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WHAT ARE THE NUMBERS IN THE A330-200 FCOM & AFM?

A330-200 WHAT ARE THE NUMBERS?

The following information can be used by all pilots to review areas containing important information found in the **EVA** A330-200 Flight Crew Operating Manual (FCOM) or the Airbus Aircraft Flight Manual (AFM) which is located in the ship's library on each aircraft. This information lists some of the numbers which pilots use everyday in carrying out their duties and responsibilities as an operating crewmember. This study-aid also covers some of the knowledge necessary for all pilots to operate **EVA** aircraft in a safe and efficient manner. The material has been written so you can cover up the left column, look at the statement in the right column requiring a specific number and then checking your accuracy by uncovering the associated number found in the column on the left. To offer yourself a real challenge and really test your knowledge of the FCOM numbers, you can cover up the statement column, look at the number on the left and then try to determine what the number refers to.

This review material is divided up into FCOM/AFM sections to aid in finding and studying the appropriate material.

These references were accurate on the date the guide was published and will possibly change as the FCOM/AFM is updated. This study guide will not be updated on a regular basis.

NOTE: This study aid **is not** to be used as the reference source for making operational decisions. The actual FCOM/AFM is the final document source.

A330-200 WHAT ARE THE NUMBERS?

FLIGHT OPERATIONS – VOL. 3	
01 - LIMITATIONS	
233.9 Tons 230.9 Tons 192.9 Tons	Maximum taxi weight 1 Maximum taxi weight 2 Maximum taxi weight 3
233 Tons 230 Tons 192 Tons	MTOW 1 MTOW 2 MTOW 3
~~182~~ Tons	MLW
~~170~~ Tons	MZFW
116 Tons	Minimum weight
2	Minimum flight crew
 7.27m(23.85 ft) 24.96m(81.89)	CG limit reference chord length. Aft of leading edge Aft of nose
+2.5 to -1g +2.0 to 0g	G-Load - Clean G-Load - Slats extended
41,100 ft	Maximum altitude
12,500 ft	Maximum takeoff and landing altitude
55°C.	Maximum operating temperature
± 2%	Runway slope
<0.2/<poor	No take off / landing if brake action
15 kts	Maximum tailwind
40 kts (50 kts nose into wind)	Max wind passenger door operation
40 kts (50 kts nose into wind)	Max wind for cargo door operation
60 kts	Max wind for pax / cargo doors to be open
330 kts / .86 M	VMO / MMO
 240 kts 215 kts 196 kts 186 kts 180 kts	Maximum slats / flaps speed 1 Holding 1+F Takeoff 2 Takeoff / Approach 3 Takeoff / Approach / Landing FULL Landing
20,000 ft	Maximum altitude with flaps / slats extended
250 kts / .55M	Maximum speed for landing gear extended (VLE)
250 kts / .55M	Maximum speed for landing gear operation (VLO)
200 kts	Maximum speed for landing gear gravity extension (VLE, VLO)
21,000 ft	Maximum altitude landing gear may be extended
204 kts	Maximum tire speed
230 kts	Windshield wiper operation
230 kts	Cockpit window open
 118 kts 106 kts 109.5 kts	Minimum control speed (0 altitude): VMCL VMCA VMCG -- CONF 1+F, 2 or 3 (highest)

A330-200 WHAT ARE THE NUMBERS?

9.25 psi 8.85 / -1 psi 8.32 psi -1 psi -0.1 psi	Maximum positive cabin pressure Safety relief valve setting Maximum normal (flight time<2.5hrs) Maximum negative cabin pressure Maximum tolerance
15000 ft 14000 ft / -2000 ft 8000 ft 7350 ft	Automatic outflow valve closure Maximum/minimum cabin altitude selection Maximum normal cabin altitude(flight time<2.5hrs) Maximum normal cabin altitude(flight time>2.5hrs)
<1 psi	Ram air inlet maximum differential pressure to open
123 Tons	Minimum weight for auto land
 100 ft AGL MDA MDA - 100 ft 160 ft 100 ft 500 ft 80 ft	Minimum height for autopilot use takeoff with SRS. straight in non-precision approach circling approach. CAT 1 displayed on FMA. go-around engagement all other phases Minimum altitude for AP disengagement if manual landing – CAT II
MDA or 500 ft AGL	Minimum FCU altitude with AP or FD in OPEN DES or DES
250 ft	FINAL APP guidance with GPS PRIMARY MDH -- demonstrated
100 ft AGL	Minimum DH on CAT 2
1	Minimum AP engaged with CAT 2, CAT 3 SINGLE on FMA
50 ft	CAT III - FAIL PASSIVE - Minimum DH
1	CAT III - FAIL PASSIVE - Minimum number of autopilots engaged
200 ft	CAT III – FAIL OPERATIONAL - Alert height
75 meters	CAT III – FAIL OPERATIONAL – minimum RVR
1000 ft	Engine out CAT II and III fail passive auto land allowed with CONF 3 if engine out procedures completed before this altitude
Headwind: 35 kts Crosswind: 20 kts Tailwind: 10 kts	Maximum wind conditions for CAT II or III approach or automatic landing and rollout.
Flaps 3 and FULL	Automatic landing flap settings
2.5 – 3.15^{o}	Automatic landing glide slope range
9,200 ft	Maximum altitude
5 and 15 kts	Minimum and maximum wind corrections for autoland
229 Tons	Maximum weight for auto land incase of emergency on pilot responsibility
 2900 kgs 4800 kgs 1480 kgs 2400 kgs	Maximum fuel imbalance Inner Tank FULL Inner tank HALF Outer tank FULL Outer tank HALF
+55^{o} C	Maximum fuel tank temperature
-54^{o} C	Minimum fuel tank temperature or +3^{o} C above freezing temperature in inner tank or freezing point in outer and trim tank.
-40^{o} C -47^{o} C	Freezing temp for JET A Freezing temp for JET A1

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5,200 kgs	Minimum fuel quantity for takeoff
+3°	Maximum pitch attitude for forward trim tank transfer with forward trim tank pump failure
3,000 psi ± 200	Hydraulic normal operating pressure
300° C	Maximum brake temperature for takeoff
80%	Maximum N1 thrust with parking brake on
72°	Maximum nose wheel steering angle
65°	Maximum nose wheel steering angle for pushback and towing
7 kts	Maximum taxi speed with one tire deflated on one or more gears (maximum 3 tires)
3 kts 10°	Maximum taxi speed with 2 tires deflated on the same gear (other main gear not deflated) and maximum steering angle
15 NM	EGPWS TERR should be off when this close to the field
15 hrs	Maintenance required within next 15 hrs after APU start and operate with LOW OIL LEVEL ECAM .
3	APU consecutive start attempts without cooling, 60 min cool down period must be observed before next start.
3	APU start is guaranteed within 3 consecutive attempt .
107%	APU maximum rotor speed
650℃	APU maximum EGT for operation
1250℃	APU maximum EGT for start
41,100 ft	APU maximum operating altitude with electric (no bleed air)
25,000 ft	APU maximum BAT start limit altitude (ELEC EMER configuration)
14,600 ft	APU maximum ground starting and operational altitude
22,500 ft	APU maximum bleed air and electric use altitude
115 KVA	APU maximum electric power extraction
 975℃ 940℃ 750℃ 975℃	ENGINE maximum EGT Takeoff and Go-Around (5 min) / with engine failure (10 min) MCT Starting – normal Starting – air start only
 160℃ 175℃ -40℃ 12 qt + est. consumption 10 psi	OIL Maximum continuous temperature Maximum transient temp for 15 minutes Minimum starting temp Minimum oil quantity(0.56 qt/h) Minimum oil pressure with idle thrust
 115.5% 113%	RPM N1 max N2 max
 5 min 30 sec 10 / 5 30%	STARTER Maximum continuous operation time Between cycles wait ___ sec for each 1 minute Wait ___ after two consecutive ___ minute cycles Maximum N2 starter engagement speed
70 kts	Speed for thrust reverser in maximum
25%	Max thrust reduction

+43℃	Max FLEX temp above ISA to meet the above (T MAX FLEX)
02 – ABNORMAL & EMERGENCY PROCEDURES	
1000 ft	During an abnormal/emergency situation the table must be stowed before down to 1000ft.
500 ft	Autopilot can be used to this altitude in all failures other than engine failures (note: it has not been certified, however, in all configurations)
400 ft	Minimum altitude before initiation of abnormal/emergency procedures
>80 kts to 1500 ft	ECAM inhibits warnings from this speed to this altitude (or 2 minutes whichever comes first.)
12.5° 15° 25°	Engine out operation: pitch attitude target on takeoff. Bank angle is limited if speed between maneuvering – 10 kts Bank angle is limited if speed between maneuvering - 3 kts
5℃ ± 4℃	Fixed temperature for a pack regulator fault
20℃	Fixed pack temp for a Cond Zone Regul Fault
2 electric latches fault 2 sensors fault	Cockpit door : The cockpit door is not intrusion-proof. Automatic latch release is unavailable, in case of cockpit decompression
21,000 ft	Maximum landing gear extension altitude
2,182 or 8364 kHz	Emergency HF distress frequencies
10 sec	Time it may take to see an outflow valve position change in manual press mode
8.85 psi	Pressurization safety valve limit for ΔP
5 hrs	Flight time limit with a BLOWING fault
5 sec	Time between Engine Thrust Locked warning messages when due to an involuntary disconnection of A/THR
80 NM	ND map range automatically displayed with a total FCU loss.
<200 ft AGL 15 ft – 200 ft AGL 100 ft – 200 ft AGL ± 15 ft < 200 ft AGL	AUTOLAND light flashes when: AP off when . . . Excessive LOC deviation between . . . Excessive glide slope deviation between . . . Radio altimeter discrepancy of more than . . .
3 sec < 200 ft	AUTOLAND flashes for ___ in case of voluntary AP disconnect ____ ft
1.5%	Increase of fuel consumption with engine anti-ice ON.
< 15 Tons	Fuel considered unusable in center tank with EMER GEN CONFIG
270 kts / 3° 1%	Minimum speed and maximum pitch attitude for transfer of trim tank fuel forward with EMER GEN CONFIG. Fuel consumption increase is ____
< 260 kts	Speed with EMER GEN CONFIG where fuel pump is lost
200 kts	Maximum L/G GRVTY EXTN speed
230 kts	Maximum speed for opening cockpit window
10 days	Maximum days between automatic test of Slat (FLAP) TIP BRK Fault warning system

A330-200 WHAT ARE THE NUMBERS?

1.5 times 2.2 times 2.5 times	Fuel penalty over normal fuel burn for: flaps extended slats extended flaps and slats extended
5 sec	Time cycle for “SPEED, SPEED, SPEED” with low energy warning without thrust increase
330 kts / M.82	Maximum speed for F/CTRL ALTN LAW (PROT LOST)
330 kts / M.80	Maximum speed for DIRECT LAW (PROT LOST)
< 2000 ft RA / > CONF 2	Aileron preset lost below this altitude or in this configuration
16% 6% 16%	Fuel penalty increase for F/CTL ELEV REDUND LOST F/CTL L (R) INR (OUTR) AIL FAULT one aileron two or more ailerons fault
FL 300 / M0.75	Maximum flight level and speed for F/CTL ELEV REDUND LOST
15 kts	Maximum crosswind for RUD TRV LIM Fault
>160 knot >FL200	F/CTL FCDC 1 + 2 FAULT Use rudder with care S/B don’t use
1.5 ° to the right.	F/CTL RUD G (Y) (B) SERVO JAM after engine started and ground test failed. The rudder will
>160 knot <15 knots VLS+10 Flap 2	F/CTL RUD TRV LIM FAULT Use rudder with care If TLU (rudder or pedals) remains locked at high speed after slat extension Approach speed Flap setting
180knot	Max speed when F/CTL STAB CTL FAULT and if trim lock > 8 up
20,000 ft 15,000 ft	GRVTY Fuel Feeding altitude > 30 min since takeoff < 30 min since takeoff
<15T	FUEL L + R CTR PUMPS LO PR unusable fuel in center tank.
1%	FUEL EXCESS AFT CG Fuel consumption increases by
-37°C/-44°C -40°C/-47°C 45°C/49°C/60°C	FUEL FUEL LO TEMP inner tank temp /auto recall. outer or trim tank temp/auto recall. FUEL FUEL HI TEMP without procedure/ auto recall with procedure for JET B/ auto recall with procedure for all fuel.
VLS+10	CG > aft CG limit the approach speed
4 hrs	TRIM TANK FUEL UNUSABLE max flight hours
FL250	FUEL APU AFT PUMP FAULT , APU available max altitude.
7	Number of brake applications available with accumulator
1000 psi	Brake pressure to be applied with accumulator brakes only
2.8 times	The fuel penalty with landing gear stuck down
30 secs	L/G GEAR NOT UPLOCKED landing gear sequence is not completed after
250/ 0.55	L/G DOORS NOT CLOSED max speed
750 ft RA	Altitude where red gear down arrow illuminates with L/G

	not down
200 kts	L/G GRVTY EXTN max speed
> 72 kts	Speed for spoilers extend automatically on the ground after landing.
10 / 2%	Number of passengers moved from front to back to change the aircraft CG ___%
30 sec	Time which engine hydraulic pumps supply sufficient hydraulic pressure after engine shutdown
30 secs	IR ALIGNMENT IN ATT MODE ac must remain level flight for
 0.5min/0.5min/1min 0.5min	NAV FM/GPS POS DISAGREE longitude threshold depends on the latitude: <45°/45°-60°/>60° latitude threshold, regardless of the latitude
5 min	Time delay before selecting brake fans on
300℃. (150℃)	Delay takeoff with brakes above this temp (with fans on)
 15° 10° 5°	Unreliable airspeed indication pitch attitude with: TOGA CLB and below FL100 CLB and above FL100
1500 ft	BLEED LO TEMP passing 1500 ftwith wing anti ice off, recycle WAI switch.
FL100 FL220	AIR DUAL BLEED FAULT descent rapidly to FL100 if ENG 1 BLEED was lost due to a LEAK on side 1/ENG 1 FIRE/Start Air Valve 1 failed open. Other cases descent to FL220.
 300 / 0.82M 260 kts 15 min -2 ° 30 sec 30 sec <FL250 <FL200 230 kts Flap 1 200 kts 140 kts 170kts	2 ENG flameout: Optimum engine relight speed . Minimum speed where one fuel pump supplied Time to descend at 300 kts / 0.82M from FL400 to GRND Pitch attitude for engine start with no speed indication (150 T + ½ degree for each 20T above) Wait ENG relight before put ENG MASTER switch OFF. Wait 30 sec before put ENG MASTER switch ON. Start APU. APU BLEED ON. Optimum speed with APU BLEED available. Landing flap Max speed for gears gravity extend. Min speed for RAT. Target speed.
≥ 1	Flap setting where EMER GEN stops
> 140 kts	Speed where RAT supplies flight control servos
- 10℃	Minimum oil temp for takeoff
7% / 14% 30 sec ≥ 15%	START FAULT due to ENG STALL or EGT OVERLIMIT or NO LIGHT UP ,Fuel flow reduction by FADEC. Time to DRY CRANK the engine if manual start and no light-off N2 speed where start valve automatically reopens
< 30%	N2 maximum speed on TAILPIPE FIRE for ENG START SEL to CRANK
	ECAM engine vibration level (does not require a shutdown)

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> 5.7 units > 5.6 units	N1 N2
 115.5% 113% 3 sec	ENG 1(2) N1/N2 OVERLIMIT N1 N2 Before Eng shutdown
 940°C/975°C 5 sec	ENG 1(2) EGT OVERLIMIT : EGT above __ at takeoff power Before Eng shutdown
 300/.82 250/0.7	ENG 1(2) REV UNLOCKED max speed. Max speed if buffet
30 sec	Time for engine relight when in flight
<-10℃ 160℃-175℃ >15 min or>175℃	ENG 1(2) OIL LO TEMP ENG 1(2) OIL HI TEMP
30000 ft	Max guaranteed altitude ENG RELIGHT (in flight)
5 sec	ENG THRUST LOCKED is automatically repeated every 5 sec.
≥ 15%	Minimum N2 wind milling speed for wind milling relight in flight
230 kts	Initial optimum speed for ditching – then green dot
500 – 1000 ft RA	Altitude to determine sea state prior to ditching
> 10°	Drift greater than this where you should ditch into the wind
11°	Pitch attitude for touchdown when ditching
360 ft / min	Maximum descent rate for overweight landing
> 800℃.	Temp where you can expect tire deflation after overweight landing or abort
1 psi / 2,500 ft	BOMB ON BOARD At ΔP, the cabin altitude is ____ above the aircraft altitude
4	Number of rows to move passengers away from LRBL location
25 ㎝ (10 in)	Minimum depth of wetted blankets etc. over an explosive device
FL230	Cracked cockpit windshield/window Maximum altitude to give a ΔP of 5 psi .
>3,000 kg	ECAM advisory for FUEL MANAGEMENT…CHECK (leak?)
> 142℃	ECAM advisory for IDG oil temp
 < 600 psi < 300 psi	ECAM advisory for CREW OXY Pulsing green Pulsing amber
< 2 qt.	ECAM advisory for low oil quantity
> 260℃	ECAM advisory for nacelle temperature
12.5°	Initial pitch attitude for WINDSHEAR or GPWS escape maneuver
03 – STANDARD OPERATING PROCEDURES	
5% 8% 3%	Fuel penalty for flying 4,000 ft below Optimum Flight Level Fuel penalty for flying 8,000 ft below Optimum Flight Level Fuel penalty for flying above Optimum Flight Level
6 hrs	Maximum ground time before the batteries need to be checked for voltage charge
95%	N% value where APU AVAIL light comes on

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10 sec	Time delay where ECAM DOOR / OXY page replaces ECAM APU page after APU start
12 psi	Bleed pressure sometimes shown when OAT <10°C. with APU bleed valve closed.
2538psi ± 145	ACCU brake PRESS indicated when checked at the gate
24 ± 6℃	Cabin and cockpit temperature range
21.5℃	Temp selector at 10 o'clock position for the cabin
12 qt	Minimum oil quantity + estimated consumption for dispatch
.56 qt/hr	Maximum average estimated oil consumption per hour
 25.5 V 23.5 V 20min >5 min 3 sec <1000 psi	COCKPIT SAFTY INSPECTION: BAT voltage to ensure a charge above 50% APU start on BAT, one BAT below23.5V will have risk of abort start. Charge cycle. BAT only on ground, ground horn triggered along with EXTRACT FAULT. Time to press ECAM RECALL pb to display previous warnings Oxygen pressure (boxed amber) where MIN FLT CREW OXY CHART needs to be referenced for dispatch.
0.56 – 0.87 qt/hr	Consumption range where engine operation is allowed to complete flight.
 3 min 10 sec / <60 amps 0.4 1000 ft/3000 ft AAL 1000 ft /1500 ft AAL 2400—2700 psi 100% <5 kts 5 ° >10 days 140 2% <PTOW-4T / <PTOW	Cockpit preparation: Time to wait before programming FMGEC after initial power-up BAT charging check Time /maximum decreasing amperage. Taxi fuel ACC ALT NADP2/NAPD2 EO ACC ALT TO/GA Alternate brake check accumulator pressure range. OXY mask N selector position . Maximum ground speed indicated on ND Radar tilt setting for takeoff If cockpit clock is adjusted for more than ___ days, maintenance has to do a Wing Tip brake engagement test. Pack flow LO when economic class passenger less than 140. Maximum difference in Load sheet vs aircraft TOWCG. PTC recalculated(use LPC / RAM).
 3 sec 10% 15% 20 sec 50% 54% 15 sec 3 min 30 sec	ENGINEE START After IGN START and before ENG MASTER ON. N2 speed when the active igniter displayed N2 speed when fuel flow is indicated time for EGT rise (on ground) N2 where start valve goes x-line N2 when ignition indication is off ENG page automatically replaced by WHEELS page after Min time after engine start to avoid thermal shock prior to takeoff WAI ON ,on ground after 30 sec test period then close.
30 min / 60% / 30 sec	Time ____ (or with engine vibration) in icing conditions which exceeded where engine should be accelerated to ____ N1 for approximately ___ sec prior to higher thrust operation.

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25 ft /180 ft	Danger area in front of (behind) engine at idle thrust
0 psi 40% 15 kts / 5 kts >150℃ >20 sec	BEFORE TAKEOFF: BRAKE PRESS indicated pressure for brake check on initial taxi Maximum normal N1 break-away thrust Maximum taxi speed for slippery surface in straight line / sharp turn. Delay takeoff when brake temperature __ with brake fan on. Pack off take off put PACK switches off at lease 20 sec before apply take off thrust.
45 m	Standard runway width
42 m / 72°	minimum runway width with ___ degrees of steering (no margin)
20 ° 5 - 10 kts	180° turn, angular offset to runway heading to begin the turn. Minimum speed for 180° turn on the runway
½ / 80 kts / 100 kts FULL/80 kts / 100 kts 50% 50%/70% / 40 kts 80 kts 3 ° / sec 15 °/ 12.5 ° 11°/16° ≤ 10 ℃TAT/< -40 ℃SAT 10,000 ft	TAKEOFF AND CLIMB To counter nose-up effect on takeoff, maintain ____ forward side stick until _ and then BACK to neutral by _ (crosswind < 20 kts) maintain FULL forward side stick until __ and then reduce to neutral by __ (crosswind > 20 kts) Takeoff N1 setting for stable thrust Takeoff N1 setting /after stable / before __ for crosswinds > 20 kts. S peed check for N1 stable on takeoff roll Rotation rate on takeoff. Pitch attitude for all engines operating / 1 engine operating. Pitch attitude when tail shrike landing gear compressed/ extended TAT /SAT where engine anti-ice is turned on visual moisture. Altitude where RAD NAV is cleared
1%	N1 discrepancy on takeoff requiring a logbook write-up
100 ft	Minimum altitude for AP engagement after takeoff
1	F speed is not displayed for this flap setting
1,500 ft AAL	CRUISE page replaces the ECAM ENG page after this altitude
1,500 ft AAL / 400 ft AAL	Default / Min THRUST RED ALT
1500 ft/3000 ft / 400 ft AAL	Default NADP2/NADP1/ Min ACCEL ALT
1000 ft AAL	Default ENG OUT ACC ALT
V2 + 10 / 18 °	Speed and maximum pitch attitude on takeoff
30 min	Time interval for fuel comparison check
< 3 NM	Cruise - NAV ACCUR check error where ACCUR is high
> 3 NM	Cruise – NAV ACCUR check error where ACCUR is LOW
0.8/300 5 / 15 kts 1/3 <165 kts 80kts/60kts/taxi	DESCENT/APPROACH Modify descent manage dpeed. MIN / MAX wind correction to VLS when computing VAPP Portion of headwind component added to VLS if manually computing Vapp Before select flap FULL. Reverse thrust ops start reduce to IDLE/ IDLE/CANCEL
15 NM	Recommended distance from runway to manually activate APPR phase
> 1 NM	Approach – NAV ACCUR check error high where ACCUR is LOW
< 1 NM	Approach – NAV ACCUR check error low where ACCUR is LOW
3 sec	Minimum time for LOC or G/S engagement after arming them

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3 NM	Minimum distance before FAF to select FLAPS 1
2,000 ft	Decelerated approach initial altitude with FLAPS 1 and S speed
1,400 fpm	Target rate of descent to capture G/S from above
3 NM	Distance where L/G should be down prior to FAF on NP APPR
1 NM	Distance on final full landing flaps should be selected on NP APPR
800 ft	Altitude where ECAM WHEEL page appears or at L/G extension
MDA – 50 ft	Altitude on Managed guidance (FINAL APP) or at MAP where automatic AP disconnect
45 o / 30 sec	Circling approach offset time (± wind) and angle to downwind
20 sec	Circling approach – runway abeam time (± wind) at 500 ft prior to turning base leg
45 sec	Visual approach – runway abeam time (± wind) prior to turning base
62 ft	Pilot eye height over threshold
27 ft	Main gear height crossing threshold
10.1 °	Tail strike pitch attitude with oleos compressed – boogie level
14.2 °	Tail strike pitch attitude with oleos extended – boogie tilted
20 °	Cockpit visual cutoff angle
30 ft	Normal flare altitude
7.5 °	PM call for excessive pitch “PITCH, PITCH, PITCH”
7 °	PM call for excessive bank “BANK, BANK, BANK”
20 ft	Height for “RETARD, RETARD, RETARD” auto call for manual landing
10 ft	Height for “RETARD, RETARD, RETARD” auto call for auto landing
16 °	Wing tip or engine scrape occurs at this roll angle on touchdown
20 kts	Minimum speed to disengage the auto brake to avoid braking jerks
30 °	Temperature where keeping flaps at CONF 1 will prevent a “AIR L(R) WING LEAK warning due to hot bleed ducts in the wings
5 min >500 ℃ >500 ℃	AFTER LANDING/ SHUTDOWN Minimum time to start brake fans after landing or after reaching the gate, whichever comes first. Prevents oxidation. Brake temperature where brake fans should be turned on Brake temperature where parking brake application at the gate should be avoided
3 min	Minimum idle cooling time after landing for engines before shutdown
GS > 15 kts	Residual IRS ground speed where a report is required.
GS > 21 kts	Residual IRS ground speed where a report is required and IRU is removed
2 min/ 0	Maximum time after engine shutdown to perform IRS GS check. GS resets to ___ after this time.
10 reset button is used	Minimum time to wait before switching off electrical power supply after shutting down the ADIRS (1+2+3) to ensure memorization of the last data
2 min	Minimum time to wait after the APU AVAIL light goes out before shutting off the APU BAT. Prevents smoke in the cabin on next flight.
04 – SUPPLEMENTARY TECHNIQUES	

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1.13VS1g 1.23VS1g 0.3G 1.13 VS >1.05V2 >1.05VMCA 1.18 VS 1.23 VS >=VMCL	SPEED DEFINITION: V2 = 1.2 * 0.94 VS1g=1.13 VS1g Vref =1.3 * 0.94 VS1g =1.23 VS1g VLS provide 0.3G from buffet margin. VLS at take off . or or VLS after flap retracted. VLS at clean configuration VLS at other phases.
Takeoff = / limit Landing conf 2 = / min / limit Landing conf 3 = / min / limit	F-Minimum speed flaps retracted at takeoff, target speed CONF 2 /3 in approach. 1.18 VS CONF 1 + F / VMCL + 5 kts 14 % Takeoff / VMCL + 15 / VFE CONF 3 – 2 kts 4% Takeoff / VMCL + 10 / VFE CONF FULL – 2 kts
Takeof Landing	S- slat retract speed at take off, target speed CONF1 at approach. 1.21 VS of clean Limit VFE CONF 1* - 2 kts.
0.6 × weight + 107 knots 1 kts /1000 ft /10 kts	O-green dot speed <20000 ft >20000 ft
± 2.5℃	Individual cabin zone temperature change limit via PIM.
>20 min	With passengers on board ,exceed 20 minutes without air conditioning supply Is not recommended
2 MHz/6 MHz	Some interference may occur when frequency difference is within 2 MHz (between VHF1 and 2, or between VHF3 and 2), or closer than 6 MHz (between VHF1 and 3).
3 sec/1 sec	Computer reset use normal cockpit control /reset button.
1-9 sec 5-20 min 15-120 sec(30 for EVA)	Cockpit door operation: Buzzer sounds when ROUTINE ACCESS is requested. DOOR LOCK switch put to LOCK ,the emergency access, the buzzer, and the keypad are inhibited. EMERGENCY ACESS and If the flight crew does not take any action, the door will unlock after --.
1.9 o left /1.6 o right	Rudder trims range during cruise.
1000 psi	Brake pressure at or below if antiskid is lost.
150 ℃ /60℃60 ℃ 200 ℃ 900 ℃	Brake temperature: Maintenance action is due when --temperature difference between 2 brakes is__ and one brake is above __, or below__. --brake temperature between both side of main gear above__. --brake temperature above__.
184 psi / 206 psi	Nose/main gear nominal tire pressures, max weight & loaded.
± 0.5° /± 5 ° ± 0.8 ° -- 2 ° / +-5 ° --12 ° ± 2 ° / ± 12 °	NWS offset/rudder trim to taxi straight ahead --maintenance requirement. --dispatch allowed but requires special procedure. --dispatch limit.
	Gnd / 5000 ft / 10000ft. maximum ALTITUDE difference

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20 ft / 55 ft / 60 ft 60 ft / 90 ft /130ft 25 ft	--between ADRs . --between ADRs and ISIS. --between PFD and field elevation.
 6 / 4 / 4 kts 6 / 7 / 7 kts	Gnd / 5000 ft / 10000ft. maximum SPEED difference --between ADRs . --between ADRs and ISIS.
 0.008/0.01/0.009 ------ /---- /0.009	Gnd / 5000 ft / 10000ft. maximum MACH difference --between ADRs . --between ADRs and ISIS.
4 °	maximum Magnetic Heading difference
1500 ft/min	VS limit within 2000 ft to level-off when convergent traffic within1000 ft .
54 ft	Minimum MEHT(minimum eye height threshold) to use PAPI below 200 ft.
5000ft	Maximum MDH accepted by FMGEC.
10 min / 30 sec	Complete / FAST alignment.
5 sec	Rotate NAV switch OFF then NAV within__ sec enter FAST alignment. Above __, will enter complete alignment.
 5nm/8nm/12nm/22nm 15kts/21kts	IRS performance check: log in when above __ value. Drift check: 1.5 hrs/3hrs/5hrs/10hrs Residual ground speed check: check within 2 min after aircraft stop. Remove IRU after 2 flights / 1 flight.
100 ft	A/THR will disconnected when THR lever leave CL detent below__ RA.
 15% N2 1% / 5sec 20sec 50% N2	MAN Engine start: --Minimum N2 --Max motoring --Max time to light up after ENG master switch ON. --to check start valve and ignition closed/off.
25 psi	Engine start with external pneumatic: Minimum recommended air pressure.
 30 psi 30%	Cross bleed start:: Minimum recommended air pressure. N1 RPM to get air pressure 30psi
 50% N2	Engine start with start valve manual operation: Close start valve.
5—10% 10—15%	DCLB1(derated climb1) reduce the maximum climb thrust by __. DCLB2(derated climb1) reduce the maximum climb thrust by __.
<=10 ℃ +visible moisture - 40℃ SAT -15 ℃	Cold weather operation: icing conditions may be expected when OAT on ground and TAT in-flight is. ENGINE ANTI ICE must be ON when icing conditions expected on ground and in-flight except SAT below- 40 ℃. During descent even below --ground power should be used for APU start. --IRS alignment need 15 mins, if avionic bay temperature below__. --Display units may not be available, if cockpit temperature below__

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3 mm (1/8 inch)	Maximum layer of frost on the underside of the wing tank area.
40% N1	Maximum N1 to start the aircraft moving.
15 kts/ 5kts	Maximum taxi speed for taxi straight ahead/ turn.:
60% N1 for 30 sec	Engine run-up when ground operation of more than 30 minutes
VLS + 15 / 5 kts	Minimum speed for clean/other configuration when significant ice accretion on de-ice part (wing anti ice work).
VLS + 15 / 10 kts	Minimum speed for clean/other configuration when significant ice accretion on none de-ices part (wing anti ice inop).
12hrs/-15 ℃	Remove APU BAT to avoid cold soak for more than 12 hrs.
	LOW VISIBILITY APPROACH:
<200 ft AAL	The FMGC freeze the landing capability until LAND mode disengaged or both AP disengaged.
	AUTOLAND warning:
	--The autopilots are lost.
15 ft	--Loss of LOC signals above 15 ft.
100 ft	--loss of glide signal above 100 ft (transmitter or receivers).
15 ft	--difference between both radio altimeter.
	Warning of excessive beam deviation:
1 dot (above 100 ft RA).	G/S deviation
1/4 dot (above 15 ft RA).	LOC deviation
	Failure of localizer or glide slope transmitter
7 sec	--above 200 ft, within 7 sec, will retain LOC and T/S mode.
	--above 200 ft and 7 sec, AP disengaged, FD revert to HDG-V/S
	--below 200 ft AUTOLAND warning appears
>1000 ft AAL	CAT II / III approach failure occur above 1000 ft maybe revert to higher minimum , provided ECAM action done and weather OK.
<1000 ft AAL	Below 1000 ft any occurrence imply a go-around and reassessment.
240 kts	Turbulence penetrates speed up to 20000 ft.
260 kts	“” “” “” up to 37000 ft
0.8 M	“ “” “” above 37000 ft
	Before selecting RDR WX, WX/T, MAP mode:
5 meters/± 135°	NO person within __ from antenna.
5 meters/± 90	NO large metallic obstacle within__ from antenna.
	rainfall rates vs color code(CAL)
< 0.7(mm/hrs)	Black
0.7 - 4.0	Green
4.0 - 12.0	Amber
> 12.0	Red
Turbulence	Magenta
40 nm	Weather within __, use Wx + T mode to analysis weather situation.
+5 °	Antenna TILT angle before takeoff.
+1 °/10000ft	Antenna TILT angle during descent down to 15000 ft.
+1 °/5000 ft	Antenna TILT angle during descent below 15000 ft.
	Weather avoidance:
160 nm / 80 nm	PM's ND/PF's ND range selection to cope with thunderstorms.
40 nm	Avoidance decision should be taken.

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>25000 ft 20nm/ 5-10nm / 5nm 5000 ft	Avoid over fly TS >25000 ft. Avoid magenta (Wx/T mode) /red areas and fringes by at least __> FL230 /<FL230 / single magenta area. Penetration or over flying TS by more than 5000 ft.
60 vs 1	Δh (ft)= d(NM) × Tilt (degrees) × 100.
Flap 3 VLS+15 ktl 12.5°	WINDSHER Recommended flap If downburst expected, Vapp increase up to. WS encountered during T/O and if no SRS .initial pitch 12.5 up to full back stick.
+ 50 ft	Non-precision Approach “Straight-in” or “Offset” to a landing, the MDH __.
3 minutes	Taxi with engine shutdown, wait no less than __.
05 – IN FLIGHT PERFORMANCE	
5 min	Time limit for MAX thrust on takeoff
10 min	Time limit for MAX thrust on takeoff with an engine failure
- 5 %	Thrust reduction for manual cruise thrust using MAX CLB thrust N1 reference.
350 fpm	Normal cabin rate of descent.
2.1%	Minimum steady gradient with one engine inoperative for go-around at a speed ≤ 1.4 VS.
2.5 %	Minimum approach climb gradient for CAT II approaches
06 – SINGLE ENGINE OPERATIONS	
300 kts / 0.82M Green dot 330 kts / 0.82M	Speed strategies – DESCENT TO CEILING Fixed Obstacle Standard
LR Green Dot 330 kts	Speed strategies - CRUISE Fixed Obstacle Standard
M.82 / 300 kts / 250 kts “ “ “ “	Speed strategies – DESCENT TO LANDING Fixed Obstacle Standard
30%	Approximate increase in fuel consumption with engine out
- 2,500 ft	Ceiling reduction with severe icing conditions encountered
500 fpm	If vertical speed in climb becomes less than ____fpm, select V/S
+ 2 % + 3 % - 5 %	Increased fuel burn during holding with: Engine anti-ice ON Total anti-ice ON Correction for straight-line holding
07 – OPERATIONS ENGINEERING BULLETINS	
08 – FCOM BULLETINS	
150 / 600	Brake binding is indicated by a temperature of > ____℃. between brake temps on one gear AND any one brake temp is >____℃. (brake temp limit)
12 ° / 15.5 °	Maximum pitch attitude before ground contact (oleo compressed /

	fully extended)
2.5 - 3° /sec 3 - 4 ° /sec	Normal rotation rate after engine failure. Normal rotation rate with all engines operating
CONF 1	Fastest rotation rate for a given stick input with this takeoff flap setting
3,500 ft	Minimum hard surface runway length to be included in EGPWS airport database
15 nm	Turn off EGPWS TERR function when this close to the airport.
 400 ft 700 ft	EGPWS Terrain clearance floor within: 5-12 NM of the airport 15+ NM of the airport
12 NM	Early descent for an idle factor of +4.
 -5 to +10 > 7 ° < 0° to +10°	PM calls for unstable approach: Speed target Bank angle Pitch
>100 ft	Minimum altitude to move thrust levers beyond CLB detent to get increased thrust before moving them back to CLB
15 °/ sec 40 ° / sec	Maximum roll rate with sidestick (normal law) in addition to the aircraft roll rate due to turbulence (maximum ____/ sec when surfaces fully extended)
 ± 35 ° ± 4 °	Maximum rudder deflection at low speed 150 kts 330 kts
SYSTEM DESCRIPTION – VOL. 1	
00 – GENERAL INFORMATION	
20 – AIRCRAFT GENERAL	
 58.37m / 191ft 3 in 60.3m / 197ft 10 in 17.8m / 58ft 5 in	Aircraft principal dimensions: Length Width height
51m / 165ft	Minimum turning width for 180 o turn (symmetric power,NWS 65 o).
21 – AIR CONDITIONING / PRESSURIZATION / VENTILATION	
± 3°C (5.4° F)	During cruise each cabin zone temperature demand can be modified by forward and additional attendant control panel.
 P < 1 psi ΔP >= 1 psi :	Ram air switch on: --outflow valve will open 50 % when in auto mode -- Outflow valve remain normal no emergency ram air flows in.
70 kts	Pack ram air inlet and outlet flap: --closed during takeoff when thrust lever is at or above CL and the wheel speed is at or above __, and during landing main landing gear is compressed and speed above __. --reopened 15sec after __.
18°C (64°F) to 30°C (86°F) 24°C (76°F)	Cockpit/cabin temperature selection ranges. 12 o'clock position.
20°C (68°F)	The fixed pack outlet temperature when both zone temperature control channel have failed.
1--15°C (34--59°F)	The anti-ice valve regulates the pack outlet temperature between

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	__when both pack temperature control channel have failed. The flow control valve pneumatically regulates the pack flow to approximately 120% of the NORM flow.
30sec	Start valves reopen: --if MASTER switch or MAN START pb are not set to ON within __ during engine start --The valve reopening is delayed __ to avoid an extra pack closure cycle during subsequent engine start..
80% / 100% /125%	Pack flow LO / NORM /HI
88°C (190°F) 70°C	The hot air FAULT light ON when duct overheat is detected, The hot air valve and trim air valves close automatically. The hot air FAULT light OFF when temperature drop below __..
260°C	Pack compressor outlet temperature indication become amber and keep amber it temperature not drop below 180°C.
95°C	Pack outlet temperature indication become amber and keep amber it temperature not drop below 60°C.
88°C	Zone duct temperature indication become amber and keep amber it temperature not drop below 70°C.
1/5	outflow valves manual mode move speed vs automatic mode
15 000 ft	Outflow valves automatically close when cabin altitude reaches __.
ΔP >4 psi	When one pack is OFF, aft outflow valve closes and the forward outflow valve controls the cabin pressure.
ΔP 8.85 psi / – 1 psi	safety valves prevent the cabin pressure from going too high /low
ΔP >8.42 psi	CPC maintains the Δp constant, to avoid over pressurization.
+0.1 psi	During take off CAB V/S - 328 ft/min until pressure different reaches During abort Cabin pressure is set back to the takeoff altitude. During landing CAB V/S to reach __ before landing.
1000 ft/min	CAB V / S limit during climb.
7350 ft /8000ft	CAB ALT limit during cruise when flight longer./ shorter than2.5hrs.
750 ft/min	CAB V / S limit during descent
+ 500 ft/min	At touchdown, CAB V/S __ to release remaining cabin overpressure
80 sec	80 sec after touchdown 2 automatic controller automatic transfer. Out flow valve fully open to ensure there is no residual ΔP t.
- 2000 to 14000 ft	LDG ELEV sel range.
3 sec	Cabin pressure MODE SEL switch MAN, 3 sec then AUTO to change controller.
±1800 ft/min	V/S FT/MIN (cabin vertical speed) indication pulse if above __.
ΔP - 0.2 --8.85 psi ΔP>1.5 psi	ΔP PSI(Cabin differential pressure) indication turn amber if __. Indication green pulse if __ during final approach.
8000ft—9550ft >9550	CAB ALT FT (cabin pressure) indication pulse if between __. CAB ALT FT (cabin pressure) indication turns red.
8.75—8.95psi	Safety valves open when cabin differential pressure is between__.
>95%	Out flow valve indication become amber.
88°C (190°F)	Bulk cargo duct overheats, HOT AIR switch FAULT light ON .light goes off when the temperature drops below 70°C (158°F),
 5°C (41°F) 15°C (69°F)	Temperature selector of cargo compartment temperature Cold Middle

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25°C (77°F)	Hot.
22 – AUTO FLIGHT SYSTEM	
28days	FMGEC navigation database updated every__.
20 waypoints	Pilot-stored elements: 20 waypoints, 10 runways, 20 navaids, and 5 routes.
45 sec	Turning a selector knob on FCU without pulling, the dashes reappear after__ except ALT knob and HDG knob in TO /GA phase.
30 kts or 0.3 Mach	SPD/MACH selector knob One rotation approximately__.
30°	HDG/TRK selector knob One rotation approximately__.
100 ft/min	V/S selector knob 2 clicks approximately__. One complete rotation sets V/S 1600 ft/min e
0.1°	FPA selector knob 1 clicks approximately__. One complete rotation sets FPA 3.2°.
0.2 nm 0.28 nm + 8 nm /h then+ 2 nm /h	FMGS Estimated Position Error (EPE) : After an IRS alignment, or at takeoff, the EPE is set at__. IRS/GPS mode--EPE above __, GPS position is rejected. IRS/DME/DME mode--EPE decreases from initial value to __. IRS/VOR/DME mode --0.1 nm + 0.05 X DME minimum __. IRS ONLY mode-- + 8 nm /h for the first 21 min,+ 2 nm /h after.
2 nm 1 nm 0.3 nm/0.5nm	Default RNP: ENROUTE and OCEANIC TERNIMAL and TAKEOFF APPROACH—GPS/LOC or OTHER
0.5 min 0.7 min 1 min	"NAV FM/GPS POS DISAGREE" in GPS PRIMARY mode: Latitude or longitude between 0°--45°. longitude between 45°--60° longitude between 60°--70°
300 nm	ILS autotunes ILS frequency when destination direct distance __.
6 navaids	Navaid deselect function can deselect __.
10 min / 30 sec	Alignment: normal / fast.
73°N 73°--82° 82°anu up	Alignment: No specific procedure. Need specific procedure and alignment time is longer No possible.
FL250	Below __ FMGS calculates ECON CRZ SPD instead of ECON CRZ MACH.
0 40 999	CI: minimum fuel consumption (max range) CI LRC minimum time
FL410 0.3G V / S 300 ft/min	Recommended maximum altitude (REC MAX): Certified. Buffet margin. With MAX CLB thrust.
FL220/FL310	Predictions for alternates: airway distance less/more than 200nm.
30ft	FD show pitch and roll crossbars above __, show yaw bar below __ when ILS available.

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25°Up/13°DN/45°Bank	FD removed. Pitch and roll bar both removed when pitch/bank over__.
100 ft RA 15 ft RA	FD flashes permanently: Pitch bar--Transmission of GLIDE data is interrupted above__ Roll bar--Transmission of LOC data is interrupted above __.
10sec	FD flashes: Pitch bar flashes __ when initial engaged or G/S, LAND, FINAL mode revert to V/S mode or ALT* mode altitude changed more then 250ft. Roll bar flashes__ when APPR mode reverts to HDG mode or initial engaged.
22°Up / 10°DN / 40°Bank VLS / Vmax	AP engagement
MDA – 50 ft or 400 ft α port+1° 25°Up/13°DN /45°Bank	AP auto disengaged with APPR mode engaged and a non-ILS approach selected.
<200 ft RA	autoland red warning flashes in LAND mode when : o The aircraft gets too far off the beam (LOC or GLIDE). o Or both autopilots fail. o Or both localizer transmitters and receivers fail. o Or both glide slope transmitters and receivers fail. o Or both radio altimeters differ from more than 15 ft.
5 sec aft lift-off	selected speed engaged: -pilot pull SPD select knob. Or No selected or managed speed. -FM speed target is lost except below 700 ft RA in takeoff, LAND or go around mode. -MCDU has a preselected speed for the next phase, and the aircraft transitions into that phase
30 ft aft lift-off 1nm	NAV mode engages: -Automatically. -DIR TO function. -push HDG/TRK knob when close 1 nm of active flight plan leg. -automatically when NAV is armed and the aircraft reaches the capture zone.
MDA – 50 ft	NAV mode disengages: -Automatically. -any other lateral mode is engaged. -flight plan is lost or entering a discontinuity.
45°	RETURN-TO-TRAJECTORY ASSUMPTIONS 45° convergence angle or direct to "TO" waypoint when greater than 45°.
1000ft/min	Level change less than 1200 ft in OPEN CLB mode produce__:
1000ft	DES mode managed vertical guidance to reach VAPP by:
-350ft/min	DES mode defaulted cabin rate.

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±20 kts max	DES mode speed target range.
1000ft/min	DES mode descend rate in HOLD mode.
1/2	TOO STEEP PATH miss with 1/2 speed brake.
250 ft	ALT* mode disengaged when ALT knob change more than __.
40 ft	ALT* mode become ALT mode when within__.
250 ft	ALT mode, when AP engaged. AP will back to FCU ALT if △ALT within __ , and will maintain current ALT when above__.
VLS-2 or VLS-19(S/B) Vmax+4 VLS Vmax	SPEED PROTECTION FD mode – FD disappeared ,A/THR engaged in SPEED, FD mode -- FD disappeared ,A/THR engaged in SPEED V/S mode—V/S temporarily abandoned to maintain SPEED. V/S mode—V/S temporarily abandoned to maintain SPEED.
V2+10 V2 or current speed max V2+15	SRS mode Guidance: Normal. ENG out
17.5° or 22.5max for W/S 0.5° V2+15	SRS mode protection: Attitude protection. Min climb gradient. Speed protection of max.
0.5° 20°	RWY mode engagement -LOC deviation less than. -HDG is within __. -SRS mode required conditions met.
300nm	ILS frequency automatically tuned when the direct distance to destination is below __.
Above 5000ft 2500RA 30ft	G/S engagement: May engaged above RA operative range. Display autoland capability when RA active. AP/FD guidance down to__.
7sec	LOC and G/S mode disengaged when LOC or G/S signal lost for 7 sec above 200RA,
20nm 20°	LOC capture assistance function: NAV mode guide a track to help interception of LOC. Within destination AP. From LOC axis
400 ft RA	Land mode engaged when LOC G/S modes are engaged and below 400ft RA. If no displayed below 400 ft the landing capability degrades to CAT1. No action on the FCU will disengage LAND mode. Only TOGA mode can disengage LAND mode.
55 ft RA 45 ft RA	FLARE mode engaged , Align mode engaged, A/THR start to reduce to IDLE. ROLL OUT mode engaged when AC touch down.
700 ft RA	Vapp and WIND entry in MCDU has no effect on the speed target.
200 ft RA 1/4 dot above 15 ft RA	AUTOLAND warning light flashing and triple click aural warning when below 200 ft RA in LAND mode and: -both APs OFF. -excessive deviation in LOC

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1 dot above 100 ft RA 15 ft / 100 ft 15 ft	-excessive deviation in GLIDE -loss LOC signal above 15 ft or loss of GLIDE signal avove 100 ft. -2RA indication different by more than15 ft.
1.5nm	FINAL mode engaged when NAV mode and within __.
MDA-50 ft or 400ft AGL	FINAL mode disengaged, AP also disengaged.
100 ft RA	GA TRK disengaged when other lateral mode engaged above__.
VLS+25 / VLS+15	SRS maintain current speed or Vapp, up to __(normal / 1 ENG out)
<100 ft RA	A/THR disconnected when sets thrust levers out of CL detent.
>15 sec	A/THR disconnected for the remaining of flight when push and holds one instinctive disconnect pb more than__.
40/10/20 ft RA	RETARD mode engaged / ‘’RETARD’’ callout (auto) /(manual)
VLS—VMAX Green Dot, S, F 320/.84-VFE-VLE / 315/.83-VFE-VLE	SPEED or MACH mode speed limit: Selected speed—VLS and VMAX(VMO/MMO,VFE-VLE) Managed speed – maneuvering speed and Maximum speed / in descend.
±3 kts	A/THR soft mode: during cruise in MACH mode
VAPP—VFE or VFE-5 VLS+1/3 TWR HEAD WIND VAPP+ current –TWR wind VAPP+ (current-TWR)/3	GROUND SPEED MINI speed range(config 1.2.3 or FULL) VAPP: minimum +5 knot maximum 15 kts. Speed target above 400 ft Speed target below 400 ft
LIFT OFF to 100 ft RA	ALPHA FLOOR protection
10 sec 9sec	FMA mode change white box display 10 sec up to 15sec. FMA 3RD line display special message. The priority message will display in red and flash 9 sec exp MAN PITCH TRIM ONLY.
30sec	SET HOLD SPEED __ before entering hold s with elect speed.
-500 ft	EXTEND SPD BRK displayed when ALT CSTR will miss by __.
>20000 ft	AFT CG monitoring is available above __.
23 – COMMUNICATIONS	
118.0—136.975MHZ	VHF frequency range
5 sec	Alarm tone indicate microphone is in emission more than 30sec.
2.8—24.0MHZ	HF frequency range.
60sec	MECH and ATT light go off after __.
3sec	EVAC switch on CAPT and EVAC CMD from cabin, cockpit horn sounds__ only.
2 hrs 2sec	CVR record last 2 hrs contain. Automatically energized after one ENG started and stopped 5 minutes after engine shutdown. To erase, push ERASE button 2 sec if the aircraft is on ground and parking brake is ON.
121.5 243 406025 MHZ	ELT emergency signal frequency.
24 – ELECTRICAL SYSTEM	
115/200 volt 400hz 28volt	AC DC
115KVA	AC generators and APU generator output
90KVA	GPU output(A or B)
8.6KVA / 3.5KVA	EMERGENCY GENERATOR output (green hydraulic / RAT)
2.5KVA	STATIC INVERTER transforms DC to AC power.

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200A /100A 100A	2 main TR(200A each)1 essential TR (100A) supply DC to aircraft. 1 APU TR (100 A) dedicated to APU start or charge.
37 ampere-hrs	2 main batteries permanently connected to hot buses. 1 APU battery is dedicated to APU start.
26.5 volt	Battery recharged, recharge cycle end when charge current goes below 4 amperes for 10 sec on ground or 30mins in flight.
>23 volt	Battery automatic cut off on ground voltage >23 volt >16sec.
>3 sec	IDG pb holds more than 3 sec may damage disconnect mechanism.
142°C <T<185°C >185°C >108% >120 volt or <110 volt >400 MHZ or <390MHZ	IDG oil outlet temperature flashed if 142°C <T<185°C. IDG oil outlet temperature amber if T>185°C. GEN load become amber for more than 10sec. GEN voltage become amber. GEN frequency become amber.
>31volt or <25volt	TR voltage becomes amber.
>31volt or <25volt 5A	BAT voltage become amber BAT current become amber.
20°C(68°C)	Foot warmer temperature.
25 – EQUIPMENT	
5min 30sec 1min	COCKPIT DOOR sw LOCK position will lock door 5-- 20min. After Emergency access code 15—120sec cockpit door unlocks. After entry request , video 1 come on for 1min.
26 – FIRE PROTECTION	
3sec	APU extinguisher auto discharge 3 sec after warning appearance.
5sec	Avionics smoke warning come on when both detectors detect smoke more than 5 sec.
60sec / 240mins	Cargo fire extinguisher 1 st take 60 sec to discharge into cargo compartment , 2nd comprises a flow metering last 240min.
27 – FLIGHT CONTROLS	
30°nose up/ 15°nose down	Maximum elevator deflection.
14°nose up/ 2°nose down	Maximum THS deflection.
±35°	Maximum rudder deflection.
25°	Maximum Ailerons deflection.
35°	Maximum spoiler's deflection.
72kts	Ground spoilers automatically extend during RTO above 72kts.
4.7° / 32°	Thrust levers considered idle when above/below 6 ft RA.
14°/35°	Ground spoilers 1 deflection.
20°/50°	Ground spoilers 2--6 deflection
35°/< 150kts 4° />350kts	Max rudder deflection base on CAS.
 5sec 2sec 2sec	Flight control Normal law mode change: Ground mode to flight mode—RA>50 ft or pitch <8°. Flight mode to flare mode—RA<100 ft. Flare mode to ground mode—GND+5 sec or pitch< 2.5°.
4°up	Ground mode THS automatically set to 4°up.nose <2.5° 5sec.
33° <100 ft RA or <0.5G	Normal law provides auto trim up to 33° bank. Auto trims frozen.

50 ft	Flare mode provide slight pitch down order.
+2.5g to -1g /+2g to 0g	Normal law G limit slats retracted/ extended.
30°nose up/15°nose down	Normal law pitch attitude limit.
8° or 0°	To leave the AOA protection sidestick must be pushed 8°forward or 0°forward for at least 1 sec when $< \alpha$ max.
VMO/MMO VMO+4kts / MMO+0.006	HI SPEED protection activated, bank limit reduced from 67° to 45°, positive spiral static stability is reduced from 33° to 0°. HI SPEED warning activated
10 ft – 2000 ft	LOW ENERGY warning available in configuration2,3 full. Aural warning '"SPEED SPEED SPEED" every 5 sec.
15°/sec	Max roll rate with full sidedtick.
 33° >45°/<40°. 67°	BANK ANGLE protection. positive spiral static stability 33°. AP disconnected, FD disappears / FD reappears. Max bank angle.
30%	Sideslip indication change from yellow to blue when asymmetrical thrust different by 30%, the other side >80%.
200kts	Turbulence damping function available.
5—10kts	Alternate law Low speed stability active from 5-10kts above stall warning speed.
VMO/MMO VMO+4kts / MMO+0.006	Alternate law HI SPEED stability activated, HI SPEED warning activated
20°/sec--25°/sec	Alternate law Max roll rate with full sidedtick.
±4°/±15°	Alternate law yaw damping authority is limited to ±4°(configuration 0)/±15°(other configuration)
1°/sec ,3°/sec	Rudder trim rate (clean), if slats/flaps extended 1°/sec up to 1.5sec then 3°/sec above.
3°/sec	Rudder trim reset pb reset rate.
5daN pitch, 3.5 daN in roll	Side stick input will disconnect AP.
2° off neutral	"DUAL INPUT" voice activated when both pilot sidestick input.
40sec	Take over button pushed 40 sec will latch priority condition.
±29.2°	Redder trim indication range.
14°nose up/ 2°nose down	Pitch trim indication range.
200kts	Automatic retraction system retract flap to 0 when conf 1+F .
 VFE+2.5 / VFE VFE+4	Flap load relief system retract flap In confi2,3,full , if speed reach VFE+2.5, back to normal when speed drop below VFE. Overspend warning appear when VFE+4 (flap actual position)
 8.5° /148 kts 7.5° / 154 kts	Slats alpha / speed lock function Inhibits slats retraction at AOA >8.5° or speed <148 kts. Normal retraction when AOA <7.5 °or speed >154 kts.
28 – FUEL SYSTEM	
2%	Vent surge tank allow 2% of over fueling without spillage.
1000kg	Collector cell capacity.
109186kg 32970kg*2 32625kg 2865kg*2 4891kg	Fuel tank total capacity Inner tank Center tank Outer tank Trim tank

2000kg below full	Center tank transfers to the inner tanks to maintain 2000kg --full.
4000kg	Trim tank fuel transfers to the inner tanks and stop by 5000kg.
3500kg	Outer tank fuel transfers to inner tanks to maintain 3500—4000kg.
17000kg	Fuel quantity of inner tanks below 17000kg ,all center tank fuel can be transferred without any risk of overflow.
36.9—39%MAC 2% CG target to CG target-0.5% 1.5%	CG target range, based on weight. 168 tons CG target is 39%MAC. 230 tons 36.9%MAC. Target CG to AFT certified limit. CG automatic control range. If FMGC detects CG is too aft or FQI data degradation, the target CG will moved forward by 1.5%.
FL255 / 6250kg FL245 or <35min to DES	Begin automatic CG control. CG automatic control ended.
500kg	If inner tanks are unbalanced by more than 500kg ,the transfer will stop on the lightest side transfer.
3° /1 min	Forward Gravity transfer from trim tank stop when AFT attitude is higher than 3° for 1 min.
2min / FL255	APU fuel: Fed from the trim pipe the 1st 2 min. on ground and above FL255 in-flight when trim tank is empty. Fed from engine 1 collector cell aft 2 min on ground and below FL255 in flight. Fed from trim tank above FL255 when trim tank not empty.
33min	Fuel time: both sides, normal pressure (50psi).
136kg	Fuel used indication become double amber bars when computed value is considered to be erroneous by more than __.
15 tons	Fuel quantity indication will have partial amber boxed when more than 15 tons of fuel in center tank is unusable.
3000kg	Fuel quantity indication will pulses when left/right wing differ by__.
 49℃/45℃/-35 -40 -40	Fuel temperature indication become amber: Inner tank when in flight/ on ground. Outer tank become amber. Trim tank become amber.
 1000kg 1100kg	Fuel temperature indication disappear: Trim tank Outer tank
1640kg—2700kg 60sec level sensor dry	L® WING RK LO LVL msg come up.
25 sec	WING TK OVERFLOW msg comes up.
3500kg	FUEL FU/FOB DISCREPANCY msg come up.
29 – HYDRAULIC SYSTEM	
3000psi/2500psi	Normal /RAT operation pressure/RAT
25sec	Green electric pump work in flight when 1 engine failure.
18%	Electric pump flow capacity is 18% of engine driven pump.
15%--45%	RAT flow capacity is 18% of engine driven pump.
150sec	Green reservoir low level, green hydraulic fire shut-off valves are automatically closed by the HSMU, after 150 sec EDP depressurized fire shut-off valve reopen.

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Engine 1 HP	Reservoirs automatically pressurized by HP bleed air from ENG1.
100kts	LEAK MEASUREMENT VALVES inhibited in flight above100knot.
32/47;/21(L) 29.5/38/19(L) 13.8/15.1/8.5(L) 5/4/6(L) 5/8/5(L)	Reservoir quantity Max capacity Max fill Min fill Normal filling LO LVL WARNING
≦1450psi ≧1750psi	SYS LO PR Amber pressure Reset it pressure
≧95℃	RSVR OVHT
≦22psi ≧25psi	RSVR LO AIR PR Reservoir air pressure Reset if air pressure
<8L <5L	RSVR LO LVL Green Yellow / blue
<17L if temp>0℃	RSVR UNDERFILLED (green)
30 – ICE AND RAIN PROTECTION	
30sec	On ground wing anti-ice switch on, perform 30 sec test sequence.
130sec	ICE NO DET ice not been detected for 130 sec after sw on.
0.5 ㎜ /60 sec, TAT>10℃ ALT>1500 ft ENG A/I OFF	ICE DETECTED
5 ㎜ /60 sec, TAT>10℃ ALT>1500 ft WING A/I OFF	SEVERE ICE DETECTED
31 – INDICATING / RECORDING SYSTEMS	
2min	T.O MEMO appears
＜2000 ft	LDG MEMO appears
20 sec	WHEEL page for 20 sec when pilot move sidestick more than 3°.
95% for 10 sec	APU page disappeared when APU rpm reach 95% for 10 sec.
>1.4g or <0.7g	G LOAD will display amber at lower center column of SD.
3min	1 ECAM DU only ,push system pb can display system up to 3 min.
3 sec	Push and holds RCL pb 3 sec displays any caution messages that were suppressed by the EMER CANC pb.
5sec	Push RCL or STS pb will display 5 sec.
2 sec	Push and hold ALL pb display systems page by 2 sec intervals.
30 ft RA	Ground roll guidance command bar is displayed below 30 ft RA.
45°/40°	Bank angle exceeds 45°,all the PFD symbols, except those for attitude, speed. heading, altitude, and vertical speed, disappear. Return normal display when ＜40°.
25° nose up/13°nose down 22°nose up /10°nose down	Pitch attitude exceeds 25° nose up/13°nose down, all the PFD symbols, except those for attitude, speed. Heading, altitude, and vertical speed disappear. Return normal display when 22°nose up /10°nose down.
30°	Pitch attitude exceeds 30° nose up red arrowheads displayed.

A330-200 WHAT ARE THE NUMBERS?

±67° 30°nose up/15°nose down	＝＝symbols mark the bank and attitude limits
0.2g/0.3g	Sideslip index: 1 ㎝ ＝0.2g, sideslip is against its stop at 0.3g.
10 sec	Speed trend tip show the speed after 10 sec. it appear when it is greater than 2 kts and disappears when less than 1 knot.
1 sec aft lift-off 5 sec aft lift-off	VLS is inhibited from touchdown until 1 sec after liftoff. VSW is inhibited from touchdown until 5 sec after liftoff.
±500 ft	VDEV range is ±500 ft,
<2500 ft DH+100 ft<RA<2500 ft RA<DH+100 ft. 400 ft<RA<2500 ft RA<400 ft. 3 sec 10 ft /5 ft /1 ft	RA appears <2500 ft Displays in green Displays in amber Displays in green when no DH input. Displays in amber when no DH input. DH flash 3 sec when reach decision height. RA displays every 10 ft down to 50 ft, then every 5 ft down to 10 ft, every 1 ft when below.
570 ft	Ground reference appear when below.
6000 ft/min 2000 ft/min 1200 ft/min	V / S analog pointer become amber when: V/S greater than 6000 ft/min climb or descent. V/S greater than 2000 ft/min when descent 1000 ft<RA<2500 ft. V/S greater than 6000 ft/min when descent RA<1000 ft.
82.5°N or 60.5°S 73.5°N 117.5°W—92.5°W	ADIRU replace magnetic heading by true heading on EFIS, DDRMI.
1/4 dot 2 sec(above15 ft RA) 1dot 2 sec (above15 ft RA) 2dot 2 sec	LOC scale flashes when deviation exceeds 1/4 dot > 2 sec. G/S scale flashes when deviation exceeds 1dot > 2 sec. LOC G/S index flashes when deviation exceed 2dot > 2 sec.
±0.8°/±0.4°	1 dot deviation represents ±0.8° for LOC ,±0.4° for G/S.
±200 ft	Vertical deviation scale range. each index represents 100 ft.
200 ft RA	Rising runway symbol starts rise to center of PFD by 200 ft.
<250 ft 250 ft—750 ft >750 ft	Altitude alert: Normal(yellow) pulsing yellow(arriving), flashing amber(departing) normal yellow(arriving), flashing amber(departing)
5°	CHECK ATT flag attitude on both PFD differ by >5°.
250 ft/ 500 ft	CHECK ALT flag attitude on both PFD differ by 250 ft when QNH selected or 500 ft when STD selected.
5°	CHECK HDG flag attitude on both PFD differ by >5°
3 sec aft liftoff —1300 ft RA 1300 ft RA—50 ft RA	WINDSHEAR warning. it remains displayed at least 15 sec aft detection. Aural “WINDSHEAR” repeat 3 times.
<1500 ft RA	W/S AHEAD warning.
2kts /100 kts	Wind arrow appeared when wind speed >2 kts TAS >100kts.
5°	VOR deviation scale 1 dot represents 5°.
160nm/320nm	ND does not show SID or STAR except 1st waypoint with range__. Procedure turn and holding pattern show only the turn direction.
≧40nm	MORA displayed when CSTR is selected and range selected ≧40nm, represent MORA 40nm circle around the aircraft.
≦40nm	Runway is drawn to scale (paved length) if the selected range__.

+1000ft /-500 ft or -250 gear +1000ft/+2000ft +2000ft and up	EGPWS medium density yellow high density yellow high density red
25hrs	DFDR can store last 25 hrs data. System activated during 1st 5 min after ELEC energized and after 1st engine started.
32 – LANDING GEAR	
280kts	Green hydraulic safety valve closed above 280 kts to isolate the gear system hydraulic supply.
＞750 ft RA	GEAR NOT DOWN warning, gear not down flap at 2, 3, or full.
±72°	Handwheel control provides up to ±72°
±72°/14 kts ±36°/30kts	Speed limit for handwheel control range.
±6°	Rudder pedals provide nosewheel steering up to ±6°.
100 kts	Rudder pedals provide nosewheel steering control <100 kts.
100kts for landing 150kts for takeoff	NWS centers itself .
±93°	NWS TOWING red light indicate oversteer (±93°) has occurred.
33 - LIGHTS	
EXCESS CAB ALT limit +1750ft max 14350 ft	Cabin lights, NO SMOKING, FASTEN SEAT BELT, EXIT signs come on automatically.
34 – NAVIGATION SYSTEMS	
10min	ADIRS ATT mode heading reentry every 10min.
24 satellites	GPS world wide satellites network contain 24 satellites.
4 satellites	MMR enter the NAV mode and continuously supplies data to the ADIRS when it can track 4 or more satellites.
2 sec	ISIS attitude indication can be reset by pressing ATT RST pb for at lease 2 sec, the ATT reset need approximately 10 sec.
0.5M/0.45M	ISIS Mach number displayed/disappeared.
4/2	ISIS has 4 SPD BUG and 2 ALT BUG can be select by the pilot.
5 stations	FMGEC use 2 DMEs automatically tune 5 stations for display or navigation update.
<2500 ft RA	Automatic call out available below 2500 ft RA.
11 sec/>50 ft 4 sec/ <50 ft	Time interval threshold for repeat between 2 consecutive predetermined call out. Repeat every 4 sec.
20 ft/10 ft	“RETART” callout for manual landing / autoland.
3 sec	REMOTE ATC BOX when activated , only can be reset on ground de-energized at least 3 sec.
>40nm	Weather radar WX+T mode shows turbulence areas within 40nm.
5nm/<2300 ft/<1500 ft	PWS scan the space 5 nm ahead of aircraft below 2300 ft and display warning, caution, advisory message below 1500 ft.
100kts / 50ft	PWS warning, caution, advisory message inhibited during takes off. Down to 50 ft during landing.
<1200 ft*0.5nm*1.5nm <1200 ft*0.5nm*1.5—3nm <1500 ft*0.5nm*3-5nm	PWS WARNING take off phase: Warning Caution advisory
<370 ft –50ft AGL *0.5nm-1.5nm	PWS WARNING landing phase is the same with take off phase except: <370 ft –50ft AGL *0.5nm-1.5nm downgrade to caution.

30 ft RA—2450 ft RA 10 ft RA—2450 ft RA	EGPWS provide visual and aural warning for: Mode2,4,5 Mode 1,3
30sec*0.25nm+3° 60sec*0.25nm+3°	EGPWS TAD mode provide aural /visual warning: Warning' Caution
>15nm/700 ft 5—12nm/400 ft	EGPWS FCF mode provide below floor warning :
±9900ft/30-40nm	TCAS detection capability.
±1200 ft/< 6nm TAU 40sec TAU 25 sec <30nm	TCAS intruder classification Proximate Traffic advisory(TA) Resolution advisory(RA) Other traffic
<1700ft 1100ft climb / 900ft descent 1200ft climb / 1000ft descent 1650ft climb / 1450ft descent <500ft	TCAS advisory inhibited All intruder <380 ft AGL. All RA aural. All RAs are converted into TAs. "Descent" "Increase Descent" RA All TA aural messages.
±2700ft +2700ft/-9900ft -2700ft/+9900ft	TCAS control TRAFFIC selector ALL BLW ABV
±500ft/min	Vertical speed arrow displayed.
10nm/20nm	2.5nm range is displayed when a 10 or 20nm range is selected.
40nm	REDUCE RANGE displayed when TA /RA detected range >40nm.
35 - OXYGEN	
>35000ft CAB ALT	Crew oxygen mask provide 100% oxygen when CAB ALT >35000ft.
>30000ft CAB ALT	Crew oxygen mask overpressure supply automatically starts.
≧600psi ≦300psi <1000psi <50psi	CKPT OXY indication Green Amber Amber half frame appeared. "REGUL LO PR"
>14000ft (+0,-500)CAB ALT	Cabin oxygen masks drop automatically.
15min / 22min	Cabin oxygen provides pure oxygen under positive pressure for__.
20min	PBE should work at least 20min
36 – PNEMATIC SYSTEM	
36±4psi	HP valve provide bleed air when IP is not enough to provide __.
>73psi	HP valve automatically closed when pressure above__.
44—52psi	Bleed valve regulate delivery pressure between__.
85psi	OPV overpressure valve closed when pressure regulation function failed and pressure is over__.
<8psi	Bleed valve closed when upstream pressure is __.
<4psi/>60psi	Precooler inlet pressure indication becomes amber.
200℃	Precooler to regulate bleed air temperature to__ "BLEED LO TEMP" Low temperature with WAI on.

A330-200 WHAT ARE THE NUMBERS?

150℃ 290℃/5 sec 270℃/15 sec 257℃/55 sec	Indication become amber if over __ sec
N>95% <25000ft increasing or<23000ft decreasing	APU bleed supply the pneumatic system when __ and APU bleed switch ON.
>124℃	”LO WING LEAK “
>124℃	“ÄPU BLEED LEAK”
>204℃	“WNG 1(2)BLEED LEAK “
38 – WATER WASTE SYSTEM	
<16000 ft and on ground	Vacuum generator produce pressure differential to dump the waste.
700liters (1050liters if 3 tank)	The waste tank capacity.
49 – AUXILLARY POWER UNIT	
>25000ft climbing >23000ft descending	APU ECB automatically closed.
 7% 50% 95% 10 sec	APU start sequence: Ignition is turned on. APU starter de-energized, ignition off. ON light on the START pb goes off and AVAIL come on green. APU page disappeared.
 105 sec 15 sec <7%	APU shutdown sequence: Cooling period at 100%speed. For no break power transfer Air inlet flap closed
≧107%	APU N turn red.
1250℃ 650℃	APU EGT limit (0%) APU EGT limit (APU running)
52 - DOORS	
>0.029psi	Red cabin pressure light flashed, to open door is dangerous.
70 – POWER PLANT	
1/ 4 / 5	N1 consist of 1 stage fan, 4 stages LP compressor 5 stages turbine.
14 / 2	N2 consists of 14 stages HP compressor 2 HP turbine.
30 / 2	Combustion chamber fitted with 30 fuel nozzles and 2 igniters.
<15% / >12%	FADEC system is powered by AFT electrical circuit<15%, self-powered >12%.
95.6%	CLB N1 limit.
8th/14th/11th	Air bleed system IP /HP/engine anti ice retract air from__.
>30% />15%	Reverser IDLE PROTECTIION .the FADEC select ILDE if the reverse thrust is not selected and one translating cowl is unstowed by more than 30% or both cowls are unstowed by more than 15%.
1/2	1 Igniter is supplied during automatic start, both igniters when manual start and in flight start
   10%/ 15%	Auto start sequence: LP fuel valve opens START VALVE opens Ignition starts HP fuel valve open

50% 54% 15 sec--30 sec	START VALVE closes, PACK VALVES reopened if other engine is not started within30 sec. Igniter off . ENG page replaced by WHEEL page if START switch not back NORMAL.
  ENG MAN START on >15% 50% 54% ENG MAN START off	Manual start sequence ENG page displayed. PACK VALVES close. Start valve opens. Select ENG MASTER switch ON, HP and LP fuel valve opens. Start valve closes. ENG start selector back to NORMAL. Ignition stop Pack valve reopen after 30 sec. ENG page disappears.
40 sec	Releasing ENG FIRE pb permits engine shutdown by closing the low pressure fuel valve, 40 sec delay due to fuel left between low pressure valve and nozzles.
5min	ENG FADEC GND PWR pb ON FADEC is energized for 5 min.
115.5%	N1 max
 750℃ 940℃ 975℃	EGT limit Amber during start. Amber except at takeoff Red EGT max.
113%	N2 max
10 sec	IDLE message flashes for 10 sec when both engines are at idle.
2 quarts	Oil quantity indication pulses if drops below 2 quarts.
10psi	Oil pressure indication become red when drops below 10psi.
 >160℃ >160 ℃>15min >175℃	Oil temperature indication: Pulses Amber or
100 kgs	Fuel used indication become 2 amber dashes when the displayed value is 100kg less than the actual value.
5.7 /5.6	VIB indications pulses when N1 >5.7.N2>5.6.
<21psi	Engine bleed pressure become amber when <21psi with N2≧10%.
>260℃	Nacelle temperature indication pulses when>260℃.
<-10℃	OIL LO TEMP
5 sec	THRUST LOCKED is recall every 5 sec.
Flight Preparation – Vol. 2	
01 - LOADING	
 18869 kgs 15241 kgs 3468 kgs	Maximum cumulative load for each compartment FWR AFT BULK
10 sec 1 min	Cargo door open electric pump shuts down after LEVER OF MANUAL SECECTOR VALVE RELEASE. After Cargo door close LEVER OF MANUAL SECECTOR VALVE RELEASE within 1 min.
	Automatic refueling :

A330-200 WHAT ARE THE NUMBERS?

9000 kgs / 2865 kgs 36500 kgs / 2400 kgs 74100 kgs 109186 kgs	Outer tank is filled when above/ volum. Trim tank is filled when above/ volume Center tank is filled when above Max volume
2 %	Fuel tank filled to max capacity, space for thermal expansion without spilling.
3000 kgs	END lg on refueling panel flash when imbalance more than.
14000 kgs	Trim tank start to filled when 2 inner tank above
3500 kgs	Outer tank start to feed when inner tank below
200 liters/minute	Overwing refueling max flow rate .
50 psi	Max refueling pressure.
02 – TAKEOFF PERFORMANCE	
15°Bank	1ENG out turning departure, maintain 15°Bank until 1500 ft or green dot speed.
35 ft	1ENG out accelerating height allow min 35 ft above obstacle.
15 ft	Runway end height for wet runway calculation.
25%	Flex limitation: <25% full thrust <climb N1 < max flat rating temperature(ISA+43) >max continuous thrust (ISA+35 at 16600ft) >min flat rating temperature(ISA+15)
50 ft	ACTUAL LANDING DISTANCE:: Distance between 50 ft above threshold and stop Speed—VLS(1.23 VS) for manual landing VLS+5 for CAT II/ CAT III auto landing Max manual braking Anti-skid and ground spoiler operating No reverse thrust
03 – LANDING PERFORMANCE	
0.6 115% 115% 115%	REQUIRED LANDING DISTANCE: Dry runway --Actual landing distance/0.6 Wet runway—115% of dry runway. Contaminated runway—115% of wet runway. Automatic landing—115% of dry runway.
<3mm >3mm 0.85 dh/l 0.4 kg/l 0.2 kg/l 0.2 friction coefficient <=0.05 friction coefficient	RUNWAY CONDITION: Wet Standing water Slush Wet snow Dry snow Compacted snow icy
<=2mm(0.08 inch) <=3mm(0.12 inch) <=4mm(0.16 inch) <=15mm(0.59 inch)	WET runway equivalent: Slush Water Wet snow Dry snow

12.7mm(0.5 inch) wet snow 15mm(2 inch) dry snow	Contaminated runway equivalent: 6.3mm(1/4 inch) slush 6.3mm(1/4 inch) slush
>2 inch dry snow / 1 inch wet snow	take off no recommended
	04 – SPECIAL OPERATIONS
10000—14000 ft 14000—15000 ft >15000 ft	Oxygen requirements: (passenger) 10% passengers for 30 minutes. 30% passengers. all
9950±350 ft >14000 fy	CAB ALT EXCESS CAB ALT ECAM warning triggered . Passenger oxygen masks automatically provided.
500 ft/min 1000 ft/min	Flight without CAB PRESSURIZATION climb and descent rate: Climb descent
2%	Emergency descent between FL150—FL80, oxygen must be provided for 2% of the passengers
35000 ft 255knots / 0.6M	Flight with gears down: maximum altitude. Maximum speed
21% 16% 15%	Gear down RTOW 2nd segment climb gradient 1+F 2 3
240knots / 0.52M VLS+5	Flight with gear down Speed (climb, cruse, descent) Eng out drift down speed
2000 ft/1000 ft	Flight over mountainous area: drift down procedure must clear the obstacles during climb/descent.
5% 15 min/ 1500 ft/ green dot 2 approaches 1 go-around 5% 5% 130 kg/h	ETOPS CRITICAL FUEL RESERVES Contingency Holding Approaches and go-around Fuel mileage penalty Icing APU (APU GEN ON, APU BLEED OFF)
433nm/844nm/1259nm	ETOPS diversion distance: 21000kgs/FL170 60min/120min/180min
2ADR+2DMC 1 transponder 1 AP 2 PFD 1 FCU 1 FWC	Required equipment/function for RVSM
150 ft	RVSM transition between flight level , the altitude overshoot limit.
	RNP capability:

	With GPS PRIMARY function
RNP-1	En route
RNP-0.5	Terminal , provided AP or FD in NAV mode.
RNP-0.3	Approach provided AP or FD in NAV mode.
	Without GPS PRIMARY function
RNP-1	En route and Terminal,
RNP-0.3	Approach
	BRNAV(RNP-5) equipment requirement:
1 navigation system Flight plan data on 2 ND	1FMGEC/1MCDU/1VORor DME for FM update/1 IRS
	RNP-10 equipment requirement:
2 long range nav system	2 FMGEC(or 1FMGEC + 1 B/U NAV) /2 MCDU /1 GPS /2 IRS
	P-RNAV(RNP-1) equipment requirement:
1 navigation system Flight plan data on 2 ND	1FMGEC/1MCDU/1VORor DME for FM update/1 IRS/1 ND in NAV mode.
	XTK accuracy use for EPE entry:
1.2nm	RNP-1
6.1nm	RNP-5
12.2nm	RNP-10
	Without GPS update, flight outside navaid coverage time limit:
6.2hrs	Since IRS ground alignment.
5.7hrs	Since last FM radio update.
05 – FLIGHT PLANNING	
	MINMUM RECOMMENDED FUEL REQUIREMENTS
25 kg/min	Taxi fuel
40 kg/min	Approach / landing fuel
500 kg	Go-around fuel
160 kg	VFR FUEL
2400 kg	Holding fuel for 30 min at 1500 ft.
200 kg/h	APU fuel on ground packs on , gen on.
140 kg/h	APU fuel on ground gen on.
130kg/h	APU fuel in-flight FL200 packs on , gen on.
65 kg/h	APU fuel in-flight FL300, gen on.
55 kg/h	APU fuel in-flight FL410, gen on.
	Maximum altitude
300 ft/min	climb thrust
0.3G	climb thrust
	Max cruise trust
	LRC speed when engine out

MEMORY ITEMS

WINDSHEAR / WINDSHEAR AHEAD (3.02.80 p19, 20)

- **BEFORE V1**

REJECT THE TAKEOFF IF NECESSARY AND RUNWAY REMAINS

- **AFTER V1**

THR LEVERS . . . . . .TOGA
REACHING VR . . . . . ROTATE
SRS ORDERS . . . . . FOLLOW

- **AIRBORNE**

THR LEVERS AT TOGA . . SET OR CONFIRM
AP (IF ENGAGED) . . . . . KEEP
SRS ORDERS . . . . . FOLLOW
CONFIGURATION . . . . . DO NOT CHANGE

TCAS (3.02.24 p13)

AP . . . . . OFF
BOTH FDs . . . . . .OFF
ADJUST VERTICAL SPEED

EGPWS (3.02.34 p12)

AP . . . . . OFF
PITCH . . . . . PULL UP
THRUST LEVERS . . . . . .TOGA
SPEEDBRAKE LEVER . . . . . CHECK RETRACTED
BANK . . . . WINGS LEVEL or adjust

LOSS OF BRAKING (3.02.32.13)

- **IF AUTOBRAKE SELECTED**

BRAKE PEDALS . . . . . PRESS

- **IF NO BRAKING AVAILABLE**

REV . . . . . MAX
BRAKE PEDALS . . . . . RELEASE
A/SKID & N/W STRG . . . OFF
BRAKE PEDALS . . . . . PRESS
MAX BRK PR . . . . . .1000 PSI

- **IF STILL NO BRAKING**

PARKING BRAKE . . . . . SHORT AND SUCCESSIVE APPLICATIONS

EMERGENCY DESCENT (3.02.80.7)

CREW OXY MASKS . . . . . ON
THRUST . . . . . IDLE
SPD BRK . . . . . FULL

UNRELIABLE AIRSPEED INDICATION (3.02.34 p18)

AP/FD . . . . . .OFF
A/THR . . . . . .OFF
FLAPS . . . . . MAINTAIN CURRENT CONFIG
SPEEDBRAKES . . . . . .CHECK RETRACTED
L/G . . . . . UP WHEN AIRBORNE

IMMEDIATE PITCH ATTITUDE AND THRUST GUIDANCE

If the failure occurs before thrust reduction

THRUST LEVER . . . . . .TOGA
PITCH ATTITUDE . . . . . .15°

If the failure occurs after thrust reduction

THRUST LEVER . . . . . .CLB
PITCH ATTITUDE BELOW FL 100 .10°
PITCH ATTITUDE ABOVE FL 100 . 5°

When flight path is stabilized

PROBE WINDOW HEAT. . . . . ON
ATTITUDE/THRUST . . . . . ADJUST

ENG TAILPIPE FIRE

ENG MASTERT(affected) . . . . . .OFF
AIR BLEED PRESS. . . . . .ESTABLISH
BEACON. . . . . ON

- **When N2<30%:**

ENG START SEL. . . . . .CRANK
MAN START. . . . . .ON

- **When burning has stopped:**

MAN START. . . . . OFF
ENG START SEL. . . . . .NORM .