Code of Safe Practice

The following is designed to provide a minimum set of guidelines for new and existing members to ensure their own safety, the safety of other members and of the public. It may be freely used by clubs as a document to advise members on the practical aspects of operating radio control models. It should be noted that it also forms the basis of the questions used by examiners in the A/B "Certificate" scheme.

The code applies to both Fixed wing and Helicopter types, both internal combustion **(IC)** and electric powered. Specific references as appropriate to helicopters are preceded by **(H)** and printed in brown and electric models by **(E)** and printed in blue.

Section 1: Before setting out for the field

The following checks should be completed:

Is the propeller the correct size for the model? Too small a prop can result in the engine over revving, while too large a prop places excessive loads on the engine. It should be free from nicks and other damage, and properly balanced. Otherwise a prop may be shed when rotating at high speed. An unbalanced prop can lead to excessive vibration in the airframe, giving rise to many problems from radio failure to bits falling off the airframe. When a spinner is fitted it should not exert pressure on the blades of the propeller. It may be necessary to cut away the spinner where it wraps around the blades to prevent contact. **(H)** Check that all rotor blades are in good condition, with no obvious damage. Check mounting bolts and blade clamping area for security. Blades should be balanced.

Are the engine and silencer securely mounted? Even in the best constructed model there is some vibration present. The vibration has the effect of loosening the screws, allowing bits to fall off. Locking washers or locking compound should be used on all critical screws and nuts. **(E)** The power pack (or drive battery) needs particular attention as it is typically a heavy component which requires suitable restraint by straps. It also contains a large amount of electrical energy and therefore care should be taken with all connections. These should be checked regularly for looseness and to ensure all protective sleeves securely insulate them.

Are the receiver and transmitter batteries fully charged? A discharged battery will result in total loss of control, and loss of the model. Partially discharged batteries may appear to function correctly while operating the model on the ground, but when the model takes off and servo loads increase combined with a greater distance between transmitter and receiver, loss of control may be experienced due to range problems. Hence the importance of range checks. The types of cells used in modern r/c equipment vary from NiMh packs to Lithium cell with voltage regulators and have discharge characteristics where they show good charge initially and then go flat quickly towards the end of the cycle without warning. A full charge in accordance with the manufacturer's recommendations is required before a flying session. As a general guideline most receiver LiPo batteries will be charged at 1C so taking approx one hour to fully charge and NiMh batteries vary from 5 to 10 hours depending on charges and cell type. One must be particularly wary of old batteries, or equipment laid up for a number of years. It is a false economy not to replace all such batteries. The use of an on-board battery checker or hand held meter used regularly is very useful in preventing problems.

The receiver aerial also needs to be properly installed regardless of model type. For 35MHz it is important to uncoil the aerial and exit the model to allow the maximum length outside. It is recommended that it be tied back to the tail fin with a simple restraining band. For 2.4GHx, the

practice varies between manufacturers but the principle of putting the aerial and receiver at 90 degrees apart is fundamental to the success of the system and should be observed at all times.

Range checks should take place before flying any new model or when any equipment is first used after an accident, or when any equipment is changed in a model. The model aircraft should be range checked on the ground with the engine running and model restrained. For 35MHz system the transmitter aerial should be down to reduce power and on 2.4GHz system a special program or button on the transmitter should be used to reduce the power output in a similar way. The signal response is then checked by walking away for a distance of approx 50 paces and seeing a normal response to all commands. As the range increases even further the model should go into failsafe model for 35MHz PCM receivers and all 2.4GHz systems and in regular non-PCM systems, the servos will typically jitter and lose control. The optimum failsafe which should be demonstrated, if available, is the engine going to tick over or off with the other channels optional for this test. It is not considered appropriate to carry out an engine or electric motor running range check with a helicopter without the use of special equipment; however a range check with the internal combustion engine off and throttle stick open should still be carried out. To demonstrate failsafe satisfactorily to the examiners, it may be necessary to switch off the transmitter, if the range check does not achieve the desired result.

All radio equipment must be well isolated from vibration by foam insulating pads or similar. The battery pack in particular needs restraint as its weight may move the pack and disconnect from the switch. The aerial must be affixed in such a way so as to prevent chafing on any part of the frame or entanglement with moving parts. Some 2.4GHz receivers require a particular mounting system and the specific manufacturers' data sheet should be followed in all cases.

Has the centre of gravity been checked and adjusted where necessary? The balance point of a model has a major effect on the stability of a model during flight. If it is too far back the model may be so unstable as to be uncontrollable. A forward CG will normally result in a more stable model. The desired balance point should be indicated on the plan or instructions, which came with the model. If it is not as indicated it must be adjusted, preferably by moving existing equipment, for instance the receiver battery pack forward or aft, or, if this is not possible, by adding weight to the nose or tail. **(H)** The model should hang level or nose forward when lifted by its flybar.

Are all the control surfaces and hinges secure? Do they move in the correct directions? Looking at a model on the ground it is difficult to imagine the stresses and forces on the airframe and surfaces in flight. Try putting your hand out the window of a car travelling at sixty miles per hour, and feel the force of air striking your hand to appreciate the effect on a model. For this reason it is imperative that all control surfaces are well secured. Hinges should be well glued and pinned where necessary.

Are the control movements correct? The elevator controls pitch, the aileron controls roll, and the rudder controls yaw on an aeroplane. It is vital to check that all the surfaces move in the correct direction and that the amount by which the surface moves is appropriate for the particular surface and model. An experienced modeller should always check this aspect of the model set-up. **(H)** Particular attention should be given to "gyro direction", throttle opening and pitch direction.

Does the engine stop when the stick and trim are fully back or the "kill" switch is used? Apart from the fact that it is normally necessary to be able to stop the engine after landing, it can also be useful at other times. For instance during a test flight if the model is virtually uncontrollable, stopping the engine can slow things down enough to make flying manageable, and allow the model to be landed "dead stick".

Are all the linkages secure? Plastic clevises split easily and can detach from the control horn or servo arm. The clevises should be screwed on to the threaded end sufficiently far to ensure adequate grip. When cables or snakes are used the outer casing must be securely supported at both ends and in the middle if the run is long. **(H)** Check all links for stiffness or looseness, replace links on an ongoing basis as necessary.

The following mechanical checks should be made; loose or missing nuts or bolts, fuel tank and piping secure. **(H)** Check for excess backlash in the gears ball joints, and that the gyro is securely mounted.

Pilots should ensure that their radio equipment conforms to the latest version of Document ODTR 02/71R (Jan 09) ***Permitted Short-Range Devices in Ireland.*** This in general terms describes the Max. Power output as 100 mW ERP for any radio type and the requirement to use equipment with a "CE" approval

Has the model got its MACI Registration number attached?

If the model exceeds 7kg weight a large model registration permit is required. If the model exceeds 20kg, separate approval from the Irish Aviation Authority is required.

Section 2: On arrival at the flying site.

Check flight line /pits/parking arrangements and park your vehicle accordingly. The flight line must not overfly the pits or the parking area. The pits area must be chosen taking into account the direction of the wind.

Are the weather conditions suitable for the model, and for the experience level of the pilot? Wind condition and visibility must be taken into account.

Do not switch on your transmitter until the local procedures are understood and complied with.

On 35MHz systems, only one model at a time may use any given channel. Switching on a second transmitter on the same channel will result in interference to both models, with potentially disastrous consequences. Check locally which control system is in operation (usually called a pegboard) and comply with these rules at all times. With 2.4 GHz systems frequency control is not an issue as each Radio is operating with a unique digital code rather than a frequency. However you should still observe the need to check procedures as some clubs may have a unique peg for 2.4 GHz use and registration may also be required.

As an added precaution on 35MHz systems, call out your channel number loudly or speak to the other pilots present to confirm their frequencies before switching on so as to eliminate other pilots to a possible clash.

Ensure that the wings are properly secured to the fuselage. If rubber bands are used ensure that they are of sufficient quality and quantity. A minimum of six is recommended.
Check for secure mounting of the canopy, **(H)** boom clamps, main and tail rotor blades.

If circumstances dictate that a range check is required upon arrival, then look for the assistance of a helper and inform others of your intention.

(E) It may be necessary to recharge the drive batteries at the flying site and if this occurs, the following guidelines should be observed:

- Never charge battery packs in a model or left in a motor vehicle.
- Ensure a well ventilated area and never charge battery packs unattended.
- Check carefully that the charge rate and cell count are appropriate to the pack.
- The use of a fireproof bag or case is recommended for home use. At a flying site it may not be necessary if it is in an open environment and if the pack is separated form any combustible items.
- Lithium batteries, in particular, have a tendency to swell up and even explode if charged incorrectly.

Section 3: Starting the model

For fixed wing models have someone trustworthy to hold the model securely or use a suitable restrainer.

Ensure that all leads, tools, clothes, neck straps, etc. are well clear of the prop and the throttle stick is at "low" when starting. **(H)** Before any attempt is made to start, ensure the transmitter's flight condition is "normal" and the throttle stick is "low". The helicopter should be held by the rotor with one hand while starting with the other.

Ensure that nobody is standing in line with the prop disc. Any bystanders should stand behind the model to avoid danger.

(E) The final electric connection to be made is normally the drive battery and should only be completed when satisfied that the model is operating correctly and the throttle is off. The drive battery should be disconnected in all cases before turning off the transmitter.

If flick starting the engine, use finger protection or a strong glove.

When the engine has started perform all adjustments from behind the model.
(H) Adjustments should only be made with the clutch disengaged and while holding the rotor head firmly.

Ensure that the model is restrained at all times when the engine is running. Run the engine at full throttle and hold the nose of the model up to ensure that the engine will not lean out and stop. Model should be started and all adjustments made only in the pits area

(H) Ensure that the rotor head is restrained by hand at all times while the engine is running in the pits area.

Section 4: Flying the model

The model must not be flown behind the pilot line, over cars, people, property, or any other area which would constitute a hazard in the event of loss of control, or an engine cut.

Pilots should stand together when flying, with their backs to the pits area. **(H)** Applies to helicopters flying in the same airspace as fixed wing models.

Last thing before takeoff; check all controls for correct movement and direction.

All take offs and landings must take place into wind. **(H)** This does not apply to helicopters.

"Dead stick" must be called out in the event of an engine failure to alert other fliers to give priority and to keep the runway clear.

"Landing" must be called clearly to alert others in the area. **(H)** Applies to helicopters flying in the same airspace as fixed wing models.

In an emergency the model is the lowest priority.

The cardinal rule is – "Ditch if necessary, to avoid people".