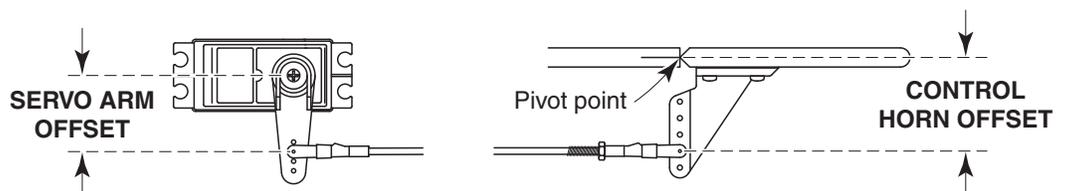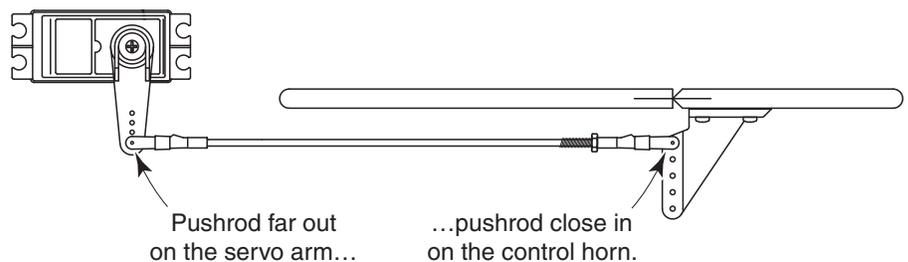# Proper Pushrod Hookup

Avoiding Flutter, Maximizing Servo Output Torque

When connecting pushrods and setting up your control throws, it is **critically important** to use proper pushrod geometry — that is the distance from the

pushrod on the servo arm to the center of the output shaft (**servo arm offset**) compared to the distance from the pushrod on the control horn to the pivot point (**control horn offset**).

EXTREMELY DANGEROUS
PUSHROD HOOKUP

One particularly dangerous situation arises when the pushrod on the servo arm is too "far out" and the pushrod on the control horn is too "close in." This setup is usually chosen by pilots who are trying to achieve maximum, "monster" control throws for 3D

Pushrod far out on the servo arm…   …pushrod close in on the control horn.

flight. But with your pushrods set up this way, any free play (slop) in the linkages or servo will be greatly magnified, possibly causing destructive control surface flutter. Additionally, if you have to turn your ATVs way down for "normal" throw, the result will be poor resolution and poor servo holding/centering capabilities. More importantly, too much force may be transmitted back to the servo, possibly causing control surface *blowback*, stripped servo gears or stripped servo arms—the latter two likely causing a crash.

PREFERRED
PUSHROD HOOKUP

Here is an optimum pushrod setup—the pushrod is "close in" on the servo arm and "far out" on the control horn. This situation gives the greatest mechanical advantage of the servo over the control surface which

"Closest in" on servo arm   **"Farthest out"** on control horn

will increase the servo's centering capabilities and output torque, minimize any free play in the system and allow high ATV settings for optimum servo resolution and positive control "feel." **Note:** When the pushrod is "close in" on the servo arm, make certain the servo arm can travel through its full range of movement without the pushrod (or clevis or other type of connector) interfering with the servo arm, output shaft or servo case.
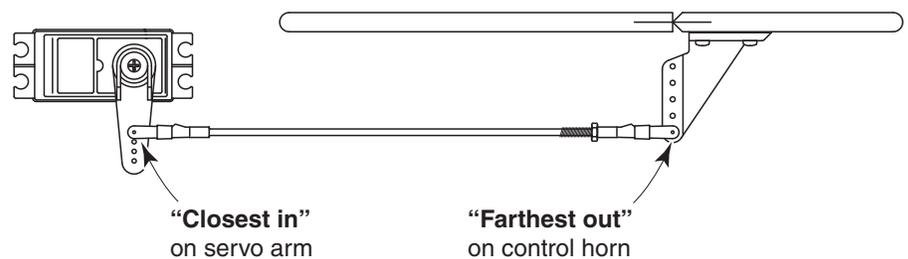
ACCEPTABLE
PUSHROD HOOKUP

If the optimum situation doesn't provide enough control throw, the pushrod may be moved inward on the control horn, but it's better to go **farther out** on the servo arm because this will introduce less free play

Move the pushrod farther out on the servo arm…   …But leave the pushrod in the farthest out location on the control horn.

than the alternative. Only after moving the pushrod all the way out on the servo arm, if you still can't get the throw required, you'll have to resort to moving the pushrod closer in on the control horn. **Note:** If you have a computer radio, it is always desirable to set your ATVs to 100% (or as near 100% as possible to achieve the control throw required). If setting up a model that requires extraordinary control surface throw (for 3D flying for example), start by "maxing-out" your ATVs (typically 130% – 140%). Then, the dual rates in your "normal" flight mode will still be acceptably high (70% – 80%) for good servo resolution.