DAVIS-MONTHAN AIR FORCE BASE

FEBRUARY 1992

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REPORT

VOLUME II

TO THE GOVERNMENTS AND CITIZENS OF THE TUCSON REGION

AIR INSTALLATION COMPATIBLE
USE ZONE REPORT
(AICUZ)
DAVIS-MONTHAN AIR FORCE BASE, ARIZONA
VOLUME II

This is the companion document to Volume I of the updated Air Installation Compatible Use Zone (AICUZ) study prepared for Davis-Monthan Air Force Base, Arizona. It contains the following AICUZ information:

APPENDIX A

THE AICUZ CONCEPT, PROGRAM AND METHODOLOGY

CONCEPT

Federal legislation, national sentiment, and other external forces which directly affect the Air Force mission, have served to greatly increase the Air Force role in environmental and planning issues. Problems of airfield noise, air and water pollution, and socio-economic impacts, require continued and intensified Air Force involvement. These problems dictate direct Air Force participation in the process of comprehensive community and land use planning. Effective coordinated planning requires the establishment of good working relationships with local citizens, local planning officials and state and Federal officials which, in turn, depend upon creating an atmosphere of mutual trust and helpfulness. The Air Installation Compatible Use Zone (AICUZ) concept has been developed in an effort to reduce the noise and accident hazards associated with flying activities in the interest of health, safety, and general welfare and also to prevent degradation of mission capability due to encroachment.

Land Use zones and guidelines have been developed; the guidelines are a composite of a number of other land use compatibility studies which have been refined to fit the Davis-Monthan AFB aviation environment.

PROGRAM

Installation commanders establish and maintain active programs to achieve the maximum feasible land use compatibility between air installations and neighboring communities. The program requires that all appropriate governmental bodies and citizens be kept informed of Air Force views whenever AICUZ or other planning matters affecting the installation are under consideration. This includes positive and continuous programs designed to:

1. Provide criteria and guidelines to state, regional and local planning bodies, civic associations, and similar groups.

2. Inform groups of the noise exposure and aircraft accident potential resulting from flying activity.

3. Describe the noise reduction measures which are being used.

4. Insure that all practical measures are taken to reduce or control Air Force noise producing activities. These measures include properly locating engine test facilities, providing sound suppressors where necessary, and adjusting flight patterns and/or techniques to minimize the noise impact on populated areas. This must be done without jeopardizing safety or operational effectiveness.

METHODOLOGY

The AICUZ consists of areas where facilities may obstruct the airspace or otherwise be hazardous to aircraft operations, and areas where occupants are exposed to the health, safety, or welfare hazards of aircraft operations. In other words, the AICUZ includes:

1. Accident Potential Zones based on an analysis of past Air Force aircraft accidents. (Appendix B)

2. Noise Zones produced by the computerized Day-Night Average Sound Level (Ldn) methodology. (Appendix C)

3. Federal Aviation Administration and the Air Force designated height limitations in the approach and departure zones of the base. (Appendix D)

The AICUZ program designates Accident Potential Zones and Noise Zones, and provides land use compatibility guidelines for these zones. The two zones are overlaid on area maps which are the basic planning units of the AICUZ program. The AICUZ becomes a composite input into the local planning process.

As part of the AICUZ program, the only real property interest for which the United States Air Force has received authorization and appropriations to acquire is the area designated as the Clear Zones. Compatible land use controls for the remaining airfield environs are recommended to the local governments through their land use planning and control process. The Clear Zone areas at Davis-Monthan Air Force Base are owned by the Department of Defense.

AICUZ LAND USE DEVELOPMENT POLICIES

The basis of any effective land use system is a set of land development policies which serve as the standard by which all airfield environs land use planning and control actions are evaluated. The Air Force recommends the following policies be considered for incorporation into the comprehensive plans for the Davis-Monthan AFB environs:

POLICY #1: In order to promote the public health, safety, peace, comfort, convenience, and general welfare of those living within the airfield environs, it is necessary to:

1. Guide, control, and regulate future growth and development.

2. Promote orderly and appropriate use of land.

3. Protect the character and stability of existing land uses.

4. Prevent the impairment of the airfield and the public investment.

5. Enhance the quality of living in the areas affected.

6. Protect the general economic welfare by making developers aware of incompatible land use.

POLICY #2: In order to implement **POLICY #1**, it is necessary to:

1. Incorporate the Air Installation Compatible Use Zone concept into existing land use plans, and modifying them when necessary to:

   a. Establish guidelines for land use compatibility.

   b. Restrict or prohibit incompatible land use.

   c. Prevent establishment of any land use which would unreasonably endanger aircraft operations and the continued use of the airfield.

2. Adopt appropriate ordinances to implement land use recommendations in the area surrounding Davis-Monthan AFB.

POLICY #3: Within the boundaries of the AICUZ, certain land uses are inherently incompatible. The following land uses are not in the public interest and must be restricted or prohibited:

1. Uses which release into the air steam, dust, and smoke or any substance, which impair visibility or otherwise interfere with the operation of aircraft.

2. Uses which produce light emissions, either direct or indirect (reflective), which interfere with pilot vision.

3. Uses which produce electrical emissions which would interfere with aircraft communication systems or navigational equipment.

4. Uses which attract birds or waterfowl, such as operation of sanitary landfills, maintenance of feeding stations, or growth of certain vegetation.

5. Uses which provide for structures within ten feet of aircraft and transitional surfaces.

POLICY #4: Certain noise levels of varying duration and frequency create hazards to both physical and mental health. Where this condition exists, it is not consistent with public welfare to allow the following land uses:

1. Residential

2. Retail Business

3. Office Buildings

4. Public Buildings (Schools, Churches, Hospitals, Etc.)

5. Recreation Buildings and Structures

POLICY #5: Areas below take off and flight approach paths are exposed to danger from aircraft accidents. It is prudent to limit the density of development and intensity of use in such areas.

POLICY #6: Different land uses have different sensitivities to noise. Standards of land use should be adopted based on these noise sensitivities. In addition, a system of Noise Level Reduction guidelines for new construction should be implemented to permit certain uses where they would otherwise be prohibited.

POLICY #7: Land use planning and zoning in the airfield environs cannot be based solely on aircraft generated effects. Allocation of land used within the AICUZ should be further refined by analysis of:

1. Physiographic Factors

2. Climate and Hydrology

3. Vegetation

4. Surface Geology

5. Soil Characteristics

6. Intrinsic Land Use Suitabilities and Constraints

7. Existing Land Use

8. Land Ownership Patterns and Values

9. Economic and Social Demands

10. Cost and Availability of Public Utilities, Transportation, and Community Facilities

11. Other Noise Sources

APPENDIX B

ACCIDENT POTENTIAL ZONES

GUIDELINES FOR ACCIDENT POTENTIAL

Urban areas around airports are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained aircraft crews. Despite stringent maintenance requirements and intensive training, past history makes it clear that accidents are going to occur.

When AICUZ first began, there were no current comprehensive studies on accident potential. In support of the program, the Air Force completed a study of Air Force accidents that occurred between 1968 and 1972 within 10 nautical miles of airfields. The study of 369 accidents revealed that 75 percent of aircraft accidents occurred on or adjacent to the runway (1000 feet to each side of the runway centerline) and in a corridor 3000 feet wide (1500 either side of runway centerline), extending from the runway threshold along the extended runway centerline for a distance of 15,000 feet.

Three zones were established based on crash patterns: The clear zone, Accident Potential Zone (APZ) I and Accident Potential Zone (APZ) II. The clear zone starts at the end of the runway and extends outward 3000 feet. It has the highest accident potential of three zones. The Air Force has adopted a policy of acquiring property rights to areas designated as clear zones because of the high accident potential. APZ I extends from the clear zone an additional 5000 feet. It includes an area of reduced accident potential. APZ II extends from APZ I an additional 7000 feet in an area of further reduced accident potential.

The Air Force work in accident potential was the first significant effort since 1952 when the President's Airport Commission published "The Airport and Its Neighbors", better known as the "Doolittle Report". The recommendations of this earlier report were influential in the formulation of the accident potential zone concept.

The risk of people on the ground being killed or injured by aircraft accidents is small. However, an aircraft accident is a high consequence event and when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead the Air Force approaches this safety issue from a land use planning perspective, given that aircraft accidents do occur.

ACCIDENT POTENTIAL ANALYSIS

Military aircraft accidents differ from commercial air carrier and general aviation accidents because of the variety of aircraft used, the type of missions, and the number of training flights. In 1973, the Air Force performed a service-wide aircraft accident hazard study in order to identify land near airfields with significant accident potential. The accidents that were studied occurred within ten nautical miles of airfields.

The study reviewed 369 major Air Force accidents during 1968-1972, and found that 61 percent of the accidents were related to landing operations and 30 percent were related to take-offs. It also found that 70 percent occurred in daylight and that fighter and training aircraft accounted for 80 percent of the accidents.

Because of the purpose of the study was to identify accident hazards, the study plotted each of the 369 accidents in relation to the airfield. This plotting found that the accidents clustered along the runway and its extended centerline. To further refine this clustering, a tabulation was prepared which described the cumulative frequency of accidents as a function of distance from the runway centerline along the extended centerline. This analysis was done for widths of 2,000, 3,000 and 4,000 total feet.

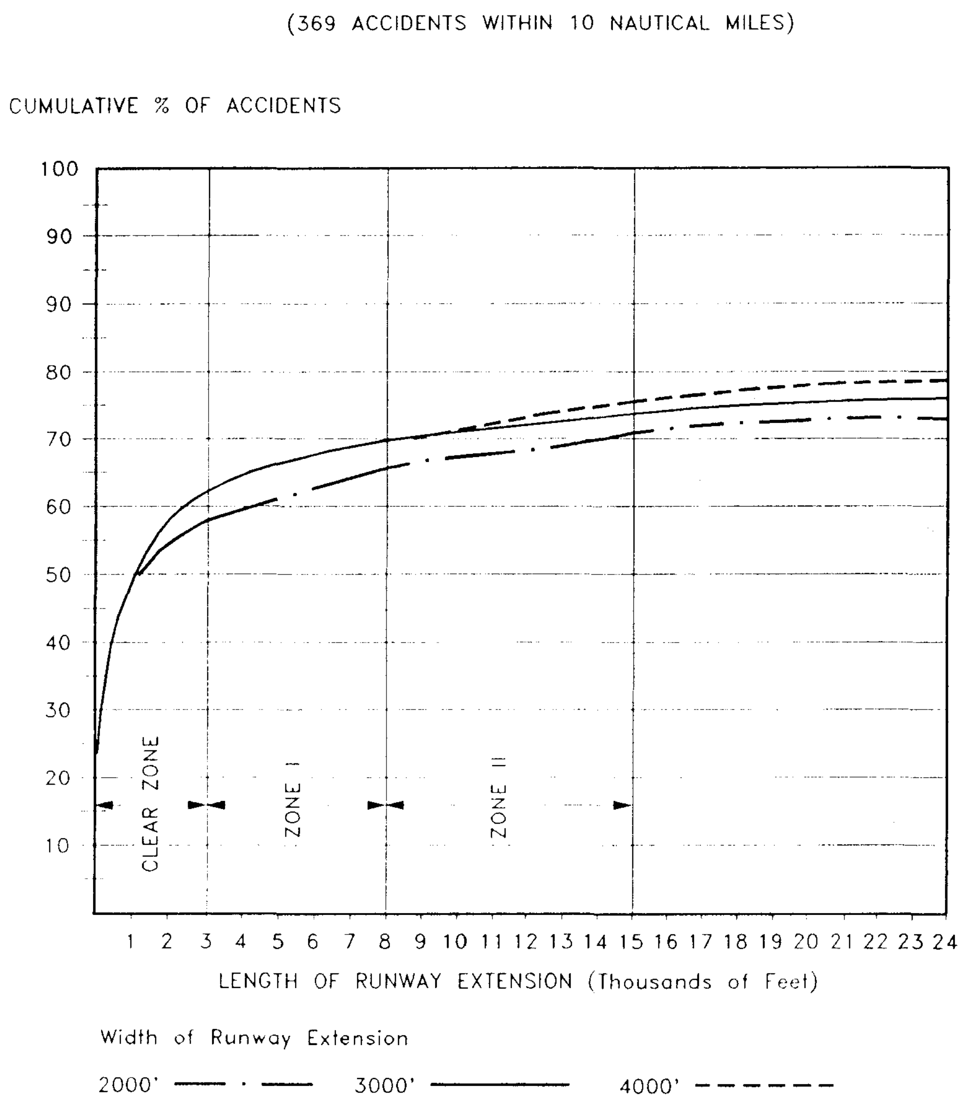
THE LOCATION ANALYSIS FOUND THE FOLLOWING:

	WIDTH OF RUNWAY EXTENSION (FEET)		
LENGTH FROM BOTH ENDS OF RUNWAY (FEET)	2,000	3,000	4,000
PERCENT OF ACCIDENTS			
On or adjacent to runway (1,000 feet to each side of runway centerline)	23	23	23
0 to 3,000	35	39	39
3,000 to 8,000	8	8	8
8,000 to 15,000	5	5	7
CUMULATIVE PERCENT OF ACCIDENTS			
On or adjacent to runway (1,000 feet to each side of runway centerline)	23	23	23
0 to 3,000	58	62	62
3,000 to 8,000	66	70	70
8,000 to 15,000	71	75	77

Figure B-1, Distribution of Air Force Aircraft Accidents (1968-72), indicates that the cumulative number of accidents rises rapidly from the end of the runway to 3,000 feet, rises more gradually to 8,000 feet, then continues at about the same increase to 15,000 feet, where it levels off rapidly. The location analysis also indicates that the optimum width of the runway extension, which would include the maximum percentage of accidents in the smallest area, is 3,000 feet.

FIGURE B-1

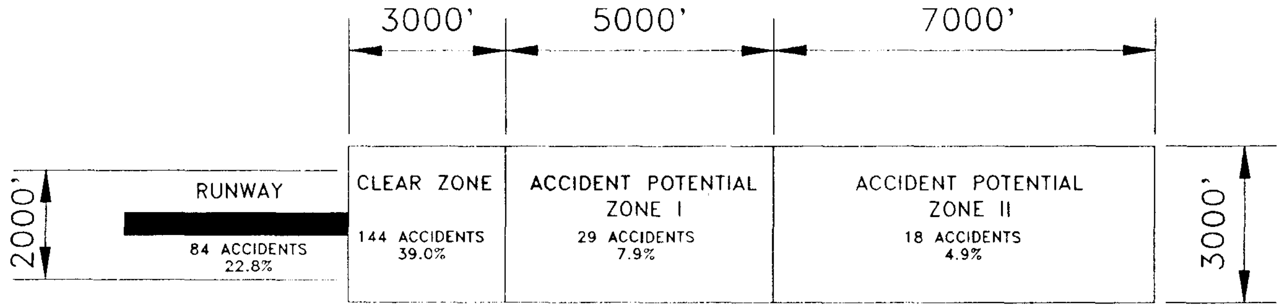
DISTRIBUTION OF AIR FORCE AIRCRAFT ACCIDENTS
(1968-1972)



Using the optimum runway extension width, 3,000 feet, and the cumulative distribution of accidents from the end of the runway, zones were established which minimized the land area included and maximized the percentage of accidents included. The zone dimensions and accident statistics for the 1968-1972 study are shown in Figure B-2.

FIGURE B-2

AIR FORCE ACCIDENT DATA
(369 ACCIDENTS - 1968-1972)

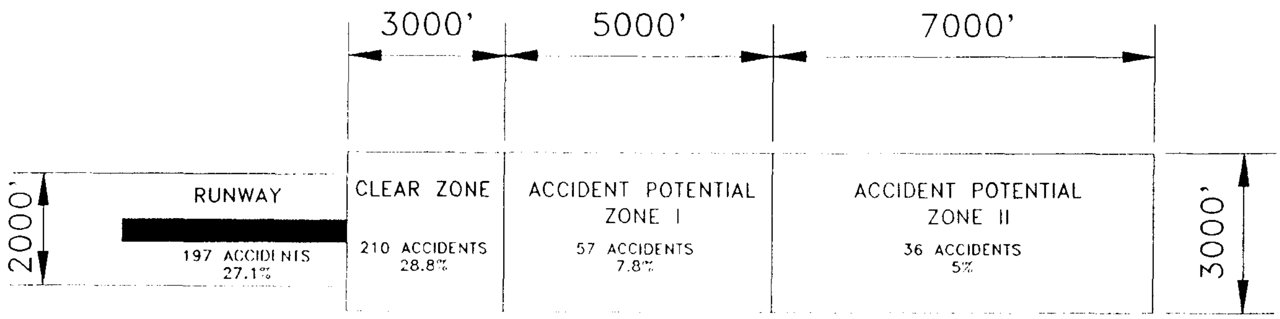


OTHER ACCIDENTS WITHIN 10 NAUTICAL MILES: 94 ACCIDENTS (25.4%)

The original study has been updated to include accidents through 1985. The updated study now includes 728 accidents during the 1968-1985 period. Using the optimum runway extension width, 3,000 feet, the accident statistics of the updated study are shown below.

FIGURE B-3

AIR FORCE ACCIDENT DATA
(728 ACCIDENTS - 1968-1985)



OTHER ACCIDENTS WITHIN 10 NAUTICAL MILES: 228 ACCIDENTS (31.3%)

Using the designated zones and the accident data, it is possible to calculate a ratio of percentage of accidents to percentage of area size. These ratios indicate that the clear zone, with the smallest area size and the highest number of accidents, has the highest ratio, followed by the runway and adjacent area, Zone I and then Zone II.

RATIO OF PERCENTAGE OF ACCIDENTS TO PERCENTAGE OF AREA

	AREA[1] (ACRES)	NO.[2] ACCID	ACCIDENTS PER ACRE	% TOTAL AREA	% TOTAL ACCIDENTS	RATIO:[3] ACCIDENTS TO AREA
Runway Area	487	197	1 per 2.5 acres	0.165	27.1	164
Clear Zone	413	210	1 per 1.9	0.140	28.8	206
Zone I	689	57	1 per 12.1	0.233	7.8	33
Zone II	964	36	1 per 26.7	0.327	5.0	15
Other	292,483	228	1 per 1282.8 acres	99.135	31.3	.3

1. Area includes land within ten nautical miles of runway.
2. Total number of accidents is 728.
3. Percent total accidents divided by percent total area.

The Air Force also determined which accidents had definable debris impact areas and in what phase of flight the accident occurred. Overall, 75 percent of the accidents had definable debris impact areas, although they vary in size by type of accident.

The Air Force used weighted averages of impact areas, for accidents occurring only in the approach and departure phase, to determine the following average impact areas:

AVERAGE IMPACT AREAS FOR APPROACH AND DEPARTURE ACCIDENTS

Overall average impact area	5.06 acres
Trainer and misc aircraft	2.73 acres
Heavy bomber and tanker	8.73 acres

1. **FINDINGS**

a. Designation of safety zones around the airfield and restriction of incompatible land uses can reduce the public's exposure to safety hazards.

b. Air Force accident studies have found that aircraft accidents near Air Force installations occurred in the following patterns:

(1) 61% were related to landing operations;

(2) 39% were related to takeoff operations;

(3) 70% occurred in daylight;

(4) 80% were related to fighter and training aircraft operations;

(5) 27% occurred on the runway or within an area extending 1,000 feet out from each side of the runway;

(6) 29% occurred in an area extending from the end of the runway to 3,000 feet along the extended centerline and 3,000 feet wide, centered on the extended centerline; and,

(7) 13% occurred in an area between 3,000 and 15,000 feet along the extended runway centerline and 3,000 feet wide, centered on the extended centerline.

c. US Air Force aircraft accident statistics found that 75% of aircraft accidents resulted in definable impact areas. The size of the impact areas were:

(1) 5.1 acres overall average;

(2) 2.7 acres for fighters and trainers;

(3) 8.7 acres for heavy bombers and tankers.

d. The flight characteristics, aircraft mix, and type of operations at military installations differ significantly from commercial air carrier and general aviation airports. Potential damage to people and structures on the ground from crashes of heavy bombers, high speed fighters, and fuel laden tankers is greater than general aviation or commercial air carrier operations.

e. The hazard to people and buildings in the overflight zone is less than in areas near the ends of runways. There is, however, a potential for accidents in this area for airfield traffic patterns.

f. Certain types of land uses have been recognized as hazards to air navigation. They are:

* Land uses that attract large concentrations of birds within approach-climbout areas
* Land uses that produce smoke
* Land uses with flashing lights
* Land uses that reflect light
* Land uses that generate electronic interference
* Land uses related to flammable materials

g. Air Force installations fulfill a vital national defense function and are significant economic influences in the surrounding areas. Their continued operation, unhindered by additional restrictions on flying activities, is important to the country.

APPENDIX C

DESCRIPTION OF THE NOISE ENVIRONMENT

NOISE CONTOURS

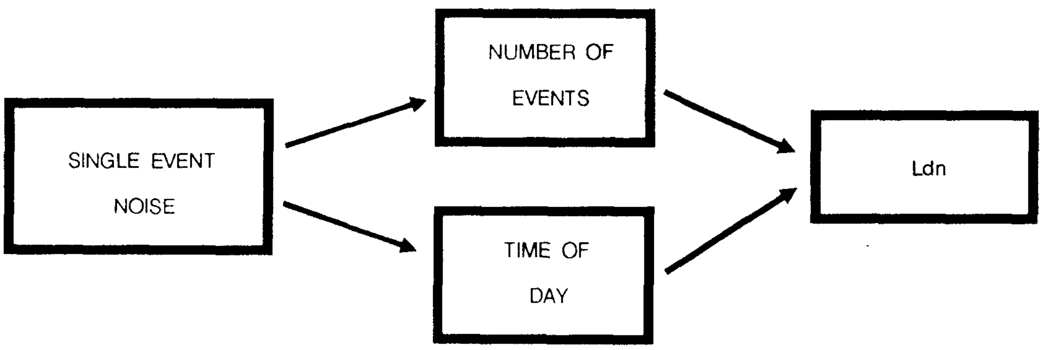
In a study of airport and aircraft noise, two different types of noise descriptors are needed; one to measure the noise of individual noise events, such as the noise of an aircraft flyover, and another to describe the noise environment resulting from a complex of noise events, such as the total noise effect of aircraft operations at an air base.

NOISE ENVIRONMENT DESCRIPTOR

The methodology used to produce the noise contours contained in this Study consists of the Day-Night Average Sound Level (Ldn) system of describing the noise environment. Efforts to provide a national uniform standard for noise assessment have resulted in adoption by the Environmental Protection Agency of Ldn as the standard noise prediction model for this procedure. The Ldn descriptor is a method of assessing the amount of exposure to aircraft noise and predicting the community response to the various levels of exposure. The Ldn values used for planning purposes and for which contours are shown in Figure III-3 of this report are 65, 70, 75, and 80. Land-use guidelines are based on the compatibility of various land uses with these noise exposure levels.

It is generally recognized that a noise environment descriptor should consider, in addition to the annoyance of a single event, the effect of repetition of such events and the time of day in which these events occur. Ldn begins with a single event descriptor and adds corrections for the number of events and the time of day. Since the primary development concern is residential, nighttime events are considered more annoying than daytime events and are weighted accordingly (10 decibels).

Ldn values are computed from the single event noise descriptor, plus corrections for number of flights and time of day.

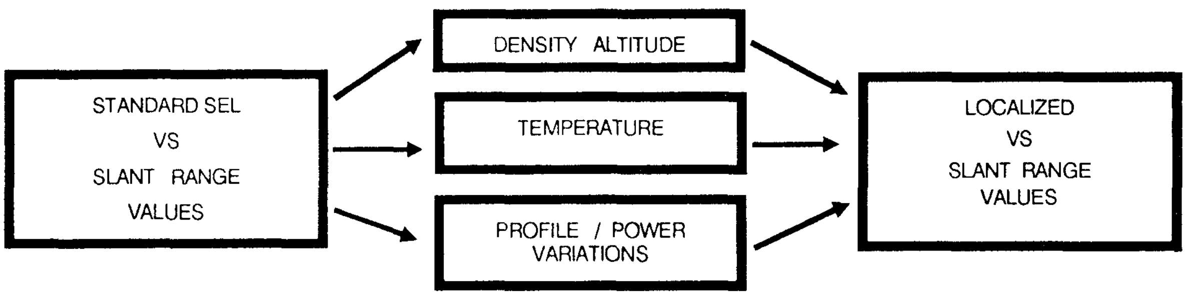


As part of an extensive data collection process, detailed information is gathered on the flight tracks flown by each type of aircraft assigned on the base and the number and time of day of flight on each of these tracks during a "typical" day. This information is used in conjunction with the single event noise descriptor to produce Ldn values. These values are combined on an energy summation basis to provide single Ldn values for the mix of aircraft operations at the base. Equal value points are connected to form the contour lines.

NOISE EVENT DESCRIPTOR

The single event noise descriptor used in the Ldn system is the Sound Exposure Level (SEL). The SEL measure is an integration of the "A" weighted noise level over the period of a single event such as an aircraft flyover, in decibels(dB). Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are collected for various types of aircraft/engines at different power settings and phases of flight. The following diagram shows the relationship of the single event noise descriptor (SEL) to the source sound energy.

SEL vs. slant range (distance from aircraft to the ground) values are derived from noise measurements made according to a source noise data acquisition plan developed by Bolt, Beranek, and Newman, Inc. in conjunction with the Air Force Aerospace Medical Research Laboratory (AMRL) and carried out by AMRL. These standard day, sea level values form the basis for the individual event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, density altitude, and variations from standard profiles and power settings.



Ground-to-ground sound propagation characteristics are used for altitudes up to 500 feet absolute with a linear transition between 500 and 700 feet and air-to-ground propagation characteristics above 700 feet.

In addition to the assessment of aircraft flight operations, the Ldn system also incorporates aircraft and engine ground run-up or tests resulting from engine/aircraft maintenance checks on the ground. Data concerning the orientation of the noise source, type of aircraft or engine, number of test runs on a "typical" day, the power settings used and their duration, and use of suppression devices are collected for each ground run-up or test position. This information is processed and the noise contribution added (on an energy summation basis) to the noise generated by flying operations to produce Ldn contours reflecting the overall noise environment with respect to aircraft air and ground operations.

NOISE CONTOUR PRODUCTION

Data describing flight tracks, flight profiles, power settings, flight path and profile/utilization, and ground run-up information by type aircraft/engine is assembled by the individual Air Force Base. These data are screened by Headquarters United States Air Force, and trained personnel process the data for input into a central computer. Flight track and utilization data are entered into the computer and flight track check plots are generated for verification by the Base AICUZ Project Officer. After verification and incorporation of any required changes, Ldn contours are generated by the computer using the base-supplied operational data and the standard source noise data corrected to local conditions. The computer system plots these contours which are then reviewed and prepared for photographic reproduction by specialists. A set of such contours is provided in the body of this report.

Additional technical information on the Ldn procedure is available in the following publications:

1. Community Noise Exposure Resulting from Aircraft Operations: Applications Guide for Predictive Procedure, AMRL-TR-73-105, November 1974 from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

2. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with Adequate Margin of Safety, EPA Report 550/9-74-004, March 1974, from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

APPENDIX D

HEIGHT AND OBSTRUCTIONS CRITERIA

GENERAL

This appendix section establishes criteria for determining whether an object or structure is an obstruction to air navigation. Obstructions to air navigation are considered to be:

1. Natural objects or human-made structures that protrude above the planes or surfaces as defined in the following paragraphs, and/or

2. Human-made objects that extend more than 500 feet above the ground at the site of the structure.

EXPLANATION OF TERMS

The following will apply:

1. **Controlling Elevation:** Where surfaces or planes within these criteria overlap, the governing elevation is that of the lowest surfaces or plane.

2. **Runway Length:** Davis-Monthan AFB has a 13,645' runway designed and built for sustained aircraft landings and take offs.

3. **Established Airfield Elevation:** The elevation, in feet above mean sea level, for Davis-Monthan AFB it is approximately 2705 feet.

4. **Dimensions:** All dimensions are measured horizontally unless otherwise noted. Reference Figure D-1 for representation of planes and surfaces.

PLANES AND SURFACES

1. **Primary Surface:** This surface defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing areas. The primary surface comprises surfaces of the runways, runway shoulders, and lateral safety zones. The length of the primary surface is the same as the runway length. The width of the primary surface is 2,000 feet or 1,000 feet on each side of the runway centerline.

2. **Clear Zone Surface:** This surface defines the limits of the obstruction clearance requirements in the vicinity contiguous to the ends of the primary surfaces. The length and width of the clear zone surface is 3,000 feet by 3,000 feet respectively.

3. **Approach/Departure Clearance Surface:** These surfaces are symmetrical about the runway centerline extended and begin as inclined planes (glide angles) 200 feet beyond each end of the primary surfaces at the centerline elevation of the runway ends, and extend for 50,000 feet. The slope of the approach/departure clearance surfaces is 50:1 along the

runway centerline extended (glide angles) until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the start of the glide angles. The width of this surface at the runway end is 2,000 feet; it flares uniformly, and the width at 50,000 is 16,000 feet.

4. **Inner Horizontal Surface:** This surface is a plane, oval in shape at a height of 150 feet above the established airfield elevation. It is constructed by scribing an arc with a radius of 7,500 feet about the centerline at the end of the runway and interconnecting these arcs with tangents.

5. **Conical Surface:** This is an inclined surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope of the conical surface is 20:1.

6. **Outer Horizontal Surface:** This surface is a plane located 500 feet above the established airfield elevation. It extends for a horizontal distance of 30,000 feet from the outer periphery of the conical surface.

7. **Transitional Surfaces:** These surfaces connect the primary surfaces, clear zone surfaces, and approach/departure clearance surfaces to the inner horizontal surface, conical surface, outer horizontal surface or other transitional surfaces. The slope of the transitional surface is 7:1 outward and upward at right angles to the runway centerline. To determine the elevation for the beginning of the transitional surface slope at any point along the lateral boundary of the primary surface, including the clear zone, draw a line from this point to the runway centerline. This line will be at a right angle to the runway axis. The elevation at the runway centerline is the elevation for the beginning of the 7:1 slope.

HEIGHT OBSTRUCTIONS AND OTHER CONSIDERATIONS

Although height and obstruction criteria in the vicinity of airports have been established for most airfields, including Davis-Monthan AFB, it is appropriate to mention these criteria in this report. Where such criteria are not included in local community land use planning, there is a possibility that uses could be permitted which would endanger safe aircraft operations.

The land area outlined by this Appendix for purposes of height obstruction criteria should be regulated to prevent uses which might otherwise be hazardous to aircraft operations. The following uses should be restricted and/or prohibited:

1. Uses which release into the air any substance which would impair visibility or otherwise interfere with the operations of aircraft, e.g., dust and smoke.

2. Uses which produce light emissions, either direct or indirect (reflective), which would interfere with pilot vision.

3. Uses which produce electrical emissions which would interfere with aircraft communication systems or air navigational equipment.

4. Uses which would attract birds or waterfowl, such as, but not limited to, operation of sanitary landfills or maintenance of feeding stations.

2. **HEIGHT RESTRICTIONS**:

City/County agencies involved with approvals of permits for construction should require developers to submit calculations which show that projects meet the height restriction criteria of FAA Part 77 as described, in part, by the information contained in this Appendix.

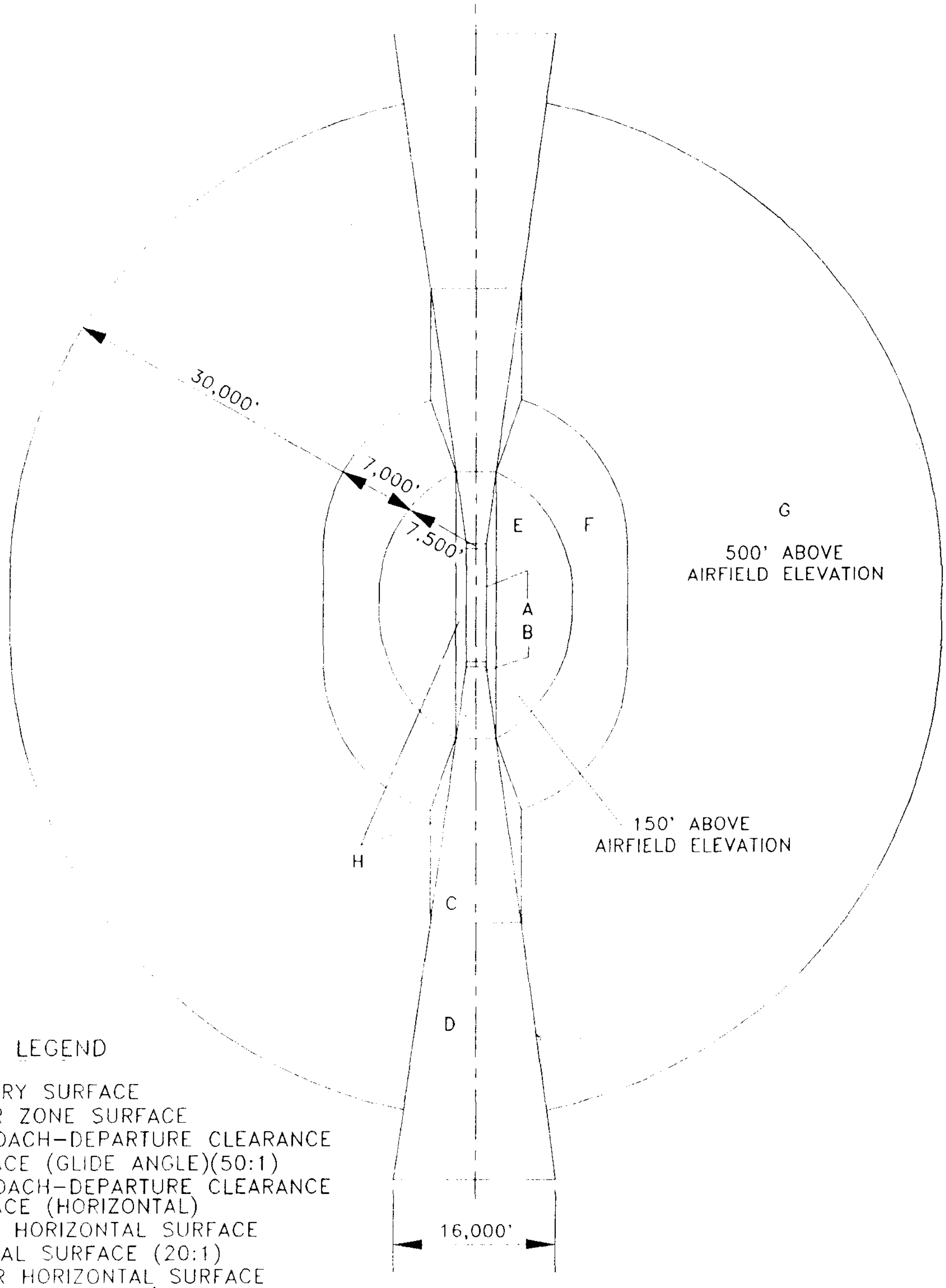
DAVIS-MONTHAN AFB

COORDINATES AND ELEVATIONS

Average Field Elevation		–	2705' MSL
Coordinates	12	–	Lat 32° 10' 48.30" N
		–	Long 110° 53' 50.764" W
	30	–	Lat 32° 09' 08.93" N
		–	Long 110° 52' 3.33" W

AIRSPACE CONTROL SURFACES
PLAN VIEW

Figure D-1



LEGEND

A – PRIMARY SURFACE
B – CLEAR ZONE SURFACE
C – APPROACH–DEPARTURE CLEARANCE SURFACE (GLIDE ANGLE)(50:1)
D – APPROACH–DEPARTURE CLEARANCE SURFACE (HORIZONTAL)
E – INNER HORIZONTAL SURFACE
F – CONICAL SURFACE (20:1)
G – OUTER HORIZONTAL SURFACE
H – TRANSITIONAL SURFACE (7:1)

APPENDIX E

NOISE LEVEL REDUCTION GUIDELINES

A study which provides in-depth, state-of-the-art noise level reduction guidelines was completed for the Naval Facilities Engineering Command and the Federal Aviation Administration, by Wyle Laboratories in November 1989. The study title is "Guidelines for the Sound Insulation of Residences Exposed to Aircraft Operations" (Wyle Research Report WR 89-7). Copies of this study are available, upon, request from 836 CSG/DEEV, Davis-Monthan AFB, Az 85707.

APPENDIX F

OPERATIONAL CHANGE ANALYSIS

PATTERN CHANGES

Davis-Monthan AFB has examined operational changes and, where feasible has taken action to reduce noise impacts. The active runways at Davis-Monthan AFB are 12 (takeoffs are over the desert in a southeasterly direction) and 30 (takeoffs are in a northwesterly direction). The present overhead patterns at Davis-Monthan AFB, without jeopardizing safety or operational effectiveness, attempt to minimize flight paths over densely populated areas.

Noise abatement is a continuing subject of discussion at all quarterly meetings of the Air Traffic Control Board, which are attended by Federal Aviation Administration representatives including local approach control personnel and all Davis-Monthan units which conduct flying operations.

RUNWAY USEAGE

Aircraft arriving at Davis-Monthan AFB are preferentially routed to the southeast for a flow towards the north end of the runway. Arriving and departing traffic is regulated within a southeastern area of the airfield due to Tucson residences to the northwest. All possible takeoffs, up to a 10 knot tail wind, are attempted in the southeasterly direction over the desert. The southeasterly takeoff accounts for 75-80% of all takeoffs.

PROFILE MODIFICATIONS

1. Steeper Approach: The optimum approach angle is currently established for the precision approach to the runway. The glide slope is operationally feasible while minimizing noise problems over the City of Tucson. Steeper approaches, other than currently utilized, are not feasible due to the high percentage of jet fighter aircraft utilizing the Davis-Monthan AFB runway. Steeper approaches would require lower power settings, resulting in longer acceleration times and an excessive pitch change, which could lead to danger in transitioning from the glide slope to round out for touchdown.

2. Steeper Climb-Out: Most traffic departs Davis-Monthan utilizing military power, a reduced power setting, instead of afterburners. This procedure minimizes noise at ground level even though the climb-out gradient is less. The aircraft attempt to climb as rapidly as possible, but this is not always possible due to restrictions by Terminal Radar Approach Control(TRACON) traffic.

PATTERN ALTITUDE CHANGES

The predominant altitude for patterns at Davis-Monthan AFB is 1,500 feet Above Ground Level (AGL). Visual routes and orbit points in the Tucson basin are at 3,000 feet AGL. The fairgrounds visual departure to the northwest is flown at 1,000 feet AGL.

USE OF NON-STANDARD TECHNIQUES

Lower Power Approaches: Low power approaches are not an effective technique for jet powered aircraft. This is because jet engine acceleration time and power response is very slow in comparison to reciprocating engines. Airflow in jet aircraft necessitates different approach techniques. The aircraft is flown in a high drag configuration. This allows the pilot to keep the engines at a relatively high power setting while keeping landing speeds down, so that thrust is available immediately should it be needed.

NON-STANDARD DEPARTURES AND ARRIVALS

Non-standard departures and arrivals are already in use. Departing aircraft climb gradients are well in excess of minimum standards prescribed by the USAF and the Federal Aviation Administration. Arrivals are routed over ground tracks which reduce overflights of noise sensitive areas to the maximum extent possible consistent with safe training accomplishments.

MINIMUM POWER TAKEOFFS

The aircraft at Davis-Monthan AFB operate at less than maximum power for all takeoffs unless safety dictates otherwise. Afterburners are generally not used during training sorties. When afterburners are used, they are shut off at the airfield boundary.

POWER REDUCTIONS

Most aircraft depart from Davis-Monthan AFB utilizing military power, a reduced power setting, rather than afterburners. It is not feasible to safely reduce power further.

LIMIT NUMBER OF OPERATIONS, RESTRICTED HOURS OF OPERATION

The number of flights conducted at Davis-Monthan AFB is dictated by unit training needs established by higher headquarters. Flight schedules, mission routes, and altitudes are predicated on optimum training per flying hour, maintenance capabilities, and availability of the Davis-Monthan range airspace. Because of these factors, it occasionally becomes necessary to fly early morning and late night missions.

Published quiet hours are observed daily between the hours of 2230 and 0600. Departures and arrivals are restricted during these hours. Additionally, training sorties are not generally accomplished on Saturdays or Sundays.

LIMIT OPERATIONAL AREAS

Fully 90% of Davis-Monthan AFB training flights are conducted in the Tombstone Military Operating Areas (MOA), Sells MOA, and the Goldwater Range complex. Required instrument approaches are flown at Libby Army Airfield to the maximum extent possible.

ENGINE RUN-UP

Ground run-ups of aircraft engines for maintenance purposes are conducted periodically. These run-ups are performed both suppressed and unsuppressed. All run-ups are restricted during quiet hours, which are from 2230 to 0600.