Electric Roll Trim

Steve Wright-Gordon Hanka (TN) - I just test flew my homebrew electric roll trim, a collaborative design with Steve Wright. It works great, goes together in a weekend and weighs approximately nothing. The key is a horseshoe-shaped spring made from glass or carbon. Unlike a 2-spring system, if the horseshoe spring somehow fails there is no force on the stick. The only expensive part is the servo, available on the web for about $130.

Best of all, I am no longer sitting on my roll trim lever.

The drawing shows a firewall installation, as implemented by Steve. Mine is similar, but is mounted in the wing root and connects to the bellhorn.

Some tips: Lay up the horseshoe spring with 2-inch tape, then cut/sand it back to about 5/8 inch. You might want to start with a bit too much spring, then sand it back to get the desired stick force. Try to keep the spring thickness uniform, to avoid concentrating the bending stress. When deciding how much trim authority you want, it might be wise to assume that someday a switch will weld closed and force you to finish your flight will full left trim.

Both ends of the horseshoe spring should be connected via Clevis pins or some other type of swivel, so the horseshoe feels only stretch and squeeze, no bending force. Otherwise the stick feels mushy and large movements can crack the horseshoe spring.

The tips of the horseshoe spring are forked and the notches (see picture) have to be fairly deep. Remember to check clearance with both the servo and stick at their extreme positions.

On a Long-EZ, this system will work with any slow servo that has an inch of travel. You may be able to get by with less than an inch. The Ray Allen servo is very light, and apparently its motor is tiny enough that it can be run directly from two, low-current SPDT momentary pushbuttons, with no relays or catch diodes. At least, that's how the Ray Allen joystick is set up. (On each switch, wire one of the servo power leads to COM, GND to NC, and 12V to NO) This servo is not fast enough to use with a wing leveler.

I use only a tiny fraction of the full 1.2" range of motion on my servo. Consider this when deciding whether to bother with a servo position indicator.

Good luck, and if you use this design I would appreciate a note describing your experience.

Wright-Hanka Roll Trim

Horseshoe Spring
12 BID or 8 Carbon Fiber
Lay up over a roll of packing tape
Adjust trim authority by sanding or adding plies

Connect with Clevis pin or other rotating joint

Mount so aelerons are neutral at servo midpoint

Thickened Stress Point

Servo Motion

Ray Allen Servo
1" travel is adequate
Mount Securely

← This opening at least → 1/2 (Servo travel + Pushrod travel)

Clevis Pin

4"

Aeleron Pushrod

Pushrod Motion

Cable Clamp

Pushrod clamp or servo
1/8" Clevis
Spring
Check clearance through full range of motion
5/8"

Side View of Horseshoe Spring Tips

Assembled View