of *RC Micro World*. For this construction article, I built a larger version intended for electric-powered park flying. It has 175 square inches of wing area and should weigh in at about 12 ounces maximum. Input power was selected at about 50 watts, yielding a power loading of approximately 70 watts per pound. It is a simple to build sport-scale model that retains the basic shape of the aircraft and required about a week to build.



### LET'S START BUILDING

The basic wing structure is built-up open framework with ribs along with a pair of barn-door, scale-like ailerons. Cutouts are made in the underside of the wing to accept two aileron servos (one per aileron). Each servo is held in place with

## SPECIFICATIONS

**Model:** Swallow 2

**Type:** sport-scale electric park flyer

**Wingspan:** 39 in.

**Wing area:** 175 sq. in.

**Weight:** 12.1 oz.

**Wing loading:** 9.9 oz./sq. ft.

**Length:** 24 in.



NEAT Fair founder and director Tom Hunt launches the Swallow 2, while AMA District II assistant vice president Ray Juschkus was on the camera.



## GEAR USED

**Radio:** Spektrum DX-7 transmitter and 6-channel receiver (spektrumrc.com); 4 E-flite S60 sub-microservos (e-fliterc.com); 2 12-in. servo-extension leads

**Motor:** BP Hobbies Gold 2204-19 brushless outrunner (bphobbies.com)

**ESC:** Hobby-Lobby Jeti Advance 8A (w/BEC) (hobby-lobby.com)

**Prop:** APC 8x3.8 Slow-Flyer (apcprop.com)

**Battery:** FMA Direct 1300mAh CellPro LiPo (fmadirect.com)

double-sided tape. Extension leads are required to connect the aileron servos to the receiver located inside the fuselage. The center wing section is flat, and the outer wing panels are attached to it to produce the dihedral. The wing is removable with the help of two screws and a length of dowel.

The main landing gear requires some wire bending, cutting and silver-soldering. This may look complicated but will prove much easier than you might think. The tail surfaces are made out of medium to hard  $\frac{1}{16}$ -inch balsa. Notice that cross-grained reinforcement inserts were added to strengthen the tail surfaces. The fuselage consists of medium to hard  $\frac{1}{16}$ -inch balsa sides. The upper portion of the fuselage is like a turtle deck made of soft  $\frac{1}{16}$ -inch balsa. This will take a little extra time but adds a lot to the scale appearance.

The full-size aircraft had a radial engine

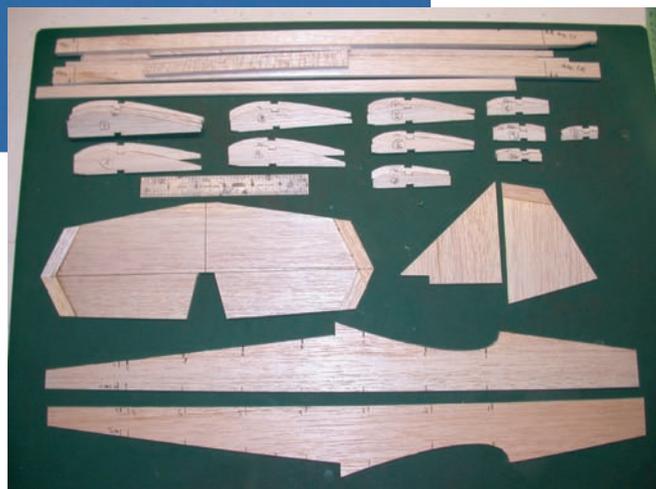
## CONTROL THROWS

**Ailerons:**  $\pm\frac{1}{4}$  in.

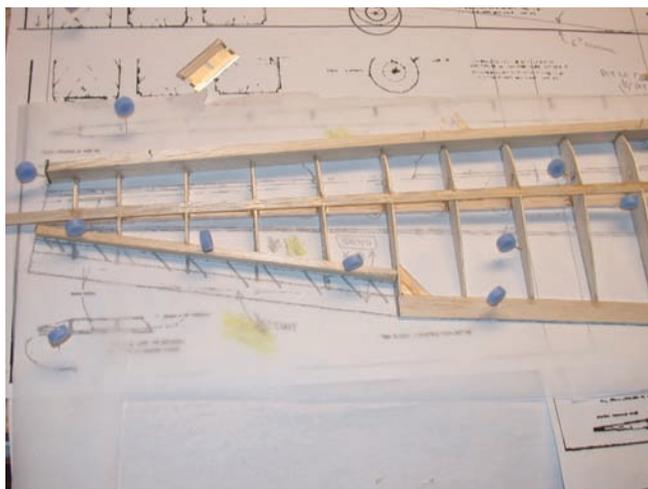
**Elevator:**  $\pm\frac{1}{2}$  in.

**Rudder:**  $\pm 1$  in.

with exposed cylinder heads. I chose not to add this detail to save some time. But you could fashion a dummy engine using the end of a plastic bottle with the cylinder heads formed of scrap balsa. Two dummy exhaust pipes can be made of simple soda straws.



The basic construction parts were mostly cut out of medium grade  $\frac{1}{16}$ -inch balsa. Although many ribs are required, you should be able to cut them out in about one hour's time.



One of the two outer wing panels under construction. The ailerons are fashioned of  $\frac{1}{16}$ -inch soft balsa.

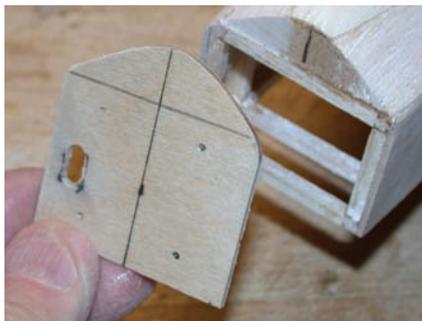
# HOME BUILT

## RADIO GEAR

The airplane is a 4-channel design with controls for ailerons, elevator, rudder and throttle. The aileron servos were separately connected to the receiver with "flaperon" function enabled on my Spektrum DX 7 transmitter. This allowed me to adjust the positions of both ailerons and even raise them slightly for a bit of washout effect. In total, I used four S60 sub-microservos.

## FINAL ASSEMBLY

For power I chose a BP Hobbies Gold 2204-19 brushless outrunner motor turning an APC 8x3.8 Slow-Flyer prop. This provides input power of about 53 watts using a 2-cell FMA CellPro 1300mAh LiPo pack (an alternate 800mAh pack made



The  $\frac{1}{16}$  plywood firewall is next. Note the hole for the passage of the motor wires back to the speed control. The motor is attached with four small sheet-metal screws.

the plane somewhat tail heavy). A Jeti Advance 8A brushless ESC handled the motor and includes a BEC so that only one battery pack is required. At the final weight of 12.1 ounces, the power loading worked out to 70 watts per pound.

The entire plane was finished with two types of iron-on covering. I covered the outer wing panels and all tail surfaces with BP Hobbies opaque white Solite. The fuselage and wing center section were covered



A closer look at the main landing gear that is made up of 0.055-inch-diameter wire with a rear brace wire made out of 0.047-inch-diameter wire. The two wires are bound with soft copper wire and then silver-soldered. Both wires are attached to the plywood strips with pieces of thin scrap aluminum and sheet-metal screws.

## PERFORMANCE

**Max speed:** 104mph

**Cruise speed:** 90mph

**Range:** 420 miles

**Service ceiling:** 17,000 ft.

**Rate of climb:** 800 ft./min.



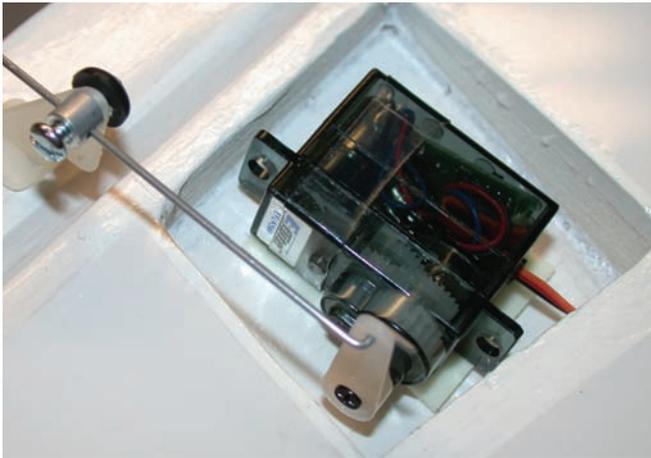
One of the remaining British Aircraft Co. Swallow 2 aircraft as it appeared in the April 2010 issue of *Flight Journal*.

## THE B.S. SWALLOW

Powered by 75hp Salmson A.D.9 or 85hp Pobjoy Cataract II engines, the B.A. Swallow was a 1930s British light aircraft. It was a license-built version by the British Klemm Aeroplane Co., which later became known as the British Aircraft Manufacturing Co. The Swallow was basically a British-built version of the German Klemm L.25, of which some 135 were built. Proven to be robust and safe, the Swallow was a popular aircraft while in service. Most were sold to private owners or to flying schools in the UK. When WW II started, many were enlisted by the RAF and issued to basic flight training squadrons for use as primary trainers.

During late 1940s, several Swallows were used by the RAF's glider training squadron based at RAF Ringway near Manchester. Their propellers were removed and gliding hooks attached to each wing panel's leading edge. They were then towed (in twos and threes) by retired Armstrong Whitworth Whitley bombers before being released. The pilots then glided them to their simulated landing targets on the airfield. These unorthodox flights were used to evaluate the future use of heavy gliders in assault operations over enemy positions. As of 2008, there are still a few airworthy Swallows flying under private ownership.

# HOME BUILT



Aileron servos are attached with double-sided tape. Control rod is 0.032-inch-diameter wire. Du-Bro micro control horns and EZ connectors are employed on each aileron (dubro.com).



BP Hobbies Gold 2204-19 brushless outrunner motor is reliable yet very inexpensive. The prop is an APC 8x3.8 Slow-Flyer type.

in Military or Insignia blue Monokote. I cut the wingwalks and simulated cockpits from a black contact shelving paper and fashioned the windshields of 0.015-inch-thick clear acetate. I made my own decals using Desktop Publishing Supplies decal paper. The lettering was done on my computer with MS Word, and then I inkjet-printed my decals onto the adhesive-backed paper.

## CONCLUSION

My smaller indoor-flyer version of the

Swallow 2 was a big success, and as it turned out, this larger park-flyer version is a total success in every regard. It flies great, is easy to build and cover, doesn't cost very much compared with sport ARFs from the hobbyshop, and the comments it receives at my local flying field made the project totally worthwhile!

## IN THE AIR

With the final CG location at 1 1/8 inch back from the leading edge (using a 2.9-ounce

2S 1300mAh LiPo battery), flying the Swallow 2 proved just great! At full power, the model climbs out with total authority! For cruising, I was able to come back to almost 1/2 throttle, which made the flying really comfortable and greatly extended flight time upwards of 15 minutes! Winds of 10mph can be handled with ease.

Basic maneuvers such as loops and rolls are also possible. I did not use any dual rate or expo rate control on this model. It just wasn't necessary! The one thing I observed was, when slowing down for a landing, there was slight tip-stalling. This was a little surprising since the CG is rather far forward. But just to be safe, I reheated the wing covering and added a bit of wingtip washout (raised the trailing edge.) I suspect this results for the relatively high-aspect-ratio wing. In the final plans, I show the wing trailing edge raised about 1/8 inch at the beginning of the ailerons. Building in the washout during construction is much preferred. The Swallow 2 is just a perfect flying aircraft great for any sport pilot, even a novice flier! ✈

To order the full-size plan, visit [AirAgeStore.com](http://AirAgeStore.com)

**K0311A SWALLOW 2**

Designed by Bob Aberle, the Swallow 2 is a sport-scale park flyer. It is very easy to build and fly, and it uses basic balsa and lite-ply construction. Its high-aspect-ratio wing design and built-in wingtip washout give it forgiving landing characteristics. **Wingspan: 39 in.; Length: 24 in.; Weight: 12.1 oz.; Power: BP Hobbies 2204-19 Gold Brushless motor; LD 2; 1 sheet; \$14.95**

