Gliding Australia Training Manual

Trainer Guide

Unit 29

Steep Turns

Unit 29 - Steep Turns

AIM

To develop the skills and knowledge to perform steep turns in a glider (60° of bank).

PRE-REQUISITE UNITS

- GPC Unit 8 - Sustained turns, all controls
- GPC Unit 26 - Competence for first solo

COMPLEMENTARY UNITS

There are no complementary GPC units to this unit.

COMPETENCY ELEMENTS AND PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARDS
1. Enter Steep Turn	• **Describe** ○ The higher stall speeds, lift vector, induced drag and aircraft operating limits for steep turns. ○ Risks associated with steep turns. • **Demonstrate** ○ Targeted scan prior to commencement of turn. ○ Selection of attitude to achieve required airspeed. ○ Use of coordinated controls when rolling into the turn. ○ Judgement of required bank angle.
2. Maintain Steep Turn	• **Demonstrate** ○ Maintenance of attitude, airspeed and G loading. ○ Maintenance of nominated angle of bank. ○ Flying by attitude as opposed to speed. ○ Alternating between lookout and monitoring of attitude and angle of bank/rudder coordination.
3. Conduct Roll Out from Steep Turn	• **Demonstrate** ○ Lookout prior to rollout. ○ Identification of roll-out heading. ○ Wings rolled level with coordinated controls. ○ Return to normal flight attitude. ○ Emergency actions and anomalies are identified and rectified during steep turn regime.

Unit 29 - Steep Turns

KEY MESSAGES

- Ability to maintain nose attitude during turn is critical.
- Lookout is more difficult under 2G or more loading.
- Steep turns can result in stalls or spiral dives if not conducted correctly.
- High G loading for prolonged periods may lead to blood loss to the upper body with resulting grey-out or black-out of flight crew.

LESSON PLANNING AND CONDUCT

Briefing

- This unit is a prelude to teaching the kind of manoeuvring needed to be able to thermal well, and to teach the student how to recognise and recover from a spiral dive.
- A steep turn is no different to any turn of a lesser angle of bank save in degree, all control functions are the same. However a higher speed is required for a steep turn than for say a thermalling turn.
- From a medium turn, select a suitable nose attitude for the required speed. Typically, 70 kts but confirm with the Aircraft Fight Manual.
- Increase the angle of bank to the required angle (60 degrees) and maintain the nose position with elevator.
- Considerable back (up) elevator will be needed to maintain the nose attitude in a steep turn.
- Heavier loads are placed on the aircraft during a steep turn and consequently the stalling speed is increased. The speed to maintain the turn should be increased in proportion to the angle of bank.
- High G loading and noise level may mask pre-stall warnings, so extra care is needed.
- Care must be taken to maintain the attitude. If the nose is allowed to drop the speed will build up very rapidly and the glider could enter a spiral dive. To correct, ease the back pressure on the stick and reduce the angle of bank with the ailerons.

Flight Exercises

- Instructor demonstrates a steep turn.
- Points out speed and angle of bank, and higher G Loading.
- Explain the need for use of back elevator to maintain nose attitude.
- Demonstrates recovery to level flight.
- Let student come on controls if they are hesitant.
- Student practices steep turn.
- Instructor to monitor speed and bank and use of elevator to ensure to completion of the exercise correctly.
- Repeat exercise a number of times to develop confidence.

Notes:

- If student is competent at 45° bank turns, they should find this relatively easy, otherwise they may be hesitant to apply a steep angle. Gradually get them to demonstrate turns at increasing angles of bank before trying proper steep turn.
- Application of coordinated aileron and rudder should be smooth and progressive. Larger aileron movement requires commensurate larger rudder pedal movement. Steeper turns will require more back-stick pressure to maintain nose attitude.

TABLE OF TYPICAL STALLING SPEEDS AT GIVEN ANGLES OF BANK

ANGLE OF BANK	'G' LOADING	TYPICAL STALLING SPEED (KTS)
0 degrees	1	33
10 degrees	1.02	33
20 degrees	1.06	34
30 degrees	1.15	35
40 degrees	1.2	38
50 degrees	1.56	41
60 degrees	2.0	46
70 degrees	2.92	56
80 degrees	5.75	79

COMMON PROBLEMS

Problem	Probable Cause
• Student does not conduct adequate look-out in turn.	G-loads may prevent adequate lookout.
• Nose attitude is not maintained (typically is lowered) during steep turn.	Student is not providing the significant back stick force required to maintain attitude. Demonstrate the steep turn and allow the student to feel the control input required. Beware of excessive back stick as this can increase chances of stall as G-load increases. The student needs to select a suitable attitude and fly to that.

THREAT AND ERROR MANAGEMENT

- Ensure appropriate lookout on entry and during steep turns.
- Beware of aggressive stick movements on entry, requires smooth control.
- Beware of excessive speed and G loading.
- Reinforce spiral dive recovery actions.

TRAINING MATERIALS AND REFERENCES

- GPC Unit 29 Student Guide.