
'A' CERTIFICATE PROUDLY PINNED TO THE SHED WALL? WHAT NEXT, THEN? THE 'B', OF COURSE! ANDY ELLISON KICKS OFF A SERIES THAT'LL TAKE YOUR FLYING SKILLS TO THE NEXT LEVEL

# 'B' Prepared!

*Spend time getting your model trimmed and sorted before the test. The last thing you want is to be fiddling with trims when you're supposed to be concentrating on your 'line'.*

*Ah, the perfect 'B' machine. The good old Wot-4 has probably helped more pilots through the test over the years than any other type, and for good reason!*

Earlier in the year I presented a series of articles in *RCM&E* that took the novice R/C pilot from the very basics through to the standards required to pass the British Model Flying Association's 'A' Certificate. The 'A' is promoted by the BMFA as the level at which a pilot is deemed safe to fly solo, and is one of many Personal Achievement Schemes run for (and on behalf of) UK model pilots.

The second and more advanced stage of these schemes for R/C fixed-wing model aircraft is the BMFA 'B' Certificate. If you've already passed your 'A', perhaps it's time to raise your game? If you believe it is, read on, as over the next few issues we'll explore how to attain this advanced flying qualification, the type of model needed, how to go about preparing for the test, and what you might achieve at the end of it all.

## REMIT

The official remit of 'B' certification is to 'recognise the pilot's more advanced ability and a demonstrated level of safety suitable for flying at a public display', a statement that's often misinterpreted to brand the 'B' certificate as a display licence, which it isn't. However, since the BMFA recommend that pilots of large models and model jet turbines (and any pilot wishing to fly in front of the public) hold a 'B' certificate, the 'display licence' tag isn't likely to be going away any time soon. The test is, in essence, a level of personal achievement that's rated above the 'A' Certificate. But it doesn't end there - beyond the 'B' is the 'C, which is much more aerobatic specific than the 'B'. I won't cloud matters by discussing that here, we'll take a look at it in a separate (future) article.

As is common with BMFA schemes, the 'B' Certificate can be conducted at club level, and UK clubs actively operating BMFA achievement schemes will usually have at least one examiner in place for the purpose of internal flight testing. However, as the 'B' is at a more advanced level than the 'A', the test has to be conducted by two club examiners (the 'lead' examiner must be fixed-wing qualified) or one fixed-wing Area Chief Examiner. An application to the relative BMFA area's Achievement Scheme Controller is often required in order to make contact with chief examiners who are available to undertake the


test. Details of Area Scheme Controllers can be obtained from the BMFA's head office.

## SCHEDULE

The test schedule itself comprises fifteen distinct parts. Fourteen are associated with the operation and flight of the model, the remaining part being question based. The flight must be completed in one attempt unless an intermediate landing is agreed beforehand with the examiner(s), and only two attempts are permitted in any one day. The test schedule is as follows:

a.) Carry out pre-flight checks as required by BMFA Safety Codes
b.) Take off and complete a left- (or right-) hand circuit and overfly the take-off area.
c.) Fly a 'figure of eight' course with the crossover in front of the pilot.
d.) Fly into wind and complete one inside loop.
e.) Fly downwind and complete one outside loop downwards from the top (i.e. a bunt).
f.) Complete two consecutive rolls starting into wind.
g.) Complete two consecutive rolls downwind using the opposite direction of roll rotation to that used in (f).
h.) Complete a stall turn, either to the left or the right.
i.) Gain height and perform a three-turn spin. The initial heading and recovery heading must be into wind and the model must fall into the spin (no 'flick' entry).
j.) Fly a rectangular landing approach and overshoot from below 10' (3m). Note that this manoeuvre is a baulked landing, not a low pass.
k.) Fly a rectangular circuit in the opposite direction to that in (j) at a constant height of not more than 40' (12m).
l.) Fly a rectangular landing approach and land - wheels to touch within a pre-designated 98' (30m) boundary.
m.) Complete post-flight checks as required by the British Model Flying Association safety codes.

In addition, the candidate must then satisfactorily answer a minimum of eight questions on safety matters, based on the BMFA Safety Codes for General Flying, Model Flying Displays and local flying rules.

As you can see it's not an onerous test, however the position of the flight manoeuvres, the height they're performed and the line taken to perform them are all as important as the actual manoeuvres themselves. The standard of flying required to attain the 'B' certificate is much greater than that required to pass the 'A', so be prepared to undertake some practise. On the journey through this series I'll break down the flight into its component parts, highlight the areas where pitfalls can be made and give you a few tips to help you achieve this worthwhile personal goal. However, before getting into the nitty gritty of the test itself let's take a look at the model and how best to set it up for the flight.

*VMAR's Escape is an ideal 'B' Certificate design that'll breeze through the test in the right hands.*

*Go on, add a challenge to your flying and start practising for the B this weekend.*

## MODEL CHOICE

It was always the BMFA's intention to create an advanced flying test that a pilot could complete using his basic

*Although the standard required to pass the 'B' is significantly higher than the 'A', the satisfaction that goes with a 'pass' is equally inflated.*

*Whilst the 'B' Certificate isn't a display licence, the BMFA certainly recommend that you have one before flying in public.*

trainer, and whilst this ethos remains, the statement does significantly pre-date the march of ARTF, park flyers and low powered electric models. All of these are used much more commonly as first models these days, and some are better suited to other tests in the BMFA's suite of personal achievement schemes.


*Little 3D electric aerobats like this Fury should be able to fly the test without a battery change, although they're not always best suited to the style of flying that's required.*

Whilst the 'Fixed Wing Power B Certificate' (to give this test its full title) was predominantly penned for i.c. powered aircraft, it's now highly likely that many test candidates will be flying suitable electric powered models. The BMFA have recognised this, and there's an intermittent landing allowed on agreement with the examiner (however this should not be seen as 'normal' practice). Li-Po batteries, longer motor runs and adequate power for vertical climbs are very much the electric flight norm these days, so (generally speaking) it should be possible for the test flight to be completed in one attempt.

*You'll need to correctly answer eight questions to pass your 'B' test.*

The model you choose should obviously be capable of comfortably flying the manoeuvres, and again, while there are certain options within the test to allow for models of restricted ability, these are not to be viewed as normal procedure. It's key to remember that an examiner is not empowered to change the content of the test to suit your model, and that it's the responsibility of the pilot to select the correct model for the examination. The examiner will be testing you, not your aircraft. As an Area Chief Examiner, I've seen 'B' certificates performed quite successfully with three-channel trainers (no ailerons), but they've been very well set up and flown by pilots of exceptional ability for this particular level.

It's worth noting that the candidate is not expected to build or even own the model that they use for the flying test. (This is predominantly in answer to the issue of modellers once having to 'build' a model to fly the test, which was never well received). Of course, this means that you may have to find a willing model donor who will afford you some airtime to practise your flight, so if you fall into this category it's best to start making your approach now. Mind you, Christmas is fast approaching and suitable ARTF low-wingers can be secured for around £45... Better start dropping some hints now!

Most typical 40-size trainers will be suitable, as will most 4-channel sport aircraft. However, rather than risk the wrath of the reader by advocating a particular airframe, I'll suggest, instead, that your model should be capable of the following:

- A series of rolls at a speed that's slow enough to demonstrate the use of elevator throughout.
- Climbing under power with enough authority to pull through from the bottom of the bunt.
- A spin and controlled exit from a fully stalled condition.
- Tracking well on a vertical up line (this may require some thrust line adjustment).
- A flat field take-off using its own undercarriage.
- Completing the test schedule in one attempt with a reliable motor. An example of this would be an engine that doesn't cut out as throttle is increased (under negative g loading) when climbing from the inverted phase of the outside loop.


*No to the one on the left; yes to the one on the right! Light 3D machines don't really make good test models.*

In my experience, lightly loaded fun-fly models (and likewise 3D aircraft with low wing loadings and high control throws) do not make a good choice for a 'B' certificate. Without doubt, most tests that I fail on the flying aspect have messed up the entry to the spin due to the model not being fully or adequately stalled. Models of the aforementioned ilk will simply refuse to deeply stall even if sat hovering into the slightest headwind. Twinkly rolls, tight circuits and tight loops may look good when you're hot-dogging at the patch, but they have no place in a 'B' Certificate schedule and will result in a legitimate fail.

Choose your model wisely, practise with it, and make sure that you're familiar with its characteristics and any idiosyncrasies it may possess. Ensure the set-up and control balance is the best that you can achieve, explore its dead-stick handling (just in case!) and make sure that, come the test day, you have spare consumables like wing bands, plugs and pre-balanced props to suit your motor, along with the tools to fit them should they be required. The last thing you want to be doing in front of an examiner is cadging spares and spanners from your clubmates!

## PREPARATION

Before committing to the examination your model should be trimmed for straight and level flight or be capable of being trimmed out very quickly once in the air. If it's out of trim and you make no attempt to rectify the situation in a timely manner, the examiner can legitimately fail you on your lack of basic competence.

The more time you spend getting the set-up of your model sorted before the test, the less you'll have to tackle poor trim, deviant lateral balance, incorrect C of G, control throw adjustments and, perhaps, a dodgy motor. Get these sorted and you'll be able to focus on flying the manoeuvres and positioning the model in the sky. The latter is a crucial element of the 'B' Certificate and can make the difference between an easy pass and a fail.

Even a model that you've flown many times before can often benefit from set-up adjustments that cater specifically for the 'B' Certificate. Mind you, you may find that the changes required can only really be highlighted by practising the flight with a friend, who can make constructive observations whilst prompting you from the book.

## THINK IT OVER

We'll park the 'B' there for now so you can consider what I've said thus far and mull over your model choice. In the next instalment we'll explore the distinct differences between flying the test compared to your usual club-style flight. Here, then, we'll talk about height, line and those all-important pre-flight checks.

In the meantime visit the BMFA's website (www.bmfa.org) and download the test schedule booklets, the guidance notes for 'B' Certificate candidates, and start reading up on the relevant sections of the BMFA member's handbook and your local flying club rules.

Remember that the 'B' Certificate examination is a test of both flying ability and knowledge. A good performance on the questions alone will not patch up a shoddy flight. In fact if the examiner considers your flying to be a failure he might not even bother to ask the questions. Likewise, if you can't answer the questions it doesn't matter how well you fly... you won't be getting that coveted 'B' ticket!

*Models like this Rascal can be surprisingly aerobatic - again, a perfect model for the test.*

# 'B' Prepared

ANDY ELLISON PREPARES THE PROSPECTIVE 'B' CERTIFICATE CANDIDATE FOR FLIGHT READINESS

*Get yourself a helper for the test, it makes starting, carrying and lean-checking a model much safer.*

*Ah, the perfect 'B' machine, the evergreen Acro Wot!*

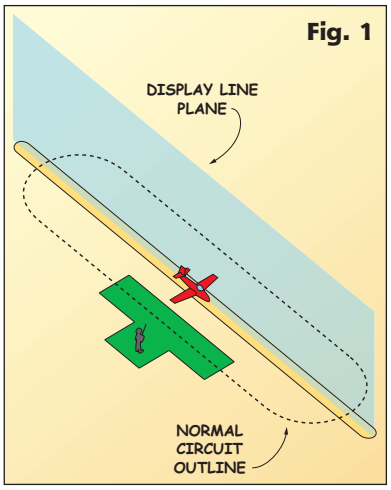
In the last issue we explored the background to the BMFA 'B' certificate for fixed-wing power models and set about choosing a suitable model for the test. This time we're going to look at the flying style needed to satisfy the requirements of the test, the correct positioning of the model for the manoeuvres and how to buy some time in the air to settle your nerves, adjust the model's speed and concentrate on the next flight pattern.

Last time I mentioned the common misconception that the 'B' cert' is a public display licence. It isn't, although it does allude to the type of flying required in the execution of the test flight.

## IN THE ZONE

Pilots often talk about a display line as if it were an imaginary vertical line running parallel to the runway between the two legs of a standard circuit, indeed much of the 'B' certificate flight must be carried out along this line (see Fig. 1).

You'd be very disappointed as a spectator at a model show if the models were flown so high that you couldn't see them properly. Similarly, if you fly the 'B' test at high altitude it's a mark of poor confidence in your ability, and an examiner will take note of this as he observes your flight. The height for the majority of the test should be around 100 - 150' (30 - 45m, or three to five houses high if you prefer). Intelligent use of the throttle should be made to keep this height consistent throughout the test. A pilot who flies with the throttle fully open throughout the test is clearly not thinking about what he's doing and will fail immediately.



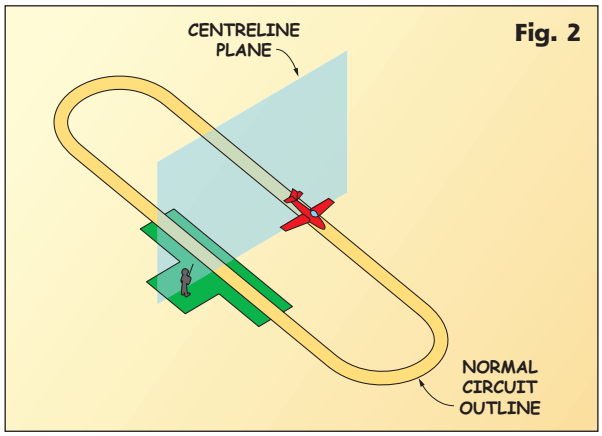


Fig. 2

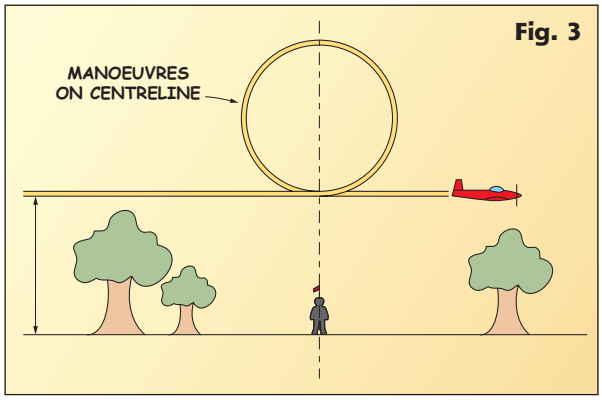


Fig. 3

*Your examiner will be looking for a high degree of accuracy in your flight patterns, especially with regard to positioning.*

A combination of the right line, good height management and sensible throttle use will see the model being flown consistently and smoothly throughout the flight. Any detraction from this when there's no need to deviate will stick out like a sore thumb, and the examiner will certainly notice.

Unnecessary and wildly fluctuating height and line are valid reasons for failure of the test, and at this level a pilot should be able to fly and present his model in a manner that demonstrates a certain mastery of it. Failure to do so will be a clear indication that either not enough practise has been undertaken or the pilot is just not good enough to be taking the test in the first place.

To add to the variables in the test, the rules stipulate that 'all manoeuvres should be carried out in front of the pilot', and this line above all others is the easiest to judge. The loop, bunt and spin elements of the test should be performed right in front of you and the rolls should be centred, one either side of this imaginary line (see Fig. 2 and 3). The intersection of the figure of eight circuit should also be flown directly in front of you, and it's this positioning that can be the most trying aspect of the flight.

When practising for the test you'll probably find that it's necessary to make some adjustment to the positioning of the manoeuvres compared to where you normally fly them when Sunday flying. Not many R/C pilots relentlessly perform loops and rolls right in front of them along an imaginary display line that's set back from the runway.

Whilst the manoeuvres required by the 'B' are set out in such a way that they can be performed consecutively in a flowing schedule, it's not essential that you do so. You're not going to be penalised if you fly the test in a loosely scheduled fashion, but be aware that even though turnarounds are not part of the test the examiner will be watching these and any extra circuits just as carefully as the rest of the flight. If you fly the test as a turnaround but haven't practised enough, you can get out of shape very quickly.

## KEEP COOL

The examiner will be looking for 'quiet competence' throughout the flight. He'll make some allowances for nerves but remember that successful completion of the test could put you in the air in front of the public, and any nerves you have in front of an examiner will be greatly magnified when there's a commentator 'bigging you up'. Needless to say, a pilot unduly affected by nerves could find his test rapidly abandoned by the examiner. It's quite common for the examiner to offer a coaching flight or two before the test is flown, and if you're unsure about certain aspects of the routine you might like to ask for this before testing begins so you don't unwittingly use up one of your two permitted attempts on the day.

Nerves aside you should be competent enough to fly the test reasonably error-free, although it may be the case that you make a minor mistake on a manoeuvre and the examiner asks you to repeat it. A major mistake is grounds for a failure but if the examiner (and this is especially true if he's from your own club) believes that you can do better and the mistake is only slight, don't be surprised if you find yourself repositioning for another go. Of course, allowing the test to degenerate into a whole series of repeated flight patterns is just not going to secure your pass which, again, is a clear sign that you're not ready for the examination.

The ace up your sleeve is the rule that the two attempts are allowed in any one day, so if you do fail the first one take some time out to practise before the retake, concentrating on the area where you went wrong.

A genuine engine failure will be considered to be an aborted test flight and not a failed attempt, so it won't count as one of the two attempts, however examiners are a savvy lot so don't go thinking you can fake a dead-stick if you're messing up the test!

## NUMBER TWO

Let's look for a moment at the role of a helper (pitman) throughout the test.

*Don't let silly things like flat glow batteries interrupt your start-up procedure and concentration.*

*Make sure your flight-box is well-stocked with tools and essential replacement spares such as glow plugs, fuel tubing etc.*

*Got the peg then? Don't forget the test starts well before your model gets into the air.*

*You must be seen to be checking the full and free movement of your model's control surfaces.*

Common sense should tell you that starting, carrying and lean-checking a model aeroplane is much easier and safer if you have a helper, and if you're trying to demonstrate to an examiner that you're a safe pilot you should enlist the services of an assistant. However, you must clearly instruct him at all times; if he takes over the decision making process you'll incur a legitimate fail.

There are exceptions to the rules regarding the use of helpers for children or disabled candidates. The examiner will use his judgement on this, but the candidate must be seen to be doing as much of the work as possible and not being led by the assistant. For children whose parents are not happy with them starting the model, they must do all of the preparatory work and pre-flights themselves, up to actually applying the starter to the motor.

## READY TO GO?

Right. You've selected an appropriate model and have practised with it extensively. You've honed the set-up and ensured that all the necessary spare parts, fuel etc. are in your flight box. All the batteries are fully charged, including those for your glow stick and starter. The day of the test has dawned and you've met your examiner, who's discussed any issues you may have for the forthcoming test. Having completed at least one trimming flight to settle your nerves, the time has come. You're under examination from the moment your examiner says, "Go!"

**a.) Carry out pre-flight checks as required by the BMFA Safety Codes.** Pre-flight checks come first, and it's essential that the examiner sees you go through the motions. Take nothing for granted and make the pre-flights applicable to the type of model you're flying.

I always liken this to taking a driving test. It's not sufficient to glance up into the rear view mirror like you might when driving normally, the examiner will need to see you move your head and physically look to know that you've done it.

Regrettably (and it shouldn't be the case on a national scheme), there appear to be two trains of thought regarding exhibition of pre-flight checks for BMFA examinations. The first would see the pilot performing model checks as if they were 'pre-flying session checks', i.e.:

- Check the airframe for any transportation damage.
- Check that the servos and linkages are secure.
- Check the undercarriage for secure fixing and alignment.
- Check propeller for damage and secure fixing.

These would assume, to a large degree, that your model is unrigged having just unloaded it from the car, and if this is the case then you should certainly perform these checks. In my capacity as an Area Chief Examiner I would expect that when you present yourself to me for the 'B' examination you will have already checked these issues and had a flight. I would only therefore expect you to go through the BMFA 'checks before each flight' pre-flights as listed below:

- Obtain frequency clearance.

The pilot should clear his frequency for use using the adopted frequency control system. This can vary from a transmitter control compound to a simple ask around other site users. You'll not be penalised if there's no pegboard or other organised structure for frequency control as long as you know how frequency use is determined on that site and that you observe the system. A brief note on the use of 2.4GHz here: Whilst it might be sufficient as far as you're concerned to switch on knowing that you're not going to cause or receive any interference from other users of the site, they won't know that. Make sure any other users are aware that you're using 2.4GHz equipment and that you're not a threat to them.

*Don't make silly mistakes - switch your transmitter on first, and off last!*

*Engine on song? It'll need to be to pass the test and convince your examiner that you can competently operate your model.*

*Keep a tidy pit area by making sure that leads, loose rags and clutter are stowed neatly out of harm's way.*

- Switch your transmitter on before your receiver.

How embarrassing it would be for you to switch the receiver on first and have servos spinning wildly through spurious interference, popping plastic clevises off the servo arms inside the model. You'd have to strip it down to remedy the situation while the examiner stood and watched. Not good for your nerves or his first opinions of your preparation!

- Check that all controls operate freely and do not bind or stick.

This test is fairly self explanatory, but you must be seen to waggle the sticks and watch the movement of the control surfaces. It's unusual to find an issue with a well flown and sorted model, but it does happen. A bad connection, trapped wire, damaged clevise etc. is all it takes.

- Check that all controls move in the correct sense.

*Some crafty examiners will stand in line with the propeller as you attempt to start your engine. If you see this, ask them to move to a position of safety, behind the aeroplane.*

Checking this from a position behind the model presents a much clearer picture to the examiner. Be methodical and make absolutely sure that everything is moving in the right direction. Visibly check the throttle operation (unless your carburettor is cowled and can't be seen). Show the examiner that you're looking, and make your checks obvious to the point of embarrassment.

- Check that all control surfaces are in their correct positions with the transmitter trims at neutral.

*Aerial extended and secure? It pays to check every so often.*

With most modern transmitters now employing digital trims it's not easy to check the position of a trim. Linkages used to be mechanically adjusted to get the transmitter's mechanical trim

into the middle, but this practice occurs less and less now. That said, it's more difficult to accidentally alter a trim position with a digital set-up as the transmitter has to be switched on to effect any change, deliberate or accidental. And when it is switched on, the unwanted disturbance of a trim is usually accompanied with a clearly audible beep.

- Look for any minor radio malfunctions such as slow or jittery servos, glitches etc.

Any slow servos or unexpected jitters when checking the operation of the control surfaces could be a sign of something more onerous. This is especially applicable to a slow-moving servo, which could indicate the beginnings of battery failure. You should immediately examine any such problem, and if you're in any doubt at all, don't fly. You'll not be penalised for stopping due to an electromechanical hiccup. However if you end up having to charge your batteries, it could be the end of that day's activities.

- After starting the motor (i.c. engine) and allowing it to warm up, check that it throttles well from tick-over to full power, and carry out a lean check.

You're probably well used to doing this, but watch out for canny examiners who may stand in line with the prop, waiting for you to ask them to move before you start the motor. Make sure that your pit area is tidy, with no stray wires that can come into contact with the rotating prop and no loose rags or the like that can get sucked into the prop as it spins. Make any adjustments to the needle setting from behind the motor and be sure to give your helper clear instructions of

when to raise and lower the model for the lean check.

The motor of an electric powered model should be treated like an idling i.c. engine once power has been connected. As a final precaution before carrying the model to the strip, double-check your transmitter using one of the BMFA-favoured acronyms, SMART:

- **S**witch on.
- **M**odel selected is correct / meter in the green.
- **A**erial extended and secure.
- **R**ate switches positioned correctly.
- **T**ransmitter voltage good and all trims in the right place.

## READERS' DIGEST

We'll leave it there for now - lots to digest, especially if the concept of the display line is new to you. Next month get the model into the air. Meanwhile, spend your time wisely and read those safety codes!

# 'B' Prepared


## ANDY ELLISON IS BACK TO CONSIDER THE FIGURE OF EIGHT AND THE INSIDE LOOP

*Instruct your helper at all times throughout the test to prove that you're in command of what's going on.*

*It's worth spending a little time getting your engine tuned correctly, before you take the test!*

Last month we'd just completed the pre-flight checks in front of the BMFA examiner, started our engine and done a lean check to make sure the engine's needle settings were correct.

Expanding on the practice of making all safety checks obvious so the examiner knows you've done them, you now get your model onto the runway for take-off. Your helper (who could even be the examiner) should be holding the model and you should be clearly telling him what you want him to do.

Be very clear that you do not want him to point the spinning propeller at anybody and, following your club rules implicitly, you should make your way to the runway area. It is best to avoid taxiing the model unless it's hard to do otherwise. Make sure you use whatever means are required locally to get permission from other pilots to enter the runway area and ensure that your model is placed on the ground and into wind on a line that will not take it towards the pit area or indeed, people or areas stipulated in local rules. You can stand behind your model if you wish but remember that the runway on which you are now loitering is an active area and you should inform the other pilots that you are on it for a prolonged length of time. If you can take-off without standing behind the model, you should do so.

Okay, let's look at the test requirement for this stage:

**b.) Take off and complete a left- or right-hand circuit and over fly the take-off area.** With a final check to make sure there are no obstructions waiting to thwart your take-off effort, you should proceed and get the model into the air. If a helper is holding it for you then be sure to let him know what you want him to do and again remind him not to assume that he knows what you want.

The take-off should be smooth and straight, don't pull the model off the ground too soon. Abandoning a take-off for any legitimate reason isn't grounds for a fail, so it's better that you demonstrate you're at least thinking about what you're doing rather than trying to persist by taking off with a sick engine, for example. Just ensure that if you do abort your take-off then you do it in a safe manner. Waving around in big 'S'

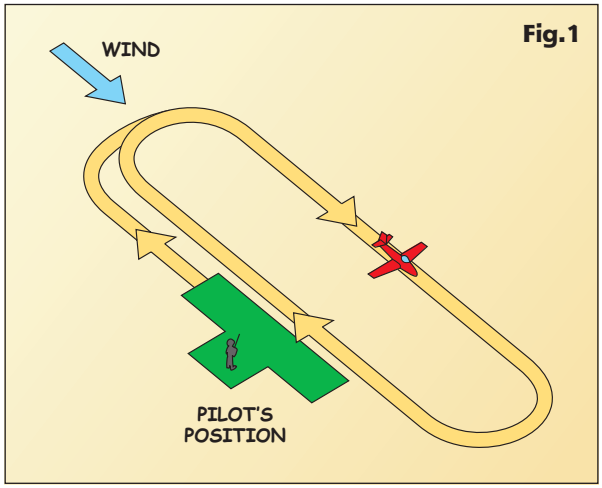



Fig.1

*Don't fall into the trap of thinking that properly flown circuits are easy and don't require practice - they do!*

bends all over the strip is hardly a demonstration of adequate control and unless you've experienced some level of mechanical failure, it is unlikely the examiner will consider it a legitimate reason and would count it as a used attempt.

Anyhow, since you're going to be successful, your climb-out should be at a nice shallow angle with no turning until you've reached the operational height for the test. Be careful here as this first circuit will set the benchmark height. Remembering what we discussed last month you should be aiming to fly at no higher than 150ft but likewise not dangerously low. Your examiner will advise. You will note that this circuit can be flown either left or right handed. This will be determined by the 'circuit of the day' which governs the direction you need to turn after take-off.

Imagine yourself flying at a public display. Models take off parallel to the crowd line and the area from which the public are watching will be dead airspace. In order to avoid flying over them you need to make a turn that takes the model away from the flightline, along the back leg of the circuit and back round into the wind again. The scenario is exactly the same for the 'B' Certificate.

With the model at height you should level out and adjust the throttle to cruising speed. That is the speed at which most of your test will be undertaken and the airspeed at which you have previously trimmed your aircraft. You are given an option here. The type of circuit is not stated and can be either racetrack (as Fig. 1) or the less common rectangular circuit, if you prefer. Even circular circuits are allowed but personally I don't like to see them. The key point of this first circuit is to set height and speed and to position the model at completion in front of the pilot and for safety reasons, just over the far edge of the take off area or over a point previously agreed with the examiner. 'Over fly the take-off area' rarely means down the centre of the strip (Fig. 1).

Bear in mind that this could conceivably be the first time an examiner has actually seen you fly and first impressions do count. Don't go haring around, it's better to buy yourself some time by extending the circuit at either end, perhaps more than you might normally do. This practice may at first feel quite uncomfortable especially if you're used to hanging around the strip, however the extra length to the circuit will give you added time to adjust height, speed and positioning for the start of the manoeuvres and also allow you a little relaxation time after their completion.

Your examiner may begin to discuss the next flight pattern as you progress around this circuit. It is quite common to expect an additional

***Keep the take-off smooth and remember not to yank the model off the deck.***


circuit after finishing the first so as to allow you to position for the figure-eight to follow. You should not assume that you are going to go straight into it as you approach the take-off area unless prompted to do so by your examiner.

You should wait for his prompt at all times, if none comes in a timely manner you must revert back to the circuit of the day. Flying the larger circuits does give you a little time to digest what he's asking you to do and it also permits a little time to question him if there's any level of uncertainty about what he requires.

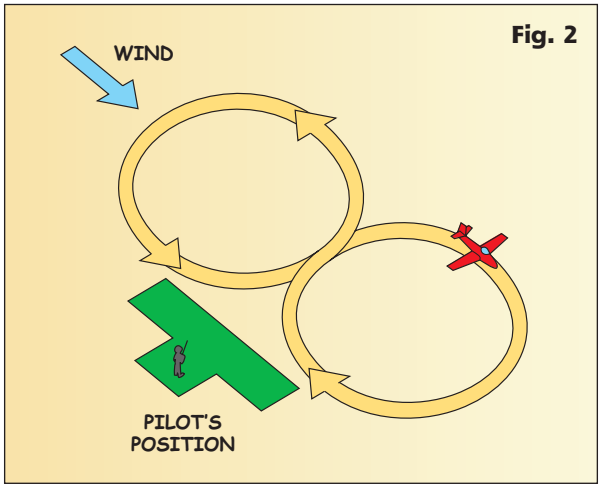
**c.) Fly a figure-of-eight course with the cross-over in front of the pilot, height to be constant.** You could be forgiven for wondering why the first part of the test mimics the 'A' certificate so closely. There is of course a figure-eight requirement in the more basic test but here it must be flown much more accurately.

You already set the height and speed for this flight pattern when you completed your first circuit and these should be repeated without significant deviation here. Where the 'A' certificate figure-eight can be lazily flown across the patch with almost diagonal intersecting lines, it is perhaps best to view the 'B' Certificate figure-eight as two opposite-hand circles of equal diameter touching each other at a point on their circumference coinciding with a point along the centreline in front of the pilot. In short, the model must be turned to 90-degrees away from the pilot in the first turn so that it is flying exactly away (Fig. 2).

To fly the figure-eight correctly, it is vital that you get a picture of what it will look like in your mind's eye, where you will enter and exit, but more importantly, exactly where that crossover point will be. You should also be able to maintain a steady height throughout the manoeuvre. Incidentally, many, many pilots cock-up the intersection and switch to the opposing turn too soon leaving them with little depth to fly the remainder accurately. It is here that most of the mistakes are made, indeed doing this will affect the remainder of the flight pattern.

The examiner will be watching the first 90-degree quadrant intently and mentally noting its size, height and the speed at which you fly it. Many examiners will stand immediately behind the pilot for the figure-eight, some even holding up a pen at the point where the completed first circle should intersect the primary arc as the model comes around. Obviously then the full circle should also end with the model flying directly away from the pilot. You should avoid immediately switching to a tight bank for the remaining 270 degree arc as soon as you hit the intersection. As mentioned above, fly through and deep enough to avoid a snap turn when you get the model back to the start point.

The finish should be at the point where you started your first 90-degree turn with the model flying at standard height and line. Obviously the angle of bank throughout the figure eight will need to be constantly adjusted to allow for wind strength. A windy day will mean shallow turns on the into-wind sections and tighter turns for the downwind parts to ensure that you hit the key intersections. As good as you may think you are, hitting the intersection




*The height of your figure-eight should be constant, with the crossover in front of you.*

*If a glow plug is going to fail then it'll be just before your test - be prepared!*

*It matters not whether you stand behind your model for take-off.*

*Be aware that the examiner will be giving you instructions throughout the test. In this respect it pays to fly larger circuits so you've time to digest and act on them.*

and starting point on a windy day is tricky and will need practice in order to pass. Your examiner can make no allowance for the wind strength during the figure-eight circuit.

The next manoeuvre is the inside loop but you're not expected to go straight into it after completion of the figure-eight as your model will probably be too close and considerably out of position. You can take a circuit now to re-position for the loop and I recommend you do so to slow the pace and give yourself time to prepare.

**d.) Fly into wind and complete one inside loop.** The inside loop is a perfect example why flying an accurate test flight is so tricky. The quality of the manoeuvre is secondary - you'll still have to do a good one of course but the examiner will be much more concerned with an accurate entry position at the correct line and speed whilst watching to see that you're close to the height and line of entry on completion.

If your model can loop without skewing out then it's a good sign that you've set it up correctly, that lateral balance imperfections are not evident, and that you started the loop with the wings level. If an error does start to occur, your eagle-eyed examiner will be looking for adequate adjustments to be made and will pay special attention to the correct use of throttle throughout. You will be required to demonstrate an increase of power for the climb part of the loop but not too early, i.e. not on your approach the manoeuvre. Again, this manoeuvre has to be performed in front of the pilot and you should make sure that no corrections to line are required as you run in.

As you approach a point perhaps 45 degrees to your side and heading for the centreline in front of you, you should increase power whilst avoiding any change in pitch that the extra airspeed brings. Allow the speed to build holding your height and line and get a good mental picture in your mind of the loop you are about to fly. Do not try to make it too big as if to impress your examiner with the mighty power of your model! Fly the manoeuvre you have been practicing and concentrate on getting it reasonably round, holding the line over the top and exiting at the correct point.

Anticipate the application of up elevator to ensure that the centre of the loop is at a point directly in front of you at or near to the crossover point you established during your figure eight circuit. As your model nears the vertical try to take a millisecond or so to view its progress objectively. Are any corrections needed? Will you perhaps need to apply rudder to regain the line? Take careful note of the height and size of this manoeuvre as it will be used as a benchmark by the examiner and this alone is reason enough not to make it too little or too large. Just because your fun fly or 3D model will do a 6ft loop doesn't mean that this is what your examiner wants to see!

As the model reaches the top, check again for wing drop and reduce the power of the motor to at least a quarter. Only go to tick-over if you are still carrying plenty of inertia as to do so has the effect of slowing the model and making the loop look balloon shaped - not in itself a failure, but you do want it to look reasonably accurate, don't you? Once over the top, all you need to be concerned about is re-establishing that all-important entry height and line. Bring in a little power as you come around to level flight again and exit at cruising speed on the correct line.

## TIME'S UP!

Right, next month we'll gain height and fly the dreaded bunt! Meanwhile, keep reading your BMFA handbook and don't stop practicing!


*Only a handful of flyers are born with any natural ability. For the rest of us the only solution is practice, practice and practice.*

# 'B' Prepared

## FROM LOOP TO BUNT - ANDY ELLISON CONTINUES HIS GUIDE TO PASSING THE BMFA 'B' CERTIFICATE

*Most sport-scale designs are ideal 'B' Certificate aircraft. Often the bigger ones, like this World Models Midget Mustang, fly better and make the pilot's job a bit easier.*

Our last look at passing the 'B' Certificate ended with the model completing the inside loop and heading off at the correct height and line in readiness for the dreaded 'bunt' (a.k.a. outside loop), performed from the top.

Unusually for the 'B' test this manoeuvre has an option that may be adopted specifically by pilots of scale models which, for reasons of structural strength, power or control limitation, can't perform an outside loop. The option is to fly a manoeuvre called a split 's' or reversal, and we'll take a look later as to whether you and your model are eligible for this option. First, however, let's consider the bunt itself.

> ***Upon cresting the top of the bunt you should be at full power again...***

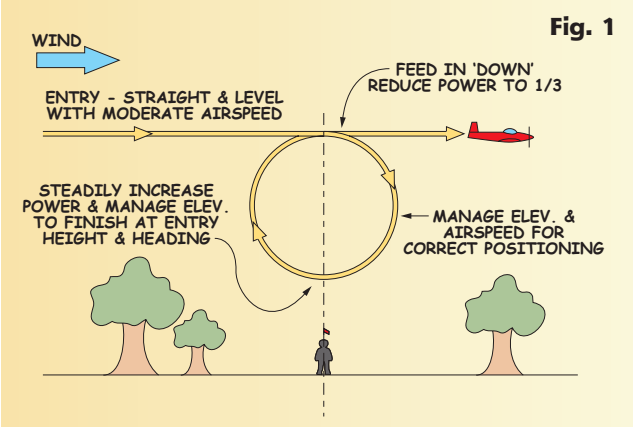
**e). Fly downwind and complete one outside loop downwards from the top, i.e. a bunt.** As the bunt (see Fig. 1) needs to be performed both downwind and from the top, some thought has to be given on how the aircraft is going to achieve the correct height and line to execute the manoeuvre without rushing. Throughout this test the pilot is required to change circuit direction a number of times and, as mentioned in previous parts of this series, these periods are perfect opportunities for the pilot to buy himself a few extra minutes for relaxation and concentration. Whilst the examiner won't include these turns as part of his test assessment, they will give him some indication as to the amount of thought and practice that you've put into the test schedule. Clearly, if you try something flash and cock it up he'll be forced to reconsider!

Whilst the required height gain may be achieved by flying a further circuit in the wrong direction at increased power, there will still be the opposite hand 'switch' to deal with. You may think it best to continue flying on right out of the loop to the far end of the circuit and gun the motor, climbing in a half loop before rolling off the top (Immelman turn), heading downwind at an increased rate of knots. The trouble with flying in this way is that whilst you might well achieve it admirably your positioning will have to be spot on, and it won't leave you much time for adjustment to line if required.

The best turn to make here is a climbing, procedure-type turn. Here


*Passing your 'B' isn't only about getting a piece of paper like this, the practice and the experience of the test will make you a more confident and accomplished pilot.*

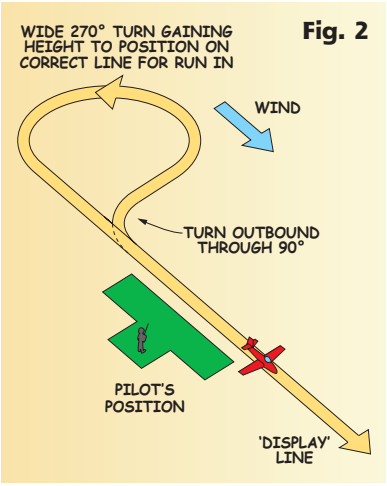
*You won't get a pass on flying ability alone. Questions will be asked!*




the model turns away from the looping circuit as if making a standard circuit turn, but after the first 90° of the arc the turn is switched to the opposite direction and a smooth, climbing 270° arc flown outside the boundaries of the normal circuit but ending on the correct line and at increased height for the bunt. Flying outside the normal limits of the circuit in this way will buy considerable extra time and provide a long run in to the top of the bunt, during which you can adjust your line and speed if required (see Fig 2.)

So now you're on the correct path (up on the 'display' line), between the two standard circuit legs but high enough to complete the manoeuvre downwards from the top. Let's take some time out here to deal with a popular misconception: The bunt does not need to be superimposed on the path of the loop you've just flown - if you normally fly like that then all well and good, but you won't be failed for not doing so. A further misconception is that the bunt has to be the same diameter as the loop. This is also not true, and unless your model has abundant power to climb and accelerate upwards from the bottom of a stretched manoeuvre back to the entry point, it's actually quite hard to achieve. The most important aspect of performing this manoeuvre is to get the entry and exit points close together. Most failures in the bunt occur when the path of the outside loop is tightened to produce something that looks like a number 6 rather than a clean circle.

The bunt should be entered with decent speed and downwind to ensure that the first part of the arc maintains an adequate curve. To achieve this fly along the chosen line at full power and as you approach the starting point reduce the power to at least $^1/_3$




(closing the throttle to idle can lead to carburation problems when you open it up again). As you reduce power start applying down elevator and, as with the loop, concentrate on keeping the wings level and fly a large-ish but smooth downward arc. Remember what I said about keeping the manoeuvre a reasonable size, but not so tight that you just flip around it. Note that whatever height is lost in the downward part of the bunt will need to be regained on the upward side. As you approach the bottom quadrant of the circle you'll need to think about increasing power. Some models are happy to round the bottom of the bunt before smoothly applying power, whilst others need to fly the full inverted section with increasing power.

The point just past inverted with the model starting to climb is where most bunt failures occur. There's a tendency to hold in the same amount of down elevator that was used to push the model over initially. But with the slowing airspeed of the climb this throw will prove too much and the model will exit the bunt much lower than its entry point. This being the case it's essential that the amount of elevator is reduced as you begin the climb back upwards, sending the model in an arc that culminates at the same height and line as the entry (see Fig. 3). Upon cresting the top of the bunt you should be at full power again, ready to reduce to cruising speed for the descent back down to the basic circuit height.

*Since the bunt is just the manoeuvre to show up any problems with the model's lateral balance, side-thrust and carburation, it's worth getting them sorted during practice sessions.*

The bunt will show up any problems in the model's lateral balance, side-thrust and carburation. Bear in mind that excessive elevator throw is often difficult to manage in the small quantities required to fly an accurate arc back from the bottom, so take care to trim these issues out of your model aerodynamically.

## SPLIT OPTION

As I mentioned earlier, if you're flying a scale model that lacks the power and control needed to fly the bunt correctly you can request (before the start of the test) to fly a split 's' or reversal. Since it's the pilot (not the model) that's on test, your examiner won't allow the alternate manoeuvre if he considers the aircraft is capable of performing a bunt.

*Examiners can be wily old dogs, but they're still human and may allow a little error in the positioning of the rolls if they're seen to be flown accurately.*

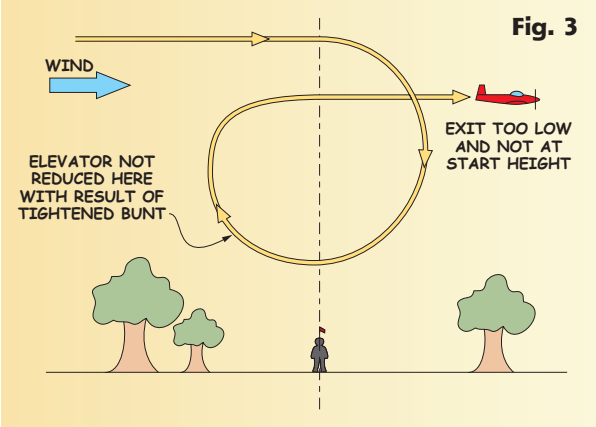


Fig. 3

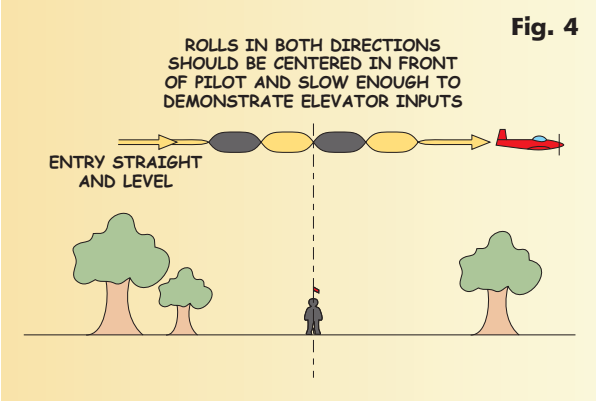


Fig. 4

*If you use a high wing trainer for the test, your examiner may allow some leeway in the requirement to make the rolls as axial as possible.*

If the split 's' is to be flown it can be performed either upwind or downwind, on the standard line but higher up, as with the bunt. Unusually the manoeuvre isn't performed in front of the pilot but at the end of the circuit, i.e. with initiation perhaps 100 yards or so to the side.

From level flight the model is rolled to the inverted position, where it must maintain altitude for a period of a second or two. At this point there should be no noticeable deviation in flight path, and some down elevator may be required to hold the line. The throttle should be closed with the model inverted, and as it begins to slow, up elevator should be applied to perform a smooth and rounded half loop downwards back to straight and level flight on the standard line. A poor exit heading or a half loop that's too tight are legitimate grounds for failure. The model should then be accelerated to cruising speed and repositioned for a transitional circuit (if required) to come around into wind for the next manoeuvre, consecutive rolls.

*Remember, you'll be wanting to start the bunt on a downwind heading.*

If you flew the bunt you'll still be at altitude, and that will need to be lost. You could, of course, fly a reversal at the end of the circuit (discussed earlier), but it may leave you out of position and carrying excessive speed. I find it better to fly a procedure turn, but this time descending all the way down to the correct base line height and on line for a run into the first set of rolls. As you'll be heading downwind at the exit of the bunt, flying this descending flight path will change the circuit direction and lose excessive height in a slow, controlled manner that gives you some thinking time. Time to steady your nerves and adjust your speed.

**f.) Complete two consecutive rolls into wind.** This manoeuvre sounds fairly innocuous but is actually fraught with problems, especially for those pilots whose usual performance of consecutive rolls is to bang the stick over until they've had enough and sort out the ensuing mess afterwards! At 'B' Certificate level there needs to be a little more care applied. Twinkle rolls performed at blurring speed aren't acceptable! The rolls must be slow enough to demonstrate elevator control throughout. This means that as the model flies through the inverted stages, some down elevator should be seen to be applied as required. If you're capable of rolling your model so slowly that rudder inputs through the knife-edge portions are also needed then that's great, but you're not required to do so in the 'B' test.

Positioning is once again crucial, and the model should be halfway between the two rolls (i.e. upright) as it passes the pilots centreline (see Fig. 4). The examiner may allow a little leeway here if the rolls are accurately flown. Note also that the rolls should be along the standard line at the standard height, i.e. in common with most other 'B' Certificate manoeuvres.

There are some more misconceptions to be dealt with here. There should be no pause between the rolls. Instead they must be flown consecutively with the model rolling twice at a reasonably continuous rotational speed, without hesitation.

There should also be no discernible loss of height throughout the rolls, but some level of barrelling is permissible. This is especially so if the model chosen for the flight is a typical high-wing trainer type that, due to its wing section and often sluggish aileron response, is more difficult to roll axially. The rolls do not need to be performed at full throttle. Most models will roll quite well at normal circuit speed, indeed to try and fly rolls with increased speed will create positioning and rotational speed problems. That said, as with the rest of the flight, it's essential that you perform the rolls as you've practiced. Don't be tempted to slow them down on the day in the hope of impressing your examiner, as you're bound to make a mistake!

There are some tricks that can be brought into play to help you perform the rolls more easily, one of which is to elect to roll in your 'worst' direction first. Most sport pilots who have been flying long enough to achieve 'B' Certificate status have developed some bad habits along the way and 'handed' rolls are just one of them. If you pitch for your worst direction first (you'll know what that is from practicing) and make them messy but passable in the eyes of the examiner, there's a good chance that he'll give you the benefit of the doubt ahead of flying the opposite direction rolls that will be coming next. Make a brilliant job of the latter and he may let slide any slight mistakes incurred during the first set.

It's very common to see test candidates struggling to stop rolling too fast, but by employing rate switches to give the required slower roll rate at full stick travel, a pilot can ensure a uniform rotational speed

with the aileron stick held fully over. This will afford some extra concentration time to focus solely on the elevator inputs. One more thing: Don't forget to make a good mental note of the direction of your first set of rolls, as those that follow will need to be executed the other way!

**g.) Complete two consecutive rolls downwind using the opposite direction of roll rotation to that used in f.)**. Everything that I've just discussed above also applies here, but note that the model will be moving considerably faster as you fly downwind, eating up valuable positioning time. Give some thought to how you're going to swap circuits to the downwind and line up for the rolls. A procedure turn will ensure you can get around without affecting height or speed, but this time flown flat and not climbing or descending as before.

With the model on line at the correct height you should fly the opposition rolls centred about the centreline with the model upright as it passes the pilot's box, rolling without hesitation. Discrepancies in the positioning of the rolls on the downwind leg are tolerated to a degree, but a big error on centring will see a fail. And don't get caught out by rolling in the same direction as performed earlier, otherwise you'll be asked to fly the task again.

Exiting the rolls at the standard height, line and speed will almost certainly see the examiner ask you to fly straight into the next manoeuvre, the stall turn, which we'll look at next month along with the spin. Until then, remember those safety codes and keep swotting!

*A good trainer will be capable of taking you through to 'B' Certificate level, so don't abandon it too soon.*

*Don't be frightened to use the tools at your disposal to help you through the test. That aileron rate switch is just what you need to stop you rushing your consecutive rolls.*

*Remember, twinkle rolls with a model like this are not what your examiner is looking for.*

*Your examiners pen will be poised over the pass certificate. Don't forget to bring your BMFA membership details in case he has to fill it in!*

# 'B' Prepared

## UP INTO THE STALL TURN AND BEYOND, ANDY ELLISON RIPS SOME MORE NOTES FROM HIS GUIDE TO PASSING THE BMFA 'B' CERTIFICATE

So far in this series we've looked at many aspects of the BMFA 'B' Certificate, from selection of a model through pre-flight checks and onto many of the flight manoeuvres required in the test. These have so far been all at moderate flying speed, but now we move into that part of the flight envelope near to (or at the point of) the stall as we explore the stall turn and the ever-tricky spin and recovery.

In the last part we'd just completed our two opposing downwind rolls and were continuing to fly in a downwind direction on the correct height and line at little more than our preset cruising speed. I made the observation that it's highly likely an examiner will ask you to go straight into the next manoeuvre, the stall turn, as there should be no reason to turn into wind or waste more time flying an interim circuit; the model is ideally positioned, the stall turn doesn't need to be executed on the centreline in front of the pilot, and the run out of the two rolls will provide a little thinking time and allow the examiner to communicate his intentions to you. So let's go for it.

**h.) Complete a stall turn either left or right.** The reason that 'either left or right' is stipulated is to account for the direction your model may be travelling having completed the two rolls and the fact that the manoeuvre must see the model turned away from an imaginary display crowd line (Fig. 1). If flying from left to right in front of you, for instance, the only way to perform the stall turn at the end of the circuit would be to the left. A stall turn to the right would direct the model towards the crowd and incur a fail. Likewise a run from right to left will see a stall turn being performed to the right as the model reaches the apogee of the climb. Let's break the manoeuvre down.

From standard height and line (following the rolls) the model should be flown past the pilot to the extremes of the established circuit, perhaps 100 yards or so off to the side. Pay particular attention to this height and line as you'll shortly be flying back past yourself in the opposing direction through the same key points when the manoeuvre is complete.

The examiner isn't looking for absolute excellence in this manoeuvre but he is looking for a recognisable stall turn. There are a number of things that can go wrong here and we'll look at the more common ones in turn, however, timing is the key to performing a stall turn correctly and practice is required to get it right. The stall turn is shown in Fig. 2.

With the model at the desired position towards the end of the circuit, up elevator should be applied as if entering a fairly tight loop - a loop with a smaller radius to that flown earlier in the test but not so tight that the model loses significant forward speed. When a vertical line has been established, elevator should be managed to ensure that the model continues up this vertical line for a short way.

*A few valuable seconds between manoeuvres will allow your examiner time to communicate his intentions to you.*

Imperfections in the model's lateral balance will manifest themselves with a dropped wing as the aircraft makes the tight quarter loop and a subsequent deviation from the vertical line towards the heavy wing. You should endeavour to trim this out with balance weights before you undertake the test. Likewise, incorrect motor side thrust will manifest itself with a steady pull in the yaw axis and a deviation of the model in the vertical line, which will need management with rudder to straighten. This too should be


*Wind direction is critical to the way you fly the 'B' Certificate.*

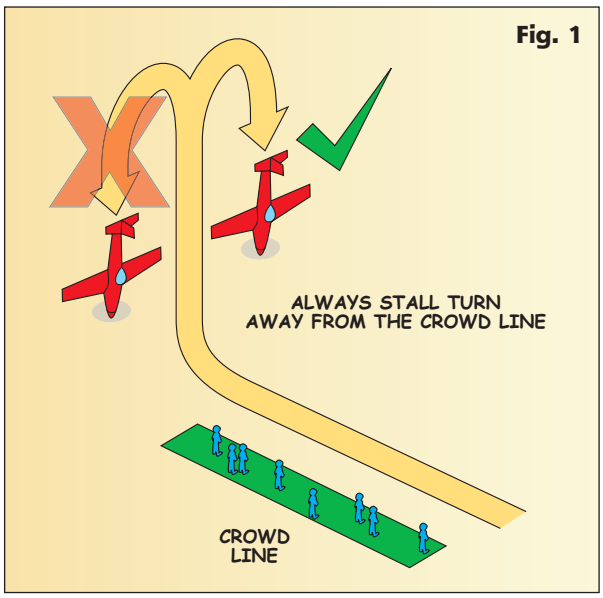



**Fig. 1**

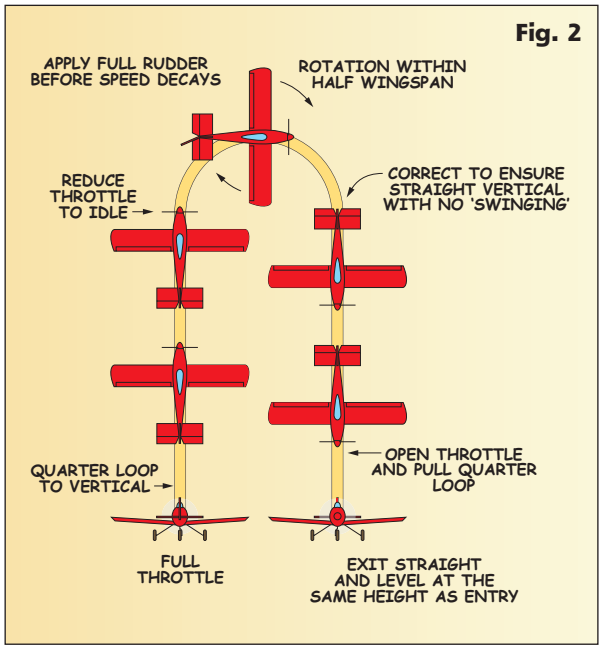


Fig. 2

*TOP RIGHT: A perfect 'B' Certificate model such as this Speed Air 40 will fly all the required manoeuvres with ease.*

*At the top of the vertical up line some pilots like to add a burst of power to increase the airflow over the rudder and help drive the model around the turn.*

trimmed out of the model before undertaking the test.

Good throttle control is essential, and many pilots make a rod for their own back by trying to prolong the period that the model is in the vertical line to the point where major rudder control is required to hold it straight as the airspeed and inertia from the entry dies off. I find it best to establish a vertical climb after completion of the quarter loop and immediately shut off power to idle and let the inertia of the model carry it upwards to the stall. This vertical line should be wind adjusted, i.e. as the model rises, the up line should be perpendicular to the floor. This may mean that the model itself is not actually vertical (see Fig. 3).

Timing now comes into play. Application of rudder with too high an airspeed will see the model 'wing over' the top due to its excessive airspeed above the stall. Apply rudder too late and the model won't turn over the top but simply flop into a deep stall, requiring an emergency recovery probably way off the desired line.

A perfect stall turn will see the model almost rotate about its own length to head straight back down the exact same line it just flew up. It's more likely, however, that it will appear to fly around a 180° arc as if pivoting around one wing tip before gravity begins to accelerate it along the down line. Some pilots prefer a little blip of power as the model flies over the top; this isn't enough to accelerate the model but merely a coax to increase the airflow over the rudder and help drive the model around as the last of the forward speed rapidly decays.

*Ensure that the vertical up line of your stall turn is wind adjusted to ensure that it remains perpendicular.*

Once over the top with flying speed rapidly increasing it's vital that the pilot gets on the elevator to keep the model on the down line, wind adjusting if necessary. At the end of the rotation it may even be necessary to add a little stab of opposite rudder to stop the model fishtailing along the down line as its inertia in the yaw axis decays and airspeed increases. This isn't very common, though, and more often than not the pilot can concentrate on balancing the elevator to a point where he can recover from the stall turn with the same radius quarter loop as was used for entry.

A common mistake is to pull out from the manoeuvre too high. This is usually a result of an initial prolonged climb and should be avoided. Entry and exit points should be close together, in common with many flight patterns in the 'B' Certificate schedule.

Throttle should be increased through the last looped quadrant to see the model exiting along the standard line and height at cruising speed, to fly back past the pilot's position once again. Now we need to think about gaining height and perhaps changing direction to get into wind at altitude for the next manoeuvre, the spin.

**i.) Gain height and perform a three-turn spin.** The initial heading and the recovery heading must be into wind and the model must fall into the spin, i.e. no 'flick' entry. There's really only one way to correctly perform the 'B' Certificate spin (Fig. 4), and success in the first part lies in getting the aircraft slow enough to properly stall into the entry instead of flicking over the top through excessive airspeed. If there's any hint of an upward pitch and roll as the model enters the spin the examiner must fail you.

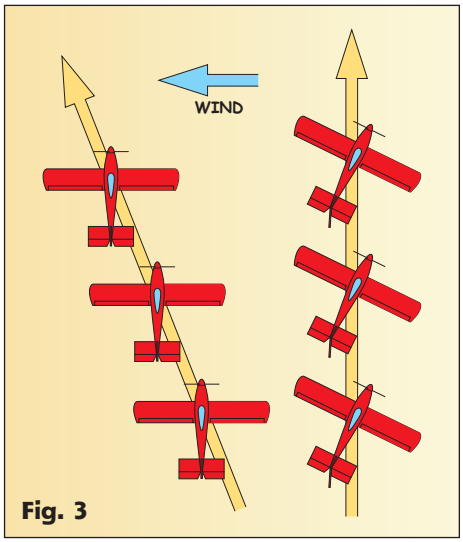


Fig. 3


*Just before you commence the spin your model should be flying slowly, in a nose high attitude and not climbing.*

As with most of the other flight patterns the spin must be performed on the established centreline, but as the model will be significantly higher up for safety, the line may be further out in front of the pilot.

So, how do you get up there neatly and quickly, yet give yourself enough time to achieve the correct position, and bleed off speed to get to the stall in the right part of the sky? If you went straight into the stall turn from your second set of rolls you'll now be coming back into wind and you can simply fly a long and lazy climbing circuit to position your model at the right sort of altitude for the spin. If you did your stall turn at the upwind end of the circuit you'll now be flying downwind and will need to turn around. You may consider swapping through the circuit with a half figure of eight climbing as you go, but this may look a little rushed off the back of the stall turn. You might even consider flying down to the downwind end of the circuit and performing a large and extended Immelmann turn (roll off the top) to gain the height and line for the spin. The problem with this is that you'll not have much time to get the line correct and drop the speed, unless, perhaps, it's quite windy.

I find it is best to fly out of the stall turn to the downwind end of the circuit and begin a wide but climbing procedure turn just as we did between the loop and the bunt. This way you can take your time getting to altitude, and as you'll be climbing steadily throughout, your speed will only be moderate. The turn itself can be exited on the correct line for the run in to the stall point of the spin. Whichever method you use, you should ensure that you gain height smoothly and in a neat manner.

With the model now at altitude and running slowly into wind you should close the throttle and hold your altitude with increasing elevator input. Juggling the elevator to get the model to the right position in the sky at the right stalling speed and still on line is one of the trickiest parts of the spin, and practice is required. Here the model should be slow and nose high, but not climbing.

At the start of the spin, rudder should be applied in your preferred direction and the speed of the model should be low enough to ensure that application of this rudder input stalls the inner wing. This is where lightly loaded fun-fly or 3D models fall down, especially so in windy conditions as it's very difficult to force them to a properly stalled attitude without climbing. The model should not first stall and then spin, rather the entry should be smooth and transitional.

Ailerons can be used, but you shouldn't apply them until the model has started to fall. The prohibited flick entry manifests itself by one wing of the model rising as the spin is begun, and the examiner will be watching very closely for an opportunity to fail you here.

Three rotations are complete when the model has spun back around to the into-wind heading three times. It sounds obvious I know, but at the time three turns are completed you have to stop the spin. That's not to say you should wait until three turns are finished and then stop the spin during a fourth. Rather, you must stop the spin bang on completion of the third rotation. Tricky to do, and many models won't simply stop spinning on the correct heading when you release the controls, especially if you've used aileron to aid rotation. You may however find it sufficient to release the controls as the third rotation approaches its end and then apply a swift input of opposite aileron to stop any continuing rotation dead in its tracks.

Some small allowance can be made for the heading of the model to be slightly off, but no more than, say, 10 to 15°. The model can also drop

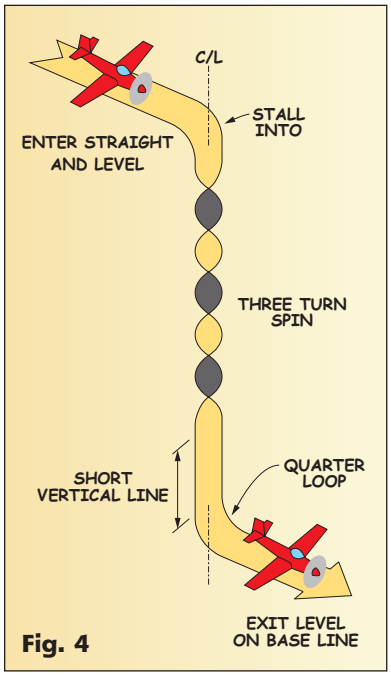



**Fig. 4**


*Many trainers are 'B' certificate capable although there are some that determinedly refuse to spin. If this is the case, you should consider using another model.*


*If you claim your model is too fragile to spin then you clearly didn't select it properly before the test and will need to find another.*

from the spin rotation to a vertical diving line before recovering onto the correct heading with elevator input only, back to straight and level flight. Note that you can't end the spin in a vertical dive 90° out of shape and quarter roll on this down line to adjust your heading - this would be a fail. The spin finishes with the model flying straight and level into wind.

**VARIATION**

The BMFA allows a variation on the spin, but it's not an option that the pilot can choose prior to the test. For aircraft that will not spin, a spin attempt resulting in a spiral dive (not necessarily of three turns) will be acceptable. A tricky one, this. As an Area Chief Examiner I don't like to see spiral dives in a 'B' Certificate flight, and indeed they are rare. It may be that the model a candidate is using simply will not spin without fundamental changes to its set-up, and it's not the model that the examiner is testing. The examiner may only accept a spiral dive before the start of the test if he can satisfy himself (perhaps even by flying the model) that the aircraft will not spin. If the spiral dive results from a correct spin entry as described earlier, the examiner is well within his rights to ask you to try again until he's absolutely sure that the model isn't going to spin despite your correctly stalled entry, correct control inputs throughout and best efforts to make it do so. Your exit from the spiral dive must be exactly the same as for the spin with the model ending its rotation on a heading into wind, recovering to straight and level flight into wind on the correct line.

The reason a spiral dive may not be permitted to complete three full turns is due to the dramatic loss of height (at speed) this manoeuvre uses in comparison to a correctly flown spin. If you claim your model is too fragile to spin, you didn't select it properly before the test and shouldn't be using it.

Next month we'll start bringing the model down towards the ground as we look at the overshoots, opposite hand circuits and landing. The test is nearly over now - how are you doing with swotting up those safety codes?

# 'B' Prepared

*The perfect approach and landing is a joy to behold. You'll know when you've got it right!*

## AEROBATICS OUT OF THE WAY, ANDY ELLISON LINES UP THE PERFECT LANDING APPROACH IN THE QUEST FOR A BMFA 'B' CERTIFICATE

Last month we finished on the spin, its completion concluding the 'aerobatic' section of the 'B' Certificate. If you've come this far without making a cock-up, the rest should be plain sailing. When we parted ways last time your model had (hopefully) just recovered from the best spin and recovery you ever flew! If all went well then you'll find it heading into wind, still with a reasonable amount of altitude and ready for the last parts of the test.

**j.) Fly a rectangular landing approach and overshoot from below 10 feet.** One question I hear quite often during lectures on the BMFA examinations is, "What's an overshoot, then?" Well, for the purpose of this test it's an aborted landing. It most certainly isn't a low pass, though it may at first appear so. To illustrate this clearly I always point out to the candidate during practice that if I don't call "overshoot!" as he approaches the strip and drops down below the preset altitude, I would expect him to land the model just as if he were doing a normal power-on landing. That won't happen during the test, of course (though I sometimes use that ploy when testing an examiner for the role), but it does eliminate any confusion as to the requirements of the flight pattern.

You'll notice that this is the first instance where the test requests a rectangular circuit to be flown and in my experience many pilots don't routinely fly rectangular circuits at their patch, primarily because it takes a little extra thought. Anyway, I'd expect you to have practiced these by the time your 'B' Certificate examination comes around, to the point where flying them is almost second nature. In readiness, then, there are a few key points to remember when flying a rectangular approach. The first might be obvious

*When flying the rectangular circuit, turns should be made quickly and accurately with a clear 'straight and level' section between each.*

*Some fun fly models have thick, draggy wing sections that, if you're not careful, can result in them falling short of the strip.*

*Only when it's clear that the model is below 10ft and about to make a landing should the pilot call the overshoot.*

*Beware of slamming the throttle open after a prolonged idle, especially if the mixture is a little weak.*

*For reference, 40ft is about the height of your average house, although you may have to adjust this to account for obstructions.*

in that the circuit should of course be rectangular! This means 90° turns, straight legs and parallel sides. You should also aim to position the circuit equidistant to either side of the point where you're standing, or at the very least imprinted over the first circuits you flew in the test, for some level of uniformity. Refer to the diagrams in your BMFA member's handbook if you're still unsure.

The turns should be made quickly and accurately, and a clear 'straight and level' section should be obvious between each turn. Resist the temptation to make very quick 'snap' turns at the corners of the circuit; fly smoothly but don't labour the point and waste sky to get the turn in.

This circuit is a landing approach, and the examiner will be looking for good throttle control and an element of height loss throughout the circuit, reflective of the starting altitude. Racing around the first three legs then diving for the patch on finals demonstrates none of this and will certainly result in a valid fail. I find it better to achieve the bulk of the height loss on the last crosswind leg and the 'into wind' run to the landing, reducing the throttle just before the last crosswind turn. Once established on a line for the final approach and descending, throttle management should determine the final descent rate. It's permissible to close the throttle to idle at this point, but many modern models have quite thick wing sections and draggy airframes and this practice could easily result in them dropping short of the strip. The key to the final approach is to get the model down to a speed, position and rate of descent that will ensure a landing in the (pre-arranged) designated area. Only when it's quite clear that the model is below 10 feet in altitude and about to make the landing should the pilot call the overshoot. This involves a carefully applied - but swift - opening of the throttle and regaining airspeed before the model is flown back out in a straight line to circuit height once again. Beware of slamming the throttle open after a prolonged idle, especially if the mixture is a little weak, as this course of action can result in a stopped motor (dead-stick) and the test will be aborted.

*Just prior to 'going around' our examiner will be listening for you to call 'overshoot'.*

The examiner will be listening for you to call your 'overshoot' and will be observing to see if you've checked the active area before and during the manoeuvre. You did make this obvious by moving your head and calling your landing, didn't you? Anything less than a safely controlled overshoot and climb back to height is unsatisfactory and will result in a legitimate fail. Likewise a low pass, where it's obvious that the pilot has no intention to land the model, will also result in a fail.

Note that if you're flying the test with an electric model the landing

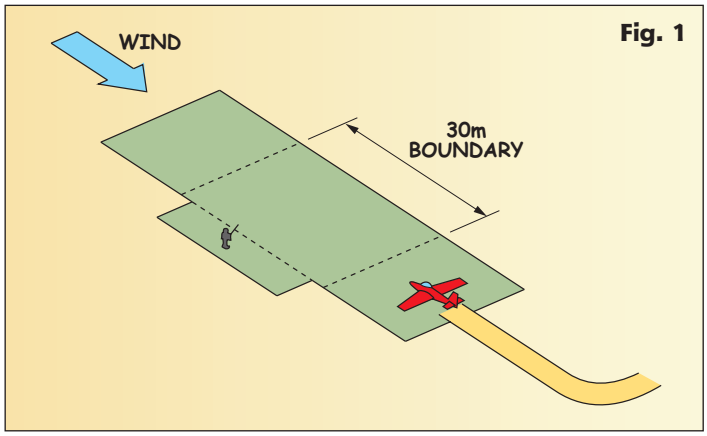


Fig. 1

*On a trike set-up a fully-flared main leg landing is what we're looking for.*

approach must be flown the same as if for an i.c.-powered aircraft. It doesn't matter if the prop stops during your control of the throttle - the line you're flying is more important here.

Okay then, with the overshoot completed, we can move on to the next task.

**k.) Fly a rectangular circuit in the opposite direction to that in j.) at a constant height of not more than 40 feet.** This element of the 'B' Certificate has undergone some subtle changes throughout the years, and used to be an opposite-hand landing approach and overshoot to demonstrate that a pilot wasn't 'handed' on his approaches. While this has now changed to an opposite hand circuit, the requirement to fly it at low altitude indicates that the intent is the same.

Everything that applied to the previous flying task is applicable here, except for the height loss. Be aware of the manner in which you choose to swap the circuit direction to commence this flight pattern, remembering back to our method of using a half 'figure eight' circuit or a procedure turn to change direction without adjusting height or speed.

The opposite hand circuit should start over the strip as the model passes you downwind (you did do your previous overshoot into wind, didn't you?) and you should make sure that your examiner knows you've started by telling him so. Again, keep the turns crisp and accurate, but here you need to watch the height carefully. A height of 40 feet is about the same as your average house and if you need to be higher to avoid obstacles such as trees etc. or need to take an unusual line to suit your patch, this should be agreed with the examiner in advance of the flight. The back end of the 'B' Certificate test is no place for detailed negotiation!

*Remember to switch your receiver off before your transmitter.*

The BMFA advocate that the height of this circuit shouldn't waver, but there's sometimes a natural tendency to fly slightly higher on the back leg of the circuit. As long as this isn't pronounced and deliberate and you fly a steady circuit with good parallels, you should be fine.

Bear in mind the origins of the circuit as an opposite-handed landing approach. While there's no indication now that this is the case, a circuit flown at full throttle will spoil the test. Remember the cruising speed you established before you started the aerobatic elements of the flight and stick with that or go slightly slower. Okay, it's almost time to bring your model safely back to earth.

**l.) Fly a rectangular landing approach and land (wheels to touch within a pre-designated 30 metre boundary).** This final circuit of the test flight is exactly the same as the landing approach and overshoot that you just flew in j.) above, but with a termination of the flight as the model alights onto the strip. This criteria of a 30m boundary (Fig. 1) is worth a closer look here, though. I've yet to see an examiner measure out a 30m boundary when conducting a 'B' Certificate flight. Typically, what this request means is that the model should touch down at a point reasonably in front of the pilot and somewhere on the landing strip - a very broad 'spot landing', if you would.

Usually the examiner will make it clear before the test that the landing should touch down between "here and here" as he points along the strip / landing circle / football pitch - whatever you're using as your patch. Note that the model doesn't have to stop in this boundary, nor should it touch down before the boundary and taxi into the area, but it should land, preferably with the motor still running. I say that as it insinuates that you haven't floated over the area and elected to bang in a load of down elevator and dive for the spot! A three-point landing on a tail dragger or a fully flared main leg landing on a trike set-up is what we're looking for here, and is better achieved by a proper lined-up approach, good throttle management to descend to the strip, and a full landing flare with the model touching down in the correct place, just before the stall.

By the time you achieve the standard of flying where you're eligible for a 'B' Certificate you'll have landed many models many times, and you'll know the difference

*Post-flight checks are something you'll be familiar with by now. Don't forget to follow frequency control procedures and clear the channel for others to use.*

*All you need do now is answer a few small questions from the BMFA bible.*

between a good landing and a bad one. Try to make your 'B' Certificate flight test landing the best one you ever did! Here again, there are a few tricks you can employ to increase your chances of success in front of the examiner. Think about the height at which you're to start the approach. This should mirror your overshoot circuit, and if this was higher than the 40 feet you're currently flying at, think about gaining a little height as you go about the process of swapping circuits to achieve an into-wind landing. The landing circuit should commence over the patch and, again, heading into wind. It's very important that you call "landing!" quite loudly as you begin the task. Make sure that the examiner sees you visually check the area to satisfy yourself that it's safe to land the model. Remember to let him see you moving your head.

If you need to perform an overshoot instead of the landing you'd best make sure you have a very good reason for doing so! Lining the model up incorrectly or fluffing your throttle control isn't a good enough excuse, and you'll fail. People on the strip, pedestrians on the approach, or the sudden 'dead-stick' of another model in the circuit are legitimate reasons for calling off the landing approach early, and your examiner should direct you to abort the circuit if any of these things occur unobserved by you. Don't rely on it, though!

So, there it is. Model safely on the ground and you suddenly find yourself able to breathe again. Mind you, be careful because this flight isn't technically over. If all is well your model should be sat on the strip with the engine ticking over nicely, following the greaser of a landing you just pulled off. Don't blow it now by messing up a tricky taxi operation or carrying your transmitter


out onto the strip when you go to retrieve your model. Stop the engine, pass the transmitter to a helper (or the examiner if you like) and, observing that it's safe to do so, go and retrieve your aircraft from the landing zone. Once back at the pit area, go through the last task:

**m.) Complete the post-flight checks as required by the BMFA safety codes.** These post-flight checks are listed in your BMFA member's handbook, and are detailed as follows:

1. Receiver off, then transmitter off.
2. Clear the frequency control system.
3. Clean the aircraft down.
4. Check propeller, airframe, undercarriage, wing fixings etc. for security of fastening and possible flight or landing damage.

These are all fairly clear from their descriptions, but to be sure that you're observed doing them, go a little 'over the top' with your post-flight checks and make a point of exaggerating them a little, just as we did for the pre-flight checks. Leave nothing to chance by assuming that the examiner has seen you do them.

A word of caution about electric-powered models here: these should be considered to be 'live' until the flight pack has been properly disconnected. The easiest way to ensure you treat them this way is to pretend that the motor is still running and carry the model or restrain it accordingly during retrieval.

Even though your electric-powered model doesn't require a 'clean down', go over it as if you were doing just that as it gives the opportunity to really look for any damage that you might have missed.

With the conclusion of the post-flight checks the first part of the test is over, and you can relax a little. It should be clear to you by now whether you've passed or failed the flying task, but if it isn't, just ask.

There's little point in sitting through the scary process of answering the part two questions if you need to fly again that day, although your examiner may request that you do so just for practice or to better assess your competency. If you failed the flying, well, you can have another go at it later the same day. If you clearly passed then well done to you, and we can move to the bit that terrifies most candidates... the mandatory questions. We'll look at these next time, when I'll wrap up this series. Hmm, by my reckoning that leaves you just one more opportunity to cram in some knowledge before you go for it!