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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2023–0671; Project Identifier AD–2022–01428–T; Amendment 39–22469; AD 2023–12–11]

RIN 2120–AA64

Airworthiness Directives; The Boeing Company Airplanes

AGENCY:

Federal Aviation Administration (FAA), DOT.

ACTION:

Final rule.

SUMMARY:

The FAA is superseding Airworthiness Directive (AD) 2022–03–20, which applied to all The Boeing Company Model 737–8, 737–9, and 737–8200 airplanes. AD 2022–03–20 required revising the limitations and operating procedures sections of the existing airplane flight manual (AFM) to incorporate limitations prohibiting the use of certain minimum equipment list (MEL) items, and to incorporate operating procedures for calculating takeoff and landing distances, when in the presence of interference from wireless broadband operations in the 3.7–3.98 GHz frequency band (5G C-Band) as identified by Notices to Air Missions (NOTAMs). Since the FAA issued AD 2022–03–20, the FAA determined that additional limitations are needed due to the continued deployment of new 5G C-Band base stations whose signals are expected to cover most of the contiguous United States at transmission frequencies between 3.7–3.98 GHz. This AD requires revising the limitations section of the existing AFM to incorporate limitations prohibiting the use of certain MEL items, and would retain the operating procedures from AD 2022–03–20 for calculating takeoff and landing distances, due to the presence of 5G C-Band interference. The FAA is issuing this AD to address the unsafe condition on these products.

DATES:

This AD is effective June 21, 2023.

ADDRESSES:

AD Docket: You may examine the AD docket at *regulations.gov* under Docket No. FAA–2023–0671; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to supersede AD 2022–03–20, Amendment 39–21937 (87 FR 4787, January 31, 2022) (AD 2022–03–20). AD 2022–03–20 applied to all The Boeing Company Model 737–8, 737–9, and 737–8200 airplanes. The NPRM published in the **Federal Register** on May 3, 2023 (88 FR 27786). The NPRM was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience 5G C-Band interference, and a determination that, during takeoffs and landings, as a result of this interference, certain airplane systems may not properly function, resulting in longer than normal landing or rejected takeoff distances due to the effect on thrust reverser deployment, spoilers, speedbrake deployment, and increased idle thrust, regardless of the approach type or weather.

In the NPRM, the FAA proposed to retain the requirements of AD 2022–03–20 until June 30, 2023. On or before June 30, 2023, the FAA proposed to require replacing those AFM limitations with limitations prohibiting the same dispatching or releasing to airports, and takeoff or landings on runways, and use of certain MEL items at all airports for non-radio altimeter tolerant airplanes. For radio altimeter tolerant airplanes, the FAA proposed to allow the prohibited operations at 5G C-Band mitigated airports (5G CMAs) as identified in an FAA Domestic Notice. The FAA proposed this AD to address degraded deceleration performance, which could lead to a runway excursion.

Discussion of Final Airworthiness Directive

Comments

The FAA provided the public with an opportunity to comment on the proposed AD and received comments from four commenters. The following presents the comments received on the NPRM and the FAA's response to each comment.

Support for NPRM

Boeing and the Air Line Pilots Association, International (ALPA), supported the NPRM without change.

The supportive comments from ALPA included additional viewpoints without a suggestion specific to the AD or a request the FAA can act on. These comments are outside the scope of this AD.

Request To Extend Compliance Time

Comment summary: Southwest Airlines and American Airlines expressed concern regarding the compliance time for the proposed actions and requested the FAA revise the AD to provide a minimum of 30 days from the effective date of the AD.

FAA response: The FAA understands the commenters' concerns and made every effort to publish this AD as soon as possible. After refraining from operating at their FCC-authorized levels for a year and a half, wireless companies are now able to operate at higher levels, yet still not at the levels authorized. Specifically, wireless companies expect to operate their networks in urban areas with minimal restrictions due to the completion of retrofits. Additionally, the FAA anticipates 19 additional telecommunication companies will begin transmitting in the C-Band after June 30, 2023. Although the FAA continues to work with the companies that intend to transmit in the 3.7–3.98-GHz band near 5G CMAs, the FAA has no agreement with those companies to provide the FAA with tower locations and other information necessary to support the current NOTAM/AMOC process. Therefore, the FAA will not be able to extend the June 30, 2023, date.

Conclusion

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. This AD is adopted as proposed in the NPRM.

Interim Action

The FAA considers this AD to be an interim action. Once the Technical Standard Order (TSO) standard for radio altimeters is established, which will follow the existing international technical consensus on the establishment of the minimum operational performance standards (MOPS), the FAA anticipates that the MOPS will be incorporated into the TSO. Once a new radio altimeter TSO is developed, approved, and available, the FAA might consider additional rulemaking.

Effective Date

Section 553(d) of the Administrative Procedure Act (APA) (5 U.S.C. 551 *et seq.*) requires publication of a rule not less than 30 days before its effective date. However, section 553(d) authorizes agencies to make rules effective in less than 30 days when the agency finds “good cause.” Radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 5G C-Band. This interference can cause other airplane systems to not properly function, resulting in longer than normal landing or rejected takeoff distances due to the effect on thrust reverser deployment, spoilers, speedbrake deployment, and increased idle thrust,

regardless of the approach type or weather. To address this unsafe condition, the actions required by this AD must be accomplished before the compliance date of June 30, 2023. The FAA based this date on the changes to the 5G C-Band environment beginning on July 1, 2023. These changes include increased wireless broadband deployment and transmissions closer to the parameters authorized by the FCC. The earlier operators learn of the requirements in this AD, the earlier they can take action to ensure compliance. An effective date less than 30 days would ensure the AD is codified earlier, thereby increasing awareness of its requirements. Therefore, the FAA finds that good cause exists pursuant to 5 U.S.C. 553(d) for making this amendment immediately effective.

Costs of Compliance

The cost information below describes the costs to change the AFM. Although this AD largely maintains the AFM limitations currently required by AD 2022–03–20, the FAA acknowledges that this AD may also impose costs on some aircraft operators from having to change their conduct to comply with the amended AFM. However, the FAA lacks the data necessary to quantify the costs associated with aircraft operators changing their conduct.

The FAA estimates that this AD affects 276 airplanes of U.S. registry. The FAA estimates the following costs to comply with this AD:

Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
AFM revision (retained actions from AD 2022–03–20)	1 work-hour 1 × $85 per hour = $85	$0	$85	$23,460
New AFM revisions (new action)	1 work-hour × $85 per hour = $85	0	85	2 23,460

1 The labor rate of $85 per hour is the average wage rate for an aviation mechanic.

2 The estimated cost for this revision would not constitute a significant economic impact (even for small entities) because $85 is a minimal cost compared to the regular costs of maintaining and operating a Model 737–8, 737–9, or 737–8200 transport category airplane.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the

scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

(1) Is not a "significant regulatory action" under Executive Order 12866,

(2) Will not affect intrastate aviation in Alaska, and

(3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

- Air transportation
- Aircraft
- Aviation safety
- Incorporation by reference
- Safety

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39—AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by:

a. Removing Airworthiness Directive (AD) 2022–03–20, Amendment 39–21937 (87 FR 4787, January 31, 2022), and

b. Adding the following new AD:

2023–12–11 The Boeing Company: Amendment 39–22469; Docket No. FAA–2023–0671; Project Identifier AD–2022–01428–T.

(a) Effective Date

This airworthiness directive (AD) is effective June 21, 2023.

(b) Affected ADs

This AD replaces AD 2022–03–20, Amendment 39–21937 (87 FR 4787, January 31, 2022) (AD 2022–03–20).

(c) Applicability

This AD applies to all The Boeing Company 737–8, 737–9, and 737–8200 airplanes, certificated in any category.

(d) Subject

Air Transport Association (ATA) of America Code 34, Navigation.

(e) Unsafe Condition

This AD was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7–3.98 GHz frequency band (5G C-Band), and a determination that, during takeoffs and landings, as a result of this interference, certain airplane systems may not properly function, resulting in longer than normal landing or rejected takeoff distances due to the effect on thrust reverser deployment, spoilers, speedbrake deployment, and increased idle thrust, regardless of the approach type or weather. The FAA is issuing this AD to address degraded deceleration performance, which could lead to a runway excursion.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

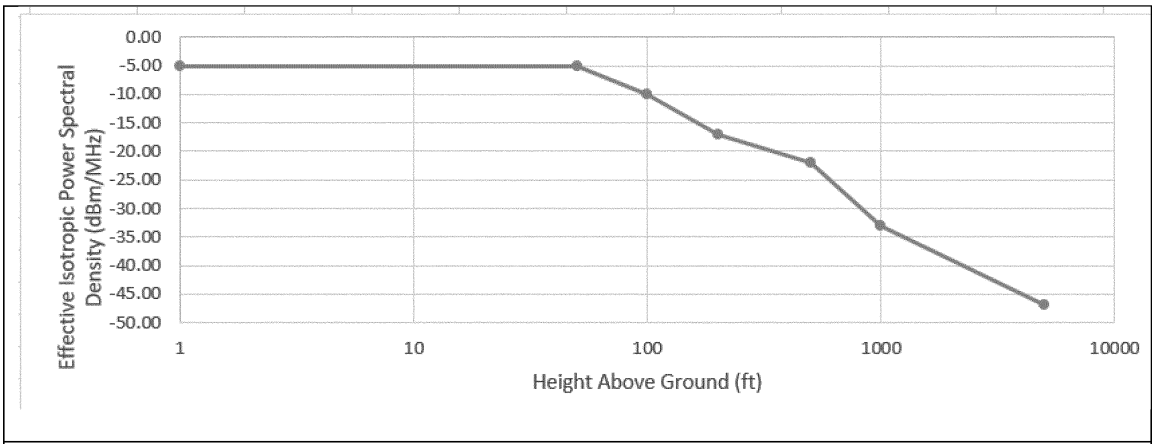
(g) Definitions

(1) For purposes of this AD, a "5G C-Band mitigated airport" (5G CMA) is an airport at which the telecommunications companies have agreed to voluntarily limit their 5G deployment at the request of the FAA, as identified by an FAA Domestic Notice.

(2) For purposes of this AD, a "radio altimeter tolerant airplane" is one for which the radio altimeter, as installed, demonstrates the tolerances specified in paragraphs (g)(2)(i) and (ii) of this AD, using a method approved by the FAA.

(i) Tolerance to radio altimeter interference, for the fundamental emissions (3.7–3.98 GHz), at or above the power spectral density (PSD) curve threshold specified in figure 1 to paragraph (g)(2)(i) of this AD.

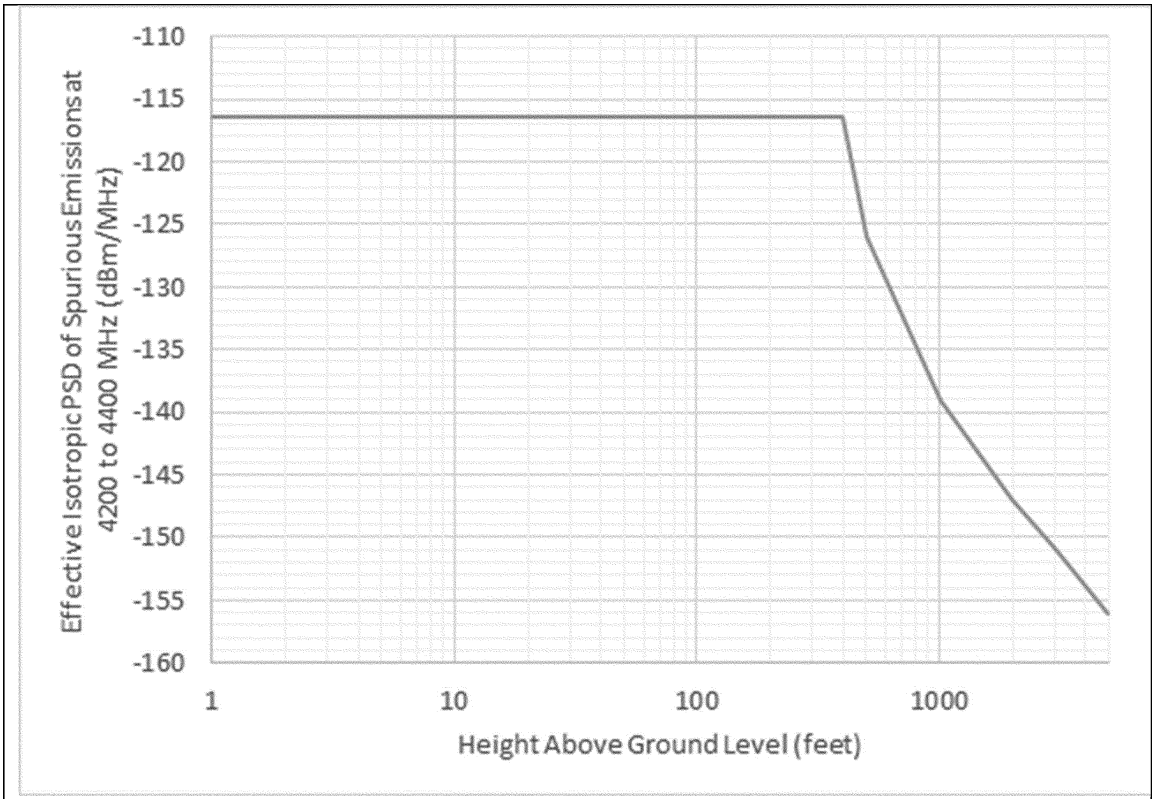
Figure 1 to paragraph (g)(2)(i)— *Fundamental Effective Isotropic PSD at Outside Interface of Aircraft Antenna*



Height above ground (ft)	Effective Isotropic PSD (dBm/MHz)
Aircraft on the ground	-5
50	-5
100	-10
200	-17
500	-22
1000	-33
5000	-47

(ii) Tolerance to radio altimeter interference, for the spurious emissions (3.7–3.98 GHz), at or above the PSD curve threshold specified in figure 2 to paragraph (g)(2)(ii) of this AD.

Figure 2 to paragraph (g)(2)(ii)— *Spurious Effective Isotropic PSD at Outside Interface of Aircraft Antenna*



Aircraft Altitude (ft AGL)	Effective Isotropic PSD (dBm/MHz)
1	-116.50
400	-116.50
500	-126.00
1000	-139.00
2000	-147.00
3000	-151.00
5000	-156.00

(3) For purposes of this AD, a “non-radio altimeter tolerant airplane” is one for which the radio altimeter, as installed, does not demonstrate the tolerances specified in paragraphs (g)(2)(i) and (ii) of this AD.

(4) Runway condition codes are defined in figure 3 to paragraph (g)(4) of this AD.

Figure 3 to paragraph (g)(4)— *Runway Condition Codes*

Runway Condition Code	Runway Condition Description	Reported Braking Action
6	Dry	Dry
5	Wet (smooth, grooved, or porous friction course (PFC)) or frost 3 mm (0.12 inch) or less of: water, slush, dry snow, or wet snow	Good
4	Compacted snow at or below -15°C (5°F) outside air temperature (OAT)	Good to medium
3	Wet (slippery), dry snow, or wet snow (any depth) over compacted snow Greater than 3 mm (0.12 inch) of: dry snow or wet snow Compacted snow at OAT warmer than -15°C (5°F)	Medium
2	Greater than 3 mm (0.12 inch) of: water or slush	Medium to poor
1	Ice	Poor
0	Wet ice, water on top of compacted snow, dry snow, or wet snow over ice	Nil

(h) Retained Airplane Flight Manual (AFM) Revision

This paragraph restates the requirements of paragraph (h) of AD 2022–03–20.

(1) Within 2 days after January 31, 2022 (the effective date of AD 2022–03–20): Revise the Limitations Section of the existing AFM to include the information specified in figure 4 to paragraph (h)(1) of this AD. This may be done by inserting a copy of figure 4 to paragraph (h)(1) of this AD into the existing AFM.

Figure 4 to paragraph (h)(1)— *AFM Limitations Revisions*

(Required by AD 2022-03-20)

Radio Altimeter 5G C-Band Interference, Takeoff and Landing Performance

The following limitations are required for dispatch or release to airports, and takeoff or landing on runways, in U.S. airspace in the presence of 5G C-Band wireless broadband interference as identified by NOTAM (NOTAMs will be issued to state the specific airports or approaches where the radio altimeter is unreliable due to the presence of 5G C-Band wireless broadband interference).

Minimum Equipment List (MEL)

Dispatch or release with any of the following MEL items is prohibited:

- 32-42-01 – Antiskid Systems
- 32-42-02 – Alternate Antiskid Valves
- 32-42-03 – Automatic Brake System
- 32-44-01 – Parking Brake Valve

Landing Operations on Runways with Condition Code 1 or 0

Dispatch or release to, or takeoff or landing on, runways with a runway condition code of 1 or 0 is prohibited.

Takeoff and Landing Performance

Operators must use the 5G C-Band Interference Takeoff Performance and Landing Distance Calculations procedure contained in the Operating Procedures Section of this AFM.

(2) Within 2 days after January 31, 2022 (the effective date of AD 2022–03–20): Revise the Operating Procedures Section of the existing AFM to include the information specified in figure 5 to paragraph (h)(2) of this AD. This may be done by inserting a copy of figure 5 to paragraph (h)(2) of this AD into the existing AFM.

Figure 5 to paragraph (h)(2)— *AFM Operating Procedures Revision*

(Required by AD 2022-03-20)

5G C-Band Interference Takeoff Performance and Landing Distance Calculations

Dispatch Guidance – Takeoff Performance

Stopping distance during a rejected takeoff (RTO) can be significantly increased due to the following potential effects on airplane systems:

- Limited spoiler extension
- Higher engine idle
- Thrust reversers may not deploy

For the increased stopping distance during an RTO, refer to the Departure Airport, Takeoff Performance section below.

Dispatch Guidance – Destination or Alternate Airport – Landing Performance

Calculate the required landing distance (select Method A or Method B).

Method A: Use of normal landing performance increased by a predetermined percentage

Use Prior to Descent, Required Landing Distance section below.

Method B: Use of the Non-Normal Configuration Landing Distance table for SPOILERS

Use the SPOILERS Non-Normal Configuration Landing Distance table in the Performance chapter of the AFM, or the applicable table below, for flaps 30 or flaps 40.

- Use the distance for MAX MANUAL braking configurations with the appropriate runway condition at estimated time of arrival.
- Apply all of the appropriate distance adjustments to include the reverse thrust adjustment for no reverse (NO REV).

For runway condition codes 6 and 5, obtain the required landing distance by using the higher of:

- The resulting unfactored distance increased by 15%, or
- The normal dispatch calculations.

For runway condition codes 4 and 3, increase the resulting unfactored distance by 15% to obtain the required landing distance.

For runway condition code 2, increase the resulting unfactored distance by 30% to obtain the required landing distance.

End of Method B

Departure Airport, Takeoff Performance
Select Method 1 or 2 to adjust the accelerate stop distance available (ASDA).
Note: Both methods provide an acceptable margin of safety.

Method 1: Adjust the ASDA by a predetermined value.
Adjust the ASDA by using the following adjustment:

Runway Condition Code	Runway Condition Description	Subtract from ASDA
6	Dry	950 feet
5	Wet skid resistant*	2,600 feet
5, 4, or 3	Wet/dry snow/wet snow/compact snow/slippery	3,700 feet
2	Slush or standing water	4,900 feet

*Provided approval to use wet skid resistant data has been received from the appropriate regulatory authority in accordance with the AFM.

Use the adjusted ASDA and complete the takeoff performance calculations using actual departure runway conditions and actual departure environmental conditions. Do not take credit for use of reverse thrust when calculating takeoff performance.

End of Method 1

Method 2: Adjust the ASDA by a predetermined factor.

Multiply the ASDA by the following factor:

Runway Condition Code	Runway Condition Description	ASDA Factor
6	Dry	0.86
5	Wet skid resistant*	0.76
5, 4, or 3	Wet/dry snow/wet snow/compact snow/slippery	0.71
2	Slush or standing water	0.65

*Provided approval to use wet skid resistant data has been received from the appropriate regulatory authority in accordance with the AFM.

Use the adjusted ASDA and complete the takeoff performance calculations using actual departure runway conditions and actual departure environmental conditions. Do not take credit for use of reverse thrust when calculating takeoff performance.

End of Method 2

Prior to takeoff:
Verify normal radio altimeter indications.

Climb out:
- TO/GA mode may not be available

- Monitor pitch mode engagement
- Monitor roll mode engagement
- Autopilot may not engage

Prior to Descent, Required Landing Distance

Do a time of arrival (en route) landing distance assessment using Method A or B. Use the SPOILERS Non-Normal Configuration Landing Distance table in the Performance chapter of the AFM, or the applicable table below, for flaps 30 or flaps 40.

Method A: Use of normal landing performance and increase by a predetermined percentage.

Use the Normal Configuration Landing Distance table for flaps 30 or flaps 40.

Note: The distances and adjustments shown in the Normal Configuration Landing Distance tables are factored and have been increased 15%.

Select the appropriate runway condition.

Select the distance for the MAX MANUAL braking configuration.

Apply all of the appropriate distance adjustments.

Note: Do not apply adjustments for reverse thrust.

To obtain the required landing distance, increase the resulting factored distance by the percentage below in Table 1 based on the runway condition code or runway braking action.

Table 1

Runway Condition Code	Reported Braking Action	Percentage
6	Dry	23%
5	Good	63%
4	Good to medium	56%
3	Medium	65%
2	Medium to poor	113%

Determine autobrake settings using the Determine Autobrake Settings section below.

End of Method A

Method B: Use of the Non-Normal Configuration Landing Distance table for SPOILERS

Use the SPOILERS Non-Normal Configuration Landing Distance table in the Performance chapter of the AFM, or the applicable table below, for flaps 30 or flaps 40.

Select the appropriate runway condition.

Select the distance for MAX MANUAL braking configuration.

Apply all of the appropriate distance adjustments including the reverse thrust adjustment for no reverse (NO REV).

For runway condition codes 6 to 3, increase the resulting unfactored distance by 15% to obtain the required landing distance.

For runway condition code 2, increase the resulting unfactored distance by 30% to obtain the required landing distance.

Determine autobrake settings using the Determine Autobrake Settings section below.

SPOILERS Non-Normal Configuration Landing Distance Tables

737-8 and 737-8200 One Position Tailskid, FLAPS 30, VREF30

	Landing Distances and Adjustments (Feet)								
	Reference Distance	Weight Adjustment	Altitude Adjustment*	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
Runway Condition Code	150,000 LB Landing Weight	Per 10,000 LB Above / Below 150,000 LB	Per 1,000 ft STD / HIGH	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	4870	250 / -270	130 / 170	-210 / 680	80 / -70	130 / -130	310	180	280
5	6300	420 / -410	230 / 320	-330 / 1160	200 / -170	210 / -210	420	610	1300
4	6890	430 / -430	240 / 330	-350 / 1210	260 / -210	210 / -210	420	740	1620
3	7330	450 / -450	250 / 340	-360 / 1270	310 / -250	220 / -220	420	910	2090
2	8290	610 / -570	330 / 460	-470 / 1660	440 / -340	280 / -280	450	1530	4410

737-8 and 737-8200 Two Position Tailskid, FLAPS 30, VREF30

	Landing Distances and Adjustments (Feet)								
	Reference Distance	Weight Adjustment	Altitude Adjustment*	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
Runway Condition Code	150,000 LB Landing Weight	Per 10,000 LB Above / Below 150,000 LB	Per 1,000 ft STD / HIGH	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	4670	250 / -250	130 / 170	-210 / 670	80 / -70	120 / -120	300	160	250
5	6030	410 / -380	220 / 320	-320 / 1130	190 / -160	200 / -200	410	550	1170
4	6610	420 / -400	230 / 330	-340 / 1180	240 / -200	200 / -200	410	680	1480
3	7050	430 / -420	240 / 340	-360 / 1240	300 / -240	210 / -200	410	850	1960
2	7980	590 / -540	330 / 460	-460 / 1640	420 / -330	270 / -270	450	1430	4110

737-9 FLAPS 30, VREF30

	Landing Distances and Adjustments (Feet)								
	Reference Distance	Weight Adjustment	Altitude Adjustment*	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
Runway Condition Code	160,000 LB Landing Weight	Per 10,000 LB Above / Below 160,000 LB	Per 1,000 ft STD / HIGH	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	5030	250 / -250	140 / 170	-210 / 690	90 / -80	130 / -130	310	170	270
5	6530	410 / -380	250 / 330	-340 / 1180	220 / -180	210 / -210	420	610	1290
4	7090	420 / -400	260 / 340	-350 / 1230	270 / -220	220 / -220	420	720	1560
3	7550	430 / -420	270 / 350	-370 / 1290	330 / -260	220 / -220	420	880	1990
2	8530	590 / -530	360 / 480	-480 / 1690	460 / -360	290 / -290	460	1480	4070

737-8 and 737-8200 One Position Tailskid, FLAPS 40, VREF40

	Landing Distances and Adjustments (Feet)								
	Reference Distance	Weight Adjustment	Altitude Adjustment*	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
Runway Condition Code	150,000 LB Landing Weight	Per 10,000 LB Above / Below 150,000 LB	Per 1,000 ft STD / HIGH	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	4630	300 / -250	140 / 170	-210 / 670	90 / -80	120 / -120	330	160	250
5	5860	490 / -380	230 / 310	-320 / 1110	190 / -160	190 / -190	420	510	1070
4	6450	500 / -390	230 / 320	-340 / 1170	250 / -200	190 / -190	420	640	1380
3	6900	510 / -420	240 / 330	-350 / 1230	310 / -240	200 / -200	410	800	1830
2	7670	670 / -520	320 / 450	-450 / 1610	410 / -320	260 / -260	450	1260	3430

737-8 and 737-8200 Two Position Tailskid, FLAPS 40, VREF40

	Landing Distances and Adjustments (Feet)								
	Reference Distance	Weight Adjustment	Altitude Adjustment*	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
Runway Condition Code	150,000 LB Landing Weight	Per 10,000 LB Above / Below 150,000 LB	Per 1,000 ft STD / HIGH	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	4600	310 / -250	140 / 170	-210 / 670	90 / -70	120 / -120	330	160	250
5	5830	500 / -370	230 / 310	-320 / 1110	190 / -160	190 / -190	420	510	1060
4	6420	510 / -390	240 / 320	-330 / 1160	250 / -200	190 / -190	420	630	1370
3	6870	520 / -410	250 / 330	-350 / 1220	310 / -240	200 / -200	410	800	1820
2	7630	680 / -520	330 / 450	-450 / 1610	410 / -320	260 / -260	450	1250	3400

737-9 FLAPS 40, VREF40

	Landing Distances and Adjustments (Feet)								
	Reference Distance	Weight Adjustment	Altitude Adjustment*	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
Runway Condition Code	160,000 LB Landing Weight	Per 10,000 LB Above / Below 160,000 LB	Per 1,000 ft STD / HIGH	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	4920	330 / -250	150 / 180	-210 / 690	90 / -80	130 / -130	330	170	260
5	6280	520 / -370	250 / 340	-330 / 1160	210 / -180	200 / -200	430	550	1150
4	6850	520 / -390	250 / 340	-350 / 1200	270 / -220	210 / -210	430	660	1410
3	7300	540 / -410	260 / 350	-360 / 1260	330 / -260	210 / -210	430	820	1830
2	8140	690 / -510	340 / 470	-460 / 1650	450 / -340	270 / -270	460	1290	3420

*For landing distance at or below 8,000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8,000 ft, first apply the STD adjustment to derive a new reference landing distance for 8,000 ft then apply the HIGH adjustment to this new reference distance.

Reference distance is based on MAX MANUAL braking, sea level, standard day, no wind or slope and maximum reverse thrust.

Reference distance includes a distance from threshold to touchdown associated with a flare time of 7 seconds.

Distances are based on SPOILERS failure distances which conservatively approximates the effects of 5G interference after the Reverse Thrust Adjustment for no Reversers is applied.

Actual (unfactored) distances are shown.

Note: per procedure, MAX MANUAL braking is not required for normal operations.

End of Method B

Determine Autobrake Settings

- Determine desired AUTOBRAKE setting by using the normal configuration landing distance.

  Note: Normal manual or normal autobrakes can be used. The use of maximum brakes is not needed except as stated in the During Landing section below.

During Approach

- Monitor radio altimeters for anomalies.
- Monitor performance of autopilot and autothrottle. If the autopilot or autothrottle is not performing as expected, disconnect both the autopilot and autothrottle and apply manual inputs to ensure proper control of flight path.

At DA(H), MDA(H), or the Missed Approach Point

- If suitable visual reference is established, disengage the autopilot and autothrottle and continue for a normal manual landing.

- If a go-around is needed, do the go-around and the missed approach procedure either in manual or automatic flight.

During Landing

- Radio altitude-based altitude aural callouts during approach may not be available or may be erroneous.
- Manual deployment of the speedbrakes may be needed.
- If the thrust reversers do not deploy, immediately ensure the speedbrakes are extended, apply manual braking, and modulate as needed for the existing runway conditions.

Note: In some conditions, maximum manual braking may be needed throughout the entire landing roll.

During Go-around and Missed Approach

- TO/GA mode may not be available.
- Monitor thrust and verify that thrust increases.
- Monitor pitch mode engagement.
- Monitor roll mode engagement.
- Autopilot may not engage.

(i) New Requirement: AFM Revision for Non-Radio Altimeter Tolerant Airplanes

For non-radio altimeter tolerant airplanes, do the actions specified in paragraphs (i)(1) and (2) of this AD.

(1) On or before June 30, 2023, revise the Limitations Section of the existing AFM to include the information specified in figure 6 to paragraph (i) of this AD. This may be done by inserting a copy of figure 6 to paragraph (i) of this AD into the existing AFM. Incorporating the AFM revision required by this paragraph terminates the AFM revision required by paragraph (h)(1) of this AD.

(2) Before further flight after incorporating the limitations specified in figure 6 to paragraph (i) of this AD, remove the AFM revision required by paragraph (h)(1) of this AD.

Figure 6 to paragraph (i)— *AFM Revision for Non-Radio Altimeter Tolerant Airplanes*

(Required by AD 2023-12-11)

Radio Altimeter 5G C-Band Interference, Takeoff and Landing Performance

Due to the presence of 5G C-Band wireless broadband interference, the following limitations are required for dispatch or release to airports, and takeoff or landing on runways, in the contiguous U.S. airspace.

Minimum Equipment List (MEL)

Dispatch or release with any of the following MEL items is prohibited:

- 32-42-01 – Antiskid Systems
- 32-42-02 – Alternate Antiskid Valves
- 32-42-03 – Automatic Brake System
- 32-44-01 – Parking Brake Valve

Landing Operations on Runways with Condition Code 1 or 0

Dispatch or release to, or takeoff or landing on, runways with a runway condition code of 1 or 0 is prohibited.

Takeoff and Landing Performance

Operators must use the 5G C-Band Interference Takeoff Performance and Landing Distance Calculations procedure contained in the Operating Procedures Section of this AFM.

(j) New Requirement: AFM Revision for Radio Altimeter Tolerant Airplanes

For radio altimeter tolerant airplanes, do the actions specified in paragraphs (j)(1) and (2) of this AD.

(1) On or before June 30, 2023, revise the Limitations Section of the existing AFM to include the information specified in figure 7 to paragraph (j) of this AD. This may be done by inserting a copy of figure 7 to paragraph (j) of this AD into the existing AFM. Incorporating the AFM revision required by this paragraph terminates the AFM revision required by paragraph (h)(1) of this AD.

(2) Before further flight after incorporating the limitations specified in figure 7 to paragraph (j) of this AD, remove the AFM revision required by paragraph (h)(1) of this AD.

Figure 7 to paragraph (j)— *AFM Revision for Radio Altimeter Tolerant Airplanes*

(Required by AD 2023-12-11)

Radio Altimeter 5G C-Band Interference, Takeoff and Landing Performance

Due to the presence of 5G C-Band wireless broadband interference, the following limitations are required for dispatch or release to airports, and takeoff or landing on runways, in the contiguous U.S. airspace, unless operating at a 5G C-Band mitigated airport as identified in an FAA *Domestic Notice*.

Minimum Equipment List (MEL)

Dispatch or release with any of the following MEL items is prohibited:

- 32-42-01 – Antiskid Systems
- 32-42-02 – Alternate Antiskid Valves
- 32-42-03 – Automatic Brake System
- 32-44-01 – Parking Brake Valve

Landing Operations on Runways with Condition Code 1 or 0

Dispatch or release to, or takeoff or landing on, runways with a runway condition code of 1 or 0 is prohibited.

Takeoff and Landing Performance

Operators must use the 5G C-Band Interference Takeoff Performance and Landing Distance Calculations procedure contained in the Operating Procedures Section of this AFM.

(k) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Operational Safety Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or responsible Flight Standards Office, as appropriate. If sending information directly to the manager of the Operational Safety Branch, send it to the attention of the person identified in paragraph (l) of this AD. Information may be emailed to: *AMOC@faa.gov*.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the responsible Flight Standards Office.

(3) AMOCs approved for AD 2021–23–12, Amendment 39–21810 (86 FR 69984, December 9, 2021) providing relief for specific radio altimeter installations are approved as AMOCs for the requirements specified in paragraph (h) of this AD until June 30, 2023.

(l) Related Information

For more information about this AD, contact Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712–4137; phone: 817–222–5390; email: *operationalsafety@faa.gov*.

(m) Material Incorporated by Reference

None.

Issued on June 9, 2023.

Michael Linegang,

Acting Director, Compliance & Airworthiness Division, Aircraft Certification Service.

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