

# Control Linkages

by Roy Vaillancourt

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Basically there are three type of control linkages used on full size aircraft:

## “Push-Rod”

(commonly used on elevators and ailerons)

## “Pull-Pull Cables”

(commonly used on rudder, also used on elevator on WWI stuff)

## “Torque Tubes”

(commonly used on flaps or auxiliary landing gear doors)

Auxiliary items are some times driven by

**Pneumatic** or **Hydraulic** means.

Examples would be:

Drive brakes

Wheel brakes

Sliding canopies

Arresting hook

Bomb or belly tank releases

We simulate these by using small air cylinders

## Push rod samples



The top two push rods are carbon fiber tubing with wood “plugs “ inserted and epoxied into each end to capture an “L” shaped 4-40 rod..

The bottom push rod is 1/8 dia steel welding rod. It is copper clad for rust prevention and weldability. It is also very easy to solder and machine yet this material is extremely stiff and perfect for our applications. I use this type of push rod for all my aileron set-ups..



This end of the carbon fiber tube has a 4-40 threaded clevis and jam nut attached. You can see the wood plug well here.

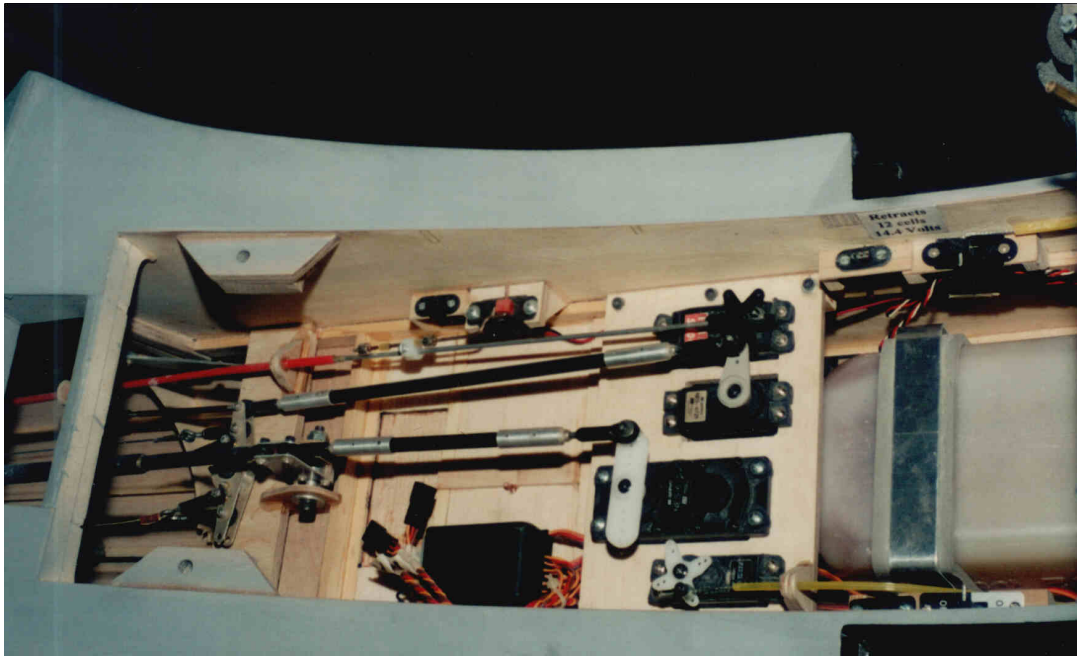


One end of the 1/8 steel rod has been threaded for a 4-40 clevis and also has a jam nut. The opposite end has been turned down and a solder style clevis attached.

## Pull-pull cables

For pull-pull cables I like to use Kevlar. This is an extremely strong fiber like material that is available from a few different sources and comes in two varieties. It can be had uncoated and looks like yellow twine. It is also found Teflon coated and has a black Teflon skin that resembles the insulation on wiring.

## Push rods and pull-pull cables in the Typhoon



## Torque tubes

For Torque tubes I like to use thick wall Aluminum tubing or wound carbon fiber tubing. Both are extremely strong yet still are light weight.

The Aluminum tubing comes in different wall thickness and I prefer 1/4 inch OD with a .049 or .035 wall.

In the carbon fiber area I prefer the thick wall wound variety. Do **NOT** use the pultruded tubing. This works very well as a push rod but is very poor in twisting applications such as torque tubes.

### Torque tubes and push rods To drive the flaps on a FW-190

