



Exercise 5

Attitude and Power Changes

Aim

- To learn how to make Attitude, Power, and Speed Changes in Level Flight

Airmanship

- Observe Power Limits
- Maintain a good Lookout throughout
- FREDA Checks

First of all what is meant by Aircraft Attitude?

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Aircraft 'Attitude' refers to whether the nose of the Helicopter is Up or Down.

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Aircraft 'Attitude' refers to whether the nose of the Helicopter is Up or Down.



First of all what is meant by Aircraft Attitude?

Aircraft 'Attitude' refers to whether the nose of the Helicopter is Up or Down.

Or Level



You may remember from the Effects of Control Exercise that it is the Cyclic Stick that Controls the Nose Position.

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Cyclic Forward Nose ↓ Airspeed ↑ Aircraft ↓

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This is called an ACCELERATIVE ATTITUDE

You may remember from the Effects of Control Exercise that it is the Cyclic Stick that Controls the Nose Position.

Cyclic Forward Nose ↓ Airspeed ↑ Aircraft ↓



This is called an ACCELERATIVE ATTITUDE

...because usefully, the Helicopter Accelerates.

An ACCELERATIVE ATTITUDE from the cockpit should look a bit like this.

An ACCELERATIVE ATTITUDE from the cockpit should look a bit like this.



An ACCELERATIVE ATTITUDE from the cockpit should look a bit like this.



Notice how the Magnetic Compass is BELOW the Horizon

An ACCELERATIVE ATTITUDE from the cockpit should look a bit like this.



Notice how the Magnetic Compass is BELOW the Horizon

An ACCELERATIVE ATTITUDE from the cockpit should look a bit like this.



Notice how the Magnetic Compass is BELOW the Horizon

As long as you hold this Nose Down position, or Accelerative Attitude, the airspeed will continue to increase and the Aircraft will go down.

An ACCELERATIVE ATTITUDE from the cockpit should look a bit like this.



Notice how the Magnetic Compass is BELOW the Horizon

As long as you hold this Nose Down position, or Accelerative Attitude, the airspeed will continue to increase and the Aircraft will go down.



Now let's look at a DECELERATIVE ATTITUDE.

Now let's look at a DECELERATIVE ATTITUDE.



Now let's look at a DECELERATIVE ATTITUDE.

Cyclic Aft (or Rearward) Nose ↑ Airspeed ↓ Aircraft ↑



Now let's look at a DECELERATIVE ATTITUDE.

Cyclic Aft (or Rearward) Nose ↑ Airspeed ↓ Aircraft ↑



Usefully, Helicopter
Decelerates.

A Decelerative Attitude from Inside the Cockpit will look a bit like this

A Decelerative Attitude from Inside the Cockpit will look a bit like this



A Decelerative Attitude from Inside the Cockpit will look a bit like this



Notice the Magnetic Compass ABOVE the Horizon

A Decelerative Attitude from Inside the Cockpit will look a bit like this



Notice the Magnetic Compass ABOVE the Horizon

As long as you hold a Decelerative Attitude the Aircraft will continue to Decelerate.

Then there is the Datum Attitude

Then there is the Datum Attitude



Then there is the Datum Attitude

Nose is Level



Then there is the Datum Attitude

Nose is Level

Aircraft is
Level



Then there is the Datum Attitude

Nose is Level

Aircraft is

Level

Speed is Constant



Then there is the Datum Attitude

Nose is Level

Aircraft is

Level

Speed is Constant



You should hold a DATUM ATTITUDE whenever you want to maintain the same Speed.

Then there is the Datum Attitude

Nose is Level

Aircraft is

Level

Speed is Constant



You should hold a DATUM ATTITUDE whenever you want to maintain the same Speed.

From the Cockpit, it looks like this...



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Notice how there is no clear gap between the Magnetic Compass and the Horizon

So what about making an Attitude Change?

So what about making an Attitude Change?

Lets first go from a Datum Attitude to an Accelerative Attitude.

So what about making an Attitude Change?

Lets first go from a Datum Attitude to an Accelerative Attitude.



So what about making an Attitude Change?

Lets first go from a Datum Attitude to an Accelerative Attitude.



Cyclic Forward

So what about making an Attitude Change?

Lets first go from a Datum Attitude to an Accelerative Attitude.



Cyclic Forward



So what about making an Attitude Change?

Lets first go from a Datum Attitude to an Accelerative Attitude.



Cyclic Forward



Usefully, Airspeed Increases.

So what about making an Attitude Change?

Lets first go from a Datum Attitude to an Accelerative Attitude.



Cyclic Forward



Usefully, Airspeed Increases.

Not so usefully, Aircraft goes down.

Then we re-adopt a Datum Attitude.

Then we re-adopt a Datum Attitude.



Then we re-adopt a Datum Attitude.



You have now selected a higher airspeed to fly at.

Now let's go from a Datum Attitude to a Decelerative Attitude.

Now let's go from a Datum Attitude to a Decelerative Attitude.



Now let's go from a Datum Attitude to a Decelerative Attitude.



Aft (or rearward)
cyclic

Now let's go from a Datum Attitude to a Decelerative Attitude.



Aft (or rearward)
cyclic



Now let's go from a Datum Attitude to a Decelerative Attitude.



Aft (or rearward)
cyclic



Usefully, Airspeed Decreases.

Now let's go from a Datum Attitude to a Decelerative Attitude.



Aft (or rearward)
cyclic



Usefully, Airspeed Decreases.

Not so usefully, Aircraft
Climbs.

Then we re-adopt a Datum Attitude.

Then we re-adopt a Datum Attitude.



Then we re-adopt a Datum Attitude.



You have now selected a lower airspeed to fly at.

You now know how to Accelerate and Decelerate effectively and are able to re-adopt a datum attitude for the desired airspeed...

You now know how to Accelerate and Decelerate effectively and are able to re-adopt a datum attitude for the desired airspeed...

...however it is more effective to make a speed change and maintain the same height throughout...

You now know how to Accelerate and Decelerate effectively and are able to re-adopt a datum attitude for the desired airspeed...

...however it is more effective to make a speed change and maintain the same height throughout...

...this is where power changes come in.

Making a Power Change is simple.

Making a Power Change is simple.



Making a Power Change is simple.



From the Effects of Controls Exercise...

Making a Power Change is simple.



From the Effects of Controls Exercise...

Simply Raise the Lever increasing the Blade Pitch Angle

Making a Power Change is simple.



From the Effects of Controls Exercise...

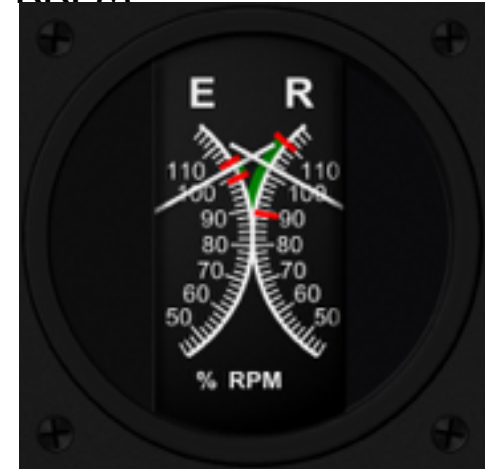
Simply Raise the Lever increasing the Blade Pitch Angle

There is an Automatic increase of Engine Power

Making a Power Change is simple.



This maintains constant ERPM and RRPM



From the Effects of Controls Exercise...

Simply Raise the Lever increasing the Blade Pitch Angle

There is an Automatic increase of Engine Power

Making a Power Change is simple.

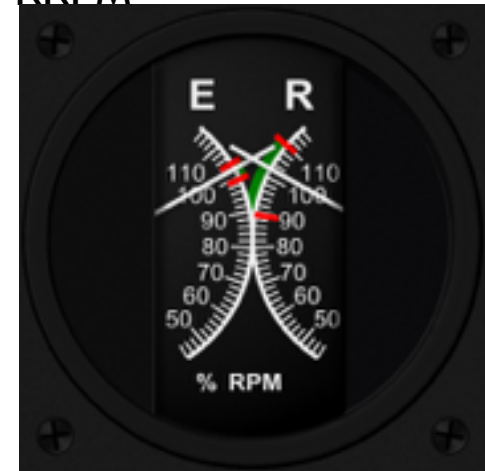


From the Effects of Controls Exercise...

Simply Raise the Lever increasing the Blade Pitch Angle

There is an Automatic increase of Engine Power

This maintains constant ERPM and RRPM



And increases MANIFOLD PRESSURE (simply our Measure in Power).



Don't forget the Secondary Effects of a Change in Power.

Don't forget the Secondary Effects of a Change in Power.

Raise Lever

Don't forget the Secondary Effects of a Change in Power.

Raise Lever Nose pitches up



Don't forget the Secondary Effects of a
Change in Power.

Raise Lever Nose pitches up

YAW RIGHT



Don't forget the Secondary Effects of a Change in Power.

Raise Lever Nose pitches up

YAW RIGHT Requiring Left Pedal input.



Don't forget the Secondary Effects of a Change in Power.

Raise Lever Nose pitches up

YAW RIGHT Requiring Left Pedal input.



Lower Lever

Don't forget the Secondary Effects of a Change in Power.

Raise Lever Nose pitches up

YAW RIGHT Requiring Left Pedal input.

Lower Lever Nose pitches down



Don't forget the Secondary Effects of a Change in Power.

Raise Lever Nose pitches up

YAW RIGHT Requiring Left Pedal input.

Lower Lever Nose pitches down

YAW LEFT



Don't forget the Secondary Effects of a Change in Power.

Raise Lever Nose pitches up

YAW RIGHT Requiring Left Pedal input.

Lower Lever Nose pitches down

YAW LEFT Requiring Right Pedal input.



Now let's combine Attitude and Power Changes to Make a
Speed Change in Level Flight from 60 to 80 knots
(Knots = Nautical Miles Per Hour)





60 Kts



60 Kts

Straight and
Level



Datum Attitude

60 Kts

Straight and
Level



Datum Attitude

60 Kts

**Adopt Accelerative
Attitude**

Straight and
Level



Datum Attitude

60 Kts

**Adopt Accelerative
Attitude**

Straight and
Level



Speed starts
increasing



Datum Attitude

60 Kts

Adopt Accelerative Attitude

Straight and Level



Speed starts increasing

Aircraft starts to Descend



Datum Attitude

60 Kts

Straight and
Level

Adopt Accelerative
Attitude



Speed starts
increasing

Aircraft starts
to Descend





Datum Attitude

60 Kts

Straight and
Level

**Adopt Accelerative
Attitude**



Speed starts
increasing

Aircraft starts
to Descend

Raise the Lever to
Increase Power and stop
descent...





Datum Attitude

60 Kts

Straight and Level

Adopt Accelerative Attitude



Speed starts increasing

Aircraft starts to Descend

Raise the Lever to Increase Power and stop descent...



...apply pedal and forward cyclic as necessary to overcome secondary



Datum Attitude

60 Kts

Straight and Level

Adopt Accelerative Attitude



Speed starts increasing

Aircraft starts to Descend

Raise the Lever to Increase Power and stop descent...



Once desired Airspeed is achieved...

...apply pedal and forward cyclic as necessary to overcome secondary



Datum Attitude

60 Kts

Adopt Accelerative Attitude

Straight and Level



Speed starts increasing

Aircraft starts to Descend

Raise the Lever to Increase Power and stop descent...



Once desired Airspeed is achieved...

...re-adopt Datum Attitude

...apply pedal and forward cyclic as necessary to overcome secondary



Datum Attitude

60 Kts

Straight and Level

Adopt Accelerative Attitude



Speed starts increasing

Aircraft starts to Descend

Raise the Lever to Increase Power and stop descent...



Once desired Airspeed is achieved...

...re-adopt Datum Attitude



...apply pedal and forward cyclic as necessary to overcome secondary



Datum Attitude

60 Kts

Straight and Level

Adopt Accelerative Attitude



Speed starts increasing

Aircraft starts to Descend

Raise the Lever to Increase Power and stop descent...



Once desired Airspeed is achieved...

...re-adopt Datum Attitude

Now take away a little bit of the Power you brought in to stop any climb



...apply pedal and forward cyclic as necessary to overcome secondary



Datum Attitude

60 Kts

Adopt Accelerative Attitude

Straight and Level



Speed starts increasing

Aircraft starts to Descend

Raise the Lever to Increase Power and stop descent...



Once desired Airspeed is achieved...

...re-adopt Datum Attitude

...apply pedal and forward cyclic as necessary to overcome secondary

Now take away a little bit of the Power you brought in to stop any climb



But not so much that you lose the Height you just managed to maintain

Increase in Speed Complete.

Increase in Speed Complete.

Now let's look at a Decrease in
Speed.
Back from 80 to 60 Kts.



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80 Kts



80 Kts

Straight and
Level



Datum Attitude

80 Kts

Straight and
Level



Datum Attitude

80 Kts

**Adopt Decelerative
Attitude**

Straight and
Level



Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing



Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing

Aircraft starts to Climb



Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing

Aircraft starts to Climb





Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing

Aircraft starts to Climb

Lower the Lever to Decrease Power and stop climb...





Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing

Aircraft starts to Climb

Lower the Lever to decrease Power and stop climb...



...apply pedal to overcome secondary effects.



Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing

Aircraft starts to Climb

Lower the Lever to decrease Power and stop climb...

Once desired Airspeed is achieved...



...apply pedal to overcome secondary effects.



Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing

Aircraft starts to Climb

Lower the Lever to decrease Power and stop climb...

Once desired Airspeed is achieved...

...re-adopt Datum Attitude

...apply pedal to overcome secondary effects.



Datum Attitude

80 Kts

Straight and Level

Adopt Decelerative Attitude



Speed starts decreasing

Aircraft starts to Climb

Lower the Lever to decrease Power and stop climb...

Once desired Airspeed is achieved...

...re-adopt Datum Attitude



...apply pedal to overcome secondary effects.



Datum Attitude

80 Kts

Adopt Decelerative Attitude

Straight and Level



Speed starts decreasing

Aircraft starts to Climb

Lower the Lever to decrease Power and stop climb...

Once desired Airspeed is achieved...

...re-adopt Datum Attitude

Now add a little bit of Power so you don't descend



...apply pedal to overcome secondary effects.





Datum Attitude

80 Kts

Straight and Level

Adopt Decelerative Attitude



Speed starts decreasing

Aircraft starts to Climb

Lower the Lever to decrease Power and stop climb...

Once desired Airspeed is achieved...

...re-adopt Datum Attitude

Now add a little bit of Power so you don't descend



...apply pedal to overcome secondary effects.

But not so much that you start to climb.

Tip:
Get your Instructor to explain the effects of 'Flap back'.