

Kamloops Model Airplane Society



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Types of "Kit" Planes available

Types of Kits and Construction

There are various ways to construct and assemble an RC plane. Various kits are available, requiring different amounts of assembly, different costs and varying levels of skill and experience. Kits can be mostly foam or plastic, or may be all balsa and plywood. Construction of wood kits typically consists of using formers and longerons for the fuselage and spars and ribs for the wing and tail surfaces. Many designs use solid sheets of balsa wood instead of longerons to form the fuselage sides and may also use expanded polystyrene for the wing core covered in a wood veneer, often balsa. Such designs tend to have to be totally built from scratch, are slightly heavier and are typically harder to build, if you don't have any previous experience.

Wood Kits

Wood kits come in many sizes and skill levels. The wood, typically balsa and light ply, may either be pre-cut with a die-cutter or laser. Laser cut kits have a much more precise construction and much tighter tolerances, but tend to cost more than die-cut kits.

Wood kits include the raw material needed to assemble the air-frame, a construction manual, and full-size plans. Assembling a model from plans or a kit can be very labor-intensive. In order to complete the construction of a model, the builder typically spends many hours assembling the air-mainframe, installing the engine and radio equipment, covering it, sometimes painting it, installing the control surfaces and push-rods, and adjusting the control surfaces travels. The kit does not include necessary tools, so they must be purchased separately. Care must be taken when building model wood kits since construction flaws may affect the model's flying characteristics or even result in structural failure. If you are interested in this type of construction and have no experience, I would suggest getting a small inexpensive kit. Even if you don't cover or fly it, it will give you an idea of what it details and if you have problems with the instructions which in my experience, can be confusing and not include detailed information needed.

Foam RC Plane Kits

The advent of "Foamies," or craft injection-molded from lightweight foam and sometimes reinforced with carbon fiber, require less experience and building skills. EPP (Expanded Polypropylene) foam planes are actually even bendable and usually sustain less damage in the event of an accident. The advantage of Foam planes is that you can replace selected parts such as wings, body (fuselage) or other parts easier than wood. Balsa planes usually will be more labour intensive when a crash happens.

Expanded polystyrene and extruded polystyrene foam (Styrofoam) came to be used more recently for the construction of the entire air-mainframe. Depron (the type of foam used for meat trays) blends rigidity with flexibility, allowing aircraft to absorb the stress of flying. Polypropylene (EPP) is an extremely resilient variety of foam, often used in basic trainers, which take considerable abuse from beginners. Foam is used either in an injection mold to make a molded air-frame or is cut out of sheet to make a built-up air-frame similar to some wood air-frames. "Foamies" allow you to get a plane in the air a lot faster than wood kits.

A higher amount of RC Planes purchased, are Foamies. They range in configurations from a box with everything you need to fly them, to kits that require you to purchase items in order to complete them. They also cover a broad range of planes from Trainers, Gliders and even Jets.

Manufacturers have been quick to catch on to this popularity, with foam EP (electric powered) planes, quickly developing from basic high wing trainers to very advanced planes and jets with superb detailing on scale models. Indeed, a big manufacturing advantage of foam over balsa/ply construction (other than lower production costs) is that detailing such as panel lines and rivets can be put in to the molds very easily.

One downside to foam RC planes is that any scale appearance is slightly ruined not only by the obvious texture of the foam surface itself, but sometimes also by the numerous injection molding marks left behind - but neither of these things are seen when the plane is flying, and in fairness manufacturers are getting better at hiding both issues!

A second, and more annoying, downside to foam is that, because of its soft nature, it is easily damaged if handled carelessly. 'Hanger rash' is always an issue with Foamies that are not well cared for, and if stored and handled without too much thought then it really doesn't take long for a new foam plane to start looking old and tired. A high number of pilots buying Foamies, construct "Wing Socks" for their removable wings. I use thin foam that is used for hardwood flooring underlay. I just roll it out, lay a wing on it and wrap and tape leaving one open end to insert and remove the wing(s).

A third issue with Foamies, is that the paint doesn't stick well to the foam and it doesn't take long to see wear. I have taken to clear coating all external parts of any new plane I purchase, before flying it for the first time. I usually apply two coats of a good gloss, waiting 24 hours between coats. While adding further protection against paint coming off, I find it gives the plane more reflection while flying and easier to see orientation of the plane.

The following is a breakdown of kits to aid you in where you want to start. Keep in mind that no matter which kit you select, you are going to have to do some assembly due to the fact a huge box would be needed if things like rudder or stabilizers came installed on some of the large-scale planes.

Almost-Ready-to-Fly (ARF) RC Planes

An ARF is an aircraft that is "mostly" built with the exception of the main control and power system electronics. ARF's require you to purchase primary electronic components separately (motor, servos, ESC, etc.). ARF's are for hobbyists who prefer a true build experience and/or prefer to put their own choice of electronics in the aircraft. Possibly the user has a different radio than normal and requires a more compatible Receiver. ARF RC airplanes - a good intro to model plane construction. ARF's are also just a nice option if you don't like the idea of building from a kit. Quality varies between manufacturers so it's worth doing some serious research before buying (internet forums, video sites etc.)

Requires: servos, ESC, motor, receiver, battery, charger, and Radio.

Apart from the obvious installation of engine/motor and radio gear, other things you might need to do to complete an ARF plane will likely be:

- hinging the control surfaces
- fitting the landing gear
- tail plane and fin assembly
- fuel tank installation if IC (internal combustion)
- fitting of other peripheral hardware items
- servo linkages.

Control surface hinges in today's ARF kits are typically CA hinges; the trailing edge of the flying surface (wing, tail plane, fin) and leading edge of the corresponding control surface (aileron, elevator, rudder) will be already slotted and you just need to glue the hinge in place with thin cyanoacrylate glue (use thin Cyanoacrylate glue only). It's a quick and easy job, you simply slide the dry hinge into its slot and put a few drops of the glue onto it. The material the hinge is made of means the thin glue wicks (soaks) into the hinge and surrounding balsa, fixing the hinge securely in place.

A comprehensive instruction manual should come with the kit, to give you step-by-step instructions aided by clear photographs. So even if you have no or little modelling experience, you should be in with a fair chance of completing your ARF successfully by reading through and carefully following the manual.

If you do have any doubts then consulting a fellow modeler, hobby shop staff or seeking advice on a forum would be the best thing to do. If you already have modelling experience then completing an ARF RC plane shouldn't prove too much of a challenge at all. If you are new to the hobby, you should research gluing hinges before attempting. CA glue is very unforgiving when installing hinges and there are serious "wrong" ways to install them.

Plug-N-Play™ (PNP) RC Planes

Although the term “plug and play” is used as a very generic term for many different products these days, in this context the names 'Plug-N-Play' and 'PNP' are trademarks registered to Illinois-based RC product distributor Horizon Hobby.

A Plug-N-Play electric RC airplane has the motor, ESC (Electronic Speed Control) and servos installed but is missing the Radio, receiver and motor battery pack & charger. In other words, the airplane comes 99% assembled just like an RTF one does, but you need to supply your own Radio, receiver and battery pack.

In recent years there has been a huge increase in the number of manufacturers, many located in the Far East, supplying RC planes with power-train components but without radio gear, and such aircraft are now widely available. You might also see the term Receiver Ready which is also widely used to describe plug and play airplanes.

Plug and play RC planes are a great option, and with some careful shopping around for the receiver and battery pack they can be better value than an RTF package. Even better, if you already have some spare receivers and flight packs kicking about the workshop, then a PNP airplane is without doubt your cheapest option if you do want an RTF-based plane.

Bind-N-Fly (BNF) RC Planes

You've more than likely seen the terms Bind-N-Fly or BNF if you've been looking around at RC airplanes or helicopters to buy, but what do the terms mean?

The name Bind-N-Fly is a registered trademark name for a type of plane and helicopter category sold by the radio control distributing giant Horizon Hobby, and the aircraft mainly come from the Park Zone, Hobby Zone and E-flite ranges.

Essentially, BNF is a natural 'evolution' of the Plug-N-Play (PNP) planes and helicopters available. But instead of the PNP configuration of the aircraft being sold in Ready to Fly form, which is lacking a Radio, receiver and motor battery pack, a Bind-N-Fly RC aircraft is equipped with a 2.4GHz DSM2/DSMX technology compatible receiver, notably from the Spektrum range.

In other words, a BNF model aircraft is closer to an RTF one than a PNP one in terms of what you get in the box - you only need a DSM2/DSMX compatible Radio and battery pack to complete it and get flying.

Just bind... and fly!

Bind-N-Fly RC planes and helicopters are an excellent product and given that 2.4GHz Radios are now common place, it stands to reason that more folks are being attracted to BNF aircraft.

As with a typical Ready to Fly RC airplane or helicopter there's not much to do to the model other than some very final assembly work and to bind the receiver to your own Radio. Once this process is complete, usually a few seconds later, you're good to go.

The binding of receiver to Radio is a fundamental part of flying on a 2.4GHz system, the process enables the Rx (receiver) and Tx (transmitter) to lock together to form the impenetrable signal that has made spectrum radio systems so reliable. The binding process varies slightly between manufacturers but it's a simple process that is quickly done.

The Spektrum binding process should be carried out as per your Tx and plane instruction manuals, but essentially it involves inserting the supplied bind plug (shown below) into the appropriate receiver slot, powering up the receiver and then switching on your Tx while activating the bind function.



The Tx and Rx will then communicate with each other and bind after a few seconds; successful binding is indicated by the flashing orange LED on the Rx turning to a solid illumination. Once bound, you shouldn't need to do it again for that model although you can re-bind the two components at any time, for whatever reasons.

During the binding process the receiver learns the Global Unique Identifier code (GUID) that was programmed in to the Radio during manufacture. There are 4.2 billion code combinations possible and this is one of the reasons why spectrum RC technology is so secure.

Incidentally, when you bind your BNF aircraft it's very important to have all the Radio sticks and trims in their neutral positions, and more importantly to have any motor power fail-safe setting set; common practice is to have the throttle stick and trim fully down when you bind. By doing this the motor will automatically power down if the RF link is lost between Tx and Rx whilst flying.

You should always check your fail-safe before flight. Power up the RC plane as normal and apply some power to the motor (always restrain the plane first), and then turn off the Radio - if the fail-safekeeping is correctly set then the motor will stop as soon as the radio link between Tx and Rx is lost.

The essential difference between PNP and BNF is that a Bind-N-Fly (also a trademark name of Horizon Hobby) plane comes with a DSM2/DSMX receiver installed. In other words, you need a compatible Radio to fly a BNF RC airplane - namely a Spektrum one. Since a Plug-N-Play RC plane comes with no receiver installed, you are free to fit whichever Rx you prefer and so are not tied to any particular brand.

Ready-to-Fly (RTF) RC Planes

In the radio control flying hobby the abbreviation RTF stands for Ready to Fly and RTF RC airplanes offer the beginner the easiest, quickest and often cheapest option for getting started in this exhilarating pastime.

Ready to Fly planes can be IC powered (internal combustion e.g. glow plug) or, more commonly, EP (electric power). They can be traditional balsa/ply construction or, more commonly, foam.

Whatever they are, they need no construction or installation work done to them to get them flying, only some very basic final assembly stuff such as attaching the wing to the fuselage and fixing the tail plane and landing gear in place. Essentially, anything that makes the plane difficult to put in a box at the factory is left off for you to fit at home, otherwise the plane is complete.

Having said that, the smaller RTF RC airplanes - such as the Ultra Micro™ ones do come fully assembled because their wingspan is only around the 16-inch mark, plenty small enough to fit in a box.

RTF RC airplanes have introduced thousands of people to the hobby of radio control flying, as they have become increasingly widely available, affordable and popular. The completeness of electric RTF RC airplanes means that the only thing left for the buyer to get are the batteries for the Radio, but there are manufacturers that offer a complete one box purchase that includes the batteries. Park Zone and Hobby Zone are good examples.

Non-foam RTF RC Planes

While the majority of RTF's are electric powered planes, as previously mentioned there are also traditional balsa/ply and IC powered ones available. But the balsa/ply RTF market is a very limited one and if you're looking for a specific plane then you might be out of luck. The choice of ARF RC airplanes is much larger for traditionally built model planes.

Final note on RTF RC Planes

One thing to note about RTF kits, the Radio that is included, is a very basic, entry level Radio. There are several problems with these radios. First, they do not come equipped with a built-in telemetry feature (LCD display) which can give you real-time information on things like battery voltage, signal quality, motor temperature and more. Second, they do not do a Buddy Box connection without special software, cables and software configuring. Third, they are limited by the number of channels, usually four to six. And finally, they do not accept an SD Card which is used to install updates and load Plane models..

As you advance your skills and purchase more planes, you are going to need a radio with at least eight channels. This allows you to fly planes that have a retractable landing gear and/or ability to drop objects such as bombs or toy parachutists. Four, they do not allow you to switch to different planes easily. The radio that usually is included in an RTF is the Spectrum DXe found [here](#). A popular radio is the Spectrum DX8e 8 channel [here](#) or the Spectrum DX8 8 channel [here](#).