

# CONTROL LINE

## About Control Line



### **Control Line**

Is a simple and light way of controlling a flying model aircraft. The aircraft is connected to the operator by a pair of lines, attached to a handle, that work the elevator of the model. This allows the model to be controlled in the pitch axis. It is constrained to fly on the surface of a hemisphere by the control lines.

The control lines are usually either stranded stainless steel cable or solid metal wires of anywhere from 0.008in (0.20mm) to 0.021in (0.53mm).

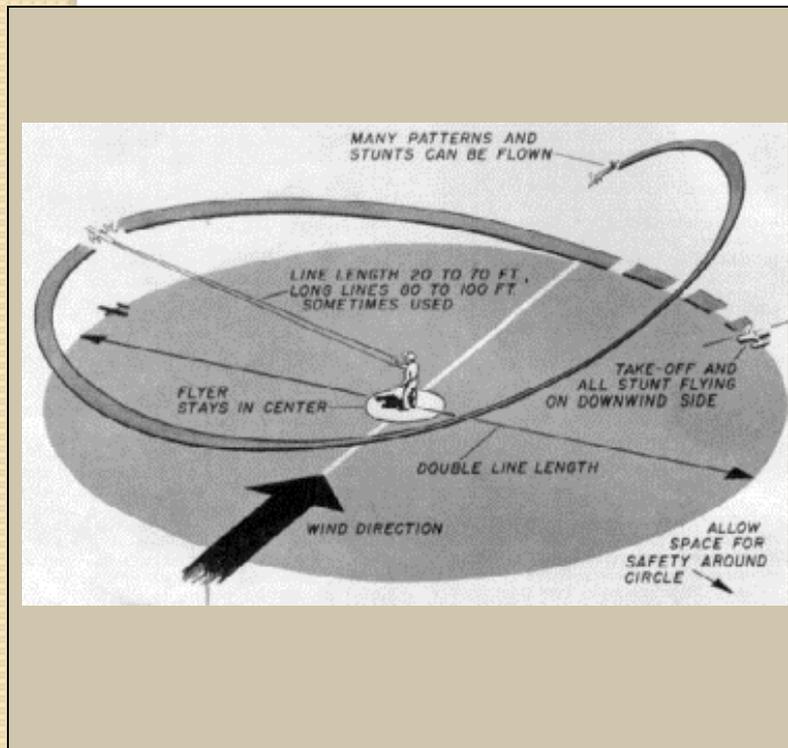
Sewing thread or braided fishing line may be used instead of wires, but air resistance is greater. A third line is sometimes used to control the engine throttle, and more lines may be added to control other functions.

Electrical signals sent over the wires are sometimes used in scale models to control functions such as retracting undercarriage and flaps.

There is also a control system that uses a single solid wire, this is called Monoline. When the pilot twists the wire around its axis, a spiral inside the

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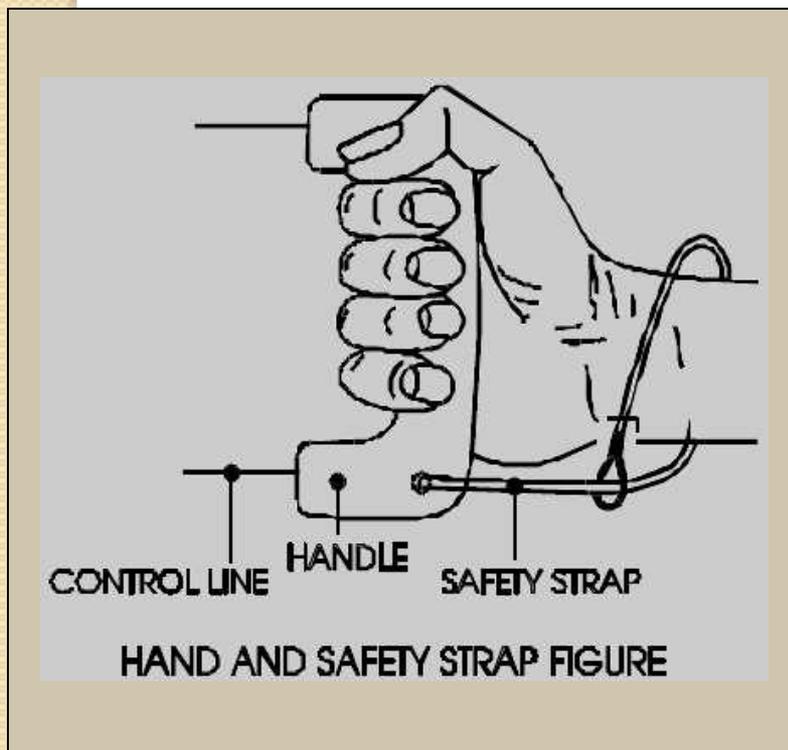
airplane spins to move the elevator. While it can be used with some success on any type of model, it is best for speed models where the reduced aerodynamic drag of the single line is a significant advantage. The control provided is not as precise as the two-line control system.

Almost all control-line models are powered with conventional model aircraft engines of various types. It is possible to fly control-line models that do not use on-board propulsion, in a mode called “whip-powered”, where the pilot “leading” the model, who’s lines are attached

to a fishing or similar pole, supplying the necessary energy to keep the airplane aloft, in a fashion similar to kite-flying.

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## Safety



Control-line flying is generally quite safe when all prescribed safety measures are followed. The airplane is constrained to fly in a circle, which is generally marked. A pilots' circle is also provided, so as long as the pilot stays in the pilots' circle and everyone else is outside the outer circle, the flying model can hit no one. In most competition categories, a "safety thong" connecting the control handle at the pilots' wrist is also required, so if the pilot inadvertently releases the handle, the airplane cannot fly outside the circle. The lines, handle, and control system are subject to a "pull test" before

flight to ensure that they are in good shape with some significant margin. For example, the pull test is around 40lb (18kg) for a 4lb (1.8kg) Stunt model (a 10G load, and the in-flight pull is around 10lb (4.5kg). This provides a 2x margin of safety even if one line should fail. One failed line immediately moves the elevator to the extreme of its movement, which almost always results in a crash, safely in the circle. Other categories of model are tested in a similar way, with the loads set to correspond to the expected speeds with a safety margin around a factor of 4.

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## Competitions



A typical FAI 0.15 cubic inches (2.5cm<sup>3</sup>) speed model – with control lines stored on reel between flights. Very long inboard wing acts as a fairing for the control lines, greatly reducing aerodynamic drag

Competitions for control-line aircraft are held in various classes. These include speed, precision aerobatics (AKA Stunt), team racing, combat, naval carrier, and scale.

For competition the lines are tested before the flight with a “pull test” that varies with the model weight and category to verify that the lines and control system (primarily the bell crank and its attachment to the rest of the model) will withstand the line tension during flight.

A full-fuselage aerobatic control line  
Strega in flight

