

Fixed Wing (Power)
Basic Pilots Course - Lesson Plans



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Version: 3.1

Date: 28 Nov 2011

For Trial Purposes Only

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1. Introduction

The purpose of these lesson plans is to provide instructors with a consistent approach and a logical sequence when teaching students to fly RC aircraft.

These lesson plans are based on the MAAA Flight Instructors' Manual and the associated MAAA Trainee Pilot Log Book. The lesson plans are not meant to be compulsory or slavishly followed. The sequence of training should be tailored to meet the needs of the student.

The content of these lesson plans is designed to present, in a logical sequence, the knowledge and skills needed to fly an RC aircraft safely and competently. Competence comes with practicing the right skills.

Some students will be able to master some of the skills very quickly which will enable some of the lessons to be combined. Others will require the same lesson to be conducted several times. This is normal as all students are different, especially the typical person attracted to the hobby today.

This approach to training is based on mastering two distinct stages of learning to fly RC aircraft. The first is the theory and preparation needed to operate RC aircraft safely. Prior preparation and understanding will give the student the knowledge and confidence to be a good RC pilot.

The second stage is about mastering the skills needed to fly an RC aircraft competently and safely.

Both stages are essential for the development of an RC pilot capable of flying RC aircraft in a safe and competent manner in a club environment.

Each lesson plan is based on following a standard process for the delivery of each theory and practical (flying) lesson. These processes are:

Theory Lesson	Flying Lesson
Brief	Brief
Explain	Rehearse
Debrief	Demonstrate
	Practice
	Debrief

All lessons should follow either of these two processes depending on what is being taught. The appropriate process is printed on the bottom of each page as a prompt. The aim of each lesson is determined by the lesson objective. The teaching points for each lesson are listed on the respective lesson plan. Once the student pilot can meet the lesson objective then the lesson has been successfully completed.

Any suggestions for improving these lesson plans can be forwarded to *(insert club or state CFI)*.

See www.maaa.asn.au *(to be confirmed)* for details.

2. Preparation for Flying

Stage objective: To understand the theory and preparation needed to become a competent RC aircraft pilot.

Lesson topics:

- 2.1 Introduction to learning to fly an RC aircraft.
- 2.2 Field layout and safety procedures.
- 2.3 Transmitter and aircraft controls.
- 2.4 Aircraft air worthiness.

Notes:

- Provide student with *MAAA Trainee Pilot Logbook (for Fixed Wing Power Aircraft)*.
- Provide student with *club safety rules or procedures*.
- You should use a suitable RC trainer aircraft and transmitter.
- Obtain a copy of *MAAA014 Checklist for Inspection of Fixed Wing Aircraft*.

2.1. Introduction to learning to fly RC Aircraft

<p>Lesson Objective: To explain to the student the sequence of training and content of the Basic Pilots Course.</p>	
<p>Teaching Points:</p> <ul style="list-style-type: none"> ▪ The sequence of lessons that make up the Basic Pilots Course. ▪ Importance of safety. ▪ The stages of a theory lesson; Brief - Explain - Debrief. ▪ Stages of a practical (flying) lesson: <ul style="list-style-type: none"> ○ Brief (explain) - every flight needs an objective, even if it is just to practice circuits or figure eights. ○ Rehearsal - on the ground when possible. ○ Demonstrate - demonstrate in the air so the student can see what the aircraft/manoeuvre looks like. ○ Practice - makes perfect. ○ Debrief - ask two questions "how do you think you went?" and "what would you do differently next time?" ▪ What's involved in learning to fly (commitment) ▪ Demonstration flight - to get the student flying 	<p>Notes:</p> <p>Adult learning - students like to know why as well as what. Each student is different so the approach used will need to be tailored to meet their needs.</p> <p>The overall objective is to teach the student to fly RC aircraft safely. The focus is the student not the instructor.</p> <p>Student should know the stages of a lesson. They can then follow the lesson and will understand the structure better. The student will also know if the lesson objective is clear or not and if the lesson objective has been achieved or not.</p> <p>Each practical lesson should generally take about 30 minutes, with about 15 minutes flying practice.</p>
<p>Things to look for:</p> <ul style="list-style-type: none"> ▪ Following the stages of a lesson. 	<p>Common issues:</p> <ul style="list-style-type: none"> ▪ Failing to follow the stages of a lesson.

Brief - Explain - Debrief

2.2. Field Layout and Safety Procedures

Lesson Objective: To understand the requirements for safe operation of RC aircraft.

See Annex A for diagram of circuit and safety zones.

Teaching Points:

- Layout of the field and safety arrangements - rules and safety procedures (every RC pilot should know).
- Potential hazards and how to deal with them.
- What to do in the event of an accident.
- What to do if a full size aircraft, helicopter or hot air balloon enters the flying area.
- Flight line etiquette.

Notes:

- Have a copy of the *club Safety Rules or Operating Procedures* for the student.
- Have the student show on the ground where he/she can and cannot fly (walk around the flying field).
- Have the student talk you through the safety issues (starting in the pits, awareness of others, safety on the strip etc).

Things to look for:

- An understanding of the safe flying zones.
- Safety in the pits.
- Cooperation and communication with other pilots when flying.
- Safety (to self, to others, to property and equipment).

Common issues:

- Starting aircraft in the pits (especially electric).
- Flying over the pilot box.
- Flying too fast along the strip at low level.
- Not seeking permission to taxi on the strip or to take off.
- Not letting other pilots know when you are going to land.
- Not seeking permission to cross the strip.
- Not letting other pilots know when you are clear of the strip.

2.3. Transmitter and aircraft controls

Lesson Objective: To control the RC aircraft using the transmitter.

The use of the buddy box and terms used to transfer control from instructor to student and back should be covered during this lesson.

Teaching Points:

- Lift, gravity, thrust, drag.
- Aircraft major components.
- Transmitter major components.
- Operating the transmitter and the aircraft control movements.
- Operation of the buddy box (system).

Notes:

Use this lesson to run the student through a typical flying lesson but on the ground. You will need:

- RC trainer aircraft.
- Transmitter.
- Buddy box (other transmitter and cable).

Things to look for:

- Keeping fingers/thumbs on the gimbals (transmitter sticks).
- Ability to find and manipulate the trims without looking.

Common issues:

- Use consistent terminology.
- Using the correct control on the transmitter.
- Taking eyes off the aircraft or looking at the transmitter.
- Getting distracted.

2.4. Pilot Safety and Aircraft Airworthiness

Lesson Objective: To understand how to check the RC aircraft is safe to fly and how to operate the RC aircraft safely.

To reinforce the point that the safe operation of a model RC aircraft rests exclusively with the pilot.

Teaching Points:

- Ensuring the training aircraft is airworthy (and safe to operate).
- Use of MAAA014 - Checklist for Inspection of Fixed Wing Aircraft.
- Preparation before flying. See checklist - RC aircraft preparation for flight.
- Starting an RC aircraft. See checklist - Starting RC aircraft.
- Post flight checks.
- Post flying checks.
- Five 'P's - prior preparation prevents poor performance.

Notes:

You will need to cover:

- RC training aircraft.
- Transmitters (including frequency management/keys etc).
- Checklist - RC aircraft preparation for flight.
- Checklist - Starting RC aircraft.
- Copy of *MAAA014 Checklist for Inspection of Fixed Wing Aircraft*.
- Common sense (often in short supply).

Things to look for:

- Awareness of safety.
- Potential safety issues/hazards.
- Situational awareness (understanding of what is happening around them).

Common issues:

- Poor condition of aircraft.
- Not understanding the importance of safety .
- Not completing range check.
- Not checking control surface movements for appropriate travel or direction.
- Not checking COG, batteries, fuel etc.

3. Training Sequence

Stage objective: To outline the training sequence (and content of each lesson) used to teach a person to fly RC aircraft.

The following sequence is not mandatory or compulsory. It is a suggested sequence that should work for most student pilots. There are always exceptions or instructor preferences which should be taken into account when commencing to teach. The key factor is the student and what will work for them. All lessons, and associated teaching points, will need to be covered at some stage during the Basic Pilot's Course.

Key Point: The aim is to teach the student to fly proactively rather than reactively.¹

Lesson topics:

- 3.1 Flying in a straight line
- 3.2 Turns
- 3.3 Circuits and procedural turns
- 3.4 Figure eights
- 3.5 Taking off
- 3.6 Fast and slow flight
- 3.7 Simple aerobatics
- 3.8 Landing approaches and landing
- 3.9 Landing dead stick and cross wind landings

Common Issues:

- Flying too fast - learning to fly is about getting the student to land. The ability to fly the aircraft **slow** is **essential** to this objective.
- Inability to set up for landings appropriately - the instructor must know and understand the correct method.
- Flying in an unsafe manner - including deliberately breaching or ignoring local rules (too high, too fast, outside of safety zones, poor visibility, when too much traffic).
- Lack of awareness or consideration of other pilots - the student learns as much from the instructor's example as he does from each lesson.

¹ Being proactive rather than reactive is about getting the student to fly the plane in a purposeful manner, or being in control of the plane, rather than always reacting to the plane. This is accomplished by getting the student to fly the plane to a predetermine position rather than just correcting their mistakes. It is as much about the instructor being positive and setting targets (in other words being in front of the plane) as it is in the student's ability to get and put the plane where he/she wants it to be rather than letting the plane wander all over the sky.

3.1. Flying in a straight line

Lesson Objective: To fly the RC airplane straight and level towards a predetermined position.

The use of the buddy box and terms used to transfer control should be covered before commencing this lesson.

Teaching Points:

- Use of ailerons to maintain level flight.
- Use of elevator to maintain height.
- Use of both to maintain level and height.
- Small smooth control inputs.
- Becoming familiar with the airplane's shape/silhouette in the sky when flying close, far away and at a consistent height.
- Student must keep eyes on the aircraft when in control (not to be distracted by other pilots, airplanes etc).
- Student must be able to manipulate the transmitter controls without looking at them.

Notes:

- Instructor to take off and trim aircraft.
- Instructor should set the throttle (approx 1/2).
- Instructor to take control of turns.
- Height should be about 300 ft.
- Should fly the circuit using upwind and down wind legs.
- Instructor should demonstrate flying in a straight line and clearly identify where he wants the student to fly to for the upwind and the down wind legs (give the student a spot to aim for).

Things to look for:

- Student has throttle set at 1/2 before taking control.
- Student may have tendency to change throttle setting when manipulating the ailerons.
- Student may have tendency to input rudder when manipulating the elevator.

Common issues:

- Jerking the controls.
- Taking fingers off the controls.
- Reacting to the airplane rather than anticipating and controlling the aircraft.

3.2. Turns

Lesson Objective: To perform 90 and 180 degree turns ensuring the aircraft does not lose height.

The student should be able to fly in a straight line to a predetermined position.

Teaching Points:

- Use of ailerons to bank the aircraft.
- Use of elevator to maintain height during the turn.
- Use of both aileron and elevator to make a coordinated turn while maintain height.
- Small smooth control inputs.
- **Aircraft should not be banked more than 30 degrees.**²
- Becoming familiar with the airplane's shape/silhouette in the sky when making turns.

Notes:

- The instructor should fly the circuit to demonstrate where the turn points are located.
- Height should be about 300 ft.
- Need to start turn on to base leg out much further to enable plenty of room for subsequent turn on to upwind leg.
- Student should be told to keep their eyes on their aircraft when in control (not to be distracted by other pilots, airplanes etc).

Things to look for:

- Banking no more than 30 degrees.
- Student may have tendency to change throttle setting when manipulating the ailerons.
- Student may have tendency to input rudder when manipulating the elevator.
- Starting turns too late - resulting in flying too far away.

Common issues:

- Losing height in the turn (need to add elevator input much earlier).
- Aircraft balloons in the turn (elevator input much too early), watch for the aircraft to stall.
- Taking fingers of the controls.
- Reacting to the airplane rather than anticipating.

² A bank angle of 30 degrees will enable a smooth turn without the need for a large amount of elevator. Once the bank angle gets over 30 degrees the elevator has a tendency to tighten the aircraft's turning circle rather than bring the nose of the aircraft up. The student will attempt to put in large amounts of elevator which is then difficult to judge causing the aircraft to nose up changing height and speed rapidly. A smooth turn using 30 degree of bank is ideal for landing approaches.

3.3. Circuits and procedural turns

Lesson Objective: To fly the airplane around the circuit (in both directions) in a rectangular pattern at a constant height with the up wind and down wind legs parallel to the airstrip.

The student should be able to fly in a straight line and make 90 degree turns without losing height. Before commencing the flight ensure you explain what a procedural turn is and why we use it.

Teaching Points:

- Use of both aileron and elevator to maintain level and height.
- Small smooth control inputs.
- Student to fly the circuit.
- All turns should involve 30 degree bank - no more.
- Introduce a procedural turn to ensure there is enough room for the base leg turn on to the up wind leg (landing approach).
- Student to fly reverse circuit, incorporating a procedural turn.

Notes:

- Instructor to take off and trim aircraft.
- Instructor should set the throttle (approx 1/2).
- Height should be about 300 ft.
- All banking of the aircraft should be no more than 30 degrees for all turns.
- Instructor should show/demonstrate location of the circuit including where to turn to commence both up wind and down wind legs which are parallel to the strip.
- Instructor should demonstrate a procedural turn.

Things to look for:

- Student maintains the same height throughout the circuit.
- Student making the turns at the appropriate locations.
- Control inputs are smooth and gradual.

Common issues:

- Not leaving enough room for the turn resulting in a bank greater than 30 degrees.
- Not finishing the base leg turn lined up with or just prior to the up wind leg.
- Not being able to fly a reverse circuit.

3.4. Figure Eights

Lesson Objective: To fly figure eights at a constant height. This will assist in addressing control reversal.

Students should be able to fly the circuit without losing height before commencing this lesson.

Teaching Points:

- Use of both aileron and elevator to maintain level and height.
- Smooth gradual control inputs.
- Becoming familiar with the airplane's shape/silhouette in the sky when flying close, far away and at a consistent height.
- The effects of control reversal. Flying towards you and flying away from you³.
- Introduce use of rudder - to tighten turns while maintaining 30 degrees of bank.

Notes:

- Instructor to take off and trim aircraft.
- Instructor should set the throttle (approx 1/2).
- Height should be about 300 ft.
- Instructor should demonstrate flying a figure eight, with emphasis on the cross over point and the size of the circles.
- Cross over point should be about 100 - 150m in front of student.
- Introduce the use of rudder when turns with ailerons and elevator have been mastered.

Things to look for:

- Student maintains throttle setting.
- Cross over point is maintained, central and in front of student.
- Turns are 30 degrees of bank and smooth.

Common issues:

- Jerking the controls - not flying smoothly.
- Reacting to the airplane rather than anticipating.

³ In order for the student to recognise which aileron to input there are three techniques which may work; have the student face the direction of travel of the aircraft (difficult when aircraft is behind them), or have the student stand parallel to the strip and move their head to keep the aircraft in view and watch what the aircraft does, or have the student 'waggle' the wings at various parts of the circuit until they get use to control reversal.

3.5. Landing approaches and landings

<p>Lesson Objective: To correctly set up for a landing, including throttle control.</p>	
<p>Teaching Points:</p> <ul style="list-style-type: none"> ▪ Elevator controls pitch, throttle controls rate of descent. ▪ Use throttle to adjust rate of descent -while keeping the aircraft level (using the elevator and ailerons). ▪ Alignment on runway centreline essential - practice landing approaches. ▪ Landing from both ends. ▪ High and low approaches. ▪ Call out "landing" on downwind leg for other pilots to hear. 	<p>Notes:</p> <ul style="list-style-type: none"> ▪ Concentrate on height and speed control throughout circuit when preparing to land. ▪ Lining up on the centreline - use 30 degrees of bank for final turn which places the aircraft on or very close to the runway centreline. ▪ Need to land under power (even if just above idle). ▪ Cut throttle on or just before crossing threshold. ▪ Touch and goes. ▪ Need to practice landing from both directions.
<p>Things to look for:</p> <ul style="list-style-type: none"> ▪ Alignment with runway centreline. ▪ Minimal control inputs (get set up correct - wings level and aircraft heading in right direction, small adjustments only). ▪ Height control. ▪ Aircraft should be pointing level, not down or up. ▪ Flaring. ▪ Go rounds. ▪ Safety procedures - let other pilots know, call out "landing". 	<p>Common issues:</p> <ul style="list-style-type: none"> ▪ Down wind leg too close. ▪ Base wind leg too close. ▪ Excessive speed prior to or during landing approach. ▪ Inability to approach on the centreline - poor setup. ▪ Approaching too high, too low or too far away. ▪ Nosing the aircraft down to lose height. ▪ Dumping the aircraft on to the airstrip (not flaring). ▪ Not being able to land properly from both directions.

3.6. Taking off

Lesson Objective: To fly the plane off from the runway (to take off).	
Teaching Points: <ul style="list-style-type: none">▪ Tricycle undercarriage vs. tail dragger - use of elevator.▪ Motor will pull to the aircraft to the right as power is increased.▪ Use of rudder on the ground.▪ Angle of attack.▪ Using all of the runway in case the motor cuts out.▪ The effect of a cross wind when taking off.	Notes: <ul style="list-style-type: none">▪ Have the student practice taxiing up and down the runway increasing speed.▪ Have the student take off from behind the aircraft initially.▪ Eventually have the student take the aircraft off while standing in the pilot box.
Things to look for: <ul style="list-style-type: none">▪ Smooth application of throttle.▪ Anticipate the aircraft veering to the right by putting in opposite (left) rudder.▪ Keep angle of attack below 20 degrees, use a gradual climb out.	Common issues: <ul style="list-style-type: none">▪ Jerking the throttle, applying power too quickly.▪ Late input of the rudder resulting in aircraft veering all over the place.▪ Climb out too steep - angle of attack too steep, potential for stall.▪ Commencing cross wing turn (first turn after taking off) too early.

3.7. Fast and slow flying

Lesson Objective: To fly the RC aircraft fast and slow, and to trim the aircraft accordingly.	
Teaching Points: <ul style="list-style-type: none">▪ Airspeed and effect on aircraft controls.▪ Time to react.▪ Flying at a comfortable speed.▪ Height.▪ Stall speed.▪ Trimming the aircraft for different speeds.	Notes: <ul style="list-style-type: none">▪ The faster the aircraft flies the greater the lift.▪ Understanding the stall speed of the aircraft, and the aircraft's reaction when it stalls - demonstrate a stall at height.▪ Gauging the stall speed will assist when landing the aircraft.
Things to look for: <ul style="list-style-type: none">▪ Flying too fast for comfortably control of the aircraft.▪ Flying too slow such that the aircraft stalls.▪ Ability to manipulate the trims without looking.	Common issues: <ul style="list-style-type: none">▪ Flying too fast can result in the aircraft flying too far away.▪ Flying too slow especially close to the ground may not leave enough reaction time to recover.▪ Aircraft pitching when power is applied - aircraft needs to be re-trimmed.

3.8. Simple aerobatics: inverted flight, barrel roll and loop

<p>Lesson Objective: To perform simple aerobatics to assist in getting out of trouble.</p>	
<p>Teaching Points:</p> <ul style="list-style-type: none"> ▪ While simple they are used to get out of trouble. ▪ Effects of wind turning the aircraft over ie wind lifts a wing. ▪ How to recover from a stall. ▪ Use of elevator when barrel rolling and flying inverted. ▪ Trimming the aircraft. ▪ Setting the aircraft up (COG, lateral balance, control throws, rates, exponential) - introduce and explain the flight trimming chart. 	<p>Notes:</p> <ul style="list-style-type: none"> ▪ An RC trainer aircraft may not be suitable to teach all manoeuvres, may need another aircraft type. ▪ Teach one manoeuvre at a time. ▪ Inverted flight - use ailerons to roll aircraft over and a little forward elevator (push elevator stick forward) held in to keep aircraft level. ▪ Barrel roll - point nose of aircraft up a little, use ailerons to roll aircraft through 360 degrees and then back to level using elevator. ▪ Loop - pull back on elevator and hold in all the way around a loop (make sure you have plenty of height before commencing). ▪ Practice will improve.
<p>Things to look for:</p> <ul style="list-style-type: none"> ▪ Ensure the student understands the control inputs needed for each manoeuvre. ▪ Poorly set up aircraft - too nose heavy or tail heavy. ▪ Lateral balance issues - ailerons, elevator, rudder are not neutral. ▪ Incident lines and thrust line are out of alignment. 	<p>Common issues:</p> <ul style="list-style-type: none"> ▪ Students will be nervous, so break lesson down into simple stages, one manoeuvre at a time. ▪ Take the time to ensure the student understands the control inputs needed for each manoeuvre and how the aircraft will react.

3.9. Landing dead stick and cross wind landings

Lesson Objective: To land the aircraft when motor cuts out or when there is a cross wind.	
Teaching Points: <ul style="list-style-type: none">▪ Immediate action when plane stops responding - reduce throttle, get the aircraft level, apply throttle gradually.▪ Landing on the strip - call out "dead stick".▪ Landing off the strip - make a mental note of where the aircraft landed.▪ Cross wind landings - use of rudder and a little more throttle than normal.	Notes: <ul style="list-style-type: none">▪ When engine cuts out it is a matter of judgement whether to try and make it back to the strip.▪ When the aircraft is approaching the ground keep the aircraft level (wings level and nose/tail of aircraft level).▪ When landing in a cross wind watch the aircraft not the direction it is pointing. Be aware that the aircraft will want to 'weather cock' into the wind.▪ Cross wind landings take practice to master.
Things to look for: <ul style="list-style-type: none">▪ Stalling the aircraft.▪ Not keeping the aircraft level, from side to side and from nose to tail, especially when approaching the ground.	Common issues: <ul style="list-style-type: none">▪ Flying too far away and/or down wind, means there is no chance of making it back to the strip if the motor cuts out.▪ Not compensating for the wind.▪ Giving up before the aircraft has reached the ground. Never give up.

3.10. Putting it all together

Lesson Objective: To take off, fly a number of circuits, trim the RC aircraft, complete figure eights and safely land.	
Teaching Points: <ul style="list-style-type: none">▪ Have a mental flight plan before commencing the flight.▪ Be aware of safety.▪ Practice the skills, while using the knowledge that has been taught.▪ Congratulate the student on completing the course.	Notes: <ul style="list-style-type: none">▪ The student should now be encouraged to take responsibility for their own flying.▪ By all means continue to assist/coach but let them fly their aircraft themselves.▪ Encourage the student to enjoy flying.
Things to look for: <ul style="list-style-type: none">▪ Unsafe practices.▪ Being over confident and taking short cuts.	Common issues: <ul style="list-style-type: none">▪ Instructors that will not let go of the student.▪ Not being prepared for the inevitable crash, its just part of the hobby.▪ Not having a sense of humour.

The student pilot should now be competent to fly solo.

4. Reference material

- *MAAA Flight Instructors' Manual*
- *MAAA Trainee Pilot Logbook - for Fixed Wing Power Aircraft*
- *MAAA014 Checklist for Inspection of Fixed Wing Aircraft*
- Club Safety Rules or Operating Procedures

Every instructor should be familiar with the following publications:

- *MAAA MOP 001 - Accident Reporting*
- *MAAA MOP 014 - General Rules And Guidelines For The Operation Of Model Aircraft*
- *MAAA MOP 027 - Award of Wings and Instructor Rating*
- *MAAA MOP 056 - Safe Flying Code*

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Annex A - Field Layout

