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Bug training syllabus.

Phase 1: Initial hang gliding training.
Student training with hang glider and upright training harness.

Hill launch / tow launch method to include:
Good launch technique and to maintain straight controlled flight (roll/ pitch and airspeed). Flat slope launch technique is an important skill. The student is also to be able to make, maintain and exit from turns of up to 45 degrees of bank both left and right.
Landings are to be made within a designated area and are to be on the students feet.

This is normally when the student has achieved their EP level and are moving onto their CP level, I believe this will be around Hang 3.

Phase 2: Bug powered harness and ground based simulator.

1) Introduction to harness.
Various adjusters and articulation of the seat from seated to standing. How the seat works and transfers the thrust to the lower back / rear when running. Importance of correct adjustment.

2) How to enter.
Demonstration by instructor.
a) Sequence of putting on the straps, tightening sequence, leg straps first then shoulder straps. Standing in the harness and final adjustments. Remember to show the de-tightening tabs on the leg strap buckles.
b) Explanation and demonstration of throttles, hand and mouth, choke, ignition switch and starter.

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3) How to take off and get into the supine position procedure:
Demonstration by instructor.
a) Shoulders and arms in front of main straps.
b) Arms back behind the main straps, one at a time.
c) Knees up to chest and rotate back into seat whilst lifting feet over base bar.
d) Set hand throttle to fully forward (engine off) and place mouth throttle into lap.
e) Look up and take the stirrup with one hand, lift left foot to rest on right knee for right handed students or vice versa for left handed students. Emphasis given to the pulling down of the stirrup and the correct hand hold. Place stirrup on foot and pushing out with feet.

4) How to set up and execute a landing.
Demonstration by instructor.
a) Set throttle to half position (for level flight).
b) Remove feet from and secure the stirrup to the spreader bar.
c) Bring feet behind the control frame base bar.
d) Close the hand throttle to the rear stop, move the choke lever to the forward position (this will stop the engine). Switch off the ignition switch.
e) Bring one arm at a time through and forwards of the main straps. Bring shoulders forwards through the main straps and adopt an upright position for landing.

5) Student practice.
Repeat as many times as necessary.

Phase 3: Flights in the Bug trainer.
These exercises are to be adopted and adapted to fit the style of exercises covered by the current hang gliding syllabus practised by the relevant school.
1) Low flights from the training hill or low tows from the winch whilst staying in the upright position.
2) High flights from hill or winch, radio contact with instructor essential. Practice getting into the harness at height. Initial flight to remain in supine until 350 / 250 feet above the ground, get out of supine with feet behind the bar and arms forwards or the main straps, set up for landing.
If there is sufficient height the student can get in and out of supine as many times as possible for practice.

3) Practice until the student and the instructor are confident.

Phase 4: Class room tutorial on:
1) Power flight, effects of power, importance of airspeed and the effect of power on spiral stability.
2) 2 stroke engines, how they work, carburattion, exhaust and fuel system. Importance of maintenance.
3) Fuel and correct mixing of oil to fuel, filtering fuel.
3) Propellers, how they work, inherent dangers, balancing and maintenance.
4) Setting up the Bug to a hang glider wing, adjusting hang height and limit lines.
5) Effects of the limit lines and how they work to create additional spiral stability.

Phase 5: Powered Bug Harness.

Important: All exercises from this point on need detailed and comprehensive briefings to cover the exercise in question, failure to do so will reduce the learning potential of the student.

Exercise 1. Rigging and Starting.

Aim of exercise: To be familiar with the rigging, the controls and starting the Bug harness.
1) Rigging the Bug, frame and fuel system. Fueling with pre mixed petrol / oil at 40 to 1.
2) Daily inspection of unit and priming the fuel system.
3) Explanation and demonstration of throttles, hand and mouth, choke, ignition switch and starter.
4) Ground starting, attached to wing and unattached from wing. Brief on starting procedure. Pre start checks: S.T.A.M.P.
S. Security, no loose objects and braced for initial start thrust.
T. Throttle set. Choke set.
A. Area clear of people, animals and obstructions.
M. Mags. Ignition switch on.
P. "Clear prop!" shout loudly, wait 3 seconds and press starter or kick pull start.
5) Warm up period and full power checks, importance of pre start checks and keeping onlookers at a safe distance.

6) Attaching harness to wing and final pre flight checks, wing and harness.

Supervised student practise.

Exercise 2. Putting on the harness and starting engine with power checks.

Aim of exercise: Getting into the harness and safely starting the engine, carrying out power checks and to be able to switch off the engine.
1) Full briefing on exercise.
2) Entering harness.
3) Standing up and final checks on harness adjustment.
4) Pre start checks: S.T.A.M.P.
5) Start and warm up procedure.
6) Balance wing and carry out full power checks with mouth throttle.
7) Stop engine by applying full choke. After engine stops switch off ignition switch.

Supervised student practise.

Exercise 3. Full power runs.

Aim of the exercise: To carry out full power runs while maintaining wings level and straight into wind direction. At the point of take off to lower the nose and to spit out the mouth throttle, then to land straight ahead.
Important: Radio is needed.
1) Full briefing on exercise.
2) The instructor needs to stand directly into wind and at a suitable distance away. Student must use the instructor as an aiming point, it is important to ensure that the student looks forwards and at the instructor during the exercise. A streamer is useful to have near the instructor.
3) After start up and power checks, balance the wing and at a low but positive angle of attack. Check that the hand grip is at the correct position on the uprights.
4) Smoothly apply full power and start committed run. Student must look forward at the instructor.

5) Accelerate into the run. Note; do not slow the aircraft down by allowing the engine to do all the pushing.
6) Allow the wing to lift changing grip on the bar from thumbs forward to the 'handled beer glass' position. Do not raise the nose, this causes a wing to drop, just maintain the angle of attack and allow the wing to float up making the main straps tight.
Important: In the event of a wing drop or turn, the student will no longer point at the instructor, if so, the student must spit out the throttle and come to a stop, trying to continue will lead to breaking the propeller, the wing, the Bug or the lot.
7) Keep running and allow pilot weight to be supported by the wing, in light winds use extend strides (moon walking). Keep running even after the wing has lifted the student of the ground.
8) The instructor will call 'Stop!" and hold both hands crossed above head. Student is to then:
a) pull the control bar in to lower the nose to the gliding attitude to maintain approach airspeed.
b) spit out the mouth throttle whilst still aiming for the instructor or into wind.
c) Land straight ahead.
8) Repeat exercise until both student and instructor and student are satisfied with students progress.
9) Debrief student.

Classroom tutorial to cover air-law and an appropriate exam to be sat and passed before moving onto the next exercises.

Exercise 4. Take off and landings.

Aim of exercise: To achieve a controlled and straight take off. A climb to 10 feet. To enter a glide descent / approach, round out and held off landing (landing flare). Repeat exercise with climbs to 25 feet and 50 feet.

Brief student on:
a) Awareness of maintaining higher than trim airspeed during initial climb, control bar to be held positively back (Student must pull their hips forwards, not their shoulders)
b) Importance of using a reference point ahead and into wind to maintain a straight climb. Low climbs, use the instructor.
c) Introduction to A.P.T. (Attitude: Lower the nose. Power: Reduce

power to idle by spitting out the throttle. Trim: Trim for approach speed and angle.)
d) Importance of an aiming point for the approach and to lift the eye line to the horizon immediately before the round out.
e) Emphasise the importance of spitting out the throttle and abandoning the take off in the event of a wing drop or turn during the take off run.
Note: This exercise is useful to demonstrate and practise recovery from an engine failure immediately after take off.
Important: Radio is needed.

1) Full briefing on exercise.
2) Follow steps 1 to 7 for exercise 3. Instructor to stand at such a distance that will allow the student to land in front of them whilst keeping into wind.
3) Immediately after take off increase the airspeed by pulling the bar back (approximately 4 inches rearward of hands off trim). Steer to aiming point, use small roll inputs to achieve this. Do not over control and induce pilot induced oscillations.
4) At a predetermined height the instructor calls "Stop!" on the radio and to raise both hands above their head. The student is to then use A.P.T. to enter and maintain an approach for landing straight ahead.
Attitude: Lower the nose. Power: Reduce power to idle by spitting out the throttle. Trim: Trim for approach speed and angle. Important: Keep looking ahead and steer to the aiming point (instructor).
5) Landing: At 6 feet (head height) lift eye line and look towards the horizon ahead, allow control bar forwards to arrest the descent, try to maintain feet off the ground (Hold Off). as feet touch or just before the wing stalls, push the control bar forwards to enter the flare. This will require slightly less effort compared to a unpowered harness / hang glider. Run off any excess speed.
6) Return to launch and repeat to a higher height if both student and instructor are happy with progress.
7) Debrief student.

Exercise 5. First high flight

Aim of exercise: To take off and climb straight ahead, to make the transition from the upright pilot position to fully supine and to retract the landing legs. To level off and maintain a predetermined

altitude. To then practice climbs, descents and medium bank turns. To join a circuit, approach and land at a predetermined point.

Brief student on:
a) Suitability of weather for first flight, appreciation of wind gradient, wind speed and wind direction.
b) Re-brief on procedures for take off and getting into supine. During initial run use instructor for the aiming point, during the climb adopt a new aiming point further ahead and into wind.
c) Cover circuit procedure and re brief on getting out of supine, switching off the engine when established late downwind or on the base leg. Starting the procedure at a height between 500 and 300 feet a.g.l. (for first flights). Adopting the upright position in front of the straps for landing. Maintaining a higher than trim airspeed for the approach (trim speed plus half wind speed).
Note: It is important to make the student aware of the reasons why they have to stop the engine at height and to appreciate the time that converting from supine to the upright position and switching off the engine takes. At lower altitude the increase in turbulence will also induce a lack of concentration.
d) Use of power to control altitude.
e) Use of pitch to control airspeed. Old hang glider pilots need to fully appreciate this as many will revert to trying to use pitch for altitude ... ouch!
f) Re brief on the use of A.P.T. for transiting from climb / level flight to descent.
g) Turns to be kept to no more than 30 degrees of bank.
h) Orientation, always keep the airfield in sight.
Important: Radio is needed.

1) Full briefing on exercise.
Note: The student will initially be nervous and charged with adrenaline, it is wise to encourage the student to fly for 20 - 30 minutes to settle down and become familiar with the flying position.
2) Prepare for flight, pre flight checks and fuel aircraft.
3) Pre start checks and prepare for take off.
4) Take off and adopt climb, 100 - 200 feet and wings stable get into supine. Stirrup and gear up. instructor to prompt student when necessary.
5) Level off at predetermined height or instructors prompt. Stow away mouth throttle.

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6) Instructor to give a series of simple exercises for the student to follow, climb, level off, descend, fly fast, fly slow, turn right, turn left, etc.
7) Student to be allowed free time to play.
8) Instructor to call for the return to the field and to establish a circuit.
9) Supine to upright and engine shut down.
10) Establish approach, instructor to prompt if necessary.
11) landing.
12) Debrief and student to buy the drinks... hoorah!

Exercise 6. Take off and landings (circuits).

Aim of exercise: To take off, enter the supine position with legs retracted and climb to the down wind. To then stop the engine and return to the upright position. Fly a base leg and establish an approach and finally a landing.
Brief student on:
a) Suitability of weather for flight, appreciation of wind gradient, wind speed and wind direction.
b) Re-brief on procedures for take off and getting into supine. During initial run use an into wind aiming point, during the climb adopt a new aiming point further ahead and into wind.
c) Cover circuit procedure and re brief on getting out of supine, switching off the engine when established late downwind or on the base leg. Starting the procedure at a height between 500 and 300 feet a.g.l. (for first flights). Adopting the upright position in front of the straps for landing. Maintaining a higher than trim airspeed for the approach (trim speed plus half wind speed).
d) Orientation, always be aware of wind direction and position to airfield.
Radio is optional depending on students progress.

1) Full briefing on exercise and circuit.
Note: The student will initially be nervous and charged with adrenaline, it is wise to encourage the student to fly for 20 - 30 minutes to settle down and become familiar with the flying position.
2) Prepare for flight, pre flight checks and fuel aircraft.
3) Pre start checks and prepare for take off.
4) Take off and adopt climb, 100 - 200 feet and wings stable get into supine. Stirrup and gear up. Stow away mouth throttle.

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5) Enter cross wind leg, appreciation of wind and drift angle needed.
6) Enter Down wind and level off. Use timings to calculate fuel use and fuel left in tank, 20 minutes for 1/4 gallon used.
7) Supine to upright and engine shut down.
8) Establish base leg, appreciation of wind and drift angle needed. Awareness of options incase of under shoot or over shoot.
9) Establish approach.
10) landing to a target. Student should be able to consistently land within 100 feet of target before progressing to next exercise.
11) Debrief and student.
12) Repeat as many times as student and instructor agree upon.

Classroom tutorial to cover principles of flight and an appropriate exam to be sat and passed before moving onto the next exercises.

Exercise 7: Medium, level turns. Exercise 8: Climbing and descending turns.

Exercise 8: Stall recovery.

Exercise 9: Forced landings.

Exercise 10: Advance turns, spiral descents and spiral dive recovery.

Classroom tutorial to cover navigation and meterology plus appropriate exams to be sat and passed before moving onto the next exercises.

Exercise 11: Cross country and navigation.

Exercise 12: General flying test.