

## Exercise No 5/ Attitude and Power

Aim: To teach how to change power and show effects on Attitude and airspeed

### Airmanship:

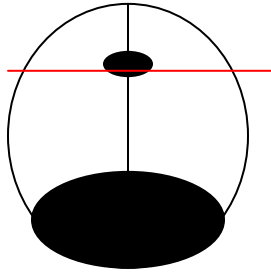
- LOOKOUT
- Location - where is the airfield, land marks
- T&P's, Fuel ,Warning Lights

In this exercise we discover the relationship between the attitude of the aircraft as in what we can see out of the window and the power needed to maintain and change that attitude. It is very important to understand this relationship as attitude determines whether the aircraft is flying straight and level. Maintaining the correct attitude and holding the appropriate power setting will hold the aircraft straight and level. We call this attitude flying. It is amazing that so many pilots even with many hours find straight and level flying so difficult. The reason for this is that in their early stages of flying they concentrated too much on the instruments and not enough on the attitude. The problem with that is that the instruments only have a certain tolerance for accuracy and normally also have a lag or delayed reaction. We encourage you to get the attitude right first and then the instruments second. You should do this as 80% outside at the horizon and 20% inside at the instruments. Its just like driving a car, you only look inside at the speedometer to confirm what you can see outside.

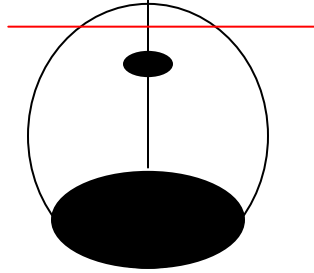
Below is a picture of an aircraft level to the horizon



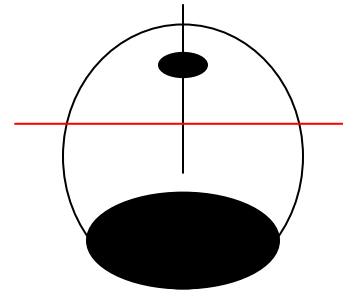
There may be minor differences depending on your height and therefore eye line with the horizon so your instructor should establish a straight and level attitude so you can judge your level with reference to the compass.



**Level flight**



**Accelerative**



**Decelerative**

We will talk more about straight and level in exercise 6 where we cover level flight and climbing and descending. For exercise 5 we will cover accelerating and decelerating.

**Air Exercise**

**Select – Hold – Adjust**

Speed Changes: **cyclic & pedals**

Increase Speed 60 – 80 Kts	Decrease Speed 80 – 60 Kts
Lead with the power <b>increase</b>	Lead with the power <b>decrease</b>
Apply trim pedal <b>Left</b>	Apply trim pedal <b>right</b>
Select an accelerative Att	Select a decelerative Att
Hold Att( <b>push forward</b> )	Hold Att( <b>pull back</b> )
Speed Increase	Speed Decease
<b>Monitor IAS</b>	<b>Monitor IAS</b>
Select speed stable att	Select speed stable att
Adjust power and pedal	Adjust power and pedal

It is crucial to maintaining height that you lead with the power. For accelerating increase the power to more than required for your new speed. Once the new speed is reached and the aircraft is back level reduce the power required for your new speed. For decelerating again reduce the power for less than is required for the new speed and increase once level. Remember from Exercise 4 that the cyclic has a much greater influence than the collective in climbing and descending.

**Flapback:** Flapback occurs as the forward speed of the aircraft increases. The advancing blade has a greater angle of attack compared to the retreating blade as it is moving into wind. This greater angle of attack will produce more lift on that side and therefore create a “Dissymmetry of lift” situation. This is overcome in the R22 by the blades being allowed to flap around a teetering hinge which allows the advancing blade to flap up and the retreating blade to flap down. The movement of the blade reacting 90° to the lift due to gyroscopic principle means that the highest point of the blade is at the front

## Air Exercise

### Power Changes

Power Change: **lever & pedals**  
**power change maintaining constant RPM Gov On**

<b>Raise lever</b>	<b>Lower lever</b>
<b>Balance left pedal</b>	<b>Balance right pedal</b>
<b>Monitor MP</b>	<b>Monitor MP</b>

Power Change: **lever & pedals power change constant RPM Gov Off**

<b>Raise lever 20” to 24”</b>	<b>Lower lever 10” to 15”</b>
<b>Open throttle left</b>	<b>Close throttle right</b>
<b>Balance left pedal</b>	<b>Balance right pedal</b>
<b>RRPM Increase</b>	<b>RRPM Decrease</b>

**RRPM changing maintaining a constant MAP**

<b>Open throttle</b>	<b>Close throttle</b>
<b>Lower lever</b>	<b>Raise lever</b>

If we were flying a different aircraft type i.e. an Enstrum or a Schweizer we would have to spend a long time understanding the relationship between power attitude and, even more importantly, engine and rotor revs. As the R22 has a governor, however, we don't tend to take as much time talking about this. In any aircraft if you lift the collective and increase the pitch angle this increases the angle of attack thus giving more lift. It also increases drag and therefore slows the blades down, so any gain in lift is lost. In other aircraft types you would open the throttle as you increased the collective. In the R22 the governor monitors and controls the revs a bit like a cruise control on a car. This is done on your instrument panel as a percentage 104%. We will discuss rev control later when we do emergencies and assume a governor failure.

