



Model Aeronautics Association of Canada

Aircraft - Quadcopter/Helicopter

Flight Training Courses



Brockville Model Aeronautics Club

Name: _____

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Introduction

Welcome to the Model Aeronautics Association of Canada training program. This program will teach you the basics of flying radio controlled model aircraft and/or quadcopter/helicopter and is MAAC's best effort to assist you in the process.

There is nothing in this program that guarantees that you will become a successful R/C pilot. Nor, are there any expectations on how long it will take to complete this program. Like everything else, your success will all depend on your willingness to spend the time and practice.

This program is a series of lessons designed to build upon previous lessons to develop the skill and confidence, which will allow you to thoroughly enjoy your new hobby.

Upon completion of these lessons, you will be ready to take your "A Wings" test. This test is designed such that you can demonstrate to the club's satisfaction that you are able to control your plane safely. After passing this test, you will be allowed to fly without an instructor present.

Hopefully, the completion of your "A Wings" is only the beginning of your learning and will serve as an incentive to get out and fly. Where you go from here is up to you. Good Luck!

Reminder

You must learn to crawl before walking and walk before running. For this reason, MAAC strongly recommends that you start your flight instruction on a trainer and then evolve to more advanced planes.

A trainer will enable you to learn easier and it will simplify your instructor's roles. Your aircraft quadcopter/helicopter will last you longer with less chance of a serious crash.

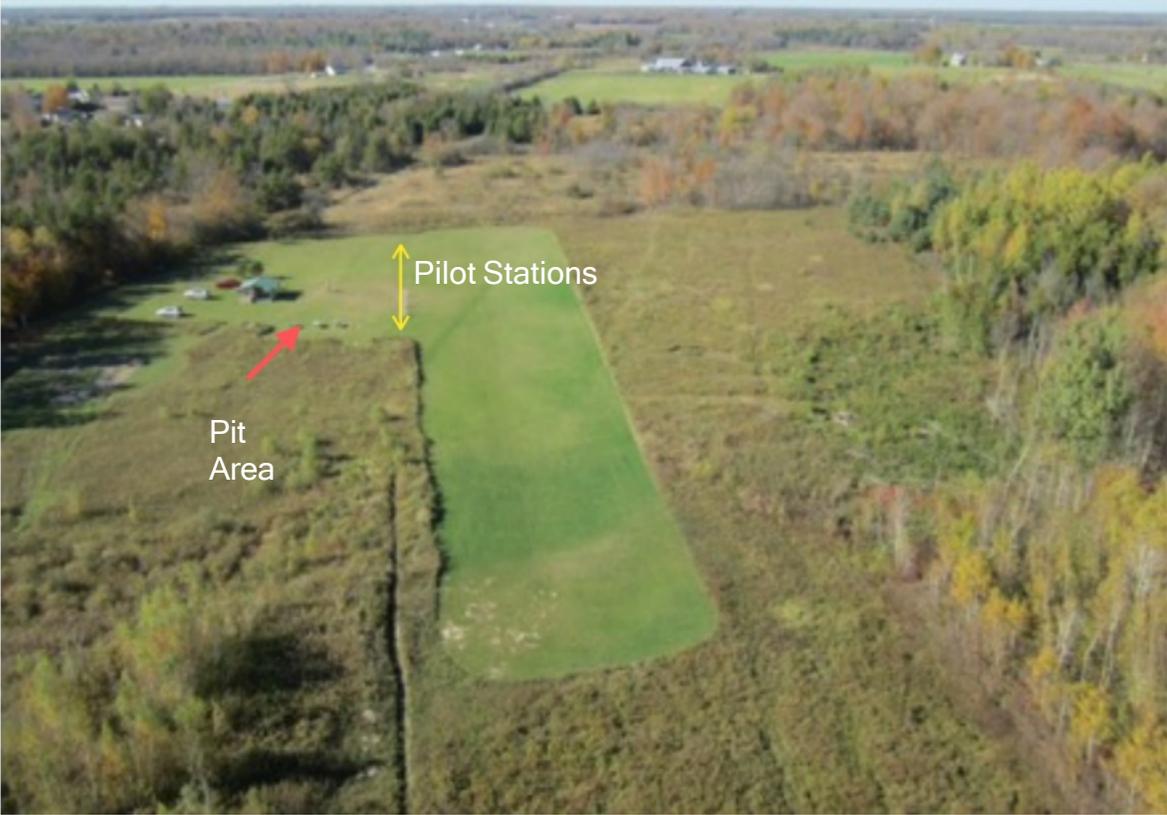
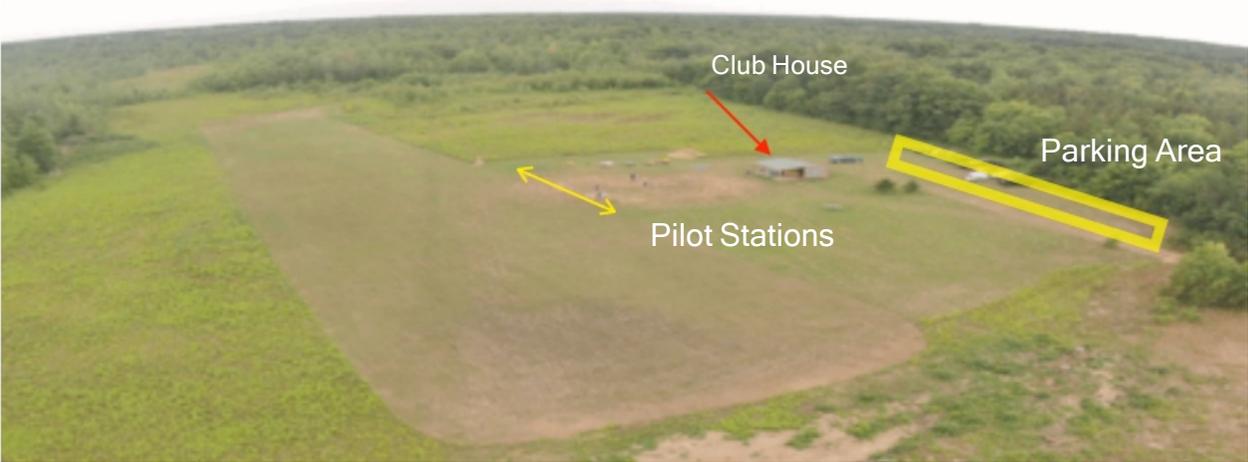
Remember, even the jet fighter pilots learn to fly in trainers before advancing to jets. So leave the scale planes until after you have learned to fly.

SAFETY FIRST, FUN SECOND

The Buddy Box Training System

Buddy box or buddy boxing is a phrase referring to two R/C aircraft radio systems joined together for pilot training purposes. This training system is universal among the six major R/C radio manufacturers (Spektrum, Futaba, JR, Hitec, Sanwa/Airtronics and KO Propo) which means that transmitters do not have to be the same brand in order to be joined via an umbilical cable. There are, however, two different types of DIN or PIN cable connectors used for the purpose and the two are incompatible. Therefore, both transmitters must have the same type of receptacle in order to operate together. Buddy boxing is accomplished by joining the student and master transmitters via the aforementioned cable and making sure that the servo reversing switches and trims are set identical on both. The student is given control of the aircraft via a long-handled, spring-loaded switch on the top left corner of most transmitters located on the master transmitter, normally held by the instructor. When the switch is pulled forward and held on by the instructor's left index finger, control of the aircraft is at the student's transmitter. Should the instructor judge that the student is encountering difficulty in flight, control is transferred to the master transmitter merely by releasing the switch. The two transmitters need not be on the same frequency. The master transmitter is the one that actually flies the plane; buddy boxing turns the student transmitter into a "dummy" remote control of the master. The student transmitter is operated with power switched off as power for both is provided by the master. The student transmitter will power up via the umbilical despite being switched off.

Airfield Layout



Lesson 1: Instructor - Student Responsibilities

You are about to embark upon the Primary Flight Training Course of Model Aeronautics Association of Canada.

Your instructor has met the qualifications of MAAC. He has accepted the responsibility to teach you to become a responsible and safe pilot who can be proud of his flying abilities and an enjoyable fellow club member. If the instructor ignores his responsibility, you may be a pilot who is a hazard to yourself and other persons wherever you fly. You may seek training assistance from any other club instructor. However you should look to your instructor as your primary source of assistance.

You may not take your "A" Wings test until your instructor, or the Chief Instructor has signed below indicating that you have completed the elements of your primary training program and you are ready for your "A" Level Wings test. You must pass your "A" Wings test before you are allowed to fly at the club field without supervision.

As a student, you have shown the diligence to build your first trainer, seek out the Local Club and join this training program. It is your responsibility to apply yourself diligently to learn and apply the material presented in this course. By doing so, you will learn the minimum amount of information and skills to allow you to safely enjoy radio controlled flight.

Each section of this course deals with a different aspect of flying a radio controlled model aircraft, quadcopter/helicopter. Your instructor will explain and demonstrate each element of each lesson. Where applicable he will demonstrate the element in the air using your aircraft, quadcopter/helicopter. You will have opportunities to perform each element and receive an evaluation from your instructor. In each lesson there is a space on the Student Log Sheet for a club instructor to check mark and "initial" that the material has been reviewed with you. It is important that you keep your training program with you at all times and ensure that instructors check mark and initial elements after they have been covered. Other club instructors will use the initials/check marks and notes to assist you when your instructor is absent.

I recommend that _____ take the MAAC "A" Wings test.

Instructor

Lesson 2: Aircraft Familiarization

Purpose:

To teach the student how to properly pre-flight his model.

Objective:

At the completion of the lesson the student should be able to inspect his model and identify any deficiencies that could cause a malfunction or safety hazard. He will be able to start and stop the engine(s) properly.

Elements:

Inspection of aircraft structure, centre of gravity and longitudinal balance.

Inspection of radio installation.

Inspection of all linkages and control surfaces including controls for proper throw, direction and freedom of movement.

Engine(s), fuel system installation and security, battery installation and security, including propellers

Instructor's demonstration of safe powering up, initializing, syncing the model to the transmitter.

Instructor's demonstration of safe engine starting procedure.

Student starts and adjusts engine (gas/glow).

Instructor teaches how to identify rich and lean engine settings (gas/glow).

Instructor teaches student how to adjust the idle mixture to get optimum performance from the type of engine (gas/glow).

Lesson 2a: Quadcopter/Helicopter Familiarization

Elements:

Inspection of quadcopter/helicopter structure.

Inspection of flight control linkages.

Inspection of radio installation, flight controls.

Engine(s), battery installation and security, including propellers, rotors.

Proper engine(s) starting procedure.

Instructor's demonstration of safe powering up, initializing, syncing the model to the transmitter.

Evaluation:

Student should be able to perform lesson objectives.

THIS LESSON SHOULD BE REVIEWED AS NECESSARY AT THE START OF ALL LESSONS IN THE PRIMARY TRAINING COURSE.

Lesson 3: Radio and Field Procedures

Purpose:

To familiarize the student with all safety aspects associated with model aircraft, quadcopter/helicopter both on the ground and in the air.

Objective:

At the completion of the lesson the student will be aware of all MAAC and MAAC safety rules and field procedures. The student shall also be able to perform a pre-flying session and pre-flight check list.

Elements:

MAAC SAFETY AND FIELD RULES

Current MAAC membership card (or photocopy) to be prominently displayed on transmitter. MAAC insurance is mandatory to fly.

“A” Wings qualification before solo flying.

No taxiing in the pit area. Engines off when clear of runway after landing.

There will be absolutely **NO FLYING**:

- 1 Over any general area where field workers or equipment are active.
- 2 Behind the flight line no matter how far away from the runway. No flying over the pits, car parking.

Note: The presence of active field workers could easily require that no flying take place at all!

MAAC noise limits apply measured at 3 meters (10 feet) with full throttle. As of April 1999,

MAAC noise guide lines are:

- ◆ 98 dba @ 3 meters on hard surface
- ◆ 96 dba @ 3 meters on soft surface

All aircraft, quadcopter/helicopters shall be flown in a safe manner with consideration to others at the field. Aircraft, quadcopter/helicopters shall be flown in a fashion so as to minimize the noise footprint as perceived in adjacent areas.

Unaccompanied spectators (any observer who is not a club member unless invited) and animals must stay out of the pit area.

No breaking in engines in the pit area while other members are flying.

Every transmitter shall display the appropriate MAAC frequency flag at all times, if using 72 mhz radios.

No flying before 9:00 am Monday to Saturday and 10:00 am on Sunday. No flying time restrictions for electric aircraft.

Pilots shall announce their intention to land or take off.

Landing aircraft, quadcopter/helicopters shall have the “right of way”.

When in the pit area, aircraft shall be placed between the pilot and the runway to enhance awareness of the potential hazards posed by already flying aircraft.

Importance of MAAC and BMAC safety rules.

Enforcement of MAAC and BMAC safety rules

CHECK LIST

Before each flying session:

Transmitter battery has sufficient charge to be used for several flights

Aircraft, quadcopter/helicopter battery has been charged fully for intended flight(s)

Radio range check

Field workers. (presence of workers on field)

Before each flight:

Pre-Start

Fuel level - if using gas/glow engine

Receiver Battery - Voltage Check (gas/glow engine aircraft)

Radio Transmitter - Throttle at low setting, all switches at default settings

Radio Receiver – On

Throttle set

Start

Aircraft Secure, quadcopter/helicopter on level ground.

All Clear - Ahead (prop) and behind for aircraft, quadcopter/helicopter rotor(s) area clear. Run Up - Mixture Set (gas/glow engine testing to take place in testing area)

Idle - Reliable

Pre-Takeoff

Engine - Full power performance OK (fixed wing aircraft).

Controls - Free and movements correct

Rate Switches - Set

Trims - Set for Take-off

Timer - On

Field Workers - Checked (presence of any workers on the field)

Wind Sock - Checked

Runway - Clear

Announce intention to take off to other pilots on flight line.

Evaluation:

Student should be able to perform lesson objectives.

THIS LESSON SHOULD BE REVIEWED AS NECESSARY AT THE START OF ALL LESSONS IN THE PRIMARY TRAINING COURSE.

Lesson 4: Aircraft, Quadcopter/Helicopter Flight Familiarization

Purpose:

To introduce the student to controlling the model on the ground and in flight.

Objective:

To allow the student to become familiar with the model's controls and their use on the ground and in flight.

Elements:

On the ground, instructor familiarize the student with the controls (aileron/roll, elevator/pitch, rudder/yaw and throttle/power) and what kind of affect they will have on the aircraft, quadcopter/helicopter in flight.

The procedures used by the instructor using the "buddy box system" during the flight will be explained.

Note: As each instructor has different preferences concerning the process of using the buddy box system the student should ensure that he has reviewed and understands this procedure with new instructors.

Note: The student should learn to taxi, properly and safely, an aircraft from the start of the lessons and continue each and every subsequent lesson. The student learns controlling the aircraft on the ground, left side, right side orientation to oneself, providing sufficient runway for an emergency landing after takeoff, and because of the distance of the aircraft from the transmitters, a final radio range check.

Instructor flies and lands the student's model to evaluate its performance and airworthiness. This flight determines any changes necessary for control throws and trims. If the instructor can trim the aircraft, quadcopter/helicopter without landing, the use of a buddy box will continue.

With the assistance and direction of the instructor, the student will continue the process of becoming familiar with the controls.

The student will strive to keep the model controlled on the ground and in level flight following turning instructions given by the instructor.

When the student becomes tired or disoriented, ask the instructor to take the aircraft's controls using the buddy box system.

Note: It is the student's responsibility to allow aircraft, quadcopter/helicopter control back to the instructor to take corrective action to prevent a crash. Concentrate on flying within your ability. If you are disorientated or confused, allow the instructor to take control.

Evaluation:

The lesson is complete when the instructor has determined that the student is able to determine and execute proper control inputs to achieve a desired change in the model's attitude and direction on the runway. Proficiency and accurate control are not critical at this point.

Lesson 5: Aircraft Flight Maneuvers

Purpose:

To acquaint the student with the basic flight maneuvers.

Objective:

To teach the student to properly control the model during basic maneuvering.

Elements:

Level flight and trim. (Aileron, elevator, rudder, throttle)

Banked turns. (30 degrees)

Straight climbs. (add power and trim)

Climbing turns.

Gliding. (idle power and trim)

Disorientation. (silhouette and R+L reversal with inbound aircraft).

NOTE: An explanation of disorientation and the use of trim should proceed this lesson. The five maneuvers should be taught in the order listed, if possible.

Lesson 5a: Quadcopter/Helicopter Flight Maneuvers

Elements:

Hover - movements up and down, left and right, forward and back, left and right side views.

Level flight and trim. (Roll, pitch, yaw and power)

Straight climbs. (add power and trim)

Climbing turns.

Disorientation. (silhouette and R+L reversal with inbound drone/helicopter)

NOTE: An explanation of disorientation and the use of trim should proceed this lesson. The four maneuvers should be taught in the order listed, if possible.

Evaluation:

The lesson is complete when the student can perform the maneuvers without assistance from the instructor. Each maneuver should be done with a reasonable degree of accuracy. Example: turns should be fairly smooth and altitude maintained fairly well.

Lesson 6: Aircraft, Quadcopter/Helicopter Accuracy Maneuvers

Purpose:

To teach the student to perform the five basic maneuvers to a standard that will develop proficiency in their executions.

Objective:

To develop the skill and ability of the student to control the model in a specific manner.

Elements:

- Level flight, maintaining heading and altitude.
- Level flight at reduced power, maintaining heading, altitude and trim.
- Left and right turns to specific headings.
- Climbing turns to specific headings.
- Use of rudder/yaw for turns and maintaining straight flight at slower speeds.

NOTE: Keep in mind that the object is to develop skill and ability, AND an awareness of the model's position relative to directions and altitude. Don't insist on mechanical precision. Review disorientation with the student if necessary.

Evaluation:

The lesson is complete when the student can maneuver the model at the instructor's directions and can demonstrate an ability to control the model in an accurate manner.

Lesson 7: Aircraft, Quadcopter/Helicopter Orientation Maneuvers

Purpose:

To develop the judgment, skill and ability necessary for the student to control the model in any direction.

Objective:

To teach the student to control the model regardless of its heading or direction relative to himself.

Elements:

Figure 8 - the student must fly a figure 8 pattern consisting of two 360 degree turns, one left and one right. The student must place the maneuver in front of himself at a safe distance and altitude.

Rectangular Pattern - fly at a safe altitude, with the upwind leg crossing the landing area.

NOTE: The instructor will designate the size, altitude, and distance of both maneuvers.

Evaluation:

The lesson is complete when the student can fly the Figure 8 without experiencing disorientation and can fly both right and left rectangular patterns consistently and accurately.

Lesson 8: Aircraft Stalls

Purpose:

To develop the student's understanding of stalls, their cause and avoidance.

Objectives:

To teach the student to recognize and recover from stalls.

Elements:

Pre-flight discussion of stalls. What causes them and how to recover.

Practice of stalls by the student with power and without power.

Stalls in turns. (take-off, departure stalls)

NOTE: Take-off and departure stalls are almost impossible to set up with most trainers, but do occur in more advanced models. Therefore, it is recommended that power be reduced to about 1/3 throttle, and a steep climbing turn entered. The stall entry will look similar to a spin entry with the model rolling towards the high wing. During this lesson it should be emphasized to the student that a stall can occur at any airspeed and is a function of angle of attack.

Evaluation:

The lesson is complete when the student understands the cause of stalls and has demonstrated the lesson elements and proper recovery.

Lesson 9: Aircraft Take-Off

Purpose:

To teach the student how to make a normal take-off.

Objective:

To teach the student how to control the model during take-off.

Elements:

Discussion of the effects of torque during take-off and initial climb.

Use of rudder.

Use of throttle.

Use of elevator.

Student makes a normal take-off INTO wind.

Evaluation:

The lesson is complete when the student has successfully taken off and established a normal climb with adequate airspeed. He must also demonstrate adequate directional control during take-off.

Lesson 10: Aircraft Approaches to Landing

Purpose:

To prepare the student for his first landing.

Objective:

To develop the student's ability to visualize and perform a stable and controlled approach and landing.

Elements:

Review of Lesson 5 Flight Maneuvers (idle power and trim), Lesson 6 Accuracy Maneuvers (level flight at reduced power, maintaining heading, altitude and trim, use of rudder/yaw for turns and maintaining straight flight at slower speeds).

Discussion of proper landing techniques.

Student flies a rectangular pattern as in Lesson 7 Orientation Maneuvers, but reduces power and establishes an appropriate glide on the base leg and continues the approach until over the end of the runway, at which point he is to add power and go around. The minimum altitude at the end of the maneuver should be no less than 6.5 meters.

As the student becomes comfortable with the maneuver, the altitude should be lowered until the instructor is confident that the model can glide to the runway with the power off (idle).

Landing. At this point the instructor will tell the student to continue the approach and land.

NOTE: The chances of a successful landing will be increased if the instructor reminds the student to keep the power at idle. It may be necessary to talk to the student through the flare and touchdown.

Evaluation:

The lesson is complete and the student can advance to supervised solo flight after the student has successfully landed the model several times and is comfortable with the maneuver.

Lesson 11: Aircraft Emergency Procedures

Purpose:

To prepare the student for the unexpected.

Objective:

To acquaint the student with safe procedures to be used in emergencies.

Elements:

Discussion of possible in-flight problems and how to deal with them.

Unusual attitude training (optional): a) loops; b) rolls.

Distance flying and orientation.

Student performs dead stick landing.

Cross wind take-off and landings (optional).

Lesson 11a: Quadcopter/Helicopter Emergency Procedures

Elements:

Discussion of possible in-flight problems and how to deal with them.

Unusual attitude training.

Distance flying and orientation.

Vortex ring state. Discussion of problem descending too quickly and ways to minimize and correct.

Discussion of safe rapid way to descend if necessary flying a forward or sideways flight, corkscrewing pattern.

Evaluation:

The elements of this lesson are only suggestions and there is no minimum performance requirement. The objective is to provide the student with insights that will assist him in safely dealing with the unexpected. Experience will teach him the rest.

"IF THE STUDENT DOESN'T LEARN, THE INSTRUCTOR HASN'T TAUGHT."

Lesson 12: Solo Flight

Purpose:

Confidence building exercise.

Objective:

The student is to perform a solo flight demonstrating the knowledge and skill objectives of the previous 11 lessons to the instructor.

Elements:

Pre-flight discussion to answer questions and resolve any problems that concern the student about the lesson.

Student performs a flight, under the instructor's supervision, starting with a thorough pre-flight and ending with the aircraft, quadcopter/helicopter engine(s) stopped, aircraft battery circuits turned off and the transmitter turned off and secured.

Instructor monitors student's performance, but assists only when necessary.

Evaluation:

The lesson is complete and the student signed off for solo flight ONLY after he has demonstrated a practical knowledge of all course objectives AND has observed all safety and field operating rules, and has successfully flown his model unassisted.