BY ORDER OF THE
SECRETARY OF THE AIR FORCE

DEPARTMENT OF THE AIR FORCE
MANUAL 13-215

16 DECEMBER 2025

Nuclear, Space, Missile, or Command and Control Operation

AIRFIELD OPERATIONS CHARTS AND INSTRUMENT PROCEDURES SUPPORT

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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RELEASABILITY: There are no releasability restrictions on this publication.

OPR: HQ AFFSA/XOS
Certified by: AF/A3O
Supersedes: AFMAN13-215V2, 29 August 2019
Pages: 23

This manual implements Air Force Policy Directive (AFPD) 13-2, *Air Traffic*, *Airfield, Airspace and Range Management*. This publication applies to all civilian employees of the Department of the Air Force (DAF) uniformed members of the Regular Air Force, the Air Force Reserve, the Air National Guard, the United States Space Force (USSF), and those with a contractual obligation to abide by the terms of DAF publications. At joint, shared-use and overseas airfields, this manual applies to the facilities that are controlled and used exclusively by the DAF, as outlined in real estate documents or letters of agreement. It defines procedures and responsibilities for constructing Air Traffic Control (ATC) Charts, Minimum Vectoring Altitude Charts (MVAC), Minimum Instrument Flight Rules Altitude Charts (MIFRAC), Diverse Vector Areas (DVA), Non- Radio Detection and Ranging (RADAR) boards for ATC RADARs, and manual Terminal Instrument Procedures (TERPS).This manual may be supplemented at any level, however major command (MAJCOM)/field command (FLDCOM) supplements to include interim changes to previously approved supplements must be routed to Headquarters (HQ) Air Force Flight Standards Agency, Director of Airfield Operations (AFFSA/XA) for coordination prior to certification and approval. Unit (wing, delta or base) level supplements to this manual must be routed to the responsible MAJCOM/FLDCOM office of primary responsibility (OPR) for Airfield Operations for coordination prior to certification and approval. The authorities to waive wing/unit/delta level requirements in this publication are identified with a tier ("T- 0, T-1, T-2, T-3") number following the compliance statement. Submit requests for waivers through the chain of command to the appropriate tier waiver approval authority, or alternately, to the publication OPR for non-tiered compliance items. See Department of the Air Force Manual (DAFMAN) 90-161, *Publishing*

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SUMMARY OF CHANGES

This document has been substantially revised and needs to be completely reviewed. Major changes include: (1) eliminates **Chapter 3**, Low Altitude Alert System (LAAS); (2) eliminates Chapter 6, Manual TERPS Calculations; (3) eliminates as many acronyms as possible; (4) eliminates instrument procedure jargon; (5) eliminates guidance duplicated in other governing directives or no longer required; (6) eliminates specific governance paragraphs and version changes; (7) deletes references to outdated forms and updates data processing and automation tool guidance.

Chapter 1

OVERVIEW

1.1. Scope and Purpose of this Manual. This manual provides instructions, processes, and procedures to assist USAF/USSF Chief Controllers/Air Traffic Managers and Instrument Procedure Specialists (Unit or MAJCOM/FLDCOM) to carry out responsibilities per DAFMAN 11-230, *Instrument Procedures* and DAFMAN 13-204V3, *Air Traffic Control*. **(T-2)**

1.2. Roles and Responsibilities.

1.2.1. Chief Controller / Air Traffic Manager.

1.2.1.1. Manages the ATC facility and associated RADAR systems.

1.2.1.2. Coordinates with TERPS when establishing a facility MVAC, MIFRAC, DVA and non-RADAR suitability/requirements.

1.2.2. Instrument Procedure Specialist. Accomplish responsibilities per DAFMAN 11-230 in conjunction with this manual.

1.3. Waivers. For tiered and non-tiered compliance item process waivers per DAFMAN 11-230.

Chapter 2

MINIMUM VECTORING ALTITUDE CHARTS (MVAC) AND MINIMUM INSTRUMENT FLIGHT RULES ALTITUDE CHART (MIFRAC)

2.1. General. MVACs and MIFRACs are developed and maintained by TERPS authorities as directed by ATC facility management using Global Procedure Designer (GPD) Software. MVACs and MIFRACs do not require flight inspection.

2.1.1. Minimum Vectoring Altitude Chart. Establish MVACs in a accordance with (IAW) this chapter and Federal Aviation Administration (FAA) Order JO 7210.3, *Facility Operation and Administration*, as appropriate. **(T-2)** The MVAC is used in a RADAR environment to determine the lowest useable Instrument Flight Rules (IFR) altitude at which an aircraft may be vectored while maintaining clearance from obstructions, terrain and uncontrolled airspace.

2.1.1.1. DAF TERPS are not required to develop MVACs at DAF locations where host nation or the FAA provide terminal RADAR service e.g., a USAF/USSF Visual Flight Rules (VFR) control tower. However, they are required to obtain a copy of the FAA, host nation MVAC or suitable alternative documentation for reference when developing instrument procedures. **(T-2)**

2.1.1.2. TERPS functions required to develop MVACs must consider the adjacent ATC facilities' MVAC when developing the USAF/USSF chart to prevent excessive altitude changes between the two facilities' adjoining MVAC sectors. **(T-2)**

2.1.1.3. When developing MVACs for Digital Airport Surveillance RADAR (DASR)/Standard Terminal Automation Replacement System (STARS), enter the DASR magnetic variation (MV) of record for the DASR, not STARS equipment.

2.1.2. **Definitions and chart types** .

2.1.2.1. Single sensor MVAC.

2.1.2.1.1. This chart supports those systems where RADAR data is provided by a feed from a single short range (terminal) Airport Surveillance RADAR (ASR) or DASR antenna. Instrument Procedure Specialist will develop single-sensor MVACs for legacy analog RADARs (GPN-27), and mobile ASRs (MPN-14 and MPN-25), and DASR (GPN-30). **(T-2)** Single-sensor MVAC rules may also be used for multi-sensor mosaic systems where RADAR data from a single terminal RADAR is selected or adapted.

2.1.2.1.2. Instrument Procedure Specialist will develop single-sensor MVACs for a single-sensor terminal RADAR mode and for designated terminal areas where the area is adapted to utilize a single terminal RADAR. **(T-2)** Three nautical miles (NM) lateral separation will be provided from terrain and obstructions (sector buffer) within 40 nautical miles of the ASR/DASR and five nautical miles lateral separation will be provided 40 nautical miles and greater from the chart center. **Note:** For fulltime reinforced Monopulse Secondary Surveillance Radar (MSSR) systems use 60 NM instead of 40 NM in all instances outlined in FAA Order 8260.3, *U.S. Standard for Terminal Instrument Procedures*, paragraph 11-3-2(1). **(T-2)** A single-sensor MVAC is centered on the terminal ASR/DASR antenna in order for GPD to determine where to apply the increase in lateral separation to five nautical miles.

2.1.2.1.3. For a terminal area where ATC has the ability to switch from single-sensor to multi-sensor mode, Instrument Procedure Specialist will develop a multi-sensor MVAC. **(T-1)** When operationally advantageous, both a single- and multi-sensor MVAC may be developed.

2.1.2.2. Multi-sensor MVAC. This chart supports those systems where RADAR data is provided by a feed from one or more long range (en route) Air Route Surveillance RADAR antennas, or a feed from more than one single-sensor RADAR. Instrument Procedure Specialist will develop en route MVACs for multi-sensor mosaic systems such as Microprocessor En Route Automated RADAR or STARS, except for the adapted terminal area specified in **paragraph 2.1.2.1** **(T-2)** When a single-sensor MVAC is developed for the terminal area or the single-sensor mode of a multi- sensor system, develop and maintain both single- and multi-sensor MVACs. Five nautical miles lateral separation is provided from terrain and obstructions (sector buffer) regardless of the distance from the chart center or aerodrome.

2.1.2.3. FUSION-based MVAC. This chart supports multi-sensor (multiple radar feeds and Automatic Dependent Surveillance - Broadcast (ADS-B) when facility enhanced) systems enabling more precise aircraft tracking. FUSION allows for a continuous 3 nautical mile or 5 nautical mile MVAC buffer throughout the entire radar presentation, regardless of antenna distances. Instrument Procedure Specialists will develop FUSION MVACs with 3 nautical mile or 5 nautical mile buffers in GPD under the single-sensor MVAC module by selecting a desired airspace range to the extent of the work area and then selecting 3 nautical mile or 5 nautical mile buffers as appropriate. **(T-2)** This will prevent auto-triggering of the 5 nautical mile buffers at 40 nautical miles. For the appropriate FUSION buffer selection and requirements, see FAA Order JO 7210.3, as appropriate.

2.1.3. Standard sector. A sector bounded by two bearings and two ranges (arcs) relative to chart center.

2.1.4. Irregular sector. A more complex sector bounded by more than two bearings and two ranges relative to chart center.

2.1.5. Polygonal sector. A sector defined by the World Geodetic System-84 coordinates of each corner (vertex). There is no limit to the number of sides to this type of sector.

2.1.6. Prominent obstacle sector. This is a “buffer” sector intended to provide the required vertical and lateral clearance from a single, isolated, man-made obstacle. When a single, isolated, man-made obstacle causes the entire sector altitude to be higher than desired, a prominent obstacle sector may be established. A prominent obstacle sector may be contained within a single larger sector or overlap several adjacent sectors and can be based on an obstacle that is outside the MVAC radius but within the buffer area of the sector (**Figure 2.1**.). **Note:** Prominent obstacle sectors cannot be used to provide separation from terrain features such as mountain peaks that may or may not have towers or antennas near the peak (**Figure 2.2**.). All obstacles inside the prominent obstacle sector, except those obstacles that fall within the horizontal accuracy of the obstacle upon which the prominent obstacle sector is based, are evaluated when determining the minimum altitude of the sector(s) surrounding or adjoining the prominent obstacle sector.

Figure 2.1. Application of Prominent Obstacle Sector without High Surrounding Terrain.

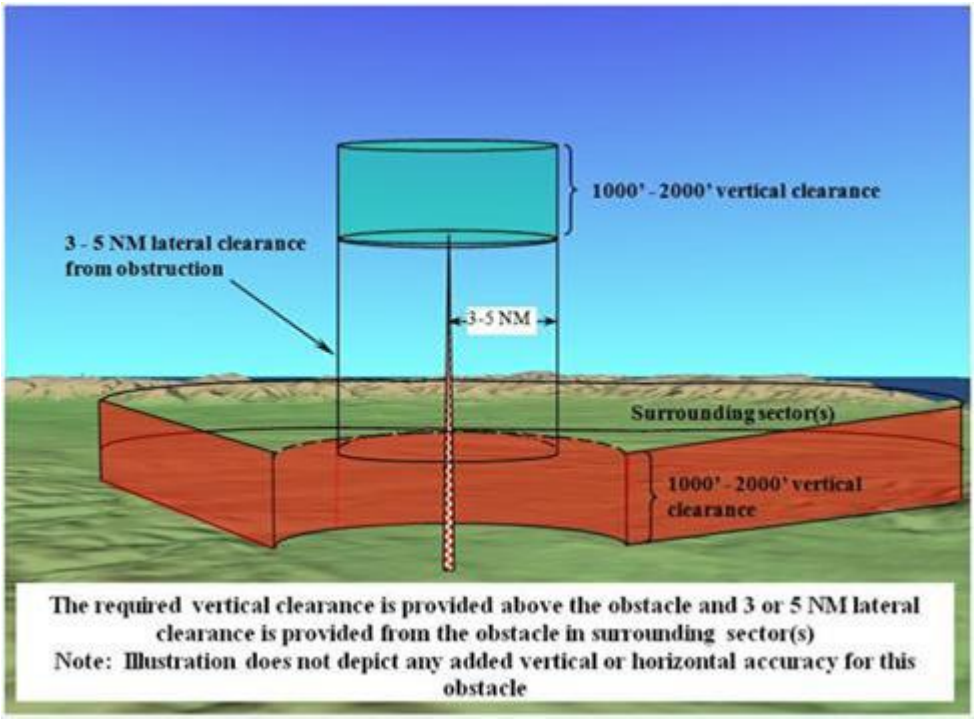
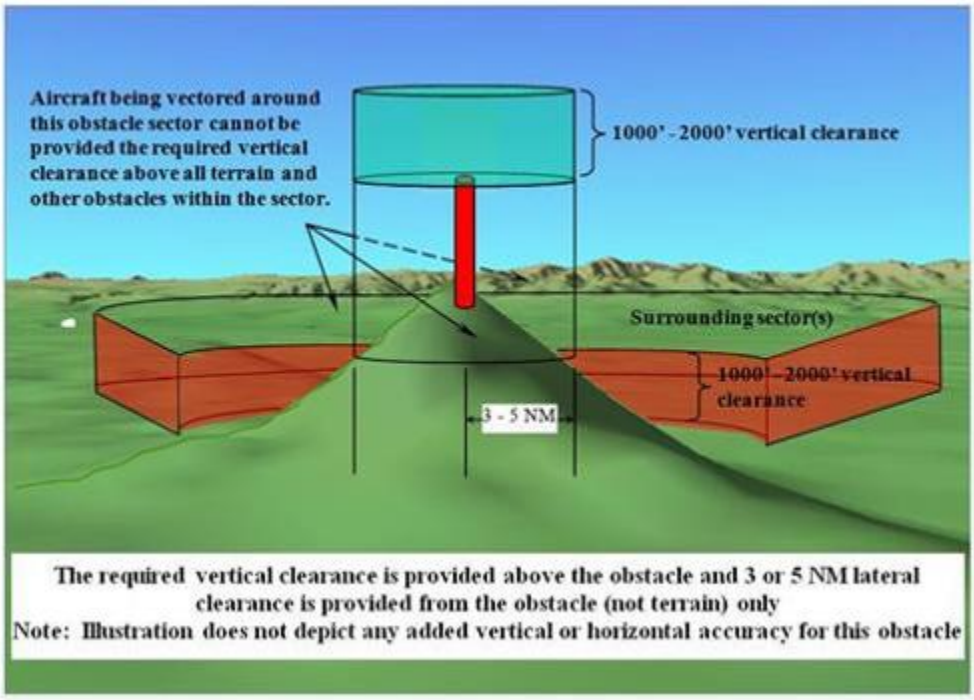


Figure 2.2. Misapplication of Prominent Obstacle Sector with High Surrounding Terrain.



2.1.7. **Chart Design.**

2.1.7.1. Determine which type of chart (Single Sensor, Multi-Sensor or both) is applicable based on **paragraph 2.1.2**. Instrument Procedure Specialist will establish MVACs

irrespective of the flight-checked RADAR coverage in the sector concerned; they are based on obstruction clearance criteria and controlled airspace only. **(T-2)**

2.1.7.1.1. For a single-sensor MVAC, Instrument Procedure Specialist will ensure the area considered for obstacle clearance (chart radius) encompasses the maximum range of the ASR primary RADAR coverage and be extended to include all delegated airspace. **(T-3)** This includes adjacent areas where control responsibility is assumed because of early handoff or track initiation. **Exception:** When developing a single-sensor MVAC to support the designated terminal area of a multi-sensor system (**paragraph 2.1.2**), the area only needs be large enough to include the entire terminal area to include the appropriate buffer area based on the distance from the ASR/DASR.

2.1.7.1.2. For a multi-sensor MVAC, Instrument Procedure Specialist will ensure the area considered for obstacle clearance (chart radius) is large enough to include 20 nautical miles beyond delegated airspace boundaries to include adjacent areas where control responsibility is assumed because of early handoff or track initiation. **(T-2)** When developing an En Route MVAC, ensure that "multi-sensor" is selected in the chart properties of GPD to ensure the proper buffer size is constructed.

2.1.7.2. To aid in determining the appropriate chart radius, delegated ATC airspace may be entered into GPD Data Manager as a new, unclassified airspace.

2.1.7.3. Define the chart properties. Specify whether the default terrain type for the chart is designated mountainous or non-mountainous IAW Title 14, Code of Federal Regulations (CFR) Part 95, *Designated Mountainous Areas* in the Continental United States (CONUS). **(T-2)** Outside the CONUS, review the appropriate host nation Aeronautical Information Publication (AIP) or other applicable directives and comply with mountainous terrain designations. When the host nation has not explicitly defined terrain type designations, evaluate the topography of the area to determine if it is a mountainous area as defined by International Civil Aviation Organization (ICAO) (3000 feet of terrain elevation change within a distance of 10 nautical miles). Additionally, check host nation en route charts (host and National Geospatial-Intelligence Agency) to ascertain that the required obstacle clearance (ROC) is applied on air traffic service routes and to off-route altitudes such as minimum off-route altitude and off-route obstruction clearance altitude. Determine which terrain type is appropriate and document the rationale in the chart's user defined notes.

2.1.7.3.1. Apply mountainous terrain obstacle clearance per FAA Order 8260.3 or ICAO Doc 8168-OPS/611 – *Procedures for Air Navigation Services – Air Operations (PANS-OPS); Volume II*, as applicable. **(T-2)**

2.1.7.3.2. Where lower altitudes are necessary in designated mountainous areas to achieve compatibility with terminal routes or to permit vectoring to an instrument approach, the default ROC may be reduced to 1000 feet for a single-sensor MVAC, and 1500 feet or 1700 feet for an multi-sensor MVAC as specified in FAA Order 8260.3 or IAW the State's Aeronautical Information Publication (AIP), Section GEN 3.3.5, "Minimum flight altitude." Instrument Procedure Specialist will annotate each sector with the statement "ROC reduced to less than 2000 feet" in the appropriate sector defined notes. **(T-2)**

2.1.7.4. Instrument Procedure Specialist will specify the appropriate allowance for trees and this allowance will be applied uniformly to the entire terrain model. **(T-2)** Where vegetation is sparse, or has variable heights, or when using Shuttle RADAR Topography Mission, it may be preferable to add assumptions for vegetation to the sector altitude rather than entering a tree allowance to the entire area. This choice should be documented in the designer notes for posterity. For additional guidance about vegetation (tree) allowance, see: DAFMAN 11-230.

2.1.7.5. Specify standard, irregular, or polygonal sectors or any combination thereof based on the terrain, obstacle and airspace environment or other operational requirements (RADAR patterns, noise abatement areas, Special Use Airspace [SUA], etc.). See **Figure 2.3** and **Figure 2.4**. Ensure sector coverage over the entire chart with no gaps between sectors. With the exception of a prominent obstacle sector, each sector's boundary must adjoin, but not overlap, the boundary of each adjacent sector. **(T-2)** In some cases, it may be desirable to combine adjacent smaller areas having different altitudes into a single large area with one altitude.

2.1.7.5.1. Instrument Procedure Specialist will make each obstacle sector, except for prominent obstacle sectors, large enough to permit the efficient and safe vectoring of aircraft. **(T-2)** Consideration should be given to aircraft performance and phase of flight.

2.1.7.5.2. There is no limitation to what sector types may be developed for either a single- or multi-sensor MVAC. For example, polygonal sectors can be established for a terminal chart, and standard sectors can be defined for en route. However, when MVAC sector design impacts low altitude alert, consider low altitude alert development limitations. Coordinate with ATC automation personnel when applicable to determine optimum sector design.

2.1.7.6. Specify sector altitudes no less than the minimum altitude. The selected altitude will provide at least the ROC above obstructions and terrain plus vegetation allowance in the sector, including buffer, and must be at least 300 feet above the highest floor of controlled airspace (FOCA) in the sector, not including buffer, rounded to the higher 100-foot increment. **(T-2)**

2.1.7.6.1. When the minimum altitude is higher than desired due to a high FOCA, and when operationally required by ATC (i.e., routinely expected to vector aircraft in Class G uncontrolled airspace), two sector altitudes may be established. Instrument Procedure Specialist will base one sector altitude on the FOCA, and the second sector altitude on obstruction clearance. **(T-2)**

2.1.7.6.2. Instrument Procedure Specialist will not add the vegetation allowance to the terrain values used for FOCA determination. **(T-2)**

2.1.7.7. Host nations may detail FOCA in their AIPs or other sources; however, some compute this data differently than United States (US) criteria. Check with appropriate host nation personnel to ensure accurate information is applied. When a host nation does not designate the FOCA, controlled airspace is considered to begin at the surface. Document in the chart's user defined notes and, when available, include a hard copy version of the host nation's airspace description in the chart package.

Figure 2.3. Minimum Vectoring Altitude Chart with Standard, Irregular, Polygonal and Prominent Obstacle Sectors.

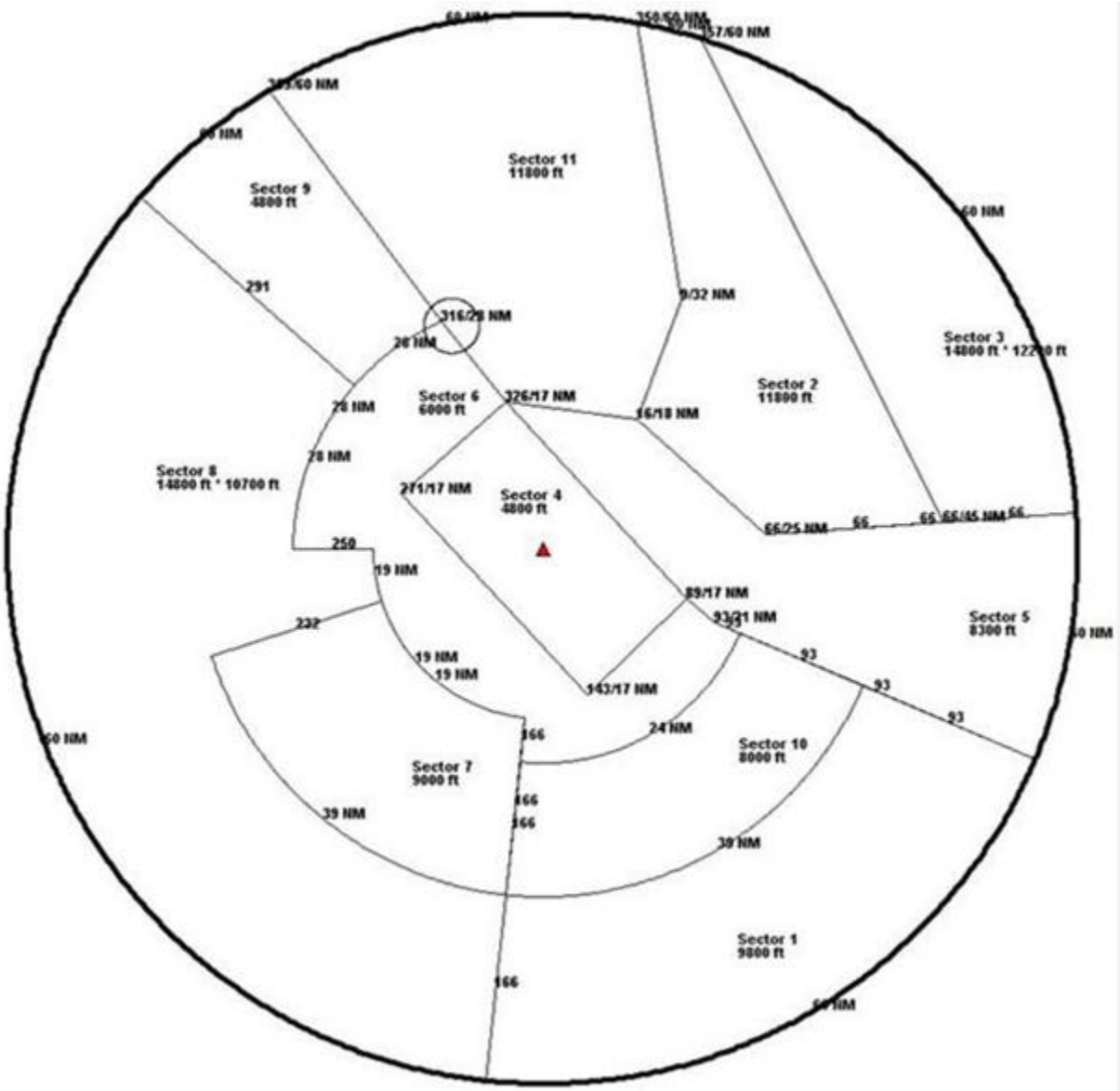
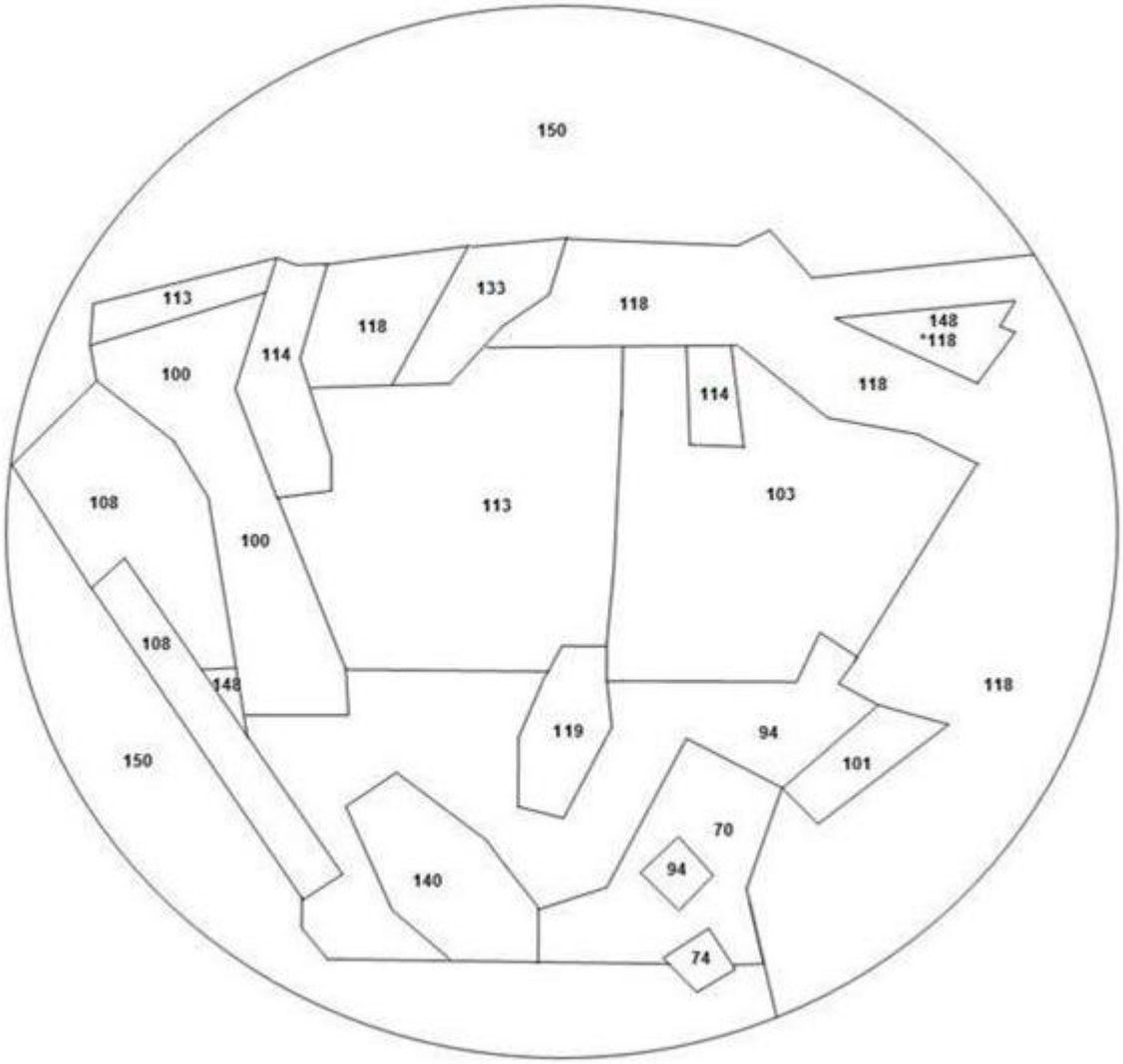


Figure 2.4. Minimum Vectoring Altitude Chart with Polygonal Sectors.



2.2. Minimum Instrument Flight Rules Altitude Chart. The MIFRAC is used to determine the lowest useable IFR altitude at which an aircraft may operate, receive the appropriate Navigation Aid (NAVAID), and maintain clearance from obstructions, terrain and uncontrolled airspace in a non-RADAR environment. **Note:** Minimum IFR altitudes are only intended for off-route and direct-route operations. The Minimum En Route Altitude MEA or Minimum Obstruction Clearance Altitude (MOCA) in a particular area has no impact on MIFRAC design

2.2.1. Chart Design. Develop a MIFRAC centered on each omni-directional NAVAID i.e., Tactical Air Navigation (TACAN), Very High Frequency (VHF) Omnidirectional Range/Tactical Air Navigation (VORTAC), VHF Omnidirectional Range (VOR) or Non-directional Radio Beacon (NDB) used for non-RADAR operations.

2.2.2. Do not exceed the standard service volume of the NAVAID. The existence of an expanded service volume has no bearing on MIFRAC design unless approved for an entire area or sector in which off-route operations are conducted. The area considered for obstacle clearance (chart radius) must be large enough to encompass the standard NAVAID service

volume for the highest altitude where control responsibility is routinely assumed. **(T-2)** The chart radius must encompass all delegated airspace to include adjacent areas where control responsibility is assumed. **(T-2)** For standard service volumes, see FAA Order 8260.19.

2.2.3. Specify the default terrain type per **paragraph 2.1.7.3** and the vegetation allowance specified in **paragraph 2.1.7.4**.

2.2.4. When an MVAC is available, associate the MIFRAC in chart properties of GPD. This ensures the MIFRAC sector altitudes are no lower than the MVAC.

2.2.5. Specify standard or irregular sectors or any combination based on the terrain, obstacle, airspace environment, MVAC and other operational requirements (RADAR patterns, noise abatement areas, SUA, etc.). GPD requires sector coverage over the entire chart with no gaps between sectors and each sector's boundary adjoin, and not overlap the boundary of each adjacent sector. In some cases, it may be desirable to combine adjacent smaller areas having different altitudes into a single large area with one altitude (**Figure 2.6**.). **Note**: There is no "Terminal" or "En Route" distinction for MIFRACs; 5 nautical miles lateral separation (buffer area) is provided from terrain and obstructions regardless of the distance to the facility.

2.2.6. Instrument Procedure Specialist will specify only one sector altitude in each sector no less than the minimum altitude. **(T-2)** This minimum altitude will provide at least the required ROC above obstructions and terrain plus vegetation allowance in the sector, including buffer, and must be at least 300 feet above the highest FOCA in the sector, not including buffer, rounded to the higher 100-foot increment. **(T-2)** The selected MIFRAC sector altitude must not be lower than the highest Minimum Vectoring Altitude (MVA) for that given area. **(T-2)** **Note 1:** When determining MIFRAC sector altitudes, do not include MIFRAC sector buffer areas when evaluating the associated underlying MVAC sectors. **Note 2:** CAUTION: Two or more MVA altitudes may affect a single MIFRAC sector. Annotate each sector where **paragraph 2.1.7.3.2** is applied with the statement "ROC reduced to less than 2000" (**Figure 2.7**.).

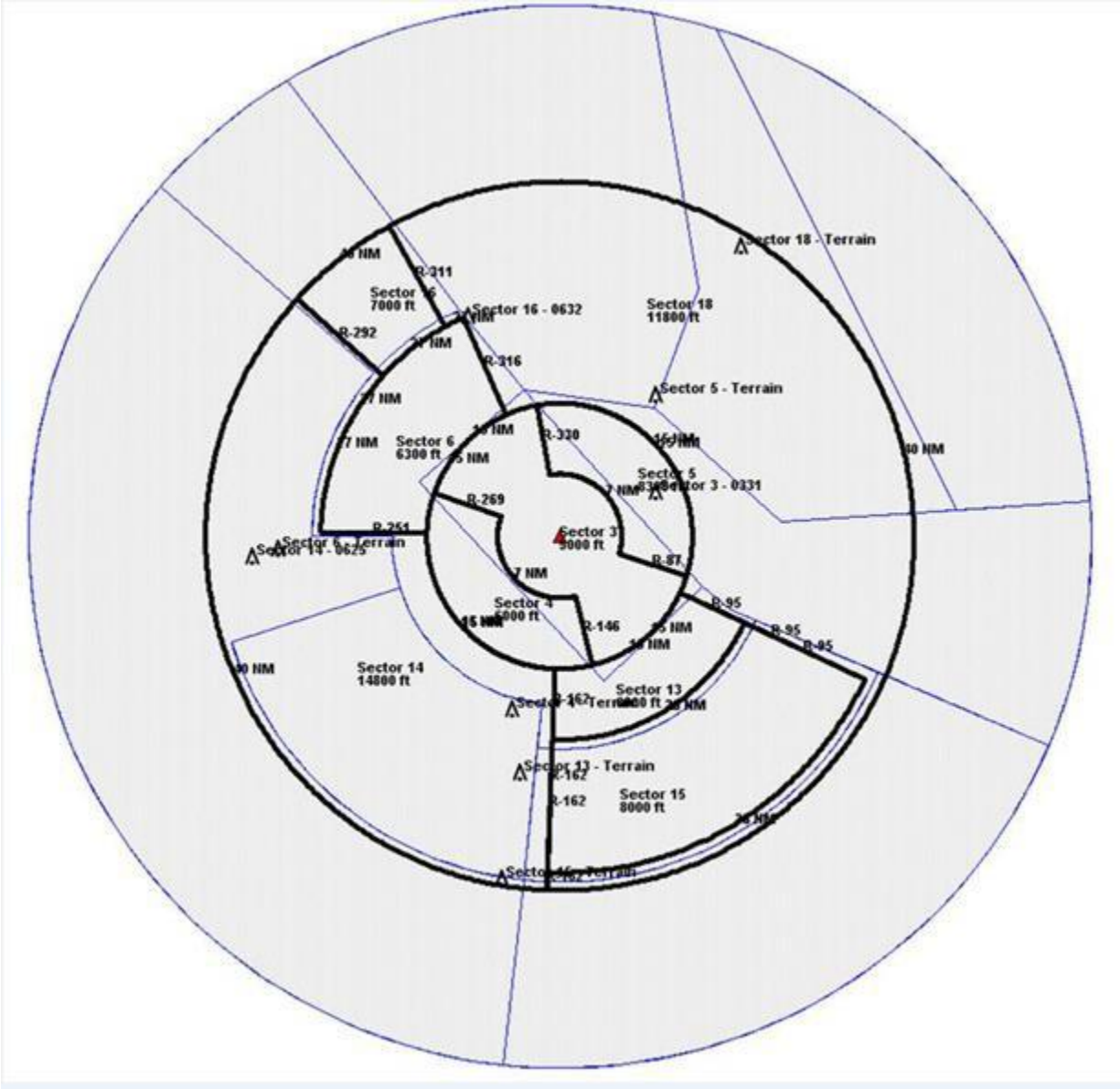
2.2.7. Consider restrictions noted on flight inspection reports or Aviation Standards Information System datasheet (i.e., horizontal and vertical NAVAID limitations to include unusable sectors) when determining sector design and when specifying sector altitudes (**Figure 2.5**.). For example, for the first restriction shown in **Figure 2.5**, the MIFRAC sector from R-130 clockwise to R-160 beyond 29 nautical miles out to the chart radius cannot be lower than 9000 feet mean sea level (MSL) regardless of the minimum altitude specified by GPD. When flight inspection designates that no coverage exists in an area, annotate the sector as unusable.

Figure 2.5. NAVAID Restrictions.

*** RESTRICTION ***								
Cmpnt	Qual	Svc Date	From	To	Byd	Below		Remark
TACAN	BOTH	08/19/93	130	160	29	9000		
TACAN	BOTH	08/19/93	235	305	19	8000		
TACAN	BOTH	02/02/96	235	305	27	12000		

Figure 2.6. MIFRAC Sectors in GPD Chart Designer with VFR Sectional.

Figure 2.7. MIFRAC Sectors in GPD Chart Designer with MVAC (in blue).



2.3. ATC Chart Documentation and Coordination. Instrument Procedure Specialist will create and maintain an electronic copy of the ATC Chart procedure package containing documentation as follows:

2.3.1. GPD export files and signed ATC charts signature page, as appropriate. Include all source documentation relating to aeronautical or obstacle data revisions pertinent to the chart to include correspondence to MAJCOM/FLDCOM TERPS functions. **(T-2)**

2.3.2. Coordination. The Instrument Procedure Specialist will obtain all approval signatures, as appropriate. **(T-3)** The Instrument Procedure Specialist, the appropriate ATC Facility Manager, Airfield Operations Flight Commander, and MAJCOM/FLDCOM TERPS must provide the required signatures for ATC charts signature page. **(T-2)** FAA or host nation

signatures are only required when mandated by formal agreement. Other signatures are determined by the MAJCOM/FLDCOM.

Chapter 3

DIVERSE VECTOR AREA DEVELOPMENT

3.1. Diverse Vector Area. When requested by IFR facility management or host nation aviation authorities, the Instrument Procedure Specialist will use GPD, FAA Order 8260.3, Section 14-5, FAA Order JO 7210.3, paragraph 3-8-5 and the following guidance to develop a DVA. **(T-1)** **Exception:** When no penetrations to the 40:1 diverse departure assessment exist, Instrument Procedure Specialist will notify the requesting ATC facility management that a DVA is not required IAW FAA Order JO 7210.3, paragraph 3-8-5. **(T-1)**

3.1.1. When a DVA is requested and required, the Instrument Procedure Specialist will document coordination with IFR facility management and the Airfield Operation Flight Commander by obtaining their signatures on the GPD Approach/Departure Signature Page. **(T-2)** MAJCOM/FLDCOM TERPS review and approval is required prior to DVA implementation. **(T-2)**

3.1.2. When a DVA is requested and required, the Instrument Procedure Specialist will document coordination with IFR facility management and the Airfield Operation Flight Commander by obtaining their signatures on the GPD Approach/Departure Signature Page. **(T-2)**

3.1.3. When no penetrations to the 40:1 diverse departure assessment exist, the Instrument Procedure Specialist will notify the requesting ATC facility management that a DVA is not required IAW FAA Order 7210.3 and document completion of the diverse departure obstacle assessment on the GPD Approach/Departure Signature Page. **(T-1)** Evaluate the diverse departure assessment monthly for any change that may require a DVA.

3.2. DVAs. DVAs do not require flight inspection. **Note 1:** When the USAF/USSF provides IFR air traffic services to an airport that the FAA has TERPS responsibilities, contact the appropriate FAA instrument procedure designer for a list of the non- Digital Terrain Elevation Data penetrations of the diverse departure assessment area for each runway. USAF/USSF Instrument Procedure Specialist will ensure these results include the location, description, and elevation of all 40:1 Obstacle Clearance Surface penetrations. **(T-3)** The USAF/USSF Instrument Procedure Specialist will use this information when developing the DVA. **(T-3) Note 2:** When the FAA provides IFR air traffic services to an airport that the USAF/USSF has TERPS responsibilities, when contacted by the appropriate FAA instrument procedure designer provide them with a list of the non-Digital Terrain Elevation Data penetrations of the diverse departure assessment area for each runway. These results will include the location, description, and elevation of all 40:1 Obstacle Clearance Surface penetrations. FAA instrument procedure designer will use this information when developing the DVA.

Chapter 4

TERPS SUPPORT OF USAF/USSF NON-RADAR PROGRAMS

4.1. General. Non-RADAR programs at USAF/USSF Air Traffic Facilities are the responsibility of the IFR Facility Manager. Non-RADAR programs are developed/maintained in concert with the supporting Instrument Procedure Specialist. This Instrument Procedure Specialist may be located locally or at the MAJCOM/FLDCOM.

4.2. IFR Facility Manager. During the non-RADAR program development, the IFR facility manager will contact the Instrument Procedure Specialist and request support. **(T-3)**

4.3. IFR Facility Manager will supply the following as applicable:

4.3.1. Depiction of any current non-RADAR board. **(T-3)**

4.3.2. Current non-RADAR program details. **(T-3)**

4.3.3. List of requested holding fixes, to include minimum and maximum holding altitudes. **(T-3)**

4.3.4. List of departure routings (NAVAID radials) and or Standard Instrument Departures (SIDs) for each runway, to include altitudes and associated transfer of control points. **(T-3)**

4.3.5. List of arrival routings (NAVAID radials) or Standard Terminal Arrival Routes for each runway, with required altitudes and any associated transfer of control points. **(T-3)**

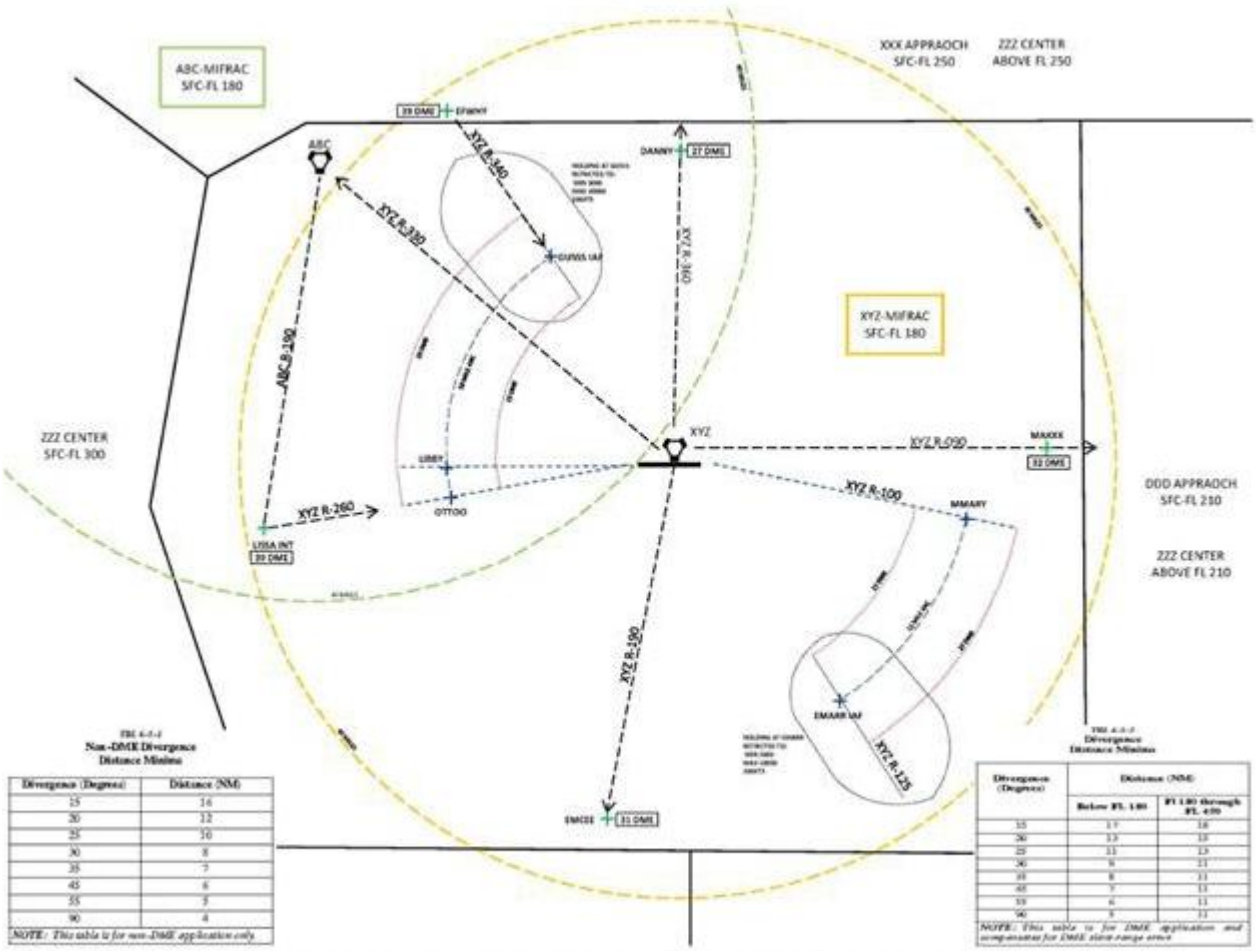
4.3.6. List of instrument procedures required to support non- RADAR operations for each airport and runway. **(T-3)**

4.3.7. List of NAVAIDs required to support the non-RADAR program. **(T-3)**

4.3.8. Airspace description (RADAR Approach Control delegated, adjacent ATC facility and SUA). **(T-3)**

4.3.9. Copies of Letters of Agreement with adjacent facilities that describe actions during RADAR outages. **(T-3)**

Figure 4.1. Non-RADAR Board Example.



Instrument Procedure Specialist (Unit or MAJCOM/FLDCOM) When requested by the IFR Facility Manager will assist in the following:

4.3.10. Design the requested non- RADAR routings (radials, arc, SIDs, approaches, missed approach segments, etc.). **(T-3) Note**: When plotting radials, use the MV assigned to the NAVAID. Design the requested non- RADAR routings (radials, arc, SIDs, approaches, missed approach segments, etc.). **(T-3)**

4.3.11. Provide the required radials that keep aircraft clear of airspace to be protected around a holding pattern. **(T-2)**

4.3.12. Apply FAA Order JO 7110.65, *Air Traffic Control*,to display airspace to be protected for arrival/departure routings, and arcs about NAVAIDs. **(T-2)**

4.3.13. Determine Distance Measuring Equipment (DME) points where lateral separation stops and vertical separation must exist. **(T-2)**

4.3.14. Validate or develop diverging courses for non- RADAR routings as required. **(T-2)**

4.3.15. Validate routings, altitudes and holding against the MAJCOM/FLDCOM approved MIFRAC for each NAVAID. **(T-2)**

4.3.16. De-conflict the airspace to be protected around non-RADAR routings, holding patterns, approaches, missed approaches, and SIDs as requested by facility management. **(T-2)**

4.3.17. Clearly label all NAVAIDs, radials (magnetic), arcs about the NAVAIDs, fixes (include coordinates if requested), holding airspace with minimum and maximum authorized altitudes, and airspeed, as required. **(T-2)**

4.3.18. Forward the completed scale drawing to the requesting IFR Facility Manager. **(T-2)**

ADRIAN L. SPAIN, Lt Gen, USAF
Deputy Chief of Staff, Operations

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

Title 14, Code of Federal Regulations (CFRs) Part 95, Subpart B, Designated Mountainous Areas

AFPD 13-2, Air Traffic, Airfield, Airspace and Range Management

DAFMAN 13-204 Volume 3, Airfield Operations Procedures and Programs

DAFMAN 11-230, Instrument Procedures

DAFMAN 90-161, Publishing Processes and Procedures

AFI 33-322, Records Management and Information Governance Program

FAA Order JO 7110.65, Air Traffic Control

FAA Order JO 7210.3, Facility Operation and Administration

FAA Order 8200.1, United States Standard Flight Inspection Manual

FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS)

ICAO Doc 8168 PANS-OPS Vol II, Procedures for Air Navigation Services (PANS) - Aircraft Operations - Volume II Construction of Visual & Instrument Flight Procedures (Doc 8168)

GPD-MA-53-4109 Global Procedure Designer (GPD) Operations Manual-Software

Adopted Forms

DAF Form 847, Recommendation for Change of Publication

DAF Form 679, Air Force Publication Compliance Item Waiver Request/Approval

Abbreviations and Acronyms

ADS-B—Automatic Dependent Surveillance - Broadcast

AFI—Air Force Instruction

AFPD—Air Force Policy Directive

AIP—Aeronautical Information Publication

ASR—Airport Surveillance RADAR

ATC—Air Traffic Control

CFR—Code of Federal Regulations

CONUS—Continental United States

DASR—Digital Airport Surveillance RADAR

DAF—Department of the Air Force

DAFMAN—Department of the Air Force Manual

DME—Distance Measuring Equipment

DVA—Diverse Vector Area

FAA—Federal Aviation Administration

FLDCOM—Field Command

FOCA—Floor of Controlled Airspace

GPD—Global Procedure Designer

HQ AFFSA—Headquarters Air Force Flight Standards Agency

IAW—In Accordance With

ICAO—International Civil Aviation Organization

IFR—Instrument Flight Rules

LAAS—Low Altitude Alert System

MAJCOM—Major Command

MEA—Minimum En Route Altitude

MIFRAC—Minimum IFR Altitude Chart

MOCA—Minimum Obstruction Clearance Altitude

MSL—Mean Sea Level

MV—Magnetic Variation

MVA—Minimum Vectoring Altitude

MVAC—Minimum Vectoring Altitude Chart

MSSR—Monopulse Secondary Surveillance Radar

NDB—Non-directional Radio Beacon

NM—Nautical Mile

NAVAID—Navigational Aid

OPR—Office of Primary Responsibility

PANS—Ops—Procedures for Air Navigation Services Operations

RADAR—Radio Detection and Ranging

ROC—Required Obstacle Clearance

SID—Standard Instrument Departure

STARS—Standard Terminal Automation Replacement System

SUA—Special Use Airspace

TACAN—Tactical Air Navigation

TERPS—Terminal Instrument Procedures

US—United States

USAF—United States Air Force

USSF—United States Space Force

VFR—Visual Flight Rules

VORTAC—VOR and TACAN navigation facilities (collocated)

VOR—Very High Frequency Omni-Directional Range Station

Office Symbols

AF/A3O—Air Force Assistant Deputy Chief of Staff, Operations

HQ AFFSA/XA—Headquarters, Air Force Flight Standards Agency, Airfield Operations

HQ AFFSA/XOS—Headquarters, Air Force Flight Standards Agency, Safety of Navigation

Terms

ASR—A radar system that detects and tracks aircraft in the airspace around an airport. ASR is the primary air traffic control system for the airspace around airports. It's used to quickly handle terminal area traffic by providing precise aircraft locations on a radar display

DVA—An area in which a prescribed departure route is not required. Radar vectors may be issued below the minimum vectoring or minimum IFR altitude. It can be established for diverse departure, departure sectors, and/or video map radar areas portraying obstacles and terrain.

En Route MVAC—A chart used by air traffic control (ATC) that displays the lowest altitude at which an aircraft can be safely vectored using radar, ensuring adequate obstacle clearance within a specific airspace sector, typically providing 1,000 feet above the highest obstacle in non-mountainous areas and 2,000 feet in designated mountainous regions; essentially, it outlines the minimum altitude a controller can clear an aircraft to while using radar vectoring.

FUSION—Refers to the process of combining data from multiple radar sensors to create a more comprehensive and accurate picture of the environment, often by merging information from different radar units with varying perspectives or detection capabilities, resulting in a more robust understanding of objects and their positions in space; this is particularly relevant in applications like autonomous vehicles where multiple radars are used to overcome individual limitations and achieve better overall perception.

Instrument Procedure Specialist—Individual responsible for the safe navigation of the National Airspace System via instrument flight procedure construction supporting the FAA Instrument Flight Procedures (IFP), International Civil Aviation Organization (ICAO) and/or Military Instrument Procedures Standards (MIPS). Specific duties, responsibilities and position qualification requirements are outlined in AFMAN 13-204, Volume 3 and AFMAN 11-230.

Microprocessor En Route Automated RADAR (Micro-EARTS) —Refers to a computer system used in air traffic control that utilizes microprocessor technology to automatically track aircraft positions received from radar, providing controllers with a real-time display of air traffic on their screens, particularly in the en route airspace between airports; essentially, it's a sophisticated radar processing system that uses advanced computing power to efficiently monitor and manage aircraft movement during flight.

MIFRAC—Chart used to determine the lowest useable IFR altitude at which an aircraft may operate, receive the appropriate Navigation Aid (NAVAID), and maintain clearance from obstructions, terrain and uncontrolled airspace in a non-RADAR environment.

Monopulse Secondary Surveillance Radar (MSSR)—An advanced type of radar system used in air traffic control, which provides more accurate aircraft positioning compared to standard Secondary Surveillance Radar (SSR) by utilizing a "monopulse" technique to precisely determine the azimuth (direction) of an aircraft, significantly reducing the issues of "garbling" and "fruit" when multiple aircraft are close together; essentially, it allows for better identification and tracking of aircraft in congested airspace by providing more precise location data.

RADAR—A system for detecting the presence, direction, distance, and speed of aircraft, ships, and other objects, by sending out pulses of high-frequency electromagnetic waves that are reflected off the object back to the source.

PAR—A radar guidance system that helps pilots land by providing lateral and vertical guidance until the aircraft reaches the landing threshold. PAR is a primary radar equipment used by air traffic controllers to guide pilots during final approach.

Polygonal sectors—Refers to a portion of a sector or essentially a "slice" of a polygon, created by dividing a polygon into smaller sections using lines that radiate from a central point within the polygon, similar to how a pie is divided into slices; essentially, it's a wedge-shaped area bounded by two polygon edges and an arc connecting them at a central vertex.

Required obstacle clearance (ROC)—Refers to the minimum vertical separation an aircraft must maintain above the highest obstacle within a specific airspace during an instrument flight, essentially defining the minimum altitude needed to safely clear obstacles during a flight procedure like departure, enroute, or approach; it is a crucial aspect of IFR operations and is calculated based on factors like terrain elevation and the specific flight segment involved.

TERPS—Prescribes standardized methods for design and evaluation of instrument flight procedures (IFPs) and Air Traffic Control (ATC) procedures in the United States and its territories.

VHF Omnidirectional Range/Tactical Air Navigation (VORTAC)—A combined aviation navigation system that uses both a VHF Omnidirectional Range (VOR) for azimuth information and a Tactical Air Navigation (TACAN) beacon for both azimuth and distance measurement, essentially providing pilots with a single ground station that offers both bearing and distance data to their aircraft; it's commonly used in both civil and military aviation.