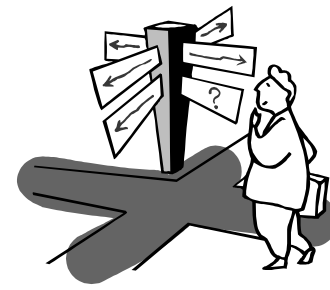


A32F

Abnormal procedures



ECAM procedure in flight

REJECTED TAKEOFF

F/CTL SLATS/FLAPS JAMMED

ENG DUAL FAILURE

ECAM procedure on ground

EMER EVAC

NAV ADR / IR FAULT

ENG START FAULT

Dual HYD workmethod

ELEC EMER CONFIG

Windshear

ENG FAIL on takeoff

Overweight landing

SMOKE

Bomb on board

ENG FAIL in cruise

Failure memo

HYD G + Y SYS LO PRESS

ENG FAIL on final

Approach memo

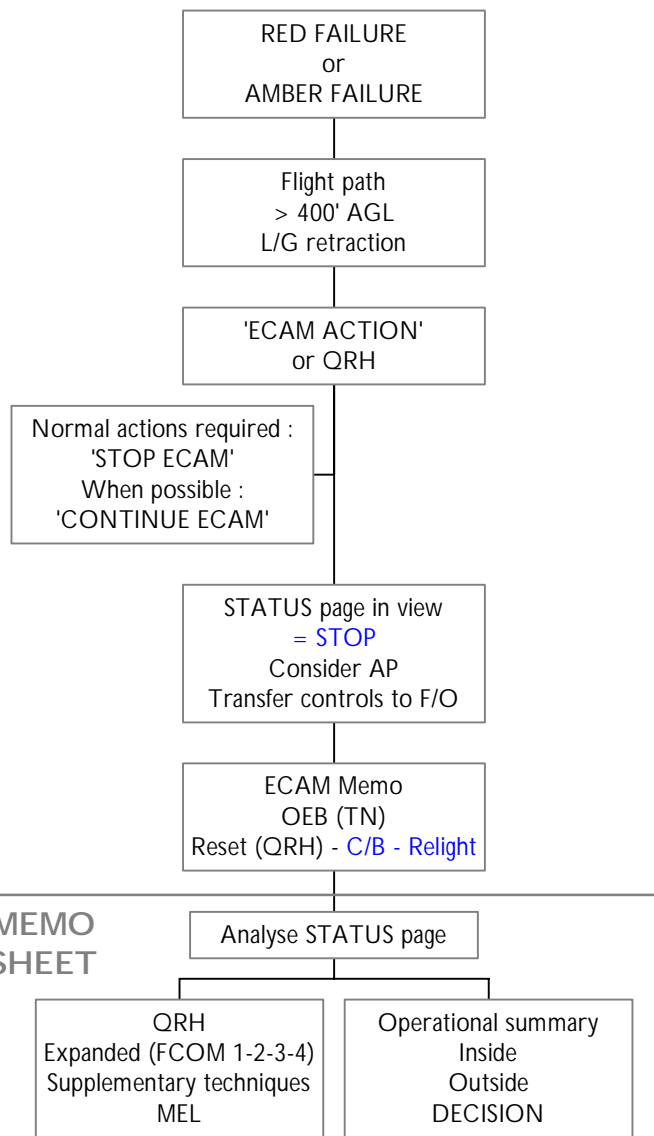
HYD G + B SYS LO PRESS

MEL

HYD B + Y SYS LO PRESS

CAB PR EXCESS CAB ALT

ECAM procedure in flight



- React when failure appears.
- Unimportant failures are inhibited !

- Initiate gear retraction.
- Consider use of TOGA.
- AP may be used from 100' AGL.

- Task distribution by Capt. : « I/YOU FLY, ECAM ACTIONS ».
- If no ECAM : check QRH.
- PF has thrust levers, flight path, navigation and ATC.

- Do not interrupt ECAM actions too long !
- Engine severe damage : at least continue till AGENT 1 DISH.

- Use maximum automation.
- Transfer controls to F/O.
- Check Autoflight – Fuel – Systems.

- Equivalent of 'After T/O checklist'.
- Check OEB's affecting ECAM.
- Consider reset via C/B or pushbutton : use QRH !

- Analyse STATUS page first, summarize on memo sheet.
- Read expanded (FCOM 1-2-3-4), especially for ELEC & instruments.
- Check MEL, even in flight (return to base is better than stuck in outstation).

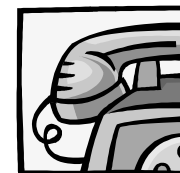
- Consider status of CONF, gear, brakes, REV and NWS for suitable airport.
- Check weather – notams – fuel.
- Summarize – Involve F/O – Decide – Announce inside & outside.
- Cabin : Nature – Intention – Time – Specials.

This workmethod is applicable to all failures. Failures requiring specific treatment are clarified further.



KEY'S

- First fly the A/C !
- Use AP & A/THR !
- No rush !
- Use FCOMs !



ATC

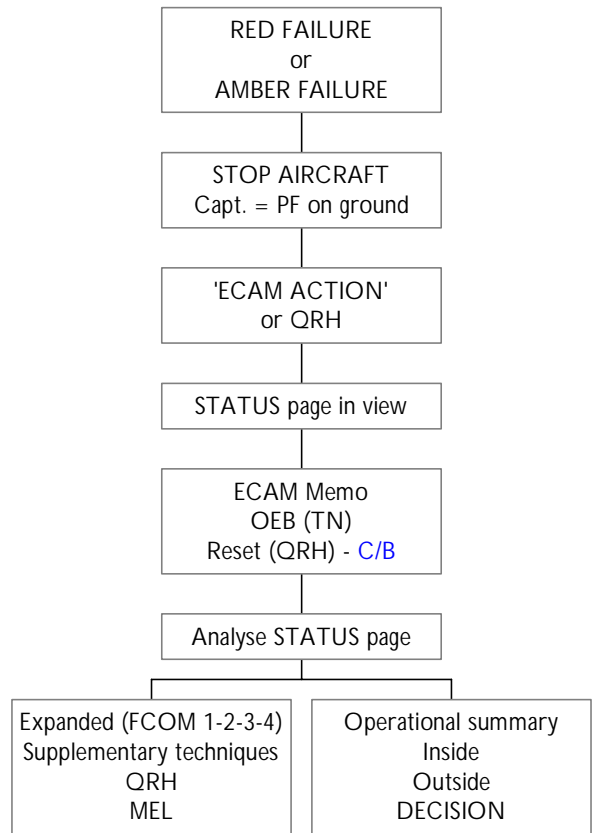
- MAYDAY when required and ECAM completed !
- PANPAN can be used immediately.



REF'S

- SN Non-normal SOP [D1.3](#)
- FCOM 3.02.01
- [FOM 8.3.16.2.3](#)

ECAM procedure on ground



- Stop aircraft, set parking brake & check pressure !
- Task distribution by Capt. : « ECAM ACTIONS ».
- Capt. = PF on ground.
- If no ECAM : check QRH.
- Advise ATC, mechanic and CC.

- Check OEB's affecting ECAM.
- Consider reset via C/B or pushbutton : use QRH !

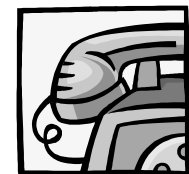
- Analyse STATUS page.
- Read expanded (FCOM 1-2-3-4).
- Check MEL (advise outstation or base if required).

- Check weather – notams – fuel.
- Summarize – Involve F/O – Decide – Announce inside & outside.



KEY'S

- Stop the A/C !
- MEL !
- Destination !



ATC

- Delay on push or start !
- Fire brigade if fire !



REF'S

- SN Non-normal SOP
- FCOM 3.02.01

Rejected T/O

AUTO BRK MAX :

- Triggered by ground spoilers extension.
- Disarming possible by :
 - selecting pushbutton OFF.
 - disarming ground spoilers.
 - pushing a pedal.

T/O power

T/O inhibit

72 kts

Autospoilers & AUTO BRK active

T/O CONF warning triggered by :

- Slats/flaps not in T/O config.
- Pitch trim not in T/O range.
- Rudder trim not in T/O range.
- Speedbrakes not retracted.
- Sidestick fault (deactiv. by takeover).
- Brakes hot.
- Doors.
- Parking brake ON*.
- Flex temp not set*.

*Not triggered by T/O CONF test.

80 kts

Abort only if :

- Loss of thrust.
- Aircraft expected not to fly.
- ECAM :
 - ENG FIRE
 - ENG FAIL
 - CONFIG
 - ENG OIL LO PR
 - L+R ELEV FAULT

100 kts

Low speed

High speed

Rejected T/O actions :

Conditions	Capt	F/O
Decision	"STOP" Thrust levers idle REV max	Monitor Spoilers REV AUTO BRK Cancel audio Inform ATC
Preparation	Aircraft stopped REV stowed "ATTN CABIN CREW ON STATION" x 2 "ECAM ACTIONS" or "ON GND EMER/EVAC XL"	Check REV stowed "MAYDAY" on Capt command
Evacuation	See 'EMER EVAC'	

If EMER EVAC not required :
« KEEP YOUR SEATS – ALL NORMAL »

Additional information :

- Position aircraft to keep possible fire away from fuselage.
- The aircraft should remain stationary while evaluating.
- Dome light is the only available light source on batteries.
- Do not clear RWY unless absolutely safe !

Remark :

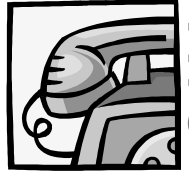
- Tyre failure slightly prior to V1 : continue !

V1 → GO !



KEY'S

- First STOP the aircraft !
- No rejected T/O for ELEC !



ATC

- F/O : « STOPPING ».
- 'MAYDAY' if expecting EVAC.



REF'S

- Abnorm/Emer 3.02.10
- SN Non-normal SOP
- Autobrake system 1.32.30
- Configuration warnings 1.31.15
- Flight phases 1.31.15

Emergency Evacuation

Evacuation actions :

Conditions	Capt	F/O
On ground	Thrust levers idle (REV max) Stop aircraft	Monitor Spoilers (REV) (AUTO BRK) Cancel audio Inform ATC
Preparation	Aircraft stopped REV stowed "ATTN CABIN CREW ON STATION" x 2 "ECAM ACTIONS" or "ON GND EMER/EVAC XL"	Check REV stowed "MAYDAY" on Capt command Complete up to ATC
Evacuation	"EVACUATION" to F/O Monitor ENG MASTERS OFF "EVACUATION" x 3 EVAC SW ON Silence signal in cockpit	Continue EMER/EVAC XL Agents not required if no failure Inform ATC Assist pax

If EMER EVAC not required :
« KEEP YOUR SEATS – ALL NORMAL »

Evaluation :

- Aircraft must remain stationary while evaluating.
- Evaluate while F/O completes checklist.
- Prepare QRH 1.05 if required and turn dome light on.
- Decide on gravity of situation whether life-threatening danger to crew or pax exist :
 - Gear collapse
 - Any sign of smoke or inextinguishable fire.
 - Runway excursion.
- Do not hesitate.
- Do never interrupt an evacuation !
- Obtain outside information if possible :
 - Fire brigade (if standby along RWY).
 - Tower.

Captain :

- Verify all items on checklist performed correctly.
- Leave cockpit as last person.
- Leave aircraft as last person :
 - Go through cabin as far as possible aft.
 - Check for remaining persons.
 - Leave aircraft through aft door.

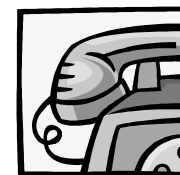
F/O :

- Proceed to cabin.
- Evacuate through suitable exit.
- Assist on ground & direct pax away from aircraft.



KEY'S

- Do not hesitate !
- Never interrupt EVAC !



ATC

- 'MAYDAY' if expecting EVAC.



REF'S

- Abnorm/Emer 3.02.80
- Detailed EVAC 3.02.90
- SN Non-normal SOP
- FOM 8.3.16

Emer Elec

ELEC EMER CONFIG :

- Never start APU if not required by ECAM, since probability of APU GEN coupling is low and battery power is consumed !
- RAT capability :
 - A320 : till 140 kts with L/G UP or 180 kts with L/G DN.
 - A319/321 : till 125 kts (140 kts guaranteed), except during flare.
- Single ECAM DU operation.
- Capt = PF, but temporary transfer to F/O (on STBY instruments) can be considered, but STBY instrument are not lighted !
- As long as RAT is operating :
 - No rush, but check EMER GEN = supplying network !
 - **ND1 operative when EMER GEN = working, else 'FLT ON BAT ONLY' (A320).**
- No BSCU, so N.W. STEER, NORM & ALTN brakes inop (ACCU only).
- **No REV : don't select REV since idle will increase !**
- L/G DN when CONF 3 :
 - Trimmed stated before going to DIRECT law.
 - **ECAM warning 'L/G not down' when CONF 3 since RA 1+2 inoperative.**



A320 :

- Prepare approach on RMP 1.
- Loss of DME 1, FMGC 1, MCDU 1 and ND 1 (so also ADFs) when L/G DN since RAT stalls.
- Loss of ADIRU 2 & 3 after 5 minutes without generators :
 - No PERF page.
 - Calculate VAPP & use selected speed.
 - Switch OFF IR 2 & 3 if IR 1 valid to save battery life.
- L/G DN at 1000 ft AGL on approach.
- When L/G UP (after G/A) :
 - RAT works again.
 - EMER GEN can be manually reconnected :
 - **ECAM warning 'ELEC ESS BUSES ON BAT' will ask you 'EMER GEN MAN ON' !**

A319/321 :

- APU start requested by ECAM once EMER GEN on line.
- RAT remains active when L/G DN & above 140 kts.

MAJOR INOP SYS (all aircraft) :

EMER GEN
RUNNING

AP 1+2
A/THR
REV 1+2
ADR 2+3
IR 2+3
RA 1+2

ALL F/O INSTRUMENTS & MCDU 2

Some SPOILERS

A/CALL OUT
FUEL PUMPS
ANTI SKID
N.W. STEER

BRK ACCU ONLY (max 1000 psi)

FUEL GRAV FEED ONLY

ALTN LAW & DIRECT LAW when L/G DN



A320 only :
When L/G DN,
RAT stalls and
EMER GEN OFF !

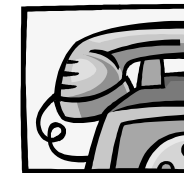
INOP SYS A320 when L/G DN :

FMGC 1
MCDU 1
RAD NAV
Capt ND
DME
ATC



KEY'S

- Capt = PF !
- Land ASAP !
- Never start APU if not on ECAM !
- G/A : reconnect EMER GEN !
- Use BIRD !
- A320 : prepare APPR on RMP 1.
- L/G DN when CONF 3 (in trim).
- **Do not use REV (high idle) !**



ATC

- Radar vectors !
- Long runway !
- RWY blocked & towing after landing !



REF'S

- Abnorm/Emer 3.02.24
- Remaining equipment QRH 1.01
- Flight on BAT only QRH 2.03

Smoke

SMOKE AVIONICS SMOKE :

- May be triggered by AIR COND smoke entering avionics bay :
 - Ask purser about smoke condition in cabin.
 - If a lot of smoke in cabin : suspect AIR COND SMOKE.
 - Apply AIR COND SMOKE procedure (QRH).
- If AVIONICS SMOKE confirmed : apply ECAM :
 - Do not restore VENT if smoke disappears !
 - Do not wait too long to isolate equipment (ECAM = 5 min.) !
 - Result will be ELEC EMER CONFIG (except fuel pumps) !
 - All remaining equipment supplied through C/B on OVHD.
 - Restore normal ELEC before L/G extension → smoke !
- A320 only : RAT stalls & EMER GEN disconnects at L/G down.
 - If normal ELEC not recovered before L/G DN :
 - FMGC will be lost (RMP only) !

SMOKE REMOVAL

- Apply only if dense or toxic smoke.
- Do not apply this for AIR COND SMOKE.
- Generally it is better to LAND ASAP !

SMOKE FWD or AFT CARGO SMOKE :

- 1 bottle for both fwd & aft cargo.
- Advise ground staff of potential fire before opening any door !
- Do not open cargo until :
 - pax out of aircraft.
 - fire brigade present.

AIR COND SMOKE (not on ECAM) :

- Confirmed by a lot of smoke in cabin (check with purser).
- Keep cockpit door closed and protected with towels.
- Use QRH !
 - Wait a few minutes after switching pack 1 off to see result.
- No smoke removal, better = LAND ASAP !
- AIR COND SMOKE will probably trigger other smoke alarms :
 - Lavatories.
 - Cargo.
 - Avionics.

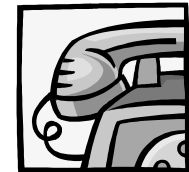
APPROACH & LANDING :

- Dimmed cockpit lights (except displays).
- PF on instruments / PNF crosschecks procedure.
- If available use both AP + A/THR and AUTO BRK.
- ON GND EMER EVAC after landing.



KEY'S

- Personal protection (100%) !
- Never OXY to pax (=mixed) !
- LAND ASAP – no holding !
- EMER EVAC after landing !



ATC

- Full EMER !
- Radar vectors !
- Committed to land !
- Runway blocked !
- EMER EVAC after landing !



REF'S

- Abnorm/Emer 3.02.26

SLATS / FLAPS jammed



LANDING WITH SLATS OR FLAPS JAMMED :

- Use QRH because FCOM is very confusing !
- Fly **SELECTED SPEED** !
- Determine :
 - Landing CONF.
 - VAPP.
 - LDG DIST.
 - G/A CONF & maximum speed.
- Establish LDG CONF in holding using QRH !
- Speedtape : only VLS correct !
- Always **ALTN LAW & DIRECT LAW** when L/G DN (except if due to WTB action).

SLATS JAMMED :

- CONF 1 :
 - Flaps do not extend in CONF 1.
 - Aircraft remains clean until CONF 2 !
 - High stall speed !
- CONF 2 :
 - Small speed margin !
 - Do not hesitate between CONF 1 & 2.
 - Ask straight & level flight between CONF 1 & 2.

FLAPS JAMMED :

- High attitudes when slats extended.

Speedtape information :

- VLS always correct.
- VFE (red tape) false but aural overspeed warning correct.
- Green dot – S – F speed false, coming from flap LEVER.
- VFE next from flap LEVER (use placard speeds).

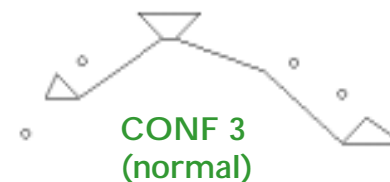
Additional information :

- Ldg CONF (QRH 2.26) is based on FLAP LEVER position !

LEVER	Slats	Table description
0	0°	
1	18°	Slats < 1
2 & 3	22°	1 ≤ Slats ≤ 3
FULL	>3 27°	Slats > 3

Remark :
Degrees valid for A320 only.

- Slats = 3 corresponds to FLAP LEVER in position 3 (22° slats).
- Slats > 3 corresponds to FLAP LEVER in position FULL (27° slats).

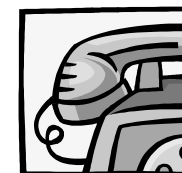


Remark : Only possible with CONF FULL or with CONF 3 when coming from CONF FULL.



KEY'S

- Selected speed & A/THR OFF !
- Speedtape : only VLS correct !
- ALTN law & DIRECT law when L/G down (except if due to WTB) !
- Unfamiliar attitudes on final !
- Increased fuel consumption !
- Maximum FL 200 !
- Use QRH !



ATC

- Higher touchdown speed.
- Prepare towing (flat tyres) !
- Fire brigade.
- Holding straight & level when extending slats / flaps.



REF'S

- Limitations 3.01.20
- Limitations 3.01.27
- Abnorm/Emer 3.02.10 & 27
- QRH

Dual HYD failure

Workmethod

Remarks :

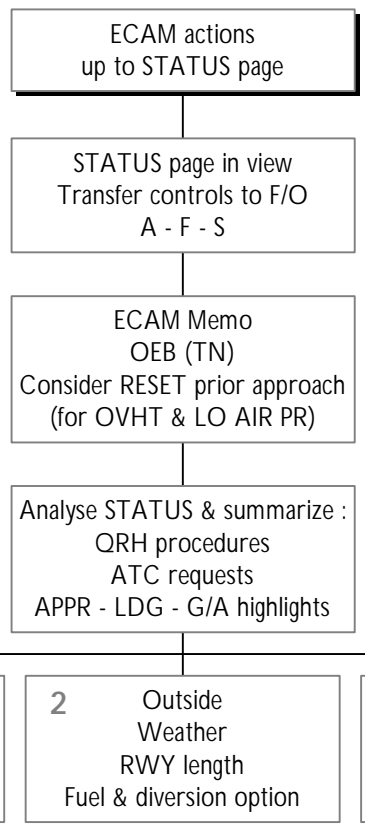
- If 1 SYS may be recovered : still prep dual HYD.
- Try reset (OVHT/LO AIR PR) in holding.
- Regardless of result : APPR & LDG as prepared !

Analysis inside :

- QRH : review procedures to be used.
 - VAPP + landing distance calculation*.
 - **Insert calculated** VAPP on PERF page.
 - Leave CONF FULL in PERF page.
 - If ldg SLATS/FLAPS jammed, use SEL speed.
 - L/G GRAVITY EXTENSION, set handle up.
- Read FCOM 3 (Expanded).

*Landing distance always based on :

- CONF FULL.
- No autobrake.



INOP SYS (in all cases) :

AP 1+2
N.W. STEER
L/G RETRACT

Decision & announcement :

- F/O : monitored appr, vectors long final (FD).
- Cabin : EMER prep due possible RWY excursion.
- Pax : make announcement.
- ATC : include all specific requests early enough.
- Company : towing & pax handling on ground.

Analysis outside :

- Nearest suitable alternate regarding :
 - Weather (CAT 1 only).
 - Landing distance (QRH ldg distance = very underestimated) !
 - Check crosswind (loss of N.W. STEER) !
 - Fuel & diversion options (parallel RWY).



KEY'S

- No rush !
- Use memo sheet !
- No AP !
- Review flying & braking capacities !



ATC

- FULL EMERGENCY !
- Announce requests early enough !
- Wide vectors, long final !
- Towing (RWY blocked after ldg) !
- G/A : straight-ahead MSA !



REF'S

- Airbus FCTM 1.03.29
- Abnorm/Emer HYD 3.02.29
- Simulator briefing

Dual HYD failure

HYD G+Y SYS LO PR

HYD G+Y SYS LO PR :

- No spoilers – no flaps – no REV – no anti-skid – accu brakes only !
- No stabilizer (hydraulically locked).
- No AP – A/THR unreliable (manual thrust if excessive speed deviations occur).
- No N.W. STEER (do not reset GRAV EXT on ground – see remark in QRH).
- No L/G retraction.

Flying capacities OK as long as L/G UP !
 ELEV compensate for jammed STAB until L/G DN.

Virtually NO braking capacity !
 Accu only – no anti-skid – max. 1000 psi.

Analysis (step 1-2-3) completed.
 QRH procedures prepared.
 Ldg distance & VAPP calculated.

Still in holding :

- Summarize APPR-LDG-G/A to F/O.
- Consider reset (OVHT/LO AIR PR).
- F/O : APPR preparation – briefing.
- Establish landing CONF & VAPP.

Initial approach :

- Long vectors.
- Early LOC/GS interception.
- 15 nm / 4000 ft.

When established :

- « Ldg check, all green ».
- L/G doors do not close.

On GS set L/G down :

- Direct law & stabilizer locked.
- Disregard 'USE MAN PITCH TRIM'.
- In ALTN law, ELEV compensate, remain L/G UP until in CONF 3 & VAPP.

Capt = landing :

- Min. at 1000 ft AGL.

Outer marker :

- PNF : « OM ALT __ ft »
- PF : « Checked »
- « Attention CCM on station x 2 »

At DA :

- « Ldg » or « G/A ».

G/A* :

- No CONF change.
- L/G remains down.
- Initially VAPP.
- Max speed (see QRH).

At 100 ft AGL :

- « BRACE 3x ».

G/A & diversion* :

- CONF change & speed : see QRH.
- L/G remains down.
- Increased fuel consumption.

At touchdown :

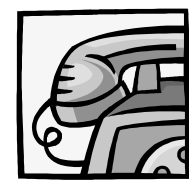
- No REV.
- F/O callout :
 - Brake pressure (10/10).
 - Groundspeed.

Long RWY (≥ 3000 m).



KEY'S

- L/G DN when CONF 3 & VAPP !
- Virtually no braking capacity !
- Cabin : full EMER preparation !
- No overweight landing !
- No autobrake (anti-skid inop) !
- Monitored approach !
- High body attitudes (slats only) !



ATC

- FULL EMERGENCY !
- Long RWY !
- Announce requests early enough !
- Wide vectors, long final, G/A !
- Towing (RWY blocked after ldg) !



REF'S

- Airbus FCTM 1.03.29
- Abnorm/Emer HYD 3.02.29
- SLATS/FLAPS jammed 3.02.10
- Ldg CONF/VAPP 3.02.80
- FOM 8.3.16.2.3

Dual HYD failure

HYD G+B SYS LO PR

HYD G+B SYS LO PR :

- No ailerons – only 1 elevator – few spoilers – only REV 2 – no slats !
- No AP – A/THR unreliable (due to loss of slats and most flight controls).
- No N.W. STEER (do not reset GRAV EXT on ground – see remark in QRH).
- No L/G retraction.
- No EMER GEN.

Braking capacities OK (Y HYD available) !

ALTN brakes only – no autobrake – REV 2 only.

Virtually NO flight controls !

No ailerons – only 1 elevator – few spoilers – no slats.



KEY'S

- L/G DN at 200 kts (1 ELEV) !
- Virtually no flight controls !
- Cabin : full EMER preparation !
- No overweight landing !
- ALTN brakes only (no A/B) !
- Monitored approach !
- Low body attitudes (flaps only) !

Analysis (step 1-2-3) completed.
QRH procedures prepared.
Ldg distance & VAPP calculated.

Still in holding :

- Summarize APPR-LDG-G/A to F/O.
- Consider reset (OVHT/LO AIR PR).
- F/O : APPR preparation – briefing.

When L/G down :

- Direct law.
- **'USE MAN PITCH TRIM'**.
- In ALTN law, still autotrim.

- Establish landing CONF & VAPP.
- Extend L/G at 200 kts for controllability with only 1 ELEV.

G/A & diversion* :

- CONF change & speed : see QRH.
- L/G remains down.
- Increased fuel consumption.

G/A* :

- No CONF change.
- L/G remains down.
- Initially VAPP.
- Max speed (see QRH).

Capt = landing :

- Min. at 1000 ft AGL.

Initial approach :

- Long vectors – wide turns.
- Early LOC/GS interception.
- 15 nm / 4000 ft.

When established :

- « Ldg check, all green ».
- L/G doors do not close.

Outer marker :

- PNF : « OM ALT __ ft »
- PF : « Checked »
- « **Attention CCM on station x 2** »

At DA :

- « Ldg » or « G/A ».

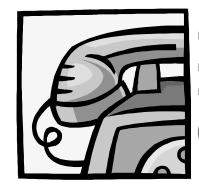
At 100 ft AGL :

- « BRACE 3x ».

At touchdown :

- Use only REV 2.
- F/O callout GS.

Long RWY (≥ 2500 m).



ATC

- FULL EMERGENCY !
- Straight-in ILS, no non-precision !
- Announce requests early enough !
- Wide vectors, long final, G/A !
- Towing (RWY blocked after ldg) !



REF'S

- Airbus FCTM 1.03.29
- Abnorm/Emer HYD 3.02.29
- SLATS/FLAPS jammed 3.02.10
- Ldg CONF/VAPP 3.02.80
- FOM 8.3.16.2.3

Dual HYD failure

HYD B+Y SYS LO PR

HYD B+Y SYS LO PR :

- Only 1 elevator – few spoilers – only REV 1 !
- No AP – A/THR unreliable.
- No N.W. STEER (do not reset GRAV EXT on ground – see remark in QRH).
- L/G GRAV EXT to preserve G HYD – no L/G retraction.
- No EMER GEN.

- Braking capacities OK (G HYD available) !
- NORM brakes only – REV 1 only – AUTO BRK operative.
- Flying capacities OK (except only 1 ELEV) !
- Only 1 elevator – few spoilers – NORMAL LAW remains.



KEY'S

- Normal law remains active !
- Cabin : full EMER preparation !
- No overweight landing !
- NORM brakes only (with A/B) !
- Monitored approach !
- Slats & flaps operative but slow !

Analysis (step 1-2-3) completed.
QRH procedures prepared.
Ldg distance & VAPP calculated.

Still in holding :

- Summarize APPR-LDG-G/A to F/O.
- Consider reset (OVHT/LO AIR PR).
- F/O : APPR preparation – briefing.
- Establish landing CONF & VAPP.
- Use AUTO BRK MED.

Initial approach :

- Normal vectors.
- Normal LOC/GS interception.
- 10 nm / 3000 ft.

When established :

- « Ldg check, all green ».
- L/G doors do not close.

Capt = landing :

- Min. at 1000 ft AGL.

On GS set L/G down :

- Use GRAV EXT to preserve G HYD.
- Normal law remains active.

G/A* :

- No CONF change.
- L/G remains down.
- Initially VAPP.
- Max speed (see QRH).

Outer marker :

- PNF : « OM ALT __ ft »
- PF : « Checked »
- « Attention CCM on station x 2 »

At DA :

- « Ldg » or
- « G/A ».

At 100 ft AGL :

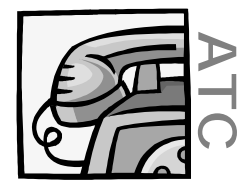
- « BRACE 3x ».

G/A & diversion* :

- CONF change & speed : see QRH.
- L/G remains down.
- Increased fuel consumption.

At touchdown :

- Use only REV 1.
- F/O callout GS.



ATC

- FULL EMERGENCY !
- Announce requests early enough !
- Wide vectors, long final, G/A !
- Towing (RWY blocked after ldg) !



REF'S

- Airbus FCTM 1.03.29
- Abnorm/Emer HYD 3.02.29
- SLATS/FLAPS jammed 3.02.10
- Ldg CONF/VAPP 3.02.80
- FOM 8.3.16.2.3

Long RWY (≥ 2000 m).

Remark : No real EMER since G HYD available, but still anticipate a possible deterioration of flying or braking capacity (better be safe than sorry) !

ADR / IR fault

If ADR & IR fault simultaneously, solve ADR problem first.

NAV single ADR FAULT :

- Follow ECAM.
- ADR 3 can be used as backup of ADR 1 or 2.
- GPWS OFF if ADR 1 affected.

INOP SYS :

GPWS
(if ADR 1 fault)

NAV single IR FAULT :

- Follow ECAM.
- IR 3 can be used as backup of IR 1 or 2.
- Consider ATT mode (QRH) !
- Do not switch IR OFF if not required by ECAM, as this will switch OFF corresponding ADR as well !

NAV dual ADR FAULT :

- Follow ECAM.
- ALTN law (direct law when L/G DN).
- Determine PF.
- If ADR 3 operative : switch to PF.
- If ADR 1+3 fault : L/G GRAV EXT, no retraction !

F/CTL PROT
(ALTN LAW &
DIRECT LAW when
L/G DN)
AP 1+2
A/THR

NAV dual IR FAULT :

- Follow ECAM.
- ALTN law (direct law when L/G DN).
- Determine PF.
- If IR 3 operative : switch to PF.
- Check NAV capability (1 IR + GPS).

L/G GRAV EXT*
ATC ALT*

NAV triple ADR FAULT :

- ECAM shows dual ADR fault !
- If confirmed (look overhead), disregard ECAM, use QRH 'ADR 1+2+3 FAULT'.
- Capt. = PF
 - ATT on PFD and ALT & SPEED on STBY.
 - Use TRK / FPA.
 - Set target bugs on STBY instruments.
- Use manual CAB PRESS (not mentioned in QRH) !
 - Target cabin altitude on STS page.
 - Manual CAB PRESS = full time job !
- During Capt's management, F/O PF on STBY instruments :
 - Set bugs and give clear orders to F/O.
 - Ask airspeed & altitude buffer to ATC.
 - Level flight only (long legs in holding).
 - Monitor closely.

CAB PRESS 1+2
(Use MANUAL)

*L/G GRAV EXT if ADR 1+3 fault.
ATC ALT inop if ADR 1+2 fault.

Consider
Diverting !

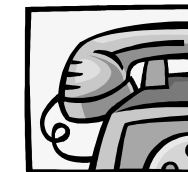
Remark :

- Switch ADR OFF with pushbutton.
- Switch IR OFF with rotary selector. (ADR will be OFF as well).
- IR in ATT mode :
 - Use QRH.
 - Enter magnetic heading (STBY compass).
 - Operative IR = TRUE HDG !
 - Consider reset of flight computers to recover normal law.



KEY'S

- Triple ADR confirmed : disregard ECAM & use QRH !
- Always crosscheck with STBY !
- All actions confirmed by both pilots !
- Read FCOM 3 !
- Consider pilot incapacitation !
- IR fault : consider ATT mode !
- If IR switched OFF = ADR also !



ATC

- Triple ADR : ask buffer airspace.
- Report instrument & navigation capability.



REF'S

- Limitations 3.01.34
- Abnorm/Emer 3.02.34
- ADIRS alignment 3.04.34

Engine start problems

ENG 1(2) OIL or FUEL FILTER CLOG :

- Maintenance action is due.
- If false warning : dispatch = possible, but not advisable.
- If dispatch : check weather – flight time – destination.

ENG 1(2) START VALVE FAULT :

- Consider START VALVE MANUAL OPERATION (use FCOM 3.04.70).
- Valve can be stuck open or closed.
- Ask mechanic if valve manually operable and reset normal start condition (closed) before starting the procedure.
- Check MEL (1 valve must operate for dual engine failure case).
- No C/B on start valve.
- Use CRANK position to check valve when both engines running.

ENG 1(2) START FAULT :

Manual start on ground :

- Cranking not displayed on ECAM.
- Dry crank 30 sec when N2 < 20%.
- Use FCOM 3.04.70.

EGT overlimit :

- Auto start : FADEC reduces FF and tries again.
- If unsuccessful : manual start or maintenance action.
- Manual start : abort, crank, maintenance action.

ENG TAILPIPE FIRE :

- May be encountered during start or shutdown !
- Indicated by no EGT decrease after shutdown.
- Use QRH (cranking when N2 < 20%).
- Maintenance is due.

ELEC POWER LOSS DURING FIRST ENGINE START :

- Indicated by loss of ECAM DU's.
- Abort start.
- Cranking : use FCOM 3.

ENG 1(2) IGN FAULT :

- Check MEL.
- Check C/B.

AUTO START on ground :

- Alternatively IGN A or B.
- FADEC detects faulty start and aborts.
- Cranking = automatic.

AUTO START in flight :

- Both IGN A & B.
- FADEC decides of starter assist or not.
- Auto start recommended for inflight starts.

Consider manual start in case of :

- Engine stall.
- Engine EGT overlimit.
- Low start air pressure.

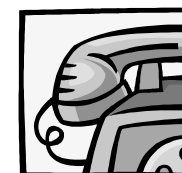
MANUAL START :

- Both IGN A & B.
- FADEC limited authority on command of MASTER SWITCH or MAN START BUTTON :
 - opening/closing of start valve;
 - opening/closing of HP valve;
 - control over IGN;
 - automatic closure of start valve;
 - automatic cutting off IGN.
- Passive monitoring :
 - Correct ECAM warning but no automatic abort;
 - except EGT overlimit on ground before 50% N2.
- In flight : manual start is always starter assist.
- Cranking (if required) not displayed on ECAM !



KEY'S

- Check MEL !
- Tripped C/B's may be reset on ground only in presence of maintenance !
- Manual start = only passive FADEC monitoring (use FCOM) !



ATC

- Delay on push or start !
- Fire brigade if fire !



REF'S

- Limitations 3.01.70
- Abnorm/Emer 3.02.70
- Engine start 3.03.08
- Manual engine start 3.04.70
- Ignition & starting 1.70.80

Engine failure on takeoff

ENG 1(2) FAIL :

- Do not interrupt ECAM if damage !
- Complete at least until AGENT 1 DISH.
- If no damage : consider relight in holding (use QRH).
- Secondary failures : ELEC page → start APU.

ENG 1(2) START VALVE FAULT :

- Triggered because valve not open & other engine running.
- Disregard.

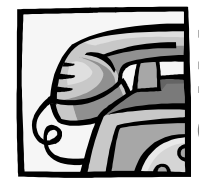
EFFRA - EFP :

- SID requires at least 3,3%.
- EFFRA :
 - min. 800 ft above RWY elevation.
 - min. 300 ft above highest obstacle.
- EFP :
 - Must be flown first !
 - V2 & 15° bank.
 - Acceleration after turn & above EFFRA.



KEY'S

- Consider use of AP & A/THR !
- Rudder trim !
- Use APU !
- Engine relight in hold (QRH) !
- Overweight landing : use QRH !
- Ldg : CONF 3 recommended !



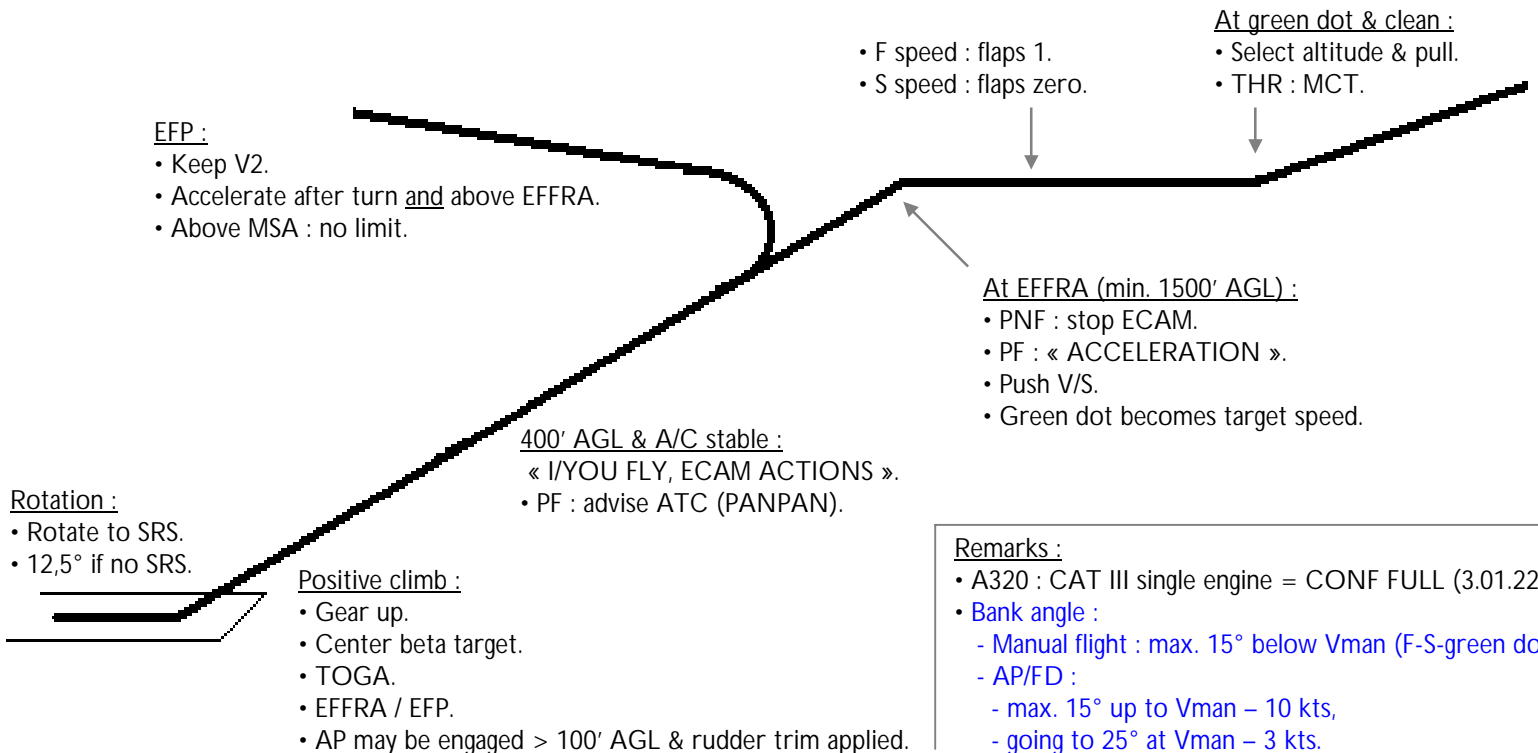
ATC

- Initial call : « Call you back » !
- PANPAN !
- Ldg : fire brigade.
- TCAS on TA only.



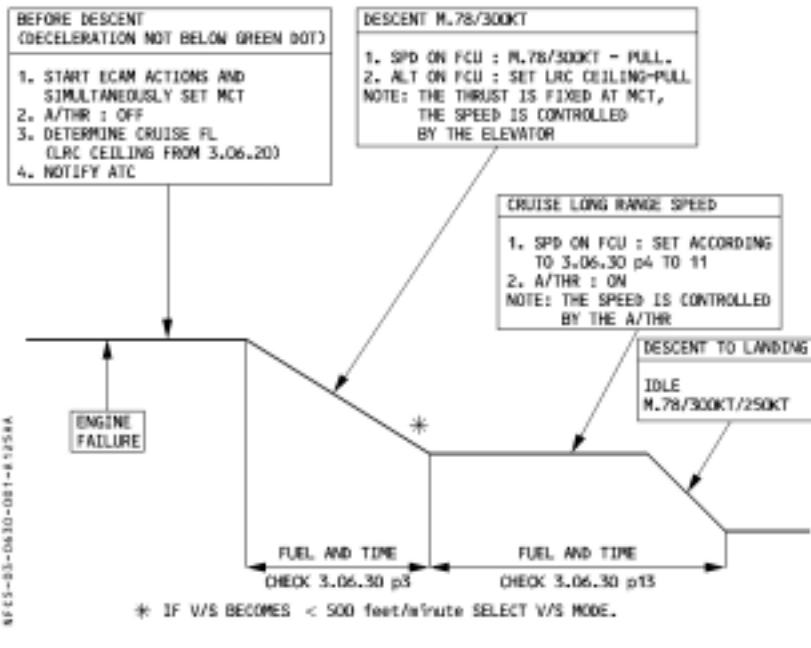
REF'S

- Limitations 3.01.70
- FCOM 3.02.10
- Abnorm/Emer 3.02.70
- Overweight landing 3.02.80
- FOM 8.1.1.2.5.1
- FMGC 1 engine out 4.04.30

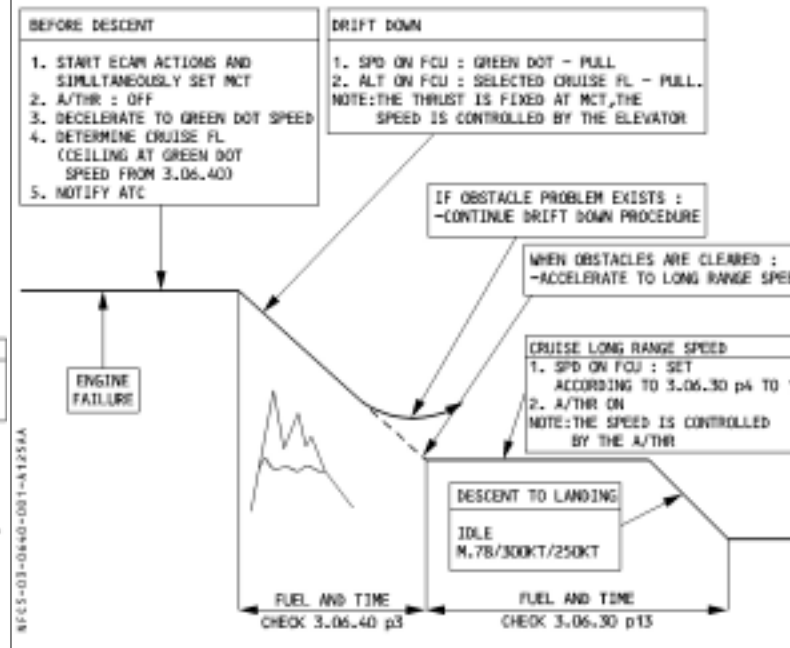


Engine failure in cruise

Standard strategy

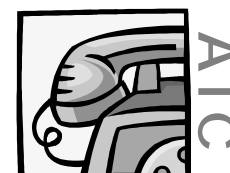


Obstacle strategy



KEY'S

- Initially MCT & A/THR OFF !
- Select speed & pull.
- Select altitude & pull.



ATC

- PANPAN !
- Ask initially FL200 !

FMGC :

- PROG page :
 - REC MAX EO ALT = LRC (A/I OFF).
- PERF page :
 - Relevant phase automatically called up.
 - Managed speed adapted :
 - CLB = green dot.
 - ALT = EO CRZ SPD according actual altitude.
 - CRZ = EO CRZ M or actual speed if higher.
 - DES = unchanged (actual or speed limit if any).
 - APPR = VAPP.
- AP/FD :
 - Reverts to OP CLB (if in CLB) or V/S (if in DES).
 - Bank angle limited to 15° below man. speeds.

Procedure :

- ECAM actions.
- MCT & A/THR OFF.
- Select speed according strategy & pull :
 - Green dot or M.78/300kts.
- Select altitude & pull :
 - Check obstacles.
 - Verify PROG page.
 - ATC.

Type	Gross ceiling	LRC ceiling
A319 - 68T	FL240	FL220
A320 - 74T	FL220	FL200
A321 - 80T	FL200	FL180



REF'S

- Single engine ops 3.06.00
- Ceilings 3.06.20
- MCDU pages 4.03.20
- FMGC engine out 4.04.30

Dual engine failure

ENG DUAL FAILURE

Remarks :

- In heavy rain, relight may take 3 minutes !
- In clear air, relight should be visible after 30 seconds.
- EGT 930° authorized by CFMI after dual engine flame out.

APU :

- A319/321 : APU start required by ECAM.
- A320 :
 - APU start not mentioned on ECAM !
 - If no windmilling relight, descent to FL250 & start APU.
 - When APU running, ECAM will be correct again.
- When below FL200 & APU running : ECAM asks APU BLEED ON.

ADIRS :

- If too long without AC power :
 - IR 2+3 FAULT.
 - Try ATT mode (QRH).

Initially :

- 300 kts (optimum relight).
- Advise ATC !
- F/O : ECAM actions.
- Max. EGT 930°C.

If no relight :

- Speed = green dot.

CAB PRESS :

- SYS 1 operating with EMER GEN.
- PACKS INOP.
- Cabin will depressurize :
 - Not visible on ECAM !
 - If gliding distance or obstacles not limiting : consider fast descent.
- OXY masks ON !

Below FL 200 :

- APU BLEED ON.
- Engine inflight relight (ECAM or QRH [ENG DUAL FAILURE](#)).
- Start 1 engine at the time.
- Max. EGT 725°C.
- Reduce speed to green dot to improve gliding.
- When 1 engine is started :
 - ECAM [ENG DUAL FAILURE](#) disappears.
 - Continue in QRH.
 - Start other engine, if unsuccessful [ENG MASTER OFF](#).

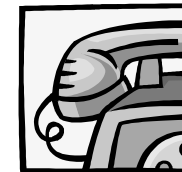
Remarks :

- ECAM not perfect (especially A320) !
- Use QRH (includes small italic notes).



KEY'S

- Do not confuse with GEN LOSS !
- Max. EGT starting = 930°C.
- Initial speed 300 kts.
- Packs INOP (CAB PRESS) !
- Below FL250 : start APU !
- Inflight relight : APU BLEED ON !



ATC

- FULL EMERGENCY !
- Vectors !



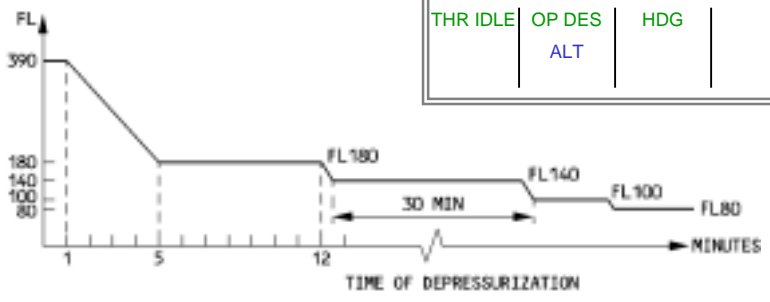
REF'S

- Limitations 3.01.70
- Abnorm/Emer 3.02.70

Emergency descent

CAB PR EXCESS CAB ALT

Pax oxy capacity profile



THR IDLE	OP DES ALT	HDG	AP1 1FD2 A/THR
----------	---------------	-----	----------------------

- Capt.:**
- « EMER DESCENT » + PA « RAPID DESC ».
 - Altitude 2 turns & pull.
 - Hdg 2 turns & pull.
 - Speed pull.
 - Read FMA.
 - Speedbrakes ½, then FULL*.
 - Adjust ALT – HDG – SPEED.
 - « ECAM ACTIONS ».



KEY'S

- Personal protection !
- Use AP !
- If structural damage suspected : maintain actual IAS !
- CPC reset with C/B allowed !

FL 250

- Low speed EMER DESC :
- Speed < VLO-VLE.
 - Altitude < FL 250.
 - L/G DN.

- 2000 ft before level off :
- Reduce speed.
 - Retract speedbrakes.

- F/O :
- ATC :
 - MAYDAY.
 - Altitude & radar HDG.
 - Ldg lights ON.
 - Verify safety altitude.
 - « ECAM ACTIONS ».

Pax OXY > FL 140 !

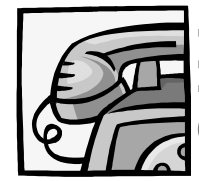
FL 140 or MEA

Cockpit OXY > FL 100 !

FL 100 or lower

- FL 100 :
- OXY OFF (1 by 1).
 - Close left OXY MASK door.
 - Transfer controls to F/O.
 - Diversion instructions to F/O.
 - Inform with purser about situation in cabin.

- If obstacle limited :
- Leave obstacle area ASAP.
 - Maintain highest possible speed.
 - Pax OXY = time limited !



ATC

- MAYDAY !
- Ask altitude & radar HDG !
- Ambulances & stairs along RWY !

Diversion to nearest suitable airport :

- Limit V/S to max. 500 fpm.
- Medical emergency possible !
- Group pax requiring assistance at 1 door.
- Inform ATC to position stairs & ambulances at that door ASAP after leaving RWY !

* Remark A320 only :
 • A320 is limited to ½ speedbrakes with AP ON.
 • Disconnect AP for steeper descent.



REF'S

- Limitations 3.01.21
- Abnorm/Emer 3.02.80
- SN Non-normal SOP
- Flight without press 2.04.20

Overweight landing

OVERWEIGHT LANDING ALL ENGINES :

- Use QRH !
- Create drag – fly G/D.
- G/A performance :
 - Check FCOM.
 - A319/320 : no limit up to MTOW (see table below).
 - A321 : check table in QRH (approach climb 1# out).
- Approach in CONF 3 & G/A in CONF 1 = never limiting.
- All engines G/A is never limiting !

OVERWEIGHT LANDING 1 ENGINE OUT :

- Use QRH !
- G/A performance (for info only, since no legal requirements) :
 - Approach climb requirement = all engines case only !
 - Check FCOM to have an idea of 1# out G/A perfo.
 - A319/320 : no limit up to MTOW (see table below).
 - A321 : check table in QRH (approach climb 1# out).
- Fly approach CONF 3 & G/A in CONF 1.

Additional information :

- If packs on APU and APU bleed fails :
 - engine bleeds open automatically if not switched OFF;
 - use PACKS OFF or supplied from APU with ENG BLEEDS OFF.
- Smooth touchdown, max 360 ft/min (F/O : callout V/S).
- Gear inspection required.
- Entry in TR.
- Tyre fuse plugs melt at 800°C.
- Landing distance : 2000m no margin / 3000m with 67% margin.

Actual landing distance (FCOM 2.03.10) :

Actual ldg distance at MTOW (meters).	A319	A320	A321
Dry CONF FULL	990	1150	1350
CONF 3	1140	1250	1500
Wet CONF FULL	1280	1450	1600
CONF 3	1460	1580	1800

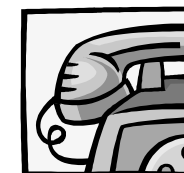
Approach climb (2,1%) – 1 engine out – MTOW (FCOM 3.05.35) :

Item	A319	A320	A321
MSN	1048 / 1068 / 1086-1145	1054 / 1081	970-1012
MTOW	68.000	75.500	89.000
MLW	61.000	64.500	75.500
G/A 1# out at MTOW FLAPS 2 – A/C ON	2000 ft 48°C	2000 ft 46°C	2000 ft 30°C
G/A 1# out at MTOW FLAPS 3 – A/C ON	2000 ft 44°C or –2.500 kg	2000 ft 44°C or –300 kg	1500 ft 26°C or –5.700 kg



KEY'S

- No rush (leave holding when in final CONF) !
- Use QRH !
- Check G/A & ldg performance !
- AUTO BRK LO !
- Packs OFF is better than on APU !
- Capt = landing !
- Bird ON (unknown attitudes) !



ATC

- Fire brigade (hot brakes) !

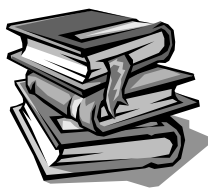


REF'S

- Weight limitations 3.01.20
- Overweight landing 3.02.80
- Go-around performance 3.05.35
- Landing distance 2.03.10

Abnormal

Emergency

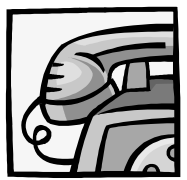


QRH

Determine which QRH procedures are required and indicate when they have been completed.

QRH procedures			
Title	Ref	Required	Done
SLATS or FLAPS jammed	2.05		
L/G gravity extension	2.13		
Ldg distance & VAPP	2.25		
Gravity fuel feeding	2.11		
Overweight landing	2.21		

Other QRH procedures			
Title	Ref	Required	Done



Comm

ATC
Desired runway & approach
Vectors - ILS interception
G/A routing & altitude
Fire brigade
Runway blocked
Evacuation
Medical
UN number / Drill code



Airport

Determine suitable alternate.

Cabin
Landing preparation
Evacuation

Wx

Company
Towing - Stairs - Pax

Approach type



Highlights

Approach
CONF
LAW
L/G

Resets

Landing
VAPP
LDG DIST
BRAKES
SPOILERS
REV
N.W. STEER

G/A
CONF
SPEED
ACCEL ALT

Landing check - all green