

GUIDE FOR PROSPECTIVE CLUB MEMBERS

If you want to learn to fly radio controlled model aeroplanes then you really ought to join a club and ask the more experienced club members for help. You need to spend between £250 and £300 to get started and you will need to devote between 5 and 50 (or more) hours preparing your first aeroplane, and at least one or two half days or evenings per week learning to fly.

WHAT YOU NEED

- You need a basic radio control set on the 35 MHz frequency band, with four servos, and clear instructions. It should have rechargeable batteries welded together and securely fitted (not loose cells in holders), and a charger supplied. £100+
- You need a high winged purpose designed trainer. The bigger it is the easier it is to see. Most come ready made with just final assembly and fitting of radio and engine to do; some require a fair bit of careful, but satisfying, work. £50-£150.
- Buy an engine of the recommended size or in the middle of the recommended power range. You will need a glowplug and a spare and a spanner, and a suitable prop and a spare and a spanner. £40+
- You also need bits and pieces like glues, tools, covering materials perhaps, fuel, rubber bands, and engine starting accessories. The minimum is a 2 volt battery with plug lead (or a rechargeable glow starter), rubber finger protector (chicken finger) and priming bottle. Electric starters and power panels with electric fuel pumps are available.

WHAT TO DO

Pay the subscription and join a club as soon as possible. There is often a joining fee and an annual subscription. Insurance is essential and I recommend joining the BMFA (British Model Fliers' Association) which includes substantial third party insurance.

Advise the club officials that you want help in learning to fly, tell them your address and phone number and when you get time off. You may possibly get some introductory lessons on a club trainer under dual control.

Build your model accurately and finish with a colour scheme which is easily seen at a distance (NOT white, sky blue or silver all over). Fluorescent film or trim is a great help. Install the engine, radio and controls carefully and seek advice from an experienced flier if in doubt (instructions here are often poor). In the meantime familiarise yourself with the BMFA safety Code, the local club rules, and the club Training Schedule. If you run in your engine alone, follow the instructions and be careful. **KEEP HANDS AND CLOTHING CLEAR OF THE PROP** - its slicing power is lethal.

When you turn up with your newly finished model seek help. **YOU CANNOT FLY ALONE TILL CLEARED BY A CLUB INSTRUCTOR. DO NOT EVEN SWITCH ON YOUR RADIO** in case you shoot down someone else's aeroplane.

Make sure you know your channel number (a number from 50 to 90 marked on the radio crystals and probably somewhere on the packaging)

Relax and enjoy the world's greatest hobby.

THE COMPLETE BEGINNER

An instructor should give the new member a copy of the training schedule and go over the following important items.

1. Frequency control. Check carefully that the channel number on your Tx flag corresponds to the number on your crystals. Many clubs have a crystal checker. You must not switch on your transmitter unless you remove the peg for your channel number from the pegboard and clip it on your Tx aerial. That is your authorisation to fly. After a flight return the peg to the pegboard when your Tx is off, and fully retract your aerial. In some clubs you are required to leave a peg bearing your name in place of the channel peg, so that others know who has it.
2. Crashes are the responsibility of the pupil. The instructor can take no responsibility for any crash, on the basis that it would have happened much sooner without him. And without this understanding there would be no instructors.
3. Runway discipline. Check the approach and call "TAKE OFF" to ask other fliers' permission before carrying the model onto the runway, and walk away from the runway as soon as possible after take-off. Call "LANDING" when on the approach, and pick up the model quickly after landing. Anyone whose engine stops calls "DEADSTICK" and should be given right of way.
4. NO-GO Areas Models must not fly over the car park or the pits or other no-go area designated by the Club.
5. Model Check. A new trainer must first be checked out carefully. Before assembly check the radio installation, hinges and linkages for security and correct movement. Check the wing is on securely, no warps, CG position correct.
6. The Engine. Check sense of throttle operation, use of trim for cut-off, prop correctly mounted, all bolts secure, plumbing to fuel tank correct. Use a chicken finger or chicken stick to flick the prop, keep everything clear of the prop, and do adjustments from behind.
7. Range check. With the Tx in the pits and its aerial down, the model is carried away to check its range. Make a note of the distance for future comparison.
8. Starting. Remember the pegboard. The Tx must be switched on before the Rx. and switched off after the Rx. Remembering item 6, start the engine and adjust, and check the settings in a nose up attitude. Do another range check with engine running.
9. Pre-flight Check. Before each flight the Tx should be checked to make sure all switches and trims are in their correct positions. Check all controls for free and correct movement. Before take-off, check all controls again, aerial up, and Tx

switches, trims and volts (*C-A-T* check, Controls - Aerial - Transmitter).

THE MAIDEN FLIGHT

The instructor will carry out the test flight bearing in mind the pre-flight briefing items. He will check the handling of the model in looping, rolling, stalling, spinning, and demonstrate its capabilities. After the first flight some adjustments (to linkages etc.) are usually necessary followed by another test flight. If all is well the instructor may let the student get the feel of the controls. After the flight switch off the Rx, then the Tx, remove your peg from the peg board, and fully retract the Tx aerial.

THE FLYING INSTRUCTION

GENERAL

Flying a radio controlled model is a completely new and totally different experience and takes some getting used to. There is the third dimension of height to appreciate, the orientation of the model ("*which way is it going now?*") and we are using the AIR which we can't see and usually dismiss as non-existent. Instructors should keep the flights short, 5 to 10 minutes, otherwise over concentration causes brain-fade. So give the novice a break now and then by taking control to demonstrate something.

Instructors must not think that they can talk the trainee out of a crash as at best they will violently over-control, or they may freeze on the sticks or simply not hear him. Use of a buddy box is recommended as it allows the instructor to take control easily, instantly, and once the pupil's mistake is obvious. Otherwise it is essential that the instructor takes over control at the first sign of a height or fly-away problem developing, even if the trainee thinks he can manage. Better to repair a damaged ego than a damaged model.

The flying training is done at three different heights:-

- HIGH ("two mistakes high") for early practice at turns, circles, figures of eight etc. and stalls and spins. Leaves room for the trainee to make a mistake and then take the wrong corrective action.
- MEDIUM ("one mistake high") As orientation improves and mistakes less frequent the lower altitude make it easier to see the model and thus fly more accurately.
- LOW Only when the model can be flown accurately round a rectangle, and figure eight etc. at medium height will the instructor allow the student to descend the model to the heights needed for take-off or approach and overshoots.

In an attempt to make learning easier we can introduce the controls one at a time, first the primary steering control, be it aileron or rudder, then elevator, then throttle, and then the trims.

Instructors need to fly your model (a) to check it out (b) to make sure it will do what they ask you to do, and (c) to demonstrate what manoeuvre it is they want you to copy. Do not think that they are just hogging the flying.

Your Control Box

Your instructor will assume (quite reasonably) that you know your left from your right but he will also assume that you know how to work the controls on your Transmitter and respond to his demands for left, right or up, which is much less obvious.

The usual Transmitter (Tx for short) has two control sticks, each of which can give proportional output to two controls. Proportional means the servo movement varies in proportion to the stick movement. It is not just on and off like a switch. The sticks are spring loaded to the centre position, except for the throttle function which stays where you put it. The Tx also has a small adjuster (or trim) which makes fine adjustments for each of the four main controls. It also has an ON/OFF switch which you must never switch off, or on, by accident (don't laugh but I've seen them switched off by mistake in confusion with elevator trim). Find out if it has rate switches and adjusters and servo reversers, and how to operate them.

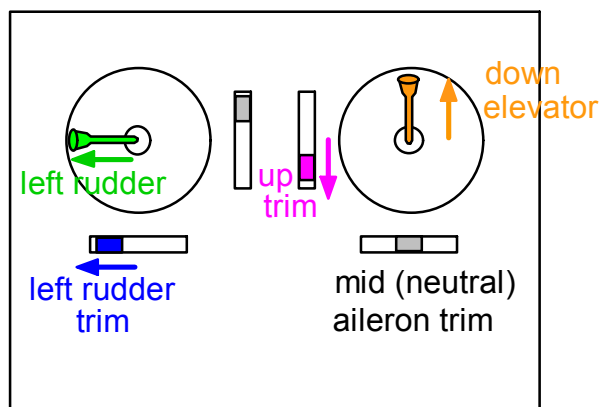


Figure 1

Full size aeroplanes all have the two main controls, the one you use for banking and the one for pitching the nose up and down, linked on the same control wheel or joystick. Modellers call this "Mode 2" (I'll come to Mode 1 soon).

We have the elevator control and aileron control on the right stick, and use the left stick for rudder and engine throttle. Think of the control box as lying flat with the two controls sticking up. The right stick is like the joystick on an aeroplane. You push the sticks away from you or towards you, NOT up and down. As illustrated in Figure 1 you pull the joystick towards you for up elevator and push it away for down elevator. You slide the little trim beside it away from you for DOWN trim and towards you for UP trim. The left stick goes left for left rudder and right for right rudder just as you would expect. The rudder trim also slides left and right to move the rudder left and right when the stick is in the middle.

Now, referring to Figure 2, the aileron stick is pushed to the right for right aileron (the right aileron comes up) and left for left aileron. On models which do not

have ailerons and are steered by rudder, the rudder control is on this stick instead of its usual one.

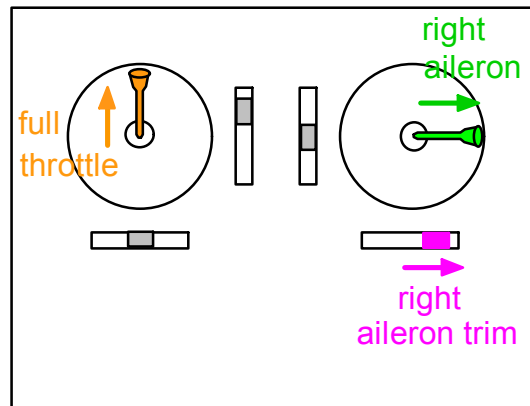


Figure 2

In Figure 3 the operation of the throttle is shown. Just like on a full size aeroplane you push the throttle stick fully forward (away from you) for full power, and pull it back to the stop for idle power, always with the throttle trim forward. It need not be fully forward: anywhere between mid and fully forward is fine. The trim is used to stop the engine when required by pulling it fully back.

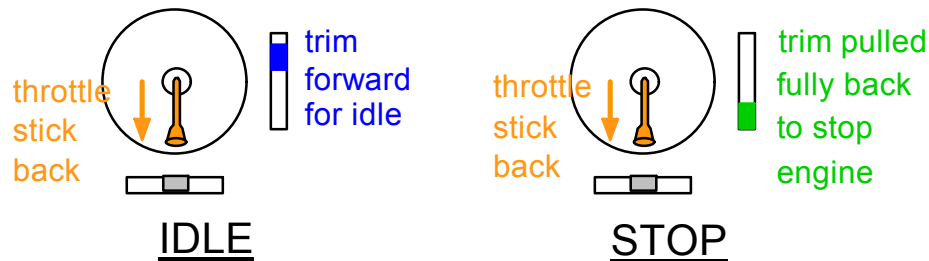


Figure 3

A large number of modellers fly "Mode 1", which just means that the throttle and elevator controls are swapped, so that the elevator is on the left stick, and the throttle is on the right. Which mode you learn on depends on what your instructor uses. In some areas of the country everyone uses Mode 1 while in other areas everyone uses Mode 2. I shall describe Mode 2, but if your instructor tells you that your club uses Mode 1 you can either look for a different club or instructor, or just swap the throttle and elevator in the above diagrams.

Some model trainers do not use ailerons. They are turned by use of the rudder which pushes the back end sideways, and this coupled to the dihedral angle produces a bank, just like ailerons. If no ailerons are fitted the rudder is connected to the aileron channel and the right stick, and the aircraft is flown with the right stick just as if it had ailerons. Sideways movement of the left stick is not used for anything.

SOME BASIC FLYING PRINCIPLES

The instructor should trim the model for straight and level flight at a safe height and one third to half throttle and show that:-

1. If left to itself the model would continue to fly "hands off" like this almost indefinitely if it is "in trim".
2. If a little rudder or aileron is applied and held, an angle of bank develops which gradually increases. As the bank angle increases the nose drops and a spiral dive develops.
3. Holding on up elevator makes the model pitch up initially, then slow down, stall, and go DOWN. Open the throttle to make it climb.
4. Bank means turn and turn means bank. Looking from the side you cannot see that the model is turning. But if it is banked then it must be turning so have patience and wait for it to turn without over banking. If the model is overhead you cannot see the bank but if it is turning then it must be banked. Again don't stand it up on a wing tip to make sure.
5. Very little stick movement (about 2 - 3 mm each way) is enough to fly most models around the sky. The rest is for aerobatics and emergencies. Most beginners over-control drastically.
6. Never flick or jab at the controls. Use small steady movements rather than full movement for a fraction of a second. You are flying an aeroplane with proportional controls, not a computer with switches.
7. Most beginners use too much bank which gets them in trouble. Turning with 25° of bank produces perfectly adequate turns and needs very little up elevator to maintain height.

Learning to Fly

Banking

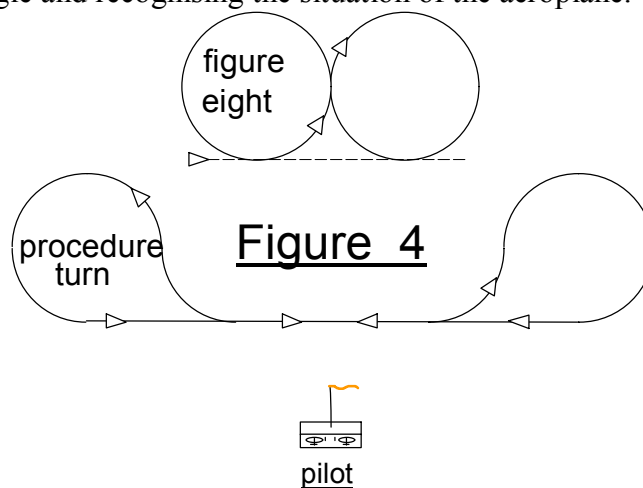
An aeroplane is not turned by the rudder or the ailerons, it is turned by the BANK ANGLE. The greater the bank angle the more rapid the turn. The angle of bank is controlled by YOU using the ailerons (or rudder). As a first exercise in control it is useful to get used to the bank control.

With the model flying away from you, use the aileron stick to bank it 25 degrees left. That means lower the left wing tip. As long as you hold the stick to the left, the left wing tip will keep dropping, but we do not want a 90 degree bank, just 25 degrees, so when you get to 25 degrees centre the stick. Then lean the stick the other way to pick up the left wing and drop the right wing - just to 25 degrees - and centre the stick.

Keep practising this "rock and roll", rocking from 25 bank one way to wings level to 25 bank the other way, using the roll control until you get used to it. When you can bank 25 degrees to left or 25 degrees to the right or level the wings on command, move on to turning.

Turning

If the aeroplane is trimmed to fly level or climb ever so slightly, then the student can practise turning the model using only small sideways movements of the right stick to control the bank angle to 25 degrees and hold at that. The student should practise at HIGH level turning the model left and right holding the bank angle just on 25°- until he can fly circles and control the bank angle all the way round. This can all be done with small deflections of just one control, concentrating on holding an accurate bank angle and recognising the situation of the aeroplane.



Co-ordinated Turns

The second stage is to increase the bank to 35° which means that the nose will drop unless slight up elevator is applied to hold the aeroplane level. Again only small stick movements are needed to practise small turns, circles and figures of eight with the increased bank angle and the co-ordinated elevator to maintain height.

Another good manoeuvre to practise is the procedure turn. These can be done in pairs at either end of a straight and level pass. Each consists of a 90° turn away from the pilot, followed by a 270° turn the other way, back towards him again.

Figures of eight involve turning to both left and right and it is useful to practise flying the variations shown in the diagrams. An extended figure eight consisting of a downwind turn and an upwind turn connected by overhead passes, introduces the business of flying the aeroplane towards yourself and overhead. Flying overhead is awkward and best avoided, but it is going to happen and you should be able to handle it.

Straight and Level

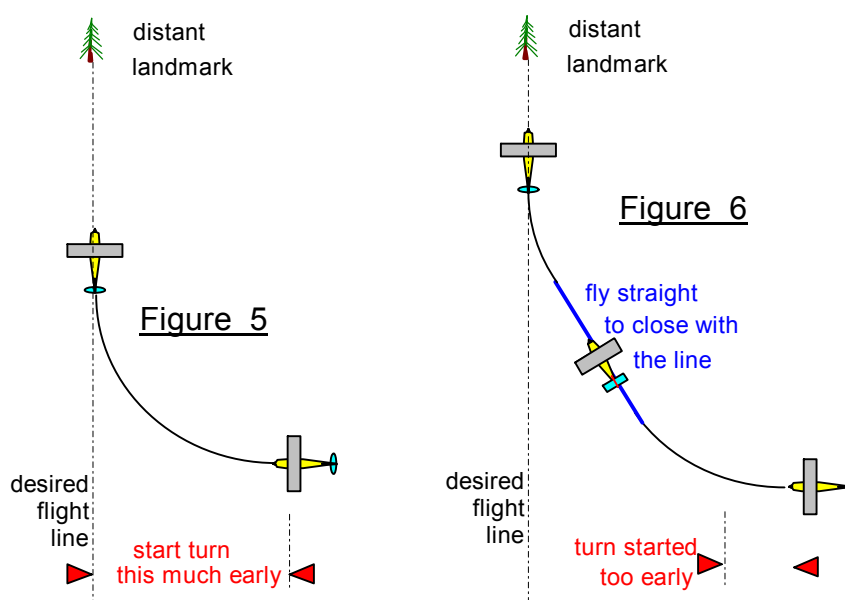
We start with turning because it keeps the model in sight and it is easier than flying straight. Flying straight means keeping the wings level. It is easier if you have an aiming point - a place to fly straight towards, so pick a landmark and fly towards it.

Flying a Line Away

Practise flying the model away from yourself along a definite line, a line on the ground or towards a distant landmark. Bring the model in from one side and turn away from you. That's easy, but to have it flying straight and level away AND right over your landmark takes practice and anticipation.

Start the turn early, a distance equal to the radius of turn before it gets to the line (Figure 5). Start turning too late and you tend to overbank and the nose drops, or the model shoots over the line and you have to do it again from the other side.

If you start the turn too early, and the model is going to be heading away from you before it gets to the line, that is not a problem, simply reduce the bank angle. Or, you can take a second bite at the cherry: level the wings when the turn is two thirds complete and fly it with wings level towards your intended line. When it gets close enough crank on the bank again and complete the turn (Figure 6).



Stick under the Low Wing

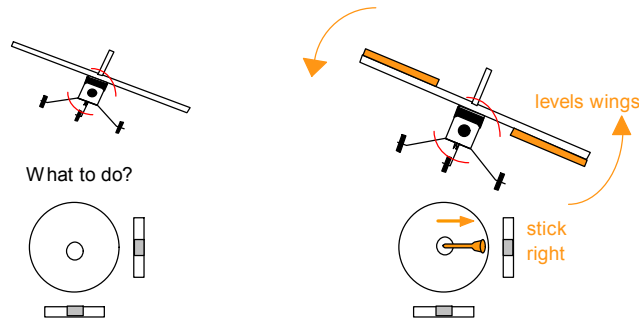
When flying the model away from you the control sense is quite natural. To turn left you put the stick to the left, you get left aileron and the model banks to its left, which is the same as your left. Great.

When the model is coming towards you then your left is the model's right. When the instructor yells LEFT he means put the STICK left. No doubt you could fly looking over your shoulder or do amazing tricks with a series of mirrors (joking) but

in a crisis you need a really simple rule, and many of us found this one useful:-

PUT THE STICK UNDER THE LOW WING.

If the model is facing you and banked, and you want to level the wings, then move the stick to whichever side you see the wing down. Move it the wrong way here and it will quickly roll itself into the ground (been there, done that). Freeze on the sticks and do nothing and it will still roll in, but more slowly. See Figure 7 for corrective action to level the wings.

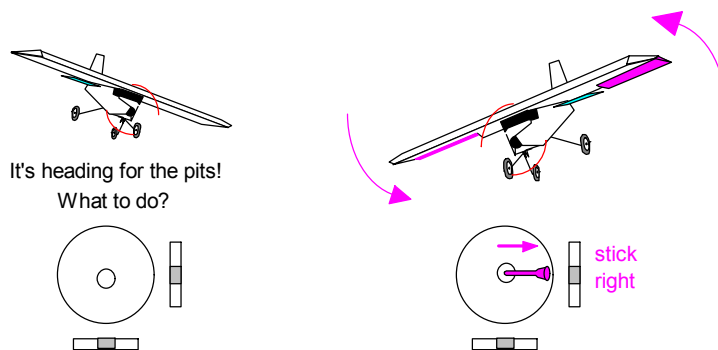


Stick towards the low wing

Figure 7

Avoid the Pits

The other crisis you must avert in a hurry is where the model is flying towards you and somehow ends up pointing not at the runway but behind your back. You are facing the model, the runway is on your left, and the model is heading for the pits, which is full of models and worried people. You must push the stick towards the pits, and that will make the model turn away, towards the runway. Then you can level the wings and overshoot safely for another try (or you might even pull a safe landing out of it).

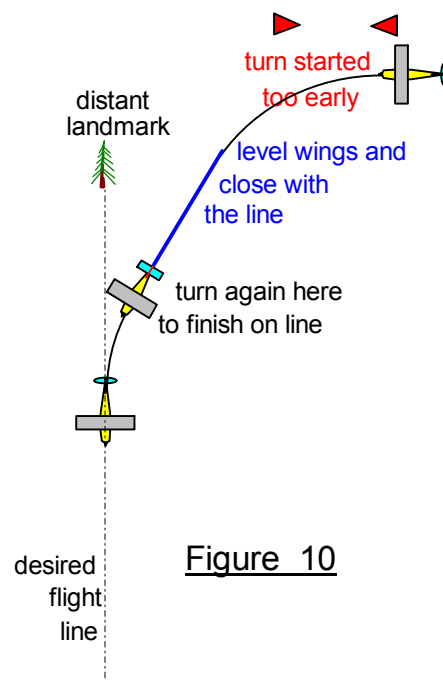
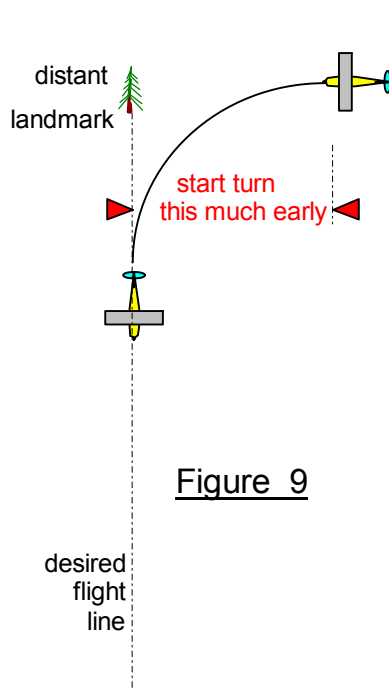


Stick towards the Pits

Figure 8

Flying a Line Towards

With those two safety rules learned you can practise flying the model towards you, preferably into wind to give you more time. The practice that you had flying along a line away from yourself will help. Pick a landmark in the distance again, to define your intended flight line. Coming in from one side, start to turn towards you when the model is one circle radius before your marker (Figure 9). Do not over bank. It is better to start the turn too early, and have two bites at the cherry (Figure 10), than start too late.



If a model is trimmed out to fly straight and level it will do so unassisted. But you will learn nothing just leaving it to its own devices. Get practice making it fly in a direction chosen by you. Choose a point on the horizon and make it fly directly towards it, accepting no deviation from the direct line. Then fly a co-ordinated procedure turn to fly directly towards yourself and then on towards another landmark. Fly your chosen directions (or "headings") as accurately as possible. Maintain height by small adjustments to throttle or elevator trim.

Stalls Spins and Spirals

Still at HIGH level, and perhaps mixed with the co-ordinated turns and flying fixed headings, investigate the effect of gently pulling the nose up with a low throttle setting. The aeroplane will slow down and "stall", that means it will not be able to produce enough lift for level flight at that low speed. Some aeroplanes drop their nose into a dive, some drop one wing into a spiral dive, some remain level but descend rapidly, and some nod to you, as the nose drops and recovers repeatedly.

Get to know what your aeroplane does, how to recognise its situation, and how to recover control. DON'T PULL UP ELEVATOR. Open the throttle, a gentle dive to pick up speed, and GENTLY ease out of the dive. If a spiral dive has resulted FIRST LEVEL THE WINGS, then ease out of the dive and apply some power.

No trainer will spin out of a stall, in fact hardly any trainers will spin even if forced. If yours does, get it fixed.

Climbing and Descending

Now we introduce the throttle control. To initiate a climb when the model is trimmed for "cruising" just open the throttle and pitch the nose up slightly with a little up elevator. To descend, pitch the nose down slightly at the same time as closing the throttle to idle. On reaching the desired height pitch the nose up or down into level flight and adjust the throttle to the cruise setting (quarter to half throttle). Practise climbing from "medium" to "high" level and then descending again.

Trimming the Aeroplane

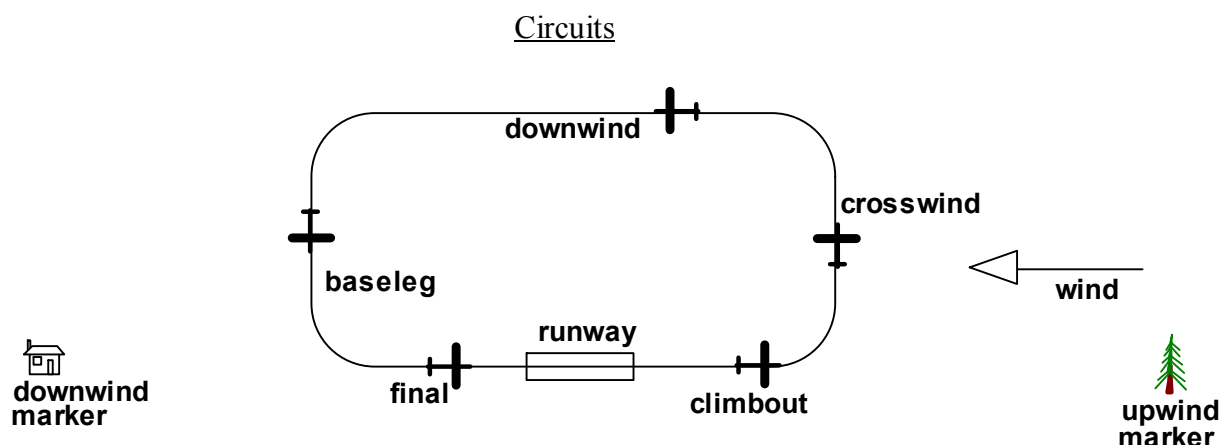
To get practice in using the trims, climb to high level and trim out to fly at full throttle. Fly a couple of turns and reduce to cruise power and re-trim for straight and level flight. After a couple more turns open up and re-trim for full throttle again. Repeat the process until you get used to trimming out the model to fly straight and level "hands off". You may need to adjust the aileron trim after changing power setting to maintain straight flight.

Steep Turns

During the above trimming exercise, try a few steep turns. While trimmed for high speed, apply a lot of bank -- say 70° or so. Then pull up elevator, lots of it. I'll consider this aerobatics and let you use full up elevator. When the aeroplane has turned through 180° take off the bank and the up elevator together. A bit of practice will see you able to co-ordinate the two controls to produce a rapid and level turn. It is a matter of timing.

Try it at cruising speed as well. You cannot afford to use as much bank or as much up because there is a danger of stalling in the turn. There is a definite limit to

how tightly you can turn at this lower speed, which you should know.



GETTING THE SHAPE

The legs of the circuit are named "climbout, crosswind, downwind, baseleg, & final" as above and these names are relative to the runway, not the wind.

Stand in the middle of the runway and pick a landmark in the distance, in line with the centreline of the runway, towards which you will fly on the climbout. Turn around and pick a downwind landmark in line with the runway to mark the final approach path.

First fly the circuit shape as a level rectangle at medium height, without any descent, to get the shape correct. Take care to fly straight towards your upwind marker, and come out of the turn onto finals right over the downwind marker. Keep the model on a straight approach track, to end up right above the runway centreline. The downwind leg should be parallel to the runway. Then take the circuit up high and do descents from "high" on finals to medium level, overshooting above the runway back to high level again.

Only when the instructor is confident that the student can do so without error will he allow him to fly a circuit at medium height and descend on finals towards the runway. Before reaching the runway start an overshoot by opening the throttle fully, pitching the nose up with a little up elevator, and climbing straight out on runway heading, when back at circuit height turn crosswind, level off and reduce to cruise power.

At any time when flying circuits if an approach goes wrong and the model gets out of position (seriously low or off the centreline) the safest thing to do is an overshoot. You must start by levelling the wings as you open the throttle, then start the climbout, and turn the model gently back onto the correct flightpath.

TAKE OFF

Take-offs can be attempted once overshoots have been done successfully. The main thing is to keep straight. If the model veers off to the side of the runway close the throttle and abort the attempt. (Try a fast taxi, or aborted take-off, just for practice.) If the model runs straight let it pick up speed and lift it off with just a little up elevator and set a safe climb angle, not too steep but clear of obstacles. Keep the climb out STRAIGHT'.

LANDING

You need plenty of practice doing these circuits and overshoots (or go-arounds). Descend on finals with one or two clicks of throttle ideally. If the model is getting too low and appears to be undershooting the runway, add some more power. If it appears to be going high then close the throttle completely but start the next approach a little lower or further away. Once a good approach path has been established keep practising, making the overshoot point gradually lower and nearer the touchdown point. When you are consistent the instructor will say "don't overshoot, land this time!". Close the throttle and, keeping the wings level, gradually feed on up elevator to keep the wheels off the grass until the speed runs out and it lands. Aim to land on the main wheels with the nose wheel just clear.

THE WHOLE CIRCUIT

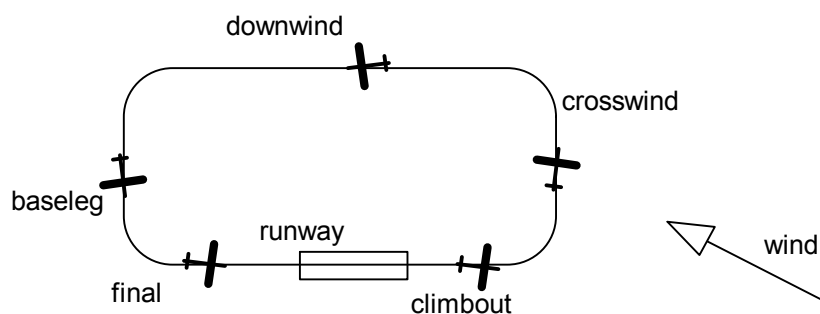
Briefly, a good circuit starts with a straight take-off. a safe climb to circuit height, a positive turn onto crosswind and a reduction to cruise power. Turn downwind and trim out the model to fly straight and level "hands off" along a line parallel to the runway. The baseleg should be at right angles to the approach path. Make a gentle turn onto finals right over the downwind marker. Close the throttle and open again a click or two, and maintain a steady descent to the end of the runway. Close the throttle completely and flare out for the landing. If you make a mess of an approach it is safer to throw it away. Overshoot safely and do another circuit.

TIGHTER CIRCUITS

If you find the size of the circuit a strain on the eyesight, you can tighten them up by reducing the height, and shortening the downwind. Turn baseleg earlier and close the throttle. Descend on baseleg to a point on finals from which you can do a good approach. With the throttle closed the turn onto finals must be gentle to avoid a risk of stalling.

CROSSWIND CIRCUITS

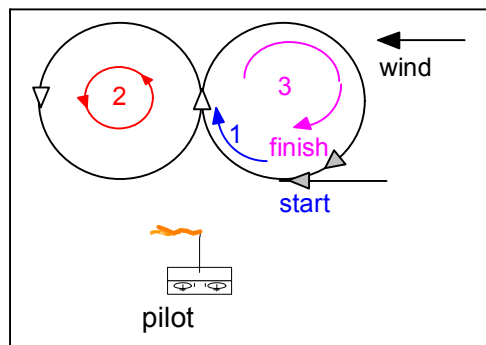
The tendency of the model to go off downwind on the climbout must be nipped in the bud on take-off. Turn the nose slightly into wind. As the model tries to go into wind, the wind will push it back onto line again. The same "laying off of drift" should be done on downwind and final approach legs so that the tracks over the ground are always aligned parallel to the runway.



LOOPS AND ROLLS

Even before you go solo a few simple manoeuvres add interest and get you used to unusual positions of the aircraft. Fly a circuit at medium height and full throttle. Half way along the downwind leg apply full up elevator to loop the aeroplane. For a roll, IF your aeroplane will do one, start at high level and full power and apply full aileron half way along the downwind leg. A little bit of aerobatics relieves the tedium of endless circuits and gives more practice in trimming.

1. HORIZONTAL FIGURE EIGHT

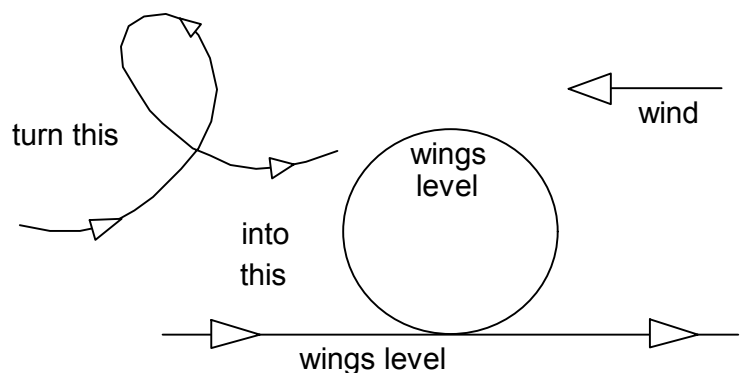


Fly at full throttle and trimmed for straight and level flight. Starting down wind turn through 90° away from yourself then reverse the turn to fly a complete circle back to the crossover point in the centre. Reverse the turn again to fly 270° of turn back to the starting point. Increase the bank as you turn downwind, and decrease the bank as you turn into wind to keep the track over the ground circular. Make both circles the same size and

height, and at the centre crossover point the model should momentarily be going straight away from you. The manoeuvre should finish at the same point at which it started.

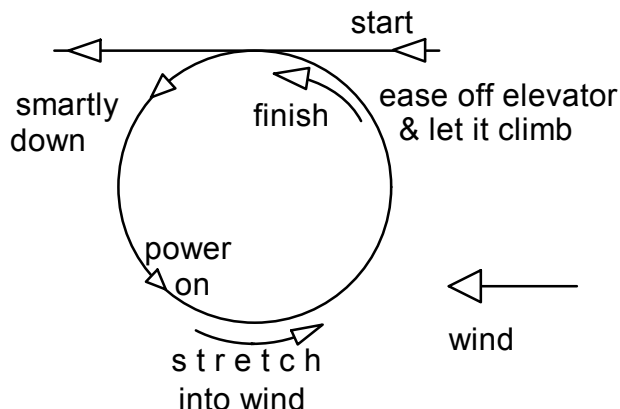
2. LOOPS

Start flying into wind with the wings level -- never banked. Pull smartly up the first quarter, reduce the up elevator to stretch the second quarter up and back to the centre. Level the wings at the top and let the model fly gently through the third quarter and then pull it out at the bottom at the same height and on the same heading on which it started. Try flying a loop away from yourself to check that it stays on heading & wings level.



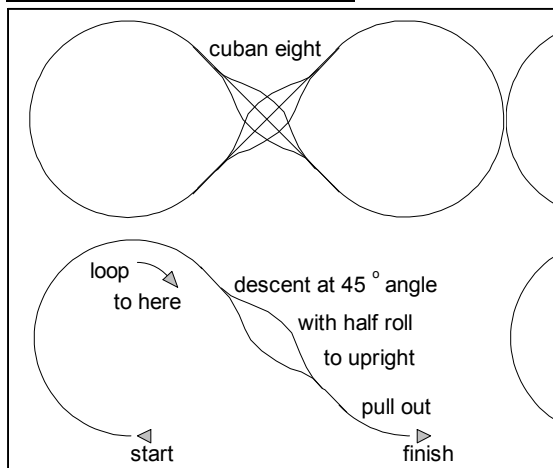
3. OUTSIDE LOOP (BUNT)

Using the same vertical space as the loop, start high flying downwind and push down elevator. Let it penetrate into wind at the bottom before pushing more down elevator to climb back towards the top, reducing the down near the top to stretch up to the start height. Reduce power going down and open throttle a third of the way round. (Do the first one very high to make sure of clearing the ground.)



Next we practice some turn around manoeuvres (4, 5 & 6). Once you have practiced them on their own, link together 2 and 3 with 5 and 6 by doing a loop into wind, an Immelmann turn at the upwind end, then an outside loop in the centre followed by a split-S at the downwind end to position for the next loop.

4. HALF CUBAN EIGHT

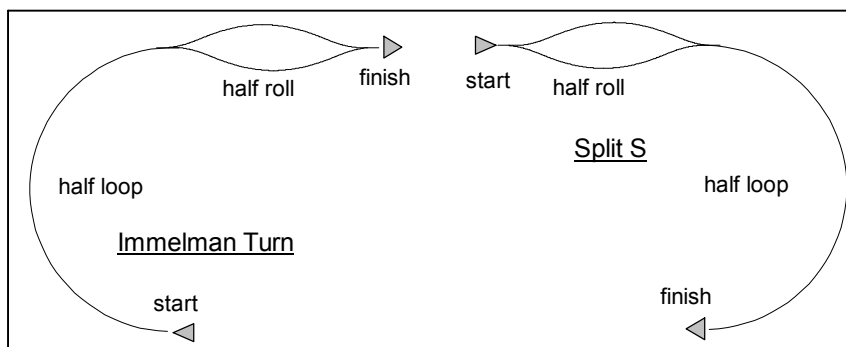


The full Cuban eight consists of two partial loops joined by straight portions at 45 degrees, with half rolls on the straights, and is done at the centre of the flight line.

We use the first half of the Cuban eight as a turn around at the downwind end of the flight line. You can start by practising it right in front of you, and then move it off down wind. Pull a loop, and when the model has done 5/8 of the circle apply just a touch of down elevator to hold that 45° nose down inverted

attitude. After a brief pause half roll to upright, but still 45° nose down. Pull out of the dive at the same height the manoeuvre started.

5 & 6. IMMELMANN TURN & SPLIT S



An Immelmann consists of a half loop followed by a half roll. The Split-S is the opposite, a half roll followed by a

half loop.

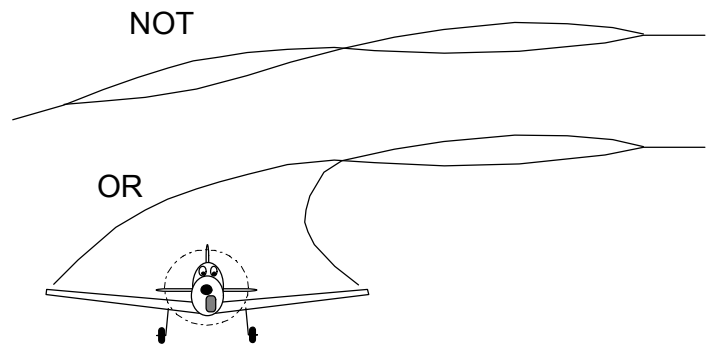
Make the half loop your normal looping height, but not so big that the model has run out of airspeed by the top. It must still have enough airspeed for the ailerons to work to give a nice roll.

As the model gets to the top of the half loop apply just a little down elevator to hold inverted, and then half roll (either way) back to upright. On the Split S close the throttle after the half roll and open it again at the bottom of the half loop.

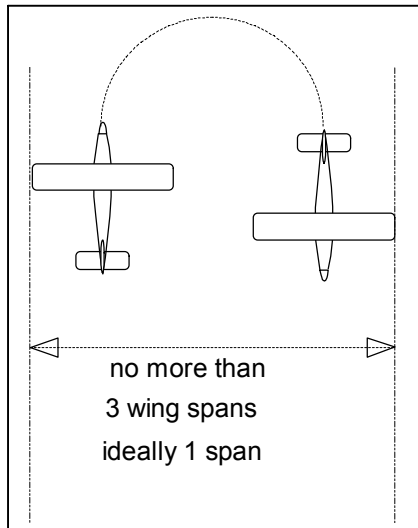
Practise these two together as a symmetrical pair, and gradually move them further apart on the flight line. Then practise with the loop and outside loop (2 and 3) in the middle.

7 & 8. ROLLS

Approach along the flight line at full power and just before the centre apply full aileron (either direction) until upright again. Adjust aileron throw so that a roll takes between one and two seconds. Practise rolling into wind and down wind. Now apply a jab of down elevator as it passes through the inverted to keep the nose up.



4 and 5 can be strung together if at each end of the flightline you do a stall turn.



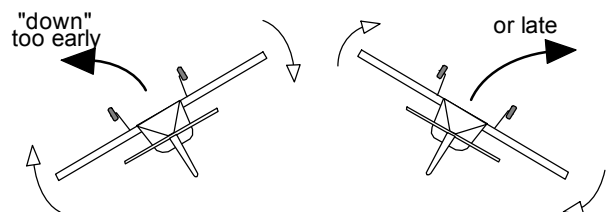
9 & 10. STALL TURN

Pull into the vertical and after a good length of climb close the throttle. Just before the model stops apply full rudder. It should yaw around its wing into a vertical descent from which you pull out at the original height, as you open the throttle. If the climb is less than vertical it may stall and pitch forward, or if you pull up past the vertical it may go over on its back instead of yawing. Try consecutive stall turns at either end of the flight line. Some models stall turn more easily one way than the other, and a burst of throttle as you apply the rudder often helps.

If the wind is across the flight line it is normally easier to stall turn into wind, and it looks neater.

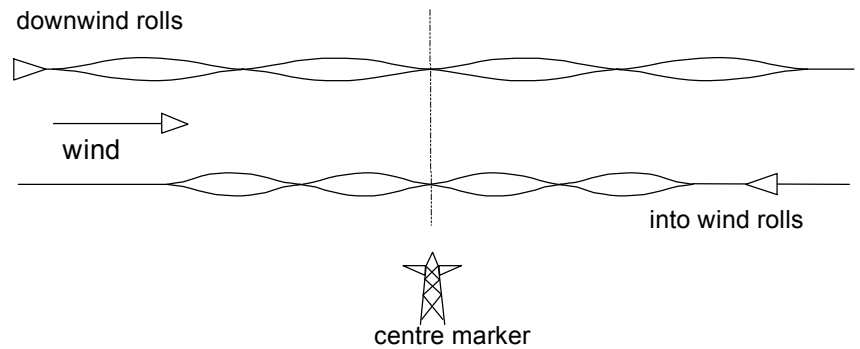
11. END-ON ROLLS

When viewed from behind a roll should be straight (but probably not axial). Look out for miss-timed elevator applications pushing it out of line resulting in a change of heading.



12 & 13. TWO ROLLS

Back on the flight line, do two continuous rolls with a little down when inverted and up when upright. Start early enough to finish the first roll by the centre, for symmetry. You will notice they take up a longer piece of sky flying downwind than into wind.

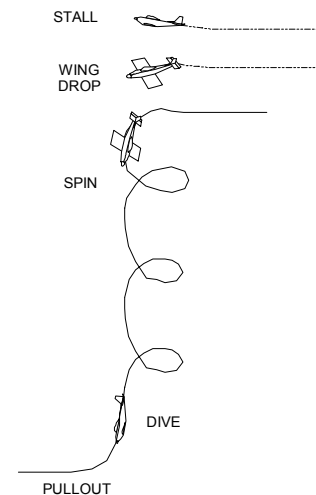


14 & 15. FOUR ROLLS

If you can do four rolls and maintain height and heading then the first two must have been pretty good so try it, into and down wind. Then try two rolls again to see the improvement.

16. THREE TURN SPIN

Make sure your model will spin rather than spiral dive. Approach high, into wind, and slow, with idle throttle. Holding level flight with gradually increasing up elevator, let the aeroplane slow down until eventually it stalls and drops a wing. Apply full aileron and rudder in the direction of the natural wing drop to hold it in the spin. If a wing does not naturally drop at the stall it can be induced with a hint of rudder, then once the wing drops follow up with full rudder and aileron. Let it rotate twice through its original heading and about a third of a turn (models vary) before the third time, centralise all controls. It should come out on heading in a steep dive, from which you recover at base height, as you open the throttle. Make sure you can gain enough height in an Immelmann turn to spin safely.



17. INVERTED

Try pulling half a loop and then pushing down to hold inverted flight. The amount of down varies from just a touch to half the movement. Now try half rolling into inverted but do not half loop out unless you have more than enough height. Try flying inverted for more extended periods and turn using aileron as normal with some extra down to hold the nose level in the turn. Practice entering the flight line level upright, half roll inverted about 3 seconds before the centre, roll back upright three seconds after passing the centre. Then practice an Inverted Pass following a half loop, with a half roll out to level flight.

18. HAND LAUNCH

It's not in the test but, if you have not already done so, take the controls of a trainer when someone hand launches it. Then try hand launching one yourself, for someone else. Take a couple of paces into wind and as you step forward push it away into wind. Having the wings level and the nose level is more important than a great heave.

19 20 21 & 22. CIRCUITS

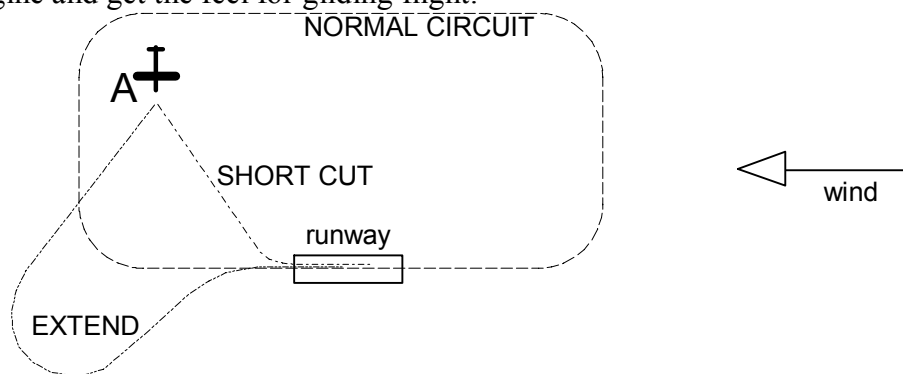
Practise left and right hand circuits. The climbout must be straight and at a safe climb angle and speed. When at a good circuit height turn through 90° onto the crosswind leg, level off and reduce to cruise power (quarter to half throttle). Turn onto

downwind allowing for any crosswind so that the model tracks parallel to the runway at constant height, trimmed out "hands off". Descend on the baseleg as necessary to get the model ideally positioned for a straight final approach in line with the runway. Aim to land near the end of the runway and on the centreline.

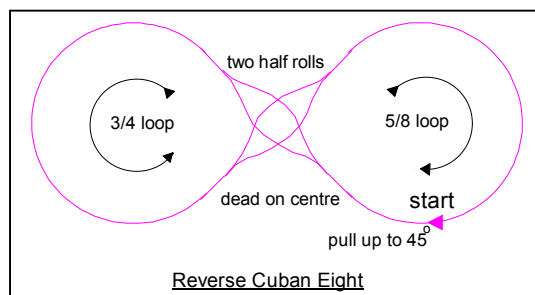
23. DEADSTICK LANDING

It is not part of the Silver schedule, but it is something that a pilot of silver standard should practise and be happy with. Simulated deadsticks are now part of the bronze test, but now practise completely stopping the engine and landing on the runway.

Pick a point (A on the diagram) at the start of a baseleg on a tighter than normal circuit. By trial and error find the height at A which will give you an approach ending up high with the throttle at idle and the trim set for a good gliding speed. Starting at that height with the engine stopped should then give you a reasonable glide approach. Models vary. There is only one way to find out. Try it for real. Take your model way up, cut the engine and get the feel for gliding flight.



When the engine stops unexpectedly, immediately turn excess speed into height, trim for a good gliding speed, and turn towards the field. Then go for point A. If the model is too high at A circle or extend the approach. If too low the approach can be shortened. Practise deadstick approaches from various positions around the field. With practice, point A can be moved in quite close to the runway. Try to land into wind in any case.



REVERSE CUBAN EIGHT

Pull up to 45° climb, half roll, pull 3/4 loop to 45° climb, half roll, pull 5/8 loop to level flight at the start point. Make sure the diagonals are at 45° and the half rolls are dead centre laterally and vertically. The loop portions should be of equal radius.

HALF CUBAN EIGHT

As for Silver.

TWO LOOPS

Must be, round, of equal diameter, finish at the starting height and on the starting heading, and same distance away, and on centre marker. Practice continuous loops, four, six, or ten at a time. Stretch them into wind to keep them in the same place,

round, and of a consistent diameter. To avoid successive loops getting nearer or further away start with wings level, put weights in the lighter wing tip, try rudder or aileron trim or sidethrust.

STALL TURN

Leave plenty room to line up for the rolls which follow. There is a half roll (either direction) at the midpoint of both vertical legs. During the stall turn the aircraft bottom is towards the pilot (so rudder control is reversed). On a stall turn the downward track should overlap the upward track, with the aircraft stopping and rotating about its centre. Only a small “spread” is allowable. Make the model fall away from the pilot, unless there is a strong cross-wind on the flight line in which case they should be into wind.

THREE ROLLS DOWNWIND

The model should be inverted passing the centre. Roll rotation should be away from pilot (near wingtip up) and three rolls should take from 3 to 6 seconds. Maintain height and heading throughout. Practise continuous rolls along the whole flightline, timing the elevator corrections so that flight is dead level and straight, then three rolls should be easy.

VERTICAL REVERSAL

Also known as a HUMPTY BUMP, you have the option of either doing a half roll on the way up, or a $\frac{1}{4}$ roll on the way up and a $\frac{1}{4}$ roll on the way down. The latter option is so that you can adjust the flight line nearer you or further away. So, approaching the end of the flight line, pull up to vertical, hold the vertical climb, half roll, hold the vertical climb again, pull $\frac{1}{2}$ loop to a vertical descent from which you pull to level flight at the start height. The other option is to perform a $\frac{1}{4}$ roll in the middle of the vertical climb (either towards you or away from you), pull a half loop across the top, and in the middle of the vertical descent $\frac{1}{4}$ roll the model towards the flight line, and pull out at start height but either nearer or farther away than before.

FOUR POINT ROLL

Also called a ‘hesitation roll’. The model rolls $\frac{1}{4}$ turn and pauses (using rudder to hold nose up), rolls $\frac{1}{4}$ turn and pauses (using down elevator to hold nose up), rolls $\frac{1}{4}$ turn and pauses (using the opposite rudder to hold nose up), and rolls $\frac{1}{4}$ turn to resume upright flight. For symmetry it should be inverted passing the centre. The pauses should last about a second.

HALF REVERSE CUBAN EIGHT

The first half of the reverse Cuban eight. Pull up to 45° climb, two quarter rolls, pull $\frac{5}{8}$ loop to level flight. It is like the half Cuban in the silver except that (a) it starts closer and finishes further away, giving more space to line up for the next manoeuvre, and (b) instead of a half roll there are two points of a four point hesitation roll. The pause need only be short, but noticeable.

TWO OPPOSITE ROLLS

One complete roll from wings level to wings level, followed immediately by another roll to wings level in the opposite direction of rotation.

IMMELMANN TURN

As for the Silver. Half loop, half roll, used to gain just the right amount of height to

perform the outside loops in comfort.

TWO OUTSIDE LOOPS

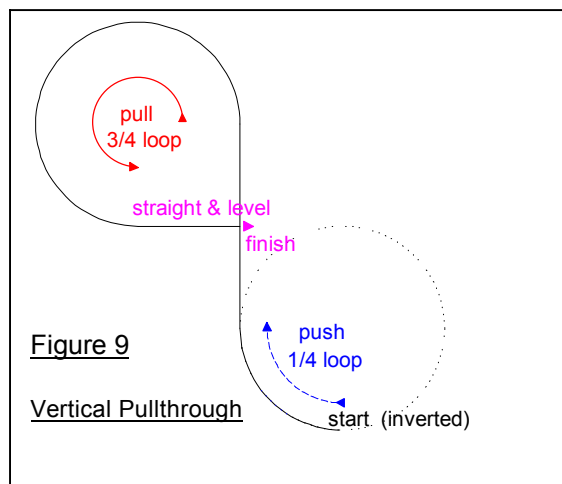
Also called bunts. As for the Silver, but two the same size and position, as for the loops. As for inside loops, keep the wings level and make sure the model tracks straight.

HALF OUTSIDE LOOP

Push down elevator (and close throttle) and make it a semi-circle. Open throttle at bottom.

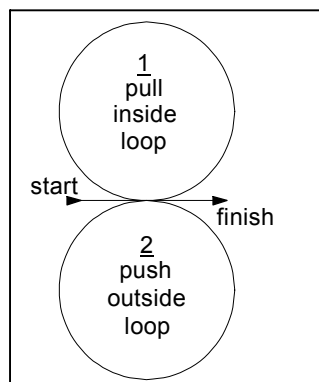
DOWNWIND INVERTED PASS

The model flies straight and level inverted from the bottom of the outside loop to the start of the Figure 9. Make the inverted part symmetrical about the centre marker.



VERTICAL PULLTHROUGH

Also called a 'Figure 9' manoeuvre. Starting inverted, push a quarter outside loop into vertical, with the aircraft bottom towards the pilot. Let it climb to one and a half times normal loop diameter, then pull up elevator to complete $\frac{3}{4}$ of a normal sized loop to straight and level flight at the normal height for the top of a loop or to start an outside loop. Fly straight into the flight line at this height.



VERTICAL EIGHT FROM CENTRE

Starting at the same height as the top of the outside loops, and at the centre marker, pull an inside loop back to the start point, then push an outside loop, the same size as the loop above and similar to the previous outside loops. Exit at the start height and the same distance away and on the same heading.

SPLIT S

Leave plenty of room to line up for the following roll.

SLOW ROLL

Model should be inverted passing the centre marker and should take 3 to 6 seconds,

and should occupy more than half of the length of the flightline.

HALF SQUARE LOOP, HALF ROLL

Pull a quarter loop, hold straight up, pull quarter roll to level, immediately half roll and reduce power.

SLOW SPEED PASS WITH ONE TURN SPIN ON CENTRE

Control speed in slow level flight after half roll above and arrange to stall and spin (one turn only) on centre. Model should drop wing and nose into spin.

RECTANGULAR APPROACH TO LAND