

# Installing a Spoiler

by Chuck Anderson

**Here is a simple, effective solution to an age-old spoiler control problem.**

**The increased popularity of rudder/elevator/spoiler (RES)** and Nostalgia type sailplanes has resurrected the use of spoilers for speed and glide path control in remote-control gliders. Many of the current generation of sailplane pilots have never used spoilers in their models. Instead, they simply install servos in their models' wings to actuate the spoilers in the same way they actuate flaps and ailerons. There is, however, a simpler and less expensive solution to this problem.

## Servo Position

In the past, I've used the "servos in the wings" solution for spoiler control, but I have now gone back to pull strings, with a servo in the fuselage, because this control method is easier to install, easier to adjust, less expensive, has no plugs or wires to mess with, and keeps the weight of the servos out of the wing where it is not needed and puts it in the nose where it is needed. I now use wing-mounted spoiler servos only on three-piece wings, where the spoilers are in the outboard panels and pull strings are impractical.

I have been this type of spoiler installation since 1975. The spoiler blade is fabricated from 1-in. hard balsa trailing edge stock. For larger models, I sometimes glue a 1/4-in.-square balsa strip to the spoiler's leading edge to increase its width. The only critical part of the spoiler installation is its control horn. The distance from the spoiler hinge line to the actuating link attachment point should be slightly less than the distance from the center of the servo arm to the point at which the pull string or pushrod is attached to the servo arm.

Also, the angle between the actuating link and a line from the spoiler's hinge to the actuating link attachment point should be 45 degrees when the spoiler is closed; this ensures that the spoiler can extend to 90 degrees when opened. The leading edge of the spoiler should be far enough aft of the spar to prevent the spoiler horn from hitting the spar's shear web. Following these dimensions assumes that a standard spoiler servo with a total of 90 degrees of travel is used. If the spoiler servo has more or less travel, then the dimension and the angle of the servo arm may need to be adjusted.

Everything discussed so far applies whether the spoiler is

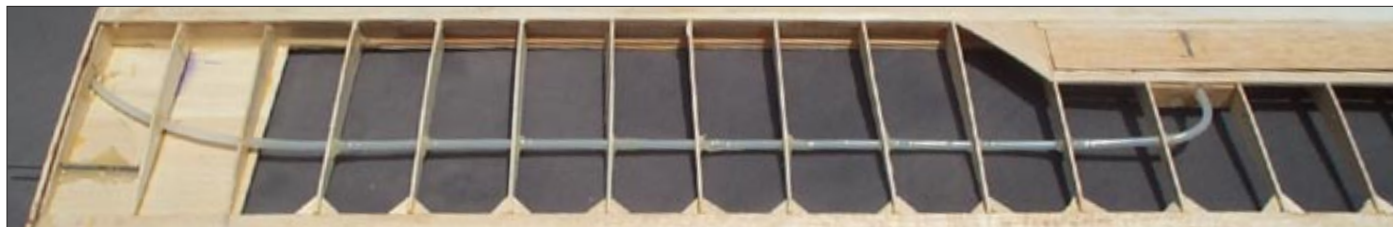
actuated with a pushrod connected directly to a servo, or with a pull string from a remote servo. The remainder of this article will be confined to opening the spoilers with a pull string connected to a servo in the fuselage.

## Using a Pull String

The pull string used to actuate the spoilers must be very flexible and should not stretch under load. For years, radio "dial" cord was the standard string used to actuate spoilers. Modern radios do not use dial cord, and I have found that 20-lb test braided fly-fishing line is a good substitute. Kevlar™ thread can also be used as spoiler pull strings.

Spoilers can be held closed by a small magnet. Magnets such as those used for holding notes to refrigerators are often used; however, I have found that the smallest magnets – sold at my local builder's supply store for holding cabinet doors closed – provide a more positive latch. The magnet should be glued to the bottom of the spoiler near the trailing edge, but far enough forward to clear the aft spoiler well frame when the spoilers are opened. A small scrap of steel glued to a strip of wood spanning two ribs is used to provide a contact for the spoiler magnet. Old No. 11 hobby knife blades make good contacts for the magnets. Just be sure that the magnet is in contact with the knife blade when the spoiler is fully closed.

Flexible pushrod housings make excellent spoiler string guide tubes through the model's wings. I bought 25 ft of nylon pushrod tubing from Hobby Lobby ([www.hobby-lobby.com](http://www.hobby-lobby.com)) for just \$5.95. This tubing works well as spoiler guide tubing, and for fuselage antenna tubes. Fuselage guide tubes for the pull strings are formed from 1/4-in.-diameter aluminum tubing and



Here is the spoiler installation on my Sirius III RES model.

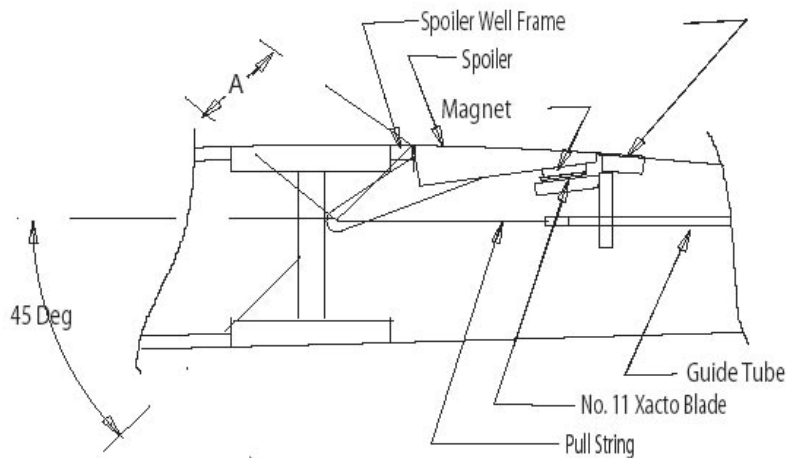


This photo shows the routing of the guide tubes through the wing.

epoxied in place. Just be sure that the wing and fuselage guide tubes are aligned when the wings are installed.

## Making the Connection

To provide easy control adjustment, a short section of pushrod is installed between the spoiler servo and a guide at the rear of the servo. In this example, the aft guide is simply a 1/16-in. hole drilled in the model's aft bulkhead. Wheel collars with short screws – instead of the normal set screws – are installed on the pushrod. Then, loops tied in the ends of the spoiler strings are placed over the screws. Initial control adjustments are made at the spoilers' control horns. Final adjustments are made by sliding the wheel collars back and forth on the push-



A short section of pushrod is installed between the spoiler servo and a guide at the rear of the servo.

rod, and then tightening the screws to lock the collars in place.

To get the spoilers working and adjusted, cut two lengths of string slightly longer than required to reach from the servo to the spoiler's control horn. Tie a loop into one end of the string. Push the other end of the string through the wing guide tube. Insert the end of the string through the hole in the spoiler horn, and pin the string in place with a short section of round toothpick. Assemble the model, inserting the pull string through the fuselage's guide tubes. Place the strings' loops over the screws in the wheel collars. Next, turn on the transmitter and receiver, and extend the spoiler servo. Remove the toothpick, pull the

string tight with the spoiler vertical, and reinsert the toothpick in the spoiler horn to secure the string in position. Then, close the spoilers to make sure that they will close, and to make sure that there is a small amount of slack left in the pull strings. Slowly extend the spoilers until one starts to open, then adjust the appropriate wheel collar until both spoilers open at the same time. It is essential that the spoilers start to open together. When you are satisfied with the control setup, put a drop of cyanoacrylate glue on each toothpick to lock the string in place in the control horn. After that, all further adjustments are made with the wheel collars. ■

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