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NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Attachment 10 - UPS Pilot Training Guide
(32 Pages)

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

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Attachment 10 – UPS Pilot Training Guide

OPERATIONAL FACTORS

DCA13MA133

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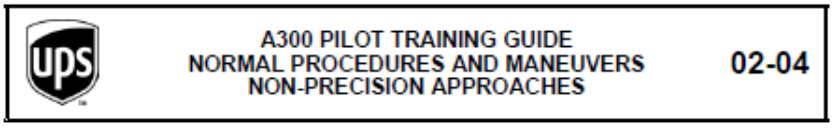
UPS PILOT TRAINING GUIDE[1]

Normal Procedures and Maneuvers – Non-precision Approaches



A300 PILOT TRAINING GUIDE
NORMAL PROCEDURES AND MANEUVERS
NON-PRECISION APPROACHES 02-04

02.04.01 NON-PRECISION APPROACHES

02.04.01.01 GENERAL

Executing a non-precision instrument approach is one of the most demanding tasks placed on the flight crew. The safe execution of non-precision approaches places increased challenges on the aircrew in the areas of:

- Strategy and decision making
- Crew coordination (monitoring and callouts)
- CFIT awareness (responses)

Non-precision approaches may be flown either using VNAV guidance (Profile Approach Mode) or a conventional manner using Vertical Speed (V/S Approaches). If available, a Profile Approach is highly recommended over a V/S approach due to having VNAV guidance.

Most CFIT incidents and accidents occur during step-down non-precision approaches. A Mitre Corporation study finds that step-down non-precision approaches account for less than 5% of the total number of approaches flown by U.S. air carriers yet the accident rate is five times higher than precision approaches. The infrequent need to execute these types of approaches in IFR conditions and the fact that the aircraft is not only in a critical phase of flight, but a much greater demand is placed on the crew's coordination, piloting skills and ability to manage all available cockpit resources are reasons for a much higher accident rate for step-down non-precision approaches. VNAV approaches eliminate the "dive and drive" aspect of non-precision approaches. VNAV, with its defined vertical path and specified vertical angle, provides vertical guidance enabling a constant rate-of-descent for the final approach segment, much like a precision approach.

02.04.01.02 DEFINITION

A non-precision approach is any instrument approach that does not incorporate ground-based vertical guidance. The NavAid used for the approach provides lateral guidance only. These NavAids include: NDB, VOR, LOC - only, VOR-DME, LOC-DME, LOC BCK CRS and GPS LDA.

NOTE: UPS A300s are not authorized to conduct NDB or LOC BCK CRS or ADF approaches.

Non-precision approaches usually consist of three approach segments:

- Initial approach:
  - From the IAF to the Intermediate Fix (IF), if defined
  - Minimum 1000 feet obstacle clearance
- Intermediate approach:
  - From the IF to the FAF

[1] Source: UPS A300 Pilot Training Guide.

- Minimum 500 feet obstacle clearance

The intermediate approach is a transition segment during which time the aircraft is configured for the final approach:

- Landing Gear extended
- Landing Flaps
- Speed stabilized at V_{APP}
- Aircraft aligned with the final approach course
- APP briefings and Landing checklist complete
- Final Approach:
  - From the FAF to Missed Approach Point (MAP)
  - Minimum 250 feet obstacle clearance

02.04.02 PROFILE NON-PRECISION APPROACHES

02.04.02.01 BAROMETRIC VNAV CONCEPT

Barometric Vertical Navigation is a function provided by the FMC. The A300 FMC provides two VNAV functions: one used during enroute and terminal area operations, called Profile Performance Descent mode and the other to be used during non-precision approaches, called Profile Final Approach Mode.

Profile Performance Descent mode computes a geometric path from an altitude constraint backwards to cruise altitude, resulting in a FMC calculated Top-of-Descent point. This concept is most often used when planning a descent from cruise altitude.

It can also calculate a geometric path between altitude constraints defined at two waypoints in the FMC flight plan. This concept is often used when meeting crossing restrictions on a STAR.

Profile Final Approach mode operates using an entirely different concept from Performance Descent mode. Final Approach mode computes a geometric path of fixed angle from a single reference waypoint (usually the Threshold Crossing Height) extending infinitely upward. The Profile Approach VNAV path is independent of all FMC altitude constraints and the MCP altitude window. Profile Final Approach mode is only used to provide vertical guidance during approach and must be explicitly activated by the flight crew.

COMPARISON OF FMC VNAV MODES	
PERFORMANCE DESCENT MODE	FINAL APPROACH MODE
Computed path between vertical constraints.	Constant angle vertical path from a single fixed point. (Usually the TCH).
Speed managed by FMC or entered by crew on TACT MODE page.	V_{APP} speed default by FMC or entered by crew on APPROACH page.
Respects (maintains) altitude set in MCP altitude window.	Disregards altitude set in MCP altitude window.
VDI on ND: 1 dot = 200 feet.	VDI on ND: 1 dot = 100 feet.
Default Profile mode function.	Requires explicit activation by crew on APPROACH page.
VNAV path automatically recomputed after insertion of new approach.	Final Approach mode is cancelled after insertion of a new approach.

02.04.02.02 FINAL APPROACH MODE

Final Approach mode computes a geometric VNAV path a fixed angle from a single reference point and extending infinitely upward. The VNAV path begins at the Threshold Crossing Height (TCH) over the runway threshold and projects back infinitely at a constant angle. The Vertical Path Angle (VPA) is hard coded into the NAV database, is unique to each approach procedure and cannot be modified by the flight crew. The Profile Final Approach Mode vertical path is independent of F-PLN page vertical constraints and from an operational perspective, is very much like an ILS glideslope. However, since the VNAV path is computed from barometric altitude, altimeter setting and extremely cold temperatures can affect the actual vertical path (unlike an ILS).

Unlike Performance Descent mode, Profile Final Approach mode does not respect the MCP ALT window. When Final Approach mode is activated and Profile is the selected mode, the aircraft will intercept and fly the VNAV path regardless of the altitude set in the MCP window.

02.04.02.03 USE OF PROFILE TO FLY VNAV PATH

Profile mode is the AFDS mode used to fly the VNAV path computed by the FMC while in Final Approach mode. Profile mode is authorized for use to fly the VNAV path down to a barometric Decision Altitude or a Derived Decision Altitude, as applicable, after Final Approach mode is activated by the flight crew. An Autopilot or Flight Director is required to fly Profile Approaches.

02.04.03 VNAV APPROACH CONSIDERATIONS

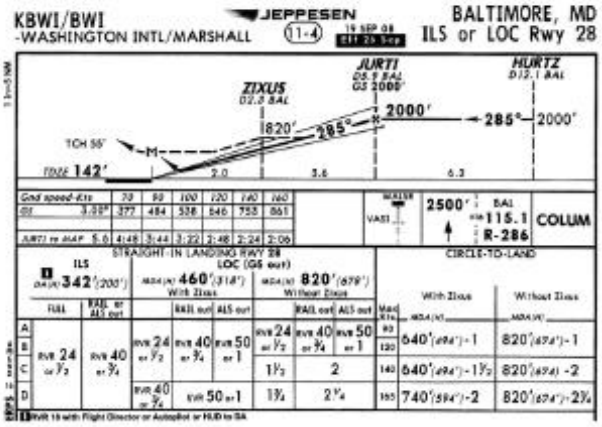
02.04.03.01 STEP DOWN FIXES INSIDE OF THE FAF

Some non-precision approaches include one or more step down fixes inside the FAF with minimum crossing altitudes. Step-down fixes must always be respected, even when flying a VNAV path. The VNAV path published on Jeppesen charts and contained in the FMC NAV database is designed

to clear all step-down fixes inside the FAF. However, flight crews must still monitor the crossing restriction as a back-up to ensure the minimum altitude is respected. The VNAV path is not designed to clear step-down fixes in the initial and intermediate approach segments. Compliance with step-down fixes in the initial and intermediate segments remains the responsibility of the air crew.

Although a Profile approach may look and feel very similar to an ILS approach, it is still a Non-Precision Approach (NPA) and must meet all NPA restrictions. Any NPA flown in Profile must clear all step-down restrictions beyond the FAF. If the depicted glideslope does not clear all step-down altitudes inside the FAF, a V/S approach must be flown. For example, BWI ILS28 GS-out, would have to be flown in V/S to an MDA of 460 feet, ensuring ZIXUS is crossed at or above 820 feet (see diagram below).

However, even if the glide path depiction clears all step-down fixes inside the FAF and the approach is flown in Profile, the crew is still responsible to monitor the step-downs and intervene if necessary.



NOTE: Step-down fixes should be identified using DME from depicted approach NavAids. Along Track Distance (ATD) to the Rwy waypoint is permitted on RNAV (GPS) approaches only.

02.04.03.02 BAROMETRIC DECISION ALTITUDE

Flying non-precision approaches using a VNAV path allows the aircraft to maintain a constant-rate/constant angle flight path down to the MDA. Because the VPA is very close to the normal glide path the aircraft would maintain while flying an ILS or visual approach, the aircraft

reaches the MDA at the point that has been conventionally referred to as a visual descent point. Operationally, the point where the aircraft reaches the MDA on the VNAV path is very similar to the Decision Altitude (DA) used for ILS approaches. The FAA has recognized this similarity and has applied the Barometric (Baro) DA to some VNAV approaches. On non-precision approaches where a DA is authorized, the aircraft reaches the DA on the VNAV path and the flight crew makes the decision to continue the descent if required visual references are available, or to go-around if visual references are not available.

As with an ILS, a slight momentary descent below the DA is considered to be acceptable while arresting the descent during the initiation of a missed approach.

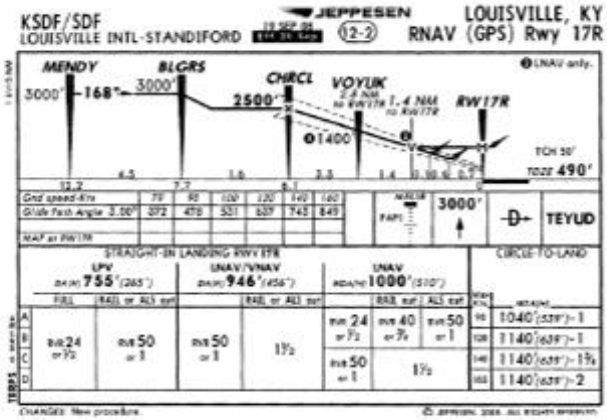
A300 crewmembers are permitted to fly PROFILE non-precision approaches in US Airspace (includes San Juan) to a Barometric DA on the following approaches:

- RNAV (GPS) approaches with published LNAV/VNAV minima. (GPS and RNAV (GPS) approaches may only be conducted in US airspace).
- All approaches with a VNAV Ball Note. The Ball Note states: "Only authorized operators may use VNAV DA in lieu of MDA." UPS A300 crews are authorized operators.
- ILS (GS out) approaches. These approaches may only be flown in PROFILE mode if the vertical path clears all step down fixes in the final approach segment. These provisions also apply to LOC approaches when title "ILS or LOC RWY XXX" or "ILS or LOC DME RWY XXX." The VNAV ball note does not appear on ILS approach charts, however, these approaches may be flown to a DA that is equivalent to the GS out MDA.

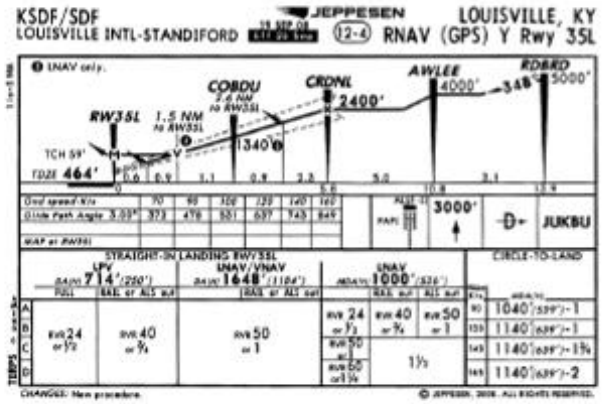
If the approach does not support the use of a DA, the crew must utilize a Derived Decision Altitude (D-DA). PROFILE approaches may be flown outside of US airspace, but must be flown to a D-DA. The use of a DA with a non-precision approach is restricted to US airspace only.

EXAMPLES

RNAV (GPS) Approach with LNAV/VNAV minima may be flown in PROFILE to a DA of 946 feet. VDPs are not applicable on PROFILE approaches. (See SDF RNAV (GPS) RWY 17R diagram.)



NOTE: Approaches retrieved from the aircraft's NAV database do not contain fixes between the Final Approach Fix (FAF) and the runway threshold or Missed Approach Point (MAP). Step-down fixes and Visual Descent Point (VDP), even if named and charted, will not be displayed. Pilots must be able to identify these fixes using the alternate means published on the approach chart. Step-down fixes in the final approach segment of RNAV (GPS) approaches may be identified using Along Track Distance (ATD). ATD is the distance to the next waypoint on a properly sequenced FMC flight plan. RNAV (GPS) approaches may contain a runway threshold waypoint that is coded RW## (e.g., RW17R). ATD to the runway threshold on RNAV (GPS) approaches may be used to determine the aircraft's position over a charted waypoint or determine the VDP (for v/s approaches) if applicable. Use of ATD is only permitted on RNAV (GPS) approaches.



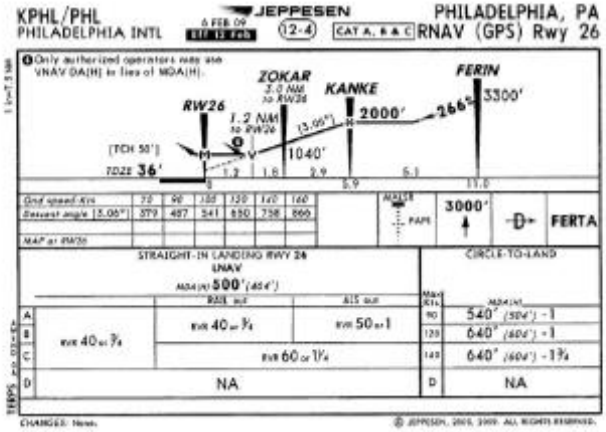
In some instances, an approach may be published with LNAV/VNAV minimums that are higher than the LNAV only minimums. The KSDF RNAV (GPS) Y Rwy 35L approach is an example. The LNAV/VNAV minimums are 1648 feet while the LNAV minimums are 1000 feet. The difference in approach minimums is due to different approach criteria. The LNAV minimums provide 250 feet clearance above the highest obstacle in the final approach segment. The LNAV/VNAV minimums are based on a curved line from the runway threshold to the Final Approach Fix. While the A300 can safely fly a PROFILE approach to either a DA of 1648 feet or a D-DA of 1050 feet (1000+50), it is desirable to fly to the lowest possible minimums.

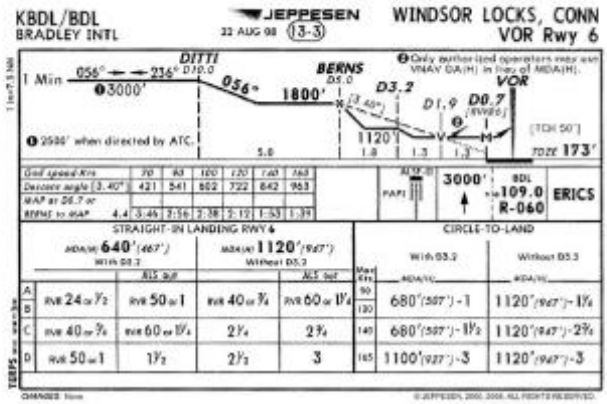
RNAV (GPS) and VOR approaches with the ball note *"Only authorized operators may use VNAV (DA (H) in lieu of MDA (H)"* may use the published MDA as the Profile DA.

PHL RNAV (GPS) 26 may be flown in Profile to a DA of 500 feet.

BDL VOR 6 may be flown in Profile to DA of 640 feet.

See diagrams below:





02.04.03.03 BAROMETRIC DERIVED DECISION ALTITUDE (D-DA)

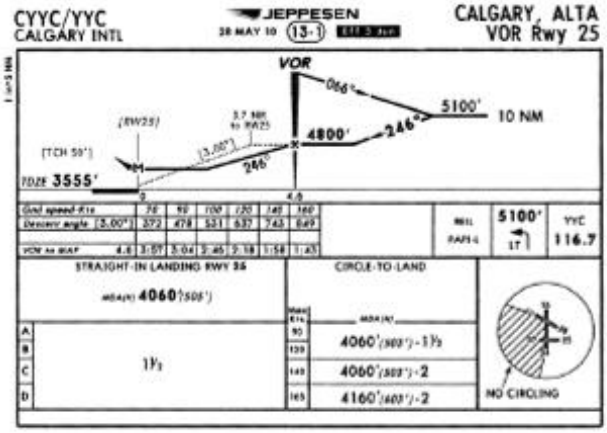
On approaches where a DA is not authorized, a Baro Derived Decision Altitude (D-DA) will need to be used. A D-DA is simply a slightly higher decision altitude which, in the event of a missed approach, will keep the aircraft above the MDA. Operationally, the D-DA is treated just like a

DA. The aircraft reaches the D-DA on the VNAV path and the flight crew makes the decision to continue or to go-around. The aircraft will not descend below the MDA during the execution of the missed approach.

Profile mode approaches must be conducted to a Baro D-DA unless the approach has published LNAV/VNAV approach minima or the approach has the VNAV Ball note or the approach is an ILS (G/S out).

To calculate the D-DA for a Profile Approach, add 50 feet to the published MDA.

YYC VOR 25 (see diagram) can be flown in Profile to a D-DA of 4110 feet (MDA of 4060 feet + 50 feet). In some cases, the VNAV path intercepts the FAF crossing altitude inside of the FAF. This results in a level flight segment after crossing the FAF. Where this is the case, it is depicted in the vertical profile view of the Jeppesen chart. In this example crossing the VOR results in a level-flight segment until 3.7 NM from RWY 25, which is where the VPA intercepts 4800 feet. (This information is for reference only. Using along Track Distance to the Runway Waypoint is permitted on RNAV (GPS) approaches only.) Upon reaching the VNAV path, the aircraft will intercept the path and begin its descent.



02.04.03.04 PROFILE APPROACH MISSED APPROACH PROCEDURES

A missed approach must be executed at or above the DA/D-DA unless visual reference is established with the runway threshold environment and the aircraft is in a position from which a landing can be made using normal maneuvers and rate-of-descent so that landing will occur within the touchdown zone. If the missed approach occurs at a point which is prior to the published missed

approach point, a climb should be immediately established while the aircraft continues to track the lateral final approach course until passing the published missed approach point. Although the missed approach point maneuver begins at the DA/D-DA, turns must not be initiated until crossing the published missed approach point to ensure obstacle protection during the missed approach.

02.04.03.05 VISUAL SEGMENT OBSTACLE CLEARANCE

An obstacle clearance assessment has been accomplished for all runways which have published VNAV minima to ensure that obstacle clearance can be maintained during the execution of a missed approach from the decision altitude. However, to land from a non-precision approach the aircraft must descend below the DA once visual reference has been established. The area on the approach below the MDA/DA beginning at the VDP and continuing to the runway threshold is referred to as the Visual Descent Area (VDA). Terrain and obstacle clearance is not always guaranteed when operating in the VDA even when on a nominal 3° glide path or the VNAV path contained in the FMC NAV database. Terrain and obstacles must be visually acquired and avoided when operating in the VDA.

A glide path provided by a Visual Glideslope Indicator (VGSI) (VASI or PAPI) must always be followed when operating below DA/D-DA or for a MDA during V/S approaches. The glide path of a VASI provides safe terrain and obstruction clearance within 4 NM of the runway threshold, while a PAPI provides safe terrain obstruction clearance within a 3.5 NM of the runway threshold.

RNAV approach procedures with published VNAV minima provide obstacle clearance in the VDA as long as the aircraft stays at or above the indications of the VASI/PAPI (if installed) while operating below the DA/D-DA. If a VASI or PAPI is not installed, obstacle clearance is assured while operating at or above the published Vertical Path Angle (VPA). The glideslope of a standard (200 and ½) ILS provides safe terrain and obstacle clearance form the published glideslope intercept point to runway threshold. Since the VPA of an ILS (G/S out) approach is the same as the underlying ILS glideslope angle, staying at or above the VPA provides obstacle clearance when operating below the MDA/DA/D-DA. The VNAV path may be used only for situational awareness below the MDA.

Unless the above conditions are met, the approach may have obstacles that reach all the way up to 250 feet below the MDA/DA all the way to the threshold. This is one of the primary reasons for the visual segment - to be able to locate and avoid any obstacles visually.

On some approaches, the VGSI (VASI or PAPI) glide path may not coincide with the glide path of the ILS glideslope or published VNAV VPA. In this case, most approach charts contain the note "VGSI and descent angle not coincident" to warn the flight crew.

WARNING: THE VASI/PAPI GLIDE PATH IS CONTROLLING WHEN OPERATING BELOW THE DA/D-DA AND MUST BE MAINTAINED DURING DESCENT TO THE RUNWAY.

02.04.03.06 ALTIMETER SETTING AND TEMPERATURE AFFECTS

Recall that a Profile Approach takes the Threshold Crossing Height (TCH) and using the VPA for that approach, builds a glide path backwards from the TCH. If the altimeter is not set to the correct local barometric pressure, the TCH used in calculating the vertical path will be either erroneously high or erroneously low. This will result in vertical path that will bring the aircraft in for either a long landing or for a landing short of the runway.

When Profile Final Approach Mode is activated both the Captain and F/O's Navigation Display (ND) will depict the Vertical Deviation Indication (VDI) on the right side of their display. Much like the ILS glideslope indicator, the VDI shows if the aircraft is on, above or below the VPA. Each ND uses its own side altimeter to determine the VDI. If the altimeter is not set to the correct local barometric pressure, the VDI for that side ND may indicate the aircraft is on glide path when in actuality, it isn't. The ramifications are obvious, a lower than actual baro setting may mean you don't break-out of the clouds when reaching your DA/D-DA and have to perform a go-around when you could have landed. A higher than actual baro setting will eat into the 250-foot obstacle clearance buffer and could put you dangerously close to an obstacle or to the terrain. If the correct altimeter setting is used on both the Captain's and F/O's altimeter, the VPA on both NDs should match. A mismatch is an indication of an incorrectly set altimeter or of a system failure.

WARNING: **AN INCORRECT ALTIMETER SETTING COULD RESULT IN THE COMPUTED PATH BEING LOWER THAN THAT PUBLISHED FOR THE APPROACH PROCEDURE, POSSIBLY RESULTING IN A DECREASE IN (OR TOTAL LOSS OF) TERRAIN AND OBSTACLE CLEARANCE.**

The effect of non-standard pressure is corrected by using the local altimeter setting below the Transition Altitude/Level. However, the effect of non-standard temperature is not normally considered. Cold temperatures can result in True Altitude being below indicated altitude resulting in less terrain and obstacle clearance during the approach.

WARNING: **EXTREMELY COLD TEMPERATURES RESULT IN THE COMPUTED PATH BEING LOWER THAN THAT PUBLISHED FOR THE APPROACH PROCEDURE, POSSIBLY RESULTING IN A DECREASE IN (OR TOTAL LOSS OF) TERRAIN AND OBSTACLE CLEARANCE.**

Because of the potential loss of obstacle clearance at low temperatures, use of Profile Final Approach mode is prohibited below -15°C or the charted temperature if more restrictive.

02.04.03.07 VERTICAL PATH ANGLE

The VPA used during VNAV non-precision approaches is coded for most database approach procedures with no way for the flight crew to modify them. If a VNAV path is depicted in the profile view of the Jeppesen chart, then a VNAV path is also coded in the NAV database for that approach. Not all approaches permit the application of the VNAV concept due to the absence of a published VNAV path, approach procedure design, or other database issues. For these approaches no VNAV path is coded in the NAV database. It will be evident to the flight crew because there will not be

a vertical path on the Jeppesen chart and, if the crew attempts to pull a VPA from the FMC the FINAL X.X° prompt will not be displayed next to LSK 6R on the APPROACH page of the CDU after the MDA has been entered. Profile approaches cannot be conducted if a VNAV path is not coded in the NAV database.

VNAV path angles will not be less than 2.75° or greater than 3.77° without special FAA approval. For ILS approaches, the VPA is equal to the ILS glideslope angle. For non-precision approaches, the VPA is the same as that published on the Jeppesen approach chart. The VPA contained in the NAV database is coded to the hundredth of a degree as indicated on the Jeppesen chart. The VPA displayed on the APPROACH page is rounded to the nearest tenth of a degree for display purposes. The aircraft will fly the VPA in the NAV database and depicted on the Jeppesen chart.

02.04.04 FINAL APPROACH MODE OPERATION

02.04.04.01 GENERAL

There are four basic steps to flying a Profile Approach:

1. Determining that the approach is authorized for VNAV guidance and figuring the DA/D-DA.
2. Loading the FMC for flying a Profile Approach.
3. Activating Final Approach Mode.
4. Selecting Profile mode on the MCP.

02.04.04.02 DETERMINING IF APPROACH CAN BE FLOWN

This is a very straight forward step. Look at the Jeppesen plate and see if there is a vertical glide path. You'll see it drawn on the vertical depiction but if there's any doubt you can quickly confirm if there's a vertical glide path by looking in the table just below the vertical depiction on the Approach plate. The table will have either a GS, Glide Path Angle or Descent Angle listed if the approach is VNAV capable. Approaches with a Descent Angle (LOC, VOR and some RNAV (GPS)) will depict the angle along the vertical path on the vertical depiction. Those with GS (ILS) or Glide Path Angle (most RNAV (GPS)) will just have the vertical glide path in the table.

Next ensure the vertical path meets all step-down fixes inside of the FAF. The only approaches that this should be an issue with are ILS (G/S out) approaches. Remember, if the vertical path does not meet all of the step-down altitude restrictions then the approach cannot be flown in Profile.

If flying a GPS or a RNAV (GPS) Approach, GPS PRIMARY must be verified on the PROG page of both FMCs and PREDICTIVE GPS must indicate "Y's" +/-15 minutes of ETA (Accessed via the REFERENCE page).

The PROG page should be checked to ensure any crew entered RNP value has been cleared.

Determine whether you can fly the approach to a DA or to a D-DA. Recall we can use the published approach minima as the DA for:

- RNAV (GPS) approaches with published LNAV/VNAV minima.
- All approaches with the VNAV Ball Note, "Only authorized operators may use VNAV DA in lieu of MDA."
- ILS (GS out) approaches.

If the approach must be flown to a D-DA, add 50 feet to the MDA.

02.04.04.03 LOADING THE FMC

Since the VPA for each Approach capable of VNAV is stored in the NAV database and is specific to that particular approach, you will need to first load the Approach. Then enter the DA/D-DA into the MDA brackets (LSK 5R) on the APPROACH page of the CDU).

NOTE: The FMC is still in Profile Performance Descent mode and will remain so until Final Approach is activated. Profile mode can still be used for descents out of cruise altitude and intermediate descents as long as Final Approach is not activated.

NOTE: LDA Approaches cannot be flown in Profile Approach mode since they are not contained in the NAV Database.

When the DA/D-DA is entered, the prompt "FINAL X.X°" is displayed on the APPROACH page (LSK 6R). The "X.X" value indicates the VNAV path angle (VPA) loaded from the NAV database rounded to the nearest tenth of a degree. This VPA cannot be modified by the crew. Although the displayed VPA is rounded, the actual VPA computed and flown by the aircraft is accurate to the hundredth of a degree and will be the same as indicated on the Jeppesen chart. Compare the VPA on the Approach page with the Jeppesen chart. The VPA displayed on the CDU must be within a tenth of a degree from the Jeppesen chart.

NOTE: If Profile mode is engaged when the DA/D-DA is entered into the Approach page, the VPA will not display on the Approach page. This is a limitation of the FMC. To check that the VPA matches the Jeppesen chart (within a tenth of a degree) deselect Profile mode by selecting ALT Hold on the MCP. After checking the VPA on the Approach page, Profile mode can be reselected and used for the descent.

When Profile is selected after Final Approach Mode is activated and the aircraft intercepts the VPA, the FMC will take over control of the airspeed and command the autothrottles to maintain the V_{APP} speed displayed on the CDU. The Airspeed window on the MCP will become dashed to indicate the FMC is controlling airspeed. If the final Approach speed needs to be different than what is shown on the CDU (because of winds, wing anti-ice on, etc.) enter the desired airspeed directly into the V_{APP} prompt, overwriting the displayed FMC computed V_{APP}. Do not use the WIND CORR prompt (LSK 5L). The FMC takes too long to calculate the new approach speed when the WIND

CORR prompt is used. It's much quicker for the crew to simply enter the new desired approach speed into the V_{APP} prompt.

02.04.04.04 ACTIVATING FINAL APPROACH MODE

Final Approach mode must be activated proir to arming Profile. LSK 5R of the APPROACH page. FINAL "x.x" prompt will only appear when ALT, V/S or LVL CH modes are engaged.

- The APPROACH page title changes to "FINAL APP X.X°"
- FINAL X.X° prompt at LSK 6R changes to "VDEV = + XXXX"
- VDI is displayed on both NDs

VDEV (Vertical Deviation) is displayed on the APPROACH and PROG pages in digital format.

Once Final Approach mode is activated, the VNAV path computation changes from Performance Descent mode to Final Approach mode. The Vertical Deviation Indicator (VDI) - commonly referred to as the football - will appear on the right side of each crewmember's ND. (The exception to this is if shooting a VOR approach and the PM's ND is in Rose or Arc to monitor raw data. The VDI will not be displayed if a ND is selected to Rose or Arc.)

NOTE: Final Approach Mode cannot be activated if Profile is the selected mode. The FMC has a limitation of being unable to go directly from Profile Performance Descent Mode directly to Profile Final Approach Mode. ALT HOLD, LVL CH or V/S will need to be selected on the MCP before the "FINAL X.X°" prompt on the APPROACH page (LSK 6R) will be displayed.

NOTE: When a HOLD leg is active in the FMC, all VDEV information is removed from the ND and VDEV is replaced by dashes on the APPROACH and PROG pages.

02.04.04.05 SELECTING PROFILE MODE ON THE MCP

Selecting Profile mode arms the AFDS to capture the VNAV path when intercepted. At VNAV path interception it will disregard the MCP altitude window. The AFDS remains engaged in ALT HLD or V/S (whichever was engaged when Profile was selected) until the VNAV path is intercepted. P.DES (blue) indicates Profile mode is armed to intercept the VNAV path.

NOTE: Profile mode will arm but not engage unless NAV, LOC or LOC* mode is engaged. With Profile armed, selecting LVL CH or ALT Hold will disarm Profile mode. A V/S descent does not disarm Profile mode. If Profile is selected during ALT*, it will disarm when ALT* changes to ALT.

When the aircraft intercepts the VPA and P. DES is engaged (green on the FMA), the airplane will slow to VAPP displayed on the CDU, because the aircraft will slow to approach speed with no regard to flap configuration.

P. DES will flash as the aircraft as the aircraft approaches the VNAV path. When the VNAV path is intercepted, the FMA displays P. SPD and P. DES (green) to indicate Profile mode engagement.

Deviation from the VNAV path displays in digital format on the APPROACH and PROG pages. It is also depicted on each ND VDI where 1 dot equals 100 feet (200 feet full-scale deflection). No path deviation is ever displayed on the PFD.

02.04.04.06 ILS (GS OUT) PROCEDURE

Profile Approaches are non-precision approaches so they must adhere to all altitude restrictions. On some ILS (GS OUT) approaches the glide path actually starts down slightly before the FAF. We cannot legally follow the glide path since we must adhere to non-precision altitude restrictions and not descend until past the FAF. A special procedure was developed to address this issue. Use this special procedure on ILS (GS OUT) approaches where the VNAV path crosses the FAF below the FAF minimum altitude.

- When at the FAF altitude ("ALT"), do not select Profile inbound to the FAF.
- Instead, 1 NM prior to the FAF, open the V/S Window (O/O).
- 0.2 NM prior to FAF, set V/S to a 1000 feet/minimum descent and immediately select Profile mode on the MCP.
- Monitor VDI on ND and verify the aircraft captures the VNAV path. Ensure P.SPD and P.DES engaged on the FMA and airspeed stabilized at V_{APP}.

02.04.04.07 MODE REVERSIONS

When Final Approach mode is active, Profile mode disengages automatically 50 feet below the altitude entered in the MDA prompt on the APPROACH page. The autopilot will automatically disconnect and a mode reversion to V/S and HDG occurs. The Flight Director (FD) will flash to alert the crew to the mode reversion. V/S and HDG modes engage at the vertical speed and heading values at the time of the mode reversion. The Airspeed window on the MCP will open to current speed.

CAUTION: **DURING HIGH OR GUSTY WINDS, THE AUTOTHROTTLES MAY HAVE A HARD TIME MAINTAINING THE APPROACH SPEED. IF THE MODE REVERSION OCCURS WHEN THE AIRSPEED HAS DECAYED, THE AIRSPEED ENTERED IN THE AIRSPEED WINDOW ON THE MCP WILL BE ACTUAL AIRSPEED AT THAT INSTANCE AND NOT THE APPROACH SPEED DISPLAYED ON THE APPROACH PAGE. THIS COULD RESULT IN A SPEED MUCH SLOWER THAN DESIRED.**

02.04.04.08 VISUAL SEGMENT BELOW DA/D-DA

- Select the Flight Path Vector (FPV) or set V/S to the desired rate-of-descent for vertical guidance below DA/D-DA.

- Disconnect the autopilot no later than 50 feet below DA/D-DA. The autopilot will automatically disengage 50 feet below DA/D-DA but most pilots choose to control the situation and disconnect the autopilot instead of having it disconnected on them. Autothrottles may continue to be used at pilot's discretion.
- VNAV path information may only be used to aid Situational Awareness below DA/D-DA. Distance to threshold information can also be used to aid in maintaining proper glide path angle to the runway.

WARNING: THE VNAV PATH DOES NOT GUARANTEE TERRAIN AND OBSTACLE CLEARANCE WHEN OPERATING BELOW THE DA/D-DA.

- Monitor VGSI (if available) and ensure the flight path stays at or above glide path to ensure terrain and obstacle clearance. If VGSI angle is not coincident with VPA, maintain VGSI angle.
- Visually locate and avoid any obstacles in the visual segment.

WARNING: AN IMMEDIATE MISSED APPROACH MUST BE EXECUTED IF TERRAIN OR OBSTACLE CLEARANCE CANNOT BE ASSURED BELOW DA/D-DA.

02.04.04.09 FINAL APPROACH MODE DEACTIVATION

The following events deactivate Final Approach mode and the FMC reverts to Performance Descent mode:

- A different approach is inserted
- TOGA lever is selected
- AN OFFSET is inserted into the active flight plan

If Final Approach mode is deactivated, all steps for activation must be re-accomplished.

02.04.05 PROFILE APPROACH PROCEDURES

02.04.05.01 GENERAL

The following section provides amplified crew procedures for conducting non-precision approaches using Profile mode.

02.04.05.02 APPROACH PREPARATION

- Verify a VNAV path is depicted on the Jeppesen chart.
- Verify VNAV path clears all step-down fixes inside of the FAF.
- Review Approach for any limitations such as cold temperature or remote altimeter setting restrictions. Profile Final Approach mode is prohibited below -15°C.

- GPS PRIMARY and GPS PREDICTIVE must be verified for GPS and RNAV (GPS) approaches.
- Verify ECAM FM/GPS POSITION DISAGREE message is not displayed.
- Verify PROG page RNP value (CLR any crew entered RNP).
- Load Approach. Verify database including missed approach against Jeppesen chart. If differences exist, Jeppesen chart is controlling.
- Enter DA/D-DA into APPROACH page MDA field (LSK 5R) and verify VPA (FINAL X.X° LSK 6R) against vertical glide path charted on Jeppesen plate. The FMC and Jeppesen chart VPA must agree within a tenth of a degree. If Profile mode is being used, select ALT Hold to verify VPA and then reselect Profile for descent.
- Set altimeter bugs to DA/D-DA.
- Calculate V_{APP} and if necessary adjust it using the VAPP prompt (LSK 4L) on the APPROACH page. Do not use the wind correction prompt.
- Brief approach thoroughly including expected callouts from the PM.
- Check VNI switches in proper position for approach to be flown.
- It is highly recommended to review the Profile Approach Summary Table and to use the Profile Briefing Guide to ensure the approach is set up properly.

02.04.05.03 INITIAL/INTERMEDIATE APPROACH

- Configure aircraft similar to conventional precision approaches to a Flaps 15/15 configuration with a speed of 180 knot(s).
- Select the appropriate AFDS roll mode to track the initial and intermediate approach segments or HDG/S while on radar vectors.
- Use V/S mode to establish the aircraft at the initial/intermediate segment altitudes. Ensure next step-down altitude is set in MCP prior to leaving previous altitude.
- PF calls "Activate Final Approach," prior to selecting PROFILE. PM selects FINAL X.X° prompt *LSK 6R) and verifies APPROACH page title changes to FINAL APP X.X°.

CAUTION: **IF MCP ALTITUDE IS CHANGED WHILE FMA INDICATES ALT*, THE AFDS PITCH MODE WILL REVERT TO V/S WITHOUT WARNING.**

02.04.05.04 WHEN CLEARED FOR THE APPROACH

- Select NAV or V/L mode (as applicable) to intercept and track the final approach course. PM monitors raw data for ILS (GS OUT), LOC and VOR approaches.

- Not less than 5 NM from the FAF PF calls for "Gear down, Flaps 20" and sets 160 knot(s) in the MCP Speed window.

NOTE: It is recommended to descend to the FAF crossing altitude prior to intercepting the VNAV path. Intercepting the VNAV path outside the FAF does not guarantee step-down fix compliance.

02.04.05.05 ESTABLISHED AT THE FAF CROSSING ALTITUDE

- Not less than 3 NM from the FAF PF calls for "Flaps 40, Speed ____, Landing Checklist, set missed approach altitude."
- Slow the aircraft down to V_{APP}.
- Set missed approach altitude.
- Unless approach is a ILS (GS OUT), select Profile mode on MCP and verify P.DES (blue) on FMA. P. DES will begin to flash when approaching VNAV path intercept. If Profile is selected with ALT* annunciated on the FMA, Profile will be disarmed when the FMA changes to ALT.
- Monitor vertical deviation from VNAV path as aircraft approaches FAF.
- If ILS (GS OUT), and the VNAV path crosses the FAF below the FAF minimum altitude, at 1 NM from FAF open V/S window in preparation for descent at FAF.

02.04.05.06 CROSSING FINAL APPROACH FIX

- If ILS (GS OUT), 0.2 NM from the FAF start a 1000 FPM descent and immediately select Profile on the MCP. Monitor VDI and verify aircraft captures VNAV path by ensuring P.SPD and P.DES engaged on FMA.
- For all other approaches, verify P.SPD and P.DES engaged on FMA and aircraft begins descent on VNAV path.
- Monitor deviation from VNAV path. (Max + 100/-50 feet). One dot on the Vertical Deviation Indicator (VDI) equals 100 feet. Compare PF and PM VDI indications to identify gross errors.
- Verify step-down fix compliance.
- Arrival at DA/D-DA with the runway environment insight, select FPV or V/S for guidance in the visual segment. AFDS and ATS will mode revert and the autopilot will disengage at 50 feet below DA/D-DA. AFDS modes will revert to the HDG and V/S existing at the time of reversion. The ATS mode will revert to existing speed. **Ensure the correct approach speed is maintained.**

02.04.06 REQUIRED CREW CALL OUTS

02.04.06.01 OVERVIEW

NON-PRECISION APPROACH STANDARD CALLOUTS

PF	PM
Confirm localizer movement.	During ILS (GS out), LOC, LDA approach: When localizer indicator moves from fully deflected position, call "Localizer Alive."
Confirm aircraft is within Stabilized Criteria and respond, "DA (D-DA) _____" or "MDA _____." If PM announces other than "Stable", announce and conduct the appropriate response (e.g., "Go-Around Thrust, Flaps").	At 1000 feet HAT, check that the appropriate altitude is set in the altitude alerter and that the aircraft is within Stabilized Criteria and call "1000 Feet, Altitude Set, Stable." If stabilized criteria are not met, announce what the condition is (e.g., "1000 Feet, Altitude Set, Sink 1500").
Acknowledge.	At 500 feet HAT: Call altitude, existing speed (referenced to target speed) and sink rate; for example, "500 feet/plus5/sink 7."
	At 100 feet above DA (D-DA) or MDA: "Approaching Minimums."
Respond "Landing," "Continuing" or "Go-Around Thrust, Flaps ___" as appropriate.	At DA (D-DA), MDA or missed approach point: Call "Minimums" or "Missed Approach Point".
	If Visual Descent Point (VDP) is applicable, call "Visual Descent Point" or "VDP."
	Call out 100, 50, 40, 30, 20, 10 feet reference to the radio altimeter if the automated callouts are inoperative.
NOTE: After FAF and prior to 1000 feet HAT, call any sink rate in excess of 1500 FPM. Below 1000 feet HAT, call any deviations from stabilized approach criteria. At any time during the approach, the PM calls any visual cues associated with the runway environment; for example, "Runway, Strobes, Approach Lights," etc.	

02.04.07 MISSED APPROACH REQUIREMENTS

02.04.07.01 OVERVIEW

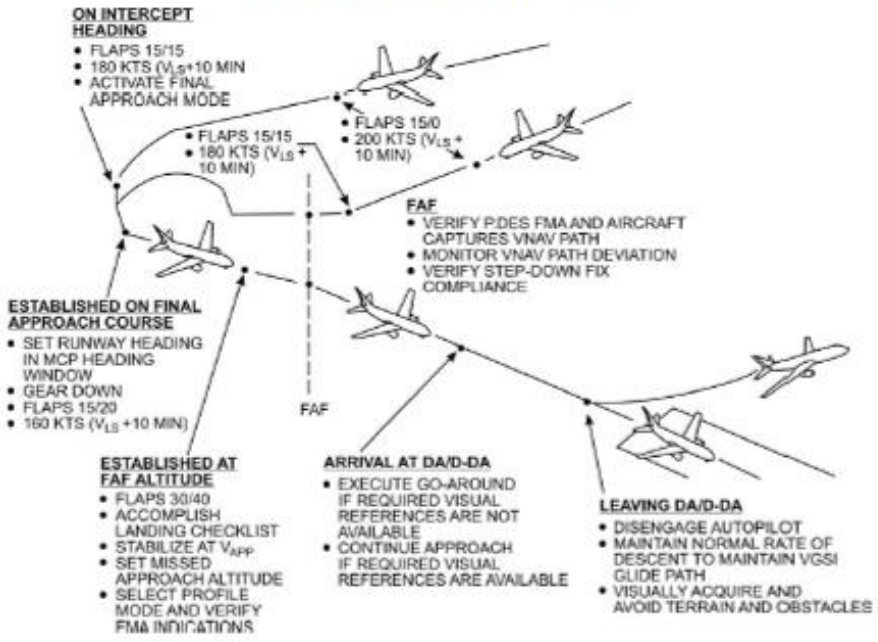
Execute a missed approach if any of the following occur:

Execute a missed approach for the following:

- Lateral deviation exceeds:

  - Localizer 1 dot
  - VOR 1 dot (5°)
  - GPS or RNAV (GPS) .2 NM
- FM/GPS POS DISAGREE message displayed.
- GPS PRIMARY LOST (GPS or RNAV (GPS) approach).
- Vertical deviation exceeds +100/-50 feet (1 dot equals 100 feet).
- Stabilized approach criteria is not met.
- PROFILE mode disengages prior to DA/D-DA without the runway environment in sight.
- Arrival at DA/D-DA without the required visual references. **Do not turn until reaching the published missed approach point.**

PROFILE NON-PRECISION APPROACH



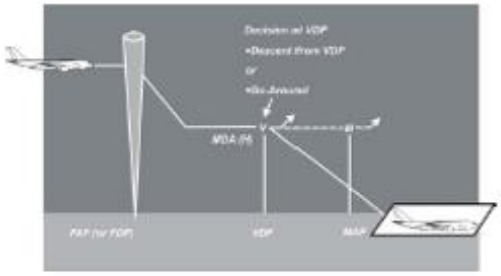
02.04.08 VERTICAL SPEED (V/S) APPROACHES

02.04.08.01 VISUAL DESCENT POINT (VDP)

The VDP is a point in the approach, at the MDA (H), where the aircraft is in position to execute a visual descent and maintain a normal (approx. 3°) glide path to the runway. It can be defined by:

- Distance from a DME source (i.e., VOR or LOC)
- FMC distance from the Rwy Threshold of waypoint
- Time elapsed since crossing the FAF

The VDP is considered the point from which a visual, stabilized, normal descent rate can be safely conducted to the landing runway. VDPs may be published or computed by the crew.



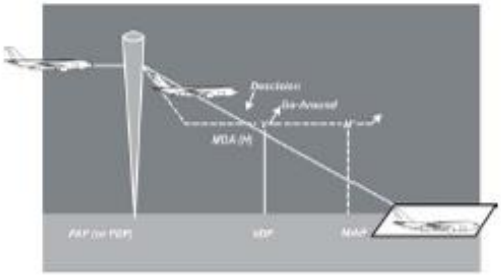
02.04.08.02 CONSTANT-ANGLE FINAL APPROACHES

Nearly 60% of all transport category aircraft CFIT incidents and accidents have occurred during step-down non-precision approaches when the crew used a "dive and drive" method of descent from the FAF. It is important to note that step-down approaches are based solely on an obstacle clearance profile and are not optimized for modern commercial jetliners. Flying constant angle approaches offers several advantages:

- Provides a stabilized flight path.
- Reduces crew workload in a critical phase of flight.
- Decreases the risk of errors in step-down fixes/altitude level-offs and the need to level-off at the MDA(H).

The combination of all these advantages greatly reduces the risk of CFIT incidents and/or accidents.

For these reasons we make every attempt to fly V/S approaches in a constant angle and avoid the dive and drive technique.



02.04.08.03 PLANNING STRATEGIES AND OPTIONS

Proper execution of any non-precision approach requires thorough planning and understanding of:

- Lateral Guidance modes:
  - HDG/S, NAV or LOC based upon the approach being flown
  - Switching from NAV to HDG/S based upon inadequate NAV mode performance (e.g., during a VOR approach)
- Vertical Guidance modes:
  - ALT hold and V/S
  - Use of the FPV (if desired) during visual segment

Use of the autopilot and autothrottles reduces the crews' workload with respect to flight path control. This is the preferred technique as it allows more time for management and monitoring of the approach. Proper management of the AFDS system also prevents descents below authorized altitudes.

A Vertical Speed (V/S) non-precision approaches may be conducted using lateral navigation guidance (NAV mode), NAV mode until LOC interception or Raw Data only.

NAV mode may be used for lateral guidance on VOR, RNAV (GPS) and GPS approaches. If the lateral tracking of a VOR course becomes inadequate or inaccurate, the PF must revert to the **HDG/S** mode to continue flying the approach using raw data.

V/L (LOC) mode must be used to track a localizer or LDA.

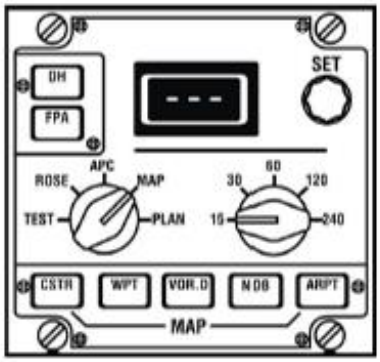
02.04.08.04 APPROACH PREPARATION

Proper and safe execution of a non-precision approach requires that the crew adequately prepare the following areas:

- Reviewing terrain and obstacle positions and minimum safe altitude.
- Preparing and confirming the approach and runway in the FMC flight plan.
- Determining the lateral guidance mode to be used.
- Defining the needs for the monitoring of Raw Data information.
- Setting up and confirming courses and NavAids and identifying as required.
- Planning of the descent to reach the FAF and MDA at the prescribed altitude and airspeed.
- Computing expected groundspeed.
- Confirming the published or computing the target vertical speed to be used based upon the glide path and anticipated groundspeed.
- Confirming the method for defining the VDP and Missed Approach Point.
- Reviewing the expected visual references after visual acquisition (lighting, etc.).
- Reviewing the missed approach procedure.

02.04.08.05 USE OF THE ND MAP MODE

Use the Navigation Display (ND) Map mode to the maximum extent possible for greatest Situational Awareness (SA).



Although ND Arc and Rose modes are available, their use is discouraged unless necessary or as required by UPS policy (such as the PM Raw Data on a VOR approach inside the FAF). Rather, the ND Map mode provides a "birds' eye" view of the entire approach routing and is of tremendous benefit in maintaining a higher level of SA during the progress of the approach. The CSTR tile should always be selected to increase SA.

Another advantage of using the Map mode is the integration of weather radar and EGPWS terrain displays along with the approach path and airport area display.

Because of the many advantages it provides, the use of the NAV mode is permitted for any non-precision approach when outside of the FAF or when beyond the Missed Approach Point as long as NAV ACCR is high. The AOM requirement to monitor the raw data information on a VOR approach are only applicable to the final approach portion between the FAF and the MAP.

Although UPS A300s are not equipped with ADFs, we can still navigate to them by retrieving the waypoint from the NAV database.

For instance, reference the ILS DME RWY 18L at LEMD in the following diagram:

should be accomplished well prior to top-of-descent or prior to descent below 10,000 feet and entering the terminal area.

02.04.08.09 FINAL APPROACH

Turning base to the final inbound course, the aircraft should be in Flaps 15/15 configuration and slowed to 180 KIAS (V_{LS}+10 minimum). Set the missed approach altitude when established at the FAF altitude (FMA=**ALT**). Open the MCP V/S window by pulling on the V/S knob or deselecting ALT on the MCP. This will cause the FMA to change from ALT to V/S and the MCP vertical speed window to open to current V/S. Verify V/S is 0 FPM.

For the vertical descent profile, V/S is the only pitch mode to be used. It is the ONLY mode that allows the crew to have direct control over the aircraft vertical profile and immediately initiate altitude changes. **LVL/CH** mode is really a speed pitch mode and altitude changes may not be immediately initiated by the AFDS. This could prove to be frustrating and dangerous when trying to comply with altitude restrictions on an approach.

Use of the AFDS lateral or roll modes on approach will depend upon the approach being flown. For VOR GPS and RNAV (GPS) approaches, **NAV** mode should be used to intercept and track the FMC lateral flight path. On VOR approaches, the PM must monitor raw data information and keep the PF informed regarding deviation from the raw data final approach course, step-down fixes, etc. If the aircraft exceeds a deviation of 1 dot on the raw data while in the **NAV** mode, the PF must switch to raw data and use **HDG/S** to maintain the final approach course. (Refer to the AOM, Chapter 04, for guidance on RNAV (GPS) approaches.)

For Localizer approaches use the V/L button on the MCP to intercept and track the localizer inbound. Remember that if the approach is based off of localizer DME, it will be displayed in the lower left corner of the PFD!

Final Approach Preparation

For approach planning a good technique to use is the "5-3-1 rule."

- 5 miles from the FAF, extend the gear, lower the flaps to 15/20 and slow to 160 KIAS (V_{LS}+10 minimum).
- At 3 miles, lower the flaps to 30/40 and slow to V_{APP}. Accomplish Landing checklist.
- No later than 1 mile from the FAF, "walk the panel" on the MCP from right to left, verifying that **V/S** is the active vertical mode (FMA and MCP window open), the proper heading, Missed Approach altitude and the correct approach speed are set in the respective MCP windows.

NOTE: These mileages are based on level flight. When there is a step-down to the FAF altitude, add 1 or 2 miles, (e.g., 7 miles, gear down...).

Approximately 0.2 miles from the FAF, set the planned vertical speed in the V/S window. By the time the aircraft noses over and begins to descend, it will be passing over the FAF. Start timing (if applicable) and call the tower.

Modify the vertical speed as necessary to comply with altitude and speed restrictions. At 1000 feet HAT, ensure vertical speed is no greater than 1000 FPM. The PM announces "Approaching Minimums" at 100 feet above the MDA. Reduce the vertical speed to zero in order to level at the MDA. Use 10% of the vertical speed (100 feet above for 1000 FPM descent) as the altitude to begin the level off. Continue until the VDP and with the runway in sight, set -700 FPM in the MCP V/S window to begin the descent toward the runway, disengaging the autopilot no later than 50 feet below the MDA.

Provided that the runway is a waypoint on the approach (usually the case), the distance to the runway will be displayed in the upper right corner of the ND (when using the MAP mode). The 3:1 rule can then be used as a crosscheck to ensure the aircraft is on a 3° glide path toward the runway. At 3 miles from the runway, the aircraft should be at 900 feet AGL, 2 miles 600 feet AGL, 1 mile 300 feet AGL, 1/2 mile 150 feet AGL, etc. Using this technique, safety will be enhanced by diminishing the likelihood of long/short landings due to duck under, visual illusions, etc.

NOTE: Except for GPS and RNAV (GPS) stand alone approaches, all non-precision approaches are performed while monitoring raw data. The NAV mode may be used for roll commands only if the NAV mode guidance is consistent with the raw data's indication of the inbound course.

02.04.08.10 VERTICAL SPEED NON-PRECISION APPROACH

On Downwind or Prior to IAF

- PM obtains ATIS or weather information, tunes NavAids and sets up approach in FMC.
- PF then positively transfers aircraft control to PM and briefs the approach. [Briefing should include the method that will be used to monitor raw data, the location for the display of DME (PFD, ND or RMDI); GPS requirements (if required), calculated VDP and missed approach procedures and callouts.]
- PF positively resumes aircraft control from PM and calls for "Approach checklist."
- PM accomplishes and announces "Approach checklist complete."
- PF calls "Slats Extend/Speed 200" (V_{LS}+10 minimum) and sets speed in MCP window.
- PM calls "Speed checks, Slats extended" selects Flaps 15/0

On Base or Crossing IAF

- PF calls "Flaps 15/Speed 180" (V_{LS}+10 minimum) and sets speed in MCP window
- PM calls "Speed checks, Flaps 15" and selects Flaps 15/15

Cleared to Intercept Final Approach Course

- PF announces and selects the appropriate AFDS mode to track final approach course. For LOC approaches (G/S unusable), select V/L (except for planned holding on the localizer course). For VOR and GPS approaches or when holding on the localizer course is required, select NAV when bank angle <5° to avoid the 45° intercept.

Established Inbound on Final Approach Course (approximately 3-5 miles from FAF)

- PM sets ND to appropriate mode for display of raw data (as required) no later than the FAF. PF monitors ND map mode for greater situational awareness.
- With "ALT" annunciated on FMA, in anticipation of next descent, PF ensures V/S mode (on FMA) by opening V/S window to "00" (or deselect ALT HOLD tile). Directs PM to set the next appropriate altitude in MCP window.
- PF calls "Gear Down, Flaps 20, Speed 160" (V_{LS}+10 minimum) and sets speed in MCP window.
- PM calls "Gear Down, Speed Checks, Flaps 20" and selects Gear Down, Flaps 20, arms Speedbrakes and selects Ignition to Continuous Re-light.
- PF calls "Flaps 40/Speed ____ (V_{APP}) Landing checklist," (approximately 3 miles from FAF) and sets speed in MCP window.
- PM calls "Speed checks, Flaps 40" and selects Flaps 40, completes and announces "Landing checklist complete."
- Approaching the FAF with "ALT" annunciated, PF opens V/S window, ensuring "00" in MCP window and "V/S" annunciated on FMA.
- PF calls "Set Missed Approach Altitude."
- PM sets altitude and calls "missed approach altitude set."
- PF ensures aircraft is in landing configuration, stabilized at V_{APP} no later than 1 NM prior to FAF. "Walk the panel" in anticipation of beginning the approach.

CAUTION: IF MCP ALTITUDE WINDOW IS CHANGED WHILE ALT* IS ANNUNCIATED ON THE FMA, THE PITCH MODE WILL REVERT TO V/S AT THE RATE-OF-CLIMB OR DESCENT THAT EXISTS WHEN THE MCP ALTITUDE WINDOW WAS CHANGED.

At FAF Altitude with "V/S" Annunciated on FMA

- At 0.2 NM prior to FAF, PF calls "Vertical Speed (planned) ____ FPM down" and sets V/S in MCP window.
- PM crosschecks descent rate in V/S window.

At 1000 Feet Above TDZE

- PF adjusts V/S as necessary to ensure a maximum of 1000 FPM down.
- PM calls, "1000 ft, instruments crosschecked, no flags."

100 Feet Above MDA

- PM calls "Approaching Minimums."
- PF acknowledges and selects V/S to zero at 10% of V/S above MDA to ensure level off. (Use V/S to adjust altitude to MDA if necessary.)
- Both pilots ensure that aircraft levels off at MDA.

At MDA

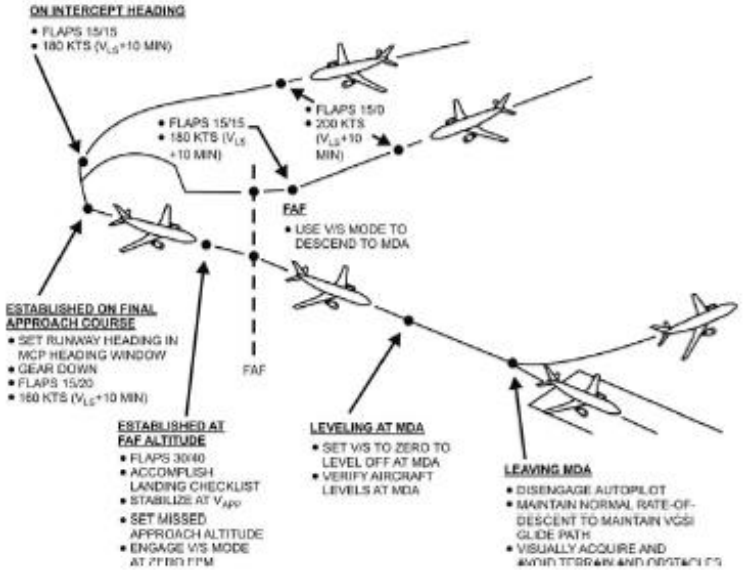
- PM calls "Minimums"
- PF levels off at MDA until reaching the VDP

At VDP with Runway Environment in Sight

- PF sets 700 FPM down, then disconnects Autopilot. (*FD/FPV switch may be selected to FPV if desired.*)
- PM crosschecks -700 FPM down in V/S window and Speed at V_{APP} in MCP Speed window.
- PM makes radio altitude and vertical speed call-outs and any deviations from Stabilized Approach Criteria during descent to the runway.
- Both pilots can use the ND distance (if applicable) display for flight path verification (3:1 rule).

VERTICAL SPEED NON-PRECISION APPROACH PROFILE

This profile provides a standard method of flying a non-precision approach and may be modified to suit operational requirements



WARNING: **IF MCP ALTITUDE IS CHANGED WHILE FMA DISPLAYS ALT*, THE AFDS PITCH MODE WILL REVERT TO V/S.**

02.04.09 MISSED APPROACH (GO-AROUND)

02.04.09.01 OVERVIEW

A missed approach or go-around, is normally initiated at the published missed approach point of an instrument approach procedure. Depending on the type approach flown the aircraft may be very close to the ground in a descent. In this case the missed approach must be initiated promptly and correctly. Positive action may be required to avoid ground contact.

A go-around requires an immediate change in aircraft attitude and performance, possibly very close to the ground. Unless performed correctly, there is potential to put the aircraft in a dangerous situation.

A go-around seldom occurs in line operations. As a result, crewmembers have very little practice in actually flying the maneuver. On every approach, crewmembers must always be mentally prepared to perform a go-around should conditions require. This is why the G/A briefing is required prior to each approach.

A go-around should be accomplished whenever visual conditions do not allow the approach to continue or the aircraft is not in position to safely land. At any time during an approach if the crew feels conditions are not satisfactory, the approach should not be continued. The "No Fault Go-Around" policy makes it clear UPS puts safety above all other considerations.

Once a go-around is initiated it must be completed. *Once the throttles are advanced toward go-around thrust do not attempt to land the aircraft.*

Question: What is the EPR difference in TOGA, maximum power, go-around power, full power, 100% power or fire-wall thrust?

Answer: NONE! They all end up with full, 100% FADEC-controlled thrust. The only difference between a TOGA power T/O, a TOGA go-around or slamming the throttles full forward (fire-wall) in a windshear recovery is the rate of engine spool up. The FADEC not only recognizes the power requested, but monitors the "rate" of movement of the throttles, (slow for T/O, medium for G/A, fastest for fire-wall). Therefore, after the engines have stabilized, it is essential that the PM confirm full power is achieved by pushing on the throttles in the above situations. if they are not full-forward, push until they are.

That being said, go-around thrust is always TOGA (full power, 100%). When TOGA thrust is set the resulting aircraft pitch up can be aggressive, especially at a lighter aircraft gross weight. If the autopilot is not engaged the PF must be prepared to control pitch with yoke pressure and, if necessary, trim to prevent over-rotation. TOGA thrust can also produce a rapid acceleration rate. At a lighter aircraft gross weight this can result in airspeed exceeding the flight director target of V_{App}+10 in SRS mode. The PF should be prepared for this and not attempt to reduce airspeed with an excessive pitch attitude or abrupt thrust reduction. Normally the selection of climb thrust at 1500 feet AFE and/or altitude capture will prevent excessive airspeed.

During a go-around compliance with the published missed approach procedure is mandatory unless other ATC instructions are received. Continue on the final approach course until reaching the published missed approach point. All turns must be initiated at the point depicted on the procedure.

A go-around is initiated by the PF simultaneously accomplishing the following:

- Announce "Go-Around Thrust, Flaps." Select the TOGA levers. Ensure ATS advances throttles or, if ATS OFF, manually advance throttles to go-around (TOGA) thrust.
- Rotate aircraft to initial go-around attitude of 17.5° then adjust to follow the flight director go-around guidance.

The PM must verify **THR** and **GO AROUND** are indicated on the FMA as the active (green) A/THR and combined pitch/roll modes, with **ALT** as the armed (blue) pitch mode.