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Ottawa Remote Control Club
Wings Program

Guide line

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Rule and Regulation Quiz

1- What are the most important announcements a pilot must make?

2- How will you recognize flying path?

3- What is the regulation in regards to noise at ORCC fields?

4- What are the rules for guest pilots at ORCC fields?

5- Where can you start you aircraft engine at the west end field?

6- What is the use of the pit area?

7- What is the use of the pavement and grassed area at the west end field?

8- What is the maximum number of aircrafts in the air allowed at one time?

9- Where are the no flying zones at the west end filed?

10- What is maximum use of frequency limit?

11- Name two regulations of the float pond?

12- Name five regulations of Gliders?

13- When can you turn on your transmitter at the flying fields?

14- Where would you keep your transmitter if you are not using it at the flying fields?

PURP0SE OF THE PROGRAM

- To provide an interesting and challenging flying achievement program that will teach the basics of flying radio controlled model aircraft.

- To develop a membership of competent flyers to assist new club members regarding all aspects of the sport that pertain to powered flight.

- To minimise safety hazards and accidents by encouraging all club members to develop better and more proficient flying habits.

- To make radio control flying a more meaningful and satisfying experience for all club members.

Theory of Flight

Basic principles of flight

Thrust: The force exerted by the engine and its propeller, which pushes air backward and creates thrust in a forward direction. As the propeller turns, it passes a mass of air backward and thereby generates an equal forward force.

Drag: This is the resistance to forward motion directly opposite to thrust. Drag is the resistance an airplane experiences in moving forward through the air. It has two principal components:

- **Parasite Drag** is the term given to the drag of all of the model's parts that do not contribute to lift. (Fuselage, landing gear, antennas, wing tips, fuel tanks, etc.). Parasitic drag increases with airspeed. It has two components:

    - **Form drag**, which is drag created by the form or shape of the model as it resists motion through the air.
    - **Skin friction,** which is caused by the tendency of air flowing over a body to cling to its surface.

- **Induced drag**, which is caused by the parts of an airplane that are active in producing lift. (Wings, tail plane, etc.) It increases as the angle of attack increases and decreases as the angle of attack decreases. **Induced drag** can only be reduced by changing the design of an airplane's wings. (Wings with a very long span and a narrow chord have lower induced drag.) Induced drag does not increase as the speed increases; it is greatest when the airplane is flying slowly.

(It should be noted that a slowly turning propeller could be a significant source of drag.)

Lift: This is the upward force that sustains the airplane in flight. As the aircraft is thrust forward, by the propeller on take-off, the wing meeting the oncoming air begins to generate lift. When the lift force is equal to the weight of the aircraft, the aircraft begins to fly.

Centre of pressure: Lift acts at 90 degrees to the relative airflow. The total force of lift is considered to act through a single point on the wing. This point is called the centre of pressure.

Weight: This is the downward force due to gravity and is directly opposed to lift. Weight is the total weight of the aircraft. It is considered to act through a single point termed the **Centre of Gravity.**

Balance of Forces: The airplane maintains level flight when all the forces acting on it are in equilibrium. That is to say, lift equals weight and thrust equals drag. As soon as one of these forces is changed, for example a change in throttle setting, the airplane will either climb or descend.

Angle of Incidence: The angle of incidence is the angle at which the wing is permanently inclined to the longitudinal axis of the airplane. Choosing the right angle of incidence can improve take-off and landing characteristics and reduce drag in level flight.

Angle of attack: The angle at which the airfoil meets the relative airflow is called the angle of attack. As the angle of attack is increased, the relative changes in pressure over the upper and lower surfaces and the amount of down wash increase up to a point (the stalling angle). Beyond this angle, they decrease.

Stall: The stall occurs when the amount of lift being produced by the wing is reduced to the point that it is less than the weight of the airplane. The airplane suddenly drops the nose and descends. The stall can be very gentle in some airplanes (trainers) or very pronounced with wing drop in others, especially high performance airplanes. The stall speed of an aircraft increases with sudden increases in the angle of attack such as a sudden pull-up or steep angles of bank.

Dihedral: The dihedral angle is the angle that each wing makes from the horizontal. The purpose of dihedral is to improve lateral stability.

Understanding Your Airplane's Control Surfaces

Wings: The wings provide the lift required to make an airplane fly by obtaining a useful reaction from movement through the air.

Ailerons: These are moveable airfoil surfaces that enable the pilot to manoeuvre and control the aircraft laterally. The ailerons are positioned on hinges toward the outer ends of the wings. One moves up while the other moves down when the control stick is moved side to side. They are used to control bank in flight.

Elevators: These are moveable airfoil surfaces that enable the pilot to manoeuvre and control the aircraft vertically. The elevators are hinged to the trailing edge of the horizontal stabiliser and move up and down as the control stick is moved forward and backward. They pitch the aircraft up or down in flight.

Rudder: This is a moveable airfoil surface that enables the pilot to manoeuvre and control the aircraft longitudinally. The rudder is hinged to the trailing edge of the vertical stabiliser and it moves left and right in response to control input from the rudder stick. The pilot controls the yaw of the aircraft by using the rudder.

Flaps: These are moveable surfaces forming part of the wing and are mounted at the trailing edge between the wing root and the ailerons. They extend and retract together and increase or decrease the effective lift of the wing by altering its camber and in some cases its area. They also increase drag, which helps to slow the airplane for landings. The pilot normally controls them with a switch or knob on the transmitter.

Throttle: This is the power control. To increase power the throttle stick is moved forward, to decrease power the throttle stick is moved backward.

Trim: Trim switches are mounted on the transmitter for each the ailerons, elevator, rudder and throttle. Their purpose is to make minor m changes in the position of the respective control surfaces so that the airplane can be flown straight and level without having to hold pressure on any of the control sticks. This makes for easier and more controlled flight. The throttle trim allow the pilot to set the engine idle speed and allow the engine to be stopped by fully closing the trim setting to the minimum position.

Wings Program

Basic Control

1- Take off
2- Straight and level flight parallel to the runway
3- Flat figure eight
4- Low pass parallel to the runway
5- Rudder turn

6- Rectangular approach
7- Land under power
8- Dead-stick landing

Before taking the Wings Test, prospective pilots must demonstrate to the instructor that they are capable of flying the test from either end of the runway and that they have mastered all of the elements. Candidates must demonstrate on two successive attempts, during their examination period, their ability to perform the eight required skills in wings program.

Ground School

Aim to familiarise the student with club regulations and rules, (see attached club rules and regulations).

General

- Explain that displaying current ORCC and MAAC membership cards on the flight box is or on their person is mandatory.

- Explain the MAAC safety code and insurance policy.

- Explain field regulation parking, gate (rules, keys), pit area, start-up area, fence, usage of the building and lights.

- Explain general rules and flying restrictions, usage of the runway, pilot stations, grass field (helicopter hovering practice area), windsock and that the maximum aircraft flying at any one time (including helicopters) is five.

- Explain radio and frequency regulations and that use of a frequency that is limited to a maximum of 15 minutes, if an other flyer waiting. Explain frequency board and restoring the radios in transmitter compound.

- Explain that pilots must announce their intention for taxing on runway, takeoffs or launches, low passes, landing, and dead stick.

- Explain the traffic pattern, and how it will vary according the wind direction.

- Explain coordinated flight patterns when two or more aircraft are flying.

Pre-flight Check Up

Airplane: Check the airplane's control surfaces, linkages, hinges, servo connections and soundness of construction. Check the Ailerons, Rudder and Elevator are functioning in right direction. (Right aileron will be up if you turn stick to the right, rudder will be in

right if you turn stick to the right, elevator will be up if you push stick down, carburettor will be open if you push stick forward).

Engine: Check the engine mount and muffler screws. Check the spinner and spinner nut for tightness and check the propeller for soundness. If engine needs to be broken-in, explain how and why this must be done. Explain engine adjustment procedure, low idle and high full power adjustments. Explain what the lean and rich condition of the engine is and how to correct the problem.

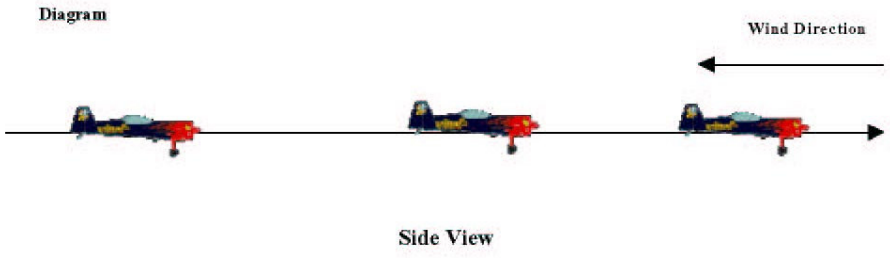
Fuel System: Explain how the fuel tank must be set-up. Explain position of fuel lines, clunks and fuel tank relative to engine fuel inlet.

Electrical: Check the battery and explain charging procedure and importance of monitoring the battery charge between flights. Explain importance of range check. Explain the effect of the transmitter antenna position relative to the airplane on signal strength. Cover the proper placement of receiver antennae (do not cut, tie, place next to metal push rods, etc.). Explain the use of transmitter and buddy-box (if used).

Training Manoeuvres

Straight-and-Level Flight

Straight and level flight can be described as holding a steady direction, parallel to the runway, with the wings level, while maintaining a constant altitude. Keep the wings level and provide rudder input as necessary to prevent yaw.



Co-ordinate turn

The co-ordinate turn is the basic manoeuvre used to change the heading of an aircraft. A co-ordinate turn is a change of direction maintaining a desired angle of bank, with no slip or skid, while maintaining a desired altitude. Turn can be classified as one of three levels:

- gentle turns, involving angles of bank up to 15 degrees,
- medium turns, involving angles of bank from 15 to 30 degrees, and
- Steep turns, involving angels of bank over 30 degrees.

In order to complete a co-ordinate turn at any angle of bank, it is important to use the rudder to prevent yaw and the elevator to hold the plane from descending. Adding rudder in the direction of turn will keep the airplane at the same desired angle without skid or slip.

Low pass

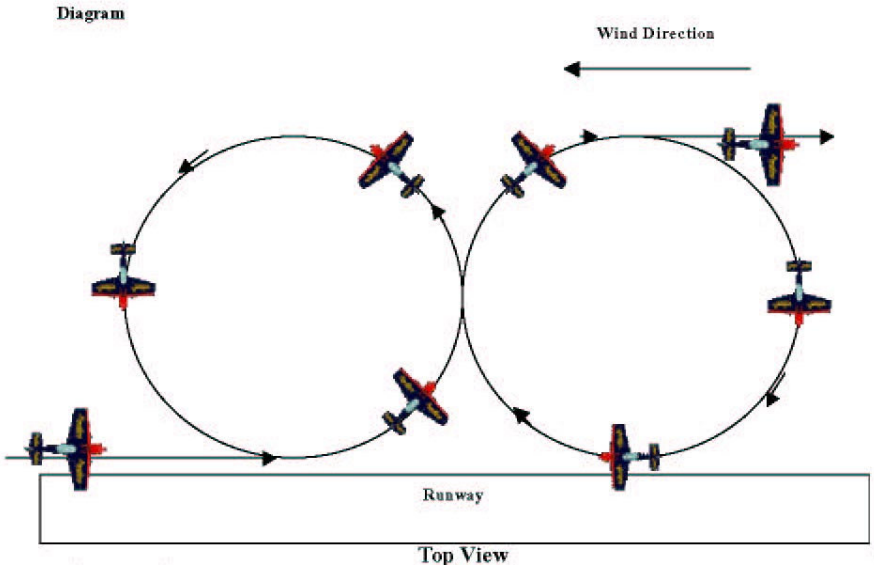
The purpose of this manoeuvre is to provide the pilot with the confidence needed when the airplane is flying in slow flight and close to the ground. This exercise improves one's flying abilities and confidence. This manoeuvre begins with model flying straight and level from final point in low altitude, not more than 25 feet above the ground passing over the runway. The pilot should control the model at the same altitude during passing over runway.

Flat Figure Eight

With the model at a safe altitude, it is to be flown parallel to the runway to a point opposite the pilot. The model then is to make a ninety-degree turn away from the pilot, level its wings, and then make a 360-degree flat turn to the right or left. When the model returns to its original heading away from the flight line, it is to make a second 360-degree flat turn in the opposite direction to the first 360-degree turn. The manoeuvre is complete when the model levels its wings after the second 360-degree turn.

Important points:

- turns must be co-ordinated,
- 360-degree turns are to be circular in shape,
- the model is not to make changes in altitude during 360-degree turns, and
- the model should finish the first and second 360-degree turns at the original start point of the manoeuvre.



Rudder Turn

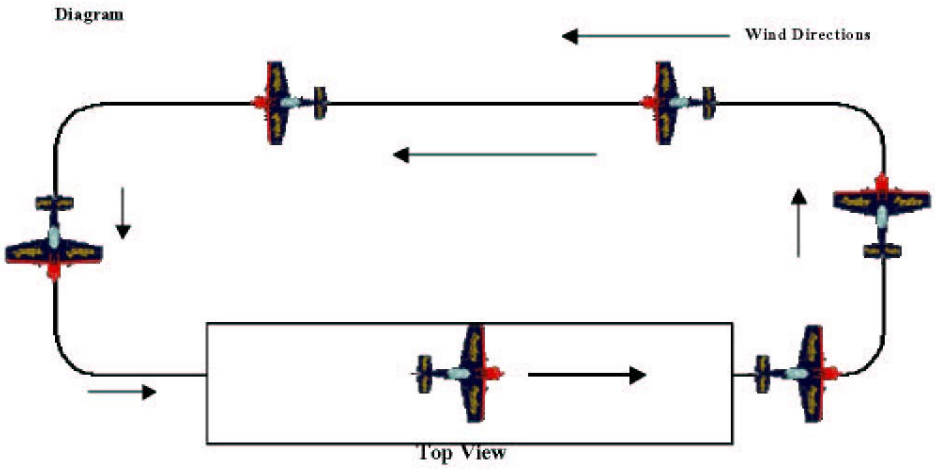
This manoeuvre is important as it prepares the student to use the rudder to control the model during crosswind landings. The rudder turn is a simple 180-degree turn, without losing altitude, and using rudder only.

Rectangular Approach

This manoeuvre begins with the model flying straight and level into the wind parallel to the runway. At the up-wind end of the runway, the model is to turn 90 degrees away from the flight line for the first crosswind leg. The model then makes a second 90-degree turn into the downwind leg followed by a third 90-degree turn into the second crosswind leg. Finally, the model makes a fourth 90-degree turn into the wind and begins to descend toward the runway (though an actual landing is not required).

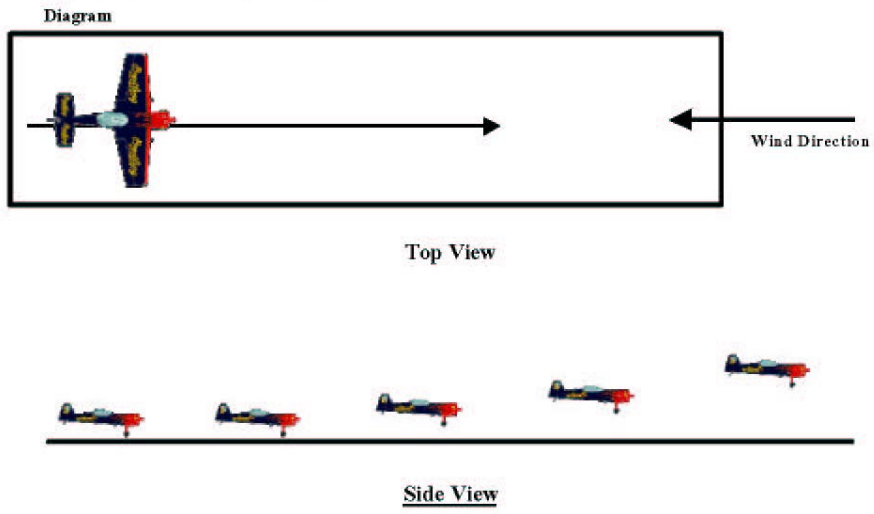
Important points:

- make sure the first three legs maintain a constant altitude,
- the 90-degree turns must be co-ordinate, smooth and precise, and
- the turns should be close to 90 degrees.



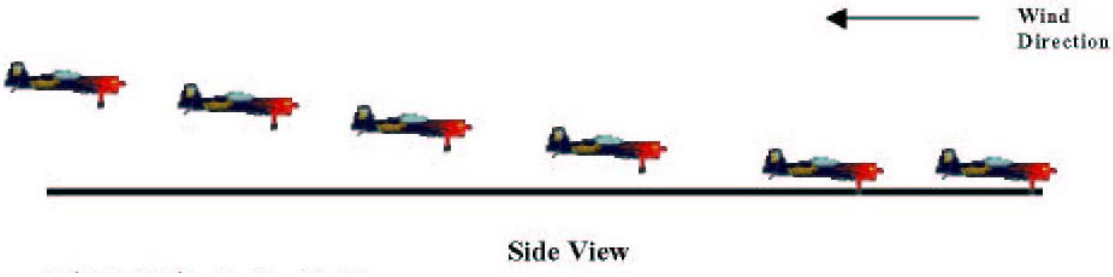
Take off

From a dead stop, the model is to travel straight down the centre of the runway. A small amount of rudder control may be required to hold airplane in the centre of runway. The manoeuvre will be executed at full power. When the model lifts off and climbs out, it should not change direction until it has gained a safe altitude. The wings must be level throughout.



Landing

This manoeuvre follows a rectangular approach and culminates in the model stopping before the upwind end of the runway. It is very important to keep the wings level at all times. Altitude and rate of descent are to be controlled by elevator and throttle control. The model is to flare smoothly, touch the ground and roll to a stop with little bouncing and no changes in heading. (Elevator control is very important; otherwise the airplane will bounce at the touch down point.)



Dead stick landing

The purpose of this manoeuvre is to provide the pilot with the confidence needed to land the airplane in the case of an engine failure. This exercise improves one's flying abilities and confidence. It is very important to master this maneuver.

This emergency procedure should be practiced regularly, with decreasing levels of warning, with the throttle trim set at a high idle (this is to eliminate the drag effects of the propeller). When a dead stick landing is ordered, the pilot will cut the throttle and maneuver the airplane to achieve a proper (if short) approach to the runway. The landing should be into the wind, with the touchdown point at the down-wind end of the runway.

The airplane's speed should allow the model to come to a halt on the runway if the idle speed wasn't set artificially high. As completing a landing under these circumstances is very difficult, a touch and go is recommended and provides good training.

Wings Exam Program

The Chief Flying Instructor will appoint qualified instructors of the club as examiners for the Wings Program.
Examinations may be taken at any time. However, to ensure that an examiner will be on hand a candidate should contact the Chief Instructor so that arrangements can be made.
During an examination no other aircraft shall be flying or any engine running in the start-up area. This is to ensure every advantage to the candidate. All manoeuvres will be judged out of 10 points.
A minimum of 70 points is required for passing the exam. There will be 20 point available for general Knowledge.
Instructors should question student to ensure that they have a clear understanding of club rules and regulations this will be total of 10 points based on how well student answered.
Total of 10 pints if students did answer the rule and regulation quiz on page two of this guidebook
Examples of general knowledge questions are:

- How many fliers allowed in the air at one time?
- Indicated the "No Fly" zones at our field?
- How long do you have the frequency pin for each time?
- Where do you start your engine?
- How do you indicate you are going to take-off, land?
- Which way do you turn after take-off?
- How do you display your MAAC and ORCC membership card?
- What is the range check?

Candidates are encouraged to have an assistant to aid them in the pit area and call the manoeuvres out during the flight.

Test requirements:

- the pilot must stay within the designated pilot area for all manoeuvres
- the pilot or assistant must call each manoeuvre prior to its execution
- at no time should the aircraft fly behind the flight line
- the candidate must perform all manoeuvres and/or procedures parallel to, but beyond the designated runway
- the model will maintain a reasonable height and range while the pilot is being judged
- candidates are allowed only two free passes per flight

General downgrading. A general downgrading of the total score will be made due to the following:

- 5 points for each time the aircraft crosses the flight line
- 2 points for each time a manoeuvre is not clearly called

- 5 points for each free pass made over the allowed limit of two
- 5 points for flying too far away

NOTE: See description of manoeuvres for individual downgrading.

Downgrading for each manoeuvre:

1. Take off:
- take-off is not straight
- lift-off is not smooth
- climb-out is too steep or erratic
- the model turns left or right during climb

2. Straight flight:
- the model makes a change in altitude during straight and level flight
- the model deviates left or right
- the manoeuvre is not held for at least three seconds
- the manoeuvre is not centred in front of pilot
- the model is flown at a distance greater than twenty-five meters away from the pilot

3. Flat figure eight:
- the first turn is not close to 90 degrees
- the 360-degree turns are not circular in shape
- the model changes altitude during the 360-degree turns
- the model does not finish the first and second 360 degree turns at the original start point of the manoeuvre

4. Low pass
- the model deviates left or right
- the model changes altitude during the manoeuvre

5. Rudder turns:
- the model changes altitude during 180-degree turns
- the pilot uses the ailerons to effect the turn

6. Rectangular approach:
- the 90-degree turns are not smooth and precise
- the turns are more or less than 90-degrees
- the model deviates from heading on the straight part of any leg
- the model changes altitude on the straight part of the first three legs

7. Landing:
- the wings not level
- the model impacts the ground due to lack of flare
- the model changes heading on the runway
- the model bounces after touchdown

8. Dead stick landing:

- the wings not level at the downwind threshold of the runway
- the model can't make it to the runway
- the model is traveling too quickly or the touch-and-go is too far down the runway to reasonably land safely

9- knowledge of rule and regulation:

- Total of 10 points based on how well student answered question in regards to rule and regulation (Instructor will ask question about field regulation). Total of 10 pints if students did answer the rule and regulation quiz on page two of this guidebook

Basic Control Score Sheet

Name: _____ Date: _____

Examiner: _____

Manoeuvre	1st	2nd
1-Take Off		
2- Straight flight		
3-Flat figure eight		
4-Low pass		
5-Rudder turn		
6-Rectangular approach		
7-Landing		
8-Dead stick landing		
9- knowledge of rule and regulation		
Less General Downgrades		
Total:		

= _____ / 100 = _____ %