RUDDER A333

Max deflection 31.6°

P2 — ACTUATOR
S1 ← P1 — ACTUATOR
P3 — ACTUATOR

RUDDER TRIM PFTU (Pedal Feel and Trim Unit)
S1 — MOT1 [DC ESS SHED]
S2 — MOT2 [DC2]
ART FEEL

ELEC GEN — ELEC GEN

BCM Backup Control Module

RUDDER PEDALS

RUDDER A332

RUDDER LIMITER
MOT1 [DC ESS] — S1
MOT2 [DC2] — S2

RUDER LIMITS
35° < 150kts
4° > 350kts

BACKUP YAW DAMPER UNIT
ELEC GEN — ELEC GEN
BYDU

YAW DAMPER
ACTUATOR — P1 — S1
ACTUATOR — P3 — S2

ART FEEL
MOT1 [DC ESS SHED] — S1
MOT2 [DC2] — S2

RUDDER TRIM LIMITS
85% of deflection limited to 29°

PTLU Pedal Travel Limit Unit
MOT1 — S1
MOT2 — S2

FLIGHT CONTROLS LAWS

	PITCH	ROLL	PROTECTIONS
GND / RA>50ft	Direct deflection	Direct deflection	**NORMAL** = Load factor +2.5g / -1g clean; Load factor +2g / 0g not clean; = Pitch 30°up / 15°down; = Bank 67° / 33° stick neutral; Side slip blue if eng failure; High α, Vα prot, Vα floor, Vα max; = High speed VMO+4, bank 0° with stick neutral; Low energy warning Flaps 2,3 or FULL 100ft - 2000ft
FLT / RA<100ft	Load factor demand; Auto pitch Trim if less than 33° bank	Roll rate	
FLARE	Direct deflection; 50ft pitch down order		
F/CTL ALTN LAW (PROT LOST)	same as Normal	same as Normal	**ALTN 1** X: Same as Normal except: no Pitch & Low energy prot; High α: LOST if VS1g computation failure; Low speed, nose down demand 5-10kts > Stall warning; High speed, light nose up demand, symbol disappears
F/CTL ALTN LAW (PROT LOST)	same as Normal	Roll direct; Spoiler 2,3 & 6 u/s; Yaw alternate	**ALTN 2** X: Same as Altn 1 except: no Bank prot; no Low speed prot if 2 ADR failed; no High speedif 3 ADR failed
F/CTL DIRECT LAW (PROT LOST)	Direct control	Roll direct; Yaw alternate	**DIRECT** No protection except Overspeed & Stall warning; USE MAN PITCH TRIM
F/CTL L + R ELEV FAULT	Manual pitch trim only	RUDDER ONLY; Yaw by BYDU; A333 with BCM	**MECHANICAL BACK-UP** MAN PITCH TRIM ONLY

BRAKES

AUTOBRAKE

mode	delay	decel
LO	1s	1.8m/s2
MED	0s	3m/s2
MAX	max pressure	

DECEL light illuminates if 80% of rate in LO or MED and if 2.65m/s2 decel in MAX mode

ACCU designed for 7 full brakes application or at least 12 hrs prk brk

BRAKE TEMPERATURE
- T/O max 300°C
- **A332 only:** if BRK FAN ON max 150°C, then switch brake fan OFF for T/O

Maintenance action required if:
- (TEMP difference on same gear > 150°C) **and** (1 BRK > 600°C **or** < 60°C)
- average diff TEMP L/R > 200°C
- a fuse plug has melt
- Brake temp > 800°C, tyre deflates at ~800°C

LP DISTRIBUTION LINE
NORMAL SELECTOR VALVE
AUTOMATIC SELECTOR
NORMAL SERVO VALVE
NORM BRK
BSCU CH1 [DC ESS SHED LAND REC] CH2 [DC2]
DUAL VALVE
ALTERNATE SERVO VALVE
ALTN & PARK BRK
PARKING BRAKE VALVE
DUAL SHUTTLE VALVE

LANDING GEAR / NWS

[DC ESS] LGCIU 1 [LAND REC]
Gear & doors selector valves
LGCIU 2 [DC2]
GRAVITY EXTENSION CUT OUT VALVE
GRAVITY EXTENSION SYS 1 [HOT 1] SYS 2 [HOT 2]
LANDING SAFETY VALVE
(IAS<280kts **or** MLG on GND) **and** Gear Lever Down
BOGIE PITCH TRIMMER
G HYD from nose gear doors closing circuit
BSCU — SERVO VALVE
NOSE WHEEL STEERING

GEAR LIMITS

retraction	250kts/.55
extension	250kts/.55
extended	250/M.55
gravity ext	200kts
max alt ext	21'000ft
gear dn flt	255/M.60
tire speed	204kts

NWS LIMITS
Steering hanwheels:
max 72° at 14kts, 0° at 100kts
Rudder pedals:
TO: max 6° at 100kts, 0° at 150kts
LDG: max 6° at 40kts, 0° at 100kts
Towing max 65°
Oversteer at 93°

HYDRAULICS

ELECTRIC PUMPS
Flow is ~18% of eng pump, used to retract surfaces but not to replace the eng pumps.
G ELEC PUMP runs 25' if ENG 1 (2) FAIL **and** GEAR selected up **and** speed>100kts
Y ELEC PUMP runs if ENG 2 FAIL **and** FLAPS not 0° **and** G elec pmp not running
A333: B ELEC PUMP runs if ENG 1 FAIL **and** F/CTL PRIM 1 (3) FAULT to ensure sufficient authority on electrical rudder

EMER GEN
ACCU — ELEC PUMP [AC1,DC1] — ENG1 PUMP — RESERVOIR
ACCU — ENG1 PUMP — ELEC PUMP [AC2,DC1] — RESERVOIR
CARGO DOORS — HAND PUMP
ACCU — ELEC PUMP [AC1,DC2] — ENG2 PUMP — RESERVOIR
ENG2 PUMP — RAT

RAT comes automatic out if dual eng fail **or** G+B lo lvl **or** G+Y lo lvl

LIMITATIONS
Normal pressure 3000 ± 200 psi
RAT pressure ~2500 psi
Fluid SKYDROL LD4
RESERVOIR PRESSURIZATION
is achived by HP bleed air from engine 1 or x-duct bleed

AILERONS / SPOILERS

AILERONS ACTUATOR MODES
- active, electrically controlled
- damping, follows surface

ROLL DEFLECTION LIMITS
- 25° for ailerons
- 35° for spoilers

ENG 1 — REV
SFCC 2 [DC2]
SFCC 1 [DC ESS LAND REC]
REV — ENG 2

SLATS FLAPS

GND SPLR and SPD BRK
P3 — 1
P3 — 2
S2 — 3
P2 — 4
P1 — 5
S1 — 6
WTB — SFCC2 — SFCC1
P1 → P2
P3 → S1 — S1 → S2
Maneuver Load Allevation
Roll Control

FLAPS

ECAM	Slats	Flaps (ailerons)	VFE
1	16°	0° (0°)	**240kts**
1+F	16°	8° (5°)	**215kts**
2 RELIEF	20°	8° (10°)	205kts
2	20°	14° (10°)	**196kts**
3 RELIEF	23°	14° (10°)	186kts
3 (FULL RELIEF)	23°	22° (10°)	**186kts**
FULL	23°	32° (10°)	**180kts**

Max altitude with Flaps/Slats extended is 20'000ft
Slats ALPHA LOCK if α > 8.5° **or** IAS < 148kts
T/O with conf 1+F, auto flaps retract at 200kts

STABILIZER TRIM

P1 → P2 → P3
MOT1 [DC ESS SHED] — MOT2 [DC2] — MOT3 [DC2]
TRIM WHEEL
MOT — MOT

STABILIZER LIMITS
14° nose up
2° nose down

A332/A333

FLIGHT CONTROL COMPUTERS

	MAIN	STBY
PRIM 1	DC ESS	HOT
PRIM 2	DC2	
PRIM 3	DC2	
SEC 1	DC ESS	HOT
SEC 2	DC2	DC ESS
FCDC 1	DC ESS SHED	
FCDC 2	DC2	

BUS in red are available in ELEC EMER config with EMER GEN on ENG PUMP

ELEVATORS

ELEVATOR ACTUATOR MODES
- active, electrically controlled
- damping, follows surface
- centering, hydraulically maintained in neutral only if 4 jacks are unpowered (both sides)

ELEVATOR DEFLECTION LIMITS
- 30° nose up
- 15° nose down

P2 — P1 — S2 — S1
P1 — P2 — S1 — S2

!!! NOTFOR OPERATIONAL USE !!! A330 ©Pierre-Michel Gasser , 26.3.2009