B737 NG CBT - FMS - APPROACH

COURSE OUTLINES

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COURSE START

1-The material contained in this training program is based on the information obtained from current national, international and company regulations and it is to be used for training purposes only. At the time of designing this program contained then current information. In the event of conflict between data provided herein and that in publications issued by the authority, the authority shall take precedence.

FLIGHT MANAGEMENT SYSTEM- APPROACH

2-In this chapter we will see the FMS operation during the approach phase of flight. Here is the outline: * Introduction * Arrival page * VFR approaches * Approach reference page * Diversion to alternate destination

INTRODUCTION

3-The approach phase starts at the end of descent point and continues to touchdown or go–around.

4-The FMC switches to on approach when the airplane is within 2 NM of the first approach waypoint or 2000 feet of destination airport elevation, whichever occurs first.

5-VNAV is the normal method for accomplishing ILS approaches.

6-For airplanes not equipped with integrated approach navigation or IAN, VNAV is also preferred to execute non-ILS approaches that have an appropriate vertical path defined on the FMC LEGS page

7-A vertical path suitable for use of VNAV is a path that is about 3° and crosses the runway threshold at approximately 50 feet.

8-Therefore, VNAV should be used only for approaches that have one of these on the ROUTE LEGS page: a published GP angle for the final approach segment, or a runway waypoint coincident with the approach end of the runway, or a missed approach waypoint before the approach end of the runway. These features allow construction of a normal glide path

9-Approaches with VNAV can be flown using LNAV or any of the other recommended roll modes provided in the procedure. If an ILS approach is flown, VNAV will disengage when passing the waypoint with the GS code, as the glide slope is captured.

10-For an approach without a runway waypoint on the ROUTE LEGS page, it is your responsibility not to descend below the minimum descent altitude until adequate visual contact has been achieved.

11-The ARRIVALS and APPROACH REFERENCE pages let you manage the approach.

12-The PROGRESS, ROUTE LEGS and HOLD pages are also used to support the approaches. These are discussed in a different lessons. Now let’s start with ARRIVALS page.

ARRIVALS PAGE

13-The arrivals page lets you select the desired arrival and approach procedures for the destination airport. You can use the page to manage both IFR and VFR approaches

14-To get access to ARRIVALS page, push the DEPARTURE/ARRIVAL function key. Then select the arrival prompt to display the arrivals page for destination airport.

15-The destination airport identifier is displayed in the title.

16-The STARs are shown in the left column. When the page is first selected, the STARs are listed in alphabetic order. Profile descents, if available, are listed under PROFILE DESCENT label after the STARs.

17-The approaches and runways are displayed in on the right column.

18-If more than 5 STARs or approaches exist for the destination airport, there are multiple arrival pages.

19-Let’s enter a STAR and approach for the destination airport.

20-First go to DEPARTURE/ARRIVAL INDEX page and then show the ARRIVALS page for the destination airport.

21-Select the STAR. The selected STAR moves to the top and all other STARs and non–applicable approaches/runways are removed. A selected label appears next to the STAR, indicating an arrival selection is made but not executed yet.

22-The transitions line displays all arrival transitions related to the selected STAR. In this example, there is no transition for the selected STAR. However, other STARs may have transitions which are used to connect the route to the STAR.

23-Now, select the approach that you are cleared. Like the selected STAR, only the selected approach is displayed.

24-The approach includes missed approach routing and holding if the missed approach procedure is part of published approach.

25-The approach transition line displays all approach transitions related to the selected approach. Transitions can include the initial approach fix, feeder fixes and fixes that provide routing to the initial approach fix.

26-Select the approach transition. Now, the selection of the STAR, approach and transition is completed.

27-The STAR and approach entries usually create route discontinuities. Therefore, you should go to the LEGS page to check for route discontinuities.

28-Select LEGS function key to show the ROUTE LEGS page. The first legs page displays two route discontinuities.

29-Connect the first route discontinuity.

30-Now, connect the second route discontinuity.

31-Check other pages for any remaining route discontinuity.

32-With all discontinuities linked, you can activate the modifications.

33-If you go back to the ARRIVALS page, you will see the following: all STARs and approaches are shown in their initial order. This allows you to select any STAR or approach if your clearance changes. The executed STAR and approach procedure are identified as active

VFR APPROACHES

34-If a VFR approach has to be performed, you use the runways listed in the ARRIVALS page.

35-The runways for the destination airport are displayed after the approaches.

36-With the ATC clearance received, you select the runway. Other runways and approaches are removed and a runway extension data line appears on the page.

37-The runway extension line lets you create a waypoint on the extended runway centerline at a specified distance from the runway threshold. Valid entries are from 1 to 25 nautical miles with 0.1 nautical mile resolution.

38-Let’s key in the runway extension on the scratchpad. With the runway extension entered, a waypoint on the final is created.

39-Now, you should go to the LEGS page to check for route discontinuities. The page shows two route discontinuities.

40-Connect the first route discontinuity.

41-Now, connect the second route discontinuity.

42-With all discontinuities linked, activate the modifications.

43-Note that recent FMC versions also show a flight path angle data line when a runway is selected.

44-Flight path angle data line lets you enter a flight path angle between the runway threshold and the runway extension waypoint. Valid entries are between 2.0 to 5.5 degrees.

APPROACH REFERENCE PAGE

45-The APPROACH REFERENCE page displays the approach performance data related to the selected arrival and approach for the destination airport. You use the page to select the approach reference speed.

46-During flight, you can access the APPROACH REFERENCE page by selecting the INITIALIZATION REFERENCE function key.

47-The gross weight line normally shows the FMC calculated gross weight; however, crew entry is also possible. If the gross weight data from FMC is not valid, a box prompt is shown.

48-This data field shows the runway length for the destination runway in feet and meters.

49-Approach information line shows the ILS frequency and the identifier for the associated runway.

50-The front course of the ILS approach is the other information displayed. The front course has a suffix of a T if the course is relative to true north.

51-The ILS frequency and identifier, and front course are also displayed for localizer and localizer backcourse approaches

52-Other information displayed on the page is the selection of reference speed which determines the final approach speed.

53-The reference speed lines show the FMC calculated reference speeds for the three landing flap settings. These speeds are based on the calculated gross weight.

54-Initially, the reference speeds show in small font. You may select the FMC computed speed or manually enter another value into the line related to desired landing flap configuration.

55-To select an FMC computed reference speed you push the corresponding line select key twice. Selection causes the speed to change to large font. The flap/speed line shows the selected flap and reference speed. The reference speed bug is displayed on the airspeed display.

56-Once selected, the reference speed will not be updated automatically. If the gross weight changes due to large amount of fuel use, you must delete the current speed or select a different reference speed to make an update.

57-The wind correction line lets you enter a wind correction value for the approach.

58-The default value is +5 knots. You may enter a wind correction between 0 and + 20 knots.

59-When you enter a wind correction, it shows in large font.

60-The wind correction is added to the selected reference speed. This provides an additional stall margin for airspeed excursions caused by turbulence and wind shear.

61-When making corrections for winds, the maximum final approach speed should not exceed V reference + 20 knots or landing flap placard speed minus 5 knots, whichever is lower. Do not apply wind corrections for tailwinds.

DIVERSION TO ALTERNATE DESTINATION

62-The alternate destination pages let you review and select several different alternate destinations.

63-The page can be accessed from the INITIALIZATION REFERENCE INDEX page, or the APPROACH REFERENCE page or the ROUTE page depending on FMC version.

64-The ALTERNATE column allows entry of the alternate destination identifiers. Valid entries are airports, navaids, or waypoints.

65-Let’s enter a new alternate airport. With the airport identifier keyed in the scratchpad, push the line select key.

66-The VIA column shows the direct-to route to the alternate or missed approach from the original destination to the alternate. The default for the VIA is the DIRECT-TO route to the alternate destination

67-In addition, distance to, estimated time of arrival and fuel remaining at alternate destination are also automatically displayed. You can use the DELETE function key to remove manually entered alternates.

68-When the NEAREST AIRPORTS prompt is selected, the FMC searches the navigation data base and then shows the five airports nearest to the airplane present position.

69-The nearest airport and related data is displayed in the first line, the second nearest in the next line and so on. The PREVIOUS prompt lets you go back to the ALTERNATE DESTINATIONS page.

70-In some FMC versions, a WEATHER REQUEST prompt is displayed in the ALTERNATE DESTINATIONS page. The prompt is used to request weather data uplink for the alternate destination.

71-You use the NEXT PAGE function key to access the alternate destination individual pages.

72-The page lets you review the alternate destination and the route used for diversion.

73-The alternate destination identifier is displayed here. The VIA field shows the selected routing method for diversion which is DIRECT TO route in this example.

74-This shows the distance to the alternate destination. With the direct to routing selected, manual entry is allowed. The next line shows the estimated time of arrival at the alternate. The FUEL field indicates the predicted fuel remaining at the alternate destination.

75-The TRIP ALTITUDE line displays the FMC calculated optimum cruise altitude to the alternate destination. Let’s change the trip altitude to flight level 250. Your entry is displayed in large characters.

76-This data line displays current wind direction and speed.

77-The MISSED APPROACH prompt lets you select a missed approach route to the alternate destination. You push the line select key next to the prompt to select the missed approach route.

78-The page now shows the FMC predictions for the missed approach route to the alternate airport. These FMC predictions are based on descent to the original destination followed by a missed approach and then climb, cruise, and descent to the alternate destination

79-The distance to, estimated time of arrival and fuel remaining at the alternate change accordingly. Note that manual entry of distance to go is not allowed for missed approach routing

80-DIRECT TO replaces the MISSED APPROACH prompt to let you select the direct routing method.

81-Now let’s do a diversion to an alternate airport

82-With the ROUTE page selected, put the new destination over the original destination.

83-Go to the next page and enter the expecting routing for the new destination airport.

84-Now you should select the LEGS page to check for any route discontinuity. When you ensure there is no route discontinuity make the modifications active.

85-You can set the cleared cruise altitude on the PERFORMANCE INITIALIZATION page or, CRUISE page or, CLIMB page.

86-With the cruise altitude put in and executed, the diversion to alternate is completed.

COURSE END

87-End of course. ?