Canberra Model Aircraft Club
Canberra
A.C.T

Pilot Training Manual & Logbook

Issue Date: November 2009

www.cmac.org.au

Contents

Learning to Fly Radio Controlled Aircraft

Introduction

Learning to fly radio controlled models is a relatively demanding process. As with full size flying, it is advisable to avoid short cuts when purchasing equipment and you should also aim to avoid interruptions to your training.

Limiting your commitment to the training process can drastically extend the time required to learn to fly.

At CMAC we take pride in our training program and we aim to teach you to fly competently and safely in the shortest possible time.

What do you need to get started?

- Club membership
- 4 channel radio (fitted with NiCad batteries)
- A training aircraft
- An engine
- A flight box
- An instructor

Do you need to join the club immediately?

CMAC allows three trial instructional flights to prospective newcomers to allow them to get a feel for what is required. After these initial flights you are expected to join the club.

An important aspect of paying for club membership is that it provides insurance cover and it entitles you to the full services of the club including the newsletter and the flight training program.

How do I learn to Fly?

CMAC Encourages the use of your own trainer for the flying training program, however, it is advisable to begin with learning to fly on a PC Based RC Flight Simulator such as Real flight or AeroFly Deluxe as this is a great way to sharpen your reflexes and give you a feel for what it will be like when you first take to the skies.

How much does it cost?

You won't get much change from $1,000 by the time you have purchased the equipment required to become an R/C flyer. While this may sound like a large commitment of funds, it's no more than the cost of a good set of golf clubs and, as with golf, the right equipment should give the right result. Buying second-hand equipment may be a feasible option, however, it is advisable to seek assistance from someone experienced with R/C flying before you make the purchase.

Remember also that the radio gear and engine, new or second hand, can be transferred to other models.

How long does it take to learn to fly?

This is variable because it depends on the skill and commitment of the student. Based on our experience, on average, it takes between 25 and 30 flights, each of about 15 minutes duration. If you fly each weekend (weather permitting) you can expect to go solo in around 8 to 10 weeks. Be aware, however, that training can take as long as 12 months.

On the other end of the scale we have taught people to fly in one week of intensive effort.

How do I select a training aircraft?

A suitable training model is essential for rapid and trouble free learning. Unfortunately many training models which are marketed as a 'basic training aircraft' are not suitable for training. To avoid buying an unsuitable model, discuss the options with your instructor and follow their advice. There can be many external pressures on you to purchase an unsuitable model such as cost, ease of building, or even a model shop sales person's preference for a particular training model. If possible, you should resists these pressures and temptations and follow your instructor's recommendations. Remember that your instructor is the one who will actually teach you. Your instructor is giving up his time, free of charge, to get you airborne. Instructors enjoy teaching but they also like to see their time being invested in the best possible way. If your instructor suggests a particular type of model you should consider their suggestion carefully before purchasing your model.

Most people start with a standard type trainer aircraft, high wing, 40 size, almost ready to fly (ARF) trainer with a wing span of around 60 inches and the instructors at CMAC recommend this type of model. It is slow, stable and forgiving! The building of this type of model is familiar to your instructors, as are the flying characteristics. Also, you have the club trainers to refer to during building.

Remember also to assist your instructor by assembling your trainer at the start of the days flying and clearing and packing it up at the end of the day. Also assist by refuelling between flights. The more you do and the more you get involved the more you will learn and never hesitate to ask questions even if they seem simple. The sport of aeromodelling is a very interactive past time and you will learn a great range of skills from the experience.

Welcome to R/C flying and good luck in your training!

Student Pilot Details

Name: _____

MAAA Number: _____

Address: _____

_____

Phone: _____

Date commenced training: _____

Date completed training: _____

Bronze Wings: _____

Gold Wings: _____

Stage 1 – General Handling

Training Outcome

At the completion of this stage the student will be able to perform the following manoeuvres:

- Turns
- Climbs and descents
- Steep turns
- Loops
- Figure eights
- Taxying
- Procedure turns
- Speed control (flying slow and fast)

Theory

Aim of Flight Training

This course is designed as a basic course which will enable the student to confidently launch and recover his/her trainer type model. General handling and the basic manoeuvres will be mastered as part of the process. The training course is divided into four stages with each stage sub-divided into theory and practical (i.e. flying).

Basic Flying Techniques

Depth Perception

Control Reversal – why it happens.

The following techniques are used for dealing with control reversal:

1. Turn and face in the direction of flight
2. Memory
3. Stick toward the low wing
4. Experimentation
5. Practice control inputs with model on the bench and fly 'mental'

Basic Aerodynamics

- Lift, weight, thrust, drag
- Why a wing lifts
- Flat bottom wings versus symmetrical wings – ballooning
- Effect of changes in angle of attack
- Stalling angle and speed
- The effect of turns on stalling speed
- Speed controlled by attitude. Rate of climb or descent controlled by power.
- Centre of Gravity (C of G) – what is it and what are the effects of moving it

Effects of Controls

- Aileron
- elevator
- rudder
- throttle

Define the terms:

- pitch
- yaw
- roll
- rotation

Further Effects of Controls

- ailerons
- elevator
- rudder

Model Flying and the Law

- Civil Aviation Orders
- Insurance
- Organisational structure of the aero-modelling movement in Australia

Frequency Board

How to determine what frequency your transmitter is on (channel number)

Use of frequency board:

- The use of this board must be observed religiously!
- Do not turn your transmitter on, even momentarily, without placing your key in the board.

Safe Flying Area – Borders and Safety Considerations

NO FLY ZONES!

- Don't fly over the pits
- Don't fly over the road

The flying field:

- General description
- Limitations
- Hazards
- Suitable emergency landing areas

Point out the slope in the field.

Radio Range Check

Aerial Down
Walk at least 20 paces

Batteries

- Characteristics of nicads
- Care and use of nicads
- Charge and discharge rates

Propellers

- Explain meaning of numbers
- Explain practical effect of changing pitch
- Propeller safety
- Explain the importance and how to balance the propeller

Engine Tuning

- Tune from behind the propeller
- Aim to have the engine on the rich end of peak performance because acceleration on take off and reduction in fuel tank level, as well as the motor unloading in the air can cause a lean engine run. Running lean causes the engine to overheat and greatly reduces the life span of the engine

Execution of a Typical Flight

1. *Assemble model*
2. Key in frequency board
3. Test controls ensure they are both free and correct
4. *Ensure throttle can be fully closed (engine stopped) from the transmitter*
5. *Range check*
6. Fuel up
7. Prime engine
8. Connect to glow plug, set throttle to high idle and ensure engine can be shut down from the transmitter
9. Start engine and allow *engine to warm up for about 30 seconds*
10. *Run engine up to full power and tune main needle for peak performance then turn back to the rich end of the peak performance range (rich setting –anti clockwise, is achieved with the needle out rather than in)*
11. With engine at full throttle, hold model in a vertical attitude and confirm engine running OK
12. Taxi model out to the holding point
13. Advise other pilots of your intention to taxi into position for take off by calling 'take off'
14. **Again check controls are free and correct and set elevator trim for take off**
15. After line up, check wind direction and other traffic
16. Remind yourself to steer with rudder on the ground and aileron immediately when airborne
17. Remind yourself also that should things turn even slightly bad, abort the take off
18. Open the throttle smoothly and use elevators to lift off
19. after landing, vacate the field as soon as possible
20. turn the receiver (Rx) off before the transmitter (Tx)
21. remove your key from the frequency board
22. refuel for further flying

Note: Items in *italics* need only be conducted prior to the first flight.

Stage 1 Test – General Handling

Student: _____

Theory

- ☐ Aim of flying
- ☐ Basic flying techniques
- ☐ Basic aerodynamics
- ☐ Effects of controls
- ☐ Further effect of controls
- ☐ Model flying and the law
- ☐ Frequency board
- ☐ Safe flying area
- ☐ Radio range check'
- ☐ Execution of a typical flight
- ☐ Batteries
- ☐ Propellers
- ☐ Engine tuning

Practical

- ☐ Turns
- ☐ Climbs and descents
- ☐ Steep turns
- ☐ Loops
- ☐ Figure eights
- ☐ Taxying
- ☐ Procedure turns
- ☐ Speed control (flying slow and fast)

Stage 1 Completed on: _____

Instructor's Name: _____

Instructor's Signature: _____

CANBERRA MODEL AIRCRAFT CLUB

Stage 2 – Circuits and Take Off

Training Outcome

At the completion of this stage the student will be able to perform the following manoeuvres:

- Introduction to “box” circuits and go-rounds
- Takeoff from behind the model
- Takeoff from the flight box
- Trimming the model

Theory

Takeoff technique

Ask for clearance to takeoff from the pilots flying. Once you have been given the all clear then taxi out to the appropriate end of the runway to position the aircraft to take off into the wind. If in doubt ask the other pilots what way the circuit is i.e. left to right or right to left.

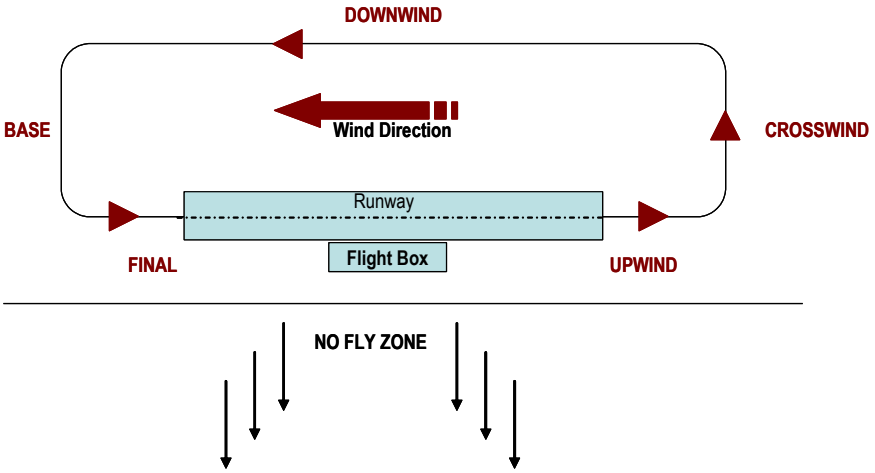
Right rudder is generally required at the start of the take off run. Remind yourself to steer with rudder on the ground and go to aileron as soon as the model lifts off. Abort the take-off if directional control is lost or engine is doubtful when you commence the run along the runway. Allow the aircraft time to accelerate after take-off before commencing to turn.

With tricycle undercarriage aircraft the trim should be set such that the nose wheel will lift off the ground when the aircraft reaches flying speed. Try to avoid ‘wheel-barrowing’. Tail wheel aircraft should be trimmed to virtually take off by themselves.

Take off down hill when wind is a crosswind or very slight tail wind. Once at a safe height, reduce power to reduce control sensitivity and tendency for nose to pitch up. Re-trim the model as the model was trimmed nose light for take off.

The "Box" Circuit

Description of typical "box" circuit (refer to diagram)



Handling traffic

When at the holding point shout 'takeoff' to advise other modellers of your intention to take off and wait for them to acknowledge. Should another pilot require to use the field urgently due to engine failure etc while you are taxying for takeoff, you should taxi promptly off the runway to the nearest boundary, advising them that the field is clear. Mid-air collisions are rare and usually no-one is at fault. Try to fly and land with the engine operating as this increases the speed at which you can vacate the runway thus improving

traffic flow. Exhaust smoke will often tell you if your engine is still running when it is not audible over other engines.

Power loss or engine failure on takeoff

If you have a loss of power during take then throttle back to richen the fuel mixture. Maintain flying speed if possible by keeping the aircraft level or slightly nose down. Land straight ahead within a fan of 15 degrees either side of straight ahead. Do not turn back. It is better to retain control and land among obstacles than stall and crash. If fences are in the way commit to land on one side or the other.

Trimming the model

Trims are fine adjustments on controls. Practice reaching for the trims without looking at them i.e. keep your eyes on your model. Set the throttle trim so the engine can be shut down from the transmitter. Every power change may requires a change in elevator trim to maintain a given altitude. Many models benefit from re-trimming during flight and after landing. Beware of excessive up trim after take off. If the model is out of trim fly it on the sticks until such time as you have sufficient altitude to reach for the trims. Your aim should be to trim the aircraft at approximately half throttle so that it will fly straight and level without you needing to touch the sticks to correct the aircrafts flight path.

Stage 2 Test – Circuits and Takeoff

Student: _____

Theory

- ☐ The “box” circuit
- ☐ Takeoff technique
- ☐ Power loss or engine failure on takeoff
- ☐ Handling traffic
- ☐ Trimming the model

Practical

- ☐ Introduction to “box’ circuits and go rounds
- ☐ Takeoff from behind the model
- ☐ Takeoff from the flight box
- ☐ Trimming the model

Stage 2 Completed on: _____

Instructor’s Name: _____

Instructor’s Signature: _____

Stage 3 – Approach and Landing

Training Outcome

At the completion of this stage the student will be able to perform the following manoeuvres:

- Speed control – slowing down without losing height and descending at a reduced airspeed
- "Box" circuits with practice let downs – Student to continue to landing where a good approach is made otherwise go around
- Approaches of procedural turns
- Dead stick approach and landing

Theory

Approach and landing technique

A good landing follows a good approach. Speed is controlled by attitude (i.e. nose down or nose up) and the rate of descent is controlled by power. As you turn onto the base leg reduce the throttle to slow the aircraft down. Make a gentle turn onto the upwind leg lining the aircraft up with the runway centreline. As you get close to the runway keep the model on the runway centre line as well as on the glide slope. Should an approach go bad, i.e. the aircraft is not travelling on the runway centreline or is too high or low relative to the glide slope then apply throttle and go around. Saving a bad approach is very difficult. You can use one or more "S" turns to lose height on an approach. Keep the aircraft relatively level. Use the throttle to control the rate of descent. As the aircraft losses speed you may have to apply throttle and adjust the attitude (using the elevator) to keep the aircraft level and travelling at the

appropriate speed while descending. When the aircraft gets near the ground hold it just off the ground using the elevator and reduce the throttle. This is called flaring. Eventually the aircraft will settle on the runway. If your approach speed is too fast the aircraft will bounce. If it does bounce then adjust the aircraft's attitude using the elevator to get it level and wait for it to settle on the runway. Use the rudder to steer once on the ground.

Forced Landing

If your aircraft's engine stops then try to land into the wind. If you are too close to the ground then continue in straight direction ignoring the wind. Remember the glide slope cone. It is better to land under control in the outfield than risk total loss of control. Do not lose flying speed. Do not attempt to stretch glide. Best glide speed is stall speed plus about 15%. Remember the "S" turn. Keep the nose of the aircraft down slightly and be prepared to land at a speed slightly faster than you would normally. When close to the ground commence flaring and don't forget to steer with the rudder once on the ground.

Engine trouble shooting

If the engine is not running satisfactorily do not take off. If you have taken off and you find the engine is spluttering or not running as well as it should then land immediately. Return to the pits and re-tune the main mixture needle about 1/8 - ¼ of a turn out (anti-clockwise) on the rich side of peak revolutions per minute. If the engine is still not performing as expected then check the following; plug, plumbing (especially for holes or nicks in the fuel lines), location of the clunk in the fuel tank, pressure build-up in the tank, fuel quality or idle mixture setting.

Loss of control – Vital actions

The first action is to close the throttle. This should enable you to regain some control and slow the rate at which the aircraft changes

direction and should also assist in limiting any damage should the worst occur. If time and circumstances permit shout “out of control” – in case someone has turned on your frequency by accident. Releases both sticks and try to re-orient yourself. Attempt to get the aircraft level and slightly nose down. Remember the application of excessive up elevator can exacerbate the situation by holding the model in a stalled condition. Attempt to land the aircraft as quickly and as safely as possible.

Stage 3 Test – Approach and Landing

Student: _____

Theory

- ☐ Approach and landing technique
- ☐ Flaring
- ☐ Forced Landing
- ☐ Engine trouble shooting
- ☐ Loss of control – vital actions

Practical

- ☐ Speed control (revision)
- ☐ "Box" circuits and go rounds
- ☐ Approaches from procedural turns
- ☐ Dead stick approaches

Stage 3 Completed on: _____

Instructor's Name: _____

Instructor's Signature: _____

Stage 4 – Advanced

Training Outcome

At the completion of this stage the student will be able to perform the following manoeuvres:

- Landing from opposite end of strip
- Cross wind operations
- Rudder only flying
- Side slipping
- Conversion to students model

Theory

Cross wind takeoffs and landings

On takeoff the model tends to weather cock into wind until the wheels leave the ground. On landing "crab' into the wind using the rudder. Describe the manoeuvring required to re-intercept the runway centre-line after it has been lost.

Tricycle vs. tail-wheel

Fundamental difference is the location of the C of G in relation to the main gear. Tricycle undercarriage aircraft have main gear behind the C of G therefore on the ground the wing sits at a low angle of attack (explain implications for landing). Tail wheel aircraft have their C of G behind the main gear so the wing sits at a high angle of attack (explain the implications for landing).

Flaps

Flaps increase lift and drag. Flaps change the trim of the aircraft. Beware of sudden retraction at low altitude.

Flying in wind

Surfing back and forward along the face of the wind. Turbulence. Wind speed does not affect flying airspeed, only ground speed. Wind does not lift the upwind wing. Windshear.

Stage 4 Test – Advanced

Student: _____

Theory

- ☐ Cross wind takeoffs and landings
- ☐ Tricycle vs. tail-wheel
- ☐ Flaps
- ☐ Flying in wind

Practical

- ☐ Practice landing approaches from the north and south
- ☐ Crosswind landings
- ☐ Rudder only flying
- ☐ Side slipping
- ☐ Conversion to student model

Stage 4 Completed on: _____

Instructor's Name: _____

Instructor's Signature: _____

Contact Details

www.cmac.org.au Canberra Model Aircraft Club located on the Monaro Highway.

www.nsfc.canberra.edu.au Namadji Sports Flyer Club located in Tharwa A.C.T

www.bmac.org.au Belconnen Model Aero Club located near Mitchell.

www.qmac.net.au Queanbeyan Model Aircraft Club located near Captains Flat

www.monaromodels.com.au Monaro Models and Hobbies located in Fyshwick, major sponsor and preferred supplier.

www.maaa.asn.au Model Aeronautical Association of Australia

References

Civil Aviation Orders (CAO) Part 95 Section 95.21 Issue 3 – Exemption From Provisions of the Civil Aviation Regulations – Model Aircraft.

Canberra Model Aircraft Club Rules and Regulations

Author: Kent Jorgensen