U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: **NOISE ABATEMENT DEPARTURE PROFILES**

Date: 7/22/93
Initiated by: AFS-400

AC No: **91-53A**

1. PURPOSE. This advisory circular (AC) describes acceptable criteria for safe noise abatement departure profiles (NADP) for subsonic turbojet-powered airplanes with a maximum certificated gross takeoff weight of more than 75,000 pounds. These procedures provide the user with one means, although not the only means, of establishing acceptable NADP's. These departure profiles are consistent with the airworthiness standards required by the Federal Aviation Regulations (FAR's) Part 25 for type certification and FAR Part 91 for general airplane operations. This AC also provides a technical analysis and description of typical departure profiles that are consistent with the Federal Aviation Administration's (FAA's) safety responsibilities and have the potential to minimize the airplane noise impact on communities surrounding airports.

2. CANCELLATION. AC 91-53, Noise Abatement Departure Profile, dated October 17, 1978, is canceled.

3. RELATED READING MATERIAL.

a. FAR Parts 25, 91, 121, 125, 129, and 135.

b. U.S. Department of Transportation, Federal Aviation Administration Environmental Assessment for AC 91-53A. Copies may be obtained from the Office of Environment and Energy, FAA, 800 Independence Avenue SW., Washington, DC 20591.

c. FAA Analysis of Noise Abatement Departure Procedures for Large Turbojet Airplanes. Copies may be obtained from the Office of Environment and Energy, FAA, 800 Independence Avenue SW., Washington, DC 20591.

d. County of Orange, California, Environmental Impact Report #546. Copies may be obtained from County of Orange, Environmental Management Agency, 12 Civic Center Plaza, P.O. Box 4048, Santa Ana, CA 92701-4048.

4. BACKGROUND.

a. For several years, the FAA has worked to develop and standardize profiles to minimize airplane noise. As part of that commitment, the FAA has worked with airport managers, airplane operators, pilots, special interest groups, and Federal, State, and local agencies in numerous programs for evaluating noise levels in the airport environment. The research considered a variety of departure flight tracks and profiles.

b. From an environmental standpoint, avoiding noise sensitive areas by using preferential noise abatement runways and flight tracks whenever possible can effectively supplement a comprehensive noise abatement program. The FAA believes that using the two NADP's described in this AC for subsonic turbojet-powered airplanes can provide environmental benefits to the airport communities. The profiles outline acceptable criteria for speed, thrust settings, and airplane configurations used in connection with NADP's. These NADP's can be combined with preferential runway selection and flightpath techniques to minimize noise impact.

c. FAA reviews of various airplane vertical NADP's indicate that some intricate NADP's have been developed on an airport specific basis. The management of these intricate profiles could compromise the pilot's attention to interior flight deck details, traffic avoidance, and other safety responsibilities.

5. DEFINITIONS.

a. NADP. Noise abatement departure profile.

b. Close-in Community NADP's. NADP's for individual airplane types intended to provide noise reduction for noise sensitive areas located in close proximity to the departure end of an airport runway.

c. Distant Community NADP's. NADP's for individual airplane types intended to provide noise reduction for all other noise sensitive areas.

d. AFE. Above field elevation.

6. NADP's. Acceptable criteria have been established for two types of NADP's for each airplane type, as defined for use by each airplane operator. These departure profiles are applicable to all types of subsonic turbojet-powered airplanes over 75,000 pounds gross takeoff weight. The two types of NADP's are the "close-in" and "distant" profiles as described below.

a. Close-in NADP.

(1) Initiate thrust cutback at an altitude of no less than 800 feet AFE and prior to initiation of flaps or slats retraction.

(2) The thrust cutback may be made by manual throttle reduction or by approved automatic means. The automatic means may be armed prior to takeoff for cutback at or above 800 feet AFE or may be pilot initiated at or above 800 feet AFE.

(3) For airplanes without an operational automatic thrust restoration system, achieve and maintain no less than the thrust level necessary after thrust reduction to maintain, for the flaps/slats configuration of the airplane, the takeoff path engine-inoperative climb gradients specified in FAR Section 25.111(c)(3) in the event of an engine failure.

(4) For airplanes with an operational automatic thrust restoration system, achieve and maintain no less than the thrust level necessary after thrust reduction to maintain, for the flaps/slats configuration of the airplane, a takeoff path engine-inoperative climb gradient of zero percent, provided that the automatic thrust restoration system will, at a minimum, restore sufficient thrust to maintain the takeoff path engine-inoperative climb gradients specified in FAR Section 25.111(c)(3) in the event of an engine failure.

(5) During the thrust reduction, coordinate the pitchover rate and thrust reduction to provide a decrease in pitch consistent with allowing indicated airspeed to decay to no more than 5 knots below the all-engine target climb speed and, in no case to less than V_2 for the airplane configuration. For automated throttle systems, acceptable speed tolerances can be found in AC 25-15, Approval of Flight Management Systems in Transport Category Airplanes.

(6) Maintain the speed and thrust criteria as described in subparagraph 6 a(3) through 6 a(5) to 3,000 feet AFE or above, or until the airplane has been fully transitioned to the en route climb configuration (whichever occurs first), then transition to normal en route climb procedures.

b. Distant NADP.

(1) Initiate flaps/slats retraction prior to thrust cutback initiation. Thrust cutback is initiated at an altitude no less than 800 feet AFE.

(2) The thrust cutback may be made by manual throttle reduction or by approved automatic means. The automatic means may be armed prior to takeoff for cutback at or above 800 feet AFE or may be pilot initiated at or above 800 feet AFE.

(3) For airplanes without an operational automatic thrust restoration system, achieve and maintain no less than the thrust level necessary after thrust reduction to maintain, for the flaps/slats configuration of the airplane, the takeoff path engine-inoperative climb gradients specified in FAR Section 25.111(c)(3) in the event of an engine failure.

(4) For airplanes with an operational automatic thrust restoration system, achieve and maintain no less than the thrust level necessary after thrust reduction to maintain, for the flaps/slats configuration of the airplane, a takeoff path engine-inoperative climb gradient of zero percent, provided that the automatic thrust restoration system will, at a minimum, restore sufficient thrust to maintain the takeoff path engine-inoperative climb gradients specified in FAR Section 25.111(c)(3) in the event of an engine failure.

(5) During the thrust reduction, coordinate the pitchover rate and thrust reduction to provide a decrease in pitch consistent with allowing indicated airspeed to decay to no more than 5 knots below the all-engine target climb speed and, in no case to less than V_2 for the airplane configuration. For automated throttle systems, acceptable speed tolerances can be found in AC 25-15, Approval of Flight Management Systems in Transport Category Airplanes.

(6) Maintain the speed and thrust criteria as described in subparagraph 6b(3) through 6 b(5) to 3,000 feet AFE or above, or until the airplane has been fully transitioned to the en route climb configuration (whichever occurs first), then transition to normal en route climb procedures.

7. OPERATIONAL GUIDELINES.

a. Each airplane operator may apply the procedures specified in this AC to determine the following for each of its airplane types:

(1) Close-in community NADP.

(2) Distant community NADP.

b. For each NADP, the airplane operator should specify the altitude AFE at which thrust reduction from takeoff thrust or airplane configuration change, excluding gear retraction, is initiated.

c. Each airplane operator should limit the number of NADP's for any airplane type to no more than two.

d. Each airplane operator is encouraged to use the appropriate NADP when an airport operator requests its use to abate noise for either a close-in or distant community.

e. This AC should not be construed to affect the responsibilities and authority of the pilot in command for the safe operation of the airplane.

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