ALT Hold During Takeoff

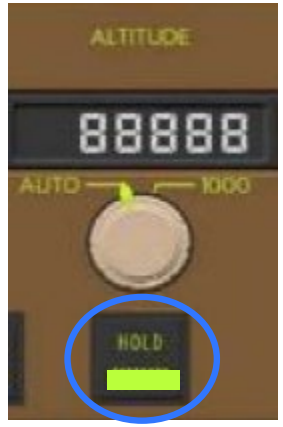
ALT Hold During Takeoff

- Boeing has received reports of 777 and 787 events where the Autopilot Flight Director System (AFDS) altitude hold (ALT) pitch mode was engaged during takeoff. A recent 777 event resulted in an unusually low initial rate of climb.
- During most of these events, the flight crews rotated and climbed normally, noticing the erroneous pitch guidance.
- After airborne, the flight crews pushed the TO/GA switch to restore the proper pitch guidance.

ALT Hold During Takeoff

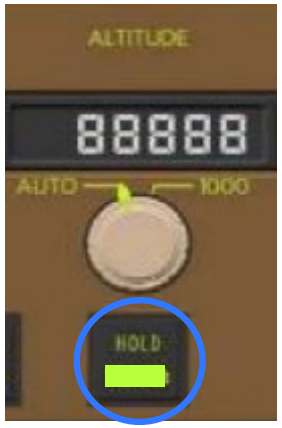
- Review of the flight data from these events showed the activation of the ALT pitch mode prior to takeoff.
- Laboratory tests are ongoing, but engineers have been unable to duplicate any system induced anomaly.

ALT Hold During Takeoff



- When on the ground and the Flight Director (F/D) is initially turned on, the default roll and pitch mode is TO/GA.
- Activation of the ALT mode will be displayed as the pitch mode of the Flight Mode Annunciator (FMA) and by the illumination of the Altitude HOLD Switch.
- On the ground, transition of the pitch mode from TO/GA to ALT can be induced in four ways.

ALT Hold During Takeoff



1. Inadvertent selection of the Altitude Hold Switch on the MCP

- Exercise care when using the storage slot under the MCP.

ALT Hold During Takeoff

2. Inadvertent selection of the Flight Level Change Switch (FLCH) or Vertical Speed/Flight Path Angle Switch (VS/FPA) when the MCP Selected Altitude is within 20 feet of the displayed barometric altitude.

•Exercise care when using the storage slot under the MCP.

ALT Hold During Takeoff

Flight Director ON and MCP Selected Altitude with 20 feet of indicated altitude

Proper TO/GA guidance will be restored by cycling both F/D switches OFF then ON

3. With both Flight Directors OFF, one or both Flight Directors are selected ON when the MCP Selected Altitude is within 20 feet of the displayed barometric altitude.

- Selecting both Flight Directors OFF, then ON, while on the ground and when the MCP Selected Altitude is not within 20 feet of the displayed barometric altitude will restore TO/GA pitch guidance.
- There is no Boeing procedure to set the MCP Selected Altitude to airport elevation.

ALT Hold During Takeoff

4. When all of the following are true:

- One or both Flight Directors are ON
- MCP Selected Altitude is within 20 feet of the displayed barometric altitude
- ADIRU is selected OFF for 30 seconds or more, then ON and alignment completes

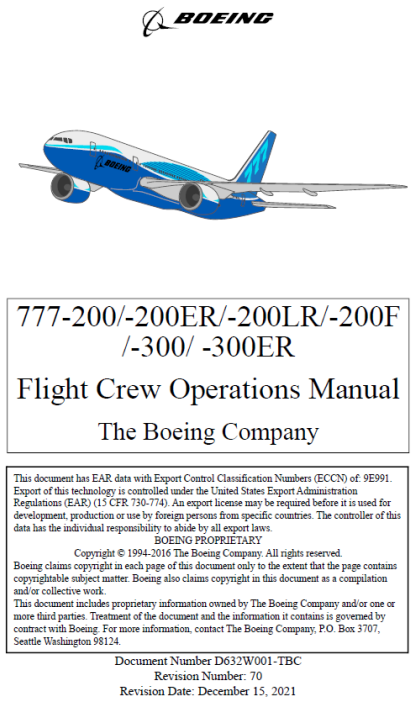
Note: After ADIRU alignment, selecting both Flight Directors OFF, then ON, while on the ground and when the MCP Selected Altitude is not within 20 feet of the displayed barometric altitude will restore TO/GA pitch guidance.

Roll and pitch FMAs show TO/GA, TO/GA when FD switch is selected ON

Pitch FMA changes to ALT after ADIRU re-alignment

777 FCOM and FCTM

- It should be noted that the practices detailed in the following slides are not new or amended crew guidance. They are in accordance with existing FCOM procedures, Flight Crew Training Manual (FCTM) guidance and expected application of crew resource management and callouts.



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777-200/-200ER/-200LR/-200F
/-300/ -300ER

Flight Crew Operations Manual

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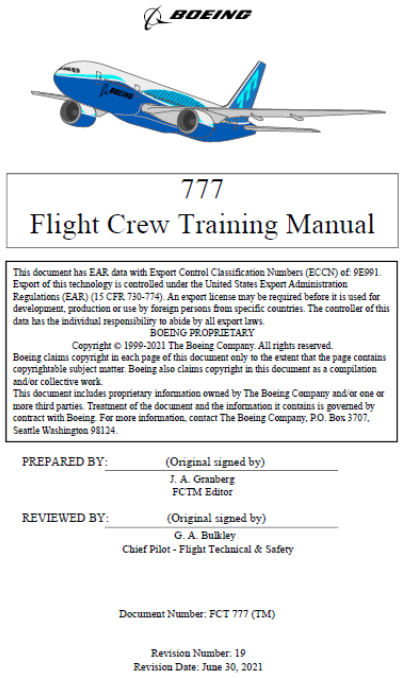

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Flight Crew Training Manual

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PREPARED BY: (Original signed by)
J. A. Granberg
FCTM Editor

REVIEWED BY: (Original signed by)
G. A. Bulkley
Chief Pilot - Flight Technical & Safety

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777 FCOM Preflight, Before Start and Shutdown Procedures

Preflight Procedure – Captain

Preflight Procedure – First Officer

FLIGHT DIRECTOR switch ..... ON

Flight instruments ..... Check

Verify that the flight instrument indications are correct.

Verify that only these flags are shown:

- TCAS OFF
- NO VSPD until takeoff V–speeds are selected

Verify that the flight mode annunciations are correct:

- autothrottle mode is blank
- roll mode is TO/GA
- pitch mode is TO/GA
- AFDS status is FLT DIR

Before Start Procedure

Start the Before Start Procedure after papers are on board.

MCP ..... Set C

IAS/MACH selector ..... Set V2

Arm LNAV as needed.

Arm VNAV.

Initial heading or track ..... Set

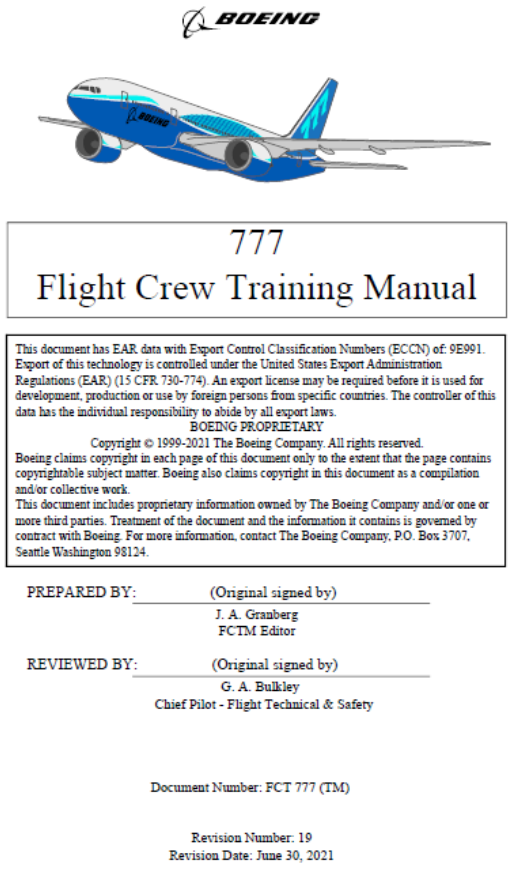
Initial altitude ..... Set

Shutdown Procedure

Start the Shutdown Procedure after taxi is complete.

FLIGHT DIRECTOR switches ..... OFF C, F/O

777 FCTM



Callouts

Both pilots should check the flight instruments and Flight Mode Annunciations (FMAs) at regular intervals to verify the selections made are correct for the phase of flight. Both pilots should crosscheck their MCP selections with the FMAs to ensure the airplane is responding as expected. Unexpected FMAs should be announced, evaluated and addressed appropriately.

777 FCTM

Callouts

The Pilot Monitoring (PM) makes callouts based on instrument indications, FMAs or observations for the appropriate condition. The Pilot Flying (PF) should verify the condition/location from the flight instruments and acknowledge. If the PM does not make the callout, the PF should make it.

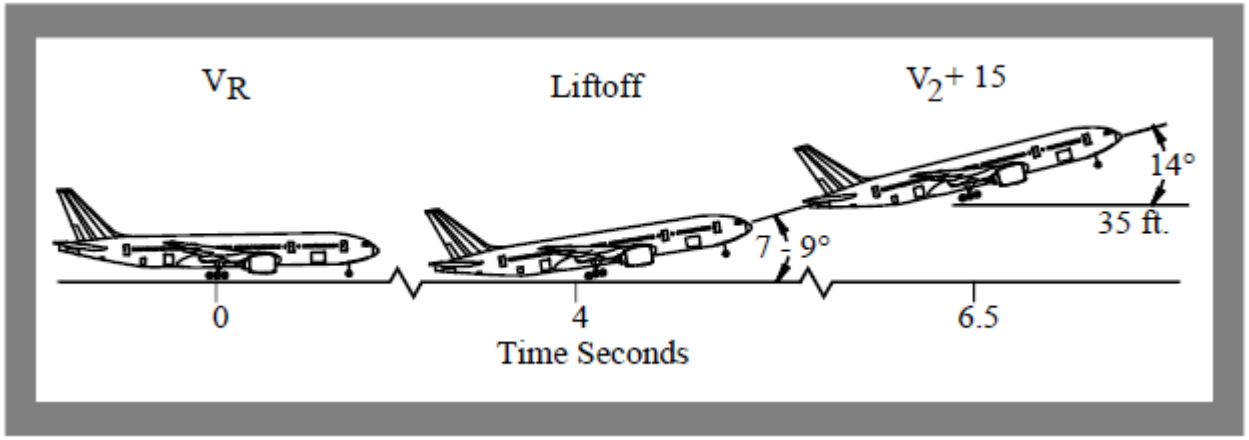
The PM calls out significant deviations from command airspeed or flight path. Either pilot should call out any abnormal indications of the flight instruments (flags, loss of deviation pointers, etc.).

Initiating Takeoff Roll

Autothrottle and flight director use is recommended for all takeoffs. However, do not follow F/D commands until after liftoff.

Rotation and Liftoff – All Engines

For optimum takeoff and initial climb performance, initiate a smooth continuous rotation at VR towards 15° of pitch attitude.



After liftoff, use the attitude indicator as the primary pitch reference. The flight director, in conjunction with indicated airspeed and other flight instruments is used to maintain the proper vertical flight path.

Note: The flight director pitch command is not used for rotation.

777 FCTM

Autopilot Engagement

The autopilot is FAA certified to allow engagement at or above 200 feet AGL after takeoff. The airplane should be in trim, and the flight director commands should be satisfied before autopilot engagement.

ALT Hold During Takeoff

- As a reminder, the AFDS pitch guidance is parked at 8° in the TO/GA mode.
- This indication is not meant to be used as guidance for the rotation.
- At VR, initiate a smooth rotation at 2° to 2.5° per second towards a 15° pitch attitude.
- Only after liftoff, should the pitch guidance be followed, and only if the guidance is appropriate.
- Pilots need to maintain awareness of the primary flight instruments… attitude, airspeed and altitude.
- Some operators have developed SOPs which include FMA callouts by either the PM or PF.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