

Increased navigational accuracy obtained from software and hardware improvements have led to several enhanced approach types being developed for the Boeing 737. These augmented approach types provide a constant rate of descent, follow an approximate 3 degree glide path, and eliminate the traditional step-down style of approach.

This improves landing capability in adverse weather conditions, in areas of difficult terrain, and on existing difficult to fly approach paths. Not to mention, the benefits that a stabilized and safer approach bring: greater passenger comfort, less engine wear and tear, and lower fuel usage while bringing less workload for the flight crew.

In this article, I will discuss the concept of Integrated Approach Navigation (IAN) and explain the procedures recommended by Boeing to successfully implement IAN.

The Boeing Flight Crew Training Manual (FCTM) has an excellent section addressing IAN, and I recommend you read it to gain a greater understanding of how the IAN system functions.

The Navigation Performance Scales (NPS), which augment IAN, will not be discussed. NPS will form part of a future article. Information in this article relates to FMC software U10.8A.

Overview

Integrated Approach Navigation (IAN) derives information from an approach type selected from the Flight Management Computer (FMC) database to generate a 3 degree glide path from the Final Approach Fix to the threshold of the runway. In so doing, it displays visual cues similar to the Instrument Landing System (ILS). Flight path guidance is derived from the FMC, navigational radios, or combination of both.

To use IAN, an approach with a glide path must be selected from the FMC database. The approach must include a series of waypoints that depict a vertical profile that includes a glide path.

An IAN approach may be flown with a single autopilot, raw data, or by following the visual cues displayed on the Flight Director (FD).

IAN is an airline option, and although not every airline carrier will have IAN as part of their avionics suite, the technology is becoming more popular as the safety and economic benefits of IAN are understood by airline carriers.

Geometric Path (Glide Path)

An IAN Approach approximates a 3 degree glide path (descent profile) from the Final Approach Fix (FAF) to approximately 50 feet above the runway threshold. Although, the glide path may not comply with altitude constraints in the FMC prior to the FAF, the generated glide path will always be at or above the altitude constraints between the FAF and the Missed Approach Point (MAP) displayed in the FMC.

Critically, an IAN approach is a Category I Non Precision Approach (NPA) and is not to be confused with an ILS Precision Approach. Therefore, NPA procedures must be adhered to when initiating an approach using IAN.

Although the automation provided by IAN will guide an aircraft (in most cases) to the threshold of the runway, IAN has not been designed to do this. Rather, IAN has been designed to guide the aircraft to the MAP published on the approach chart. The flight crew will then disengage IAN by disengaging the autopilot and autothrottle and fly the remainder of the approach manually as per NPA protocols.

In some instances, the final approach course (FAC) is offset from the runway centreline and manoeuvring the aircraft for direct alignment will be necessary, whilst following the glide path angle.

Although the final approach is very similar to an ILS approach, IAN does not support autoland; if the aircraft is not in a stable configuration and you are not visual with the runway at or beyond the MDA, a missed approach procedure (Go-Around) should be executed.

Consistency in Procedures (eighteen approach types to one)

The introduction of IAN has condensed the number of approach types (and differing procedures) to one consistent procedure; minimising the amount of time an airline needs to train pilots in numerous approach types. Time is money and utilising advanced technology such as IAN can increase airline productivity and safety.

Approach Types

IAN can be used for the following approach types:

- RNAV
- RNAV (RNP) – (provided there are no radius to fix legs)
- NDB and VOR
- GPS & GNSS
- LOC, LOC-BC, TACAN, LDA SDF (or similar style approaches)

Note that if using IAN to execute a Back Course Localiser approach (B/C LOC), the inbound front course must be set in the MCP course window.

During the approach you must monitor raw data and cross check against other navigational cues. Furthermore, although the use of IAN is recommended only for straight-in approaches, line use suggests that flight crews routinely engage IAN up to, but not exceeding 45 degrees from the runway approach course.

IAN is compatible with several approach types, however, being compatible does not necessarily mean that every approach type in the FMC is suitable.

Since IAN was introduced, additional approaches have been developed and added to the RNAV family; in particular, RNAV (RNP) approaches, that use 'radius to fix' (RF) to generate a curved path that terminates at a location where an approach procedure begins. These approaches have been designed to optimise airspace and usually have tight separation requirements; to fly these approaches an aircraft is required to have additional on-board navigation performance monitoring and alerting equipment.

These approach charts are identified by the title RNAV (RNP) RWY XX and the letters AR (*Authorisation Required*) in the description of the chart.

These approaches are not suitable to use with IAN; they should be flown with LNAV/VNAV.

Recommended Approach Types

The best approach to use with IAN are straight-in or near straight-in approaches. VOR, LOC, NDB, RNAV and RNAV (GNSS) approaches work especially well as these approaches usually provide relatively long straight-in legs.

IAN can be used on an RNP (AR) approaches as long as there are no RF turns involved (straight-in approach only). If flying such an approach you should be aware that the legs can be quite short and IAN may arm and engage quite late in the approach profile.

Important Point:

- The use of IAN is not authorised for a RNAV (RNP-AR) approach.

Using IAN – General

IAN does not need to be specifically *'turned on'* for it to function; the functionality, if installed in the aircraft, is always operational. When the aircraft is within range of the designated approach, the runway data and/or Deviation Pointers will annunciate and be displayed on the PFD. At any time after this point has been reached, IAN can be armed and or engaged by pressing the APP button on the MCP.

Navigation Radios and Radio Frequencies

For an IAN approach to function, an approach procedure with a glide path must be selected from the FMC database. Although selection of navigation radios is *not* mandatory, selection is recommended, as correct tuning of the radios can provide increased visual awareness and redundancy, should a CDU failure occur, or there be a corruption of the data in the FMC.

Boeing strongly advise to tune the radios to the correct localiser frequency for the approach. This eliminates the possibility of the radio picking-up another approach from a nearby airport (and providing erroneous data to the crew). The ILS frequency must never be used with an IAN approach (unless the glideslope is inoperative). In the case of an inoperative glideslope, the G/S prompt in the CDU must be selected to OFF to ensure that the FMC generated glide path is flown.

Minimum Descent Altitude (MDA)

As mentioned, an IAN approach is a NPA, and when authorised by the Regulatory Authority non-ILS approaches can be flown to a published VNAV Decision Altitude/Height (DA/H) or to a published MDA (the MDA is used as a decision altitude). If not authorised to use the MDA as a decision altitude, crews must use the MDA specified for the approach flown.

To comply with the MDA protocols during a constant angle approach where a level off is not planned at the MDA, it is necessary to add +50 feet to the published MDA. This enables an adequate buffer to prevent incursion below the MDA and adhere to the NPA protocols.

Important Points:

- IAN uses the FMC database to generate a 3 degree glide path from the FAF to the runway threshold. IAN does not require the navigation radios to be tuned. However, it is recommended to tune the radios.
- Some approaches in the FMC database have a number of glide paths displayed with differing altitudes. When presented with this scenario, always select the first glide path and altitude.

Using IAN - IAN Annunciations and Displays

IAN can display several visual cues to alert you to the status of the IAN system. The cues are triggered at various flight phases and are displayed on the attitude display of the Primary Flight Display (PFD) and on the Flight Mode Annunciator (FMA).

Runway Data: Runway data (runway identifier, approach front course, approach type and distance to threshold) is displayed in the top left area on the PFD when either the localiser or the selected FMC approach is in range of the runway.

If the source of the runway data is the navigation radio, then this information will be displayed when the radio is in range of the localiser. However, if the primary data source is from the FMC (radio not tuned) the runway data will be displayed only after IAN has engaged. When IAN engages, the runway data will be sourced from the FMC. This will be evident as the approach type will be displayed on the PFD.

The approach type (LNAV, FMC, LOC, ILS etc) displayed will depend on what type of approach has been selected from the FMC database.

Approach Guidance: Approach guidance (Deviation Pointers) are displayed on the PFD whenever IAN is in range of the runway. When the Deviation Pointers are displayed, IAN can be used.

Final Approach Course (FAC): The letters FAC are displayed on the center FMA when IAN is armed.

It stands to reason, that FAC (lateral guidance) usually annunciates prior to G/P (vertical guidance), but depending on the position of the aircraft when APP is pressed, both annunciations may be displayed at the same time.

Glide Path (G/P): The letters G/P are displayed on the right FMA when IAN is armed.

FMA FAC and G/P Colours: Two FMA colours are used. White indicates that the FAC or G/P is armed. The colour of the FMA display will change from white to green when the aircraft captures either the localiser or glide path.

Mode Control Panel (MCP): Arming IAN (pressing the APP button on the MCP) will cause the letters APP on the MCP to be illuminated in green. The APP light will extinguish when IAN captures the glide path.

Lateral and Vertical Guidance Deviation Pointers: Deviation Pointers display the lateral and vertical position of the aircraft relative to the final approach course of the selected runway. The lateral pointer represents the localiser while the vertical pointer represents the glide path. The pointers are displayed whenever IAN is in range of the runway.

The pointers will initially be displayed as either magenta or white-coloured outlined diamonds. When the aircraft captures either the localiser or glide path, (2 1/2 dots from center) the pointer (s) will change from an outline, to a solid-filled magenta-coloured diamond.

Whether the initial colour of the diamonds is magenta or white depends on which pitch/roll mode has been selected when the aircraft comes into range.

Although the correct name for the pointers is Deviation Pointers, they are often called anticipation pointers, anticipation cues or ghost pointers (ghost pointers being an *'Americanism'*).

During an IAN approach:

- (i) The deviation alerting system will self-test when passing through 1500 feet radio altitude. The self-test will generate a two-second FAC deviation alerting display on each PFD (the pointers will flash in amber); and,
- (ii) If the autopilot is engaged, and at low radio altitudes, the scale and Deviation Pointers will turn amber and begin to flash if the deviation from either the localiser or glide path is excessive.

SINGLE CH: SINGLE CH will be displayed in green, when the aircraft captures the glide path (both the localiser and glide path). At this time, the Deviation Pointers will change from white-coloured outlines to solid magenta-coloured diamonds. FAC and G/P on the FMA will also be in green. Additionally, the illuminated APP button on the MCP will extinguish. At this point, the aircraft will be guided automatically along the glide path.

Flight Mode Annunciations (FMA): The FMA display will vary depending on the source of the navigation guidance used for the approach.

For localiser-based approaches (LOC, LDS, SDF and ILS (glideslope OUT), the FMA will display VOR/LOC and G/P. For B/C LOC approaches, the FMA will display B/CRS and G/P.

If lateral course guidance is derived from the FMC (RNAV, GPS, VOR, NDB and TACAN approaches), the FMA will display FAC and G/P.

Ground Proximity Warning System (GWPS) Aural Warnings and Displays: GWPS warnings will annunciate if at any time the aircraft deviates below the glide path, and failure to disengage IAN at the appropriate altitude will trigger a GPWS aural warning alert '*autopilot autopilot*' at 100 feet radio altitude. This is in addition, to the words '*autopilot*' being displayed on the PFD.

Using IAN – At What Distance Does IAN Work

IAN is not designed to navigate to the airport and its functionality will only be available when the aircraft is in range of the airport runway; for a straight-in approach, this is at approximately 20 nautical miles. However, this distance can be considerably less if the aircraft is not on a straight-in course to the runway.

Important Point:

- To give you the longest time from which to transition to an IAN approach, try to choose a suitable approach type (from the FMC) that exhibits a '*more or less*' straight-in approach.

Using IAN – When to Arm and Engage IAN

- (i) IAN can be armed at anytime after the Deviation Pointers are displayed on the PFD.
- (ii) To arm/select IAN, the flight crew press the APP button on the Mode Control Panel (MCP) similar to performing an ILS approach.
- (iii) IAN is armed only after clearance for final approach has been received from Air Traffic Control (ATC). By this time, the aircraft is probably on a straight-in approach.
- (iv) IAN cannot be used for STARS and is not designed to be engaged when the aircraft is '*miles*' from the designated runway. Transition to an IAN approach can be from any of several pitch/roll modes.
- (v) IAN (if armed) engages automatically when the either the localiser or glide path is captured.

IAN should only be armed or engaged when:

- (i) The guidance to be used for the final approach is tuned and identified on the navigation radio;
- (ii) An approach has been selected from the FMC database that has a 3 degree glide path;
- (iii) The appropriate runway heading is set in the course window in the MCP;
- (iv) The aircraft is on an inbound intercept heading;
- (v) ATC clearance for the approach has been received; and,
- (vi) The approach guidance information is displayed on the PFD along with the lateral and vertical Deviation Pointers.

Disengaging IAN

IAN is either armed, engaged or not engaged.

If you want to disarm IAN from the arm mode, it is a matter of pressing the APP button on the MCP; the light on the APP button will extinguish and the Deviation Pointers on the PFD will not be visible.

If you want to disengage IAN after it has captured either the localiser or glide path (or both), pressing the APP button on the MCP will do nothing. In this scenario, to disengage IAN you will need to conduct a Go-Around by selecting TOGA, or change the pitch/roll mode (i.e. Level Change).

Disconnecting the autopilot and flying manually will also disengage IAN; the upside being that the Deviation Pointers will remain displayed on the PFD, until a different pitch/roll mode is selected.

Important Points:

- If the navigation radio is not tuned to the localiser, the runway data will not be displayed until IAN is engaged, however, the Deviation Pointers will be displayed.
- IAN can be armed whenever the aircraft is in range of the runway - in other words whenever the Deviation Pointers are displayed on the PFD.
- When IAN is armed, the FAC and G/P display on the FMA is coloured white.
- When IAN is engaged (localiser or glide path) the FAC and G/P on the FMA is coloured green.
- IAN will only engage after capture of either the lateral (FAC) or vertical glide path (G/P).
- When IAN has captured the glide path, SINGLE CH will be displayed in green in the PFD.

Using IAN - Set-Up and Procedure

The procedures used for an IAN approach are derived from ILS procedures and are consistent for all approach types.

- (i) Select the appropriate approach to use from the FMC database. Ensure that the selected approach has a glide path. Do not alter any of the approach constraints.
- (ii) Set the altitude of the glide path (from the FMC) in the MCP altitude window.
- (iii) Fly the aircraft in whatever pitch/roll mode to the Initial Approach Fix (IAF). Remember straight-in approaches are best, although offsets between 25 and 45 degrees may be used but not recommended.
- (iv) Configure the navigation radios to the correct frequency based on the approach type you have selected from the FMC database. Do not use an ILS frequency.
- (v) Set the barometric minimums to the altitude published on the approach chart. Add 50 feet to avoid breaking NPA protocols.
- (vi) Set the correct runway approach course in the MCP course window.
- (vii) Do not select IAN (press the APP button) until the aircraft is in the correct position relative to the approach course.
- (viii) When approximately 2 miles from the FAF - GEAR DOWN, FLAPS 15, SPEED CHECK.

- (ix) At glide path capture (FAF) – FLAPS 25/30 (landing flaps), SPEED CHECK.
- (x) At 300 Feet below glide path capture, reset the MCP altitude window to the missed approach altitude. Failure to wait until the aircraft descends 300 feet will cause the ALT HOLD annunciation to display and the aircraft levelling off.
- (xi) At minima – Disengage autopilot and autothrottle, manually align aircraft to the runway, and follow the Deviation Pointers and Flight Director (FD) cues to the runway threshold. Maintain the glide path to the flare and do not descend below the displayed glide path. Although glide path guidance can be used as a reference once the aircraft descends below the MDA, the primary means of approach guidance is visual. If not visual at the MDA, execute a Go-Around. Remember, using IAN is a NPA.

Important Points:

- When using IAN the aircraft should be configured approximately 2 nautical miles from the FAF (this is one of the fundamental differences between an IAN approach and an ILS approach).
- Often, the runway may not be aligned with the FMC generated course. The FCTM states; *'If the final approach course is offset from the runway centreline, manoeuvring to align with the runway centreline is required. When suitable visual reference is established, continue following the glide path angle while manoeuvring to align with the runway.'*
- Flying an IAN approach is an NPA; it is important to fly visually after passing the MDA.
- The approach mode (APP on center CTR knob) on the EFIS can be selected when using IAN. This will display the IAN approach on the Navigation Display as if it is an ILS approach.

Transitioning to an IAN Approach

A flight crew will usually transition to an IAN approach 2 nautical miles prior to the Initial Approach Fix (IAF).

At this distance from the runway there is not a lot of time to configure the aircraft for landing, and if IAN engages when the aircraft is either above or below the glide path, there is a possibility that the aircraft will abruptly and unexpectedly ascend or descend as the automation attempts to capture the glide path. Therefore, you must be diligent that the aircraft's altitude roughly matches the position of the Deviation Pointers when close to the FAF.

Techniques to Transition Smoothly to an IAN Approach

There are several techniques that can be used to ensure a smooth transition to an IAN approach.

By far the easiest technique to ensure a seamless transition without any abrupt lateral or vertical deviation, is to position the aircraft *'more or less'* within one dot deviation of the localiser or glide path (Deviation Pointers) prior to selecting IAN.

In this way you can follow (*'fly'*) the Deviation Pointers and engage IAN when the aircraft is more or less aligned with the position of the pointers (similar to how an ILS approach is carried out).

Another technique, is to fly the aircraft until ALT HOLD is displayed in the FMA (assuming that the altitude set in the altitude window in the MCP is approximately 2 nautical miles from the FAF). Then select IAN. This should enable the aircraft to smoothly capture the glide path when reaching the FAF.

Importantly, if transitioning to IAN from VNAV, it is prudent to engage [SPD INTV](#) to manually control MCP speed.

Increased Spatial Awareness

Any approach can be busy and it is easy to forget something. Therefore, it is wise to create a circle at 2 miles from the FAF that can be displayed on the Navigation Display (NP).

One way to accomplish this is by using the *FIX* page in the CDU.

In the *LEGS* page copy to the scratchpad the FAF (click the line on which the FAF is located). Open the *FIX* page and upload the FAF (from the scratchpad) to the *FIX* entry. To create a dashed circle at 2 nautical miles from the FAF, enter */2* to *Line Select Left 1*.

Important Points:

- Maintaining the correct approach speed and altitude is paramount to a successful IAN approach. If the aircraft is travelling too fast, slowing down after IAN has engaged can be difficult. Likewise, if the aircraft is too high and IAN engages, the vertical descent can be steep as the aircraft attempts to follow the FMC generated glide path.
- You must be vigilant and anticipate actions and events before they occur.

Using IAN - Situations To Be Attentive Of

Automation can have its pitfalls and IAN is no different. However, once potential shortcomings are known, it is straightforward to bypass them. The most common mistake, especially with virtual pilots, is not following the correct procedure.

Possible '*surprises*' associated with an IAN approach are:

1. Failing to configure the aircraft prior to IAN engaging in FAC and G/P mode.

Unlike an ILS approach, where configuration for landing is initiated when the aircraft captures the glideslope (usually some distance from the runway) during an IAN approach configuration for landing is initiated approximately 2 nautical miles from the FAF.

If you have not configured the aircraft for landing prior to the capture of the glide path, there may be insufficient time for you to complete recommended actions and checklists.

If you believe this will occur, there is no reason why configuration cannot occur at an earlier stage.

2. Forgetting to set the Missed Approach Altitude (MAA) in the MCP.

Failing to wait until the aircraft has descended 300 feet below the glide path capture altitude to reset the MCP altitude to the MAA. Failure will cause the ALT HOLD annunciation to display and the aircraft levelling off.

3. Approaching the runway while not on the correct intercept course.

IAN operates flawlessly with straight-in approaches and to a certain extent with approaches up to 45 degrees from the main approach course, however, IAN will not engage if you approach the assigned runway at 90 degrees. Nor will IAN engage if you are attempting to fly a STAR.

4. Forgetting to set the initial glide path altitude in the MCP (from the FMC).

A common mistake is not setting the glide path altitude (from the FMC) in the MCP window when configuring the aircraft for an IAN approach.

ProSim737 and IAN

Installing IAN to ProSim-AR Avionics Suite

IAN forms part of the avionics suite, however, for IAN to function it needs to be selected (turned on) in the ProSim-AR IOS (Instructor Operator Station). The same is for the Navigation Scales (if required).

To turn on IAN, open IOS: *Settings/Cockpit Setup Options/Options* and place a tick in the appropriate box beside IAN. A restart of the ProSim-AR main module may be required for the change to take effect.

IAN was introduced to the ProSim737 avionics suite in December 2014. For the most part, the functionality is reliable and operates as it should (**see note 1**).

As at writing, known issues are as follows (this may change with Version 3 software updates):

- (i) ProSim737 does not display the IAN runway data immediately following the engagement of TO/GA during the take-off roll.

This is incorrect. In the real aircraft, this information is displayed immediately following the engagement of TO/GA during the take-off roll while. (further research required)

- (ii) The colour of the approach guidance display (LNAV/VNAV) after TO/GA is engaged is currently white. This is incorrect. The colour should be green.

- (iii) At 100 feet AGL, if IAN is engaged and the autopilot remains selected, a flashing AUTOPILOT warning in amber colour will be displayed on the PFD. This is correct. However, an audible *'autopilot'* callout should also be heard. This is not simulated.

Important Point:

- ProSim737 users should also note, that for IAN to function within the avionics suite, it must be activated in the cockpit set-up page of the Instructor Station (IOS).

Note 1: IAN works flawlessly for straight-in approaches (or approaches that are slightly offset). However, the ProSim software when using some RNAV (RNP) approaches has trouble maintaining the correct vertical profile.

When a RNAV (RNP) approach (not AR) is selected, IAN arms and engages very late in the approach profile (after the FAF). The altitude that IAN engages is well below the profile used in VNAV; this results in the aircraft diving to capture the IAN glide path. Once the aircraft is established on the glide path IAN works as it is supposed to.

The above scenario does not occur with every VNAV (RNP) approach; only those that exhibit a curved radius to fix (RF) profile or short leg profile to the runway threshold.

In the real aircraft (depending on operator and country of operation) IAN can handle all RNAV (RNP) approaches with the exception of RNAV (RNP-AR) approaches.

In comparison, Precision Manuals Development Team (PMDG) NGX and NGXu can fly the above approaches in IAN. This has been achieved by artificially replicating the approach using various hidden *'waypoints'* that their software can read. In effect, what you are seeing is the aircraft flying over the waypoints that have been overlaid onto the curves in the approach.

I do not believe ProSim has replicated PMDG's methodology in their software.

Therefore, if flying an RNAV (RNP) approach using IAN, select only those approaches that are *'more or less'* straight-in without RF curves or turns; otherwise, use LNAV/VNAV.

Videos of IAN Approach

- [IAN VOR Approach \(simulator\)](#)
- [IAN NDB Approach \(real aircraft\)](#)

Final Call

The use of Global Positioning Systems has enabled stabilised approaches at many airports, and the IAN system can take advantage of this technology to provide intuitive displays that support stabilised approaches on a consistent basis.

Aircraft fitted with IAN are capable of using the APP button located on the MCP to execute an instrument ILS-style approach based on flight path guidance from the FMC. This makes Non Precision Approaches easier to execute with increased safety. It also enables a constant descent angle, less engine spooling, wear and tear, and improved passenger comfort. Furthermore, IAN uses a standardised and consistent procedure, that in addition to improved displays and alerts, can be used in place of LNAV/VNAV.

Nevertheless, a flight crew must be vigilant when using any automation, especially during the critical approach phase where there is little margin for error. First and foremost is the innate ability to fly the airliner manually, and although automation such as IAN can enhance safety, it does so at the detriment of manual flying skills.

References

Several sources were used to obtain the information documented in this post, including: personal communication with a B737-800 pilot, the *Boeing Flight Crew Training Manual* and the *Boeing 737 Technical Guide* by Chris Brady.

If any discrepancies are noted in this article, please contact me so they can be rectified.

Acronyms and Glossary

AGL – Above Ground Level

APP – Approach button located on MCP

CDU – Control display Unit (glorified keyboard)

EFIS – Electronic Flight Instrument Display

FAC – Final Approach Course

FAF – Final Approach Fix

FMA – Flight Mode Annunciator

FMC – Flight Mode Computer

FMS – Flight Management System

G/P – Glide Path (Non Precision Approach / NPA)

G/S – Glideslope (Precision Approach / PA)

IAF – Initial Approach Fix

IAN – Integrated Approach Navigation

ILS – Instrument Landing System

IMC – Instrument Meteorological Conditions

MAP – Missed Approach Point

MCP – Mode Control Panel

MDA - Minimum Descent Altitude

ND – Navigation Display

PFD – Primary Flight Display

RA – Radio Altitude

RF – Radius to fix

RNAV (RNP-AR) Approach - RNP-AR is a subset of an RNAV approach that requires authorization (RA) to fly

Select – To select , arm or engage something

STAR - Standard Terminal Arrival Route

Review and Updates

Release Date	Notes
25 August 2017	Review and content updated
03 December 2019	Review and content updated
29 October 2020	Review and content updated
28 April 2021	Review and content updated. Release of .pdf

Various Figures

DIAGRAM 1: Approach sheet using IAN (copyright Boeing FCOM)

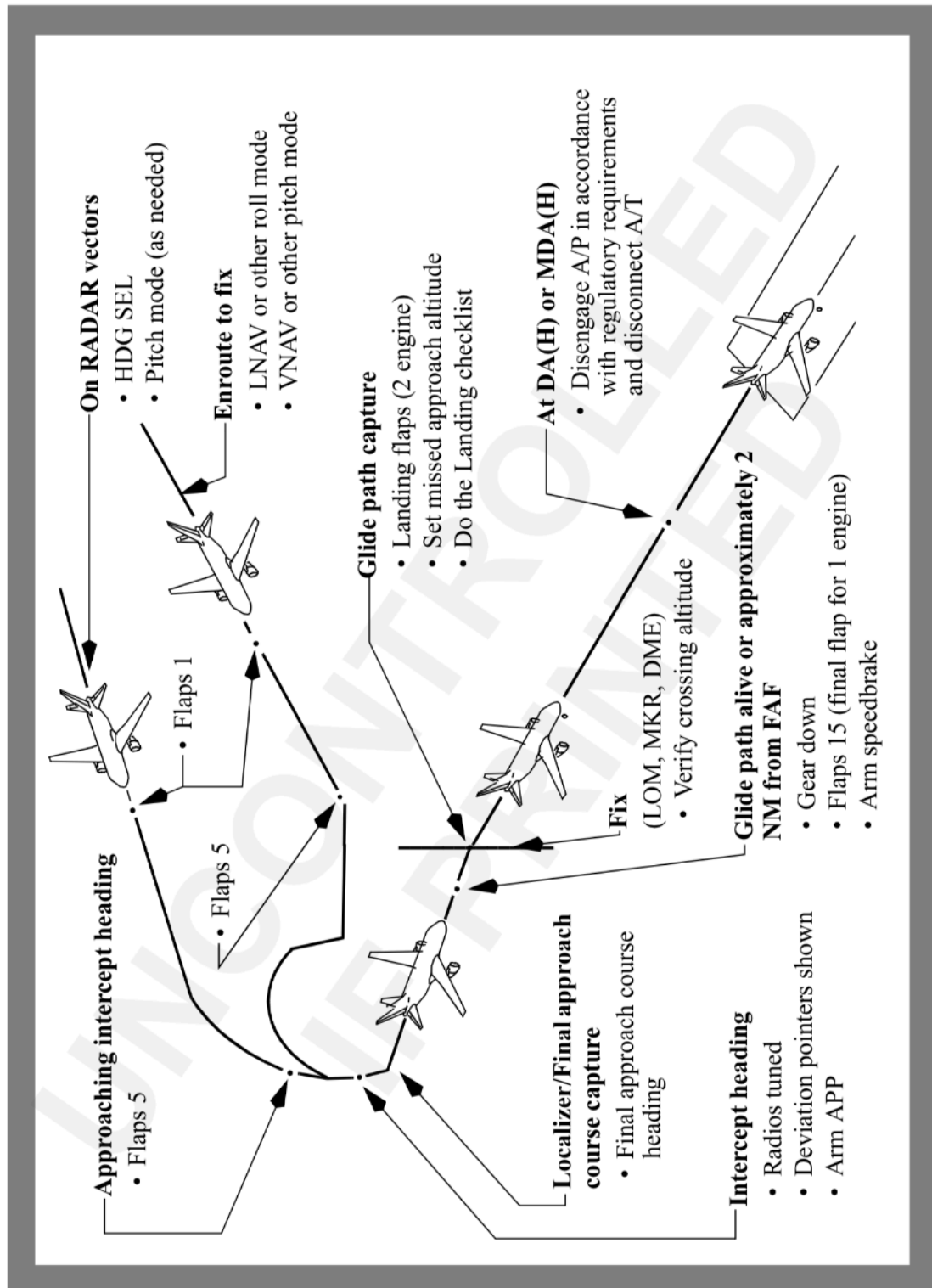


FIGURE 1: Montage of four screen captures of the PFD showing some of the displays generated during an IAN approach (images upper left to right then bottom left to right). Images 1-3 are sequential, however, image 4 is standalone.

Image 1: Aircraft is LNAV/VNAV approaching the IAF. The aircraft is too far from the runway for IAN to be in range to operate (RJAA VOR Rwy 16R).

Image 2: Aircraft is in range of RJAA localiser (tuned in the navigation radio). Runway data is displayed from localiser and Deviation Pointers are displayed in outlined white-coloured diamonds (anticipation pointers). The Deviation Pointers will change from white (outline) to magenta (either outline or solid) when either the localiser or glide path is captured. FAC and G/P are displayed on the FMA in white indicating that IAN has been armed. Note that if IAN was not armed, only the runway data and Deviation Pointers would be displayed (RJAA VOR Rwy 16R).

Image 3: IAN has captured the localiser and the lateral Deviation Pointer is displayed as a solid magenta-coloured diamond. FAC (in green) is displayed on the FMA. The vertical Deviation Pointer is still in outline and in white (anticipation pointer), as is the G/P on the FMA. IAN is tracking the localiser (RJAA VOR Rwy 16R).

Image 4: IAN has engaged. The runway data is now sourced from the FMC and not the localiser (as in the above examples). The FMA displays FAC and G/P in green colour, SINGLE CH is displayed, and both Deviation Pointers are solid magenta-coloured diamonds. IAN has captured the Glide Path (RJAA ILS X or LOC X Rwy 16L).

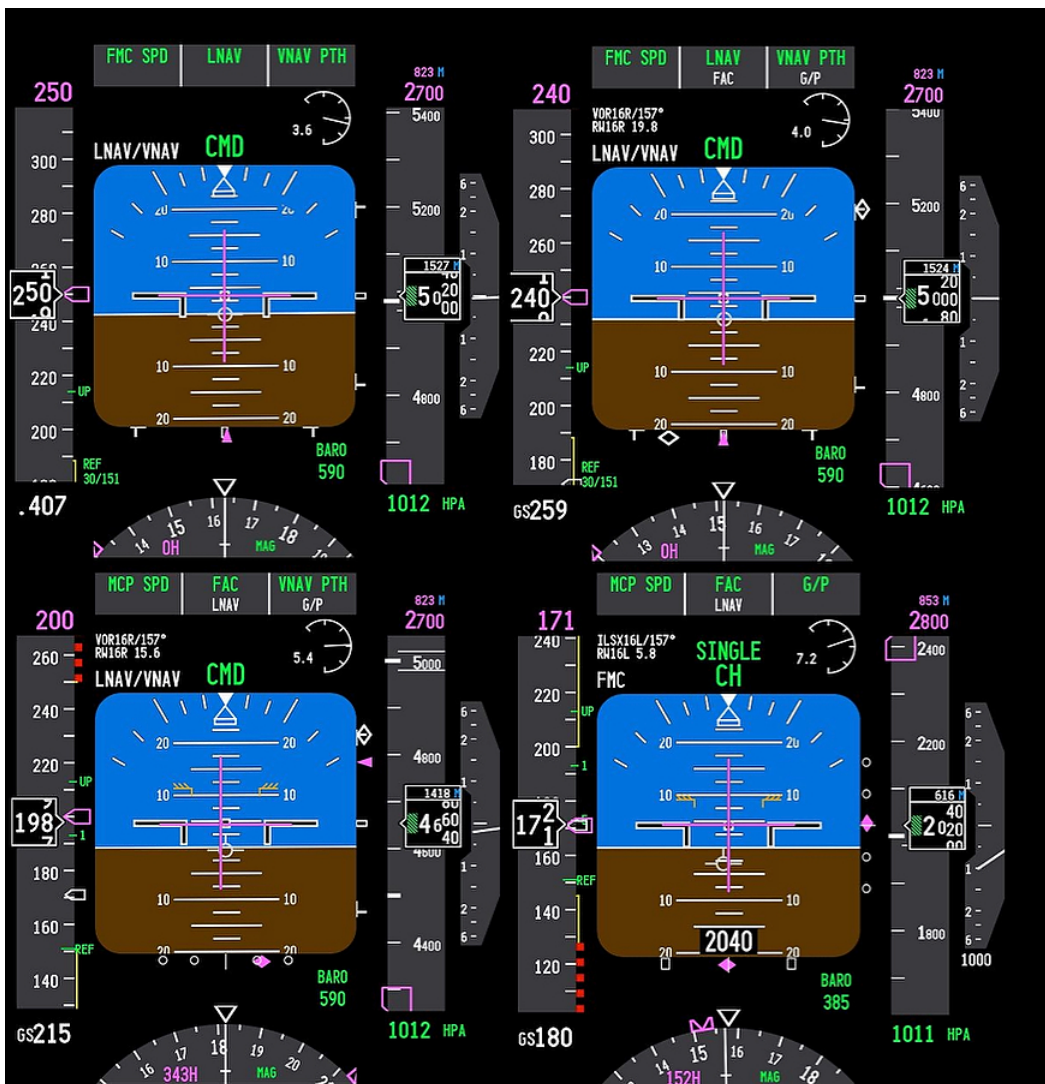


FIGURE 2: IAN approach to RJAA ILS X or LOC X Rwy 16L. The localiser has been captured and the FMA displays FAC in green, while G/P is armed (FMA G/P white). The vertical Deviation Pointer is displayed as an outlined magenta-coloured diamond (anticipation pointer) while the localiser is displayed as solid magenta (because FAC has been captured). The source of the runway data is from the FMC. (ProSim737 avionics suite).

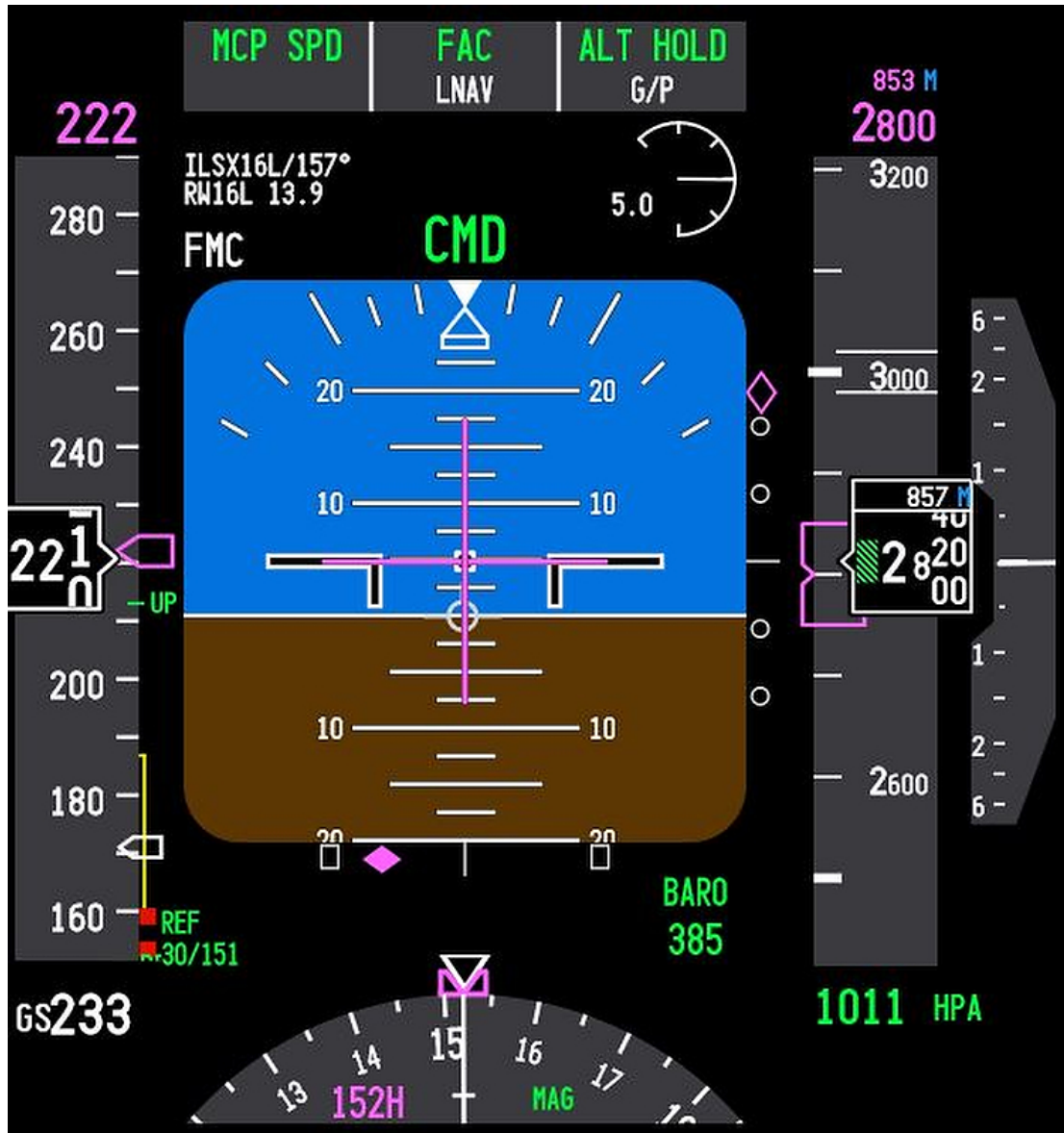


FIGURE 3: IAN approach to RJAA ILS X or LOC X Rwy 16L. The localiser and glide path have been captured. The FMA displays FAC and G/P in green and SINGLE CH is displayed. The Deviation Pointers, previously in outline (Figure 2), are now magenta solid filled. The aircraft will descent on the glide path to the threshold of the runway (ProSim737 avionics suite).

