

1. Key highlights of the final rule

What the FAA is requiring?

Radio altimeters operate in the 4.2–4.4 GHz band. New terrestrial wireless services will operate immediately below that spectrum, including the newly allocated Upper C-band. Existing radio altimeters may receive misleading altitude information, lose altitude information altogether, or provide erroneous information to integrated systems.

The new regulation therefore establishes an **Interference Tolerance Mask**, or ITM, defining the minimum level of adjacent-frequency interference that the complete radio-altimeter system must tolerate while continuing to perform its intended function.

The requirement applies to the **entire installed system**, not merely the receiver/transceiver. The FAA describes a radio-altimeter system as generally consisting of:

- Transceiver
- Antennas
- Cabling
- Aircraft integration and dependent functions

Compliance may be achieved through improvements to the transceiver, antennas, system configuration, or a combination of those elements.

Two principal compliance deadlines

Aircraft operation	Compliance deadline
Part 121 aircraft	December 30, 2030
Part 129 aircraft with 30 or more passenger seats or payload capacity greater than 7,500 pounds	December 30, 2030
Most remaining Part 91 aircraft equipped with a radio altimeter	October 31, 2034
Parts 125, 133, 135, 136, 137 and 194 operations, because they are also subject to Part 91	October 31, 2034
Remaining smaller Part 129 aircraft	October 31, 2034

The first deadline is one day before the FCC permits new Upper C-band terrestrial service to begin on **December 31, 2030**. The FAA extended the second compliance period to 2034 to give general aviation, rotorcraft, small operators and older-aircraft fleets additional time.

Geographic applicability

The rule applies when aircraft operate in the airspace of:

- The 48 contiguous states
- Washington, D.C.
- Generally, airspace within three nautical miles of the coast

It does not presently apply solely because an aircraft operates in:

- Alaska
- Hawaii
- Puerto Rico
- Other U.S. territories or possessions
- Airspace generally between three and twelve nautical miles offshore

However, an aircraft based outside the applicable area will need compliant equipment if it enters the covered airspace.

Existing aircraft are included

This is not merely a forward-fit rule for newly manufactured aircraft. It applies equally to existing aircraft and new aircraft after the applicable deadline.

It covers:

- Airline aircraft
- Business aircraft
- General aviation aircraft
- Part 135 aircraft
- Helicopters
- Public aircraft
- State and local government aircraft

- Military aircraft
- Aircraft on which a radio altimeter was installed voluntarily

Aircraft without a radio altimeter are not affected.

The FAA also indicates that removing an optional, noncompliant radio altimeter may be preferable to retaining one that could provide misleading information, provided the aircraft and its required systems can legally and safely operate without it.

2. Why the FAA considers this a safety issue

Radio-altimeter data may feed far more than a cockpit altitude display. Depending upon the aircraft, it can support:

- TAWS and ground-proximity warning
- TCAS functions
- Predictive windshear systems
- Autoland
- Automatic flare and throttle functions
- CAT II and CAT III approaches
- Enhanced Flight Vision Systems
- Head-up-display operations to touchdown
- Helicopter Category A and B takeoffs
- Hover and search-and-rescue autopilot modes
- Night-vision-goggle operations
- Aircraft ground/air logic
- Thrust-reverser and spoiler deployment logic

The FAA's concern is not simply a blank radio-altimeter display. A misleading signal can cause automated systems to react as though the aircraft is at a different height than it actually is. That can generate erroneous warnings, suppress legitimate warnings or trigger inappropriate flight-control and landing-system responses. The FAA concludes that no currently installed radio-altimeter population can be assumed to withstand the future Upper C-band environment merely because it was previously modified for the Lower C-band. In other words, many aircraft already modified during the first 5G response may require another upgrade.

The new requirement is intended as a **“one-and-done” solution** addressing Lower C-band, Upper C-band and, to an extent, possible future spectrum activity near the radio-altimeter band. The FAA stops short of guaranteeing compatibility with every possible future spectrum allocation.

3. Equipment and certification pathway

The final rule is performance-based. It does not mandate one manufacturer, part number or universal installation.

Potential compliance paths include:

- Modification of equipment previously authorized under TSO-C87 or TSO-C87a
- New equipment approved under TSO-C87a
- Future equipment approved under the planned **TSO-C221**
- Equipment designed and approved under a type certificate or supplemental type certificate
- Amendment of an existing aircraft TC or STC
- A new STC where necessary

The new RTCA/EUROCAE radio-altimeter MOPS are expected to be published in **March 2027**, and the FAA says it intends to issue TSO-C221 shortly thereafter. However, the FAA is not requiring operators to wait for or use TSO-C221 exclusively.

An installation may comply using equipment that:

1. Meets the FAA ITM;
2. Meets the aircraft-specific installation and intended-function requirements; and
3. Is incorporated through an acceptable aircraft design approval.

The FAA provides an especially important streamlining principle for SEA: when an RA manufacturer has demonstrated ITM compliance and an installation remains within the parameters defined by that manufacturer, an additional aircraft-level ITM demonstration should not be necessary.

Minor versus major changes

The rule suggests that certain replacements may be treated as minor changes when:

- The existing radio-altimeter design is modified under its current TSO authorization;
- The modification primarily creates interference tolerance;
- Other performance characteristics are not appreciably affected; and
- The aircraft installation remains substantially unchanged.

More extensive replacements involving antennas, cabling, interfaces or dependent aircraft systems may be major changes requiring amended type design or an STC.

This distinction will be commercially important. A near-drop-in transceiver replacement might be completed during an overnight maintenance event. An older or unsupported aircraft may require several days of downtime, new cabling, antenna work, engineering analysis, ground tests and possibly flight testing.

4. What happens if an aircraft is not compliant

The deadlines are firm. The FAA included a mechanism allowing the Administrator to authorize limited continued operation in rare circumstances, but FAA repeatedly states that these authorizations are not intended to become routine.

Likely restrictions for noncompliant airplanes after the relevant deadline include prohibitions on:

- CAT II and CAT III approaches
- SA CAT I and SA CAT II approaches
- Autoland
- EFVS to touchdown
- HUD operations to touchdown

Likely helicopter restrictions include prohibitions on:

- Category A or Category B takeoffs or landings requiring RA data
- Search-and-rescue autopilot modes
- Hover autopilot modes
- Procedures requiring radio-altimeter minima
- Certain NVG operations without an exemption

After October 31, 2034, FAA indicates it generally does not intend to authorize noncompliant RA use for operations involving required TAWS, TCAS/ACAS, predictive windshear or NVG functions. The FAA also plans to supersede existing 5G-related airworthiness directives and recognize compliant systems as an AMOC with relevant existing ADs.

5. Retrofit costs and rebates

The FAA estimates airplane retrofit costs at approximately:

- **\$80,000 to \$120,000 per radio altimeter**, including equipment and installation
- Approximately **\$40,000 per rotorcraft radio altimeter** in its economic assumptions

Many commercial aircraft contain two or three radio altimeters, so the aircraft-level value can be substantially greater.

The FAA estimates total civil-fleet retrofit costs of roughly **\$4.8 billion to \$7.1 billion** in 2025 dollars. The cost table on pages 12–13 shows particularly substantial expenditures in the Part 91 and Part 135 populations, not only the airline fleet.

FCC rebate program

The accompanying FCC action creates a radio-altimeter retrofit rebate program for eligible U.S. civil-aircraft owners and operators.

The document states that:

- Auction winners will fund the program.
- Funding is expected approximately six to twelve months after completion of the Upper C-band auction.
- The auction must be completed by July 4, 2027.
- Eligible domestic operators may receive a lump-sum payment.
- The payment is intended to defray both radio-altimeter equipment and aircraft-alteration costs.
- State and local public-safety aircraft may qualify unless legally prohibited.
- Foreign operators are not eligible.

The precise reimbursement amounts, qualifying dates, documentation standards and claim procedures are contained in the FCC order rather than fully detailed in the FAA rule.

Importantly, operators will apparently need to pay for the retrofit initially and later receive reimbursement.