

A32N FCOM



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A32N FCOM Revision 7

Introduction

This update to the A320 FCOM and SOP incorporates a couple of small SOP changes alongside some additional information relating to FLS.

In addition, training material relating to Rejected Takeoff, FLS and Use of Normal Checklists has been added. For now this material remains within the FCOM document, however it is likely in the future as this section grows that it will be split in to a separate FCTM document.

This OMN contains the additions and amendments and the procedures within may be used immediately; the updated FCOM is currently undergoing final proof-reading and is expected to be released on DocStore early next week.

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Flight Control Check by PM

Due to a number of occasions where PM has omitted their flight control check, a small SOP amendment has been made to the flight control check process in order to trap the error.

1. In the Normal Checklist the 'Flight Controls' item changes from a PF response to a response by BOTH pilots.
2. To help PF detect an omission of the flight control check by PM, a new standard call of "Flight Control Check Complete" is added once PM finishes their check.

Normal Checklist

BEFORE TAKE OFF	
FLIGHT CONTROLS _____	CHECKED (BOTH)
TCAS	TA/RA or TFC
LOADSHEET	ACK'D
TRIMS	()% & ZERO
DEPARTURE BRIEF _____	CONFIRMED
TO DATA _____	() (BOTH)
FLAPS _____	CONF () (BOTH)
CABIN REPORT	(BLACK)
ECAM MEMO _____	T.O NO BLUE
--- ENTERING RUNWAY ---	
TAKE OFF RWY _____	() (BOTH)
CABIN CREW SIGNAL	GIVEN
PACKS	()

FCOM > Procedures > Expanded Normal Procedures > Standard Callouts > Summary for Each Phase

EVENT	PF	PM
Flight control check in the following sequence (the check is possible before the start of taxi)	FLIGHT CONTROL CHECK	
1. Elevators		FULL UP, FULL DOWN, NEUTRAL
2. Ailerons/Spoilers		FULL LEFT, FULL RIGHT, NEUTRAL
3. Rudder	RUDDER	FULL LEFT, FULL RIGHT, NEUTRAL
After PM has checked their flight controls		FLIGHT CONTROL CHECK COMPLETE

FLS

Flight crew are now authorised to use FMS Landing System (FLS) to fly non-precision approaches on FLS equipped A32N aircraft. These are:

A320 Neo: G-TTNV – G-TTSA

A321 Neo: G-TNEA – G-TNEE

Procedures for the use of FLS are contained within this document and will be incorporated in to A32N FCOM Revision 7.

FLS is suitable for all ‘straight line’ non-precision approaches and is now the recommended method for these approaches if the aircraft is FLS equipped. FLS **must not** be used for approaches with a turn after the FAF, such as RNP Circling, RNAV Visual approaches etc. FINAL APP or selected guidance, as appropriate, must be used for these approaches.

Some potential ‘traps’ that may be encountered with FLS include:

- **QNH setting error** – FLS beam construction is based on the QNH setting
- **Use of FLS for unsuitable approaches** – FLS is not suitable for approaches with turns after the FAF, such as RNP Circling, Circling with Prescribed Tracks and RNAV Visual
- **Early beam capture** – the beam is 80 NM long and can be captured at any point along this beam.

In particular, it should be noted that **FLS may not be used for the RNP A and VOR A approach runway 04L/R at Nice**. FINAL APP remains the preferred mode for this approach.

OM C > Aerodromes > Europe > Nice (NCE/LFMN)

{Remainder unchanged}

APPROACHES TO RUNWAYS 04L/R

RNP A and VOR A Approach Rwy 04L/R:

Use of FINAL APP or LNAV/VNAV is strongly recommended. Airbus aircraft: do not use FLS for this approach – ensure FINAL APP is selected on the PERF APPR page. Vertical and lateral guidance using FINAL APP or LNAV/VNAV is provided from the Final Descent Point of the instrument procedure down to the threshold. Review the table in the “Circling Approach Execution” section to ensure the correct approach is selected in the navigation database.

FCOM > Limitations > Autoflight > Autopilot Function

At takeoff	100 ft AGL and at least 5 s after liftoff
In approach with F-G/S mode	200 ft AGL
In approach with FINAL APP, V/S or FPA mode	250 ft AGL
In circling approach	500 ft AGL for aircraft category C (600 ft AGL for aircraft category D)
ILS/MLS approach when CAT1 is displayed on the FMA	160 ft AGL
GLS approach when AUTOLAND is not displayed on the FMA	160 ft AGL
ILS/MLS approach when CAT2 or CAT3 (single or dual) is displayed on the FMA	0 ft AGL if autoland.
PAR approach (Precision Approach Radar)	250 ft AGL
<i>Note: The use of the AP and/or FD is authorised</i>	

in PAR approach, with HDG V/S or TRK FPA. PAR approaches may be subject to operational approval.	
After a manual go-around	100 ft AGL

FCOM > Limitations > Use of FLS

USE OF FLS

Applicable to: G-TTNV – G-TTSA, G-TNEA – G-TNEE

APPROACH BASED ON RADIO NAVAIDS

An approach based on radio aids (e.g. VOR/DME) may be flown with the FLS provided that:

- F-APP capability is displayed on FMA
In this case, the reference navaids are not required to be serviceable, or the aircraft VOR/DME/ADF etc receiver may be inoperative or not installed, provided an operational approval is obtained.
- F-APP + RAW capability is displayed on FMA
In this case, the reference navaids and corresponding airborne radio equipment must be serviceable, tuned and monitored during the approach.

An ILS (G/S out), ILS-B/C (G/S out), LOC, LOC-B/C approach may be flown with the lateral LOC (LOC B/C) mode and with the F-G/S mode of FLS function provided that:

- F-APP capability is displayed on FMA
In this case, the reference navaids used for the vertical path validation must be tuned and checked at the final descent point
- F-APP + RAW capability is displayed on FMA
In this case, the reference navaids used for the vertical path validation must be tuned and checked at the final descent point and monitored during the approach.

RNAV(GNSS) APPROACH

An RNAV(GNSS) approach with LNAV minimum may be flown with the FLS provided that the F-APP capability is displayed on the FMA.

An RNAV(GNSS) approach with LNAV/VNAV minimum must be flown with the FLS provided that the F-APP capability is displayed on FMA.

Note: The RNAV(GNSS) approach limitations must be used to perform an RNAV approach for which the GNSS is not required.

FCOM > Normal Procedures > Approach > Approach using F-LOC F-G/S Guidance

APPROACH USING F-LOC F-G/S GUIDANCE

Applicable to: G-TTNV – G-TTSA, G-TNEA – G-TNEE

GENERAL

The following items are to be performed in addition to previous SOP chapters in the following cases:

- RNAV(GNSS) approaches with LNAV or LNAV/VNAV minima
- Conventional approaches based on VOR or NDB using F-LOC F-G/S guidance
- ILS G/S OUT, LOC ONLY approaches

AIRCRAFT EQUIPMENT

For RNAV(GNSS) approaches, 1 FMS must be operative in GPS PRIMARY.

In addition, the following equipment is recommended:

1 MCDU, 1 FD, 1 PFD and 1 ND on the PF side, and both FCU channels.

DESCENT PREPARATION

WEATHER AND LANDING INFORMATION..... OBTAIN

- The FLS vertical beam (F-G/S) computation takes in to account the effect of low OAT on obstacle clearance if the destination temperature is correctly inserted on the PERF APPR page.

PERF APPR page..... CHECK/SELECT FLS

- Check that the FLS guidance mode is selected on the PERF APPR page.

F-PLN A pageCHECK

- 0.1 degree of difference between the MCDU and the charted final vertical path is acceptable
- 1 degree of difference between the MCDU and the charted final lateral track is acceptable
- 3 degree of difference between the MCDU and the charted final lateral track is acceptable for overlay to a conventional radio NAVAID approach.

FLS DATA.....CHECK

- Press the LS pb to display FLS data on PFD and ND
- Check the following FLS data against the published approach chart:
 - o The anchor point
 - o The course of the F-LOC (LOC) (LOC B/C) beam
 - o The slope of the F-G/S beam
- On the ND, check the compatibility of the FLS beam with the final approach leg of the flight plan.

Note: For ILS G/S out, LOC only and LOC B/C approaches, FLS data is only composed of the F-G/S beam.

● For ILS G/S OUT:

G/S..... DESELECT

Deselect the G/S on the RAD NAV page.

PROG page COMPLETE

- Insert the reference RWY threshold in the BRG/DIST field for position monitoring during approach.

GO AROUND STRATEGY..... REVIEW

- The briefing should include a review of the "Management of Degraded Navigation" chapter.

DESCENT

At 10 000 ft:

FLS CAPABILITY.....CHECK

- The FLS function may be used if the FLS capability is F-APP or F-APP + RAW

● For RNAV(GNSS) approaches:

FLS CAPABILITY..... CHECK F-APP

BARO REF SET/CROSSCHECK

- The vertical guidance requires a precise baro setting. The maximum acceptable discrepancy between altimeters is 100 ft.

CAUTION Obstacle clearance is not guaranteed if an erroneous BARO setting is selected, or if FLS guidance is used outside the published approach.

INITIAL/INTERMEDIATE/FINAL APPROACH

APPR pb on FCU PRESS

Press the APPR pb when all of the following is applicable:

- The aircraft is cleared for approach
- The aircraft is on the intercept trajectory for the final approach course.

This arms the **F-LOC** and **F-G/S** modes.

For ILS G/S OUT and LOC only approaches, this arms the **LOC** and **F-G/S** modes.

Note: In **NAV** mode, the aircraft may leave the F-PLN to capture the F-LOC.

F-LOC (LOC) CHECK ARMED

F-G/S CHECK ARMED

F-LOC (LOC CAPTURE) MONITOR

F-G/S CAPTURE MONITOR

GO AROUND ALTITUDE SET

Set the go-around altitude on the FCU.

F/GS INTERCEPTION FROM ABOVE

The following procedure must only be applied when established on the F-LOC (LOC) (LOC B/C) beam. The flight crew must react without delay in order to meet the stabilization criteria.

In order to achieve the best rate of descent, when cleared by ATC and below the limiting speeds the flight crew should lower the landing gear and select flaps as required (at least CONF 2 should be selected to ensure that the aircraft speed will not increase).

● If above the F-G/S beam:

APPR pb on FCU PRESS

F-LOC (LOC) (LOC B/C) CHECK ENGAGED

FCU ALTITUDE SET ABOVE A/C ALTITUDE

V/S MODE SELECT

- Select V/S -1 500 ft/min initially. V/S in excess of -2 000 ft/min will result in the speed increasing toward VFE.

- When reaching VFE, the AP maintains VFE and reduces the V/S without mode reversion.

FINAL APPROACH

FLIGHT PARAMETERS MONITOR

- Check altitude crossing at FAF as published on the chart
- If the FLS capability is F-APP + RAW, monitor raw data on conventional radio NAVAID approaches.
- The PM calls out if excessive deviation occurs:
 - F-LOC (LOC): ½ dot
 - F-G/S: ½ dot
- For additional information on the associated standard callouts, refer to PRO-NOR-SOP Standard Callout - Approach

AT ENTERED MINIMUM + 100 FT

ONE HUNDRED ABOVE MONITOR OR ANNOUNCE

AT ENTERED MINIMUM

MINIMUM..... MONITOR OR ANNOUNCE
Below minimum, the visual references must be the primary reference until landing.

● **If visual references are sufficient:**

CONTINUE, I HAVE CONTROL.....ANNOUNCE
At this point, P1 becomes PF in anticipation of landing.

When appropriate:

AP..... OFF
- *For Minimum Use Height of AP, refer to LIM-AFS Autopilot Function*

FD..... AS RQRD
- *The PF orders the PM to set both FDs OFF.*

● **If visual references are not sufficient:**

GO AROUND.....ANNOUNCE
- *Initiate a go around.*

MANAGEMENT OF DEGRADED NAVIGATION

● **For VOR, NDB, ILS G/S OUT, LOC ONLY approaches:**

- If the FLS capability downgrades to F-APP + RAW:

- The flight crew can continue to use FLS, provided that radio navaid raw data confirms that the lateral navigation is correct.
- Crosscheck distances vs altitudes as published on the charts.

- If the FLS capability downgrades to RAW ONLY:

- For VOR and NDB approaches, the flight crew must select the LS pb to OFF and revert to TRK-FPA guidance.
- For ILS G/S OUT, LOC ONLY approaches, the flight crew must disregard the F-G/S deviation and revert to vertical selected mode (the LOC deviation remains trustworthy). The flight crew can continue the approach with the localiser and altitude vs distance raw data.

● **For RNAV(GNSS) approaches with LNAV minima and LNAV/VNAV minima:**

- Use the appropriate remaining AP/FD in the following cases:

- **GPS PRIMARY LOST** on one ND
- **NAV ACCUR DOWNGRAD** on one FMGS.

- Discontinue the approach in the following cases, if external visual references are not sufficient to proceed visually:

- **F-APP capability lost**

- F-LOC deviation exceeds 1 dot
- NAV FM/GPS POS DISAGREE.

● **For RNAV(GNSS) approaches with LNAV/VNAV minima:**

- Discontinue the approach if the F-G/S deviation exceeds ½ dot below the F-G/S beam.

FCOM > Training Notes > Normal Procedures > Approach using FLS Function

APPROACH USING FLS FUNCTION

Applicable to: G-TTNV – G-TTSA, G-TNEA – G-TNEE

GENERAL

This chapter explains some of the specific details required to fly an approach using the FLS function. However, general recommendations mentioned in the aircraft configuration management and aircraft guidance management section apply.

Approaches based on both radio nav aids and RNAV(GNSS) with LNAV or LNAV/VNAV minima can be flown with the FMS Landing System (FLS) function.

For LOC G/S OUT, LOC ONLY and LOC B/C approaches, the lateral guidance remains based on the radio beam whilst the FLS function can guide the aircraft on the vertical path.

The FLS function may be used if:

- The FLS function is available
- The required FLS capability for the approach is available

FLS PRINCIPLE

GENERAL

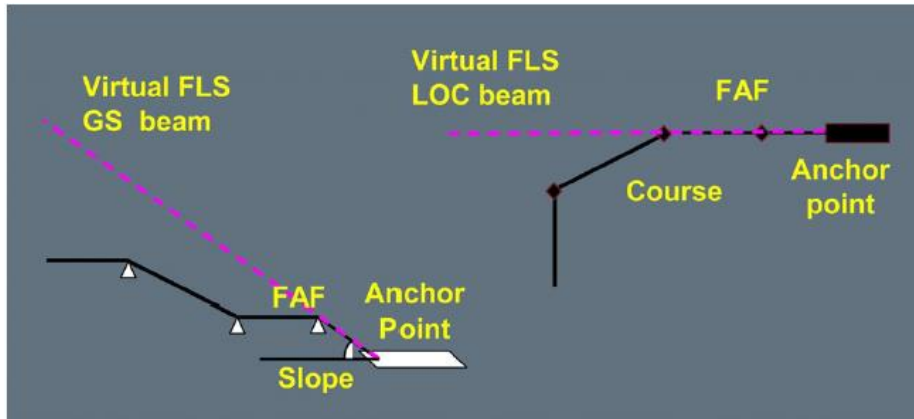
The FLS function allows flying a NPA “ILS alike”.

The FMS uses information from the Navigation Database to compute a virtual FLS beam. The FMS sends this FLS beam and the FM position to the Multi Mode Receiver (MMR).

The virtual FLS beam is characterized by:

- An anchor point (the anchor point ident is RWY if it is located on the runway threshold, or EP in other cases)
- A slope
- An approach course (shown as a double dagger on the PFD heading scale)

The final approach leg from the Navigation Database defines the course and slope of the FLS beam. On the ND, the FLS lateral beam is displayed as a magenta dotted line.



The MMR computes and displays the lateral and vertical angular deviations from this FLS virtual beam in the same way as for an ILS approach. These deviations are presented as double diamonds both on the PFD and ND. The FLS virtual beam may be flown with F-LOC and/or F-G/S AP/FD modes.





APPROACH CAPABILITY

The approach capability is displayed on the FMA when the LS pb is pressed. This approach capability helps the flight crew to determine their strategy.

- F-APP: FLS deviations and F-G/S, F-LOC guidance are reliable.
- F-APP + RAW: The flight crew can refer to FLS deviations but must cross check with navaid raw data, i.e. VOR, NDB and/or DME
- RAW ONLY: The flight crew must not use the FLS and must refer exclusively to navaid raw data, i.e. VOR, NDB and/or DME to perform the approach.

- Note:**
1. Any approach capability degradation on the FMA is accompanied by a triple click (as for ILS)
 2. The term RAW in F-APP + RAW and RAW ONLY refers to navaid raw data. It does not refer to an approach in FLS raw data (AP/FD OFF)
 3. In F-APP + RAW, the distance to be considered for the altitude/distance cross-check is the radio-computed distance on the ND and not the FMS computed distance (to anchor point) on the PFD.
 4. The flight crew must not fly RNAV approaches when the FLS capability is F-APP + RAW or RAW ONLY since no navaid raw data is available for these types of approach.

F-G/S DEVIATIONS REFERENCE

Unlike the ILS G/S, the F-G/S deviations are baro-referenced, i.e. at sea level a 1 hPa altimeter setting error moves the F-G/S vertical profile about 30 ft up or down. The crew should therefore pay particular attention to the altimeter setting and any altimeter setting change on the approach must be reflected both on the FCU and the MCDU PERF APPR page.

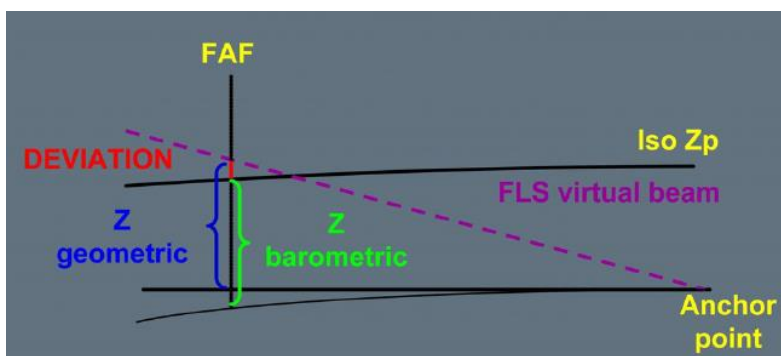
Whatever the altimeter reference used prior to or during the approach, i.e. STD, QNH or QFE (if installed), the virtual FLS G/S beam is always based on QNH. The QNH value used for the FLS beam is either:

- The QNH value entered on the PERF APPR page (whilst STD is used for baro ref)
- The QNH value entered on FCU (when QNH is used for baro ref)
- Computed from the QFE (if installed) set on the FCU and the runway elevation from the FM database (when QFE is used for baro ref)

When temperature is below ISA, the F-G/S deviations are temperature-corrected.

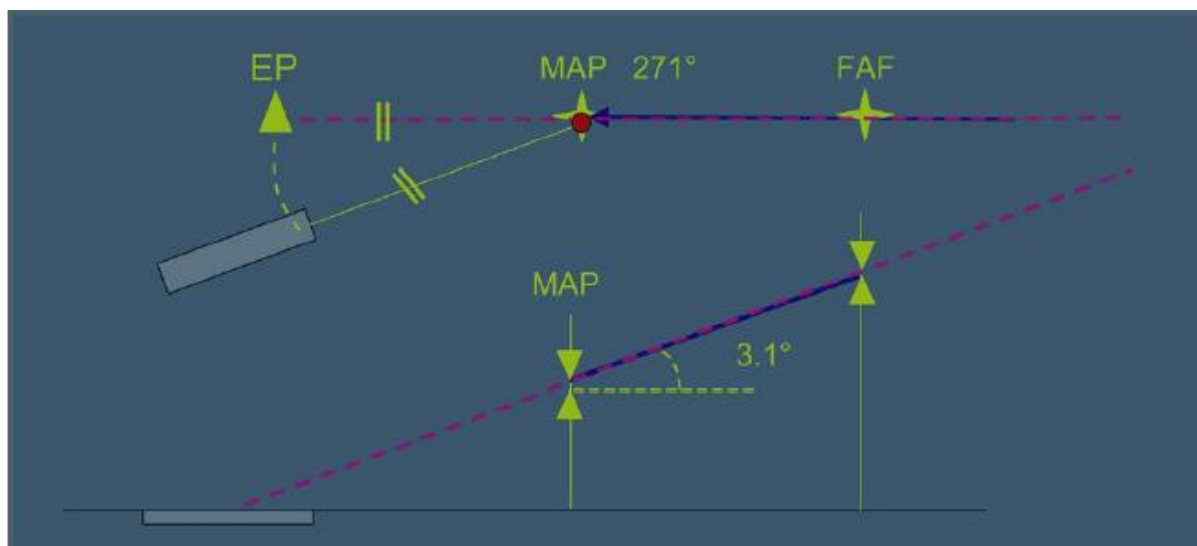
EARTH CURVATURE

For NPAs flown with the FLS function, the final path crossing altitudes are geometric altitudes referenced to the anchor point. When intercepting the final approach path, a slight altitude deviation between the altimeter and the published approach chart may be noticed due to the curvature of the Earth. Typically, at the FAF, the F-G/S virtual beam is about 50 ft higher than the chart.



OFFSET APPROACH

Depending on the approach procedure, the anchor point may be different from the runway threshold and may be located abeam this threshold. The anchor point ident is then EPXXX (e.g. EP33L).



- Down to minimum, the distance and slope information on the PFD are representative of distance and slope to the runway threshold.
- When flying the visual part of the approach, i.e. below the minimum:
 - The distance displayed on PFD is no longer representative of distance to the threshold (indeed, distance may increase as the aircraft is converging toward the runway threshold)
 - As the aircraft is leaving the F-LOC beam and turning toward the runway threshold, the F-G/S deviation becomes meaningless and must be disregarded. Therefore, the LS pb should be selected OFF at minimum.

FLS USE

All published NPA coded in the FM database may be flown using the FLS function provided:

- The offset between the final approach course and the runway course does not exceed 50°
- The approach capability is at least F-APP or F-APP + RAW

If the FLS function is not available due to the approach construction, a white MCDU message “NO FLS FOR THIS APPR” is displayed on the scratchpad when selecting the NPA. If a system failure affects the FLS capability, the ECAM STATUS page displays the FLS capability even before the LS pb is pressed.

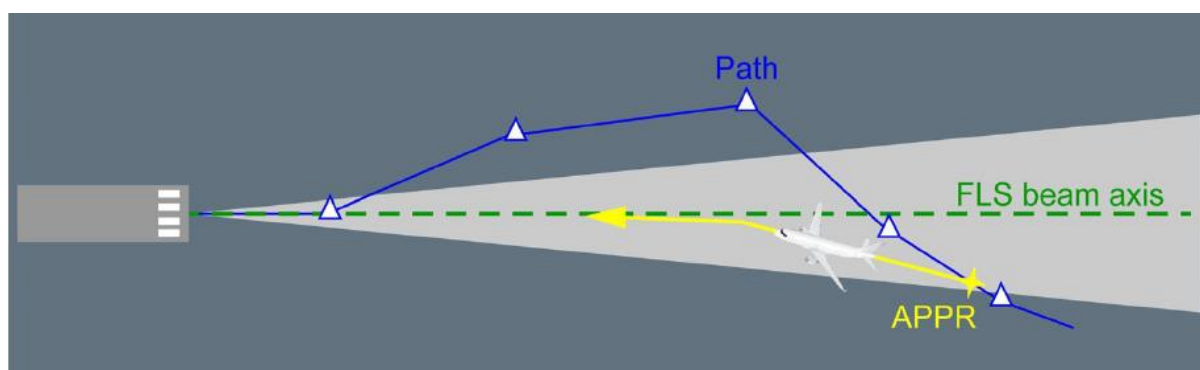
INTERCEPTION OF THE FINAL APPROACH COURSE

The FLS virtual beam is displayed in magenta and is 80 NM long. It can be intercepted at any point along the magenta line.

When cleared for interception of the final approach course and on an intercept trajectory for the final approach course, the flight crew press the APPR pb on the FCU. Check F-G/S and F-LOC become armed on the FMA.

WARNING Obstacle clearance is not guaranteed if FLS guidance is used outside the published approach.

Example of APPR pb selection that leads the aircraft to fly outside the published approach:



INTERCEPTION OF THE FINAL VERTICAL LEG

When the aircraft reaches the FDP, the crew must check that F-G/S is engaged.

As with an ILS, when passing the FDP the crew must check the altitude and location of the FDP via an altitude/distance check.

When the FLS capability is F-APP + RAW, the crew must monitor the final approach using FLS deviations and cross-check with navaid raw data, i.e. VOR, NDB and/or DME (needles, distance and altitude).

GLIDE SLOPE INTERCEPTION FROM ABOVE

The following procedure must only be applied when established on the localiser (F-LOC). There are a number of factors which might lead to a glide slope interception from above. In such a case, the crew must react without delay to meet the stabilization criteria.

In order to get the best rate of descent, when cleared by ATC and below the limiting speeds the landing gear should be lowered and at least CONF 2 selected to ensure that the aircraft speed will not increase. Speedbrakes may also be used.

When cleared to intercept the glideslope, the flight crew should:

- Press the APPR pb on FCU and confirm F-G/S is armed and F-LOC (LOC) (LOC B/C) engaged
- Select the FCU altitude above aircraft altitude to avoid unwanted ALT* engagement
- Select V/S 1 500 ft/min initially. V/S in excess of 2 000 ft/min will result in the speed increasing toward VFE.

The use of V/S mode ensures that the A/THR is in SPEED mode.

The flight crew must carefully monitor the rate of descent to avoid exceeding VFE. When approaching the F-G/S path, F-G/S* will engage. The flight crew should monitor the F-G/S capture with raw data (pitch and F-G/S deviation). The go-around altitude should be set on the FCU at F-G/S*.

REACHING MINIMA

The applicable minima are those associated with the approach chart.

When the aircraft reaches the minima, the PF either monitors or announces "MINIMUM".

The current altitude value becomes amber.

■ **If the appropriate visual conditions are met at minima:**

The flight crew can continue the approach visually.

• **Below minima:**

When the FLS is used for approach, the FDs provide lateral and vertical managed guidance down to the anchor point. The flight crew can keep the AP/FD engaged below minima.

Keeping the AP/FD below minima when visual references are acquired is highly valuable in the following conditions:

- High minima above ground level
- Marginal weather conditions

However, the guidance may not be relevant especially in the following circumstances:

- Missed Approach Point not at the RWY threshold and final segment not aligned with the runway track
- Large offset between final segment and runway track.

In such cases the AP/FD should be switched off and TRK/FPA (bird) flying reference may be used.

• **At the minimum use height of the AP:**

The AP must be disconnected now later than the Minimum Use Height of AP (Refer to [LIM-AFS-Autopilot Function](#)). Switching off FDs and use of TRK/FPA (bird) is at pilot discretion.

CAUTION

- Below minima, the visual references must be the primary references until landing
- From minima the FD provides additional guidance. The FD must be switched off if the guidance is not relevant or not followed.

■ **If the appropriate visual conditions are not met at minima:**

A missed approach must be initiated.

LOC ONLY, ILS G/S OUT, LOC B/C APPROACH

LOC ONLY, LOC B/C and LOC G/S OUT approaches may be flown using the LOC radio beam signal for lateral navigation and FMS computed F-G/S for vertical guidance.

APPROACH PREPARATION

LOC ONLY APPROACH

The flight crew selects the LOC approach as required in the FMS during the approach preparation.

LOC B/C APPROACH

Back course localizer (LOC B/C) approach must be flown using TRK FPA mode.

LOC GS OUT APPROACH

The flight crew selects the ILS approach in the FMS during the approach preparation. As the G/S deviations and guidance modes are not available, the vertical FLS deviation (double diamond) and mode (F-G/S) may be made available by deselecting the G/S. To deselect the G/S, the flight crew should press the "DESELECT*" prompt on the MCDU RAD NAV page.

DESCENT (CROSSING FL100)

When the flight crew presses the ILS/LS pb they should check:

- FLS approach capability (addresses only the vertical mode)
- The LOC (or LOC B/C) deviation is displayed as single diamond (radio data)
- The F-G/S deviation is displayed as a double diamond (FM computed data)
- The LOC IDENT, frequency and DME distance.



INTERMEDIATE APPROACH

The flight crew presses the APPR pb on the FCU when cleared for approach, and on the intercept trajectory for the final approach course. The flight crew monitors that the LOC (or LOC B/C) and F-G/S mode arm.

FINAL APPROACH

- **If the approach capability reverts to F-APP+ RAW:**
The lateral navigation (LOC or LOC B/C deviations) remains reliable
The vertical navigation (F-G/S deviations) must be crosschecked with navaid raw data (distance/altitude).
- **If the approach capability reverts to RAW ONLY:**
The F-G/S vertical deviation remains but must be disregarded.
The flight crew will select the bird and select a Flight Path Angle. This will disengage the F-G/S mode.

COLD WEATHER OPERATIONS

The virtual FLS beam is corrected for temperature below ISA thanks to the airport temperature entered in the MCDU PERF APPR page. The F-G/S deviations and the managed vertical mode F-G/S can therefore be used whatever the outside temperature.

The altitude corrections for cold weather operation should still be applied:

- During approach, before being established on the F-G/S beam
- When the FLS capability is F-APP+RAW or RAW ONLY, for the altitude/distance check
- On the value of the minima entered in the MCDU.

Refer to OM A for further Cold Weather Operations guidance.

Use of Normal Checklists

The following section is added to the Training Notes section in order to provide clarity about how the checklist is used, the correct responses, which items are checked before responding and where (e.g. which display) these items must be checked.

FCOM > Training Notes > Normal Procedures > Use of Normal Checklist

USE OF NORMAL CHECKLIST

Applicable to: ALL

Airbus' NORMAL CHECKLIST takes into account ECAM information, and includes only those items that can directly impact flight safety and efficiency, if actions are not correctly performed. These checklists are of a "non-action" type (i.e. all actions should be completed from memory before the flight crew performs the checklist).

The NORMAL CHECKLIST includes 9 flight phases. The BEFORE START, BEFORE TAKEOFF, AFTER TAKEOFF and APPROACH checklists are divided in two sections: The "Down to the Line" section, and the "Below the Line" section. This format is designed to help flight crew manage the workload.

The Pilot Flying (PF) requests the NORMAL CHECKLIST, and the Pilot Monitoring (PM) reads it. The checklist actions are referred to as "challenge/response"-type actions. The PF "responds" to the "challenge" only after checking the current status of the aircraft in a considered and deliberate manner.

Level 2 information is provided to detail the intent of the checklist item and/or which cockpit display/panel to check.

If the configuration does not correspond to the checklist response, the PF must:

- Stop the checklist;
- Take corrective action before "responding" to the "challenge";
- Continue the checklist.

If it becomes apparent that an entire procedure was not done:

- Stop the checklist;
- Complete the entire procedure;
- Do the checklist from the start.

The PF may request that action is performed by the PM depending on the situation. If corrective action is not possible, then the PF must modify the response to reflect the real situation (with a specific answer). When necessary, the other flight crewmember must crosscheck the validity of the response. The challenger (PM) waits for a response before proceeding with the checklist.

For the checklist items that are identified with (___), the response should correspond to the real condition or configuration of the system.

Normal Checklists should be initiated in a timely manner during low-workload periods to prevent unconscious completion, rushing or interruption that could defeat the safety purpose of the Normal Checklists.

Note: The QRH Normal Procedures defines the latest point by which each Normal Checklist must be initiated.

Critical items require response by the PF. These are indicated by an solid line:

CHALLENGE _____ RESPONSE

Some less critical items may be both challenged and responded to by the PM alone. These are indicated by a dotted line:

CHALLENGE RESPONSE

The PM must announce "XXX CHECKLIST COMPLETED", after reading and completing the checklist.

BEFORE START

Applicable to: ALL

COCKPIT PREP _____ COMPLETED (BOTH)
Confirms PRELIMINARY COCKPIT PREP, EXT WALKROUND and COCKPIT PREP procedures have been completed.

BARO REF _____ (____) SET (BOTH)
Confirm that the correct QNH is set (both PFDs and the Standby Altimeter – PF/PM States Value), and altitude is in limits w.r.t airfield/apron elevation (PFD/STBY ALT).

ACARS _____ INITIALISED
Confirms that Merlin ACARS has been initialised and armed to start recording the flight.

PARK BRAKE _____ ON
Check yellow pressure applied to the left and right brakes and ACCU PR is in green band (BRAKES Indicator).

FOB _____ (____)kg
Confirms the FOB Procedure has been completed and the Fuel On Board is sufficient for the intended flight (E/WD – PF states FOB Value).

[A318 only] FUEL X FEED _____ CHECKED
Confirm the fuel cross-feed valve has been tested and is now closed (OVERHEAD PANEL).

INIT B _____ LOADED
Confirms that the FMGS CRITICAL DATA ENTRY PROCEDURE has been complete and that ZFW, ZFWCG and FOB have been entered (PF INIT B).

FLEX TEMP _____ (____)
Confirm that a valid FLEX temperature (if required) has been entered (PERF TO - PF States Value). State "TOGA" if FLEX Takeoff not possible.

SPEEDS _____ (____)
Confirms that the FMGS CRITICAL DATA ENTRY PROCEDURE has been complete and VALID SPEEDS have been entered (PERF TO). PF States V1/VR/V2 and Grn Dot.

START CLEARANCE

SIGNS _____ ON & AUTO

Confirm that SEAT BELT and NO SMOKING signs are ON and AUTO (Sw ' s and EWD MEMO)

BEACON _____ ON

Confirm that BEACON is ON (Overhead Panel)

ATC _____ AUTO or XPDR

Confirm that ATC is in AUTO (or XPDR) (TCAS/ATC panel)

N WHEEL STEERG DISC _____ AS RQRD

Confirm that NW STRG DISC is displayed, if required for push back (EWD MEMO)

(PF States DISCONNECTED or NOT RQRD)

WINDOWS and DOORS _____ CLOSED (BOTH)

Confirm that both sliding windows are closed and locked (WINDOW CONTROL HANDLE) and all aircraft external doors are closed (DOOR/OXY SD).

FLT DECK DOOR _____ LOCKED

Confirm FLT DECK Door is locked and No FAULT LT (PEDESTAL)

AFTER START

Applicable to: ALL

GROUND CREW CLEARANCE _____ SEEN

Confirm all personnel and ground equipment are clear and hand signal received.

ANTI ICE _____ (____)

Confirm required Engine(s) (OVERHEAD PNL) and/or Wing anti ice is selected (if required) (EWD MEMO)

FLAPS _____ CONF (____) (BOTH)

Confirm that the FLAPS position (EWD - PF states with colour) corresponds to the intended position (PERF TO - PM states with colour).

APU _____ (____)

Confirm APU MASTER Sw is in the required position (OVERHEAD Panel)

Y ELEC PUMP _____ (____)

Confirm Y ELEC Pump Pb in in the correct position (OVERHEAD Panel)

ECAM STATUS _____ CHECKED

If STS reminder is displayed (EWD), PM depresses STS Pb (ECAM CTL PNL) and PF reviews the ECAM STATUS page.

BEFORE TAKEOFF

Applicable to: ALL

FLIGHT CONTROLS _____ CHECKED (BOTH)

Confirms FLT CTL check procedure has been completed

TCAS TA/RA or TFC

PM Confirms TA/RA or TFC (ATC/TCAS Panel). (PF reviews TA ONLY displayed on ND).

LOADSHEET ACK'D

Confirms the LATE CLOSEOUT PROCEDURE has been completed and that the GW Cx (SD Vs Final Loadsheets) has been completed AFTER any REVISIONS have been entered.

TRIMS (____)% & ZERO

PM confirms Takeoff CG is set (PITCH TRIM wheel - PM States value) and in green band, and Rudder Trim is zero (PEDESTAL - PM States).

DEPARTURE BRIEF _____ CONFIRMED

Confirm Departure Brief has been verbalised or, if any changes, restated.

TO DATA _____ (____) (BOTH)

PM states the RWY and SHIFT (PERF TO).

PF verifies that this is valid and appropriate for the cleared takeoff point and responds with the Runway and the Intersection observed outside the aircraft.

PF states the Speeds & FMAs (PFD) and the FLX/TOGA with Value (EWD).

FLAPS _____ CONF (____) (BOTH)

Confirm that the FLAPS position (EWD - PF states with colour) corresponds to the intended position (PERF TO - PM states with colour).

CABIN REPORT (BLACK)

Confirm cabin report is received for Takeoff (CDSS) (Not RQRD for CSF aircraft)

ECAM MEMO _____ T.O NO BLUE

PM depresses the TO Pb (ECAM CTL PNL), PF Reviews the TO MEMO and assures no blue

ENTERING RUNWAY

TAKEOFF RWY _____ (____) (BOTH)

Confirm the aircraft is entering the correct RWY (Signage, RWY markings)

CABIN CREW SIGNAL GIVEN

Confirm CABIN CREW signal was given

PACKS (____)

Check Packs are ON or OFF as required (OVERHEAD Panel)

AFTER TAKEOFF/CLIMB

Applicable to: ALL

L/G _____ UP
Confirm that the landing gear is retracted (lights extinguished on LDG GEAR Indicator panel).

ECAM _____ CHECKED
Check the ECAM Memos are as desired (E/WD)

STD SET

BARO REF _____ () (BOTH)
Confirm that STD is set (both PFDs - PF/PM State Value).

APPROACH

Applicable to: ALL

ECAM STATUS _____ CHECKED

If there is a status reminder, check the aircraft STATUS.
Take particular note of any degradation in landing capability, or any other aspect affecting the approach and landing.

APPROACH BRIEF _____ (APPR/RWY) CONFIRMED
Confirm the ATC cleared approach and runway is correct (ND - PF States APPR and RWY).

MINIMA _____ () BARO/RADIO SET (BOTH)
Confirm applicable minima (PFD - PF/PM State value).

APPROACH PHASE _____ ACTIVE
Confirm that approach phase has been activated (PERF APPR).

QNH SET

BARO REF _____ () (BOTH)
Confirm that the correct QNH is set (both PFDs and the Standby Altimeter - PF/PM State value).

LANDING

Applicable to: ALL

CABIN REPORT (WHITE)
Confirm cabin report is received for Landing (CDSS) (Not RQRD for CSF aircraft)

AUTOBRAKE _____ ()
Check selected Autobrake mode is ON (WHEEL SD page - PF States Selection or NOT RQRD).

ECAM MEMO _____ LDG NO BLUE
Review the LDG MEMO and assure no blue (EWD)

AFTER LANDING

Applicable to: ALL

EXTERIOR LIGHTS..... SET
Check STROBE Sw, LDG LT Sw are OFF and TAXI LT Sw and RWY TURN OFF LT Sw are ON or AS RQRD

FLAPS..... ZERO
Confirm Flaps at Zero (EWD).

GROUND SPOILERS..... DISARM
Confirm Spoilers retracted (ECAM MEMO - EWD)

APU..... START/AS RQRD
Confirm APU MASTER Sw ON and APU START ON (OVERHEAD Panel). With SETWA capability consider delaying APU start.

RADAR/PWS OFF
Check Radar OFF (ND - No Wx Radar Indications) and PWS OFF (EWD MEMO - PRED W/S OFF Amber)

TCASSTBY
Confirm TCAS is STANDBY (EWD Memo)

Consider ONE ENGINE TAXI ARRIVAL

PARKING

Applicable to: ALL

PARK BRK ON
Confirm yellow pressure applied to the left and right brakes and ACCU PR is in green band (BRAKES Indicator).

ENGINES OFF
Check fuel flow zero (EWD).

SLIDES DISARMED
Confirm slides disarmed (DOORS SD)

BEACON OFF
Confirm that BEACON is OFF (OVERHEAD Panel)

SEAT BELTS OFF
Confirm SEAT BELTS OFF (EWD)

FUEL PUMPS OFF
Confirm all FUEL PUMP Pbs are OFF (OVERHEAD Panel)

ATCx000/STBY
Confirm ATC Code Display is X000 and Mode Sel STBY (TCAS/ATC Panel)

Consider HEAVY RAIN

SECURE

Applicable to: ALL

ADIRS..... OFF

Confirm IR Mode rotary Sel for IR 1, 2, 3 are OFF (OVERHEAD Panel)

EXTERNAL POWERON

Confirm EXT PWR Pb is selected to ON (OVERHEAD Panel)

SIGNS..... OFF

Confirm SEAT BELTS and NO SMOKING Sign are OFF (OVERHEAD Panel)

EMER EXIT LT OFF

Confirm EMER EXIT LT Selector is OFF (OVERHEAD Panel)

OXYGEN..... OFF

Confirm CREW SUPPLY Pb is OFF (OVERHEAD Panel)

BATTERIES..... OFF

Confirm both BATTERY Pbs are OFF (OVERHEAD Panel)

Consider COLD WEATHER

Rejected Takeoff

The following is added to the Training Notes section to provide detail and guidance regarding the Rejected Takeoff procedure, task-sharing and decision-making process.

FCOM > Training Notes > Abnormal and Emergency Procedures > Rejected Takeoff

REJECTED TAKEOFF

Applicable to: ALL

FACTORS AFFECTING THE REJECTED TAKEOFF (RTO)

Experience has shown that rejected takeoffs, particularly at high speed, can be hazardous even if the correct procedures are followed.

Some factors which can detract from a successful rejected takeoff include:

- Tyre damage
- Worn or malfunctioning brakes
- Brakes not fully applied
- Error in gross weight determination
- Incorrect performance calculations
- Incorrect runway line-up technique
- Initial brake temperature
- Delay in initiating the stopping procedure
- Runway friction coefficient lower than expected

Thorough pre-flight preparation and exterior inspection can eliminate the effect of some of these factors.

During the taxi out, the takeoff briefing should be confirmed. Any change to the planned conditions requires the takeoff data to be re-calculated. In this instance, the crew should resist pressure to accept a takeoff clearance before being fully ready. Similarly, the crew should not accept an intersection takeoff until the takeoff performance has been checked.

The line-up technique is very important. The pilot should use the over-steer technique to minimise field length loss and consequently to maximise the acceleration-stop distance available.

DECISION MAKING

The decision to reject the takeoff is made by the Captain, although F/O's may call STOP in certain circumstances. The stop action is performed by PF.

A rejected takeoff is a potentially hazardous manoeuvre and the time for decision making is limited. It is not possible to list all the factors that could lead to a decision to reject the takeoff. However, in order to help the Captain make a decision, the ECAM inhibits warnings that are not essential from 80 kt to 1 500 ft or 2 min after lift-off, whichever occurs first. Therefore, any warning received during this period must be regarded as significant.

SPEED CONSIDERATIONS

To assist in the decision making process, the takeoff is divided into low and high speed regimes, with 100 kt being chosen as the dividing line. The speed of 100 kt is not in itself critical, but was chosen in order to help the Captain make the decision and to avoid unnecessary stops from high speed.

- **Below 100 kt:**
The decision to reject the takeoff may be taken at the Captain's discretion
The Captain should seriously consider discontinuing the takeoff if any ECAM warning/caution is activated.
- **Above 100 kt, and below V1:**
Rejecting the takeoff at these speeds is a more serious matter, particularly if braking action is degraded.

It could lead to a hazardous situation if the speed is approaching V1. At these speeds, the Captain should be 'go minded' and very few situations should lead to the decision to reject the takeoff:

1. Fire warning or severe damage
2. Sudden loss of engine thrust
3. Malfunctions or conditions that give unambiguous indications that the aircraft will not fly safely
4. If any ECAM alert is triggered.

Exceeding the EGT red line or nose gear vibration should not result in the decision to reject the takeoff above 100 kt. In the event of tyre failure between V1 – 20 kt and V1, unless debris from the tyres has caused serious engine anomalies it is far better to get airborne, reduce fuel load and land with a full runway length available.

The V1 call takes precedence over any other call.

• **Above V1:**

The takeoff must be continued, since it may not be possible to stop the aircraft on the remaining runway.

DECISION CALLOUTS

If a malfunction occurs before V1 for which the Captain does not intend to reject the takeoff, the Captain will announce their intention by calling "CONTINUE".

If a decision is made to reject the takeoff, the Captain calls "STOP".

The First Officer should also call "STOP" at any speed in the following circumstances:

- Fire warning or severe damage
- Sudden loss of engine thrust

When the First Officer is handling the take-off, they may also call "STOP" for a significant handling difficulty or a blocked runway.

Above 100 kt the First Officer may also call "STOP":

- If an ECAM alert is triggered.

RTO TECHNIQUE

If an RTO procedure is initiated, the following task sharing shall be applied:

PF	PM
"STOP"	ANNOUNCE
Simultaneously: THRUST LEVERS IDLE REVERSE THRUST MAX AVAIL ⁽¹⁾	REVERSERS CHECK/ANNOUNCE DECELERATION CHECK/ANNOUNCE ⁽²⁾ AUTOBRAKE MONITOR ANY AUDIO CANCEL
<u>Aircraft stopped</u> Consider positioning the aircraft to keep any possible fire away from the fuselage. REVERSERS STOWED PARKING BRAKE ON Set parking brake ON after aircraft stops.	
CAPT	F/O
"Attention Crew, At Stations" ANNOUNCE ECAM ACTIONS ORDER The aircraft should remain stationary while the crew	ECAM ACTIONS PERFORM

evaluates the situation. ATC..... NOTIFY	EMER EVAC PROCEDURE LOCATE
EVACUATION PHASE • If required: EMER EVAC Procedure ORDER ATC..... NOTIFY <i>Inform ATC of the intention and the required assistance</i>	EMER EVAC ProcedureAPPLY

(1): Full reverse may be used until the aircraft is fully stopped. However, if there is enough runway available at the end of the deceleration, reverse thrust should be reduced when passing 70 kt.

(2): Annunciation of the deceleration means that the flight crew feels the deceleration and confirms it by the speed trend indicator on the PFD. If the autobrake is on, the DECEL light may illuminate when the actual deceleration is 80% of the selected rate. However, the DECEL light is not an indicator of proper autobrake operation and is not a criteria to confirm the deceleration. For example, the DECEL light may not appear on a contaminated runway with the autobrake working properly due to the effect of the antiskid.

- If a rejected takeoff is initiated and A/BRK MAX decelerates the aircraft, PF must avoid pressing the pedals (which may be a reflex action).
- If the autobrake is inoperative of the takeoff is rejected prior to 72 kt (autobrake not active and no spoiler deployment) PF simultaneously reduces thrust and applies maximum pressure on both pedals. The aircraft will only stop in the minimum distance if the brake pedals are maintained fully pressed until the aircraft comes to a stop.
- If the brake response does not seem appropriate for the runway condition, full manual braking should be applied and maintained. If the flight crew has any doubt, they must take over manually.
- If normal braking is inoperative, the flight crew should immediately apply the [MEM] **LOSS OF BRAKING** memory items.

After a rejected takeoff, if the aircraft stops using A/BRK MAX the flight crew must disarm the ground spoilers in order to release the brakes before taxiing.

Do not attempt to vacate the runway until it is absolutely clear that an evacuation is not necessary and it is safe to do so.

TAKEOFF FOLLOWING RTO

Depending on the technical condition of the aircraft and the reason for the RTO (e.g. ATC instruction) the flight crew may consider a new takeoff attempt subsequent to the RTO.

In this case the flight crew should:

- Reset both FDs and set FCU
- Restart Standard Operating Procedures from the AFTER START checklist.

One Engine Taxi Departure

For CEO aircraft, the X-BLEED is to remain closed to avoid inhibiting BLEED LEAK ECAM cautions.

In addition, when conducting a One Engine Taxi Departure, the Engine 2 Start and After Start procedures are to be completed by read and do reference to the QRH One Engine Taxi Departure Aide-Memoire, which has been [published in Docstore](#). The procedure is completed by PM, though PF will confirm THR LEVER 2.... IDLE.

FCOM > Supplementary Procedures > PRO-SUP-93 Green Operating Procedures > One Engine Taxi
{Unchanged}

ENGINE 1 START

Use Engine 1 for taxiing because it pressurizes the green hydraulic system, providing normal braking.

AFTER START

Apply the normal "AFTER START" procedures, but:

- Keep the APU running and switch the APU BLEED to OFF.
The APU generator provides power to the engine fire extinguisher, prevents electrical transients and enables galley operation. Closing the APU BLEED prevents engine exhaust gases ingestion in the air conditioning system.
- Do not open the X-BLEED to prevent inhibition of BLEED LEAK ECAM cautions
- Delay the wing anti-ice setting until all engines are started.

Note: CAT 3 DUAL INOP will be displayed on the STS PAGE with only ENG 1 running.

Note: With the exception of the above items, the full normal "AFTER START" procedure is followed including the selection of takeoff flap.

Packs Off Takeoff

For CEO aircraft, the advice to turn Packs OFF for fuel saving is removed due to excessive bleed valve wear. This does not apply to NEO aircraft.

FCOM > Supplementary Procedures > PRO-SUP-93 Green Operating Procedures > Before Takeoff

BEFORE TAKEOFF

Applicable to: A320NEO and A321NEO

AIR CONDITIONING

PACK 1+2 OFF

Before takeoff, the flight crew can select both packs to OFF, in order to reduce fuel consumption.

During flexible takeoff, the selection of packs to OFF reduces takeoff EGT and therefore maintenance costs.

Applicable to: A319, A320CEO and A321CEO

AIR CONDITIONING

Before takeoff, the flight crew can set both packs to OFF for performance requirements only. Packs should not be set to OFF purely for fuel saving reasons due to excessive Bleed Valve wear.