

Exercise No 6 /Level Flight, Climb-Descending & Turns

Aim: To learn how to fly level at any given airspeed, to climb and descend and to turn onto selected headings

Airmanship:

- **Lookout, T&P's Warning Lights, Fuel, Location**
- **Carb heat, Performance**

Air Exercise

Straight & Level: This exercise although appearing simple can be one of the most difficult as it requires constant concentration. Small changes by exterior elements like wind and thermals as well as pilot induced changes may require constant inputs. The trick again is attitude. We briefly spoke about straight and level in exercise 4. In straight and level, attitude is KING. Any changes in attitude will result in a change in speed and if not accompanied by a change of power will result in a climb or descent. Straight and level is simply the right power for the right speed. Take a look below at the graph. Notice that unlike a car power graph the helicopter is using most of its power to maintain a hover. As the helicopter then increases in forward speed its power requirement decreases. WHY? This is to do with the air the helicopter displaces. In order to hover the helicopter must displace enough air to oppose its weight, called induced flow. As the helicopter moves into forward flight or accelerates we don't have to displace as much air as we are now moving into it. It's not quite that simple as we must also look at lift in our principles of flight. We can assume therefore from the graph that any given power setting will have a given speed. i.e. 75 kts 20" manifold. This is always an assumed figure as temperature, weight and wind can also have an effect on performance. Taking this into consideration the way we will teach you straight and level is to assess your attitude and associate your speed with the power you are using. Remember always sort speed out first and power second as the cyclic has a much greater influence than the collective on climbing as descending. The aircraft is statically stable and dynamically unstable and small corrections on the cyclic and collective will be needed to keep the aircraft in trim, straight and level.

Air Exercises

Straight and Level

| | |
|---------------------|---------------------------|
| Cyclic Stick | Att & speed |
| Collective | Height & power |
| Throttle | RPM engine |
| Pedals | Balance |



Increasing and Decreasing Speed in Level Flight

Attitude & Power = Performance

| | |
|--------------------------------|--------------------------------|
| Increase in speed | Decrease in speed |
| Raise lever | Lower lever |
| Yaw right left pedal | Yaw left right pedal |
| Select an acc att | Select a descending att |
| Hold Att Flap Back | Hold Att Flap forwards |
| Monitor IAS 50 – 70 Kts | Monitor IAS 70 – 50 Kts |
| Select speed stable Att | Select speed stable att |
| Lower lever | Raise lever |
| Balance | Balance |

Turning – Level

Angle of bank less than 20° turn onto geographic features such as roads, rail etc

| | Entry | In turn | Exit |
|---------------|---|--|--------------------|
| Cyclic | AOB/Att | AOB/Att | Wings level |
| Lever | Height  | Height  | Height |
| Pedals | Inturns | Balance | Opp pedal |

Climbing and Descending

| | Climb LOOKOUT | Descend Full Carb Heat | |
|-----------------|---------------------------|---------------------------------|--------------|
| ATTITUDE | Hold Back | Pull Back slight nose up | Power |
| Power | Power 23" | Power 15" man | Att |
| Trim | Balance left pedal | Balance right pedal | Trim |

Turning (climb & Descend)

Max ROC 53 kts + Max Power (corrected) 23"

Basic Climb 60 kts @ max con power

Basic descent 60 kts @ 15" MAP

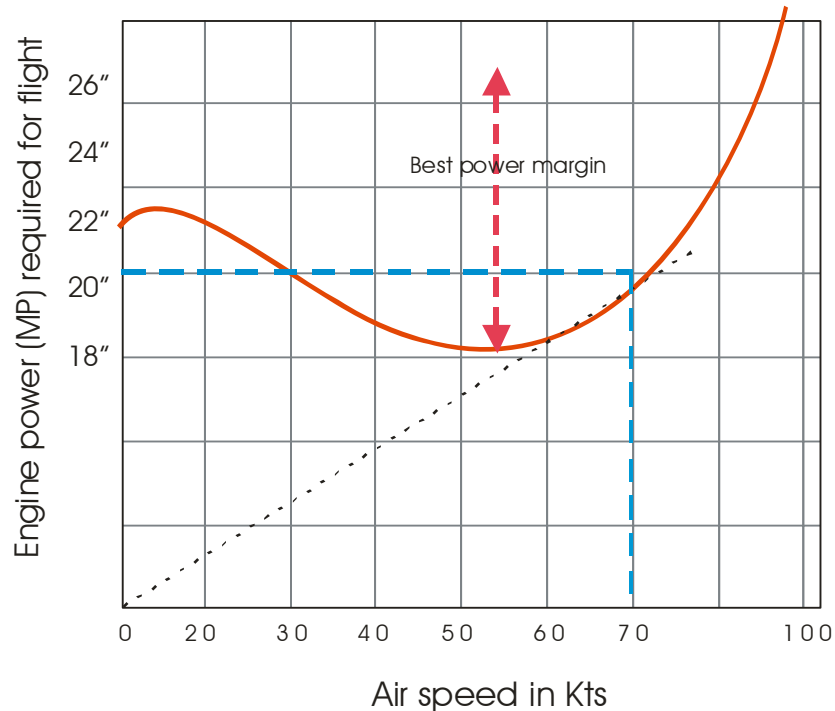
Level out 50 ft or 10% rate climb or descent

Air Exercise

- Level Flight – 70 kts , 20" MP
- Level Turns
- Climbing & Descending
- Climbing & Descending Turns

Discussion Points

- Optimum climb and Descent speed
- Offset seating effect during turns
- Balance/trim during turns- not a problem below 20° angle of bank
- Anticipate roll out of turn



The graph above shows the power available in relation to the drag produced. The maximum power is produced at around 53 kts which is also the best rate of climb speed.

NOTES

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