



CCMAC New member information sheet

Central Coast Model Aero Club welcomes all new members, both experienced pilots and novice pilots wishing to learn how to fly radio controlled aircraft. This information sheet is aimed at prospective pilots with little or no knowledge of R/C equipment. Our instructors and members are always happy to talk with you and advise you on all aspects of the hobby.

RC – How it all works

The letters **rc** stand for radio control. You'll often see rc airplanes referred to as *remote* control but technically this is an incorrect term. Radio control is the correct term because the airplane controls respond to **radio signals** that pass through the air from the **transmitter** (*abbreviated to 'Tx'*) to the **receiver** (*abbreviated to 'Rx'*).

The transmitter (also often just called the *radio*) is the main box that you hold in your hands and use to control your airplane; the receiver is located inside the airplane and receives the radio signals sent out from the transmitter.

The signals are sent to the model in the same fundamental way as television and radio broadcasts are sent. Signals are generated whenever you move a stick or flick a switch on the Tx, and they are emitted via the antenna, or aerial.

All radio signals operate on a **frequency** commonly measured in kilohertz (kHz), megahertz (MHz) or gigahertz (GHz). The Tx and Rx must be operating on the same frequency for them to work together and the gadget that determines which frequency channel the radio system uses is called a **crystal**. Both the Tx and rx need a matching crystal to function. However, crystals are only necessary in traditional MHz radio systems...

Traditionally radio control systems operate on designated frequency channels in the MHz ranges but more recently a newer radio technology, called spread spectrum, has come in to existence and has become commonplace throughout the hobby.

These newer rc systems use the 2.4GHz frequency band and are far less

susceptible to unwanted radio interference. It's a much better and more advanced technology and 2.4GHz radios are quickly replacing the MHz ones for radio control use both in the air and on the ground.

2.4GHz systems *don't* require crystals to operate because the technology and method of operation is different to the MHz systems.

Regardless of the rc system being used, once the radio signals are picked up by the receiver, via the receiver antenna, they are passed on to the **servos** (and **ESC** – Electronic Speed Controller – in electric powered models) inside the model and converted into physical movement.

Servos are connected directly to the **control surfaces** of the airplane by linkages, so any movement of the servo is passed directly to the control surface that it is connected to.

The end result is that when you make an input at the transmitter, something on the airplane moves to control the plane.

Number of channels

Every operation that is controllable on an rc airplane is referred to as a '**channel**'. The most basic plane will be just one channel which could be either motor control on/off (electric) *or* rudder movement. A 2 channel rc airplane will likely have motor and rudder control.

To get a *true* feeling and understanding of radio control flying you should get a plane with three or four channels. A four channel plane will have throttle (motor power), elevator, aileron and rudder control whereas a 3 channel powered plane will have either rudder *or* aileron control but not both.

More complex airplanes can have more channels, for example landing flaps and retractable undercarriage. There are no set rules as to how many channels an rc airplane must have, it all comes down to the number of functions the pilot wants to have control over.

For the majority of 'sport' and club level rc pilots a 3, 4 or 5 channel airplane is the most popular.

Trainer RC airplanes

Learning to fly rc airplanes is best done on a **trainer airplane**. These are planes that have certain built-in design characteristics to make them nice and stable in the air.

The biggest giveaway is the position of the wing in relation to the fuselage. If the wing sits on top of the fuse then there's a good chance that the plane is indeed a trainer. High wing airplanes always make the best trainers because they are very stable and forgiving; the weight of the fuselage *underneath* the wing means that the airplane will always want to naturally level itself if left to fly on its own (providing that it is correctly **trimmed** by the pilot).

Another giveaway is the amount of **dihedral** – the upward angle of the wings when looked at from the front of the airplane. More dihedral means more stability in the air and hence easier flying. Also, rc airplanes that rely only on rudder for directional control (*i.e.* no ailerons) will have more dihedral compared to one with ailerons, because the dihedral aids the turn of the airplane when rudder is applied.

When learning to fly rc airplanes, always go for a trainer style airplane before any other. When you've mastered the basics, you can move on to other design planes which are more aerobatically capable.

A suitable trainer aircraft would be a Boomerang high wing trainer or a Sky raider high wing trainer. These are available from all hobby shops in Australia. Both of these trainers can be fitted with IC power or electric power (the choice is yours).

Different types of power unit

With the exception of rc gliders, all rc airplanes need a motor of some kind to generate the **thrust** to pull (or push) the model through the air.

The two primary power types are internal combustion (**IC**) and electric power (**EP**). IC is a collective term that covers all engine types that run on fuel; these are petrol (gasoline), glow plug, diesel and turbine. Glow plug is often referred to as 'nitro' but is exactly the same thing. To confuse things even more IC powered airplanes, particularly glow plug ones, are often just referred to as 'gas' planes even though this name suggests that they're gasoline powered when in fact they use a different type of fuel.

There are many different choices of both IC and EP rc airplanes available and the size of the engine or motor used depends on the size and weight of the model, as well as the desired performance.

There are several pros and cons to each type of power unit but it is fair to say that in recent years electric powered rc planes have become hugely popular. Newer electronic technology has improved their performance and flight

capabilities to the point that a well-equipped EP airplane can easily match an equivalent size/design IC one in terms of speed, duration and aerobatic performance. That just wasn't possible a decade ago!

The advent of low cost and Ready To Fly EP planes has really opened up the hobby in recent years, and there is no argument that you can get started for less with electric, but there are still many beginners who prefer to start with an IC model airplane and this is perfectly acceptable.

RC flight simulators

RC flight simulators offer one of *the* best ways of learning to fly rc airplanes *without* any risk of crashing and damaging a real model.

The flight simulator is software that runs on your home computer and will either have its own transmitter-style controller or will let you use *your* own transmitter to power the software. Modern rc flight simulators running on a modern, powerful pc are extremely realistic and an excellent training aid.

If you are serious about learning to fly rc airplanes and your budget will stretch, consider buying one of the better sims such as *Phoenix, RealFlight, Reflex XTR* or *AeroFly*. Alternatively look at the *FMS* simulator which is a freebie download, and *Clearview* is another option.

RC flight sims let you learn to fly an rc airplane (or helicopter) in complete safety and they *will* teach you the co-ordination and reactions you need to fly the real thing. Obviously there are some differences between flying a virtual plane and a real one, but the basics are the same and a sim can be an invaluable tool for the beginner to the radio control flying hobby.

Club instruction

Without doubt this is the *best* method of rc airplane flight training, and is the option you *should* choose if you want to jump in at the deep end with an IC airplane, rather than electric power, and you have no experience whatsoever. Getting yourself along to a local rc flying club is a great idea if you want to take the hobby seriously. Most clubs have **certified instructors**, or at least experienced rc pilots who are willing to teach, and many clubs even have a club trainer airplane reserved for use by new members, so you can 'fly before you buy'!

If learning to fly rc airplanes at a club, there are a few methods that you'll likely encounter...

The first one is the traditional method of **side-by-side instruction**, either by sharing a single transmitter or, more commonly, using a *buddy box* system. For single transmitter, or 'pass-the-box', instruction your instructor will fly the airplane and show and tell you what to do as he does it, then he'll hand you the transmitter for you to fly the plane. If you get in to difficulty he will take the transmitter from you and regain control of the airplane. When your heart has stopped racing and your hands have stopped shaking, he'll hand back the transmitter and you can have another go.

Although the 'pass-the-box' method is still used, it's become less common since the introduction of the buddy box system...

The **buddy box** system is a much better way of learning, and you and your instructor each hold a separate transmitter.



In conventional BB systems the transmitters are joined together by a cable; the instructor holds the master transmitter while you, the student, hold the slave transmitter. With the flick of a switch the instructor can hand over or take away complete control from you, without having to take the transmitter from your hands.

The system shown to the right is a *true* buddy box system whereby the slave Tx (left) can only ever be used with the master Tx (right). In other words, the slave transmitter is not a real one and cannot transmit an actual radio signal.

But the majority of modern radio control transmitters have a buddy box training capability, so two actual transmitters can be connected to each other and neither of them are 'dummies'.

At Central Coast Model Aero Club, all instruction is by buddy cord or telemetry joined buddy system.

What radio do I buy?

At Central Coast Model Aero Club, the majority of the available instructors use Spectrum or JR radios. This means that we recommend that you purchase either of these two brands so that you will be compatible for training with the buddy box system. The spectrum radios are quite economical compared to other brands and are becoming very technologically advanced. If you already have another brand radio, we can sometimes link it with the telemetry buddy system.