



GLIDER PILOT CERTIFICATE SYLLABUS

1. Lookout awareness;
2. Ground handling, signals;
3. Orientation, sailplane stability;
4. Pre-take-off checks;
5. Primary effects, further effects of bank;
6. Aileron drag, rudder co-ordination;
7. Sustained turns, all controls;
8. Lookout procedures;
9. Straight flight, various speeds, trim;
10. Pre-landing checks;
11. Slow flight, stalling;
12. Launch and release;
13. Radio use and endorsement;
14. FLARM use;
15. Take-off;
16. Circuit joining and planning;
17. Thermal centring techniques;
18. Thermal entry;
19. Soaring with other gliders;
20. Approach and landing;
21. Spinning & Spiral Dives;
22. Crosswind take-off and landing;
23. Launch emergencies;
24. Flying with other gliders and aircraft;
25. Rules of the air;
26. Human Factors;
27. Threat & Error Management;
28. First solo;
29. Side slipping;
30. Steep turns;
31. Thermal sources and selection;
32. Outlanding;
33. Flight preparation, glider, trailer and pilot;
34. Soaring instruments and flight computers;
35. Meteorology and flight planning;
36. Navigation and airspace;
37. Cruising, speed to fly and height bands;
38. Demonstrated cross country capability;
39. 'C' Certificate (or overseas equivalent or higher);
40. DI Certificate; and
41. Independent operator Level 1.
42. Glider Pilot Certificate (application authorised)

Highlighted syllabus items are covered in this document. Other syllabus items are covered in the GFA Instructor's Handbook. Human Factors and Threat and Error Management resources are in the web-based GFA document library



13 & 14 Radio and Flarm use

Objective:

Pilot demonstrates effective use of radio in communication with other pilots and base
Pilot demonstrates effective use of Flarm to aid awareness of other aircraft and collision avoidance

Key skills

Think, listen then speak use of radio
Demonstrate relevant terminology for radio use
Use of situation normal calls on extended flights
Lookout and scanning
Flarm as an aid to collision awareness and avoidance

Theory/briefing

Radio operator theory notes and assessment
Radio frequencies for local area, other nearby airfields, and cross country flight (Refer to ERSA)
How to change radio frequencies on aircraft radio
SAR, last light (refer <http://www.airservicesaustralia.com/brief/>)
Flarm operation, range, visual and audio signals
Flarm as an aid to collision avoidance
Lookout techniques and scanning
Lookout, awareness of key danger areas

Flight exercises

Pilot demonstrates effective radio use in circuit and situation normal calls
Pilot selects and speaks on relevant radio frequencies
Good scanning techniques
Seek out other flarm equipped gliders, interprets signals appropriately.

References

GFA "Airways and Radio procedures for glider pilots" [Note: Logbook authorisations issued by an Instructor is required]

Eckey: Advanced Soaring Made Easy: Chapter 9

Formosa: Beyond Gliding Distance: Page 66 Safety/Lookout limitations of eyesight; Page 192 Computers and GPS navigation systems – Flarm use

McCullagh: Bronze & Beyond: pp 1-8 (Note frequency details are for England, not Australia)

GFA: Flying Faster and Further:



17 Thermal centring techniques

The skill of thermal centring is a core requirement for all soaring pilots. The expectation of this syllabus item is to develop a basic level of thermal centring. The skills and techniques will continue to develop well after the GPC has been achieved, with advanced coaching and experience.

Objective:

Trainee can consistently re-centre and remain in a thermal to utilise the available convection height.

Demonstrated over a number of flights with varying thermal conditions.

Key skills (all must be achieved prior to signing off this syllabus item)

Maintain constant angle of bank (+ - 5 degrees) and speed (+ - 3 knots) through reference to horizon

Maintain an angle of bank of at least 30 degrees at constant speed.

Demonstrate a 45 degree angle of bank at constant speed

Select an angle of bank to suit the thermal strength and diameter

Maintains nose attitude so that speed returns to selected value even in turbulent thermals

Demonstrate thermalling in both directions

Monitors change of lift strength throughout the circle

Feels thermal surges to identify strongest part of the thermal

Adjust centre of thermal in response to changes in thermal strength

Demonstrate the straighten towards lift, away from sink technique

Demonstrate use of feel to locate thermal centre

Theory/briefing

Thermal structure

Optimum speed when thermalling: Minimum sink increases with angle of bank.

Manoeuvrability may require a speed slightly above the expected minimum sink.

Diameter of circle for various speeds and angle of bank Graphical/diagrammatic view of thermal size/shape and glider circle

Detecting variation of thermal strength – monitor vario reading (whilst maintaining lookout, attitude etc); use of audio vario; surge of thermal; changing noise.

Lookout techniques

Use of feel (wing lift and seat of pants surge) rather than vario to locate centre of thermal. Impact of Time lag associated with vario.

Use of geographical features as orientation reference points to locate thermal (situational awareness).

Flight exercises

Reinforce lookout, speed control through attitude reference, determining angle of bank through attitude reference. Note that horizon sweeps at a constant rate as glider completes the turns.

In a thermal: Demonstrate (or direct trainee) impact of circling at 20 degrees, 30 degrees and 45 degrees angle of bank on achieved rate of climb. Explain that a higher speed is required for higher angle of bank. Impact on diameter of circle. Explain that we need to fit the glider circle into the thermal circle that gives the best rate of climb, and so we must select and re-select the angle of bank/speed to achieve the best outcome.



Get trainee to thermal the glider with an emphasis on maintaining a constant speed and angle of bank. If speed control is poor, use lower angle of bank until speed control improves.

Explain that the glider may increase its angle of bank over time due to long wings and outside wing travelling faster and therefore generating more lift. The pilot must notice this slow change happening and correct accordingly. Holding off a small amount of bank will negate this problem.

Demonstrate the "straighten towards lift, away from sink" technique. Note which part of the circle has the greatest rate of climb and then straighten out to move the glider in this direction. For large moves, roll wings level and count 1-3 seconds, then return to original angle of bank. For small moves, the glider may not actually achieve level flight before returning to the original angle of bank. Explain that multiple small moves will achieve the same result without the fear of going too far and falling out of the thermal completely, but will take much longer to improve the lift strength.

As pilot starts to feel the gusts and surges, the straighten technique can be applied to move towards the surges.

Demonstrate use of geographical features as orientation reference points to locate thermal

Note:

There are other techniques such as tightening into the stronger part of the thermal, but these techniques can be left until later in the pilot's development. Skills such as thermalling need to be revisited a number of times during a pilot's development.

References

Reichmann: Cross Country Soaring: Page 9-11 Centring and flight in thermal

Eckey: Advanced Soaring Made Easy: Chapter 1

Formosa: Beyond Gliding Distance: Page 46 Thermal techniques

GFA: Flying Faster and Further:



18 Thermal Entry

Objective:

Trainee can consistently identify and enter a thermal, achieving a positive rate of climb for the whole circle within 2 turns.

Key skills

Manage speed to enable sufficient feel and so identify where the thermal is
Identify thermal structure as glider fly's through
Good lookout when approaching the thermal and during the initial turn to enter the thermal
Selecting an appropriate bank and speed
Adjusting the circle to centre on the thermal
Achieves a positive rate of climb for the whole circle within 2 turns of entering the thermal

Theory/briefing

Thermal structure
Lookout
Appropriate speed for feel and manoeuvrability
Draw a diagram to show flight path through initial turn
Use of feel (wing lift and seat of pants surge) rather than vario to locate thermal. Impact of Time lag associated with vario.
The three decisions which need to be made - Deciding to turn/not turn, which way to turn and when to turn.

Flight exercises

Reinforce lookout
Demonstrate and explain thermal structure as glider fly's through – sink, turbulence area of lift, core of thermal
Demonstrate maintaining speed through sink, and then assertive speed reduction to enable improved feel and increased time for decision making, but not too slow as to reduce manoeuvrability.
Explain 'feel' to determine whether to turn, which direction to turn, and when to turn.
Demonstrate initial turn – usually not too steep so as to increase search range for the core.
Demonstrate increased bank when the core is found
Demonstrate circle adjustment during first turn to align glider with thermal
Leave thermal, then get student to fly back and re-centre the same thermal (note – feel can vary depending on direction of approach)

References

Reichman: Cross Country Soaring.: pp 9-13
Eckey: Advanced Soaring Made Easy: Chapter 1
Formosa: Beyond Gliding Distance: pp 54-59
GFA: Flying Faster and Further:



19 Soaring with other gliders

Objective:

- Pilot can enter a thermal with a minimum of one other glider already established
- Pilot can thermal with at least one other glider, maintaining safe separation throughout the climb
- Pilot can adjust thermal centre to improve thermal strength without creating conflict with other glider
- Pilot can leave thermal without creating conflict with the other glider
- Pilot can fly safely with another glider, either in a lead and follow arrangement or in cooperative flying
- Pilot can fly independently whilst maintaining contact with and separation from the other glider
- Pilot can observe the other glider in order to improve own performance
- Pilot can communicate effectively with other glider using radio

Key skills

- Assess and predict flight path of other gliders
- Adjust own flight path so as to avoid conflict. Act to enable others to react to your situation. Don't put your glider nose in front of other glider's tail
- Lookout. Awareness of other aircraft – not staring at them, peripheral vision. How to lookout
- Use other gliders to identify best areas of lift
- Adjust thermal centre to improve lift without causing conflict – with both following other glider as well as initiating the move
- Leaving the thermal safely and positively
- Use other gliders to identify areas with better conditions and adjust track accordingly
- Act to enable others to react to your situation
- Communicate effectively with other glider using radio

Theory/briefing

- Lookout
- 2D analysis of glider flight path, 3D analysis of glider flight path
- Spiral entry to thermal
- Adjusting flight path through speed, direction and bank angle changes to arrive in thermal at correct location relative to other gliders or to reduce conflict
- Monitoring other glider to improve climb, to improve glide performance and avoid conflict
- Need to follow other glider if it adjusts the centre – impact of not doing this
- Need to be predictable with manoeuvres
- Technique for leaving the thermal in a predictable manner
- When ever unsure or uncomfortable with the situation, you can leave thermal – possibly returning once the situation improves.
- Noticing the closing speed when flying almost parallel
- Communicating with other pilot via radio to maximum benefit
- Not blindly following the other glider into a dangerous situation – independent decisions re safety. (break off altitude)



Flight exercises

Demonstrate lookout scan to identify conflicting aircraft possibly approaching the same thermal.

Demonstrate spiral entry to thermal

Demonstrate use of audio vario and other glider to indicate lift

Demonstrate adjustments to flight path (speed, bank) to maintain separation

Demonstrate techniques to re-centre thermal whilst staying safe

Demonstrate technique to leave thermal positively and safely

Determine cruise speeds prior to flight

Exercises can be practiced in a single seat glider after a comprehensive briefing and with good radio contact, or can be practiced in a two seat glider with a coach.

Cruise parallel to other glider for 5-10km, note variation in performance through lift and sink.

Fly parallel but behind (500m) other glider. Move closer as other glider travels through lift, further apart when travelling through sink

Not pulling up in lift when the other glider does – responding to the air movements rather than the other glider

Observing other glider, but maintaining independent actions and decisions

Demonstrate adjustments to flight path to maintain separation

Pilot to demonstrate these techniques whilst clearly stating what he/she is thinking and doing

References

Reichman: Cross Country Soaring.:

Eckey: Advanced Soaring Made Easy: Chapter 1 & 9

Formosa: Beyond Gliding Distance: pp 203-205

McCullagh: Bronze & Beyond:

GFA: Flying Faster and Further:



31 Thermal sources and selection

Objective:

Pilot can identify potential thermal sources dependant on sun, wind, terrain, vegetation, time of day, cloud cover.

Pilot navigates to relevant thermal sources in a search for thermals

Pilot selects the most likely thermal source from a choice of many

Key skills

Identifying thermal sources

Prioritising thermal source options

Evaluating thermal strength and characteristics

Decision making

Theory/briefing

Thermals supplied by sources with greater temperature difference, or higher moisture content

Describe typical thermal sources (relate to local 'house thermals')

Life cycle of a thermal (explains that a good source doesn't always have a thermal over it – too early/too late)

Relationship between convection height and thermal separation

Understanding of a gliders range (10km per thousand feet)

Increasing the chance of finding a thermal by flying over likely sources

Evaluating thermal when flying through or within 2 turns

Flight exercises

Demonstrate the range of thermal options within gliding distance

Pilot fly's to a series of thermal sources, identifies those that produce thermals

Emphasise need to search once some indication of lift is found – don't expect to fly into the middle every time

References

Reichman: Cross Country Soaring.: pp 3-8, 13-21

Eckey: Advanced Soaring Made Easy: Chapter 1

Formosa: Beyond Gliding Distance: pp 90-100

McCullagh: Bronze & Beyond:

GFA: Flying Faster and Further:



33 Flight preparation: Glider, Trailer and Pilot

Objective:

Pilot is aware of key pilot requirements to enable a flight in excess of 2 hours, and demonstrates ability to fully prepare
Pilot is aware of key aircraft/equipment requirements to enable a flight in excess of 2 hours, and demonstrates ability to fully prepare
Pilot develops and uses a check list to ensure critical items are prepared
Pilot selects wing loading and Centre of Gravity location to suit flight goals and weather conditions (note, for most flights for GPC we would not expect water ballast to be carried)
Trailer is prepared to enable a simple retrieve – tyres, lights, jigs are all checked, fuel in car, keys in car.

Key skills

Maintains pilot fluid levels during flight
Maintains pilot blood sugar levels during flight
In preparation for longer flights, urinates in flight
Manage concentration levels, taking small breaks when appropriate to enable longer flights
Develops and uses a check list (pilot and aircraft preparation)
Pilot has a prepared flying kit (nutrition, maps, gps, phone, etc) for any extended flight
Pilot consciously prepares trailer and car for possible retrieve
Pilot can rig/de-rig glider

Theory/briefing

effects of dehydration
Blood sugar levels and nutrition
Aware of pilot physiological requirements and actively prepares - drinking water, food, urination techniques, effect of alcohol
Hypoxia and temperature considerations
Wing loading effects
Centre of Gravity considerations

Flight exercises

Adequate water and food carried, accessible during flight
Plan and monitor water consumption during flight
Demonstrate opportunities to relax and reduce concentration, thereby having reserves during a longer flight
Practice urinating in flight
Optimise C of G and experience improved handling

References

Eckey: Advanced Soaring Made Easy: pp58-61 (Pilot) 61-63 (Equipment)
Formosa: Beyond Gliding Distance: pp 157-169 (physiological), pp 170-189 (aircraft)
McCullagh: Bronze & Beyond: pp 47-54
GFA: Flying Faster and Further:



34 Soaring instruments and flight computers

Objective:

Pilot to demonstrate the effective use of Audio vario, GPS, Final glide computer, Flarm.

Key skills

Pilot responds to audio signal to centre thermals, thus enabling increased opportunity for effective lookout

Pilot demonstrates skills in setting GPS to navigate to a selected location, identifying airfields within range, declaring task, reading wind data.

Pilot demonstrates skills in setting a final glide computer to determine when home can be reached.

Pilot demonstrates effective use of flarm to identify potential conflicts.

Theory/briefing

Awareness of how pneumatic instruments work – altimeter, variometer, Total energy

Demonstrate GPS settings and adjustments

Pressure altitude vs GPS altitude

Final glide theory, settings for final glide computer

Flarm operation and limitations. Interpreting signals

Flight exercises

Demonstrate effective use of audio vario.

Set a series of 'turnpoints' within local area, demonstrate use of GPS to navigate to each in turn.

From a distance of at least 20km, use final glide computer to verify that 'goal' can be achieved. Fly the distance and observe height loss compared to prediction.

Demonstrate Flarm response with 'known' aircraft.

References

Reichman: Cross Country Soaring.: pp 124-146

Eckey: Advanced Soaring Made Easy: Chapter 1, 4 & 9

Formosa: Beyond Gliding Distance: pp 189-194

GFA: Flying Faster and Further:



35 Meteorology and Flight planning

Objective:

Pilot can access weather information for the local area
Pilot can use BOM info, temperature trace and other weather data to predict soaring potential – expected heights, thermal strength, start and end of soaring, wind direction and strength, frontal systems and sea breezes.
Pilot uses this weather information to plan a suitable cross country flight

Key skills

Pilot can access a range of weather information using the internet (at least two of Bureau of Meteorology web site, Temperature trace information for local area, NOAA, Blipmap, etc)
Pilot can use weather information to predict thermal height and strength, potential of cumulus cloud, trigger point, end of soaring time, wind speed and direction, potential for sea breeze or frontal systems.
Based on the weather information, pilot can predict a reasonable estimate of cross country speed for the day
Pilot can plan a cross country flight (distance and track) to maximise the benefits of the weather and speed predictions.

Theory/briefing

Temperature trace to predict thermal height, strength, trigger temperature, cumulus base.
Using Synoptic information to predict wind direction, stability, identify frontal systems
Obtaining wind information from BOM forecast (or similar information)
Where available, interpreting NOAA and/or Blipmap information
Predicting cross country speed based on thermal conditions, cumulus potential, wind speed and direction, glider performance, McCready theory, plus pilot experience.
Selecting cross country course to suit weather conditions impacting on the terrain.
Planning the flight, estimating time for each leg,

Flight exercises

Predict weather conditions prior to coaching flight (even for local soaring) and compare achieved heights, thermal strength, wind, cloud, etc with prediction.
Demonstrate impact of head and tail winds on achieved cross country speed.
Demonstrate flight with frontal systems, sea breeze and/or other meteorological condition in your area.

References

Reichman: Cross Country Soaring.: pp82-94
Eckey: Advanced Soaring Made Easy: Chapter 2, 3 & 4
Garlick: Going for Gold
GFA: Flying Faster and Further:



36 Navigation and Airspace

Objective:

Pilot identifies key features on map in flight (eg WAC chart) and can identify current location

Pilot can navigate to a selected map point, demonstrating the use of compass and GPS, [A minimum distance of 20km but certainly outside of the normal local flying area of the site].

Pilot can plan a flight on a map, distance of up to 300km with two turnpoints – select bearing on each leg making allowance for wind to determine track to fly, provides a realistic estimate of cross country speed for each leg

Pilot can demonstrate an understanding of airspace limits through reference to a VEC or Terminal chart

Key skills

Map reading, recognition of key features. Measuring distances.

Flight planning

Allowing for drift, identify effects of wind on thermal sources.

Navigating to selected points, with aid from compass and GPS

Navigating to avoid airspace limits

Theory/briefing

Flight planning, map preparation

Allowing for drift – calculating bearing and track

Finding yourself when 'lost'

Airspace categories, identifying airspace limits

Difference between QNH, QFE and Flight level

Flight exercises

Navigating to an agreed location outside of normal flying experience

Solo navigation, with evaluation from logger trace

Demonstrates awareness of airspace limits

References

Reichman: Cross Country Soaring.: pp 39-40, 43-45

Eckey: Advanced Soaring Made Easy: Chapter 5

Formosa: Beyond Gliding Distance: p48

McCullagh: Bronze & Beyond: pp 25-29

GFA: Flying Faster and Further:



37 Cruising, Speed to fly and Height bands

Objective:

Pilot selects an appropriate cruising speed to suit weather conditions and height
Pilot monitors speed and adjusts constantly with changes to conditions
Pilot adjusts flight path to improve glide performance – Following cloud streets; Feeling the air for lift streets in blue conditions
Pilot selects and flies height bands appropriate to conditions,
Pilot aware of rule of thumb values to achieve consistent performance

Key skills

Selects speed according to McCready theory and maintains selected speed
Select appropriate block speed and maintains selected speed
Maintains appropriate speed through varying conditions
Selects and flies path under cumulus cloud to extend glide
Seeks out and feels streeting in blue conditions and follows selected path to extend glide
Determines cruising height band dependant on convection height, cloud cover, air mass energy and 'risk profile'. Flies to maintain the height band profile.

Theory/briefing

McCready theory re speed to fly
Block speeds to fly
Thermal structure and streeting
Height band selection

Flight exercises

Pilot nominates a suitable thermal strength for McCready setting and maintains required speed within 5 knots.
Pilot nominates appropriate block speed as conditions vary, and maintains required speed within 5 knots.
On a day with cumulus cloud, pilot identifies flight paths that provide extended flight under cloud (and in lift). Possibly exaggerate this.
Under blue conditions, experiment with flying at angles to the wind to try and identify lines of better lift/reduced sink.

References

Reichman: Cross Country Soaring.: pp56-62. pp95-116
Eckey: Advanced Soaring Made Easy: Chapter 5
Formosa: Beyond Gliding Distance: pp42-45, pp60-65
GFA: Flying Faster and Further:



38 Demonstrated cross country capability

Objective:

Pilot to demonstrate the capability to soar a glider cross country

Utilising all the skills of the GPC, the pilot demonstrates that they can combine these skills to enable successful cross country flight

Potentially, the pilot could complete a 50km, Silver C flight. Or the flight could be executed within the local area via a series of turnpoints. The flights can be solo or dual. If dual, the pilot must be making the relevant decisions, choices and flying the aircraft with minimal input from the second pilot.

Flight analysis of the flight recorder will indicate skills with thermal selection and centring, use of appropriate height band, speed selection and navigation.

Sign off for this element of the GPC requires the instructor/coach to validate that all elements of the GPC were demonstrated by the pilot. (Use check sheet).

Key skills

Pilot plans a cross country flight and fully prepares for this

Pilot declares the planned flight in writing or electronically on a flight recorder

All skills contained within the GPC

Theory/briefing

Flight exercises

Pilot completes one or more cross country flights solo or dual.

If dual, pilot must be making the relevant decisions, choices and flying the aircraft with minimal input from the second pilot.

References

Reichman: Cross Country Soaring.:

Eckey: Advanced Soaring Made Easy: Chapter 4 & 5

Formosa: Beyond Gliding Distance:

McCullagh: Bronze & Beyond: pp 90-92

GFA: Flying Faster and Further: