

# Concorde FXP

## *Cold & Dark Startup*

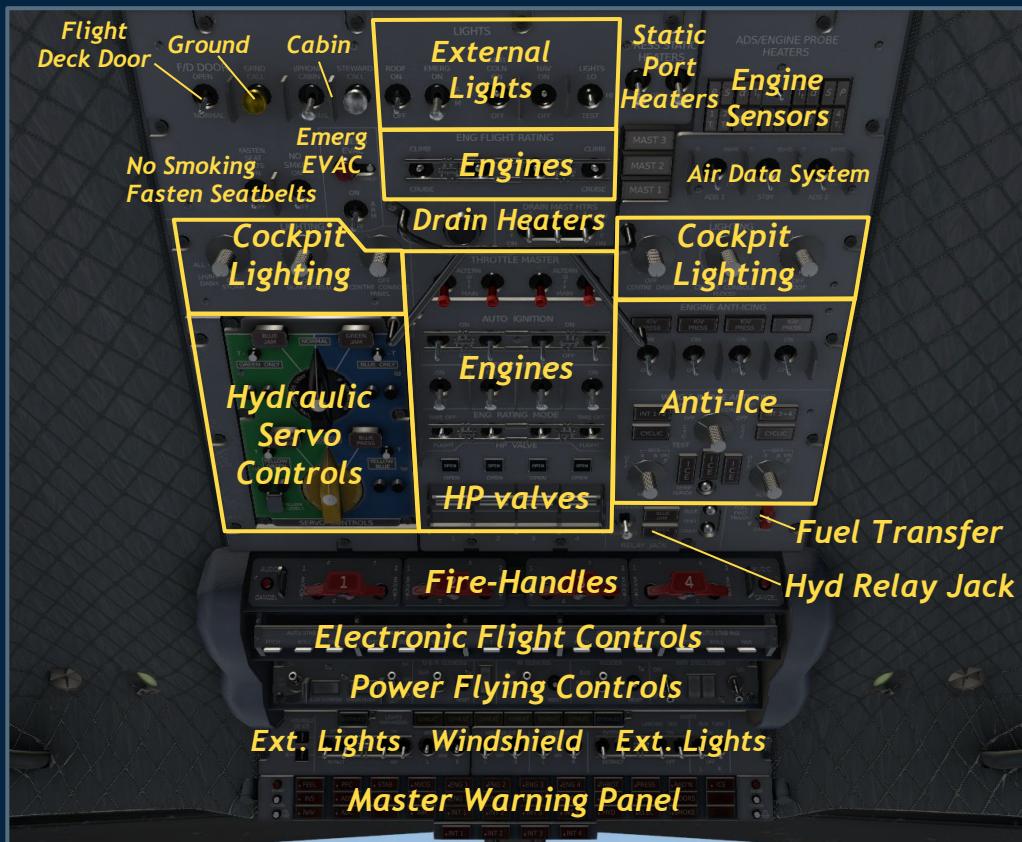


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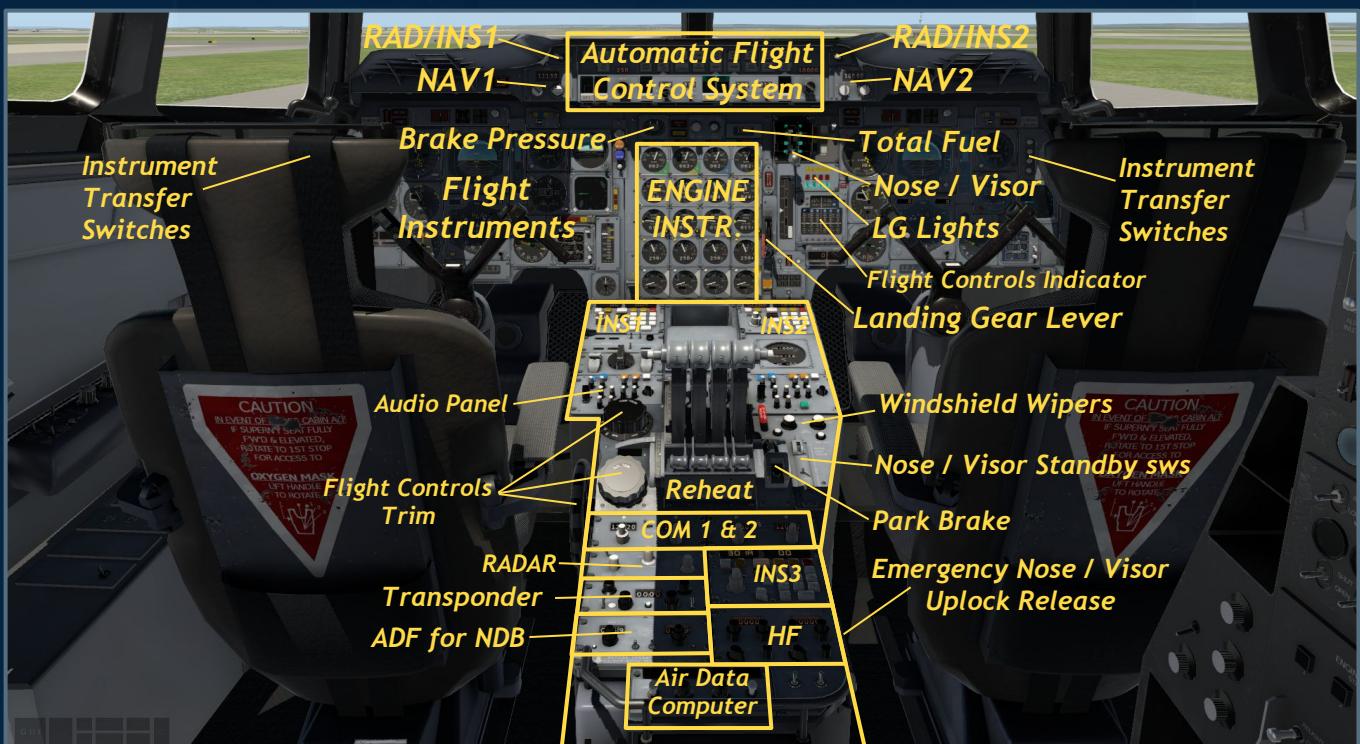
# Cold & dark startup

procedure requires interactions all over the cockpit.  
Hence here's an overview of the involved areas:

## ROOF PANEL



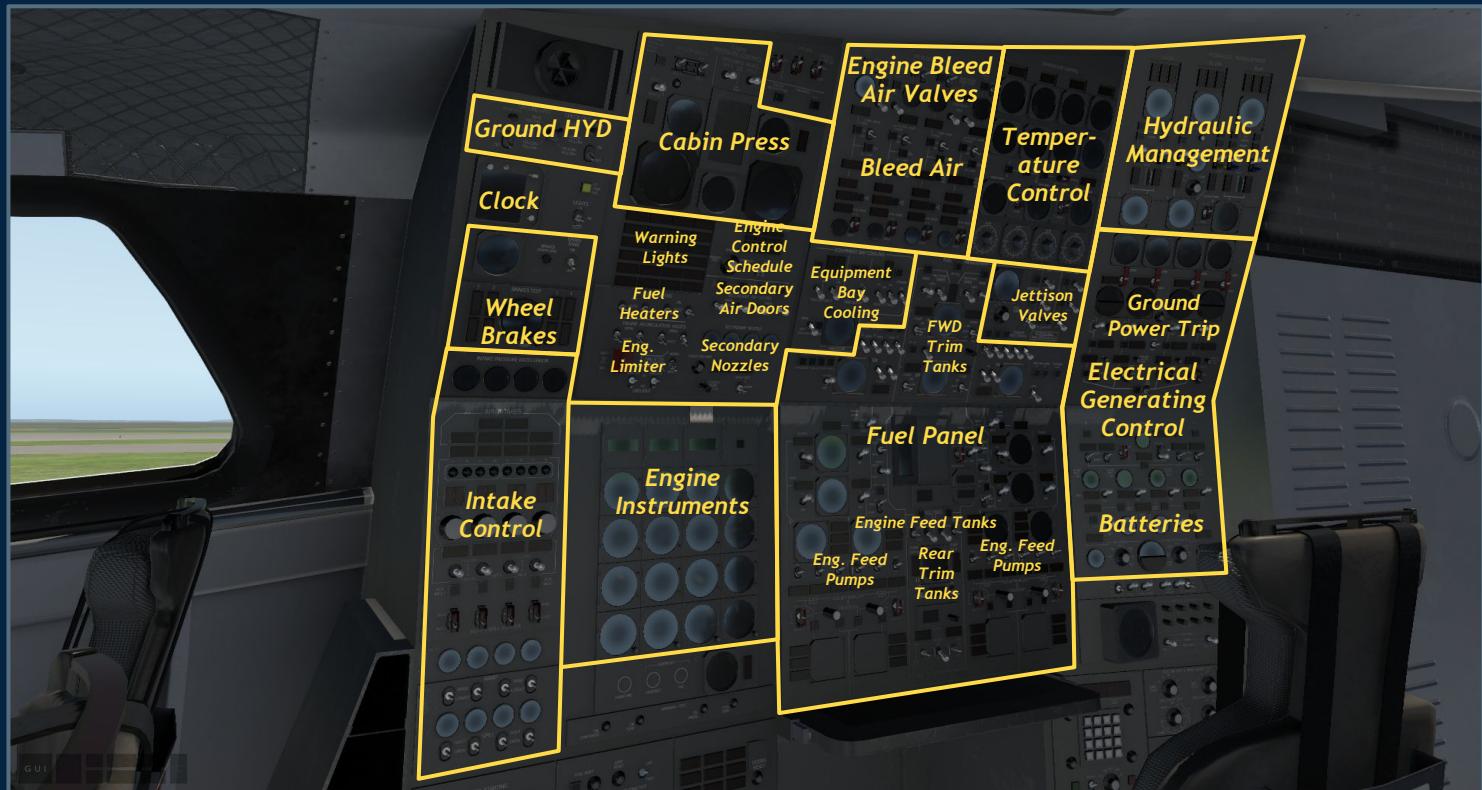
## FRONT PANEL & CENTER CONSOLE



# Engineering panel

Startup involves many switches on the Engineering panel.

## UPPER PANEL



## LOWER PANEL



## **Teamwork:**

Starting up such a complex and powerful machine like Concorde, most of the time in a busy airport environment, requires a high degree of professionalism and efficient collaboration between all involved personal on the ground, in the cabin and in the cockpit.

Safety must be number one priority.

The now following checklists are scheduled after all the outside ground checks are passed and the preflight scan of the cabin and cockpit are completed.

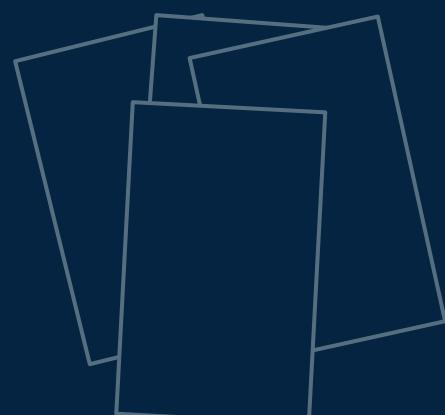
These checklists are part of the 'Normal Checklists'.

'Abnormal' and 'Emergency Checklists' are not listed here.

This pdf contains details on all the checklists from 'Cold & Dark startup' up to the point where the aircraft stands on the runway, ready for takeoff on 3, 2, 1, now.

Contained checklists:

- +SAFETY CHECKLIST
- +PRELIMINARY COCKPIT CHECKLIST
- +BEFORE START CHECKLIST
- +ENGINE START CHECKLIST
- +BEFORE PUSHBACK CHECKLIST
- +BEFORE TAXI CHECKLIST
- +TAXI CHECKLIST
- +BEFORE TAKEOFF CHECKLIST



## SAFETY CHECKLIST

BRAKES.....	PARK
YOKE, THROTTLE, RUDDERS .....	SAFE
PEDAL ADJUSTMENT .....	LOCK
PREFLIGHT SCAN .....	CHECK
BOARDING AND RACKING AREA AND ROOF LTS .....	GUARDED
LANDING GEAR STBY LEVER .....	GUARDED
TRANSPOUNDER .....	STBY
RADAR .....	OFF
EMERGENCY NOSE / VISOR UNLOCK RELEASE.....	DOWN / PIN ENGANGED
NOSE AND VISOR STBY CONTROL .....	OFF / GUARDED
LANDING GEAR NORMAL LEVER .....	DOWN
GEAR O/RIDE .....	GUARDED
VISOR / NOSE LEVER .....	AS REQD
AUTO IGNITION sws .....	OFF
ADS / ENGINE PROBE HEATERS .....	OFF
WING / INTAKE ANTI-ICING TEST .....	OFF
FUEL FWD TRANS sw .....	GUARDED
TRIM TRANS AUTO MASTER sw .....	OFF / GUARDED
TANK11 INLET VALVES sws .....	AUTO / OFF
STANDBY INLET VALVES sws .....	SHUT
TRIM PIPE DRAIN sw .....	SHUT
JETTISON PANEL COVER .....	CLOSED
RAM AIR TURBINE sels .....	GUARDED
W / SHIELD EMERG DE-ICE sws .....	OFF / GUARDED
CIRCUIT BREAKERS .....	SET

## SAFETY CHECKLIST -1-

An aircraft is a working place with changing crews, bigger and smaller maintenance work done between different flights, in and outside the cockpit, out of schedule cockpit visits of passengers and others etc.

Nearly all involved people are highly trained professionals that are well aware of safety and responsibility. Being part of this complex collaboration yourself, before every flight, one should ask if he/she in safe flight conditions him / herself.

Nevertheless the well justified thrust in the work of the colleagues one must always have an eye on safety first in his own working environment.

1. Check visually if the main controls are physically ok, free and in the position where they are meant to be.

<b>BRAKES</b> .....	<b>PARK</b>
<b>YOKE, THROTTLE, RUDDERS</b> .....	<b>SAFE</b>
<b>PEDAL ADJUSTMENT</b> .....	<b>LOCK</b>
<b>PREFLIGHT SCAN</b> .....	<b>CHECK</b>
<b>BOARDING AND RACKING AREA AND ROOF LTS</b> .....	<b>GUARDED</b>
<b>LANDING GEAR STBY LEVER</b> .....	<b>GUARDED</b>
<b>TRANSPOUNDER</b> .....	<b>STBY</b>
<b>RADAR</b> .....	<b>OFF</b>
<b>EMERGENCY NOSE / VISOR UNLOCK RELEASE</b> .....	<b>DOWN / PIN ENGANGED</b>
<b>NOSE AND VISOR STBY CONTROL</b> .....	<b>OFF / GUARDED</b>
<b>LANDING GEAR NORMAL LEVER</b> .....	<b>DOWN</b>
<b>GEAR O/RIDE</b> .....	<b>GUARDED</b>
<b>VISOR / NOSE LEVER</b> .....	<b>AS REQD</b>

## SAFETY CHECKLIST -2-

Ok. First step done.

😊 It wouldn't be very pleasant to discover shortly before takeoff that one of the yokes is not mounted and a forgotten smartphone is blocking the brake pedals movement... The Next steps.

<b>AUTO IGNITION sws</b>	.....	<b>OFF</b>
<b>ADS / ENGINE PROBE HEATERS</b>	.....	<b>OFF</b>
<b>WING / INTAKE ANTI-ICING TEST</b>	.....	<b>OFF</b>
<b>FUEL FWD TRANS sw</b>	.....	<b>GUARDED</b>

The switches for these four checklists items are on the roof panel. Check:

- +Automatic engine ignition is off on all 4 engines. It is switched on later after engine startup.
- +Air Data System and the probe heaters are in there OFF position, we engage them after engine start.
- +The anti icing systems are safe
- +Fuel forward transfer. More on that on the next page



## SAFETY CHECKLIST -3-

The switches for the following items are located on the Engineering panel.

<b>TRIM TRANS AUTO MASTER sw .....</b>	<b>OFF / GUARDED</b>
<b>TANK11 INLET VALVES sws .....</b>	<b>AUTO / OFF</b>
<b>STANDBY INLET VALVES sws .....</b>	<b>SHUT</b>
<b>TRIM PIPE DRAIN sw .....</b>	<b>SHUT</b>
<b>JETTISON PANEL COVER .....</b>	<b>CLOSED</b>
<b>RAM AIR TURBINE sels .....</b>	<b>GUARDED</b>
<b>W / SHIELD EMERG DE-ICE sws .....</b>	<b>OFF / GUARDED</b>
<b>CIRCUIT BREAKERS .....</b>	<b>SET</b>

With a maximum of 95 tonnes of fuel on board, around half of the aircraft's weight, the fuel mass and its location is of crucial importance for Concorde. Furthermore around a third of this large weight is in the 'Trim tank' meaning that can change its location drastically changing the aircraft's balance significantly.

Overviewing this is one of the core tasks of the Flight Engineer.

The first items in this area are:

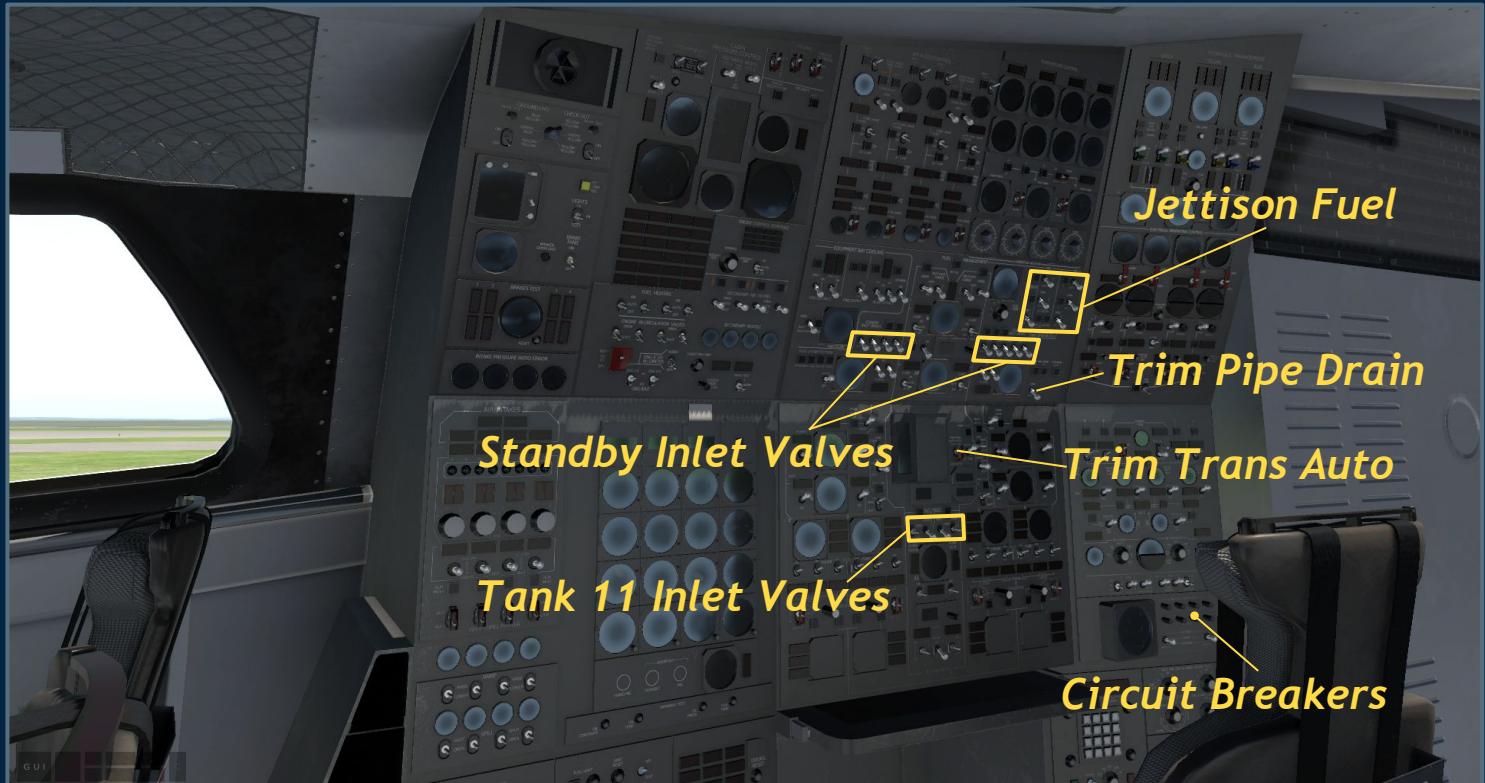
+Fuel forward trans switch (on the previous page) on the roof panel. We don't want tonnes of fuel in a wrong position accidentally influencing the important CG location

+TANK 11 INLET VALVES. That is the trim tank located in the aft cone of the jet. It can contain 10.5 tonnes of fuel at a significant distance (large momentum) from the tipping point of the aircraft (the main wheels). Make sure it's inlet valves are shut. We want this mass stable currently.

+There is personal working on or near the jet during ground procedures. We want them to be safe.

Furthermore we want the jet's systems in there start position. So: RAM AIR TURBINE - GUARDED (it's integrated in the actuator fairing of the main elevon in the left wing), fuel jettison panel safe, drains safe etc.

## ENGINEERING PANEL



## LOWER LEFT ENGINEERING PANEL



## JUMP SEAT



**SAFETY CHECKLIST ---COMPLETED---**

## PRELIMINARY COCKPIT CHECKLIST

TECHNICAL LOG .....	CHECK
GROUND POWER .....	ON
MAIN BATTERIES .....	ON
EQUIPMENT BAY COOLING PANEL .....	CHECK / SET
OXYGEN PANEL .....	CHECK / SET
DRAIN MAST HEATERS .....	CHECK / SET
INS 1, 2 & 3 .....	Select ALIGN, TEST
AIR DATA COMPUTERS .....	ON
EMERGENCY EQUIPMENT .....	CHECK
NO SMOKING SIGN .....	ON
FASTEN SEATBELTS SIGN .....	ON

FASTEN SEATBELTS SIGN .....	ON
NO SMOKING SIGN .....	ON

# PRELIMINARY COCKPIT CHECKLISTS -1-

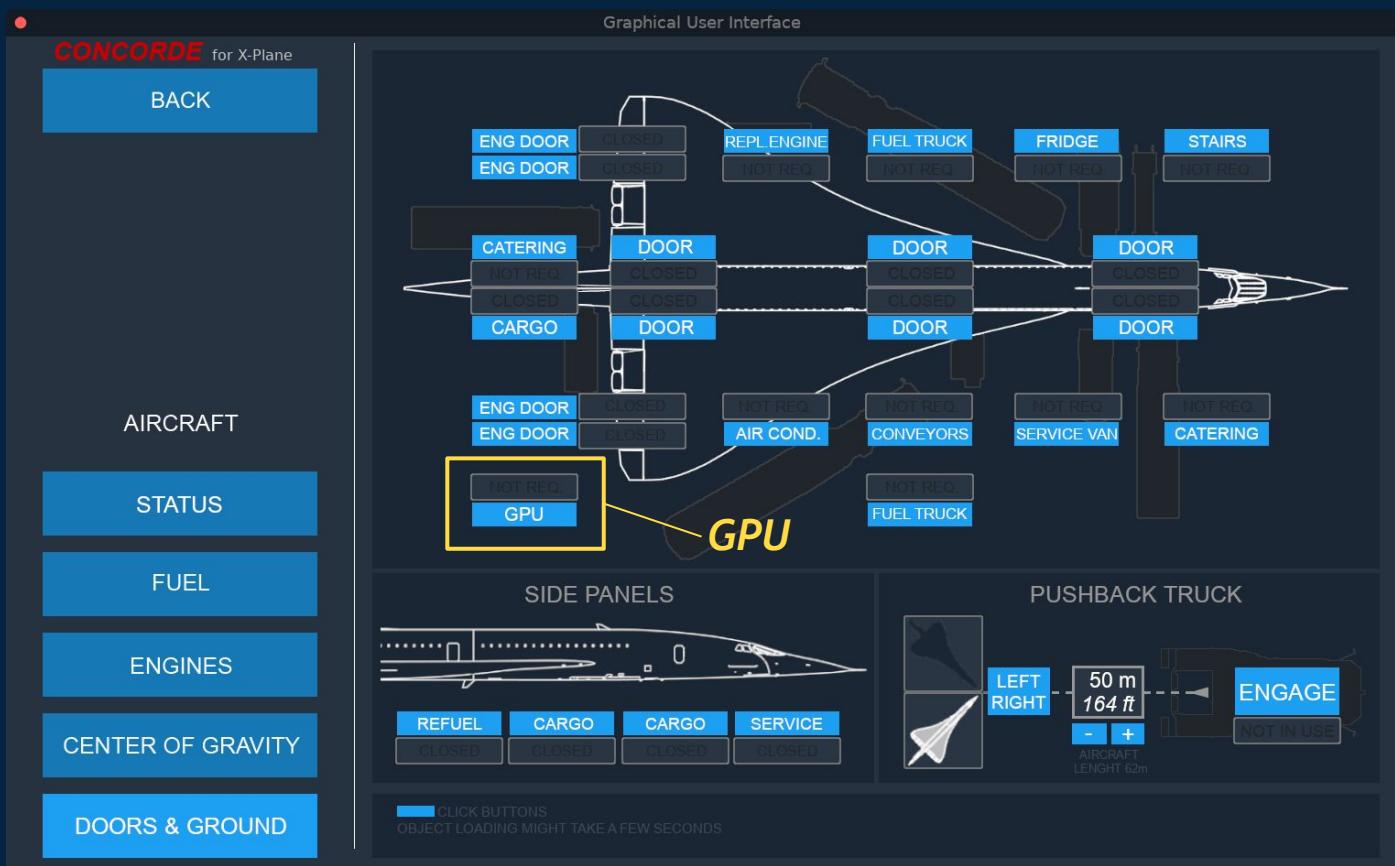
This checklists involves items all over the cockpit.

TECHNICAL LOG .....	CHECK
GROUND POWER .....	ON
MAIN BATTERIES .....	ON

+TECHNICAL LOG: Before starting up the systems we check the aircrafts technical log. Are there some notes about malfunctions on the last flights, extraordinary maintenance requirements or even missing secondary parts?

+GROUND POWER is required as external source for electric power and bleed air. It can be engaged via the Graphical User Interface.

AIRCRAFT -> DOORS & GROUND -> GPU



+MAIN BATTERIES .... ON: This initiates a 30 second long automatic system startup and self check procedure. You will see how the cockpit instruments are checked for correct functionality.

After this self check the core systems and instruments are up and running and can be used for further procedures.



## PRELIMINARY COCKPIT CHECKLISTS -2-

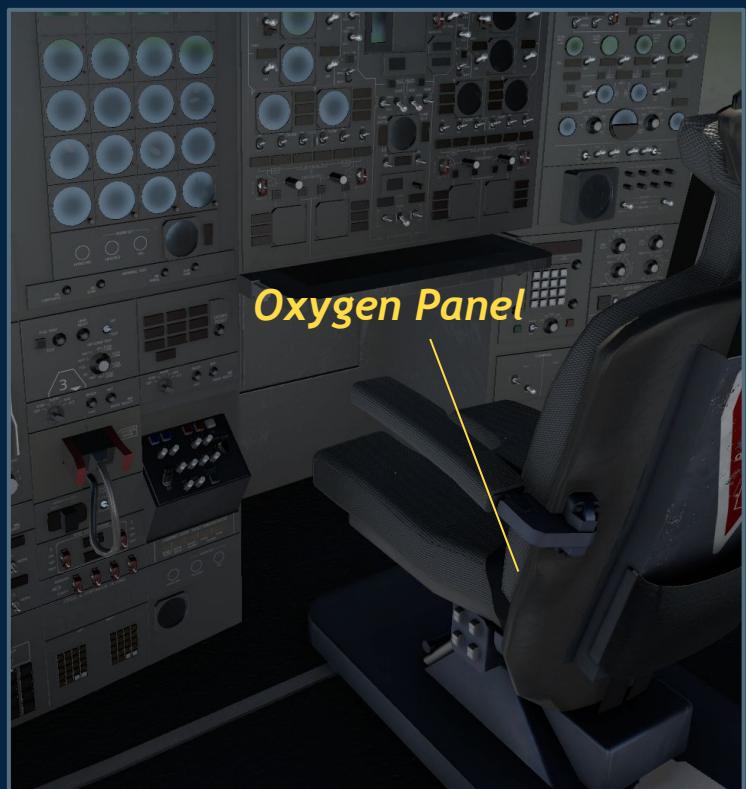
EQUIPMENT BAY COOLING PANEL .....	CHECK / SET
OXYGEN PANEL .....	CHECK / SET

+The Equipment Bay must be cooled containing many electrical power consuming systems. Electricity that is converted into heat.

+The oxygen panel is located very low at the right foot of the Flight Engineer



**ENGINEERING PANEL**



# PRELIMINARY COCKPIT CHECKLISTS -3-

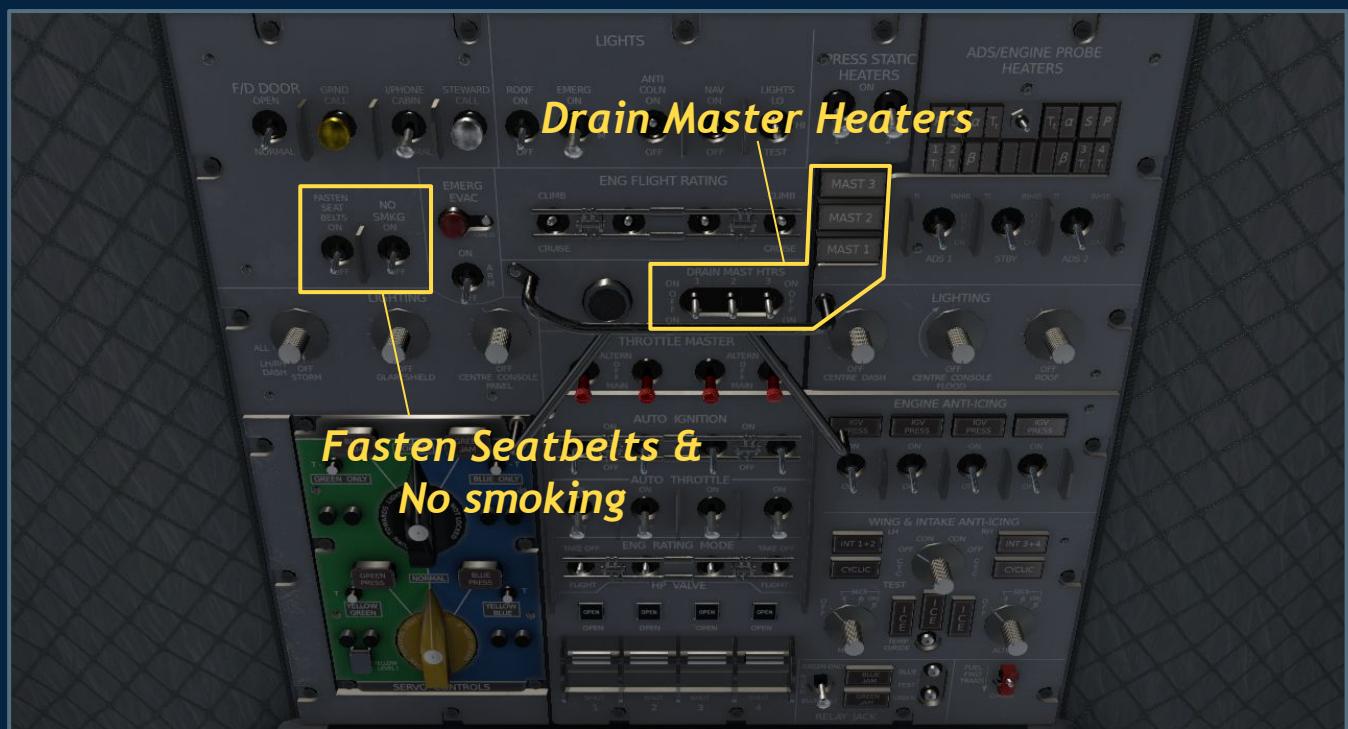
Now we come to a switch on the roof panel

DRAIN MAST HEATERS .....	CHECK / SET
NO SMOKING SIGN .....	ON
FASTEN SEATBELTS SIGN .....	ON

+The Drain Master Heaters are required since Concorde climbs high into very cold air. The drain pipes could ice up and stop working in certain conditions. Set as required.

+NO SMOKING & FASTEN SEATBELTS signs on. Passengers should now take there seats and have time to prepare.

## ROOF PANEL



## PRELIMINARY COCKPIT CHECKLISTS -4-

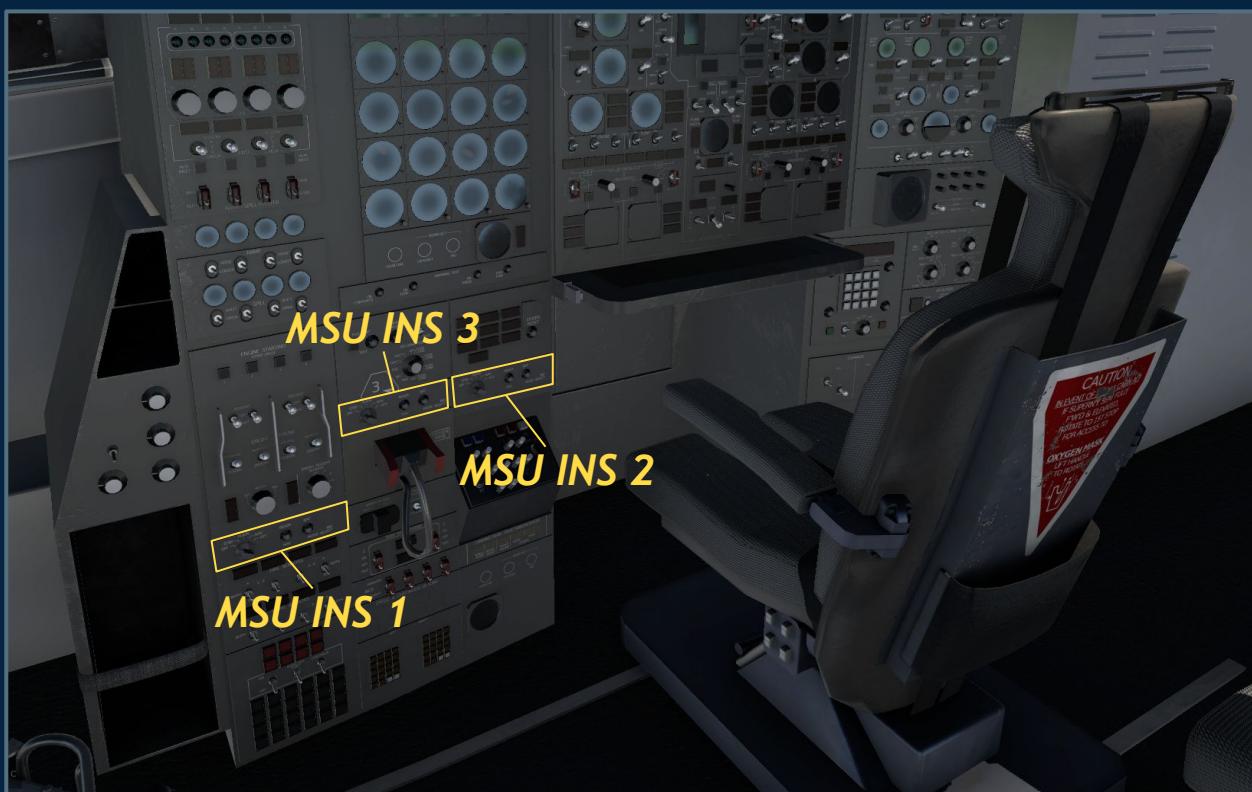
Back to the Engineering panel.

INS 1, 2 & 3 ..... Select ALIGN, TEST

INS 1, 2 & 3 ..... Select ALIGN, TEST

We engage the main navigation systems, the three INS's. First the INS's must achieve operating temperature and then they must perform the automatic alignment process. The switch is on the Mode Selector Units MSU. The time the alignment process takes depends on the aircraft position on the earth's surface. The nearer to the equator the jet stands, the less time is required. A common alignment time is around 10 minutes.

### ENGINEERING PANEL



# PRELIMINARY COCKPIT CHECKLISTS -5-

On the Center Console.

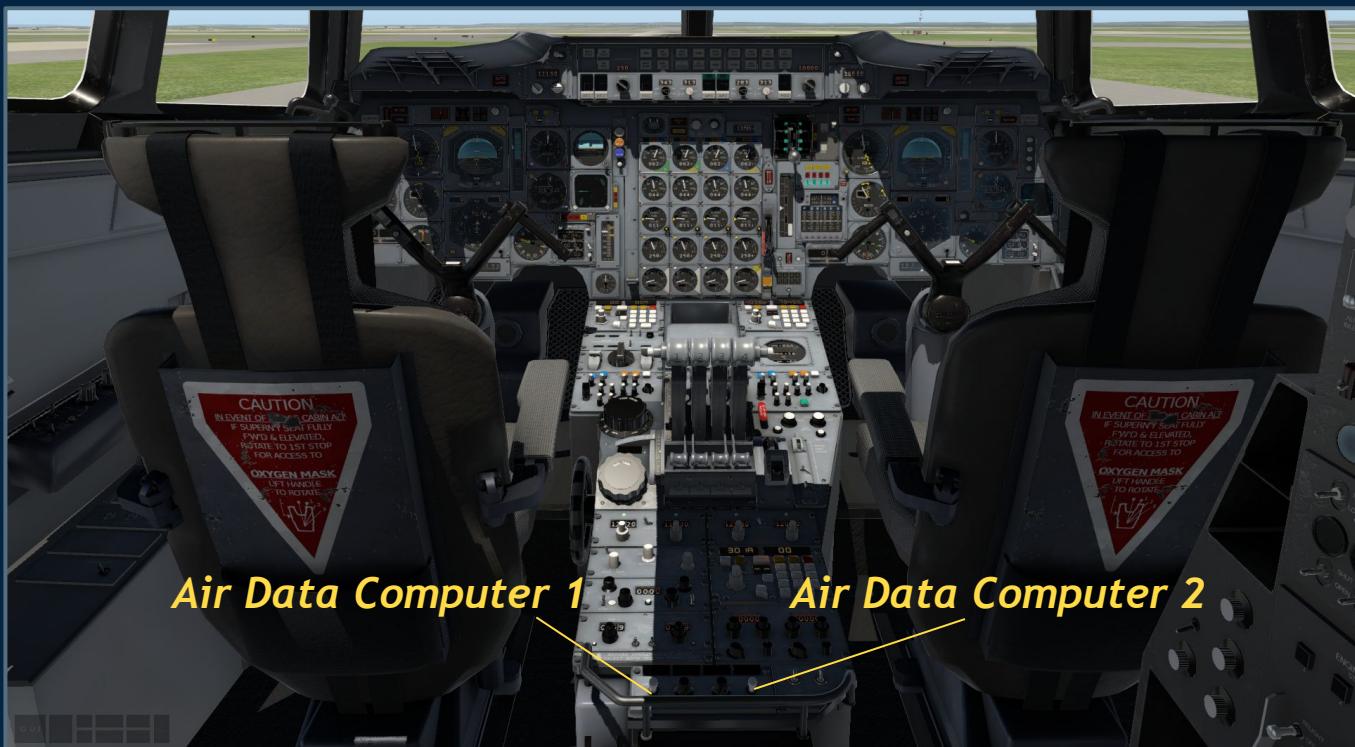
**AIR DATA COMPUTERS ..... ON**

**PILOT DAILY CHECKS ..... ON**

Concorde comes with two independent Air Data Systems that are supplied by two Air Data Computers.

The computers convert sensor inputs to useful data for the other systems. ADC is the datasource for many instruments and digital systems.

## **CENTER CONSOLE**



**EMERGENCY EQUIPMENT ..... CHECK**

**PILOT DAILY CHECKS ..... CHECK**

Last Item on this checklist is the emergency equipment.

**PRELIMINARY COCKPIT CHECKLIST ---COMPLETED---**

## BEFORE START CHECKLIST

MASTER CBs..... SET / CHECKED ... ALL  
COCKPIT PREPARATION / SECURITY ..... COMPLETE  
OXYGEN ..... CHECKED 100% ... ALL  
DV WINDOWS ..... CLOSED .... CP  
FLIGHT CONTROL INVERT.S ..... ON ..... P  
FLIGHT CONTROL AUGMENT. SYS..... ON ..... P  
ANTI-STALL SYSTEMS ..... ON ..... P  
RAD / INS sws ..... RAD..... CP  
INSTRUMENT TRANSFER sws ..... SET..... CP  
ALTIMETERS..... CHECKED / SET ... ALL  
AUDIO PANEL COM 1 ..... ON ..... ALL  
NAV RADIOS ..... SET ..... ALL  
BRAKES ..... PARK / CHECKED ... PE  
NAV LIGHTS ..... AS REQUIRED ..... E  
THROTTLE MASTERS..... MAIN / ALTERN ..... E  
GROUND HYD. CHECK OUT ..... YELL, YELL / OFF .... E  
FUEL HEATERS ..... AUTO ..... E  
ENGINE RECIRC VALVES ..... SHUT ..... E  
Secondary Air Doors  
+Takeoff with Reheat ..... AUTO ..... CE  
+Takeoff WITHOUT RH ..... SHUT ..... CE  
BATTERIES ..... ON / Normal ..... E

INS 1, 2 & 3	CHECK READY NAV LIGHT ON	E
INS 1, 2 & 3	COMPARE PRESENT POS TO BOOK	CHECK ALL
INS 1, 2 & 3	WAYPOINT COORDINATES	CHECK ALL
INS 1, 2 & 3	DME	CHECK CP
CONFIRM	'READY FOR NAV'	CPE
INS 1, 2 & 3	NAV	E
INS 1, 2 & 3	READY NAV LIGHT OFF	E
INS 1, 2 & 3	LOADING	CHECKED ALL
ASI BUGS & PITCH INDEX	SET	ALL
FUEL FLOW BUGS	SET	ALL
CLOCK	SET	ALL
THROTTLE LEVER INDICES	SET	ALL
BRIEFING	STATED	C
<hr/>		
LOADSHEET	CHECKED	ALL
ZFW & ZFCG	SET / CHECKED	EC
FUEL REMAINING & A/C WEIGHT	SET / CHECKED	ALL
LOAD LIMITS	SET	E
T.O. DATA	CHECKED	ALL
START CLEARENCE	OBTAIN	P
DOOR LIGHTS	CHECKED	E
MASTER WARNING	TEST	C
ANTI - COLLISION LIGHTS	ON	E
THROTTLES	IDLE	E
ENGINE FEED PUMPS	ON	E
CLEARANCE TO START	OBTAIN	EG

CLERK - COFFEE NATION 2013-14  
TURNTHEROT SMOKELESS ENGINE FEED SWIMMING POOL  
EG E E

# BEFORE ENGINE START CHECKLIST -1-

The first item on this checklist are general safety points. This checklist on the far right side also shows the responsible crew member.

C.... Captain P.... First Officer E.... Engineer

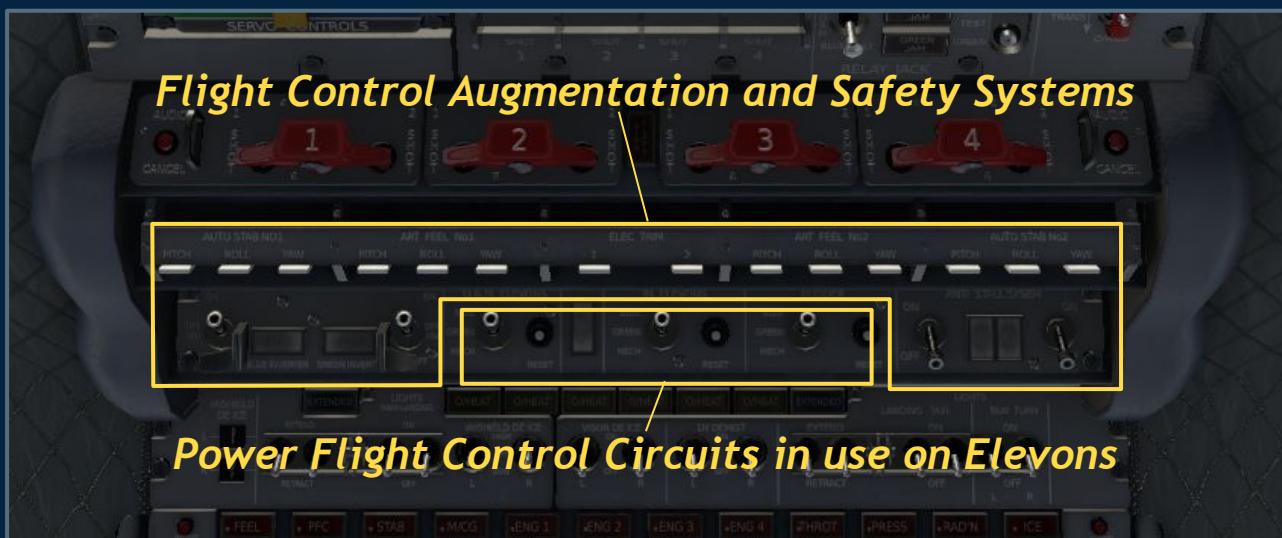
MASTER CBs.....	SET / CHECKED ... ALL
COCKPIT PREPARATION / SECURITY .....	COMPLETE
OXYGEN .....	CHECKED 100% ... ALL
DV WINDOWS .....	CLOSED .... CP

- +Circuit Breakers
- +Cockpit Preparation and Security
- +Emergency Oxygen checked
- +Cockpit side Windows closed and locked

FLIGHT CONTROL INVERT.S .....	ON .....	P
FLIGHT CONTROL AUGMENT. SYS.....	ON .....	P
ANTI-STALL SYSTEMS .....	ON .....	P

It's time now to activate step by step the many Flight Control augmentation, stability and safety systems.

## LOWER ROOF PANEL



## BEFORE ENGINE START CHECKLIST -2-

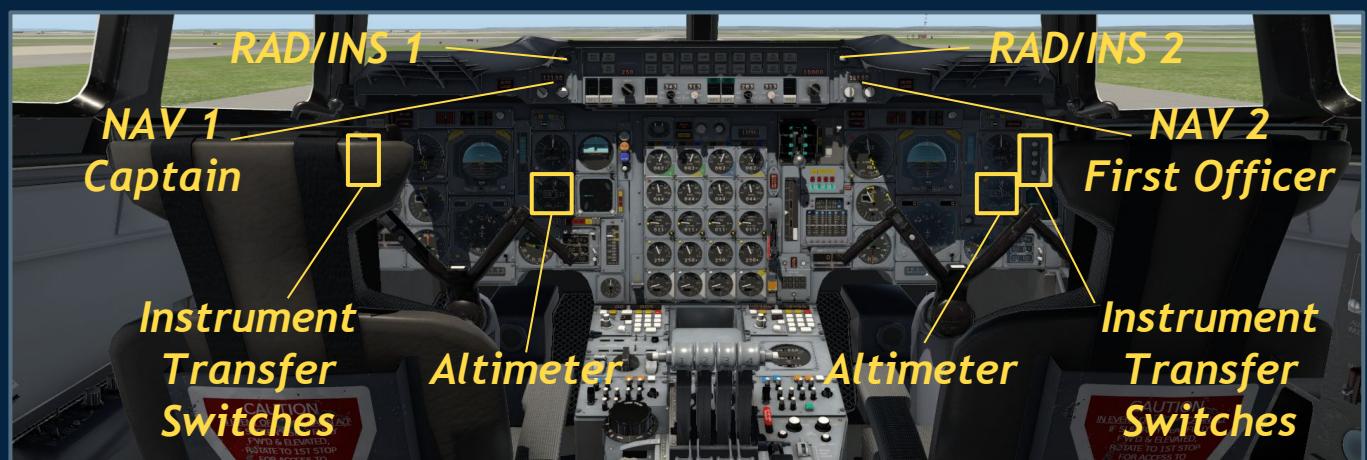
The following items are on Front panel and Center Console

RAD / INS sws .....	RAD.....	CP
INSTRUMENT TRANSFER sws .....	SET.....	CP
ALTIMETERS.....	CHECKED / SET ...	ALL
AUDIO PANEL COM 1 .....	ON .....	ALL
NAV RADIOS .....	SET .....	ALL
BRAKES .....	PARK / CHECKED ...	PE

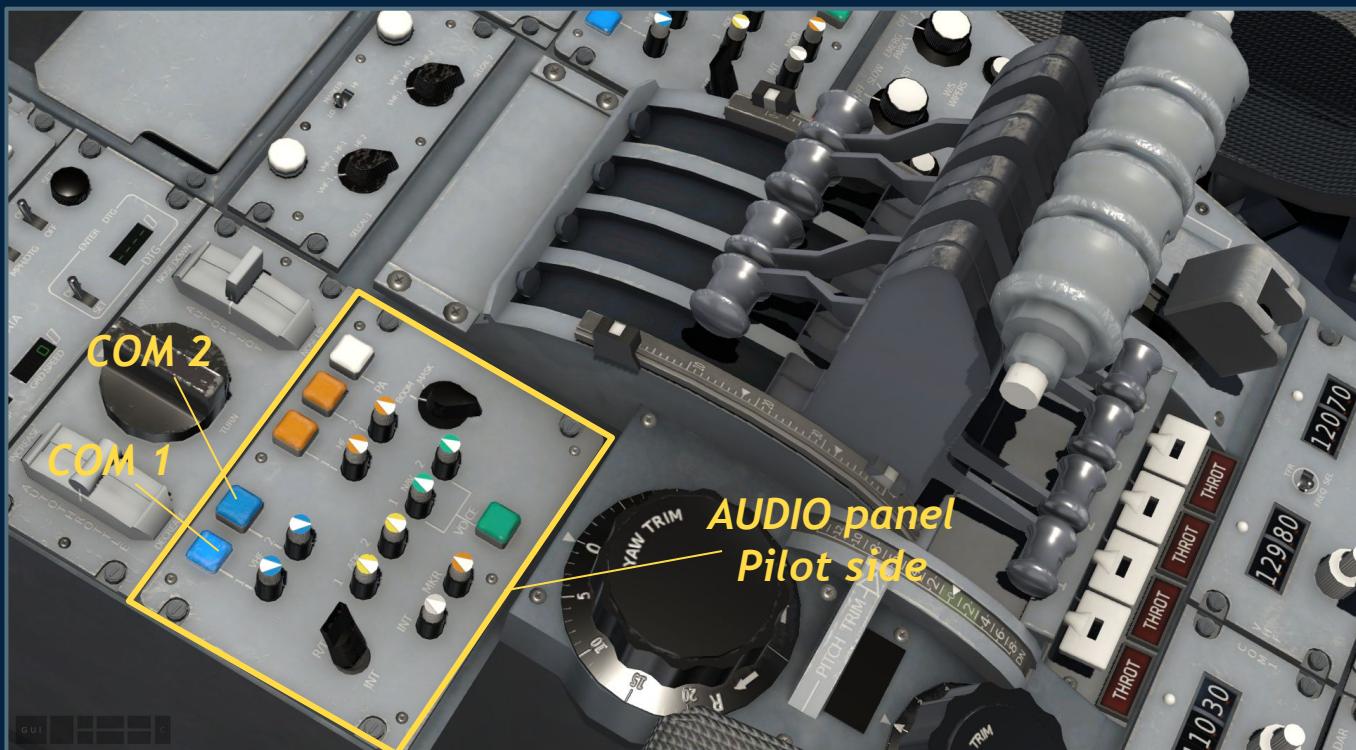
+RAD/INS: We select the data source for navigation. At this point we set to RADIO BEACON navigation RAD. Later it will be switched to INS.

+INSTRUMENT TRANSFER switches. Select the data source for instruments like the ADI, HSI etc.

+Altimeter QNH and altitude values must be checked and cross checked between Captain and FO's instruments.

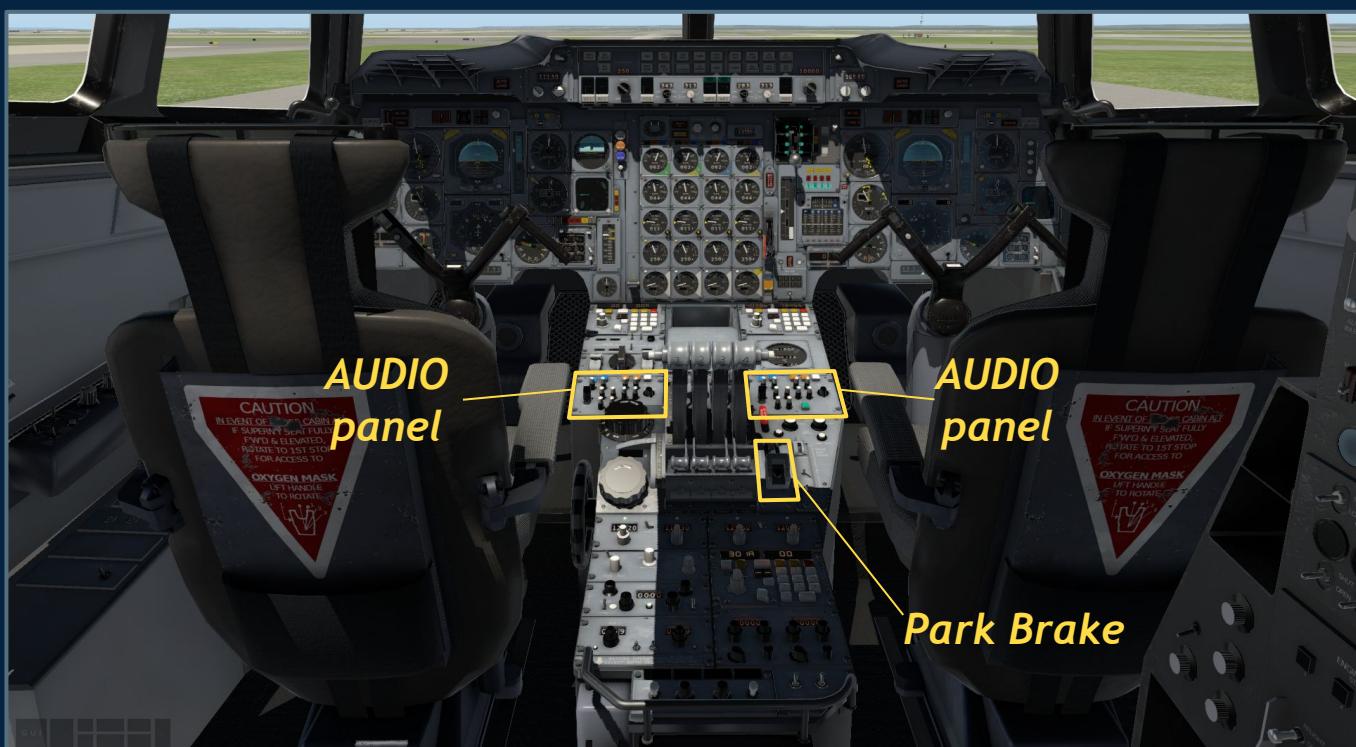


+AUDIO PANEL: The COM in use must be set to ON. the left blue button is COM1 the right blue button is COM2



+NAV frequencies set

+Park Brake checked again



# BEFORE ENGINE START CHECKLIST -3-

We change to the roof panel.

NAV LIGHTS .....	AS REQUIRED .....	E
THROTTLE MASTERS.....	MAIN / ALTERN .....	E

+The outside world needs to see that this aircraft is about to startup. Switch on NAV LIGHTS a required.

+The digital throttles can run on two redundant systems. MAIN or ALTERNATIVE. Make sure they are on one of those two not on OFF.

**ROOF PANEL**



## BEFORE ENGINE START CHECKLIST -4-

On the Engineering panel:



+Assure Ground Hydraulics are off and the supplied hydraulic circuits are on Yellow / Yellow.

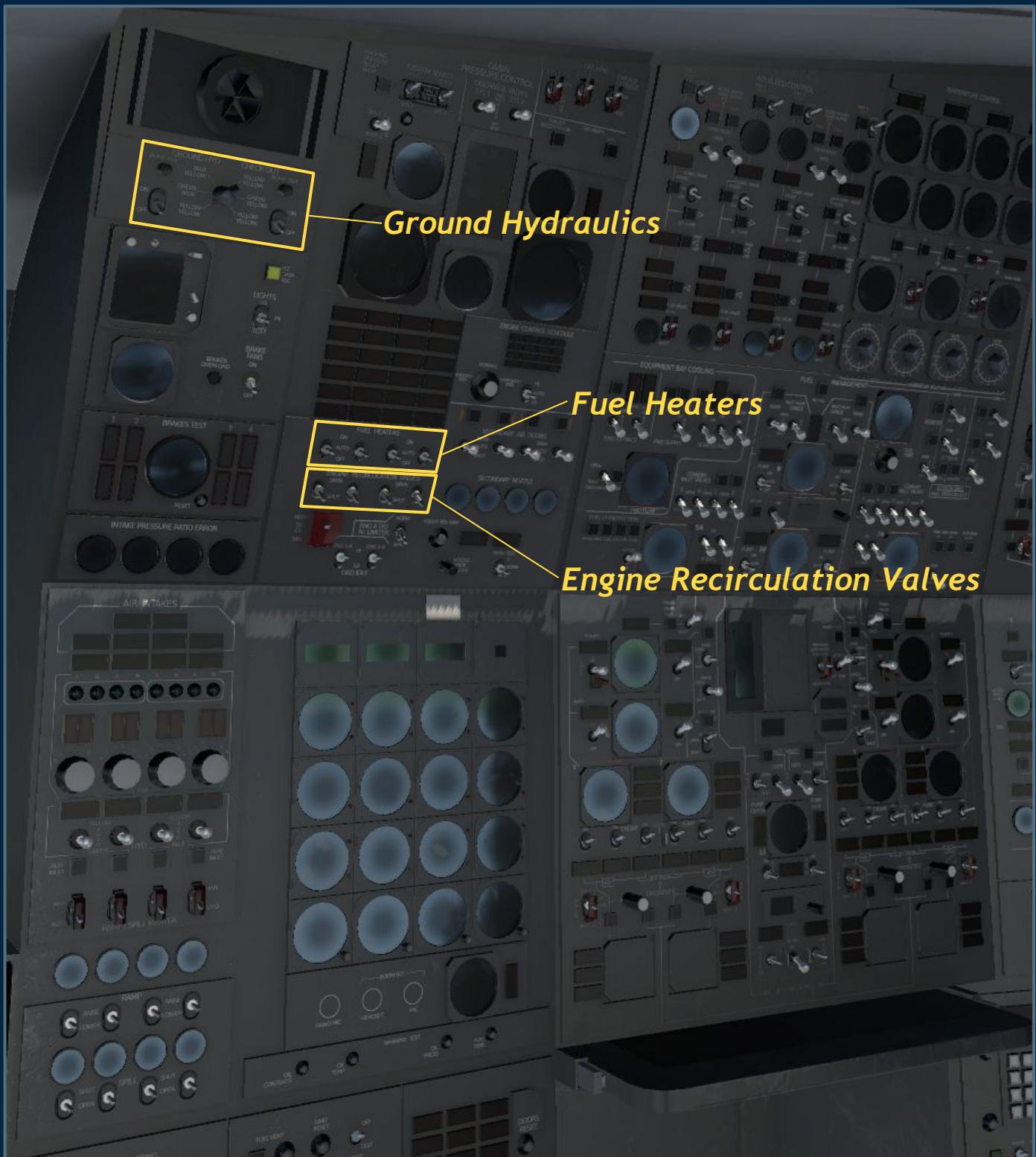
+Fuel Heaters: Concorde needs to handle large amounts of thermal energy. Most of it coming from friction with the outside air. But also from air conditioning, hydraulic systems, constant speed drive and generators and from engine lubricating oil. The fuel on board is also used as a heat sink for this thermal energy.

There is however the possibility especially at low speeds for the fuel temperature to fall to low.

For safety there are heat exchangers available. Should the fuel inlet temperature fall below 5°C hot air from the engines will heat up the fuel via heat exchangers.

+Engine Recirculation Valves: Has also a thermal function. If the engines demand small amounts of fuel there might occur problems with the thermal management, being the fuel flow to the engines the main heat dissipation process. When the Eng. Recirc. Valves are opened the amount of fuel flowing is increased by allowing it to flow into the engine and back into the feed tank. Higher mass flow, higher heat dissipation.

## ENGINEERING PANEL



## BEFORE ENGINE START CHECKLIST -5-

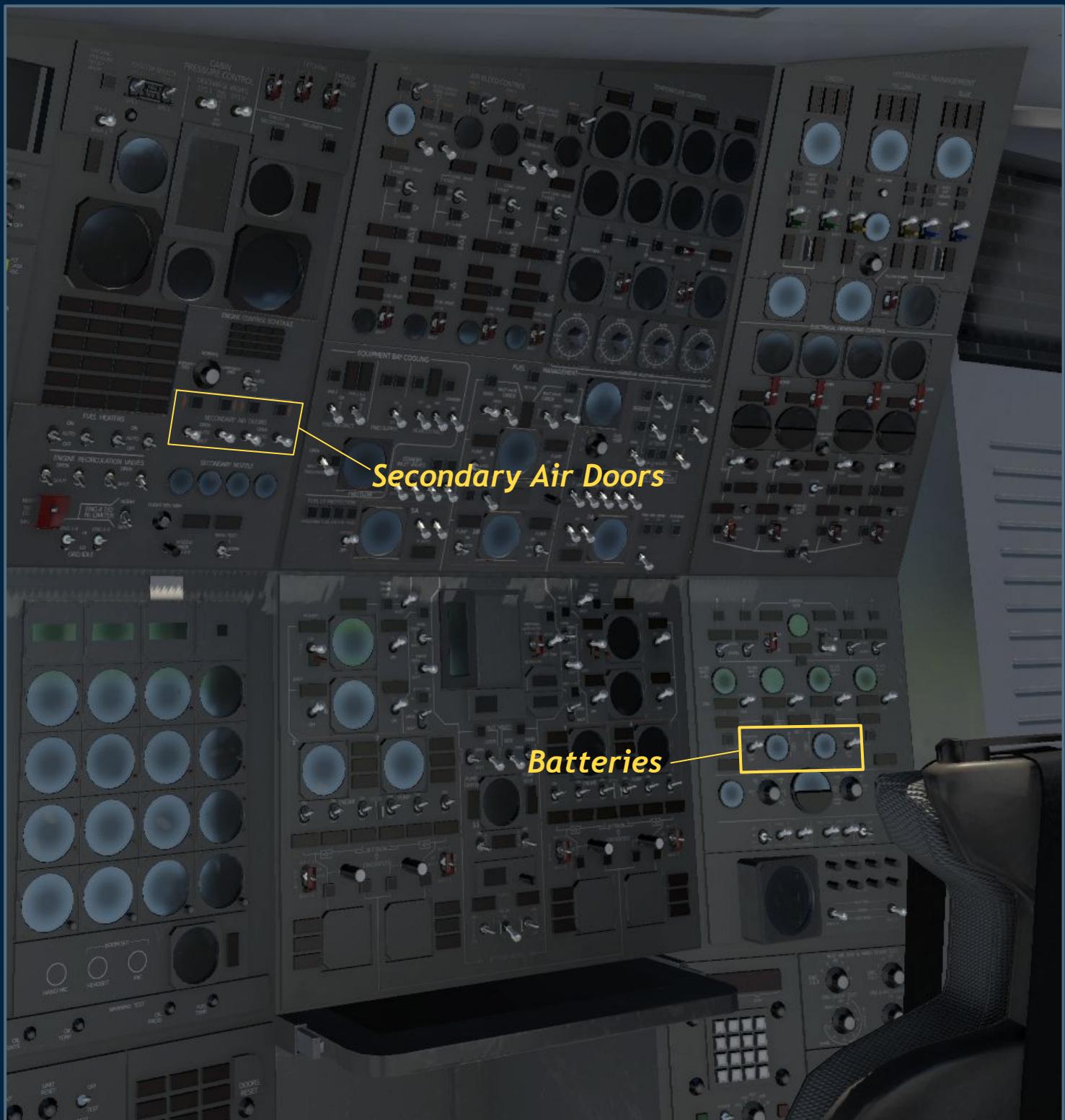
Still on the Engineering panel:

<b>Secondary Air Doors</b>		
+Takeoff with Reheat .....	AUTO .....	CE
+Takeoff WITHOUT RH .....	SHUT .....	CE
<b>BATTERIES .....</b> ON / Normal .....		

+The Secondary Air Doors are these additional intakes (that have also a spill function during deceleration). During takeoff with reheat (afterburner) and climb huge amount of additional air is required to feed the engine. The aircraft might fly at high Angles of Attack and the airflow into the Intake alone, especially during certain weather conditions, can be non optimal. Here the Sec. Air Doors come into play, that open automatically, helping the engine to 'breath' perfectly in every stage of the flight. The doors close automatically later on.



## ENGINEERING PANEL



## BEFORE ENGINE START CHECKLIST -6-

INS 1, 2 & 3 .....	CHECK READY NAV LIGHT ON ....	E
INS 1, 2 & 3 COMPARE PRESENT POS TO BOOK .....	CHECK .....	ALL
INS 1, 2 & 3 WAYPOINT COORDINATES .....	CHECK .....	ALL
INS 1, 2 & 3 DME .....	CHECK .....	CP
CONFIRM .....	'READY FOR NAV' .....	CPE
INS 1, 2 & 3 .....	NAV .....	E
INS 1, 2 & 3 .....	READY NAV LIGHT OFF.....	E
INS 1, 2 & 3 LOADING .....	CHECKED .....	ALL

INS 1, 2 & 3 LOADING .....

CHECKED .....

ALL

+Concorde beside radio beacon navigation relies mainly on its 3 redundant Inertial Navigation Systems. Before we set the INS's to ALIGN. Now, if the 'READY NAV' light on all 3 Mode Selector Units is ON we can proceed with the INS checks and then switch to the normal mode which is NAV. (On the 'early access version' this light is not implemented)

+Compare the aircraft present position to the position in the book / airport chart.

+Crosscheck the position of at least 3 waypoint coordinates between the 3 INS's

+ INS1 Captain, INS2 First Officer, INS3 Engineer  
If the data matches up perfectly every crew member must confirm 'READY FOR NAV' for his INS.

+After these three confirmations the Engineer will switch one INS after the other into NAV mode confirming:

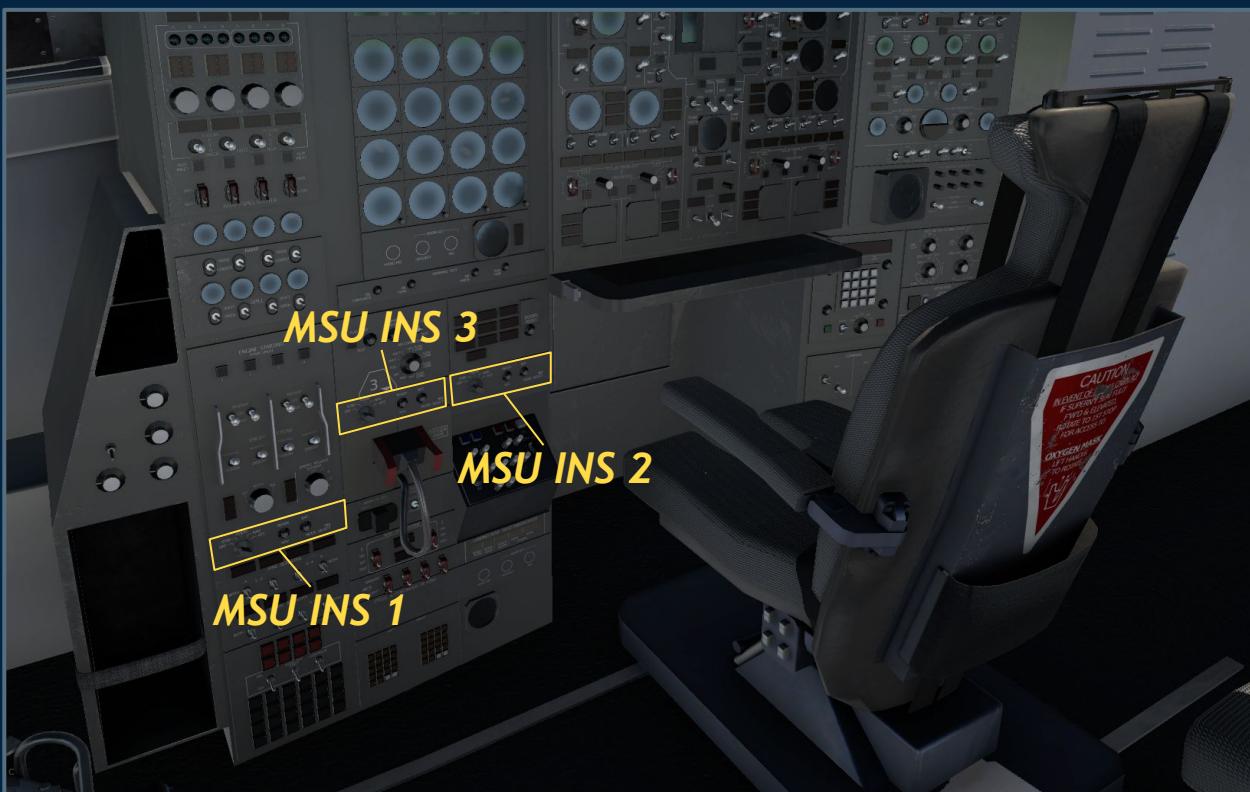
'INS1 to NAV' and 'Ready NAV light OFF'

'INS2 to NAV' and 'Ready NAV light OFF'

'INS3 to NAV' and 'Ready NAV light OFF'

+The last step is the every crew member confirms 'INS CHECKED' for his INS.

## ENGINEERING PANEL



*INS 1 on the CENTER CONSOLE*



## BEFORE ENGINE START CHECKLIST -7-

ASI BUGS & PITCH INDEX .....	SET .....	ALL
FUEL FLOW BUGS .....	SET .....	ALL
CLOCK .....	SET .....	ALL
THROTTLE LEVER INDICES .....	SET .....	ALL
BRIEFING .....	STATED .....	C

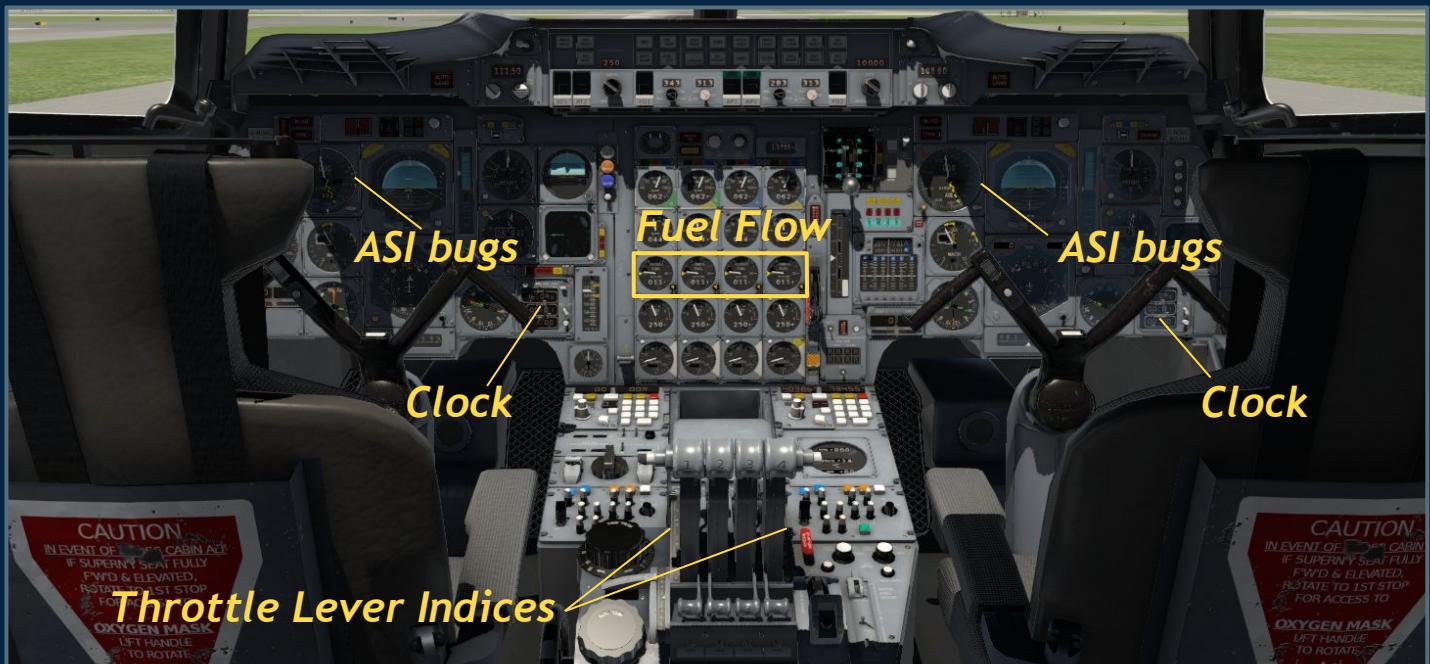
+On the Airspeed Indicator now we need to set the reminder bugs for the various reference speeds like V1, Rotation, V2.

+On the Engine Instruments the Fuel Flow bugs can also be set in accordance with the Engineer (Normally 205 which is 20.5t of fuel per engine per hour).

+Check, Cross Check and set the clocks

+Throttle lever incidence marks should be set now.

+The Captain will now shortly brief the crew again after the briefing in the office. He will clear up again who is flying the jet and who is assisting (COM, checklists), the planned departure and procedures, communications, initial route and briefly explain its decisions for possible abnormal or emergency procedures on this airport and surroundings.



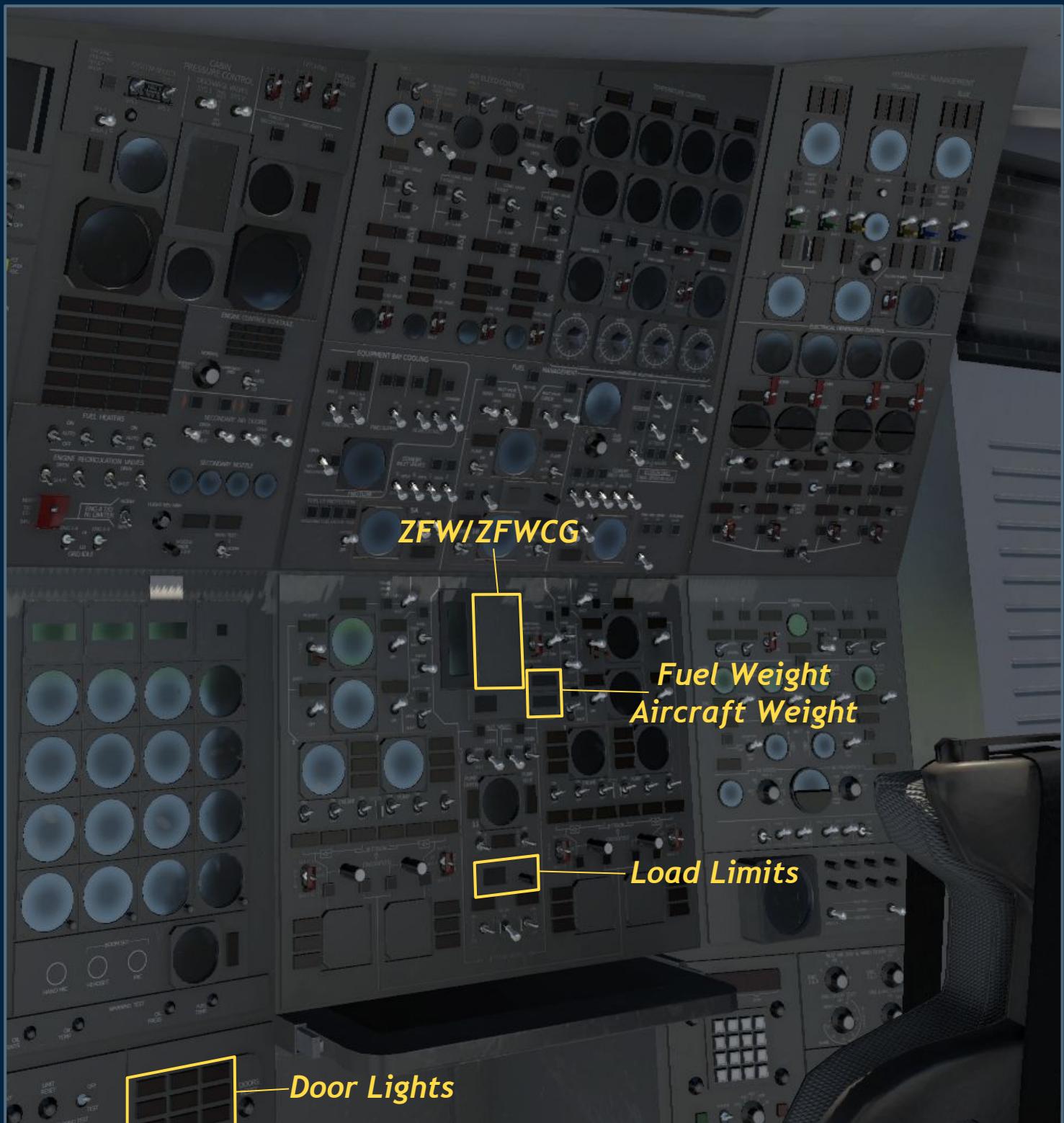
## BEFORE ENGINE START CHECKLIST -8-

Good. We now reached the 'dotted line' on the checklist. From there we can only proceed when the Dispatch Officer will hand over the final LOADSHEET of the aircraft.

<b>LOADSHEET</b>	<b>CHECKED</b>	<b>ALL</b>
<b>ZFW &amp; ZFCG</b>	<b>SET / CHECKED</b>	<b>EC</b>
<b>FUEL REMAINING &amp; A/C WEIGHT</b>	<b>SET / CHECKED</b>	<b>ALL</b>
<b>LOAD LIMITS</b>	<b>SET</b>	<b>E</b>
<b>T.O. DATA</b>	<b>CHECKED</b>	<b>ALL</b>
<b>START CLEARENCE</b>	<b>OBTAIN</b>	<b>P</b>
<b>DOOR LIGHTS</b>	<b>CHECKED</b>	<b>E</b>

- +The crew check the LOADSHEET with its precise Weight and Fuel figures. The Captain is asked to sign the Loadsheet being an official document.
- +The Flight Engineer sets the Zero Fuel Weight and the Zero Fuel Weight Center of Gravity Position as a percentage of the chord length of the wing.
- +The amount of remaining fuel and the aircraft weight are checked.
- +During taxi fuel will be pumped into the aft trim tank to move the center of gravity to the perfect position for take off. Now the amount of fuel is set that will be pumped.
- +Takeoff Data must be checked and known by all crew members.
- +Start clearance from the ground obtained, checked.
- +Door Lights: Are all doors closed and safe?  
(Door lights not implemented in the early access version).

## ENGINEERING PANEL



## BEFORE ENGINE START CHECKLIST -9-

We come to the last points of this checklist.

The switches for these items are on various panels.

MASTER WARNING	TEST	C
ANTI - COLLISION LIGHTS	ON	E
THROTTLES	IDLE	E
ENGINE FEED PUMPS	ON	E
CLEARANCE TO START	OBTAIN	EG

CLEARANCE TO START OBTAIN EG

+MASTER WARNING TEST: On the Master warning panel above the windshield.

Click and hold the 'LIGHTS TEST' button and check the lights and the warning sounds. This also makes sure the the 'INHIBIT' function is not active.



## BEFORE ENGINE START CHECKLIST -10-

+ANTI - COLLISION LIGHTS switch is on the top of the roof panel near to the NAV lights switch.

### ROOF PANEL



+Check Throttle levers to IDLE since the engines will be started up shortly.



## BEFORE ENGINE START CHECKLIST -11-

+ENGINE FEED PUMP switches are on the Engineering panel. This is a set of 12 switches that will engage the redundant pumps that feed the engines with fuel.



+CLEARANCE TO START obtained.

**BEFORE ENGINE START CHECKLIST ---COMPLETED---**

## ENGINE START CHECKLIST

BLEED AIR SOURCE .....	AVAILABLE
CROSS BLEED 3 & 4 .....	OPEN
CROSS BLEED 1 & 2 .....	OPEN
ENGINE - BLEED AIR VALVE .....	OPEN
ENGINE DEBOW	
IF ENGINE OFF > 4h .....	NORMAL
IF ENGINE OFF < 4h .....	DEBOW
START VALVE .....	OPEN
START VALVE MOVING.....	CHECKED
N2 RPM RISING .....	CHECKED
N2 RPM > 12% HP VALVE .....	OPEN
ENGINE SHUTDOWN HANDLE LIGHT .....	CHECKED
IF DEBOW IS ON	
N2 < 30% .....	CHECKED
DEBOW FOR 1 MIN .....	CHECKED
DEBOW.....	OFF
N2 RPM 67% .....	CHECKED
INFORM GROUND .....	FINISHED WITH GROUND AIR
COND VALVE .....	ON
HYDRAULIC PUMP .....	ON
ELECTRIC GENERATOR .....	ON
ENGINE - BLEED AIR VALVE .....	SHUT
CROSS BLEED .....	SHUT
.....	
REPEAT FOR EACH ENGINE .....	CHECKED

REFUEL FOR EACH ENGINE .....

CHECKED

CROSS BLEED .....

THIS

ENGINE - BLEED AIR VALVE .....

THIS

## ENGINE START CHECKLIST -1-

Now that we are sure that every aspect is ready we can proceed with the engine startup.

A common startup sequence is engine 2, 3, 1, 4.

<b>BLEED AIR SOURCE</b> .....	<b>AVAILABLE</b>
<b>CROSS BLEED 3 &amp; 4</b> .....	<b>OPEN</b>
<b>CROSS BLEED 1 &amp; 2</b> .....	<b>OPEN</b>
<b>ENGINE - BLEED AIR VALVE</b> .....	<b>OPEN</b>
<b>ENGINE - BLEED AIR VALVE</b> .....	<b>OPEN</b>

The following steps are repeated for every engine. Before the next engine is started make sure that the previously started is running stable and safe.

Engine 3 normally is started while the aircraft is still on the ramp. Then Engine 2. At this point the aircraft has BLEED AIR from its own engines and doesn't require the bleed air from the ground any more. Furthermore the engines via different gear boxes, generators and pumps provide hydraulic power and electric energy for all board systems.

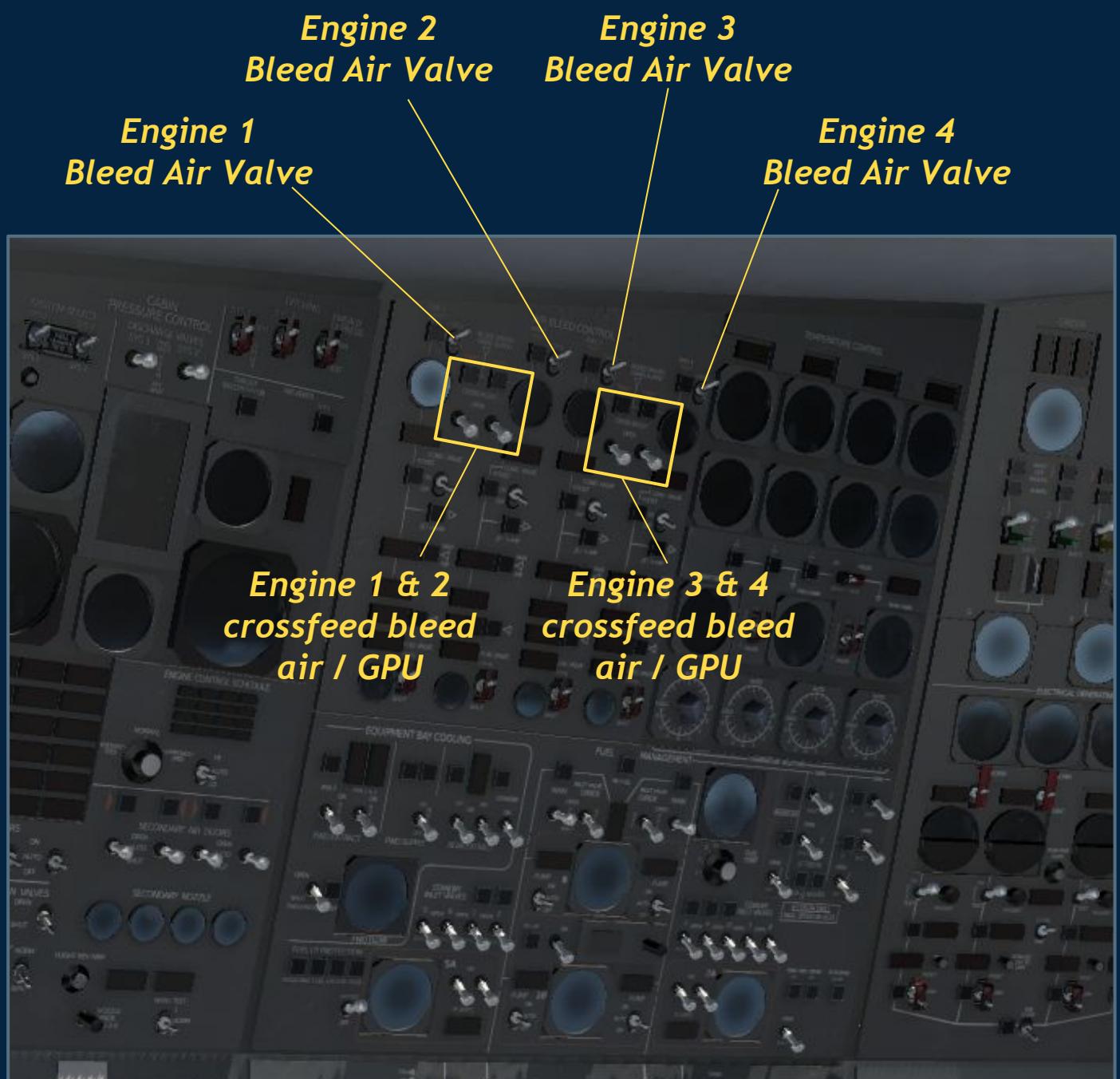
Engine 1 and engine 4 are started during pushback or after it, shortly before taxi. The later the engines are started the less fuel is burned before takeoff. Taxi must occur with all 4 engines running reliably though.

**ENGINE START:** The first step is to bring the engine into an rpm range so that fuel can be injected, light up can occur and the engine can spin up from there by its own. The initial spin up is done using bleed air that is streaming into the engine. Commonly the bleed air source is a ground utility vehicle.

+Make sure BLEED AIR is available

+Open the CROSS BLEED VALVES so that the air can stream where it's needed.

+Now open the ENGINE BLEED AIR VALVE of the engine you like to start.



## ENGINE START CHECKLIST -2-

Ok, nearly ready for the first spin up.

<b>ENGINE DEBOW</b>	
IF ENGINE OFF > 4h .....	<b>NORMAL</b>
IF ENGINE OFF < 4h .....	<b>DEBOW</b>
IF ENGINE OFF < 4h .....	

Before we open the start valve now and the engine really starts to spin, we need to check for a feature that is important for the longevity and stable running of these mighty Olympus engines. That is the 'DEBOW' feature.

Ideally an aircraft stays on the ground as short as possible. During ground operations the engines are switched off and ground power is used. After switch off an engine, it spins out and stops rotating. But many parts of it are still near operating temperature and cool down slowly.

During this cooldown time the dissipated thermal energy (heat) of the various engines parts travels it's way vertically upwards via the heated surrounding air. After some time this has the effect that the lower engine parts are cooler than the upper engine parts.

This can lead to force tensions inside the engine parts since the hot parts expand, the cool parts contract and the material tries to keep both extremes together. This is especially a problem for the shaft of the engine. The core of the turning parts that is required to be absolutely straight to turn smoothly and even. This shaft might slightly bend under the tension forces induced by the temperature asymmetry between upper and lower engine parts.

Good news is that after the engine has fully cooled down, the upper and the lower parts will have the same temperature again, tensions will go away and the shaft will come back straight and rotate perfectly even.

However, as said before, often there is not enough time for a full cooldown process. So in order to prevent the engine to spin up high with a bowed shaft we can use the DEBOW feature.

When this feature is ON the engine will spin up to ~30% N2. At this low rpm's the turing parts can heat up slowly for 1 min until all of them have the same temperature. The inside tensions are cleared now, the shaft is perfectly straight, the engine is ready to spin fully up. DEBOW off. This procedure must be undertaken every time that the engine had less the 4 hours of time to cool down.



# ENGINE START CHECKLIST -3-

Finally. Engine start.

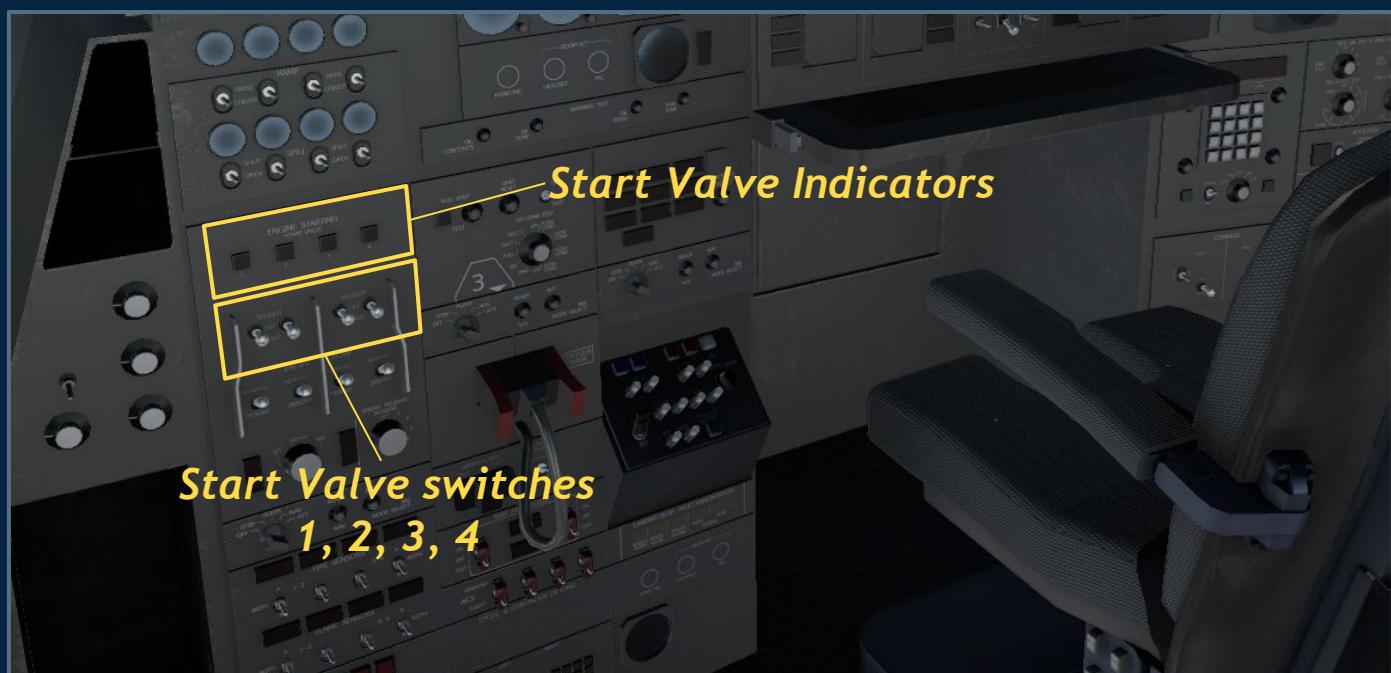
START VALVE .....	OPEN
START VALVE MOVING.....	CHECKED
N2 RPM RISING .....	CHECKED
N2 RPM > 12% HP VALVE .....	OPEN
ENGINE SHUTDOWN HANDLE LIGHT .....	CHECKED
IF DEBOW IS ON	
N2 < 30% .....	CHECKED
DEBOW FOR 1 MIN .....	CHECKED
DEBOW.....	OFF
N2 RPM 67% .....	CHECKED
INFORM GROUND .....	FINISHED WITH GROUND AIR

INFORM GROUND .....

FINISHED WITH GROUND AIR

+START VALVE. Open the start valve for the engine that needs to be started. Now the bleed air can stream into the engine and the spin up begins.

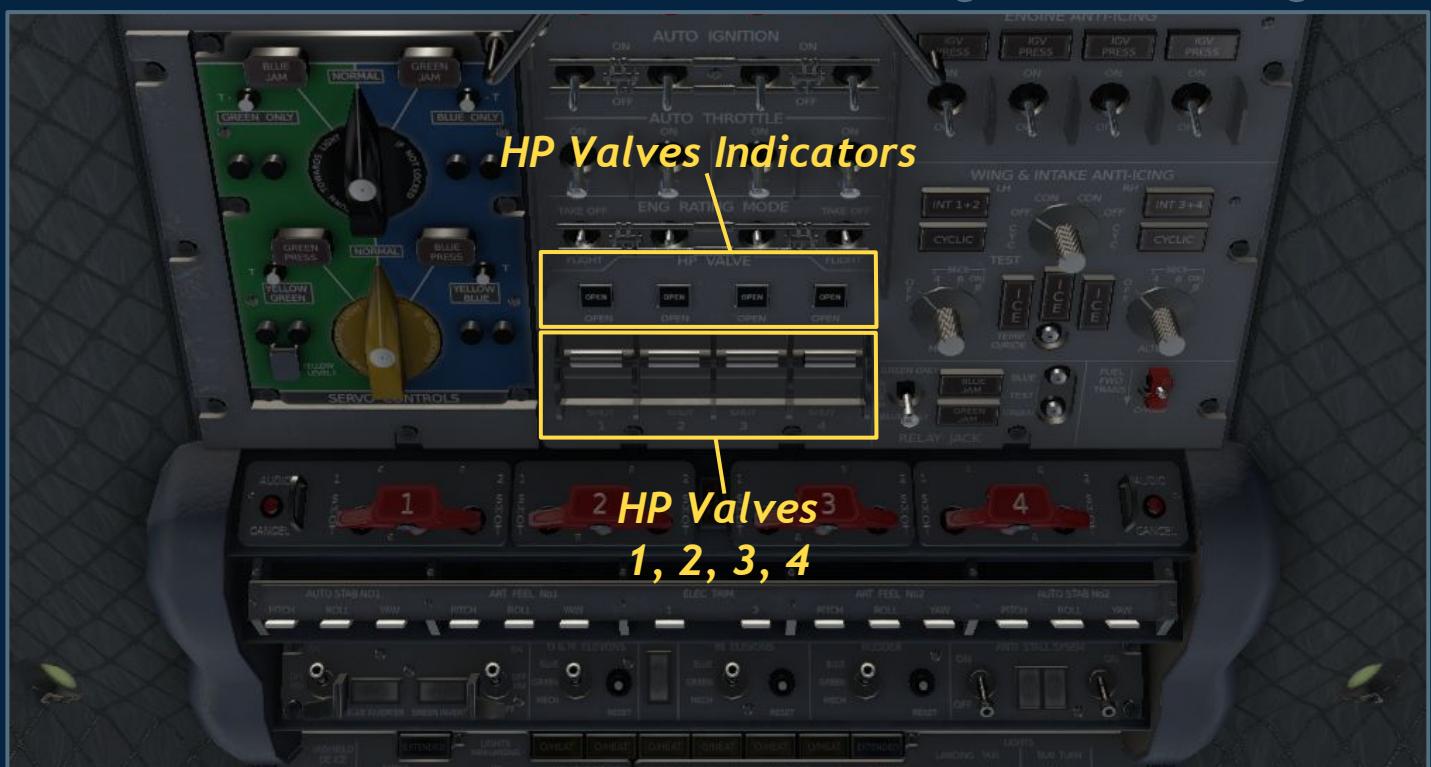
+Check that the START VALVE has actually MOVED (not implemented in the early access version)



+Check N2 rpm rising



+Stable above 12% N2 open the HP VALVE of the engine. Now the fuel will start to flow into the engine and the light



*HP Valves Indicators*

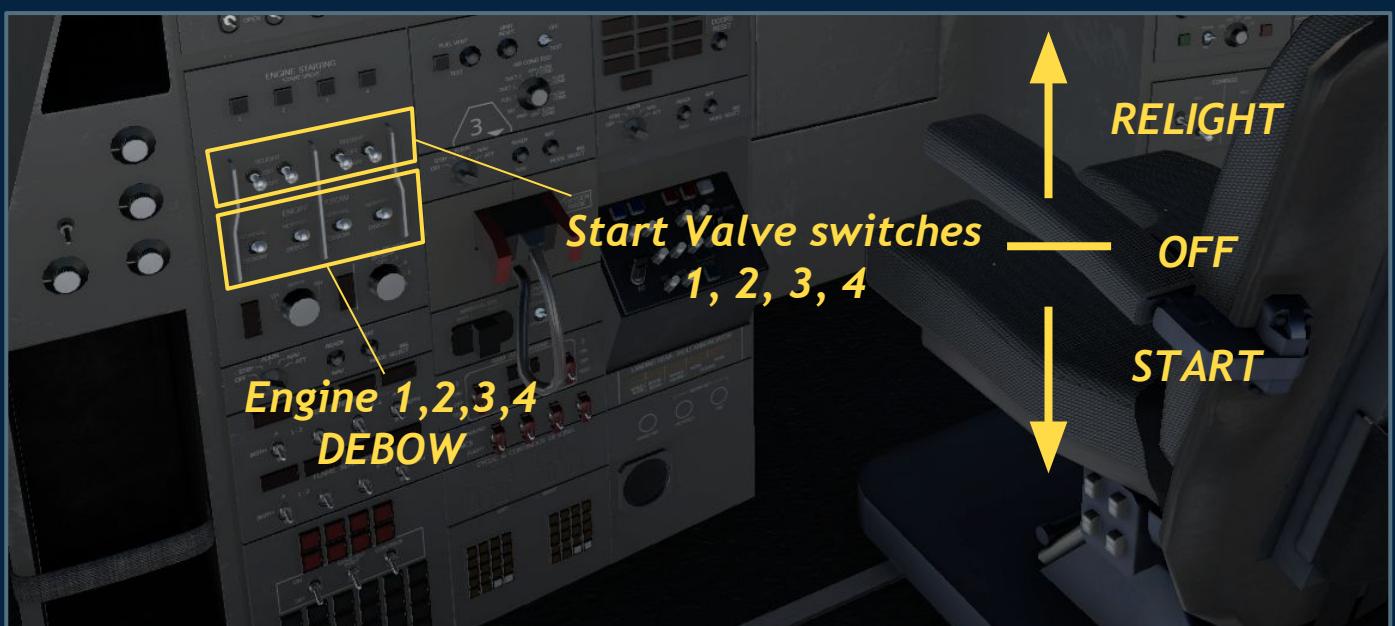
*HP Valves 3  
1, 2, 3, 4*

+ENGINE SHUTDOWN HANDLE LIGHT will light up in red. This handle is for emergency engine shut off. for example during an engine (oil) fire. The red light MUST go off above 30% N2 otherwise there might be an engine fire.



+Close the START VALVES, the engine spins by itself now

+If DEBOW was in use, let it ON for 1 min then switch it OFF again. The engine has uniformly warmed up now.



+The engine will now spin up to its correct IDLE rpm which is around 67% N2. First it might overshoot a bit, that's ok but then it should come back.



+Check all the engines gauges for a few moments. In case of a malfunction or an dangerous value switch the engine off by closing the HP valve or by using the fire handle.

+When two of the four engines are running ground bleed air is not required anymore and the ground personal can be informed to start to remove that equipment.



## ENGINE START CHECKLIST -4-

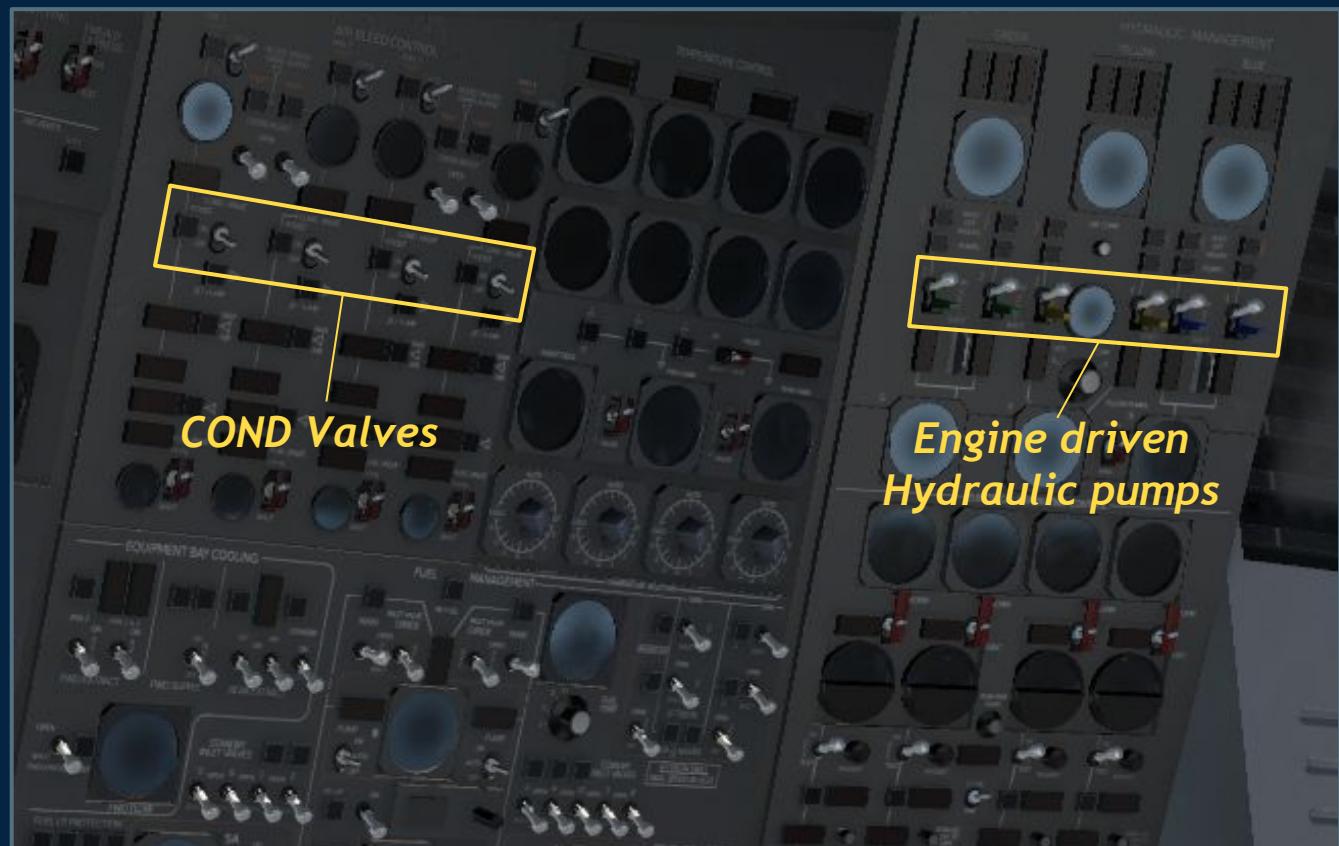
The engine is running now and can fulfill its duties. The most important one is thrust but it also provides electric and hydraulic power and pressurised air for the cabin.

COND VALVE .....	ON
HYDRAULIC PUMP .....	ON
ELECTRIC GENERATOR .....	ON
ENGINE - BLEED AIR VALVE .....	SHUT
CROSS BLEED .....	SHUT

CROSS BLEED ..... THIS

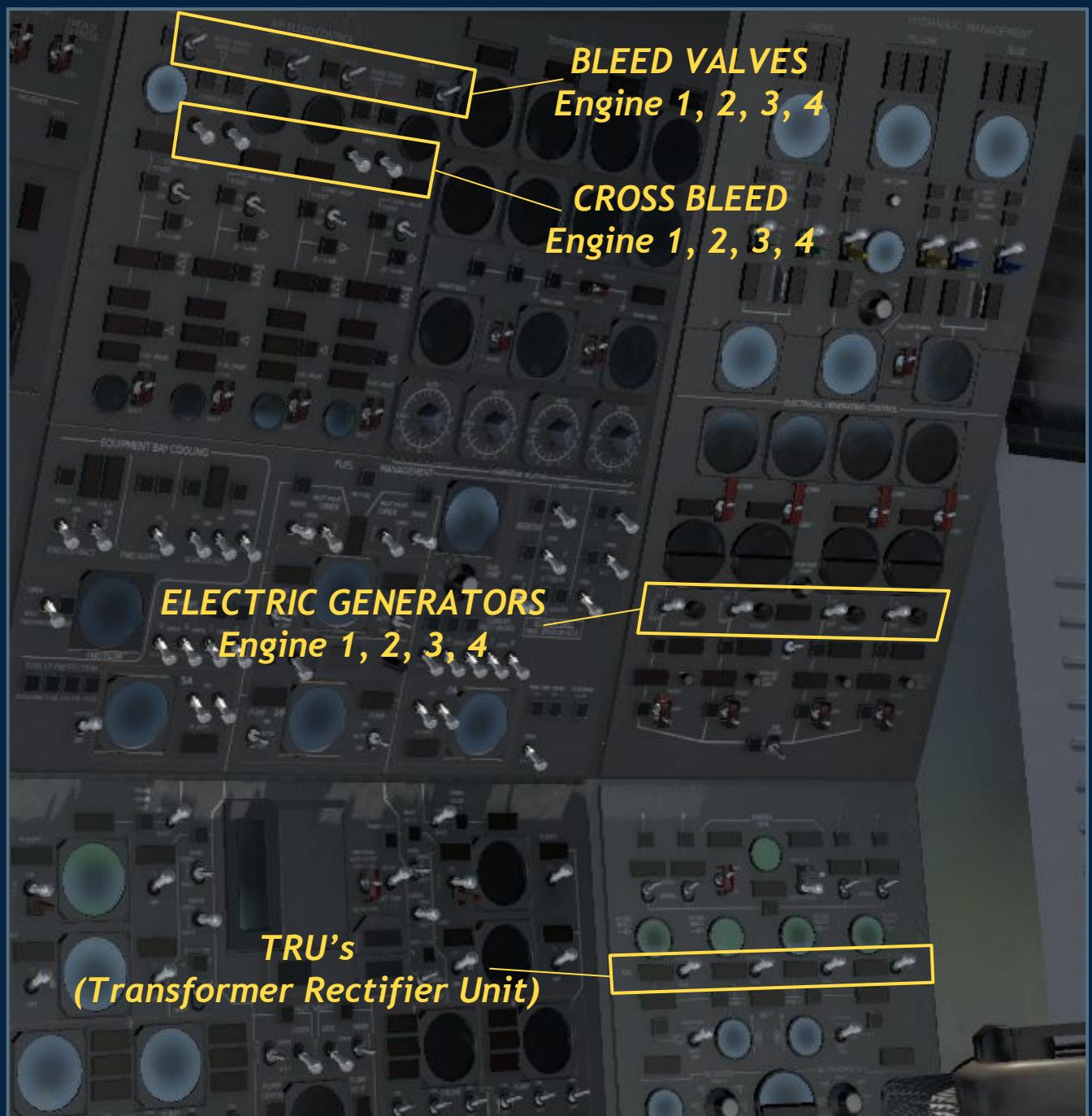
+COND VALVE on is on the bleed air panel. It provides additional pressurised air for the cabin.

+Engage the HYDRAULIC PUMPS that are connected to the started engine.



+And finally the ELECTRIC GENERATORS. Switch them on and assure that the TRU (Transformer Rectifier Unit) is in NORM so that the AC current from the GEN is converted also into DC current.

+ENGINE BLEED AIR VALVE AND CROSS BLEED can be closed again now. The engine spins by itself.



# ENGINE START CHECKLIST -5-

We reached the dotted line of the checklist.

REPEAT FOR EACH ENGINE .....	CHECKED
REPEAT FOR EACH ENGINE .....	CHECKED

+Check all activated systems.

+Then proceed with the startup of the next engine starting with the first item of this checklist.



## ENGINE START CHECKLIST ---COMPLETED---

## BEFORE PUSHBACK CHECK

EMERGENCY HYDRAULIC GEN ..... GRD BY-PASS  
ELECTRICAL SSB ..... CLOSED  
SHED GALLEYS GEN 1, 2, 3, 4 ..... ON  
WATER HEATER ..... ON  
TAXI LIGHTS ..... AS REQUIRED  
INFORM GROUND ..... GROUND EQUIP. CLEAR  
INFORM GROUND ..... PUSHBACK WHEN READY  
FLIGHT CONTROLS DEFLECTION ..... CHECKED  
SET NOSE / VISOR ..... AS REQUIRED  
PARKING BRAKE ..... RELEASED

PARKING BRAKE ..... RELEASED

# BEFORE PUSHBACK CHECKLIST -1-

These are the last items before the aircraft starts to move.

EMERGENCY HYDRAULIC GEN .....	GRD BY-PASS
ELECTRICAL SSB .....	CLOSED
SHED GALLEYS GEN 1, 2, 3, 4 .....	ON
WATER HEATER .....	ON

WATER HEATER ..... NO

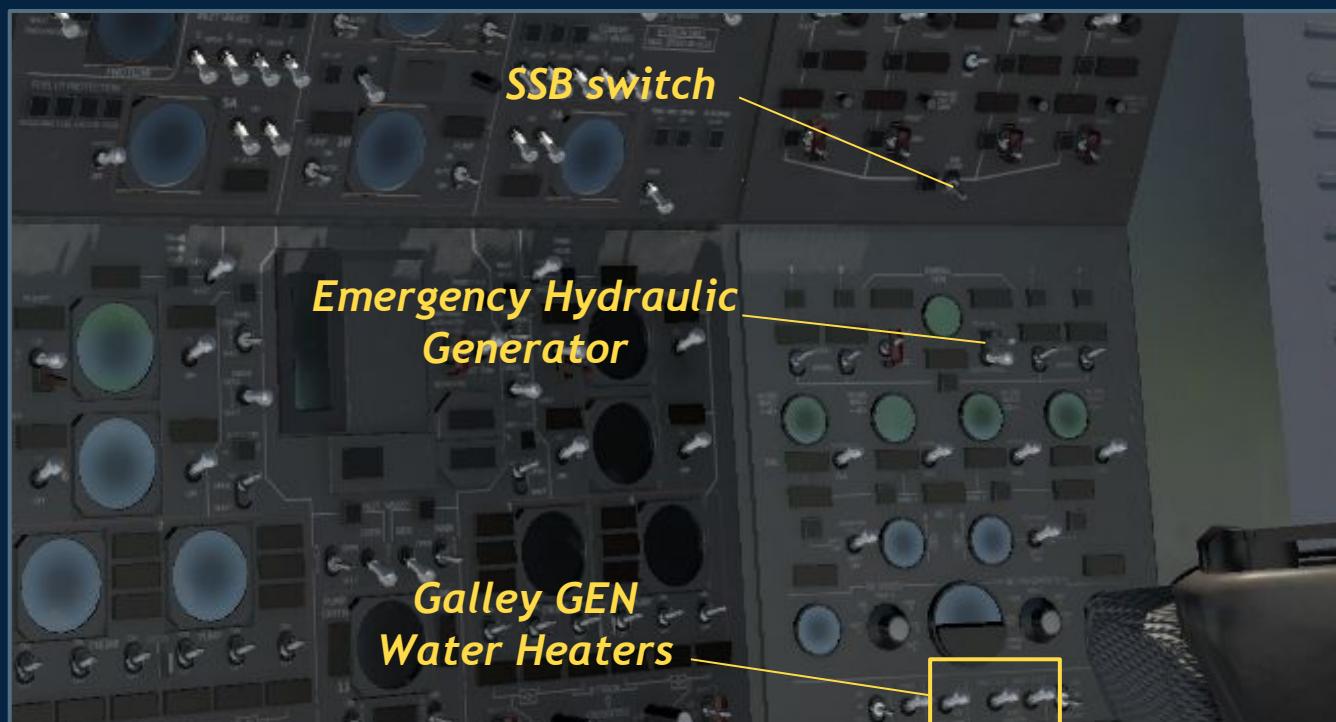
+The EMERGENCY HYDRAULIC GENERATOR needs to be tested and checked. It is an electrically driven unit therefore on the Electrics panel.

After the test it is switched to GRD BY-PASS

+Also on the Electrics panel, the SSB switch needs to be CLOSED. It connects the electrical busses of the various generators.

+SHED GALLEYS GEN to ON. With all engines running there is enough electrical power for full galley functionality.

+WATER HEATERS can also be switched ON now since there is enough electric power for this power demanding system.



## BEFORE PUSHBACK CHECKLIST -2-

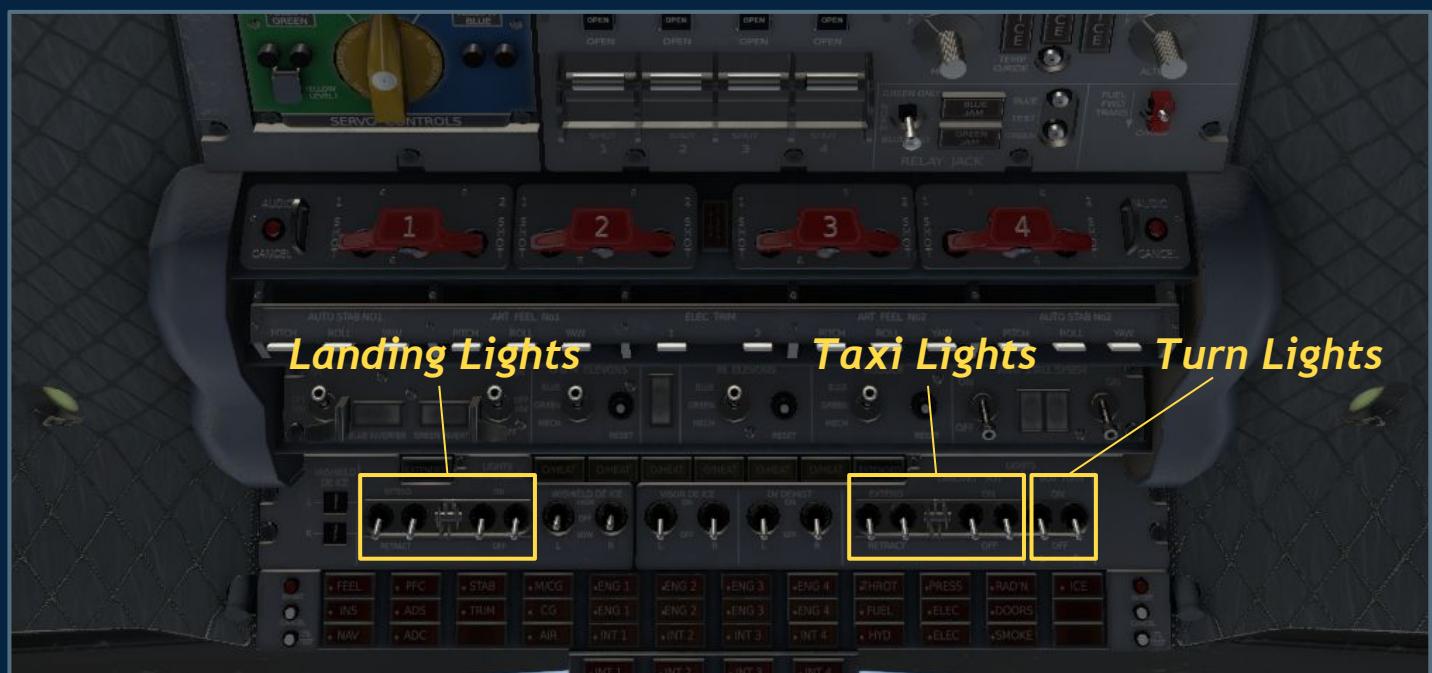
These are the last items for this checklist.

<b>TAXI LIGHTS.....</b>	<b>AS REQUIRED</b>
<b>INFORM GROUND .....</b>	<b>GROUND EQUIP. CLEAR</b>
<b>INFORM GROUND .....</b>	<b>PUSHBACK WHEN READY</b>
<b>FLIGHT CONTROLS DEFLECTION .....</b>	<b>CHECKED</b>
<b>SET NOSE / VISOR .....</b>	<b>AS REQUIRED</b>
<b>PARKING BRAKE .....</b>	<b>RELEASED</b>

**PARKING BRAKE ..... RELEASED**

+Set TAXI LIGHTS as required for the illumination level of the day. External lights switches are located above the Master Warning panel.

The LANDING and the TAXI lights need to extend before they switch on. This takes a few seconds.



+Communicate with the Ground personal for the pushback. Assure everybody is safe.

- +FLIGHT CONTROL DEFLECTION must have been checked by now. Use the ICOVOL instrument for the deflection tests.
- +Set visor and droop nose as required. Commonly by now the visor is down and the nose at 5°.
- +Release PARKING BRAKE when advised by the ground personal.



**BEFORE PUSHBACK CHECKLIST ---COMPLETED---**

## BEFORE TAXI CHECKLIST

ENGINES 1, 2, 3, 4 .....	RUNNING
NOSE WHEEL STEERING .....	CHECKED
FLIGHT CONTROLS , AFCS, TRIM .....	CHECKED
MASTER WARNING PANEL .....	CHECKED
ENGINE ANTI-ICE .....	OFF
ENGINE CONTROL SCHEDULE .....	FLYOVER
BRAKE FANS .....	ON
ENGINES IDLE SWITCH .....	LO
STALL WARNINGS .....	TESTED & OFF
ENGINE FEED PUMPS .....	ALL ON
HYDRAULICS .....	CHECKED
ELECTRICS .....	CHECKED / GROUND BYPASS
INFORM GROUND .....	GROUND EQUIP. CLEAR
NOSE.....	5 DEGREES
BRAKES .....	CHECKED AND NORMAL
FLIGHT INSTUMENTS .....	CHECKED / NO FLAGS
FLIGHT CONTROLS AFC .....	BLUE / LIGHTS OUT
TRIMS .....	CHECKED / SET FOR TAKEOFF

SMIRI .....

FLIGHT CONTROLS AFC .....

STNIMUTSNI THIETI .....

## BEFORE TAXI CHECKLIST -1-

The pushback has been completed successfully.

ENGINES 1, 2, 3, 4 .....	RUNNING
NOSE WHEEL STEERING .....	CHECKED
FLIGHT CONTROLS , AFCS, TRIM .....	CHECKED
MASTER WARNING PANEL .....	CHECKED

- +Assure that all 4 engines are running correctly
- +Check Nose wheel steering. NWS is done by a lever on the Captains console or the First Officers console.



- +Make sure that Flight Controls have been checked. As well as the Automatic Flight Control System and the Trims (Elevator trim and Fuel trim)
- +Check no warnings on the Master Warning Panel

## BEFORE TAXI CHECKLIST -2-

The following Item is on the Roof panel.

**ENGINE ANTI-ICE ..... OFF**

+The ANTI-ICE systems needs to be OFF unless very severe weather conditions are present.



The next switches are on the Engineering panel.

**ENGINE CONTROL SCHEDULE ..... FLYOVER**  
**BRAKE FANS ..... ON**  
**ENGINES IDLE SWITCH ..... LO**  
**STALL WARNINGS ..... TESTED & OFF**  
**ENGINE FEED PUMPS ..... ALL ON**  
**HYDRAULICS ..... CHECKED**  
**ELECTRICS ..... CHECKED / GROUND BYPASS**

**ELECTRICS ..... CHECKED / GROUND BYPASS**  
**HYDRAULICS ..... CHECKED**  
**ENGINE FEED PUMPS ..... ALL ON**

+ENGINE CONTROL SCHEDULE normally is set to FLYOVER. That sets the maximum amount of power until the noise abatement is initiated. Then the engines are automatically optimized for noise reduction.

+Switch ON the BRAKE FANS. Concorde has very powerful brakes but they can overheat fairly quick. Have always an eye on the brakes temperature.

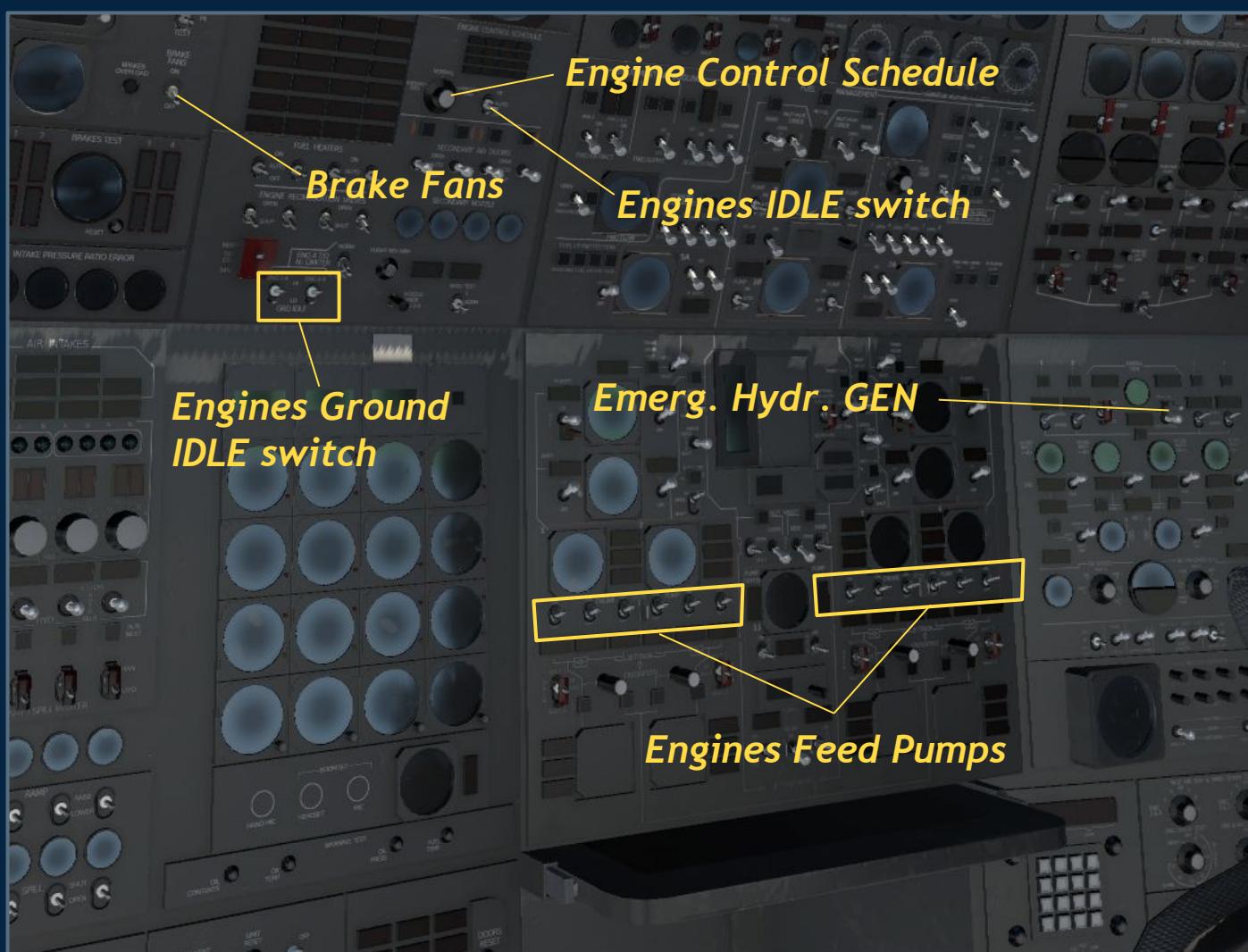
+ENGINES IDLE switch to LO.

+STALL WARNINGS tested

+ENGINE FEED PUMPS needs to be checked again

+HYDRAULICS panel, checked

+ELECTRICALS panel, checked. Emergency Hydraulic Generator to GRD BY-PASS, checked.



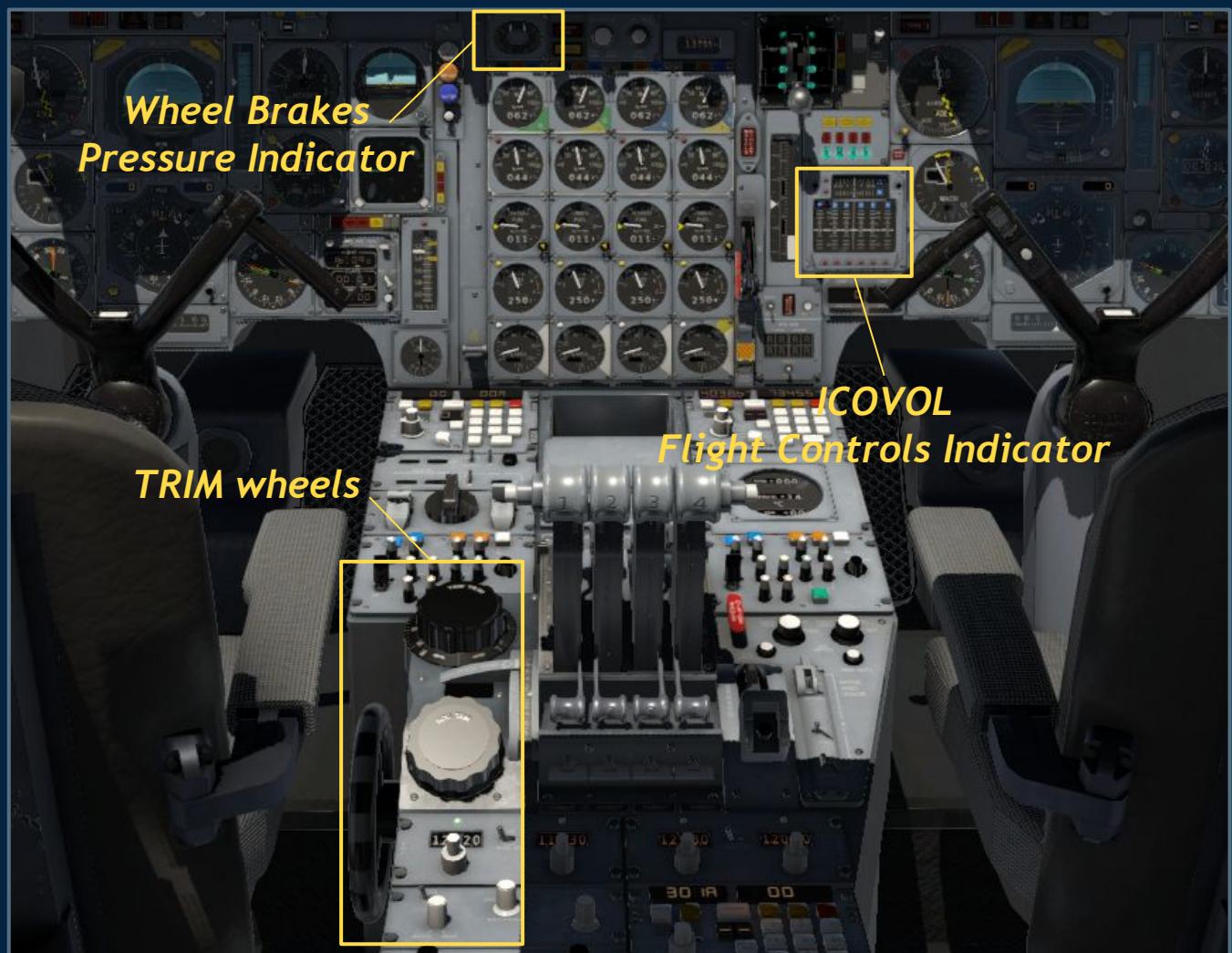
## BEFORE TAXI CHECKLIST -3-

The last items for this checklist.

INFORM GROUND .....	GROUND EQUIP. CLEAR
NOSE.....	5 DEGREES
BRAKES .....	CHECKED AND NORMAL
FLIGHT INSTRUMENTS .....	CHECKED / NO FLAGS
FLIGHT CONTROLS AFC .....	BLUE / LIGHTS OUT
TRIMS .....	CHECKED / SET FOR TAKEOFF

.....CHECKED / SET FOR TAKEOFF

+Inform the ground personal that the aircraft is about the taxi and the all ground equipment must be removed. Start taxing only after confirmation of the ground personnel.



**BEFORE TAXI CHECKLIST ---COMPLETED---**

## TAXI CHECKLIST

CG FUEL TRANSFER .....	SET
ENGINE RATING MODE .....	TAKEOFF
ENGINES AUTO IGNITION .....	ON
ENGINES AUTO THROTTLE .....	ON
THROTTLE MASTER .....	CHECK MAIN / ALTERN
THROTTLE MASTER .....	MAIN
DRAIN MAST HEATERS .....	ON
ENGINE FLIGHT RATING .....	CLIMB
PRESS STATIC HEATERS .....	ON
ADS / ENGINE PROBE HEATERS .....	ON
ENG 4 N1 T/O LIMITER .....	88%
AIR COND PANEL .....	CHECKED
FUEL PANEL .....	SET / CHECKED
ANTI SKID SYSTEM .....	NO LIGHTS
REVERSER SHUTOFF .....	CHECK
THROTTLES MID TRAVEL FWD .....	CHECKS
SEATS AND HARNESS .....	CHECKED
TANK 11 FUEL AMOUNT .....	CHECKED
DE-AIR TANK 6, 11, 8, 7A, 10, 5A .....	SET
CG GAUGES .....	CROSSCHECK / TAKEOFF
MAIN TRANSFER PUMPS TANK 5 & 7 .....	SET

MAIN TRANSFER PUMPS TANK 5 & 7 .....

CG GAUGES .....

DE-AIR TANK 6, 11, 8, 7A, 10, 5A .....

TANK 11 FUEL AMOUNT .....

## TAXI CHECKLIST -1-

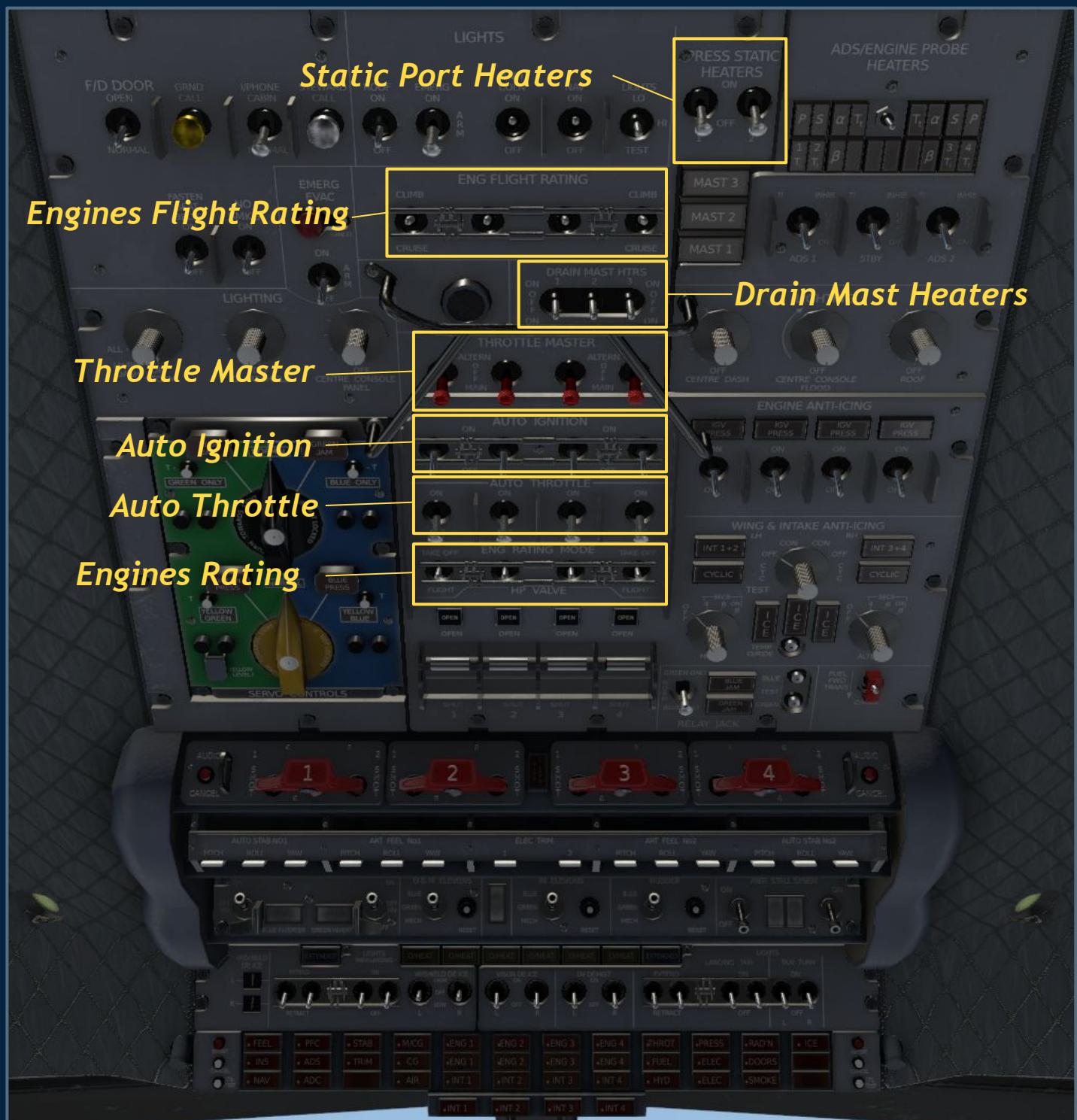
The aircraft is rolling. Time for the TAXI checklist.

CG FUEL TRANSFER .....	SET
ENGINE RATING MODE .....	TAKEOFF
ENGINES AUTO IGNITION .....	ON
ENGINES AUTO THROTTLE .....	ON
THROTTLE MASTER .....	CHECK MAIN / ALTERN
THROTTLE MASTER .....	MAIN
DRAIN MAST HEATERS .....	ON
ENGINE FLIGHT RATING .....	CLIMB
PRESS STATIC HEATERS .....	ON
ADS / ENGINE PROBE HEATERS .....	ON

ADS / ENGINE PROBE HEATERS .....

- +The Engineer has to check that the fuel transfer to Tank 11, the aft trim tank, is completed.
- +ENGINE RATING MODE, ENGINE FLIGHT RATING, ENGINE AUTO IGNITION set the electronic engine controls into the correct states for Takeoff and flight.
- +THROTTLE MASTER is switched from MAIN to ALTERNATE and back to assure that both redundant engine controllers work properly and independently.
- +DRAIN MAST HEATERS to ON makes sure that the drain pipes through the fuselage do not ice up when the aircraft is in the cold temperatures at high altitude.
- +PRESS STATIC HEATERS assures that the static ports on both sides of the fuselage are heated. This will assure that sensor data is correct.
- +ADS / ENGINE PROBE HEATERS are engage also for this purpose. (ADS is the Air Data System)

## ROOF PANEL



## TAXI CHECKLIST -2-

### Engineering panel.

ENG 4 N1 T/O LIMITER .....	88%
AIR COND PANEL .....	CHECKED
FUEL PANEL .....	SET / CHECKED

+ENG 4 N1 Takeoff Limiter. At speeds below 100 kts engine 4 will not go above 88% N1 to reduce vibrations on the airframe. Above 100 kts is will spin up to the same value as the other 3 engines.

+AIR COND PANEL checked

+FUEL PANEL checked



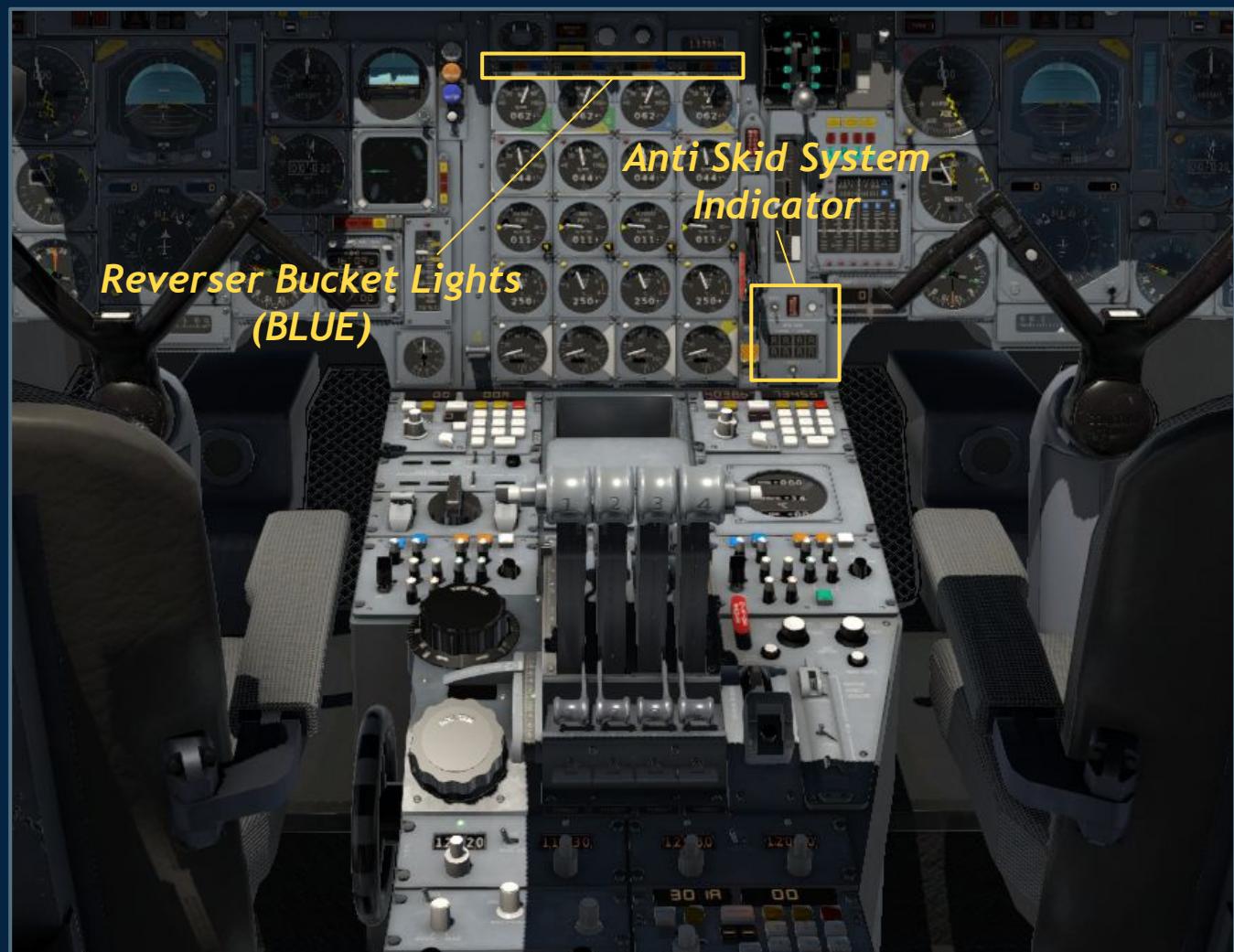
## TAXI CHECKLIST -3-

ANTI SKID SYSTEM .....	NO LIGHTS
REVERSER SHUTOFF .....	CHECK
THROTTLES MID TRAVEL FWD .....	CHECKS
SEATS AND HARNESS .....	CHECKED

SEATS AND HARNESS .....

CHECKED

- +During taxi, at speeds above 10 kts, check that the anti skid systems does not show warning lights.
- +Open and close the reverser a moment to check functionality of the secondary nozzles (reverser buckets).
- +THROTTLES MID TRAVEL check. Move throttles to half power for a moment and back and check the engines



## TAXI CHECKLIST -7-

As lastly on the Engineering panel again

<b>TANK 11 FUEL AMOUNT .....</b>	<b>CHECKED</b>
<b>DE-AIR TANK 6, 11, 8, 7A, 10, 5A .....</b>	<b>SET</b>
<b>CG GAUGES .....</b>	<b>CROSSCHECK / TAKEOFF</b>
<b>MAIN TRANSFER PUMPS TANK 5 &amp; 7 .....</b>	<b>SET</b>

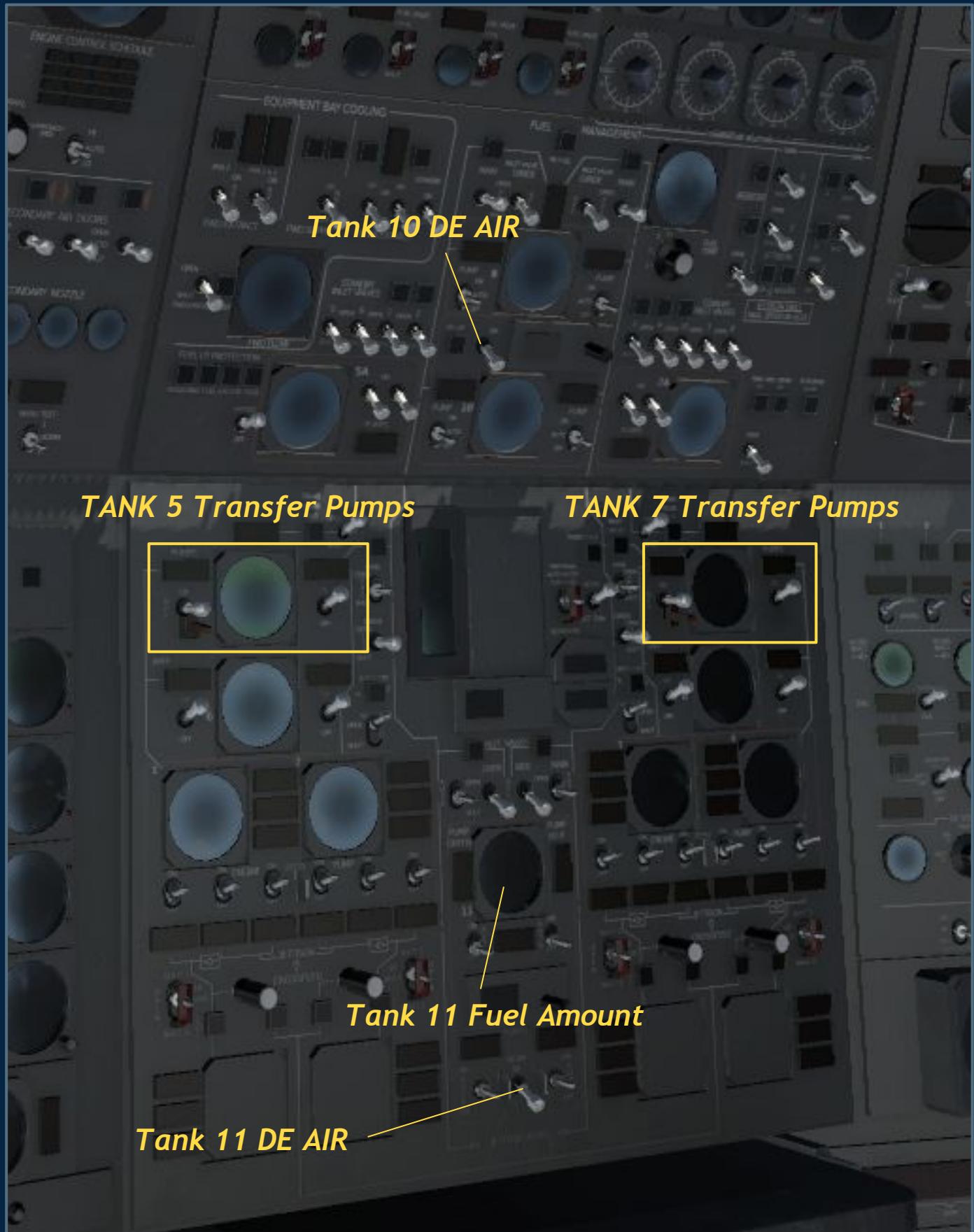
**MAIN TRANSFER PUMPS TANK 5 & 7 .....** **SET**

+Check again that the rear trim tank (11) contains the planned amount of fuel

+DE-AIR TANK 6, 11, 8, 7A, 10, 5A. Switch DE AIR ON on tank 11 and 10. The rest of the tanks is connected to those. During the steep climbs Concorde flies the fuel inside the tanks starts to flow. This might lead to air bubbles in the fuel and to more explosive air/fuel mixtures in the tanks. Because of this DE-AIR is in use during Takeoff.

+The CG position is of crucial importance on Concorde for safety and for performance. Check that the CG is in the start position and cross check that all CG gauges in the cockpit show the same value.

+MAIN TRANSFER PUMPS TANK 5 & 7. These tanks will feed the 4 engine feed tanks first.



**TAXI CHECKLIST ---COMPLETED---**

## BEFORE TAKEOFF CHECKLIST

BREFING TAKEOFF DATA ..... CHECK

NOSE & VISOR AT 12 ° ..... SET

LANDING LIGHTS ..... AS REQUIRED

TRANSPOUNDER ..... SET / ON

BRAKE TEMP WARNING LIGHTS ..... CHECKED

MASTER WARNING ..... CLEAR / INHIBIT

AFCS (AUTOPILOT) VALUES ..... SET

T/O MONITOR ..... ARMED

REHEAT SWITCHES ..... SELECTED

PITCH INDEX ..... SET

RADAR ..... AS REQUIRED

TAKEOFF CLEARANCE ..... OBTAINED

TAKEOFF CLEARANCE ..... OBTAINED

RADAR ..... AS REQUIRED

## BEFORE TAKEOFF CHECKLIST -1-

The aircraft has reached the runway and stands ready for takeoff. This is the last checklist before we get in the air

<b>BREFING TAKEOFF DATA .....</b>	<b>CHECK</b>
<b>NOSE &amp; VISOR AT 12 °.....</b>	<b>SET</b>
<b>LANDING LIGHTS .....</b>	<b>AS REQUIRED</b>
<b>TRANSPOUNDER .....</b>	<b>SET / ON</b>
<b>BRAKE TEMP WARNING LIGHTS .....</b>	<b>CHECKED</b>
<b>MASTER WARNING .....</b>	<b>CLEAR / INHIBIT</b>
<b>AFCS (AUTOPILOT) VALUES .....</b>	<b>SET</b>

**AFCS (AUTOPILOT) VALUES .....** **SET**

+TAKEOFF DATA is communicated again to all crew members. Safety heights and procedures must be clear.

+NOSE set to 12° for largest viewfield

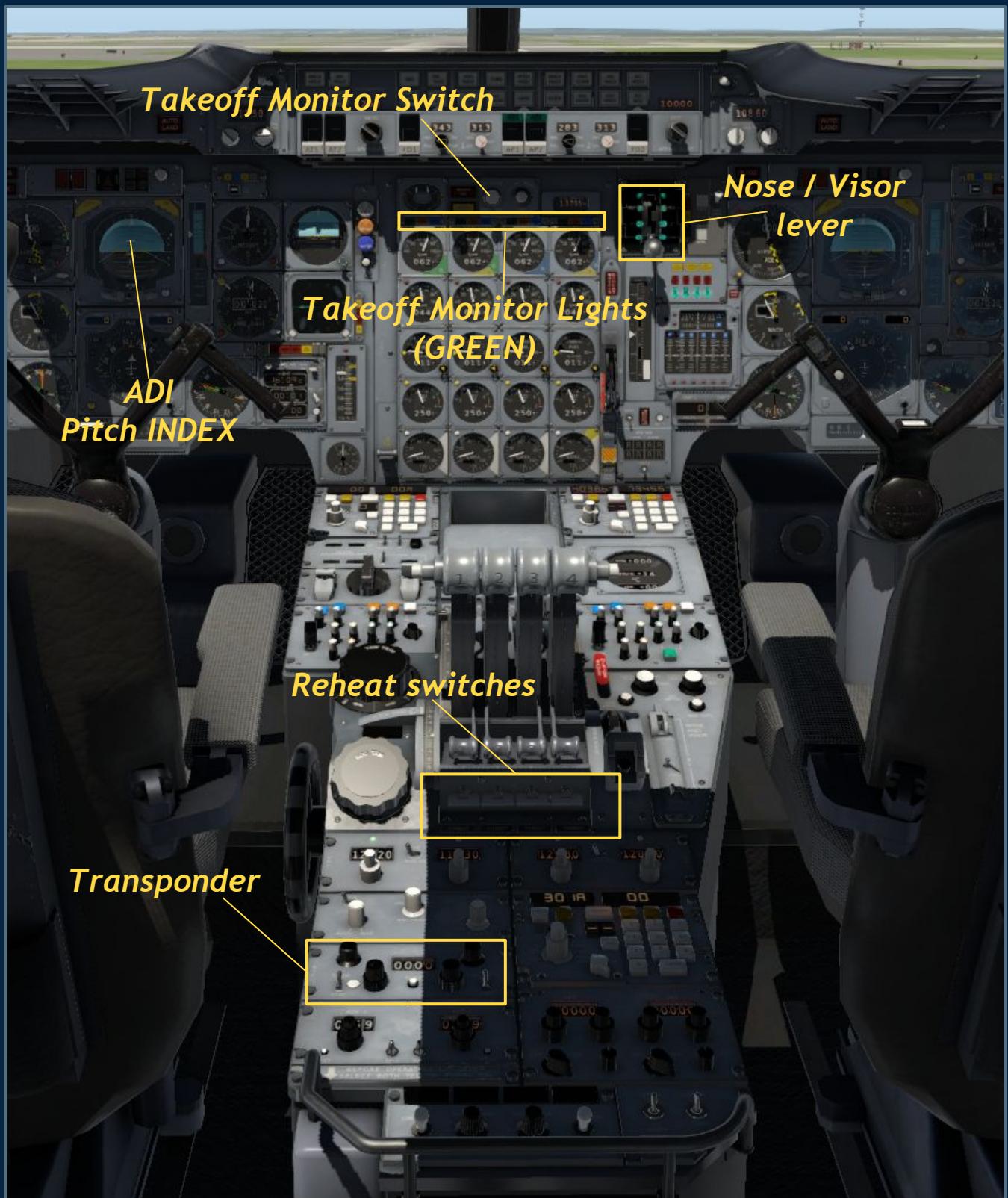
+LANDING LIGHTS as required

+TRANSPOUNDER ON and SET

+No BRAKE Temperature warnings

+MASTER WARNING PANEL clear

+AFCS AUTOPILOT values should be set now because some will be needed after takeoff. Like IAS value or AP altitude.



## BEFORE TAKEOFF CHECKLIST -2-

The aircraft has reached the runway and stands ready for the takeoff. This is the last checklist before we get in the air

T/O MONITOR .....	ARMED
REHEAT SWITCHES .....	SELECTED
PITCH INDEX .....	SET
RADAR .....	AS REQUIRED
TAKEOFF CLEARANCE .....	OBAINED

+T/O MONITOR for the ENGINES is switched on. We need to see 4 green lights above the Engines Instruments.

+The REHEAT SWITCHES are in the desired position. Normally into CTY (upper position) or center. CAUTION! If the switches are in the lower position the reheat will NOT IGNITE and the engines will only generate full military (dry) thrust.

+The PITCH INDICES on both ADI's are set (10-14°)

+RADAR is set depending on the weather

+After TAKEOFF CLEARANCE from the Tower:  
Clocks set and

**3, 2, 1, now!**

# Concorde FXP

