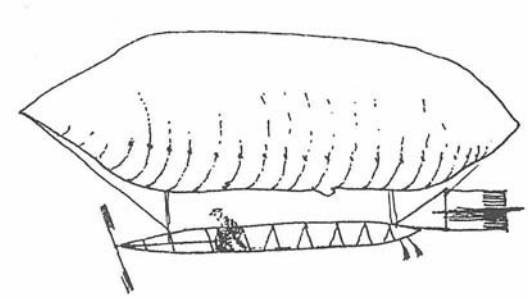
## Chapter 16

# Air Activities

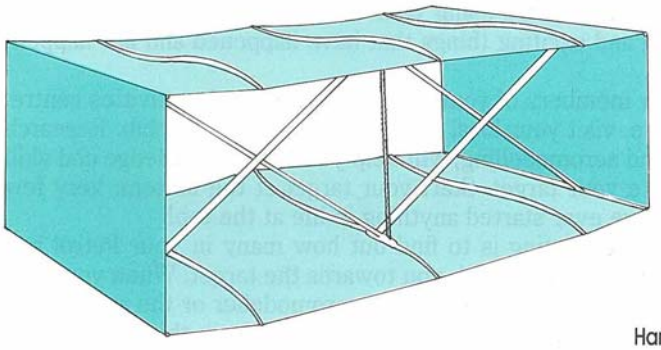
**Australian aviation – 1910 till when?**

No Australian, regardless of age or sex, who has the slightest interest in aeroplanes, can fail to pause and wonder at what has taken place in this country's aviation era. We can go back as far as the year 1851 where we find an Australia, Dr William Bland, designing an 'atmotic ship', comprising a long balloon with suspended cabin and steam-driven engines.



An early airship, 1904

This was followed by some forty years of balloon flights and experiments in various states, by men such as Harry L'Estrange, Pierre Maigré, Thomas Gale and John Allen. However, serious Australian-aviation history truly started with the now famous Lawrence Hargrave and his experiments using box kites to lift himself into the air.

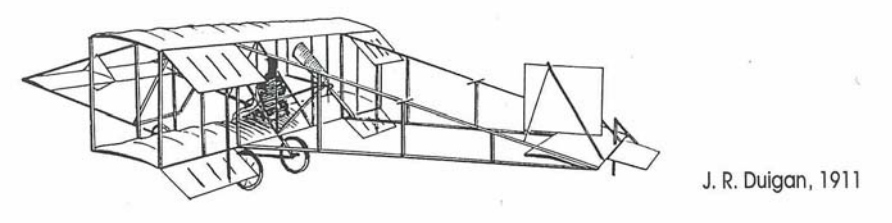


Hargrave's box kite, 1890



It is interesting to note that he achieved an ascent in 1894 using four kites weighing only a little over 15 kilograms, some 76 kilograms less than the weight they lifted to

an altitude of 5 metres. Many people today build and fly kites, different in size and design but still ably demonstrating many of the properties that helped get aviation started in the world.

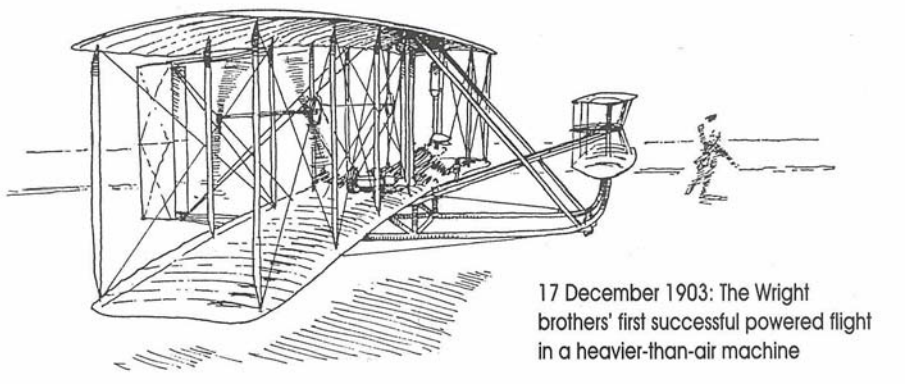



We came to the first powered flight in Australia, and with it much controversy about who is entitled to the honour. We leave it to you to decide for yourself, based on what has been recorded. On 9 December 1909, Colin Defries took off in a Wright biplane from Sydney's Victoria Park Racecourse, resulting in a flight of five and a half seconds, covering 104 metres, at a height of from 1 to 5 metres.

The next challenge to the title came on 17 March 1910, at Bolivar, just north of Adelaide, when Fred Custance in a Bleriot Monoplane recorded a flight of some five and a half minutes, the first flight in Australia by an Australian.

Next day, 18 March 1910, Harry Houdini, the famous escapologist, took off from Digger's Rest near Melbourne in a French-built Voisin biplane and flew some three and a half minutes in what has been described as perfectly controlled flight. It would appear that the controversy centres around what can truly be called flight. Is it the time airborne, the amount of control displayed, the height reached, or the distance covered? Argue on, but all three were great pioneers of Australian aviation.

Powered flight in Australia was on its way, and with the advent of World War I came the chance for many Australians to enter the field of military aviation through their enlistment in the Royal Flying Corps. From the ranks of the RFC and the Australian Flying Corps came our first military 'aces' before there was ever an official Royal Australian Air Force (RAAF).



Melbourne pilot Lt A.H. Cobby shot down a total of thirty-two enemy aircraft, and won the DSC and three DFCs to become Australia's leading ace of the war. The combat record of the three AFC Squadrons serving in Europe was indeed impressive: 284 enemy aircraft were shot down, and a further 163 were forced down, for a total Australian loss of sixty aircraft.

Some famous Australian aviation names to come out of the services after World War I were Bert Hinkler, Charles Kingsford-Smith, Oswald Watt, Sir Lawrence Wackett, Sir Hudson Fysh, Sir Ross and Sir Keith Smith, Sir Richard Williams and many others whose wartime experience both on the ground and in the air contributed greatly to Australian's aviation progress.

The years that followed the Armistice brought a gradual progression in commercial aviation in this country, from barnstorming all over the country to the formation of the Aero Club movement and to the first England-to-Australia air race including a $10,000 prize offered by Prime Minister W. M. Hughes for the first Australian crew to reach Australia within 720 hours before the end of 1919. On 10 December 1919 the Smith Brothers, Ross and Keith, arrived in Darwin in their famous Vickers Vimy Bomber, to claim the prize and bring to the Australian public the reality of international air travel.

The years 1920 and 1921 saw the evolution of some control over the aviation scene in Australian when a Controller of Civil Aviation was appointed and a system of licences for pilots and engineers was formulated. When Parliament passed the Air Navigation Bill, the 'anything goes' and 'aerial circus' atmosphere surrounding the industry began to disappear.

The next fifteen years saw fantastic development in the domestic air services, the formation of the RAAF and record-breaking flights to and from the Australian continent.

The birth of an internal airline system say the making and breaking of many companies, the names of most of which are rarely heard. They included West Australian Airways, Guinea Airways, New England Airways, Airlines of Australia, ANA, Butler Air Transport and many others. However, two names from the formative years live on, although their operations have changes considerably since those early years. One is MacRobertson miller Airlines (MMA – Mickey Mouse Airlines as it is affectionately referred to), which first formed in South Australia and then shifted to Western Australia and is now part of the Ansett Group. The other is the mightly Queensland and Northern Territory Air Services, now known as Qantas Airways Limited, which is real success story, from spanning the bush to spanning the world.

On the military side, 1 April 1921 heralded the birth of the RAAF with a collection of aircraft consisting of Avro 504Ks for training, DH9s, and some SE5As. About 140 officers and airmen operated from its one and only station, Point Cook, in Victoria. Gradually the airforce was expanded, more stations were opened, more people were recruited, and more modern aircraft, such as the Bristol Bulldog and Hawker Demons, were added to strength.

Meanwhile record breakers were speeding over the new air lanes between Australia and the rest of the world. In 1924 the round-Australian record was established by a Department of Civil Aviation crew, only to be broken less than three years later by the famous team of Kingsford-Smith (Smithy) ad Charles Ulm. In 1928, Bert Hinkler from Bundaberg knocked six hours off the England-to-Darwin record of the Smith brothers. The same year Smith and Ulm were at it again, to set a California-to-Brisbane record of 83 hours 43 minutes. These feats were followed by Sir Francis Chichester, Amy Johnson and Jean Batten, to name but a few. Scott and Black won yet another England-to-Australia air race in 1934.

Many books could be written, and indeed have been written, on Australian aviation during the period 1939-45. The exploits of the RAAF in action deserve much more space than is available here. The RAAF saw service in Europe, the Pacific, the Middle East, India-Burma, the Far East and other areas, and rose in strength to a peak of over 182 000 men and women. Within Australia, great expansion was seen in the fields of aircraft servicing and manufacture, while little expansion was possible in commercial aviation because most civil aircraft were put into military service.

The years following World War II have shown great strides in the Australian aviation scene in almost all fields. The notable exception is that of aircraft manufacture which has had many ups and downs over recent years. The light aircraft registered in this country have grown enormously in numbers, variety and sophistication. We now have small jets operating in the general aviation field and helicopters operating from the heart of our cities to the remotest areas of this continent. International airline services are almost entirely jet operated and competition is closely controlled by government policy. Qantas continues to compete at the highest level of international air travel, with its fleets of Boeing 747s and 767s.

Military aviation continually expanded in all three services, the RAAF having sent squadrons to war in Korea and Vietnam. Keeping pace with all this progress, the Department of Transport is expanding its services with radar installations, modern radio aids, longer runways, new aerodromes and everything required to service this vast industry.

All this happened in a very short time. What can we expect in the next fifty years?

## Light-aircraft engines

The light-aircraft engine today is the result of many years work by designers striving to overcome, if not eliminate entirely, some of the unacceptable features that were commonplace in the early engines.

Gone are the old bulky and unwieldy engines, and in their place are light compact units that are remarkably economical for their power output. These came into being as aircraft designers became more aware of the need to streamline aircraft. One of the major requirements was a need to reduce the frontal area (and therefore the engine size) to achieve comparable performance from a smaller capacity engine. A look around at today’s range of light aircraft, in which the horizontally opposed cylinder concept is predominant, will soon make you aware of the advances made in this field.

Taking off the engine cowls reveals a small well-designed and extremely well-finished piece of machinery, making extensive use of light-alloy materials, the operation of which is relatively foolproof. The engine has a dual-magneto ignition system (mainly for safety); a simple electric starting procedure, which eliminates the old method of hand starting; a simple-mixture control to improve performance and economy at higher altitudes, and even a simple-to-operate hot-air device to offset the carburettor icing problems that plagued the early aviators.

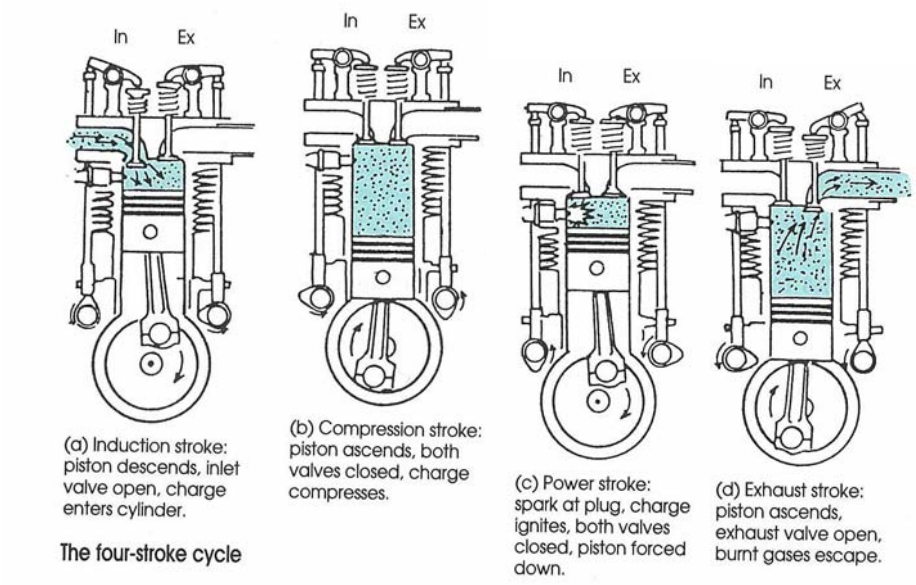
**Piston engine**

When a person stands near an engine that is running it is possible to feel the heat being driven off.

These engines are ‘heat’ engines, which means they get their power from the energy given out when fuel is burnt, making a gas.

The fuel used is aviation gasoline (AVGAS). It is first vapourised and mixed with air. The carburettor delivers the correct mixture of fuel and air. The fuel is delivered into a chamber where it is compressed by a piston. When fully compressed it is ignited by a flash of flame from the spark plugs. This causes the gas to becomes heated and expand. The piston is forced down and a rod attached to the piston head turns a shaft that is linked to the propeller. As it rotates it will make the propeller spin thousands of times per minute.

The propeller will bite into the air causing it to pull the aircraft forward through the air. A four-stroke cycle engine is the type used and the following diagram shows how it works.



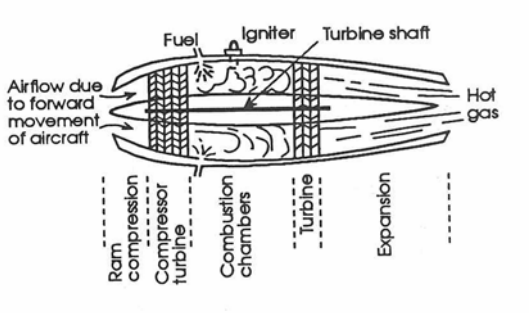
The four-stroke cycle

**Jet engine**

**Gas turbine engine**

The jet engine works the in same way as the recoil effect experienced when a machine gun is fired.

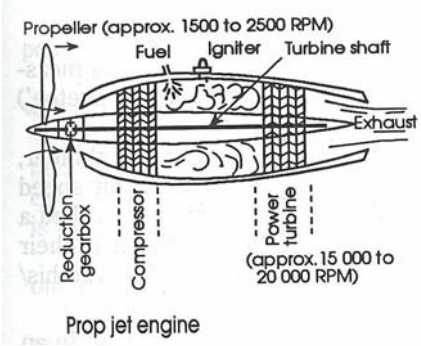
Air is dragged into a chamber by means of a turbine or fan; it is ignited in a chamber, and the exploding gas is forced out the back of the engine by a rear turbine. This provides the same reaction as the machinegun and forces the aircraft forward. Naturally, the turbines rotate at a fantastic speed causing a continuous thrust of exploding gas out of the engine, and this provides sufficient power to move the aircraft through the air. The following diagram of the gas turbine engine will show you in detail how it works.



Gas turbine engine

**Prop jet engine**

As pure jet engines are best suited to high speed, high altitude aircraft, light aircraft normally use an adaptation of the turbine engine in which the turbine shaft is extended forward to a speed reduction gearbox which then drives a propeller, which provides most of the thrust, although the jet exhaust still does provide some thrust also. For lower speed and lower altitude aircraft, the propeller provides thrust more efficiently than a pure jet, which is very important for aircraft used mainly for relatively short, low altitude journeys. Many helicopters also use prop jet engines.



Prop jet engine

# Aeromodelling

**Where do I start?**
The beginner has a few choices when starting as an aeromodeller.

**Plastic models**
These are excellent injection-moulded scale models of real aircraft, and although all the parts are of the highest quality detail, they are usually small and a certain amount of skill is required to put them together. Care and patience are rewarded by a model to decorate your home or Patrol corner.

**Hand-launch gliders**
This is usually the first type of flying model a beginner tries. Here we are introduced to some of the common modelling materials: balsa, glue, lacquer, and tissue. The tools required are not very unusual and a good job can be done with a 'Stanley' knife (razorblades are dangerous), a steel rule, fine sandpaper and sanding block, and pins. An important item is a building and cutting board, which saves the tabletops, and when dinner is ready, the board and the plane under construction can be shifted without any trouble. A plan of a typical beginner's hand-launch glider (chuckie) with many helpful hints is shown a little further on to get you started.

**Materials**
These are available from local model shops and consist of:

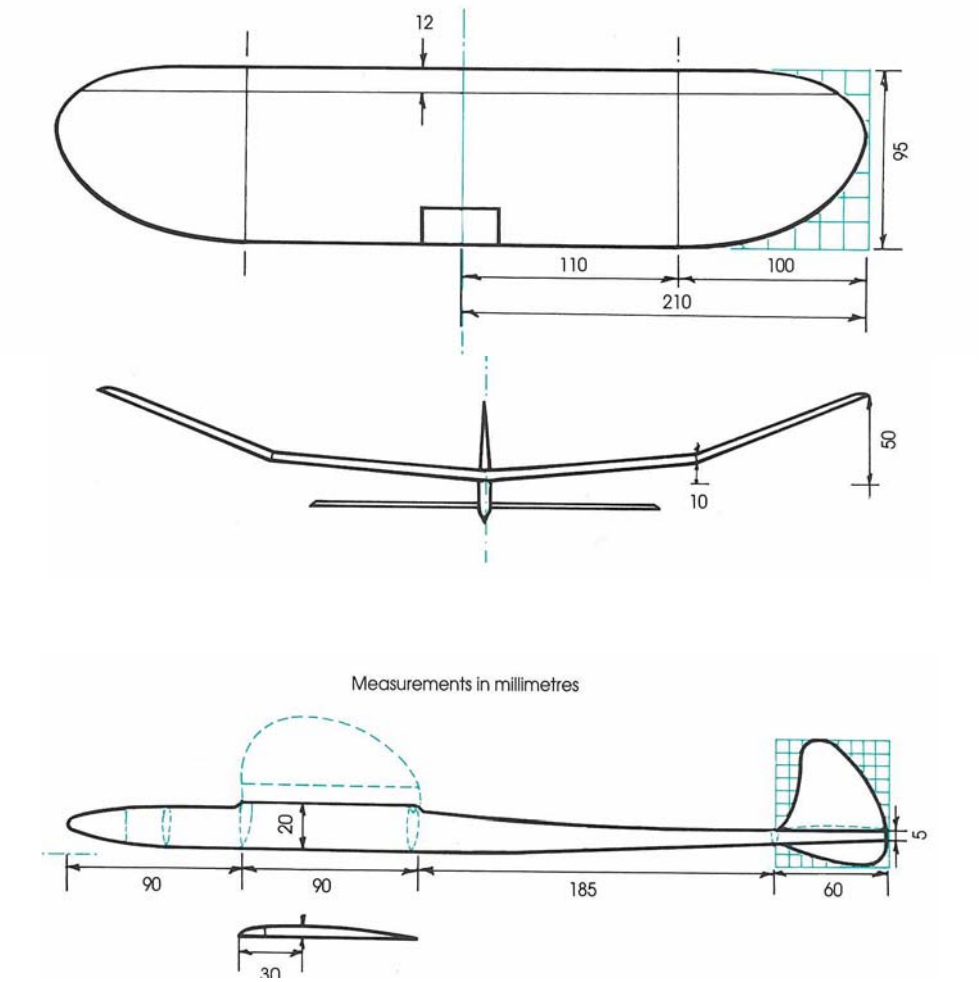
- 1 of 1 metre x 6.5 mm hard balsa (will make several fuselages)
- 1 of 1 metre x 6.5 mm medium balsa (will make two sets of wings)
- 1 of 1 metre x 1.5 mm medium balsa (will make several tailplanes).

**Building**
With carbon paper between the plan and the balsa, trace directly over the outline of the wing, fuselage and tailplane, then cut carefully around the outline on the balsa. Next the wing (still in one piece) can be sandpapered to the aerofoil shape shown on the plan; this is important if the model is to fly well. The wing can now be cut and re-glued to give the polyhedral shown. The fuselage can be shaped with sandpaper to round off the edges with exception of the wing platform, which is left flat. The tailplane is rounded off at the edges and sanded flat. The finished components can now be assembled using glue and steel pins. At this stage make sure that your model is squared off as in the front view shown on the plan. Once again this is critical, or the model won't fly. One or more coats of clear lacquer will help to toughen the glider and reduce the drag.

**Flying**
The model will almost certainly have to have a small quantity of lead sheet glued to its nose to achieve a balance at a point about one-third of the distance between the leading and trailing edges of the wing (centre of gravity shown on plan). With a gentle hand launch, the glider should descend into a gentle slope to the ground (see

illustration). Stalling is corrected by increasing the nose weight; diving is corrected by reducing the nose weight.

If at all possible, enlist the aid of an experienced aeromodeller to help your group through all the stages of building to flying – there is no substitute for experience.



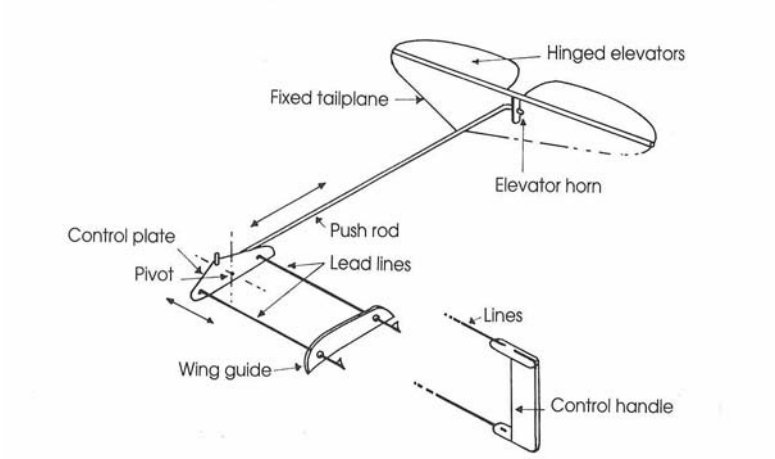

Source: Arthur E. Cooper.

Plan of a beginner's hand-launch glider

**Sailplane or glider**
This is often the next step, and a model of 60 to 100 cm wing span should be built from either a plan or a commercial kit available from your nearest hobby or model shop. As the modeller gains experience, larger models can be built and these invariably fly better and for longer times than the smaller ones.

A sailplane is usually towed on a towline like a kite, and when it is well overhead the tow ring of the end of the line slips off, leaving the glider in free flight.

**Rubber models**
This type of model is also frequently built by the beginner, but a considerable amount of know-how is required to trim the model so that it will fly successfully. A small commercial kit is certainly the best way to get started in rubber models.




**Power models**
The advent of the small model-aeroplane motor, which is now a very powerful and reliable power unit, paves the way to both free-flight power models and control-line flying.

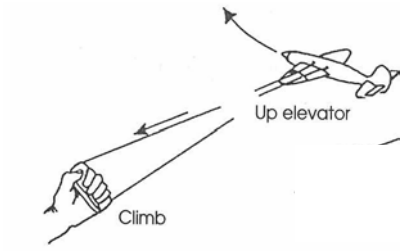
**Free-flight power**
This is a plane for the modeller with a reasonable amount of experience and is not recommended for the beginner.

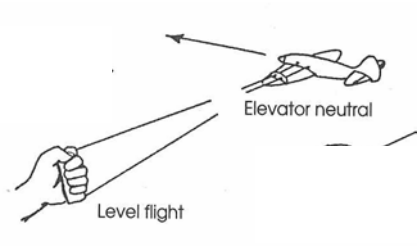
**Control-line**
After a few months of building and flying gliders, a simple control-line model is well within your scope. Control liners of 60 to 90 cm wing span powered by a 1.49 cc – 2.5 cc diesel or glow-plug motor, are usually of built-up construction, but sometimes sheet-balsa model kits are available.

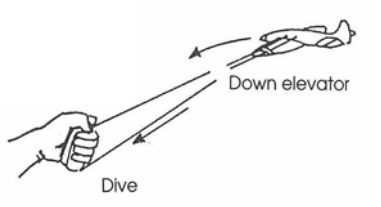
A control-line model is, as the name suggests, a model that flies in a circle tethered to two control wires held by a pilot at one end and connected to the elevator of the aeroplane, via a control plate, at the other end.

By moving the control handle, the pilot gives corresponding elevator movement causing the model to respond accordingly.  That is to say, backward movement of the control handle is the natural action for climb. Pushing the handle forward is the natural action for a dive.

With this relatively simple system of elevator control, almost any manoeuvre in the pitching plane, such as climbing, diving, looping and flying inverted, can be accomplished. Practical limits are, first, the design of the model itself, and second, the ability of the pilot. While it is relatively simple to produce a sports-type control-line model that will fly satisfactorily, climb and dive, and possibly, loop, the design of models capable of a full aerobatic range is much more specialised.



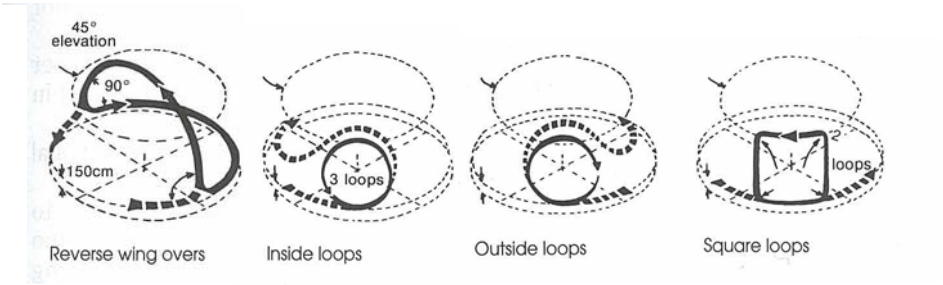



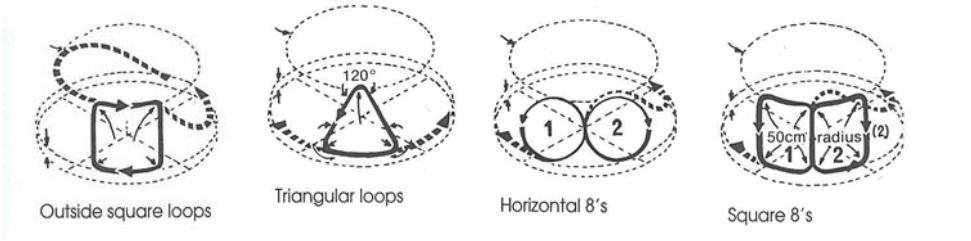



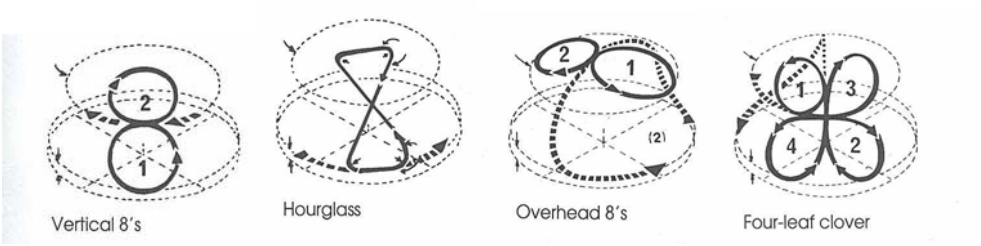

Control-line flying lends itself to many variations.

All in all, this is a very enjoyable part of model flying which does not require a big area to fly in. It is certainly advisable, however, to get the help of an experienced modeller to help you build and fly your first model and to advise you where you can fly, as many town councils now have by-laws limiting where you can fly engine-powered models due to the noise they make. Even models with silencers may still be prohibited. The types of models described here are the types of models to be built and flown to the requirements set down in the rules.

From this point onwards, the scope of types of models to fly is endless, even reaching to remote control by radio.



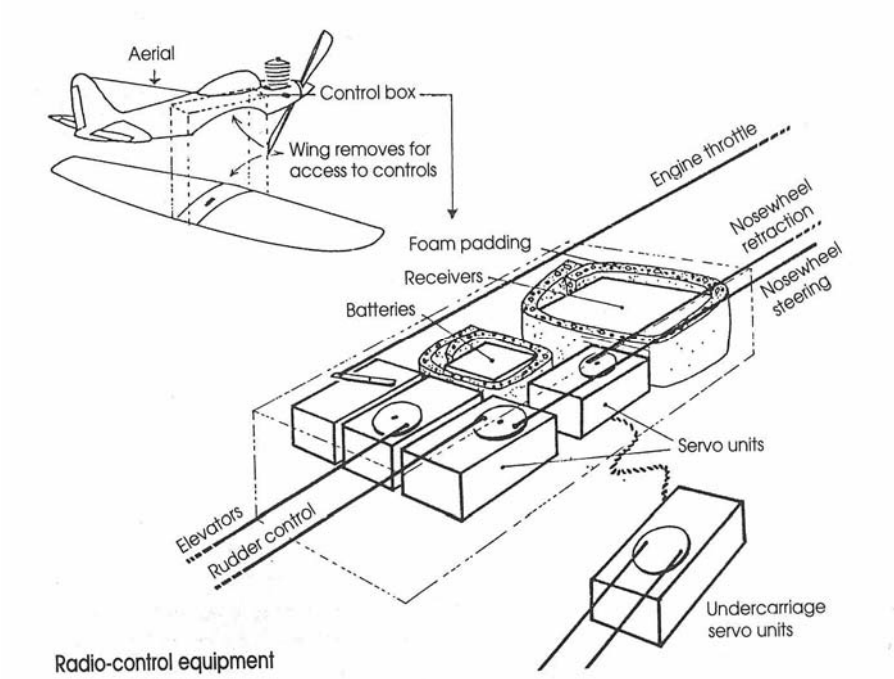



**Radio control**
A transmitter operated by the pilot sends a radio signal to a small receiver tuned to a given frequency inside the model. This signal is decoded within the radio receiver and the pulse then operates a small electric motor which in turn is connected to the various control surfaces of the aircraft.

This type of equipment is used to fly both sports and competition power models and gliders. With this equipment trained pilots can fly their model in exactly the same way as a pilot inside a real aeroplane.

Model flying is a worldwide activity, and many national and international competitions in all phases of the sport are conducted each year.

Aeromodelling is a hobby that can be enjoyed by anyone. It is a perfect training ground for any ambitious young person who perhaps wants to go on to full-size glider or power flying or even to making commercial aviation a lifetime career.



Radio-control equipment

**Aeromodelling clubs**
By this time you will no doubt be a very enthusiastic aeromodeller looking to build and fly even bigger and better models.

Joining a model-aeroplane club is the best way to progress because you will get the help of many other modellers who will be only too pleased to help you.

It is advisable to join a club affiliated with the Model Aeronautical Association of Australia, the controlling body responsibly to the FAI in France, the organisation controlling all aeroplane-glider and parachuting competition throughout the world.