### Abnormal procedures

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
<th>Issue</th>
<th>Action</th>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECAM procedure in flight</td>
<td>REJECTED TAKEOFF</td>
<td>F/CTL SLATS/FLAPS JAMMED</td>
<td></td>
<td>NAV ADR / IR FAULT</td>
<td>ENG DUAL FAILURE</td>
</tr>
<tr>
<td>ECAM procedure on ground</td>
<td>EMER EVAC</td>
<td>NAV ADR / IR FAULT</td>
<td>ENG START FAULT</td>
<td>NAV ADR / IR FAULT</td>
<td>ENG DUAL FAILURE</td>
</tr>
<tr>
<td>Dual HYD workmethod</td>
<td>ELEC EMER CONFIG</td>
<td>Windshear</td>
<td>ENG FAIL on takeoff</td>
<td>NAV ADR / IR FAULT</td>
<td>ENG DUAL FAILURE</td>
</tr>
<tr>
<td>Overweight landing</td>
<td>SMOKE</td>
<td>Bomb on board</td>
<td>ENG FAIL in cruise</td>
<td>NAV ADR / IR FAULT</td>
<td>ENG DUAL FAILURE</td>
</tr>
<tr>
<td>Failure memo</td>
<td>HYD G +Y SYS LO PRESS</td>
<td></td>
<td></td>
<td>ENG FAIL on takeoff</td>
<td>ENG DUAL FAILURE</td>
</tr>
<tr>
<td>Approach memo</td>
<td>HYD G +B SYS LO PRESS</td>
<td></td>
<td></td>
<td>ENG FAIL in cruise</td>
<td>ENG DUAL FAILURE</td>
</tr>
<tr>
<td>MEL</td>
<td>HYD B +Y SYS LO PRESS</td>
<td></td>
<td></td>
<td>ENG FAIL on final</td>
<td>ENG DUAL FAILURE</td>
</tr>
<tr>
<td></td>
<td>CAB PR EXCESS CAB ALT</td>
<td></td>
<td></td>
<td></td>
<td>ENG DUAL FAILURE</td>
</tr>
</tbody>
</table>
ECAM procedure in flight

**RED FAILURE**
- or
**AMBER FAILURE**

Flight path
- > 400' AGL
- L/G retraction

**'ECAM ACTION'**
- or QRH

Normal actions required:
- "STOP ECAM"
- When possible:
- "CONTINUE ECAM"

**STATUS page in view**
- = STOP
- Consider AP
- Transfer controls to F/O

**ECAM Memo**
- OEB (TN)
- Reset (QRH) - C/B - Relight

**MEMO SHEET**
- Analyse STATUS page
- QRH
- Expanded (FCOM 1-2-3-4)
- Supplementary techniques
- MEL

**Operational summary**
- Inside
- Outside
- DECISION

- 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.

**KEYS**
- 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

This workmethod is applicable to all failures. Failures requiring specific treatment are clarified further.
ECAM procedure on ground

- RED FAILURE or AMBER FAILURE
- STOP AIRCRAFT Capt. = PF on ground
- 'ECAM ACTION' or QRH
- STATUS page in view
- ECAM Memo OEB (TN) Reset (QRH) - C/B
- Analyse STATUS page
- Expanded (FCOM 1-2-3-4) Supplementary techniques QRH MEL
- Operational summary Inside Outside DECISION

**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

**Operational summary**

- 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.
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

72 kts

100 kts

Low speed

High speed

T/O inhibit

Autospoilers & AUTO BRK active

80 kts

Rejected T/O actions:

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Capt</th>
<th>F/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision</td>
<td>&quot;STOP&quot;</td>
<td>Monitor</td>
</tr>
<tr>
<td></td>
<td>Thrust levers idle</td>
<td>Spoilers</td>
</tr>
<tr>
<td></td>
<td>REV max</td>
<td>REV</td>
</tr>
<tr>
<td>Preparation</td>
<td>Aircraft stopped</td>
<td>AUTO BRK</td>
</tr>
<tr>
<td></td>
<td>REV stowed</td>
<td>Cancel audio</td>
</tr>
<tr>
<td></td>
<td>&quot;ATTN CABIN CREW ON STATION&quot; x 2</td>
<td>Inform ATC</td>
</tr>
<tr>
<td></td>
<td>&quot;ECAM ACTIONS&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;ON GND EMER/EVAC XL&quot;</td>
<td></td>
</tr>
<tr>
<td>Evacuation</td>
<td>See 'EMER EVAC'</td>
<td></td>
</tr>
</tbody>
</table>

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

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!
# Emergency Evacuation

## 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.

## Conditions

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<tr>
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<th>F/O</th>
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<tr>
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<td>Thrust levers idle (REV max) Stop aircraft</td>
<td>Monitor Spoilers (REV) (AUTO BRK) Cancel audio Inform ATC</td>
</tr>
</tbody>
</table>

## Preparation
- Aircraft stopped REV stowed
- "ATTN CABIN CREW ON STATION" x 2 
- "ECAM ACTIONS" or 
- "ON GND EMER/EVAC XL"

## Evacuation
- "EVACUATION" to F/O Monitor ENG MASTERS OFF 
- "EVACUATION" x 3 EVAC SW ON Silence signal in cockpit

## Evacuation actions:

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### If EMER EVAC not required:

« KEEP YOUR SEATS - ALL NORMAL »

### Evaluation:
- Aircraft must remain stationary while evaluating.
- Evaluate while F/O completes checklist.
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  - 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.
**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):**
- 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

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

**EMER GEN RUNNING**

**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)!

**REF’s**
- Abnormality 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)!

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.

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

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.

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.
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:**
- Log CONF (QRH 2.26) is based on FLAP LEVER position!

<table>
<thead>
<tr>
<th>LEVER</th>
<th>Slats</th>
<th>Table description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0°</td>
<td>Slats &lt; 1</td>
</tr>
<tr>
<td>1</td>
<td>18°</td>
<td>1 ≤ Slats ≤ 3</td>
</tr>
<tr>
<td>2 &amp; 3</td>
<td>22°</td>
<td>Slats &gt; 3</td>
</tr>
<tr>
<td>FULL</td>
<td>27°</td>
<td>Degrees valid for A320 only.</td>
</tr>
</tbody>
</table>

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

**CONF 3** (normal)

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

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)

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

ECAM actions up to STATUS page

STATUS page in view
  Transfer controls to F/O
  A - F - S

ECAM Memo
  OEB (TN)
  Consider RESET prior approach (for OVHT & LO AIR PR)

Analyse STATUS & summarize:
  QRH procedures
  ATC requests
  APPR - LDG - G/A highlights

Inside
- Review QRH procedures
- Read FCOM 3 (Expanded)
- Calculate LDG DIST & VAPP

Outside
- Weather
- RWY length
- Fuel & diversion option

Decision
- Announcement
- Specific requests to ATC
- Prepare QRH procedures

Outside
- Weather
- RWY length
- Fuel & diversion option

*landing distance always based on:
- CONF FULL
- No autobrake
**Dual HYD failure**

**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.

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

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

**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.

**Still in holding**:
- Summarize APPR-LDG-G/A to F/O.
- Consider reset (OVHT/LO AIR PR).
- Establish landing CONF & VAPP.

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

**Initial approach**:
- Long vectors.
- Early LOC/GS interception.
- 15 nm / 4000 ft.

**On G5 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.

**At DA**:
- « Ldg » or « G/A ».

**Capt = landing**:
- Min. at 1000 ft AGL.

**On G/S 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.

**At 100 ft AGL**:
- « BRACE 3x ».

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

**Long RWY (≥ 3000 m)**.

**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.**
**Q RH procedures prepared. Ldg distance & VAPP calculated.**

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

**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.
Dual HYD failure

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.

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.

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

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).

At touchdown:
- Use only REV 2.
- F/O callout GS.

At 100 ft AGL:
- « BRACE 3x ».

At 100 ft AGL:
- « BRACE 3x ».

At DA:
- « Ldg » or « G/A ».

When established:
- « Ldg check, all green ».
- « Attention CCM on station x 2 »
- L/G doors do not close.

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

When L/G down:
- « USE MAN PITCH TRIM ».
- In ALTN law, still autotrim.

Still in holding:
- Summarize APPR-LDG-G/A to F/O.
- Consider reset (OVHT/LO AIR PR).
- Establish landing CONF & VAPP.
- Extend L/G at 200 kts for controllability with only 1 ELEV.

HYD G+B SYS LO PR:

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.

OM

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

OM

- 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)!

OM

- 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

OM
Dual HYD failure

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.

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

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.

At touchdown:
• Use only REV 1.
• F/O callout GS.

At 100 ft AGL:
• Use GRAV EXT to preserve G HYD.
• Normal law remains active.

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

On GS set L/G down:
• Use GRAV EXT to preserve G HYD.
• Normal law remains active.

When established:
« Ldg, check, all green ».
• L/G doors do not close.

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.

At 100 ft AGL:
• « BRACE 3x ».

OM

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.

**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 !

**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.

**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 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 IR FAULT**:  
- GPWS  
  (if ADR 1 fault)

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

**CAB PRESS 1+2**  
(Use MANUAL)

**Consider Diverting !**

**REM**

- 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.

**Version 4.0 – May, 1st 2001**

**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.

**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.

**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!
**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.

**REF's**

**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!

**ATA 70**

**ENGINE 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.

**Remarks:**
- A320: CAT III single engine = CONF FULL (3.01.22).
- Bank angle:
  - Manual flight: max. 15° below Vman (F-S-green dot).
  - AP/FD:
    - max. 15° up to Vman ~ 10 kts.
    - going to 25° at Vman ~ 3 kts.

**Rotation:**
- Rotate to SRS.
- 12.5° if no SRS.

**Positive climb:**
- Gear up.
- Center beta target.
- TOGA.
- EFFRA / EFP.
- AP may be engaged > 100' AGL & rudder trim applied.

**At EFFRA (min. 1500' AGL):**
- PNF: stop ECAM.
- PF: « ACCELERATION ».
- Push V/S.
- Green dot becomes target speed.

**At green dot & clean:**
- Select altitude & pull.
- THR: MCT.

**At EFFRA (min. 1500' AGL):**
- PNF: stop ECAM.
- PF: « ACCELERATION ».
- Push V/S.
- Green dot becomes target speed.

**Remarks:**
- A320: CAT III single engine = CONF FULL (3.01.22).
- Bank angle:
  - Manual flight: max. 15° below Vman (F-S-green dot).
  - AP/FD:
    - max. 15° up to Vman ~ 10 kts.
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**ENG 1(2) START VALVE FAULT:**
- Triggered because valve not open & other engine running.
- Disregard.

**Rotation:**
- Rotate to SRS.
- 12.5° if no SRS.

**Positive climb:**
- Gear up.
- Center beta target.
- TOGA.
- EFFRA / EFP.
- AP may be engaged > 100' AGL & rudder trim applied.

**At EFFRA (min. 1500' AGL):**
- PNF: stop ECAM.
- PF: « ACCELERATION ».
- Push V/S.
- Green dot becomes target speed.

**At green dot & clean:**
- Select altitude & pull.
- THR: MCT.

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    - max. 15° up to Vman ~ 10 kts.
    - going to 25° at Vman ~ 3 kts.
Engine failure in cruise

**Standard strategy**

**Obstacle strategy**

<table>
<thead>
<tr>
<th>Type</th>
<th>Gross ceiling</th>
<th>LRC ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>A319 - 68T</td>
<td>FL240</td>
<td>FL220</td>
</tr>
<tr>
<td>A320 - 74T</td>
<td>FL220</td>
<td>FL200</td>
</tr>
<tr>
<td>A321 - 80T</td>
<td>FL200</td>
<td>FL180</td>
</tr>
</tbody>
</table>

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.
- **ATC**:
  - PANPAN!
  - Ask initially FL200!

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.

+ Initially MCT & A/THR OFF!
+ Select speed & pull.
+ Select altitude & pull.
+ 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°C 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.

Below FL 250:
- Start APU.

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.

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!

Remarks:
- In heavy rain, relight may take 3 minutes!
- In clear air, relight should be visible after 30 seconds.
- EGT 930°C 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.
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- 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).

Initial speed 300 kts.

Below FL 250:
- Start APU.

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).
Emergency descent

CAB PR EXCESS CAB ALT

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 ».

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

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

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

FL 250

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

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

FL 140 or MEA

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

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.

Pax oxy capacity profile

FL 140 or MEA

Pax OXY > FL 140!

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.

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.

Version 4.0 – May, 1st 2001

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

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

• Limitations 3.01.21
• AbnormEmer 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!

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.

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.

Approach climb (2.1%) – 1 engine out – MTOW (FCOM 3.05.35):

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

Approach climb (2.1%) – 1 engine out – MTOW (FCOM 3.05.35):

<table>
<thead>
<tr>
<th>Item</th>
<th>A319</th>
<th>A320</th>
<th>A321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry  CONF FULL</td>
<td>990</td>
<td>1150</td>
<td>1350</td>
</tr>
<tr>
<td>CONF 3</td>
<td>1140</td>
<td>1250</td>
<td>1500</td>
</tr>
<tr>
<td>Wet  CONF FULL</td>
<td>1280</td>
<td>1450</td>
<td>1600</td>
</tr>
<tr>
<td>CONF 3</td>
<td>1460</td>
<td>1580</td>
<td>1800</td>
</tr>
</tbody>
</table>

Actual landing distance (FCOM 2.03.10):

<table>
<thead>
<tr>
<th>Actual ldg distance at MTOW (meters)</th>
<th>A319</th>
<th>A320</th>
<th>A321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry CONF FULL</td>
<td>990</td>
<td>1150</td>
<td>1350</td>
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<td>CONF 3</td>
<td>1140</td>
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</tr>
<tr>
<td>CONF 3</td>
<td>1460</td>
<td>1580</td>
<td>1800</td>
</tr>
</tbody>
</table>

ATC

- Fire brigade (hot brakes)!

KEY’S

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

REF’S

- Weight limitations 3.01.20
- Overweight landing 3.02.80
- Go-around performance 3.05.35
- Landing distance 2.03.10
<table>
<thead>
<tr>
<th>Title</th>
<th>Ref</th>
<th>Required</th>
<th>Done</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLATS or FLAPS jammed</td>
<td>2.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/G gravity extension</td>
<td>2.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ldg distance &amp; VAPP</td>
<td>2.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravity fuel feeding</td>
<td>2.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight landing</td>
<td>2.21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**QRH procedures**

**Other QRH procedures**

<table>
<thead>
<tr>
<th>Title</th>
<th>Ref</th>
<th>Required</th>
<th>Done</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ATC**

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

**Cabin**

- Landing preparation
- Evacuation

**Company**

- Towing - Stairs - Pax

**Airport**

Determine suitable alternate.

**Wx**

**Approach type**

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

<table>
<thead>
<tr>
<th>CONF</th>
<th>LAW</th>
<th>L/G</th>
</tr>
</thead>
</table>

### Landing

<table>
<thead>
<tr>
<th>VAPP</th>
<th>LDG DIST</th>
<th>BRAKES</th>
<th>SPOILERS</th>
<th>REV</th>
<th>N.W. STEER</th>
</tr>
</thead>
</table>

### Resets

### G/A

<table>
<thead>
<tr>
<th>CONF</th>
<th>SPEED</th>
<th>ACCEL ALT</th>
</tr>
</thead>
</table>

**Landing check - all green**