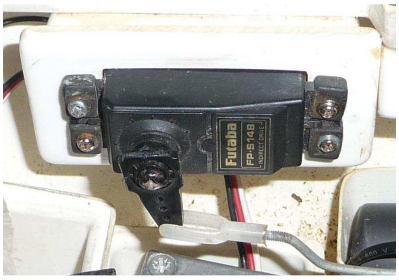
Borders Model Boat Club

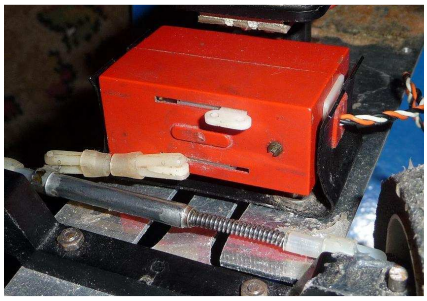
About Servo Linkages

Servo Types



The most common type of servo has a rotary output and is supplied with a number of different actuator arms. The advantage of a rotary output is that the User can select the amount of movement by selecting the length of the servo output arm. The rotation of the output shaft is usually ± 45°.

An alternative layout is the "Linear" servo. This has the advantage that the servo output has a fixed alignment, which is useful if the output shaft has to pass through a waterproofing seal.



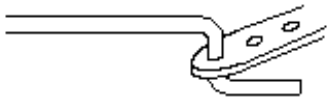
Special purpose servos are available, such as winches suitable for model yachts, where the rotary output shaft may have a multiple turn travel (maybe 4 or 8 turns), or "Retract" servos which have a travel of 180°. These are designed for use with a switched function in applications where only two positions are used, such as a stabiliser fin which may be deployed or retracted.

Linkages to servos may be push rods, push-pull Bowden cables (known as "Snakes"), or closed loop cables. The terminations for each of these will be similar.

Push Rods

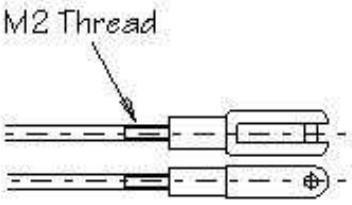
These are usually made up from 14swg piano wire, 2mm brass rod or old bicycle spokes.

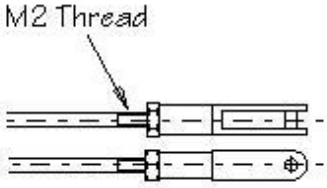
Joggle End



The simplest attachment to a servo arm is a simple joggle formed in the push rod. This needs no keeper. If you are using piano wire, anneal it before bending by getting the section to be bent red hot, then allowing it to cool slowly. Special tools are sold to make neat joggles, but it is quite easy to form them using pliers.

Clevis End

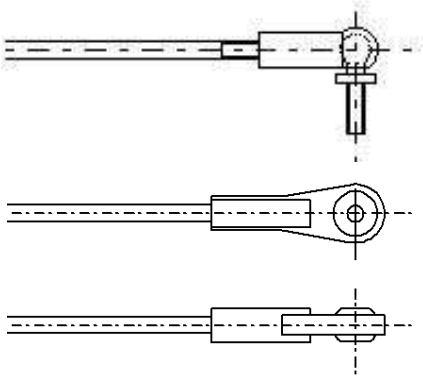




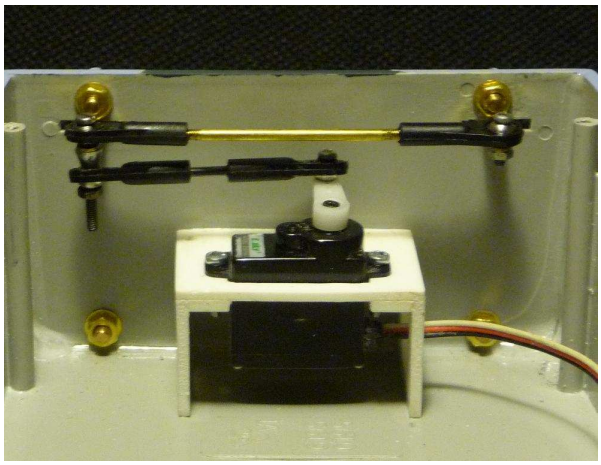
Clevises made of plastic or metal are sold by model shops to allow adjustable length linkages to be made. Bicycle spokes are nowadays manufactured with M2 threaded ends, and these can be screwed into the clevises. Older spokes had 8BA threaded ends, and these can only be used with plastic clevises. The adjustment is made by how far you screw the rod in. If you use a metal clevis, fit a locking nut. Plastic clevises are self locking.
If you are using piano wire, anneal it before making the thread by getting the section to be threaded red hot, then allowing it to cool slowly.

Ball Joint End

Plastic couplings with brass ball fittings are available. These snap together and are useful when a joint needs to be uncoupled on a regular basis. They are also tolerant of misalignment. Two types are illustrated at the left.

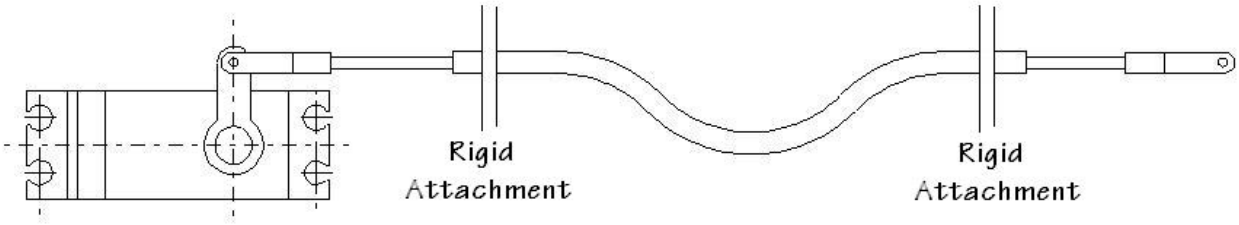


An installation for a model with twin rudders using ball joints is shown below.



Snakes (Bowden Cables)

Push rods require a clear straight line space between the servo and the control lever. If this is not available a "Snake" can be used. This consists of an inner rod (or maybe a tube) sliding inside an outer tube. Provided that curves are not too tight, the assembly can be routed around obstacles.



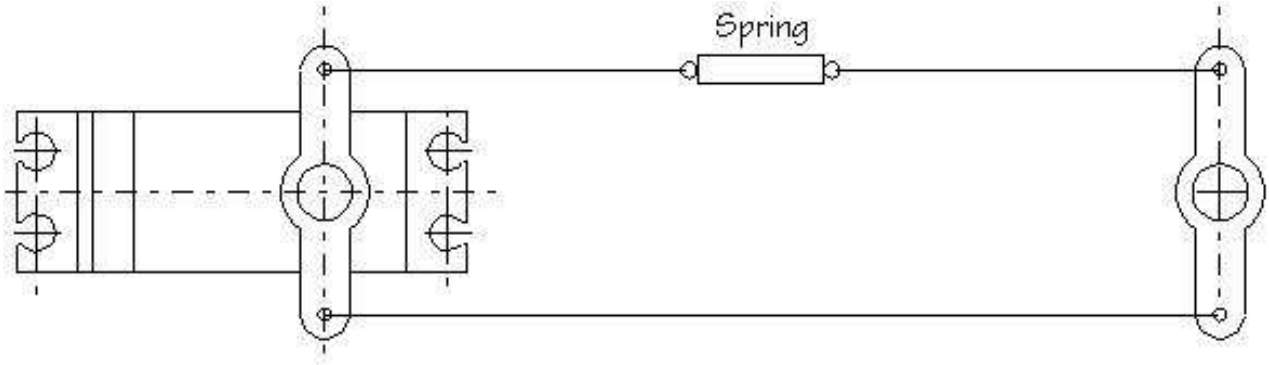
Because some clearance is required between the inner and outer so that the inner can slide freely, a small amount of backlash is inevitable when using a snake.

It is important to fasten the ends of the outer tubing to something rigid.

Snakes are usually sold with M2 adaptors (Small pieces of M2 studding) so that the clevises, ball joints etc can be attached.

Cable Controls

These are sometimes useful for scale models. The connection between the servo and the control lever is made using a pair of wires, usually made of nylon coated pike trace, obtainable from fishing



tackle shops. The arms at the two ends must be straight and parallel.

Note the inclusion of a spring. This can take up any backlash or unintentional lack of symmetry in the system. It is also possible to route the cable over pulleys or through curved pieces of tubing to go round any obstacles.

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