BRITISH MODEL FLYING ASSOCIATION

THE R/C ACHIEVEMENT SCHEME

TEST STANDARDS for CHIEF EXAMINERS and CLUB EXAMINERS

GUIDANCE for TEST CANDIDATES

THE 'B' CERTIFICATE

(SILENT FLIGHT - ELECTRIC)

ISSUE 1 **June 2006**

General

The 'B' Certificate is "designed to recognise the pilot's more advanced ability and a demonstrated level of safety suitable for flying at a public display". 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 to me in a satisfactory manner and how do I feel about them appearing in public, possibly at a large display, on the strength of the certificate which I may be about to award them'.

For many years the 'B' Certificate has been seen as a 'display licence' but, in fact, it has always been much more that. It was set up in the first place as a method of encouraging club flyers to gain further flying skills by meeting and being tested to a recognised national standard.

Whilst it certainly has its uses in the context of display pilots, the real aim of the 'B' certificate has always been to give the club flyer a personal attainment goal beyond the 'A' Certificate; a 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 'B' certificates then the general standard of flying both within your club and nationally cannot help but rise. Examiners should be pressing this concept positively within their clubs and discouraging the idea of the 'B' as just a 'display licence'.

A pilot capable of flying to 'B' certificate standards and wishing to go straight to the 'B' test without taking the 'A' test may do so but candidates should on no account be forced along this path. A flyer, known within a club to be a good pilot, going through the 'A' before taking the 'B' can be an excellent example to the rest of the club members and this should be pointed out to any candidate wishing to go direct to the 'B'.

The candidate for the 'B' should have studied the BMFA handbook, any local site rules (if applicable) and be familiar with the 'Safety Code for General Flying', the 'Operational Guide, All Models and Radio Control' and the 'Safety Code for Model Flying Displays'. Most of the questions asked at the end of the test will be from these sections of the handbook.

The Model

The test can be performed with virtually any Electric Powered Glider model, but not an Electric Powered Sports model as the Powered Flight 'B' Certificate would be more appropriate to that type of model.

The use of a gyro or autopilot is not allowed during the test. If any such system is fitted to the model it must be disabled during the test and you should check that this has been done.

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.

Electric Powered Gliders must be treated as if the motor is running as soon as the system is armed (i.e. main flight battery connected irrespective of Radio state). The arming sequence should be clearly understood and discussed/demonstrated to the examiner. Also some planes use a switched system (100% or nothing) and if the system being switched is powerful it can cause a significant torque roll. The candidate should be aware if this is the case and discuss it before the test flight(s) as it may cause issues in some of the manoeuvres and they will have to correct the flight path smoothly and you will need to allow for deviations.

Launch Height, Flight Time and Weather

The 'B' certificate candidate should be a confident pilot.

As gliders are far more affected by the conditions than most models even full launch height may not give sufficient flight time for the full test. If conditions are difficult the Examiner should discuss whether the model is suitable in "these conditions" and thus whether the test should be attempted. Remember the use of a "suitable model" is the candidate's responsibility and so it is their decision whether to attempt the test. For example a fast flying Hot-liner style may easily cope with a day which would be impossible with a simple lightweight Rudder/Elevator design.

However, the test is not about performance, it is about aircraft handling and a well flown model in conditions not really suitable for it does deserve credit.

Consistency

The combination of reasonable launch height and good speed control should mean that the model will be flying at a gently decreasing height throughout most of the test and you should note if height is lost unnecessarily.

It is a requirement that "All manoeuvres must be carried out in airspace pre-determined by the Examiner and Candidate prior to the commencement of the test flights". Thus any "no fly zones" need to be identified and discussed prior to the flight. This conversation is also the examiners chance to clearly identify the landing target and agree with the candidate the required landing pattern that is being looked for.

Somewhat inconsistent flight paths are not necessarily reasons to fail the candidate but they do give you a good indication of the pilot's general level of competence and could influence your final decision. Very poor positioning is a sure sign that the pilot has not practised the test and is a legitimate reason to fail them.

Continuity

Although the manoeuvres are set out in such a way that they can be flown one after the other as a schedule, this is NOT what is expected. There will normally be additional sections of flight to position the model for the next element. You, of course, should be watching any extra sections just as carefully as the rest of the flight as they can tell you a lot about the competence of the flyer.

Trim

It is expected that the candidate will start the test with a model that has been trimmed out previously but they should be able to trim the model out in the air if necessary. If you see obvious signs that the model is out of trim and the candidate does not make any attempt to rectify the matter you should seriously question their basic competence.

On the other hand, if they do need to re-trim and are making attempts to do so, you should make allowances for a short time of flight with a somewhat erratic flight path. This should not be penalised unless it puts the model in any danger or unless the model flies into any unsafe area.

Nerves

Quiet competence is what you are looking for during the flight but most candidates will be nervous and you should make some allowance for this. If the flyer is very nervous you should seriously consider abandoning the test for the time being and offering the candidate a coaching flight or two to settle them down before re-taking the test. This can be done on the same day and can really help those candidates who have trouble with nerves when flying in a test situation.

Repeating Manoeuvres

At 'B' certificate level the candidate should be competent to fly the manoeuvres with very few errors. If you see any major faults the test should be taken again. It may be, however, that the candidate will make a minor mistake on a manoeuvre and if you are not fully satisfied with what you have seen you should consider asking for the manoeuvre to be repeated.

Some judgement is called for on your part here. A major mistake is grounds for failing the candidate, especially if loss of control has occurred or a dangerous situation has arisen. You should definitely not let them have multiple tries at each manoeuvre until they get it right but you must give yourself the best chance of assessing the competence of the pilot you are testing.

You should consider what you have seen the model do and if you think to yourself "could be better" then a request that the manoeuvre be repeated may be considered. Be extremely careful about using this option, however, as you could very easily be degrading the worth of the test. It must not, under any circumstances, degenerate into a series of 'practice' manoeuvres. An added complication with a gliding test is the height and thus flight time available to complete the manoeuvres if repeats are requested.

Repeating the Test

The rules allow two attempts at the test in a day. If the candidate fails the first of these you must consider their performance in deciding what to do next. Many failures will be reasonably good pilots or they could be borderline cases. In these circumstances it might be appropriate to offer one or two coaching flights and then a repeat of the test. Remember that many of the candidates will be unfamiliar with flying under pressure and might do very well on the second test.

On the other hand, it will probably be obvious to you on many occasions that the pilot you are testing is simply not ready for the test they are taking. In this situation it is better that you tell them so quite clearly. A little coaching at this point along with areas to practice, is far more useful to everyone than simply telling the candidate that they have failed.

Helpers for Disabled Candidates, Young Candidates and

Others who have requested help during the Test

When disabled or young candidates present themselves for the test it may be that they will not physically be able to perform all the actions that most candidates can. At times, other candidates may also request help with certain physical aspects during the test (they may, for instance, have an injured finger). There will be times when you, as an Examiner, will think 'how much can I relax the test requirements for this person'.

Some Examiners make the decision to make no allowances at all but this effectively bars many people from attempting the tests. If we think of the achievement scheme as a true national scheme then we must consider how we can accommodate candidates, not how we can stop them from participating.

The answer, of course, is that you, as an Examiner, must make on-the-spot decisions about what you will allow during the test and, in such cases, you are within your authority to take such decisions. The guidelines set out below may help but at all times the two items at the end of this section must take precedence. They are not negotiable and mean that, whoever the candidate is, they have to convince you that they know what they are doing or what is happening for the full duration of the test.

For instance, a disabled flyer may have difficulty handling the model and may not be able to carry it out, launch it or retrieve it after the flight. The sensible use of a helper is certainly allowable in such cases but it is essential that they only do what the candidate asks them to do. Pre-flight checks may be another problem area that can be overcome by a helper but you should expect the candidate to do as much of the work as possible themselves and they should be able to talk you through anything that the helper does for them. Be sure to discuss all this with the candidate before starting the test.

In all cases:

(1) If, at any time, the helper takes over the decision making process from the candidate then the candidate must fail.

(2) You can make no allowances whatsoever for anyone during the flying of the test. The candidate can either perform the flight manoeuvres as specified or they can't. If they can't then they must not be passed.

Make sure in your briefing that both the candidate and the helper are fully aware of both of these points.

The Flights

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

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

Points to look for are that the candidate has a steady and regular ground routine. Nerves may play a part but you should satisfy yourself that the candidate is actually in control of what they are doing when preparing their aircraft for flight.

Pay particular attention to the way the candidate uses the local frequency control system and make sure that they understand it and use the correct sequence of 'get the peg, Tx on, Rx on'. Also watch carefully and take note that the transmitter controls, trims and switches are checked by the pilot.

Any candidate who switches their radio on before checking the frequency control system should be failed on the spot.

If there is no one else available then there is nothing to stop you aiding the candidate by holding the model and launching it 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. Talk this over with the candidate in your pre-flight briefing.

The candidate must be fully familiar with any failsafe system fitted to the model and should brief you on the system and demonstrate it working at some time during the pre-flight checks.

Generally, they must show that they are paying particular attention to the 'transmitter on - receiver on' sequence.

(b) After complying with the site frequency control system, prepare the model for launch. The motor start and stop switch/speed controller sequence must be demonstrated to the examiner

The correct power on sequence is critical to the safe operation of Electric Powered Aircraft. After the normal 'transmitter on - receiver on' sequence (if a separate Rx pack is used) the Candidate should clearly check the radio is operational and the throttle is closed (or control switch is in the off position) before the flight battery is connected. The motor start and stop switch/speed controller sequence must be demonstrated to the examiner and the arming sequence of the controller (if any) should also be discussed to prove the candidate understands their equipment.

As always any infringement of the site frequency control system should result in a test failure.

(c) Check that the launch area and landing area are clear both on the ground and in the air and, after complying with the site frequency control system, prepare the model for launch. If a helper is used to launch the model they should be fully briefed as to what is required

Many pilots prefer a helper to launch the aircraft. The normal helper rules apply and the candidate must clearly be in charge.

(d) Clearly announce, "Launching" and launch the model under full control. Any deviation from the expected launch path must be corrected smoothly and quickly. Climb to approximately 400 ft. Switch off power and transition to glide without stalling.

The Launch should be clearly under control and any deviations smoothly and swiftly corrected. The launch should appear competent and it is acceptable to discuss the 400ft height during the launch (As heights are very hard to estimate) and agree when to terminate the climb phase.

Depending on the climb performance of the aircraft a number of circuits may be needed to reach the desired 400 ft. With more powerful types a straight climb out may be used. Whatever the flight profile it must be smooth and controlled. Watch out for the pilot with a very powerful aircraft as it may go towards (or even beyond) the vertical in the climb and this should be marked down.

A smooth transition to gliding flight is required and again a candidate with a more powerful type may have problems here.

REMEMBER NO POWER TO BE USED DURING THE NEXT 2 MANOEUVRES

(e) Fly the model on a thermal search pattern. The model is to pass over three points, agreed with the Examiner prior to the start of the flight (e.g. corners of the field).

This manoeuvre should be flown above the minimum flight speed of the model and as stated pass over three pre agreed points. If lift is found during the search then a smooth transition into the next task is allowed but this is not mandatory. If the lift is found early in the task then the search phase can be re-flown between steps (h) and (i) on the way upwind.

(f) Fly the model through consecutive 360 degree thermal turns to a position a minimum of 100m down wind of the pilot. The model should gain height if in lift or be flown with minimum loss of height if no lift is found.

This manoeuvre should focus on a smooth rate of turn. The model will appear to speed up (downwind) and slow down (upwind) if there is a breeze. This is to be expected and is the correct result.

A weak pilot may try to slow the model whilst it flies downwind and speed it up into wind rather than allowing it to fly smoothly. If this results in an erratic motion or stalling of the plane then the examiner should mark the pilot down.

If this manoeuvre is flown in rising air it will rarely be smooth and so the examiner should make allowance for turbulence affecting the model. The gaining of height is desirable and shows the strength of the pilot, however it is not a mandatory requirement and smooth descending circles are allowed (a pilot who avoids lift to fly in smooth air must be suspect).

POWER MAY NOW BE USED AS REQUIRED TO POSITION THE MODEL.

(g) Fly the model through either a half loop or half roll to inverted, hold straight, controlled inverted flight for a minimum of five seconds and then half loop or half roll back to level flight.

This manoeuvre should be as smooth as possible. A thermal soaring glider with a large amount of dihedral will not track straight when inverted and this should be allowed for. As long as the flight path whilst inverted is corrected back to the starting heading after any deviation then that is OK. The Examiner should probably agree to count the five seconds or at least indicate that they feel the five seconds is complete to avoid any confusion with the candidate.

(h) Fly the model a minimum of 150m up wind of the pilot with minimum loss of height. Gain speed and perform a stall turn into wind.

This manoeuvre should be a smooth flight (normally above the minimum flying speed of the aircraft) forwards to an agreed position approximately 150m upwind. Verbal agreement between the examiner and candidate during the flight is allowed as distance judgement at height is very subjective.

The statement "Minimum loss of height" may cause some confusion as it can be argued the best speed to penetrate is quite fast (especially if it is windy). The examiner should look for a positive move upwind. The choice of actual speed is the candidate's decision but any excessive dive or conversely any very slow flight should be penalised.

This Stall Turn manoeuvre should include gaining speed in a gentle dive, followed by a flat entry (to establish the starting height) and then a pull up into a vertical climb. A degree of yaw will need to be achieved before the speed decays too much (as there is no Prop Wash, the glider must be yawed over before it stalls). The model should then rotate to the down vertical (there may be a tendency for gliders with high dihedral to roll as well at this point, which is acceptable if smoothly corrected) and then accelerate and pull out at the entry height.

(i) Fly the model into wind and perform one inside loop.

The loop should show the candidate understands the energy retention (or lack of it) that their model posses. The Loop should be a round as possible and reasonably large, but for some lightly loaded gliders it will need to be kept quite tight to stop the rapid speed decay causing the glider to stall out of the manoeuvre.

(j) Fly the model across wind and perform an unpowered stall, recover with minimum loss of height, still heading across wind.

This manoeuvre should be a gentle reduction of speed until the stall occurs and then a straight dive and recovery with minimal height loss. A lot of gliders (due to the high Aspect ratio wing) will drop a wing in the stall and this should be smoothly corrected. The dropping of a wing should not be a issue if the correct heading is maintained as much as possible.

(k) Turn the model down wind and perform an unpowered stall, recovering with minimum loss of height on the same heading down wind.

This manoeuvre should be a gentle reduction of speed until the stall occurs and then a straight dive and recovery with minimal height loss. A lot of gliders (due to the high Aspect ratio wing) will drop a wing in the stall and this should be smoothly corrected. The dropping of a wing should not be a issue if the correct heading is maintained as much as possible.

(l) Fly the model up wind to prepare the model for the overshoot/landing phase.

A reference point should have been agreed before the flight for a suitable upwind position. Reaching the point exactly is not critical but you are looking for the pilot to fly smoothly into the agreed area and then position themselves at a suitable height for landing.

Watch head movements that show the candidate is checking the landing area is clear..

(m) Call "landing" and prepare the model for a landing with a down wind leg, followed by a base leg and final approach.

When the candidate is happy the landing area is clear they should make a clear call of "Landing" loud enough to be audible to the other flyers. The circuit should remain out in front of the pilot and thus allow them to keep the landing area in view at all times. A pilot should not fly around themselves.

Lift or sink in the circuit can cause any pilot to be too high or too low. How the candidate adjusts circuit lines and speed will tell you a lot about their competence.

The crosswind leg may be a continuous turn if preferred and it may be stretched past the centre line of the landing approach to allow control of height but the model must be flown back to the centre line for the final approach. The whole approach should be flown smoothly with no stalling and the turns should have reasonably large radii.

(n) Overshoot from below 10 ft and climb back to circuit height. Note that this manoeuvre is an aborted landing, not a low pass.

The model should have followed a normal landing circuit and should not be being flown too fast. The overshoot should be smooth and controlled. The position to be flown to should have been agreed with the candidate before the test.

(o) Again, call "landing" and prepare the model for a landing with a down wind leg, followed by a base leg and final approach.

When the candidate is again happy the landing area is clear they should make a clear call of "Landing" loud enough to be audible to the other flyers.

(p) Land the model into wind within 10 metres of a predetermined spot.

This is probably where a weak candidate will fail the flying tests, especially if they are flying a glider without airbrakes or one where the airbrakes have strong secondary effects. The circuit should remain out in front of the pilot and thus allow them to keep the landing area in view at all times. A pilot should not fly around themselves.

You are looking for a smooth landing and not a 45 degree dive into the ground. The judgement of height on the landing circuit will have been critical to this phase. A step approach with strong brakes deployed is allowed, but a smooth round out and landing is expected.

Things to watch out for are the pilot who realises he is too high and then dives rather than slows down (thus covering more ground, the opposite of what he wants) and conversely the pilot who is too low and slows the model down. Both examples show a fundamental lack of

understanding and whilst not enough to fail the test on their own, they are a good pointer to a weak candidate.

(q) Retrieve the model from the landing area, informing other pilots that the landing area is clear.

The candidate should NOT take their transmitter with them when retrieving their model and it should be left with a competent person. If no one else is available to hold it then you should offer. When the model has been retrieved and returned to the launching area the transmitter should be returned to the pilot. There is no requirement to turn off the model and transmitter (and then clear frequency control, etc.) if the next flight will be made immediately. If the system remains armed then you should note proper handling of the model until it is disarmed.

(r) Complete post-flight checks required by the BMFA Safety Codes.

What is required here will be dependant on how smooth a landing was achieved. Any abrupt stop or collision with a fixed object would warrant a full structural and control surface check. A smooth landing will only need a visual and control movements check.

As safety is the main driver the candidate may choose to perform a full check after each flight and this should not be discouraged.

(s) Repeat the above schedule, giving a total of two flights.

If the model has sufficient power left there is no requirement to power off Rx then Tx and return to the pits. The second flight can either be completed immediately or after a delay whilst batteries are swapped or recharged. The only hard requirement is that the frequency control system of the site must be complied with and the frequency cleared if the model will not be re-flown immediately.

Once the two flights are complete return to the pits.

After schedule point (q) has been completed for the second flight the candidate and examiner should return to the pits area. The post-flight checks (r) should be completed in the pits and the frequency control system cleared.

Check that the pilot observes the correct motor disarming, power Rx off sequence and clears the frequency control system in a timely manner.

The Questions

The candidate then must answer correctly a minimum of eight questions on safety matters, based on the BMFA Safety Codes for General Flying and local flying rules. At least four of the questions should be specific to Electric Flight.

Remember that on no account can good performances on the questions make up for a flying test that you considered a failure. If you have failed the candidate's flying you should not even start to ask the questions. On the other hand the achievement 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.

How many questions you should actually ask will depend on the circumstances at the time. For instance, if the candidate has done a good flying test and answers the first five questions with confidence then you need go no further. An acceptable test but with some rough edges can be offset to an extent by the candidate performing well in the first five questions.

A candidate who has done a test which you found only just acceptable and who hesitates on the questions should be asked a few more than five and if you are not satisfied that they have actually read the safety codes, you should not hesitate to fail them.

There is some debate as to whether a list of 'approved' questions should be published for examiners to use. Current opinion is that if such a list is published then candidates will also be able to study the list and will not need to study the BMFA handbook and this is probably not a good idea.

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 BMFA Safety Codes; 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? or why should operating transmitters not be taken out when retrieving models from an active flying area?

Some of the questions must cover the special rules pertaining to public display flying, which may cause a negative comment from the pilots as in most cases they will have no intention to do so. However it must be pointed out that a B in any discipline can often be taken into account by a show organiser. Hence there is an importance of demonstrating knowledge of the special codes relating to display flying. It is better that this is explained to the candidate in advance of him coming forward for the test to avoid a surprise or an adverse reaction when such questions are posed.

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Examiners and Candidates 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 BMFA handbook
Local site rules (if applicable)
'Safety Code for General Flying'
'Operational Guide, All Models and Radio Control'
Code of Practice for Model Flying Displays ☐

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 model position after the launch and straight flight tasks (d & e) are completed and also the position at the end of the overshoot task (k) ☐

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

7 Clearly identify the landing target and agree with the candidate the required landing pattern that is being looked for (This includes the upwind position from which the manoeuvre starts). ☐

‘B’ CERTIFICATE (SILENT FLIGHT - ELECTRIC)

Examiners Test Flight Check List

Candidates Name	BMFA Number	Date	Examiners

	FLIGHT TASK	COMMENTS - FLIGHT 1	COMMENTS - FLIGHT 2
(a)	Carry out pre-flight checks as required by the BMFA Safety Codes		
(b)	Prepare the model for launch		
(c)	Check that the launch area and landing area are clear, ground and air		
(d)	Call “launching” and launch the model. Climb to approx. 100 metres. **Switch off power**		
(e)	Fly a thermal search pattern, the model to pass over agreed three points		
(f)	Fly consecutive 360^{O} thermal turns to 100m down wind		
	From this point on, power may be used		
(g)	Fly a half loop or half roll to inverted, hold straight, controlled inverted flight for a minimum of five seconds and then half loop or half roll back to level flight		
(h)	Fly 150 metres up wind of the pilot and stall turn		
(i)	Fly into wind and complete one inside loop		
(j)	Perform an unpowered stall across wind		
(k)	Perform an unpowered stall downwind		
(l)	Fly up wind and prepare for the overshoot/landing phase		
(m)	Call “landing” and fly an approach		
(n)	Overshoot from below 10 ft		
(o)	Call “landing” and fly an approach		
(p)	Land within 1O metres of a predetermined spot		

(q)	Retrieve the model from the landing area		
(r)	Complete post-flight checks required by the BMFA Safety Codes		
This is a two flight schedule, all items must be completed on each flight			
Answer correctly a minimum of eight questions on safety matters, based on the BMFA Safety Codes for General Flying, local flying rules and the Display Safety Code. At least four of the questions must be specific to electric flight			

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