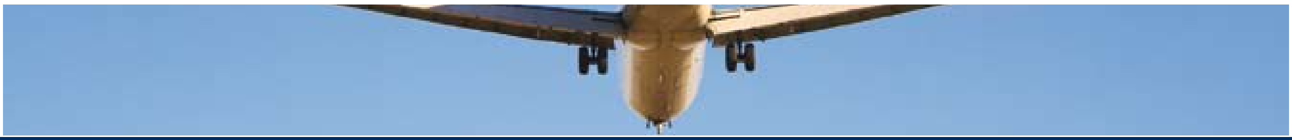


07
DESCENDING

AIM

To teach the student how to descend the aeroplane at given airspeeds, rates of descent and power settings.

Note: For practical and economic reasons this brief should follow the brief on climbing as the airborne exercises are usually combined.

INSTRUCTIONAL GUIDE

Before the flight you must ensure that the student is aware of the practical considerations of the various types of descent you intend to teach him during the particular lesson and the sequence of entering and levelling off – Figure 7-1 refers.

Brief the student on points on to be covered and ensure the student is aware of the effect of changing power, the recommended airspeeds for the various descents about to be taught, the effect of flap and the effect of wind in terms of distance covered. Also brief the student on the forces acting on the aeroplane during descent, Figure 7-2 shows the forces acting during a glide.

Stress again engine handling, explaining the use of cowl flaps and cooling devices if fitted, the use of carburetor heat and the necessity to keep the engine ready for instant response by use of cruise power for a few seconds every 1,000FT.

During the flight make sure that the student keeps a good lookout and point out the blind spot under the nose, showing how to ensure that all is clear ahead. In so doing an introduction to 30 degree banked descending turns can be given as an extension of the lookout procedure.

When demonstrating the use of the flaps you may find that the student will not anticipate the change of trim. Explain these effects as they apply to the particular aeroplane being used.

As in the climbing exercise you may find that the student is not anticipating the height at which he requires to assume level flight. Point out that the recovery to level flight should start at about 10% of the descent rate above the required height.

As the student becomes more proficient give plenty of practice in descending at given rates of descent at a constant airspeed.

PRE-FLIGHT BRIEFING CONSIDERATIONS

FORCES ACTING ON THE AEROPLANE

Explain that the forces acting in a glide are lift, drag and weight. Show that the resultant of lift and drag is equal and opposite to the weight of the aeroplane.

Figure 7-1: Method of entering a descent and levelling off.

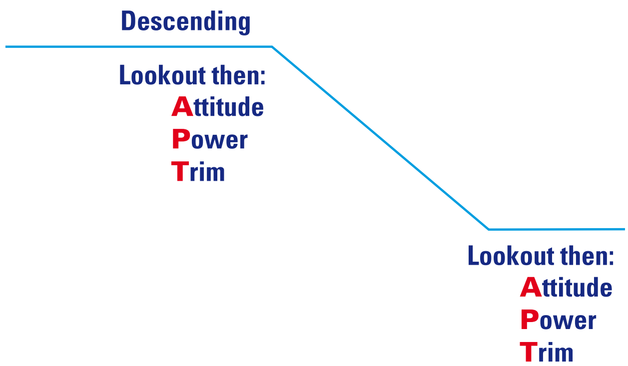
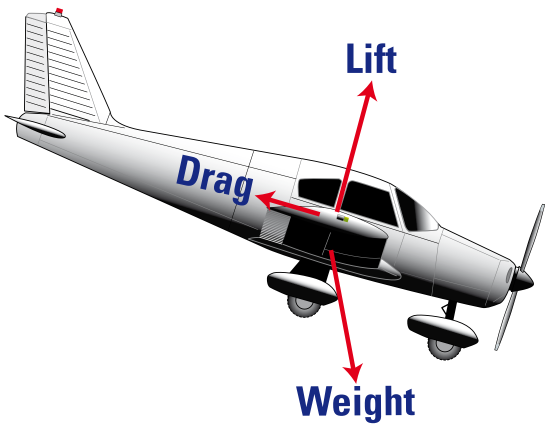
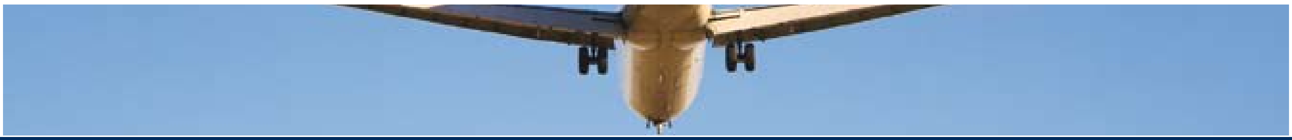


Figure 7-2: Forces acting on an aeroplane during a glide.





BEST GLIDING SPEED

Explain that at this speed the angle of attack is such that the lift/drag ratio is at a maximum.

EFFECT OF FLAP

Lowering flap increases lift for a given airspeed but also increases drag. The lift/drag ratio is always decreased. This results in an increased rate of descent. The lower nose position for a given speed should also be stressed.

EFFECT OF WEIGHT

Weight does not affect the gliding angle providing the speed is adjusted to compensate for the changed weight.

EFFECT OF WIND

The distance an aeroplane can glide from a given height is affected by wind. Gliding into wind - distance decreases. Down wind - distance increases.

EFFECT OF POWER

For a given airspeed the rate of descent varies with the power setting. The greater this power setting the lower the rate of descent.

PARTICULAR FEATURES OF THE AEROPLANE TYPE

The tendency of an aeroplane to yaw is corrected by such means as an offset fin or by rudder bias.

APPLICATION IN FLIGHT

Brief the student on the particular types of descent to be carried out during the lesson. Ensure that he or she is aware of the approximate attitudes, speeds and where applicable, flap settings to be used.

In the powered descent stress that airspeed is usually controlled with elevator and rate of descent with the throttle.

To recover to straight and level flight the normal sequence of events is Attitude, Power and Trim.

AIRMANSHIP

Check that the area into which the descent is to be made is clear. Apply cruising power at least every 1,000FT of descent and emphasize the necessity of closely managing engine temperature during a prolonged descent. Apply carburetor heat prior to closing the throttle if it is considered that atmospheric conditions are conducive to the formation of carburetor ice.

AIR EXERCISE

(a) Descent without power - gliding - how attained

(b) Effect of flaps

(c) Effect of power

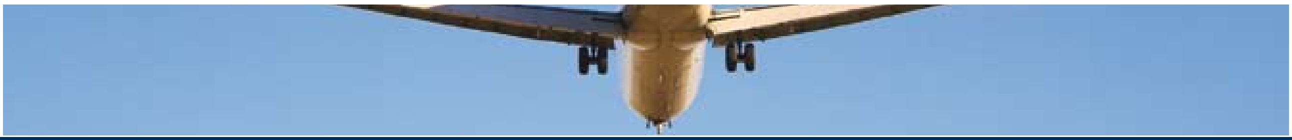
DESCENT WITHOUT POWER

The first demonstration should be the entry and maintenance of a flapless glide using the recommended airspeed. This should be done from straight and level flight.

Firstly ensure that the area into which you are about to descend is clear. Close the throttle, preventing yaw with rudder. Hold the straight and level attitude until the speed approaches the desired gliding speed, then select the appropriate gliding attitude and hold this constant. Trim the aeroplane. When the aeroplane has settled check the airspeed and adjust and re-trim if necessary. Check that the wings are level and that the aeroplane is descending on a constant heading with the balance indicator central.

During the glide point out the instrument indications to the student. Show how these readings are related directly to the attitude of the aeroplane. Bring the student's attention to the engine limitations and controls, carburettor heat, cowl flaps etc. Show the student how to clear the engine and keep the temperatures within the operating range so that it is ready to respond instantly when required. Point out the blind spot caused by the nose of the aeroplane and teach the student how to ensure that the area into which the aeroplane is descending is clear.

In teaching the student how to resume straight and level flight, show how to anticipate the required height. Progressively raise the nose to the appropriate attitude as power is increased, keeping the aeroplane balanced throughout then wait for the speed to settle. Check that the speed is correct, that the wings are level and that the balance indicator is central. Trim the aeroplane. Check the height and adjust as necessary for straight and level flight.



EFFECT OF FLAPS

Commence this demonstration from a flapless glide at the normal recommended speed. Point out the attitude and rate of descent in this configuration.

Lower partial flap and settle the aeroplane at the same airspeed. Point out the lower nose position and the slightly higher rate of descent.

Lower the flap in stages, settling the aeroplane at the same airspeed at each stage. Point out that increased flap results in a lower nose position and greater rate of descent. Impress these attitudes on the student and point out the instrument indications at all stages, showing particularly the interpretation of the low nose position from the instruments.

EFFECT OF POWER

Demonstrate the effect of power from the glide at a constant airspeed.

Point out the attitude of the aeroplane and rate of descent in the glide. Increase power to a suitable figure keeping the airspeed constant. Point out the higher nose attitude and the decreased rate of descent. If particularly noticeable show too that engine temperatures do not fall to below the normal operating range.

Demonstrate to the student how the rate of descent can be varied by use of power whilst keeping the airspeed constant.

Make sure that the student is convinced by demonstration that in these circumstances the elevators are used to control the airspeed, and power the rate of descent. Ensure that the student is aware that changes in the rate of descent, i.e. variations in power, necessitate changes of attitude to keep the airspeed constant.

COMMON FAULTS

In attempting to set up a glide, a student often tends to go on for too long at the same airspeed. If this happens, tell the student to make a conscious effort to keep the nose in the level attitude until almost at the required speed.

Often the student does not let the aeroplane settle down in the various configurations. This results in chasing the airspeed. The cure for this is to impress the various attitudes on the student's mind and to make the student wait until the aeroplane is settled before altering these attitudes.

Student's also frequently forget to clear the blind spot in the descent and do not apply cruise power every 1,000FT to manage engine temperatures.