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A318 – STEEP APPROACH OPERATION

AIRBUS

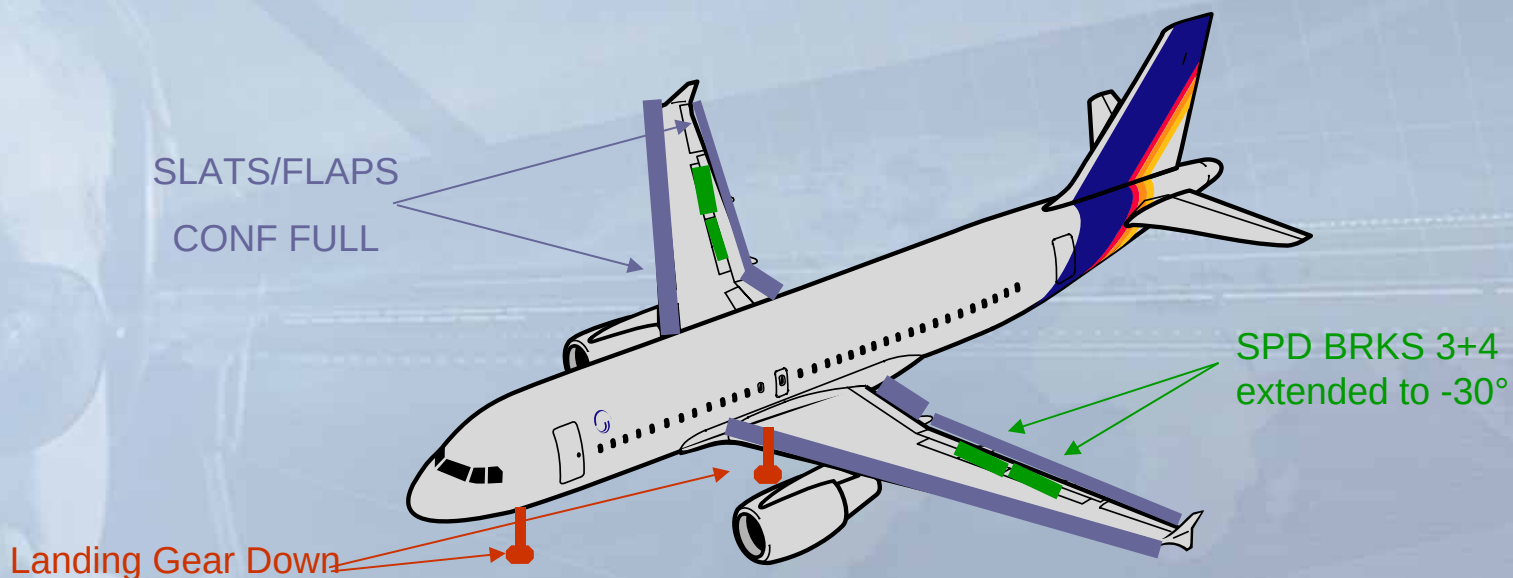
Contents

Design objective

- AIRBUS has developed and tuned a new function on A318 aircraft in order to allow steep approach operation (STEEP APPR), from **-4.5° to -5.5° FPA**, for
  - CAT1 approaches (LOC + G/S)
  - LOC without G/S (LOC + FPA or V/S)
  - Visual approaches (with PAPI or HUD)
- This function is certified since the 3rd of April 2006 and valid for both CFMI and PW A318 versions

Aircraft configuration for STEEP APPR

- In order to increase the descent capability of the A318 and to cope with the -5.5° slope, the following aerodynamic configuration has been chosen:
  - Gear Down
  - CONF FULL
  - SPD BRKS lever FULL → Only SPLR 3+4 are extended to 30°



Systems adaptation and specificities

- In order to select the STEEP APPR function, an ‘ON/FAULT’ P/B has been added in the cockpit and must be set to ON prior a Steep Approach Landing

Systems adaptation and specificities

- When this P/B is pressed in, all concerned computers (ELAC, SEC, FCDC, FAC, FMGC, FWC, EGPWS/T2CAS) check if the STEEP APPR function is available.

  If yes, the P/B 'ON' light illuminates in green, and the green memo 'STEEP APPR' appears on ECAM

  If no, the P/B 'FAULT' light illuminates in amber, and 'STEEP APPR' amber appears in INOP SYS on the ECAM STS PAGE

YES

NO

Systems adaptation and specificities

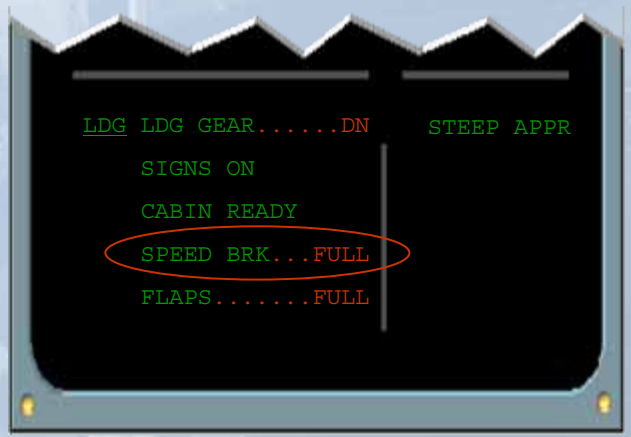
- When STEEP APPR function is active (i.e. CONF FULL/DN + SPD BRKS lever FULL position), the effects on the aircraft are the following:
  - **F/CTL systems (ELAC/SEC/FCDC):**
    - SPD BRKS 3+4 only are extended to 30°
    - At around 85ft, automatic SPD BRKS retraction to 8° (no full retraction)
    - With SPD BRKS lever set to FULL, GND SPLRS are armed (they will deploy automatically at touchdown)
    - AOA protection, Roll normal law, Nz law and Flare law are adapted (in terms of gains and thresholds)
  - **Approach Speed (FAC):**
    - VLS is increased by 8Kt ($VREF_{STEEP\ APPR}$=VREF+8Kt) and displayed accordingly on PFD

    Note: The VLS provided on PERF APPR page by the FM is not updated
  - **A/THR and Autopilot (FMGC):**
    - AP/FD glide control law is adapted to cope with the increased slope and avoid jerks at AP disconnection
    - A/THR gains are increased to be more reactive

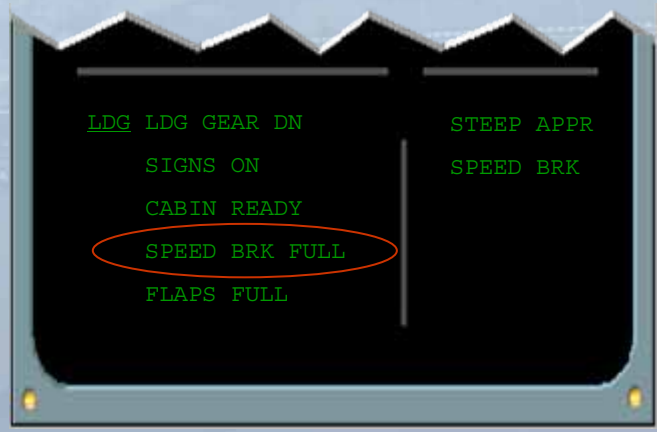
Systems adaptation and specificities

- Flight Warning System (FWC):
  - **Auto call-outs** ‘STANDBY’ at 117ft, ‘STANDBY’ at 90ft, and ‘FLARE’ at 63ft are triggered, based on Radio Height
  - In case of any **failure** affecting the STEEP APPR capability, the following new ECAM cautions and warnings are triggered:
    - Above 800ft AGL, amber ECAM caution **‘F/CTL STEEP APPR LOST’**
    - Below 800ft AGL, red ECAM warning **‘F/CTL STEEP APPR FAULT’**
  - **New ECAM LDG memo** to confirm that STEEP APPR is effectively active

Before actions



After actions



Systems adaptation and specificities

- Electronic Information System (EIS):
  - V/S threshold from green to amber is adapted to cope with the increased slope

- Ground Proximity System (EGPWS/T2CAS):
  - Adaptation of the alert thresholds to cope with the increased slope
  - Inhibition of alerts below 130ft to protect the ‘‘STANDBY… STANDBY… FLARE’ call-outs

Operational limitations

- Maximum authorised Flight Path Angle: -5.5°
- MLW unchanged (57.5t)
- FWD and AFT CG limits unchanged
- Maximum altitude for landing: 2000ft
- Tailwind limit for landing: 5Kt
- Crosswind limit for landing: 26Kt gust included
- AUTOLAND is not allowed
- CATII and CATIII are not allowed
- All engines operative only

Standard Operating Procedure (SOP)

- **Before descent:**
  - Add 8Kt to VAPP in PERF APPR page
  - STEEP APPR P/B pressed in (check ECAM Memo green)
  - Briefing “Steep approach” with following key points:
    - Landing configuration (STEEP APPR P/B pushed + Gear Down + CONF FULL + SPD BRKS lever position FULL)
    - VLS_{PFD}=VREF+8Kt in steep approach configuration
    - Automatic call-outs “Standby / Standby / Flare”
    - PNF call-out “Flare” at 60ft RA for redundancy with automatic “Flare” call-out at 63ft
    - Retard thrust levers to IDLE at flare initiation
    - Below 2000ft, Final Approach interrupted for Amber or Red warning except if immediate landing is safer (fire or smoke)
    - In case of Go Around, SPD BRKS lever must be retracted by PF (redundant action with automatic retraction)

Standard Operating Procedure (SOP)

- **Intermediate Approach:**
  - Steep Approach configuration established before final approach (STEEP APPR P/B pushed + Gear Down + CONF FULL + SPD BRKS lever FULL)
  - Check VAPP with updated wind
  - Landing Check List before final approach

- **Landing:**
  - Flare initiated at 55ft (automatic call-out at 63ft)
  - Retard thrust levers to IDLE at flare initiation

- **Go around:**
  - PF retracts SPD BRKS lever

- **Failures:**
  - In case of any red or amber alarm below 2000ft AGL during final approach, perform a Go Around (except if immediate landing is safer…)

Conclusion

- When defining the STEEP APPR function on A318, AIRBUS objective was to provide pilots with an aircraft handling and associated operational procedures as close as possible to the standard ones

- However, AIRBUS recommends a dedicated training to be provided to the crews who are meant to operate steep approaches on A318, which would consist essentially in base training

A318 Steep Approach Tests
in London City airport

AIRBUS

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