Exercise 4 All exercises start with a lookout and also follow through

EFFECTS OF CONTROLS - Part 1

The aircraft is in normal cruise 2300 RPM, airspeed 90/95 kts (as applicable). We start with a lookout.

ELEVATOR:

I'd like you to look at the position of the aircraft nose in relation to the natural horizon – it's the Datum Attitude **(datum picture etc.)** Try and remember it – follow me through on the controls. If I ease the control column back, you will notice that the nose has pitched up and the horizon has moved down the windscreen. If I put the controls in the neutral position, I can hold this new nose attitude.
Now I can ease forward on the control column – return the nose to the Datum Attitude – and check it to neutral there. If I ease the control column forward you will notice the nose has pitched down and the horizon is moving up the windscreen and if I check slightly on the control column, I can find the neutral position and maintain this new nose attitude. Now I'm going to ease back on the control column and raise the nose to the Datum Attitude and check it there.
I would now like you to practice pitching the nose up then back to the Datum Attitude and then down and back to the Datum Attitude, any questions - you have control…..

AILERONS:

Now let's have a look at the effect of the ailerons – the aircraft is in the Datum Attitude. Lookout Follow me through – if I move the control column to the left, you will see that the aircraft rolls to the left and the left wing has gone down, the right wing has come up – if you look at the horizon you will see it's no longer straight across the windscreen. If I put the controls to neutral, the rolling movement stops and the aircraft is now banked to the left.
To roll the wings level – move the control column to the right. When the wings are level with the horizon, put the controls to neutral and the roll stops.

Repeat to the right.

I now want you to practice rolling the aircraft to the left and then back to the Datum Attitude, using about the same AOB as me - and then to the right any questions? You have control ….

RUDDER:

I have control. Let's have a look how the rudder affects the aircraft. Follow me through on the rudder pedals. Lookout- Pick a feature straight ahead – if I press the left pedal you will notice the nose moving round the horizon – this is yawing. Also notice how you feel as if you are being thrown to the right and note the ball is out to the right. So to stop the yaw, put the rudder pedals to neutral. Repeat to the right.

So yawing is not a comfortable mode of flight, and normally the rudders are used to control and prevent yaw.
I would like you to practice first yawing the aircraft to the left then to the right any questions? - I just want you to take control of the rudder pedals

FURTHER EFFECTS:

ELEVATORS-Now let's have a look at the further effect of controls. Let's look at the Elevators. If I move the controls back the nose pitches up but also the airspeed reduces and the rpm reduces and the aircraft climbs. If I move the controls forward the nose pitches down and the airspeed increases the rpm increases and the aircraft descends.

AILERONS-Now let's look at the further effect of the aileron. Take your feet off the rudder pedals. Now if I roll left, also notice the yaw - we are entering a spiral descent and I am not going to let that happen and recovering now. Repeat in other direction.
The primary effect of ailerons is roll. The further effect is yaw, resulting in a spiral descent.

RUDDER- Now let's look at the further effect of rudder. Holding the control column in neutral, I push the left rudder pedal, and the aircraft yaws left, almost immediately followed by a roll left. Now we are entering a spiral descent. Repeat in other direction. That is a demonstration only you do not have to practice.

Effectiveness of the controls

I have slowed the aircraft down to 60 knots I want you to take control and use a small amount of elevator, aileron, and rudder, and you can feel that the controls are less effective at low speed. You have control.

If I now increase speed to 100 knots you will notice the controls are more effective at the higher speed. I would like you to use the elevator; aileron and rudder. You have control.

I am now going to show you the effect of the slipstream on the rudder and elevator only. I have a high power setting, take control and feel how responsive the rudder and elevator are, now we have a low slipstream; feel how the rudder and elevator are less effective.

EFFECTS OF CONTROLS PART 2

POWER (The Effect of Power)

Now let us have a look at the effect of power. To make this a more obvious demonstration I am going to reduce the power to 2000 rpm. **(Make sure the aircraft is in trim)** Look out and no need to follow through. If I apply full power, notice what has happened – the nose has pitched up and there is a slight yaw to the left as the slipstream hits the tail, this yaw will create a roll, and a spiral descent. So now if I roll the wings level with aileron and reduce the power, the nose pitches down and there is a slight yaw right.

Now I would like you to practice but as you increase the power I would like you to use the elevators to maintain the Datum Attitude and the rudder to stop the yaw. Any questions? You have control.

TRIMMER (Effect of Trimmer)

The aircraft is in normal cruise. The trimmer is to remove control loading – I want you to maintain the Datum Attitude, or this attitude, whilst I disturb the trim. You will find you have to apply forward or back pressure to the control column to hold the nose position. Can you feel the loading on the controls? OK, I am sure you would agree that it would be tiring to fly with that pressure for any length of time. (**Don't give the student the aircraft out of trim**)Now you wind the trimmer until you have relieved the control loads. If you are applying forward pressure then wind the trim wheel forward and if you applying back pressure on the control column, wind back. When you have no control loads you are trimmed out. To check, just let go of the controls and see if the nose stays in that attitude. If not reselect the attitude and now re trim Remember from the briefing the work cycle Select, Hold and Trim.

FLAP

Let's have a look at lowering and raising the Flap. Remember that flap gives extra lift and extra drag for a given airspeed. The white arc on the airspeed indicator indicates the flap range so as you can see I am flying too fast. I am going to trim the aircraft within the speed range and then lower 10 degrees of flap. Notice the nose pitches up and the airspeed reduces. **(If left for too long the nose will pitch down as lift is lost through reducing airspeed this is quite complicated for an early student so tend to be ignored**)I can now use the elevator to lower the nose to the Datum Attitude and re trim look at the speed its decrease is due to the extra drag.

Now lowering 20 degrees of flap this is the most marked pitch change in the Cessna 152 and the nose has significantly pitched up and there is a bigger speed reduction. I can use the elevator to lower the nose to the Datum Attitude and re trim. Now lowering the last stage of flap and again the nose pitches up and the speed reduces. Again using elevator to lower the nose to the Datum Attitude and trim.

Now if I raise the flap in stages you can see that the airspeed increases and the nose to the aircraft pitches down as I retract each stage. I would now like you to practice lowering and raising the flaps in stages but as you lower each stage I would like you to use the elevators to maintain the Datum Attitude and then the trim to remove any control force. Do you understand? Any questions? You have control.

If I lower the flaps all in one movement, notice the very rapid pitch up which is difficult to control, and if I raise the flaps all at once, the nose pitches down rapidly and there is a very marked pitch change, which again is difficult to control. The sink and the trim change are the reason why we lower and raise flaps in stages.

Introduce carb heat control mixture and cabin heat controls, and any other controls according to the A/C.

Exercise 5 TAXYING

When taxying, keep your feet on the rudder pedals and keep your right hand on the throttle, to begin I would like you to follow me through on the rudder pedals. To start off, lookout, reduce power to idle, release the brakes, and slowly open the throttle until the aircraft starts to move. Then test your brakes by reducing to idle power and apply the brakes. They are working obviously, so release them and open the throttle slowly again. To move forward, adjust the power for the speed you want to go – walking pace is a good speed to taxy at.

If we want to turn the aircraft right, press the right rudder pedal. And to turn left, press the left rudder pedal. If you want to stop the aircraft, reduce the power to idle smoothly and evenly apply the brakes to stop the aircraft in a straight line. Once stopped, apply the parking brake and re-set 1200 RPM to stop the plugs fouling up.

First of all give the student control of the rudder pedals only and you keep the throttle, then change around.
When the student is competent at using throttle and rudders, introduce keeping the controls back to protect the nose wheel and using differential braking to turn in a smaller turning circle and the taxy turns to check the instruments. Then holding the controls in the correct positon depending on the wind, and possible emergencies eg Brake Failure. Crossing surfaces at 45 degrees..

Exercise 6 Straight and Level

We're going to have a look at flying the aircraft straight and level. The aircraft is in normal cruise 2300 rpm and 90 knots.

Straight – flight on a constant heading.
Level the wings using ailerons and check the horizon is straight across the screen. You can also check by looking to see the wing tips are equidistant above the horizon. Pick a point straight ahead to use as a reference and check the DI. If wind disturbs the aircraft you can see that the wings are no longer level, and we are not flying straight, so use the ailerons to level the wings. Also to fly straight you must have the aircraft in balance even though the wings are level, look what happens if the ball is not in the middle, the aircraft is not flying straight – remember "tread on the ball". To fly straight I must have the wings level and the ball in the middle I would now like you to practice flying straight. I may simulate some turbulence - any questions? You have control-
I am now going to demonstrate cross controls although the aircraft is flying straight the ball is not in the middle and the wings are not level. This is a demo of what not to do.

Level – flight at a constant height.
To fly the aircraft level, first select this Datum Attitude with the horizon about 4 inches up the windscreen. – it's important – it's the level attitude. So select this attitude using elevators and cross-check using the VSI and altimeter – There is no point in trying to judge height by looking at the ground – we use the instruments to confirm. When we are level, trim.

If a gust of wind disturbs the aeroplane and pitches the nose up, the first thing you will notice is the horizon has moved down the screen and the VSI and altimeter show us we are climbing. So, using elevators re-select the level attitude and re-trim if necessary.

If a gust of wind disturbs the aeroplane and the nose pitches down, you will notice the horizon moving up the screen and the altimeter and VSI

show we are descending. So re-select level attitude using elevators – check and re-trim if necessary. We also need to check we have the correct power setting and the aircraft is in trim.

When I give you control I would like you to practice flying level. I shall disturb the aircraft, maybe put it out of trim and or alter the power setting, and I'd like you to return it to level flight. Any questions? You have control

I am going to show you how to correct small errors in altitude and heading. If you have got distracted and the aircraft has climbed, intentionally select a lower nose attitude until the required altitude is regained, and vice versa. If you have wandered from your heading use the ailerons to roll back to heading **(if big errors have occurred, you must take control and regain the correct altitude/heading and then hand the student control)**

I now want you to practice putting the two together and flying straight and level. Remember the work cycle we talked about in the briefing LAI. Spend about 80% time looking out, then check the attitude and then come in to check one instrument at a time.

Straight and Level Part 2

Flying straight and Level at different speeds

We are going to have a look at flying the aircraft straight and level flight at different speeds.
Now let's fly straight and level at a lower airspeed. We will use LAI. Lookout and follow through. I am going to reduce power to 2000 rpm and applying left rudder to keep the ball in the middle, as the airspeed starts to reduce progressively select a higher nose attitude to prevent the aircraft descending. Use a reference point to keep straight, Check the VSI and altimeter to see we're not descending. Now the aircraft has settled in straight and level, but with a higher nose attitude. Trim. Note the drop in rpm it's about 1900 rpm and the speed has settled at 70 knots. LAI to maintain.

Let's return to normal cruise, Power Attitude Trim – Power to 2300 rpm, right rudder to balance, progressively lower the nose attitude as the speed increases. Trim. Re visit the throttle to reduce 2300 rpm. Settle and adjust. Student Practice…

We are now in normal cruise – have a look at the nose position. Pick a reference point - Follow me through on the controls. I'm going to smoothly apply full power **(red line)** and as the speed increases select a lower nose attitude preventing any yaw with rudder and trim. Check for any increase in height on the VSI and altimeter. This is the maximum speed for level flight in this aircraft. If you look carefully, you will see the nose attitude is slightly lower than for normal cruise. Check inside that the DI and altimeter and ball confirm we are straight and level.

Returning to normal cruise by reducing the power to 2300 rpm and applying left rudder to keep in balance, and as the airspeed reduces selecting a higher nose attitude to return to the normal attitude and now readjusting the power to 2300 if necessary. Trim. Remember you may have to revisit the throttle setting after speed changes.

Student Practice.

I would now like you to practice flying at different speeds and finding the power setting to maintain them. Let's try 80 knots **(try some different speeds)**

(If we want to make larger increases in speed, we can apply full power, maintaining forward pressure and keeping the ball in the middle. When approaching the required speed, reduce the power to the approximate setting and settle and adjust. If we wish to reduce speed by a substantial amount, I can close the throttle, maintaining back pressure and the ball in the middle. When the required speed approaches, apply the approximate power, settle and adjust, and confirm on the instruments.) – (Cover with a capable student)

SLOW SAFE CRUISE

I am now going to show you slow safe cruise, 2000 rpm and 20 degrees of flap. I must make sure I am in the flap limiting range before lowering flaps. We are flying at about 70 knots but note the improved forward view making it a safer way of flying slowly.
I would now like you to practice.

Exercise 7 Climbing

Let's have a look at climbing the aircraft. Firstly it's very important to have a look out – all round the nose starting on the right, moving round to the left, and then especially above – as that's where we are going. To enter the climb, smoothly apply full power, checking the yaw with right rudder, and raise the nose to this attitude. I want to climb at 65 kts, so hold this attitude until the speed settles. It settled at 75 kts, so I must re-select a higher nose attitude and check the speed. It's now 65, so trim the aircraft. I want you to pay particular attention to where the nose is in relation to the horizon it's about half way down the side window, try and remember it.
I am now going to return the aircraft to cruise so you can practice entering a climb.
Student Practice…

To maintain the climb, remember the LAI checks, Lookout every 500' lower /weave the nose to clear the blind spot. Attitude maintain, and check the ASI. Check the DI, and keep the ball in the middle to keep the aircraft in balance in the climb. Also regularly monitor temperature and pressure gauges, as the engine is working hard. They are OK – they are in the green.
Student Practice…

I will now show you how to level off. It's the odd one out – it's A-P-T. First select level attitude, and wait for our speed to increase. Reduce power to 2300, and use left rudder to balance. Trim, settle and adjust, and confirm on the instruments.
Student Practice.

Now let's look at levelling off at a certain height. As this is a low powered aircraft, it is not necessary to anticipate our height – I'm going to level off at 3000′. So, there's 3000′ attitude power trim - lowering the nose to the level flight attitude and wait for the speed to increase and then reduce the power remembering to keep in balance and then trim…..settle and adjust.
(Usual teach is anticipate by 10% of rate of climb)

Now I am going to show you a cruise climb at 80knots. Note the lower nose attitude. The technique is the same. Now I am going to show you a climb at best angle of climb or VX, once again the technique is the same it is a different nose attitude.

Exercise 8 Descending Part 1

The Glide Descent

Before we descend, lookout below, apply carb heat to hot because we are bringing the power out of the green arc – we are going to glide at 65 kts, so close the throttle – P-A-T. A little left rudder for balance, and maintain the attitude using elevators until the speed has reduced to 65 – then select a lower attitude to maintain it. Settle the speed at 65 and trim.
Student Practice…
During the descent, the LAI cxs, lookout and clear the blind spot by weaving the nose every 500′. Attitude – maintain, Instruments check ASI, Check the ball is in the middle. We must also warm the engine by increasing the power to 2000 rpm for about 3 – 5 seconds.
Student Practice…

When we want to level out, it is P-A-T, so select cruise power 2300, and at the same time select carb heat cold. Watch for the trim change as you apply power and also use right rudder to remove the yaw. Select the nose to the level attitude – trim, then settle and adjust.
I'd like you to practice entering, maintaining and recovering from a glide descent, and then I will give you a height at which to level out. As briefed anticipate the height you want by 10% of your rate of descent. Any questions you have control

The Cruise Descent

To enter the cruise descent, as usual, we start with a lookout and apply carb heat to hot as we are bringing the power out of the green arc and then reduce the power to 1700 rpm, rudder for balance, select an attitude just below level flight and the speed will settle at 80 knots then trim.

Student Practice..
In the descent the LAI checks as usual.
Student Practice…
Power Attitude Trim to level out.
Student Practice

Descending Part 2

I would like you to set the aircraft up in a cruise descent.
In this descent note the rate of descent (500 fpm approx.) If I decrease power to 1500 RPM, keep in balance, and maintain 80 knots, you will notice the rate of descent is now 700 FPM. So increasing power to 1700 rpm again, maintaining balance and 80 knots – trim. Rate of decent is now back to 500 feet per minute (approx.) If I increase power to 1900 rpm, raise the nose to maintain 80 knots – look at the rate of descent – it has decreased. (200 -300 feet per minute approx.) Trim for 80 knots. If I keep increasing power, we would end up climbing. So if I increase power it will reduce the rate of decent for a given airspeed, and if I decrease power, it will increase the rate of decent for a given airspeed. We control rate of descent using power, and airspeed using elevators. Try and remember that it is very important.
I'd like you to practice descending at a constant airspeed with varying rate of descent – you have control.

Now let's have a look at the effect of flap on the descent. Put the aircraft into a glide descent. Note the rate of descent (500 fpm approx.) – the speed is in the white arc. I am going to lower 10 degrees of flap and maintain 65 knots – I need to select a lower nose attitude, note the rate of descent has increased a little.
Let's now lower another stage of flap; to maintain airspeed you will see I have selected a lower nose attitude which has resulted in a higher rate of descent. Look at the lower nose attitude and the increased rate of descent.
Lowering full flap and maintaining 65 knots and again the rate of decent

has increased. So for each stage of flap lowered, the rate of descent increases for a constant airspeed.

Let's now practice descending with 20° flap at 65 knots, it is important for future exercises, in the circuit, - note the rate of descent. Now let's maintain 65 knots and lower full flap – note the nose attitude and rate of descent.

I am going to demonstrate side slipping so I would like you to put the A/C into a glide descent.

Now I have control I am going to use left aileron and right rudder, also I am selecting a lower nose attitude. Note the increase rate of descent. We are in a side slip. I would like you to practice….

I am now going to demonstrate an emergency descent at 85 knots with full flap. This descent would be used if the aircraft had an engine fire in flight for example.

Exercise 9 Turning

Today we are going to have a look at how to turn the aircraft. We are in normal cruise. Before we enter a turn we must look out. I am going to demonstrate a turn and I want you to watch the nose attitude and try and remember it. I am now going to teach you how to enter the turn, Our first turn will be to the left – so our look out starts on the right, moves round the nose and to the left, and we must just raise the left wing to look before we turn – it's all clear. I'm going to roll into a turn – remember Bank, Balance and Back pressure, again watch the attitude and note where the horizon cuts across the dash We do not trim in a turn, but to maintain height you need a small amount of back pressure. This is a medium turn - 30° angle of bank. If you look at the ASI you will notice the speed has decreased by 5 knots – as it is so small, don't worry about it.
Student Practice…
In the turn, remember: LAI, Lookout, and you may need to move your head to see around blind spots, then check your attitude against the horizon, and then glance in at one instrument the AI, to check angle of bank. If you have too much, roll a little bank off. If you have not got enough, roll on more and check to stop the roll. Lookout, attitude, then check altimeter, and hold enough back pressure to keep the horizon in that position. If I put on too much back pressure, notice the nose is above the horizon and the aircraft is showing a positive rate of climb. If I don't hold enough back pressure, the opposite is happening and the nose is below the horizon. Back outside to keep the lookout going, and check attitude. Also in the turn, check the ball is in the middle, I'm going to roll level now, and then I would like you to practice entering and maintaining a medium turn. You have control…..

Now let's look at rolling out of a turn. To recover – roll the wings level using ailerons – a touch of right rudder to keep in balance and relax the

back pressure to keep the nose attitude, and settle and adjust – back to straight and level.

I'm now going to show you why we need rudder entering a turn. I'm going to bank the aircraft quite steeply – but there is nothing to worry about. I want you to watch the nose closely and tell me which way it moves. There – did you see it moved slightly to the right first – that's called adverse aileron yaw. You may remember I mentioned it in the briefing.

I am now going to do a medium turn to the right to show you the different nose position in relation to the horizon. This is because of the side by side seating. Can you see the difference – good.

I'd like you to practice entering and maintaining and rolling out from turn to the right. The technique is just the same. You have control…..

Now look at rolling out onto a required heading. So we use the DI. I need to bring the DI into my scan. I will start the roll out 15 degrees before the required heading. I hope you remember the briefing anticipating by half the angle on bank being used in the turn. I'm going to give you headings to roll out on – you must anticipate your heading by 15°. Try glancing at the DI and remember to look out.

Student Practice…

Rate One Turns…

Climbing and Descending Turns

Today we're going to have a look at climbing turns. First of all, let's have a good look out – all around the nose of the aircraft and also above.
I would like you to establish the aircraft in a climb at 65 knots. I have control.. If you remember the briefing – I said the turn must be kept at 15 degrees of bank in the climb, and we maintain 65 knots. So I'm going to bank the aircraft using ailerons to 15°, check the bank on the attitude indicator, using a little rudder to balance. You'll find in the climbing turn the bank trying to increase, so as you see I'm "holding off bank" – I mentioned it in the briefing.
In a climbing turn, we keep the speed constant – so I must lower the nose a fraction to maintain 65, keeping up a good look out. Look at the attitude and try and remember it Check the ball is in the middle, check 15° bank on the attitude indicator, and check your speed is 65 knots with glances to the T + P gauges as the engine is working hard.

To roll level – level the wings add a touch of rudder and raise the nose a fraction to maintain airspeed. I'd like you to practice entering and recovering from climbing turns left and right. You have control.

Let's have a look at descending turns. I would like you to enter a glide descent, have a look out, especially below. To enter a left turn – left aileron and a touch of left rudder. Lower the nose a fraction to maintain 65– we use 20° of bank in a descending turn. So we can check the attitude indicator to confirm 20° bank. The speed is 65 and the ball is in the middle. Remember to use elevators to correct your speed. Rolling level again using aileron and a touch of rudder, raise the nose slightly to maintain 65 knots. Trim if necessary. Just warming the engine.
I'd like you to practice descending turns left and right. Then we'll try some with power and flap. Student Practice..

Exercise 10a Slow Flight

Today we're going to look at slow flight. Do you remember the briefing? – we are going to fly the aircraft straight and level at 55 knots, flaps up. To do this from normal cruise, firstly a good look out. It's all clear, so carb heat reduce power to 1500 RPM, a little left rudder, and pitch the nose up to maintain height. Watch your ASI – your speed is decreasing. When we've reached 55increase power to maintain 55 knots – it's about 1800 RPM. Settle the speed and trim. Check the ball is in the middle. We are now flying level at 55 kts. If we start losing height you must recover using elevators and power and not just elevator. I want you to note the very high nose attitude – if you move the controls; you feel they are less effective. Also notice the poor forward vision. Remember the low airspeed and there is a possibility the stall warner may sound. Also I want you to appreciate how much rudder you need to keep in balance. You have probably realised those are all symptoms of the approaching stall. I want you to practice so you become familiar with the handling characteristics as the aircraft approaches the stall.
If I want to return to normal cruise, apply 2300 RPM, a little right rudder, and as speed builds, progressively lower the nose to cruise attitude – then trim and settle and adjust.
I'd like you to fly the aircraft straight and level at 55 knots. You have control…

I have control. Have another lookout. Now let's look at turning. I'm going to limit the turn to 15 degrees of bank. So, rolling on the bank, notice the amount of rudder to keep the aircraft in balance – be prepared for the stall warner because of the higher stall speed in a turn. Also notice we are describing a smaller circle – pay particular attention to the attitude because if you ever inadvertently get into this attitude and speed, you must recognise it and increase your speed. I am now going to show you a 30 degree bank turn. If we want to do 30 degree bank turns at this speed, we must apply power to maintain airspeed.

I'd like you to practice 15 degree bank turns at 55 knots. You have control…..

Let's have a look at climbing and descending. To climb – a good look out first of all, then full power and more right rudder to keep the ball in the middle – attitude – pitch up to maintain speed (note it's a very small pitch change), and trim (possibility of running out of trim). Note the lower rate of climb. Also feel the controls – the rudder and elevators are firm due to slipstream, but the ailerons are less effective. To level out, a small pitch down and reduce power to 1800rpm, keeping the aircraft in balance, and re-trim.

If I want to descend, Lookout reduce power to 1300rpm, check the balance ball – a very small pitch down to maintain 55 knots, and adjust power for the required rate of descent, and trim. Note that although the nose is above the horizon the aircraft is descending, but we are equally as close to the stall. To recover to level flight, apply power to 1800rpm, small pitch up; settle speed at 55 knots, ball in the middle, trim.
I'd like you to practice climbing and descending at 55. You have control. .

Repeat the whole exercise with 20 degrees flap at 50 knots

Exercise 10b Stalling

Today we're going to do some stalling. Before we do this exercise, do you remember the HASELL checks from the briefing? I'll go through them again ….. Okay, now I'm just going to revise the symptoms of the approaching stall. So reducing power 200 RPM at a time and maintaining height, I'd like you to watch the nose attitude and the decreasing airspeed. Feel how ineffective the controls are. Look at the high nose attitude. There's the stall warner –

Did you recognise all the symptoms of the approaching stall? Good you heard the stall warner which sounds about 5 to 15 kts above the stall. Now I'm going to carry out a hell check. Follow me through this time. I'm going to stall the aircraft and show you the stall. So closing the throttle and pitching up to maintain height there is the heavy buffet and the nose drop also you can see we have a low airspeed and a high rate of descent. The stall warner is sounding. Recovering now.
I am now going to show you that stall again and recover without using power, and this is the first recovery you are going to practice. So close the throttle, left rudder to keep the ball in the middle, pitch the nose up to maintain height. Look how rapidly the airspeed reduces. The controls are all less effective and the nose attitude very high. There's the stall warner – I'm ignoring it. Feel the buffet. The control column is fully back. There's the stall. Recovering move the controls centrally forward, until the buffet and the stall warner have stopped, the airspeed is increasing. Note the height loss about 300 feet and now apply full power and pitch the nose up and recover to a climb.

I'll go through that once more to make sure you have understood. I'll use the recovery without power.
When I give you control I would like you to carry out a HELL check – Height, Engine, Location and Lookout, and then stall the aircraft and recover without power, any questions? You have control….. Now I am going to stall the aircraft and recover to a glide. You would have to use this recovery if you were in a stall with an engine failure.

I'm going to do the same stall and recover using power or SSR. Another HELL check. There's the stall. Move the controls centrally forward, full power, carb heat cold, and rudder to prevent any further yaw. Stall warner and buffet has stopped so ease into a climb. Note the height loss – just over 100′- that's under half the height loss, so a better recovery. Remember SSR, the power results in the reduced height loss. I'll demonstrate SSR once more, then I'd like you to practice some stalls using SSR – don't forget the HELL check.

I am now going to show you how to use SSR to recover at the incipient stage….

Stalling Part 2

I am now going to show you stalls using flap and or power. Lets simulate a scenario that we are on base leg. Do you remember in the briefing– lets do a hell check and set the aircraft for base leg - 1700 rpm and 20 degrees of flap, Now select a higher nose attitude as if you have been distracted, there is the stall warner so recovering now, controls centrally forward and apply full power, prevent further yaw with rudder and when the stall warner and buffet have stopped recover to a climb, and when you have a positive rate of climb on the altimeter, retract the flaps in stages. Finishing in a Vy climb.

I'd like you to set the aircraft up and practice a stall in base leg configuration.
You have control.
Let's now simulate base turn to final. 20 degrees of flap, 1700 rpm and 20 degree angle of bank turn, so follow me through. Do another HELL check, select 1700 rpm and checking we are in the white arc, lower 20° flap – and now turn using 20 angle of bank and imagine you get distracted and let the airspeed decrease. There's the stall warner. Recovery – controls centrally forward, full power, prevent further yaw with rudder. Stall warner/buffet has stopped. Roll wings level. Ease into a climb, and

retract the flaps in stages when you have a positive rate. Climb at Vy. In a real situation you would go to the dead side and re enter the circuit.

Let's now try a stall with full flap simulating we are on final. So update the HELL check, and check the speed is within limits. 1700 rpm, Lower full flap, trim for 65 knots, imagine you get distracted and let the airspeed reduce. There's the stall warner. Recover – controls centrally forward, full power, rudder to prevent further yaw. Retract the drag flap, when the stall warner/buffet has stopped, pitch for a climb attitude, positive rate of climb retract the flaps in stages. Climb at Vy

I would like you to stall the aircraft with full flap.

You have control….

(Other stall configurations can be practised for example no power to simulate a glide approach, or a mishandled go around)

Exercise 11a Advanced Stalling/Incipient Spins

The next stall we're going to look at is the aircraft in the stalled condition with power. Do you remember in the briefing I told you that with a lot of power on there could well be a wing drop at the stall. If we get a wing drop, I will prevent further yaw with rudder – that's very important. So, let's do a HELL check and simulate base leg configuration but recover at the stalled condition, Set the power at 1700 RPM, and lower 20 degrees of flap. Note the speed rapidly decreasing. Look at the high nose attitude. Keeping the control column coming back. There's the stall and the wing drop. So, recovering now – controls centrally forward, full power, rudder to prevent further yaw, stall warner/buffet has stopped so roll wings level and then pitch for a climb attitude, positive rate of climb, retract the flaps in stages climb away at Vy.
(if wing drops more than 45 degrees close throttle as this is an incipient spin. This will result in less height loss)

It's important not to be too harsh on the controls when you recover to the climb or you could get a secondary stall. If as you climb out you hear the stall warner, just relax the back pressure, and then continue a normal recovery.

I'd like you to show you a stall in the climb. This can be known as a departure stall, because it could occur when you are climbing out after take-off and you get distracted and don't pay attention to your airspeed. So it's important that you recognise it. The recovery is just the same controls centrally forward……

Let's now try a stall with full flap and 1500 rpm. So update the HELL check and check the speed is within limits. Lower full flap. Now, throttle to 1500rpm, check the yaw and maintain height. The speed is decreasing. There's the stall warner. There's the stalled condition. Recover – controls forward, full power, prevent further yaw with rudder, retract the drag flap. Stall warner/buffet has stopped, so recover into a climb, retracting flap in stages when you have a positive rate of climb

I would like you to stall the aircraft with full flap. You have control…..

Finally, let's have a look at a stall in a climbing turn. **(the departure stall**) Follow me through. Set the power at 2000 RPM and pitch up into a climb, lower 10 degrees flap, and enter 15 degree bank turn to the left. This requires me to hold off bank, otherwise bank tends to increase. The speed is reducing. There's the stall warner. There's the stall and a wing drop. Move controls forward, full power, using rudder prevent further yaw. Stall warner has stopped so I can level the wings and recover to a climb, and raise the flap. Did you see how the outside wing dropped – that often occurs in a stall in a climbing turn.

I'd like you to do a HELL check and stall the aircraft in a climbing turn. You have control.
Good. That's the end of the stalling exercise – it's a very important one. Have you any questions?

Exercise 11 Spinning

I am now going to show you a spin so first of all HASELL checks (minimum 4000 feet) and now I am going to reduce the power to 1500 rpm and pitch the nose up until the airspeed is 55 knots, now leading with the rudder, I am applying full left rudder and moving the controls briskly aft, And holding those inputs in the aircraft is now spinning to the left, so I am recovering now, firstly close the throttle, ailerons neutral, and apply full opposite rudder, pause and then move the controls centrally forward until the spin stops, centralise the rudder and now ease gently out of the dive trying to avoid pulling to much g as you come out . As the speed reduces to less than cruise apply full power and recover to a climb. We have lost ……feet….

Exercise 12

Take Off and Climb to Downwind

After the pre-take off checks have been satisfactorily completed, and the Take off brief – radio call. As you taxi out on the runway, always check the approach for aircraft on base Leg/Final. Line the aircraft up looking straight down the runway with the nose wheel straight. Now check the runway heading with the DI and the DI with the compass. OK. Before commencing the take off always check the windsock. Today we have no wind, so pick a reference point, apply 2000rpm, check the temperature and pressure are in the green. release the brakes. heels on the floor and smoothly apply full power**.** Anticipate yaw to the left with a little right rudder. As the aircraft moves forward, check the engine develops full power and the airspeed is reading. As the speed increases, just apply enough back pressure on the control column to take the weight off the nosewheel. Keep straight using rudders. When the speed has increased to 55, ease the control column back to this position and fly the aircraft off the ground. Relax the back pressure slightly until the speed has increased to 65, then adopt normal climbing attitude. In the climb-out, keep your hand on the throttle until at least 300'. Level wings using ailerons. Check the aircraft in balance and check we are tracking down the extended centre line by glancing down the side. Remember keep the lookout going. I will now carry out the after take off checks. The FELT checks, Flaps up, engine Ts & Ps, landing light off, and trim. We are going to climb straight ahead to 500', then do a climbing turn to the left, turning through about 70°. So, approaching 500', look out. Roll into a 15 degree bank turn maintaining 65 knots and continue to climb to circuit height, checking that we are now tracking at 90 degrees to the runway. Keep up the lookout, as this is a low powered aircraft. Don't anticipate your height. Remember it is Attitude – Power – Trim. So, there's our height – lower the nose to level attitude. Wait for our speed to build up and reduce power to 2300rpm – balance, trim, settle and adjust. Now we commence a turn downwind. Do you see that pond – it's a good reference point to turn around. Also check the airfield is approx. 45 degrees behind,

Always before a turn a lookout is essential especially for aircraft joining downwind. It seems all clear, so roll into a level 30° bank turn. As the wind was straight down the runway we can turn onto the reciprocal of the runway, as we won't suffer from drift. There's our heading, so roll the wings level. Check the altimeter to see we haven't gained or lost any height, and check we are tracking parallel to the runway.

Exercise 13 from the downwind position to the landing

Abeam the upwind end of the runway, call on the radio G-XXXX downwind. Now the pre landing checks:

Brakes off check pressure
U/C down
Mixture rich
Fuel – on and sufficient for a go around and Diversion
Instruments
T + P green
DI/Compass
Altimeter QFE/QNH
Carb Heat check for carb Icing
Hatches and Harnesses

Now, keep up the lookout and note when the runway is behind the wing tip and at about 45 degrees. Turn onto base – so, lookout, and then a medium turn to track at 90° to the runway. Now we are on base leg. Set the aircraft up for the approach. Reduce power to 1700 (carb heat, balance). Maintain attitude – check your speed is in the white arc and lower 20° flap, one stage at a time, trim for 70 knots. Now the speed must remain at 70, so constantly monitor the ASI and remember – if the speed gets too low, select a lower nose attitude, and vice versa. It's very important to remember we adjust airspeed using elevators – we want to turn Final between 500 and 700'. Judge your turn by imagining an extended centre line. Before the turn, look for anyone on long Final and check the opposing base - commence your turn. Adjust your rate of turn by the centre line, but not more than 20° of bank. Radio call "G-XXXX Final". Check your airspeed and lower 30° flap. Retrim for 65 knots. From now on in monitor your airspeed and your runway – look at the runway in relation to the nose – that's the correct glidepath. We maintain that runway aspect by adjusting the rate of descent with power, so if we get low, apply some power. If we are too high, reduce power. Check your airspeed – it's a little high, so select a higher nose attitude –

there's 65knots. We're a bit high now, so reduce power. Now the airspeed is good – runway good – as we come over the threshold, and the grass has texture, trickle off the power and start to bring the aircraft into the level flight attitude. Look well ahead, fly just above the ground. Wait to feel the sink – now pitch the nose up to the horizon and keep the aircraft flying as long as possible. There's the touch-down, so keep the stick back and keep the aircraft straight using rudder. Smoothly apply brakes. At taxy speed, vacate the runway – and carry out your after landing checks from the checklist..

Next time on final approach I'm deliberately going to get too high and too low so you can see the runway aspect, and how to correct.

When teaching other approaches such as Glide and Flapless emphasis is on the differences between that approach and the normal powered approach

Exercise 14 First Solo

Make sure any pre solo exams etc have been completed, and the appropriate progress tests have been satisfactorily completed.

Exercise 15 Steep (Advanced) Turns

Today we're going to do some steep turns using 45° of bank. So before we enter the turn, have a good lookout back window to back window. I am going to demonstrate a turn and all I want you to do is look at the attitude and try and remember it. We'll start with one to the left – so check back window to back window and under the left wing.
Now I am going to teach you how to enter a steep turn. To start off I'm going to do a medium turn, so remember the three Bs – bank 30°, balance, ball in the middle, and enough back pressure to maintain height. So, settling the aircraft in a medium turn, I can now apply approx 100/200 RPM on sound and feel, and roll the aircraft until I've got 45°. Apply rudder in the direction of the turn and enough back pressure to maintain height. I am now going to roll out and let you practice entering the turn.
In the turn lookout, attitude and instruments. Move your head to clear the blind spots. check your attitude against the horizon, and afford yourself a glance at one of the instruments, then back outside lookout attitude and look in at another instrument….I now want you to practice entering and maintaining a steep turn.
Now, to recover to straight and level, roll the wings level, keep in balance and relax back pressure. As the bank passes 30 degrees reduce power to 2300rpm, settle and adjust. Lookout! I would now like you to practice a steep turn

Let's have a look at one to the right. Again, lookout, lifting the right wing. It's all clear, so entering a medium turn to the right bank 30°. A little right rudder to balance, and maintaining attitude with a little back pressure. So, settled in the medium turn, apply 100/200 RPM and increase the angle of bank to 45°. Use right rudder to balance and increase the back pressure. Now look at the nose attitude. Do you see how I have let the nose drop below the horizon. And look at the VSI – it shows a high descent rate. So reduce the bank to 30°, pitch the nose up and regain the correct attitude. Once again settled in the medium turn, re-apply the bank to 45°.

(if the rate of descent is more than 500 fpm we are entering a spiral descent, to recover it is power, Roll, Pitch…... If the nose is very high and the stall warner sounds recover using SSR)
Would you like to try 60 degrees angle of bank

Exercise 16 Forced Landings Without Power

OK. We're going to have a look at practise forced landing. So, before the exercise, just check for carb icing. Now a lookout – it's all clear. So, If the engine failed now that is the field I would land in the big green one ….. My low key/1000ft area is that pond, can you see them. Now positioning the aircraft at High Key, and simulating an engine failure The first thing to do is establish a glide. So, pitch the nose up convert any speed to height, establish 65knots, maintain it and trim – 6 back trims is a good guide. Now start a turn crosswind. Keeping the field in sight at all times. So now looking at our height, and airspeed. Now do the "cause of failure checks" – primer locked, mags on, carb heat on, cycle the throttle, mixture rich, fuel on, Ts and Ps, for training I must also warm the engine.(**on the first demo don't do checks, emphasise flying the aircraft and the key points)**

Back to your field, height and airspeed. I am turning downwind at 1800-1500 feet approx It's all looking good for our low key/1000' point, so now if time do a mayday call. TX 7700, Reassure your passengers, tighten seat belts and unlatch the door brace position etc. There's our 1000' point, so now turn onto a base leg for your field. Do your security checks – mixture fully lean, throttle closed, fuel off, mags off, master stays on for flaps. Turning Final now. My aiming point is now half way into the field, so lower first stage of flap to bring your aiming point nearer. I think you can see we would safely land in that field, bearing in mind the low flying rule, going around now. Full power etc Climb straight ahead…

Exercise 17 Precautionary landings

I want you to imagine deteriorating wx and that we are at 500 feet approx agl and I decide to find a field suitable to make an unscheduled landing in. That one looks good. I am going to set up slow safe cruise 2000 rpm and 20 degrees of flap and trim for about 70 knots. I am now going to do a low pass at about 300 feet with my chosen field just to the left of me and look for the first 3 of the 5 "**S**"s size, shape and surroundings. Also note some landmarks to help to locate the field. I still like the field so I am going to fly a close cct and do another low pass at approx 50 feet and look for the other 2 "**S**"s slope and surface if I still like my chosen field I would carry out a further cct and do a short field landing into the field. If I do not like my field I would, look for another location.

Exercise 18a Navigation

I am going to show you how to fly a navigation leg. I have set course overhead …… and carrying out a HAAT check …noted my time, and turned the aircraft on to the first heading. I now need a gross error check to make sure I haven't made a stupid mistake such as miss setting the DI/Compass or incorrectly read my plog. That small town should be on my right and it is so I am happy I have completed a gross error check. Put the chart down, I steer my heading and I have a fix half way along track. I will identify it by three things to be sure such as a railway or river or road, my time check is correct so no need to update my eta for my destination….. Freda checks……..

Ex 18B low level Nav

I am going to show you a low level navigation exercise as we return to the airfield. I am at one thousand feet on the QNH, that means approx. 700-800 feet above the ground.
First of all, I would like you to notice that local features cannot be seen until you are nearer to them because of our restricted view, especially near to higher ground.
You may also notice that we are experiencing more turbulence due to our lower level.
It is more difficult to read the map at low level so it would be sensible to set up slow safe cruise, and follow a line feature to help.
We must also be aware of birds, helicopters, possible low flying military aircraft, hand gliders and powered parachutes which all tend to fly at low levels.
This is far from an ideal way to navigate, so if you are being forced to fly low because of weather, do something promptly, plan a diversion, get on the radio and get help. Always bear in mind a precautionary landing, many accidents are caused by pilots pressing on in weather they are not qualified to fly in.

I now have the airfield in sight, so I am going to show you a bad weather circuit, which you might need to do, if you arrive at your destination in poor weather.

Ex 18 C

I am now going to show you how to track a VOR, Tune in the correct frequency identify using morse code selection. Use the obs to select the required track at the top and turn the aircraft on to the required track. Now note the needle it is full scale left so I am going to intercept by 60 degrees. Now you can see the needle is moving towards the middle and as it passes half scale deflection I am going to reduce my intercept to 30 degrees. Now the needle is in the middle I need to turn the aircraft onto track and think about the wind. It will be straight across my track so I can apply max drift to my heading and that should be what is required to keep the needle in the middle and therefore the aircraft on the required radial or QDM.
I am now going to show you some low level navigation....

Exercise 19 Instrument Flying

We are going to have a look at instrument flying.
I hope you remember the briefing. – starting with a look out. All clear. Looking outside we see our for straight and level attitude – Looking inside at the instruments, our master instrument – the attitude Indicator – the model aircraft is sitting on the horizon, with the wings level. The balance ball is in the middle and the altimeter and VSI register level flight. The ASI shows 90 kts.

If I pitch the nose up – looking outside the nose has pitched above the horizon. Inside, on the attitude indicator the little model is now above the horizon bar and the VSI and altimeter are showing a climb. On the ASI the speed is reducing. Notice outside it appears to be a very big pitch and inside on the AI it looks a small pitch change.

Lower the nose and look outside. The nose is below the horizon. Inside, the model aircraft is below the horizon bar. A big pitch change outside is a small pitch change on the AI. The VSI and altimeter are showing a descent. The airspeed indicator shows our speed increasing. What is outside is mirrored inside

Pitching up for level flight. Now rolling. Remember the briefing – all turns are rate 1. Lookout, and rolling into a rate 1 turn to the left. Looking outside – the left wing is below the horizon and the right wing is above the horizon. Looking inside, the attitude indicator is showing the left wing below the horizon and the right wing above. The turn co-ordinator is showing us a rate of turn, and the DI registers a change in heading. Roll the wings level. The inside and outside picture look relative in roll.
I am now going to show you the instrument indications in yaw. I am yawing the a/c to the right can you see that the attitude indicator does not sense yaw but the turn coordinator is showing a rate of turn and the ball is out to the left and the DI is showing a change of heading….

To fly S& L on instruments I hope you remember it is the T scan and also remember your secondary scan bringing in the VSI and the ball. Remember trim, relax scan…

To climb or descend on instruments the scan is attitude, heading, attitude, speed. And the secondary scan brings in the ball, the DI and VSI

To turn on instruments the primary scan is attitude, height attitude, airspeed and the secondary scan brings in the DI and the ball and the VSI

I will show you what you would do if you inadvertently entered cloud. Don't panic go straight onto your instrument scan for straight and level flight, check pitot heat on and carb heat on. Look at the bottom of the DI for reciprocal heading commence a rate one turn, don't forget your scan, Roll out on heading and once again fly straight and level, take a quick look to see if you are out of cloud. When you are decide whether to trun back or maybe you can route around the weather etc

When you are practicing with the foggles I will be responsible for the lookout