9 - THE STRAIGHT GLIDE

The straight glide is something experienced pilots take for granted, but it can be an elusive and frustratingly difficult goal for ab-initios to achieve. In straight flight even small inaccuracies are highly visible to instructors, who often comment that early ab-initios find turning far easier. Straight and coordinated flight is very precise, and requires the wings to be level to within a degree or two. Turning could be regarded as anything else!

Until a trainee can fly straight with a reasonable degree of accuracy, he can't be expected to fly directly toward a cloud or ground feature, turn on a heading, track successfully around the circuit, do an aerotow, or cope with the approach and landing. Consequently, it pays to master this fundamental skill before advancing too far into the syllabus.

The previous 'flying straight' exercises now include the 'Scan cycle'. This introduces good lookout technique at a stage where it is more likely to become an integral and automatic part of a trainee's general handling and airmanship.

BRIEFING NOTES

Lookout and airmanship

Begin by describing why good lookout is so vital, and why, at the risk of overloading the trainee, it is taught at this particular point in the syllabus. Describe briefly some of the eye/brain limitations which require us to be more vigilant than we might be on the ground. There are two main points to be made:

- (1) everyone needs to keep a good lookout
- (2) lookout needs to have a regular pattern to prevent us missing something (or not!)

Show how the 'clock' system works. Describe the SCAN CYCLE [chapter 5]. There's a lot to cover, so a proper classroom briefing is appropriate, with the pertinent points reiterated prior to any flying - see 'The straight glide' below.

Effects of controls

As described in chapter 7. The briefing covers:

- handover/takeover procedures (form of words etc)
- use and effects of the primary flight controls:
  - the elevator, ailerons and rudder
  - the rudder doesn't turn the glider
  - adverse yaw and its results
  - coordination
  - straight glide.

The straight glide

- how to recognise the straight glide:
  - correct attitude
  - wings level
  - balanced flight - string directly down the glider's centre-line
- how to select and maintain the straight glide, including the use of co-ordinated control movements to keep the wings level. The emphasis is on maintaining wings level, rather than turning
- maintaining the Scan Cycle:
  - **LOOKOUT**
  - **ATTITUDE**
  - **INSTRUMENTS**
- managing all the above.

Check that the trainee has understood the briefing.

Explain to the trainee that now they have learnt the basic effects of the controls (including, possibly, the coordination of all three to turn the glider), it is time to practice flying straight. The aim of the exercise is to fly straight at a given airspeed, and at the same time keep a good lookout.

The instructors sets up a straight glide in the normal gliding attitude (best L/D):

- trim for best L/D
- check the attitude and ASI
- check wings level. Adjust as necessary
- maintain balanced flight

Now start the scan cycle

- scan ahead, on the horizon and above and below it
- scan 45° right (or left)
- scan 90° right (or left) and as far back as possible
- look directly overhead
- look ahead. Check the attitude and ASI
- check wings level. Adjust as necessary
- scan the 45° and 90° segments on the opposite side.

ADVICE TO INSTRUCTORS

Flying straight - avoiding drift

In the early stages of training avoid drift by choosing clouds or directly into wind/downwind ground features for the trainee to fly towards. Introduce crosswind features later to illustrate the concepts of drift, track and heading. It is important that the trainee appreciates the effects of very small changes of bank from wings level, without having the picture confused by drift.

The exercise is to return to the straight glide if the glider has been disturbed, not necessarily back to the original heading, which can only be done after turning has been taught.

- always choose a cloud or ground feature to fly towards
- notice when the wings are not exactly level
- use coordinated controls to keep the wings level

Flying straight - with drift

At this stage a pre-flight briefing on the difference between heading (direction in which the glider is pointing) and track (direction in which it is travelling over the ground) is helpful. It is important that the trainee understands why trying to fly from

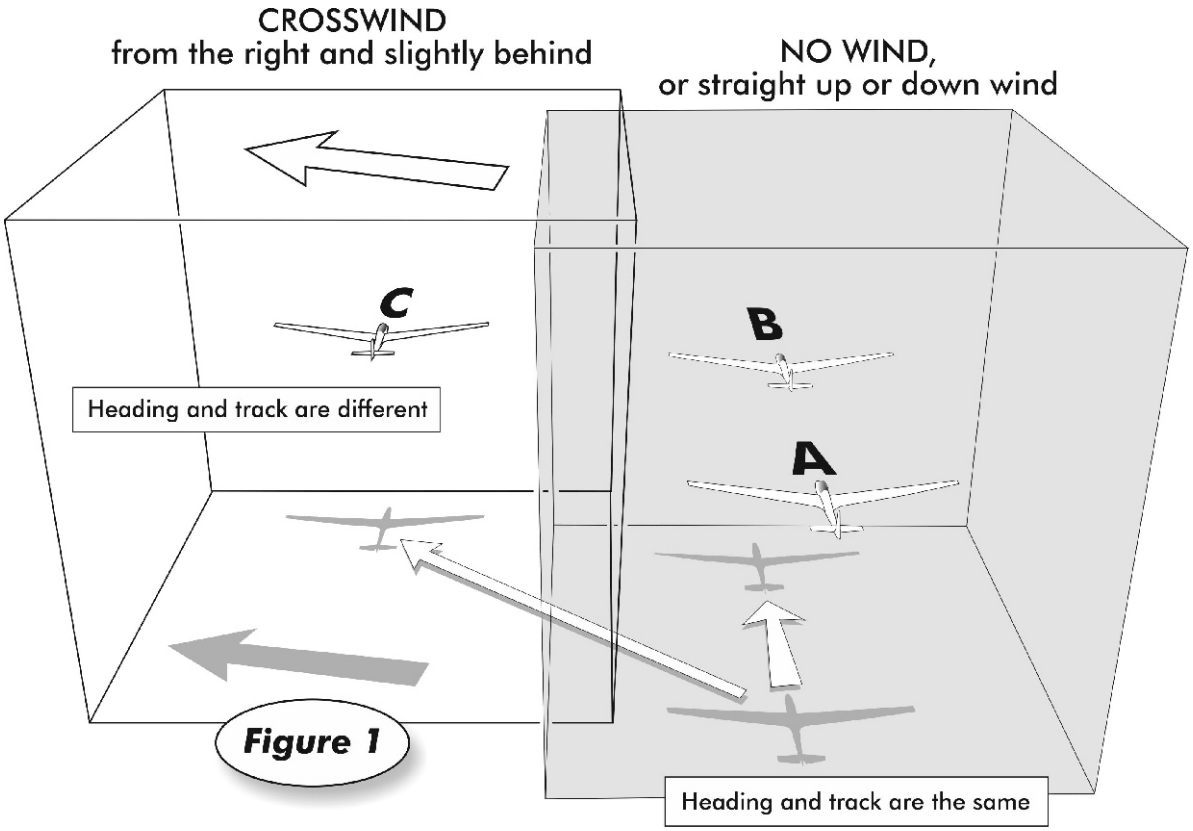

Figure 1

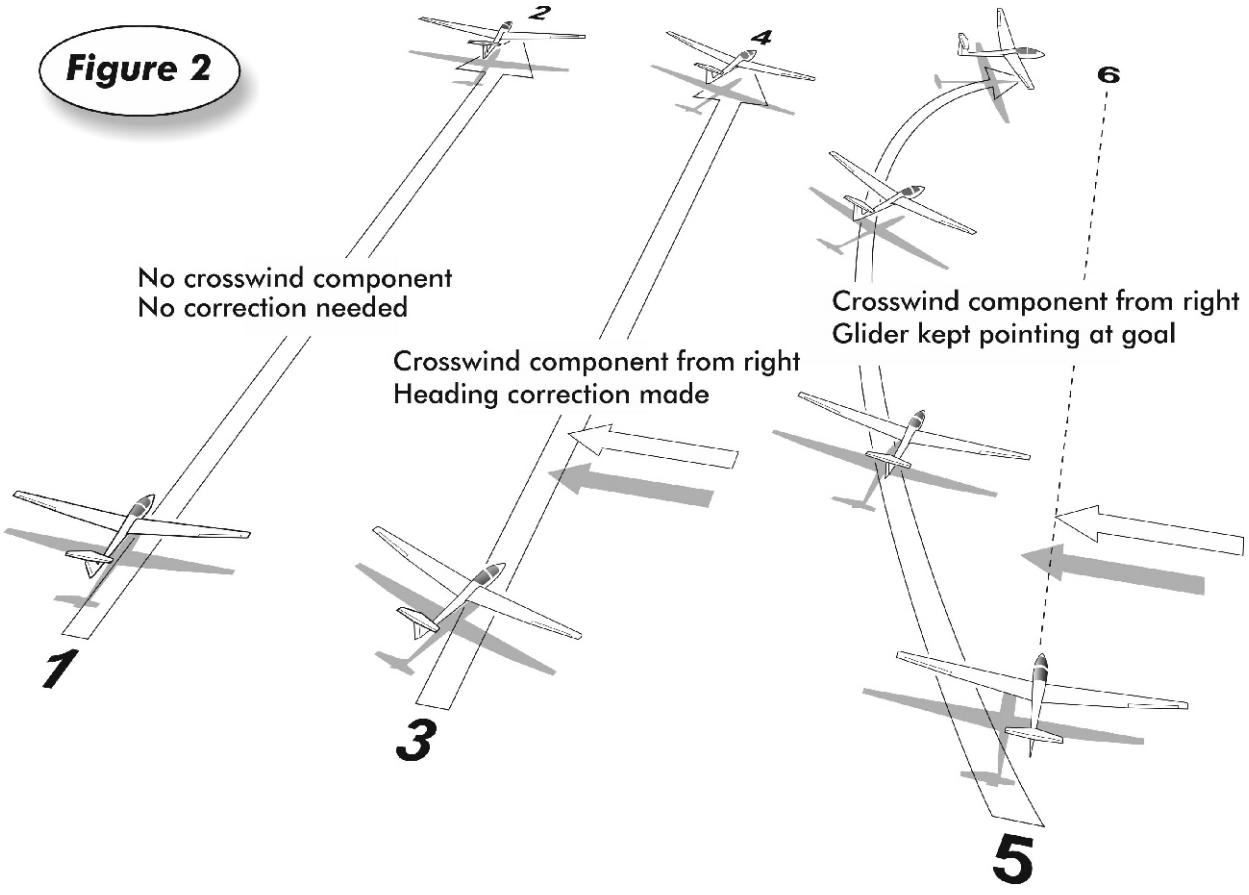

Figure 2

(5) to (6) - see figure 2 - by pointing straight at (6), won't necessarily be the quickest way to get there; the flight path may be long and wastefully curved. If there is any drift the shortest distance between (5) to (6) is covered by flying wings level, on a heading that maintains the glider's track along a straight line joining the two points, as in (3) to (4). Failure to understand drift leads to circuit related problems. For example, if there is any appreciable tail-wind component on the base leg, trainees can be tempted to over-rudder the final turn.

Drift, Track and Heading

Regardless of what the air mass is doing, a glider must maintain a certain minimum airspeed through it in order to be able to fly. When there is no wind, the air mass, as represented by the right-hand cube in figure 1, is stationary in relation to the ground. The glider's track over the ground and its heading through the air mass remain identical, regardless of the direction in which the glider is actually flying.

When there is any kind of wind the air mass moves over the ground, carrying the glider (and its flight path) with it. If the glider in figure 1 maintains the same heading as it did when there was no-wind, then any crosswind component in relation to that heading will carry the glider 'sideways' over the ground, and the track and heading will differ. Drift is greatest when the wind is at 90 to the heading. Aside from any wind gradient, airmass movement affects only the glider's speed and direction over the ground. It has no effect on its airspeed.

When introducing drift, mention the following:

- when flying cross-wind and pointing towards a ground feature, notice that the glider drifts downwind. Its track over the ground is not towards the chosen feature
- the glider is in balanced flight but being drifted by the wind (the wings are level, string/ball in the middle)
- unless flying directly up- or down-wind, the glider's nose must point upwind of the track to the ground feature
- straightening onto and maintaining a crosswind track requires additional anticipation. Make a first approximation of the drift correction and further adjustments as required. The effects of drift and the anticipation needed become far more obvious during crosswind circuits.

ADVICE TO INSTRUCTORS

If the ability to fly straight is not properly developed early on, other problems may arise later on. For example, the trainee will fly towards a ground feature, but in a gentle sideslip. Later exercises, such as learning to aerotow and the approach and landing, cannot be taught or learnt successfully if the trainee cannot maintain a reasonably consistent, wings level heading.

More out of anxiety than anything else, early trainees often feel they must always be doing something with the controls. Take control and trim for say, 45kts, if you haven't done so previously. Explain briefly that the glider has a degree of inbuilt stability and unless disturbed by air currents, it will continue to fly hands off without abruptly turning itself inside out. Ask the trainee to look back at you. Take your hands off the controls and make sure the trainee can see that you have done so. Tell the trainee to look back ahead again. Say something like, *The glider is flying itself. After a while it may start to go into a descending turn.* This isn't something to demonstrate if conditions are at all rough.

Encourage trainees to hold the stick lightly between thumb and fingers rather than with a strong, white-knuckled grip. A tense trainee won't learn very much, while a relaxed one is more likely to feel and be sensitive to what the glider is doing. Being relaxed (relatively speaking), trainees are also more likely to respond to your advice. To begin with, of course, such an easy style of flying will be almost impossible.

Anyone learning a new and unusual skill will be unaware of most, if not all of the important clues needed to do the thing correctly, and it requires some subtle skills and perceptions to be able to fly well. They take time to develop. Their lack is characterised by the trainee making corrections long after the instructor has noticed things are going awry. Initially, you can only help by prompting. As the trainee's flying improves, you can help him develop and hone his skills further by requiring greater degrees of accuracy.

COMMON DIFFICULTIES

Wandering and sideslipping can be a combination of not understanding what the yaw string is indicating, and what, if anything, needs to be done about it. The trainee may also be nervous and unwittingly making inappropriate control inputs. True straight flight (through the airmass) only occurs when the wings are level and the string is streaming directly down the centre line of the aircraft. Early trainees often fly 'straight' with one wing or the other down, and use discrete amounts of rudder to counteract the glider's inclination to turn.

The trainee may not yet be able to detect the small bank angles involved, so rather than level the wings, they centre the string with the rudder, the glider then does the gentle turn it was trying to do all along. Poor coordination here leads to the glider wandering gently from one heading to another.

High workload and/or not looking far enough ahead, are characterised by the trainee making no attempt to keep the glider on track. The trainee may also be spending far too much time looking at the instruments. Take control and return the glider to the desired heading, and remind him of the feature towards which you want him to fly. Alternatively, demonstrate the wasteful effects of wandering off track and returning, only to fly off the other side, by doing exactly that. Point out that most of the air miles covered in this way are not in the direction we wish to go and could, in extreme cases, prevent us from reaching our goal.

Pedalling the rudder pedals in a vain attempt to put the string in the middle - you asked for it! - suggests that the trainee has not fully understood the relationship between the rudder and ailerons.