MFNZ '*Wings*' Proficiency Scheme

Helicopter, Basic and Advanced

1. Aim

1.1. To provide certification of a basic proficiency level for Radio Control model pilots enabling them to operate unsupervised. Pilots achieving the required level are entitled to hold the MFNZ *'Wings'* qualification, endorsed to one or more of 10 disciplines, plus 3 specialist qualifications.

1.2. To meet the requirements of Civil Aviation Rule 101.205 for flying within 4km of aerodromes.

1.3. To provide a way of demonstrating a higher level of skill by completing an advanced test, with 'advanced' certification.

2. Method

2.1. MFNZ encourages all clubs to ensure that members follow this proficiency scheme and to ensure that all Radio Control pilots to obtain their '*Wings'*.

2.2. Many club flying sites, rallies and contests are on or near aerodromes and this qualification is mandatory to fly at those sites. The qualification provides ready proof of the holder's skill level.

2.3. Within 4km of an aerodrome all pilots must either hold a *'Wings'* qualification or operate under direct supervision of a '*Wings*' qualification holder or an approved Instructor. Away from aerodromes trainees should not be considered safe to fly on their own until they have reached the '*Wings*' standard.

2.4. **The '*Wing's* Qualification is compulsory for**:

(a) all new flying members joining MFNZ.

(b) all members who fly at sites on or within 4km of an aerodrome.

Members are encouraged to gain their '*Wings*' qualifications at the earliest time.

2.5. Clubs should keep records of all the members holding '*Wings*' certification and forward to the MFNZ membership administrator the name of members attaining the certification in the various disciplines.

3. Examiners and Instructors

3.1. Instructors

Instructors will be proficient *'Wings'* certified holders with the same discipline qualification that is being instructed. Instructors will be appointed by the club(s). Clubs will assess their membership and select their instructors to meet the above criteria. Clubs will forward the name and MFNZ number of each appointed instructor to the MFNZ membership administrator for recording in the Association's database and the issue of a Instructor's endorsement to the instructors membership card.

Instructors should be:

(a) Experienced proficient flyers that exhibit well-disciplined flying and operate in a safety conscious manner and are committed to training students to *'Wings'* standard.

(b) Be willing to spend considerable time training without letting their own skills suffer.

(c) Have empathy with the student and be able to guide the student through the learning process.

A training manual for the student is available on the MFNZ web site. The MFNZ Members Manual is structured to take students through training to *'Wings*' standard and also acts as a prompt to instructors and has a check list for the student to keep as a record of training progress.

3.2. Examiners

For '**Basic Helicopter'** examiners will be any *'Wings'* qualification holder. It is not required for the Examiner to be proficient in the skill being tested but they should be familiar with the requirements of the qualification being tested and may conduct 'dummy tests' with a qualification holder to understand the manoeuvres fully. For '**Advanced Helicopter'** examiners will be a Helicopter 'Wings' qualification holder. Clubs will assess their membership and select their examiners to meet the above criteria. Clubs should keep a register of Approved examiners and forward to MFNZ on an annual basis. To ensure a common standard among Examiners, Area Representatives will conduct Examiner

workshops whereby methods and ideas can be exchanged. The membership secretary will issue an Examiner's endorsement to the examiners membership card.

4. Qualification

There are 10 disciplines of Qualification:

Basic fixed wing Powered (**BP**)	Advanced Power (**AP**)
Glider (**GD**)	Advanced Glider (**AG**)
Helicopter (**HP**)	Advanced Helicopter (**AH**)
Multirotor (**MR**)	Advanced Multirotor (**AM**)
Basic Jet Turbine (**BT**)	Advanced Jet Turbine (**AT**)

There are additional specialist qualifications for the following categories:

Large fixed wing powered (**LM**)
First Person View (**FP**)
High Speed (**HS**)

5. Certification

5.1. The proficiency qualification gained will be issued by MFNZ in the form of an endorsement on the membership card. Applications should be made through local Club Secretaries on the official form, signed by the examiner. Annual membership cards will show the details of all qualifications held, including 'Instructor' and 'Examiner'. Members attaining a new qualification within the membership year may request the issue of a replacement membership card.

5.2. A pilot must be a current financial member of MFNZ to be the holder of a *'Wings'* qualification and the issue / retention of a *'Wings'* qualification is at the discretion of the MFNZ Council.

5.3. Any qualification may be withdrawn by a club if the pilot is considered to be no longer able to satisfactorily meet the required standard. The *'Wings'* qualification will be reissued upon the satisfactory passing of a full *'Wings'* test. You can have your *'Wings'* certification taken away if you become incapable of flying safely due to an ongoing medical condition such as failing eyesight.

If you do not renew your MFNZ membership for 3 consecutive years you will be required to retake your qualification upon re-joining.

Holders of qualifications from overseas organisations must take the MFNZ *'Wings'* qualification in order to comply with CAA regulations to be familiar with NZ airspace law.

6. The Basic Certificate

The Basic Certificate is a measure of flying ability and safety which "may be equated to a safe solo standard of flying".

As an Examiner, the level of competence you should expect of a candidate should be based on that criterion; that is 'is this person, in your opinion, fit to be allowed to fly unsupervised'. The candidate should have studied the MFNZ Members Manual, any local site rules (if applicable). Besides being an excellent guide to the safe flying of model aircraft, most of the questions asked will be from these sections of the Members Manual.

Also, be aware that you may ask questions on any local site rules that the candidate should be aware of and these may form an important part of the test questions you ask.

7. The Advanced Certificate

The Advanced Certificate is designed to recognise the pilot's more advanced ability and a demonstrated level of safety. As an Examiner, therefore, the level of competence required from a candidate should be based on the question; has this person demonstrated their flying ability and safety to me in a satisfactory manner?

The aim of the Advanced certificate has always been to give the club flyer a personal attainment goal beyond the Basic Certificate; a demonstrated level of competence and safety which is attainable by the average pilot with a little thought and practice.

The long-term strategy behind this is that if enough club flyers qualify for their Advanced certificates then the general standard of flying both within your club and nationally cannot help but rise.

A candidate wishing to take the advanced test must have already passed the Basic Helicopter test.

8. Testing Procedure

There are four parts to each proficiency *'Wings'* test:

(a) The oral test
(b) Pre 'flight inspection' of the model
(c) Pre flight procedures test
(d) The 'flight test'

It is suggested that the 'oral' testing be done first.

8.1. Each part is marked on a competent/not yet competent basis and <u>total mastery</u> is required to qualify.

8.2. Retesting is permitted. The examiner may decide if a retest can be carried out on the same day or if there needs to be some retraining or consolidation before the retest.

8.3. A guide to each test as well as test sheets and oral questions are included elsewhere in this manual.

The Test Model

The test can be performed with virtually any model helicopter, fixed pitch or collective. The helicopter may be internal combustion engine powered or electric powered. The only exception to this is that helicopters with contra-rotating main rotors are not permitted for the Basic and Advanced tests, the reasoning being that is these models are generally too stable to provide an adequate test of a candidate's abilities.

Whatever model is brought by the candidate, it must be suitable to fly the manoeuvres required by the test they are taking. You do not have the authority to alter the required manoeuvres to suit a model and if, in your opinion, the model is unsuitable for the test then you should explain this to the candidate and tell them that they cannot use that model. The selection of the model to do the test is the responsibility of the pilot and it is their ability you are testing, not the model.

On no account may the candidate use defects or limitations in the performance of the model as an excuse for poor performance on their part and you should make no allowance on this point. The type of model presented cannot be used as an excuse for not completing certain manoeuvres.

Electric Powered Models must be treated as LIVE as soon as the main flight battery is connected, irrespective of radio state and great care must be demonstrated by the candidate. The arming sequence should be clearly understood and discussed/demonstrated to you by the candidate.

The test must be taken outdoors.

Two attempts per examination will be allowed in any one day.

The use of helicopters with coaxial contra-rotating main rotors is not allowed.

Gyros, Electronic Stabilisation and GPS

Where a fly bar is fitted, it is acceptable to use an electro-mechanical or solid state gyro in a helicopter being used to take the test although electronic stabilisation is restricted to a single sensor acting in rotation around the yaw axis only. This allows a range of gyros to be fitted, from simple yaw dampers to solid state heading lock units but only acting on the tail rotor.

If the helicopter does not have a fly bar fitted it is acceptable to use extra electronic stabilisation, however the extra electronic stabilisation must only be acting as a fly bar replacement system and must not take over control from the pilot or achieve automated flight.

The use of any autopilot and/or artificial stability features which are (or may be) designed into such units beyond definition above is not acceptable during the test for the Basic and Advanced certificates and is not permitted**.**

Candidates should be prepared to explain the capabilities of the system they are using and show that it does not take over control from the pilot and that automated flight will not be achieved during the test.

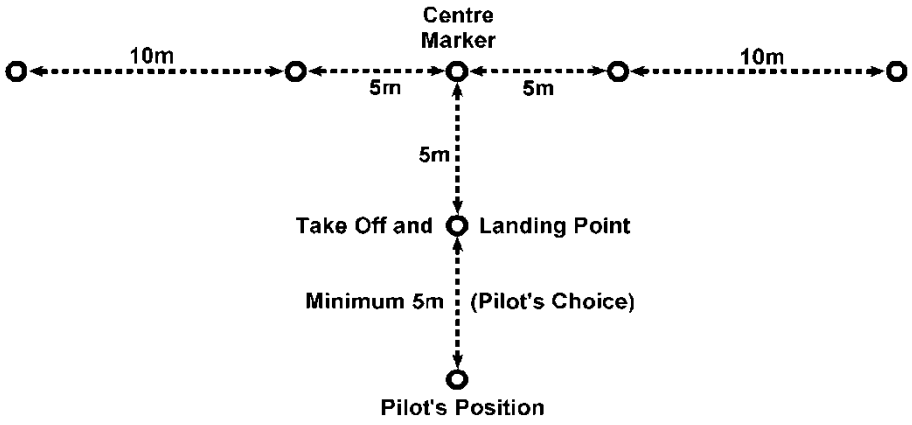
GPS must not be used during any test.

There is no requirement for the fixed positioning of manoeuvres relative to the wind direction in the Helicopter tests and you will find no reference to the wind in the text of either the test or this document.

This makes it absolutely ESSENTIAL that you discuss this with the candidate at length so that you are both aware of exactly how you want the manoeuvres to be presented and what limitations will be accepted if the wind direction is not favourable.

Ground Positioning

When taking a helicopter test, it is your responsibility as the Examiner to lay out a series of ground markers to assist both the candidate and yourself to assess the manoeuvres being flown. Small cones or any other similar marker may be used as long as they don't interfere with the flying of the model. However, it is vital that the marker used for the take off/landing point (TOLP) does not affect the model at all and probably the best marker in this case would be something like the fluorescent discs that lay flat on the ground. Alternatively, you could use some of the biodegradable ground marker spray paint that is readily available.
The layout of markers required is shown below and it must be emphasised that absolute accuracy of distance is not required when setting them out. Pacing will be quite accurate enough. It is essential, though, that the centre marker, the TOLP and the pilot's position are in line.



GROUND POSITIONING MARKERS

The general positioning of the markers will depend very much on the geography of the flying site and safe operation of the model and you should set them out with these factors in mind.

It is not a requirement that the markers in the cross bar are used by the pilot but they are there to help. However, the centre marker, the takeoff/landing point and the pilot's position must be used with some accuracy.

Landings should generally be no more than a metre from the takeoff/landing point and the pilot is expected to stay close to the selected pilot's position mark although it is not required that they 'plant' their feet. If you feel that the pilot is starting to wander, you should stop them and insist that they stand near the pre-selected mark.

Remember that it is a requirement that 'all manoeuvres are carried out in front of the pilot' so the use of the pilot's position point will be important.

General Manoeuvres and Hovering

All take-offs and landings should be smooth, without undue oscillations, and lifts and descents should be straight and controlled with the model a comfortable and safe distance in front of the pilot. In any stationary hovering the model should remain steady and should not oscillate unduly.

The standard 'brief' hover time is about five seconds. You should discuss this with the candidate before the test so that they know that you will want to see a positive stop with the hover long enough to show that the model is well controlled and steady with little wandering or oscillation. Stopwatch accuracy is not required.

The candidate should also be aware that the decision to move on is theirs and that you will not be asking them to commence with the next manoeuvre. However, during your pre-flight briefing, they may ask that you indicate when you are satisfied that they have completed their 'brief' hover times to help them decide when to move on. This is quite permissible if requested by the candidate.

Circuit and other ‘flying’ manoeuvres should be performed at the heights mentioned in ‘Height and Speed’ above. Movement of the model from one point to another whilst in the hover should be done at a steady walking pace.

Care should be taken in the flying manoeuvres that the line of approach and height each time is consistent and you should take particular note of performance in this area.

Intermediate Landing

Exceptionally, at a pre-determined point in the flight an intermediate landing may be permitted for the sole purpose of the fitting of a freshly charged flight battery. This landing may only be made with the prior consent of the Examiners. The pre-determined point may be either after a specific manoeuvre or at a specific time of flight, whichever is requested by the candidate and agreed by the Examiner.

Full pre and post flight checks are not normally required during an intermediate landing and takeoff unless the model suffered a hard landing. However, the candidate should give the model at least a quick visual examination whilst on the ground.

The Basic Test

(a) Carry out pre-flight checks as required by the MFNZ safety codes.

The pre-flight checks are laid out clearly in the MFNZ Members Members manual. The candidate should also go through the pre-flying session checks, also laid out in the Members Manual. Ask the candidate to go through their checks as if the test was their first flight of the day. Particular attention should be given to airframe, control linkages and rotors.

Points to look for are that the candidate has a steady and regular ground routine, especially when starting and tuning the engine. Nerves should not play a part in the pits, and you should satisfy yourself that the candidate is in full control of what they are doing whilst preparing the helicopter for flight.

A tidy flight box and a neat ground layout makes a good impression but bear in mind that that Basic certificate candidates may not have been flying for too long and you should make allowances.

A poor performance in this area is not direct grounds for failing the candidate but can certainly be part of a cumulative fail if other aspects of the performance are below the standard you expect.

Pay particular attention to the way the candidate uses the local frequency control system and make sure that they fully understand it and use the correct sequence appropriate to their model. For 35 MHz, this is usually 'get the peg, Tx on, Rx on'. For 2.4 GHz, the candidate should be aware of any local transmitter usage limitations and if a flight peg is required, it must be obtained before the usual Tx on, Rx on sequence. Some radio equipment and, occasionally, a specific model requirement requires that the Rx be switched on first and, if this is the case, the candidate should explain this clearly to you.

Watch carefully and take note that the transmitter controls, trims and switches are checked by the pilot.

All candidates are required to be aware of the local the frequency control system and anyone who is required to use it but switches their radio on before doing so should be failed on the spot.

With i/c powered models, it is important that the candidate is seen to hold the rotor head securely during the starting procedure and until the model is past the flight line.

With electric powered models, take note that the candidate is aware that the model is 'live' as soon as the flight battery is plugged in and that they take appropriate safety precautions. If a separate receiver battery is fitted, the candidate should have the opportunity to check the operation of the radio equipment before the flight battery is plugged in.

Electric powered models must be carried out from the pits area to a safe point before the flight battery is connected and they **MUST** be considered live as soon as the flight battery is plugged in. Great care should be taken at this point and any help available to the candidate should be used in the interests of safety.

If there is no one else available then there is nothing to stop you aiding the candidate by, for instance, carrying the model to the test area etc. but any such actions must be performed by you directly on the instructions of the candidate. You must not prompt them or carry out any actions of your own accord.

It is important that you talk these points over with the candidate in you pre-flight briefing.
(b), (c), (d), (e), (f) and (g) that follow together form a horizontal 'T'.

During the course of manoeuvres **(b), (c), (d), (e), (f)** and **(g)** the model should not have deviated significantly from a straight line drawn between the end points. Slight drifting may be permissible in adverse wind conditions, but should be rapidly corrected and put back on the correct course. If the deviation is severe, or the model does not follow the line at all, the candidate should not pass. The hovering speed between the end points is at the discretion of the candidate but must be no faster than a slow walk.

Each stop should be a controlled hover, with any movement being quickly checked, without signs of large over-corrections. The pauses at each hovering point should be about five seconds, other than in (b).

The height of the helicopter should be consistent throughout these manoeuvres with no major deviations.

(b) Take off and hover tail in over the take-off point, with the helicopter skids at approximately eye level, for about twenty seconds and then land.

Take off should be smooth and the lift to eye level should be vertical, straight and controlled with the model a comfortable and safe distance in front of the pilot. Once at eye level the model should remain stationary, and the tail should not oscillate unduly. You should notify the candidate when the hover time of about twenty seconds has passed and ask him to commence with the next part of the manoeuvre. The descent and landing should be smooth and steady with little oscillation of the tail on touchdown caused by poor tail control.

(c) Take off and hover for about five seconds, then hover the helicopter slowly forwards for approximately five metres, stop, and hover for about five seconds.

After the take off and five seconds hover time and, on your command, the pilot now hovers the model forward, at a slow hovering pace, for a distance of about five metres then stopping and hovering for about five seconds. All the previous comments about line, height at eye level, speed and steadiness apply and the orientation of the model should still be facing in the same direction as this initial forward hover, as for all the rest of the first set of manoeuvres.

(d) Hover the helicopter slowly sideways for approximately five metres, stop, and hover for about five seconds.

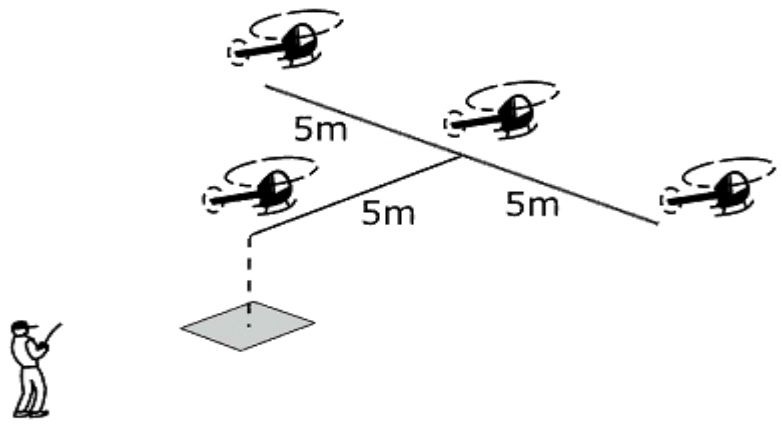
The pilot may choose to perform the initial sideways hover in either direction (to his left or right) and, once you have been told the direction, the candidate should, without turning the model, commence a sideways hover at eye level for a distance of approximately five metres. Having travelled about five metres the pilot will stop the model and hold it in a steady hover at eye level and, with the tail pointing in the same direction as it was when it took off, for about five seconds

(e) Hover the helicopter slowly sideways in the opposite direction for approximately ten metres (five metres past its original position in front of the pilot), stop, and hover for about five seconds.

At the end of the hover time the pilot, without turning the model, will hover it sideways in the opposite direction, passing in front of them and stopping 5 metres past the centre line. At this point the pilot will once again stop and hover the model with it still facing in the same direction as it was at take-off.

(f) Hover the helicopter slowly sideways in the first direction to bring it back to its original position in front of the pilot, stop, and hover for about five seconds.

The candidate should, without turning the model, commence a sideways hover at eye level for a distance of approximately five metres back to the centre marker. Having travelled to the centre marker the pilot will stop the model and hold it in a steady hover for about five seconds at eye level and, with the tail pointing in the same direction as it was when it took off.



(g) Fly slowly backwards, bringing the helicopter back to its original position over the take off point, stop, hover for about five seconds and land.

After hovering for about five seconds, the model is hovered backwards (without turning it) to the start position, stopped and hovered for about five seconds above the TOLP with skids at eye level. After the hover time has been completed the model should descend and land close to the original take off point. During this last section, you will be observing the same criteria as previously and the model should have performed as before in relation to the course and at a similar speed. The descent and landing should be smooth and steady with little oscillation of the tail on touchdown caused by poor tail control.

(h) Take off and fly slowly forward for approximately 5 metres, stop and hover for about five seconds. Turn 90 degrees either left or right and fly forward to perform two 'lazy eights', each at least 30 metres in length. Each time the helicopter passes in front of the pilot it must be sideways on to the pilot and throughout the manoeuvre the model must be flying forward, not sideways.

The pilot should make a quick visual check that the area he intends to overfly is clear and that no other models are flying in the near vicinity; you should be watching for definite head movements as they scan the area.

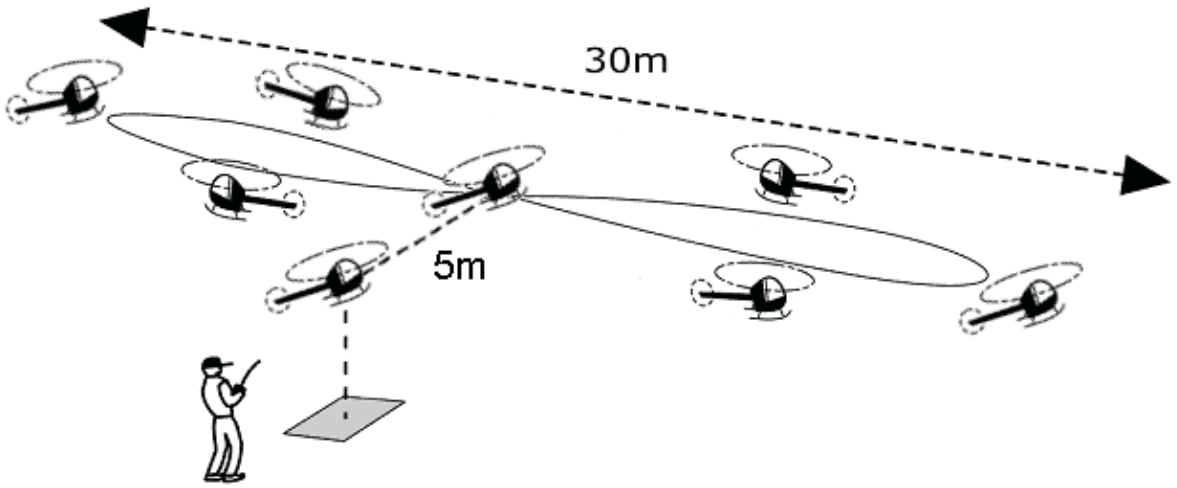
The pilot should fly this manoeuvre at a safe height above eye level, but should not fly at such a height that the model cannot be clearly seen by both the pilot and yourself. Between eye level and fifteen feet is the correct height band for this part of the test and the model **must** hover through the lazy eights, not fly through them. The pilot must be clear about the height at which they wish to fly before they take-off and you should discuss this with them in the pre-flight briefing.

Having ensured that it is safe to start the manoeuvre, the pilot then takes the model off, rises smoothly to the flight level previously selected and hovers forwards for approximately 5 metres, stopping over the centre marker and hovering for about five seconds.

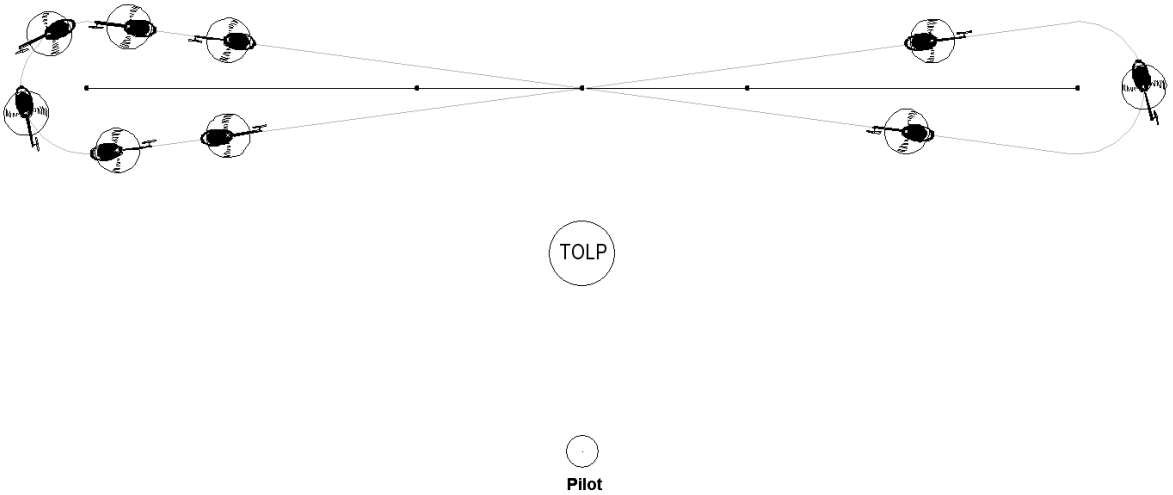
The pilot then turns the model 90^{o}, either left or right and, at the same time, slowly moves off forward at about a **walking pace** (but still in the hover). It is not required that the 90^{o} turn is completed before the model accelerates; the turn and acceleration may be one smooth manoeuvre although the pilot may treat them as separate manoeuvres if they wish.

The pilot moves away at his chosen height for a distance of about fifteen metres where they begin a turn the model smoothly through 180^{o}, flying forward in the hover all the time, and bringing the model back across in front of them. Without hesitation the model continues at the same speed in the new direction until it has flown past the pilot for a further fifteen metres to his opposite side. At this point he smoothly executes another 180° turn, causing the model to be now moving in the same direction as the first leg, again hovering across in front of the pilot.

The model does not stop at this point but it then repeats the events of the first lazy eight until two full eights have almost been completed and the model is near or over the centre ground marker.



During the lazy eights, you will be looking for a safe controlled flight throughout. The candidate should not lose or gain height significantly on the turns and should hover in a straight line between the turns with only sufficient drift on the model to prevent the it from moving either further away or, more dangerously, closer to him/herself during each leg of the manoeuvre. The **overall** length of each eight should be at least thirty metres and the model must be sideways on to the pilot each time it passes across their front. Some allowance can be made for a strong or gusty wind but the basic points of the manoeuvre must still be demonstrated.



At no time during the manoeuvre should the model be flying sideways. Throughout all the turns and straight flight, it must be flying forward in the hover and not 'crabbing' sideways.

The turns should be made by use of cyclic and rudder co-ordinated correctly, and must **not** be half pirouettes at the end of each leg. The flight pattern should be as the diagram in the MFNZ Members Manual and not deviate significantly from it. The pilot should be equally competent

to the left and to the right when flying this manoeuvre. If any significant difference in their flying skills shows up here then you should seriously consider whether they show the degree of competence necessary. It should be borne in mind that the manoeuvres in the test have been made reasonably simple, so that a fairly high degree of control can be demanded.

(i) At the conclusion of the two 'lazy eights', bring the helicopter to a halt sideways-on over the centre marker. Turn the model tail in to the pilot and hover for about five seconds. From this point fly the model to a landing on the original take off point.

At this point the model should be approaching the area of the centre marker, still at the chosen manoeuvre height, and the pilot should aim to smoothly decelerate the model to a stop in front of and sideways on to himself. The model is then turned to the heading it had before the lazy eights were started and hovered for about five seconds. At this point it should be over the centre marker, about five metres in front of the TOLP and hovering at the standard height.

The model is now flown to a landing at the original take-off point. The path taken is entirely at the discretion of the pilot and you should take the opportunity to watch carefully for a smooth well thought out and safe manoeuvre.

After landing, the candidate should shut down the engine and allow the rotor blades to stop turning before collecting the model to return to the pits.

Remember that electric models must be assumed to be 'live' until the flight battery has been disconnected and the handling of the aircraft by the candidate must reflect this during retrieval and in the pits area.

(j) Complete post flight checks as required by the MFNZ Safety Codes.

These are clearly set out in the MFNZ Members Manual, but you should pay particular attention to the correct Rx off, Tx off sequence and watch carefully to see that the frequency control system in use is cleared correctly.

The Questions (Basic)

The candidate must answer correctly a minimum of **five** of the **Mandatory Questions** (**Annex I**, **questions 1-15**; attached to this document) on safety matters, based on the MFNZ Safety Code for general flying and local flying rules.

The candidate must **also** answer correctly a minimum of **five** questions from the **General** and **Specific Discipline Questions** (**Annex I, questions 16-29 and 64-72**; attached to this document) on safety matters, based on the MFNZ Safety Code for general flying and local flying rules.

It is suggested that the 'questions' are asked before the flying test.

Prior to the 'flying test' the examiner should also ask a minimum of three 'Local site/club Rules'.

Such questions should query the maximum altitude models can fly over the flying site as well as the boundaries of the site together with site 'etiquette' and pilot safety.

Remember, the Proficiency scheme is a test of both flying ability and knowledge. It doesn't matter how well the candidate can fly, if they cannot answer the safety questions they should not pass.

As an examiner however, you should prepare yourself thoroughly for any testing that you do and you may wish to sort out your own personal and private list of sensible questions. Don't forget that you can use any local rules which you know and which the candidate should be aware of. Remember that the majority questions you ask are to be BASED on the MFNZ Safety Code; you are not expected to ask them 'parrot fashion' and the candidate is not expected to answer that way either.

This opens up the possibility of asking a candidate if they can think of reasons behind specific rules. For instance, why is the club frequency control system operated as it is and what might go wrong? Why operating transmitters should not be taken out when retrieving models from an active flying area? Or why should models not be flight taxied in or out of the pits area?

Examiners and Candidates and Basic Test Check List

The following is a short checklist of matters to discuss with the candidate taken from this document. This checklist can be used to ensure that all points raised above have been discussed with the pilot prior to any flights:

1 Has the candidate read: - The MFNZ Members Manual, Local site rules (if applicable). ☐

2 Discuss whether the model is suitable in 'these conditions.' ☐

3 Any 'no fly zones' need to be identified. ☐

4 Remind candidate to talk you through anything that the helper may do for them as the test progresses. ☐

5 Agree any manoeuvre requirements that need to be pre-determined by the Examiner and Candidate prior to the commencement of the test flights. ☐

6 Clearly identify the take off / landing point and agree with the candidate the required hovering times that he will be flying and you will being looking for. ☐

Examiners Check List. Basic Helicopter (HP)

CandidatesName	MFNZNumber	Date	Signature
Examiner's Name	MFNZNumber	Date	Signature

	FLIGHT TASK	COMMENTS
(a)	Carry out pre-flight checks as required by the MFNZ Safety Codes.	
(b)	Take off and hover tail in over the take off point, with the helicopter skids at eye level, for about twenty seconds and then land.	
(c)	Take off and hover for about five seconds then hover the helicopter slowly forwards for approximately five meters, stop, and hover for about five seconds.	
(d)	Hover the helicopter slowly sideways for approximately five meters, stop, and hover for about five seconds.	
(e)	Hover the helicopter slowly sideways in the opposite direction for approximately ten meters (five meters past its original position in front of the pilot), stop, and hover for about five seconds.	
(f)	Hover the helicopter slowly sideways in the first direction to bring it back to its original position in front of the pilot, stop, and hover for about five seconds.	
(g)	Fly slowly backwards, bringing the helicopter back to its original position over the take off point, stop, hover for about five seconds and land.	
(h)	Take off and hover forward for about five meters, stopping over the centre ground marker and hover for about five seconds. Turn 90 degrees either left or right and fly forward to perform two 'lazy eights', each at least 30 meters in length. Each time the helicopter passes in front of the pilot it must be sideways on to the pilot and throughout the manoeuvre the model must be flying forward, not sideways.	
(i)	At the conclusion of the 'lazy eights', bring the helicopter to a halt above the centre ground marker, turn the model tail in to the pilot and hover for about five seconds. Then fly to the original take off point, and land.	
(j)	Complete post-flight checks as required by the MFNZ Safety Codes.	
Answer five questions from the list of mandatory questions on legal aspects of model aircraft flying.		
Answer a minimum of five questions on safety matters from the MFNZ Safety Codes and local flying rules.		

The Advanced Test

(a) Carry out pre-flight checks as required by the MFNZ Safety Codes.

The pre-flight checks are laid out clearly in the MFNZ Members' Members manual. The candidate should also go through the pre-flying session checks, also laid out in the Members Manual. Ask the candidate to go through their checks as if the test was their first flight of the day.

Points to look for are that the candidate has a steady and regular ground routine, especially when starting and tuning the engine. Nerves should not play a part in the pits, and you should satisfy yourself that the candidate is in full control of what they are doing whilst preparing the helicopter for flight.

A tidy flight box and a neat ground layout makes a good impression and is to be expected from Advanced certificate candidates

A poor performance in this area is not direct grounds for failing the candidate but it is inevitable that you will be making mental notes of all aspects of the candidates performance and this is one that may have an effect on a real 'borderline' case.

Pay particular attention to the way the candidate uses the local frequency control system and make sure that they fully understand it and use the correct sequence appropriate to their model. For 35 MHz, this is usually 'get the peg, Tx on, Rx on'. For 2.4 GHz, the candidate should be aware of any local transmitter usage limitations and if a flight peg is required, it must be obtained before the usual Tx on, Rx on sequence. Some radio equipment and, occasionally, a specific model requirement requires that the Rx be switched on first and, if this is the case, the candidate should explain this clearly to you.

With electric powered models, take note that the candidate is aware that the model is 'live' as soon as the flight battery is plugged in and that they take appropriate safety precautions. If a separate receiver battery is fitted, the candidate should have the opportunity to check the operation of the radio equipment before the flight battery is plugged in.

Watch carefully and take note that the transmitter controls, trims and switches are checked by the pilot.

All candidates are required to be aware of the local the frequency control system and anyone who is required to use it but switches their radio on before doing so should be failed on the spot.

With i/c powered models, it is important that the candidate is seen to hold the rotor head securely during the starting procedure, and until the model is past the flight line.

Electric powered models must be carried out from the pits area to a safe point before the flight battery is connected and they MUST be considered live as soon as the flight battery is plugged in. Great care should be taken at this point and any help available to the candidate should be used in the interests of safety.

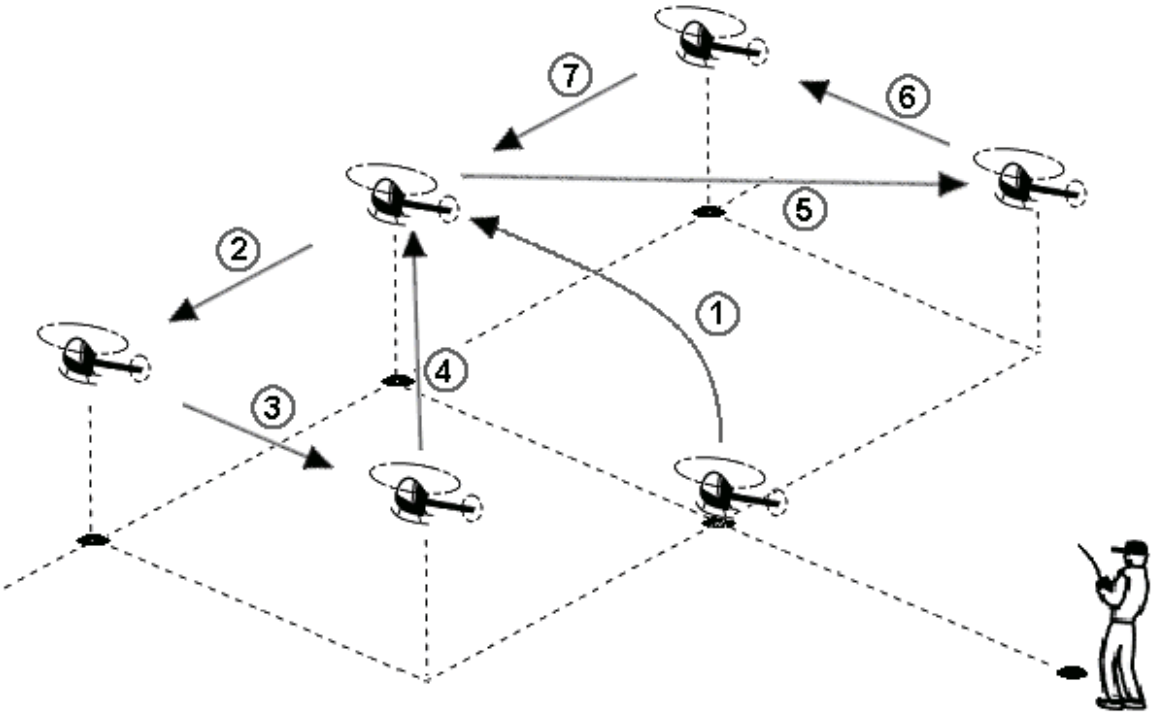
If there is no one else available then there is nothing to stop you aiding the candidate by, for instance, carrying the model to the test pad, etc., but any such actions must only be performed by you directly on the instructions of the candidate, you must not prompt them or carry out any actions of your own accord.

It is important that you talk these points over with the candidate in your pre-flight briefing.

(b) Perform one hovering 'Bowtie'

All sections of the manoeuvre are numbered and referenced to the manoeuvre drawing. The manoeuvre as described is flown anti-clockwise. However the direction of the flight may be either clockwise or anti-clockwise, at the discretion of the Examiner.

At all times in the manoeuvre, the model must be facing forward.



(1) The model starts on the TOLP, takes off and flies to a position over the centre marker where it is hovered for about 5 seconds.

(2) The model then hovers sideways to the left for about 5 metres to a position over the left inner marker where it is held and hovered for about 5 seconds.

(3) The model then hovers backwards for about 5 metres to a position immediately behind the left inner marker and level with the TOLP where it is held and hovered for about 5 seconds.

(4) The model then hovers diagonally forward and to the right to a position over the centre marker where it is held and hovered for about 5 seconds.

(5) The model then hovers diagonally backward and to the right to a position immediately behind the right inner marker and level with the TOLP where it is held and hovered for about 5 seconds.

(6) The model then hovers forwards for about 5 metres to a position over the right inner marker where it is held and hovered for about 5 seconds.

(7) The model then hovers sideways to the left for about 5 metres to a position over the centre marker where it is held and hovered for about 5 seconds.

This completes the manoeuvre.

Hover height must be consistent throughout the manoeuvre and there should be minimum wandering away from the straight lines between the designated hovering points as the manoeuvre is flown.

(c) Perform one 4-point pirouette

From the previous manoeuvre, the manoeuvre is begun with the helicopter hovering over the centre marker, tail-in to the pilot and it is held in that position for about 5 seconds. The model is then rotated 90 degrees and held in the hover, sideways on to the pilot for about 5 seconds.

The model is then rotated a further 90 degrees in the same direction to be nose in to the pilot and hovered in that position for about 5 seconds.

The model is then rotated a further 90 degrees in the same direction to the sideways on position to the pilot and hovered in that position for about 5 seconds

The model is then rotated a further 90 degrees in the same direction to the tail-in position to the pilot and hovered in that position for about 5 seconds.

The model is then hovered backwards for approximately 5 metres and landed on the TOLP.

This completes the manoeuvre.

The helicopter must rotate either clockwise or anti–clockwise for the entire manoeuvre. The Examiner will state which direction he wishes to see. The clear inference is that the candidate must be competent to perform the rotations in both directions prior to thetest.

Hover height must be consistent throughout the manoeuvre with minimum wandering away from the Centre marker. The landing must be within the 2 metre diameter circle centred on the TOLP.

(d) Perform one 'TopHat'

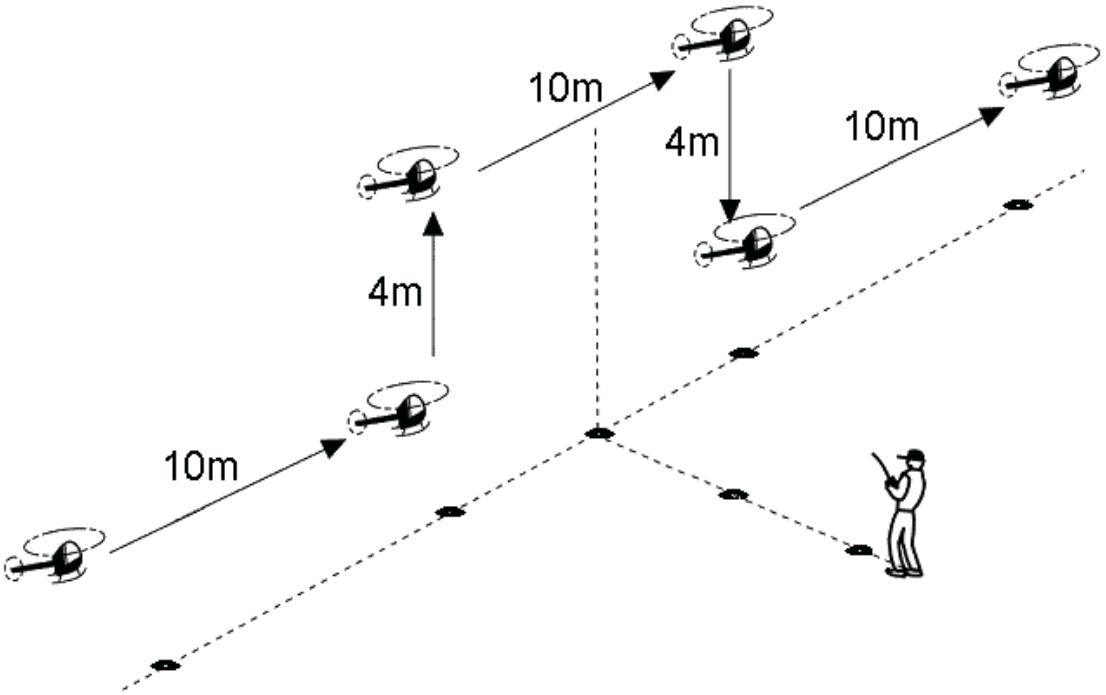
The pilot should now take off and hover the model to a position either hovering over the appropriate outer marker or approaching it at hovering pace along the line of the cross markers at eye level height. The model now moves forward at the normal hovering pace for ten metres, stops and hovers for about five seconds then climbs vertically for four metres before hovering again for about five seconds. The pilot will now hover the model forward for ten metres so that the model passes the pilot sideways on to them. The model again hovers for about five seconds and the pilot now causes the model to descend four metres until the skids are once again at eye level where it again hovers for about five seconds. The model now moves forward for another ten metres and passes over the opposite end outer marker which concludes the manoeuvre.

The model, still with skids at eye level, must then be hovered back to the take off/landing point and landed smoothly and steadily.

The speed during the top hat should approximate to a normal walking pace, and the heading is constant throughout. The entry and exit to the manoeuvre is a test of the pilots ability to

correctly position the model. The model should not drift away from or toward the pilot significantly and the model should be under accurate control for the whole manoeuvre.

The manoeuvre may be flown either from left to right or from right to left and the direction is decided by the Examiner.



(e) Take off and climb to a safe altitude.

The pilot must ensure that the route of his proposed flight path is clear before taking-off; watch for head movement as they scan the area. On taking-off, the helicopter will lift to a brief hover at about half a metre high. After again checking for obstacles and obstructions the pilot then climbs out at an angle greater than 45° to his selected safe height. When reaching this height the model can be transitioned into forward flight and the pilot can now position it for either a left or right hand circuit as he/she pleases.

During the climb out you will be looking for a positive approach to the manoeuvre, a constant angle and velocity. the pilot will also be looking for other traffic along the intended route.

(f) Fly a left hand rectangular circuit.

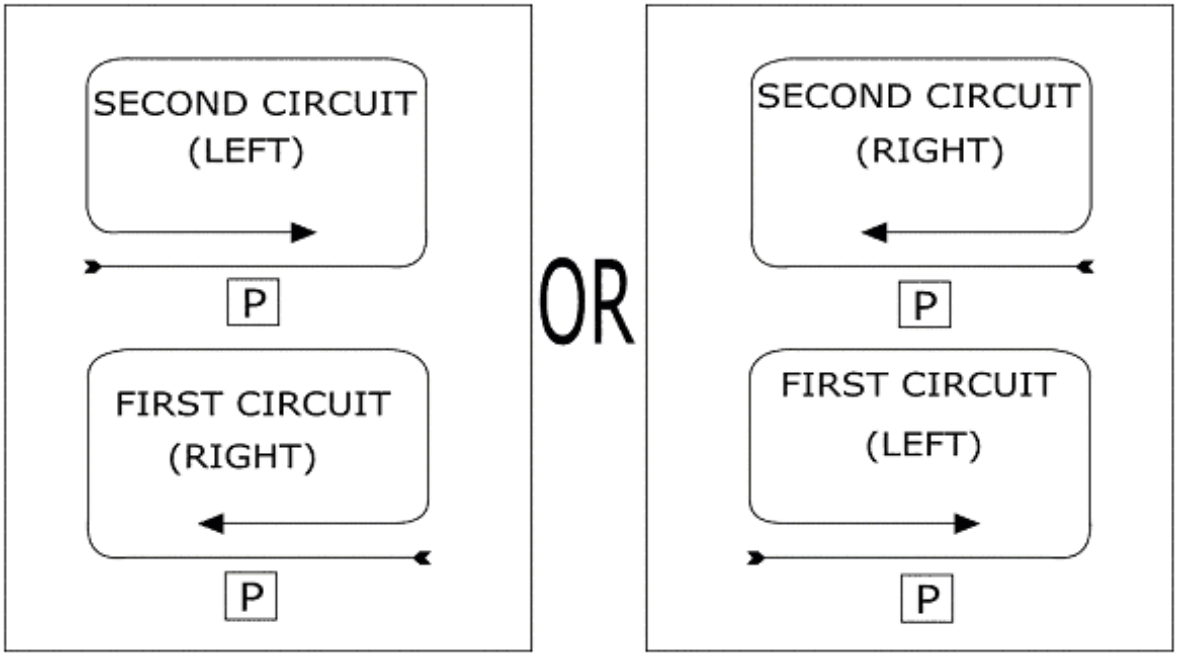
(g) Fly a right hand rectangular circuit.

The pilot can elect to fly these manoeuvres in either order. The circuits should be rectangular as shown in the manoeuvre diagrams. the longest legs of the circuit must extend over at least fifty metres. It is important that the initial turn on each circuit is made away

from the flight line and the model must never pass behind thepilot.

On the run in to the first circuit and on completion of it, the model will be flying past the front of the pilot, and, for safety reasons, twenty or thirty metres out from the take off pad. Tell the candidate prior to the flight the line you wish them to follow.

You must ensure that the candidate is clear on this, the line will be set by the model flying in front of them on a heading which will be agreed before the flight (and this will not always be into wind), and passing over a set point. The first pass in front of the pilot is extremely important as it sets the standard height and line for the rest of the 'flying' manoeuvres.



(h) Fly a Figure of Eight at circuit height with crossover in front of the pilot

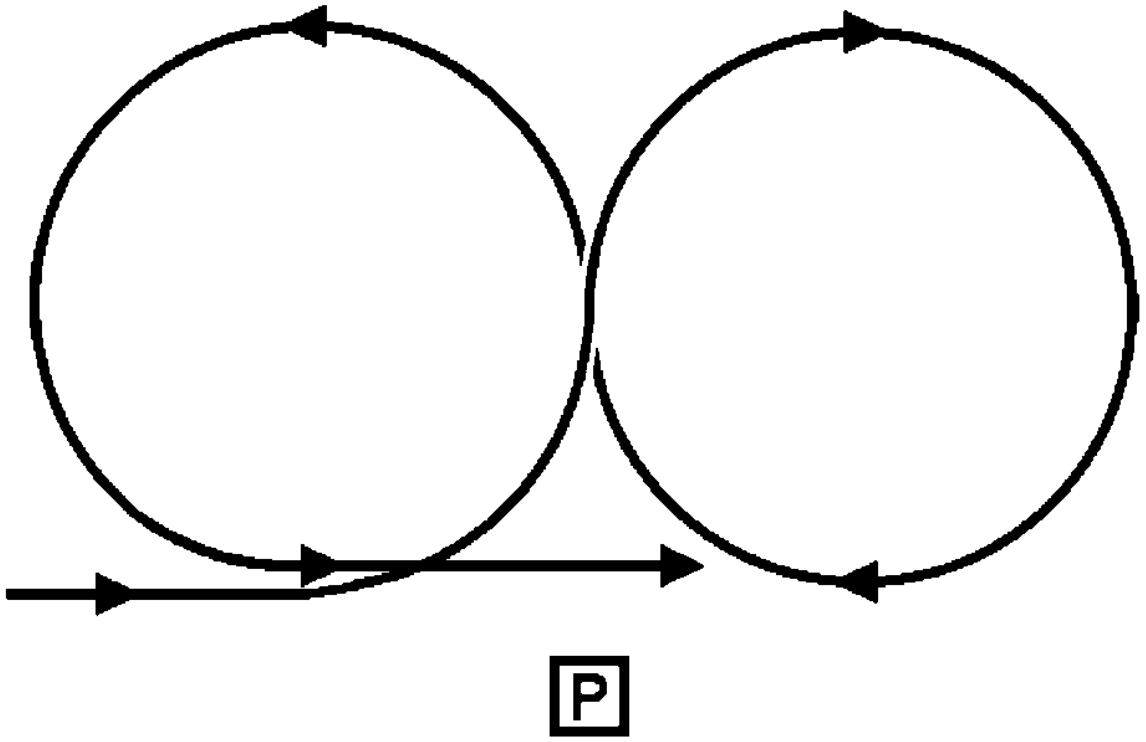
This should be flown as a banked circuit manoeuvre (not from the hover) and as shown in the diagram. The crossover point must always be in front of the pilot and, after a run in at standard height and line, the model MUST be turned through ninety degrees in the first turn so that it is flying exactly away from the pilot.

The first circle must also end with the model flying exactly away from the pilot, through the crossover point before it is turned into the second circle. Both circles should be of the same diameter as seen from the ground.

The main problems with this manoeuvre nearly always happen on the circle that is upwind of the pilot and if they do not adjust the angle of bank/turn rate to compensate they will either miss the crossover point by being a good way downwind, fly too near the pilots line, fly circles that are distorted or panic as the model accelerates towards them as it begins to come downwind and pull far too much bank (vertical!) to get the crossover point correct. This is not a sign that they have thought about the manoeuvre or practiced it.

The second circle (3/4 circle actually) is rarely a problem. The manoeuvre finishes with the model flying at standard height and line across the front of the pilot, not with another turn away.

The initial run-in to the manoeuvre may be either from left to right or from right to left and the direction is decided by the Examiner.

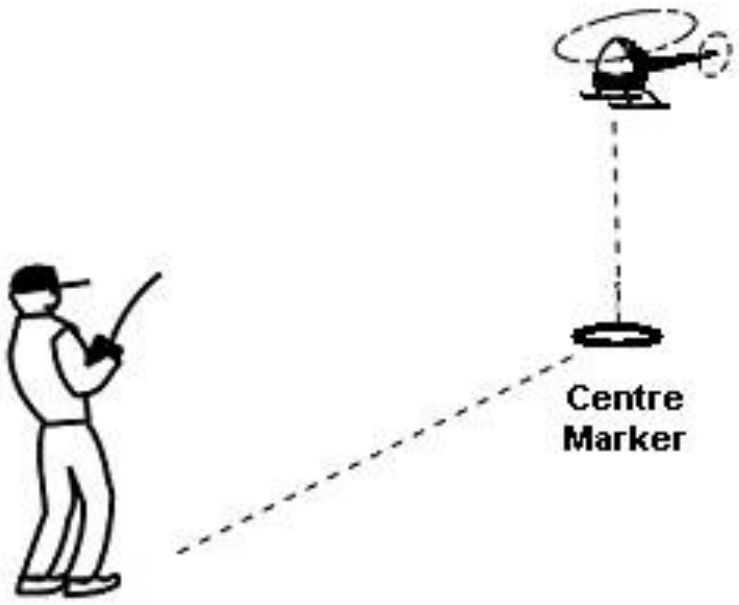


(i) Perform one twenty second nose-in hover.

The model must now transition from forward flight to the hover in a safe and steady manner and position for the nose-in hover.

The pilot should position the model over the centre marker, hovering at a height of approximately three metres. After a brief hover, the model is turned so that the nose is towards the pilot and held steadily in the nose-in hover for at least 20 seconds, then turned back, climbed away and transitioned to forward flight.

When the model is in the nose in position the tail boom should not be visible to the pilot. If the model is not completely nose in you should ask the pilot to correct it's position before starting the twenty second count. The helicopter should not drift significantly in any direction and height control should be good.



(j) Perform one double stall turn. Note that the stall turns must be performed with opposite rotation i.e. first one to the left, second one to the right or vice versa.

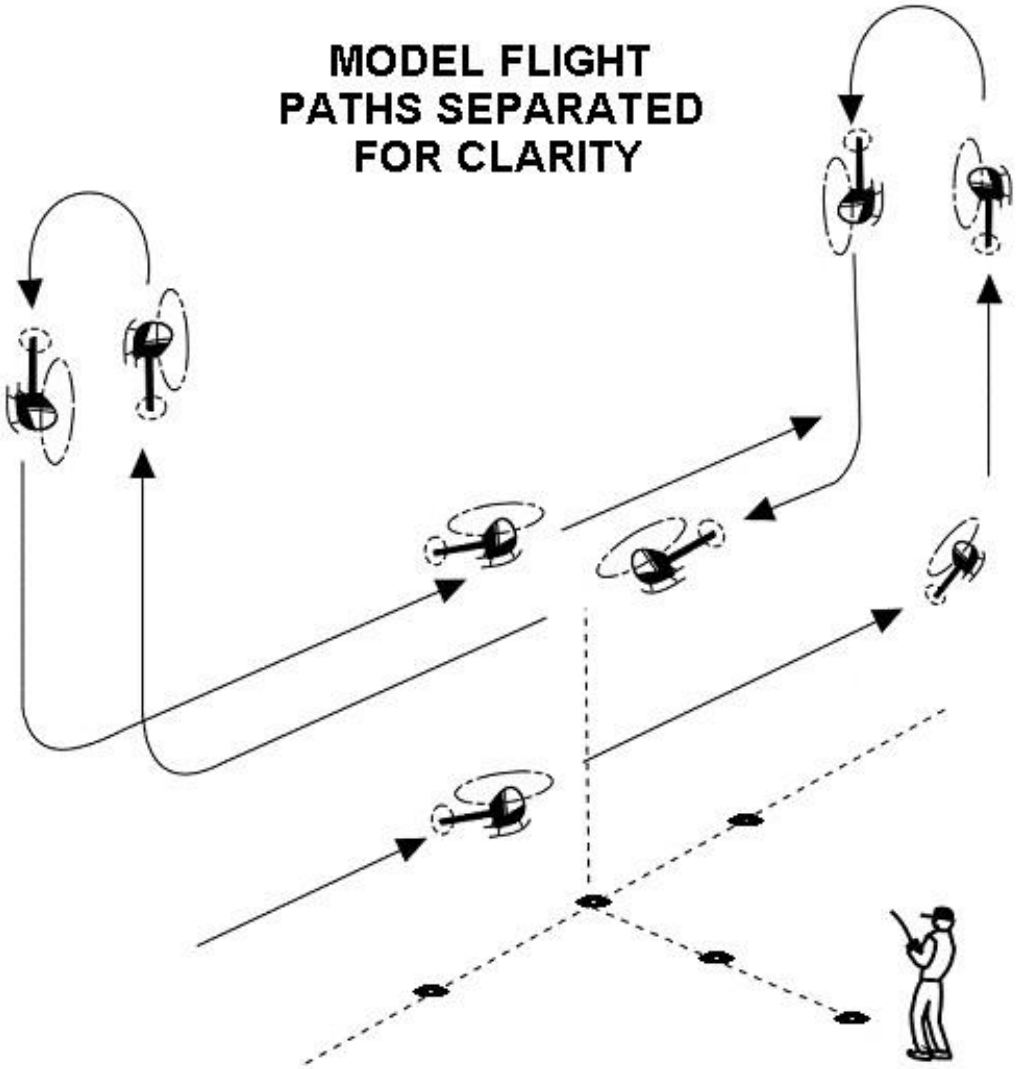
This manoeuvre is flown as one continuous manoeuvre. During the first element, the model should be flown in, on standard height and line, across in front of pilot to a point between thirty and fifty metres past the pilot. The model should then be pulled into a near vertical climb. At the top of the climb the model must stop (still pointing upwards) before being turned 180^{O}about it's vertical axis (a half pirouette). The model should descend approximately down the same path in a diving attitude and should pull out of the dive and exit the manoeuvre at about the same height as it started but on a reciprocal heading.

The second element is flown after the model has flown back down its original entry path and is performed approximately as far to the side of the pilot as the first element was to the other side. The description of the second element is exactly as for the first except that the pull-out and exit from the manoeuvre takes the model back along its original entry path to the manoeuvre.

Both of the stall turns should be away from the flight line. That is, if the initial entry to the manoeuvre is from the left to the right of the pilot, the first stall turn will be to the left and the second stall turn will be to the right (fly it with your hands and all will become clear)

You should look for accurate positioning of the model between the stall turns, that is at a constant height and along the same line. The model should not be allowed to skew off it's intended route, and should be corrected if it does. Clearly, wrong control inputs in this instance will indicate a lack of competence at the required level

The initial run-in to the manoeuvre may be flown either from left to right or from right to left and the direction is decided by the Examiner.



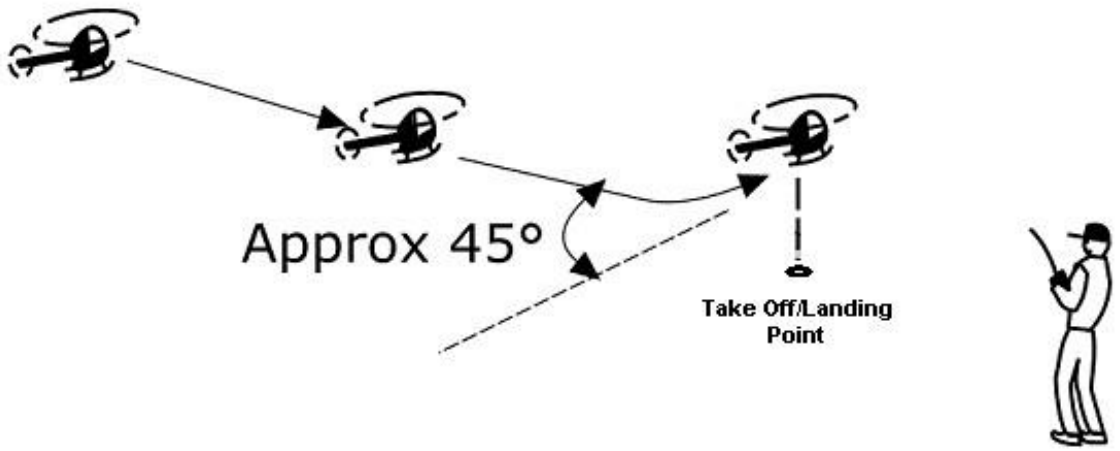
(k) Perform an approach at 45° to the vertical, landing within a pre-determined two metre square.

It is difficult to judge the angle of descent unless the model is almost sideways on to the pilot. For this reason the pilot should consider the planned approach path carefully and agree it with the Examiner during the pre-flight briefing. The direction of approach is the pilot's decision and everyone concerned with the test should be very clear exactly how the pilot will be attempting to fly the manoeuvre.

It is not a requirement that this manoeuvre should be entered from full forward flight so the pilot may set up the model in a steady hover or be moving forward in steady hovering flight at a minimum height of fifteen metres and at an appropriate distance away from the TOLP. The model should then sink at a constant rate with constant forward movement at an angle near to 45^{o}, heading down towards the TOLP. Finishing this descent exactly over the TOLP is not required but the model should be no more than a metre or so out. The candidate is allowed a short hover at a height of around two feet to make minor corrections before

settling the model on the ground. **The landing should be made with the model on the same heading as on the 45^0 descent.**

After landing, the candidate should shut down the engine and allow the rotor blades to stop turning before collecting the model to return to the pits.



(l) Complete post flight checks as required by the MFNZ Safety Codes.

These are clearly set out in the MFNZ Members' Members manual, but you should pay particular attention to the correct Rx off, Tx off sequence and ensure that the frequency control system in use is cleared correctly.

All manoeuvres must be carried out in airspace and orientations pre-determined by the Examiner and Candidate prior to the commencement of the test flight. The test must be completed in one flight.

The Questions (advanced)

The candidate must answer correctly a minimum of **five** of the **Mandatory Questions** (**Annex I**, **questions 1-15**; attached to this document) on safety matters, based on the MFNZ Safety Code for general flying and local flying rules.

The candidate must **also** answer correctly a minimum of **eight** questions from the **General** and **Specific Discipline Questions** (**Annex I, questions 16-29 and 64-72**; attached to this document) on safety matters, based on the MFNZ Safety Code for general flying and local flying rules.

It is suggested that the 'questions' are asked before the flying test.

Prior to the 'flying test' the examiner should also ask a minimum of three 'Local site/club Rules'.

Such questions should query the maximum altitude models can fly over the flying site as well as the boundaries of the site together with site 'etiquette' and pilot safety.

Remember, the Proficiency scheme is a test of both flying ability and knowledge. It doesn't matter how well the candidate can fly, if they cannot answer the safety questions they should not pass.

As an examiner however, you should prepare yourself thoroughly for any testing that you do and you may wish to sort out your own personal and private list of sensible questions. Don't forget that you can use any local rules which you know and which the candidate should be aware of. Remember that the majority questions you ask are to be BASED on the MFNZ Safety Code; you are not expected to ask them 'parrot fashion' and the candidate is not expected to answer that way either.

This opens up the possibility of asking a candidate if they can think of reasons behind specific rules. For instance, why is the club frequency control system operated as it is and what might go wrong? Why operating transmitters should not be taken out when retrieving models from an active flying area? Or why should models not be flight taxied in or out of the pits area?

Examiners and Candidates Advanced Test Check List

The following is a short checklist of matters to discuss with the candidate taken from this document. This checklist can be used to ensure that all points raised above have been discussed with the pilot prior to any flights:

1	Has the candidate read: - The MFNZ Members Manual Local site rules (if applicable) Safety Code for General Flying.	☐
2	Discuss whether the model is suitable in 'these conditions'.	☐
3	Any 'no fly zones' need to be identified.	☐
4	Remind candidate to talk you through anything that the helper does for them as the test progresses.	☐
5	Agree any Airspace requirements that need to be pre-determined by the Examiner and Candidate prior to the commencement of the test flights.	☐
6	Discuss the various manoeuvres and any options that may be available so that there can be no misunderstanding during the test.	☐
7	In particular, does the candidate understand how you expect to see the model positioned with regard to the wind throughout the test.	☐
8	Clearly identify the landing area and agree with the candidate the required landing pattern that he will be flying and you will being looking for.	☐

Annex I Oral questions

Mandatory Questions for all Disciplines (1-15)

1. Describe the airspace class you are currently flying in?

2. Where would you find information about the airspace class?

3. What are the requirements and limitations of the airspace?

4. What is the altitude limit for the current site?

5. Explain the requirement of consent from the property owner prior to flying

6. What are the requirements for flying with 4km of an aerodrome?

7. What are local flying field rules? Noise Requirements?

8. What would you do if a person walked into the flying area?

9. What frequency control, including for FPV, is currently in place?

10. What are the requirements for an observer? What is their role?

11. Describe “Line of Sight” operation

12. What is required for flying in controlled airspace?

13. Describe the legal requirement s for aircraft between 15-25kg? 25kg+?

14. Can you fly at night?

15. How would you respond to a manned aircraft entering the airspace you are operating in?

General Questions (16-29)

16. What is the purpose of a transmitter range check before flying?

17. Describe the pre-flight checks that should be done on an airframe before flying

18. Why do we not fly behind the flight line or over the pits?

19. Describe the importance of the correct centre of gravity on an aircraft

20. Why is it good practice to balance propellers/blades/fans?

21. What do you look for when checking the condition of propellers/blades/fans?

22. Explain the precautions associated with charging batteries

23. Describe the power on/power off sequence of your model

24. How do you check the centre of gravity of a model whilst on the ground?

25. What is meant by dual rates on a transmitter and how does this affect the control surfaces?

26. What is meant by exponential function on a transmitter?

27. Describe the failsafe function of your radio/flight controller

28. What are the hazards associated with carbon fibre used in construction?

29. Describe Pitch / Roll / Yaw of an aircraft

Pilot Specific Questions (30-44)

30. Why models should be restrained whilst starting?

31. How should the receiver battery status be checked before flying?

32. Describe safe tools that can be used to start an IC engine

33. Why do we check the control surface integrity and direction before flying?

34. Why is it good practice to disconnect the motor pack on an electric model whilst in the pits?

35. Why is it good practice to test a receiver battery using a load tester?

36. Why it is good practice to cycle NiCad or NiMh receiver battery packs?

37. Describe flight line etiquette

38. What happens when a model stalls and the best way to attempt to correct a stall?

39. What is the best action to take when experiencing an engine failure on take-off?

40. What is the best action to take when an engine stops in mid-flight?

41. When starting an engine (IC or electric) where should you insist bystanders position themselves in relation to the model?

42. How do you find out if a receiver battery pack has reduced capacity?

43. What is aileron differential?

44. What is the effect of low airspeed on control surfaces?

Multirotor Specific Questions (45-56)

45. Why is calibrating accelerometers and gyros important?

46. Why do we use lock nuts, or reverse threaded shafts, to secure blades?

47. How do controller gain settings affect the model?

48. Describe various flight modes

49. Describe the failsafe settings currently in use

50. How is flight pack voltage monitored?

51. What is HDOP and how can it affect GPS based flight?

52. Describe how your aircrafts configuration would respond to a motor/esc/propeller failure

53. What would cause your multirotor develop oscillations in a specific axis?

54. Why should you not take off and land in non-GPS modes?

55. Why should you not use exponential on the flight controller and your radio?

56. What is compass calibration and why is it important?

Glider Specific Questions (57-63)

57. Describe some ways to get your glider down safely from a thermal when it is getting carried away?

58. What is wash in and wash out. What are the advantages and disadvantages of each?

59. What might happen if you over speed your glider and describe some ways you could avoid it if you are up high and getting carried away?

60. Where should a tow-hook be situated in reference to the centre of gravity? What are the problems with having it too far forward and too far back?

61. The elevator compensation required for flaps down is elevator up/down?

62. Why do you wind down the line after a winch launch?

63. What other dangers are associated with winches? (Line breaks, chutes through turnarounds, locking pins)

Heli Specific Questions (64-72)

64. How do you check tail compensation direction?

65. What ESC startup setting should be enabled and why?

66. How and why do you check CG?

67. How tight should main blades be?

68. Why is heli blade tracking important?

69. Explain the purpose of throttle hold and 2 occasions you use it

70. How do you check the state of flight packs and/or RX packs in flight and before/after?

71. Give 5 examples of pre-flight checks required before any flight?

72. What is the recommended distance to fly away from the pilot when throwing down?

Large Model Specific Questions (74-83)

74. State the purpose of the Large Model certification scheme

75. Define Category 1, 2 and 3 aircraft.

76. Which Wings badge/s must be held when operating large models?

77. Are redundant Receivers and batteries mandatory for all categories?

78. Describe the two methods of choosing suitable servos for certified aircraft.

79. Define the 3 sequential parts of the certification process and give brief description of each process.

80. Where must test flights be performed, who may be present during the test flights and how many aircraft are allowed in the air during test flights.

81. How long is a Category 1, 2 & 3 permit valid for and which Category aircraft require a flight log book be kept?

82. When must checks of a certified aircraft be carried out and to what level?

83. Explain what validates a Permit to Fly at Public sites.

FPV Specific Questions (84-92)

84. What VTx frequencies and power levels are legal to use in New Zealand?

85. What are the requirements of FPV flying in New Zealand in regards to observers?

86. Can you mix and match right hand and left hand polarization antennas between VTx and VRx?

87. What tests should be performed before flying an FPV model each day?

88. Can you show me how to change your VTx to another frequency?

89. Briefly describe the difference between direction and non-directional antennas and how they would be used

90. What does a diversity VRx provide?

91. If you are using RTH or similar technologies what important steps should be done each day you go flying?

92. What happens with most VTx's during power on or channel change and how might you deal with this?

High Speed Specific Questions (93-101)

93. What is the extent of the flying area?

94. What is flutter, what causes it, and how is it avoided

95. What noise regulations exist at the flying area

96. What is the ceiling of the flying area?

97. Why is a throttle lock a good idea on a high performance electric model?

98. Why is an independent control & power system required?

99. What is 2.4Ghz carbon shielding and how is it avoided

100. What failsafe exist on the model, and why?

101. Why is a separate battery pack powering the Rx desired on the high-performance electric?

---------- End of document ----------