Notes on the conversion to a single seat gyro from a dual seat gyro, or, taking off and landing in the single seat gyro.

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It is most likely that you have been with an instructor on a factory two place machine for your initial gyro training. Flying the single is a completely new experience. It will react differently, as will most gyros from each other, but this time you will not have anyone with you on the machine to correct your mistakes, some of which may well be potentially lethal. For the conversion you should be in two way contact with an instructor watching you to help correct mistakes. You will have to learn how it works, slowly, steadily, and in the safest possible manner.

A good place to start will be learning rotor management on the single. On the bigger two place machines, the rotors were longer heavier, and had good pre-rotator, rotor brakes, it is likely that you may well never have experienced blade sail/flapping*. The single seat machine will probably be a less sophisticated machine and with fewer aids to assist you, and, blade sail/flapping more likely to happen. (* Blade sail/flapping is a complete subject in itself and should have been studied and understood before going ahead with the stages covered below. In proceeding it is understood that this is the case.)

You will begin by taxiing the gyro around getting familiar with how the brakes and steering work, blade sail/flap, and experiencing its onset. Why it occurs, and what to do immediately after it begins, how to handle the rotors while going up, and down wind, turning corners, your rotors width, and how to maintain a safe Rotor RPM, if you have elected to keep the rotors turning while taxiing around. During this stage it will be ideal to have your instructor, or at the very least, another gyro pilot in two way radio contact with you preferably in a car following along beside you as an observer will tend to spot the onset of blade sail/flap before the inexperienced student, as well as other potential mistakes.

Beginners tend to grip the control stick and throttle too tightly. A tense hand on the controls makes gentle delicate movements more difficult to make. Every movement in the beginning may probably be too much, and it is easy to find yourself over-controlling. Try to relax, holding stick and throttle firmly, but gently. Make all movements with the stick smooth and precise, never jerky and sudden. Flying a small single seat in the early stages is about feel, developing a sight picture and the gyro's attitude in ground while taxiing, as well as in the various phases of take-off, and flight, approach and landings. It may well also be that a less experienced student does not yet have the experience or ability to be analyzing instruments while he is trying to mastering the single seat machine; he will certainly be experiencing new sights and sensations, and, now without the instructor in the back to take over when things go wrong.

Progress is made through ground handling, rotor management, to wheel balancing, ie getting the correct keel angle for lift off, then on to 'Hops 'or brief periods of flight. First low short hops before increasing these in length and then in altitude. It is best done as a step by step process and is not to be rushed. Practiced thoroughly, at each stage until perfectly understood and performed with the student happy and at ease with the exercise. In early

stages it will be done in *little or no wind.* Patience will be required; because sod's law is that will always be windy just when you do not want the wind and the desire to press on is great.

The whole process will be broken down into stages.

Stages:
1a. Rotor management on the ground, (static).
1. Rotor management on the ground whilst taxiing.
2. Rocking back.
3. Wheel balancing.
4. Take off.
5. Landing.
6. Hops, Engine failure, and high hops.
7. The circuit.

Objectives for Stage 1a. Rotor management on the ground, (static).

Learning how to use the air flow through the rotor to keep it at, or a little above the best speed for taxiing, and minimizing any chance of flap or blade sail. Learning the early signs of incipient blade sail/flap, and how to stop it from getting worse. This exercise is best be done with an instructor, or experienced gyro pilot standing beside the student seated in the cockpit. Even if the machine does have a pre-rotator it is a good opportunity at this stage to introduce the practice of 'patting up; the blades. If the machine is without a pre-rotator 'patting up' by another person is a safer and less strenuous exercise, for the pilot, certainly in the beginning. Patting up on one's own blades can prove a bit more difficult particularly when the winds are either very light or non-existent, or, blowing a bit harder than normal, or, are gusty and variable in direction, although this eventuality is the scenario we are training to eventually be able to cope with.

Exercise.

This is best done with an instructor/friend. Make sure you are *both* fully briefed on the exercise that is about to happen and *both* are familiar with positions, procedures and safety points to be looked out for. The gyro should be in the open and away from any other aircraft people or obstacles with good clearance for the rotors. Since the wind can produce eddies, vortexes and gust from different directions when flowing over trees or near hangers it would be best if the wind is coming in an unobstructed direction towards the gyro. The wind should be light and steady, around 2-8Kts and not gusting.

Pre-flight the gyro as if for flight. Ensure it is chocked and facing into the wind. Engage pre-rotator and spin the blades up to 120rpm

Gently begin easing the stick back thereby tilting your rotor disc back This will begin to allow the wind flowing towards you, to come up in through the now tilted disc. The rotors will begin to accelerate. If you make the mistake of bringing the stick too far back, too quickly and the critical angle of attack be exceeded i.e. there is too much air being allowed to come through the disc for the rotor RPM achieved, the rotor will begin to diverge or to blade sail/flap. Indications of the onset of blade sailing/flapping will be the tapping or ticking sounds as the rotor begins to hit the teeter stops, and the stick beginning to jerk violent-

ly. At these first signs immediately push the stick forward thus reducing the airflow through the disc.

Although these notes assume that the subject has been covered already, let us refresh our minds on Blade Flap, (or Blade sail). Blade flap or blade sailing should not be confused with the normal blade flap or in-flight teetering of the rotor blade helping reduce dissymmetry of lift between advancing and retreating blades. Blade sailing, also known as Blade flap is an excessive violent blade motion often occurring when rotor rpm is too low in relation to the forward speed of the gyro during forward movement or take off. Too great a volume of air is attempting to move through the rotor when it is at an insufficient rpm to process it. This is normally cause by taxiing too fast for a given rotor speed, or when at a standstill, allowing too great a disc angle of attack in a wind when the rotor has insufficient rpm. When the blades have not yet achieved sufficient rigidity through centripetal force they are still very flexible, unequal lift developing between advancing and retreading blades as well as flat plate effect of the blades with the airflow under them will cause the rotors to proceed to the limit of the teeter stops. This will be felt in the cyclic beginning to kick, and a knocking sound from the rotor head. If this is not quickly controlled by easing the stick forward the situation can rapidly deteriorate with the stick jerking from side to side more violently, the blades banging hard against the teeter stops, flexing and setting up an undulation along the blade with contact then becoming likely between rotor blade and propeller, airframe, or ground. It should be understood that various different techniques will be used with different rotors and set-ups, and one should learn and use that types recommended guidelines. Light rotors (such as Dragon Wings) have a tendency to blade sail or flap very easily

To avoid the onset of blade sailing, bring the stick back gradually after initial prerotation, and allow the blades to accelerate smoothly, and taxi slowly when rrpm is low. Build up rrpms gradually and smoothly, do not rush the process until a good rrpm is achieved. In the event blade sailing is encountered, immediately apply forward stick to reduce the angle of attack of the rotor disc and slow or completely stop the gyro if it is in motion by throttle reduction or braking until rotor control has been regained. The onset of blade sail/flap is rapid, its progression aggressive and dangerous.

Never try to force the blades up to speed, never ever try to fly before they're ready to go – always wait for the nose wheel to lift when taking off. It's a natural fail-safe. The rotors themselves will tell you if they're happy or not, and you need to know how to read them. Having a Rotor Tach you can fly by the feel of the stick and other stimuli, but a rotor tach tells you precisely what your rotors are doing. DW rotors need to be turning about 125 rpm to begin your takeoff. When they hit around 160 they will seem to come alive and you can then begin feeding in full power. Some maneuvers will cause a decay in rotor rpm, and it will surprise one just how much rotors can lose in certain situations. A rotor tach gives more precise information enabling you to make better decisions than just feel, however feel and experience will always tend to be your primary indication.

Objectives for Stage 2. Rotor management on the ground whilst taxiing.

To steer the aircraft accurately and safely, controlling the taxi speeds with regard to obstacles and safe practice, controlling the rotor, and rotor rpm with due regard to prevailing wind speed and direction, and the terrain over which you are taxiing, and possibly taking off from. This done while taking care to always remain sensitive to the relative wind direction and strength at all times. The relative wind direction by using the slip thread or flag. The wind strength read from the windsock.

Exercise. (I do not taxi with the blades spinning except right after landing)

Have the instructor or experienced gyro pilot following you in a car if possible, and in two way contact on the radio. When ready, either pat up or spin up. The rotor should be kept spinning too fast for flapping or sailing but not fast enough to risk rolling over or taking off. At the same time, always steer carefully and control the taxiing speed to a fast walking pace. Note however that when on a gyro without a pre-rotator, and in still wind conditions or taxiing down wind, the speed may have to be increased at times in order to keep your rotors up to a safe rpm, as you do not have a pre-rotator.

When taxiing on tarmac some *people prefer to keep the rotor stationary and only spin up the rotor when at the holding point*, however if taxiing over grass or possibly bumpy ground one school of thought is to have the rotor turning in order that it will be at least partially supporting its own weight. The rotor by design is a light flexible structure and by proceeding over bumpy ground the hub bar and blades are being subjected to flexing forces without the rigidity that the rotor blade would have while turning.

While taxiing a fixed wing aircraft wing clearance is something that has to be carefully assessed and taken into account. This, all the more critical with turning rotors, whose tips will be at varying heights over the ground as the pilot tilts his disc in varying angles to take account of varying wind direction.

Whenever the gyro is going to be turned it is important to bring the stick forward to level the disc. It is essential to remember that a spinning rotor has considerable gyroscopic forces, attempting to turn sharply with a tilted disc can unleash forces that will roll the gyro over onto its side with the destruction of your rotor blades and possible injury to you or others.

Anticipate future training by setting the horizon reference at a convenient level, usually the horizon itself, but remember that runways are seldom perfectly level. While at this stage, you will be building up the 'sight picture' and peripheral view of the ground that will be of great assistance to you when it comes time to land. It will also be useful to have someone tilt the gyro back onto its tail-wheel while stationary to give you an appreciation of what that feels and looks like for when you progress to the next stage of wheel balancing.

Objectives for stage 3. Rocking Back.

To learn how to safely begin the initial stage of the take off.

Exercise.

Beginning to accelerate the rotor and rock back. Done on days with no, or very light winds, less than five knots and, straight down the runway, certainly to begin with. Follow the centerline of the runway, by now familiar with taxing, braking, turning and rotor management, with the stick slightly back and the blades spinning, watch the blades. Listen to them as they gain rpm's. Try to see how they flick past ever quicker, then begin to go into a blur. As the blades pick up speed, gradually bring the stick back and gradually increase both throttle and taxi speed in small increments. Make it a habit from the beginning to always handle the gyro controls gently. No hard, heavy moves on control stick or throttle and yes I

said it again. If at any time during taxi to get the blades up to speed, you feel a roughness, abnormal vibration in the stick and rotors, or the stick movement begins to feel jerky and hard to control, or you hear the blades beginning to hit the stops, *immediately put the control stick forward, pull the throttle back to idle, slow down and allow the blades to slow down*. All those signs were indication of the onset of blade flap/sail. It meant that there is too much wind coming into and through the blades and rotor disc for the amount of blade rpm's and they are having to go right to the teeter stops in order to try and cope. Too much wind could be either from taxing too fast, holding the stick too far back, from a sudden gust of wind, or too much wind. You can, if the wind speed is up enough, get blade flap without moving the gyro forward at all. If the rotor does get out of control those now flexing blades can strike the ground or tail of the machine. It can and does rapidly progress from onset, and is very expensive if the rotors do impact something.

As you begin getting up to flying speed with the stick fully back, the gyro will begin slowing down, then will rock back onto the tail wheel. This is because as the blades come up to that speed they are producing more and more lift and with the angle the blades are at, that lift component at right angles to the relative wind, is increasingly pulling you backwards. When the gyro rocks back onto the tail wheel and comes to a stop, bring the throttle back to idle while keeping the stick back. Because the gyro is no longer moving, the blades will slow down then begin to lose lift. As they do the nose wheel will drop down on it's own. This is an initial step in the take-off process and should be practiced until you are comfortable with it…taxi, bring the blades up to speed, let the gyro rock back onto the tail wheel, stop advancing the throttle, come to a stop, bring the throttle back to idle, hold the stick back and let the nose drop down on it's own, then bring the stick forward. Repeat until you are completely comfortable with the process. At this stage *do not continue to taxi with the nose wheel in the air.* That is the next stage.

Objectives for Stage 4. Wheel balancing.

Wheel balancing is an exercise that demonstrates to an instructor, and to the pilot concerned that they have learned the finesse and precise control required to safely fly the gyro without entering into pilot induced oscillation. PIO being that state where a pilots late or imprecise handling of the stick causes Pilot Induced Oscillation, PIO or "porpoising" is a 'phase' delay in a pilots reaction time and over controlling of the aircraft in his responses to pitch oscillation, his out of sync attempts to control aggravating instead of reducing the problem. The slight delay between control input and aircraft response, a characteristic of inertia in the spinning rotor blades, leading inexperienced pilots to repeat or overemphasize a control input owing to a perceived lack of response. The resulting response then possibly excessive. The pilot attempts to compensate with opposing inputs, again with excessive control motion. The inputs build quickly putting the aircraft into an increasing cycle of responses if the gyro's oscillation increases too far it will bunt or roll over forward. The term PIO suggests that the pilot is totally the cause of oscillations and that this phenomenon has nothing to do with the machine. That is not completely correct. The pilot certainly has a part of the responsibility because he emphasizes the oscillations. But the stability characteristics of the gyro are also responsible, and PIO can be considered as a lack of stability.

Wheel balancing. When the gyro rocks back on the tail wheel, it is sending a message that the blades are ready to fly. When you have practiced that step, until you are comfortable, and the instructor judges you ready, the next step will be, that when the gyro rocks

back, keep the gyro moving forward with power, then *very gently* ease the stick forward just a very small amount. From your senses that the blades were dragging you back, as you flatten the rotor disk and begin tilting the component of lift in a more upward direction, you will begin accelerating again. By putting the stick forward you reduced the amount of drag. Your aim here now is to keep the nose wheel a few inches above the ground, without your tail wheel touching the ground. This is called, 'balancing on the mains or wheel balancing'. You may find at first that you will simply rock backwards and forwards from one to the other. It is not easy at first, and only becomes easy with practice. Once again a very important and difficult exercise it is building up your ability to use small smooth movements to very precisely control your attitude.

Once you can attain a balanced attitude rolling along only on the main wheels, you will need to make adjustments with both stick and the throttle, to maintain that balanced attitude. Avoid jockeying the stick back and forth, with nose wheel bouncing up and down on the runway and rocking from nose wheel to tail wheel. Remember, the throttle is the primary control of the gyro. The control stick is used here to control the position of the nose wheel just a few inches off the runway, the throttle used to keep it there. *Do remember during this exercise to keep your heading straight down the middle of the runway by using the rudder pedals*. One can begin focusing too much on the balancing and simply not watching where you are going. If anything does not feel right, taxiing too fast, not keeping the gyro lined up straight down the center line, simply come back with the throttle, bring the stick fully back then allow the drag effect of the blades to slow the forward movement of the gyro. When then you are ready, begin again.

The concentration and effort required at this stage is tiring so take breaks. Once able to find the 'balance 'point comfortably, note what speed is indicated on your airspeed indicator. Any increase in speed above this while in the balanced attitude will make the gyro lift off the ground. Practice balancing on the main wheels until you are comfortable and can achieve and maintain the balanced attitude, then maintain that balanced condition for consistent runs down the length of the runway rolling only on the main wheels.

Objectives for Stage 5. and 6. Lifting of into the Hop, (also known as Crow Hopping in the USA.)

To progress from rocking back and wheel balancing to the stage where the gyro leaves the ground. Then to be able to safely maneuver in the air while taking into account the winds effect on the machine now that the wheels are no longer on the ground and various forces such as P factor from the propeller which will require the pilot to anticipate and correct for them, then to settle back onto the ground.

Remember to use the rudder pedals to keep the gyro lined up with the runway center line. Hold the control stick centered, not leaning to one side or the other. Do be prepared for swing or tilting of the gyro as you lift off. Conditions will not always be perfect and there is 'P' factor or pitch factor which causes swing on take-off. Gyros will weathercock into wind, and you do not want to be touching down with any sideways drift. At this stage this will simply be lifting off, then reducing the power to settle back onto the runway

Exercise.

To lift the gyro a few inches off the runway a few inches, maybe one foot. DO NOT BE TEMPTED TO GO HIGHER AT THIS EARLY STAGE. Start your taxi run. Get the gyro in the balanced attitude. Hold the control stick centered then gently ease the power up by moving the throttle slowly forward By increasing power you will be increasing speed. When you have added enough power, and are rolling fast enough, the gyro will lift off the runway without you moving the control stick. At this point stop adding power. Remember, be gentle on the throttle. The goal at this point is to just barely get the gyro off the runway, NOT to climb away. You are not ready for that just yet. As she lifts off ease the stick forward slightly to prevent climbing away any higher. Now gently reduce the power, as it begins to settle, slowly bring the stick back to flare the blades for a landing. As that happens and you make contact, not before, reduce the power all the way back, stick all the way back, and those spinning rotors at that angle will bring you to a stop, then stick forward.

Make more lift offs the same way, until you and instructor feel that you and the conditions are ready to go further. Remember any exaggerated hard yank back, if the winds were stronger, or gusty, could balloon you back into the air, so always easy and smooth on the stick. If you do balloon just ease the stick forward a bit, and if it was high perhaps bring in a trickle of power to cushion the landing because at this stage you are not using full power. After touching down, remember, keep the stick back until the blades lose their lift and the nose wheel drops down on its own, then stick forward. These first lift offs may well feel wobbly because you are only using barely enough power to lift the gyro into the air, and not enough to keep it flying. When you get these lift offs to the point you can do them comfortably, and remain well under control, the next step will be to lift off, then fly the gyro for a short distance before landing.

Objective for stage 7 Hops. Beginning with short low then progressing to longer and higher.

To progress from just lifting off and settling back, to prolonged flights along the runway building up both length and altitude while remaining centered down the runway maintaining control and developing speed control and landings. You will be given target airspeeds to aim for in lifting off, level flight and coming in to land. Since these may vary with the machine, location and local conditions these are to be determined by the instructor.

Exercise.

Begin your run. When balanced, add just a bit more power than before. You do not want to exceed more than 2 feet above the runway so go easy on the power. You will find that the gyro will want to stay in the air now due to that increased airspeed. Note the airspeed. This will be approximately the minimum speed required to maintain level flight in ground effect during the take-off phase of flight. (Later you will learn to fly slower with quite a bit more power, but this is slow flight behind the power drag curve, an advanced exercise you will cover at that stage.). Hold the gyro level and be smooth with the stick. Keep the gyro straight and level. Fly a few feet, say ten to fifteen, then close the throttle and gently bring the control stick back to land the gyro. You will be three or maybe four feet above the runway this time, so remember to maintain airspeed until down to 2 feet or less above the runway. To lose altitude and set up for the landing, ease the control stick forward a tiny bit and ease the throttle back a bit. When the gyro begins to settle toward the runway and

just above the ground, bring the throttle back to idle while also gently bringing the stick back to flare for the landing. After a while you will feel it when the gyro is no longer flying forward, but settling toward the runway and just above it. That is the point when you should begin to flare the rotor blades. The gyro should touch down in a tail low attitude, possibly even tail wheel first, then the main wheels, finally the nose wheel will settle down on its own when the blades have slowed enough to lose the drag effect. A very important point to remember here…if you should be 3 feet or more above the runway, do not bring the stick right back at that height! After backing off on the power, let the gyro settle to about 2 feet or less above the runway and then gently begin to bring the stick back to flare for the landing. If you flare too high it will kill the airspeed and the gyro will drop in hard. It is important to maintain airspeed until 2 feet or less above the ground. Ideally you will get to the point where you are flaring at six inches or less. Also remember this very important point…when the gyro touches down and the stick is held in the back position, the fast spinning blades are acting as a brake to stop the gyro. If the stick is put forward immediately upon landing, the braking effect of the blades will be lost and the gyro remain rolling forward fast.

Make short flights at two feet above the runway until you and the instructor feel comfortable. Now, plan to lift off to about 3 feet above the runway. From the balanced attitude, open the throttle as usual, but using just a little bit more this time. Hold the stick steady. The gyro will lift off and you will notice that, by adding more power the gyro and easing very slightly forward to keep the gyro from going too high, it will accelerate rapidly once clear of the runway. Gently ease the control stick back a tiny bit and the gyro will lift up a little higher above the runway. We're talking pressures on the control stick, not movements…remember it is a more sensitive machine than the two seaters. You don't want to suddenly find yourself way up there around 5-10 feet because you got rough on the stick when you only wanted to lift off to about 3 feet.

Crow hops are defined as low level lift offs and landings. Low level being inches from the bottom of the tires to about three feet above the runway. They are the stepping stone to solo circuits, and first step to being airborne. They are *most important* because it will be from these, that the students' ability to demonstrate a consistent height will let the Instructor know that the student can control PIO Pilot Induced Oscillation. It also will give the student the correct peripheral sight picture of where he needs to be when flaring for landing because a common student mistake is flaring too high. Hops are difficult to perform well at first, maintaining consistent altitude and drift management in light to moderate crosswinds can be a little tricky at first. They teach the student how to lift off correctly, then to lower the nose to build up speed in ground effect. Another common student mistake is to lift off, then to begin climbing at a too low an airspeed where they are behind the power curve. Should the engine fail, it is a dangerous position to be in, you will be unable to trade altitude for airspeed because you are too low. (In dead man's curve with nothing to trade.) In crow hops you will be learning at what indicated speed the gyro is lifting off, and learning to level off to build up to climb speed. You will be learning what the rotors look like at the speed. Sounds funny, almost impossible, but you can, and will begin to see the rotor's begin blurring and start building up a sense of rotor RPM without looking at the RRPM gage, if you even have one.

As with the earlier flights, try a few short hops at first at the higher speed, then when ready, fly longer and longer distances before landing, finally fly the length of the runway holding three feet altitude, land and taxi back. Practice crow hops and you will develop a good feel for your gyro. Remember fly one direction, land and taxi back to the other end for the next flight, every time. No flying both directions!

After becoming proficient at flying the length of the runway at about 3 feet of altitude, you will proceed to gradually lift off to higher altitudes, say, four, five, ten, twenty or even thirty feet, flying the length of the runway and then landing.

Before these higher hops are attempted the subject of a sudden engine failure will now be introduced. You have been taught that after lift off the idea is to then keep the gyro level and accelerate to whatever target speed you have been given. This will be above the lift off speed by some margin. This allows for the possibility of engine failure occurring and when only a few feet above the ground, flaring and just settling back onto the runway. As you now begin going higher you will have to be aware that when the power is off the descent angle of a gyro is quite a steep one. In order to be able to maintain an approach speed of say 55Kts with no power the nose of the gyro will have to be lowered quite a bit. On a Bensen almost 45 degrees. This can be a little daunting to the new pilot and it will also have to be done reasonable quickly and smoothly *without being jammed forward hard.* The worst case is to be climbing away nose high without any margin of speed and for your engine then to suddenly stop, and why we always emphasize the need for building up that speed before climbing away. Even with that margin a sudden silence will mean that the airspeed may well be slipping away before the nose is down to the angle that will allow you to descend back at a reasonable approach speed for the flare and landing. Under normal circumstances you will use the throttle to control altitude and your stick to control airspeed and to descend from the higher altitudes you will need to reduce the power a bit, then ease the stick forward to maintain your approach speed. Be sure to maintain airspeed until about a foot and a half to two feet above the runway. Then back off power to idle and gently bring the stick back to flare for the landing. Note: always leave yourself room to land and don't try to fly to the very end of the runway before setting it down. If you misjudge you do not want to be careering off the end.

From high hops, you will learn to ease the power all the way back, getting the nose down to the correct attitude that will hold a good steady approach speed, and begin landing with the power off. This will then lead on, to you choosing, or being given, a specific landing spot. Then cutting your power, when you judge that you will be able to make that spot, leaving the power off in simulation of an engine failure, and seeing if you make that chosen spot. Later, from higher altitudes, bringing your power all the way back, then choosing a spot to land, after assessing it's viability and the wind direction, then maneuvering to make sure that you achieve that chosen spot, facing into wind, with enough energy in your rotors to allow you to make that smooth touch down you have been practicing. You will begin to do gentle S turns down the runway. This practice will give you experience in proper take offs, short low level flights, climbs, descents, turns and landings. Additionally, you will also acquire a good grasp of airspeeds necessary. This practice will allow you time to get comfortable with all these phases of flight before committing to the pattern. The first trip around the pattern will be exciting, but you will be much better prepared to handle it successfully, if, you are diligent and haven't rushed the early stages of crow hops and low level flight.

To go over the steps. Taxi, ground handling, rotor handling. Brakes, turns, rotor disc management. Taxi till gyro rocks back onto tail and nose wheel off the runway. Balance on main wheels. Low level lift off…from inches to 1 foot. Lift off to 2 feet above runway and land. Short hops at 2 feet altitude and land. To 3 feet above runway and land, Short flights at 3 feet altitude and land. Flying the length of runway at 3 feet altitude. Lifting off to higher

and higher altitudes and landing. Going to higher altitudes then gentle S turns down the runway. Getting to high hops then power off landings. Steeper descent angle, maintenance of airspeed, then judging when to begin flaring, the landing.

Then the circuit. There will be a separate briefing on the circuit. Please remember each step has to be consistently good/perfect, before proceeding on to the next stage. It is your hide in the seat.