

# R/C FLIGHT INSTRUCTION PROGRAM for Student Pilots

The student pilot program is designed for an individual who has his/her own airplane, radio system, and related flight equipment and has not previously been trained and certified with a sanctioned AMA club. The student pilot must be a member of AMA and Flagler County RAMS prior to the beginning of flight training. A student pilot is not allowed to fly without the assistance of an instructor.

The intention of the program is to teach someone new to our great hobby how to successfully fly their airplane in a safe manner. The amount of time it will take to learn to fly varies significantly with individuals. Some may become proficient enough to solo in a few sessions at the field. Others may take much longer. Most people can learn if they persevere.

Each step in the training must be completed successfully before beginning the next step. The instructor is responsible for determining if the student understands the information and can perform the various maneuvers required. The program is based on four keystones:

**SAFETY** – Properly built and flown radio controlled aircraft present no great risk to anyone. However, in the hands of an inexperienced pilot, an airplane can cause considerable damage and/or injury. Safety will always be the primary consideration in the training program.

**SUCCESS** – Learning to fly R/C aircraft is a challenge but one that can be met by almost everyone. Without an instructor, the beginner is virtually guaranteed of several crashes. It is the intention of the RAMS training program to get the student through the training to solo without crashing. Of course, there are no guarantees. R/C flying is inherently risky.

**ORDERLY PROGRESS** – The program is a set of orderly steps ending with a solo flight.

**FUN** – The whole point of this hobby is to have fun. Each time you master a new skill, if you are not excited then you need a different hobby.

## **Disclaimer:**

Please keep in mind that the RAMS instructors are not responsible for your aircraft. The individuals that volunteer their time for the purpose of teaching you

to fly are competent pilots. They will, to the best of their abilities, check out your aircraft, radio etc., and instruct you in the safe operation of your aircraft. A “Buddy Box” provided by RAMS will be used during your training sessions. It is the safest way to learn how to fly R/C. If for some reason there is a mishap, the repairs and associated costs are up to you. Your instructor and other members will be happy to provide you with advice on how best to complete any required repairs.

### **Aircraft Preparation:**

Use the information with your airplane to be sure it is properly set up before coming to the field. Be sure all control surfaces operate properly and the surface throws are as recommended by the manufacturer. Make sure your CG is within the bounds defined by the manufacturer. Use the information provided by the engine manufacturer to select an appropriate propeller. Acquire all the necessary field items to fly your airplane, such as fuel, igniter, tools, etc. The more time you spend getting familiar with your airplane and the items you will need at the field, the more likely you are to have a fun and successful training session.

Prior to starting training, the student pilot must read the safety code on the AMA site and the safety notice and field rules on the [Flagler County RAMS web site](#).

The instruction program starts with an inspection of your aircraft at the club field, to ensure that it is ready to fly. Any suggested adjustments or modifications can and must be done prior to commencing training.

If you can't or face difficulties performing the suggested adjustments or modifications, any of the club's experienced pilot members can assist you with the set-up.

Your instructor may also re-inspect the plane, before the first flight but this will reduce his instruction time. He will however give it a final check before performing a trim flight.

### **The Buddy Box System:**

The “buddy box” system almost eliminates risk to your aircraft and provides an enjoyable learning experience. Two transmitters are used; one for the student and one for the instructor. FC RAMS has “buddy box” transmitters and cables for the more popular radio brands. The instructor controls the aircraft to a safe altitude using the primary transmitter. He depresses a switch on his transmitter, transferring control to the student, who then flies the plane. If it gets the plane in an unsafe situation, the instructor releases the switch and saves the plane to fly it back to a safe altitude. The instructor also lands the plane until he feels the student is able to do so safely.

## **Instruction Time:**

Weather permitting, instructors may be found at the field at any time however they will give priority to instructing students that have made an appointment with the instructor. If a student just shows up and hopes to get some instruction hopefully there will be another instructor that is free and willing to do so.

As you progress, we encourage you to work with 3 or 4 instructors. You will get different perspectives and you may feel more comfortable with some instructors, based on your and their personalities.

## **To make your time as a Student R/C pilot more enjoyable:**

Inspect your aircraft at home to the best of your ability.

Get your model aircraft inspected and corrected if needed before every flight session at the field.

Consider getting flight simulator software for your PC, if you have one. Any time spent on an R/C flight simulator will greatly reduce the learning curve. A Flight Simulator is available to FC RAMS members. This is an older version of the Real Flight software and the graphics may not be as up to date as the current generation, however, it is a good tool to start developing hand eye coordination before or during flight training at the field. It is also a great opportunity to see if the purchase of a simulator is for you.

Read the instruction manual for your transmitter. Instructors can't be expected to know how all the transmitters on the market function. Especially understand how to enable the "trainer" function on your transmitter.

Glow Engines: Read the instruction manual for your engine. Perform the break-in EXACTLY as instructed. Any break-in opinion expressed by a club member is exactly that: an opinion. It may a good one, but it may not. If breaking-in the engine at the field, be considerate and do so where the noise will not intrude. (Behind the south shed if the U-control area if is not being used), or well away from the pit area. Do not adjust the idle mixture until the engine has consumed about 10 tanks of fuel, unless the engine just will not idle. Expect to have a slightly higher idle rpm while the engine is new.

Electric Motors: Read the instruction manual for your ESC and know how to set its parameters. Read the instructions for your battery charger and know how to charge your batteries.

Bring to the field, the instruction manuals for your radio, aircraft, engine, ESC and Charger as applicable.

Review all pertinent instructions so you know what to expect.

If you make **ANY changes** to your aircraft between instruction sessions, inform your instructor.

The Instructors volunteer their time. Remember that they like to fly their own planes too. Through the instruction process and beyond, the more you put into the club, the more you will get out of it. Join in as many of the activities as your time permits.

R/C aviation is enjoyable and you will enjoy both the learning process and club membership by following the guidelines above.

### **Flagler County RAMS Instructor List**

The following is a list of the current RAMS instructors. Contact one of them for more information, and an appointment:

Charles Mueller Chief Instructor	<a href="mailto:chml1@bellsouth.net">chml1@bellsouth.net</a> ;	386-586-9146
Bill Semenovick	<a href="mailto:Wingit290@aol.com">Wingit290@aol.com</a> ;	
Conward Johnson	<a href="mailto:cjohnson33@cfl.rr.com">cjohnson33@cfl.rr.com</a> ;	
Bob Thierwechter	<a href="mailto:jbtheo@bellsouth.net">jbtheo@bellsouth.net</a> ;	
Victor Dumet	<a href="mailto:vdumet@hotmail.com">vdumet@hotmail.com</a> ;	
Jamie Hellmich		

**Once you and an instructor agree you have the confidence and ability to fly safely, he will sign you off as an R/C Pilot.**

## **INSTRUCTION Tasks to be accomplished:**

### RADIO and FIELD PROCEDURES

The first time you bring your plane to the field a member of the FC RAMS Flight Training Staff will do a thorough inspection to make sure the plane is airworthy. They will check that all control surfaces are properly attached and move correctly. Engine/motor mounting, servo mounting and control linkages are checked as well as the balance (CG) center of gravity.

The staff will help with engine break-in and tuning if needed.

You will be acquainted with your radio, normal and abnormal operation, interference, and conducting a range check. Your instructor will also explain the field facilities for the models and radios along with field procedures and field rules for safe and courteous operation. See the field rules and the description of the frequency control system at the field control board.

### FIRST FLIGHT

During this lesson your instructor will fly your model to verify its airworthiness and handling qualities. He will then explain the controls and what kinds of reactions you can expect. He may, at any time, present you with a list of items to be corrected before the plane flies again. You will be expected to correct these on your time. Only after your instructor is satisfied the airplane will fly safely and has been trimmed for straight and level flight, will he have you take the controls, and then, only after the model is at a safe altitude.

By using a "buddy box" the instructor will keep you out of trouble. Just relax and get the feel of the controls. Listen to your instructor. He will "talk" you through each control function and you will observe the plane's responses. If you get nervous, which happens occasionally, tell your instructor and he will take the controls. Remember, all you want to do during this lesson is get the feel of flying the model and begin to understand the dynamics of model flight. There will be a number of flights where you are only allowed to fly in the air; no takeoffs or landings.

### PROGRESSIVE TRAINING

After you have gotten the feel of flying your model, your instructor will teach you the five basic maneuvers required to get around the sky. They are:

1. Level flight
2. Banked turns
3. Straight climbs
4. Gliding
5. Climbing and gliding turns

Your instructor will also explain disorientation. This is a problem that everyone experiences sooner or later in flying models. Basically, disorientation occurs when you become confused about the direction or orientation of your model. For example, when the model is coming toward you and you start a left turn, the model will turn left, but it will move to your right! Your hands have told your brain: Left; but your eyes are telling your brain: Right!

Result: Disorientation. Experience will teach you how to respond to this problem. It's like learning to balance when riding a bicycle. Learning directional control when the plane is heading towards you takes practice. Your instructor will help you.

### ACCURACY MANEUVERS

Now that you can fly around and do the basic maneuvers, it's time to start learning how to control your model with precision. Again, you will be working with the five basic maneuvers, but now turns will have to be more exact ( 90 or 180 degrees) at a constant altitude. The whole idea of these lessons is to improve your skill and ability as a flier.

### ORIENTATION MANEUVERS

During these lessons your instructor will have you fly a figure-8 pattern and a rectangular pattern. The purpose of these maneuvers is to discipline your reflexes and judgments. Decide to really master these maneuvers. Their importance will soon be evident.

### STALLS AND RECOVERY

"If you pull back on the stick, the airplane goes up. Pull back some more and the airplane goes down!" That's a stall. But there's a little more to it and in this lesson you will learn to recognize and recover from stalls. More important, you will learn how to avoid unintentional stalls. Each airplane has different stall characteristics but the concepts are the same.

### TAKE-OFFS

As you gain flying experience and confidence, you will want to try to take off from the runway. Take-offs are nervous times because the model is near the ground and if it's not properly controlled, trouble can happen very fast. So, during this lesson, your instructor will explain the forces that affect a model during take-off and will assist you in making your first take-off. Once you have mastered the skill to maintain a straight line on take-off, you've got it made.

## APPROACHES TO LANDING

In this lesson your instructor will discuss how to land your model. You will fly a rectangular pattern again, and this time you will learn how to make a descent in preparation for landing. You'll get to practice this maneuver up high and as you become comfortable with it, the altitude will get lower. A good landing is always preceded by a good approach. As with full size airplanes, attitude controls speed and power controls altitude.

## LANDINGS

At the time the approaches are fully under control you keep getting lower and lower and all of a sudden you are landing. Only this time you need to remember to flare at the last moment. If at anytime things don't look good, go around and try again.

## SUPERVISED SOLO

At some point you will become proficient in all preceding phases of flight. It is time to solo. You will conduct a flight starting with getting your transmitter from impound, and ending, after you fly, with your transmitter back in impound. Your instructor will monitor this lesson and assist you when necessary. All you have to do is demonstrate good judgment, observe the field rules, and conduct your flight in a safe manner. Your instructor may have you do several supervised solo flights before this lesson is considered complete. When it is, check your logbook for the names of all your instructors. Search them out and thank each one. This is the only pay they receive.

## MANEUVER Detailed Procedures:

### GROUND STEERING PRACTICE



For a couple of hours, practice taxiing the model around at low speed. This is a very helpful step in making you feel more at ease in controlling the model. Do not rush it. Use a parking lot rather than a street where you are likely to run into a curb and damage your model. Practice taxiing in light breezes or when the air is calm; as strong or gusty winds can catch a wing and flip your plane over. Apply minimum throttle that just keeps the model moving at a walking pace. With the rudder stick and rudder trim in neutral position, the model should move straight ahead. If it constantly turns left or right, the nose wheel is not pointing straight forward and should be adjusted by loosening the steering arm. When the plane is pointing at you, the steering will seem "reversed." When you give right rudder, the plane turns to your left-but the model actually is turning to its right. With practice, you will become accustomed to this.

The more familiar you become with the behavior of the model, as you control it on the ground, the better prepared you will be when flying it. After taxi runs are completed, thoroughly examine the model and tighten any loose screws, etc. Checking your aircraft after each and every flight is an important habit to form, as loosened parts are the frequent cause of crashes.

### GENERAL FLIGHT TECHNIQUES

In flying, it is very important to make all your **control movements slow and measured**. Rapid movements tend to throw the model out of control. Try to make all turns gentle, not tilting (banking) the wing very much.



If you increase the bank, making the turn steeper, there will be a corresponding weight increase and reduction of lift. Therefore, when you bank your plane, it will start to descend. To maintain altitude in a turn, add enough back stick (up elevator) to hold the nose "up" through the turn.

First flights should be made on a day that is not very windy or gusty. There should be very few people or other distractions around; you will need to concentrate.

Your success doesn't depend on following the instructions here to perfection, but you should have a flight sequence in mind. Think ahead of the model; don't chase it around the sky, always one thought and one control command behind it.



While learning to fly, you may feel more comfortable looking over your shoulder (with your body in the same direction as the model) as the plane comes toward you. simply push the stick left or right, in whichever direction the ship is turning. . "Head-on disorientation" is dangerous in the air, where things can happen pretty quickly. Before flying, it is wise to spend some time familiarizing yourself with orientation by operating the controls, with the plane set on a table, while you view it from different positions.

## **FIRST FLIGHT**

There is no way to fully explain the principals of flight and the techniques of flying in a few pages. Entire books have been written about apparently simple subjects, such as the shape of the wing. Furthermore, there is no substitute for an experienced R/C flight instructor. The following information is not intended to replace your instructor, but to help give you understanding of basic flight concepts and techniques.

As stated earlier, choose a day on which there is little or no wind and the flying field is relatively quiet.

One of the most important, yet sometimes forgotten pre-flight checks is to always make sure the wing is securely attached to the fuselage; and the control system is 100 % operational.

**Remember** "A model, engine, motor, or radio that is not prepared and working properly on the ground before takeoff, will not improve in the air - it will get worse! There is no point in attempting to fly until everything is 100% correct."

Plan to make your first flight a short one. You will be surprised how exhausting beginning flights can be. Plan to spend no more than 2-3 minutes in the air the first few times you fly.

## **TAKE-OFF**

First, point the model directly into the wind. Switch the motor on (or slowly advance the throttle) and gently steer the model straight with rudder as the model gains speed rapidly. After it rolls about 50-75 feet, add slight back stick (up elevator) pressure, so that the model rises smoothly from the ground. Only hold as much back stick as necessary to keep the plane in a 5° to 10° gentle climb. Be patient; let it climb slowly, as a steep climb will cause it to stall. (If you try to pull the model up too steeply, it may slow down and then stall and crash.)

## **LEVEL FLIGHT**

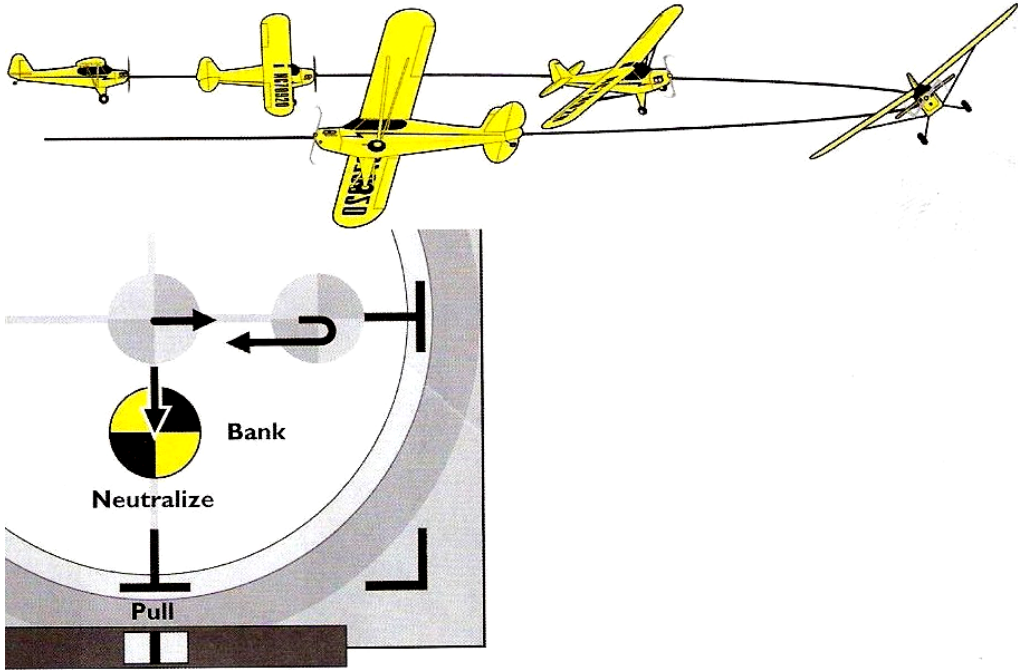
Most crashes are due to moving the controls too much, so once again, be slow and gentle on the controls during throughout the whole flight. Over-controlling tends to throw the plane out of control and wastes power.

When achieving a safe altitude after "climb out", reduce power and trim the aircraft for level flight.

Keep the wings level, adding just a touch of left or right aileron.

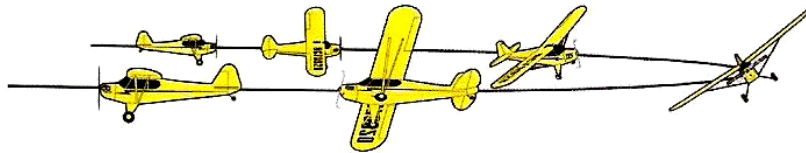
## **BANKED TURNS**

Apply a little right or left (aileron) stick pressure until the model begins a very shallow turn in the direction you want to go. Then "neutralize" the stick position. If loosing altitude apply some back stick pressure (up elevator) until the descent is arrested.

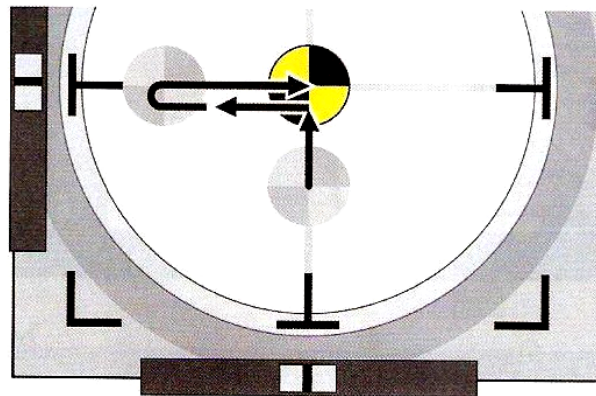
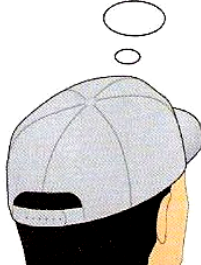


At the point at which you want to exit the turn, neutralize the elevator and smoothly apply opposite aileron to level the wings.

**Aileron Turn Correction**



"Right turn, be ready with Left."



During windy conditions, try to maintain shallow turns. Do not let the turn get too steep.

The wind will tend to blow your plane further downwind. Try to keep it upwind at all times. It is more difficult to fly a model when it is downwind, and if a mistake is made, the model will end up further away, making it harder to fly back to the field. To compensate for wind, continue making upwind turns shallow, but make downwind turns a little steeper.

### **OVER-STRESSING THE AIRFRAME.**

Spirals occur, as explained earlier, when the bank angle increases and up elevator (back-stick) is added to keep the plane flying level.

If the bank becomes too steep, the model will spiral downward at an increasing rate of speed. Trying to "pull" the aircraft out of the spiral by pulling back on the elevator only makes things worse. This sequence of events happens very often.

Abrupt control changes can stress ANY airplane, even those designed for aerobatic competition.

If you find yourself in a steep, high-speed dive, immediately level the wings and gently pull the stick back (add up elevator) pressure to recover.

### **STALLS.**

Your model's movement through the air keeps it flying. If you fly too slowly, there is a point where it will stop flying and fall out of the sky. This is called a stall.



When the nose drops, the plane will gain some speed. Give it a little more power as you gently give the plane up elevator to bring the plane nose level with the horizon.

### **SETTING ADJUSTMENTS**

As you get used to the controls, you probably will notice the model turning somewhat, or climbing or descending, without any stick pressure on your part.

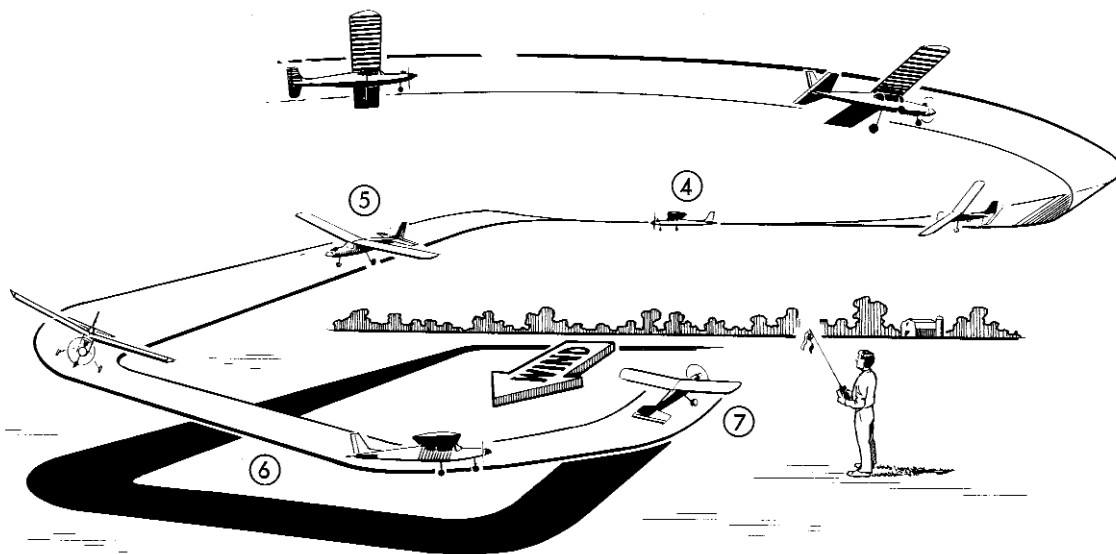
Bear in mind that airplanes have forces that must be balanced in order to fly straight and level.

These tendencies can be corrected in the air by moving the trim tabs on the transmitter. Usually when you change power settings be ready to "trim" the aircraft for nose up or down.

## **FLYING A PATTERN**

At most flying fields, models fly in a rectangular path around the runway. This is called the "pattern." The most important reason for flying the pattern is that, as the model flies in different directions in the wind, the pilot will be better prepared for landing conditions when the flight ends. Full-scale aircraft fly a landing pattern for this same reason. Another important reason for flying the pattern is to organize the take-off and landing traffic, reducing confusion.

The "traffic" pattern consists of PATTERN ENTRY (position 4), DOWNWIND LEG (position 5), BASE LEG (position 6), and FINAL APPROACH & LANDING (position 7).



## **LANDING**

In preparation for landing, plan to enter the pattern upwind, at about 120 - 150 feet altitude.

Make the Downwind Leg far enough away to allow for gentle turns to Base Leg and Final Approach. Avoid tight "panic" turns, particularly when landing.

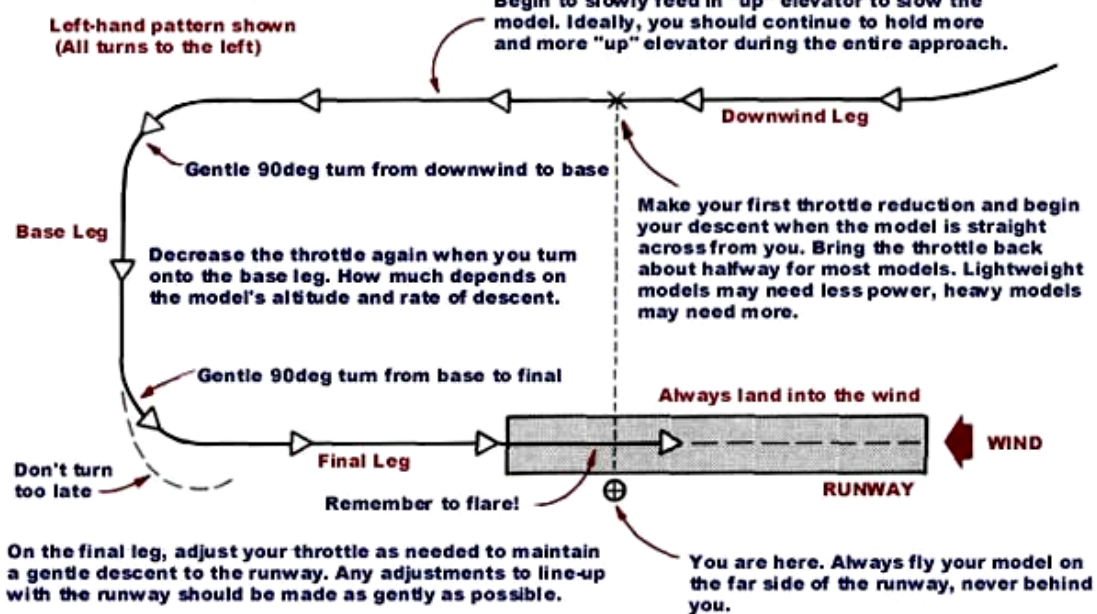
When the model reaches the Downwind Leg reduce power (when the model is straight across from you) to establish a gradual descent until it is about 45° downwind of the landing area, turn to Base Leg. When you have reached an

altitude of about 100 feet, add just a touch of left or right stick until the model begins a very shallow turn. Try to maintain this shallow turn, keeping it gentle, and not tilting (banking) the wings very much.

From now on if you increase the bank, making the turns steeper, there will be a corresponding weight increase and reduction of lift. The combination of low airspeed and reduced lift can result in a spin which will (most likely) panic new pilots into flying the model right into the ground!

Reduce power again. How much depends on the airplane's **altitude and rate of descent**.

**TYPICAL LANDING APPROACH PATTERN**  
as viewed from above



For your FINAL APPROACH & LANDING, make a gentle turn to point the model in the direction of the landing area. Keep the nose of the plane slightly down, so you don't stall.

This is your decision point, if everything looks good, continue your descent, letting the model slowly lose more altitude. (If you are not happy with the approach, turn the power back on, climb out, and set up for another pass.) Remember "good approach results in a good landing." Consequently don't rush it.

For your first landings, don't be concerned about trying to land in a particular spot. Just land safely, without damage to your model. At first, concentrate on flying a gradual descent straight into the wind.

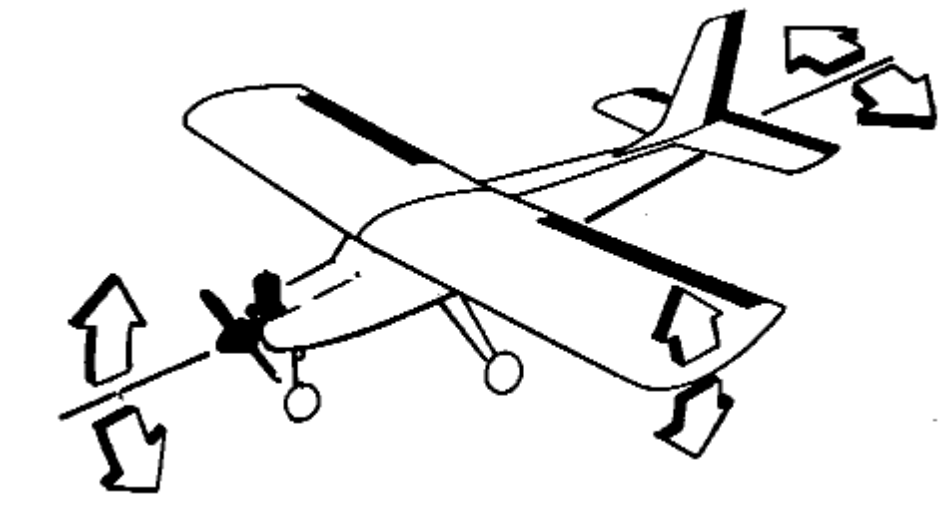
Steer the plane into the wind as it glides, keeping the wing level. Let the model settle in toward the ground and land. Just before the model touches down, you can add just a bit of back stick (up elevator) to "flare" and soften the landing.



After landing is complete taxi your aircraft to the pits, walk over to your plane and turn off the receiver first, and then the transmitter. Congratulations! You've just completed your first flight.

## GLOSSARY OF MODELING TERMS

**RUDDER CONTROLS "YAW"**  
(SIDE TO SIDE MOTION)



**ELEVATOR CONTROLS "PITCH"**  
(UP & DOWN ATTITUDE)

**AILERONS CONTROL**  
"ROLL" (BANKING)

**ARF:** Almost Ready to Fly

**AILERON:** the control surface on the wing that rolls the plane

**AIRFOIL:** the shape of the wing as seen from the end

**ANGLE OF ATTACK:** the angle at which the wing meets the air flow

**CONTROL HORN:** a device attached to each control surface to provide an attachment point for the pushrod

**COWL (COWLING):** the nose section of the fuselage that encloses the engine

**DECALAGE:** the difference between the incidence of the wing and stabilizer

**DIHEDRAL:** the inward angle of the wings, as seen from the front

**ELEVATOR:** the moveable part of the horizontal tail, which controls pitch

**EMPENNAGE:** the tail of the plane

**FIN:** the fixed vertical part of the tail

**FIREWALL:** the hard wooden former at the front of the fuselage, to which the engine is mounted

**FORMER:** a piece which shapes the fuselage; and to which the sides of the fuselage are attached.

**INCIDENCE:** the angle of the wing or the tail in relation to the thrust line

**LAMINATE:** to glue two thin sheets of material together to form a thick sheet

**LEADING EDGE (L.E.):** the edge of the wing that first meets the airflow

**OUTPUT ARM:** the piece that attaches to the servo and connects it to the pushrod

**PITCH:** an up and down movement of the nose of the plane, which is controlled by the elevator

**PUSHROD:** the long, stiff dowel or plastic piece that connects the servo with the control horn

**RTF:** Ready to Fly

**RIB:** the airfoil-shaped piece that connects the leading edge, spars and trailing edge of the wing together and holds them in shape

**RETRACTS:** devices for extending and retracting the wheels on command

**ROLL:** tilting of the plane as viewed from the front, controlled by the ailerons

**RUDDER:** the moveable vertical tail of the plane,

**SERVO:** the part of the airborne radio system that moves the control surfaces

**SPAR:** a wooden stick running lengthwise through the wing that serves as its backbone

**SPINNER:** the rounded cone that fits over the propeller hub

**STABILIZER (STAB):** the fixed horizontal part of the tail

**STALL:** a situation in which the plane is flying too slowly to move sufficient air across the wing to produce lift

**THRUSTLINE:** a line drawn from the center of the propeller hub straight through the airplane

**TORQUE:** a rolling tendency caused by the spinning propeller

**TRAILING EDGE (T.E.):** the edge of the wing that faces the rear of the plane

**TRIM:** small adjustments made to the control surfaces to cause the plane to fly straight and level by itself

**WASHIN:** a twist in the wing that makes the trailing edge lower than normal

**WASHOUT:** a twist in the wing that makes the trailing edge higher than normal

**WING SADDLE:** the shaped part of the fuselage in which the wing rests

**WHEEL COLLAR:** a metal ring that holds the wheel on the axle

**YAW:** a right-to-left movement of the nose, controlled by the rudder



## **ACKNOWLEDGEMENTS:**

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“District of Columbia Radio Control Club. Flight Training Program documentation © 2013, all rights reserved.”

[training@dc-rc.org](mailto:training@dc-rc.org)

“Dave Scott 1<sup>st</sup> RC Flight School, Mastering Procedure & Rudder Turns.”

<http://www.rcflightschool.com>

“Hobbico’s Carl Goldberg Products General Information Manual.”

[questions@carlgoldbergproducts.com](mailto:questions@carlgoldbergproducts.com)

“SIG Mfg. Company’s RC Basics Handbook”

[mail@sigmfg.com](mailto:mail@sigmfg.com)