B737 NG CBT - FMS - TAKE OFF&CLIMB

COURSE OUTLINES

TABLE OF CONTENT

COURSE START

1-The material contained in this training program is based on the information obtained from current state, local 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- TAKEOFF AND CLIMB

2-This chapter describes the FMS operation and pilot's tasks during takeoff and climb. Here is the outline. * Overview * Climb page * N1 limit page * Air turnback

OVERVIEW

3-The FMC takeoff phase begins with the pushing of a TO/GA switch. If last minute changes were made to the departure runway and SID, ensure that the TAKEOFF REFERENCE and DEPARTURES pages have been modified accordingly.

4-With the correct takeoff parameters set, when the TO/GA switch is pushed, the FMC commands the selected takeoff thrust.

5-When climb thrust is selected, the takeoff phase automatically changes to the climb phase.

6-The FMC climb profile complies with the waypoint altitude or speed constraints and airspeed restriction altitude.

7-You use the climb page to evaluate, monitor, and modify the climb profile. Now, let's take a closer look at the climb page.

CLIMB PAGE

8-The climb page is accessed by pushing the CLIMB function key.

9-The title of the page shows the active climb mode. These are the available climb modes: economy climb, maximum rate of climb, maximum angle climb, fixed speed climb and required time of arrival climb. In all modes, similar data is displayed on the page.

Economy climb

10-The economy climb is the default climb mode.

11-In economy climb mode, the FMC supplies the most economical speed which is based on the gross weight and cost index.

12-The page shows the cruise altitude from the PERFORMANCE INITIALIZATION page. You can change the altitude either from the CDU or from the MCP when needed.

13-To change the altitude from the CDU, enter a new altitude, say flight level 330. A modification is created. You need to

execute the modification to activate it.

14-You can also select a new altitude from MCP provided that no altitude constraints exist between current airplane altitude and selected altitude. When you push the altitude intervention button, the selected altitude is set in the cruise altitude data line. Note that entering a new cruise altitude with this method does not create a modification.

15-The climb speed is controlled either by target speed or restrictive speed.

16-The target speed is the FMC computed airspeed or Mach number for the corresponding climb mode, which is the economy mode in this example. Airspeed and/or Mach number may also be entered manually using the keyboard. When the target speed is controlling the climb speed, it is indicated in reverse video.

17-With the speed intervention selected, the MCP label is displayed after the speed to indicate that the MCP controls the speed.

18-The speed restriction, if there is one, is displayed below the target speed. The default value is 250 knots and 10000 feet.

19-The speed restriction can also be a waypoint related constraint or a value from the navigation database for the origin airport.

20-When the speed restriction is controlling the climb speed, it is highlighted in reverse video. In this example, you are below the speed restriction altitude of 10,000 feet and the speed restriction of 250 knots is active.

21-As the airplane passes the speed restriction altitude, the target speed automatically takes control of the climb. The speed restriction displays dashes.

22-When the climb speed restriction is due to a waypoint constraint and it cannot be met, the FMC displays this scratchpad message.

23-You should clear the message and modify the flight plan as required.

24-The speed restriction displays the FLAPS label after the speed if the active speed restriction is lower than the minimum speed for the selected flap setting. The HOLD label appears after the speed, when decelerating to holding speed prior to hold entry fix.

25-With the FMC default speed restriction active, let’s enter a new speed restriction of 230 knots and 8000 feet.

26-This causes the default speed restriction to be deleted and it will not show again. After you pass 8000 feet, there will be no speed restriction and the airplane accelerates to target speed.

27-When the next waypoint has an altitude constraint it is shown here.

28-The constraint data comes from the ROUTE LEGS page. You can delete the constraint on the CLIMB page or the ROUTE LEGS page. Let's use the CLIMB page to delete the constraint.

29-Push the DELETE key. Then push the line select key adjacent to the constraint. The page title shows MOD in the reverse video and the EXECUTE light illuminates. Push the EXECUTE key to activate the modification.

30-When the constraint is deleted on the CLIMB page, the ROUTE LEGS page also shows the deletion.

31-Conversely, when an altitude constraint is entered on the ROUTE LEGS page, the CLIMB page shows the new constraint.

32-The climb page also shows the ETA and distance to go to the constraint waypoint. If no waypoint constraint exists, the values are shown for the cruise altitude.

33-When the FMC predicts that you will be below the constraint altitude at the waypoint, the ERROR line appears to indicate how low you will be.

34-The UNABLE NEXT ALTITUDE message shows in the scratchpad. The message appears only with VNAV engaged.

35-After clearing the message, you should select MAXIMUM RATE CLIMB or MAXIMUM ANGLE CLIMB, or a different N1 limit as appropriate to achieve a steeper climb angle.

36-The active climb thrust N1 value is indicated here.

37-If CLB 1 or CLB 2 derate is selected, reduced thrust is maintained for initial part of climb. Then, thrust increases to the maximum climb thrust by 15,000 feet. Any reduced climb selection is automatically deleted above 15,000 feet.

Maximum rate climb

38-Another climb mode is the MAXIMUM RATE climb. You select this mode to gain the maximum altitude over the shortest period of time.

39-To select the maximum rate climb mode, push the line select key next to MAXIMUM RATE. Then, execute the modification.

Maximum angle climb

40-The maximum angle climb mode is selected to gain the greatest altitude over the shortest horizontal distance.

41-You normally use maximum angle climb mode for obstacle clearance, minimum crossing altitude or reaching a specified altitude in a shortest distance.

42-You can activate the MAXIMUM ANGLE climb by pushing the related line select key and executing the modification.

Fixed speed climb

43-The climb page also lets you enter a climb speed other than FMC computed target speed.

44-In this example, the FMC computed target speed is 287 knots and you want to change it to 265 knots. Put new speed in the scratchpad. Push the line select key next to target speed. Execute the modification. Now, the title of the climb page changes to show the new speed. The FMC makes the airplane climb at this new speed.

Rta climb

45-The RTA climb page is displayed when a required time of arrival is active.

46-The data on this page is the same as other climb pages except for the following. The target speed line shows the computed speed required to meet entered RTA. When RTA is exited, this speed changes to FMC target speed.

47-The computed time error at RTA waypoint is shown below the TIME ERROR title.

N1 LIMIT PAGE

48-In the air, the N1 limit page shows the N1 limits for these thrust modes: go-around, continuous, climb, cruise and reduced climb.

49-The active thrust limit is indicated on the thrust mode display.

50-AUTO is the default selection. This selection lets the FMC calculate N1 limits for all phases of flight.

51-Pilot selection of other thrust limits is allowed. The ACTIVE prompt indicates the active N1 thrust limit.

AIR TURNBACK

52-In the event of a turn-back, you need a quick access to the arrivals information for the origin airport.

53-To achieve this, push the DEPARTURE/ARRIVAL function key to show DEPARTURE ARRIVAL INDEX page. Then select arrivals for the origin airport. The information on the arrivals page is discussed in different lesson.

COURSE END

54-End of course. ?