

Appendix B

Ann Arbor Municipal Airport Noise Abatement Procedure brochure.

ARB

Ann Arbor Municipal Airport - ARB



AIRPORT NOTES:

- The Run-up areas are located at each end of runway 06-24. The run-up area for runway 24 and the eastern most 200 feet of the parallel taxiway southwest of the approach end is NOT visible from the control tower.
- When the tower is closed, activate Pilot Controlled Lighting by clicking 7 times within 5 seconds on CTAF (120.30) for high intensity.
- When the tower is closed, confirm snow removal operations and winter conditions on CTAF and ATIS / AWOS.
- When the tower is closed and weather conditions favor either runway, **runway 24 is the preferred runway of use.**
- All turbine powered aircraft are requested to perform the **NBAA “Close-in” noise abatement procedures for arrivals and departures.**

<http://nbaa.org/ops/environment/quiet-flying/#close-in>

- It is requested that turbine powered airplanes do not perform touch-and-go landings.

NOISE SENSITIVE AREAS:

ALL QUADRANTS SURROUNDING AIRPORT.

AIRPORT INFORMATION:

Elevation: 839' MSL

SVM VOR: 114.30

Runway 06 – 24: 3,505' X 75' (concrete, grooved)

Runway 12 – 30: 2,750' X 110' (turf)

ATIS: 134.55

CTAF: 120.30

Control Tower: 120.30

Ground Control: 121.60

DTW Clnc/Del (after hours): 121.60

DTW Approach/Departure: 118.95

Control Tower Hours of Operation: 08:00 – 20:00 Local (daily)

Airspace Class:

Class “D” Airspace = 08:00 – 20:00 Local

Class “G” Airspace = 20:00 – 08:00 Local

Traffic Pattern Altitudes:

Piston Aircraft: 1,000' AGL (1,800' MSL)

Turbine Aircraft: 1,500' AGL (2,300' MSL)

Traffic Pattern Direction:

Runway 06 – Right Hand Pattern

Runway 24 – Left Hand Pattern (preferred calm wind runway)

NOISE SENSITIVE AREAS:

ALL QUADRANTS SURROUNDING AIRPORT!



Ann Arbor Airport

Community Friendly

Flight and Noise Abatement Procedures

at Ann Arbor Municipal Airport - ARB

This brochure has been prepared to help pilots operate their aircraft in the quietest manner possible, while remaining consistent with safety. It is also designed to help the airport be a good neighbor to the surrounding residential communities.

The Ann Arbor Airport Noise Abatement Procedures focuses on pilot education and cooperation. Compliance with noise abatement procedures is requested unless deviations are made necessary by weather, ATC instructions or clearances, an inflight emergency or other safety considerations.

The procedures described in this brochure are not intended to preempt the responsibilities of the pilot-in-command for safe aircraft operations. Recommended procedures are not intended to conflict with instructions from ATC or those which are the exclusive authority of the FAA.

Pilots are the key to a successful Noise Abatement program.

Your courtesy will enhance the airport’s operating environment and assist in preserving this valuable community economic development gateway transportation asset.

All inquires may be addressed to the airport manager at 734-994-9124 or by email at: mjkulhanek@a2gov.org
You may also learn more about the Ann Arbor Community by visiting: <http://www.a2gov.org/>

Have a great flight.

Thank you for visiting the Ann Arbor Municipal Airport.

These procedures are intended to reduce and limit the sound footprint of departing and arriving Aircraft over populated areas.

Recommended ARRIVAL Procedures:

VFR Arrivals During Control Tower operations, join the traffic pattern as assigned by ATC remaining at or above 2,000' MSL when practical until within traffic pattern boundaries. Other than Control Tower operations, remain at or above 2,000' MSL when practical outside of the traffic pattern boundaries.

IFR Arrivals: Fly arrival procedure as assigned by ATC. All turbine powered aircraft are requested to perform the **NBAA "Close-in" noise abatement procedure for arrivals.**

Recommended DEPARTURE Procedures:

VFR Departures

Maintain runway heading and best rate of climb (Vy) airspeed to 1,300' MSL (500' AGL) when possible. Reduce power as soon as practical. Then...

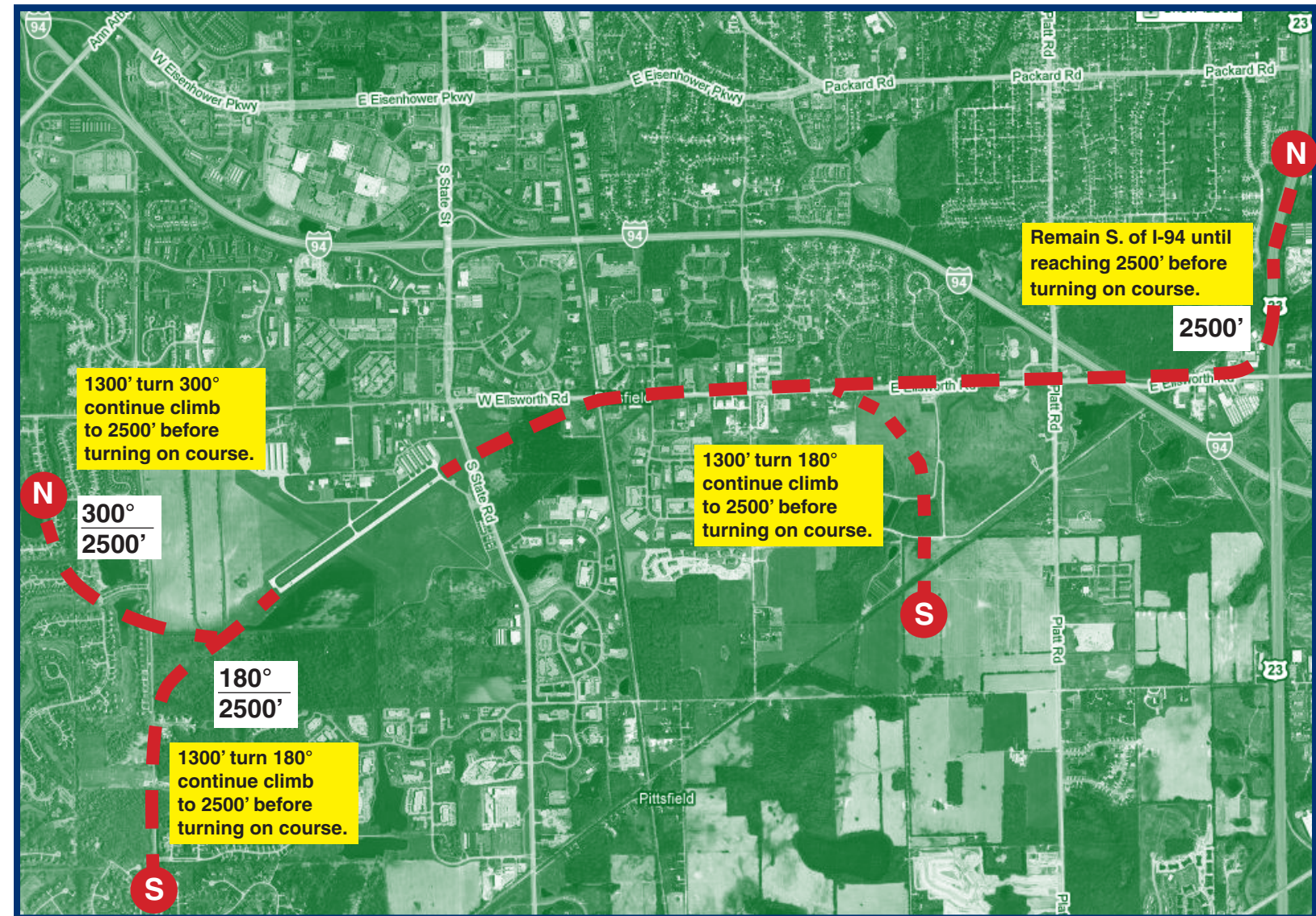
Runway 06:

When exiting the traffic pattern remain south of East-West highway (I-94) over Ellsworth Road, then turn North over North-South highway (US-23). Remain on North heading until at or above 2,500' MSL or clear of the city.

Runway 24:

- a) When exiting the traffic pattern to the North or East (heading 300° clockwise to 060), remain on a 300° heading until reaching 2,500' MSL, then proceed on course.
- b) When exiting the traffic pattern to the South or East (heading 060 clockwise to 180°), remain on a 180° heading until 3 miles south of the runway centerline and at or above 2,500' MSL, then proceed on course.
- c) When exiting the traffic pattern to the South or West (heading 180° clockwise to 300°), remain on runway heading to 2500' MSL, then proceed on course.

IFR Departures: As cleared by Air Traffic Control (ATC), maintain runway heading or assigned heading and best rate of climb (Vy) airspeed to assigned altitude. All turbine powered aircraft are requested to perform the **NBAA "Close-in" noise abatement procedure for departure.**



Map not to scale. Not for navigational use.

Recommended TRAFFIC PATTERN procedures:

Maintain runway heading and best rate of climb (Vy) airspeed to Traffic Pattern Altitude when possible. Reduce power as soon as practical. When possible, vary crosswind turn location. Please be mindful of multiple Touch-and-Go landings, especially early morning and evening.



Ann Arbor Airport



National Business Aviation Association

NOISE ABATEMENT PROGRAM

NBAA's Noise Abatement Program has been in existence since 1967. The NBAA objectives and operating procedures have withstood the test of time and have been effective in reducing noise exposure for citizens on the ground. The NBAA noise procedures are recommended as a standard for all operations where aircraft manufacturers have not recommended specific procedures. The NBAA procedures are to supplement and be complementary to established noise abatement programs containing procedures and techniques for specific aircraft manufacturers and local airport authorities.

Although the aircraft manufacturers, as a group, have not established specific noise abatement procedures for every aircraft, some individual manufacturers have taken steps in this direction and are to be commended for their initiatives in this area. Business aircraft operators should request noise abatement procedures from the aircraft manufacturers or work with them in developing noise abatement procedures for inclusion in the aircraft manuals. When professional opinion indicates that the procedures and techniques recommended for specific aircraft and local airports are less effective than the NBAA procedures, pilots should contact the manufacturers and airport authorities with specific recommendations for change.

Objectives

[NBAA Noise Abatement Program](#)

[NBAA Standard Departure Procedure](#)

[NBAA Close-In Departure Procedure](#)

[NBAA Approach and Landing Procedure VFR & IFR](#)

[Summary](#)

Objectives

The following objectives are established for all noise abatement procedures of the NBAA Noise Abatement Program for jet aircraft:

1. *Safe.* Procedures must not only meet the requirements for known parameters of aircraft performance, they must also provide adequate safety margins so that a prudent, competent pilot will be willing to use them on a repetitive and routine basis under varying conditions.
2. *Standardized.* The same procedures should be applicable to all runways and all airports. For example, the entry point of the second reduced power segment of the NBAA CLOSE-IN DEPARTURE PROCEDURE is expressed as an altitude and not as a geographic fix. Similarly, the terminal point of this procedure is based on an altitude at which return to climb thrust will not create excessive noise. It should not be based purely on local factors such as geographical fixes. Some NBAA procedures impose an operational penalty which cannot be justified solely by the noise level reduction achieved by each aircraft type. Therefore, it is necessary to make such compromises to achieve standardized procedures which could be used regardless of type and class of aircraft.
3. *Uncomplicated.* Complexity can create misunderstandings, resistance to use and loss of effectiveness. Therefore, the NBAA Noise Abatement Procedures are designed to be easily understood, easy to accept and are applicable to all types and classes of aircraft at all airports.

The NBAA Noise Abatement Program

The NBAA recommended program for reducing the noise impact of turbojet business aircraft has broad implications for all the various communities affected by aircraft/airport operations

Turbojet Business Aircraft Operations

1. Business aircraft operators must accept responsibility for operating their aircraft in such a manner as to reduce the noise impact to the lowest practicable level. Noise abatement procedures should be made part of the routine in operating aircraft in and out of ALL airports.
2. Aircraft operators must also take the initiative and responsibility to obtain all pertinent information on the local noise abatement policies followed at any airport they currently use, or expect to use in the future.
3. Operators should be aware that unnecessary use of reverse thrust when landing can be a source of excessive noise. Therefore, except for eliminating residual thrust, the use of minimum re-verse thrust necessary for safety is recommended, consistent with runway conditions and available length.

Local Communities and Airports

1. The noise abatement procedures recommended by NBAA are suggested as a national standard for business jet aircraft. They may be applied to any noise sensitive airport. Procedures adopted by any locality should, whenever feasible or beneficial, conform to such a national standard to ensure pilot understanding, acceptance and use.
2. NBAA member companies should participate in local airport affairs, particularly those concerning noise abatement procedures. Where necessary, technical assistance can be provided to assist airport management in adopting procedures which meet the objectives of the NBAA Noise Abatement Program as they relate to operational safety. Every effort should be made to tailor procedures to the specifics of each airport in order to provide the maximum noise reduction consistent with safe operational practices and without unduly restricting

- the flow of air traffic.
3. Communities must be given factual data to demonstrate that airport noise level reductions below those achievable through the procedures described can-not be realistically anticipated with current aircraft and engines.
 4. Approach aids of various types can aid noise abatement procedures at an airport. Improvements in approach aids and runway facilities increase the possibilities for aircraft to use specific runways and approach patterns over the least noise-sensitive areas. Optimal employment of visual and electronic approach aids should be investigated by the airport management.
 5. Airport approach and takeoff paths should be designated on all official zoning maps. This should be done for all airports, existing or proposed, in order that real estate activity is conducted with full awareness of the confines of such areas. Similarly, the land use permitted in these areas should be specified in zoning regulations and building codes in order to protect inhabitants.
 6. Jet aircraft runup areas should be developed but usage limited to normal daylight work hours (M-F), for least noise disturbances to airport tenants and local communities. Blast fences, hush houses, etc., should be provided and used where necessary.
 7. Airport management should take a close look at the airport's natural terrain and consider ways in which improvements to landscaping might improve noise conditions around the airport.
 8. Airport management should post signs in pilot information centers, as well as at conspicuous places along the taxi-ways or runway areas, giving the pilots a last reminder that they are in a noise-sensitive area calling for use of noise abatement procedures.
 9. A mixing of high and low performance general aviation aircraft on the same runway is often the cause for noticeable additional noise. Some problems that can arise from this type of intermixing are:
 - a. Excessive go-arounds.
 - b. Extended flight over noise-sensitive areas by aircraft in the high-drag high power-setting configuration (flaps and landing gear extended).
 - c. Derogation of the pilot's ability to follow noise abatement procedures to the fullest.
 - d. Excessive holding before take-off.
 10. The airport management has the responsibility to look at all possible alternatives to control these types of situations. For example, building a short run-way of 2,500-3,500 feet for the use of low performance aircraft would not only help solve many of the problems listed above, but would also allow the airport management to set up more effective noise abatement procedures.
 11. The airport and ATC management should conduct a procedures review to recommend and implement new airport noise awareness programs. Adding a phrase such as "use noise abatement procedures" to all tower takeoff clearances should also be included in the recommendations.

Airframe and Engine Manufacturing

1. The lowest engine noise levels that can be achieved by engine and airframe manufacturers, without imposing excessive operational penalties, should be determined. New aircraft should be de-signed to remain within the lowest noise limitations. Regulatory noise limitation on manufacturers should be confined to that which can be achieved within the existing state of the art. Any regulatory action should have sufficient flexibility to permit further noise level reductions as they are developed.
2. Power settings that will achieve a specific flight profile for noise abatement purposes should be developed and published in the manufacturer's flight manuals. Maximum gross weights should be used because business jet aircraft generally have limited gross weight flexibility without incurring an unrealistic operational penalty. Weight reduction as a means of achieving noise reduction is not practical for business jet aircraft. A power setting recommended by manufacturers should meet the following minimum safety criteria:
 - a. Approach and Landing-
 - a. Sufficient engine RPM to permit rapid acceleration of the operative engine(s) in the event of engine failure.
 - b. Sufficient engine RPM to permit rapid acceleration of the engine(s) in the event it becomes necessary to abort the approach or landing.
 - c. Sufficient engine RPM to operate anti-icing equipment.
 - d. Sufficient engine RPM to operate component equipment.
 - b. Takeoff-
 - a. Sufficient engine thrust to provide a sustained rate of climb of 1,000 FPM.

Flight Information and Training

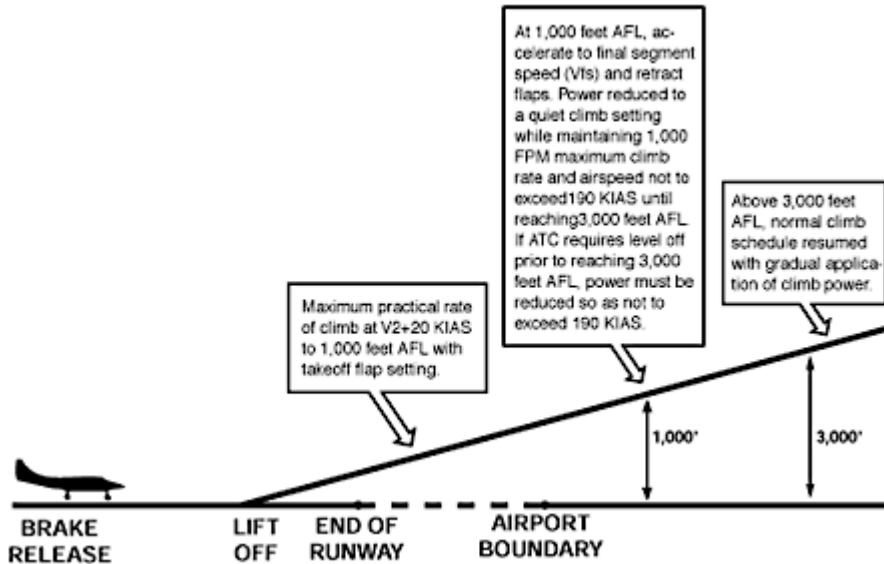
1. Pilot training for turbojet business aircraft should include basic noise abatement procedures in all types of ratings and ATR flight checks.
2. It is important that airport management realize that successful application of each airport's noise abatement procedure depends on the effort that is put into educating the pilots and the controllers. Airport management should consider an education program to inform pilots and controllers as to the need for and procedures associated with noise abatement and good community relations. A more thorough understanding by the pilots and the controllers as to what the procedures are, as well as the reasons behind them, is the key to success.
3. Specific information should be developed by airport management and made available to pilots and controllers through publication of easily attainable flight manuals, NOTAMS, AIMS, letters to airmen, charts and explanatory pamphlets. This information should include:
 - a. Approach and departure paths over least noise-sensitive areas.
 - b. Preferential runway usages.
 - c. Emphasis on use of NBAA's noise abatement procedure.
 - d. General map showing surrounding area and marking places of specific sensitivity, such as schools and hospitals.

Air Traffic Control Procedures

1. Preferential runway use systems that are safe and do not unnecessarily restrict the flow of air traffic should be established at all airports having a need for them.
2. Control tower operators should be permitted to give any needed special attention to jet aircraft that may, for purposes of noise abatement, be required to land or takeoff using a different runway than the one in use by smaller aircraft.
3. Control tower operators should develop procedures that will separate high performance aircraft from low performance aircraft as much as possible.

4. The air traffic control procedures should keep aircraft more than 3,000 feet AGL over noise-sensitive areas to the extent that this can be accomplished without excessive derogation of air traffic flow.
5. FM's order 7110.22 recommends high performance aircraft within reasonable operating limits and consistent with noise abatement policies.
 1. Remain at the highest possible altitude as long as possible when arriving
 2. Climb to the requested altitude filed by the pilot as soon as possible after departing.
6. SID's should include references to the use of noise abatement procedures.
7. ATC clearances when issued by control tower operators should include a statement to "use noise abatement procedures."

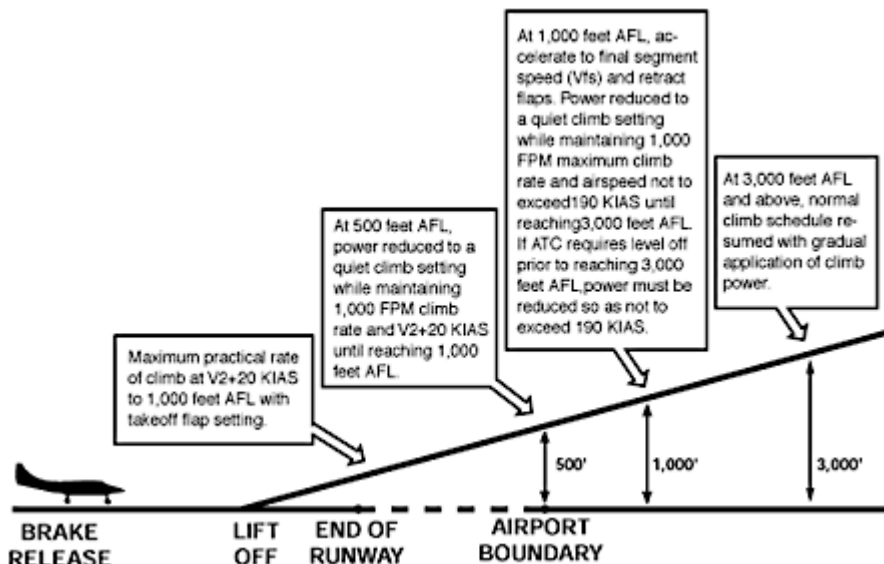
NBAA Standard Departure Procedure



1. Climb at maximum practical rate at V₂+20 Knots indicated airspeed (KIAS) to 1,000 feet above field level (AFL) with takeoff flap setting.
2. At 1,000 feet AFL, accelerate to final segment speed (V_f) and retract flaps. Reduce to a quiet climb power setting while maintaining 1,000 FPM maximum climb rate and airspeed not to exceed 190 KIAS until reaching 3,000 feet AFL. If ATC requires level off prior to reaching 3,000 feet AFL, power must be reduced so as not to exceed 190 KIAS until at or above 3,000 feet AFL. (See note below)
3. At 3,000 feet AFL and above, resume normal climb schedule with gradual application of climb power.
4. Observe all airspeed limitations and ATC instructions.

NOTE: It is recognized that aircraft performance will differ with aircraft type and takeoff conditions; therefore, the business aircraft operator must have the latitude to determine whether takeoff thrust should be reduced prior to, during, or after flap retraction.

NBAA Close-In Departure Procedure

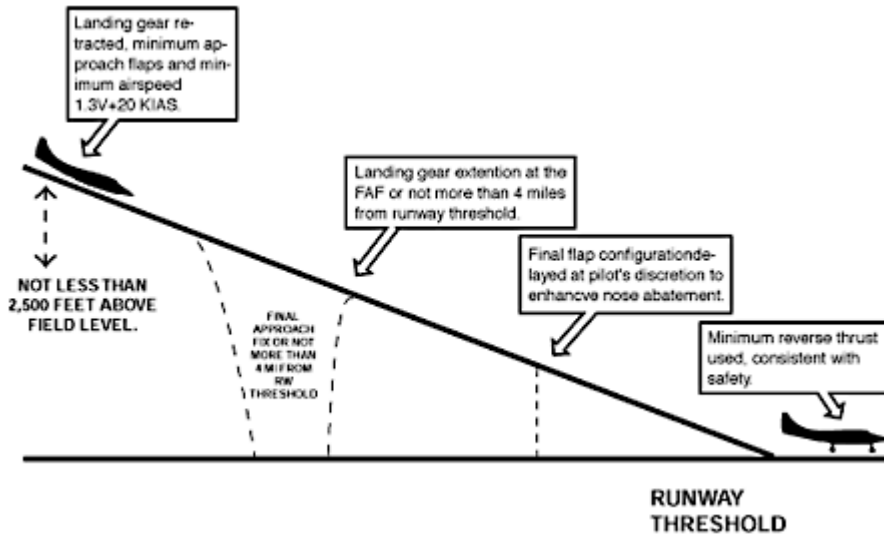


1. Climb at maximum practical rate at V₂+20 KIAS to 500 feet AFL with takeoff flap setting.
2. At 500 feet AFL, reduce to a quiet climb power setting while maintaining 1,000 FPM maximum climb rate and V₂+20 KIAS until reaching 1,000 feet AFL.

- At 1,000 feet AFL, accelerate to final segment speed (V_f s) and retract flaps. Maintain quiet climb power, 1,000 FPM climb rate and airspeed not to exceed 190 KIAS until reaching 3,000 feet AFL. If ATC requires level off prior to reaching 3,000 feet AFL, power must be reduced so as not to exceed 190 KIAS. (See note below)
- At 3,000 feet AFL and above, resume normal climb schedule with gradual application of climb power.
- Observe all airspeed limitations and ATC instructions.

NOTE: It is recognized that aircraft performance will differ with aircraft type and takeoff conditions; therefore, the business aircraft operator must have the latitude to determine whether takeoff thrust should be reduced prior to, during, or after flap retraction. Also, aircraft in excess of 75,000 lbs. GTOW operating under FAR, Part 121, Part 125, or Part 135 may not be permitted to comply with this procedure.

NBAA Approach and Landing Procedure VFR & IFR



- Inbound flight path should not require more than a 20 degree bank angle to follow noise abatement track.
- Observe all airspeed limitations and ATC instructions.
- Initial inbound altitude for noise abatement areas will be a descending path from 2,500 feet AGL or higher. Maintain minimum airspeed ($1.3V_s+20$ KIAS) with gear retracted and minimum approach flap setting.
- At the final approach fix (FAF) or not more than 4 miles from runway threshold, extend landing gear. Final landing flap configuration should be delayed at pilot's discretion to enhance noise abatement.
- During landing, use minimum reverse thrust consistent with safety for runway conditions and available length.

Summary

This publication has been designed to illustrate the need for and the availability of noise abatement procedures for turbojet business aircraft. It is not intended to describe all the various types of noise abatement policies followed by airport and aircraft operators, nor does it pretend to describe the "best" or "only" way to handle the problem of airport noise. However, it is an attempt to develop a generic approach for noise abatement procedures as a partial solution for the airport noise problem. Therefore, the following three points are stressed:

- Noise abatement policies must be cooperatively developed and understood by aircraft and airport operators, engine and aircraft manufacturers and the local communities if such programs are to be effective.
- At the time decisions are made to purchase and operate business jet aircraft, the aircraft operators will surely review what is available that would best satisfy their individual needs, but they must also thoroughly review aircraft types for performance characteristics in terms of noise generated and the impact on community noise levels. Many such aircraft have the ability to be flown within reduced noise specifications and business jet aircraft operators are strongly urged to utilize the procedures and techniques that permit them to do so.
- A system of flight procedures is only one part of a complete noise abatement program. The NBAA's recommended flight procedures can be implemented immediately, and can result in a major reduction in the noise generated by turbojet business aircraft. However, there may be a tendency to use them beyond reasonable expectations as a means of effectively resolving the entire noise reduction issue. This tendency can be self-defeating, particularly if the general public is misled as to the effectiveness of flight procedures as the sole permanent solution to the overall noise problem. Therefore, aircraft operators must continually demonstrate to the general public that there is a genuine concern toward reducing aircraft noise and that the application of NBAA's noise abatement program will serve as a partial aid in this effort by standardizing flight procedures and by providing adequate safety margins.

ADDITIONAL RESOURCES

NBAA Endorses the Stage 4 Noise Standards

Updated February 26, 2004

Advisory Circular AC36-1H: Noise Levels for U.S. Certificated and Foreign Aircraft

(895 KB PDF)

Advisory Circular AC36-3H: Estimated Airplane Noise Levels in A-Weighted Decibels

(690 KB PDF)

Noise Levels for Business Jets, Based on Advisory Circular AC36-1H

(47 KB PDF)

Boeing Airport Noise and Emissions Website

Listing of airports around the world with noise and emissions restrictions

National Business Aviation Association

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