Soo Modellers

Flight Training Guide

Club members build and fly radio controlled model aircraft. These range from simple models to complex re-creations of a modeller's favourite airplane. Models are powered by everything from electric motors to gasoline engines.

Membership is open to anyone.

The club's flying site is located on Leigh's Bay (the old Algoma Steel Airstrip) at the end of Leigh's Bay Road.

More information is available on the club web page www.soomodellers.ca

Soo Modellers Flight Training Course

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Check for proper alignment
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Check ground attitude of tricycle geared models
Check wheel alignment
Check that all bolts, screws and nuts are tight.
Fully charge batteries.

- At the flying field – Perform radio range check
Controls moving in the correct direction?
Extend radio antenna (FM)
Check that wing mounting is secure

Introduction.

Welcome to the Soo Modellers training program. This program will teach you the basics of flying radio controlled model aircraft and are Soo Modellers best effort to assist you in the process.

As a budding RC pilot please avail yourself to the knowledge within the club. The members will be glad to assist you in choosing your first model. Your instructor will offer his advice, but please talk to the other members. They may have just what you need.

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 "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 "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, Soo Modellers strongly recommends that you start your flight instruction on a trainer and then evolve to more advanced planes.

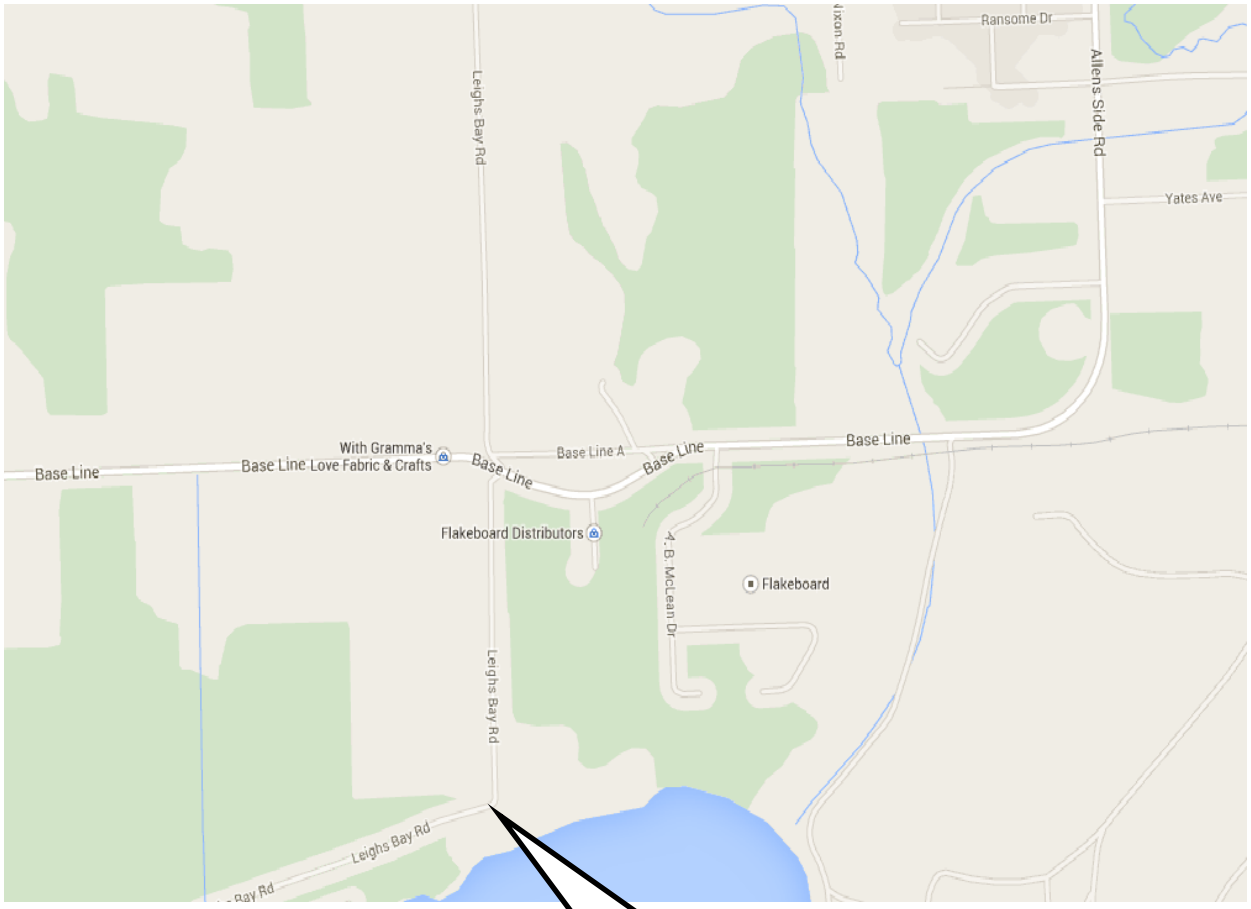
A trainer will enable you to learn easier and it will simplify your instructor's roles. Your plane will last you longer with less chance of a serious crash.

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

Introduction continued.

Field located at the south end of Leighs Bay road.



Flying field located at the south end of Leighs Bay road.

PROGRESS CHECK LIST

To be presented to Instructor prior to each days flying training. The instructor will initial each item when covered.

FLIGHT PROFICIENCY

INSTRUCTORS NOTE: You are to demonstrate each step of the particular lesson to be learned. Show the student what it looks like. When the student understands the control input sequences and reasons for them, then give him control. You are to initial and date each sequence when the student has shown he/she has mastered it.

Field Layout

□ Parking
□ Gate (rules, keys)
□ Frequency Board
□ Aircraft restraints (Pickle fork, Restraining rods)
□ Boundaries (fence, ditch)
□ Flying restrictions
□ Runway (Pilot positions)
□ Windsock.
□ Pits
□ Flying restrictions for Members without Wings

Aircraft

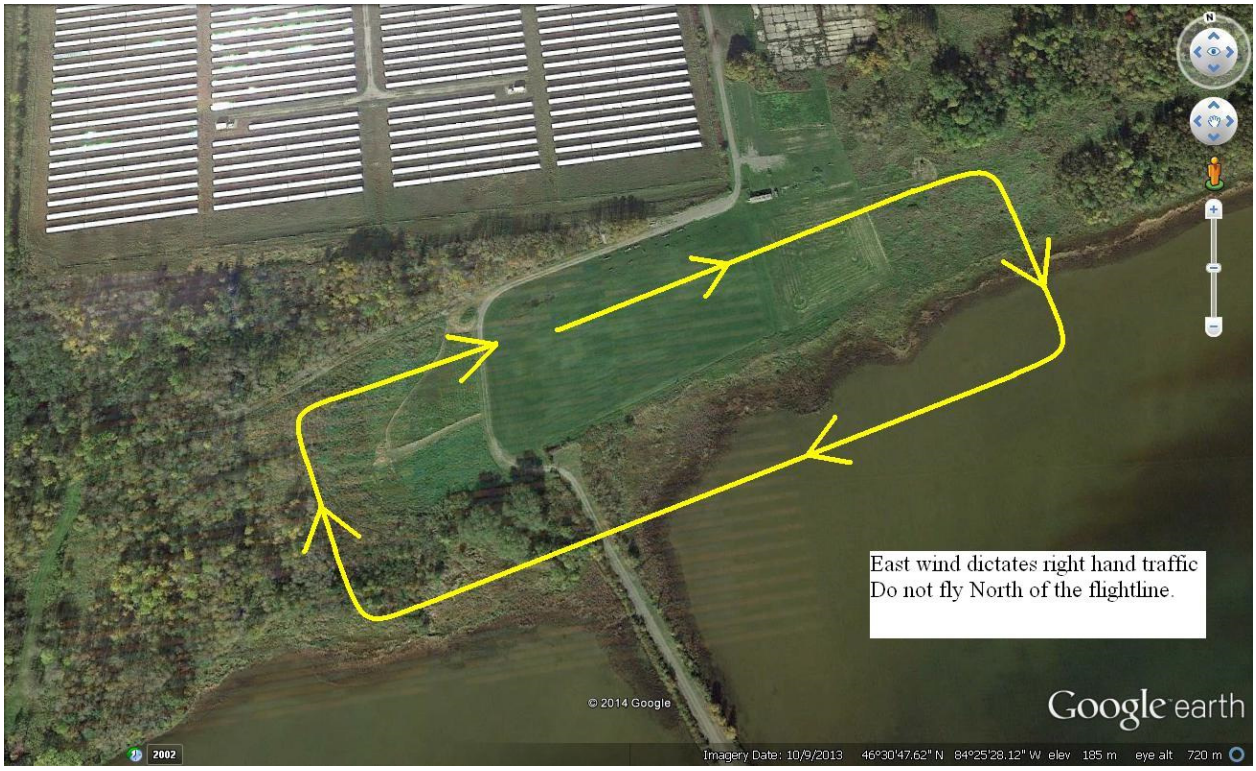
□ Engine
□ Radio (receiver and servos)
□ Fuel system
□ Balance
□ Flight Controls: Direction and throw; Hinges and Clevises etc.
□ Explanation of Battery Charging requirements

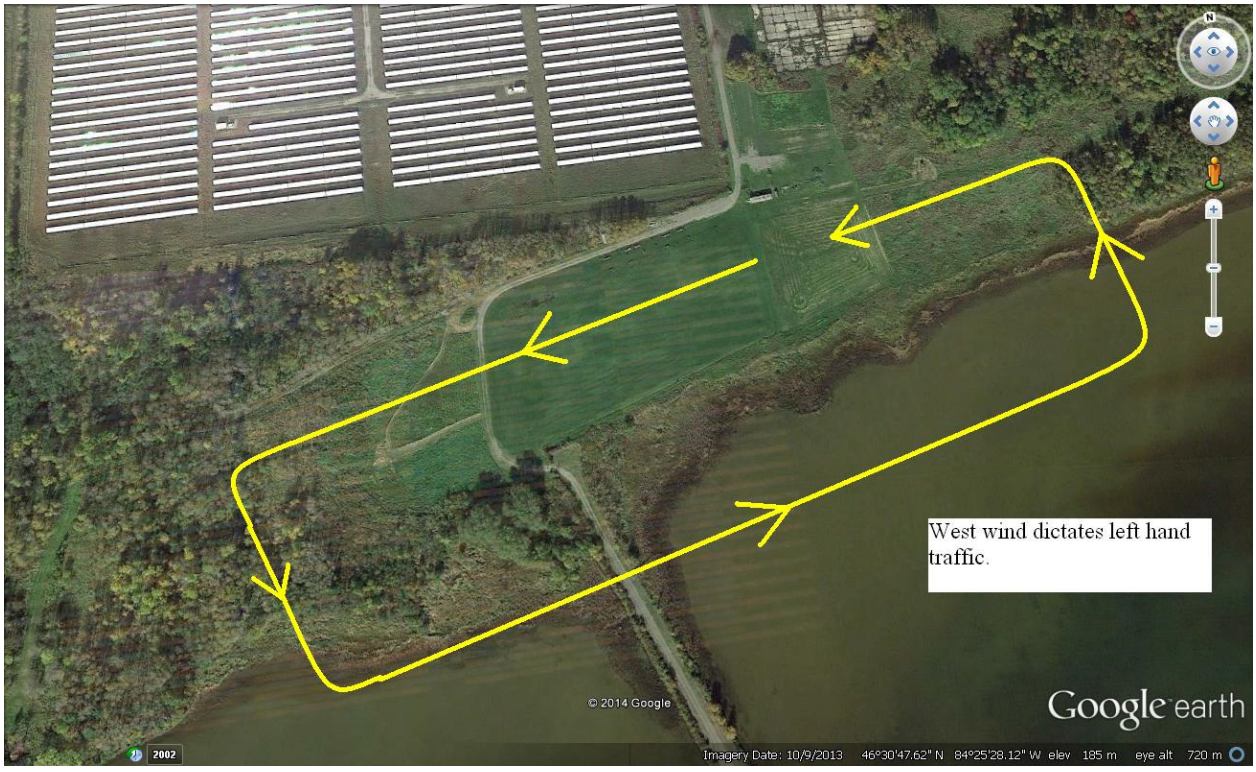
Progress check list.

- ☐ Taxiing out - right and left turns
- ☐ Taxiing in - right and left turns
- ☐ Taxi down center of runway at medium speed
- ☐ Straight and Level Flight
- ☐ Left Turns maintaining height
- ☐ Right Turns maintaining height
- ☐ Trim for level flight various power settings
- ☐ Horizontal 8s
- ☐ Procedure turns
- ☐ Tracking over runway at 150 ft., 75 ft., 25 ft.
- ☐ Slow Flying
- ☐ Trimming for slow flying
- ☐ Stalls and recovery
- ☐ Take off, Climb, Level off reduce power and trim
- ☐ Landings (discuss why take off and land into wind)
- ☐ Take off, trim for level, slow flight, and land
- ☐ Overshoots
- ☐ Touch and Goes
- ☐ Dead Stick Demo - by instructor only, S turns etc.
- ☐ Wings practice
- ☐ Recommended for Wings test Date

Airfield Layout

Airfield lay out continued.


East wind dictates right hand traffic
Do not fly North of the flightline.
© 2014 Google
Google earth
Imagery Date: 10/9/2013 46°30'47.62" N 84°25'28.12" W elev 185 m eye alt 720 m


West wind dictates left hand traffic.
© 2014 Google
Google earth
Imagery Date: 10/9/2013 46°30'47.62" N 84°25'28.12" W elev 185 m eye alt 720 m

Lesson 1: Instructor - Student Responsibilities

You are about to embark upon the Primary Flight Training Course Soo Modellers.

Although you may seek instruction from any club instructor your primary instructor is:

Name:_____

Phone:_____

He/she will work with you and monitor your progress.

Your instructor has met the qualifications of MAAC. He/she 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 designated instructor as your primary source of assistance.

You may not take your 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 Wings test.

You must pass your 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.

Your instructor will explain and demonstrate each element of each lesson. Where applicable he/she will demonstrate the element in the air *using your aircraft.* You will have opportunities to perform each element and receive an evaluation from your instructor. In each lesson there is a space for a club instructor to "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 initial elements after they have been covered. Other club instructors will use the initials and notes to assist you when your instructor is absent.

I recommend that _____ take the Wings test.

Instructor _____

Lesson 2: Aircraft Familiarization

Purpose: To teach the student how to properly pre-flight his/her model.

Objective: At the completion of the lesson the student should be able to inspect his/her model and identify any deficiencies that could cause a malfunction or safety hazard. He/she will be able to start and adjust the engine properly.

Elements:

- Inspection of aircraft structure, center 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

Glo or Gas engine equipped model

- Engine, fuel system installation and security (including propellers).
- Instructor's demonstration of safe engine starting procedure and starting of engine.
- Student starts and adjusts engine
- Instructor teaches student how to identify rich and lean engine settings.
- Instructor teaches student how to adjust the idle mixture to get optimum performance from that type of engine.

Electric equipped model

- Check motor installation, including ESC, power cables, connectors, mounting screws, and propeller.
- Check flight battery voltage and condition
- Turn on transmitter. Check voltage and ensure throttle is at the lowest position (idle).
- Connect flight battery to ESC – ensuring propeller is clear of all obstructions, in case the motor starts unexpectedly
- Listen for appropriate tone sequence to confirm the power system is 'charged' and ready for flight.
- Install flight battery, double check connections, install and secure hatch(es)
- Test motor at full throttle for a few seconds to ensure correct operation before attempting flight

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 both on the ground and in the air.

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

Elements: **SAFETY AND FIELD RULES (Revised March 27, 2015)**

Flying Site Rules

The club has an excellent facility for both land and water based aircraft (i.e. floatplanes, Seaplanes, etc.). The two fightlines: *Flying Field* and *Waterfront (Dock)* are far enough apart that both can operate independently.

Our site is open throughout the summer months, as soon as the roadway is usable in springtime. Last year, the field was open from May 17th until October 12th, 2014.

General Rules

- All Flyers must be M.A.A.C. or A.M.A. members. Please be prepared to show your current annual card if requested. Visiting flyers must be accompanied by a club member, unless alternate arrangements have been made.
- New pilots must be trained following the club's Wings Program. Pilots new to the club or returning to the hobby may be required to submit to a review by a club instructor prior to flying on their own. Any questions can be answered by a club instructor or executive member.
- Flying hours are 9AM to dusk 7 days per week. Small (quiet) electrics with < 1500 mm (60") wingspan can fly at any time.
- Mufflers are mandatory on all internal combustion engines - with proper expansion chamber / baffles etc. (cannot be flow through designs).
- In the event you lose your aircraft in the Solar Panel field DO NOT RETRIEVE IT! Contact Craig or Kevin. We will make the appropriate arrangements to recover your airplane.
- Please keep your dog properly leashed and controlled. Bring your pooper scooper. You cannot fly and have control of an animal at the same time.
- Last person leaving the flying site at any time of day must close and lock the gates.

Lesson 3: Radio and Field Procedures continued

Flying site rules continued.

Flying Field

- M.A.A.C. Safety Code and Safety Guidelines for Field Operation apply. Copies are available from Craig or on the MAAC website.
- Use of the frequency control board for all radios on 72 MHZ is mandatory. Flyers with radios on 2.4 GHZ are recommended to use the board.
- The flight line and area of operation are clearly defined,
- The Pit area is for pilots, assistants and escorted guests only. Please ensure your guests / children act appropriately.
- Use tie downs or an assistant for larger aircraft.
- Maximum of 4 aircraft in the air at one time, not including any floatplanes or small electrics. Common sense should dictate the number of aircraft in the air at any time.
- Absolutely NO flying behind the pits or over the field behind the club's property.
- Please fly from the designated pilot stations, behind the safety fence,
- No flying while field maintenance is in progress.
- Vehicles must be parked in the designated area north of the garage after unloading. (Except when float flying).

Waterfront Operations

- A tag must be fixed to the frequency board indicating that the dock area is in use for flight operations. A separate area on the frequency board is provided for this purpose. Members planning to operate from the dock area should prepare a tag or similar to affix to the frequency board before using the dock area.
- The frequency to be used must be indicated. It is highly recommended that operations from the dock area be restricted to 2.4 GHZ radios.
- Flight operations should not interfere directly with normal operations at the land strip.
- Exercise extreme caution when crossing the flight line on the way to the dock area.
- Close gate to deck area when leaving to keep geese off of the deck.
- Water is shallow at dock, no diving allowed.
- The "buddy" system applies at the dock - don't fly alone.
- It is recommended that an additional person to act as a "spotter" to ensure float operations do not encroach on land operations.
- Parking should be at a safe location.

Lesson 3: Radio and Field Procedures continued

Flying site rules continued.

Flying Offsite

There are times when club members have an opportunity to fly at alternate flying sites. Examples include: demonstrations, flying from a remote lake or during winter months when the club's flying site is not accessible. The following guidelines must be followed when flying from alternate sites:

- Ensure your MAAC membership is up-to-date (e.g. winter flyers).
- Permission must be obtained from the property owner before flying.
- Flight operations must not interfere with other activities at the site.
- All applicable club safety rules and guidelines must be observed.
- If there is more than one participant, a method of frequency control must be used. This is not required if all participants are using 2.4 GHz.
- Use of a spotter is highly recommended.
- Parking must be at a safe location.

Lesson 3: Radio and Field Procedures continued

Pre-Start

□ Frequency Board – Tag In Place
□ Receiver Battery - Voltage Check
□ Radio Antenna – Out (FM radio's)
□ Radio Transmitter - On and Checked for Interference
□ Radio Receiver - On
□ Aircraft Controls - Transmitter Operation Check
□ Throttle set

Start

□ Aircraft Secure
□ All Clear - Ahead (prop) and Behind
□ Run Up - Mixture Set (engine testing to take place in testing area)
□ Idle – Reliable
□ Perform a radio range check following your radio manufacturer's instructions (with engine running).

Pre-Takeoff

□ Engine - Full Power Performance OK
□ Controls - Free and Correct
□ Rate Switches - Set
□ Trims - Set for Take-off
□ Timer - On
□ Field Workers - Checked
□ Wind Sock - Checked
□ Runway – Clear
□ Announce your 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.

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Lesson 4: Flight Familiarization

Purpose:

To introduce the student to controlling the model in flight.

Objective:

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

Elements:

- On the ground, instructor familiarize the student with the controls (pitch, yaw and power) and what kind of affect they will have on the aircraft in flight.

The procedures used by the instructor to give the transmitter to the student and take it from him during the flight will be explained.

Soo Modellers strongly advise the use of training buddy cord systems available today. These systems allow the quick switching back and forth control of the model from student to instructor. If a buddy cord system is not available for your type of radio the method of passing the radio back and forth between instructor and student needs to be established prior to flying.

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

- Instructor flies and lands the student's model to evaluate its performance and air worthiness.

This flight determines any changes necessary for control throws and trims. If the instructor can trim the aircraft without landing the aircraft, control of the model will be passed to the student.

- With the assistance and direction of the instructor, the student will start the process of becoming familiar with the controls.
- The student will strive to keep the model in level flight and follow turning instructions given by the instructor.
- When the student becomes tired or disoriented he/she should announce and pass control of the model back to the instructor.

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. Proficiency and accurate control are not critical at this point.

Lesson 5: 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:

- On the ground taxiing (left and right in both directions with elevator in appropriate position)
- Level flight and trim. (Aileron and elevator)
- 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 precede this lesson. The Six 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.

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Lesson 6: Accuracy Maneuvers

Purpose: To teach the student to perform the Six 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 for turns and maintaining straight flight at slower speeds.
- Power off (idle) glides that require the student to maneuver the model to a specific area and approximate altitude.

Example: Have the student close the throttle over the East end of the field at 200 feet and glide to the West end at an altitude of about 100 ft.

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.

Notes:

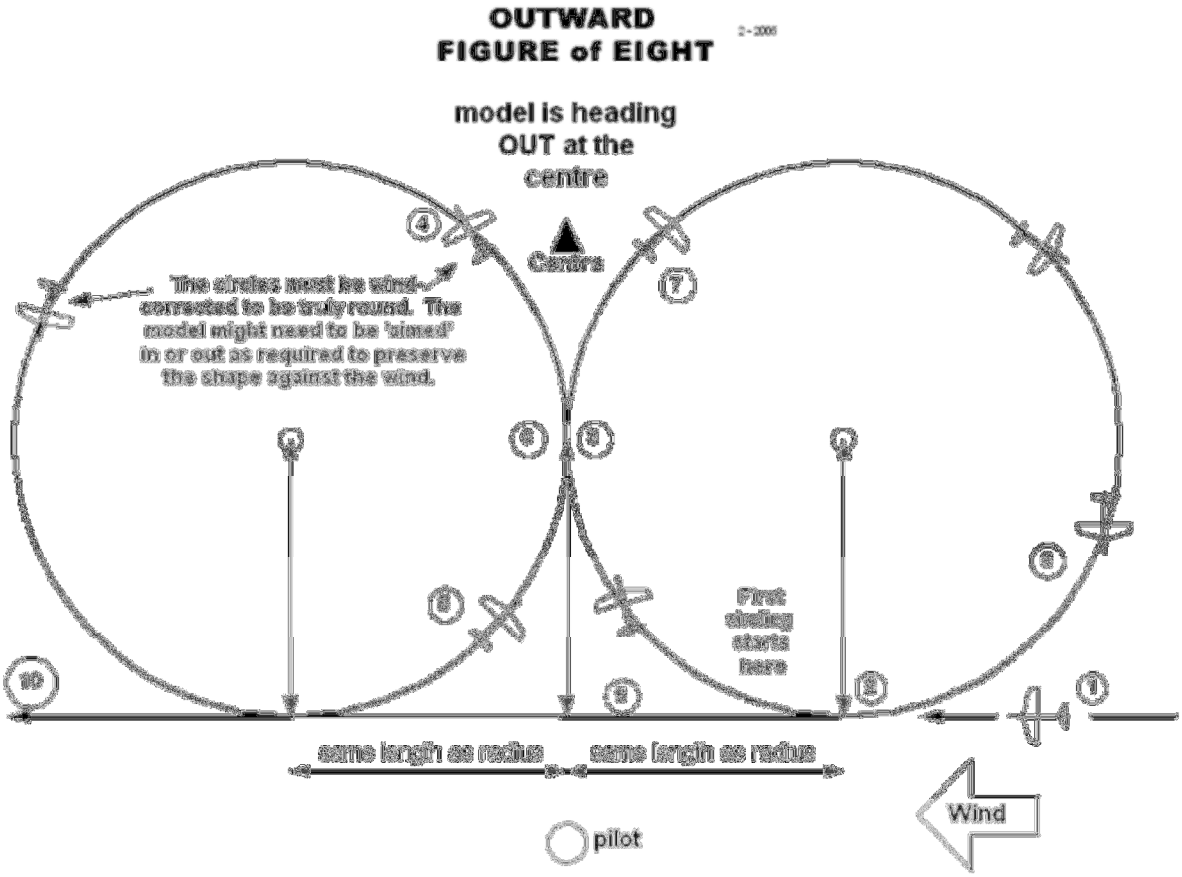
Lesson 7: Orientation Maneuvers

Purpose: To develop the judgment, skill and ability necessary for the student to make his first landing.

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

Elements:

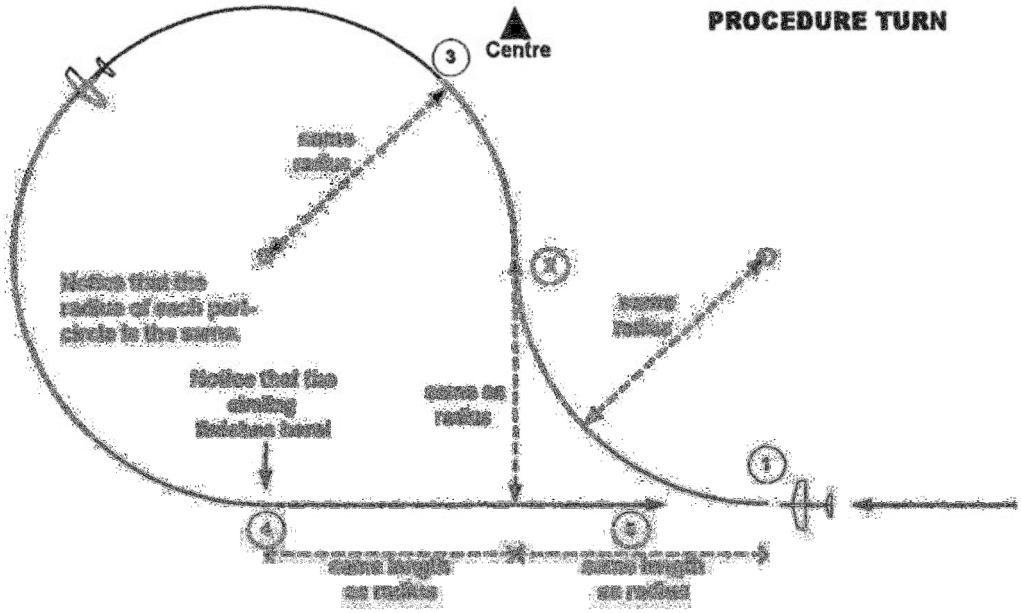
- Figure 8 - the student must fly a figure 8 pattern consisting of two 360 degree turns, one left and one right. The student must place the maneuver in front of himself at a safe distance and altitude.



- The student must fly a rectangular pattern at a safe altitude, with the upwind leg crossing the landing area.

Lesson 7: Orientation Maneuvers continued

 Procedure turn.



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, can fly both right and left rectangular patterns and perform a Procedure turn consistently and accurately.

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Lesson 8: 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.

Notes:

Lesson 9: 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.
- Develop the ability to accommodate crosswind conditions.

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.

Notes:

Lesson 10: 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 6. (Slow Flight and Gliding)
- Discussion of proper landing techniques.
- Student flies a rectangular pattern as in Lesson 6, 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 20 ft.
- 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 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.

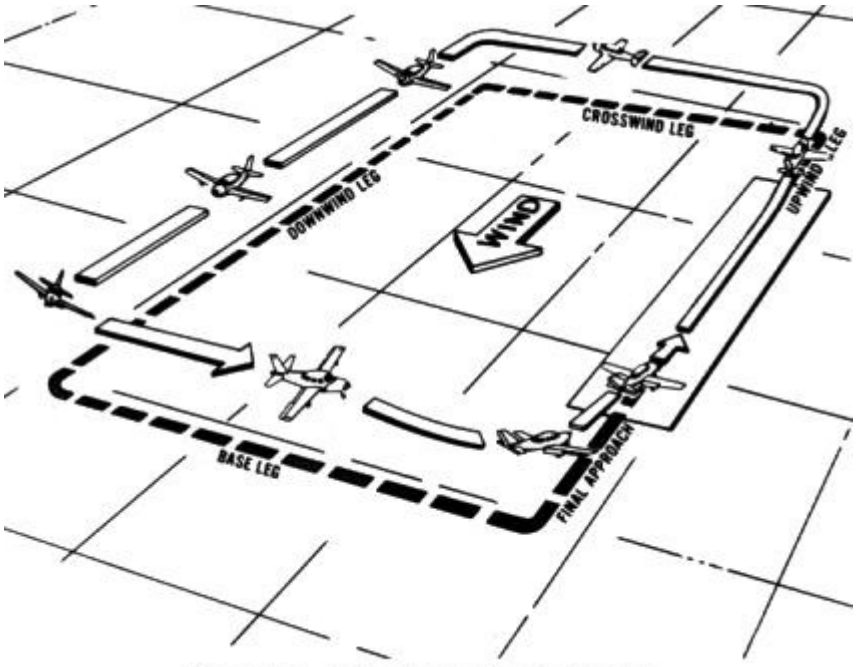
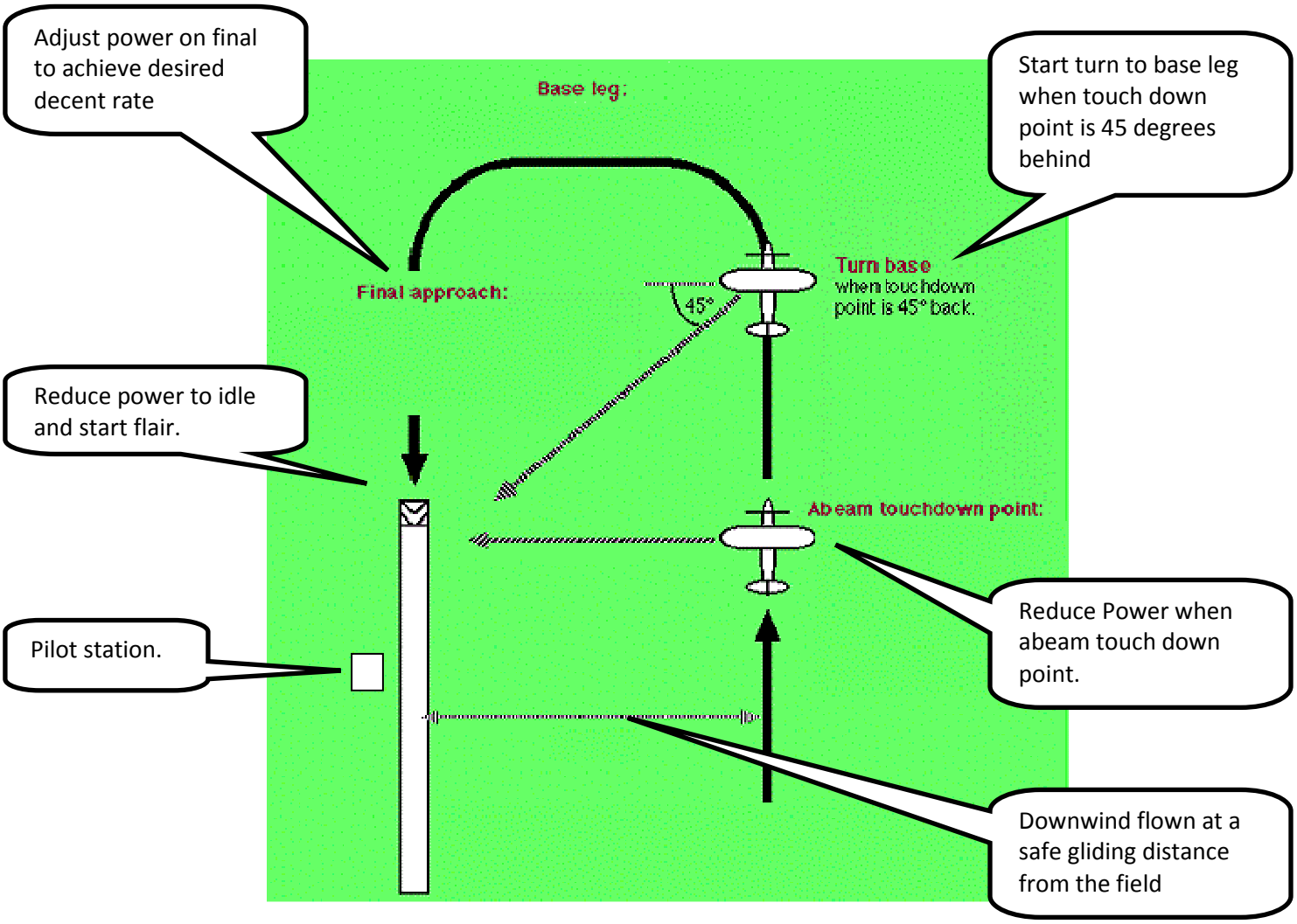


Figure 7–2 Basic Rectangular Traffic Pattern

Lesson 10: Approaches to Landing continued.

Standardized approach



Lesson 10: Approaches to Landing continued.

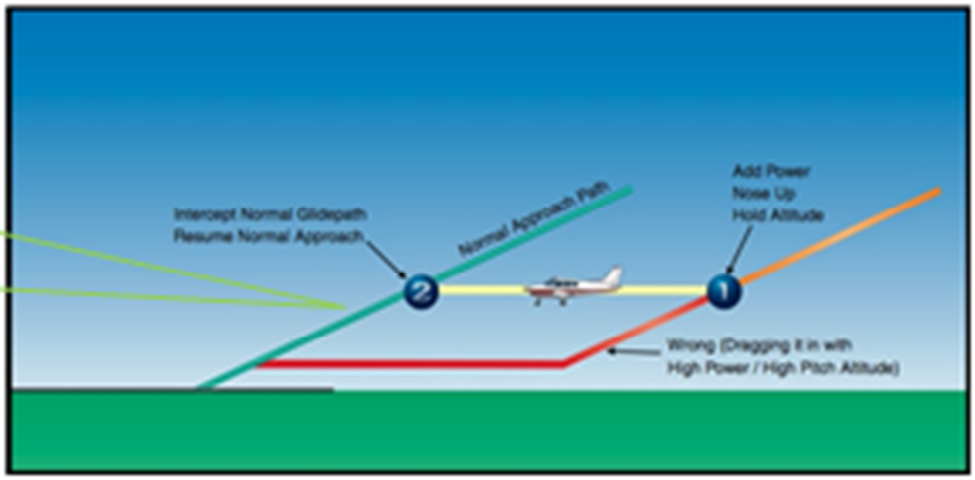
Standardized approach.

This is one of the most important concepts to understand.

On final approach you want the airplane to be at a slow approach speed with throttle at idle.

If your approach is too low you must at power. Do not pull up on the elevator (you will stall the wing)

Once back on the proper approach angle, reduce power back to idle



Lesson 11: Solo Flight

Purpose: Confidence building exercise.

Objective: The student is to perform a solo flight demonstrating the knowledge and skill objectives of the previous nine 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, take off, circuits, landing, post flight recovery and removal of your pin from the board.
- 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/she 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.

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Lesson 12: 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.
- Student performs dead stick landing.
- Cross wind take-off and landings (optional).

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."

Note:

Lesson 13: Wings Program – Soo Modellers Pilot proficiency test (Wings test).

When you and your flight instructor are confident with your performance in the air and your knowledge of ground and safety rules, you will be ready to take your pilot proficiency test. Contact the chief flight instructor and a proficiency test will be scheduled.

The test is very straight forward and consists of the following.

1. Carry out pre-flight safety checks of the airplane. For example, check for loose, cracked or missing parts, check to make sure the plane has fuel, and ensure the batteries are charged.

2. Start the engine in a safe and secure manner. For example, have a buddy hold the plane, use a chicken stick or electric starter to flip the propeller, and never reach over the propeller to turn the needle valve or remove the glow starter.

3. Taxi to position and announce take off. Take off in a controlled manner with rectangular pattern to altitude. Turn away from pits.

4. Perform a procedure turn in both directions.

5. Perform a horizontal figure 8 with the cross over point in front of the pilot.

6. Fly a rectangular landing approach and overshoot the runway from below 20 feet. (Note: this is not a low pass)

7. Perform a loop and a roll at a safe altitude.

8. Fly a rectangular landing approach and make a safe landing from the designated direction (call out landing).

9. Safely recover the aircraft from the field.

10. Complete a post flight check. (Turn off radio, de-fuel etc.)

Appendix:

Pre-Flight Checklist

Before going to the flying field

Even though you're new model looks complete and seems to be ready to fly, resist the temptation to rush out to the flying field and put it in the air prematurely. There are several important items you must check out before the airplane is actually ready to fly. Always keep in mind that a model, engine, or radio that is not prepared and working properly on the ground before takeoff will not improve in the air - IT WILL GET WORSE! There is no point in attempting to fly until everything is 100% correct. Using the following pre-flight checklist will greatly improve your chances of success.

Check the balance point

Always balance your model with the fuel tank empty (battery installed if electric). The correct balance point for your airplane should be clearly indicated on the plans or in the kit instructions. Carefully mark the balance point on the bottom of each wing. Pick up the model using only your fingertips at the marks. If properly balanced, the model should stay level after you pick it up.

If the tail hangs down (tail heavy), it means that the model's "centre of gravity" is behind the desired balance point and you will have to add weight to the nose. However, before adding new weight, check to see if you can move the battery pack and/or receiver farther forward in the nose of the model. You may be able to make the model balance properly simply by shifting these radio components as far forward as possible. This is the most efficient way of balancing a model, without adding any new weight. If shifting the radio gear forward doesn't work in you installation, then you will have to add new weight. Be sure that any weights are fastened or glued securely, and as far forward as possible for maximum effect. Remember, trying to fly with the C.G. too far back is much more dangerous than the slight increase in wing loading caused by adding weight to the nose. You must make the model balance as per the plans! A tail heavy airplane can be totally unstable and uncontrollable.

If the nose keeps dropping down when you pick up the model at the prescribed balance point, then the model is nose heavy and you must add or shift weight towards the rear of the airplane. Keep in mind that a slightly nose heavy airplane is safer to fly than a tail heavy one. So if anything, err towards then nose heavy side of your first test flights. In general, having the centre of gravity ahead of the prescribed balance point will make the airplane more stable, but if carried too far will make it react sluggishly to controls and restrict it aerobatic capability. Your best bet for good flight performance is to balance you model exactly where the designer prescribes.

In addition to the fore-and-aft balancing procedures described above, the performance of an airplane in some aerobatic maneuvers will be improved it is also balanced "span wise". For example, if one wing is heavier than the other it can affect stalls and loop tracking. Check the span wise balance of the complete model assembled with the wing in place. Pick up the mode by the engine crankshaft at the front and under the center of the fuselage at the rear. Inset weight (small finishing nails work well) into the lighter wingtip until the model is balanced.

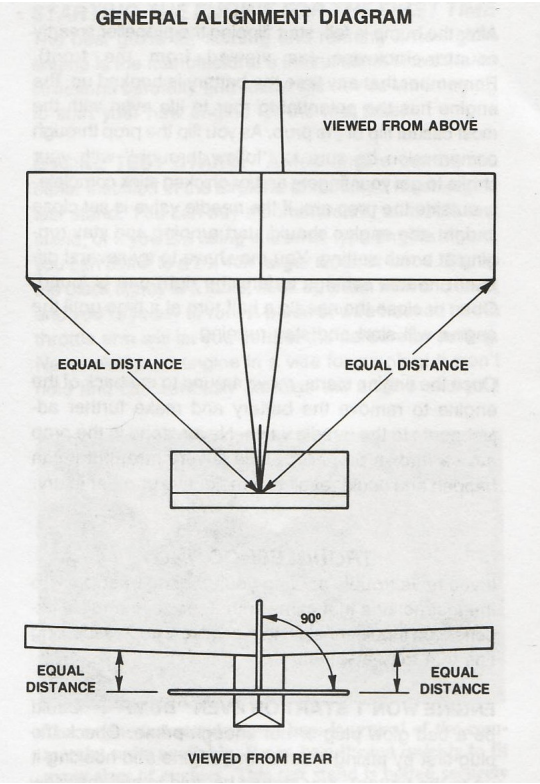
Pre-Flight Checklist continued

Why models must be individually balanced.

Every model airplane will turn out a little different. Balsa wood varies in weight and so do model engine. The form of muffler you use, the size and placement of you radio equipment, and the amount of finish you apply can also affect the final balance of the model. Don't feel that whatever C.G. the model builds out to is "good enough". Check carefully and make whatever adjustments are required. If you model is properly balanced it should fly with only minor trim changes.

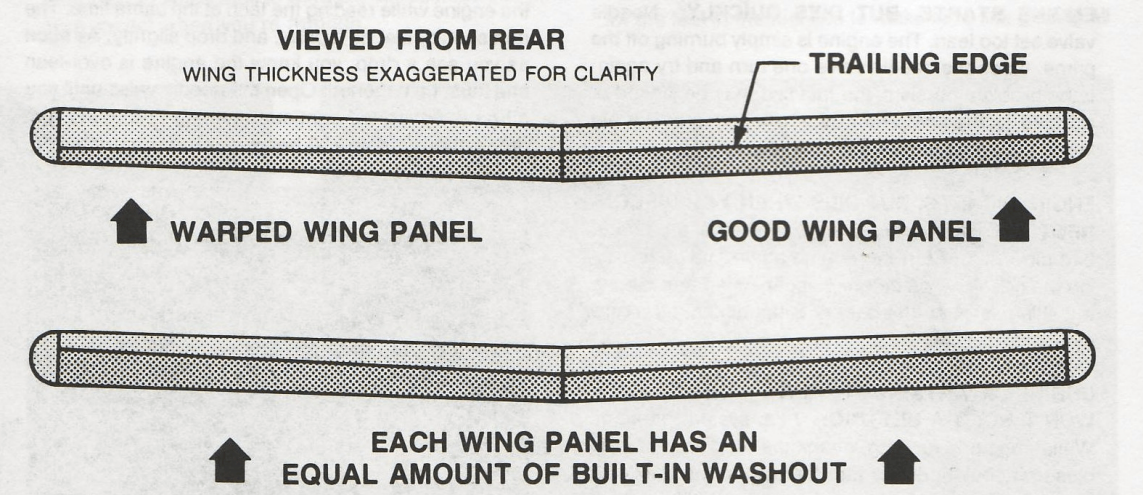
Check for proper alignment

When building a model airplane you should always strive to make it as straight and perfectly aligned as possible. Straight models always fly better! Proper alignment starts with a straight and true building board and continues through every phase of construction. Before taking the new model out for its first flight, take one more look to make sure nothing is drastically askew. Bolt or rubber band the wing in place and view the aircraft from the rear and from above, and compare to the drawings shown below.



Check for warps

A warped or twisted wing panel will make the model constantly want to turn, and a bad warp may make the model snap roll on takeoff or landing approach. Check for warps by sighting the wing from directly behind at a distance of 3 to 4 feet. Position your eyes so that when you are looking directly at the trailing edge, it appears to be about halfway between the top and bottom wing surfaces. If the trailing edge swoops up or down towards the tip, you probably have a warp that needs correcting (see note about "wingtip washout" for possible exceptions). Also check for warps in tail surfaces by carefully sighting them from a distance.
Correcting a warp is difficult, but not impossible. On a wing covered with plastic film, firmly grasp the wing with both hands and twist it opposite the warp. You need to actually twist it beyond the point at which it's straight. Hold the wing in the position and notice that diagonal wrinkles have appeared in the covering. Have a helper re-shrink the covering with an iron or heat gun while you hold the wing. Continue holding the wing until it cools, then release the pressure and check to see if the warp has been eliminated. It may take several attempts, but a straight wing is worth the effort. A wing that has been covered with a doped-on cloth covering material can sometimes be straightened by holding the wing, twisted opposite the warp as described above, over a kettle of boiling water for several minutes. The steam should loosen the covering enough to let you twist out the warp. Take care not to burn yourself.



Warps can be difficult to see, but it's important to carefully check for them just the same. Check before covering and after because the application of covering material can induce a warp, especially if it is shrunk unevenly. The top wing in this diagram is straight on one side and warped on the other. Obviously, only the warped side needs to be corrected. The lower wing was designed with built-in washout. Since the washout is equal on both sides, no correction is needed.

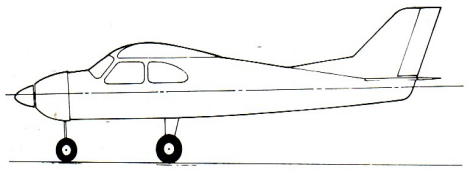
Pre-Flight Checklist continued

Wingtip washout

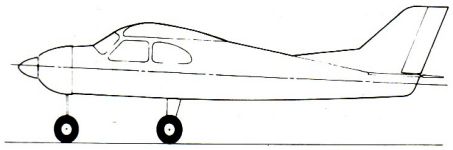
Be careful some models, particularly those with a tapered wing plan form (wing narrower at the tip than at the centre) are sometimes designed with built-in "wingtip washout", which may appear to be a warp in the wing when viewed from behind. Washout simply means that the wing is purposely twisted so that the airfoil at the wingtip is pointed slightly nose down (about 1 to 2 degrees) compared to the airfoil at the wing root. This special twist prevents the wingtips from stalling prematurely, before the larger center portion of the wing does, when the airplane is slowed down for landing. Without washout, some highly taped wings have a tendency to "tip stall" without warning and go immediately into a fatal left or right snap roll. Washout lets the wing stall in the centre first, producing a gentle, straight ahead stall. Straight, un-tapered wings (wing tip the same size as the centre) normally do not have washout. If your model has been designed to incorporate washout (the designer will normally indicate it on the plans or instructions), then you must expect the wing to appear slightly twisted. The main thing to check on a wing like this is that both wings have the same amount of washout.

Check the ground attitude of trike-geared models.

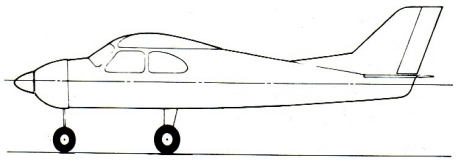
Models that have a nose wheel should be set-up so that the airplane sits level on the ground when viewed from the side. An airplane that sits nose down will want to "stick" to the runway during takeoff because the wing is actually at a negative angle of attack. As the speed increases, the wing pushes the airplane down harder, holding it on the ground. The pilot must then feed in a lot of up elevator to force the model to rotate to a positive angle of attack, which then causes it to pop quickly off the ground and jump into the air at too steep an angle. On the other hand, if the model sits nose high on the ground, takeoffs will be smoother but landings will probably be very bouncy if the nose wheel touches the ground first. The best alternative is to have the airplane sit perfectly level on the ground! Adjust the ground attitude by loosening the steering arm set screw and moving the nose wheel strut up or down as necessary.



MODEL IN A NOSE-DOWN GROUND ATTITUDE



MODEL IN A NOSE-UP GROUND ATTITUDE



MODEL IN A LEVEL GROUND ATTITUDE

Pre-Flight Checklist continued

Check wheel alignment

Make a visual check that the main wheels are aligned straight ahead. This is particularly important for tail dragger models. Although the controversy of toe-in versus toe-out for tail draggers will probably continue to rage on, we have found that aligning the wheels straight along the path of the model (wheels parallel to each other) generally works just fine.

Double check that all bolts, screws, and nuts are tight

Losing a model to mechanical failure because something wasn't securely tightened is always a shame, particularly if it could have been prevented. It can't hurt to give you model, engine and radio a final "once over" to see that everything is tight and secure. The following is a list of common areas that should be double checked - you may think of several other items that are just as important.

Servo mounting screws
Servo arm screws
Control horn screws
Engine mounting bolts
Wheel collars
Muffler bolts
Propeller nuts
Nose wheel set screw
Cowling screws
Landing gear bolts

Be sure batteries are fully charged

The batteries in the model and the transmitter should be fully charged whenever you go to the field to fly. Newcomers to R/C often fail to understand the importance of keeping your radio system fully charged. They think in terms of rechargeable tools or kids toys they have owned that are typically charged up, run down until dead, and then recharged. You can't do that with an R/C airplane! If the radio batteries go dead when the model is in flight, the airplane will crash! Always charge you r radio the night before you plan to fly, even if the batteries were charged a week or only a few days prior to flying. That's not enough! Recharge them again, just to make sure. Follow the recommended charging procedures of the radio manufacturer.

Pre-Flight Checklist - At the flying field

Radio range check

Procedures for performing a radio range check are usually provided in the instructions supplied with the radio. Follow them to perform the range check.

Check controls with the engine running.

A radio that performs flawlessly on the bench may not do so when subjected to the vibrations of a running engine. Have someone else hold tightly onto your model while you perform a simple test. Start the engine and let it run at full high throttle while you stand back and work the controls. Observe the control surfaces carefully. If there is any indication that control is being disrupted by vibration, or if control movements seem to occur without being transmitted. DO NOT FLY. These are warnings of serious radio or wiring problems that must be corrected before flying. Be certain that is plenty of padding around the receiver.

Double check that the controls are operating in the correct direction

It sounds elementary, but you'd be surprised at how many R/C models have been lost over the years because one of the controls was operating in the wrong direction. Maybe one of the servo reversing switches was inadvertently bumped, or maybe the push rod has been removed and then reinstalled on the wrong side of the servo. Don't let it happen to you! Get in the habit of moving the control sticks before each and every takeoff to verify that everything is operating properly - up stick gives up elevator, right stick gives right rudder, etc.. It also gives you a chance to confirm that the controls are not binding or sticking from some unnoticed new problem.

Transmitter antenna fully extended before flight.

If using an FM Radio ensure that the antenna is fully extended. Get in the habit of fully extending your transmitter antenna BEFORE you turn on your radio and start the engine. Develop a safe pre-flight routine in the pit area so you can avoid sill, and dangerous, mistakes in the future.

Check that the wing is mounted securely

If your model has bolt on wing mounting, double check to make sure that the bolts are snug and that none of the servo wires are pinched between the wing and fuselage joint. If you wing is held on by rubber bands, be sure to use enough rubber bands to keep the wing from shifting around on the fuselage during flight (about eight or ten #64 size rubber bands for a .40 sized model). Always put the last two rubber bands on so they crisscross diagonally to help keep the other rubber bands in place. After flying, wash engine oil off of the rubber bands, dust them with talcum powder, and store them out of the sunlight for maximum life.