Kingston Radio Control Modellers
R/C Flight Training Course

Student: _____

MAAC # _____

Instructor: _____

Instructors phone # _____

Welcome New KRCM Student!

KRCM welcomes you as a Student Pilot! You have many resources at your disposal, from our experienced Instructors to enthusiastic fellow Members of our Club. Many of the latter have received their "Wings" not too long ago and their experiences are fresh in memory. Never be reluctant to ask questions, or for assistance. Keep an eye on the KRCM.ORG website for news of Meetings, Beginners Nights, Fun Flies and other activities that you will be able to enjoy, and contribute to.

You must learn to crawl before you walk and walk before you can run. For this reason, KRCM and MAAC strongly recommend that you start your flight instruction on a trainer and then evolve to more advanced planes. A trainer will enable you to learn and progress more quickly and will simplify your instructor's roll. Your plane will last you longer with less chance of downtime due to a serious crash. Remember, even modern fighter pilots learn to fly in trainers before advancing to jets. So leave the scale planes until after you have learned to fly.

You will have a "Student Progress Card" which serves several purposes:

- Continuity: Since your formal instruction will likely involve more than one Instructor and at irregular times, i.e., when it is convenient for you, this card will track progress and help Instructors avoid unnecessary repetition while concentrating upon developing new skills and knowledge. After each flight, or perhaps at the end of a series of flights that day, the Instructor will indicate your level of achievement at that time, and initial the Card. The next time you fly, your Instructor will ask for your Card and can immediately get a good overview of your progress, what area(s) to review or improve and what may be the next area to concentrate upon.

- Self-awareness: You keep your own card. As you think about your flying prior to the next time, you can begin to realize where you are in the journey to competency. It will become a point of pride, as you gradually see your own progress. It can be rather exciting to see the 1 - 2 – 3 progression from Introduction through Competency for each of the aspects of r/c flying!

The items listed on the Progress Card cover most of what you will be learning, but not necessarily in that order. For example, one cannot take off or land an aircraft until they have learned how to competently control the aircraft at higher altitude, where mistakes can be easily corrected. Weather conditions and other factors often determine what can be covered on a given flight, or day.

Your Instructor's objective is to maximize learning while minimizing risk to your aircraft. The end result should be a Safe, Competent and Self-assured (but not over-confident!) pilot who will enjoy a lifetime of r/c flying. You will eventually stand up at a KRCM Meeting to receive your well-deserved "Wings", whereby all Pilots recognize that you can fly safely on your own. Then, the REAL learning begins!

Please take care of your Progress Card. We recommend that you put it in a Ziploc bag or otherwise protect it and keep it with your transmitter. (Keep a pen in there, as well, as our Instructors my not always have one readily available at the field.). Should you lose it, or forget to bring it to the field, Do Not Panic! We can sort things out and get you re-launched!

Come On Board and Enjoy The Flight!

TABLE OF CONTENTS

APPLICATION FOR INSTRUCTION AND STUDENT PILOT COMMITMENT

This is my request for Kingston Radio Control Modellers (KRCM) to provide me with instruction in the flying of radio-controlled model aircraft. A KRCM Flight Instructor will introduce me to the Club's Safety, and other rules and training procedures. I will maintain a training record in accordance with KRCMs' standards.

I understand that KRCM provides competent, qualified Instructors who are volunteers, receiving no financial or other remuneration, and who will put forth their best efforts to assist and train Members of KRCM, at all stages of their model flying careers.

I understand that Safety is the highest priority and that each Member accepts personal responsibility for their conduct and for the state of any aircraft, which they are flying.

I am a Member of the Model Aeronautics Association of Canada (MAAC). I agree to abide by the Safety and other rules under which MAAC operates.
(*Reference: **MAAC.ca** website and/or posted rules in KRCM clubhouse*)

I am a Member of KRCM. I agree to abide by the Safety, and other rules under which KRCM operates.
(*Reference: **KRCM.org** website*)

I recognize that, as with most sporting activities, flying of model aircraft carries a level of risk to myself and to others.

The MAAC insurance policy provides some level of personal liability protection. Neither my model aircraft, nor those of any others, are insured under this policy. In the event of a mishap resulting in injury or property damage, as a result of my actions with a model aircraft, I am aware that I am responsible for any associated deductible amount within the MAAC insurance policy in effect at that time. The KRCM Executive may decide to review any such incident and relieve me of some or all of the deductible financial responsibility, should circumstances justify such consideration. That decision will be final.

In the case of fixed-wing, or gyro-aircraft, I will always fly under supervision of an Instructor or "qualified Pilot" until I have passed a formal "Wings" test as administered by KRCM. A "Qualified Pilot" is one who has the "Wings" rating, as listed in the official KRCM Members list

In the case of helicopters, I will conduct my flying in the safest possible manner, away from others as much as possible and with due regard for all persons and equipment in the vicinity. At some time, I may be required to undergo MAAC-defined "Blades" qualification, administered by KRCM.

Student's Name (print): _____

MAAC # _____ PHONE #_____

Signature: _____

Accepted by: (KRCM Instructor) _____

Date: _____

SAFETY FIRST, FUN SECOND

Please visit the MAAC website (at www.maac.ca) and download a copy of the

"Model Aeronautics Association of Canada, SAFETY CODE"

You are required to review, understand, and abide by the Safety Code as it pertains to the specific rules of RC aircraft modeling.
If you have any questions regarding these rules or any of the Safety Code, ask your instructor for clarification.

CLUB RULES

1) All persons flying at the Kingston Radio Control Modelers Flying Club site must be a current member of M.A.A.C. (for Americans – A.M.A.) and must be able to show proof;

2) The M.A.A.C. safety code and safety guidelines for field operations are the standards of operation of the Kingston Radio Control Modellers Club;

3) Fly or running of engines will not occur prior to 8 (eight) a.m. Monday thru Friday inclusive and not prior to 9 (nine) a.m. Saturday and Sunday with the exception of special events which shall start no earlier than 8 (eight) a.m.;

4) The maximum number of radio control fliers shall be 5 (five) at one time unless operating under the rules of a specific discipline (i.e. R/C Combat);

5) No engine shall exceed 98 DBA measured with engine at maximum RPM at a distance of 10 (ten) feet from the muffler;

6) All transmitters and receivers operating in the 72 MHz band (channels 11 through 60) must be narrow band. These transmitters as well as any which operate on other MAAC - approved channels, such as Amateur Band and 27 MHz, must be kept in the impound when not in use. Spread Spectrum transmitters are not required to be impounded;

7) Operating instructions for the frequency boards will be located adjacent to the boards;

8) **ALL** members should report safety – related items to the Executive;

9) Any permanent changes to the field shall be approved by the field owners.

CLUB ETIQUETTE

1) Gate: With your KRCM membership, you will receive a gate key, which allows you access to the club field at any time.

2) As a student you may **NOT** fly unless under the supervision of an instructor or,

3) Once soloed, under the supervision of a willing, Qualified Pilot.

4) Your wings Testing may be conducted by any Qualified Instructor and will be witnessed by any Qualified Pilot.

5) Every member must have their wings rating before flying on their own at the field.

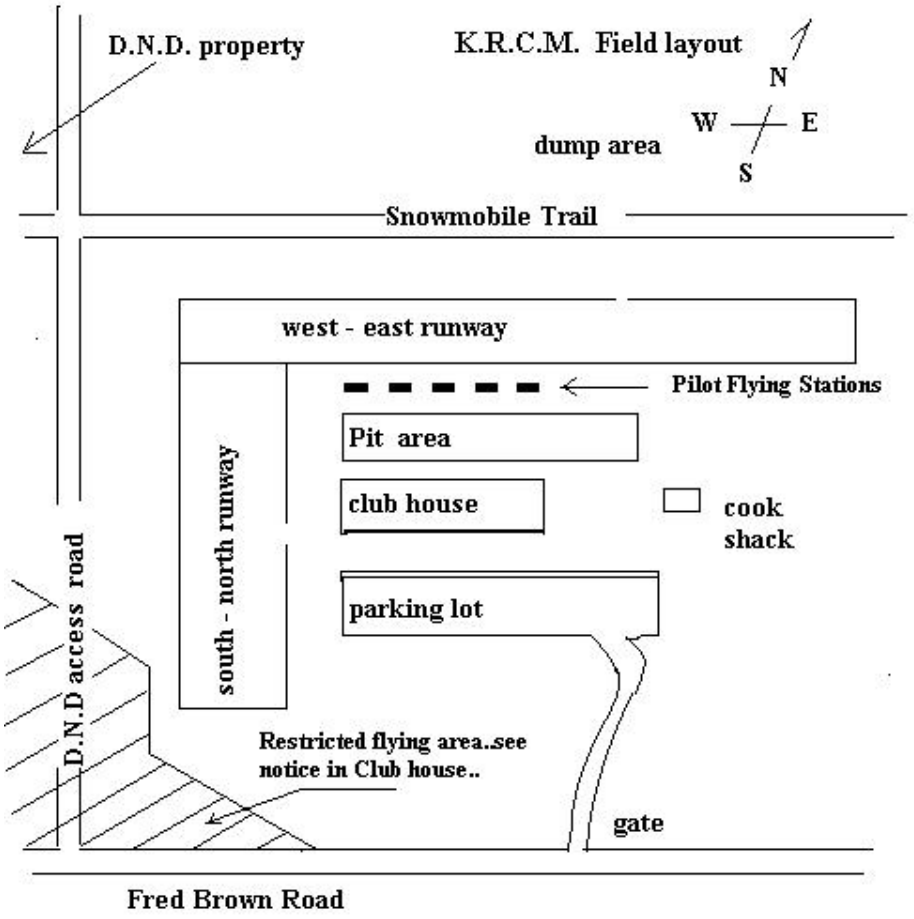
6) Flying is not permitted over the pit area, clubhouse or parking area.

7) Taxiing in the pit area is not permitted.

8) Pilots should announce their intent to take off or land**, BUT** only after taking existing aircraft traffic into consideration and giving right-of-way to those aircraft.

9) Pilots should announce their intent prior to walking onto the field to recover aircraft**, BUT** only after taking existing aircraft traffic into consideration and giving right-of-way to those aircraft.

K.R.C.M. FIELD LAYOUT



1. Club house contains the transmitter impound,frequencey control board and first aid box.,
2. No flying or engine runup untill after 8am. Mon. to Fri . and 9am. Sat. and Sun.
3. Observe all K.R.C.M. safety and field rules.

KRCM FLIGHT TRAINING OVERVIEW

As a minimum, training will cover the following:

STUDENT PILOT:

Ground School: MAAC Safety Code, Field Rules, Field Etiquette
Pre-flight safety inspection
Radio Range Check
Aircraft flight prep.
Start & tune engine
Ground handling / taxi Instruction

Flying skills: Safe, predictable flight at altitude
Aircraft flight trimming
High speed taxiing
Controlled take-offs
Controlled landings
Touch & Go
Procedure turns maintaining altitude
Horizontal figure 8 maintaining altitude
Stall recovery
Basic aerobatics -Loops and rolls

SKILLS REQUIRED FOR INSTRUCTOR CLASSIFICATION:

Pilot flight status plus *advanced aerobatic capabilities* as follows:
Straight Inverted Flight
Spin recovery
Consecutive Horizontal rolls
Inside loops
Split S & Immelmann turns
Stall turns
Reverse Cuban 8
Downwind landings
Dead stick landing

BEGINNER BASICS

CHECKING OUT A MODEL BEFORE FLIGHT:

Your instructor is responsible for demonstrating to you the critical steps in checking out your new airplane before its first flight. Once this has been done however, you should always perform a daily check routine of your own. This will be your responsibility and it's handy to know what to check for. Full-scale pilots use a checklist to pre-flight their aircraft and so should you.

Here are things you should look for before your first flight of the day.

BEFORE FUELING:

- With everything turned off, make sure that nothing in the plane is loose by tilting it in all directions while listening for moving components
- In the case of a nitro/ gas powered model you should be able to hear the CLUNK in the fuel tank as it clunks against the tanks sides while rocking the model
- Visually inspect the plane, making sure that all servo output arms are secured with screws and that all clevises are properly closed and secured.
- Check that the control linkages and surfaces have little or (best) no play in them
- Check your onboard batteries (flight pack) for full charge using an expanded scale volt meter designed to apply a pre-set load on the batteries while testing
- Ensure the wing is mounted squarely to fuselage and is securely fastened down with the screws provided or recommended number of elastic bands
- Check the “centre of gravity” to make sure the plane balances where the instructions say it should

AFTER FUELING:

- Check frequency board to ensure your transmitter frequency is clear – that nobody else is using it.
- If your frequency is clear, place your frequency pin on the board in the correct location to indicate to others that the frequency is now in use
- Extend transmitter antenna fully
- Turn on transmitter and check the battery meter or lights to ensure that its batteries are fully charged
- Turn on receiver and check that all control surfaces move smoothly and that there is no binding of servos (indicated by a humming sound from the servo)
- Ensure control surfaces move in correct directions
- In the case of an electric powered model, with the model restrained check for smooth vibration free operation of motor/gear box assembly.
- If glow/gas powered, restrain the model, start the engine and check for vibration free operation and reliable idle and throttle transition
- Range check transmitter (antenna collapsed) with engine or electric motor off (72 MHz)
- Range check transmitter (antenna collapsed) with model restrained and engine or electric motor running (72 MHz)
- For spread spectrum systems consult manual for range checking procedure.

If any of these tests fail, correct the problem before flying. Many models have been lost because the pilot dismissed a problem as being “Not too bad”.
-You can use the Pre-Flight Check-List on the back of your Training Record for reference until you have memorized it, and keep it indefinitely in your field box once your training is done.

WIND:

Windless days are best when first learning to fly because you don’t have to think about it. However, on most days there will be some amount of wind and on some there will be too much. Just how much is too much will depend partly on the model you are flying. This is something you will learn from your instructor(s) and from experience.

Wind can move along a straight path but can also be gusty or turbulent. If it comes from an unobstructed direction it may move smoothly, but many times it will come across nearby tree tops or structures and become quite unpredictable, making flying very difficult for the beginner. With experience you will become used to flying in moderate wind.

Wind is actually helpful if you learn to use it wisely. For example, you should **always** take off and land into the wind. Why? What counts in keeping an airplane flying is its **air- speed** (the speed with which it is traveling through the air). If you have a 10mph breeze down the runway and your plane is traveling 10mph **groundspeed** into the wind, you have 20mph **airspeed.** What counts in damaging an airplane is the speed with which it hits something. That's its ground speed. With takeoffs and landings you want adequate airspeed at low ground speed. By taking off and landing into the wind, you are using the wind to your advantage.

Here is another wind scenario you will encounter unless you are careful to keep you plane upwind while flying. It is very easy for a plane to move with the wind so far downwind that you can't bring it back. This is particularly true with low powered trainers with light wing loading, designed to fly relatively slowly. These "floaters" can move downwind of you quickly but when you turn back upwind they will grind their way very slowly back to you.

As a beginner, it is very easy to make mistakes trying to bring the plane back. Because disorientation becomes more prevalent the further away your plane is, it may end up drifting further away. Your instructor will help you to recognize this scenario and learn to avoid and successfully recover when it does happen.

THE BUDDY BOX:

Some beginners find that learning to fly is aided by the use of a buddy box. This is a second transmitter that is connected to the host (your) transmitter with a trainer cord. The instructor operates the host (master) transmitter and you the student operate the slave. You are able to control the airplane with the slave only as long as the instructor holds down the spring activated trainer switch on the master. If you get into trouble while flying, the instructor has only to release the trainer switch to take full control and restore your plane to a safe orientation and altitude. The buddy box must be a compatible transmitter (usually the same brand as yours in order to work with your model.

If no buddy box is available, the instructor will stand next to you and use the "hand-off" method where if there is a problem, he will take the transmitter from you to correct the situation. Before you begin to fly using this method you must **completely understand** your instructors directions as to how this will be done so that there is absolutely no confusion regarding the "hand-off" procedure when the time comes. You must also immediately hand off the transmitter to your instructor when asked to do so if he is to save your plane. It is a good idea to practice the hand-off with your instructor before flying. Each instructor may have a slightly different approach to this procedure so ask each time you have a different instructor assisting you. On rare occasions the hand-off may take too long for the instructor to be able to save the plane.

FLYING STRAIGHT LINES:

Unlike when climbing trees, the higher you are flying (so long as your model is clearly visible), the safer it is. When working with your instructor, he will fly the airplane up to a safe altitude and then let you be the pilot. We often say that beginners should start flying "three mistakes high". This means you have time to make a mistake or two and correct them before the instructor feels compelled to take over and correct the third mistake.

If you cannot fly a model in a straight line you will find safe landings nearly impossible and takeoffs difficult. Beginners are often surprised at how a model plane will try to turn off the intended course even if you make no movements with the controls. Your job as a pilot is to keep the plane flying in the direction you want it to go.

The best way to learn directional control is to think of your self "in the cockpit". One technique to help you learn this is to turn your body to face in the direction the plane is flying. If using this technique, never turn your body through 360° as you **will** become disoriented. After a while, turning with the model becomes a habit, and instead of thinking about making the plane turn, you are psychologically in the plane. There is none of the "left-right reversal" problems you would experience by just facing the plane. As you continue to fly this way, you will eventually stop physically turning. Very soon you will fly from "the cockpit" without having to think about it.

HOW TO TURN AN AIRPLANE:

Now you must learn to turn the plane. Planes like birds do not turn flat like a car, but gracefully bank. First it is important to think of the transmitter as horizontal. On most North American transmitters, the "main" stick for directional control is the one on the right side. When you rock the main stick in a left or right motion it controls the ailerons to bank the plane right or left. If you pull it toward you or push it away from you it controls the elevator. You or your instructor should never describe the stick motion as "up" or "down" because this will cause confusion between stick direction and airplane direction when learning to fly and even when you get to be an advanced flier. When the plane is in a normal upright position, when you pull on the stick you are pulling the nose of the airplane up to climb, and when you push on the stick you are pushing the nose down to descend.

Before flying for the first time you may be asked by your instructor to practice making the correct stick movements with the transmitter while he tells you directions i.e. "pull", "push", "right", "left" repeatedly in random order until you make the correct stick response every time. Many beginners have crashed their plane by doing the wrong thing after the instructor tells them the correct thing to do. This is why it is extremely important to listen to your instructor's directions and do as he says when he says to do it.

Making a turn has three steps. For example, to make a left turn:

1) Bank a little in the direction you want to turn by moving the main stick to the left.
2) Pull a little on the main stick until the plane has **almost** reached the direction you want it to go.
3) Move the main stick to the right to un-bank the plane.

Nobody can tell you how much you have to move the stick, as even the same airplane requires different amounts of stick motion depending on a host of factors. This is where practice comes in. Once again, you have to make the plane fly the way you want it to. If it banks too much, you must un-bank it. If it comes out of the bank on its own before the turn is cone, you must add the bank back in. The amount you pull will similarly vary, as the two movements work together.

There are few pilots who while learning to fly R/C have not at least once lost control of their plane in a "graveyard spiral". This happens in the early stages of flying when you bank for a turn but do not take off the bank soon enough, and the plane enters a spiral dive. When this happens the plane is turning at a very fast rate and may leave you frozen in awe on the sticks. On trainers, just letting go of the sticks will usually stop this rotation, however, often, application of opposite bank(if you can remember which one started the spiral) may be required. Your instructor will usually catch this kind of spiral dive early and save the plane for you.

The key to becoming a good pilot quickly is to learn to fly in straight lines (parallel to your runway or field), try making right angle turns and then try to fly straight again. Avoid flying aimlessly around while allowing your plane to do determine its own direction. When you can fly a large rectangle in the air with smoothly rounded corners (both right and left turning rectangles) you will have learned the basics of controlling a model plane in flight. Now you will be ready to learn to take off and land.

MASTER THE TAKEOFF:

Ground Handling

Good pilots control where the plane is going instead of letting it go wherever it wants.
That is just as important on the ground as in the air. So when preparing to do a takeoff you need to determine a ground reference on the horizon in line with your runway centreline. The goal is to taxi and climb out toward that reference in order to maintain the centreline and thus provide a direct and easy entry into your familiar rectangular flight pattern. If you neglect to maintain the runway centreline during the climb-out, it will not only look sloppy but will tend to increase your workload when you have to bring your plane back from where you didn't intend it to be.
You'll recall that takeoffs should be performed generally into the wind. What you must also learn how much to pull on the main stick to provide just enough elevator throughout the ground roll. This will prevent a tail-dragger from becoming top heavy from engine thrust and tipping onto its nose. It will also unload (take the weight off) the nose gear of a model with tricycle gear and thus reduce its sensitivity and the potential for over controlling. Of course, pulling back on the stick also helps to rotate the nose of the plane up for takeoff when it reaches flying speed.

Smoothly advancing the throttle (left stick) to full power at the start of the takeoff roll is another important key element to a successful, straight takeoff. That's because accelerating to full throttle right away gets more air traveling over the tail surfaces sooner, which helps to hold the plane straighter and provides better rudder control. If you advance the throttle slowly you will have more difficulty holding the plane straight.

When taxiing or performing a takeoff ground roll, your primary means of directional control is the rudder (and nose wheel or tail wheel), which is controlled by left and right movement of the left stick on your transmitter. As soon as the plane becomes airborne you will need to use your right (main) stick to control ailerons and elevator just as you would in your rectangular circuits. There is no set technique for maintaining the runway centreline during the takeoff ground roll. This is a situation where you, the pilot need to react to the airplane. However, as a rule, larger-sustained rudder corrections are typically needed at the start of the ground roll, and as the plane picks up speed and control improves, small rudder bumps or taps tend to work best. You may have a tendency to over control in the beginning until you get a "feel" for you planes ground handling characteristics so if you find your plane heading completely off track, cut the throttle immediately by pulling back on the left stick to stop the ground roll. Over controlling is usually the result of holding in rudder correction for too long, so try to limit yourself to briefly tapping the rudder during takeoff roll. Note that it is perfectly OK to make large rudder inputs, just as long as you don't hold them in for a long time.

Takeoff and Climb-out

A big concern for new pilots is avoiding a stall after takeoff due to climbing too steeply and losing flying speed. First you should understand that it is not the amount of elevator used to take off that causes an airplane to climb too steeply and stall. It is the length of time that you continue to pull back on the elevator stick. If you hold it too long, that can lead to a stall. Therefore you must be prepared to start smoothly returning the elevator stick to neutral as soon as the airplane leaves the ground in order to maintain a shallower climb and plenty of flying speed. Then, if necessary, small amounts of elevator can be used to fine-tune the climb angle.

Without question, the most important aspect of taking off at the beginner stage is keeping the wings level to avoid entering a turn low to the ground. It only takes a few seconds for a wingtip to strike the ground when you're so concerned with trying to climb that you forget to level the wings. You want the plane to continue to climb out in as straight a line as possible toward your set target point on the horizon until you have sufficient altitude and speed before you begin to enter the rectangular pattern.

So here is a standard takeoff summary:

1) Point the airplane into the wind.
2) Pull in a small amount of up-elevator and steadily advance the throttle to full (do not hesitate).
3) Smoothly tap the rudder to steer until the plane lifts off.
4) Smoothly reduce the amount of elevator beginning when the plane leaves the ground while keeping the wings level with the ailerons.

In addition to the above procedure you may find it necessary to make additional corrections in direction after takeoff by continuing to bump the rudder until the airplane gains enough speed to fly straight on its own. Many planes have a tendency to turn (yaw) left during takeoff due to prop-wash. This can be counteracted with right rudder.

Entering the Pattern and Trimming

As a novice pilot you should avoid making any turns until achieving a safe height. You should also reduce power to about half throttle, thus setting the stage for a more forgiving first turn. Once you have completed the first turn you can set the power and trim for straight and level flight at the speed you are comfortable flying at. If you failed to hold the centreline during takeoff and climb-out, you may still be still working to position your plane into a comfortable view. Keep flying the plane until you have enough altitude to think about trimming.

Trimming at the beginner stage is made considerably easier by briefly raising the transmitter up to eye level while still watching your airplane. This eliminates the distraction problem of looking away from your plane to find and adjust your trim controls. The most important part of the takeoff with an airplane that is out of trim is to keep flying the plane until you have enough altitude to think about trimming.

Planes rarely crash because they are out of trim. Out-of-trim airplanes crash because their pilot is so preoccupied with trimming that they forget to fly the plane. Make trim adjustments in small increments and give your airplane time to respond to each adjustment. Remember, concentrate on flying the plane and make trim adjustments only as you feel comfortable.

HOW TO LAND:

The Wind Can be Your Friend

Landing is one of the most difficult of flying tasks, for both manned and model aircraft. Part of the difficulty lies in the precision and skill required by the pilot. When flying at altitude you are free to cruise around in a reasonably relaxed and carefree manner, whereas when landing you are forced to fly precisely. The other difficult part of this task is emotional: you risk damaging the plane in every return to terra firma. Landing is a manoeuvre that you cannot avoid. What would be a slight mistake at altitude can be catastrophic when you are close to the ground. That is why even experienced pilots get a little nervous when its time to land. So don't feel that its only you who tenses as the plane gets close to the ground.

There are some hints and techniques however that can be used to make landing easier. First, the wind can be your friend. In the beginning, your instructor will have you do your landing practice when the wind is coming straight down the runway. Here's why we, along with birds, always land into the wind.

If your plane can fly as slowly as 15mph, and the headwind is 10mph, you can land at 5mph with respect to the ground (ground speed). On the other hand, landing with the wind at your tail (a downwind landing) is a good way to break a plane because you will be landing at a much higher speed. If you can fly as slowly as 15mph, and you have a tailwind of 10mph, then you would be attempting to land at 25mph. The forces in a crash increase as a square of your velocity. In this example, landing downwind means that the ground speed is five times faster than if you were landing upwind,

and there would be 25 times the forces on the model if it crashes. You are also covering 5 times as much ground on your landing run, so there is more chance of running out of runway and hitting something.

Landing with the wind at some angle to the runway is called a "crosswind landing" and is much more difficult for the beginner. Basically, you should practice your landings when the conditions are right- when you can land upwind.

The Landing Pattern

The best way to land is the way full-scale planes/pilots do. They first fly at a medium altitude with the wind, and parallel to but not over the runway (the "downwind leg"). Then they make a 90° turn in the direction of the runway and fly until they are almost in line with the runway (the "base leg"). Next, they make a second 90° turn that results in the aircraft pointing into the wind and aimed directly at the runway – where you are said to be "on final" or "on final approach". In earlier training lessons you learned to fly straight lines and turn to a desired heading. This is where all of that training pays off.

Land Level

A plane won't make a fine landing unless its wings are level. In fact one of a pilots main tasks in the last phase of landing is to keep the wings level. However, as you know, turning a plane requires causing the plane to bank. Therefore you cannot be turning and landing at the same time. The plane must be going in a straight line and in the correct direction as you land. Getting ready for this is what the final approach is all about.

Many a landing (and many a plane) have been ruined because at the last second the pilot realized that their plane was not properly lined up with the runway and tried to turn. This banks the airplane so that when it does touch down you get a ground loop or worse. It is possible to make a turning approach and at the last second level the plane to make a perfect landing, but at the beginner stage that is more like playing 00 at roulette: the odds are against you and most of the time you loose.

Keeping the wings level is one main task on final. The other task is controlling how fast your plane is descending (your "rate of descent"). In a glider you do this with the elevator alone. This works for some powered planes as well, including most trainers. At the proper time in the approach you cut the planes power to idle (for a glow or gas model) or turn off the motor (on an electric) and the model basically becomes a glider. The plan is this –fly at a slow comfortable speed, controlling the speed with the elevator (push on the stick to go faster and pull on the stick to go slower).

The Flare

The manoeuvre you use to flatten the planes downward path so that it is traveling almost parallel to the ground is called the "flare". When you are just a few wheel widths above the ground you are ready to flare. Slowly feed in up elevator by gently pulling back on the stick. This will further slow the plane. Do this reeeeally slooooooowly, or the plane will balloon up. The ideal is to run out of flying speed and lift and touch down all at the same moment. Getting this just right consistently takes a great deal of practice. Common mistakes include: slowing down too early (you want to keep up some speed and therefore control until you are nearly on the ground) and flaring too high, which can cause a stall and a crash; flaring too much which can cause the plane to balloon upwards (the only cure for this is a brief push forward on the stick with enough control that you don't make the plane dive into the ground): and flaring too late, which will result in a hard landing.

How do you know how slow you can fly comfortably? By practicing your landings at altitude, on an imaginary runway in the sky. It's all part of getting to know your airplane. Getting a feel for when it's about to become too slow to stay aloft. If your plane does get too slow at altitude, all that will happen is that it will enter a stall, and a bit of forward stick will get it flying again.

Using Throttle in Landing

Some planes are easier to land with the motor at low throttle, rather than off or at idle. Your instructor will help you with this by flight testing your model and figuring out the best way to land before you start practicing. Some fliers like to come in "long and low", using throttle to keep the plane flying level until they reach the runway, although that is more a mark of a bad approach than good technique. Just how much you use throttle during a landing can also depend very much on the kind of plane you are flying.

The Go Around and the Touch-and-Go

A good use of throttle is to "go around" or decide not to land, usually because you are too high or not on the right line in your approach. This decision is best made early, as there is a delay from the time you push on the throttle to when the plane starts to climb (except for very high powered models). If you wait too long the plane may land anyway, but with too much forward momentum, which can cause the plane to crash.

Pilots have used the touch-and-go for years as a training manoeuvre. This is where you touch the wheels on the ground as if landing, and before the plane has rolled to a stop, you smoothly apply full throttle, and take off again. Practicing touch-and-goes is a great way to learn both landings and of course takeoffs. Keep practicing!

Note: "BEGINNER BASICS" has been adapted from "Fly RC Magazine" series "Basic Training" by Jef Raskin, issues 2,3 & 6, and from "Model Airplane News Magazine, article "Mastering the Takeoff" by David Scott.

KRCM Student Progress Card & Training Record

Student:_____ **MAAC No.**_____

Rating: 1 – discussion and demo, 2, - attempted, 3 – competent

Instructor																	
MAAC & Club Safety Rules																	
Field Rules & etiquette																	
Aircraft Preflight inspection & Radio Range check																	
Pit/ Startup procedures/ Engine tuning																	
Taxi – Slow speed / cross wind																	
Taxi –High speed / throttle control																	
Level flight & gentle turns maintaining altitude																	
Trim flight & neutralizing																	
Ascending & descending turns																	
Slow flight																	
Figure 8's (Turn control)																	
Steep turns																	
Stall & Recovery																	
Spiral dive & Recovery																	
Inside loops																	
Horizontal rolls																	
Take off & Climb-out																	
Rectangular pattern (high)																	
Procedure turn																	
Tracking over runway @ 150', 75' 25'																	
Approach pattern practice																	
Landing approach with Fly through @ ≤10'																	
Landing																	
Cross-wind (discussion)																	
Wind Gradient & Ground effect (discussion)																	

Instructor																	
MAAC & Club Safety Rules																	
Field Rules & etiquette																	
Aircraft Preflight inspection & Radio Range check																	
Pit/ Startup procedures/ Engine tuning																	
Taxi – Slow speed / cross wind																	
Taxi –High speed / throttle control																	
Level flight & gentle turns maintaining altitude																	
Trim flight & neutralizing																	
Ascending & descending turns																	
Slow flight																	
Figure 8's (Turn control)																	
Steep turns																	
Stall & Recovery																	
Spiral dive & Recovery																	
Inside loops																	
Horizontal rolls																	
Take off & Climb-out																	
Rectangular pattern (high)																	
Tracking over runway @ 150', 75' 25'																	
Procedure turn																	
Approach pattern practice																	
Landing approach with Fly through @ ≤10'																	
Landing																	
Cross-wind (discussion)																	
Wind Gradient & Ground effect (discussion)																	

Recommended for KRCM "WINGS" Test: Instructor:_____ **Date:**_____

PRE-FLIGHT CHECK SHEET (BEFORE 1st FLIGHT OF THE DAY):

BEFORE FUELING:

- With everything turned off, check for loose components
- Check for free movement of CLUNK in fuel tank
- Check to ensure all servo output arms are secured with screws and all clevises are properly closed
- Check control linkages/ surfaces for excess play
- Check onboard batteries (flight pack) for full charge
- Ensure wing mounting is secure and properly aligned
- Check to ensure balance (C of G) of aircraft is correct

AFTER FUELING:

- Check Frequency Board to ensure your transmitter frequency is clear
- If clear, remove transmitter from Transmitter Impound and place your Frequency pin on Frequency board
- Extend transmitter antenna completely
- Turn on transmitter and check meter/lights to ensure full charge
- Turn on receiver and check all control surfaces for smooth movement
- Ensure control surfaces move in correct directions
- If Electric powered, restrain model and check for smooth vibration free operation of motor/gear box assembly
- If glow/gas powered, restrain model, start and check for vibration free operation and reliable operation and throttle transition
- Range check transmitter (antenna collapsed) with engine/ motor off (72 MHz)
- Range check transmitter (antenna collapsed) with model restrained and engine/ motor running (72 MHz)
- For spread spectrum systems consult manual for range checking procedure

---

BEFORE EACH FLIGHT:

- If glow/gas powered, ensure fuel tank is full
- Check onboard batteries (flight pack) for safe charge level
- Check Frequency Board to ensure your transmitter frequency is clear
- If clear, place your Frequency pin on board (no frequency pin required for spread spectrum systems)
- Extend transmitter antenna completely
- Turn on transmitter and check meter/lights to ensure safe charge level
- Turn on receiver and check all control surfaces for smooth movement

FOLLOWING EACH FLIGHT (after shutting down aircraft):

- Turn off receiver
- Turn off transmitter and collapse antenna completely
- Remove your Frequency pin from frequency board
- Place transmitter in Transmitter Impound.

KRCM FLIGHT TESTING

TESTING DETAILS, R/C GROUND SCHOOL

Prerequisite: MAAC Membership
KRCM Membership

Elements Covered:

- **Understanding of:**
  MAAC Safety Code
  Club Rules and Etiquette
  Frequency Control

- **Preflight Inspection:**
  Prior to any days flying, perform an examination of the airframe, engine, radio and control linkage installation.

- **Radio Range Check:**
  Prior to any days flying, check battery levels and range test the radio system consistent with the manufacturers instruction manual.

- **Start and Tune Engine:**
  Gain the ability to safely start and tune an engine for reliable operation.

- **Taxiing of Aircraft:**
  Learn to perform basic ground handling and low speed taxi techniques in calm and windy conditions.

_____
Student (Print)

_____
MAAC #

R/C GROUND SCHOOL COMPLETED

_____
Instructor (Print)

_____ _____
MAAC # Date

TESTING DETAILS, R/C PILOT RATING (WINGS)

This is the final test in student training which once completed gives full "R/C Pilot" status to the graduate with license to fly and further their flying skills without supervision.

Prerequisite: R/C Ground School
Instructor Recommendation

Wings Test Elements:

- Written Test: See page 20
- Flight Test: (see page 21 for diagrams of aerobatic manoeuvres)

  Controlled high speed taxi
  Controlled take-off with rectangular pattern to altitude*
  Straight and level flight for 300 feet*
  Procedure turn*
  Straight flight back
  Horizontal figure 8 maintaining altitude
  Inside loop or horizontal roll
  Up-wind rectangular circuit with landing approach and overshoot at 10 ft.
  Downwind rectangular circuit with landing approach and overshoot at 10 ft.
  Climb to stall, power off (at high idle) landing approach and overshoot at 10 ft & power up
  Join circuit on downwind leg and execute controlled landing – full stop with power on*

  *Manoeuvre to be executed from pilots right *and* left.

_____
Student (Print)

_____
MAAC #

R/C PILOT (WINGS) RATING ACHIEVED

_____
Instructor (Print)

_____ _____
MAAC # Date

_____
Witness (Print)

TESTING DETAILS, R/C INSTRUCTOR RATING

Pilots completing this test will receive "R/C Instructor" status authorizing them to train student R/C pilots.

Prerequisite: R/C Pilot Rating

Instructor Test Elements:

- Written test: See page 20
- Instructors Flight Test: (see page 21 for diagrams of aerobatic manoeuvres)

  Take off *
  Reverse Cuban 8
  Humpty Bump, Pull-Pull-Pull, ½ roll down
  2 Point Roll (thru centre)
  Stall Turn*
  3 Inside Loops at centre
  Half Reverse Cuban 8
  2 horizontal Rolls thru centre (alternating rotation)
  Straight Inverted flight for 300ft in line with runway maintaining altitude.*
  Immelmann Turn
  Split S
  Down-wind Landing – full stop with power on
  Climb to stall, power off (dead stick) approach and landing.

  *Manoeuvre to be executed in both upwind and downwind direction.

_____
Pilot (Print)

_____
MAAC #

R/C INSTRUCTOR RATING ACHIEVED

_____
Instructor (Print)

_____ _____
MAAC # Date

_____
Witness (Print)

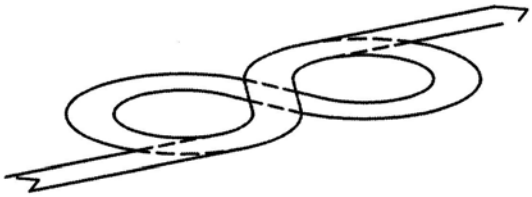
K.R.C.M. Wings Written Test

Check off the correct answer to the following true or false questions.

		True	False
1.	It is not necessary to use the Frequency Board when 5 or less fliers are present.		
2.	During normal flying times 5 aircraft are permitted in the air at one time.		
3.	Every transmitter unless spread spectrum shall be placed in the impound upon arrival at the field.		
4.	No flying before 8:00a.m. on weekdays or 9:00a.m. on weekends		
5.	Flying is not permitted over the pit area except for landing approach.		
6.	The only time aircraft are allowed to fly over the pit area is during fun flies		
7.	Full throttle engine noise level is to meet MAAC noise limits.		
8.	Every member must have earned their wings rating to fly alone at the field.		
9.	Taxiing in the pits is not permitted.		
10.	At medium throttle settings it is safe to adjust the high-speed throttle mixture from in front of the engine.		
11.	Care must be taken to keep spectators away from the area in front of the prop, or in line with the propeller arc when running up a motor.		
12.	Always fully charge your batteries the night before flying.		
13.	It is wise to check your airborne battery pack before each flight.		
14.	Sometimes it is O.K. to turn on your transmitter without checking the frequency board.		
15.	If a transmitter is left turned on in a car it won't bother any ones airplane because it is shielded by the metal car body.		
16.	If one person without MAAC, (or AMA) registration is knowingly allowed to fly at the club field it will void the MAAC Field (Land Owners) policy.		
17.	The "Flight Line" is an extension of the "safety fence" edge of the runway that extends from horizon to horizon.		
18.	In other than calm conditions the take-off run should always be into the wind.		
19.	The ground speed of an aircraft will change when turning upwind or downwind.		
20.	Taking off into the wind gives an aircraft the advantage of maximum airspeed with minimum ground speed.		

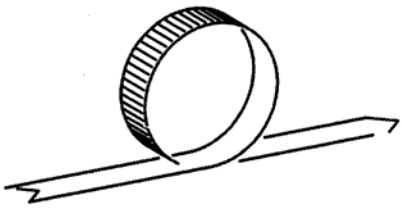
AEROBATIC MANOEUVRES USED IN FLIGHT TESTING

PILOT:



HORIZONTAL FIGURE- 8

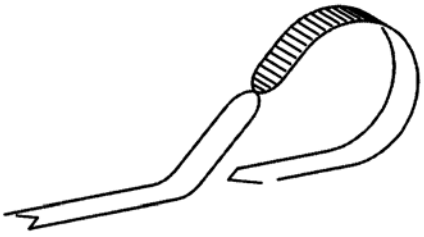
HORIZONTAL ROLL



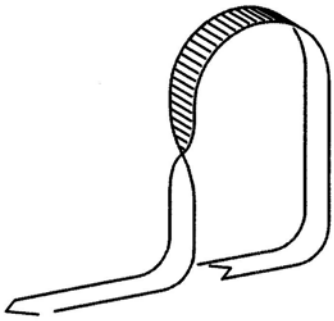
INSIDE LOOP

PROCEDURE TURN

INSTRUCTOR:

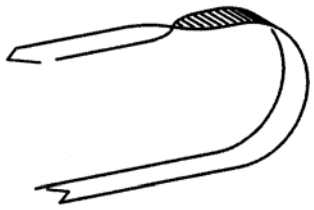


HALF REVERSE CUBAN - 8

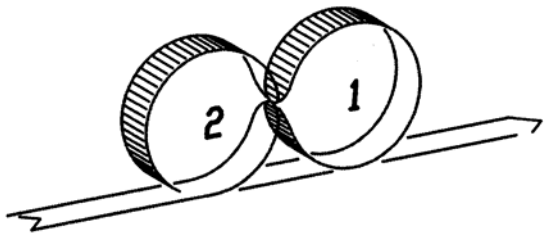


HUMPTY-BUMP (PULL)
WITH 1/4 ROLL DOWN

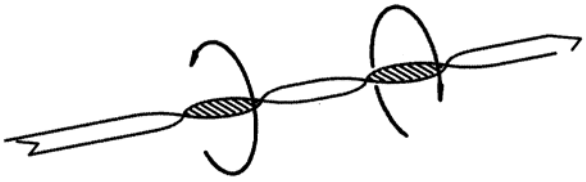
INSTRUCTOR – Continued**:**



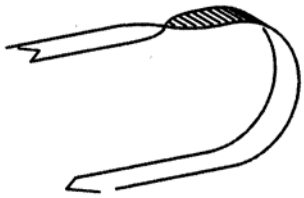
IMMELMANN TURN



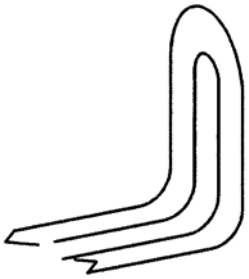
REVERSE CUBAN – 8



2 HORIZONTAL ROLLS
ALTERNATING ROTATION



SPLIT 'S'



STALL TURN

HELPFUL R/C TERMS AND DEFINITIONS

3D
A style of flying fixed wing R/C aircraft that involves manoeuvres where the plane hovers and flies below its minimum stalling speed with the plane depending on the power of its motor rather than on lift from its wings to keep it in the air.

Academy of Model Aeronautics (AMA)
The leading organization in the United States for model aircraft builders and flyers. It represents the United States to international organizations and it lobbies for model aircraft interests with local, state, and federal governments and agencies. It also oversees contest regulations, produces and distributes a magazine and provides insurance protection for most model airplane related risks.

Active runway
The runway currently in use for take-offs and landings, determined by the direction of the wind.

Adverse yaw
On some aircraft, attempting to use the ailerons to bank in one direction – say to the left as in beginning a left turn – causes the aircraft to yaw in the other direction, in this case to the right. The primary cure is to use rudder to counteract the yaw. Another fix is to design the ailerons to move more up than down.

Aerobatics
Precision manoeuvres such as loops, barrel rolls, stalls, spins, Cuban eights etc.

Aileron
A control surface, usually attached to or part of the trailing edge of the wing, used to cause the plane to roll. With standard ailerons, raising the left aileron and simultaneously lowering the right aileron will result in a bank to the left.

Airfoil
A vertical cross-section of the wing, i.e., what you would see if the wing were cut with a vertical knife while the plane was lying straight and level and you looked at the wing from where the wing tip used to be. The shape of the airfoil can have significant influence on the flying qualities of an airplane.

Airspeed
The rate at which an aircraft moves through the surrounding air.

Angle of attack
If you picture a wing as a flat sheet of material, this refers to the angle of that sheet and a line parallel to the oncoming wind.

Angle of incidence
If you picture a wing as a flat sheet of material, it is the angle between the wing and the centreline of the fuselage.

ARF (Almost Ready to Fly)
A model airplane kit that requires only a few hours of assembly before it is ready to fly. Typically. Some preparation of the parts is required: glue may have to be used, radio equipment must be installed, and the manufacturer may not have installed the motor or engine and fuel system. Many accessories needed for flight such as wheels and propellers are usually included. The transmitter is usually not included as part of the kit.

Altitude
In model aircraft sense, this is the height of the airplane over the field.

Attitude
This refers to the orientation of the aircraft in flight.

TERMS & DEFINITIONS cont'd

Bank
The angle of an airplane's wings with respect to the horizon when in rotation about its longitudinal axis. Pilots control bank with ailerons. Aircraft turn principally because banking the wings creates a horizontal component of lift.
The bank is measured in number of degrees i.e. 10°, 20°, 30°.

BEC (Battery Eliminator Circuit)
This is either a stand-alone electronic circuit or is part of an ESC.
In either case it eliminates the need for a separate battery (in electric powered models) to power the receiver and servos by producing the correct voltage to operate them.

Brushed motor
The least expensive form of electric motor used in model airplane propulsion. If an electric motor is not designated "brushless" then it is almost certainly a brushed motor.

Brushes
A part of brushed electric motors, they convey electric current to the rotating element (armature) and also mechanically effect the switching on and off of the armature's wire-coil electromagnets, which in turn, cause the armature to rotate.

Brushless motor
A form of electric motor that does not contain brushes. They are favored because of their greater power-to-weight ratio, longevity, and higher efficiency than brushed motors. Armature wire-coil electromagnets are fixed and are energized in sequence, causing magnets fixed to the prop shaft to spin the shaft.

Built-up
A style of model construction where a framework is made of many parts, usually of balsa and plywood. A thin plastic film or fabric covering material that is stretched over the framework creates the external shape of a built-up model.

CA (Cyanoacrylate)
The principal ingredient in a kind of fast setting glue widely used in the construction of model airplanes.

Centre of gravity (C of G)
The point at which an aircraft would balance level if suspended by a cable.

Clevis
A type of hinge made of plastic or metal, which is used to attach a pushrod to a control horn or to a servo arm. Typically, it screws onto the pushrod and clips on to the control horn to provide an easily adjustable linkage. Adjustment is done by unclipping the clevis from the control horn and screwing or unscrewing it on the pushrod to change the length of the assembly.

Clunk
A weighted end on the fuel pickup line in a fuel tank. It should always move freely inside the tank. You should be able to hear it making a clunking sound when you shake the aircraft.

Control horn
A lever firmly attached to a control surface and usually perpendicular to it that allows a pushrod or cable to move the surface.

Control surface
Any external moveable part of an aircraft designed to help it change orientation or speed, not including the propeller. The most commonly used control surfaces are ailerons, elevator, rudder, flaps and spoilers.

Crab angle
The angle between an aircraft heading and ground track. The amount of crosswind and the speed of the aircraft determine this angle. The stronger the crosswind, and the lower the airspeed, the greater the crab angle.

TERMS & DEFINITIONS cont'd

Dihedral
The angle at which the wings of an aircraft tilt upward from the fuselage forming a V shape as seen from a head-on viewpoint. Dihedral increases the stability along the longitudinal roll axis of an aircraft. It tends to level the wings after an aircraft is established in a shallow bank.

Dead stick
A condition or indication by a pilot that he has to make a landing without the aid of engine power. He normally has the right of way and other pilots that are flying will clear the area for him.

Elevator
A moveable control surface located normally at the tail of an aircraft. As the name implies, the elevator causes the airplane to climb or descend although it actually controls only the aircraft pitch angle above or below the horizon.

Empennage
The tail assembly of an aircraft. This includes the vertical stabilizer, rudder, horizontal stabilizer and elevator.

ESC (Electronic Speed Control)
Used in electric-powered models, this plugs into your receiver and connects it to both the battery and the motor, allowing you to control motor speed from your transmitter. An ESC often includes a BEC.

Expanded scale Voltmeter
A kind of voltmeter designed to measure a specific, narrow range of voltage.

Fixed-wing
An aircraft that derives the majority of its lift from wings that do not flap or rotate.

Flaps
A hinged section at the inboard trailing edge of some aircraft wings that can be extended downward during takeoff and landing to effectively increase the wings lift and drag. When partially extended, flaps add lift by increasing chamber (or curvature) of the wing and because they extend downward, also increase the drag, enabling the aircraft to descend steeply without building up airspeed.

Flare
To level off and establish the correct landing attitude just above the runway prior to landing.

Float
When an aircraft seems to want to keep on flying after the flare and does not want to descend, it is said to be floating, or is a floater.

Fuselage
The body of an aircraft that holds the crew or cargo. It comes from the French word "Fusele" (spindle shaped)

Flutter
Vibration of a control surface due to over-speed of the aircraft or perhaps a design or construction fault, i.e. a loose control hinge. When you here flutter (usually indicated as a sudden brief roar from the airplane in flight) you must slow down, land and inspect the aircraft for damage.

Glide Ratio
Ratio of horizontal distance traveled per unit of descent, i.e. a sail plane with a 60 to 1 glide ratio travels 60 meters forward for every one meter it descends.

Glow plug
The igniter in a 2 or 4 cycle glow engine that ensures the compressed fuel/air mixture will ignite. Unlike a spark plug, a glow plug remains glowing red hot without an external power source all the time that the engine is running.

Ground loop
An aggravated, uncontrolled tight turn on the ground of more than 90° when the aircraft is taxiing or has just touched down.

TERMS & DEFINITIONS cont'd

Heading
The direction in which an aircraft is pointed, usually referenced to magnetic north

Horizontal stabilizer
An airfoil that creates a down force on the tail to balance the upward force generated by the wing

Lift
The upward force produced by an airfoil such as a wing. One of the four fundamental forces in flight. Lift is opposed by weight.

Lithium Batteries
A kind of battery that, for a given capacity, weighs significantly less than alkaline, NiMH, or NiCd batteries.

Lithium-Polymer batteries (Li-Poly)
A kind of rechargeable lithium battery that can supply higher currents than other lithium-based batteries.

Load factor
The ratio between the total weight supported by an aircraft structure and the actual weight of the aircraft and its contents. Also known as "Gs", in steady flight the load factor is 1. When it turns or pulls up, the load factor increases. I.e. an aircraft in a 60° bank experiences a load factor of 2. In such a turn the structure must support twice the aircrafts weight.

Longitudinal axis
An imaginary line running from nose to tail of an aircraft. It is one of the three axes of an aircraft. Rotation of an aircraft about the longitudinal axis is called a roll and it is controlled with the ailerons.

Loop
An aerobatic manoeuvre in which an aircraft flies in a complete vertical circle.

Muffler
A device used primarily on glow engines and other internal combustion model aircraft engines to reduce the noise of their exhaust. It is recommended that mufflers always be used to protect the flier from hearing damage, the neighbors from annoyance, and the club from loosing its field.

Model Aeronautics Association of Canada (MAAC)
The Canadian organization for model aircraft builders and flyers. It represents Canada to international organizations and it lobbies for model aircraft interests with local, provincial, and federal governments and agencies. It also oversees contest regulations, produces and distributes a magazine and provides insurance protection for most model airplane related risks.

Nickel-cadmium batteries (NiCd)
A kind of rechargeable battery often used to power transmitters, receiver packs in R/C airplanes and as motor batteries. They are becoming less popular in many applications and are being replaced by the lighter NiMH batteries and by still lighter Lithium based batteries. Nickel-cadmium batteries contain toxic metals and must be disposed of as hazardous waste.

Nickel-metal hydride batteries (NiMH)
A kind of rechargeable battery often used to power transmitters, receiver packs in R/C airplanes and as motor batteries.

Parasitic drag
Resistance to an airplanes forward motion in the air, composed of drag due to landing gear, shape of the wing and fuselage, flying wires etc.

Pits
The area designated for pilots to park and prepare their airplanes for flight and return to when finished flying. For pilots and helpers only, when your flying is finished you should leave the pit area.

Pitch
Movement of an airplane about its lateral axis (nose up or nose down) or the angle of an aircraft nose above or below the horizon. The right stick on your transmitter controls pitch. Pulling back raises the nose, and pushing forward lowers the nose.

Radial engine (Radial)
A kind of internal combustion engine in which the cylinders are arranged like the spokes of a wheel.

RTF (Ready-To-Fly)
A model airplane kit that requires only minimal assembly before it can be flown. To be classified RTF, the motor (if there is a motor), radio equipment and all accessories should be installed by the manufacturer. It should require only attachment of the wing and possibly the empennage with fasteners that take only a few minutes to install, such as bolts or rubber bands. RTF kits usually include the transmitter. You will have to charge any rechargeable batteries prior to flight.

Roll
Rotation of an aircraft about its longitudinal axis. The pilot controls roll or bank of the plane with ailerons. Also a roll is an aerobatic manoeuvre in which an aircraft rotates completely around its longitudinal axis.

Rudder
A moveable control surface mounted on an aircrafts vertical stabilizer. The rudder causes the aircraft to rotate about its vertical or yaw axis. The left stick on the transmitter controls rudder. Left turns the aircraft to the left, right turns the aircraft to the right.

Servos
Small electric motor driven devices that move the control surfaces in a model aircraft.

Spin
A steep spiraling decent during which an aircraft wing is stalled and the aircraft is rotating rapidly to the left or right.

Stall
A condition of flight where a lifting surface, such as a wing, stops producing a useful amount of lift and the aircraft starts to fall. Stalls always result from attempting to operate the surface at too high an angle of attack.

Stalling speed
Because there is no particular speed at which a plane will stall, this term is often misused. However there is a minimum stalling speed below which a plane cannot fly using only the lift from its wings. Attempting to fly straight and level below that speed will cause the aircraft to stall.

Takeoff roll
The portion of the takeoff during which the aircraft accelerates on the ground to achieve flying speed.

Taxi
To move the aircraft around in a controlled manner on the ground using its own power.

Thrust
The rearward force generated by an aircrafts propeller or jet exhaust that causes the aircraft to move forward. One of the four forces of flight, thrust is opposed by drag.

Traffic pattern
The traffic flow for aircraft landing or taking off from the active runway. Also called the circuit. A complete pattern includes an upwind leg, a downwind leg, a base leg, and a final leg.

Wing loading
A measure of how much weight a given area of the wing is carrying. The wing loading is given in various units, such as ounces per square foot, grams per square meter, or other. The lower the wing loading, the slower an airplane can fly.