FS ACADEMY

COMMANDER

MANUAL VERSION

1.0

Contents

FS ACADEMY
COMMANDER

Keep your cool in the face of adversity. COMMANDER will arm you with the framework to deal with anything fate throws your way. Including emergency landings, system malfunctions, hazardous weather and more, COMMANDER will present you with challenging and authentic scenarios that will stretch your abilities. Find ***COMMANDER*** in **ACTIVITIES → CUSTOM CONTENT**.

Murphy's Law: If anything can go wrong, it will…

Given enough time in the air, something is bound to go wrong eventually. Having a tried-and-tested framework in place to deal with emergency situations will make all the difference when the chips are down. Airline Captain training is moving further and further from teaching how to deal with specific failures and only learning the technical details of a small range of scenarios. Instead, the focus is shifting towards "managing the grey" and having a robust failure handling process that enables the Pilot in Command (PIC) to calmly and methodically work through the task at hand.

A safe outcome is the goal of any Commander when entangled in a difficult situation. The aircraft in question is largely immaterial, as the ability to carefully assess and manage inflight difficulties is transferrable between aircraft types, from the smallest Cessna to a modern passenger airliner, as you are about to experience first-hand.

It's time to level up and step into the shoes of the Commander. Feel the weight of responsibility from the four stripes on each shoulder.

This is your moment… This is ***COMMANDER***

YOUR INSTRUCTOR

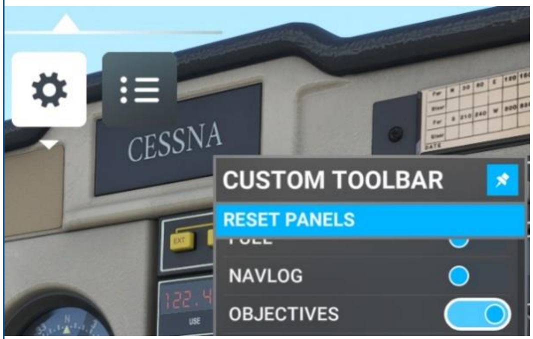
It's dangerous to go alone, so you will be accompanied by an instructor who will harness their years of real-world experience as an airline Captain to supply you with the best and most true to life techniques and advice possible. They will build you up from light training aircraft to the Airbus A320, expanding your knowledge and abilities every step of the way. In-mission markers are provided where appropriate to aid navigation.

If an extreme pitch or roll attitude is detected, the instructor may take the controls to make a correction, but they will hand it back to you wherever possible. After all, you are the Pilot in Command.

Your instructor, subtitles, on screen objectives and visual markers are all there to help you, but we cannot detect all potential navigation and handling errors. If the mission does not appear to be progressing, it may be that an earlier step was performed excessively slowly, causing the following 'trigger' to be missed. Again, keeping objectives displayed will help to mitigate this. Best practice is to wait for an objective step to be displayed on screen before performing the action.

Failure management naturally requires concentration and discipline. We will try our best to catch errors, but we suggest that you will get deepest benefit of this course if you permit yourself the undistracted time to focus on the content. Reading the associated chapters in this manual prior to launching a mission will be most rewarding and will open up your inflight capacity to take on this new set of skills.

OBJECTIVES PANEL



The directions from your instructor will be supplemented by on-screen objectives in flight, which will display what you need to do next in order to progress through each scenario.

Make sure to have the objectives panel displayed, so that you don't miss any important steps. Enable the objectives panel using the custom toolbar menu in-game and keep it displayed throughout.

Please Note: Best practice is to perform an action only once the objective step is displayed onscreen. Pre-emptively completing a task will still allow the lesson to progress correctly, but the step may remain displayed in green for longer than intended. This does not imply that the pilot should continue to satisfy that step. Take any green step as having been fully complied with and then disregard if it continues to be displayed.

SUBTITLES

Full subtitles in English (UK) are recommended and can be enabled and customised here:

OPTIONS → GENERAL → ACCESSIBILITY

Other languages are not currently supported.

TURBULENCE

The weather system of Flight Simulator models the airflow around terrain and obstacles. The level of turbulence experienced in light aircraft however appears exaggerated in its current form, so the use of LOW turbulence is recommended, found here:

OPTIONS → ASSISTANCE OPTIONS → PILOTING

SUPPORT

Please visit our support page if you encounter technical difficulties.

fsacademy.co.uk/support-commander

Let's get started...

COCKPIT – C152

We will start off with the humble Cessna 152. Let’s run through the main cockpit instruments and equipment you will be using, so that you are familiar with them when the time comes to put them to use.

Inflight highlighting of controls is provided where appropriate, which further aids identification in the heat of the moment.

A Airspeed Indicator

The Airspeed Indicator (ASI) is essentially a pressure gauge. The harder the air is hitting the aircraft and flowing into the Pitot Tube, the higher the reading, which is calibrated to display Nautical Miles Per Hour (Knots/kts). The speed of the air going over the wing is directly related to the lift produced.

Plan to cruise at 100kts when flying the C152.

C152 Best glide speed: 60kts.

B Attitude Indicator

The Attitude Indicator (AI) displays the ‘artificial horizon’ and allows us to obtain accurate pitch and roll angles.

Make normal turns with around 20 degrees of bank (as shown), indicated by the second white line on the bank index along the top of the instrument.

Aggressive inputs such as G-force and excessive pitch or roll angles may prompt an intervention from your instructor, before handing control back to you.

C Altimeter

Normally set to display altitude Above Mean Sea Level (AMSL) the altimeter displays your vertical height in feet. Maintaining accurate altitude control is especially important when flying a Forced Landing procedure, as we crosscheck our progress using altitude as our reference.

Note that some activities will rely upon your height above the ground. Subtract the elevation of the ground below you to obtain your height Above Ground Level (AGL).

Example: With an indicated altitude of 1200ft and ground below with an elevation of 400ft, your actual height AGL is 800ft.

D Directional Gyro

This instrument displays the aircraft heading (HDG) in degrees.

Supplied by the engine driven vacuum system, the Attitude Indicator and Directional Gyros will ‘topple’ and become unreliable after an engine failure. The cardinal points are displayed as N S E W.

E Hide Yoke Clickspot

Some switches are located on the lower section of the cockpit panel, but are obscured by the yoke. To hide the yoke, click on the base of the control column. This will give you full view of the panel. To re-show the yoke, click on the hole that the control column passes through. You will likely need to hide the yoke in order to access the controls behind it when running emergency procedures.

F Vertical Speed Indicator

Our rate of climb and descent is displayed by the Vertical Speed Indicator (VSI) in feet per minute (fpm). The VSI functions by measuring the rate of change of ambient air pressure, known as static pressure. Both the VSI and altimeter are supplied with static pressure by the static port, located on each side of the aircraft fuselage. A blockage of both static ports would starve the VSI of sensing pressure changes, so the instrument will remain at zero.

G Communications Radio

The C152 is fitted with two communications (COM) radios. Each radio is fitted with an active/use window and a standby window. Turning the inner and outer knobs to the bottom right of the radio allows for tuning of the standby frequency. Once correctly set to the desired frequency, pushing the white swap button (**<->**) swaps the standby frequency with the active frequency.

H Transponder

The code we set into the transponder (XPDR) is known as our 'squawk' code and is visible on the Air Traffic Control (ATC) radar screen. To set the squawk, turn the knobs located under each number, which have a range of 0-7. Lighting conditions in Flight Simulator can often make the transponder difficult to read, so you may need to zoom in to get a clear view.

Emergency squawk codes:

MAYDAY: 7700 RADIO FAIL: 7600 HIJACK: 7500

I Tachometer

Displays the engine Revolutions per Minute (RPM). The green band indicates the normal operating range in terms of engine heat. When RPM is below the green band, icing may start to form in the engine intake, depending on the conditions.

J Ammeter

Battery charge or discharge will be shown by the right or left indication of the ammeter needle, respectively.

The alternator acts to generate electrical power from the engine and keeps the battery charged up.

The battery acts as the source for the electrical systems onboard. If the battery switch is set to off or the battery becomes depleted, the electrical systems will become unpowered, including your flaps, lights and radio.

K Fuel Primer

Before engine start, the fuel primer is used to prepare the fuel system for starting. If left unlocked, this can cause fuel interruptions inflight, so is checked as part of the engine failure checklist.

L Master Switches

A two-part switch, the left side controls the alternator and the right controls the battery. Turning off the master switches will cut off electrical supply to the aircraft, either as part of the shutdown checklist or in anticipation of an emergency landing.

Be careful to select the correct switch, as an incorrect selection will have undesirable consequences, such as losing all lighting at night.

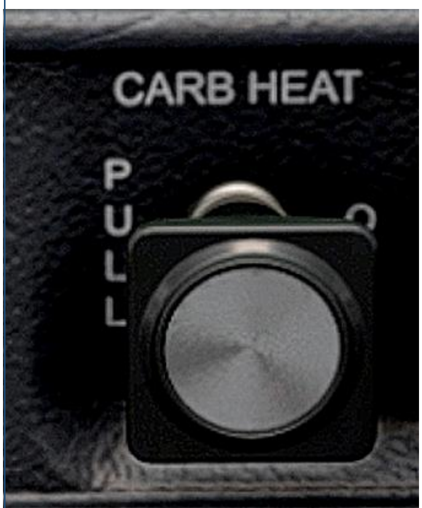
M Ignition Switch

This switch has 5 positions: OFF – RIGHT – LEFT – BOTH -START

The engine runs by two 'Magnetos' that self-generate the power to the spark plugs. The engine can run on only the 'left' or 'right' magnetos, but with diminished performance and less smooth running. The normal operating position is BOTH, where left and right magnetos are in use. As magnetos are self-powered, they will continue to operate in the event of an electrical failure.

N Switch Panel

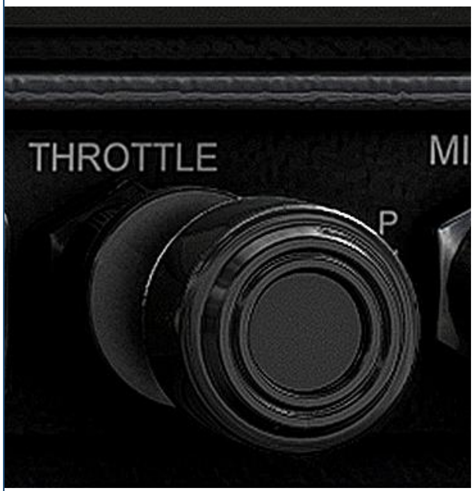
Lighting controls are located along the switch panel, along with the pitot heat switch. You may have to hide the yoke in order to access these controls, which is achieved with the clickspot discussed above.



O Carb Heat

When flying in icing conditions, ice can form on the engine intake, reducing available thrust and in extreme cases can cause the engine to fail. Carburettor ("carb") heat recycles some hot exhaust gas back into the engine intake in order to prevent ice formation. This warmer air will reduce engine power whilst carb heat is in use.

Pull the control fully out to set full carb heat.



P Throttle Control

Speed control is achieved by use of the throttle lever. Make smooth adjustments to the throttle in order to change speed, as rapid movements make sudden changes to speed and lift, which can make altitude holding more challenging.

When rehearsing a Forced Landing, we will pull the throttle back to idle and keep it there until it is time to end the exercise. Be careful not to confuse with the Mixture Control (discussed below).

Q Mixture Control

Beside the throttle you will find the mixture control. When flying at higher altitudes the air becomes thinner. As the engine runs most efficiently at a certain fuel to air ratio, we reduce the fuel flow slightly after climbing in order to preserve this ideal ratio. This ensures proper engine running and fuel efficiency.

Pushed fully inward provides maximum fuel flow for best performance at low altitudes. Pulling fully out will cut off the fuel supply, stopping the engine.

R Flap Lever

The flaps are electrically powered and increase the curvature of the wing, increasing both lift and aerodynamic drag. Full flaps are used for normal landings. Should the flaps be unavailable due to severe icing or electrical failure, a higher approach speed will be necessary to account for the reduced lift. Extension of the flaps is only permitted within the white arc on the ASI, which extends up to 85kts on the dial.

COMMANDER 01.

WIGHT KNUCKLE

We start with a bang. Know what to do when the engine stops turning overhead the Isle of Wight. You will be introduced to failure management and will be shown how to select a suitable landing site. Follow the forced landing procedure to get us down safely.

FIELD SELECTION

Being prepared is half the battle. When flying under Visual Flight Rules (VFR) in a single engine piston aircraft, keeping a mental note of nearby fields that are suitable for an emergency landing can make the situation far more manageable in the heat of the moment.

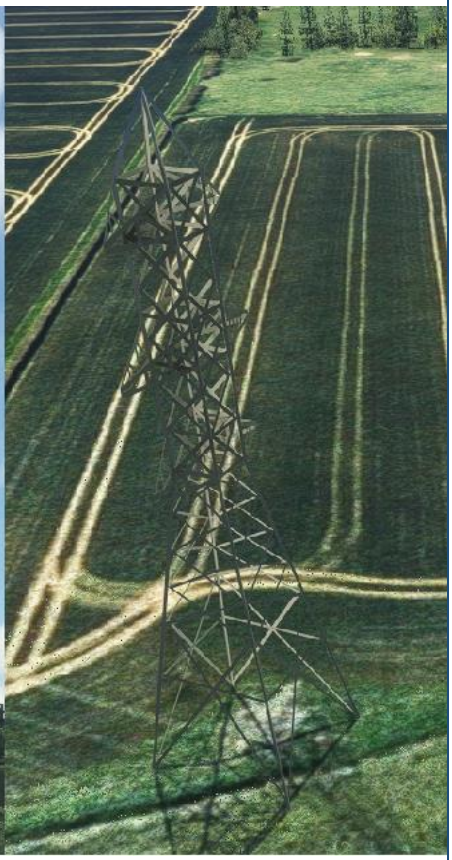
Your options are narrowing by the second as you lose height. Knowing what qualities to look for when selecting a landing site and having one or more in mind as you fly makes the handling of an engine failure considerably more efficient, which in turn saves precious seconds and allows for the widest range of options possible.

You can consider the Five S's to help you wisely select a shortlist of landing options:

SIZE	**Sufficient distance to touchdown and come to a stop with room to spare**
SHAPE	**Narrow fields restrict your approach direction options**
SURFACE	**The smoother the better**
SLOPE	**Downslopes can drastically increase stopping distance**
SURROUNDINGS	**Buildings, trees, power lines and fences are all obstacles to consider**

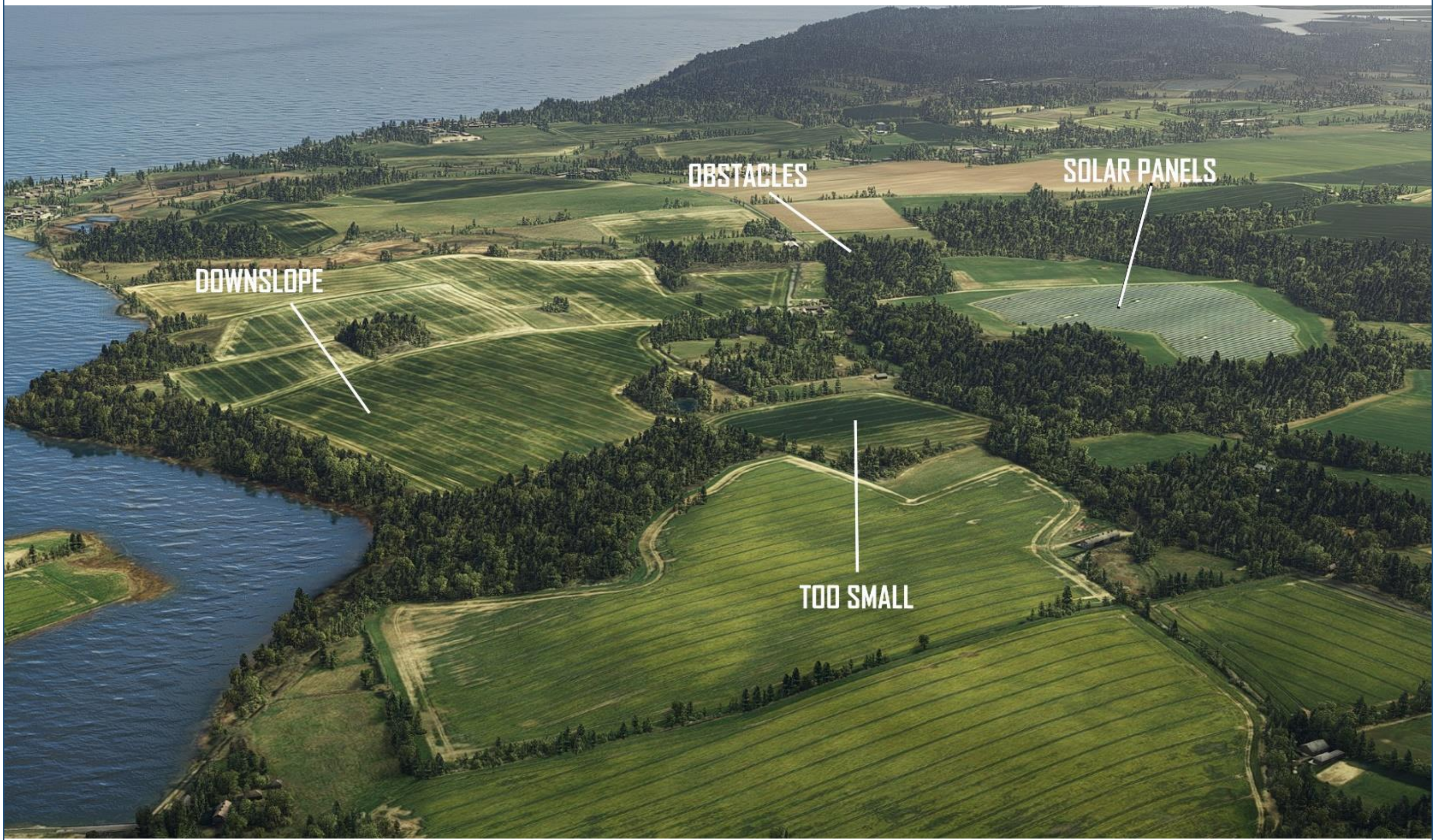
Roads generally make for poor quality landing options. Whilst there have been occasions where light aircraft have landed on highways in an emergency, this is generally not a viable option. Long stretches of empty highway can offer a landing opportunity, but are rarely found in Europe and the UK. Bridges, road vehicles, lighting gantries and signage are generally dense and obstructive, causing a high chance of damage and endangerment to those on the ground, when compared to an open field.

Some obstacles are difficult to identify from afar, so care must be taken to continuously assess the suitability of a chosen landing site and be prepared to select another if an unforeseen issue presents itself.



Electricity pylons are hazardous to light aircraft but can often be difficult to see from above. As you descend, you will likely start to notice obstacles as they become more prominent against the horizon. Be especially wary of aerials and power cables, as these are typically thin and unlit, making them very inconspicuous at anything other than short range.

Solar panels can also remain unnoticed until at short range, often having the appearance of small lakes at first glance. We will show examples of obstacles and unsuitable fields as we fly around the Isle of Wight, so that you can see for yourself.



FORCED LANDING PROCEDURE

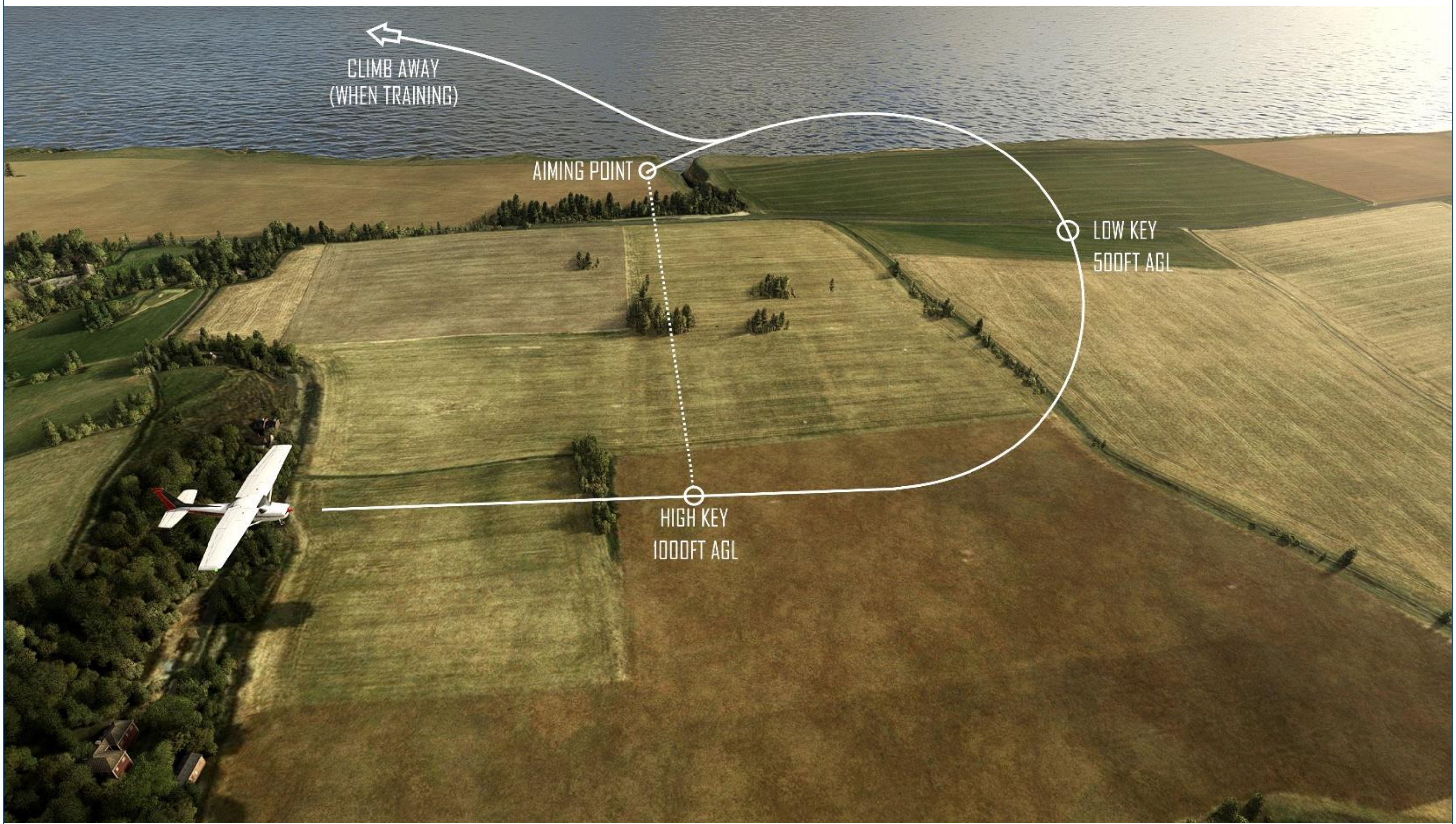
Once an engine failure has been detected and the initial 'startle factor' has subsided, our first goal is to settle at the best gliding speed for our aircraft.

This is 60kts for our Cessna 152, as is found in the Pilot's Operating Handbook (POH). Having reduced from cruising speed to best glide speed, we will need to use elevator trim to relieve the control forces needed to keep the nose raised. Once at 60kts, we must accurately maintain this speed in order to get the optimal gliding range, maximising our options.

We will simulate an engine failure by pulling the throttle back to idle and keeping it there. We will practice running the Engine Failure checklist, although as this is a rehearsal many of the controls will already be set correctly so (other than the Carb Heat) this will be run as a 'touch drill'. When we reach a low height we will increase power, retract flaps and climb away.

The flying pattern for a forced landing is deliberately similar to a regular airfield circuit. This allows for the visual perspective from the cockpit to be more familiar, making judgment of heights and distances easier. There are two main points of reference, the High Key and the Low Key.

HIGH KEY 1000FT LOW KEY 500FT



The High Key is equivalent to the 'downwind' leg of a normal traffic pattern, where we pass alongside the landing point at a height of 1000ft. Note that the altimeter is set to display altitude Above Mean Sea Level (AMSL). For a forced landing on land, we are more interested in our height Above Ground Level (AGL). It is therefore important to have a rough elevation figure in mind for the ground around you, so that your height can be well estimated.

If we arrive at the High Key significantly above or below our targeting 1000ft, we can extend or shorten the next leg to the Low Key respectively in an attempt to correct the deviation.

FORCED LANDING CHECKLISTS

Enroute to the High Key, we have time to attempt to restart our engine, assuming that no obvious and catastrophic damage has occurred. We do this with the Engine Failure checklist:

ENGINE FAILURE		
CARB HEAT	ON	
FUEL PRIMER	IN & LOCKED	
FUEL SHUTOFF	ON	
MIXTURE	FULL RICH	
IGNITION	IF PROPELLER TURNING: BOTH	IF PROPELLER STOPPED: OFF

Once we have reached the High Key, we have no more than around one minute flying time before touchdown. We must therefore accept that an engine restart is not viable and must prepare the aircraft for an emergency landing. This involves shutting down fuel lines and electrical systems in anticipation of a hard landing. To achieve this, we run the Emergency Landing checklist:

EMERGENCY LANDING		
MIXTURE	OFF	
FUEL SHUTOFF	OFF	
IGNITION	OFF	
FLAPS	WHEN LANDING ASSURED:	AS REQUIRED
MASTER SWITCH	WHEN FLAPS SET:	OFF
DOORS	UNLATCH	

The Low Key acts as an equivalent to the 'Base' leg of a circuit, where we fly roughly perpendicular to the landing direction. We hope to pass this point at 500ft AGL, but again can extend or shorten the leg to adjust our gliding range as needed.

The flaps are useful for shortening our stopping distance and lowering landing speed, but must remain retracted until we are assured that we will reach our aiming point. An early extension would reduce our gliding range and may cause us to fall short of our landing site.

COMMANDER 02.

SUBZERO

A freezing sky above the Isle of Man wreaks havoc on your instrumentation and controls. Think outside the box to recover and stay in control before returning to land with limited options. Learn the fundamentals of the pitot and static systems and see how difficult flying becomes without them. Use rudder to control your aircraft after your ailerons succumb to the chill.

AIRCRAFT ICING

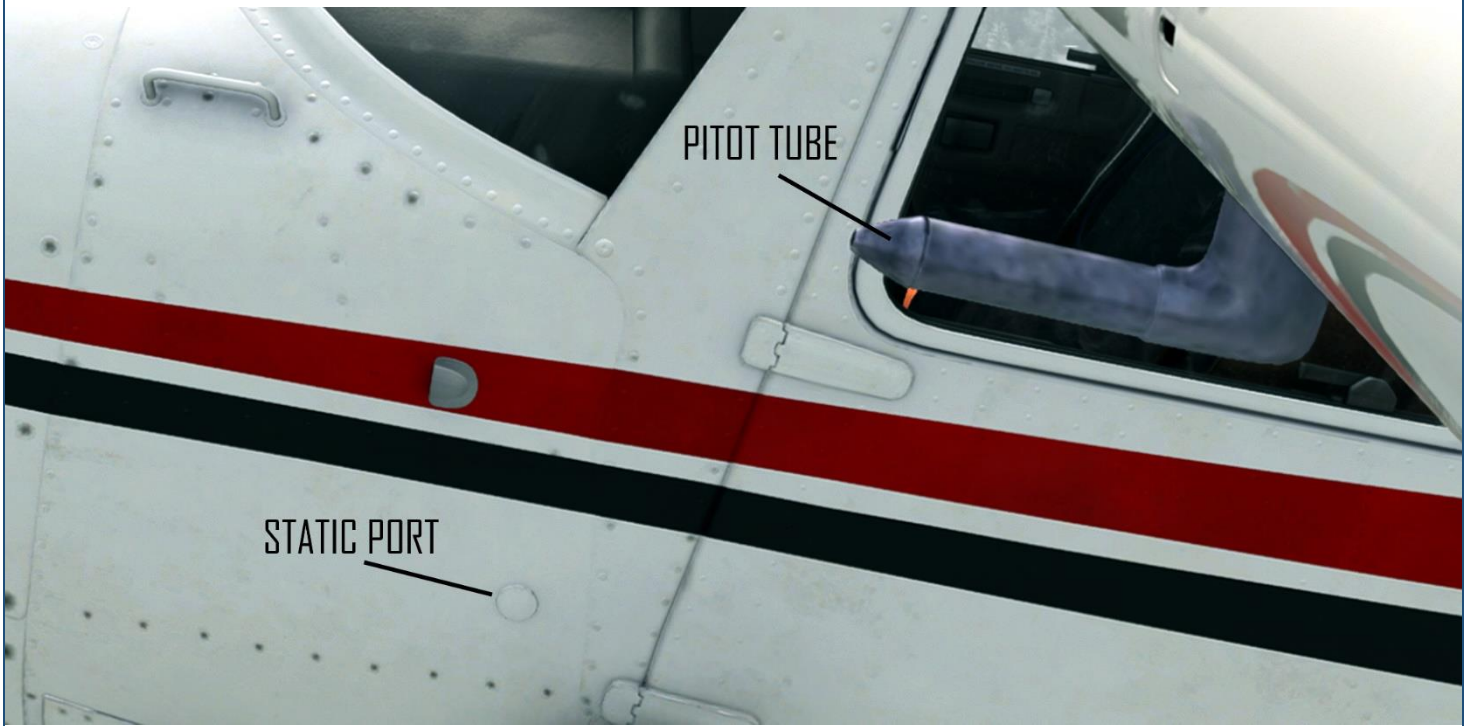
The formation of ice on an aeroplane can have a wide range of negative effects, including:

- **Reduced aerodynamic efficiency**
- **Increased weight**
- **Impaired visibility**
- **Instrumentation errors**
- **Increased stall speed**

Learning to recognise and deal with ice accumulation is an essential skill and will be the focus of this lesson.

Some of the aircraft instrumentation relies on measuring air pressure. These include the Airspeed Indicator (ASI), Altimeter and Vertical Speed Indicator (VSI) and are known as the 'pressure' instruments. These instruments are fed with the outside ambient air pressure, known as 'static pressure' via the static ports. The altimeter is calibrated to display this pressure as altitude in feet. The VSI detects rate of pressure change and displays this as a vertical speed in feet per minute (fpm).

Should the static port(s) become blocked by ice or debris, these instruments can no longer sense the outside air pressure, so will 'freeze' at the value displayed at the time of the blockage. Many aircraft are fitted with an alternative source of static air, typically from an intake located within the cockpit, which provides an alternative way of sensing static pressure. The cockpit air pressure is affected by the passing airflow over the aircraft so is typically less accurate as a source than the dedicated static ports, which are embedded in the fuselage.



The Airspeed Indicator (ASI) has two sources of air pressure. Like the altimeter and VSI, the ASI is supplied with static pressure. The ASI is also fed with 'ram air' which is provided by the pitot tube. Ram air is the total oncoming airflow that enters the pitot tube. By subtracting the static pressure from the ram air, we get 'dynamic pressure' which the ASI is calibrated to display as an Indicated Airspeed (IAS).

Should the pitot tube be obstructed by ice, only the static pressure is fed to the ASI. This would cause the ASI to no longer be useable. As icing tends to form most readily on sharp, forward facing aircraft parts, the pitot tube is particularly susceptible to ice accretion. Therefore, pitot tubes have inbuilt heating systems, which keep the pitot free from ice and prevents blockages.

There is a procedure in the Pilot's Operating Handbook (POH) for dealing with an accidental icing event. What little de-icing we have is employed in order to restore pitot tube function and engine performance, as seen here:

INDAVERTANT ICING ENCOUNTER	
PITOT HEAT	**ON**
CARB HEAT	**ON**
FLAPS	**DO NOT USE**
APPROACH SPEED	**65-75KTS**
EXPECT INCREASED STALL SPEED	

SECONDARY EFFECTS OF CONTROLS

Each of the main flight controls have a primary and secondary effect. By deflecting the ailerons, we increase lift on one wing and reduce it on the other, which produces the primary effect of roll. This imbalance of lift also causes an imbalance of drag, so a yawing motion is also produced as a secondary effect. The opposite is also true, where movement of the rudder primarily causes yaw, which speeds up one wing and slows the other, changing their lift and inducing roll as a secondary effect. We will explore controlling roll with the rudder in this lesson. Be prepared to make smooth but positive input on the rudder in order to level the wings, as this will become our only form of directional control as we return to the airport to land.

COMMANDER 03.

BLACKOUT

Shut down non-essential systems as you desperately stretch out battery life so that you are not plunged into darkness before landing. Come to a decision using a structured failure management system to ensure that you achieve the best possible outcome.

Flying under Visual Flight Rules (VFR) at night can be a great way to get around. The cool, smooth night-time air and deserted airfields can make light aircraft flying more efficient, comfortable and convenient. However, you must tread with care as we are more heavily dependent on the electrical systems of the aircraft to keep us safe. We are exposed to a narrower range of options if an electrical issue should occur at night. Airfield opening hours, runway lighting and aircraft communication and navigation systems are of a greater importance in the dark, as we will discover.

Staying calm under pressure is a crucial quality for a Commander. This is aided greatly by having a reliable structure in place that helps the decision-making process. One such process is DODAR:

DIAGNOSE	**Discover what the issue is and how that affects your aircraft**
OPTIONS	**Can you continue to destination? If not, where is available to divert to?**
DECIDE	**Choose the safest course of action**
ASSIGN	**Put your plan into motion by assigning tasks and preparing for landing**
REVIEW	**Check if anything important has changed, which may lead you to reassess**

Each step of DODAR is important in its own way. For example, if an issue is incorrectly diagnosed, then all subsequent decisions are likely to be based upon inaccurate assumptions, which may lead you to divert unnecessarily or fail to be aware of an impending deterioration.

When generating options, we need to have a good level of situational awareness; to have an idea of airfield opening times, runway lengths and lighting capabilities. These can be checked against the airfield charts but having rough estimates in mind before departure can facilitate the decision-making process.

In this lesson we will simulate the failure of the alternator. This equipment is driven by the engine and acts to generate electrical power, which is fed to the battery to recharge it. With an alternator malfunction, we can no longer top up the battery's reserves and will continue to draw power until the battery is depleted. Battery life varies by aircraft but is typically no longer than 15-30 minutes, but likely to be at the low end of this range during night-time operations due to the extra lighting increasing electrical demand.

We can stretch out our endurance by shedding non-essential consumers, such as some heating and aircraft lighting, both internal and external. Once the battery begins to discharge, we will see this represented on the ammeter, located to the far right of the cockpit. The needle on this instrument will be far to the left, indicating a discharge condition. After load shedding, the needle will move nearer to centre, indicating a lower power draw.

We cannot be certain as to our battery time remaining as it depends on the starting condition and age of the battery, plus the extent of the power draw, amongst other factors. Once the battery is depleted, all electrical services will be lost, which include:

- **Aircraft lighting**
- **Communications radios**
- **Navigation radios**
- **Electrical instrumentation**
- **Flaps**
- **Transponder**
- **Pitot heat**

Be aware that this is a considerable loss in equipment, especially during night-time operations. Notably the engine will continue to run, as the spark plugs are supplied by the engine magnetos, which generate their own power once the engine is running.

After landing we will turn off the battery master, to show how the cockpit looks when the battery is depleted. This will prove how time critical this scenario is. Also consider how taxiing in from the runway would be challenging as there is no lighting available.

COCKPIT– DA62

Our failure management structure is not only applicable to a single engine propeller aircraft such as the C152. We will now turn things up a notch and step up to the twin engine Diamond DA62. Here are the controls that we will be using in Lesson 04 – Spanner in the Works:

Flap Selector

The DA62 has three flap positions:

UP TAKEOFF (VFE: 136) LANDING (VFE: 119)

VFE represents the maximum speed for a given flap position, in order to avoid flap damage.

With landing flaps set, an engine failure would effectively eradicate our go-around performance, so landings flaps are not selected until shortly before touchdown.

Gear Controls

The DA62 has retractable landing gear. This is operated using the gear selector, shown here. When the landing gear is down and locked, it will display a green light. The absence of a green indication means that the associated gear is not safe for landing.

We will explore this scenario in the upcoming lesson.

Engine Master Switch

Without the support of a landing gear leg, the wing and engine will strike the ground upon landing. Whilst the propeller will be destroyed, we can limit damage to the engine unit itself by shutting down the engine prior to landing. To do this we will operate the engine master switch for engine 1, the left engine, when requested to do so by your instructor.

COMMANDER 04.

SPANNER IN THE WORKS

A jammed landing gear leg necessitates a discontinued approach for troubleshooting in the shadow of Mt Vesuvius. Run through your options before accepting fate and scraping down the runway centreline to a stop.

Making time is an important factor in dealing with emergency situations. Rather than trying to cram in a rushed decision in the few moments before landing, we will break off from our approach into Naples and give ourselves the time and space to correctly identify and react to an issue with our landing gear.

In coordination with ATC, we will troubleshoot our left landing gear leg not extending and use DODAR to come to a decision on how best to deal with this.

LANDING GEAR NOT DOWNLOCKED	
AIRSPEED	BELOW VLOR 162KTS
GEAR SELECTOR	RECYCLE
IF GEAR REMAINS UNSAFE:	
ABNORMAL GEAR LANDING PROCEDURE: APPLY	

We could try to extend the gear manually, but as this is not modelled in-sim, we will disregard this step and accept that we must perform a landing with the left landing gear leg still retracted.

ABNORMAL GEAR LANDING

PERFORM IF ONE OR MORE LANDING GEAR CONFIRMED NOT DOWNLOCKED

WHEN LANDING ASSURED: ENGINE ON INOP L/G SIDE – SHUTDOWN

AFTER TOUCHDOWN: EXPECT SWING TO INOP L/G SIDE

The lack of a fully extended and locked landing gear leg raises an issue with our propeller. Usually we have ample clearance between the runway surface and the propeller blades, but without the gear in place, the blades will strike the ground upon landing. It is therefore preferred to shut down the corresponding engine once our landing is assured, so that the blades are not spinning as they hit the ground. The propeller will still be destroyed, but the engine itself will be preserved.

In anticipation of the engine making contact with the ground, pulling us to the left, we will land to the right of the runway centreline, to give extra margin.

COCKPIT– A320

We will now step up to the Airbus A320 NEO, a modern and advanced passenger airliner. We will be dealing with a range of emergency situations, so let's get familiar with the displays and controls that you will need.

OVERHEAD PANEL

A – APU MASTER

Located in the tail, the Auxiliary Power Unit (APU) can supply both electrical and pneumatic power to support the aeroplane's systems whilst the main engines are shut down, or to provide an additional source of power after an engine failure. The APU MASTER switch activates the electronic control and monitoring system that oversees APU operation and prepares the APU for starting. Pushing the MASTER while the APU is running will shut it down.

B – APU START

With the MASTER turned on, pushing START will begin the APU start-up procedure, which takes around one minute to complete. Once the start-up is completed, a green 'AVAIL' light appears, indicating that the APU is 'available' for use.

C – SEATBELT SIGN

The seatbelt sign indicates to the passengers that they should be seated with their seatbelt fastened. When inflight below 10,000ft the seatbelt signs are typically always on. Above this altitude they are turned off to indicate that passengers are free to move about the cabin. The Commander may elect to turn the signs back on if turbulence is expected, such as when passing between storms. Also, after an emergency situation arises, the passengers should be seated in order to allow the cabin crew to begin their preparations for a potential emergency landing.

D – STROBE LIGHT

From entering the runway for takeoff until vacating the runway after landing, we have the white flashing strobes turned on. These increase our visibility, particularly at night. Aircraft types can be indicated by lighting patterns. For example, the wing strobes of Airbus aircraft flash twice per cycle, whereas most other airliners have strobes which flash once.

E – LANDING LIGHTS

The main source of forward illumination is provided by the landing lights, which are controlled by this pair of switches, one for the left-hand and one for the right-hand light. As with all Airbus switches, move the switch UP for ON.

Landing lights have the dual purpose of assisting both with seeing and being seen. Like the headlights on a car, the lights shine forward and enhance runway visibility during takeoff and landing. Once airborne, the landing lights make the aeroplane more easily visible to other traffic. It is for this reason that the lights are used, even in the daytime, just before landing and shortly after takeoff. The lights are retracted when not in use, as they protrude from below the wings, increasing aerodynamic drag.

F – TAXI LIGHT

As the landing lights are very high power, their ground use is reserved for time spent on the runway only. The taxi light is used for movements on the taxiways and aprons. At close range, the taxi light is also very bright, so it is turned off before turning onto stand, to avoid dazzling the ground crew.

G – ANTI-ICE

The engine intakes are susceptible to icing if operating in temperatures of 10^{o}C or below when moisture is present, such as in cloud or fog. Turning on the ENG A.ICE redirects hot engine bleed air to circulate through the intakes to warm them and prevent ice build-up, at the expense of a minor loss of engine performance. Beside the Engine Anti-ice buttons is the Wing Anti-ice. This heats the outer leading edges of the wing.

FLIGHT CONTROL UNIT

Once the Autopilot (AP) is engaged, the Flight Control Unit (FCU) becomes the main interface between the pilots and the auto-flight systems. There are control knobs for speed, heading and altitude. Pushing a knob will set the Managed mode for that parameter, whereas pulling the knob initiates Selected mode. Managed mode is where the flight computers will set the targets, based upon the inserted flightplan. In Selected mode, the pilot sets their desired target. We will mainly be using Selected modes. Selected values will be displayed in the FCU window, located above the respective control knob.

To push or pull an FCU knob in Microsoft Flight Simulator (MSFS) move your cursor over the top half of the appropriate knob until the cursor becomes an up arrow. Clicking when an up arrow is shown will push the knob. Mousing over the bottom half of the knob shows a down arrow, which will pull the knob when clicked. Turning the knob can be achieved by using the mouse wheel or clicking when a rotation cursor appears.

A – SPEED SELECTOR (SPD)

When pushed in, Managed Speed mode is active, where the speed target will be set according to the calculations of the Flight Management and Guidance Computer (FMGC). This will account for speed limits, efficient climb speeds and enroute speed restrictions. On approach with landing flaps set, Managed Speed will display the target approach speed.

Pulling the SPD knob activates Selected Speed mode, where turning the knob allows for manual selection of the speed target for the Autothrust (A/THR) to acquire.

B – HEADING SELECTOR (HDG)

Pushed in, the HDG selector delegates directional control to the Autopilot, which will follow the route as programmed in the FMGC. Turning the knob displays a heading selection in degrees on the digital window located above the knob. Pulling the knob will select the set heading as the target heading for the AP to steer towards.

C – ALTITUDE SELECTOR (ALT)

Pushing the ALT knob sets a Managed vertical mode, depending on the flight phase and flight plan's vertical profile, amongst other factors. This complex feature is not fully implemented by MSFS currently, and so can be disregarded. Our interests lay with performing interventions following an emergency situation, so we do not require the use of this mode.

Pulling the ALT knob commands either Open Climb (OP CLB) or Open Descent (OP DES). 'Open' indicates that any altitude constraints contained within the flight plan will be disregarded by the AP. In OP CLB, Climb (CLB) thrust will be demanded by the Autothrust (A/THR). In OP DES, idle power will be demanded.

D – AUTOPILOT (AP)

The A320 has two autopilot systems, AP1 and AP2. The convention is that the pilot in the left seat uses AP1 whilst the occupier of the right seat uses AP2. As you're in the Captain's seat, use AP1 throughout COMMANDER.

E – AUTOTHRUST (A/THR)

The A/THR is automatically engaged after takeoff once the thrust levers are moved backwards into the Climb detent (as discussed later in this chapter). A/THR can be disengaged by pressing this A/THR button on the FCU.

F – FLIGHT DIRECTOR

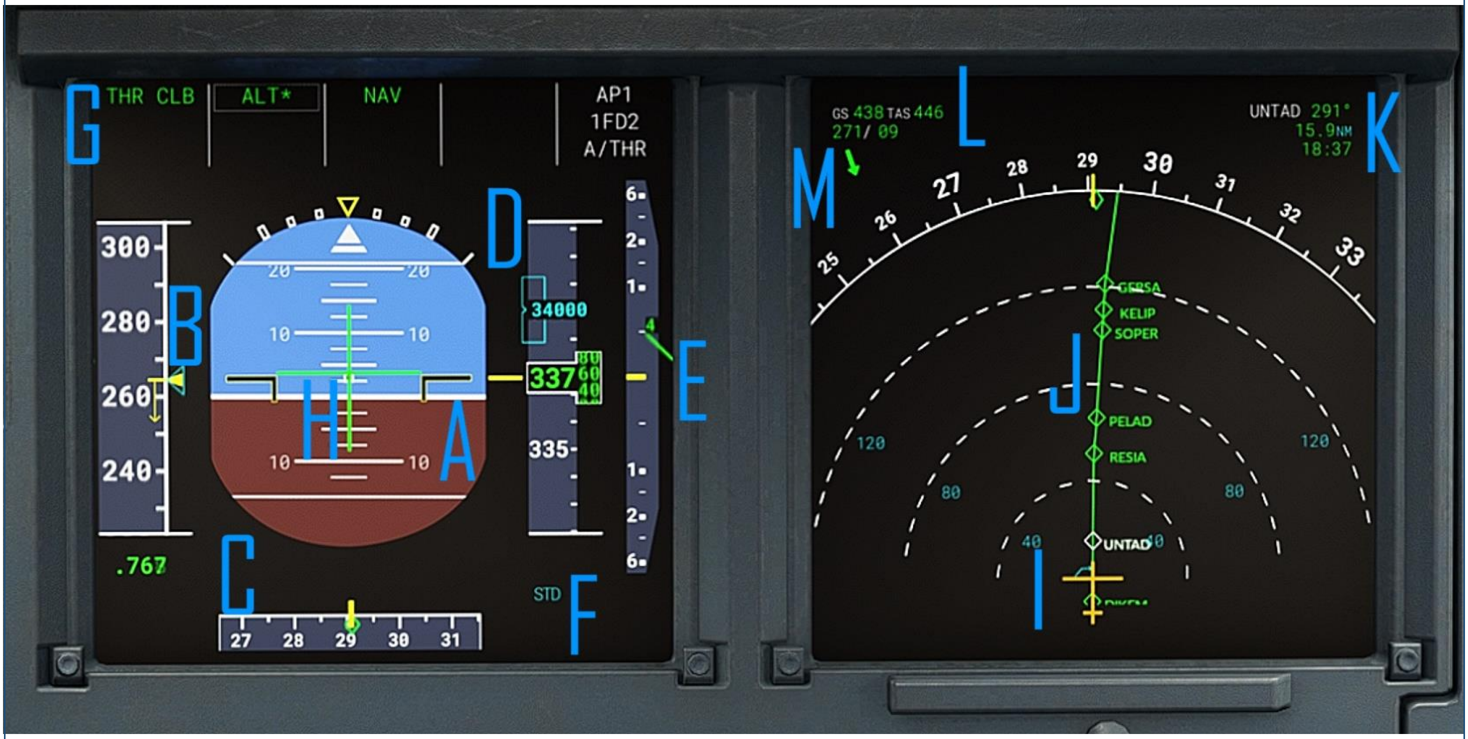
The intentions of the Autopilot are visualised by reference to the Flight Directors (FD). These comprise of a pitch bar and a roll bar. Keeping the FD centred will keep the aircraft travelling as intended by the Autopilot, although in some circumstances this may be undesirable, so the FDs can be disabled with this push button. We will demonstrate this in COMMANDER 06. Flying By Numbers.

G – SPEED/MACH SELECTOR (SPD/MACH)

The selected speed target can be displayed on the FCU in either Knots or Mach Number. Pushing this button switches between the two modes.

PFD + ND

The main pair of screens used to display instrumentation are the Primary Flight Display (PFD) and Navigation Display (ND). Located along the top of the PFD is the Flight Mode Annunciator (FMA). This indicates the current control modes that are in operation, such as A/THR demanded thrust, altitude capture (ALT*) and AP, A/THR and FD status. When in NAV (Navigation) mode, the autopilot will follow the flightplan route, as displayed on the ND.



PFD	ND
A ATTITUDE (degrees)	I AIRCRAFT SYMBOL
B AIRSPEED (knots)	J FLIGHT PLAN ROUTE
C HEADING (degrees)	K NEXT WAYPOINT DISTANCE + ETA (nautical miles)
D ALTITUDE (feet)	L TRUE AIRSPEED (knots)
E VERTICAL SPEED (feet per minute)	M WIND ARROW (degrees / knots)
F BARO SETTING (hectopascals)	
G FLIGHT MODE ANNUNCIATOR (FMA)	
H FLIGHT DIRECTOR (FD)	

ENGINE/WARNING DISPLAY

In the centre of the Flight Deck, you will find the Engine/Warning Display (E/WD). This is where you can view not only engine parameters, but also flap configuration and system messages.

Older generations of airliners would rely on several banks of gauges to display all engine parameters, with a light, horn or other system to announce anything that exceeds limits, such as high temperature or low pressure. Modern Electronic Flight Instrumentation System (EFIS) equipped aircraft make great use of the cockpit screens to display data in a more centralised location, also allowing for colour changes and flashing or highlighting in order to draw attention to a drifting parameter.

1 – N1
N1 Fan speed in percent. This is the main parameter we will use when setting engine thrust. This is the speed of the big fan at the front of the engine.

2 – EXHAUST GAS TEMPERATURE
Temperature in Celsius of the exhaust air leaving the engine.

3 – N2
N2 Fan speed in percent. This is another fan, located within the engine.

4 – FUEL FLOW
Rate of fuel supply to the engine in KG per Hour.

5 – FUEL QUANTITY
Total KG of fuel on board.

6 – FLAP/SLAT POSITION
Current flap setting. Flaps (trailing edge of wing) and Slats (leading edge of wing) are shown individually, with available positions represented by white dots. Settings are Zero, 1 (slats only), 1+F (slats and flaps), 2, 3 and FULL.

7 – MESSAGE AREA
Space for system and failure messages.

THRUST LEVER DETENTS

The A320 thrust levers (THR LVRS) have a series of positions, known as detents.

TOGA

Maximum engine power. Typically reserved for either departing a short runway or for initiating a 'go-around'; where a landing is aborted and a rapid climb is performed. TOGA may only be sustained for 5-10 minutes. TOGA stands for TakeOff/Go-Around.

FLX/MCT

The takeoff thrust setting required is 'Flexible' (FLX) and is calculated before every departure to provide ample takeoff and climb performance, whilst saving fuel, noise and engine wear.

Max Continuous Thrust (MCT) demands a slightly lower power setting than TOGA, but provides a level of thrust that can be maintained for as long as necessary, such as when climbing with a single remaining engine after suffering an engine failure during the takeoff run.

CL

Once safely climbing away after takeoff, we move the thrust levers back into the Climb (CL) detent. This position also engages the Auto Thrust (A/THR) after takeoff.

Once set to CL, the levers will typically remain here until just before landing. The thrust levers of an Airbus aircraft do not move in response to thrust changes.

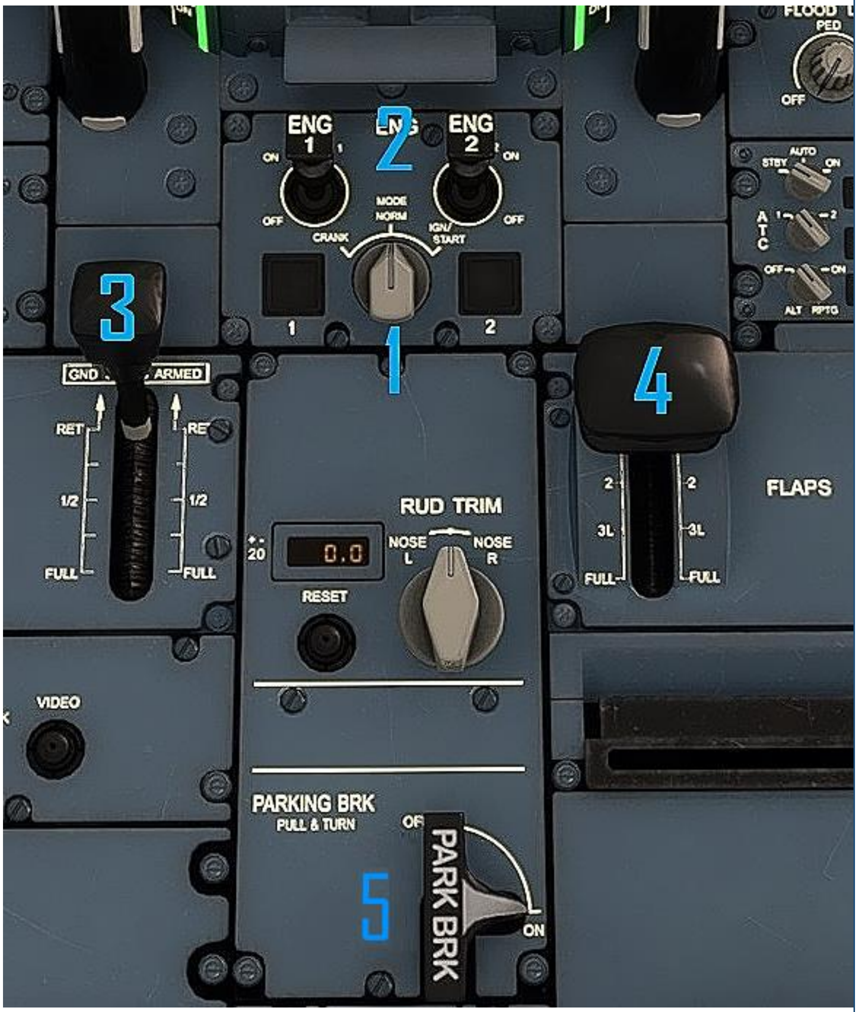
IDLE

The IDLE (zero) position commands minimum thrust from the engines. The movement of the levers into the IDLE detent disengages the A/THR and is set when nearing touchdown at the destination runway. IDLE is also the position used for engine start up.

REV

Thrust reversers can be selected after landing to help the wheel brakes slow the aircraft. Typically, only the minimum level of reverse is selected, known as Reverse IDLE. REV MAX may be needed in slippery conditions or on very short runways. Not all controller hardware offers easy selection of reversers, so their use is not a requirement in COMMANDER.

PEDESTAL



1 – ENGINE MODE SELECTOR (ENG MODE SEL)

NORM: Normal operating position.
IGN/START: Prepares systems for engine start up and for continuous firing of engine igniters.

2 – ENGINE MASTERS

ON: Initiates start of associated engine.
OFF: Shuts-down engine.

3 – SPEED BRAKE (SPLRS)

ARM: Pull out vertically to reveal white collar at the base of the shaft (as shown).

DISARM: Push in to hide white collar.

4 – FLAPS LEVER

Selects required flap and slat configuration. Position 1 will provide configurations 1 or 1+F, depending on whether surfaces are being extended or retracted and if the aircraft is on the ground or inflight.

5 – PARKING BRAKE

Selects the parking brake ON or OFF, keeping the aircraft stationary on the ground.

MCDU

The Flight Management and Guidance Computer (FMGC) is a computer system that calculates the flight progress and provides steering guidance to the AP.

The FMGC is interacted with by the pilot using this keyboard and screen unit, known as the Multifunction Control and Display Unit (MCDU). Whilst the FMGC and MCDU are technically two separate systems, the terms are commonly used interchangeably.

1 – DIRECT TO (DIR)

Pushing the DIR button displays upcoming waypoints contained in the flight plan, which can be selected in order to program the AP to fly directly to that waypoint.

2 – FLIGHT-PLAN (F-PLN)

The F-PLN button reveals the full list of enroute waypoints, as shown in the image.

3 – LINE SELECT KEYS (LSK)

Along either side of the screen are rows of keys. These are used to select an option that is displayed on screen alongside the line. On the image shown, pushing the bottom left LSK, where LEBL is listed, opens the screen used for managing approach selection.

4 – UP/DOWN ARROWS

Use the arrow keys to move a list shown on-screen, such as the F-PLN waypoints or approach options. Note that pushing UP moves the list UP the screen, which some find counter-intuitive at first.

LANDING GEAR PANEL

1 – GEAR INDICATOR LIGHTS

Three green DOWN triangles indicate that all three landing-gear legs are correctly extended and safely locked into position. Red indications appear whilst the gear is in transit (extending or retracting), with no lights shown when the gear is fully retracted.

2 – AUTOBRAKE PANEL

Low and Medium (LO and MED) settings are used prior to landing in accordance with the desired rate of deceleration to be targeted by the auto-brake system after touchdown. MAX is selected before Takeoff to allow maximum braking force to be applied automatically if a Rejected Takeoff (RTO) is performed, stopping the aircraft as quickly as possible.

3 – GEAR LEVER

Landing gear retraction and extension is achieved conventionally by moving the gear lever to the UP or DOWN position respectively. A red DOWN arrow appears if the landing gear is not detected as down shortly before landing, accompanied by an audio alert.

COMMANDER 05.

LOST IN THE FOG

Step up to the Jetliners and navigate your way out of the international Paris Charles de Gaulle airport in thick fog. Make sure not to take a wrong turn as Air Traffic Control will notice. We will discuss the takeoff procedure as we crawl to the runway in diminished visibility.

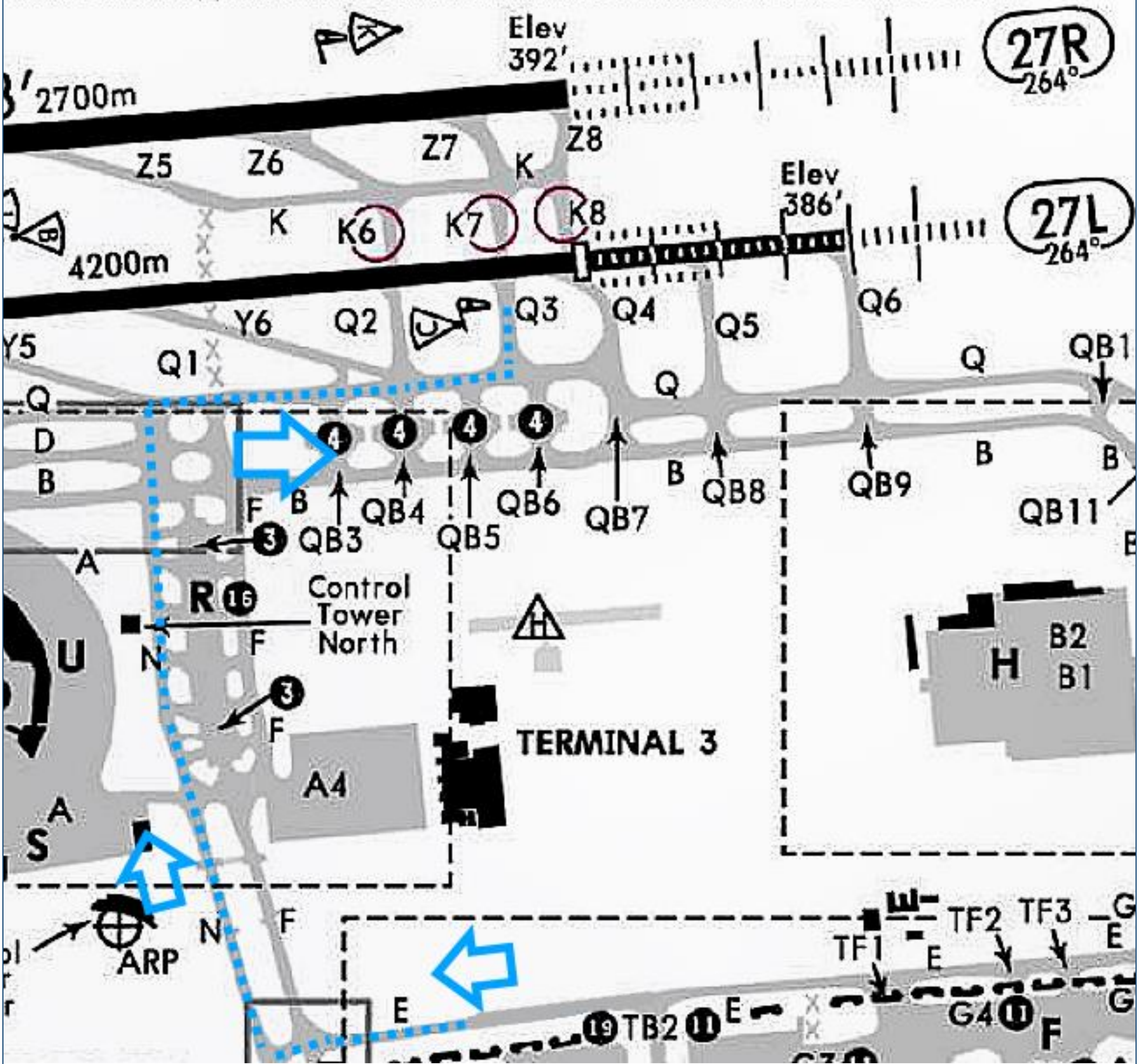
Sometimes just getting to the runway for takeoff is challenging enough. When combining Low Visibility Procedures (LVPs) and a complex airport layout, it takes concentration and care to correctly navigate the taxiway system and safely manoeuvre to the holding point.

We will get familiar with the A320 and its basic controls whilst taxiing to runway 27L at Paris Charles de Gaulle (LFPG). The weather has delayed our flight by around 45 minutes, as LVPs require additional spacing between aircraft in order to maintain safety levels. We start the lesson having completed pushback with both engines running.

As we are taxiing in fog and the temperatures are low, we will turn on the engine anti-ice for both engines. This redirects some hot engine ‘bleed’ air to the intake, warming it and preventing the buildup of ice. We will also turn on the Taxi Light, so that we can be seen more readily by controllers and other aircraft. Please see the A320 cockpit section earlier in this manual for more information on these controls.

Your instructor will manage the communications with ATC and will help you to navigate, so that you can focus on controlling the aircraft. Make sure to keep taxi speed and thrust levels low, as we have impaired visibility.

An excerpt of the LPFG Airport chart is provided on the next page, courtesy of Navigraph, with the taxi routing highlighted.


Elev
392'
27R
264°
2700m
Z5
Z6
Z7
K
Z8
Elev
386'
27L
264°
K
K6
K7
K8
4200m
Y6
Q2
Q3
Q4
Q5
Q6
Y5
Q1
Q
QB1
Q
Q
D
B
B
B
B
F
B
QB3
QB4
QB5
QB6
QB7
QB8
QB9
QB11
A
R
Control
Tower
North
F
N
U
F
TERMINAL 3
H
B2
B1
A4
A
S
N
F
ARP
TF1
TF2
TF3
E
E
G
E
TB2
G4
F

COMMANDER 06.
FLYING BY NUMBERS

Once lined up on Paris CDG runway 27L, we set takeoff thrust and power through the fog up to flying speed. However, all is not well after lift-off as our pitot systems become obstructed, forcing us to employ our Memory Actions to keep us on the rails. Sometimes the most difficult decisions are when everything returns to normal.

Indicated Airspeed (IAS) is a vital source of information to any pilot. This becomes especially true when operating a modern airliner, which has phases of flight that are highly speed sensitive. A structured and formal approach to failure management is of great benefit in order to rapidly ensure that control is maintained and the aircraft continues to operate in a safe manner.

Whilst most emergency procedures are conducted by use of a written checklist, some scenarios are time critical and there is no room for delay. Urgent procedures are designated as 'Memory Items' as they are initially run by the pilot from memory, to ensure an instant reaction when time is tight.

After we lift off from Paris CDG runway 27L, we will encounter pitot icing, causing the loss of our airspeed indications. According to the table below, we can react to this immediately to ensure that the flightpath remains safe.

Our Airbus A320 is packed with computer-controlled autoflight systems, with multiple control 'laws' and deep systems logic that rely on a number of parameters. A crucial data input to many of these systems is the airspeed, so we must prohibit these systems from acting upon the inaccurate data they are being fed. Therefore, the first actions are to turn off the Autopilot (AP) Auto Thrust (A/THR) and Flight Directors (FD).

Next, we must set and maintain a pitch and power datum, which will give similar performance to that of a routine takeoff. For our scenario, we will lose airspeed at around 1000ft after liftoff so our datums will be a pitch angle of 10 degrees nose up and climb (CL) power. We maintain this configuration until we reach a safe altitude, at which point we set power to 50% N1 (as shown on the E/WD) and reduce pitch until our vertical speed indicates zero.

UNRELIABLE SPEED

MEMORY ITEM

IF SAFE CONDUCT OF THE FLIGHT IS IMPACTED:

AUTOPILOT	**OFF**
A/THR	**OFF**
FLIGHT DIRECTORS	**OFF**
PITCH	**10 DEGREES**
THRUST	**CLIMB (CL)**
FLAPS	**MAINTAIN CURRENT CONFIG**
LANDING GEAR	**RETRACT**

RESPECT STALL WARNING

Be sure to have a disciplined approach to correctly setting and maintaining the pitch and power setting, as this is essential to achieve the result we need. We can expect a minor overspeed of flaps 1, as we will be leaving the flaps extended in accordance with the procedure.

This may be accompanied by an aural 'overspeed' alert. The A320NEO included with Flight Simulator is also slightly overpowered compared to the real aircraft.

Once at a safe altitude, we will level off for troubleshooting. To do this we reduce thrust to around 50% N1 and lower the nose until we achieve zero rate of climb, as indicated on the Vertical Speed Indicator (VSI).

COMMANDER 07.

DRIFTDOWN

Lose an engine high above the Alps and see how our reduced performance forces us lower into thicker air. Complete the authentic engine failure procedure and communicate with the cabin crew and passengers as we drift closer and closer to the alpine landscape below.

Losing an engine at cruising altitude requires a swift response and smooth handling in order to safely descent to a lower altitude without suffering excessive speed loss. Airliners fly as high as possible because the air is thinner at high altitude and therefore great speeds can be achieved for only modest fuel consumption. If an engine develops a fault however, we no longer have the power to maintain a safe cruising speed, so we must descend lower into thicker air. This subsequently reduces our range and will likely make us unable to continue to our destination due to increased fuel burn. Prolonged flight with a single engine running is also undesirable, so a diversion is almost certain.

Once an engine failure has been recognised, we have some memory actions to follow. These are to be performed without delay as the loss of thrust will result in a speed decay, which will take us towards the stall if allowed to continue. We first move the thrust levers forward to the Maximum Continuous Thrust (MCT) detent, in order to get all available power from the live engine, followed by turning off the Auto Thrust (A/THR).

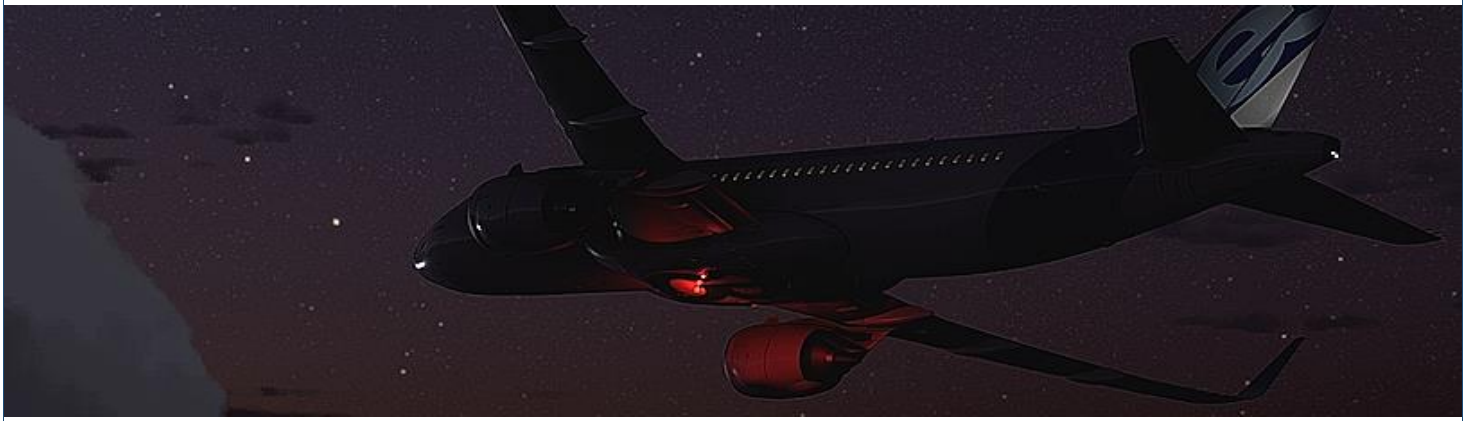
The descent to a lower level does not need to be rapid. We reduce our altitude in a controlled fashion. The aircraft flight computers will supply a new maximum altitude, known as out Engine Out Ceiling (EO Ceiling). We select this altitude in our FCU and pull the Altitude knob for Open Descent (OP DES). The thrust would normally come back to IDLE in this mode, but as we have turned off the A/THR, MCT power will persist. This method of descending to a lower ceiling is known as 'Driftdown'. This procedure allows us to Aviate and ensure the continued safe control of the aeroplane.

ENGINE FAILURE IN CRUISE	
MEMORY ITEM	
THRUST LEVERS	**MCT**
A/THR	**OFF**
FCU ALTITUDE	**SET EO CEILING AND PULL**
FCU SPEED	**300KTS**

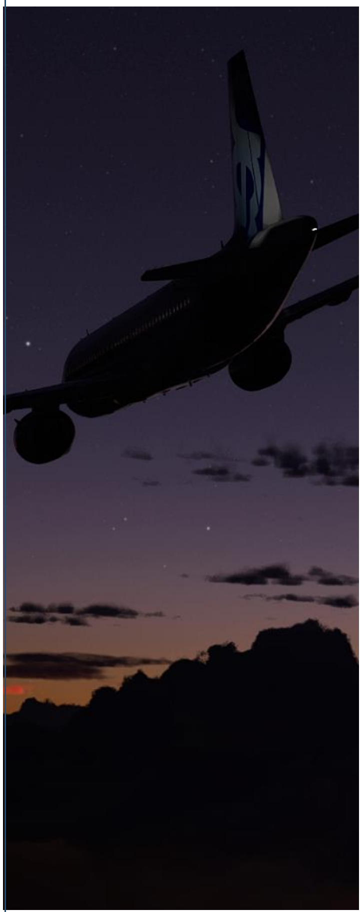
Once we have established in the descent, we will Navigate and Communicate. We may need to leave our flight planned route in order to avoid other traffic as we descend, which will be done in Heading (HDG) mode. We will also turn on the seatbelt signs to begin securing the cabin for our diversion.

Now that we are flying with only a single engine, we also only have a single generator running the aircraft systems. To improve redundancy, we will turn on the APU to supply additional backup to our electrical systems and to help share the load.

COMMANDER 08.
TEMPEST



A nightly occurrence in the European summer, fight your way between thunderstorms and achieve maximum climb performance to leap clear of the clouds and punch through to the clearer skies above. Sometimes, despite your best efforts, you are reminded that not everything is within your control.



Day or night, the summer season across Europe sees the skies scattered with thunderstorms, which present a serious safety hazard to passing aircraft. Storms are to be avoided at every opportunity as a thunder cell contains violent air currents that pose very real risks of damaging the aircraft and injuring its occupants.

The storm clouds themselves are usually easy to see and avoid. When passing between storm clouds expect some light turbulence. It is wise to reduce our cruising speed in order to give more safety margin from an overspeed condition if we do encounter gusts.

More difficult to avoid are lighting strikes, which can reach far and wide and tend to be attracted to the static-charged aircraft surfaces. As the aeroplane passes through the air, we gather static electricity across the metallic skin. Charge is evenly distributed across the many aircraft surfaces by bonding leads, which helps to reduce radio interference caused by sparks.

Even when clearing storms by some margin, lighting strikes can still occur if the atmospheric conditions dictate. This usually causes very little damage to the aircraft other than some light burn marks and minor denting to the fuselage. The surprise and loudness of the strike can be jolting and may cause concern amongst passengers, as we will see.

When communicating with the Cabin Crew in regards to an emergency situation, we continue to utilise structured formats. One such method is the NITS briefing:

NITS - WHEN THE COCKPIT CALLS THE CABIN

N	NATURE	Description of the situation
I	INTENTIONS	Intended plan of action
T	TIME	Landing time estimate
S	SPECIAL INSTRUCTIONS	Any special instructions such as securing the cabin

The cabin crew also have guidelines to ensure effective communication. Expect to hear the following information when receiving a call from the cabin:

WHEN THE CABIN CALLS THE COCKPIT

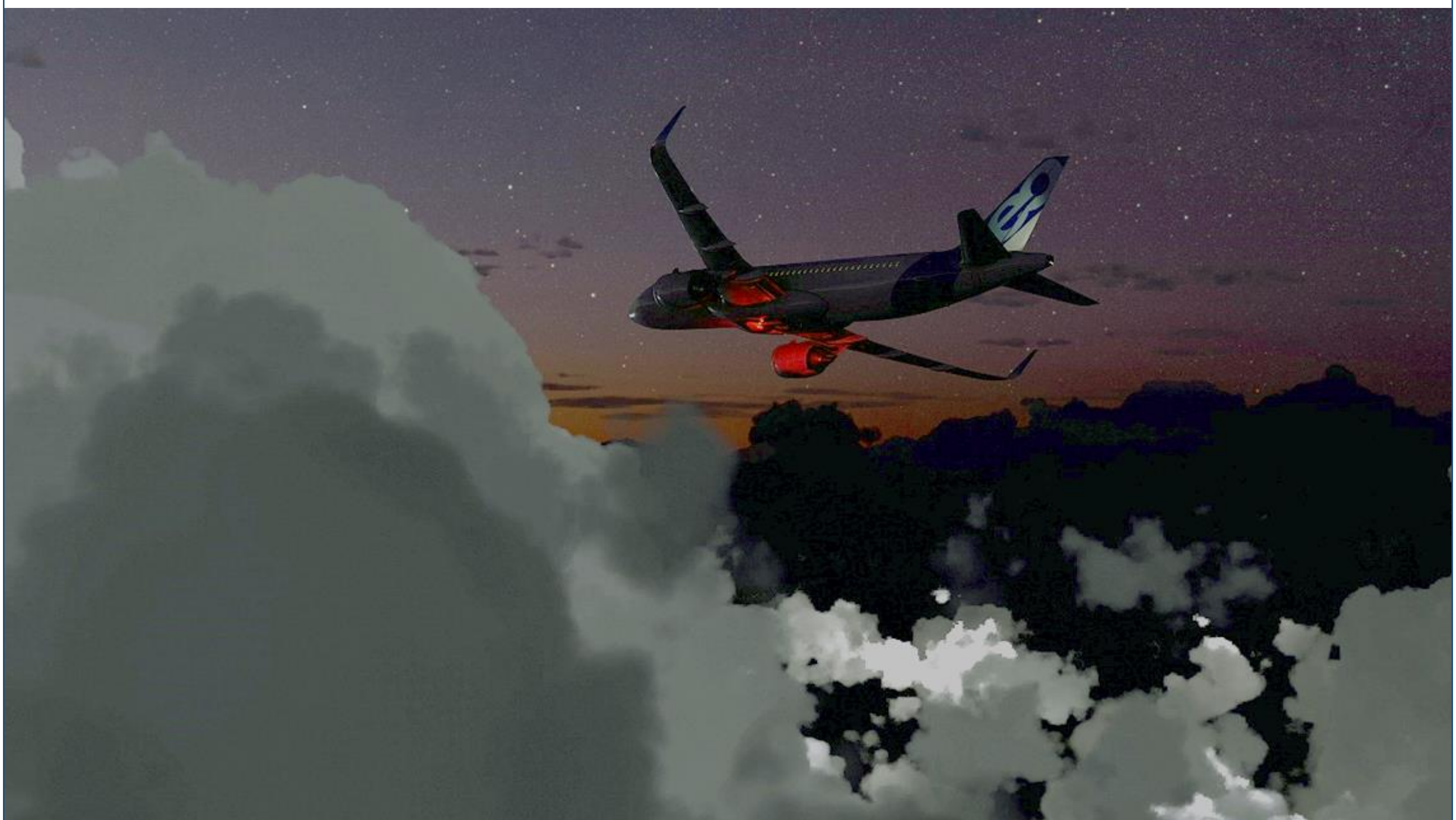
WHO is calling

WHERE they are calling from on the aircraft

WHY they are calling

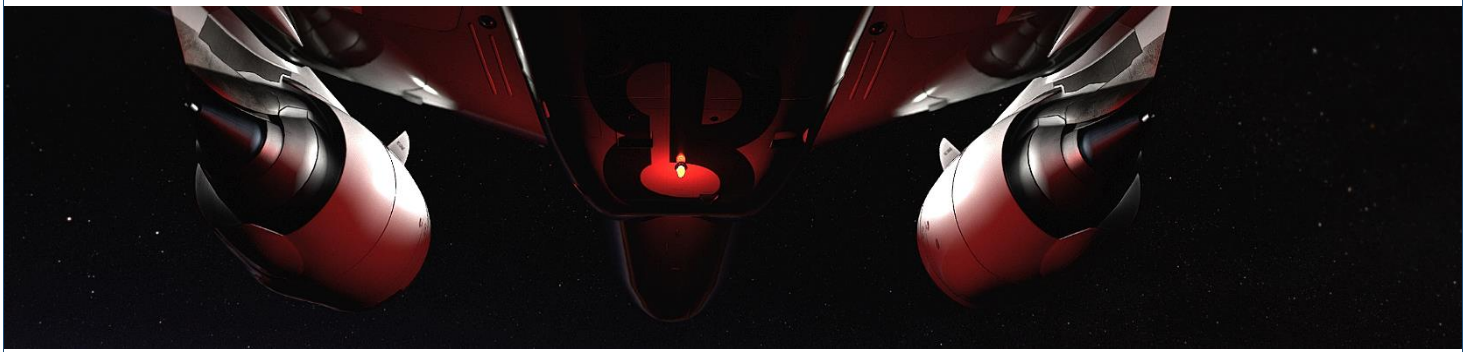
WHAT they are doing about the situation e.g. administering oxygen

WHEN we need to land e.g. request an immediate diversion for medical reasons



COMMANDER 09.

BRIMSTONE



A rapidly escalating situation develops onboard in the dead of night. Your engines begin to choke as the realisation sets in that you are engulfed within a dangerous cloud of volcanic ash. Run the real procedures to escape the area as you feel the full force of nature against you.

This scenario will escalate quickly, beginning with reports of a smoky smell in the cabin, followed by a smoke alarm activation. The Cabin Crew will investigate in case of an onboard fire, but the true cause will become apparent shortly after.

As with most scenarios, a procedure exists to help us deal with a volcanic ash encounter:

VOLCANIC ASH ENCOUNTER	
180 TURN	INITIATE
A/THR	OFF
THRUST	REDUCE
DESCENT	INITIATE
OXYGEN MASKS	DON
APU	START
ALL ANTI ICE	ON

When volcanic ash enters a jet engine, the heat of the combustion chambers melts the fine volcanic dust, which then rehardens as a glass-like material on the turbine blades. This changes the profile of the blades and reduces engine performance or causes an engine failure altogether.

By reducing thrust, and therefore engine temperatures, the glass cools and breaks free, restoring engine function. By starting a 180-degree turn, we hope to leave the ash cloud as soon as possible. Continuing until we reach the other side can be impossible, as the cloud can stretch for hundreds of miles. Advance warning to the presence of ash is supplied by forecasting only as the weather radar will not pick up the extremely fine particles.

In addition to the running of the volcanic ash procedure, we will look at an escalating situation in the cabin, where initial diagnosis can be difficult to achieve.

Damage following an ash encounter can be extensive. The particles are very abrasive and flight times of only modest duration can be enough to scratch windscreens opaque and remove paint from the fuselage.

COMMANDER 10.

MIRACLE

An authentic recreation of US Airways Flight 1549. Based on the official NTSB report, experience for yourself the time-critical decision making that was required of the crew in the cold January skies above New York. Combined with true to life weather, aircraft configuration, passenger loads, cockpit communications and ATC recordings, this is a fascinating look at the Miracle on the Hudson, but this time you are in the Captain's seat.

On a cold January morning, US Airways Flight 1549 is taxiing out from New York's LaGuardia airport in preparation for takeoff. You will be transported to the Captain's seat so that you can see for yourself the intensity of the situation that the crew of Flight 1549 experienced.

We have used true to life parameters to recreate the time, date, aircraft configuration, passenger load, weather conditions and flight path as accurately as possible within Flight Simulator. This is accompanied by real ATC communications and authentic cockpit alerts, all based upon the official NTSB reports.

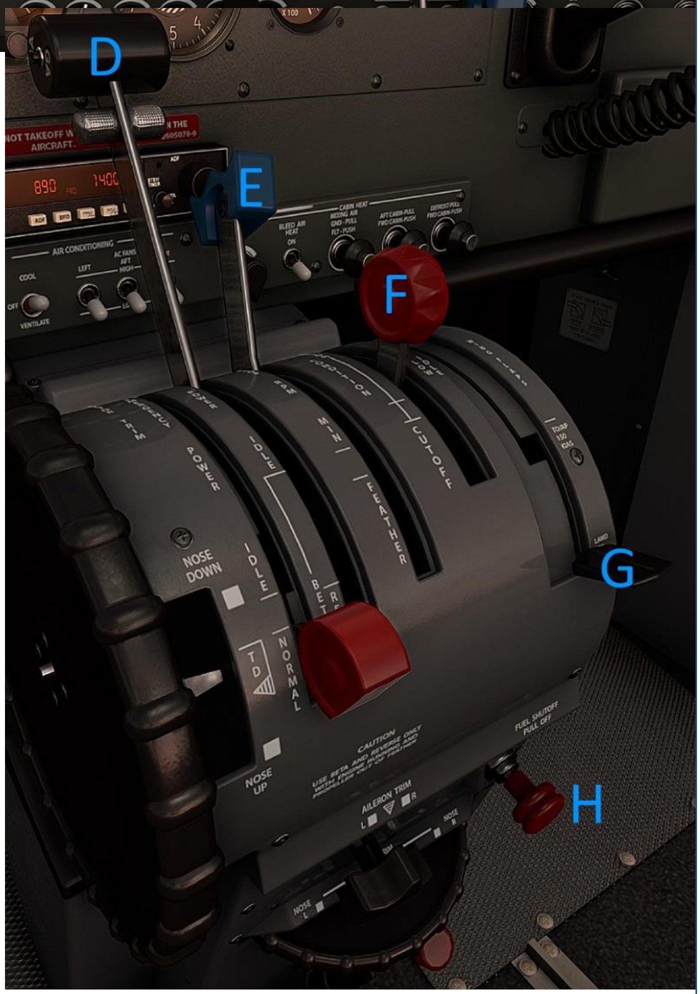
After takeoff, follow the Flight Director to make a left turn to HDG360 (North).

Strive for a smooth touchdown on the water to avoid triggering a 'crash'. If performed correctly, the aircraft will land and float on the river.

The key items you will need to perform to recreate the crew's actions will be listed in the Objectives Panel onscreen and are summarised below:

	ALL ENGINE FAILURE (DITCHING)
ENG MODE SEL	**IGNITION**
APU	**MASTER ON + START**
THRUST LEVERS	**IDLE**
FLAPS	**2**

COCKPIT – C208



A BATTERY MASTER
ON/OFF

Controls main battery power

B FUEL BOOST
ON/NORM/OFF

Supplies extra fuel pressure to help restart engine.

C STARTER
START/OFF/MOTOR

Controls engine starter. Use START to attempt a restart.

D POWER LEVER

Primary control for engine power.

E PROP LEVER

Adjusts propeller angle to change how much 'bite' the propeller takes.

Pull fully back beyond the Minimum (MIN) range to 'feather' the propeller, where the blades are angled fully back to reduce drag to a minimum after an engine failure.

F FUEL CONDITION
HIGH IDLE/LOW IDLE/CUTOFF

Adjusts fuel flow to the engine. We will use LOW IDLE for normal operations.
Pull fully back to CUTOFF if requested by engine failure procedure.

G FLAPS HANDLE
UP/TO APR/LAND

Takeoff and approach conducted with TO/APR.
LAND may reduce go-around climb performance considerably.

H FUEL SHUTOFF
ON/OFF

Pull to shut off fuel supply to engine.

COMMANDER 11.
WINDSHEAR

A last-minute windshear alert from our Cessna 208 throws our arrival into Guernsey into jeopardy. Make your own choice of whether you reattempt the approach or to conserve fuel and head for your alternate immediately.

The weather forecast for Guernsey, our destination, is poor. Strong winds are predicted to be flowing over the hillsides and coastline, which will likely produce turbulent conditions. When a very rapid change in wind speed and/or direction occurs, it can cause severe stability issues and is known as 'Windshear'. Windshear represents a significant hazard to air traffic and we must remain vigilant and be on the lookout for it.

Aircraft systems have been developed to predict windshear and detect its presence. If a Windshear scenario is perceived, a "WINDSHEAR WINDSHEAR" audio alert will sound. This mandates a go-around be performed, in order to safely climb away. But this is not the end of the story…

You are now faced with a choice. We have taken extra fuel due to the poor weather conditions, but fuel reserves are not unlimited. We can either re-attempt a landing in Guernsey, leaving us with only fuel to divert to our alternate Jersey, or we can divert immediately and arrive at Jersey with extra fuel in case we encounter trouble there also. The journey time between Guernsey and Jersey is approximately 10 minutes.

The decision will be yours to make. From this point onwards in COMMANDER, you have more autonomy and authority over your decisions, as we develop your skills to an even higher degree.

COMMANDER 12.

HIGH ROLLER

Now that the weather has cleared, we depart Jersey to reattempt our arrival into Guernsey. At some point between takeoff and landing a random scenario will be generated, leaving you to deal with the situation alone. Use everything you have learnt and roll the dice in this unique experience.

Having diverted to Jersey in the previous lesson due to Windshear, the weather has since improved. We now are going to reattempt landing in Guernsey. At some point between takeoff and landing a randomly selected failure will be triggered. Possible failed systems include engine failure, tyre burst, flap jam and pitot blockages. Some failures also have multiple outcomes, such as whether a flap will recover movement after recycling the flap lever, or not.

It is up to you to employ your new Commanders skillset and calmly Aviate, Navigate and Communicate as you deem necessary. If a checklist for your procedure exists then it will be shown onscreen in the Objectives Panel, so be sure to have this displayed. You will not be guided towards a decision but should decide upon a plan of action that ensures a safe outcome.

End your scenario whenever you wish by returning to the main menu, or press Restart to fly again with a different randomly selected failure.

MISSION ACCOMPLISHED

...or is it?

Completing COMMANDER is just the beginning. Now you have the knowledge and skillset to deal with failure scenarios and to make challenging decisions, you are ready to take on whatever comes your way.

If you take only one learning point from COMMANDER, let it be this:

AVIATE NAVIGATE COMMUNICATE

Failures can happen at any time and in any aircraft. It could be the dead of night in a light prop or as you battle down the approach on a gusty day in a heavy jet. In any case, keeping a structured and disciplined methodology will serve you well and will maximise your capacity to deal with any eventuality. All of the techniques you have learnt here are real and will benefit you for years to come wherever your flying career takes you.

Please note that online flying services such as VATSIM or IVAO do not allow practicing of emergencies when flying on their servers.

We very much hope that you have enjoyed COMMANDER and can now feel confident in dealing with your own emergency scenarios.

Congratulatons, Commander.

WHERE NEXT?

FS ACADEMY *JETLINER*

Want to learn more about airliner operations? Made by a real A320 Captain, learn how to fly and operate the Airbus A320 in this dedicated training pack. We cover a full flight from taxi-out to taxi-in plus more emergency scenarios such as rejected takeoff, depressurisation and engine failure on takeoff. Get more familiar with the FMGC and FCU and experience autopilot operation and descent management.

FS ACADEMY *IFR*

Dealing with failures is only part of the role of Commander. Gain your virtual Instrument Rating and learn how to keep the show on the road when the weather rolls in. We cover authentic procedures for VOR and NDB tracking, flight on instruments alone, compass turns, ILS approaches, holding pattern entries and more in both analogue and glass cockpit equipped aircraft.

FS ACADEMY *VFR*

Learn how to operate a light aircraft from takeoff to landing, including handling exercises, entering the airfield circuit and overhead joins. Go back to basics and get the fundamentals right.

FS ACADEMY *NAVIGATOR*

Leave the shackles of the airfield circuit behind and stretch your wings by embarking upon VFR navigation flights. Navigate with map and stopwatch across varied landscapes across the world ranging from New Zealand to California. Starting with simple landmark-based routes, we will introduce the effects of wind drift and cover the method for monitoring and correcting your tracking, plus covering night-time navigation and winter flying.

FS ACADEMY *VOYAGER*

Tackle full-length bush trips in this series of seven journeys across glorious locations from around the world. All with Jeppesen charts and fully prepared NavLogs, plus an expansive manual to boost your VFR skills even further.

fsacademy.co.uk

ABBREVIATIONS

AED	Automatic Electronic Defibrillator
AFM	Aircraft Flight Manual
AGL	Above Ground Level
AI	Attitude Indicator
AMSL	Above Mean Sea Level
AP	Autopilot
APU	Auxiliary Power Unit
ASI	Airspeed indicator
ATC	Air Traffic Control
A/THR	Auto Thrust
ATIS	Automatic Terminal Information Service
CDI	Course Deviation Indicator
CRM	Crew Resource Management
CM	Cabin Manager
ECAM	Electronic Centralised Aircraft Monitoring
EFIS	Electronic Flight Instrument System
ETA	Estimated Time of Arrival
E/WD	Engine/Warning Display
FCU	Flight Control Unit
FCOM	Flight Crew Operating Manual
FD	Flight Director
FG	Fog
FL	Flight Level
FLX	Flexible takeoff power
FMA	Flight Mode Annunciator
FMGC	Flight Management Guidance Computer
FPM	Feet per Minute
GPWS	Ground Proximity Warning System
HDG	Heading
HSI	Horizontal Situation Indicator
IAS	Indicated Airspeed
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INOP	Inoperative
KM	Kilometres
KTS	Knots

LT	Local Time
LVO	Low Visibility Operations
LVP	Low Visibility Procedures
MCDU	Multifunction Control and Display Unit
MCT	Maximum Continuous Thrust
MSFS	Microsoft Flight Simulator
MSL	Mean Sea Level
ND	Navigation Display
NEO	New Engine Option (A320)
NM	Nautical Mile
NTSB	National Transportation Safety Board
OAT	Outside Air Temperature
OEI	One Engine Inoperative
OP CLB	Open Climb
OP DES	Open Descent
PAX	Passengers
PFD	Primary Flight Display
PIC	Pilot in Command
POB	Persons Onboard
POH	Pilot's Operating Handbook
QNH	Air Pressure at Sea Level
QRH	Quick Reference Handbook
RAF	Royal Air Force
RPM	Revolutions per Minute
RTO	Rejected Takeoff
TAS	True Airspeed
TCAS	Traffic Alert and Collision Avoidance System
TOGA	Takeoff/Go-Around
TRK	Track
U/S	Unserviceable
UTC	Coordinated Universal Time
VA	Volcanic Ash
VFR	Visual Flight Rules
VSI	Vertical Speed Indicator
WS	Windshear
WXR	Weather Radar
XPDR	Transponder