BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AIR FORCE INSTRUCTION 11-230
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Flying Operations

INSTRUMENT PROCEDURES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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OPR: AFFSA/XOIP (Mr. Thomas E. Schneider)
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(Major General Walter E. Buchanan III)
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This instruction implements AFPD 11-2, *Flight Rules and Procedures.* It provides guidance on establishing, approving, revising, or deleting instrument procedures. It will apply to flying activities at all airfields where the Air Force, or an Air Force component of a unified command conducts or supports instrument flight. Use this instruction in conjunction with AFMAN 11-226 (I), *US Standard for Terminal Instrument Procedures (TERPS)* and NATO APATC-1, *Criteria for the Preparation of Instrument Approach and Departure Procedures.*

Forward copies of all supplements for this instruction to the Air Force Flight Standards Agency, Director of Operations, Instrument Procedures (AFFSA/XOIP) for approval. For suggested changes to this instruction, use AF Form 847, ***Recommendation for Change of Publication***. Send AF Form 847 through channels to AFFSA/XOIP. AFI 11-215, *Flight Manual Procedures,* will govern processing of AF Forms 847. Maintain and dispose of records created as a result of prescribed processes in accordance with AFMAN 37-139, *Records Disposition Schedule.*

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

Revisions include a change to become an Air Force Instruction; divides previous 4 Chapters into 11 Chapters; expands Foreign Terminal Instrument Procedures review and publication process to include a Special Accredited Nation/Airport category; establishes criteria to develop Diverse Vector Areas; and graphics improved that are used to aid in development of Minimum Vectoring Altitude and Minimum IFR Altitude Charts.

Chapter 1--RESPONSIBILITIES

Chapter 2—TERPS GENERAL

Chapter 1

RESPONSIBILITIES

1.1. HQ USAF Responsibilities. HQ USAF/XOO has delegated the approving authority for criteria in AFMAN 11-226 (I), *United States Standard for Terminal Instrument Procedures (TERPS),* NATO APATC-1, ICAO PANS-OPS, and this instruction to AFFSA/XOIP.

1.2. AFFSA/XOIP Responsibilities:

1.2.1. Approves nonstandard instrument procedures.

1.2.2. Approves standard instrument procedures. HQ AFFSA delegates authorization to major command (MAJCOM) TERPS Function.

1.2.3. Maintains liaison, effects coordination, and serves on committees with other agencies within the US Government, industry, and international civil or military organizations on matters relating to instrument procedure criteria. Represents the US Air Force and Department of Defense (DoD) interests as directed by HQ AFFSA.

1.2.4. Develops proposed criteria as a result of ongoing operational needs, as requested by HQ USAF or MAJCOMs. Tests and evaluates criteria at the direction of HQ USAF.

1.2.5. Custodian for NATO APATC-1.

1.2.6. Under the guidelines established for application of the USAF Host Nation Acceptance Program, approves use of foreign nations Aeronautical Information Publications for acceptance of their instrument procedures (see Chapter 7 for limitations).

1.2.7. Manages the Terminal Instrument Procedures Program in support of US Air Force requirements.

1.2.8. Informs the National Imagery and Mapping Agency (NIMA/SMWA) which US Air Force elements may send procedures and revisions for publication.

1.2.9. Develops and maintains agreements with NIMA outlining the data required for publication and maintenance of US Air Force and US Air Force-approved foreign instrument procedures.

1.2.10. Develops and maintains agreements with the Aviation Standards National Field Office of the Federal Aviation Administration (FAA) outlining the processing of US Air Force procedure requirements at US civil and joint-use bases.

1.2.11. Maintains listings of procedural requirements by location, type of procedure, and requiring commands.

1.2.12. Deletes procedures not included on a MAJCOM listing of required procedures after coordination with responsible MAJCOM or agency.

1.2.13. Identifies and justifies deviations to US charting specifications.

1.2.14. Approves computer programs, including micro, used to develop TERPS products and procedures.

NOTE: Programs submitted for approval must include internal and external documentation and the validation of testing routines to ensure there is no violation of TERPS criteria. Submission of flowcharts or program data language (PDL) will enhance validation.

1.3. MAJCOM TERPS Responsibilities:

1.3.1. Develops, reviews, approves and submits for publication standard instrument procedures within their Area Of Responsibility (AOR). Approval authority for unit's Minimum Vectoring Altitude Chart (MVAC) and Minimum IFR Altitude Charts (MIFRAC).

1.3.1.1. MAJCOMs may delegate final review and approval authority to group and wing level, combat communications units, and TERPS Unit Type Code (UTC) deployment package when required to support unique geographical requirements for short-notice operations. Organizations supporting long-term exercise planning will process procedures according to this instruction. When delegating review and approval authority (standard procedures), forward a copy of the correspondence to supporting MAJCOM and AFFSA/XOIP. All non-standard procedures will be processed IAW paragraph 5.5. Recommendation for waiver approval must be obtained from both the host MAJCOM and the deployed unit's parent MAJCOM.

1.3.2. Provides technical and procedural development assistance when requested by subordinate units. Requests for specific procedure development or verification of TERPS data submitted by subordinate units, along with obstruction evaluation cases, will be accomplished when appropriate. The TERPS personnel have the responsibility for ensuring accuracy, adequacy, safety, and practicality of each procedure within their jurisdiction and for developing and providing an effective system of quality control to maintain acceptable standards of performance. They initiate investigative action and ensure remedial action with respect to any deficiency or reported hazard, including restrictions or emergency revisions to procedures. MAJCOM TERPS personnel maintain liaison with their subordinate units, as well as FAA, DoD, and foreign nation personnel (when possible) to ensure consideration of all requirements relating to procedural use of navigational facilities. MAJCOM TERPS offices maintain suitable procedures, with required supporting data, obtaining magnetic variation values used to develop instrument procedures based on navigational aids (NAVAID) and radar facilities flight inspected from FAA/AVN-160.

1.3.2.1. MAJCOMs will ensure a FLIP maintenance system (checklist, operating instructions, etc.) has been established that tracks annual/biennial reviews, AIP changes (Host Nation locations), NOTAMs, CHUM data, and related correspondence, for updating instrument procedures.
1.3.2.2. Maintains current listing of all required procedures and waivers using AFFSA spreadsheet format. Provides listing to HQ AFFSA/XOIP by 15 October annually. This Instrument Procedures Listing complies with AFI 33-324, *The Information Collections and Reports Management Program; Controlling Internal, Public, and Interagency Air Force Information Collections.* The Report Control Symbol (RCS) number assigned is RCS: HAF-XO(A)9609, Instrument Procedures Listing. Immediately discontinue reporting this data during emergency conditions and notify AFFSA/XOIP. MAJCOM TERPS shall initiate action to have locations and types of procedures that do not appear on this listing, removed from FLIP. Annually review each published and special use instrument procedure (see paragraph 6.1.1).
1.3.2.3. Provide HQ AFFSA/XOIP a copy of all supplements to this instruction for approval.
1.3.3. Provide NIMA ISDM/DVOF with a listing of all locations under the MAJCOM's jurisdiction. This is for the purpose of obtaining a Digital Vertical Obstruction File (DVOF) out to a 105 NM radius, annually, with updates every 30 days (See paragraph 11.5).
1.3.3.1. Provide NIMA with the airport reference point coordinates and lowest landing threshold elevation.
1.3.3.2. MAJCOMs, upon receipt of the DVOF, will forward this information to the Unit TERPS office.
1.3.4. MAJCOM TERPS area of responsibility (AOR) is as follows:
1.3.4.1. Pacific Air Forces (PACAF) supports Pacific Command and other USAF procedure requirements in the Alaska FLIP; Pacific, Australasia, and Antarctica FLIP; and Eastern Europe and Asia FLIP (East of the 88 degrees longitude line). The PACAF AOR includes India, Pakistan, Nepal and Afghanistan. See paragraph 1.3.4.3 for instrument procedure development responsibility in Antarctica.
1.3.4.2. United States Air Forces Europe (USAFE) supports European Command and other USAF requirements in the Europe, Africa, and Middle East, and the Eastern Europe and Asia (West of the 88 degrees longitude line), FLIPs.
1.3.4.3. Air Mobility Command (AMC) has delegated the HQ AMC AOS OL-J, MacDill AFB, FL, MAJCOM responsibilities for the Caribbean, Central and South American region. Additionally, HQ AMC is responsible for instrument procedure requirements in Antarctica IAW established Memorandum of Understandings with the National Science Foundation for Operational and Logistics Support of the Polar Programs, AFFSA, and other participating MAJCOMs.
1.3.4.4. Air Education and Training Command (AETC) supports their own command requirements as well as those for the Canada and North Atlantic FLIP, and Air Force Space Command.
1.3.4.5. Air Combat Command (ACC), Air Mobility Command (AMC), and Air Force Materiel Command (AFMC) are responsible for their respective command elements.
1.3.4.6. Air National Guard (ANG) TERPS office supports all ANG Bases/Stations and civil locations where the ANG provides air traffic control services. They also maintain procedures developed IAW FAAO 8260.32 at select US civil airports, on a case by case basis, that are necessary to meet ANG mission/training requirements. NOTE: Responsibility for ANG requirements outside CONUS (Puerto Rico, Hawaii, Alaska, etc.) are as agreed upon with MAJCOM responsible for the applicable location.
1.3.4.7. Air Force Reserve Command (AFRC) supports all Air Reserve Bases/Stations and AFRC procedures required at civil airports developed IAW FAAO 8260.32, on a case by case basis.
NOTE: Gaining/Supporting MAJCOMs of ANG and/or AFRC assets may be tasked to support the TERPS requirements of the mission in cases where the ANG/AFRC TERPS offices are not capable of support.

1.4. MAJCOM or Air Force Component of a Unified Command, Director of Operations Responsibilities:
1.4.1. Ensures operational expertise is available to assist TERPS personnel in developing, reviewing/validating, and revising procedures. During contingency operations, the Air Force component commander may request the establishment of an in-theater TERPS cell for the purpose of developing and approving instrument procedures.
1.4.2. Ensure TERPS assets are identified during initial planning phase to Special Tactics (ST) units tasked to employ terminal navigational aids supporting contingency and training operations. ST combat controllers will conduct the airfield survey/siting and forward data to the appropriate AOR TERPS cell for completion of products.
1.4.3. Ensure flyability check is performed for procedures to be published in the DoD FLIP.
1.4.4. Ensures each procedure is operationally acceptable for the command or unit mission. In making this determination, considerations are:
1.4.4.1. Past, current, and intended usage by type of aircraft.
1.4.4.2. Climatology and topography affecting the terminal area.
1.4.4.3. Whether the procedure is a special, restricted, or public use procedure.
1.4.4.4. Flight inspection of the procedure by a US agency or host country flight inspecting to US or ICAO Annex 10 standards.
1.4.4.5. Validation of the procedure by a US agency for other US users.
1.4.4.6. The nature of the deviations that make the procedure nonstandard.
1.4.5. Ensures civil engineering or other appropriate agencies provide obstacle and airfield engineering data to support the development and maintenance of required procedures. Engineering maps from the Base Comprehensive Plan are an example

of these data. Unit TERPS offices will require current C-1, C-2 (if available), E-1, E-2, and E-3 (or E-series) engineering maps. Other engineering maps are optional. AFI 32-7062, ***Air Force Comprehensive Planning,*** provides engineering map guidance.

1.5. Unit TERPS Responsibilities:

1.5.1. Initiates actions essential to the fulfillment of TERPS program objectives assigned by their parent MAJCOM TERPS office and appropriate directives. ***NOTE:*** Situations may occasionally require extension beyond written and specific terms of a directive. Where safety or practicality of air navigation is a factor, the TERPS specialist cognizant of the situation will take action to change the situation.

1.5.2. Using the most accurate information available; plots, verifies and updates computerized obstruction and airfield data from maps, civil engineering maps, charts, surveys, and computer data bases. Maintains master obstruction maps (See paragraph 11.5).

1.5.3. Using the most current version of USAF TERPS automation software, prepare automated (manual when applicable) instrument procedure packages for approaches, departures, and Standard Terminal Arrival Routes to meet mission needs. Prepare Diverse Departure computations, Minimum Vectoring Altitude Charts (MVAC), and Minimum IFR Altitude Charts (MIFRAC). Assist Radar facility manager with the development of Diverse Vector Areas (DVA).

NOTE: When obstacles are added/deleted (CHUM data, monthly DVOF updates, and new DTED CD edition) from the TERPS database, **all instrument procedures**, including Diverse Departure, DVA, MVAC, MIFRAC, and MSAW/LAAS operations, must be re-evaluated.

1.5.3.1. Coordinate new and revised instrument procedures, ensuring procedural changes are coordinated with appropriate agencies.

1.5.3.2. Notify the MAJCOM TERPS office whenever the location/obstacle database has been modified.

1.5.4. Package Validation:

1.5.4.1. Verify controlling obstacle information for each segment of the IAP using acetate overlays. If any other obstacle is suspected of being the controlling obstacle, check it using manual calculations. If an obstacle not listed in the AF Form 3629 is identified as the controlling obstacle, enter the obstacle into the database, and re-automate the procedure.

1.5.4.2. Verify course, individual IAP segments, holding patterns, etc.; do not interfere with special use airspace, noise abatement areas, airways, restricted areas, etc.

1.5.4.3. Verify NAVAID and or radar coverage restrictions do not affect the procedure.

1.5.4.4. Check all courses and fixes for correct alignment and positioning.

1.5.4.5. Complete appropriate forms and obtain signatures, flyability check, etc.

1.5.4.6. Forward the automated or manual package to the appropriate reviewing agencies as outlined in figure 5.1 or figure 5.2.

1.5.5. Maintain TERPS Publications IAW Attachment 1 and TERPS files IAW USAF, MAJCOM, and base directives.

1.5.5.1. Develop and maintain a continuity folder including, as a minimum (See MAJCOM supplement, if applicable), the following:

1.5.5.1.1. Key Personnel.

1.5.5.1.2. Projects in Progress.

1.5.5.1.3. Procedures Listing (AFFSA annual review spreadsheet acceptable).

1.5.5.1.4. TERPS Equipment Listing.

1.5.5.1.5. Listing of Local References (Wing Instruction, DVA OI, ATC Non-Radar training material that may have TERPS restrictions, etc.).

1.5.5.1.6. File Maintenance and Disposition Plan.

1.5.5.1.7. FLIP Cycle Review Log.

1.5.5.1.8. Annual Validation and Procedure Amendment Log.

1.5.5.1.9. Copy of completed Annual/Semiannual Self-Inspection ATSEP Checklist (See AFI 13-218, *Air Traffic System Evaluation Program* for checklist).

1.5.5.1.10. Maintain historical listing of all changes to obstacle and airport databases, to include the change, reason changed, and impact (if none, so state).

1.5.5.2. TERPS files will contain current C-1, C-2 (if available), E-1, E-2, and E-3 (or E-series) Civil Engineering (CE) maps. If not available (e.g., FAA provides engineering support), suitable substitutes such as National Geodetic Survey (NGS) Airport Obstruction Charts (AOC) and the associated NOAA Aeronautical Data Sheet (ADS) are acceptable. Other maps are optional. ***NOTE:*** AFI 32-7062, *Air Force Comprehensive Planning,* provides CE map guidance.

1.5.6. Conduct annual and biennial reviews IAW paragraph 6.1.

1.5.7. Complete FAA Form 8240-22, ***Facility Data Sheet,*** IAW FAAO 8240.36**,** *Instructions for Flight Inspection Reporting.*

1.5.8. Prepare FAA Form 6050-4, ***Expanded Service Volume Request,*** as required (See paragraph 2.4).

1.5.9. Review and document that procedural data in each new FLIP product is correct (See Paragraph 6.3).

1.5.10. Provide notification of instrument procedure revisions to the installation environmental management (EM) office to conduct an environmental impact analysis. Initiate an AF Form 813 IAW AFI 32-7061***, Environmental Impact Analysis Process***. Simultaneously provide a copy of the AF Form 813 to the BCE/community planner to ensure compatibility with the AICUZ. Additionally , notify wing Airspace Management for evaluation against local Special Use Airspace or Military Training Routes (MTRs). Provide information to the CATCT/CSE/TSN for controller training and ready-reference file update.

1.5.11. Review and comment on FAA Form 7460-1, ***FAA Notices of Proposed Construction or Alteration***, for effects on instrument procedures, DVA, MVAC, MIFRAC, and MSAW/LAAS (See paragraph 11.11).

1.5.12. Ensure Airfield Management is provided data on instrument procedures requiring NOTAM action.

1.5.13. Develop Video Mapping, Programmable Indicator Data Processor (PIDP), and MSAW/LAAS data for the Facility Chief Controller/Chief Air Traffic Control Automation (CATCA).

1.5.14. Attend Base Airfield Operations Board meetings.

Chapter 2

TERPS GENERAL

2.1. Holding Pattern Development. In addition to holding pattern requirements established in FAAO 7130.3, *Holding Pattern Criteria,* and AFMAN 11-226 (I), Volume 1, Chapter 2, Section 9, apply the following:
2.1.1. Holding patterns shall be developed to accommodate a maximum holding airspeed of 310 knots when ever possible. If this cannot be accomplished, the maximum airspeed allowed shall be published in the plan view of the procedure, adjacent to the holding pattern (See paragraph 4.12, Item 7b(3)).
2.1.2. A maximum holding altitude shall be selected based on the highest anticipated altitudes that will be used by ATC when designing a procedure. ***NOTE:*** At host nation locations where procedures are being re-built for comparison to US TERPS criteria and where maximum holding altitudes cannot be determined, evaluate the holding pattern to 10,000 feet above the published minimum holding or Initial Approach Fix (IAF). If the maximum holding altitude selected indicates a change would be necessary to the host nation holding pattern, lower the selected altitude to allow use of the Foreign Terminal Instrument Procedure and publish a maximum holding altitude. At host nation locations that are in countries on the Host Nation Acceptance List (not re-built), a maximum holding altitude determination is not necessary unless the review identifies a need to determine one.
2.1.3. At locations where the USAF has instrument procedure development responsibility, ATC facility management, including adjacent FAA facilities with Approach Control responsibility, shall be made aware of all limitations (maximum speed and/or altitude) associated with holding patterns within their airspace.

2.2. Separating Instrument Procedures From Special Use Airspace (SUA). Separate the primary obstacle clearance area of instrument approach and departure procedures from the lateral boundaries of SUA except as follows:
2.2.1. The controlling facility for the instrument procedure is designated as the controlling facility for the SUA.
2.2.2. ATC Radar is utilized for separation from the SUA in those cases where the Terminal Radar facility has control responsibility for the Instrument procedure, but is not the controlling facility for the SUA, (see FAAO 7110.65, Chapter 9, Section 4, *Special Use and ATC Assigned Airspace).* ***NOTE:*** If ATC Radar is used, the procedure must specify the restrictions, e.g., "RADAR REQUIRED" or "RADAR REQUIRED WHEN HOLDING ABOVE 10,000."
2.2.3. A satisfactory airspace usage agreement has been established between the facility with control responsibility for the instrument procedure and the controlling facility for the SUA. The usage agreement must detail all actions taken to ensure separation between participating aircraft in the SUA and non-participating aircraft executing the conflicting instrument procedure.

2.3. Navigational Fixes. Requirements established in FAAO 8260.19, Chapter 2, Section 10, *Navigational Fixes***,** and as supplemented in this paragraph, shall be used for fix processing. The Unit TERPS office shall submit a request for Fix Name Codes and Identifiers through their MAJCOM. The MAJCOM shall obtain name codes from the FAA National Flight Data Center (NFDC) Airspace Section for U.S. Air Force instrument approaches in airspace under U.S. jurisdiction to be published in FAA Order 7350.6, *Location Identifiers*. This request can be made by telephone. The unit will complete the FAA Form 8260-2 and forward the request through their MAJCOM for processing IAW FAAO 8260.19. Instrument procedures may be published once fix name(s) has been obtained/reserved through NFDC. The FAA Form 8260-2 must be processed within 90 days from the date fix name is obtained. Fix names no longer required will be returned to the NFDC for re-distribution. ***NOTE:*** Obtain fix names for navigational fixes outside the US from the country with jurisdiction over the airspace where the fix is located.
2.3.1. FAA Form 8260-2, ***Radio Fix and Holding Data Record Request*** (See paragraph 2.8 for instructions on obtaining this form)**.** The instructions for this form are located in FAAO 8260.19, Chapter 9.

2.4. NAVAID Service Volume. All procedures will be reviewed to ensure that all NAVAIDs being used fall within the Service Volume(s) established in FAAO 8260.19, Chapter 2. If an Expanded Service Volume (ESV) evaluation is required, complete FAA Form 6050-4, ***Expanded Service Volume Request***.
2.4.1. FAA Form 6050-4, ***Expanded Service Volume (ESV) Request*** (See paragraph 2.8 for instructions on obtaining this form). NAVAID service volume limitations are listed in FAA 8260.19/FAAH 7110.65 and frequency management guidance in FAA Order 6050.5, Frequency Management Engineering Principles. Complete FAA Form 6050-4 IAW FAAO 8260.19, Chapter 9, and forward to the MAJCOM. MAJCOM shall validate the requirement and submit it to the appropriate regional AFREP who shall forward the request to the Regional Spectrum Management Office (SMO). The SMO shall determine if the desired frequency protections can be guaranteed. They will also do an engineering analysis to see if the signal strength, provided at the worst case points of the service volume, complies with spectrum management minimum principle requirements. SMO will indicate approval or provide alternatives to limitations for ESV checks. Flight inspections will be performed to confirm engineering analysis and to determine that a usable, interference free signal is available throughout the desired volume of airspace. When ESV approval is completed by all agencies, file the request with all affected procedures.

When there is no longer a requirement for an established ESV, the originating office shall cancel it and notify all concerned agencies. ESVs shall be reviewed at least once a year to validate the requirement.

2.5. Airspace Requirements. When procedures require establishing or changing airspace, process the airspace requirements according to AFI 13-201, *US Air Force Airspace Management,* FAAH 7400.2, *Procedures for Handling Airspace Matters,* and FAAO 7610.4, *Special Military Operations.* Coordinate with local military airspace manager for matters concerning Special Use Airspace (SUA). Coordinate with MAJCOM and FAA AFREP for all other airspace matters.

2.6. Magnetic Variation (MV) Changes. FAAO 8260.19, *Flight Procedures and Airspace,* Chapter 2, Section 5, shall be used when applying MV values. Units shall coordinate with their MAJCOM for authorization to make changes to procedures. MAJCOMs shall coordinate with FAA AVN-210 to obtain MV of record to apply to new, relocated and existing Navaids. ***NOTE:*** Military installations overseas may be bound by host nation directives, thus FAAO 8260.19 criteria will then be applied to the maximum extent possible.

2.7. VMC Procedures. If a "flight procedure" **has not** been evaluated to ensure compliance with TERPS criteria and all that goes with it (Flight Inspection, etc.), it can not be flown in Instrument Meteorological Conditions (IMC), and is thus limited to day, Visual Meteorological Conditions (VMC) only. These procedures are published in local flying directives and/or in a "loose-leaf" format and will not be published in the DoD FLIP. Naming can be accomplished IAW TERPS naming conventions as long as the procedure is identified as "FOR DAY VMC USE ONLY." "Text" and/or "graphic" must contain this caveat. For clarity, state next to the name of the procedure that it is for VMC Use Only; e.g., SUMTER DEPARTURE (FOR DAY VMC USE ONLY) or STACKS DEPARTURE (FOR DAY VMC USE ONLY). The graphic portion must also have the "FOR DAY VMC USE ONLY" identified in the planview. Additionally, in the planview, place the statement: "PILOT IS RESPONSIBLE FOR TERRAIN/OBSTACLE AVOIDANCE." These procedures do not require formal review and processing, flight inspection, or waiver action for deviations.

2.7.1. Ceiling and visibility minimums will be replaced with "(VMC)." Example: 1440 (250) (VMC). This shows a MDA of 1440 feet, a HAT of 250 feet, and ceiling/visibility minimums replaced with "VMC."

2.8. FAA Forms and Publications.

2.8.1. FAA forms referenced throughout this instruction can be obtained from the FAA Forms Officer at FAX 202-267-9900 or FAX 1-800-877-8339.

2.8.2. FAA publications referenced in AFMAN 11-226 (I) and this instruction are approved for USAF use as stated. Example, AFMAN 11-226 (I), Volume 1, Chapter 2, Section 9, refers you to FAAH 7130.3 for holding criteria. This instruction (AFI 11-230) makes reference to FAAO 8260.19 for instructions on filling out FAA Form 8260-2, ***Radio Fix and Holding Data***. The first example allows you to apply all applicable criteria within the publication as stated, where the second example allows you to apply only a portion of the FAA publication. Attachment 1, *Glossary of References, Abbreviations, Acronyms, and Terms,* is provided for the TERPS Specialist for two purposes. The first is to establish a requirement for the TERPS Specialist to maintain certain publications necessary in the performance of his/her duties. The second purpose is to provide a list of reference publications that could assist TERPS Specialists in the performance of their duties.

NOTE: Attachment 1 is **not** to be considered a list of approved FAA publications. Certain portions of these publications may be approved for USAF use and will be identified in a USAF publication.

2.9. Special Aircrew Training. Certain instrument procedures will require the following note published on the approach plate: " Special Aircrew Certification Required" or "Special Aircrew and Aircraft Certification Required." This applies to CAT II/III ILS procedures, and as required in FAA directives on some Foreign Terminal Instrument Procedures. Unique procedures that ***do not*** fall into one of the two areas listed above, and require one of the caveats listed, shall not be published in the DoD FLIP, i.e., a unique instrument procedure that has been developed requiring "special aircrew training" and is not an CAT II/III ILS procedure, or required by an FAA directive. This type of procedure will be controlled by the developing unit/MAJCOM and published "loose-leaf' only. ***NOTE:*** Except for CAT II/III procedures (these requirements are already covered in AF and MAJCOM flying directives), the unit/MAJCOM responsible for the procedure will be the point of contact for addressing these special training/aircraft requirements and a method to contact the unit/MAJCOM annotated on the procedure.

2.10. Climb Gradients (CG). Pilots are expected to climb at 200 feet per nautical mile for a Departure Procedure and when executing a Missed Approach Procedure. When a higher rate of climb is required for obstacle avoidance and/or to meet Air Traffic Control (ATC) restrictions, the climb rate required shall be specified on the procedure IAW IACC/NIMA specifications.

2.10.1. When a climb gradient (obstacle and/or ATC) is published, an altitude where the standard climb rate can be resumed shall be specified.

2.10.2. When a climb gradient is required to avoid obstacles, it shall be identified as a "Minimum Climb Rate."

2.10.3. When a climb gradient is required for an ATC restriction, it shall be identified as an "ATC Climb Rate."

2.10.4. An ATC climb gradient shall not be published in lieu of an obstacle driven CG that is also required.
2.10.4.1. There may be occasions when there is a necessity to publish an ATC Climb Rate in conjunction with an obstacle driven climb rate. The ATC climb rate will always be greater than an obstacle driven climb rate and may be negated by ATC. ***NOTE:*** The ability to differentiate between a CG required for obstacle avoidance and one for ATC will also help the aircrew if an emergency were to occur where climb performance capability has been degraded.
2.10.5. A climb gradient that exceeds 200 ft/NM for a Missed Approach Procedure requires a waiver (See paragraph A3.19). ***NOTE:*** A climb gradient that exceeds 200 ft/NM for a Departure Procedure does not require a waiver, however, the TERPS Specialist and reviewing authorities should assess whether the CG is sensible and attainable based on the various types of aircraft subject to using this procedure.
2.10.6. Missed Approach climb gradients shall be calculated using the formulas located in Figure A4.10

Chapter 3

INSTRUMENT DEPARTURE PROCEDURES/RADAR DIVERSE VECTOR AREAS

3.1. General. Instrument departure procedures shall be developed as required IAW AFMAN 11-226 (I), *United States Standard for Terminal Instrument Procedures (TERPS)*, Volume 4, *Departure Procedure Construction*, and FAAO 8260.46, *Departure Procedure (DP) Program.* Develop DP's to portray specific departure routes required by Air Traffic Control (ATC) and operational agencies. DP's are charted according to DoD Annex to IACC-7. Use the guidance in FAA Order 8260.46, paragraph 14, *Military Departure Procedures.*

3.2. RNAV Departure Procedures. Develop RNAV Departure procedures that require a GPS sensor using FAAO 8260.44, *Civil Utilization of Area Navigation (RNAV) Departure Procedures.*

3.3. Departure Procedure Criteria. Use this criteria in conjunction with AFMAN 11-226 (I), Volume 4.

3.3.1. AFMAN 11-226 (I), Volume 4, paragraph 1.2.2: Use tracks from the Departure End of Runway (DER) or radials or bearings from suitable navigational aids to define sector limits. Apply diverse departure criteria to all runways at locations where the USAF is responsible for instrument procedure development, including those in NATO countries. At civil locations where military controllers provide departure Air Traffic Control Services but FAA is responsible for instrument procedure development, diverse departure (40:1) computations should be obtained from the FAA. Diverse Departure evaluations shall be documented on AF Form 3636, *Application of Diverse Departure Criteria.* See paragraph 3.3.1.2 for action to be taken when obstacles are identified in AF Form 3636, Block 9.

3.3.1.1. Forward diverse departure documentation (AF Form 3636), departure procedure package (AF Form 3634) if required, and drawings to parent MAJCOM TERPS office for review and validation.

3.3.1.2. When a penetration of the 40:1 OIS Diverse Departure evaluation exists, a departure procedure shall be published in the front of the Terminal FLIP product under "IFR Take-Off Minimums and (Obstacle) Departure Procedures" (section) for the affected runway(s). See Table 3.1 for general guidance. Complex Departure Procedures that are obstacle driven shall be published as a graphic and shall be identified in the "IFR Take-Off Minimums and (Obstacle) Departure Procedures" portion of the FLIP. The symbol will be placed on all (approach and departure) instrument procedures at airfields that do not permit a Diverse Departure and have departure procedures established for obstacle avoidance. Use the departure procedure criteria in AFMAN 11-226 (I), Volume 4, as supplemented in this document. All Departure Procedures will be documented using AF Form 3634 and published in a text or graphic format, depending on complexity. If the procedure requires an obstacle avoidance climb gradient in excess of 200 feet per nautical mile, a ceiling and visibility shall also be published for civil users (See paragraph 3.3.4). Climb gradients to 200 feet above DER or less, shall not be specified, however, the obstacles requiring such a climb gradient shall be identified in the section and on the graphic (See paragraph 3.3.4).

NOTE 1:. All departure procedures are subject to flight inspection IAW AFMAN 11-225, section 214. These include climb gradients, routes, or notes identifying the location of obstacle(s) that would have required a climb gradient to an altitude less than 200 feet above the DER, IAW AFMAN 11-226(I), Volume 4.

NOTE 2: Publication of a DP for ATC purposes does not eliminate the need to publish a departure procedure when a penetration to the 40:1 OIS Diverse Departure exists. However, the ATC DP (SID) may be identified in the "IFR Take-Off Minimums and (Obstacle) Departure Procedures" portion of the FLIP as the method to be used for obstacle avoidance, e.g., "Rwy XX, Use published DP (SID) for obstacle avoidance." Radar vectors may also be available to aircrews as a departure method, however, aircraft shall not be vectored below the Minimum Vectoring Altitude (MVA) for departures unless a Diverse Vector Area (DVA) has been evaluated/established (See paragraph 3.3.11 and AFI 13-203, *Air Traffic Control*, regarding DVAs).

NOTE 3: When the FAA is the departure Air Traffic Control facility for the airport, all departure procedures shall be coordinated through the FAA facility manager. Additionally, when there is a penetration to the 40:1 Diverse Departure OIS, this information shall be forwarded to the Radar Air Traffic Control Facility Manager for consideration when/if developing a Diverse Vector Area (DVA).

3.3.2. AFMAN 11-226 (I), Volume 4, paragraph 1.3:

3.3.16.1. Publish climb gradients as vertical velocity tables according to Interagency Air Cartographic Committee DP Chart US (IACC-7).

3.3.3. AFMAN 11-226 (I), Volume 4, paragraph 1.3.2: When specifying an altitude where the CG is no longer necessary, determine this altitude by adding the Required Obstacle Clearance (ROC) to the height of the obstacle. Round this altitude to the next 100 foot increment. Determine the ROC using the following formula: ROC = 0.24 (CG x d) ***NOTE:*** d = Distance to the obstacle in NM.

3.3.4. AFMAN 11-226 (I), Volume 4, paragraph 1.5: Close-in obstacles are defined as any obstacle that requires a non-standard climb gradient to an altitude to 200 feet or less above the DER. A ceiling and visibility shall not be published to see and avoid "close-in" obstructions.
NOTE 1: When applying this paragraph, publish the location of these obstacles on both graphic (SID) and text DPs to alert the aircrew. Example notes are: "118' MSL (50' AGL) trees 120' left of departure end of runway" or "132' MSL (50' AGL) building 500' from departure end of runway, 350' right of centerline."
NOTE 2: Taxiing and/or parked aircraft are to be considered as obstructions when evaluating the departure obstacle clearance surface (OCS). If it is possible for taxiing/parked aircraft to penetrate the departure OCS, these potential obstructions shall be identified on the DP as defined in Note 1, above.
3.3.4.1. On graphically portrayed Departure Procedures, depict the controlling obstacle (40:1 OIS).
3.3.4.2. On graphically portrayed Departure Procedures, depict the obstacle(s) located outside the departure area that dictates a requirement for a departure procedure.
3.3.4.3. When obstacles dictate a climb gradient to an altitude greater than 200 feet above DER, you may attempt to eliminate/reduce the CG by specifying a minimum crossing height over the DER. The maximum crossing height shall not exceed 35 feet. Use this height in calculating the climb gradient. Identify, graphically or textually, the description, height, and location of the obstacle in relation to DER that would cause the climb gradient (see paragraph 3.3.4, Note 1).
NOTE 1: When a runway end crossing height is established, the 40:1 OIS begins at that height.
NOTE 2: Do not to use a minimum crossing height over the DER solely to avoid low, close-in obstructions.

Table 3.1. General Guidelines For Determining Obstacle Driven Departure Procedures.

SITUATION	ACTION
1) Obstacle assessment IAW AFMAN 11-226 (I), Volume 4, paragraph 1.11, does not identify any obstacle penetrations	Obstacle DP not required.
2) Obstacle assessment identifies Close-In obstacle(s) only that require a CG to an altitude less than 200 feet above DER	Establish Obstacle DP that consists of identifying location & height of obstacle(s). See example of standard note in paragraph 3.3.4, *Note 1*.
3) Obstacle assessment identifies obstacle(s) penetrating 40:1 OIS and are not classified as close-in obstacle(s) as in item 2, above (i.e., obstacle(s) require CG to be maintained to an altitude greater than 200 feet above the DER)	*A)* Obstacle **3 SM or less** from the DER: Establish a DP by publishing non-standard (higher) Take-Off minimums (ceiling and visibility to see and avoid an obstruction) followed by Standard Take-off Minimums* with a climb gradient **and/or** a route to avoid obstacle(s). *B)* Obstacle greater than **3 SM** from DER: State that Standard Take-Off Minimums* will apply with a required CG and/or establish a route to avoid the obstacle(s). If either of these options is not feasible, an IFR departure from that runway shall not be authorized.
4) Obstacle assessment identifies Close-In obstacle(s) that requires CG to an altitude less than 200 feet above DER with additional obstacle(s) penetrating 40:1 OIS that require CG to be maintained to an altitude greater than 200 feet above the DER	Apply action item from 2 and either 3A or 3B, above.

*STANDARD TAKE-OFF MINIMUMS – These are minimums as defined in the FARs for Civil aircraft and in applicable flying directives for DoD aircraft.

3.3.5. AFMAN 11-226 (I), Volume 4, paragraph 1.5.3: This criterion shall not be used at locations where the USAF has instrument procedure development responsibility.
3.3.6. AFMAN 11-226 (I), Volume 4, paragraph 1.6: When determining the minimums, consider the location and height of the obstacles; how well the obstacles can be seen. Consideration should also be given to type and category of aircraft authorized to use the procedure. Minimums may be limited for daylight use only, if the obstacles cannot be seen at night.
3.3.7. AFMAN 11-226 (I), Volume 4, paragraph 1.7.4c: Make sure the Initial Climb Area (ICA) is long enough for the Obstacle Identification Surface (OIS) to reach 304 feet **above airport elevation**.
3.3.8. AFMAN 11-226 (I), Volume 4, paragraph 1.7.4c(1): A waiver is required for a reduction in the length of the ICA when a climb gradient in excess of 200 ft/NM is used to define this length and the following note shall be published on the Departure Procedure: "NOT FOR CIVIL USE." Procedures requiring an early turn are nonstandard and require processing IAW paragraph 5.5.

3.3.9. AFMAN 11-226 (I), Volume 4, paragraph 1.20.1: When a Dead Reckoning (DR) segment extends more than 10 NM from the DER or beyond 5 NM after completing a turn, the area continues to splay to points abeam the point where Positive Course Guidance (PCG) is established. Publish DR tracks, not headings, to be flown, for example, "Climb on Track XXX," not "Climb on Runway Heading."
3.3.10. AFMAN 11-226 (I), Volume 4, paragraph 1.20.1e: When PCG is provided by a localizer, publish a note which reads, "CAUTION: Back course procedures apply."
3.3.11. AFMAN 11-226 (I), Volume 4, paragraph 1.29: A Diverse Vector Area (DVA) is required if an aircraft executing departure/climb-out instructions will be vectored below the Minimum Vectoring Altitude (MVA) or Minimum IFR Altitude (MIA). ***NOTE:*** Where the IFR controlling agency is the FAA/Host Nation, the responsibility for determining the need and/or development of a DVA, lies with that agency (See paragraph 3.3.1.2, Note 3). At locations where the USAF is responsible for vectoring aircraft (to include satellite airports) and when requested by the Radar Facility manager, develop DVA information as follows:
3.3.11.1. If there are no penetrations to the 40:1 OIS Diverse Departure assessment accomplished IAW AFMAN 11-226 (I), Volume 4, paragraph 1.11, inform the facility manager by Memorandum that aircraft on departure may be vectored below MVA/MIA providing the climb to an altitude at or above the MVA/MIA is not interrupted.
3.3.11.2. If penetrations to the 40:1 OIS Diverse Departure are encountered, sectors, corridors, DER crossing height, and/or a climb gradient (CG) shall be established to avoid these penetrating obstacles.
NOTE 1: Obstructions encountered that would require a CG to less than 200 feet above the Departure End of Runway (DER) (sometimes referred to as "close-in obstructions") should already be identified in the "IFR Take-Off Minimums and (Obstacle) Departure Procedures" section of FLIP. Aircrews receiving Radar vectors are therefore aware of these obstructions and will take appropriate action to avoid them.
NOTE 2: A minimum crossing height over the DER may be used to raise the 40:1 OIS to reduce or eliminate the need for a CG (See paragraph 3.3.11.2.3).
3.3.11.2.1. You may sectorize the vectoring area IAW AFMAN 11-226 (I), Volume 4, paragraph 1.11.1e, or isolate the obstacle(s) causing the penetrations. When isolating an obstacle, the boundary shall have a 3 NM (5 NM when obstruction is greater than 40 NM from the radar antenna) buffer area established. These sectors or obstructions (if only the obstruction is to be avoided) must be identified on the Radar video map. The area outside these sectors/obstacle areas (within the DVA) is known as "free vector areas." The sectors/obstructions shall be defined on a suitably scaled map with topographical features and a file maintained with other TERPS files. ***NOTE***: Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map. In a Memorandum to the Radar facility manager, define the DVA with all required restrictions (i.e., sectors, climb gradients, etc.).
3.3.11.2.1.1. If the isolated obstruction plus the appropriate Required Obstacle Clearance (ROC) height is below the MVA/MIA, the required altitude (to the next 100 foot increment) to clear this obstacle must be specified in the DVA guidance so the controller will know when the aircraft may be vectored over the obstacle.
3.3.11.2.1.2. The DVA will extend out to the MVA/MEA or further, if necessary to achieve an operational advantage. If there are 40:1 OIS penetrations outside the confines of your assigned airspace, the boundary of this airspace may be established as the boundary of the free vector area. This restriction and procedures for entering an adjacent facilities airspace shall be documented appropriately (e.g., LOA, LOP, Facility Memorandum).
3.3.11.2.2. A Radar departure corridor/route may be established which must be defined on the Radar Video Map. AFMAN 11-226 (I), Volume 4, paragraph 1.29.1b, criteria will be used to develop this corridor except the area will be expanded to widths of 6 NM (3 NM each side of the course line) or 10 NM (5 NM each side of the course line) outside 40 NM from the Radar antenna. The departure course line and corridor boundaries shall be defined on the Radar Video Map.
3.3.11.2.3. As stated in AFMAN 11-226(I), Volume 4, paragraph 1.29.1a(3), Climb Gradients (CG) may be established for a DVA (or within a sector or corridor) for obstacle avoidance. Criteria for establishing a CG is defined in AFMAN 11-226 (I), Volume 4, paragraph 1.3. Define use of the CG in the Memorandum to the facility manager. The facility manager will be responsible for insuring controllers issue the CG and/or DER crossing heights when vectoring in the affected areas. ***NOTE:*** If possible, attempt to design DVA sectors so that vectoring through multiple sectors requiring different Climb Gradients is not necessary.
3.3.11.2.4. At locations that will use the DVA obstacle isolation or corridor options when operating with a Center Radar Presentation (CENRAP), 5 NM buffers and/or course semi-width will be applied for the entire area.
3.3.11.2.5. AFMAN 11-226 (I), Volume 4, paragraph 1.11.1d, *Turns Less Than 400 Feet Above DER*, criteria shall not be applied. Turns below 400' above airport elevation shall not be authorized for DVAs.

3.4. AF Form 3634, *Departure Procedure*. Use this form to coordinate agency approval and publish DPs.
Item 1. **Departure Name.** Enter the departure name and number as you want it to appear on published data. Name departures according to FAAO 8260.46, Appendix 2.
Item 2. **Airport Name**.
Item 3. **Departure Computer Code.** Coordinate with servicing FAA ARTCC on assignment and effective date of departure computer codes IAW FAAO 8260.46.
Item 4. **Location.**

Item 5. A. **Type of Departure**. Indicate whether the Departure Procedure (DP) was developed to meet an Air Traffic Control requirement or for the purpose of obstacle avoidance.

B. **How To Publish.** Indicate which product is required. If NIMA loose-leaf, attach distribution list and/or state if negative is required. Additionally, you must indicate if NIMA is to publish as a graphic or in text format (See FAAO 8260.46, *Departure Procedure Program*, paragraphs 10e and 10f for guidance on making this determination.).

Item 6. **Effective Date.** Enter requested date based on operational requirements and integration into ARTCC computer system. The actual effective date is entered by final review authority after coordination with all concerned agencies. Indicate if procedure is original or amended. If amended, type amendment number on right side of block.

Item 7. **Plan View:**

a. Depict the airfield and prepare a graphic illustration of the complete departure routing. The chart shall encompass the area required to effectively show the departure routing, including transitions to the appropriate en route structure.

b. One procedure shall be shown on the form. Takeoff portrayals from more than one runway, or opposite ends of a runway, are not to be treated as separate procedures.

c. All routes, turns, altitudes, radio aids to navigation, facilities forming intersections and fixes, and those facilities terminating the departure procedure (where the procedure joins the altitude structure for which the departure was established), shall be shown in graphic illustration. Enter geographical coordinates to the nearest hundredth of a second, of each fix used in RNAV procedures. For each transition, include the name of the chart (L-1 or H-5) that shows the enroute facility. Show the mileage and courses, radials, or bearings between runway(s) and facilities or fixes along the route of flight.

d. Normally, the depiction is centered either on the airport runways or primary NAVAID. Depictions may be offset in order to better utilize the plan view area to enhance readability. All drawings shall be oriented to true north.

e. In addition to the above data, include:

(1) **Communications.** Generally, the communication shown shall be one primary VHF and UHF frequency for:

(a) Automatic Terminal Information Service (ATIS).
(b) Clearance Delivery (CLNC DEL).
(c) Ground Control (GND CON).
(d) Tower (TWR).
(e) Departure Control (DEP CON).
(f) Center.
(g) Other agencies as required.

(2) **Special Use Airspace (SUA).** SUA shall be shown only when considered critical to the procedures as designated by requesting agency.

(3) **Obstacles:**

(a) Controlling segment and other prominent obstacles which would create a hazard to safe navigation in the event departure procedures were not executed precisely shall be shown in their exact geographic location so as to be in true relationship to the departure procedure. When portrayal of several obstacles in a small area would tend to create clutter, only the highest of the group need be shown.

(b) The elevation of the top of the obstacle(s) above mean sea level shall be shown to the nearest foot.

(4) **Minimum Climb Rate:**

(a) When established, a minimum rate of climb table, as determined by the controlling obstacles or ATC, shall be placed in the blocks in the upper right-hand corner. Climb gradients required for ATC purposes shall be displayed when they are higher than the minimum climb rate. ***NOTE:*** Climb gradients required for obstacle avoidance or ATC purposes do not require a waiver.

(b) Minimum and ATC climb rates shall be shown as vertical velocities (V/V) in feet per minute (fpm) in 60 knot increments, from 60 knots to 240 knots for low altitude and 120 knots to 360 knots for high altitude departures. The V/V equals the climb gradient times ground speed divided by 60, publishing to the (next higher) 10 foot increment.

(c) Where multiple runway departures are required, provisions shall be made in the minimum climb rate table to show the V/V information for all runways involved. For additional runways, draw more blocks to extend the columns vertically down the page.

(d) An asterisk(s) will be used to footnote which climb gradients are ATC required.

(e) When the climb rate is premised on an ATC requirement, the following note will be shown immediately below the V/V box: "ATC Climb Rate." Minimum or ATC climb rates must indicate the altitude and/or fix at which the climb gradient is no longer required.

(5) ***NOTES:***

(a) Operational notes shall be held to an absolute minimum and shall be based on mandatory user requirements.

(b) Procedural data notes shall be entered to be consistent with a safe execution of the procedure.

Item 8. **Departure Procedure (DP) Description.** A written description of the departure procedure, including all turns, altitudes, headings, distances, facilities/fixes, and all routes (indicating number if on airways, or direct, if off airways) to the terminating facility/fix. Add the computer code for transitions, where applicable. ***NOTE:*** When revising Item 7 or 8 of previously published departures, attach a copy of the previous version with revisions clearly indicated.

Item 9. **Controlling Obstacles:**
Takeoff Obstacles. Identify obstacles located in Zone 1/Section 1 which require nonstandard takeoff minimums and/or a climb gradient to be published. List the runway affected, MSL elevation, type obstacle (i.e., terrain/tower), and coordinates to the nearest second. ***NOTE:*** See paragraph 3.3.4 for guidance on how to publish obstacle information for those obstacles that cause a CG to less than 200 feet above the DER.
Departure Obstacles. Identify obstacles outside the ICA but within subsequent departure trapezoids which require nonstandard takeoff minimums and/or climb gradient to be published. In some cases where specific departure routing is required, the controlling obstacle may be outside the trapezoids.
Item 10. **Adjustment for Close-In Obstacles.** For adjustment, enter the minimum height (AGL), in feet, for the aircraft to be over the departure end of runway (DER). If an adjustment is required, enter the number of feet in Item 10 and also as a note in the plan view. Examples of notes are: "Cross DER at least 20 feet AGL/187 MSL," or "Cross DER at least 5 feet AGL/3685 MSL due to barrier equipment."
Item 11. **Civil Takeoff Minimum.** List the takeoff minima for the benefit of applicable civil users.
Item 12. **Expanded Service Volumes (ESV).** If a facility/fix is used beyond the distance for normal usage of NAVAIDs, an ESV check is required. Complete FAA Form 6050-4 and maintain approved copies with departure procedure(s).
Item 13. **Airspace Requirements.** To afford separation from other aircraft, all departure procedures shall be contained in controlled airspace (See paragraph A3.5). Consult AFI 13-201, FAAO 7400.2, FAAO 7400.9, and FAAO 8260.46.
Item 14. **Waiver Requirements.** List any waivers required for new or amended procedures. List the number of approved waivers on file for amended procedures and the approval date for each waiver. These waiver listings can be placed in Item 15 (Remarks) or continued on bond paper as needed. Waiver requests and approvals should support each affected procedure. Send completed package to HQ AFFSA/XOIP for approval.
Item 15. **Remarks.** Enter other pertinent data necessary to publish an accurate departure.
Item 16. **Departure ID.** Self-explanatory.
Item 17. **Coordination.** Approving Authority Signatures. All signature blocks shall be signed, as required. As a minimum, the "Procedure Specialist," "Air Traffic Operations Manager" (at locations where the USAF has development responsibility), "Senior Operational Commander," and "MAJCOM TERPS Branch" signatures shall be obtained. When the procedure's protected airspace overlaps into an adjacent facilities airspace, ensure coordination signatures are obtained from that facility. On non-standard procedures, "MAJCOM (*WAIVER*)" block must be signed by the MAJCOM/DO or designated representative. Include an explanation when signatures cannot be obtained.
NOTE 1: Signature blocks shall include printed name, rank/grade, and office symbol.
NOTE 2: "Senior Operational Commander" block for Foreign Terminal Instrument Procedures shall be signed by the MAJCOM/DO or designated representative and signifies compliance with paragraph 1.4.4. At locations where the USAF has procedure development responsibilities, the "Senior Operational Commander" designated representative is the primary Wing/DO responsible for flight operations.

3.5. AF Form 3635, *Application of Departure Procedure Criteria*. Use this form to document obstacle clearance along departure routes. This applies to departure routes that are published as Departure Procedures (DPs) or any other type of departure route used under instrument flight rules. A separate form is required for each runway used in the published departure.
Item 1. **Airport Name**.
Item 2. **Runway Number and Departure End of Runway (DER) Elevation.** Enter the single runway number applicable to departure application criteria and the DER Mean Sea Level (MSL) elevation.
Item 3. **Location**.
Item 4. **Field Elevation**. Enter the MSL elevation of the highest point on the airport's usable runways.
Item 5. **Departure Procedure Description**. Provide a narrative departure procedure description for the runway and departure procedure being evaluated. This should be the same as the departure procedure description on AF Form 3634.
Item 6. **Obstacle Evaluations:**
a. **Obstacle Description.** Describe controlling obstacle(s) (terrain + trees, tower, etc.) and include its number or reference (AF Form 3629 number). Example: Tower/2.
b. **Obstacle or Equivalent Obstacle Height (MSL).** Enter the MSL height of the controlling obstacle.
c. **Required Obstacle Clearance (ROC).** Enter the distance in NM measured along the shortest possible flight path to the obstacle within the obstacle clearance area. The distance to the obstacle will begin at the start of ICA, which is at or abeam the runway end or edge, whichever represents the shortest flight path. The worst-case evaluation of flight path to obstacle should be performed in all cases. Multiply distance by 48. Allowances for precipitous terrain according to AFMAN 11-226 (I), Volume 1, paragraph 323a, should be added when judged necessary to compensate for induced altimeter errors.
d. **Minimum Height Required Over Obstacle.** Calculations are self-explanatory.
e. **Aircraft Height Over DER (MSL).** Initially, try zero for aircraft height over DER (AGL) unless an adjustment has previously been approved.
f. **Amount of Climb Required.** Calculations are self-explanatory.
g. **Climb Gradient (CG).** Calculations are self-explanatory.

h. **Published CG.** Self-explanatory. Round Climb gradients to the upper 10 foot increment for publication.

Item 7. **Remarks.** Use this section for continuation of other items, if required, or for pertinent material which is not covered elsewhere. Include operational, airspace, and air traffic control restrictions or requirements that affect the design of specific departure procedure.

Item 8. **Calculating Distances to Turn Points Described by Altitude:**

a. **Turn Altitude.** Enter the proposed turn altitude. The turn altitude will depend on such items as aircraft performance, noise abatement, and airspace or air traffic control restrictions.

b. **Required A/C MSL Altitude at DER.** Calculations are self-explanatory.

c. **Amount of Climb to Turn Point.** Calculations are self-explanatory.

d. **Turn Point Distance in NM.** Calculations are self-explanatory. If an altitude defines a turn point, a climb gradient of 200 ft/NM shall be used to determine the length of Section 1. A waiver is required for a reduction in the length of Section 1 when a climb gradient in excess of 200 ft/NM is used to define this length and the following note shall be published on the Departure Procedure: "NOT FOR CIVIL USE."

Item 9. **Obstacle Data:**

a. **Obstacle Description.** Describe as indicated in Item 6a.

b. **Obstacle Distance.** Enter the distance in NM along the shortest possible flight path within the obstacle clearance area. The distance to the obstacle will begin at the start of Section 2. Measure perpendicular to the nearest edge of Section 1 or runway. The worst case evaluation of flight path to obstacle should be performed in all cases.

c. **Obstacle or Equivalent Obstacle Height.** Enter the height, to the nearest foot, of the controlling obstacle.

Item 10. **ROC.** Calculations are self-explanatory.

Item 11. **Determine Minimum Climb Gradient.** Calculations are self-explanatory. When the altitude entered in Item 8a does not provide adequate obstacle clearance for Section 2b or 2c, rework Items 8-11 with a higher turn altitude. When the climb gradient is 200 or less, it need not be published. When it exceeds 200, the primary adjustment technique is to raise the turn altitude/extend the turn point. Where extending the turn point is unsatisfactory, publish the required climb gradient or redesign the departure procedure. The altitude the climb gradient is specified to, will be Item 11a.

3.6. AF Form 3636, *Application of Diverse Departure Criteria*. Use this form to evaluate a 40:1 obstacle identification surface (OIS) on runways approved for instrument departures. All three zones will be evaluated with obstacles listed by the AF Form 3629 number.

Item 1-6. **Airport Information Data.** Self-explanatory.

Item 7-8. **Zones 1, 2, 3 Obstacle Evaluation Data.** Evaluate all obstacles within Zone 1, 2, and 3 areas. If required, continue obstacle evaluation on bond paper using the same format.

Item 9. **Summary of Diverse Departure Criteria.** List penetrating obstacles and follow guidance in Attachment 3 of this instruction.

Item 10. **TERPS Specialist Signature and Date Prepared**.

Chapter 4

INSTRUMENT APPROACH/ARRIVAL PROCEDURES

4.1. Standard Terminal Arrival Route (STAR). Develop STARs only when feeder routes, initial approach segments, or both will not suffice. Use the criteria in AFMAN 11-226 (I), Volume 1, Chapter 17, and the guidance in FAA Order 7100.9, when developing a STAR. Use FAA Form 7100-4, ***STAR-Standard Terminal Arrival Route***, for processing. Instructions on filling out FAA Form 7100-4 can be found in FAAO 7100.9. *NOTE:* Overseas locations have the option to use the FAA form or AF Form 3637, ***Instrument Approach Procedure***. Host nation STARs are published and maintained by NIMA at the request of the MAJCOM. ***NOTE***: NIMA may request MAJCOMs resolve conflicting data between STAR and instrument approach information with the host nation.

4.2. Airborne Radar Approach Criteria. The following special-use procedures relate to Airborne Radar Procedures and are used only by aircraft with airborne radar systems authorized by each MAJCOM headquarters. AFMAN 11-226 (I) applies, except as follows:

4.2.1. **Initial Approach Segment.** AFMAN 11-226 (I), Volume 1, paragraphs 230, 231, 232, and 235 apply, except the angle of intersection between the initial and intermediate approach courses will not exceed 90 degrees. A satisfactory terminal area fix (chapter 2, section 8) may be used in addition to the ARA fix at the Initial Approach Fix (IAF) to facilitate use of enroute navigation systems up to the IAF.

4.2.2. **Intermediate Approach Segment.** Comply with AFMAN 11-226 (I), Volume 1, paragraphs 240, 241, and 242.

4.2.3. **Final Approach Segment.** Comply with AFMAN 11-226 (I), Volume 1, paragraph 250, except:

4.2.3.1. **Alignment.** The final approach course will be aligned on the extended runway centerline.

4.2.3.2. **Area.** The area considered for obstacle clearance begins at the final approach fix, ends at the runway threshold, and is centered on the final approach course. Course length must provide adequate distance for an aircraft to make the required descent. Minimum length is 6 miles, and maximum length is 10 miles.

4.2.3.2.1. The primary area width is 1.7 miles on each side of the runway centerline at the approach end. It expands uniformly to a maximum 4 mile width on either side of the extended runway centerline (8 miles total) at a point 10 miles from the approach end of the runway.

4.2.3.2.2. AFMAN 11-226 (I), Volume 1, paragraph 1044 b, Airport Surveillance Radar (ASR) criteria can be used in developing the Final Approach Segment for aircraft equipped with APN-241 RADAR in lieu of the criteria stated in paragraph 4.2.3.2.1. Since the obstacle assessment areas are smaller, aircraft must be equipped with Dual Inertial Navigation System (INS), Integrated Global Positioning System (GPS), and Dual Radar Altimeters. When this criteria is used, the following note shall be published in the approach plate: "**FOR USE BY AIRCRAFT EQUIPPED WITH APN-241 AIRBORNE RADAR, DUAL INS, INTEGRATED GPS, AND DUAL RADAR ALTIMETERS.**" ***NOTE:*** Integrated GPS must meet the requirements established in AFI 11-202V3 and current AF/MAJCOM policy directives. The additional systems required are to supplement and enhance situational (position) awareness and compensate for the reduced obstacle assessment area widths.

4.2.3.2.3. The secondary area, which is on each side of the primary, is zero miles wide at the approach end of the runway. It expands uniformly to a maximum of l mile on each side of the primary area, at a point 10 miles from the approach end of the runway. ***NOTE:*** Secondary areas are not required when applying criteria outlined in paragraph 4.2.3.2.2.

4.2.3.3. **Obstacle Clearance:**

4.2.3.3.1. The minimum obstacle clearance in the primary area is 250 feet. In the secondary area, 250 feet of obstacle clearance must be provided at the inner edge, tapering uniformly to zero at the outer edge

4.2.3.4. **Descent Gradient.** The optimum gradient is 318 feet per mile. The maximum is 400 feet per mile. If a step-down fix is used, the descent gradient applies between the Final Approach Fix (FAF) and the step-down fix and between the step-down fix and the approach threshold.

4.2.4. **Circling Approach.** AFMAN 11-226 (I), Volume 1, Chapter 2, Section 6, applies:

4.2.5. **Missed Approach Segment.** AFMAN 11-226 (I), Volume 1, Chapter 2, Section 7, applies. The missed approach point is on the final approach course at the point where the aircraft has reached a specific radar distance from the end of the runway. It must not be farther from the FAF than the first usable portion of the landing surface. When ever possible, develop a missed approach that does not require Airborne Radar.

4.2.6. **Landing Minima.** AFMAN 11-226 (I), Volume 1, Chapter 3 applies.

4.2.7. **ARA Reflectors.** Reflector requirements are determined by equipment specifications addressed in MAJCOM flying directives. When Radar Reflectors are placed on the airfield, their locations will be depicted on the plan view of the approach procedure.

4.2.8. **Satisfactory Fixes**. All fixes may be defined by use of the Airborne Radar system. The fix error used in the design of the procedure will be based on the type of airborne equipment to be used as follows:

4.2.8.1. A fix error displacement of plus or minus 500 feet may be used and the following note shall be published on the Approach Procedure: "PROCEDURE NOT AUTHORIZED FOR APN-59 EQUIPPED AIRCRAFT."

4.2.8.2. If a procedure must be designed to accommodate APN-59 equipped aircraft, a fix error displacement of plus or minus ½ mile must be used.
4.2.8.3. Annotate all **named** turn points and fixes of an airborne radar pattern as waypoints, with the appropriate latitude and longitude on the FAA Form 8260-2. Additionally, annotate all waypoints (named and unnamed) on AF Form 3637 so they can be depicted on the procedure planview. RNAV waypoints may be depicted for all segments but they **shall not** be used as a primary means of navigation. The only purpose of RNAV waypoints on an ARA procedure is to assist aircrews in maintaining situational awareness.

4.3. Area Navigation (RNAV)
4.3.1. A MAJCOM may approve the use of RNAV systems that meet the accuracy tolerances in FAA Advisory Circular 90-45, *Approval of Area Navigation Systems for Use in the US National Airspace System.* The MAJCOM notifies AFFSA/XOF of the type of aircraft and system approved for RNAV.
4.3.2. To facilitate enroute RNAV operations, geographic coordinates are authorized on public use non-RNAV procedures at IAFs and the last fix on departure procedures. Geographic coordinates may be published at any fix on special use procedures.
4.3.3. RNAV (Ground Based System, e.g., VOR/DME)
4.3.3.1. The criteria in AFMAN 11-226(I), Volume 1, Chapter 15, is the source to develop VOR/DME RNAV procedures. Note: For more information on area navigation, see FAA Handbooks 7110.65 and 8260.19, *Flight Procedures and Airspace*.
4.3.4. RNAV (Satellite Based System, e.g., GPS)
4.3.4.1. Criteria in FAAO 8260.42, *Helicopter Global Positioning System (GPS) Nonprecision,* is the source to develop RNAV helicopter procedures.
4.3.4.2. When designing a Terminal Arrival Area (TAA) apply FAAO 8260.45**,** *Terminal Arrival Area (TAA) Design Criteria.*
4.3.4.3. Criteria to develop final and missed approach segment for GPS (LNAV) procedures are contained in FAAO 8260.48, *Area Navigation (RNAV) Approach Construction Criteria.* Criteria to develop intermediate, initial, holding, and MSA segments for GPS (LNAV) procedures are contained in FAAO 8260.38***, Civil Utilization of Global Positioning System (GPS).***
4.3.4.3.1. The USAF takes exception to criteria contained in FAAO 8260.38: Paragraph 11a, course changes at the Intermediate Waypoint shall not exceed 90 degrees. Paragraph 12a, a course change at the Final Approach Waypoint shall not exceed 15 degrees.
4.3.4.3.2. The USAF will not develop "Overlay" GPS (LNAV) procedures.
4.3.4.4. GPS (LNAV) procedures will be processed IAW AFI 11-230, Chapter 2. Procedure package will also include AF Form 3981, ***GPS/RNAV Descent Angle and Surface Evaluation***, and AF Form 3982, ***GPS/RNAV Combination Straight and Turning Missed Approach Length of Section 1,*** if applicable
4.3.4.5. When the basic "T" design method is used, the IAFs at the outer edges of the top of the "T" shall not be less than 5 NM (6 NM for Category E) from the center IAF/IF.
4.3.4.6. When developing High altitude GPS (LNAV), WAAS, and BARO/VNAV procedures, use the same (low altitude) criteria and AFMAN 11-226 (I), Volume 1, paragraph 232d, ***Descent Gradient***, criteria.
4.3.5. Use IAPA 83 spreadsheet to aid in the development of geographical coordinates of all waypoints.

4.4. Point in Space Procedure. Procedures that do not provide for landing may be established with a Minimum Descent Altitude (MDA) or Decision Altitude (DA) of 500 feet or higher above ground level (AGL). Ceiling and visibility minima may be established. Except for Helicopter point in space procedures, these are special use procedures and require annotation per paragraph 5.8.1.

4.5. Publishing ILS Restrictions. Permanent restrictions for ILS facilities, must be published as caution notes: (Example: "Caution: ILS GS unusable below 300 MSL" or "Caution: Autopilot coupled operations NA past DA"). Coordinate with the flight inspector for content of the notes (see AFJMAN 11-225). Send such restrictions as procedural changes.

4.6. Combining Procedures. The primary reason for combining instrument approach procedures is to facilitate pilot actions when flying multi-receiver aircraft, however, RNAV (GPS) procedures shall not be combined with procedures using ground based Navaids (e.g., VOR/DME, TACAN, ILS, etc.). Procedures must first be developed as stand-alone procedures and may be combined on a single chart provided:
4.6.1. Aircrew confusion or chart clutter does not result.
4.6.2. The final approach courses are within 4 degrees and only one track is depicted. Show no more than two final approach courses. Example: ILS 150°/TAC 154°.
4.6.3. Only one non-precision FAF and altitude, step-down fix (most restrictive) and altitude, VDP, and non-precision missed approach point (MAP) is established.
4.6.4. Circling minima are common.

4.6.5. Missed approach procedures are common, except that precision and non-precision MAPs may differ.

4.7. Displaced Threshold Procedures. Displacing, relocating, or moving the threshold may have an adverse effect on instrument approach/departure procedures. TERPS personnel shall revise instrument procedures as necessary to ensure flight safety. Only those procedures considered mission essential will be adjusted based on the following guidance:
4.7.1. A new threshold/departure end must be established. Obstacles that lie within the displaced area, machinery/vehicles, must be evaluated to ensure the procedure continues to meet TERPS criteria. If used at night or in IMC, runway lighting must include threshold lighting for the displaced threshold (See AFI 32-1044, *Visual Air Navigation Systems*).
4.7.2. Approach lights will not be usable for taking a reduction in visibility minimums. Re-compute no-light minima by adding the amount of displacement to the "MAP-to-Threshold" distance.
4.7.3. Suspend ILS operations, except localizer only. Turn off the glideslope until the normal runway configuration is restored. NOTE: There may be situations where the threshold is displaced a short distance without affecting precision capability. To determine if precision capability can remain, the relocated Threshold Crossing Height must be computed and be in compliance with AFMAN 11-226 (I), Volume 3 (Paragraph 1026b for PAR). Consideration must also be given to what will be located in the closed portion of the runway. For example, if men and equipment will be located in the closed portion, the OIS must be evaluated to ensure proper obstacle clearance.
4.7.4. Visual glideslope indicator systems (VASI/PAPI/PLASI) may be unavailable for the same reason as the ILS.
4.7.5. PAR approaches may be unusable for the same reason as for ILS.
4.7.6. The elevation of the new threshold and touchdown zone will more than likely change. In this case, revise the height above touchdown portion of the approach minima.
4.7.7. The airport elevation might also change. This requires a revision to the height above airport elevation on circling procedures. Visibility changes may be required accordingly.
4.7.8. Evaluate climb gradients on required departure procedures during threshold displacement. Compute new climb gradients based upon redesign of the departure trapezoid.
NOTE: The intent of this paragraph is for those situations when the threshold will be temporarily displaced. You are not required to completely redesign each procedure to the displaced threshold.

4.8. Side-Step Maneuver (SSM) Procedures. A SSM is a procedure where the final approach is aligned to one runway, and a visual maneuver is made to land on a parallel runway. A SSM to a parallel runway is authorized under the following conditions:
4.8.1. Runway centerlines are separated by 1200 feet or less.
4.8.2. Only one final approach course is published.
4.8.3. Course guidance is provided within 3 degrees of the runway centerline of the primary runway.
4.8.4. The procedure is identified according to AFMAN 11-226 (I), Volume 1, paragraph 161.
4.8.5. Final approach areas must be established for both runways and determined by the approach guidance provided. Both final approach areas must be used to determine the MDA to the sidestep runway. The final approach area of the sidestep runway must extend from a point abeam the FAF to the side-step runway threshold.
4.8.6. The same non-precision obstacle clearance used for the primary runway is used to determine the published MDA for the side-step maneuver.
4.8.7. Visibility Minima:
4.8.7.1. Published visibilities are according to AFMAN 11-226 (I), Volume 1, Table 6, using the side-step HAT (SSM MDA-SSM Runway Touchdown Zone (TDZ) Elevation = SSM HAT) or Table 11, whichever is greater.
4.8.7.2. If the distance between the FAF and side-step runway threshold is less than the minimum no-lights visibility, a SSM for that approach category is not authorized. ***NOTE:*** This is because the maneuver can only be conducted between the FAF and the MAP and sufficient visibility is necessary to acquire and maneuver to the side-step runway.
4.8.7.3. Published visibilities must not be less than the distance between the MAP and the side-step runway threshold.
4.8.7.4. Credit for lights installed to the sidestep runway may be applied according to AFMAN 11-226 (I), Volume 1, Chapter 3, except read references to straight-in as side-step. The minimum visibility after applying credit for lights must be no less than 1 mile.
4.8.8. The criteria for descent gradients are in AFMAN 11-226 (I), Volume 1, paragraph 252, except the gradient is based on:
4.8.8.1. The distance from the FAF or step-down fix to the side-step runway threshold.
4.8.8.2. The height difference between the minimum altitude at the FAF or step-down fix and the TDZ elevation of the side-step runway.

4.8.9. Minima are published as shown below, assuming the following conditions: Runways 27L and 27R with 1200 feet separation and the ILS installed on Runway 27L, the procedure would be identified as ILS Runway 27L, and minima printed as such:
S-ILS 27L
S-LOC 27L
Side-Step- 27R
Circling

4.9. ASR Instrument Approach Procedures and Recommended Altitudes. ASR approaches will comply with AFMAN 11-226(I), Volume 1, paragraph 252, to determine the appropriate descent gradient and FAF altitude. The TCH, descent angle, and gradient shall not be published for ASR approach procedures.
4.9.1. Recommended altitudes shall be figured for each mile on final, but not below the MDA. Calculations are as follows:
4.9.1.1. For approaches with published straight-in minima, use the FAF to threshold distance and Threshold Crossing Height (TCH) elevation (TCH + threshold elevation). ***NOTE:*** Use VGSI TCH for calculations. If there is no VGSI for the runway, select an appropriate TCH from AFMAN 11-226(I), Volume 3, Table 2-3.
4.9.1.2. For circling approaches (having only one circling minima), use the FAF to Missed Approach Point distance and use airport elevation. ***NOTE:*** ASR Circling Only approach calculations to the airport elevation could result in recommended altitudes exceeding 400 feet per mile descent gradient. If this occurs, adjust the recommended altitudes (before rounding) so the descent gradient does not exceed 400 feet per mile. Do this by relocating the MAP or moving the FAF outward from the runway to achieve an acceptable descent gradient.
4.9.1.3. For point in space approaches, use the FAF to Missed Approach Point (MAP) distance and the missed approach point elevation.
4.9.1.4. Recommended altitudes shall be rounded to the **nearest** 20-foot increment.
4.9.2. The example calculations at Table 4.1 illustrate two descent gradients due to a stepdown fix. If ROC would permit a stepdown fix altitude below the normal gradient, raise the minimum altitude at the stepdown fix to preserve a constant gradient.

Table 4.1. Sample Recommended Altitude Calculations.

Conditions: FAF 7.8 miles from threshold; minimum altitude at FAF – 9000; minimum altitude at 3 mile fix – 7300; TCH Elevation – 6172; MDA 6800.

9000-7300 divided by 4.8 = 354 feet per NM
0.80 x 354 = 283 (FAF to 7 Miles)

9000-283 = 8717 at 7 Miles = **8720**
8717-354 = 8363 at 6 Miles = **8360**
8363-354 = 8009 at 5 Miles = **8000**
8009-354 = 7655 at 4 Miles = **7660**
7655-354 = 7301 at 3 Miles = **7300 (Step Down Fix)**
7300-6172 divided by 3 = 376 feet per NM
7300-376 = 6924 at 2 Miles = **6920**
6924-376 = 6548 at 1 Mile = **Not Used (Below MDA)**

4.10. ASR Approaches that Use PAR Equipment at RFC Only Facilities. At Radar Final Control (RFC) locations without ASR scope availability (RFC Only), surveillance approaches using PAR azimuth may be developed using Localizer criteria (AFMAN 11-226 (I), Volume 1, Chapter 9). This will permit use of TERPS automated software for procedure development. Recommended altitudes must be computed manually.

4.11. Best Fit Straight Line (BFSL) Application to Threshold Crossing Height (TCH).
4.11.1. If the TCH has been determined by actual flight inspection IAW FAAO 8240.47, *Determination of Instrument Landing Systems (ILS) Glidepath Angle Reference Datum Heights (RDH), and Ground Point of Intercept (GPI),* publish this RDH in place of the manually computed TCH. ***NOTE:*** Annotate AF Form 3637, Remarks Section, that there is a difference between the BFSL calculations and TERPS calculations and instruct NIMA to publish the BFSL value.
4.11.2. ILS procedures that have the TCH determined by BFSL that are below 30 feet or above 60 feet shall be submitted for waiver approval. A copy of the Flight Check report shall be submitted with the waiver request.
4.11.3. See FAAO 8240.36, *Instructions for Flight Instruction Reporting,* Appendix 19, for TCH changes required to Facility Data Sheet.
4.11.4. If a BFSL evaluation results in a change to GPI/RPI location as stated on the Flight Inspection Report:
4.11.4.1. Changes shall not be made to the TERPS database. TERPS calculations shall not be changed.

4.11.4.2. If PAR and/or VGSI systems are installed to the same runway, determine if coincidence has changed (See AFMAN 11-226 (I), Volume 3, and AFI 13-203, Chapter 4) and take appropriate action if parameters can no longer be met (i.e., NOTAM action, FLIP changes, etc.).

4.12. AF Form 3637, *Instrument Approach Procedures*. Use this form, prepared manually or by automation, to document all USAF instrument approach procedures (IAP). It provides a permanent record of data available at the time of original/amended procedural development. Complete all blocks on the form. Enter "NA" where data is not authorized/applicable. Attach computation forms (manual or automated) to AF Form 3637, as applicable. Enter AF Form 3628 and 3629 data, when available, in appropriate items.

Item 1 and 2. **Airport Information.** Self-explanatory.

Item 3. **Procedure Identification.** Enter the procedure identification according to AFMAN 11-226 (I), Volume 1, Chapter 1, Section 6. For Foreign Terminal Instrument Procedures, enter the identification used by host nation.

Item 4. **Airdrome Reference Point.** Enter to the nearest hundredth of a second. This point should be the location used to determine actual magnetic and grid variations.

Item 5. **Effective Date.** The final review authority will enter, or inform requesting unit to enter, effective date after coordination with National Imagery and Mapping Agency (NIMA). Units should coordinate with all affected air traffic control agencies for interfacing with publication cycles. Indicate if the procedure is an original or amendment. Amendments to procedures will be sequentially numbered 1 through 6 (date, Amnd 1, Amnd 2, etc.). Amendments are required for all procedural changes to the IAP (see paragraph 6.2). Amendment changes are not required for editorial corrections (AFMAN 11-226 (I), Volume 1, paragraph 142).

Item 6. **Communications.** Enter the radio call sign and primary VHF and UHF frequencies of the agency performing the function, as applicable.

Item 7. **Plan View:**

a. **Radar:**

(1) Enter radar arrival routes from the Intermediate Fix (IF) to Missed Approach Point (MAP), if Minimum Vectoring Altitude (MVA)/diverse vectors are used for the initial segment. Enter all radar arrival routes of the pre-established pattern, if a specific radar pattern is used for the initial segment.

(2) Depict IF, FAF, MAP, step-down fix(es) or other fixes, as applicable.

(3) Exception to MVA shall be identified as a "NOTE" in the plan view. If vectoring below MVA (according to FAAH 7110.65) is required for FAF intercept altitude, etc., then identify this application to controllers and flyability/flight inspection pilots. Example: "***NOTE:*** Exception to MVA. For PAR/ASR approach only, altitude 3100 between 15-7 NM from ASR antenna. Obstacle clearance provided by application of AFMAN 11-226 (I), Volume 3."

b. **Non-Radar:**

(1) **Facilities and Fixes.** Enter the name, type, frequency or channel number, identification, emission (as required), and coordinates, to the nearest hundredth of a second, of each facility/fix used in the procedure. Intersection and DME fixes used in the procedure should show the name and how formed. Show bearings and distances to facilities or fixes to the nearest degree and mile.

(2) **Transition Altitude (TA) and Transition Level (TLv).** Enter the TA and TLv on procedures as established by national authorities. (This information is needed primarily in overseas areas). Additional information can be found in FLIP General Planning.

(3) **Holding Patterns.** Depict holding patterns to include holding fix, inbound and outbound courses, direction of turn, leg lengths (If DME is used, depict DME value at end of holding pattern. If time distances are other than standard for holding altitude, indicate specific value). **Publish the maximum holding airspeed if the holding pattern was designed for less than 310 knots** (e.g., Maximum Holding Airspeed 265 Kts).

(4) **Feeder Routing.** Transition should be those routings frequently used by air traffic control and local aircrews. Consideration for ESV should be made prior to establishing routes.

(a). **High Altitude IAP:**

1. **Outer Ring.** Depict facilities or fixes which are part of the enroute high altitude airway structure as published on the enroute high altitude chart to include routing, distance, and MEA to the IAF, holding fix, or feeder facility.

2. **Middle Ring.** Depict facilities or fixes that are not part of the enroute high altitude airway structure. Facilities that are part of the enroute low altitude airway structure and used for transition from high to low or to eliminate ESV problems should be shown on this ring. Facilities or fixes on this ring must have a transition from a facility or fix on the outer ring. Include routing, distance, and MEA to the IAF or holding fix. Facilities on this ring must include the name, frequency/channel number, as appropriate, and identification. Fixes must show how they are formed.

(5) **IAP Depiction:**

(a) The inner ring should be drawn to scale. Range radius for low IAP is 10 NM and 20 NM for high IAP. (Recommended scale: inner ring designed on engineer ruler 60 scale with 1 NM = 10 ticks for low altitude IAPs and 5 ticks for high altitude IAPs). Normally, the IAP drawing using the NAVAID that provides final approach guidance should be centered on the center point of the inner ring. Depiction's may be offset in order to better use the plan view area. All drawings shall be oriented to true north.

(b) Include the following data, as applicable:

1. Show IAF/IF(s), FAF, Step Down Fix(es), MAP, or other fixes, as applicable. ***NOTE:*** "FAF-only" instrument procedures shall not be developed. As a minimum, an intermediate or holding segment must be depicted joining the final approach segment.

2. Identify the procedure's routing of all IAP segments to include headings, radials, bearings, arcs, course, procedure turn (PT), or holding pattern in lieu of PT (showing the side course).

3. Enter any controlling obstructions within 10 NM radius (low altitude) and 20 NM (high altitude) which fall in the initial, intermediate, final, circling, and missed approach areas. Other significant obstacles in or near the instrument approach area may be charted within the inner ring when deemed critical to flight safety. Explain obstacles (obstacle located near final approach area edge, excessively high terrain parallels final and intermediate boundary areas, etc.) When portrayal of several obstructions within a small area would clutter the chart, only the highest obstacle of that group need be shown. The elevation of the obstacle above mean sea level shall be shown to the nearest foot.

4. Use symbols listed in FLIP legend section of IAP charts. Symbol drawings need not be to scale; however, that should adequately portray required information to publication agencies.

5. Depict hydrographic, international boundaries, or special use airspace (SUA) features, as applicable.

Item 8. **Minimum Sector Altitude (MSA).** Define the sector(s) used for MSA(s) clockwise between bearings to the NAVAID which provide final approach guidance. Depict MSA as shown in FLIP legend section of IAP charts.

Item 9. **Vertical Velocity (V/V) Chart (Waiver Only).** Minimum climb rates shall be shown as vertical velocities in feet per minute (FPM) in 60-knot increments, from 60 knots to 300 knots or as requested. The V/V equals the climb gradient times ground speed divided by 60. The V/V will be rounded up to the next 10 foot increment, i.e., a computed V/V of 253 FPM will be rounded up to 260 FPM. Indicate the termination altitude of published minimum climb rate. Published as a "Caution Note."

Item 10. **Field Elevation.** Enter the elevation of the highest point on the usable landing surface.

Item 11. **Touchdown Zone Elevation.** Enter the highest elevation in the first 3000 feet of the approach end of the runway.

Item 12. Profile:

a. **Radar:**

(1) Same information as Item 7a(1). Identify the procedure's routing in all segments to include headings, radials, bearings, arcs, and courses.

(2) Depict IAF/IF if specific radar pattern is used; FAF, MAP, Step Down Fix(es), or other fixes, as applicable, with associated altitude information as shown in FLIP legend section of IAP charts. ***NOTE:*** As a minimum, an intermediate segment must be depicted joining the final approach segment.

(3) For PAR procedures, indicate glidepath angle and threshold crossing height (TCH).

(4) Depict ASR recommended altitudes and distances across the top portion of the profile. Compute altitude information according to AFI 13-203.

(5) Indicate FAF to MAP and MAP to runway distance as shown on FLIP IAP charts.

(6) Missed approach instructions are not required in the profile section.

b. **Non-Radar:**

(1) Same information as in Item 7b(5)(b)1 and 2. ***NOTE:*** "FAF-only" instrument procedures shall not be developed. As a minimum, an intermediate or holding segment must be depicted joining the final approach segment.

(2) Include associated altitude information with fixes listed in (1).

(3) Enter Visual Descent Point (VDP) DME value used to establish VDP.

(4) For ILS procedures, indicate glideslope (GS) angle, TCH, GS interception altitude, and height of the GS at localizer FAF. For CAT II procedures, indicate the radar altimeter (RA) at DA point.

(5) For non-precision procedures, indicate the Vertical Path Angle (VPA) or descent angle and TCH. ***NOTE:*** If the published descent angle and VGSI angle are not coincident, publish the following note: "VGSI and descent angles not coincident."

(6) Indicate FAF to MAP and MAP to runway distances as shown on FLIP IAP charts. For CAT II ILS procedures, indicate distances between DAs and runway threshold in feet.

(7) Missed approach instructions are not required in the profile section except when the form is used as the sole support for exercise or actual contingency operations.

(8) Transition Altitude (TA) and Transition Level (TLv). Enter the TA and TLv on procedures as established by national authorities. (This information is needed in overseas areas). Give the transition altitude(s) to the nearest 100 feet and flight level as specified. Additional information can be found in FLIP General Planning.

Item 12. **Airdrome Sketch.** (Used only for exercises/contingency operations). Drawing need not be to scale. Draw the runway and depict its length and width as shown on FLIP IAP charts. Indicate approach lighting identification, Visual Glideslope Indicator (VGSI), and runway lighting as shown on FLIP IAP charts and according to AFMAN 11-226 (I), Volume 1, Appendix 5.

Item 13. **Minimums:**

(a) Under CAT/APP, enter procedure name (ILS-36, LOC-36, TAC-36, CIR, etc.).

(b) Enter MDA or DA, as appropriate; RVR (if not available, enter prevailing visibility); HAT or HAA; and ceiling and visibility for each category. Categories may be combined when none of the minima elements differ. Enter "NA" where minima are not authorized/applicable. TERPS offices need to add no light minima in the remarks section of approach plate for non-DoD locations.

Item 14. **Magnetic (MAG)/GRID Variation (Actual).** Enter the assigned magnetic variation for the area. The assigned magnetic variation should indicate the nearest future Epoch Year value. Enter the Epoch Year of the variation value (8°W/1995). If the station is north of 67 degrees North or south of 67 degrees South, give the magnetic grid variation to the nearest degree.

NOTE: (See AFPAM 11-216, Chapter 14, for computation of grid data.) The magnetic variation of record and the assigned variation used to orient the NAVAID may be different. Projected magnetic variation and variation of record can be obtained from MAJCOM.

Item 15. **NAVAID Assigned MAG/Grid Variation.** Enter current assigned variation obtained from the FAA Master Data Summary listing. This information can be obtained from the MAJCOM. Enter the current ASR oriented variation value. (This information can be obtained from maintenance personnel by direct reading of equipment or from ATCALS eval report.)

Item 16. **Time/Distance Table.** Enter minutes and seconds in the table based on FAF to MAP distance displayed in the profile section. Compute data as follows: (Distance X 60) divided by Knots = Minutes and Fraction. Fraction X 60 = seconds.

Item 17. **Precision Data.** Enter runway number, GPI, RPI, TCH, and GS angle for precision approaches. Enter VGSI RRP for all procedures. ***NOTE:*** For TCH determination, see AFMAN 11-226 (I), Volume 3. Enter TCH information to the nearest hundredth of a foot and publish to the nearest foot.

Item 18. **Approach Information.** Enter the bearing and distance from the FAF to the MAP. Enter the missed approach instructions describing the missed approach in detail (include missed approach track, altitude, holding and other instructions, as applicable). If the MAP is based on time and distance, enter the FAF to MAP times in Item 16. If a missed approach climb gradient is required, enter the vertical velocity (V/V) in Item 9.

Item 19. **Approach/Missed Approach Radials Selected.** List the radials for the initial, intermediate, final and missed approach selected for flight inspection of the IAP. ***NOTE: Publish*** the radial to the nearest whole degree (i.e 0.49 degrees or less round down, 0.50 degrees or greater round up). When evaluating FTIP procedures, determine if the radial published by the HN meets straight-in criteria applying the radial rounding method described above. In situations where the rounding places the radial outside the straight-in criteria parameters, the procedure does not meet straight-in criteria and a straight in approach is not authorized without a waiver. Publication of circling minima in lieu of straight-in minima does not eliminate the need to obtain a waiver for non-standard straight-in final approach course alignment.

Item 20. **Additional Information:**

a. The ESV block is to serve as a reminder to request expanded service volume checks (FAA Form 6050-4) when established service limitations (FAAH 7110.65) are exceeded. ESV checks apply to distance and altitude. The ESV check may be required not only for terminal NAVAIDs, but also for feeder facilities as well. The appropriate frequency managers must check for possible co-channel interference and flight inspection must determine the adequacy of the signal. The NAVAID classifications and service volume of each are listed in FLIP.

b. Airspace requirements are according to AFI 13-201.

Item 21. **Waivers.** List any waivers required for new or amended procedures. List the number of approved waivers on file for amended procedures and the approval date for each. Waiver requests and approvals should support each affected procedure.

Item 22. **Airfield/NAVAID Data.** Enter the coordinates for the approach and departure end of the runway serving the procedure. Enter the coordinates for the NAVAID (primary) which provides final approach guidance. Enter coordinates for secondary (GS antenna) or other NAVAIDs, as appropriate. This information should agree with data on AF Form 3628.

Item 23. **Obstacle Data.** Identify obstacles to include:

a. **Segment.** Initial, intermediate, final, missed approach, circling. Identify all Step Down Fix(es) used. FINAL (FAF-Step Down Fix) on one line followed on the next line with FINAL (Step Down Fix-MAP). List obstacles that are portrayed due to Flight Safety Determination (FSD).

b. **Controlling Obstacles.** Describe obstacle (terrain + trees, tower, etc.) and include its AF Form 3629 number.

c. **Elevation and Coordinates.** Enter MSL elevation of obstacle to the nearest foot. Enter location of obstacles by latitude and longitude to the nearest second. Extract this data for AF Form 3629 or indicate source of information above coordinates (JOG NM 14-2).

Item 24. **Holding Data.** List all holding patterns on IAP. Include:

a. NAVAID name and identification.

b. Radial or bearing and DME, if applicable. If DME not derived from a co-located source, identify source.

c. List template number based on maximum holding altitude used by ATC and holding direction (to and from NAVAID, not holding fix).

d. List maximum holding altitude used by ATC. Normally allow for holding of three aircraft at a holding fix.

e. Indicate maximum airspeed (A/S) utilized in holding.

f. Identify controlling obstacle across the top of block and include coordinates below identification.

g. Enter location of obstacles by latitude and longitude to the nearest second.
h. Indicate minimum holding altitude. List ROC value if other than 1000 feet.

Item 25. **Minimum Sector Altitude(s) (MSA).** Define the sector(s) used for MSA clockwise between bearings to the NAVAID. MSA defined here should agree with the depiction in Item 8. Data entered shall agree with AF Form 3629. MSA minimum altitude is obstacle plus 1000 feet ROC. NIMA will verify this data.

Item 26. **Emergency Safe Altitude (ESA).** ESA is approved by MAJCOM.

Item 27. **Feeder Routes.** List the feeder routing required by procedure. If minimum reception altitude (MRA) is required, document rationale in remarks.

Item 28. **Visual Aids.** Enter the type and length of approach lights used for reduced visibility. Enter the type and spacing of runway lights used for RVR eligibility. Indicate (yes/no) if touchdown zone and centerline lighting are available. Enter VGSI GS angle.

Item 29. **No-Light Visibility.** Enter the no-light visibility values. If a credit for lights was taken in accordance with AFMAN 11-226 (I), Volume 1, Chapter 3, a note shall be published on the approach plate (normally in the remarks section)/Radar minima section, indicating the increase that has been added to published minimums, segregated by approach categories when different (Example: "When ALS inop, increase CAT AB RVR to 50, vis to 1 mile; CAT CD RVR to 60, vis to 11/4 mile; CAT E vis to 11/2 miles").

Item 30. **ASR Recommended Altitudes.** Enter the recommended altitudes for surveillance approaches. Compute recommended altitudes according to paragraph 4.9 this instruction.

Item 31. **Remarks.** The remarks section is used to expand or explain any items on the form. Explanations should be concise and identify specific affected items on this form or a specific paragraph reference in regulations pertaining to IAP criteria. Publish descent information for all nonprecision approach procedures (except ASR) by entering the descent angle and TCH data from the FAF to FEP, or S/D to FEP, as appropriate, in this block. Use the following format: "(FAF or S/D fix) to (FEP): (angle/TCH)"; e.g., **PUBLISH DESCENT ANGLE & TCH AS FOLLOWS: LEXY TO RW19L: 3.00/59.** Note: Do not use degree or feet symbols. Use bond paper to continue remarks and attach it to the form.

Item 32. **Procedure Requester(s).** Enter the agency (unit/office symbol) and date of the request for IAP development. This information will be used by MAJCOM TERPS Branch to maintain IAP OPR listing.

Item 33. Same as Item 3.

Item 34. **Approval Signatures**.

Item 34 A-B. **Flight Check**. Obtain the flyability and flight inspection pilot's signatures. If the IAP was developed using NAVAIDs not maintained or flight inspected by a US agency, enter a statement in the flight inspection pilot block to denote the agency (or country) performing the flight inspection of the facility and, if available, the date of the last inspection.

Item 34 C. **Approving Authority Signatures**. All signature blocks shall be signed, as required. As a minimum, the "Procedure Specialist," "Air Traffic Operations Manager" (at locations where the USAF has development responsibility), "Senior Operational Commander," and "MAJCOM TERPS Branch" signatures shall be obtained. When the procedure's protected airspace overlaps into an adjacent facilities airspace, ensure coordination signatures are obtained from that facility. "MAJCOM (WAIVER)" block must be signed by the MAJCOM/DO or designated representative. Include an explanation when signatures cannot be obtained.

NOTE 1: Signature blocks shall include printed name, rank/grade, and office symbol.

NOTE 2: "Senior Operational Commander" block for Foreign Terminal Instrument Procedures shall be signed by the MAJCOM/DO or designated representative and signifies compliance with paragraph 1.4.4. At locations where the USAF has procedure development responsibilities, the "Senior Operational Commander" designated representative is the primary Wing/DO responsible for flight operations.

4.13. ***Precision Computations.*** Precision computations will be accomplished manually by using AFFSA approved spreadsheets or by use of TERPS automation. Regardless of method used, documentation showing calculations shall be a part of the procedure package.

4.14. AF Form 3640, ***Nonprecision Computations.*** Use this form to determine Minimum Descent Altitude (MDA) for non-precision approaches (i.e., TACAN, VOR, localizer).

Item 1. **MDA Based on Final Approach Segment.** Space is available to compute two types of approaches, when a combined approach is being designed. The computation format is self-explanatory. Use the ROC value given in the proper chapter in AFMAN 11-226 (I) for the type of approach.

Item 2. **MDA Based on Missed Approach.** The MDA also provides clearance over obstacles in the missed approach area. The calculation format is self-explanatory. A different MDA could be required for each category of aircraft making turning missed approach because of the different obstacle areas encountered. In this case, make the computations shown in Item 2 and enter obstacle data in the remarks section. If an obstacle penetrates the obstacle surface, the MDA must be increased or a climb gradient provided. If a combination straight and turning missed approach is required or desired, refer to AFMAN 11-226 (I).

Item 3. **Adjusted MDA if Penetration Exists.** Calculations are self-explanatory.

Item 4. **Missed Approach Climb Gradient Required for Item 1 MDA.** If the MDA value from Item 3 results in a minima higher than that required, missed approach obstacles may be covered by a climb gradient higher than the 200 feet per NM standard and the Item 1 MDA retained.
NOTE: If necessary, a combination of Item 3 MDA and Item 4 climb gradient may be used. In this case, use the Item 3 and Item 4 formats to show the amount of penetration covered by each option and explain, in remarks section how they were combined. An increase to the standard climb gradient requires a waiver to AFMAN 11-226 (I).
Item 5. **HAT Computation.** Calculations are self-explanatory.
Item 6. **Ceiling.** Calculations are self-explanatory.
Item 7. **Visibility Without Approach Lights.** The computation format is self-explanatory.
Item 8. **Visibility With Approach Lights.** Visibility may be reduced if approach lights are available and the operational conditions in AFMAN 11-226 (I) are met. Use the format on the form to determine visibility with approach lights. Enter the RVR value (if any) for each aircraft category.
Item 9. **Minima.** Enter the controlling values from the Items 1-8. Show these values in the FLIP minimum section format. If a Foreign Terminal Instrument Procedure is being validated, show the host minima here. Minima may be combined for categories when no differences exist. The highest minima (AFMAN 11-226 (I)/APATC-1/host nation) shall be entered in the minima section of AF Form 3637 (Item 13).
Item 10. **Changes to Published Minima Without Approach Lights.** Enter only the changes that will be made to establish no-light minima.
Remarks. This section is used to expand or explain any item(s) on the form. It may be continued on plain bond paper, if required. Explanations/Calculations should be concise and identify specific items or a specific paragraph reference in a regulation pertaining to data herein.

4.15. AF Form 3641, *Visual Portion of Final Worksheet.* Use this form to evaluate the visual portion of final for runways with or without Visual Glide Slope Indicator.
4.15.1. Section I: **SUMMARY INFORMATION (Result Data for Publication)**
Item 1: Enter result from Section II, item H or from AFMAN 11-226 (I) Volume 3, Table 2-3.
Item 2: Enter result from Section III, item E or Section IV, item E.
Item 3: Enter results from Section VII, item G.
Item 4: Enter Yes or No (after completing section VI).
Item 5: Enter Yes or No (after completing section V).
Item 6: Enter Yes or No (after completing section VI).
4.15.2. Section II: **DETERMINATION OF TCH WITH VGSI**
Items A - C: Self-explanatory
Item D: Enter distance in feet along centerline.
Item E: Enter tangent of VGSI angle (i.e., VGSI angle is 3°, enter its tangent (0.0524).
Items F – H: Self-explanatory
4.15.3. Section III: **DETERMINATION OF VDP WITH VGSI**
Item A: Self-explanatory
Item B: Enter value from section II, Item H.
Item C: Self-explanatory
Item D: Enter tangent of VGSI angle (i.e. VGSI angle is 3°, enter its tangent (0.0524).
Item E: Self-explanatory
4.15.4. Section IV: **DETERMINATION OF VDP WITHOUT VGSI**
Item A - C: Self-explanatory
Item D: Enter tangent of descent angle or 3° (i.e., descent angle is 2.5°, 3° is greater, enter tangent of 3°(0.0524).
Item E: Self-explanatory
4.15.5. Section V: **OBSTACLE CLEARANCE DETERMINATION, 20:1**
Item A: Self-explanatory. See AFMAN 11-226 (I), Volume 1, Figure 14-5 or Figure 14-6A.
Items B – F: Self-explanatory
Item G: Subtract item F from item E and enter result. Also, answer "Yes" or "No" in section I, Items 5 & 6.
4.15.6. Section VI: **OBSTACLE CLEARANCE DETERMINATION, 34:1**
Item A: Self-explanatory. See AFMAN 11-226 (I), Volume 1, Figure 14-5 or Figure 14-6A.
Items B – F: Self-explanatory
Item G: Subtract Item F from Item E and enter result. Also, answer "Yes" or "No" in section I, Item 4.
4.15.7. Section VII: **DME FIX AT VDP**
Note: First row is a calculation area. Result used in Item D.
Item A: Measure along centerline from abeam facility to EOR.
Item B: Enter value from Section III, Item E or Section IV, Item E.
Item C: Self-explanatory

Item D: Enter value from first row.
Items E – G: Self-explanatory

4.16. AF Form 3642, *Circling Computations.* Use this form to determine circling minimums based on obstacle clearance or height above airport (HAA).
Include the airport name and names of instrument procedures applicable to specific circling computations in block provided.
Item 1. **Circling Minimum Descent Altitude (CMDA) Based on Obstacle Clearance.** Controlling Obstacle Height. Ensure the expanded circling area obstacle is considered when sector(s) have been eliminated from circling obstacle clearance. The highest obstacle in the circling or expanded obstacle clearance shall be used.
Item 2. **CMDA Based on Minimum HAA.** Calculations are self-explanatory.
Item 3. **Ceiling.** Calculations are self-explanatory.
Item 4. **Visibility.** Calculations are self-explanatory.
Item 5. **Minima.** Show these values in the FLIP minima section format. The highest minima shall be entered in the minima section of AF Form 3637, Item 13.

4.17. AF Form 3981, GPS/RNAV Descent Angle and Surface Evaluations. This form is used to determine the descent angle from the Final Approach Fix (FAF) altitude to a point 50 feet above the threshold for Straight-In approaches. This criteria is established in AFJMAN 11-226, paragraph 1523f. Descent Angles will not be published if the Missed Approach Waypoint (MAWP) is not located over the threshold.
Item 1. **Descent Angle.** Calculations are self- explanatory.
Item 2. **Obstacle Identification Surface Angle.** Calculations are self-explanatory.
Item 3. **Horizontal Distance MDA to Threshold.** Calculations are self-explanatory.
Item 4. **Stepdown Fix.** If a Stepdown Fix is used, complete this section to determine if the Step Down Fix altitude permits the publication of a Descent Angle.
Item 5. **Length of OIS Surface.** Calculations are self- explanatory.
Item 6. **Obstacle Evaluation In OIS Surface Area.** Calculations are self-explanatory. NOTE: A Descent Angle is not published if the OIS Surface Area is penetrated.

4.18. AF Form 3982, GPS/RNAV Combination Straight and Turning Missed Approach Length of Segment 1. This form is used to determine the turn starting point (Length of Section 1) in the Missed Approach Segment when a Combination Straight and Turning method is used. Calculations are self-explanatory.

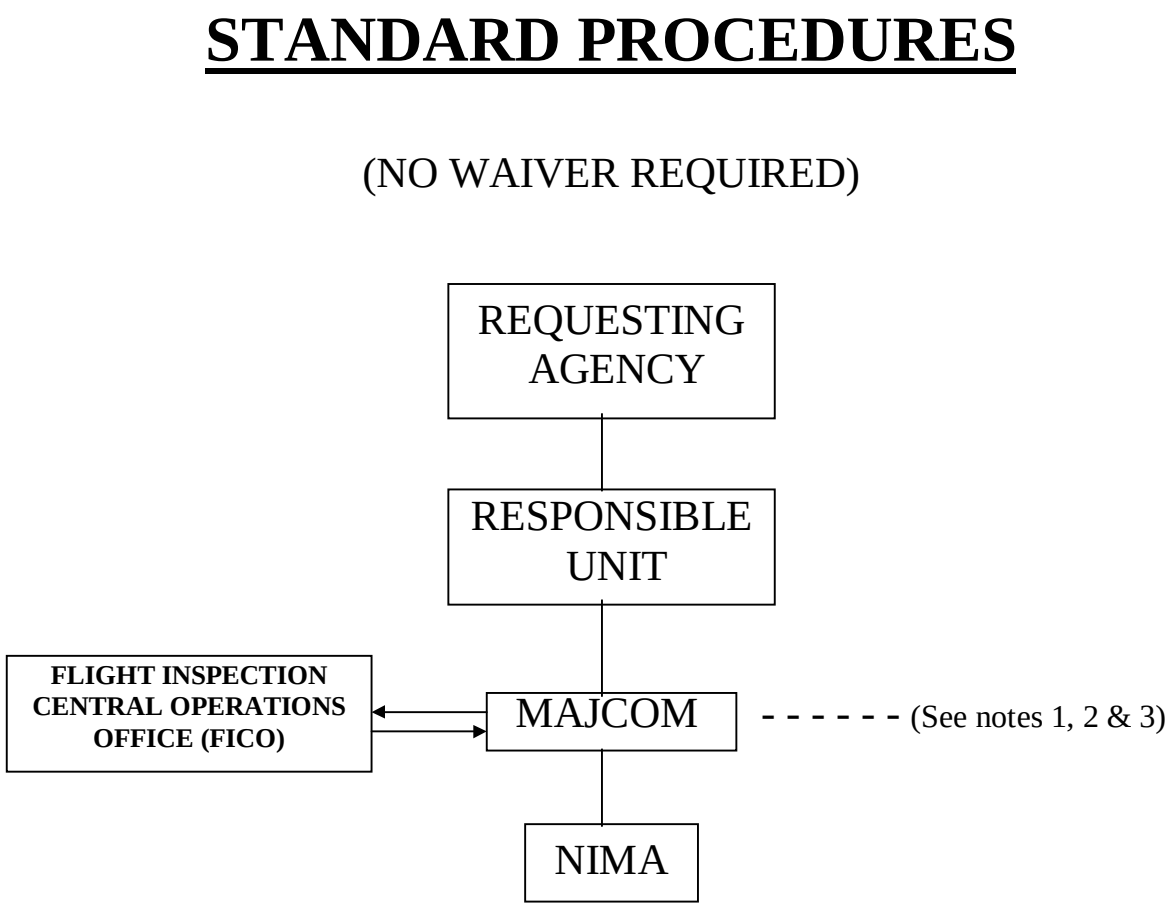
Chapter 5

HOW TO REQUEST/PROCESS/DELETE INSTRUMENT PROCEDURES

5.1. Steps in Requesting, Processing and Publishing Instrument Procedures (Figures 5.1 and 5.2)**:**
5.1.1. Requesting Agency (i.e., MAJCOM, Air Force Component of a Unified Command or Unit Flying Organization):
5.1.1.1. Identifies requirement for new or revised procedures and advises the responsible agency for that location. Requests must contain:
5.1.1.1.1. Name of the airfield or location desired.
5.1.1.1.2. Type of procedure, for example, High or Low Altitude, Very High Frequency Omni-Directional Range (VOR), Instrument Landing System (ILS), Tactical Air Navigation (TACAN).
5.1.1.1.3. Approach categories.
5.1.1.1.4. Special requirements. Detail specific features or capabilities needed, for example, point to which a departure procedure should go, en route fixes where the recovery or approach should commence, and avionics features that influence procedure design.
5.1.1.1.5. Date procedure or revision must be available, when appropriate, date no longer needed.
5.1.1.1.6. Designation and address of organizations or units requesting the procedure and number of copies required, when NIMA publishes in loose-leaf format.
5.1.1.1.7. Runway number(s) of procedure. For foreign procedures, include a copy of the Foreign Terminal Instrument Procedure, if possible.
5.1.1.2. May recommend, with justification, a procedure for inclusion in the appropriate DoD FLIP. Evaluate on a case-by-case basis a need to publish procedures at alternate airports or airports not frequently used. Send specific justification to the MAJCOM headquarters.
5.1.1.3. May request new or revised instrument approach or departure procedures at domestic civil airports or USAF air bases where FAA provides TERPS service in accordance with FAA Order 8260.32.
5.1.1.4. Forward publication requests for civil procedures to the proper MAJCOM TERPS office. Base requests for publication of civil approaches in DoD FLIP on operational requirements.
5.1.2. All instrument procedures will be published and distributed by NIMA, except if a unique situation exists where there is an urgent need (due to war time/contingency operations, etc.) for the procedure and NIMA cannot support the requirement. MAJCOMs may then locally publish these procedures until receipt of the NIMA product (See *Notes 2 and 3).* MAJCOMs shall immediately send HQ AFFSA/XOI information copies of the locally published product with the applicable page one of AF Form 3637, ***Instrument Approach Procedures,*** and/or AF Form 3634, ***Departure Procedure (DP),*** upon completion. Locally published instrument procedures shall conform to IACC specifications to the maximum extent possible, contain an expiration date, a point of contact, and, if applicable, exercise name and authorized users.
NOTE 1: If a procedure is in the developmental phase, a MAJCOM/unit may produce a product for review and/or coordination purposes, and the following note shall be published on the approach plate: NOT FOR NAVIGATIONAL USE or FOR USE BY FLYABILITY/FLIGHT CHECK AIRCREW ONLY.
NOTE 2: When the procedure requirement is of short duration, time will not permit production of a product by NIMA, and it can only be published locally, the procedure does not have to be sent to NIMA.
NOTE 3: Instrument approach procedures shall always be in a graphic format (Plan and Profile View). Text only instrument procedures (NOTAM, Message, etc.) shall not be implemented except in extreme emergencies. AFFSA/XOIP shall be notified whenever "text only" instrument procedures have been implemented.
5.1.3. Publication of Radar procedures:
5.1.3.1. Airborne Radar Approaches (ARAs) shall be published in a graphic format (Plan and Profile View).
5.1.3.2. PAR/ASR approaches are published in text format in Terminal FLIP products in the section identified as: RADAR INSTRUMENT APPROACH MINIMUMS. However, there may be situations where the PAR/ASR procedure is complex or in an obstacle rich environment, etc., which could justify publication in the graphic format also. NIMA specifications exist to permit this type of portrayal.
5.1.3.3. Do not publish a descent angle/gradient for ASR approaches.

5.2. The MAJCOM TERPS Function:
5.2.1. Selects an existing US Government/foreign nation procedure or develops a new procedure for publication.
5.2.1.1. Foreign nation instrument procedures will be processed IAW paragraph 7.1.5.1.
5.2.2. Coordinates with the requesting agency and appropriate air traffic units, as required.
5.2.3. Reviews and approves unit developed TERPS procedures. Unless contingency situations dictate otherwise, reviews and approves instrument procedures prior to a flight inspection being scheduled. Ensures all data required by AFJMAN 11-225, Section 214, is submitted to flight inspectors prior to flight check operations. Submit all new standard or special instrument procedures, civil or host nation procedures, procedural changes (fix, course, altitude, published minimum, obstacle data, and procedure identification) to existing procedures to NIMA/SMWA. Non-procedural changes and

Figure 5.1. Processing Standard Instrument Procedures.



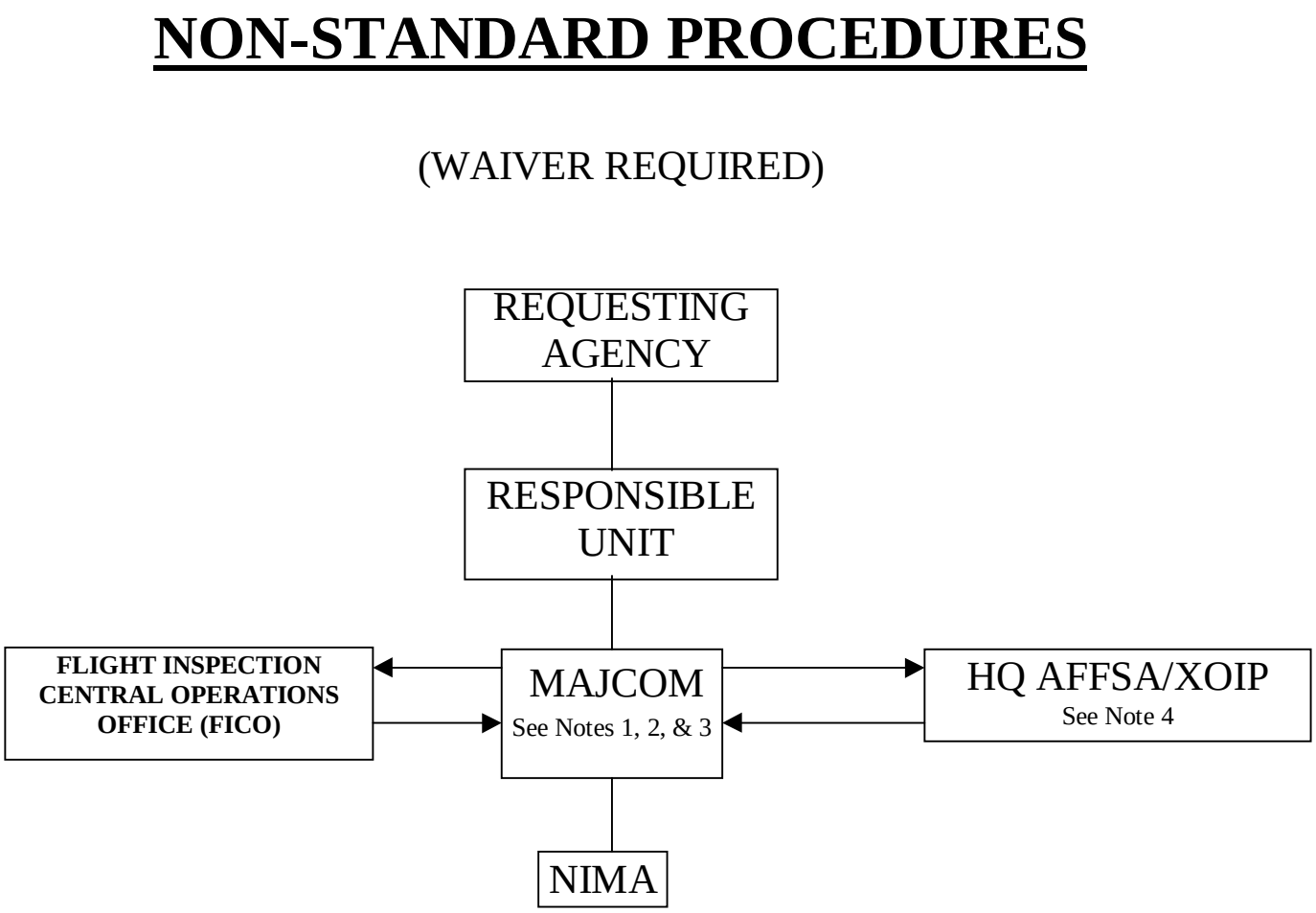
NOTES:

1. Locations where USAF OSS are not available to develop and locally coordinate procedures, development and local coordination will be performed by the applicable MAJCOM or independent group as directed by HQ AFFSA/XOIP.

2. When final review and approval authority is delegated below the MAJCOM, the approving unit will send the approved procedures to NIMA for publication and a copy to the responsible MAJCOM.

3. After the MAJCOM TERPS office has reviewed the procedure, it must be forwarded to the Flight Inspection Central Operations Office (FICO) for flight inspection services (See paragraph 8.3).

Figure 5.2. Processing Nonstandard Instrument Procedures.



NOTES:

1. Locations where USAF OSS are not available to develop and locally coordinate procedures, development and local coordination will be performed by the applicable MAJCOM or independent group as directed by HQ AFFSA/XOIP.

2. After the MAJCOM TERPS office has reviewed and the MAJCOM/DO has approved the procedure, it must be forwarded to the Flight Inspection Central Operations Office (FICO) for flight inspection services (See paragraph 8.3).

3. HQ AFFSA is the final approving authority before publication. All items/approval signatures must be completed before submitting to HQ AFFSA, including flyability check and flight inspection. ***Note:*** If a waiver to criteria is questionable (potential exists for disapproval due to being extreme in nature), contact AFFSA/XOIP for guidance prior to scheduling Flight Inspection.

4. HQ AFFSA/XOIP will advise MAJCOMs of waiver approval or disapproval using AF Form 3980, ***Instrument Procedure Waiver.***

Table 5.1.
PROCEDURE PACKAGE REQUIREMENTS.

Forward To	Standard Procedure	Non-Standard Procedure	Host Nation Standard (See Note 1)	Host Nation Non-Standard (See Note 1)
MAJCOM TERPS	AF Form 3632, 3634, or 3637 -Computation Data* -Maps, Charts, Drawings or Acetate Overlay Plots -ESV (If Applicable) -FAA Form 8260-2 (If Applicable) -Supporting Documents** -AF Form 3992 or 3993 (Flyability Check) -AF Form 813 See Note 2	-AF Form 3632, 3634, or 3637 -Computation Data* -Maps, Charts, Drawings or Acetate Overlay Plots -ESV (If Applicable) -FAA Form 8260-2 (If Applicable) -Supporting Documents** -AF Form 3992 or 3993 (Flyability Check) -AF Form 813 See Note 2 -AF Form 3980 (Waiver Form)	(Prepares Package) See Note 3	(Prepares Package) See Note 3
MAJCOM/DO	N/A	-AF Form 3632, 3634, or 3637* -AF Form 3980 (Waiver Form)	-N/A	-AF Form 3634, or 3637* -Computation Data* - Maps, Charts, Drawings or Acetate Overlay Plots -Supporting Documents** -Foreign Terminal Instrument Procedure -AF Form 3980 (Waiver Form)
AFFSA/XOIP	N/A	-All items listed above that are required for MAJCOM TERPS	-N/A	-Same as above -AF Form 3992 or 3993 (Flyability Check) See Note 2
NIMA	-AF Form 3634, or 3637*	-AF Form 3634 or 3637*	-AF Form 3634 or 3637*	-AF Form 3634 or 3637*

* Computer printouts, of each segment summary and computer generated procedure package, replace manual computation forms (AF Form 3640/3641/3642) for automated procedures.
** Supporting documentation is any item that supports the waiver request (i.e., coordination letters, flight inspection report, manual computations not on AF Forms, etc.).

NOTES:
1. Foreign Terminal Instrument Procedures in countries **not approved** on the USAF Host Nation Acceptance List. See Chapter 7, paragraph 7.1.5.2.1 and 7.1.5.2.2 for package requirements and processing for procedures in approved countries identified on the USAF Host Nation Acceptance List.

2. If a flyability check cannot be conducted because the NAVAID has not been commissioned, satisfactory flight inspection of the procedure during the commissioning is a substitute for the flyability check requirement and AF Form 3992/3993 is not required.

3. Coordinate with Host Nation authorities when publishing new procedures (host nation procedures not available) or publishing procedural changes which differ from published host procedures.

recommendations for improvement of FLIP product content/format IAW *DoD FLIP General Planning*, Chapter 11, normally submitted by airfield operations.
5.2.4. Processes procedures and supporting documentation as shown in Figure 5.1 or Figure 5.2.
5.2.5. Plan the operational date for new procedures to coincide with the FLIP General Planning (GP), chapter 11, *Revision Schedules*. When this is not possible, the following note shall be published on the approach/departure plate: "Effective by NOTAM." Do not use this caveat for more than 90 days (AFJMAN 11-208, *The US Military Notice to Airmen [NOTAM]*).
5.2.6. Provide written guidance to subordinate units on steps required for processing procedures.

5.3. Unit TERPS:
5.3.1. Provide sufficient information to permit a rapid and complete check of the procedure package by the designated agencies. Submit request for new procedures predicated on a programmed NAVAID or runway at least six months prior to the estimated commissioning of the new NAVAID or runway. (***NOTE:*** The flyability check and FAA flight check requirement will be completed simultaneously during the NAVAID commissioning flight inspection. It is not necessary to accomplish an AF Form 3992/3993 in this case.) New procedures will be published in the DoD FLIP with an "EFFECTIVE BY NOTAM" caveat. A NOTAM of procedure availability will be issued immediately following successful flight inspection to include any required changes. Legible copies may serve as originals in a TERPS package. (See Table 5.1 for specific contents needed for each reviewing agency.)
5.3.2. Includes the following documents/information in a procedure package:
5.3.2.1. Signed copies of:
5.3.2.1.1. AF Form 3637, ***Instrument Approach Procedures****, or*
5.3.2.1.2. AF Form 3632, ***Minimum Vectoring Altitude Chart (MVAC****), or*
5.3.2.1.3. AF Form 3634, ***Departure Procedure (DP****), or*
5.3.2.1.4. AF Form 3636, ***Application of Diverse Departure Criteria****, or*
5.3.2.1.5. FAA Form 7100-4, ***STAR-Standard Terminal Arrival.***
5.3.2.2. Computation sheets (AF Form 3635, ***Application of Departure Route Criteria***; AF Form 3640, ***Nonprecision Computations***; AF Form 3641, ***Visual Portion of Final Worksheet***; and AF Form 3642, ***Circling Computations***, Precision Computations, showing DA/MDA/CMDA, HAT/HAA, visibility and ceiling values, etc.) will be attached to the procedure package. Do not send computation sheets to NIMA. Include notation on the forms when sources of obstacle data, computed values, and nonstandard criteria can cause misunderstanding by reviewing levels.
NOTE: Annotate on Precision Computation sheets, the type of radar used for PAR approach procedure development. Change procedures associated with a GPN-22 or TPN-19, touchdown (TD) reflector distance, to "TD DISTANCE" and annotated with the TD distance derived from the radar's site parameter panel TD distance setting. For new or revised ILS installations, select use of rapidly dropping formulas.
5.3.2.3. Charts, maps, or automation overlays showing proper segments and holding patterns of the complete procedure as defined in AFMAN 11-226 (I). Ensure the charts and maps are available to all users when using overlays (see note 1). Process requests for charts according to instructions in the *DoD Catalog of Aeronautical Charts*, FLIPs.
NOTE: Units with a DoD Activity Address Code (DODAAC) shall have all maps/charts applicable for their location listed for Automatic Initial Distribution (AID). This will ensure automatic receipt of any map/chart revisions. Units without a DODAAC should have their AID requirements specified on the Base Operations DODAAC.
5.3.2.4. Supporting documentation that affected the planning of the procedure (engineering surveys, foreign nation Aeronautical Information Publication (AIP), NAVAID or airspace limitations, flight inspection results, etc.). Submit requests for Expanded Service Volume (ESV), FAA Form 6050-4, ***Expanded Service Volume Request***, when instrument procedures require use of NAVAIDs beyond their usable distance and altitude limitations as listed in FAAH 7110.65, *Air Traffic Control*. Request ESV checks according to instructions in paragraph 2.4.1 and include supporting documentation in the procedure package.
5.3.2.5. The location, type, and height of the controlling obstruction in each segment of the procedure. When reliable charts and obstacle data are unobtainable, assume the most critical evaluation of the obstacle locations (identify source of assumed values, state forestry department, etc.). Accomplish this by plotting the obstacle location and height from various sources and using the placement and/or value that require the highest minima.
5.3.2.6. Automated procedure packages must contain a complete printout of the build summary for each segment.
5.3.3. Include in loose-leaf packages the same information as prescribed in paragraph 5.3.2. Submit requests to the MAJCOM TERPS Office and include a list of all the addressees and the number of copies sent to each (Include DoD Activity Address Code {DODACC} of recipients). Include three copies for forwarding to AFFSA/OL-D and one copy to AFFSA/XOIP.
5.3.4. Provide the technical expertise and procedure alternatives necessary to help in the drafting of the waiver justification. Address each nonstandard condition independently on a single AF Form 3980, ***Instrument Procedure Waiver***. Process procedures requiring waivers independently of all other procedures with no reference to other procedures for substantiation. Complete documentation and supporting data (see Table 5.1) shall accompany the waiver request so reviewing offices can conduct an evaluation without additional research. The fact that a procedure has existed for a number of years does not provide an equivalent level of safety.

NOTE: MAJCOMs will send a copy of the waiver package to AFFSA/XOIP and maintain the original package until receipt of approval/disapproval notice. Then return the approval/disapproval notice and original package to the requesting unit.

5.4. The MAJCOM Headquarters Director of Operations:
5.4.1. Evaluates and endorses each nonstandard procedure.
5.4.1.1. Concurs or non-concurs with the request for inclusion in the recommended DoD FLIP.
5.4.2. When required, ensures a flyability check is performed.

5.5. Waiver Requests (Non-Standard Procedures). A waiver is required to permit deviation from standard criteria application for Instrument procedures at locations where the USAF has procedure development responsibility. A waiver is also required to permit deviation from U.S. TERPS criteria compliance for procedures at host nation locations not accepted on the USAF Host Nation Acceptance List that are published loose-leaf or in DoD FLIP. Procedures developed for the USAF by the FAA at domestic civil airports that do not meet U.S. TERPS criteria shall be processed IAW FAAO 8260.32, paragraph 10.
5.5.1. Submit a waiver request using AF Form 3980, ***Instrument Procedure Waiver***. Process procedures requiring waivers independent of all other procedures with no reference to other procedures for substantiation. A single AF Form 3980 shall accompany each procedure. This single AF Form 3980 will contain all deviations requiring waivers. Complete documentation and supporting data (see Table 5.1) shall accompany the waiver request so reviewing offices can conduct an evaluation without additional research. The fact that a procedure has existed for a number of years does not provide an equivalent level of safety. Units will provide the original plus two copies of the procedure package to the MAJCOM. MAJCOM will submit one copy of the procedure package to HQ AFFSA/XOIP. See Table 5.1 for package contents. See Figure 5.2 for processing guidance. A complete waiver package, with maps, shall be mailed to HQ AFFSA/XOIP for processing. Faxed packages will only be accepted after prior coordination with HQ AFFSA/XOIP and the procedures are necessary for short notice requirements. The request must also contain:
5.5.1.1. Statement of flyability check completion (See paragraph 7.3 for host nation procedures, Chapter 8 and Attachment 8). ***NOTE:*** If a flyability check cannot be conducted because the NAVAID has not been commissioned, satisfactory flight inspection of the procedure during the commissioning is a substitute for the flyability check requirement and AF Form 3992/3993 is not required.
5.5.1.2. Appropriate AIP information for a foreign procedure and/or information obtained by agreement from host nation.
NOTE 1: When a procedure is amended, reprocessing of an existing waiver is not necessary unless the amendment directly impacts the basis for the waiver.
NOTE 2: AIP product must be translated into English.
5.5.2. Except for procedures published IAW FAAO 8260.32, a permanent waiver will not be granted. Waivers will be valid for Two Years from the date of issue. Waiver re-validations must be received NLT 10 days prior to expiration. Extensions to the waiver expiration date will not normally be given. Extension request must be addressed to AFFSA/XO with a copy to AFFSA/XOI and come from the Wing OG/CC or MAJCOM O-6 equivalent. Extension requests shall include justification and impact if disapproved.
5.5.3. Waiver re-validation requests require the following:
5.5.3.1. Completed AF Form 3980, Sections 1 through 6; Section 7 & 8 does not require signatures and shall read "See Previous Waiver"
5.5.3.2. Copy of previous approval message/letter or AF Form 3980, ***Instrument Procedure Waiver.***
5.5.3.3. Documentation showing the procedure was re-evaluated against the most current criteria and obstacle database. Submission shall include all segment builds, the AF Form 3634/3637, and any manual calculations.
5.5.3.4. Any additional information deemed appropriate.
5.5.4. Original approved waiver and latest re-validation shall be retained with the procedure package.
5.5.5. When waiver processing by HQ AFFSA/XOIP is completed, the requesting MAJCOM will only receive a copy of AF Form 3980.

5.6. AF Form 3980, ***Instrument Procedure Waiver***. This form is used to submit for a waiver to established criteria applicable to Instrument Procedures. Items 1 through 5 must be answered completely and accurately.
Item 1. **Procedure Name, Airport Name, ICAO ID, City, State or Country.** Self-explanatory.
Item 2. **Specific Directive(s) and Paragraph(s) To Be Waived.** Self-explanatory. Additionally, define what is creating the violation of criteria (i.e., AFMAN 11-226 (I), Volume 3, for penetration of the 7:1 transitional surface by obstacles #214, 407, 408, and 412-415, listed on AF Form 3637).
Item 3. **Reason For Waiver (Justification) and Operational Impact If Not Approved.** Justify the need for the waiver and state the operational impact if the waiver is not approved. When stating the operational impact, be specific (i.e., Historical weather data shows that Ceilings and Visibility's below 500 feet and 2 miles occur approximately 95 days per year. This translates into the loss of , at approximately 10 sorties a day, 950 sorties per year, seriously degrading our mission readiness and training ability).

Item 4. **Alternative(s) Considered and Reason For Rejection.** Explain each alternative considered used to eliminate the need for the waiver and state why they were not acceptable.
Item 5. **Equivalent Level of Safety Provided.** An equivalent level of safety ***must*** be established for every waiver request to ensure that Safety of Flight is maintained. An Equivalent level of safety can be defined as a compensating measure to insure that the deviation from criteria does not have an adverse effect on the operation of aircraft. An example could be a warning note published on the procedure to have pilot configure his aircraft for landing at a designated point due to a shorter than standard intermediate segment.
Item 6. **Submitted By.** Self-explanatory.
Item 7. **MAJCOM TERPS (Comments).** The MAJCOM TERPS Office will be the first in line to recommend approval or disapprove the waiver request. If the waiver is not approved, reason for disapproval must be stated in the "Comments" block. ***NOTE:*** The first "disapproval" will end the processing phase and the package will be returned through the coordination chain. Waiver revalidation; does not require coordination or signature, enter "See Previous Waiver" in the "Comments" block.
Item 8. **MAJCOM FLYING OPERATIONS (Stan/Eval) ENDORSEMENT.** This endorsement is to ensure that the MAJCOM flying personnel have the opportunity to review the waiver to determine if there is any reason that this waiver should not be approved. If the waiver is not approved, reason for disapproval must be stated in the "Comments" block. Waiver revalidation; does not require coordination or signature, enter "See Previous Waiver" in the "Comments" block.
Item 9. **HQ AFFSA ACTION.** HQ AFFSA is the final waiver approving authority. If the waiver is not approved, reason for disapproval must be stated in the "Comments" block.

5.7. Deleting Instrument Procedures. When a procedure is no longer required:
5.7.1. The requesting unit informs the appropriate TERPS branch to cancel the procedure. (Organizations at any level of command may initiate a deletion.)
5.7.2. The TERPS branch coordinates with other interested agencies (MAJCOM, DoD, FAA, and host nation).
5.7.3. Each reviewing echelon determines whether the deletion will adversely impact any known operations.
5.7.4. If other agencies concur, the MAJCOM TERPS office sends cancellation notice to NIMA through channels shown in figure 5.1 or 5.2. (See paragraph 3.13 for deletion of fix name codes and identifiers.)

5.8. Special-Use Instrument Procedures. A "Special-Use" procedure is one not published in the DoD/FAA FLIP and developed where a unique operational requirement exists. These procedures are published by NIMA in a "loose-leaf" format (see paragraph 5.1.2). Procedures are developed IAW AFMAN 11-226 (I) and AFI 11-230.
5.8.1. Procedures must state: "For Use by (organization/exercise/operation) ACFT Only." ***NOTE:*** Other aircraft/DoD components are authorized to use these procedures upon approval of the MAJCOM/DO who is responsible for the procedures development/maintenance.
5.8.2. Procedures being developed that do not meet applicable TERPS criteria (non-standard procedure) must be coordinated with HQ AFFSA/XOIP (see paragraph 5.5).

Chapter 6

INSTRUMENT PROCEDURE MAINTENANCE/REVIEWS

6.1. FLIP Maintenance. MAJCOMs will ensure a FLIP maintenance system (checklist, operating instructions, etc.) has been established that tracks annual/biennial reviews, AIP changes (Host Nation locations), NOTAMs, CHUM data, and related correspondence, for updating instrument procedures.

6.1.1. Conduct annual reviews of all instrument procedures and provide written correspondence to parent MAJCOM NLT 15 September using the AFFSA spreadsheet format (See paragraph 1.3.2.2). This review shall identify and validate the need for each procedure, ensuring they meet mission requirements, and ensure that all waivers are current and in compliance with paragraph 5.5, *Non-Standard Procedure Waiver Requests.*

6.1.2. Conduct a biennial (every 2 years) review on **all** instrument procedures (see exceptions in paragraph 6.1.2.5 for Foreign Terminal Instrument Procedures {host nation}) to include the following:

6.1.2.1. Obstacle database. ***NOTE:*** Obstacle databases shall be updated and documented as changes occur (i.e., map revisions, CHUM changes, etc.). Evaluate vegetation growth and new/proposed construction. (The purpose of this evaluation is to ensure that vegetation growth was considered and review all updates made over the past two years)

6.1.2.2. Review/validate need for existing waivers and ensure currency (if applicable).

6.1.2.3. Review MVAC, MIFRAC, Diverse Departure/Diverse Vector Areas, IAPs, STARs, and DPs to ensure development complies with current standards and correct obstacle assessments have been applied.

6.1.2.4. At locations where the USAF has instrument procedure development responsibility, review all "named" fixes used on those instrument procedures. Within the 50 United States and its Territories, verify data published in FAAH 7350.6, *Location Identifiers,* and data on FAA Form 8260-2, ***Radio Fix and Holding Data Record,*** match the data published. For locations outside the 50 United States and its Territories, ensure "named" fixes have been obtained properly through the appropriate governing aviation authorities.

6.1.2.5. The biennial review for Foreign Terminal Instrument Procedures {host nation} shall consist of the following:

6.1.2.5.1. Procedures in non-accredited nations shall meet the requirements as defined in paragraphs 6.1.2.1, 6.1.2.2, and 6.1.2.3. Ensure source documents used are current and that all changes have been documented and published correctly.

6.1.2.5.2. Procedures in Accredited Nations and Special Accredited Nations/Airports must be reviewed to ensure source documents used are current and that all changes have been documented and published correctly.

6.1.2.6. This review will be documented and a copy forwarded to parent MAJCOM NLT 15 Sep. in the applicable year. ***NOTE 1:*** This review may be conducted anytime as long as a Two-year cycle is maintained.

NOTE 2: For Foreign Terminal Instrument Procedure {host nation} biennial reviews, the MAJCOM OPR shall document in the procedure package, discrepancies found, corrective actions taken, and review completion date.

6.1.3. Foreign Terminal Instrument Procedures {host nation}. In addition to meeting biennial review requirements in paragraph 6.1.2.5, conduct the following:

6.1.3.1. Maintain as much source information as possible, following paragraph 7.1.5.2 as applicable.

6.1.3.2. Check the following source documents on a daily basis:

6.1.3.2.1. Host nation AIP changes/revisions. Compare the new procedure against what is published.

6.1.3.2.2. US/host nation NOTAMs.

6.1.3.3. If host nation procedural changes are noted in advance, and time permits a full review, notify NIMA of changes for inclusion in next FLIP cycle.

6.1.3.4. If time permits a full review and changes will occur before the next FLIP cycle:

6.1.3.4.1. Issue a NOTAM of changes until correct depiction appears in the FLIP.

6.1.3.4.2. NIMA notified of changes.

6.1.3.5. If a full review is not possible, the procedure shall be NOTAM'd "NOT AUTHORIZED" until completion of the review.

6.1.3.6. Where possible, establish points of contact (POC) with the host nations to coordinate changes. Exchange agreements are recommended to facilitate crossfeed of information.

6.1.4. Instrument procedures at locations where no unit specialist is available. In addition to paragraphs 6.1.1 and 6.1.2 above, MAJCOMs shall:

6.1.4.1. Maintain the original procedure package as outlined in paragraph 5.3.2, this instruction.

6.1.4.2. Upon receipt, conduct a review of updated CE maps, maps/charts, and CHUM supplements to verify if changes have occurred.

6.1.4.3. If changes are proposed, verify the date when the changes take effect. Include the changes in the next FLIP cycle with NOTAM coverage filling time between the actual FLIP publishing date and the effective date of the change.

6.1.4.4. Establish a POC at each location that will provide timely changes to the airfield environment. Establish the POC with the unit(s) requesting the instrument procedures. Thoroughly brief the POC on changes to the airfield environment that affect instrument procedures. Also, establish clear avenue of communications to ensure timely reporting.

6.2. Revising Instrument Procedures.

6.2.1. The following process is applicable to instrument procedures for which the USAF has development and maintenance responsibility:

6.2.1.1. Procedural changes are those changes affecting fix, radial, bearing, course, track, altitude, minima, obstacles, holding pattern, climb tables, time/distance tables, procedure identification, and operational notes/remarks. Process procedural changes through the appropriate channels shown in Figure 5.1 or 5.2 and as noted in paragraph 6.2.1.3 below.

6.2.1.2. Base Operations will normally submit all non-procedural changes according to FLIP GP, Chapter 11. Non-procedural changes do not require processing through original coordinating channels; however, send an information copy to the MAJCOM TERPS office.

6.2.1.3. Terminal Amendment System (TAS). The TERPS specialist will assign an amendment number to each procedural change. Make no more than six procedural changes (amendments). Use the "Original" signature page for the first three amendments and a second signature page for the next three amendments. Procedural changes after the sixth amendment require the procedure package be re-automated and designated "original". All correspondence for processing the procedure will reference the current amendment number. Depict the amendment number on the published IAP and so that it can be used by the flight check pilot to confirm currency of obstacle information.

6.2.1.4. Manual Procedure Revision(s):

6.2.1.4.1. Shall be annotated in ink and not make procedure packages illegible or difficult to review.

6.2.1.4.2. That are not developed using TERPS automation software must describe how the change was verified for compliance with AFMAN 11-226 (I). Restrict each procedure to a maximum of six (6) non-automated revision submittals (pen and ink changes are acceptable). Forward the procedure package with a coordination letter describing the change with applicable instructions to each agency (See Figure 5.1 or 5.2), which coordinated on the original, for their endorsement. Maintain the letters in the procedure package until all signatures are obtained and the pertinent information added to Block 31 of AF Form 3637. Completely redevelop the procedure using automation or manual methods after the sixth revision.

NOTE: Excluding Host Nation procedures, MAJCOM approval responsibility for revisions is the same as for original packages. All approval signatures must be re-obtained. MAJCOMs are the final authority guaranteeing AFMAN 11-226 (I) criteria compliance.

6.2.1.5. Automated Procedure Revision(s):

6.2.1.5.1. May be revised by either re-automating the entire procedure or manually calculating the impact of minor changes.

6.2.1.5.2. In either case generate a new AF Form 3637. The remarks section on AF Form 3637 (Block 31) must contain sufficient information that the reason for the procedural revision will be clear to the reviewing offices. Include in the remarks section why the procedure was not re-automated, if applicable. Forward all recommendations for procedural revision to instrument procedures through organizational channels to the appropriate MAJCOM. Coordinate revisions through each agency that coordinated on the original procedure (See Figure 5.1 or 5.2). Re-accomplish all original coordination when making revisions to instrument procedures that affect terminal airspace (for example, holding pattern size).

NOTE: When a notice to airmen (NOTAM) or message is used to make a procedural change, forward a new or revised package to applicable MAJCOM within 30 working days.

6.2.2. Process revisions to host nation instrument procedures published in the DoD FLIP and maintained by the USAF IAW paragraph 6.2.1 above, except as follows:

6.2.2.1. Procedures Based on Non-accredited Source.

6.2.2.1.1. Make no more than six (6) procedural changes (amendments) to host nation procedures based on non-accredited source.

6.2.2.1.2. Use the original signature page for the first three amendments and a second signature page for the next three amendments. The seventh procedural change requires re-accomplishing the procedure package and an "original" designation.

6.2.2.1.3. Coordination with all original signatories is not required for each amendment. Re-accomplished "original" procedures shall be processed as if a new procedure.

6.2.2.2. Accredited Source.

6.2.2.2.1. An unlimited number of amendments may be made to procedures based on accredited source. The Checklist for Review of Host Nation Instrument Procedures (Attachment 7) shall be accomplished prior to the amendment being submitted to NIMA for revision and publication.

6.2.2.2.2. Coordination with all original signatories is not required for each amendment. Re-accomplished "original" procedures shall be processed as if a new procedure.

6.2.2.3. Amendments/revisions to existing published procedures do not require flyability checks or tabletop/simulator reviews prior to publication.

6.3. Review of Flight Information Publications (FLIP) and Other TERPS Related Material:

6.3.1. FLIP Products. FLIP review is an in-depth check of the plan, profile, minima block, radar minimums, and airport sketch ensuring published information mirrors the procedure package. Upon receipt of new products, the TERPS Office initiating the change/amendment is responsible for conducting a thorough review (within 5 working days if the unit level

TERPS Office initiated the change, 10 working days if the MAJCOM initiated the change) to check their accuracy because of possible printing errors. Pay special attention to:

6.3.1.1. New Procedures. Compare the new product against the procedure package. The possibility for errors is highest in new procedures.

6.3.1.2. Changes to Existing Procedures. Upon receipt of a new FLIP, check each procedure for printing errors when a new plate is published (check for a Julian date change to determine plate change).

6.3.2. Errors in Published Procedures. If errors are found which are procedural in nature (see paragraph 6.2.1.1) and could jeopardize flight safety, initiate NOTAM action to either stop the use of the procedure or list the corrections.

6.3.3. Review loose-leaf/locally published FLIPs on receipt and during annual review.

6.3.4. Base Civil Engineering Comprehensive Planning Maps or Equivalent. Review revised maps to verify changes/new information.

6.3.5. Obstacle data not considered during development of the instrument procedure (Chart Updating Manual {CHUM}, Electronic CHUM {ECHUM}, obstruction evaluations {OE's}, FAA ASIS {Aviation Standards Information System}, obstacle printouts, NIMA Vertical Obstruction File {DVOF} printouts, National Geodetic Survey (NGS) Airport Obstruction Charts {AOC} and Obstruction Data Sheets {ODS}, etc.). The CHUM lists obstacle changes, additions, and deletions for specific charts/maps and edition number. Cross-check maps/charts used to develop instrument procedures with the CHUM for any possible changes. Document obstacle reviews within the airfield folders. ***NOTE:*** If you use ECHUM in lieu of the CHUM, a method to for tracking and maintaining monthly updates must be established for each map.

6.3.6. Planned or completed changes in airfield layout, facilities, lighting, etc. As soon as possible, determine effect of proposed construction/engineering changes on instrument procedures.

Chapter 7

FOREIGN TERMINAL INSTRUMENT PROCEDURES

7.1. Publication of Foreign Terminal Instrument Procedures (FTIP). The following guidelines shall be used for publication of instrument approach and departure procedures outside U.S. jurisdiction (See Figure 7.1). A process called the Host Nation Acceptance Program has been established to assist TERPS Specialists in the review/publication process. This program validates the reliability and accuracy of select host nation instrument procedure development and publication practices. Host nations meeting the strict guidelines set forth are allowed publication and/or use after applying the following paragraphs, as applicable. The checklists at Attachment 5 and 6 are used to determine acceptability of each host nation being considered. Procedures to be published in the DoD FLIP that *are not* in countries approved on the HQ AFFSA Host Nation Acceptance List, must have a complete TERPS evaluation (either manual or automated) of all segments (including holding), including minimum sector altitudes.

7.1.1. Nations can be broken down into three levels of acceptability: "Special Accredited," "Accredited," and "Non-accredited."

7.1.1.1. **Special Accredited Nations and/or Airports** are those locations USAF MAJCOMs have placed a very high degree of confidence in their instrument procedure development and publication practices. These development and publication practices are equal to our own (FAA/DoD) as determined through the results of a detailed checklist (Attachment 6). Final approval of these nations/airports rests with HQ AFFSA/CC.

7.1.1.2. **Accredited Nations** are those nations USAF MAJCOMs have placed confidence in their instrument procedure development and publication practices as determined through the results of a detailed checklist (Attachment 5).

7.1.1.3. **Non-accredited Nations** are those nations USAF MAJCOMs do not have sufficient confidence in their instrument procedure development and publication practices. Instrument procedures in countries that *are not* on the HQ AFFSA Host Nation Acceptance List are "non-accredited."

7.1.2. FAA Order 8260.31, *Foreign Terminal Instrument Procedures (FTIP)*, establishes requirements for US civil air carriers to comply with regarding the use of instrument procedures outside the US. This order directs air carriers to determine that instrument procedures comply with criteria. Air carriers are required to inform the applicable FAA Region of significant discrepancies found and the FAA will then notify AFFSA/XOIP of these findings. AFFSA/XOIP will forward these findings to the appropriate MAJCOM TERPS office. Additionally, the FAA will place other significant instrument procedure discrepancies they or the air carriers found in the FAA *International Flight Information Manual* and/or FAA *Notices To Airman-Domestic/International* book published monthly.

7.1.3. The MAJCOM will accomplish the following when determining a nation's level of acceptability using the Host Nation Acceptance Program:

7.1.3.1. Inform AFFSA/XOIP as early as possible that an AIP of a host nation within their geographical AOR is being considered for accreditation. AFFSA/XOIP, in turn, will request comments from USAASA, NAVFIG, and FAA.

7.1.3.2. Review the FAA *International Flight Information Manual* and FAA *Notices To Airman-Domestic/International* for potential concerns that may discourage acceptance.

7.1.3.3. Notify AFFSA/XOIP of all known host (civil and/or military) declared exceptions to U.S. TERPS/PANS-OPS/APATC-1. HQ AFFSA will be the final approval authority for USAF acceptance of exceptions.

7.1.3.4. Send AFFSA/XOIP a copy of completed AIP acceptance documentation. A MAJCOM O-5, as a minimum, must approve accredited nations before they can be added to the USAF Host Nation Acceptance List. ***NOTE:*** Checklist at Attachment 5 must accompany this documentation.

7.1.4. AFFSA/XOIP responsibilities under the Host Nation Acceptance Program:

7.1.4.1. Maintain a list of USAF accepted AIPs (distinguishing whether civil or military) and instrument procedures, and inform the NAVFIG, USAASA, and FAA of completed USAF host nation acceptance actions.

7.1.4.2. Notify MAJCOMs whenever FAA changes the status of approved host AIPs and IAPs.

7.1.5. Process Foreign Terminal Instrument Procedures as requested IAW Paragraph 5.1 for publication of instrument procedures.

7.1.5.1. MAJCOM responsibilities for processing of foreign terminal instrument procedures:

7.1.5.1.1. Select instrument procedures to be published in DoD FLIP IAW paragraph 5.1, to satisfy DoD requirements at foreign locations where a US Government agency is not responsible for instrument procedure development, provided:

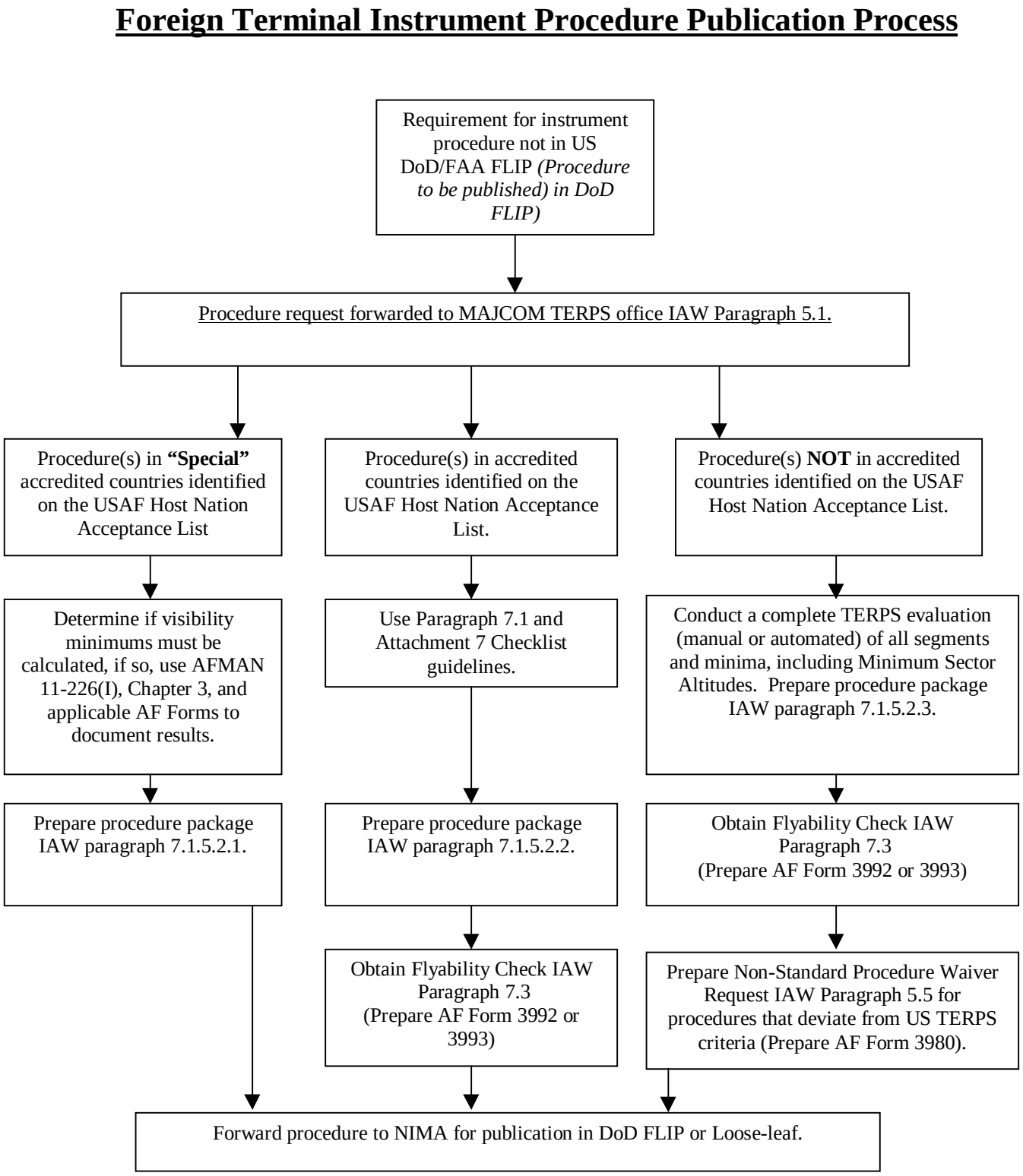
7.1.5.1.1.1. The procedure is published in an international AIP or acquired as the result of a written international agreement. This agreement shall insure that the MAJCOM is informed of changes/revisions as they occur. ***NOTE:*** Information/instrument procedures obtained from an AIP not published in English must be translated by NIMA or by a qualified translator on the MAJCOM TERPS staff. An alternative is to receive an official translation from the Air Attaché office (USDAO) located in the country of where the procedure is located.

7.1.5.1.1.2. An international aeronautical information service (NOTAMs, etc.) is available for the procedure.

7.1.5.1.1.3. The procedure can be safely flown, as depicted or explained, using US Air Force instrument flight procedures contained in AFMAN 11-217, *Instrument Flight Procedures*, and other applicable directives.

7.1.5.1.2. Coordinates with a foreign nation:

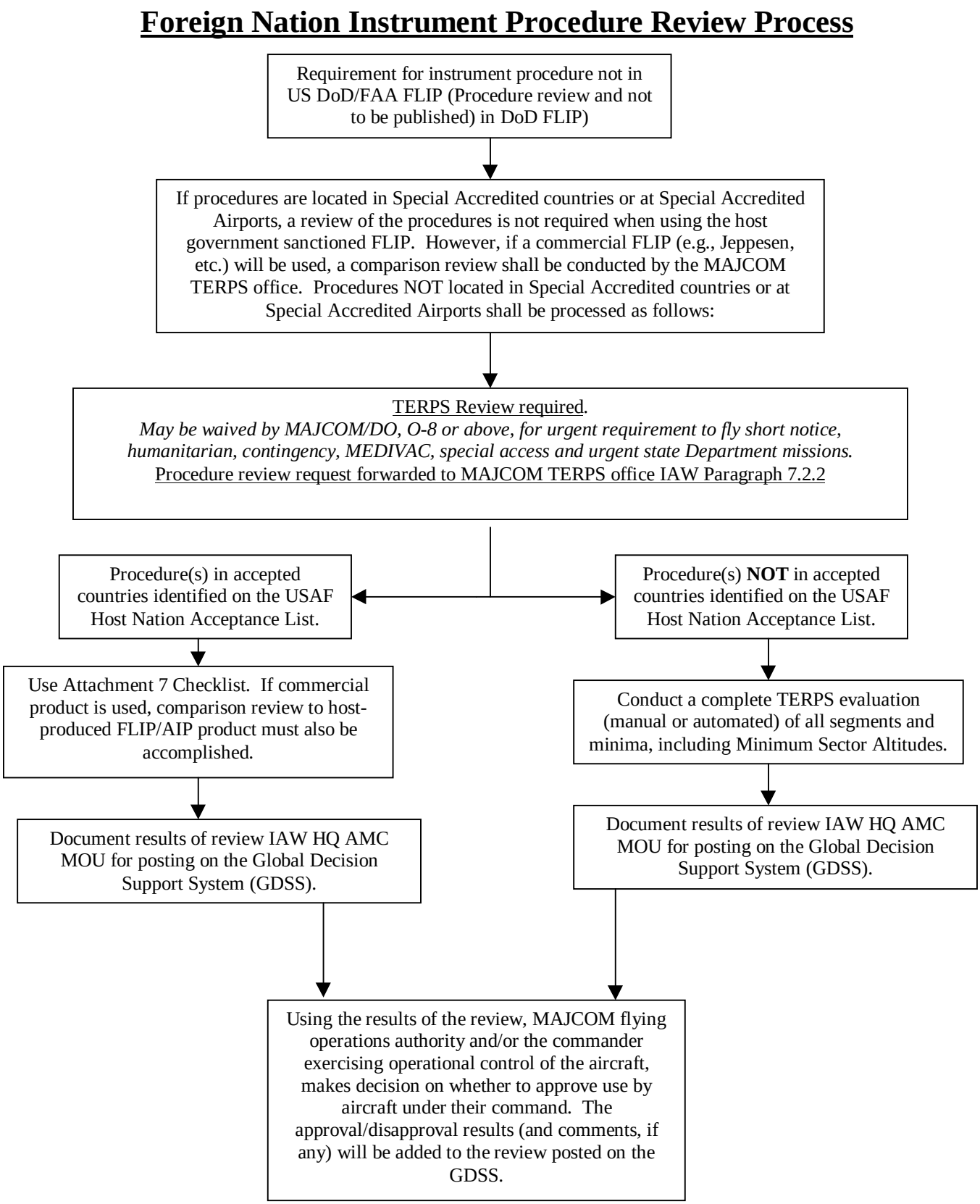
Figure 7.1. Process for Publishing Foreign Terminal Instrument Procedures.



7.1.5.1.2.1. For approval of a new procedure if an existing procedure is not available.
7.1.5.1.2.2. When altering an existing procedure, except with higher minima, emergency safe altitudes, minimum safe altitudes, or other changes permitted by an established agreement with the host nation. ***NOTE:*** Rounding altitudes IAW AFMAN 11-226 (I) is acceptable when converting from meters to feet. The differences are small and inconsequential, thus coordination with the host would not be necessary.
7.1.5.1.3. Coordinates with the requesting agency and appropriate air traffic control units, as required.
7.1.5.1.4. Plan the operational date for new procedures to coincide with the FLIP General Planning (GP), Chapter 11, *Revision Schedules*. When this is not possible, the following note shall be published on the approach/departure plate: "Effective by NOTAM." Do not use this caveat for more than 90 days (AFJMAN 11-208, *The US Military Notice to Airmen [NOTAM]*).
7.1.5.2. A procedure package shall be developed as follows:
7.1.5.2.1. As a minimum, procedure packages for **"Special Accredited"** host nation/airport procedures must contain a copy of the cover letter with instructions to NIMA for publication, a copy of the FTIP, copy of minimums calculations if none were published on the host procedure, and a procedure log to track amendments/reviews and any other actions taken.
7.1.5.2.1.1. Procedure packages sent to NIMA shall conform to requirements IAW the "Working Agreement Between NIMA and DoD Flight Information Coordinating Committee (FCC) On Processing Foreign Terminal Instrument Procedures (TERPS)."
7.1.5.2.2. As a minimum, procedure packages for **"Accredited"** host nation procedures must contain a completed Attachment 7 checklist (signed and dated by the procedure specialist accomplishing the package), a copy of the FTIP, the appropriate computation forms for minimums verification, flyability check documentation (See paragraph 7.3) and a procedure log to track amendments/reviews and any other actions taken.
7.1.5.2.2.1. When preparing a procedure from accredited source for publication, conduct the procedure evaluation using checklist at Attachment 7. The purpose of this evaluation is to determine if the procedure conforms to U.S. TERPS criteria except for Required Obstacle Clearance (ROC) and as stated in paragraph 7.1.5.
7.1.5.2.2.2. If the procedure is in a non-accredited country and does not conform to U.S. TERPS criteria, determine if the anomaly meets ICAO PANS-OPS, APATC-1, or the host nations own criteria standards. When anomalies are discovered, the MAJCOM shall determine if/what action is necessary to compensate (i.e., caution note on procedure, etc.).
7.1.5.2.2.3. Waiver action IAW paragraph 5.5 *is not* required for countries accepted on the USAF Host Nation Acceptance List. Procedures *not* conforming to U.S. TERPS criteria that are located in countries *not on the USAF Host Nation Acceptance List*, shall have waiver requests processed IAW paragraph 5.5.
7.1.5.2.2.4. In order to comply with paragraph 1.4.4, approving authority signatures, as a minimum, shall be the Procedure Specialist, MAJCOM TERPS Branch (someone other than the Procedure Specialist for a quality assessment), and Senior Operational Commander (MAJCOM/DO or designated representative for host nation procedures). This can be accomplished with an "In Turn" coordination Memorandum.
7.1.5.2.2.5. Procedure packages sent to NIMA shall conform to requirements IAW the "Working Agreement Between NIMA and DoD Flight Information Coordinating Committee (FCC) On Processing Foreign Terminal Instrument Procedures (TERPS)."
7.1.5.2.3. As a minimum, procedure packages for a **"Non-accredited"** host nation will consist of AF Form 3637, ***Instrument Approach Procedures,*** or AF Form 3634, ***Departure Procedure,*** appropriate computation forms for minimums verification, copy of the host nation source product, flyability check documentation (See paragraph 7.3), and applicable correspondence requesting the procedure. Do not use cut-out/paste-on of foreign nation procedures on the AF Form 3637 or on the AF Form 3634, however, once DoD FLIP publishes the procedures, cut-out and paste-on are acceptable.
7.1.5.2.3.1. When preparing a procedure from non-accredited source for publication, a complete TERPS evaluation (either manual or automated) of all segments (including holding) and minima must be accomplished. When automation is used to develop procedures, databases shall be managed and maintained IAW paragraph 11.1.
7.1.5.2.3.2. AF Forms shall be filled out to the maximum extent possible. Approving authority signatures, as a minimum, shall be the Procedure Specialist, MAJCOM TERPS Branch (someone other than the Procedure Specialist for a quality assessment), and Senior Operational Commander (MAJCOM/DO or designated representative for host nation procedures).
7.1.5.2.3.3. Procedure packages sent to NIMA will consist of a cover letter with appropriate instructions and the appropriate AF Forms (i.e., AF Form 3637, AF Form 3634, etc.).
7.1.6. The following general guidelines will apply to FTIPs subjected to the AIP and instrument procedure checklists:
7.1.6.1. Do not alter FTIP titles. ***NOTE***: If the identification differs from AFMAN 11-226 (I), Volume 1, paragraph 161 criteria, explain the intent of the procedure (the foreign nation identifies a procedure as "TACAN/ILS R-35" that provides ILS final approach guidance only). In such cases, annotate the procedures in the minima block: "S-TAC-35 NOT AUTHORIZED."
7.1.6.2. Publish FTIP warnings and/or cautionary notes.
7.1.6.3. Publish FTIP procedural restrictions.
7.1.6.4. Establish minimum sector altitudes not lower than altitudes specified by the host nation. Addition of an emergency safe altitude requires prior approval from the host nation.
7.1.6.5. Identify all IAFs.

7.1.6.6. State FTIP published alternate minimums verbatim unless the DoD procedure is "NOT FOR CIVIL USE." In those cases, do not publish alternate minimums.
7.1.6.7. Include FTIP feeder routes and associated data/altitudes on the DoD procedure. Addition of a route requires host nation approval, as does establishing a minimum flight altitude.
7.1.6.8. Publish a caution note on the DoD procedure anytime it exceeds US TERPS descent gradient limits.
7.1.6.9. Publish FTIP circling restrictions on DoD procedures.
7.1.6.10. Add VDPs only if specifically requested by the proponent and the host approves.
7.1.6.11. Convert and publish FTIP "percentile" climb gradients in FPNM.
7.1.6.12. Use AFMAN 11-226 (I), Volume 1, Chapter 3, to validate minima. Publish the higher of resultant computations or the host's values. Adjust minima upward, if necessary, to use reportable weather values IAW Attachment 2. The following exceptions apply:
7.1.6.12.1. If TDZE is not available, use threshold elevation for computing the HAT.
7.1.6.12.2. If threshold elevation is not available, use airport elevation for computing the HAT.
7.1.6.12.3. Use airport reference elevation when the touchdown zone, threshold, or airport elevation is not available when computing HAT.
7.1.6.12.4. Publish a note anytime HAT/HAA figures are not according to US TERPS criteria.
7.1.6.12.5. Paragraph 332. When obstacles penetrate the visual assessment surfaces, visibility values will be affected. Use criteria contained in AFMAN 11-226 (I), Volume 1, paragraph 251. The following shall be applied to FTIP procedures:
7.1.6.12.5.1. Procedures in "accredited" nations do not require evaluation using this criterion. ***NOTE:*** MAJCOM TERPS authorities may evaluate IAW this criterion if deemed necessary. If an evaluation is accomplished and a penetration of the 20:1 OIS has been found, the obstruction must be identified on the procedure and the host nation informed of this potential hazard (See paragraph 7.1.6.12.5.3).
7.1.6.12.5.2. Procedures in "non-accredited" nations **are required** to be evaluated using this criteria. If a penetration of the 20:1 OIS has been found, the obstruction must be identified on the procedure and the host nation informed of this potential hazard (See paragraph 7.1.6.12.5.3).
7.1.6.12.5.3. The following is an example of what will be placed on the procedure when there is a 20:1 OIS penetration: "Trees 120' AGL/220' MSL .4 NM from threshold, 50 feet right of course. USAF: Straight-In procedure to Rwy XX/Circling to Rwy XX at night requires approval from MAJCOM Flying Operations Authority and/or Commander Exercising Operational Control of the aircraft."
7.1.6.12.6. Paragraph 334a. Do not apply.
7.1.6.12.7. Paragraph 334b. Dos not apply.
7.1.6.12.8. Paragraph 342. If runway markings and/or course alignment are questionable, request particular attention be given to those aspects of the procedure during the flyability check, and annotate results on AF Form 3992/3993.
7.1.6.12.9. Paragraph 360. Do not apply.
7.1.6.12.10. At host nation locations where procedures are being re-built for comparison to US TERPS criteria and where maximum holding altitudes cannot be determined, evaluate the holding pattern to 10,000 feet above the published minimum holding or Initial Approach Fix (IAF) using FAAO 7130.3, *Holding Pattern Criteria*. If the maximum holding altitude selected indicates a change would be necessary to the host nation holding pattern, lower the selected altitude to allow use of the Foreign Terminal Instrument Procedure and publish a maximum holding altitude. At host nation locations that are in countries on the Host Nation Acceptance List (not re-built), a maximum holding altitude determination is not necessary unless the review identifies a need to determine one.
7.1.6.13. When a host nation publishes QFE heights, they shall be published in parentheses below QNH Altitudes.
7.1.6.14. Host Nation Missed Approach procedures:
7.1.6.14.1. When a host nation publishes more than one missed approach, all of them shall be published.
7.1.6.14.2. When a host nation publishes a missed approach procedure/instructions for Radar procedures, publish them in the "Radar Instrument Approach Minimums" section in the FLIP (Terminal).
7.1.6.15. NAVAID's and holding patterns that have been identified on the FTIP that are not part of the procedure shall be depicted on the DoD procedure plate.
7.1.6.16. If the FTIP (source) depicts a Time/Speed Table, it shall be depicted on the DoD procedure even if DME is required for the procedure. If the FTIP (source) does not depict a Time/Speed Table, one shall not be established for the DoD procedure.
7.1.6.17. When reviewing data on the FTIP (source), compare the data to what is also published on area and enroute charts, looking for possible discrepancies in altitudes/fix locations that should be the same on all sources.
7.1.6.18. Category II/III instrument procedures.
7.1.6.18.1. Category II/III instrument procedures approved by the FAA are posted on the FAA AFS-410, Flight Operations Branch, web site: http://www.faa.gov/avr/afs/afs410/afs410.htm
7.1.6.18.2. Category II/III instrument procedures that have been approved by the FAA may be published under the guidelines established for Special Accredited Nations/Airports, as outlined in paragraph 7.1.5.2.

Figure 7.2. Process for Reviewing Foreign Terminal Instrument Procedures.



7.1.6.18.3. Category II/III instrument procedures not approved by the FAA are subject to publication requirements associated with "Accredited" or "Non-accredited" nation locations (which ever is applicable), as outlined in paragraph 7.1.5.2.

7.1.7. When publishing FTIPs in the DoD FLIP, determine if the host nation established "obstacle driven" departure procedures for each location, if so, publish in the "IFR Take-Off Minimums and (Obstacle) Departure Procedures" (T section) IAW paragraph 3.3.1.2. At non-accredited locations and/or Accredited locations where a Departure Procedure is developed by the USAF, document these Departure Procedures on AF Form 3634, *Departure Procedure (DP).* Such procedures are subject to the requirements stated in paragraph 7.3, *Flyability Check/Flight Inspection Requirements for Foreign Terminal Instrument Procedures.* Use the following guidelines for determining what to publish:

7.1.7.1. Procedures published in accepted countries under the Host Nation Acceptance Program (Accredited and Special Accredited Nations/Airports): Review the applicable host nation AIP/FLIP products to determine if departure procedures have been established for obstacle avoidance. ***NOTE:*** It is not required to build an obstacle database to determine if a departure procedure is required in an approved host nation. However, if the approved host nation does not have a departure procedure and the airfield location appears to be in an obstacle rich environment, an obstacle database should be developed and a "diverse departure" assessment accomplished.

7.1.7.1.1. If there is no departure procedures published in the AIP and it is not possible to determine if a Diverse Departure is permitted, annotate each procedure with the T and publish "Diverse Departures Not Authorized."

7.1.7.1.2. If an ATC departure procedure is published in the AIP and is intended to be used as the only DP for obstacle avoidance, annotate each procedure with the T and publish "Rwy XX, Use (NAME of DP/SID) for Obstacle Avoidance."

7.1.7.2. Procedures that require a complete TERPS review (not in a country approved on the Host Nation Acceptance List): In addition to the process in paragraph 7.1.7.1, a "diverse departure" obstacle search shall be accomplished. If penetrations are found and the host nation has not published an obstacle driven departure procedure, advise the host nation of the finding, establish a climb gradient for the appropriate departure quadrant to avoid the penetrations, and establish a Departure procedure package IAW paragraph 7.1.5.2.3.

7.1.7.2.1. If there is no departure procedures published in the AIP and it is not possible to determine if a Diverse Departure is permitted, annotate each procedure with the T and publish "Diverse Departures Not Authorized."

7.1.7.2.2. If an ATC departure procedure is published in the AIP and is intended to be used as the only DP for obstacle avoidance, annotate each procedure with the T and publish "Rwy XX, Use Published DP/SID for Obstacle Avoidance."

7.2. Aircrew Use of Foreign Instrument Procedures Not Published In U.S. Government (DoD or FAA) FLIP. AFI 11-202, Volume 3, *General Flight Rules*, Chapter 8, states that MAJCOM TERPS offices must review instrument approach and departure procedures not published in a DoD or FAA FLIP for which an operational requirement exists (See Figure 7.2). Aircrews will be responsible for checking the HQ AMC Global Decision Support System (GDSS) to see if the necessary procedure review has been accomplished and approved for use. If the procedure(s) required are not posted on the GDSS or valid time has expired, the MAJCOM responsible for the area in which the airport (procedures) is located will be contacted to conduct/update these reviews. If another MAJCOM requiring a procedure review requests review responsibility, it may be delegated to them. **Authorization to use the procedure(s) ultimately remains with the appropriate MAJCOM flying operations authority and/or the commander exercising operational control of the aircraft.**

NOTE: If procedures are located in Special Accredited countries or are at Special Accredited airports, a review of the procedures is not required when using the host government sanctioned FLIP. However, if a commercial FLIP (e.g., Jeppesen, etc.) will be used, a comparison review shall be conducted by the MAJCOM TERPS office.

7.2.1. The TERPS review may be waived under the following provisions:

7.2.1.1. The procedure is required for operations defined as an urgent requirement to fly short notice, humanitarian, contingency, MEDEVAC, "special" access and urgent State Department missions.

7.2.1.2. The applicable MAJCOM/DO, if an O-8 or above, may waive the TERPS review. If the DO's grade is below O-8, the waiver authority will lie with the first O-8 or above in the MAJCOM operational chain of command with responsibility for mission risk assessment. This waiver authority will not be further delegated.

7.2.1.3. If the waiver authority is exercised, MAJCOMs will ensure the aircrew and applicable MAJCOM TERPS office is notified that authorization has been given to use the procedure without review.

7.2.2. The MAJCOM TERPS office responsible for conducting the review should receive a review request at least 7 duty days prior to date of anticipated use. The request shall consist of:

7.2.2.1. Four-letter ICAO location identifier.

7.2.2.2. Name of airport.

7.2.2.3. Name of procedures to be reviewed. ***NOTE:*** The requestor shall be responsible for identifying all procedures to be reviewed. If the requestor does not know what procedures are available, the reviewing MAJCOM will provide a list of all procedures available at the specified location. This information can be obtained from the applicable nations AIP, Terminal FLIP, Jeppesen product, etc. The requestor will then select the procedures to be reviewed.

7.2.2.4. Identify product to be used (host nation FLIP product, host nation AIP, Jeppesen, etc.) by the aircrew, indicating specific volume, section, page number, and date.

7.2.2.5. Aircraft category(s) and aircraft instrument capability (e.g., NDB, VOR, TACAN, GPS).
NOTE: It is important to identify the aircraft navigational equipment capability to eliminate potential instrument procedures that could not be flown.
7.2.3. The extent of the review is as follows:
7.2.3.1. Review the FAA *International Flight Information Manual* and FAA *Notices To Airman-Domestic/International* for potential concerns that may discourage use.
7.2.3.2. If the airport is located in a country identified on the HQ AFFSA Host Nation Acceptance List, the product to be used must be reviewed using the Attachment 7 checklist. Additionally, if a commercial product (e.g., Jeppesen) will be used, a comparison review to the host-produced FLIP/AIP product must also be accomplished.
7.2.3.3. If the airport is located in a country *not* identified on the HQ AFFSA Host Nation Acceptance List, a complete TERPS evaluation (either manual or automated) of all segments (including holding) and minima must be accomplished. The MSA must also be evaluated. ***NOTE:*** If a visual segment evaluation identifies penetrations to the 20:1 OIS that are not lighted, identify them to the requestor (in the review letter) for consideration to limit procedure use to daylight operations only to the affected runway (See paragraph 7.1.6.12.5.3).
7.2.3.3.1. It is not necessary to develop a Master Obstruction Chart (MOC) covering a 100 NM radius for this type of review. If a "segment review" method is used (without a MOC developed), care must be taken to ensure terrain lines and obstacles on the border of the trapezoids are considered.
7.2.3.3.2. Use the appropriate scale maps for each segment of the procedure as defined in Table 7.1.

Table 7.1. MAP Requirements for Approach/Departure Procedure Reviews.

SEGMENT TO BE EVALUATED	MAP SCALE REQUIRED FOR REVIEW
Intermediate – Final – Missed Approach - Circling	1:20,000 to 1:100,000 (1:250,000 scale maps may be used without a waiver if 1:20,000 to 1:100,000 scale maps are not available)
Minimum Safe/Sector Altitudes	1:250,000
Initial – Holding	1:500,000
Emergency Safe Altitudes (If applicable)	1:500,000 to 1:1,000,000
Departure	1:20,000 to 1:100,000 (1:250,000 scale maps may be used without a waiver if 1:20,000 to 1:100,000 scale maps are not available)

NOTE: DVOF and DTED Level 1 (or higher) may be substituted for map products. Adverse assumption for vegetation shall be applied as appropriate when using DTED and map products. Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map.

7.2.3.3.3. Authority to deviate from map scale requirements established in Table 7.1 requires a MAJCOM waiver approved at the MAJCOM/DO level. This MAJCOM waiver package must include the map scale **required**, the map scale **used,** and the vertical and horizontal accuracy of the map that was used in the evaluation of the FTIP. The MAJCOM TERPS office must also coordinate with other MAJCOMs to determine if there has already been a review of the procedure. If so, the action taken by other MAJCOMs must be included in the waiver package.
7.2.3.3.3.1. Alternative to map scale requirements MAJCOM waiver is to have the procedure Flyability Checked in Day VMC conditions prior to allowing IFR use. ***NOTE:*** All segments shall be assessed that have not been evaluated using the appropriate map, e.g., if a 1:500,000 scale map was available and used to evaluate the holding pattern, it is not necessary to fly this portion of the procedure.
7.2.3.4. Category II/III instrument procedures.
7.2.3.4.1. Category II/III instrument procedures approved by the FAA are posted on the FAA AFS-410, Flight Operations Branch, web site: http://www.faa.gov/avr/afs/afs410/afs410.htm
7.2.3.4.2. Use of Category II/III instrument procedures that have been approved by the FAA shall follow the guidelines established for Special Accredited Nations/Airports, as outlined in paragraph 7.2, *NOTE*.
7.2.3.4.3. Category II/III instrument procedures not approved by the FAA are subject to review requirements associated with "Accredited" or "Non-accredited" nation locations (which ever is applicable), as outlined in paragraph 7.2.3.
7.2.3.5. Determine if the host nation has established "obstacle driven" departure procedures for the airport by using the following guidelines:
7.2.3.5.1. Procedures reviewed IAW paragraph 7.2.3.2, under the Host Nation Acceptance Program: Review the applicable host nation AIP/FLIP products to determine if departure procedures have been established for obstacle avoidance. If a departure procedure has been established, provide this information to the requester IAW paragraph 7.2.5. If diverse departure information is not available, notify the requestor that the diverse departure was not assessed and will not be authorized. ***NOTE:*** It is not required to build an obstacle database to determine if a departure procedure is required in an approved host

nation. However, if the approved host nation does not have a departure procedure and the airfield location appears to be in an obstacle rich environment, an obstacle database should be developed and a "diverse departure" assessment accomplished.
7.2.3.5.2. Procedures reviewed IAW paragraph 7.2.3.3, in a country not approved on the Host Nation Acceptance List: In addition to the process in paragraph 7.2.3.5.1, a "diverse departure" obstacle search shall be accomplished. If penetrations are found and the host nation has not published an obstacle driven departure procedure, advise the requester of the finding IAW paragraph 7.2.5 and provide a climb gradient for the appropriate departure quadrant to avoid the penetrations.
7.2.4. HQ AMC/DOA will post the results of all reviewed instrument procedures on the Global Decision Support System (GDSS) conducted IAW paragraphs 7.2.3.2 and 7.2.3.3 above. These results will be maintained by the MAJCOM conducting the review. Guidelines and format used regarding the posting of this information will be IAW the Memorandum of Understanding (MOU) established by HQ AMC and agreed upon by all MAJCOMs using these reviews and HQ AFFSA/XO.
7.2.5. Reviewed FTIPs will receive continuous maintenance IAW paragraph 6.1 ***(see below)*** while the review remains effective. If the procedure is intended to be published, MAJCOM approval authority may extend up to publication in appropriate FLIP. An expiration or anticipated publication date shall be specified. The MAJCOM conducting the review shall be responsible for currency and informing the requester of any changes. NOTE: If subsequent/additional requests for a procedure review is received and maintenance has been continuous, the procedure does not have to be reviewed again from the beginning. For example: if a procedure will be required for an extended period of time or is awaiting publication, and request(s) come in for a review, the process ***does not*** have to be re-initiated each time. If the procedure is in another MAJCOM's AOR, the reviewing MAJCOM retains maintenance responsibility until the operation/exercise expires or maintenance responsibility is transferred. If maintenance of the procedure is stopped, for whatever reason, and a new request for use of the FTIP is submitted, the review must be re-accomplished.
7.2.6. If more than six reviews over a 12 month period of the same location are required, the responsible MAJCOM (within whose AOR the location lies) should take steps to publish the procedures in DoD FLIP, IAW paragraph 5.1 (Countries NOT on HQ AFFSA Host Nation Acceptance List) or paragraph 7.1.3 (Countries on the HQ AFFSA Host Nation Acceptance List).

7.3. Flyability Check/Flight Inspection Requirements for Foreign Instrument Procedures.
7.3.1. Actual (live) Flyability Checks will be accomplished prior to publication unless one of the following requirements is met:
7.3.1.1. Procedure is in an accredited country.
7.3.1.2. A US FAR Part 121 air carrier routinely serves the location. US air carrier will be contacted to determine if special restrictions have been established for operating at this airport. The results will be documented in the procedure package (remarks section of the AF Form 3634, ***Departure Procedure***; or AF Form 3637, ***Instrument Approach Procedure***; or in a memorandum when a procedure package does not contain an AF Form 3634 or 3637). If the air carrier has established restrictions, the MAJCOM will evaluate whether these restrictions should be applied. FAAO 8260.31 requires air carriers to provide this information to the Air Force. If the air carrier does not respond or refuses to divulge information, this shall be documented and you should contact AFFSA for assistance. If you wish to publish the procedure prior to resolution by AFFSA, a Flyability Check is required.
7.3.1.3. The FAA Flight Inspected the instrument procedure. A copy of this flight inspection report will be considered an acceptable substitute for AF Forms 3992/3993 and inserted in the procedure package files. ***NOTE:*** The Flight Inspection report must specifically state that the "instrument procedure" was inspected because there are locations where only the NAVAID is inspected IAW FAAO VN8200.3, *Policy With Respect To Military Program Procedures For Flight Inspection Of Foreign-Owned Air Navigation Facilities*, and not the associated instrument procedures.
7.3.2 A flight simulator or tabletop review will be accomplished prior to publication if a Flyability Check is not required IAW 7.3.1.1 and 7.3.1.2 above. A flight simulator or "tabletop" review shall be documented on AF Form 3992, ***Instrument Procedure Flyability Check, Instrument Approach Procedure (IAP)*** or AF Form 3993, ***Instrument Procedure Flyability Check, Departure Procedure (DP)***, whichever is appropriate. These forms shall be maintained with the TERPS procedure package. ***NOTE***: If the "simulator" or "tabletop reviews only" blocks are checked, explain in the comments block why this option was used. Example: "Tabletop review conducted due to airport having routine US FAR Part 121 air carrier operations."
7.3.3. When conducting flyability checks at Host Nation airfields, it may be difficult to evaluate the entire procedure. For portions of the instrument procedure that cannot be flown, pilots will assess the probability of satisfactory NAVAID/Radio reception, obstacle and terrain clearance, e.g., If the missed approach segment cannot be flown on arrival, an assessment can be made when departing, if practical.
7.3.4. Amendments to existing published procedures or FAA flight inspected procedures do not require Flyability Checks or tabletop/simulator reviews prior to publication.
7.3.5. Flight Inspection requirements are as follows:
7.3.5.1. When publishing a host nation procedure obtained from an AIP or via agreement for existing procedures, a Flight Inspection by the US is not required.

7.3.5.2. When the MAJCOM has been given the authority to develop and publish a procedure at a host nation location, a Flight Inspection of the procedure shall be obtained (see paragraph 8.2). Depending on the agreement with the host nation involved, the Flight Inspection may be conducted by the host nation Flight Inspection authorities or the FAA.

7.4. Foreign Procedure Turns:
7.4.1. Chart procedure turns exactly as shown on the foreign procedure, for example, if shown chart an 80/260-degree turn. Include the fix when the turn starts at a fix, rather than at a time or distance determined by the pilot. Determine and publish the outbound and inbound tracks on the 45-degree offset of the 45/180 degree procedure turn when they are not shown on the foreign procedure.
7.4.2. Determine and publish a "Remain within Distance" for the procedure turn that is equal to or less than the distance limitation intended in the foreign procedure. Where the turn starts at a fix, the "Remain within Distance" will be from that fix.
7.4.3. Determine the notes and operational information necessary to convey the intent of the procedure.

7.5. Metric Minima. When developing or reviewing instrument procedures determine the units of measurement (for example, meters, feet, or statute miles [SM]) used in air-to-ground communications for ceiling, RVR, and prevailing visibility (PV) at each airfield. Make minima computations as outlined in AFMAN 11-226 (I) to the point that publishable minima are defined in feet for ceiling and RVR, and SM for PV. When meters are used, convert feet or SM to meters using the equivalent values in attachment 2.

7.6. NOTAMs. NOTAMs can only be sent on foreign instrument procedures published in the DoD FLIP. If the situation occurs where a Foreign Terminal Instrument Procedure published in the DoD FLIP must be NOTAM'd as "Not Available," it must be defined in the NOTAM that it applies only to the DoD published procedure. The FLIP (Volume number, if applicable) and procedure affected must be specified in the NOTAM. This will normally occur when the foreign nation changes and implements a procedure prior to the change being published in the DoD FLIP and the revised foreign nation and/or commercial product is available for use. ***NOTE:*** If the foreign instrument procedure product or the commercial product will be used, an appropriate review must be conducted IAW paragraph 7.2.

7.7. Applying APATC-1. Apply APATC-1 when developing or revising US Air Force procedures in NATO subscribing nations and adopting foreign military procedures of NATO subscribing nations. APATC-1 will also be applied to locations in the area covered by the Europe, North Africa, and Middle East DoD Terminal FLIP. Exceptions to APATC-1 are:

APATC-1	**APPLY**
Chapter 2, Section V	AFMAN 11-226 (I), Chapter 2, Section 5 and AFI 11-230, Attachment 3
Chapter 3	AFMAN 11-226 (I), Chapter 3 and AFI 11-230, Attachment 2 & 3

Chapter 8

FLYABILITY CHECK AND FLIGHT INSPECTION OF INSTRUMENT PROCEDURES

8.1. Flyability Check of Instrument Procedures. Flyability Checks on host nation instrument procedures are conducted IAW paragraph 7.3. Flyability Checks on USAF developed instrument procedures shall be completed prior to submission for Flight Inspection. USAF developed procedures shall be flown (simulator or "table-top" reviews are not acceptable) by DoD aircrews. If a Flyability Check cannot be completed (NAVAID not available/commissioned, etc.) prior to Flight Inspection, satisfactory completion of the Flight Inspection may be substituted for the Flyability Check requirement and annotated on the AF Form 3637 or 3634.

8.1.1. Perform the Flyability Check using AF Form 3992, ***Instrument Procedure Flyability Check, Instrument Approach Procedure (IAP)***, and AF Form 3993, ***Instrument Procedure Flyability Check, Departure Procedure (DP),*** by simulating the most restrictive aircraft category. The entire procedure must be evaluated. The procedure is acceptable if the pilot conducting this check determines that:

8.1.1.1. The procedure is operationally sound; that is, required aircraft maneuvering is consistent with good operating practices.

8.1.1.2. Cockpit workload is acceptable.

8.1.1.3. Charts can be easily interpreted and contain proper information.

8.1.1.4. The procedure ensures safety of flight using the guidance in AFMAN 11-217, *Instrument Flight Procedures*, or as explained in the procedure.

8.1.1.5. See Attachment 8 for instructions on the use of AF Form 3992, ***Instrument Procedure Flyability Check, Instrument Approach Procedure (IAP)***, and AF Form 3993, ***Instrument Procedure Flyability Check, Departure Procedure (DP)***.

8.2. Flight Inspection of Instrument Procedures. Instrument procedures developed by the U.S. Air Force that require the use of Instrument Flight Rules shall be flight inspected IAW AFMAN 11-225, Section 214. Requests for Flight Inspection shall be submitted (normally by the MAJCOM) to the Flight Inspection Central Office (FICO) IAW FAAO 8240.32, *Request for Flight Inspection Services.*

8.2.1. Each Instrument Procedure package submitted for Flight Inspection shall contain the following:

8.2.1.1. A cover letter stating, as a minimum, all appropriate points of contact and an address to where the completed package is to be returned. Additionally, if the procedure is a revision, define (in bullet statements) what has changed on the procedure and what requires Flight Inspection consideration.

8.2.1.2. AF Form 3634, ***Departure Procedure (DP)***, AF Form 3637, ***Instrument Approach Procedure (IAP)***, or FAA Form 7100-4, ***STAR-Standard Terminal Arrival Route***.

8.2.1.3. Maps, 1:100,000 scale planimetric/topographical charts or the next best available scale, are recommended. An actual color map is desired with the segments drawn on the map. Do not send overlays taped to the map. Overlays should be placed on an original map/chart and traced using a light table, if available. Separate maps will be provided for each procedure at a given location (Do not send a single map for multiple procedures). Controlling obstacles must be identified and highlighted; these obstacles shall be identified so that they correlate to the controlling obstacles listed on the AF Form 3634 or AF Form 3637 and map template. See Figure 8.1 for template example to be placed on the map.

Figure 8.1. Controlling Obstacle Template Example

Airport ID:	KVAD	AF 3637 Ref #	SEGMENT	OBSTRUCTION	ELEV
Airport Name:	Moody AFB				
City:	Valdosta	424	Initial	Tower	497
State:	Georgia	4666	Intermediate	Tower	498
		353	Final (ILS)	Trees	239
Procedure ID:	HI-ILS Rwy 36R	485	Final (LOC)	Antenna	340
Amdt #:		417	Missed Apch	Trees	247
Date Drawn:	3/20/01	38	Circling A-E	Water Tower	411
Scale:	1:100000				

8.2.1.4. Graphic depiction of the procedure. New procedures will contain the graphic already placed on the AF Form 3637 or AF form 3634. Procedure revision packages will also have the sketch on these AF forms, however, include a copy of the existing NIMA graphic with the changes added (penned in) and highlighted. RNAV (GPS) procedures shall have both the

magnetic courses and true courses depicted in the plan and profile view. The true course shall be adjacent to the magnetic course in parenthesis, e.g.: (240T).
8.2.1.5. All FAA Form 8260-2, *Radio Fix and Holding Data Record.* ***NOTE:*** If there are no changes to the FAA Form 8260-2 and it does not require Flight Inspection action, annotate on the form that it is "For Information Only."
8.2.1.6. FAA Form 6050-4, *Expanded Service Volume Request*, if applicable.
8.2.1.7. AF Form 3980, *Instrument Procedure Waiver,* if applicable. ***NOTE:*** If the procedure is new and a waiver has not been approved by HQ AFFSA, submit to Flight Inspection with Blocks 1-8 completed.
8.2.1.8. Any additional information that has relevance to the procedure that may aid in the Flight Inspection process.
8.2.2. Submit 2 Copies of the procedure package to the FICO. This is so that one copy will remain with the FICO and the other provided to the flight crew. Completed procedures packages shall be forwarded to FICO not later than 10 days (14 days, if outside Continental US) prior to the scheduled/anticipated flight inspection.
8.2.2.1. Contingency and/or short-notice flight inspections shall be coordinated as soon as possible between the MAJCOM and FICO. Flight inspection of short-notice requirements in overseas theaters may be prohibited by timelines required to process country clearance and diplomatic visa requests. Earliest possible notification of potential flight inspection requirements will improve ability to respond. Flight inspection requests inside foreign clearance guide timelines will require MAJCOM/Theater assistance to expedited clearance requests.

8.3. Flight Inspection of Special Use Instrument Procedures.
8.3.1. Special Use procedures do not require flight inspection if all of the following can be met to achieve an equivalent level of safety:
8.3.1.1. Uses NAVAIDs that have been flight inspected according to AFMAN 11-225 or ICAO Annex 10. ***NOTE:*** Not applicable to Airborne Radar Approach (ARA) procedures.
8.3.1.2. Is within the service volume and usable coverage of the NAVAIDs used. ***NOTE:*** Not applicable to Airborne Radar Approach (ARA) and PAR procedures.
8.3.1.3. Has received a flyability check and the controlling obstacle in each segment of the procedure verified by the using (requesting) agency. ***NOTE:*** The aircrew performing the flyability check must be told to accomplish this and they must annotate the applicable flyability check form of satisfactory completion.
8.3.1.4. Aircraft using the procedure are monitored by ATC radar throughout the entire procedure and the procedure noted "RADAR REQUIRED."
8.3.2. If all the requirements of paragraph 8.3.1 cannot be fulfilled, the procedure requires flight inspection.
8.3.3. MAJCOM commanders may authorize a waiver to paragraphs 8.3.1.1 through 8.3.1.4 for Special Use procedures without prior approval from HQ AFFSA, if IMC use of the instrument procedure is essential because of a military emergency or an urgent military necessity. MAJCOMs will notify HQ AFFSA/XO/XI of their intention to do so.
8.3.4. Flight inspection of FTIPs conducted by the host country (not conducted by the FAA International Flight Inspection Office {IFIO}), are acceptable as long as the flight inspection authority adheres to either FAAO 8200.1 or ICAO Annex 10 criteria.

8.4. AF Form 3992, *Instrument Procedure Flyability Check, Instrument Approach Procedure (IAP).* The instructions and example of this form is located in Attachment 8.

8.5. AF Form 3993, *Instrument Procedure Flyability Check, Departure Procedure (DP).* The instructions and example of this form is located in Attachment 8.

Chapter 9

MINIMUM VECTORING ALTITUDE/MINIMUM IFR ALTITUDE CHARTS

9.1. Minimum Vectoring Altitude Chart (MVAC). Develop MVACs as required by AFI 13-203. If a facility has the capability of Center Radar Presentation (CENRAP), a separate MVAC may be required. Use of CENRAP requires 5 NM buffer areas, regardless of distance from the antenna. The Facility Manager and TERPS Specialist may elect to use 5 NM buffers for both normal and CENRAP operations to eliminate the need for a separate chart and video map for each operational concept. MVACs shall be approved by MAJCOM TERPS. Units with approach control service by FAA/host nation shall obtain a current MVAC from the controlling facility for use in developing instrument procedures.

9.1.1. Terminal Operations, single-sensor, develop an MVAC as follows:

9.1.1.1. The MVAC is designed and centered on the ASR antenna location and may include magnetic bearings, arcs, or point-to-point lines using Lat/Long positions (See Figure 9.1). This chart must meet terrain/obstruction clearance first, then operational needs. Areas such as noise abatement, sanctuaries, etc. whose altitudes are actually higher than that of the MVA may be included as part of the MVA or designed separately. Evaluate all obstacles within the maximum range of the primary radar system. If usage of secondary radar is authorized for radar service according to FAAH 7110.65 and AFI 13-203, *Air Traffic Control*, then evaluate obstacles in the designated areas. MVACs do not require flight inspection.

NOTE: Evaluate adjacent Radar facility MVACs for compatibility.

9.1.1.2. Use AF Form 3632, ***Minimum Vectoring Altitude Chart***, to coordinate and document approval of new/revised MVACs (See paragraph 9.3). Use AF Form 3633, ***Minimum Vectoring Altitude Computations***, to show computations (See paragraph 9.4). AF Form 3632 shall only show data according to AFMAN 11-226 (I), Volume 1, paragraph 1041a, *Radar Patterns*. Show other segment data on appropriate procedure forms.

Figure 9.1. Minimum Vectoring Altitude Chart (MVAC) for Terminal, Single-Sensor Operations.

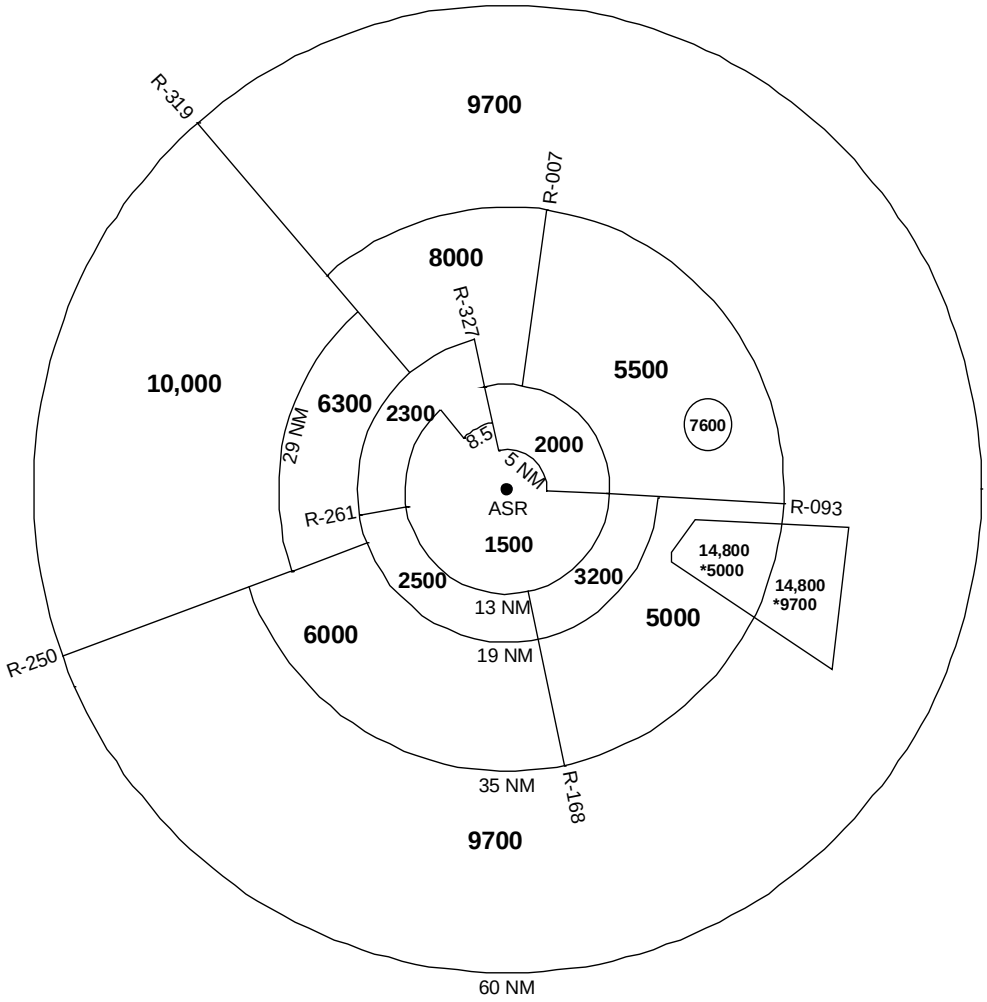
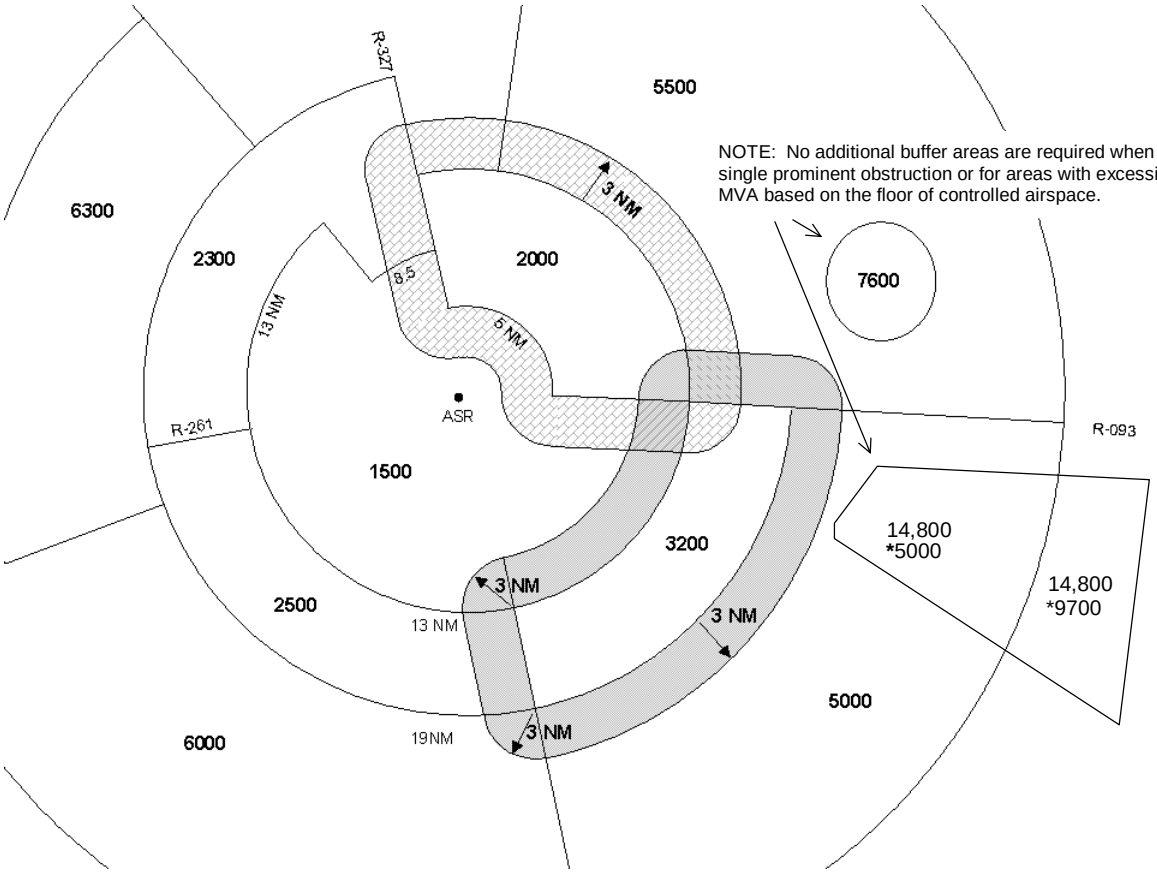


Figure 9.2. MVAC Sector Buffer Areas.



9.1.1.3. Develop the MVAC using a VFR Sectional or equivalent chart that depicts Special Use and Floor of Controlled Airspace, however, the adverse assumption on a 1:500,000 scale map may be excessive and require the MVAC to **also** be drawn on a larger scale. Make the center of the MVAC represent the radar antenna site, and divide it into sectors, as required by different obstacle clearance altitudes. Update (CHUM) associated charts/maps as required. ***NOTE***: Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map. The configuration of each section, and the features to be shown, depend on the local terrain and operational considerations. Use the following methods, as applicable.

9.1.1.3.1. Depict each sector in relation to its magnetic bearing from the antenna site, radials from NAVAIDs, radar display range marks, or controller airspace boundaries. ***NOTE:*** Use the assigned magnetic variation for the ASR antenna.

9.1.1.3.2. Make each sector large enough to permit the vectoring of aircraft within the sector. Establish the boundary of each sector (See Figure 9.2) at least 3 miles from obstacle determining the minimum altitude (5 miles, if 40 miles or more from the antenna site). Additionally, evaluate a 3 mile (5 mile if 40 miles or more from the antenna site) buffer around each sector to ensure no obstacle was overlooked in the adjacent sector. See paragraph 9.1 if CENRAP will be used.

9.1.1.3.3. If there is a large sector with an excessively high altitude due to an isolated prominent obstacle, isolate this obstruction with a boundary at least 3 miles from the obstacle (5 miles, if 40 miles or more from the antenna site). In establishing this area, take care to examine the surrounding contour lines for gradually sloping terrain. An additional 3/5 mile buffer around an isolated prominent obstacle is not required.

9.1.1.3.4. Determine the minimum altitude in each sector that will provide the required obstacle clearance specified in AFMAN 11-226 (I), Volume 1, paragraph 1041b(3) except that 2,000 feet of obstacle clearance shall be provided in mountainous areas. Within mountainous areas, obstacle clearance may be reduced to not less than 1,000 feet when necessary to achieve altitude interface with other procedures and when precipitous terrain is not a factor. This minimum altitude must be at least 300 feet above the floor of controlled airspace (Refer to paragraph 9.4, Section 1A thru 1C). ***NOTE:*** Floor of controlled airspace in mountainous areas or sparsely populated areas, may be as high as 14,500 feet MSL. If an unreasonable MVA is the result of a high floor of uncontrolled (Class G) airspace and ATC may be required to vector aircraft in this Class G airspace, two MVA altitudes may be established. One shall be based on the Floor of Controlled Airspace and the second based on obstruction clearance only, both must be identified on the chart (e.g., an asterisk will be placed adjacent to the altitude associated with obstacle clearance).

9.1.2. Enroute Operations (single-sensor or mosaic) develop an MVAC (See Figure 9.3) as follows:

9.1.2.1. This chart must meet terrain/obstruction clearance first, then operational needs. Areas such as noise abatement, sanctuaries, etc, whose altitudes are actually higher than that of the MVA may be included as part of the MVA or designed separately. ***NOTE:*** When defining MVA sectors, consideration should be given to MSAW development. For example, MEARTS MSAW sectors are defined as convex polygons. It is difficult to define these polygons for MVA sectors using traditional radial/ranges. Develop the MVA at least 20 NM outside designated airspace boundaries. MVA sectors may be extended further to ensure an MVA is available for early control of aircraft outside designated airspace boundaries. If usage of secondary radar is authorized for radar service according to FAAH 7110.65 and AFI 13-203, Air Traffic Control, then evaluate obstacles in the designated areas. MVACs do not require flight inspection. NOTE: Evaluate adjacent Radar facility MVACs for compatibility.

9.1.2.2. Use AF Form 3632, ***Minimum Vectoring Altitude Chart***, to coordinate and document approval of new/revised MVACs (See paragraph 8.3). Use AF Form 3633, ***Minimum Vectoring Altitude Computations***, to show computations (See paragraph 8.4). AF Form 3632 shall only show data according to AFMAN 11-226 (I), Volume 1, paragraph 1041a, *Radar Patterns*. Show other segment data on appropriate procedure forms. Update charts as required.

9.1.2.3. Develop the MVAC using a VFR Sectional or equivalent chart that depicts Special Use and Floor of Controlled Airspace, however, the adverse assumption on a 1:500,000 scale map may be excessive and require the MVAC to **<u>also</u>** be drawn on a larger scale. Update (CHUM) associated charts/maps as required. ***NOTE***: Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map. Divide this area it into sectors, as required by operational needs and obstructions. Use the following methods, as applicable.

9.1.2.3.1. Depict each sector by defining boundaries utilizing geographical coordinates.

9.1.2.3.2. Make each sector large enough to permit the vectoring of aircraft within the sector. Establish the boundary of each sector at least 5 miles from obstacle determining the minimum altitude Additionally, evaluate a 5 mile buffer around each sector to ensure no obstacle was overlooked in the adjacent sector (See Figure 9.4).

9.1.2.3.3. When there is a large sector with an excessively high altitude due to an isolated prominent obstacle, isolate this obstruction with a boundary at least 5 miles from the obstacle. In establishing this area, take care to examine the surrounding contour lines for gradually sloping terrain. An additional 5 mile buffer around an isolated prominent obstacle is not required.

Figure 9.3. Minimum Vectoring Altitude Chart (MVAC) for Mosaic Multi-Sensor Radar Systems.

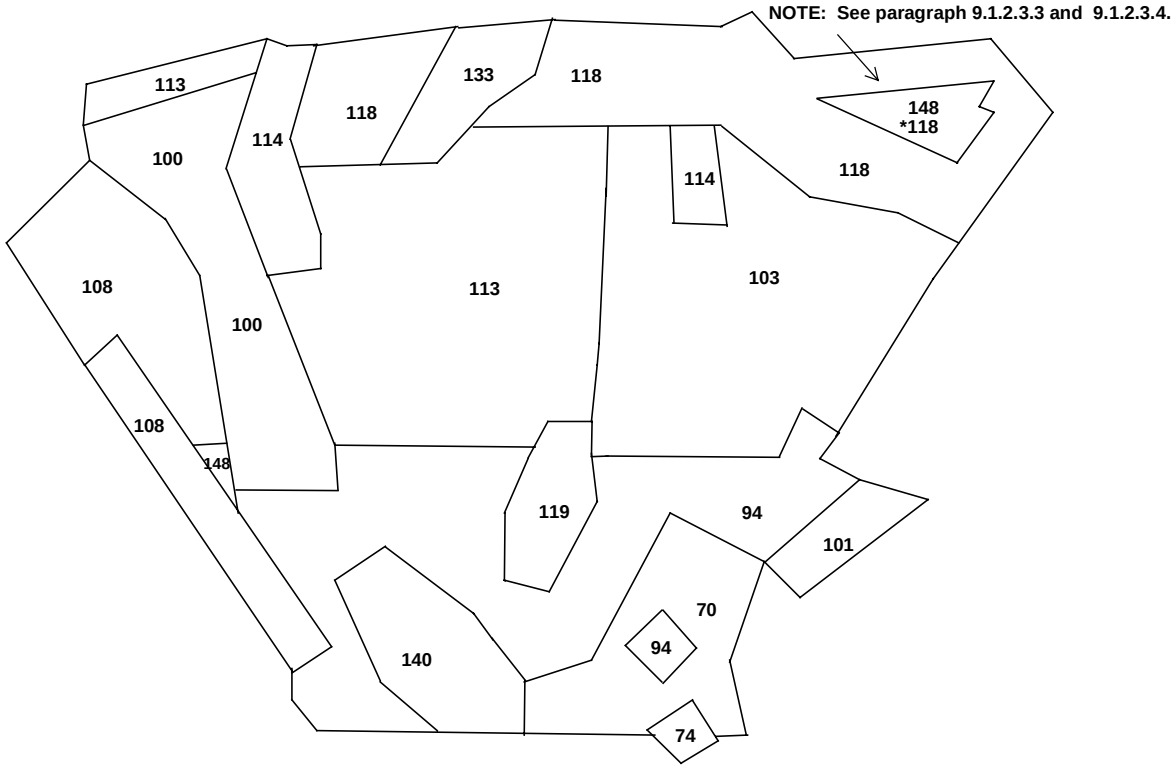
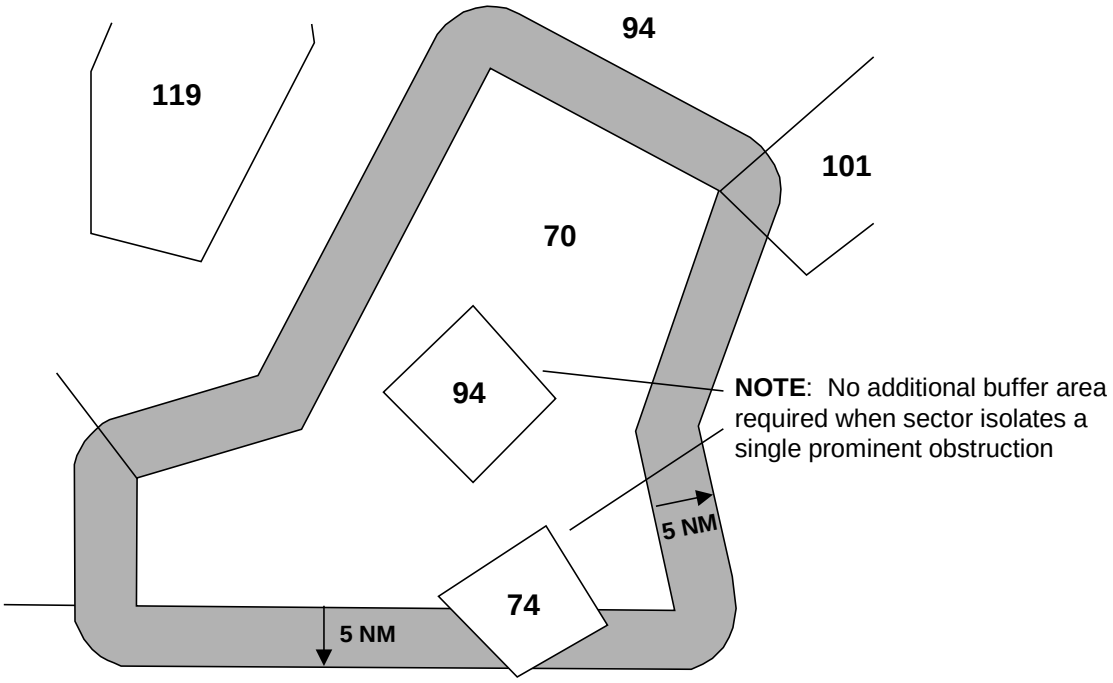


Figure 9.4. Mosaic Buffer Areas.



9.1.2.3.4. Determine the minimum altitude in each sector that will provide the required obstacle clearance specified in AFMAN 11-226 (I), Volume 1, paragraph 1720a, except that 2,000 feet of obstacle clearance shall be provided in mountainous areas. Within mountainous areas, obstacle clearance may be reduced to not less than 1500/1700 feet in accordance with AFMAN 11-226 (I), Volume 1, paragraph 1720b(1) and (2). This minimum altitude must be at least 300 feet above the floor of controlled airspace (Refer to paragraph 9.4, Section 1A thru 1C). ***NOTE:*** Floor of controlled airspace in mountainous areas or sparsely populated areas, may be as high as 14,500 feet MSL. If an unreasonable MVA is the result of a high floor of uncontrolled (Class G) airspace and ATC may be required to vector aircraft in this Class G airspace, two MVA altitudes may be established. One shall be based on the Floor of Controlled Airspace and the second based on obstruction clearance only, both must be identified on the chart (e.g., an asterisk will be placed adjacent to the altitude associated with obstacle clearance).

9.2. Minimum Instrument Flight Rules Altitude Chart (MIFRAC). A MIFRAC will be developed only for facilities that control IFR traffic (not required for GCA or RFC facilities). Charts should be as simple as possible and still allow efficient traffic flow. MIFRACs shall be approved by MAJCOM TERPS.

9.2.1. The MIFRAC is used to assist Air Traffic Controllers determine the lowest useable IFR altitude an aircraft may operate, receive the appropriate NAVAID, and maintain obstruction/terrain clearance. The sectors are determined by radials and arcs and designed to meet operational requirements. Units must coordinate with adjacent ATC facilities to obtain minimum IFR information on navigational aids that fall on or near common airspace boundaries. The design must take into account any NAVAID restrictions noted on flight inspection reports, NAVAID limitations (horizontal/vertical), and a selected sector altitude may not be lower than the MVA for that given area. **CAUTION:** Two or more MVA altitudes may affect a single MIFRAC sector. ***NOTE:*** IFR airways/routes that are approved for use are not affected by the MIFR or MVA altitudes. Evaluate each NAVAID (TACAN, VORTAC, VOR or NDB) within delegated airspace to assist controllers in applying FAR 91 and FAAH 7110.65 for off-route and direct-route operations.

9.2.1.1. Depict each sector in relation to radials and/or distances from the NAVAID to extend ***at least*** to the boundary of ATC assigned airspace, not to exceed the service volume of the NAVAID. Make sure altitudes established for sectors also provide 1000/2000 feet clearance within 5 NM outside established sectors.

9.2.1.2. Make sure sectors encompass areas where altitude information is not printed on aeronautical charts. Accomplish this by appending the data on the MVAC.

9.2.1.3. Use AF Form 3632, ***Minimum Vectoring Altitude Chart,*** and AF Form 3633, ***Minimum Vectoring Altitude Computations,*** to document the MIFRAC (See paragraphs 9.3 & 9.4). When preparing these forms for the MIFRAC, cross through "VECTORING" in the title and add "IFR."

9.2.2. Prepare a single chart for each selected NAVAID. Using a VFR Sectional or equivalent chart that depicts Special Use and Floor of Controlled Airspace, make the center of the chart represent the center of the NAVAID, and divide the chart into sectors, as required by different obstacle clearance altitudes (See Figure 9.5). Update (CHUM) associated charts/maps as required. The configuration of each section, and the features to be shown, depend on the local terrain and operational considerations. Use the following methods, as applicable.

9.2.2.1. Depict each sector in relation to a radial or magnetic bearing from the NAVAID. To facilitate a correlation between the chart and radar displays, make the sector boundaries coincide with map overlay or video map data, if possible.

9.2.2.2. Make each sector large enough to permit the operation of aircraft within the sector. Establish the boundary of each sector at least 5 miles from obstacle determining the minimum altitude. Additionally, evaluate a 5 mile buffer (See Figure 9.6) around each sector to ensure no obstacle was overlooked in the adjacent sector. In establishing these areas, take care to examine the surrounding contour lines for gradually sloping terrain.

9.2.2.3. Determine and depict the minimum altitude in each sector that will provide the required obstacle clearance specified in AFMAN 11-226 (I), Volume 1, paragraph 1041b(3) except that 2,000 feet of obstacle clearance shall be provided in mountainous areas. Within mountainous areas, obstacle clearance may be reduced to not less than 1,000 feet when necessary to achieve altitude interface with other procedures and when precipitous terrain is not a factor. This minimum altitude must be at least 300 feet above the floor of controlled airspace (Refer to paragraph 9.4, Section 1A thru 1C).

Figure 9.5. Minimum Instrument Flight Rules Altitude Chart (MIFRAC).

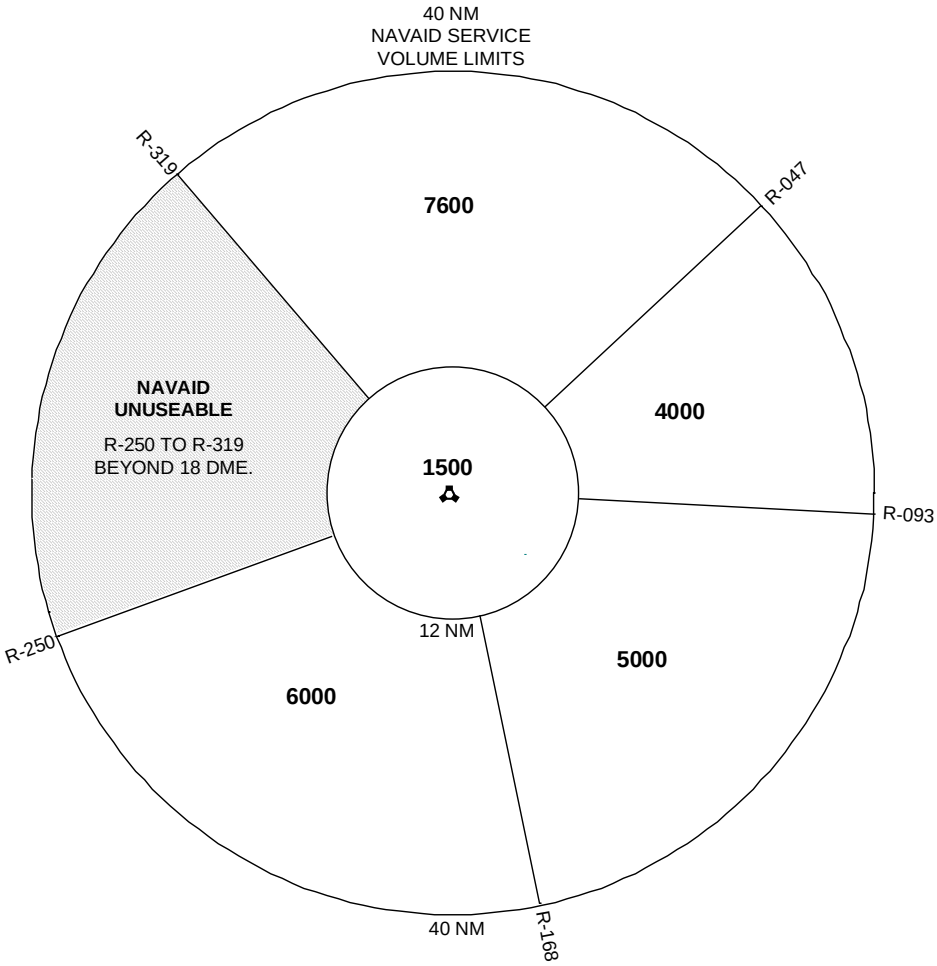
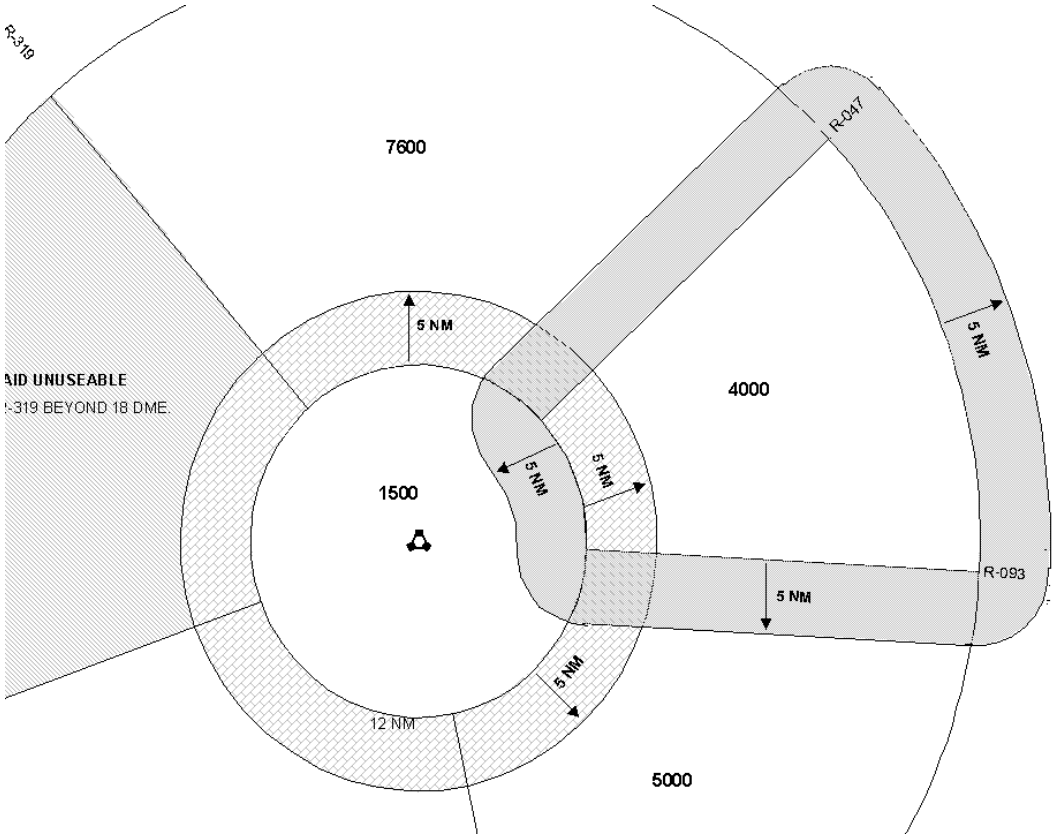


Figure 9.6. MIFRAC Sector Buffer Areas.



9.3. AF Form 3632, *Minimum Vectoring Altitude Chart (MVAC).* This form is used to show the plan view layout of the minimum vectoring altitudes within a given area around the Airport Surveillance Radar (ASR) antenna and coordination signatures.

Item 1. **Name of Facility and Type of Equipment.** Enter name of facility providing radar air traffic services and type of ASR equipment (for example Minot RAPCON, GPN-12).

Item 2. **Name of Airport.**

Item 3. **Effective Date.** Enter date based on current/proposed allocated airspace used for radar vectoring. Enter actual date after MAJCOM approval.

Item 4. **Location.**

Item 5. **MVAC Depiction.** Depict MVA information as required in this instruction (see paragraph 9.4). Azimuths are magnetic. Distances are in nautical miles (NM) measured from the radar antenna. Depiction may be altered for clarity or best-use depiction purposes (for example, label sector line(s) adjacent to defined point versus on the outside ring of MVAC). DO NOT depict exceptions to MVA (FAAH 7110.65) on MVAC. A MVAC for mosaic, single and multi-sensor capable systems, will be developed using geographical coordinates to define sectors.

Item 6. **Coordination.** Obtain all signatures. Signatures of all agencies will represent their coordination and approval of MVAC. ***NOTE:*** Signature blocks shall include printed name, rank/grade, and office symbol.

Item 7. **ASR Assigned Variation.** Enter magnetic orientation value of ASR obtained from flight inspection or ATCALS evaluation reports.

Item 8. **Obstacle Data.** Identify obstacle to include:

a. **Sectors.** Enter sector numbers, to agree with those from AF Form 3633, on AF Form 3632 drawing and in these blocks (360 - 090 degrees, 0 -15 NM). Mosaic, single and multi-sensor capable systems, will have sectors defined using geographical coordinates.

b. **Controlling Obstacle.** Describe obstacle (terrain + trees, tower, etc.) and include its AF Form 3629 number.

c. **Elevation and Coordinates.** Enter MSL elevation of obstacle to the nearest foot. Enter location of obstacle by latitude and longitude to the nearest second. Extract this data from AF Form 3629 or indicate source of information above coordinates (JOG NM 14-2).

Item 9. Remarks. This section is used to expand or explain any item(s) on AF Form 3632 or 3633. Explanations/Calculations should be concise and identify specific affected items on these forms or a specific paragraph reference in a regulation pertaining to data herein. An isolated prominent obstacle may be eliminated as the controlling

obstacle in a sector according to this instruction, paragraph 9.1.1.3.3. Document calculations in the remarks section in the same format as sector calculations on AF Form 3633 when an isolation buffer is used.

9.4. AF Form 3633, Minimum Vectoring Altitude Computations. This form is used to show minimum sector altitudes and the obstacles that control them for both the MVAC and the MIFRAC. NOTE: When this form is being used to develop the MIFRAC, references to the MVAC will be crossed out and replaced with MIFRAC.

Section 1A--MVA Required for Terrain/Obstacle Clearance

1. **Description of controlling obstacles.** All established sectors shall be evaluated. Evaluate each sector and a 3 or 5 NM buffer completely around the sector as depicted in AFMAN 11-226 (I), Volume 1, Figure 2-1 (Non-RNAV MSA). A master drawing of sector and buffer areas shall depict controlling obstacles used for AF Form 3633 computations. Obstacles should be identified by AF Form 3629 number, if available. ***Controlling obstacles for both basic and buffer sector areas shall be identified.***
2. **Controlling Obstacle Height.** Self-explanatory.
3. **Required Obstacle Clearance (ROC).** Non-mountainous areas require 1000 feet of ROC. Mountainous areas require 2000 feet of ROC. FAR Part 95 designates mountainous areas (Outside the U.S., this may be found in the countries Aeronautical Information Publication (AIP) or through local aviation authorities). Within designated mountainous areas, obstacle clearance may be reduced to not less than 1000 feet when necessary to achieve altitude interface with other procedures and when precipitous terrain is not a factor. MVA sector altitudes shall be at least 300 feet above the floor of controlled airspace. When these reductions are used to achieve an operational advantage, document the reasoning on reverse side of AF Form 3632.

NOTE: In non-mountainous areas, if precipitous terrain is determined to be a factor in the sector(s), document, in the MVA package, the method and/or rationale used for determination, identify the sector, and apply 2000 feet of ROC. (Example***:*** Ridge line within area between LTS 330-R to 350-R from 9 DME to 15 DME is designated as precipitous terrain, 2000 foot ROC applied).

4. Required Altitude Based on Obstacle Clearance. Self-explanatory.

Section 1B--MVA Required for Airspace

1. **Floor of Controlled Airspace (AGL).** FAAH 7400.2, Terminal Airspace Section, contains data on the floor of designated controlled airspace. The floor of controlled airspace is: Ground level within Class B, C and D Airspace; 700 ' AGL, 1200 ' AGL or 14,500 ' MSL for Class E Airspace. ***NOTE:*** Airports that have instrument procedures and no control tower **may** have Class E Airspace beginning at the surface. The highest floor of controlled airspace within the sector shall be used. Location of the highest terrain within the sector is not the determining factor when selecting the floor of controlled airspace, e.g., the highest terrain lies where the floor of controlled airspace is 1200 ' AGL, however, the highest floor of controlled airspace within the sector may be 14,500 ' MSL. If an unreasonable MVA is the result of a high floor of uncontrolled (Class G) airspace and ATC may be required to vector aircraft in this Class G airspace, two MVA altitudes may be established. One shall be based on the Floor of Controlled Airspace and the second based on obstruction clearance only, both must be identified on the chart (e.g., an asterisk will be placed adjacent to the altitude associated with obstacle clearance). Host nations normally designate the floor of controlled airspace in their AIPs. However, host nations compute this data differently than US criteria. Check with appropriate host nation personnel to ensure accurate information is applied. If a host nation AIP does not designate the floor of controlled airspace, controlled airspace shall be considered to begin at the surface.
2. **Surface.** Ascertain the highest terrain within the sector to obtain the surface. (***NOTE:*** This is a bald terrain evaluation, without any man-made or vegetation obstruction additions.) Example: In a given sector, a spot elevation is found to be the highest elevation. This would be the figure used as that sector's surface.
3. **Floor of Controlled Airspace (MSL).** Sum of 1 and 2 above.
4. **Standard ROC.** 300 feet.
5. **Required Altitude Based on Airspace Floor.** Self-explanatory.

Section 1C--Selected Sector Altitude

1. Selected sector altitude must be the highest of section 1A or 1B.
2. Section 1A has two areas (basic sector and buffer). The controlling sector altitude must be a least 300 feet above the floor of controlled airspace.

Chapter 10

MICROWAVE LANDING SYSTEMS

10.1. Category I Microwave Landing System (MLS). Develop MLS procedures using the criteria in FAA Order 8260.36, ***Civil Utilization of Microwave Landing System (MLS).***

10.2. Mobile Microwave Landing System (MMLS). The minimum glideslope angle is 2.5°. The maximum authorized glideslope angle is 6.40°. Angles above 3.60° shall not be established without Headquarters Air Force Flight Standards Agency Instrument Procedures Branch (HQ AFFSA/ XOIP) approval.

10.2.1. The following definitions apply:

10.2.1.1. Along Track Distance (ATD). Distance measured along a flight course, measured in nautical miles.

10.2.1.2. Collocated Azimuth and Elevation Antenna Configuration. Azimuth antenna installed within 6 feet of the elevation antenna. ***NOTE:*** Preferred configuration which produces Category I minimums.

10.2.1.3. Split Site Configuration. Azimuth antenna located at stop end of runway.

10.2.1.4. MMLS Datum Point. A point on runway centerline, 90 degrees abeam the MMLS elevation station (same as runway crown point for ILS procedures).

10.2.1.5. Elevation Antenna Emplacement Point. Elevation station located approximately 156 to 306 feet either side of centerline for a collocated site (up to 450 feet for a split-site configuration).

10.2.1.6. Final Centerline Segment (FCLS). That portion of the approach (last roll out point prior to DA) where no further course changes shall be required.

10.2.1.7. Glidepath angle. The angular displacement, expressed in tenths of a degree, of the vertical guidance path with a horizontal plane passing through the antenna phase center. This angle is published on the approach chart (e.g., 3.00º, 3.10º).

10.2.1.8. Glidepath Intercept Point (GIP). This point is the beginning of the precision final approach segment and coincides with the intersection of the glideslope and the intermediate segment altitude. At this point descent is authorized to the decision height. This point must be at or prior to the non-precision final approach fix (FAF).

10.2.1.9. Service Limitation. The azimuth service limitation is 15 miles from the facility, within ± 40º of the center course. The elevation service limitation is 15 miles from the facility and from 2.5° to 15° (see Figure 10.1). NOTE: The azimuth scan +5° must cross the center of the threshold end of the runway.

10.2.2. MMLS Approach Minimums:

10.2.2.1. MMLS Category I. A precision approach procedure with a Decision Altitude (DA) of not less than 200 feet Height Above Touchdown zone (HAT) elevation (See Table 10.3).

10.2.2.2 MMLS Category II. Criteria not approved.

10.2.2.3. MMLS Category III. Criteria not approved.

10.2.2.4. Azimuth (AZ) Only. Approach procedures which do not use the elevation components of the MMLS.

10.2.2.5. Computed MMLS. A collocated azimuth and elevation antenna site which provides guidance along the extended runway centerline to account for offset installation of the azimuth antenna. MMLS DME information is derived from an antenna located on top of the azimuth antenna. Use of external DME source (TACAN or VOR/DME) is not authorized, except as noted in paragraph 10.2.14, for missed approach. Computed MMLS requires special aircraft avionics and may not support normal civil operations. ***NOTE:*** MMLS DME and elevation signal is required for the aircraft avionics to compute the MMLS offset for Computed MMLS procedures. All Computed MMLS procedures shall have the annotation in the Planview: **ALL SYSTEM COMPONENTS MUST BE OPERATIONAL**. ***NOTE:*** Azimuth only minimums shall be established and published to meet tactical mission and training requirements. *Do not* publish a FAF to MAP timing table.

10.2.3. System Components: The system components are considered to be the MMLS Azimuth, MMLS Elevation, and MMLS DME. ***NOTE:*** An additional conventional type DME source may be used to conduct the instrument procedure, however it is not considered to be a "system component."

10.2.3.1. MMLS Azimuth (AZ) (Course Guidance). Final centerline segment (FCLS) lateral guidance is normally provided along the 0° reference azimuth signal emanating from the azimuth antenna usually aligned along the runway centerline (see Figure 10.1).

10.2.3.2. MMLS Elevation (EL) (Vertical Guidance). Vertical guidance is provided by a signal emanating from the elevation antenna phase center. The glidepath for a procedure will be the lowest glidepath permitted by obstacles or signal quality. The glideslope will be no lower than 2.5°. The MMLS receiver allows the pilot to select glidepaths above the minimum established glidepath..

10.2.3.3. MMLS Distance Measuring Equipment (MMLS DME). The azimuth antenna is equipped with DME. The accuracy of the MMLS DME can support computed approaches with an azimuth antenna offset of up to 300 feet from centerline (450 feet for split-site, non-computed procedures). When used as a ranging source for determining the final approach fix the accuracy is ±0.2 NM or ±1216 feet and is referenced to the azimuth antenna site.

10.2.3.4. Conventional Distance Measuring Equipment. An external DME system is not normally installed in conjunction with the MMLS system. These systems are associated with distance information derived from a TACAN or the DME portion of a

VOR/DME. The aircraft must be able to simultaneously interrogate both DME and MMLS signals. DME from an external source will not support a computed MMLS approach, except as noted in paragraph 10.2.14, for missed approach.

10.2.4. FIXES: Within the MMLS coverage area, the following applies:

10.2.4.1. MMLS DME fix error is ± 0.2 miles.

10.2.4.2. Publish all DME distances to the nearest tenth of a mile.

10.2.4.3. MMLS fixes, including the Missed Approach Point (MAP), shall be formed by DME. For precision finals, the MAP is a point on the final approach course where the height of the glideslope equals the authorized decision height.

10.2.4.4. Establish the MAP at the DA location. Publish the distance from the DME antenna to the DA location.

10.2.4.5. Establish the FAF by DME and publish the distance from the DME antenna. Establish the FAF at or inside the glideslope intercept point. When the DME signal is from a source other than the MMLS DME antenna, the aircraft must be able to simultaneously interrogate both DME and MLS signals. This does not apply for computed approaches.

10.2.5. Inoperative System Components. At collocated sites, a failure of any component (azimuth, elevation, or DME) will render the procedure unusable. Failure of one antenna will result in aircraft receiver course and glideslope off/warning flags and loss of course information.

10.2.5.1. Azimuth Failure. When the azimuth transmitter is inoperative, no approach is authorized.

10.2.5.2. Elevation Failure. **Split Site:** When the elevation transmitter is inoperative, the MMLS straight final approach procedure may revert to a non-precision straight-in azimuth procedure. The obstacle clearance area in paragraph 10.2.12.1.2 applies. The ROC in the final segment is 250 feet. **Collocated Site:** Azimuth minima will be published and may be used when all components are operational (see paragraph 7.2.5).

10.2.5.3. DME Failure. For split-site locations, when the MMLS DME transmitter is inoperative, some other means should be employed to determine position along the approach course; such as DME from a TACAN or VOR/DME. If this is not possible, a precision approach may be flown provided there is another means of identifying the FAF such as RADAR. When DME and elevation are not available, a non-precision approach is not authorized. For collocated facilities when the MMLS DME transmitter is inoperative computed approaches are not permitted.

10.2.6. MMLS Installation Planning. The MMLS system shall be installed IAW Technical order 31R4-2TRN45-1. The azimuth scan must encompass the runway threshold + 5° from the centerline (see figure 10.1). Tentative RPI/TCH/GPI computations must be conducted prior to and after installation using Rapidly Dropping Terrain criteria established in AFMAN 11-226 (I), Volume 1, Appendix 2. Calculate the height of the elevation antenna phase center with respect to the MMLS Datum point. The MMLS elevation antenna phase center is normally five feet above ground level. With a 3° glide slope on level terrain, the height differential is 5 feet. If the antenna phase center height is greater than 5 feet above the MMLS Datum point, or if the glide path is greater than 3° and/or the antenna phase center is lower than the MMLS Datum point, a new emplacement point must be evaluated.

10.2.6.1. On assault landing strips, the MMLS shall be configured to allow a RPI of 300 to 500 feet from threshold. For fixed runway configurations, the system should be sited for coincidence with an established VGSI system and/or established precision procedures. See paragraph 10.2.6.3 regarding TCH.

10.2.6.2. RPI/GPI COMPUTATIONS. Since very few airfields have ideal terrain conditions, MMLS phase antenna elevation and distance to threshold, runway slope, MMLS Datum (runway crown) and threshold elevation must be considered. Rapidly Dropping Terrain criteria established in AFMAN 11-226 (I), Volume 1, Appendix 2 shall be used to conduct RPI/GPI and TCH computations. The actual distance of the elevation station to threshold, MMLS Datum (runway crown) and phase center antenna elevation must be used. To determine the antenna elevation, add the height of the phase antenna (normally 5 feet) to the MSL ground elevation at the base of the elevation station emplacement point. An example of computing RPI/GPI and TCH computations using rapidly dropping terrain on a positive slopping runway is shown below.

From antenna siting we know:
Phase Center of Elevation Antenna = 1802.85’ MSL
Distance of Elevation Station to Threshold = 840.00ft
MMLS Datum (runway crown) elevation = 1797.85’ MSL
Threshold Elevation = 1795.81’MSL
Glide Slope Angle 3°

Using the Rapidly Dropping Terrain (positive sloping runway) formulas in AFMAN 11-226 (I), Volume 1, Appendix 2, we compute the following:

TCH 51.03
RPI 930.63
GPI 973.76

10.2.6.3. Threshold Crossing Height (TCH). TCH will vary based on deployment configuration and system siting requirements. RPI/GPI/TCH computations shall be established using the Rapidly Dropping Terrain criteria established in AFMAN 11-226 (I), Volume 1, Appendix 2. The optimum threshold crossing height is 50 feet. The maximum TCH can be found on Table 9.1 for the appropriate glideslope. The minimum TCH is determined by applying criteria in AFMAN 11-226(I), Volume 3, Chapter 2. For threshold crossing heights greater than 60 feet, ensure consideration is given to effective

placement of approach light systems. Specialists should be aware that siting on short assault strips will result in a TCH not meeting Air Force criteria and will require a waiver.
10.2.7. Procedure Design Limitations. Development of MMLS procedures shall be independent of existing procedures. Only straight-in procedures are authorized. Curved, angled, or side-step procedures are not permitted.
10.2.8. Altitude Selection. Altitudes for the final approach fix, turn point fix (when used), intermediate fix, and initial approach fix shall be established IAW AFMAN 11-226 (I).
10.2.9. Circling Approach. Circling procedures may be authorized IAW AFMAN 11-226 (I), Volume 1, Chapter 2.
10.2.10. Identification. All procedures shall be named IAW AFMAN 11-226 (I), Volume 1, paragraph 161, AFI 11-230, paragraph A3.6, and identified as MLS. Example: MLS Rwy 34, MLS Z Rwy 33, or MLS-A. ***NOTE:*** Due to various siting configurations permitted with a MMLS, publishing operational restrictions in the planview of the procedure plate may also be required as identified throughout this paragraph. For example, all collocated MMLS procedures that have an offset centerline will require the note identified in paragraph 10.2.11 below.
10.2.11. Procedure development. Each procedure designed for MMLS, as with any other procedure, will develop the final segment first. Procedures developed for collocated facilities that have an offset runway centerline shall include a note stating **"COMPUTED APPROACH: FOR USE BY AIRCRAFT CAPABLE OF COMPUTING OFFSET RUNWAY CENTERLINE ONLY."** Since the MMLS has a selectable azimuth and glideslope, all procedures will be published with the following cautionary note: **"FLYING OTHER THAN PUBLISHED AZIMUTH AND/OR GS ANGLE RENDERS THE PROCEDURE UNUSABLE."**
10.2.11.1. Except as noted below, use criteria in AFMAN 11-226 (I), Volume 3, to develop MMLS procedures. ***NOTE:*** When using TERPS automated software for MMLS procedure development, AF Form 3628, ***TERPS Automation Data Summary,*** information shall be adjusted as follows:
For "Glidepath Ant Elevation" – Input MMLS Antenna Phase Center Elevation
For "Glidepath Ant Distance" – Input MMLS Antenna Distance to threshold
For "ILS Runway Crown Elevation – Input MMLS Runway Crown Elevation
10.2.11.1.1. Alignment.
10.2.11.1.1.1. For split-site facility, see AFMAN 11-226 (I), Volume 3, for alignment criteria.
10.2.11.1.1.2. For a collocated facility, align the final approach course with the extended runway centerline. The offset distance information is entered into the ground equipment. The aircraft equipment will automatically displace the final approach course of the Navigational Aid (NAVAID) to the centerline of the runway.
10.2.11.1.2. Descent Gradient (DG). The descent gradient will be published with each glideslope. See Table 10.2 to determine the appropriate DG.
10.2.12. Takeoff and Landing Minimums. Takeoff and landing minimums shall be established for MMLS procedures in accordance with AFMAN 11-226 (I), Volume 1, Chapter 3, except as noted in this instruction. See Table 10.3 for precision minimums.
10.2.12.1. Portable approach lighting systems may be used to reduce visibility IAW AFMAN 11-226 (I), Volume 1, Chapter 3, Section 4, provided they are equivalent to those listed for lighting credit in AFMAN 11-226 (I), Volume 1, paragraph 343.
10.2.12.2. MAJCOM commanders have authority approve/disapprove waiver requests for runway marking deviations (AFI 32-1042, ***Standards for Marking Airfields***, paragraph 2) at locations under their jurisdiction for 180 days or less. In a situation where appropriate runway markings are not present, credit for lights will not be allowed.
10.2.12.3. When RVR equipment is not available, the visibility will be expressed as Prevailing Visibility.
10.2.13. Missed Approach. The MMLS does not provide back course azimuth. Course guidance used beyond MAP shall be based on another source. For deployments, specialists must evaluate the deployed location for potential missed approach navigational sources. *NOTE:* MMLS DME can be used in the missed approach segment. If radar is used for the missed approach, publish a note stating **"RADAR REQUIRED."**

10.3. AF Form 3979, *MMLS TERPS Computations*. This form is used to calculate the distance from the DA to threshold, determine the TCH, and location of the GPI.
Item 1. **General Information.** Information that will be needed for calculations and results of the calculations.
Item 2. **Establishment of MAP (DA).** Calculations are self-explanatory.
Item 3. **Calculation of TCH.** Calculations are self explanatory.
Item 4. **Calculation of GPI.** Calculations are self-explanatory.

Figure 10.1. Operational Limits of MMLS.

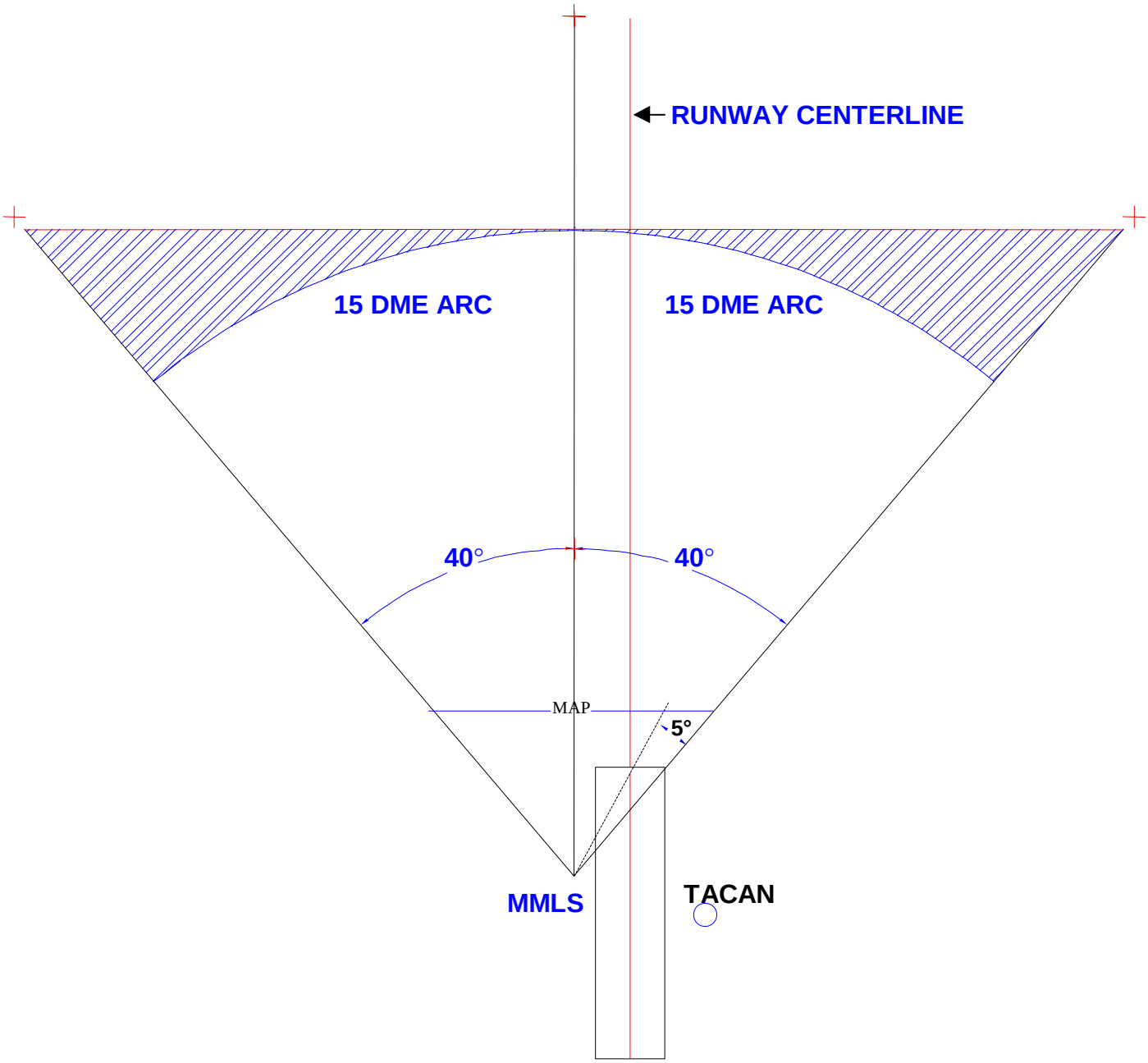


Table 10.1. TCH Upper Limits.

TCH UPPER LIMITS								
HAT	GLIDE SLOPE°	TCH UPPER LIMIT feet	HAT	GLIDE SLOPE°	TCH UPPER LIMIT feet	HAT	GLIDE SLOPE°	TCH UPPER LIMIT feet
200	2.50 - 3.20	75	**250**	2.50 - 4.10	75	**270**	2.50 - 4.40	75
	3.21 - 3.30	70		4.11 - 4.20	71		4.41 - 4.50	73
	3.31 - 3.40	66		4.21 - 4.30	67		4.51 - 4.60	68
	3.41 - 3.50	63		4.31 - 4.40	62		4.61 - 4.70	64
	3.51 - 3.60	59		4.41 - 4.50	58		4.71 - 4.80	59
	3.61 - 3.70	55		4.51 - 4.60	54		4.81 - 4.90	55
	3.71 - 3.80	50		4.61 - 4.70	50		4.91 - 5.00	51
	3.81 - 3.90	47		4.71 - 4.80	45		5.01 - 5.10	46
	3.91 - 4.00	43		4.81 - 4.90	41		5.11 - 5.20	42
	4.01 - 4.10	39		4.91 - 5.00	37		5.21 - 5.30	37
	4.11 - 4.20	35					5.31 - 5.40	35
300	2.50 - 4.90	75	**350**	2.50 - 5.60	75			
	4.91 - 5.00	71		5.61 - 5.70	70			
	5.01 - 5.10	66		5.71 - 5.80	65			
	5.11 - 5.20	61		5.81 - 5.90	60			
	5.21 - 5.30	56		5.91 - 6.00	55			
	5.31 - 5.40	52		6.01 - 6.10	50			
	5.41 - 5.50	48		6.11 - 6.20	45			
	5.51 - 5.60	43		6.21 - 6.30	40			
	5.61 - 5.70	39		6.31 - 6.40	35			

Table 10.2. Glideslope Angles and Associated Descent Gradients.

GLIDESLOPE ANGLE	DESCENT GRADIENT (FT per NM)
2 degrees	212.18
3 degrees	318.43
4 degrees	424.88
5 degrees	531.59
6 degrees	638.62
7 degrees	746.05

Table 10.3. Military Standard MMLS Precision Landing Minimums.

GLIDEPATH ANGLE (WITH APPROACH LIGHT CONFIGURATION)		MINIMUM HAT	APPROACH CATEGORY			
			A	B	C	D & E
			MINIMUM VISIBILITY			
2.50° - 3.10°	*	200	3/4 4000			
	#	200	1/2 2400			
	$	200	1800			
3.11° - 3.30°	*	200	3/4 4000		N/A	
	*	250	3/4 4000		1 5000	N/A
	#	200	1/2 2400		N/A	
	#	250	1/2 2400		3/4 4000	N/A
	$	200	1800		N/A	
	$	250	1800		1/2 2400	N/A
3.31° - 3.60°	*	200	3/4 4000		N/A	
	*	270	3/4 4000		1 5000	N/A
	#	200	1/2 2400		N/A	
	#	270	1/2 2400		3/4 4000	N/A
	$	200	2000		N/A	
	$	270	2000		1/2 2600	N/A
3.61° - 3.80°	*	200	3/4 4000		N/A	
	#	200	1/2 2400		N/A	
3.81° - 4.20°	*	200	3/4 4000	N/A		
	*	250	3/4 4000	1 5000	N/A	
	#	200	1/2 2400	N/A		
	#	250	1/2 2400	3/4 4000	N/A	
4.21° - 5.00°	*	250	3/4 4000	N/A		
	#	250	1/2 2400	N/A		
5.01° - 5.70°	*	300	1 5000	N/A		
	#	300	3/4 4000	N/A		
5.71° - 6.40°	*	350	1 1/4	N/A		
	#	350	1 5000	N/A		

* = No Light
$ = # Plus TDZ/CL Lights
# = MALSR, SSALR, ALSF
N/A = Not Authorized

NOTES:
1. For a HAT higher than the minimum, the visibility (prior to applying credit for lights) shall equal the distance MAP to threshold, or: (a) 3/4 mile up to 5.00° or, (b) 1 mile 5.01 through 5.70 or, (c) 1 1/4 mile 5.71 through 6.40; whichever is the greater.
2. Glideslope angles greater than 3.60° require a waiver.

Chapter 11

TERPS AUTOMATION/DATABASE MANAGEMENT

11.1. TERPS Automation. TERPS automation software must be used to the maximum extent possible, to develop new procedures, to evaluate/maintain existing procedures and, as deemed appropriate, when reviewing host nation procedures.
11.1.1. TERPS automation software is defined as the current AFFSA-approved procedure development software (AFTERPS and projected replacement software).
11.1.2. Computer Aided Drafting Software (CAD, AutoCAD, MicroStation, etc.) may be used as a **drawing** tool. CAD may not be used to determine obstacle/terrain data or to analyze TERPS data. Information, such as coordinates and elevations may not be obtained from CAD type software and then utilized in TERPS computations, without documented manual validation. ***NOTE:*** CAD drawings require manual validation, on paper maps, in the same manner as those produced using manual drafting techniques.
11.1.3. Self-calculating spreadsheets may be used to assist in the performance of TERPS duties; however, may not be used as the sole source of TERPS analysis (determination of minimum segment altitudes, landing minimums, departure climb gradients, etc.). MAJCOMs must document the validation of the formulas imbedded in self-calculating spreadsheets and establish a process to control version currency prior to releasing for MAJCOM-wide use.
11.1.4. NIMA CADRG (Compressed ARC Digitized Raster Graphics) digital maps: The resolution of CADRG map products is a limiting factor for unrestricted TERPS use. Some maps contain areas where small or fine details are unreadable. This is especially true of (but not limited to) large scale maps with close contour lines and congested features. Some obscuration is the result of printer/plotter or paper quality, however reduced image resolution can still exist when using photo quality paper and high resolution printers. This is a result of the compression process used to reduce the size of the scanned map files. Due to this image degradation, even on-screen images are not the same quality as a NIMA paper product. Use of reduced-resolution products for critical TERPS tasks could lead to improper identification of controlling obstacles, negatively impacting flight safety. Therefore the following restrictions apply to CADRG map use:
11.1.4.1. Do not use CADRG maps printed or plotted using programs such as FalconView™ or ArcView® for any task that requires the evaluation of terrain or man-made obstructions against TERPS instrument approach or departure segment obstacle clearance surfaces (to include MVA/MIFRAC sectors).
11.1.4.1.1. This restriction applies to the manual verification of segment/sector controlling obstacles using TERPS automation plot overlays.
11.1.4.1.2. This restriction is equally applicable to evaluation of instrument procedures at locations where the USAF has TERPS development responsibility and to Non-DoD procedure reviews.
11.1.4.1.3. Do not use the drawing tools embedded in these programs for the purpose of conducting controlling obstacle evaluations using only the on-screen image.
11.1.4.2. CADRG maps ***may be*** used as follows:
11.1.4.2.1. Printed/plotted CADRG maps may be used to assist TERPS or other reviewing agencies visualize instrument procedures/segments in relation to general terrain/map features (e.g., Flight Inspection packages). When used as such, these maps shall contain the caveat: *FOR VISUAL REFERENCE ONLY*.
11.1.4.2.2. CADRG maps may be used in conjunction with FalconView™ to download NIMA electronic Chart Updating Manual (ECHUM) data. However, the location of new/revised ECHUM obstacles obtained in this manner must be plotted on affected manual TERPS drawings and on all Master Obstacle Charts used for controlling obstacle verification. Also manually input ECHUM obstacles into the TERPS automation obstacle database as required.
11.1.4.2.3. CADRG maps may be used for any other TERPS task **not** involving the evaluation of terrain or man-made obstructions against instrument procedure, MVA, or MIFRAC obstacle assessment criteria.

11.2. TERPS Development, Hardware Requirements. This standard identifies the hardware required to support Air Force Instrument Procedure development software, using Geographic Information Systems (GIS) technology. GIS refers to a technology capable of collecting, storing, analyzing, and displaying both spatial (geographically-referenced) and non-spatial data.
11.2.1. In order to prepare annual budgeting, TERPS development hardware must be evaluated and updated every 2 years and the purchase must be, as a minimum, an Advanced Level Workstation.
NOTE: The performance of the computer will directly affect the performance of the TERPS specialist. Do not attempt to purchase a platform of lesser performance.
11.2.2. The TERPS workstation requires:
11.2.2.1. Access to the Internet via Local Area Network (LAN) (TERPS development software revisions are only available through Internet).
11.2.2.2. E-mail account with the ability to attach and transfer files.

11.2.2.3. Workstation hardware must use Windows NT/Windows 2000 operating systems and must conform to the following minimum system specifications:

Platform	High-performance (Pentium IV) processor, supporting a minimum of 133MHz Front Side Bus
Memory	256MB RAM
Monitor	21" with 1280x1024 by 256 color capability
Video	32 MB AGP Graphics
Storage	18GB hard drive CD-Rewrite (CD-RW) 3.5" 1.44MB Diskette drive
Scanner	Color, 600 dpi, or higher resolution. It is also recommended that scanners have the ability to scan transparencies
Printers	Laser or ink jet technology, with minimum 600 dpi resolution. 16MB RAM. (color print capability will be required in the near future).
Color Plotter (Recommended)	Ink jet technology, with minimum 600 dpi resolution. Minimum 36x48 (E size) paper size. 16MB RAM
Software	Microsoft Office Pro Suite, File Transfer Protocol (FTP) software.
Connectivity	Ethernet PCMCIA 10/100 Base T (or appropriate LAN interface card)
Sound capability	Sound Card and Speakers

11.2.3. Mobile Units: as a minimum, laptops must use Windows NT/Windows 2000, Pentium III class processor, minimum 750 MHz, 256 MB of RAM, 15" Color Display, 18GB Hard Drive, CD-RW, 600 dpi or higher Laser Printer (color print capability will be required in the near future).
11.2.4. TERPS Procedure Development Hardware Grandfather Clause: Existing TERPS Procedure Development Hardware, which met the requirements of AFMAN 11-230, dated 1 Oct 98, may continue to be used. This existing Hardware/software must be upgraded within 2 years from the date of this regulation and the acquisition must follow the standards outlined above.

11.3 Database Management. All functions, using approved TERPS automation software, shall develop and maintain a location/obstacle/NAVAID database for each airport where TERPS procedures are developed/evaluated.
11.3.1. Database Content. The location/obstruction/NAVAID database must contain, as a minimum, data obtained from Digital Aeronautical Flight Information File (DAFIF), (NIMA Vertical Obstruction File (DVOF), and Digital Terrain Elevation Data (DTED). If DVOF or DTED information is not available, document the non-availability and retain with AF Form 3628.
11.3.2. Storage of Database. All USAF developed automation databases (including those locations where the USAF has TERPS responsibility and those developed for Host Nation locations subject to review), shall be forwarded to HQ AFFSA/XOIP by the MAJCOM TERPS office. The MAJCOM TERPS office shall upload all location files/Navaid data, no later than the end of each month, on the HQ AFFSA/XOIP File Transfer Protocol (FTP) site.
NOTE: The accuracy of the obstacle, airfield, and NAVAID information in your automation database directly relates to the safety of the automated instrument procedures.
11.3.3. TERPS Development Software Problem Reporting. Timely software problem reporting is essential to ensure flight safety and the software's continued ability to support the USAF TERPS mission. DO NOT attempt to develop local "work-arounds."
11.3.3.1. Responsibilities:
11.3.3.2. The unit shall notify their MAJCOM as soon as they become aware of a suspected problem with the TERPS automation software.
11.3.3.3. MAJCOM shall validate that the software problem exists and that the problem is not operator induced.
Once the MAJCOM has verified the problem as legitimate, the MAJCOM shall immediately notify AFFSA/XOIP.
11.3.3.4. MAJCOM shall provide AFFSA with a full description of the steps that lead to the problem to include pertinent screen shots and a copy of the exact Location File and NAVAID data file that was used when the problem occurred.
11.3.3.5. MAJCOMs shall provide notification of all TERPS development software problems and solutions, as provided by AFFSA/XOIP, to all users under their command including Foreign Military Users.
11.3.3.6. AFFSA shall work with HQ Software Systems Group (SSG) to resolve all software problems.
11.3.3.7. AFFSA shall provide notification to all MAJCOMs when software problems are encountered and provide solutions.
11.3.4. Minimum standards for distances, bearings, and geographical coordinates for input into TERPS automation databases are as follows:
11.3.4.1. Distance:
11.3.4.1.1. The nearest foot when formulating distance.

11.3.4.1.2. The nearest tenth of a mile for distances reported in statute/nautical miles.
11.3.4.1.3. The nearest hundredth of a second when reporting geographical coordinates.
11.3.4.1.4. The nearest degree when reporting true/magnetic values (radials, bearings, courses, etc.). True runway azimuth shall be reported to the nearest hundredth of a degree.
11.3.4.1.5. All elevations are mean sea level (MSL).
11.3.4.1.6. The nearest foot when elevation measurements are in feet
11.3.4.1.7. Coordinate database changes through the appropriate MAJCOM TERPS office prior to implementation. After approval, provide MAJCOM electronically, an updated Location (.LOC) file. Include documentation describing the change(s) to the Location File, reason for the change, source data (if available). Any change to the location/obstacle database requires a review of all instrument procedures at that location. The results of the review (including no impact) must be documented and retained with each procedure.

11.4. AF FORM 3628, *TERPS Automation Data Summary*. Each unit with TERPS responsibility shall produce a computer generated AF Form 3628 or manual equivalent only if no automation capabilities exist, and submit to their MAJCOM. This form contains the baseline airfield and NAVAID data for TERPS automation. Use the most accurate data available. Data required on other forms must agree with data on AF Form 3628.
11.4.1. **Horizontal Datum.** Geodetic coordinates must be in WGS 84 when DVOF, DTED, and DAFIF are imported. When DVOF, DTED, and DAFIF are not used, and the obstacle database is manually developed, local datum may be used as long as all coordinates are in the same datum.
11.4.2. **Importing DAFIF.** All NAVAID data shall be imported from NIMA Digital Aeronautical Flight Information File (DAFIF). Alteration/deletion of DAFIF data is prohibited unless directed by AFFSA/XOIP. If a discrepancy exists and you must continue with the build, manually enter a pseudo NAVAID, with a unique ID using corrected information necessary for an automated build. TERPS Automated Software will not allow you to duplicate NAVAID ID's. Units shall immediately notify the MAJCOM of the DAFIF NAVAID error. MAJCOMs shall notify NIMA of the DAFIF error for resolution. Document the use of other than DAFIF NAVAID data for the procedure development in the remarks section of the procedure.
11.4.2.1. Validate DAFIF data against host nation AIP. When DAFIF data and Host Nation data do not match, the MAJCOM shall coordinate with NIMA to resolve the differences. NIMA should provide an explanation as to the reason DAFIF data does not match Host Nation source information.
11.4.3. All Automation database information must agree with the source data (airfield and ATCALS surveys, maps, civil engineering maps, Host Nation AIP, DAFIF, etc.). If doubt exists to the accuracy of the source data, request a survey to validate the data. MAJCOM TERPS is OPR for initiating survey requests. Additional information can be obtained by referring to AFI 14-205, ***Identifying Requirements for Obtaining and Using Cartographic and Geodetic Products and Services***.
11.4.4. FORM CONTENT. Completion instructions for each block on the manual form (or corresponding item in TERPS automation program) are as follows:

1. General:

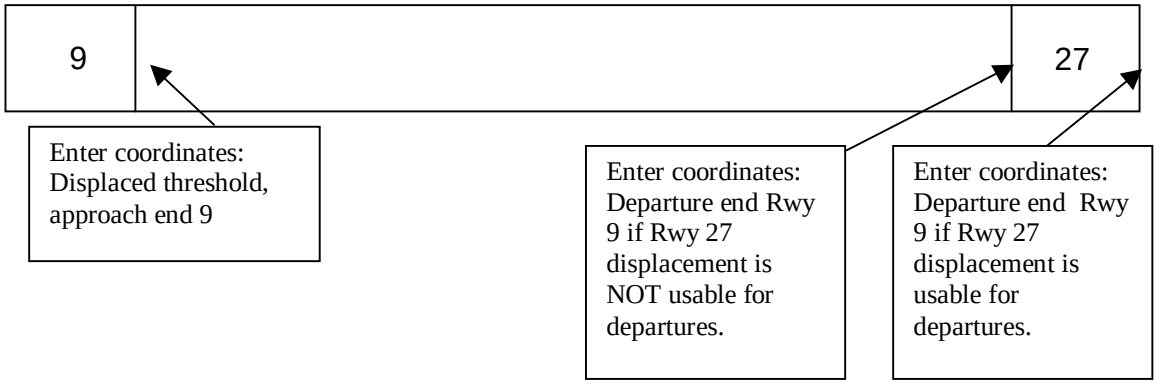
a. Airport. Enter the name of the airport
b. Location. Enter name of associated city and state (host nation, if applicable).
c. Operating Agency Enter USAF, FAA, Host Nation, etc.
d. Owner. Enter actual owner (FAA, USAF, foreign country, etc.).
e. ICAO Identifier. Enter the identifier for the airport.
f. Airport Elevation. Enter the highest point on all usable runways measured in feet MSL.
g. Magnetic Variation. Enter the Airport Magnetic Variation (MV) of record and the Epoch year (8.00 E 1995). If the station is north of 67 degrees north, or south of the 67 degrees south, give the magnetic grid variation to the nearest degree.
h. Airport Reference Point. Enter the Latitude and Longitude for the airport reference point. The ARP is the center of all landing surfaces as outlined in AFMAN 32-1123(I).
i. Airport Horizontal Datum. Enter the horizontal Geodetic datum code. See Attachment 8 for datum codes.

2. Airfield Information:

a. Runway Number. Self-explanatory.
b. Length of Landing Surface. Self explanatory
c. Width of Landing Surface. Self explanatory
d. Threshold Elevation. Self explanatory.
e. Touchdown Zone Elevation. Highest elevation within the first 3000' of the runway.
f. Runway Departure End Elevation. Self explanatory.

g. Displaced Threshold. Enter runway and exact distance runway is permanently displaced. For automation software, enter the displaced threshold coordinates as the runway approach end threshold. The departure end threshold coordinates will be the end of the surface available for takeoff. See Figure 11.1.

Figure 11.1. Displaced Threshold Examples, RWY 09



h. Runway Slope in Percent. Enter value from current source data.
i. Runway True Azimuth. Enter to the hundredth of a degree (Example**:** 312.71).
j. Runway Coordinates. Coordinates for the physical end of the runway. For runways with permanently displaced thresholds, enter the coordinates of the displaced threshold. Also, enter the departure end coordinates for each runway.

NOTE: Obtain the above information from survey data. Maintain a copy source data, for each block, with AF Form 3628.

3. Approach Lighting or Equivalent. Enter runway number, IACC code, and the length of approach lights. Check appropriate lighting system blocks. Indicate availability of other systems by placing a check in the appropriate blocks. Use remarks section (Item 9) for any necessary explanations.

4. Remote Altimeter Setting Source (RASS):
a. Enter LAT/LONG of altimeter source according to AFJMAN 11-226.
b. Check appropriate box if adverse assumption was applied according to AFJMAN 11-226 (I).

5. Communications Data. Include the identification and UHF/VHF radio frequencies of the approach control, control tower, ground control, clearance delivery, ASOS/AWOS and ATIS/UNICOM, as applicable. Indicate PAR and ASR status by circling the appropriate response.

6. ILS/MLS/PAR/VGSI Information:

a. Runway Number. Self explanatory
b. Runway Crown Elevation. ILS/MLS - Enter the crown elevation of the runway abeam the ILS/MLS glideslope antenna. PAR – Enter PAR RPI/Touchdown elevation.

NOTE: Host nation AIPs rarely contain the required data to build precision procedures using TERPS automation software. TERPS Automation Software requires data such as runway crown elevation abeam GS antenna, GS Antenna elevation, distance of GS antenna to threshold, threshold elevation, and GS angle. These data are used to calculate TCH, GPI and RPI. When the host nation AIP (or other source data) does not contain the above data, but does provide a threshold elevation, GS angle, and a TCH, use the following formula to calculate GPI:

GPI = TCH/(tan)GS

Using the host nation threshold elevation, TCH and GS angle, and the calculated GPI, enter the following data into the TERPS Automation Software:
RWY crown elevation abeam GS antenna ---Enter Threshold elevation
GS Antenna site elevation ---Enter Threshold elevation
Distance GS antenna to threshold ---Enter calculated GPI
TERPS Automation Software should generate the same TCH as the host nation (+/- rounding differences).

c. Reflector to Threshold. Enter the point abeam touchdown reflector to threshold distance from current source/survey data. N/A GPN-22/25 (TPN-19).
d. Reflector to Antenna (FRN-16/62, MPN-14). Enter the point abeam PAR antenna to touchdown distance from current source/survey data. Leave blank for GPN-22/25 (TPN-19).
e. GPN-22/25 (TPN-19) Parameter Panel touchdown point (this is the RPI for this system). Enter parameter panel touchdown (K ft) entry. Leave blank for FRN-16/62, MPN-14 Radars.
f. Glideslope Intercept Altitude. Enter Glideslope (GS) intercept altitude for PAR and ILS. If PAR and ILS GS intercept altitudes are different, split the block and enter PAR intercept altitude on top.
g. Glideslope Angle. Enter in degrees and hundredths the ILS, PAR, glideslope angles and VGSI glidepath angle.
h. Visual Glideslope Indicator (VGSI). Self explanatory

7. Computations. Indicate that rapidly dropping terrain formula was used. If more than one ILS is available and terrain is different for each ILS, indicate the difference in the remarks section.

8. NAVAID Information:

a. **Facility.** List any facility used for procedure design at your location. List in the remarks section which facilities are restricted, but DO NOT list the restrictions.
NOTE: When a PAR serves more than one runway, enter the position (coordinates X and Y distances) of the facility in relation to the different runway thresholds it serves.
b. **Facility Identification.** Enter the 2 or 3 letter identifier.
c. **ILS Glideslope Antenna Base Elevation.** Enter the MSL elevation for each antenna base. (See Note in 6b, above)
d. **ILS Glideslope Antenna to Threshold Distance.** Enter the distance to the nearest foot. (See Note in 6b, above)
e. **Magnetic Slaved Variation.** Enter the current assigned magnetic variation of record for the VOR, TACAN, NDB, Localizer, ASR, or VORTAC. Coordinate with MAJCOM to obtain current magnetic variation of record from the FAA Data Branch. Magnetic variations of record for NAVAIDS and airports are reported, except for host nations, in whole degree increments. Use the MV of record to develop instrument flight procedures regardless of the MV shown on the chart being used. NOTE: At airports with localizers or more than one navigational aid, the MV at the airport reference point (ARP) shall be designated and assigned to all facilities at that airport, including all components of the ILS. MAJCOMS must coordinate with FAA Aviation System Standards (AVN) for changes/initial assignment to/of NAVAID MV of record.
f. **Cartesian Coordinates From Threshold.** Measure Cartesian coordinates from the runway the NAVAID serves. If NAVAID serves more than one runway, indicate from which threshold the measurement was taken. Attachment 4, this instruction, describes how to measure Cartesian coordinates.
g. **Geographical Coordinates of Facility.** Enter the Latitude and Longitude of each facility.
h. **Horizontal Datum.** Enter the NAVAID datum code. See attachment 8 for Datum code numbers.

9. Remarks. Use this section to help clarify any information above. If necessary, continue on bond paper.

10. Coordination Data. The date is important. It shows the most current form on file. The AOF/CC must sign each form to indicate review and concurrence.

11.5. AF Form 3629, *Obstruction Data.* Each unit with TERPS responsibility shall produce a computer generated AF Form 3629 (or manual equivalent only if no automation capabilities exist) and submit to their MAJCOM when changes occur. This form contains information on all obstacles within a given radius of an airport and is vital to the evaluation of instrument procedures. There are two methods to obtain this obstacle data; the "manual" obstacle search method and the DVOF/DTED method. For both methods, list all controlling obstacles for each segment of existing instrument procedures. Include controlling obstructions for holding areas, Minimum Vectoring Altitude Chart (MVAC), departure procedures, Emergency Safe Altitude (ESA) and each sector of the Minimum Safe Altitude (MSA) areas.
11.5.1 Horizontal Datum. Geodetic coordinates must be in WGS 84 when DVOF, DTED, and DAFIF are imported. When DVOF, DTED, and DAFIF are not used and the obstacle database is manually developed, the local datum may be used as long as all coordinates are in the same datum. Document the reason when DVOF, DTED, and/or DAFIF are not used.
11.5.2. Master Obstruction Charts (MOC). Each unit with a TERPS function will develop and maintain a set of master obstruction charts which identify all obstacles listed on the current AF Form 3629 printout except as noted in paragraph 11.5.3.1 and 11.5.3.2. These master obstruction charts shall be used in conjunction with TERPS automation software plots to verify controlling obstacles for each/all segments of the instrument procedure. Document using a Memo For Record (MFR) in the procedure package stating that manual validation of the controlling obstacle was completed and the results. At least one of the Master Maps shall contain depictions of Special Use Airspace and floor of controlled airspace. Retain all original maps used during the manual obstacle search and file as the facility's Master Obstacle Charts (MOCs). Update MOCs using all available sources (Chart Updating Manual {CHUM}, Electronic CHUM {ECHUM}, obstruction evaluations

{OE's}, FAA Aviation Standards Information System {ASIS} obstacle printouts, NIMA Vertical Obstruction File {DVOF} printouts, National Geodetic Survey {NGS} Airport Obstruction Charts {AOC} and Obstruction Data Sheets {ODS}, etc.). MAJCOM TERPS offices may require that unit TERPS offices provide a duplicate set of master maps. MAJCOMs may also require additional engineering maps to accompany the master maps.

11.5.2.1. Manual Obstacle Search method. The obstacle search area shall originate at the airport reference point (ARP) and extend to a radius of 100 NM. The ARP is considered to be the geographical center of the runway(s). The Obstacle Identification Area (OIA) consists of four independent areas of evaluation: ARP-10 NM, 10-30 NM, 30-60 NM and 60-100 NM. Listed below are minimum guidelines for accomplishing obstacle searches in these areas. Certain areas may require more stringent evaluation to achieve the best operational evaluation of the terminal area. When a different type of evaluation is done, fully document the method(s) used. Overlays may be designed to aid in construction of the obstacle OIA.

11.5.2.1.1. **Obstacles Within 10 NM of ARP:**

11.5.2.1.1.1. **Construction.** Use Topographic charts (1:24,000, 1:25,000, 1:50,000, 1:62,500, or 1:100,000) and Civil Engineering (CE) maps for the obstacle search in this area. ***NOTE***: Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map. On the appropriate topographic chart and CE map, construct the following areas to aid in identifying obstacles (Figure 11.2):

11.5.2.1.1.2. Draw **5-degree** splay areas 360 degrees around the ARP from the runway edge outward to 10 NM from the ARP. The apex for the 5-degree splay areas will originate at the ARP.

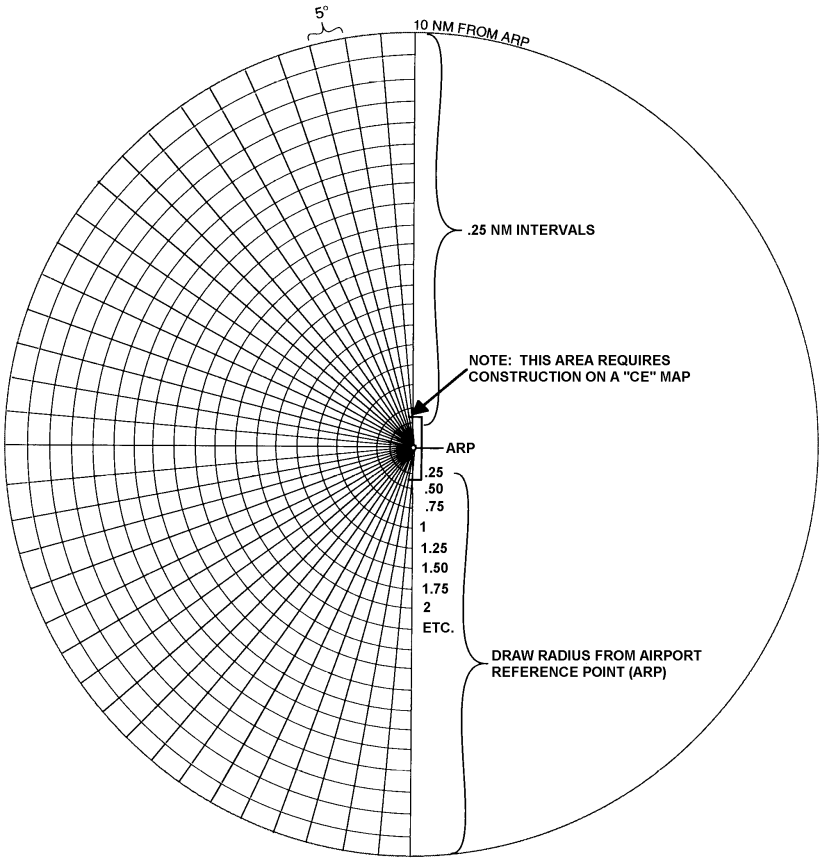
11.5.2.1.1.3. Define the mileage limits as follows: Starting from the ARP, draw 360-degree arc radii at every **0.25 NM** interval outward to 10 NM from ARP.

11.5.2.1.1.4. The 5-degree by 0.25 NM splay area represents the area for obstacle identification. The area beginning at the ARP shall include the **entire coverage of the appropriate CE map** (C-1 or equivalent chart). ***NOTE:*** There may be installations that have adjacent or near-by military property, which may have separate CE Maps that must be evaluated also.

11.5.2.1.1.5. **Search Identification Procedures.** From the ARP outward to 10 NM, identify the obstacle/terrain with the highest elevation within each 5-degree splay by 0.25 NM section that is higher than the lowest threshold elevation. ***Obstacle shadowing is not authorized***.

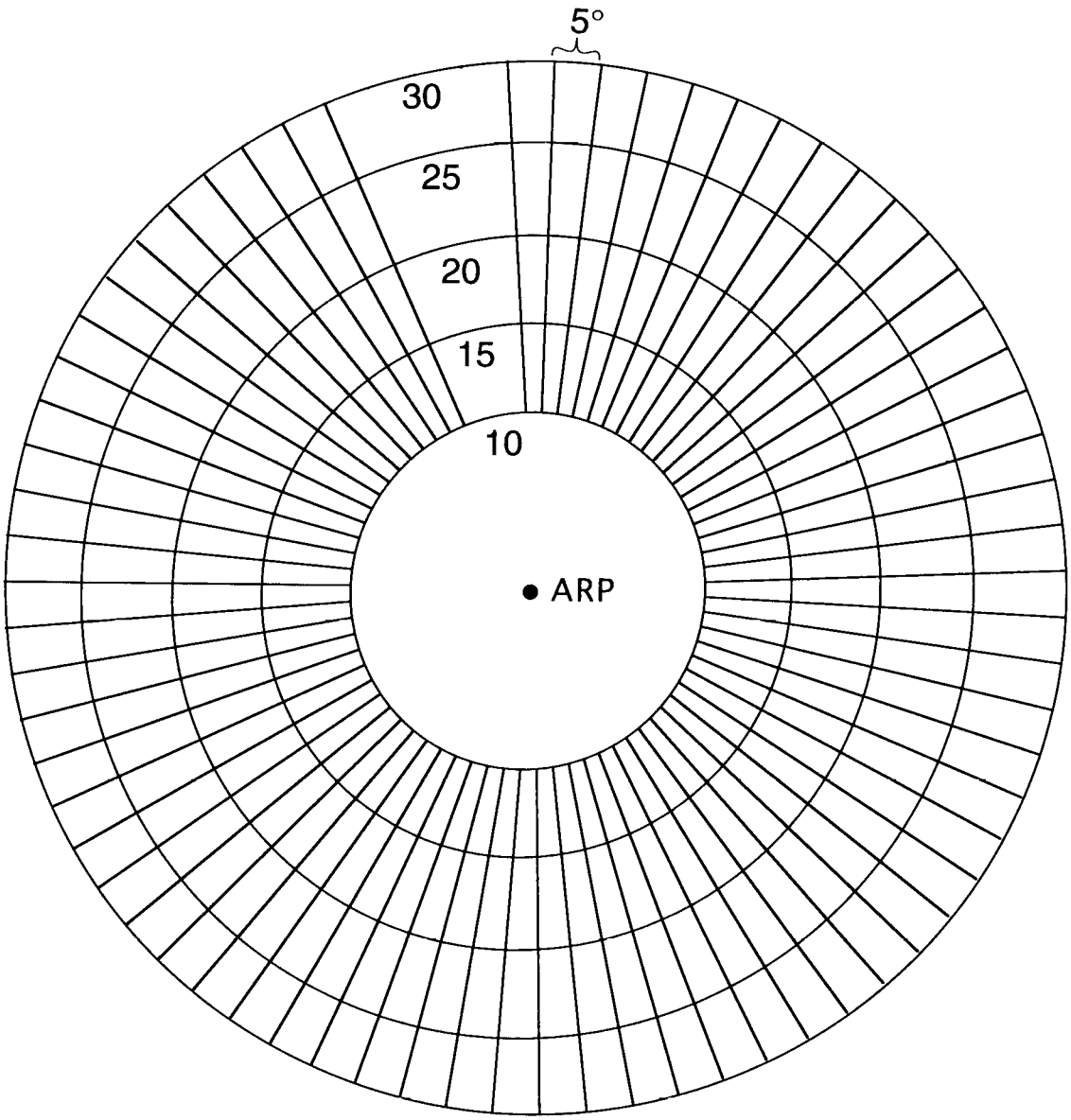
11.5.2.1.1.6. **Compilation.** Identify obstacle's height and location for inclusion on AF Form 3629. Obstacle location will be determined either by geodetic or Cartesian coordinates (X/Y). If Cartesian coordinates are used, measure from the threshold of the primary instrument runway.

Figure 11.2. Obstacle Identification Area (OIA) -- Obstacles Within 10 NM of ARP.



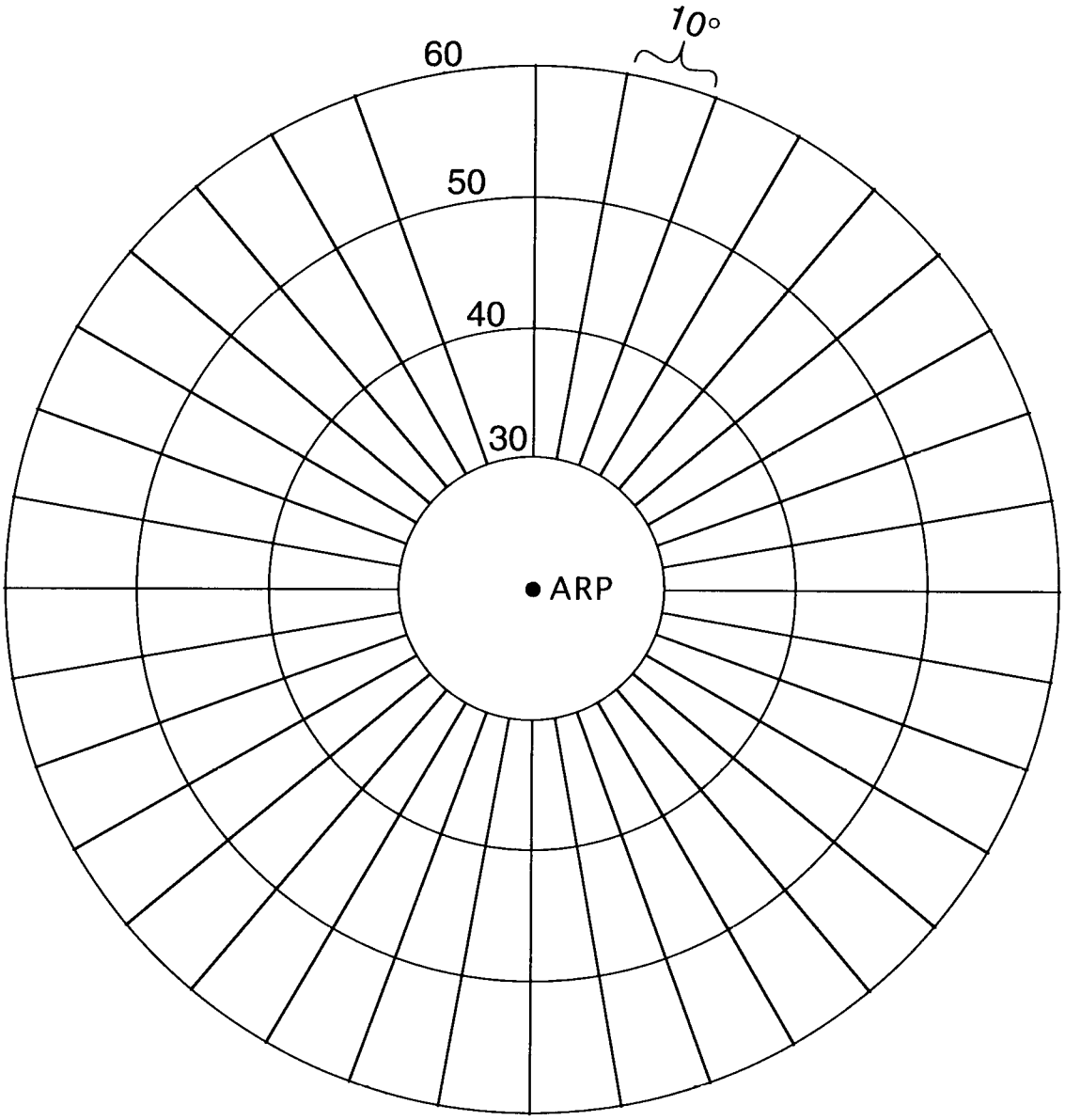
11.5.2.1.2. 10 NM to 30 NM Area:
11.5.2.1.2.1. Construction. Use Terminal Area Charts, JOGs or equivalent 1:250,000 scale maps for the obstacle search in this area. ***NOTE***: Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map. The following area will be constructed to aid in identifying obstacles (Figure 11.3):
11.5.2.1.2.2. Draw 5-degree splay areas 360 degrees around the ARP, beginning at 10 NM outward to 30 NM. The apex for the 5-degree splay will originate at the ARP.
11.5.2.1.2.3. Define the mileage limits as follows: Draw 360-degree arc radii for every 5 NM interval from 10 NM to 30 NM.
11.5.2.1.2.4. The 5-degree by 5 NM splay represents the area for obstacle identification.
11.5.2.1.2.5. Search Identification Procedures. Identify the highest obstacle/terrain elevation and other prominent obstructions that may be considered as factor to procedures within each sector, which is higher than 400 feet above the lowest threshold elevation. ***Obstacle shadowing is not authorized.***
11.5.2.1.2.6. Compilation. Identify obstacle's height and location for inclusion on AF Form 3629. Obstacle location will be determined either by geodetic or Cartesian coordinates (X/Y). If Cartesian coordinates are used, measure from the threshold of the primary instrument runway.

Figure 11.3. OIA - 10 NM to 30 NM Area.



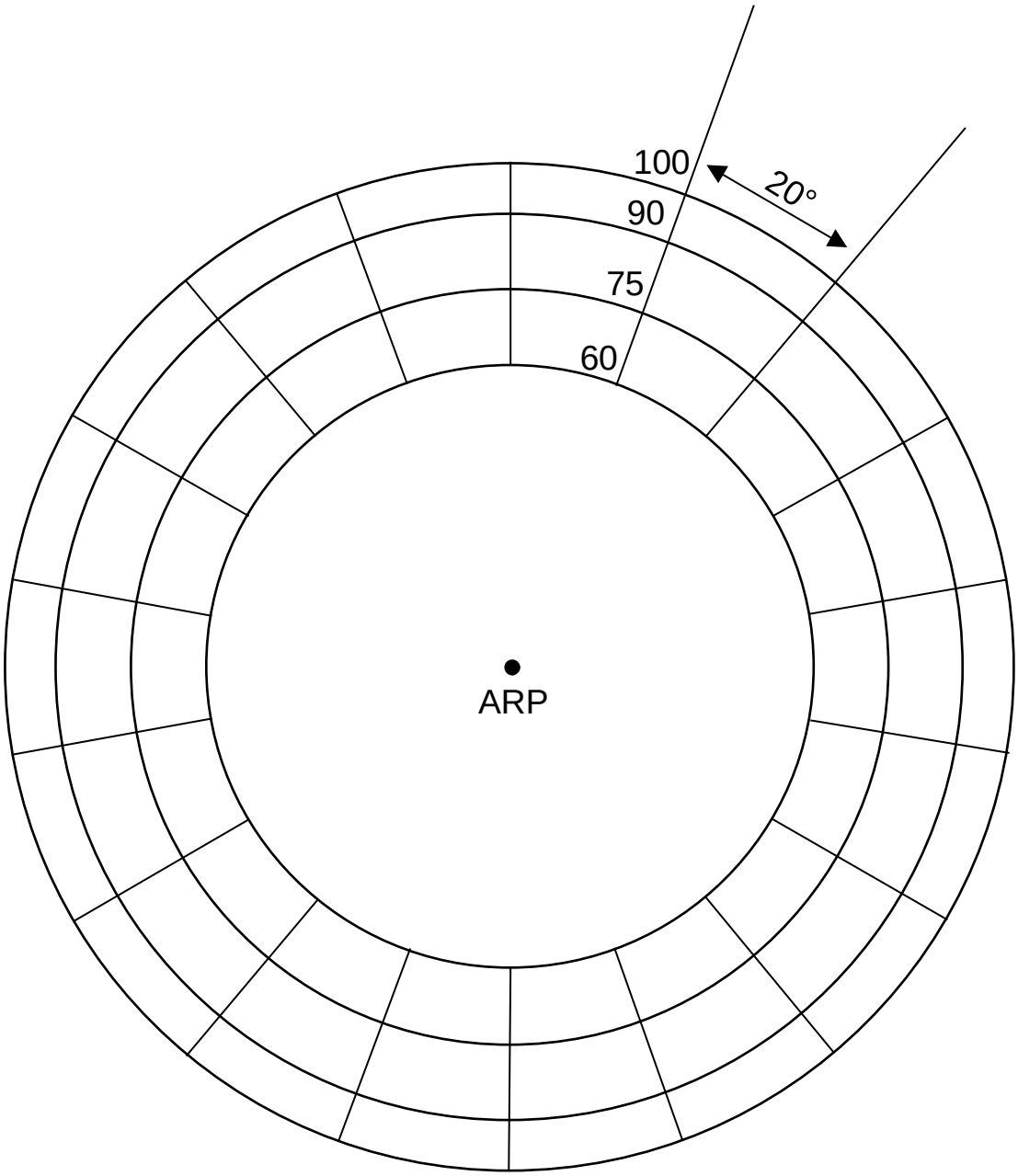
11.5.2.1.3. 30 NM to 60 NM area:
11.5.2.3.1. Construction. Use Sectional Aeronautical Charts or equivalent 1:500,000 scale maps for the obstacle search in this area. ***NOTE***: Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map. The following area will be constructed to aid in identifying obstacles (Figure 11.4).
11.5.2.3.2. Draw 10-degree splay areas 360 degrees around the ARP, beginning at 30 NM outward to 60 NM or boundary of airspace. The apex for the 10-degree splay will originate at the ARP.
11.5.2.3.3. Define the mileage limits as follows: Draw 360-degree arc radii for every 10 NM interval from 30 NM to 60 NM.
11.5.2.3.4. The 10-degree by 10 NM splay represents the area for obstacle identification.
11.5.2.3.5. Search Identification Procedures. Identify the highest obstacle/terrain elevation and other prominent obstructions that may be considered as factor to procedures within each sector, which is higher than 400 feet above the lowest threshold elevation. ***Obstacle shadowing is authorized.***
11.5.2.3.6. Compilation. Identify obstacle's height and location for inclusion on AF Form 3629. Obstacle location will be determined either by geodetic or Cartesian coordinates (X/Y). If Cartesian coordinates are used, measure from the threshold of the primary instrument runway.

Figure 11.4. OIA - 30 NM to 60 NM Area.



11.5.2.4. 60 NM to 100 NM area or the boundary of airspace, whichever is greater:
11.5.2.4.1. Construction. 1:500,000 or 1:1,000,000 scale maps may be used. ***NOTE***: Printed/plotted NIMA Compressed Arc Digitized Raster Graphics (CADRG) maps shall not be used in lieu of the appropriate scale paper map. The following area will be constructed to aid in identifying obstacles (Figure 11.5).
11.5.2.4.2. Draw 20-degree splay areas 360 degrees around the apex of the ARP, beginning at 60 NM outward to 100 NM (or airspace boundary if greater than 100 NM).
11.5.2.4.3. Define the mileage limits as follows: Draw 360-degree arc radii for each 15 NM interval to 90 NM and a 10 NM interval from 90 NM to 100 NM (or airspace boundary if greater than 100 NM).
11.5.2.4.4. The 10-degree by 15/10 NM splay represents the area for obstacle identification.
11.5.2.4.5. Search Identification Procedures. Identify the highest obstacle/terrain elevation and other prominent obstructions that may be considered as factor to procedures within each sector that is higher than 1000 feet above the lowest threshold elevation. ***Obstacle shadowing authorized.***
11.5.2.4.6. Compilation. Identify obstacle's height and location for inclusion on AF Form 3629. Obstacle location will be determined either by geodetic or Cartesian coordinates (X/Y). If Cartesian coordinates are used, measure from the threshold of the primary instrument runway.

Figure 11.5. OIA - 60 NM to 100 NM Area.



11.5.3. Manual Obstacle Search method supplemented by DTED/DVOF.

11.5.3.1. All existing and new obstacle databases shall be enhanced using NIMA Digital Terrain Elevation Data (DTED) Level 1 and Digital Vertical Obstruction File (DVOF) data. Only those locations without **any** DTED coverage within 100 NM are exempt from this requirement. Document the fact that DTED is not available and retain with AF Form 3629. Locations with partial DTED coverage require manual search of those areas identified by automation software during the DTED importation process. The software will provide you a set of coordinates it is attempting to find. These coordinates are the located at the bottom left corner of a 1 degree by 1 degree DTED cell. If you choose to select "IGNORE," you are required to manually search this area for obstructions IAW paragraph 11.5.2. Document when cells are ignored and the results of the manual cell evaluation and retain with AF Form 3629. **TERPS automation program can only import DTED Level 1 data**. Locations using the DVOF/DTED obstacle search method are required to complete an MOC by a manual search of available CE Maps/airport Obstruction Chart (OC) or equivalent, for airfield obstructions that may or may not be included in the DVOF data. The search method shall be accomplished IAW paragraph 11.5.2.1, extending to the maximum distance of the Maps/Charts used. Additionally, a current set of CHUMed maps covering the entire obstacle search area IAW paragraph 11.5 shall be maintained and used for procedure validation (overlay procedure acetates to confirm correct controlling obstacle has been identified). Spot Elevations contained/listed in the CHUM are not included in the DVOF data information. This set of maps must include at least one (1) map depicting Special Use Airspace (SUA) boundaries and floor of controlled airspace. The controlling obstacles for all procedures shall be plotted on the charts used for procedure validation.

11.5.3.2. MAJCOMs/Units using DTED and DVOF shall maintain documentation identifying DTED CD-ROM Series, to include Item and edition used to enhance/develop the database (Example - Series: TCD Item: DTED146 Edition: 004, DVOF – Name and Date of file). This documentation shall not be included as part of the location file as an obstacle.

11.5.3.2. DTED elevations are terrain based and require manual adjustments to account for vegetation. In order to account for vegetation and growth, determine the maximum growth of the tallest tree species indigenous to the area (contact State Forestry Division or Host Nation equivalent). DTED obstacles adjusted for vegetation growth shall be described in the automation database as "DTED Elevation + Manually Adjusted (MA) number of feet," example; DTED ELE + MA100. If desired/necessary, procedure specialists may elect to reduce the maximum tree height added to a DTED posting if a lower height can be verified by a qualified source (i.e. Forestry Dept. confirms vegetated area does not include largest indigenous tree species, or qualified survey source determines **actual** tree height). ***NOTE:*** Annual rate of growth must be determined and added to the height of any manually verified DTED posting + actual tree height. Each time the procedure is evaluated, the annual tree growth must be assessed. Any alteration of the MSL or AGL elevation of DTED data will change the description from MA to manually verified (MV). Exception: If new data requires a change to the MA elevation, all DTED posting will be changed by the TERPS automation software. Obstacles described as MV will be exempted from the change. For example new source data indicates maximum tree height needs to changed from 100' to 125', program will change all MA entries to DTED ELE + MA100.

11.5.4. Databases developed solely using the DVOF/DTED data are only authorized during contingencies at locations where the lack of adequate mapping prevents manual searches. Ensure DTED coverage encompasses at least a 105 NM radius from the ARP (the entire area evaluated for an equivalent manual TERPS search). Locations with partial DTED coverage require manual search of those areas identified by automation software during the DTED importation process.

11.5.5. MAJCOMs/Units shall maintain documentation identifying, DTED CD-ROM Series, Item and edition used to enhance/develop the database (Example - Series: TCD Item: DTED146 Edition: 004). DVOF – date of the file.

11.5.6. MAJCOMs will forward an electronic DVOF file, with *monthly* updates, to each unit TERPS office. MAJCOM/Units shall import, using TERPS automation software, all monthly DVOF updates. If there are no obstacle additions/deletions/revisions for the month, the MAJCOM shall provide documentation indicating no changes. ***NOTE***: This does not negate the requirement to continue receiving the CHUM/ECHUM and its Supplements. The CHUM shall still be used to ensure that maps are the correct series, appropriate edition number, and aeronautical date. When monthly updates to the obstruction database are completed, ensure the updated location file is uploaded to the AFFSA FTP Site.

11.5.7. AF Form 3629 Content. Completion instructions for each block on the manual form (or corresponding item in TERPS automation program) are as follows:

11.5.7.1. Obstacle Number. Number all obstacles in sequence starting with number one (#1). An Obstacle number, once deleted, shall not be used again unless special circumstances dictate. Under circumstances when the obstruction file has been corrupted or the number of obstacles exceeds the maximum allowed by the software, the obstruction file may be redeveloped and new obstacle numbers assigned. When this is necessary, the MAJCOM shall ensure the following actions are taken:

11.5.7.1.1. Archive the old obstruction file and retain with each applicable instrument procedure, MVA, MSAW, and MIFRAC product. No procedures/products will be published or used without the original (source) obstruction file available.

11.5.7.1.2. Provide AFFSA/XOIP with the justification/rationale for obstruction file redevelopment.

11.5.7.1.3. Forward the obstruction file to AFFSA/XOIP for modification. AFFSA will remove all DTED and DVOF obstacles and renumber the remaining obstacles and return the obstruction file to the MAJCOM for actions listed in paragraphs 11.5.7.1.4 through 11.5.7.1.8.

11.5.7.1.4. Verify the accuracy of all remaining obstructions.

11.5.7.1.5. Request an "INITIAL" DVOF run from NIMA. When received, import this DVOF run into the new obstruction file.
11.5.7.1.6. Import the current edition/version of DTED into the obstruction file and apply manual adjustments as necessary.
11.5.7.1.7. Rebuild/revalidate all instrument procedures, MVA, MSAW, and MIFRC using the new obstruction file.
11.5.7.1.7.1. Re-coordination with original signatories is not necessary unless there are procedural changes.
NOTE: A change to an obstacle number is administrative (not considered a procedural change) unless the location and/or elevation of the obstruction has been changed. Retain a copy of the original signature page, with each package, unless procedural changes require a new signature page.
11.5.7.1.8. Maintain documentation of the required procedure rebuilds/revalidations.
11.5.7.2. Coordinates. Determine the coordinate system used to enter obstacle location.
11.5.7.2.1. Geodetic Coordinates (Latitude and Longitude). Use geographic coordinates only from surveys, National Imagery and Mapping Agency (NIMA), or National Aeronautical Charting Office (NACA) sources. Report coordinates to the nearest hundredth of a second.
11.5.7.2.2. Cartesian Coordinates (X and Y). Use Cartesian coordinates unless geographic coordinates are provided. The "X" axis shall be centered on the axis at the threshold of the primary instrument runway (see Attachment 4). Enter runway number from which measurements are made when Cartesian coordinates are used.
11.5.7.3. MSL Elevation. Enter the obstacle's elevation in MSL. Enter the AGL value into the automated form (may be added to the description/source block on the manual form). When a chart depicts vegetation (coded by green coloring), use the largest known tree type's full grown height unless documentation proves otherwise. Plot vegetation at the closest point to the runway edge within each sector. When necessary, consult local utility companies for actual heights of utility poles. Adverse assumption may be used to consider the most critical height of unmeasurable obstacles (trees, power poles/lines, etc.). When assumptions are made, document source(s) used to apply assumed values in a cover letter attached to the AF Form 3629/computer printout. When evaluating contour lines, use the following technique to take care of the hilltops and draws: Use one foot less than the next appropriate terrain line (map contour interval is 20 feet. The highest contour line identified within a section is 300 feet. The elevation value reported on AF Form 3629 would be 319 feet).
11.5.7.4. Date. Date obstacle added or deleted to manual form
11.5.7.5. Description/Source. Obstacle description (control tower, tower, contour line + trees, spot elev., etc.). Include the source of obstacle information (Altus Map 1:24,000, 1:250,000 JOG Air (series and sheet #), DVOF, CE MAP, survey, etc.) on manual form only. Provide the geodetic datum of obstacle source. ***NOTE:*** When using DVOF/DTED, the description will be automatically included.
11.5.7.6. Horizontal Datum. Enter the Geodetic horizontal datum of obstacle coordinates.

11.6. Use of Hand-Held GPS Receivers for Development of Instrument Procedures. Hand-held GPS receivers shall not be used to determine geographic coordinates for instrument procedure development purposes except as follows:
11.6.1. During contingency operations at locations where no usable geodetic data is available, use of a hand-held GPS is permitted only after all other means of obtaining airport/NAVAID source data have been exhausted (DAFIF, Host Nation source, NIMA photogrametric analysis, on-site survey, etc.). Procedures developed using hand-held GPS coordinates are non-standard, and require approval by the MAJCOM/DO. All (each) coordinates determined by use of hand-held GPS receivers shall be identified as such and documented on the AF Form 3628/3629.
11.6.2. Hand-held GPS receivers may be used to assist in on-site obstruction plotting for contingency and normal operations.

11.7. General Obstacle Charting and Map Information.
11.7.1. The procedure specialist should have extensive knowledge of existing and proposed obstacles in the areas used for the final approach, missed approach, and circling areas since these are the obstacles, which will control the minima. Other segments of the approaches are more likely to be controlled by airspace and air traffic considerations than by obstacles.
11.7.2. Trees on and near the airport must be evaluated for Obstacle Identification Surface (OIS) encroachment. The annual rate of tree growth must be considered and documented for future reference. A line of trees acceptable today may not be acceptable five or six years from now.
11.7.3. The fundamental sources of obstacle information will be various charts, maps and engineering maps. There is no single chart/map that will provide all the information needed in designing instrument procedures.
11.7.3.1. Charts and maps available through the National Imagery and Mapping Agency (NIMA) depict only those man-made obstacles 200 feet or higher above ground elevation. Contour intervals may vary from 2 feet to 2,000 feet, depending on the particular chart/map.
11.7.3.2. Detailed descriptions and requisitioning procedures are in the *DoD Catalog of Aeronautical Charts and Flight Information Publications.*
11.7.3.3. NIMA also publishes the *DoD Chart Updating Manual (CHUM).* The CHUM shall be used to update obstruction information on published charts between publication dates.
11.7.3.4. US Geological Survey maps are not available through government distribution, but may be purchased through local map dealers. Further information is available via the Internet at http://mapping.usgs.gov/ or by phone at 1-888-ASK-USGS.

11.7.3.4.1. Indexes to maps available from USGS are available at http://mapping.usgs.gov/mac/maplists/selectstatelist.html, or by contacting:

USGS Information Services
Box 25286
Denver CO 80225
1-888-ASK-USGS or 303-202-4700
Fax: 303-202-4693

11.7.3.4.2. U.S. Geological Survey maps are usually called quadrangles or "Quads" and come in a variety of scales. These maps depict terrain information. On these maps, all terrain information is "bald" and height of trees is an additional consideration. Height of man-made obstacles is not shown, requiring the use of other sources to obtain information concerning them. Consider a visit to county/state engineers or a visit to planning and zoning commissions.
11.7.3.5. The following information is provided as an explanation of items to be found on available maps and charts. Not all maps and charts will provide the same information:
11.7.3.5.1. Geographic Coordinates. Indicated on all four corners of the maps.
11.7.3.5.2. Declination Diagram. Found in the lower margin. Indicates the direction of true north, magnetic north, and grid north; the angle between those directions in degrees and minutes; the date for which the diagram was compiled and the annual magnetic change.
11.7.3.5.3. Elevation, Contour Interval. The contour interval is indicated as well as the datum to which all elevations are referred.
11.7.3.5.4. Latitude and Longitude Designation. The map borders are lines of latitude and longitude and, at each corner of the map, you will find the latitude and longitude of that corner in degrees, minutes and seconds. Two and one half, 5 minutes, etc., intersections are indicated on the face of the map in black crosses, with large tick marks along the border which show numbers indicating minutes and/or seconds.

11.8. Digital Terrain Elevation Data (DTED). DTED data is a uniform matrix of terrain elevation postings. There are six levels of DTED information of which 3 levels are readily available for general use:
11.8.1. DTED Level 0 characteristics – Level 0 post spacing is approximately every 30 seconds (nominally one kilometer). Level 0 information is a “thinned” data file extracted from DTED Level 1.
11.8.2. DTED Level 1 characteristics – Level 1 post spacing is every 3 seconds (approximately every 100 meters). Information content is approximately equivalent to contour information represented on a 1:250,000-scale map. DTED Level 1 is the basic level median resolution elevation data source for landform, slope, elevation, and/or gross terrain roughness in a digital format. ***NOTE:*** Currently the only level imported by AFTERPS computer software.
11.8.3. DTED Level 2 characteristics – Level 2 post spacing is every 1 second (approximately every 30 meters). Information content is approximately equivalent to contour information represented on a 1:50,000-scale map. DTED Level 2 is the basic level high-resolution elevation data source for landform, slope, elevation, and/or gross terrain roughness in a digital format.
11.8.4. Accuracy objectives of DTED levels are:
Absolute Horizontal – plus or minus 50 meters at a 90% circular error.
Absolute Vertical -- plus or minus 30 meters at a 90% linear error.
NOTE: Depending on the level of DTED data being used, it is important to remember that elevation postings are evenly spaced. If a higher elevation should fall between two lower DTED postings, this higher elevation will not be added to the obstacle database. This is an inherent characteristic of DTED, therefore, it is essential that procedures built using a database compiled with DVOF/DTED or a combined manual DVOF/DTED information must be manually verified with a CHUMed paper map.

11.9. Digital Vertical Obstruction File (DVOF). DVOF is a database of man-made obstructions extracted from NIMA data collection efforts, which could pose a hazard to flight. The database only contains vertical obstructions that have been found in collection activities or have been reported. The National Aeronautical Charting Office (NACA) is responsible for vertical obstruction data for the United States and adjacent countries, including Canada, Mexico and several Western Hemisphere islands to NIMA. NACA data is reformatted and the domestic vertical obstructions are entered into the DVOF without manipulation. The remaining non-domestic data is validated and entered. Requests from USAF TERPS offices for DVOF data are formatted specifically for importing into an AFTERPS database. See paragraph 1.3.3 for information on requesting DVOF data.
NOTE: The use of DVOF does not substitute the need to CHUM maps.

11.10. Chart Updating Manual (CHUM)/Electronic Chart Updating Manual (ECHUM). The CHUM is published in two volumes on a semi-annual basis (March and September). Chum Supplements will be published monthly. The CHUM contains known chart discrepancies that meet CHUM criteria as listed in the CHUM Section II. The CHUM will also contain corrections to Spot Elevations. These Spot Elevations are not contained in DVOF.
NOTE: The use of DVOF/DTED does not substitute the need to CHUM maps.

11.11. Construction or Alteration of Obstruction Evaluations. Federal Aviation Regulation (FAR) Part 77 requires that notification be provided to the FAA on proposed construction or alteration of structures which might present a hazard to flight.
11.11.1. FAA Form 7460-1, Notice of Proposed Construction or Alteration, is the medium for that notification of construction or alteration.
11.11.1.1. The appropriate FAA region has the responsibility to process all FAA Forms 7460-1 in accordance with FAR Part 77 and FAAO 7400.2, Procedures for Handling Airspace Matters. The FAA Region Air Force Representative (AFREP) will forward the FAA Form 7460-1 to the affected military installation for evaluation and recommendations.
11.11.1.2. When reviewing the FAA Form 7460-1, the TERPS Specialist will evaluate the following:
11.11.1.3. Terminal Area IFR Operations. The effect upon terminal area IFR operations; e.g., transitions, radar vectoring (MVAC), Minimum IFR altitudes, holding, STARs, and Departure Procedures.
11.11.1.4. Instrument Approach/Departure Procedures. The effect upon any segment of an Instrument Approach Procedure (IAP). Also, the effect upon any proposed IAP or any departure restriction.
11.11.1.5. Adjustments to Instrument Flight Procedures. Do not disregard proposed construction that impacts TERPS procedures (including MVA, MIFRAC, etc.) regardless of the severity of the impact or whether adjustment to the procedure is feasible. The TERPS Specialist shall not amend an IAP until receipt of the FAA Form 7460-2, Notice of Actual Construction or Alteration, or other notification relative to an obstacle which will have a procedural affect. If during procedural review or while on a site visit, it becomes obvious for safety reasons that the existence of a previously unknown obstacle requires procedure minima to be raised, expedite accomplishment of the change by means of a NOTAM.
11.11.1.6. Recommendations. If the proposed construction or alteration will have any impact on IFR aircraft operations, procedures, or minimum IFR altitudes, the response back to the FAA Region AFREP should clearly state the extent of these affects and if possible, provide an acceptable solution (i.e., If the proposed antenna is reduced by XX feet, there would be no adverse affect to IAPs or DPs. Do not consider adjustments to instrument procedures as an acceptable solution). The adverse affect should also be brought to the attention of Wing Flying officials (DO, Stan Eval, etc.). Maintain a file copy of all proposals. The rationale for this filing is that construction could be delayed for various reasons and the same proposal may resurface one or two years later.
11.11.1.7. Obstacles of Variable Height or Location. An obstacle may be ignored when means are established to control its height, location, or both. A construction crane or traffic on a perimeter road with lights controlled by ATC are good examples. Corrective procedures must be defined in an LOP.
11.11.2. Obstruction Evaluation/Airport Airspace Analysis (OE/AAA). The USAF focal point for OE/AAA is located in the FAA Southern region AFREP office. The OE/AAA system is designed to identify structures affecting military airfields/heliports. The OE/AAA automation program incorporates a Military Part 77 surface evaluation, military VFR traffic pattern, circle searches, distance, calculation, and datum conversion capabilities. An Operational Instruction has been issued to the AFREP office to provide continuity in handling the Obstruction Evaluation program throughout the regions. This instruction will be updated yearly, and interim changes will be issued via E-mail.
11.11.2.1. Regional AFREP OE Specialist Responsibilities. Each AFREP office is staffed with a Transportation Specialist who is a trained OE/AAA specialist in all aspects of the automated OE/AAA program. The specialist is responsible for ensuring the OE/AAA is executed on a regular basis and notifies responsible parties of conflictions to airfields. Structures identified as possible conflictions affecting airfield operations shall be distributed directly to the TERPS or MAJCOM point of contact as directed. Using the OE/AAA web-based geographical information system, each AFREP office shall E-mail an electronic folder containing a letter which will contain information to evaluate the structure from the appropriate AFREP office to the unit TERPS point of contact or MAJCOM (as directed). The folder will contain automated FAR PART 77 evaluation results for military surfaces, and VFR Traffic Pattern. The AFREP offices will distribute landing proposals FAA Form 7480-1's in the same manner as OE's for unit review and evaluation, as appropriate.
11.11.2.2. FAA Air Traffic Division Obstruction Evaluation Specialists Responsibilities. The FAA Air Traffic personnel are responsible for entering and verifying the information from the Notice of Proposed Construction, FAA 7460-1 into the OE/AAA automated system for further evaluation by the AFREP offices. In accordance with FAR Part 77, paragraph 77.19, FAA OE Specialists have 30 days to respond to the proponent unless circumstances warrant further study.
11.11.2.3. FAA Airports District Office Specialist Responsibilities. The FAA Airports District Offices personnel are responsible for processing and verifying the information from the Notice Of Landing Area Proposals, FAA 7480-1 into the OE/AAA automated system for further evaluation by the AFREP offices.
11.11.2.4. Military Unit Responsibilities: MAJCOM/Unit TERPS personnel are responsible for evaluating detrimental affects to instrument procedures in accordance with FAA Order 7400.2E and all changes and applicable USAF directives.

Responses are due to the AFREP offices within ten working days, unless it is determined a further study is necessary. Thus, the unit shall notify the appropriate AFREP office requesting additional time to respond. When objecting to an OE Study, the unit should identify the detrimental effects in detail and suggest alternatives such has lowering or relocating the structure. When responding to a landing area proposal, the unit should identify the detrimental effects in detail to the AFREP office within ten working days. Notify the MAJCOM when changes occur in OE contact information (i.e. POC, phone number, office symbol, e-mail address).

11.11.2.5. MAJCOM Responsibilities. MAJCOMs shall coordinate any changes in the distribution of OE cases with the Air Force Representative OE/AAA focal point in Southern Region.

11.12. FAA Form 8240-22, *Facility Data Sheets Request* (See paragraph 2.8 for instructions on obtaining this form).

11.12.1. FAA Form 8240-22 shall be completed/maintained for each NAVAID and VGSI at the airport.

11.12.2. Complete FAA Form 8240-22 IAW FAAO 8240.36, *Instructions for Flight Inspection Reporting, Appendix 22*. ***NOTE:*** Source documentation (survey data, engineering maps, etc.) shall be utilized as source for each blocked of the form and shall be maintained with each Facility Data sheet. Previous Facility Data Sheets shall not be considered as "source" material.

11.12.2. Unit TERPS shall forward completed FAA Form 8240-22 to their parent MAJCOM for review and approval. MAJCOM shall forward the FAA Form 8240-22 to AVN-210 (Flight Inspection technical support branch) for processing. For new or modified NAVAID information, AVN 210 must have processed the FAA Form 8240-22 prior to requesting Flight Inspection services.

11.12.3. When changes are made to a facility, Base Operations is responsible for non-procedural changes required in FLIPs, e.g., Enroute Supplement, airport diagrams.

Figure 11.6. Chart Scales and Equivalents.

CHART SCALES AND EQUIVALENTS

FRACTIONAL SCALE	MILES PER INCH		INCHES PER MILE		FEET PER INCH
	NAUTICAL	STATUTE	NAUTICAL	STATUTE	
1:500	0.007	0.008	145.83	126.72	41.67
1:600	0.008	0.009	121.52	105.60	50.00
1:1,000	0.014	0.016	72.91	63.36	83.33
1:1,200	0.016	0.019	60.76	52.80	100.00
1:1,500	0.021	0.024	48.61	42.24	125.00
1:2,000	0.027	0.032	36.46	31.68	166.67
1:2,400	0.933	0.038	30.38	26.40	200.00
1:2,500	0.934	0.039	29.17	25.34	208.33
1:3,000	0.041	0.047	24.30	21.12	250.00
1:3,600	0.049	0.057	20.25	17.60	300.00
1:4,000	0.055	0.063	18.23	15.84	333.33
1:4,800	0.066	0.076	15.19	13.20	400.00
1:5,000	0.069	0.079	14.58	12.67	416.67
1:6,000	0.082	0.095	12.15	10.56	500.00
1:7,000	0.096	0.110	10.42	9.05	583.33
1:7,200	0.099	0.114	10.13	8.80	600.00
1:7,920	0.109	0.125	9.21	8.00	660.00
1:8,000	0.110	0.126	9.11	7.92	666.67
1:8,400	0.115	0.133	8.68	7.54	700.00
1:9,000	0.123	0.142	8.10	7.04	750.00
1:9,600	0.132	0.152	7.60	6.60	800.00
1:10,000	0.137	0.158	7.29	6.34	833.33
1:10,800	0.148	0.170	6.75	5.87	900.00
1:12,000	0.165	0.189	6.08	5.28	1,000.00
1:13,200	0.181	0.208	5.52	4.80	1,100.00
1:14,400	0.197	0.227	5.06	4.40	1,200.00
1:15,000	0.206	0.237	4.86	4.22	1,250.00
1:15,600	0.214	0.246	4.67	4.06	1,300.00
1:15,840	0.217	0.250	4.60	4.00	1,320.00
1:16,000	0.219	0.253	4.56	3.96	1,333.33
1:16,800	0.230	0.265	4.32	3.77	1,400.00
1:18,000	0.247	0.284	4.05	3.52	1,500.00
1:19,200	0.263	0.303	3.80	3.30	1,600.00
1:20,000	0.274	0.316	3.65	3.17	1,666.67
1:20,400	0.280	0.322	3.57	3.11	1,700.00
1:21,120	0.290	0.333	3.45	3.00	1,760.00
1:21,600	0.296	0.341	3.38	2.93	1,800.00
1:22,800	0.313	0.360	3.20	2.78	1,900.00
1:24,000	0.329	0.379	3.04	2.64	2,000.00
1:25,000	0.343	0.395	2.92	2.53	2,083.33
1:31,680	0.434	0.500	2.30	2.00	2,640.00
1:48.000	0.658	0.758	1.52	1.32	4,000.00
1:50,000	0.686	0.789	1.46	1.27	4,166.67
1:62,500	0.857	0.986	1.17	1.01	5,208.33
1:63,360	0.869	1.000	1.15	1.00	5,280.00

FRACTIONAL SCALE	MILES PER INCH		INCHES PER MILE		FEET PER INCH
	NAUTICAL	STATUTE	NAUTICAL	STATUTE	
1:75,000	1.029	1.184	0.97	0.85	6,250.00
1:96,000	1.317	1.515	0.76	0.66	8,000.00
1:100,000	1.371	1.578	0.73	0.63	8,333.33
1:125,000	1.714	1,973	0.58	0.51	10,416.67
1:126.720	1.738	2.000	0.58	0.50	10,560.00
1:200,000	2.743	3.157	0.36	0.32	16,666.67
1:250,000	3.429	3.946	0.29	0.25	20,833.33
1:253,440	3.476	4.000	0.29	0.25	21,120.00
1:400,000	5.486	6.313	0.18	0.16	33,333.33
1:500,000	6.857	7.891	0.15	0.13	41,666.67
1:506,880	6.952	8.000	0.14	0.13	42,240.00
1:750,000	10.286	11.837	0.10	0.08	62,500.00
1:1,000,000	13.715	15.783	0.07	0.06	83,333.33
1:1,013,760	13.904	16.000	0.07	0.06	84,480.00
1:1,500,000	20.572	23.674	0.05	0.04	125,000.00
1:1,680,000	23.041	26.515	0.04	0.04	140,000.00
1:2,000,000	27.430	31.565	0.04	0.03	166,666.67
1:2,500,000	34.287	39.475	0.03	0.03	208,333.33
1:3,000,000	41.145	47.348	0.02	0.02	250,000.00
1:3,500,000	48.002	55.240	0.02	0.02	291,666.67
1:4,000,000	54.860	63.131	0.02	0.02	333,333.33
1:4,500,000	61.717	71.023	0.01	0.01	375,000.00
1:5,000,000	68.575	78.914	0.01	0.01	416,666.67
1:6,000,000	82.290	94.697	0.01	0.01	750,000.00
1:7,000.000	96.005	110.479	0.01	0.01	833,333.33
1:8,000.000	109.719	126.262	0.01	0.01	916,666.67
1:9,000,000	123.434	142.045	0.01	0.01	1,000,000.00
1:10,000,000	137.149	157.828	0.01	0.01	1,083,333.33
1:11,000,000	150.864	173.611	0.01	0.01	1,116,666.67
1:12,000,000	164.579	189.393	0.01	0.01	1,250,000.00
1:13,000.000	178.294	205.176			1,333,333.33
1:14,000,000	192.009	220.959			1,416,666.67
1:15,000,000	205.724	236.742			1,500,000.00
1:16,000,000	219.439	252.525			1,583,333.33
1:17,000,000	233.154	268.308			1,666,666.67
1:18,000,000	246.869	284.090			1,750,000.00
1:19,000,000	260.584	299.373			1.833,333.33
1:20,000,000	274.299	315.656			1,916.666.67
1:21,000,000	288.014	331.439			1,750,000.00
1:22,000,000	301.728	347,222			1,833,333.33
1:23,000,000	315.443	363.005			1,916,666.67
1:24,000.000	329.158	378.787			2,000,000.00
1:25,000,000	342.873	394.570			2,083,333.33
FORMULAS	$\frac{\text{SCALE}}{72913\ 24}$	$\frac{\text{SCALE}}{63.360}$	$\frac{72913\ 24}{\text{SCALE}}$	$\frac{63,360}{\text{SCALE}}$	$\frac{\text{SCALE}}{12}$

Chapter 12

TERPS TRAINING

12.1. TERPS Training:

12.1.1. Units with a TERPS responsibility will ensure continuity of TERPS expertise. Selection of an assistant TERPS specialist is required. The assistant TERPS specialist should be equally knowledgeable and involved in the unit's TERPS activities.

12.1.2. MAJCOMs manage TERPS course E30ZR13B4A-000 quotas according to AFCAT 36-2223. TERPS course E30ZR13B4A-000, or an equivalent substitute approved by HQ AFFSA/XOIP, and completion of qualification training, is mandatory prior to assignment as a TERPS specialist.

NOTE: Recommend that personnel being assigned to a MAJCOM TERPS position have at least 3 years TERPS experience prior to assignment.

12.1.3. HQ AFFSA/XOIP manages TERPS course E30ZR13B4A-000 curriculum items. These items will constitute the CTS for this course.

12.1.4. The primary unit TERPS specialist will provide training for the assistant TERPS specialist(s). If a qualified TERPS Specialist is not available, the MAJCOM shall assume or delegate to a TERPS qualified individual from another location, the training responsibility. A qualified TERPS specialist (not the trainer) who is also a task certifier, must task certify the trainee. ***NOTE:*** The MAJCOM shall identify this representative in writing with a copy maintained in the trainees training record. The primary TERPS specialist will involve their assistant TERPS specialist(s) to the maximum extent possible in projects to ensure proficiency and project continuity.

12.2. Forms Prescribed: AF Form 3628, **TERPS Automation Data Summary;** AF Form 3629, **Obstruction Data;** AF Form 3632, **Minimum Vectoring Altitude Chart (MVA);** AF Form 3633, **Minimum Vectoring Altitude Computations;** AF Form 3634, **Departure Procedure (DP);** AF Form 3635, **Application of Departure Procedure Criteria;** AF Form 3636, **Application of Diverse Departure Criteria;** AF Form 3637, **Instrument Approach Procedures;** AF Form 3640, **Nonprecision Computations;** AF Form 3641, **Visual Portion of Final Worksheet;** AF Form 3642, **Circling Computations;** AF Form 3979, **MMLS TERPS Computations;** AF Form 3980, **Instrument Procedure Waiver;** AF Form 3981, **GPS/RNAV Descent Angle and Surface Evaluation;** AF Form 3982, **GPS/RNAV Combination Straight and turning Missed Approach Length of Section;** AF Form 3992, **Instrument Procedure Flyability Check, Instrument Approach Procedure (IAP);** AF Form 3993, **Instrument Procedure Flyability Check, Departure Procedure (DP).**

ROBERT H. FOGLESONG, Lt Gen, USAF
DCS, Air & Space Operations

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

NOTE: The Following publications are required in the TERPS work area. In some cases, publications listed as "must be accessible within the Air Traffic Control Operation", may be required in the TERPS work area. For example, if your location is equipped with MLS, you would be required to have FAAO 8260.36 in the TERPS Office. At overseas locations, MAJCOMs may determine which appropriate FAA publications are required in the TERPS work area. If an electronic means (CD-ROM, via LAN, etc.) is available to access these publications, paper copies are not required to be maintained in the TERPS office.

References

AFI 11-201, *Flight Information Publications*
AFMAN 13-215, *ATC Radar Maps and Associated Systems*
AFJMAN 11-225, *United States Flight Inspection Manual (FAAO 8200.1)*
AFMAN 11-226 (I), *U.S. Standard for Terminal Instrument Procedures (TERPS) (FAAO 8260.3)*
AFI 11-230, *Instrument Procedures*
AFI 14-205, *Identifying Requirements for Obtaining and Using Geospatial Information and Services*
AFI 32-1042, *Standards for Marking Airfields*
AFI 32-1044, *Visual Air Navigation Systems*
AFMAN 32-1123(I), *Airfield and Heliport Planning and Design*
AFI 32-7061, *The Environmental Impact Analysis Process*
AFI 32-7062, *Air Force Comprehensive Planning*
AFI 32-7063, *Air Installation Compatible Use Zone Program*
APATC-1, *Criteria For The Preparation Of Instrument Approach And Departure Procedures* (Required at NATO locations only)
FAAO 7100.9, *Standard Terminal Arrival (STAR)*
FAAH 7130.3, *Holding Pattern Criteria*
FAAO 8240.32, *Request for Flight Inspection Services*
FAAO 8240.36, *Instructions for Flight Inspection Reporting*
FAAO 8240.47, *Determination of Instrument Landing System (ILS) Glidepath Angle, Reference Datum Heights (RDH)*
FAAO 8260.19, *Flight Procedures and Airspace*
FAAO 8260.32, *U.S. Air Force Terminal Instrument Procedures Service*
FAAO 8260.38, *Civil Utilization of Global Positioning System*
FAAO 8260.44, *Civil Utilization of Area Navigation (RNAV) Departure Procedures*
FAAO 8260.45, *Terminal Arrival Area (TAA) Design Criteria*
FAAO 8260.46, *Instrument Departure Procedure Program*
FAAO 8260.47, *Barometric Vertical Navigation (VNAV) Instrument Procedures Development*
FAAO 8260.48, *Area Navigation (RNAV) Approach Construction Criteria*

The following National Imagery and Mapping Agency publications are required:
National Imagery and Mapping Agency Catalog of Maps, Charts, and Related Products
FLIP General Planning Guide
FLIP Area Planning (AP1, AP2, AP3, or AP4 as applicable)
Complete set of FLIPs as applicable to facility)
Chart Updating Manual (CHUM) and it's supplements (electronically derived ECHUM data acceptable)

NOTE: The following publications must be ***accessible*** within the Air Traffic Control operation.
AFI 11-202V3, *General Flight Rules*
AFMAN 11-217, *Instrument Flight Procedures (Volumes 1 and 2)*
AFI 13-201, *Air Force Airspace Management*
AFI 13-203, *Air Traffic Control*
AFI 13-213, *Airfield Management*
AFMAN 32-1076, *Design Standards for Visual Air Navigation Facilities*
AFMAN 37-139, *Records Disposition Schedule*
AFI 33-360 Vol. 2, *Air Force Forms Management Program*
FAA AC 0031, *U.S. National Aviation Standard for the VOR/DME/TACAN Systems*
FAAH 7350.6, *Location Identifiers*

FAAO 7400.2, *Procedures for Handling Airspace Matters*
FAAO 7400.8, *Special Use Airspace*
FAAO 7400.9, *Airspace Designations and Reporting Points*
FAAH 7610.4, *Special Military Operations*
FAAO 7930.2, *Notice to Airman (NOTAM)*
FAAO 8260.36, *Civil Utilization of Microwave Landing System*
AIM, *Aeronautical Information Manual*
FAR PART 71, *Designation of Federal Airways, Area Low Routes, Controlled Airspace, and Reporting Points*
FAR PART 73, *Special Use Airspace*
FAR PART 77, *Objects Affecting Navigable Airspace*
FAR PART 93, *Special Air Traffic Rules and Airport Traffic Patterns*
FAR PART 95, *IFR Altitudes*
FAR PART 97, *Standard Instrument Approach Procedures*

NOTE: The following publications are available for reference.
FAA AC 70/7460-2, *Proposed Construction or Alteration of Objects That May Affect The Navigable Airspace*
FAAO VN8200.3, *Policy With Respect To Military Program Procedures For Flight Inspection Of Foreign-Owned Air Navigation Facilities*
FAAO 8260.23, *Calculation of Radio Altimeter Height*
FAAO 8260.31, *Foreign Terminal Instrument Procedures*
IFIM, *International Flight Information Manual*
NOTAMs, *Notices To Airman Domestic/International (Published monthly)*
FAAO 8260.40, *Flight Management System (FMS) Instrument Procedure Development*
FAAO 8260.41, *Obstacle Assessment surface evaluation for Independent Simultaneous Parallel Precision Operations*
FAAO 8260.42, *Helicopter Nonprecision Approach Criteria Utilizing the Global Positioning System (GPS)*

Abbreviations and Acronyms

AFRC	Air Force Reserve Command
AFFSA	Air Force Flight Standards Agency
AICUZ	Air Installation Compatible Use Zone
AIP	Aeronautical Information Publication
ALS	Approach Lighting System
ASIS	Aviation Standards Information System
ANG	Air National Guard
APATC	Allied Publication Air Traffic Control
ARA	Airborne Radar Approach
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
CHUM	Chart Updating Manual
DA	Decision Altitude
DAFIF	Digital Aeronautical Flight Information File
DER	Departure End of Runway
DH	Decision Height
DME	Distance Measuring Equipment
DoD	Department of Defense
DP	Departure Procedure
DR	Dead Reckoning
DTED	Digital Terrain Elevation Data
DVOF	Digital Vertical Obstruction File
ECHUM	Electronic Chart Updating Manual
ESV	Expanded Service Volume
FAA	Federal Aviation Administration
FAAH	Federal Aviation Administration Handbook
FAC	Final Approach Course
FAF	Final Approach Fix
FAS	Final Approach Speed
FIO	Flight Inspection Office
FLIP	Flight Information Publications
FMS	Flight Management System

FTF	Fix-To-Fix
FTIP	Foreign Terminal Instrument Procedures
GIS	Geographic Information Systems
GPS	Global Positioning System
GS	Glide Slope
HAT	Height Above Touchdown
HAA	Height Above Airport
IACC	Interagency Air Cartographic Committee
IAF	Initial Approach Fix
IF	Intermediate Fix
IFIO	International Flight Inspection Office
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
KIAS	Knots Indicated Airspeed
MAJCOM	Major Command
MAP	Missed Approach Point
MDA	Minimum Descent Altitude
MIFRAC	Minimum IFR Altitude Chart
MLS	Microwave Landing System
MMLS	Mobile Microwave Landing System
MSA	Minimum Safe Altitude
MSL	Mean Sea Level
MVAC	Minimum Vectoring Altitude Chart
NAVAIDs	Navigational Aids
NATO	North Atlantic Treaty Organization
NIMA	National Imagery and Mapping Agency
NM	Nautical Mile
OE/AAA	Obstruction Evaluation/Airport Airspace Analysis
OIS	Obstacle Identification Surface
PAR	Precision Approach Radar
PCG	Positive Course Guidance
PV	Prevailing Visibility
RNAV	Area Navigation
ROC	Required Obstacle Clearance
RVR	Runway Visual Range
SM	Statute Mile
SSM	Side-Step Maneuver
STAR	Standard Terminal Arrival Route
TACAN	Tactical Air Navigation
TDZ	Touchdown Zone
TERPS	Terminal Instrument Procedures
VDP	Visual Descent Point
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omni-Directional Range Station

Terms

NOTE: For additional terms, refer to the glossaries in AFMAN 11-226 (I), Handbook FAAH 7110.65 *and Flight Information Publication (FLIP)*, General Planning.

Air Force Flight Standards Agency (AFFSA)--Responsible for the day-to-day management of the USAF Terminal Instrument Procedure Program.

Final Approval Authority--Standard Instrument Procedure (SIP)--Designated individual or agency that guarantees a SIP meets all criteria as stipulated in AFMAN 11-226 (I), NATO APATC-1, and other applicable directives. This authority also ensures the procedure package is complete as outlined in paragraph 2.3.2 of this instruction.

Flight Inspection--An inspection conducted in accordance with AFJMAN 11-225***, US Standard Flight Inspection Manual*** or ICAO Annex 10, Volume I, Part I, *Equipment and Systems.* This inspection also includes a check for flyability of the instrument procedure.

FLIP Maintenance--Systematic procedure used by Unit and/or MAJCOM TERPS for tracking and updating instrument procedures.

Flyability Check--An in-flight check normally accomplished by flying unit requesting the procedure to determine if a procedure is operationally acceptable.

High Altitude Instrument Procedure--Terminal instrument procedure that usually begins (approach) or ends (departure) at or above 18,000 feet mean sea level (MSL). The beginning/ending altitude may be lower to achieve compatibility with airspace constraints and optimum traffic flows.

Low Altitude Instrument Procedure--Terminal instrument procedure that usually begins (approach) or ends (departure) below 18,000 feet MSL.

Nonstandard Procedure--Procedure that deviates from the criteria or requirements of this instruction, AFMAN 11-226 (I), NATO APATC-1 and any approved supplements.

Obstruction Evaluation/Airport Airspace Analysis Program-An automated program to identify structures/civil airfields that affect military airfields.

Procedure Package--Documentation used to develop, revise, and approve instrument procedures. Examples of documents include maps, charts, automated products, computation sheets, and host nation aeronautical information publications (AIP).

Public-Use Procedure--Procedure that may be used by any agency or person.

Restricted-Use Procedure--Procedure limited in use; USAF ONLY or NOT FOR CIVIL USE.

Segment Review--A process in which properly constructed TERPS areas and/or any other areas associated with the procedure are evaluated to ensure proper obstacle clearance.

Obstacle Shadowing--When the elevation of an obstacle, in an obstacle evaluation section, is equal to or greater than the section before (closer to ARP), the obstacle lower and further from the ARP is considered “shadowed.”

Special Use Procedure--Operational required procedure that is not published in FLIP.

Standard Procedure--Procedure conforming with the criteria and requirements of this instruction, AFMAN 11-226 (I) or NATO APATC-1 and any approved supplements.

Terminal Instrument Procedure--Any procedure designed for instrument approach or departure of aircraft to or from an airport or point in space (for example, non-precision and precision approaches and standard instrument departures).

Attachment 2

EQUIVALENT REPORTABLE WEATHER VALUES
(Source: FMH-No. 1)

CEILING		RVR		PREVAILING VISIBILITY (PV)	
FEET	**METERS**	**FEET**	**METERS**	**SSM**	**METERS**
100	30	600	180	1/8	200
200	60	800	240	1/4	400
300	90	1,000	300	3/8	600
400	120	1,200	370	1/2	800
500	150	1,400	420	5/8	1,000
600	180	1,600	490	3/4	1,200
700	210	1,800	550	7/8	1,400
800	240	2,000	610	1	1,600
900	270	2,200	670	1 1/8	1,800
1,000	300	2,400	730	1 1/4	2,000
1,100	330	2,600	790	1 3/8	2,200
1,200	360	2,800	850	1 1/2	2,400
1,300	390	3,000	910	1 5/8	2,600
1,400	420	3,200	970	1 3/4	2,800
1,500	450	3,400	1,030	1 7/8	3,000
1,600	480	3,500	1,070	2	3,200
1,700	510	3,600	1,100	2 1/4	3,600
1,800	540	3,800	1,160	2 1/2	4,000
1,900	570	4,000	1,220	2 3/4	4,400
2,000	600	4,500	1,370	3	4,800
2,100	630	5,000	1,520	4	6000
2,200	660	5,500	1,670	5	8000
2,300	690	6,000	1,830	6	9000
2,400	720			7 and	9999
2,500	750			above	
2,600	780				
2,700	810				
2,800	840				
2,900	870				
3,000	900				
3,100	930				
3,200	960				
3,300	990				
3,400	1,020				
3,500	1,050				
3,600	1,080				
3,700	1,110				
3,800	1,140				
3,900	1,170				
4,000	1,200				
4,100	1,230				
4,200	1,260				
4,300	1,290				
4,400	1,320				
4,500	1,350				
4,600	1,380				
4,700	1,410				
4,800	1,440				
4,900	1,470				
>5000 but <10,000	Nearest 500’				
>10,000	Nearest 1000’				

Attachment 3

INSTRUMENT PROCEDURE CRITERIA

NOTE: This attachment clarifies and expands criteria that are not complete or are open to interpretation in AFMAN 11-226 (I), *Terminal Instrument Procedures (TERPS)* and *NATO Allied Publication Air Traffic Control-1 (APATC-1), Criteria for the Preparation of Instrument Approach and Departure Procedures*. Use this attachment with AFMAN 11-226 (I) and APATC-1. If there is any conflict between this and the TERPS documents, the criteria here govern.

A3.1. AFMAN 11-226 (I), Volume 1, paragraph 5b, Circling. Circling procedures shall not be designed for use with Precision IAPs. ***NOTE:*** This does not apply to host nation locations where the country has authorized circling from a precision procedure that does not have an accompanying non-precision procedure (i.e., ILS and Circling Minima without Localizer minima).
NOTE: Circling procedures are appropriate when localizer minima are authorized. (See AFMAN 11-217, Chapter 15, *Circling Approaches,* for aircrew guidance.)

A3.2. AFMAN 11-226 (I), Volume 1, paragraph 122a, Airport. This paragraph refers to FAA AC 150/5340-1, Marking of Paved Areas on Airports, and AC 150/5300-13, Airport Design. Use the applicable USAF directives in lieu of these FAA Advisory Circulars. They are: AFI 32-1042, *Standards for Marking Airfields*, and AFMAN 32-1123(I), *Airfield and Heliport Planning and Design*. Additionally, AFI 32-1044, *Visual Air Navigation Systems*, and AFMAN 32-1187 (Formerly AFMAN 32-1076), *Design Standards For Visual Air Navigation Systems*, contain guidance found in these FAA Advisory Circulars. Non-compliance with these Civil Engineering directives may require a waiver approval through appropriate CE channels and do not require a TERPS waiver.

A3.3. AFMAN 11-226 (I), Volume 1, paragraph 141, Nonstandard Procedures. Process waivers for military procedures according to this instruction.

A3.4. AFMAN 11-226 (I), Volume 1, paragraph 142, Changes. Process all non-procedural changes according to FLIP GP, Chapter 11; providing an information copy to MAJCOM TERPS office. Process procedural changes through channels per paragraph 6.2 in the basic text.

A3.5. AFMAN 11-226 (I), Volume 1, paragraph 150d, Coordinating Airspace Action. Ensure all instrument procedures "primary obstruction clearance areas" are within controlled airspace in the United States and where required by host nation regulations. The following criteria apply:
A3.5.1. Altitudes or heights established must be at least 300 feet above the floor of Class E Airspace, except that these altitudes or heights may be rounded to the nearest 100 feet. Outside the United States, procedures must be contained within controlled airspace according to host nation criteria.
A3.5.2. Outside of Class D airspace (and extensions) and Class E airspace, use air traffic control IFR lateral separation standards. (See FAAH 7110.65, Chapters 5 and 6)
A3.5.3. In Class D airspace (and extensions) and Class E airspace, use the criteria in FAAH 7400.2 and FAAO 8260.19, or the TERPS primary obstacle clearance area, whichever is greater.
A3.5.4. Ensure Instrument Approach Procedures which contain Category E Circling Minimums remain within the confines of Class D/E Surface Areas and/or extensions.
NOTE: AFI 13-201, *Airspace Management*, contains procedures for processing airspace actions.

A3.6. AFMAN 11-226 (I), Volume 1, paragraph 161, Straight-In Procedure Identification. If DME and RADAR identify the FAF, add "RADAR OR DME REQUIRED" in the plan view of the procedure. This applies to any equipment required (ADF OR DME REQUIRED, ADF OR RADAR REQUIRED, etc.).

A3.7. AFMAN 11-226 (I), Volume 1, paragraph 163, Differentiation. At USAF locations where both high and low altitude instrument approach/departure procedure are published in the same DoD FLIP, a procedure can be identified as a HI/LO procedure, e.g., HI/LO TACAN or VOR/DME Rwy 36. The procedure will be crosshatched along the upper left half of the top border and along the lower right half of the bottom border. The procedure will contain Category A-E minimums.

A3.8. AFMAN 11-226 (I), Volume 1, paragraph 211, Positive Course Guidance. When Positive Course Guidance is available, it shall be used to develop Missed Approach segments. Radar may be used as positive course guidance and the following note shall be published on the Approach/Departure Procedure: "RADAR REQUIRED."

A3.9. AFMAN 11-226 (I), Volume 1, paragraph 221, Minimum Safe Altitudes. Comply with this paragraph but note that the navigation facility on which a procedure is based may not always provide the pilot with the most useful origin for the MSA. If more useful information can be obtained from a facility other than the one on which the procedure is based, use that facility provided it is within 30 miles of the airport. This will only be accomplished after the procedure specialist has coordinated with all concerned agencies.

A3.10. AFMAN 11-226 (I), Volume 1, paragraph 221b, Emergency Safe Altitudes. The ESA Controlling Obstacle will be the highest obstacle in the search area. If there is more than one obstacle that is of the same height, the obstacle closest to the ESA center will be identified as the controlling obstacle.

A3.11. AFMAN 11-226 (I), Volume 1, paragraph 232a[2] and Table 1, Initial Approach Segments Based on Straight Course and Arcs With Positive Course Guidance. When a 15 NM arc is used, the OPTIMUM descent gradient is 800 feet per nautical mile.

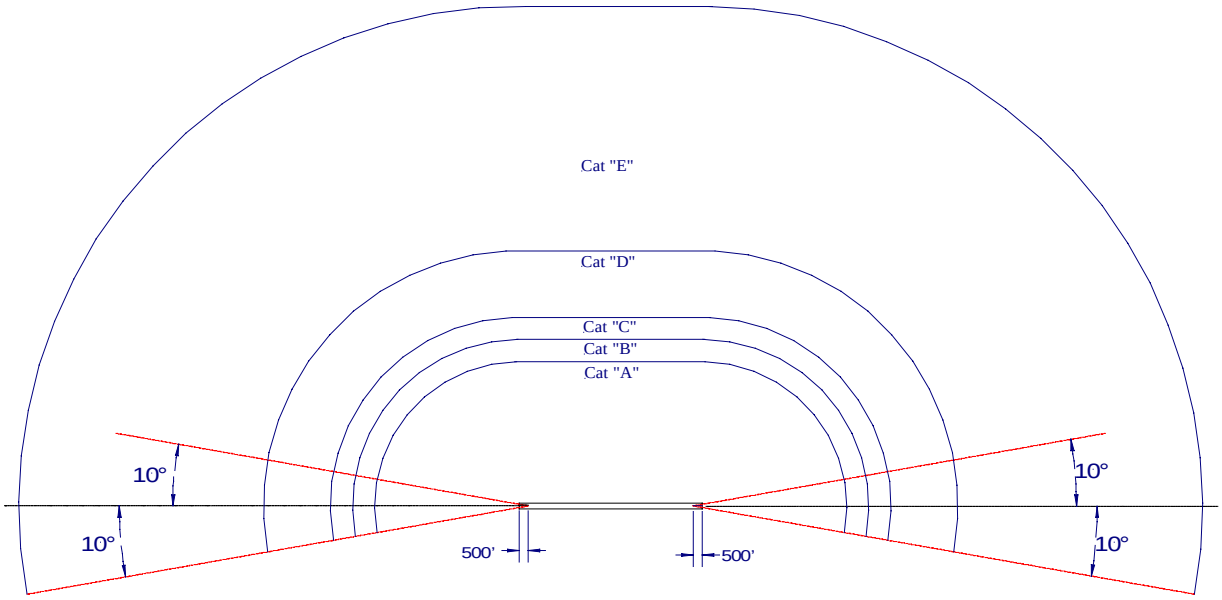
A3.12. AFMAN 11-226 (I), Volume 1, paragraph 235, Initial Approach Based On High Altitude Teardrop. This Initial Approach segment shall normally be used in situations where the altitude to be lost is 5000 feet or greater. Where less than 5000 feet of altitude is to be lost, Procedure Turn or other Initial Segment methods shall be used.
A3.12.1. When the procedure requires a delay before descent of more than 5 miles, the distance in excess of 5 miles (e.g., descent is delayed 8 miles; excess distance is 3 miles) **shall** be added to the distance the turn commences.

A3.13. AFMAN 11-226 (I), Volume 1, paragraph 252, Descent Angle/Gradient.
A3.13.1. Construct nonprecision approaches to provide a descent angle that is coincident with the associated VGSI angle. If this cannot be done, thus not coincident, the following note shall be published in the profile view of the procedure: "VGSI and descent angles not coincident."
A3.13.2. Do not publish a descent angle/gradient for ASR approaches.
A3.13.3. The Vertical Path Angle (VPA) and TCH shall not be published for the LOC/AZ-only portion of a precision approach. The angle and TCH for the ILS/MLS glideslope portion will be published as it always has.

A3.14. AFMAN 11-226 (I), Volume 1, paragraph 253, Visual Descent Point. Use this criteria and:
A3.14.1. With the exception of ASR approaches, establish a VDP for all non-precision procedures. ***NOTE:*** Procedures outside CONUS (i.e., Host Nation procedures and military bases applying APATC-1 criteria), exceptions may apply.
A3.14.1.1. A VDP fix can be less than one mile from a step-down fix or missed approach point, provided chart clarity is not compromised.
A3.14.1.2. When a VDP can not be published, document the reason in the procedure package (AF Form 3637, Item 31, Remarks).

A3.15. AFJMAN 11-226, Volume 1, paragraph 261, Circling Approach Area Not Considered for Obstacle Clearance. Additionally, when a sector is eliminated from the obstacle clearance area (e.g., "Circling NA West of Rwy 18-26") expand the obstacle clearance area within which circling is permitted to include a portion of the sector eliminated. The expanded portion of the obstacle clearance area will begin 500 feet down the runway (from the threshold) on the centerline. It will splay $\pm$ 10° either side of runway centerline and extend outward to the maximum circling distance. See Figure A3.1.

Figure A3.1. Circling Approach Area Not Considered for Obstacle Clearance.



A3.16. AFMAN 11-226 (I), Volume 1, paragraph 270, Missed Approach Segment. When developing missed approaches for PAR or ASR procedures, it is not necessary to use "non-radar" NAVAIDs. These radar missed approaches should be the same as normal climbout instructions, if possible, to get the aircraft back to minimum vectoring altitude for another approach or headed to an alternate airfield.

A3.17. AFMAN 11-226 (I), Volume 1, paragraph 272, Missed Approach Point. Crossing radial may be used to define a missed approach point. This will be considered a "Non-Standard Procedure" and processed IAW paragraph 5.5. Maximum acceptable fix error is 1/2 mile for crossing radial. Fix to NAVAID distance shall not exceed 7.9 NM.

A3.18. AFMAN 11-226 (I), Volume 1, paragraph 274, Straight Missed Approach Obstacle Clearance. In addition, note that instances may occur when an obstacle penetrates the 40:1 precision or non-precision missed approach surface and other solutions (e.g., DA adjustments) are not feasible. An equivalent level of safety may be achieved by selecting a climb gradient which matches a missed approach surface that clears the obstacle. If this alternative is selected, the procedure becomes nonstandard. Required minimum climb rate information must be graphically displayed on the procedure. The altitude or fix to which the climb gradient must be maintained must be published. ***NOTE:*** A climb gradient required for Air Traffic Control purposes or to prevent a climb-in-holding situation at the end of the missed approach segment shall be considered nonstandard and processed IAW paragraph 5.5. (Also see AFMAN 11-226 (I), Volume 1, paragraph 141).

A3.19. AFMAN 11-226 (I), Volume 1, paragraph 282, DME Fixes. In addition, describe in nautical miles when a "'fly-off" (level flight) is maintained from the primary facility or fix, before the beginning of the penetration or procedure turn or descent. Depict the beginning of the penetration or procedure turn or descent on the plan and profile view by associated DME values when available.

A3.20. AFMAN 11-226 (I), Volume 1, paragraph 310, Takeoff and Landing Minimums. Do not establish or publish alternate minima  for Air Force procedures. ***NOTE:*** Alternate minima are given in AFI 11-202, Volume 3, *General Flight Rules*, or as supplemented by each MAJCOM.

A3.21. AFMAN 11-226 (I), Volume 1, paragraph 320, Height Above Touchdown, HAT. In addition to the requirements of chapter 3, make sure each procedure specifies the HAT and/or height above airport (HAA). For foreign procedures, the minima must be the higher of the minima established by the host nation or required by AFMAN 11-226 (I) or APATC-1.

A3.22. AFMAN 11-226 (I), Volume 1, paragraph 323c, Minimums Adjustments. Excessive length of final computations does not apply to circling approach procedures.

A3.23. AFMAN 11-226 (I), Volume 1, paragraph 330c(2), Establishment of Visibility Minimums. The annotation "Fly Visual to the Airport" shall be placed in the plan and profile view when the MAP is 2 SM or greater from the threshold for Straight-In procedures or closest landing surface for circling approaches.

A3.24. AFMAN 11-226 (I), Volume 1, paragraph 334c, Runway Requirement for Approval of RVR. Use RVR minima equivalent to the no-light minima when runway markings are removed, deteriorated, or obscured and touchdown zone, and centerline lights are inoperative. See paragraph A3.26.

A3.25. AFMAN 11-226 (I), Volume 1, paragraph 342a, Runway Marking Obscuration. Runway markings should be in good condition when the procedures are established and minimums are prescribed IAW AFMAN 11-226 (I), Volume 1, Chapter 3 criteria. However, the condition of the runway markings will vary during periods when they are partially obscured by surface water, snow, ice or tire marks and it may be difficult to assess their value under these conditions. Airfield Management will coordinate with the OG/CC, or designated representative, to determine when these conditions are no longer adequate for taking credit for lights and will provide the results to the TERPS Specialist.

A3.26. AFMAN 11-226 (I), Volume 1, paragraph 343e, Visibility Reduction. Do not use see and avoid procedures for obstacles when developing Air Force instrument procedures.

A3.27. AFMAN 11-226 (I), Volume 1, paragraphs 513a[1][a] and 713a[1][a]. Apply the alignment criteria in paragraph 513a(2)(a).

A3.28. AFMAN 11-226 (I), Volume 1, paragraph 523b, Final Approach Segment. See supplemental paragraph A3.11 (this attachment) for allowable arc radius and descent gradient for the initial segment.

A3.29. AFMAN 11-226 (I), Volume 1, paragraph 613c(1) and 713c(1), Obstacle Clearance. NDB procedures that use the reduced ROC shall have following note published on the Approach Procedure: "NOT FOR CIVIL USE". NDB procedures developed using the higher (civil) ROC do not require this caveat unless driven by a different requirement.

A3.30. AFMAN 11-226 (I), Volume 1, paragraph 952, Alignment. Align localizers to meet final approach alignment criteria for VOR (no FAF), except make sure that the angle of divergence of the final approach course and the extended runway centerline does not exceed 3 degrees.

A3.31. AFMAN 11-226, Volume 1, paragraph 1750c(2), LF Airways and Routes. Add…begin the splay of the secondary areas at a point abeam the beginning of the primary area spay (50 NM from the facility). Maintain secondary area width of 4.34 NM to a point not to exceed the NAVAID limitation or 99 NM whichever occurs first.

A3.32. AFMAN 11-226, Volume 1, paragraph 1750 d.(2)(a), LF Airways and Routes. Apply paragraph 1721, except D1 has a total width of 4.3 NM out to a distance of 25 NM from the enroute facility.

A3.33. AFMAN 11-226 (I), Volume 1, Appendix 5, paragraph 1, Approach Lighting Systems. In addition to referenced paragraph, observe the sequenced flashers are not a part of the approach lighting system when applying credit for lights to instrument procedures. If the sequenced flashers are inoperative, the visibility minima for a procedure are not affected. However, if the Runway Alignment Indicator Lights (RAIL) are part of the approach lighting system (MALSR and SSALR), and the RAIL portion of the system becomes inoperative, revert to no-light visibility minimum.

A3.34. AFMAN 11-226 (I), Volume 3, paragraph 2.3, En Route, Initial, Intermediate Segments. Solid state ILS localizers have false courses approximately 35 degrees either side of the final approach course. To assist pilots in avoiding these courses, establish a lead point (fix or lead radial or bearing) that provides at least 2 miles of lead when any part of the initial approach course lies outside of plus or minus 10 degrees of the final approach course.

A3.35. AFMAN 11-226 (I), Volume 3, paragraph 2.9.1, Distance Measuring Equipment (DME). A DME fix used in lieu of an Outer Marker may be exempted from the six degree angular divergence criteria only upon completion of a successful flight inspection to verify the suitability of the fix. This exemption is limited to 23 degrees (AFMAN 11-226 (I), Volume 1, paragraph 282).

Attachment 4

TERMINAL INSTRUMENT PROCEDURES GUIDE

NOTE: This attachment provides terminal instrument procedures (TERPS) specialists with AFMAN 11-226 (I) quick reference calculations/formulas and guidance for using maps and charts in developing instrument procedures.

A4.1. GPI, RPI, TCH Computations.

A4.1.1. Calculate GPI, RPI, and TCH for ILS procedures as detailed in Figure A4.1 through A4.3. Factors that influence these computations include the glidepath angle (GPA), runway threshold elevation, glideslope antenna elevation, glideslope antenna to threshold distance, and runway crown elevation abeam glideslope antenna. The formulas vary based on whether the runway "slope" or gradient is positive or negative. Slope is negative if the threshold elevation is higher than that of the "RPI" and positive if the threshold elevation is lower. Always use Rapidly Dropping Terrain calculations. These calculations may also be used for MMLS procedures. Replace ILS glideslope antenna to threshold distance with MMLS elevation antenna to threshold distance. Also add the height of center of the elevation antenna phase array (normally 5 ft) to the elevation antenna site elevation and use in the place of the ILS glideslope antenna elevation.

Figure A4.1. RPI/GPI/TCH Computations for Runways with Zero Slope.

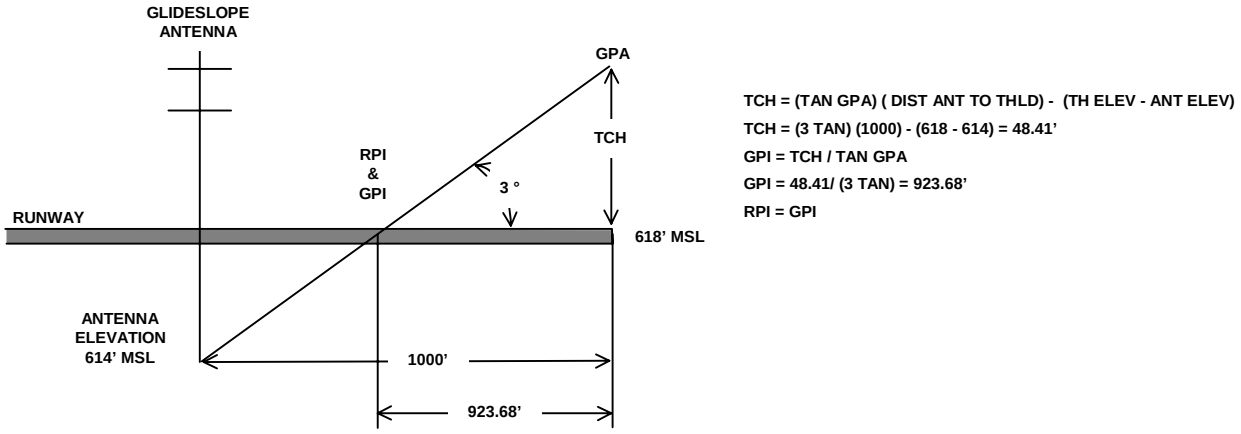


Figure A4.2. RPI/GPI/TCH Computations for Positive Sloping Runways.

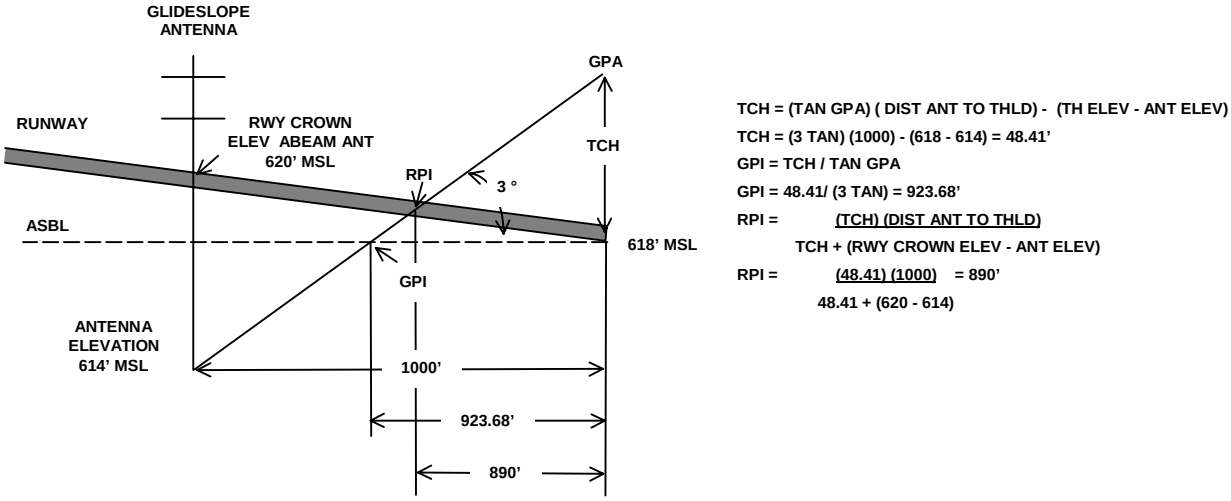
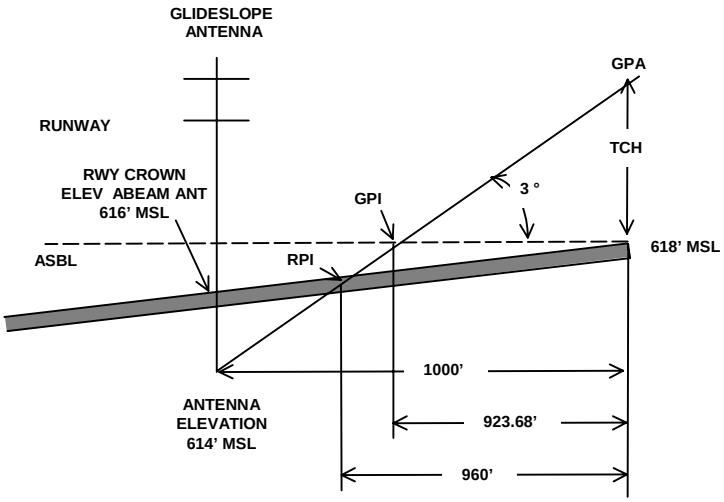


Figure A4.3. RPI/GPI/TCH Computations for Negative Sloping Runways.



TCH = (TAN GPA) (DIST ANT TO THLD) - (TH ELEV - ANT ELEV)
TCH = (3 TAN) (1000) - (618 - 614) = 48.41'
GPI = TCH / TAN GPA
GPI = 48.41/ (3 TAN) = 923.68'

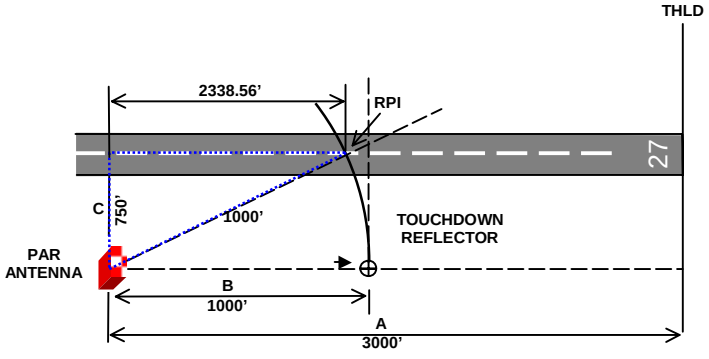
$$RPI = \frac{(TCH)\,(DIST\ ANT\ TO\ THLD)}{TCH + (RWY\ CROWN\ ELEV - ANT\ ELEV)}$$

$$RPI = \frac{(48.41)\,(1000)}{48.41 + (616 - 614)} = 960'$$

A4.1.2. For GPN 22/25, TPN-19 PAR systems, RPI computations are not necessary. The RPI is determined during system installation, and may be confirmed by the checking the "Touchdown (Kft)" value on the site parameter panel. ***NOTE***: This value is from RPI to the point abeam the PAR antenna. In order to use this RPI value (i.e. for coincidence issues, or FAA Form 8240-22 Facility Data Sheet input) the number must be converted to distance from threshold.

A4.1.3. For FPN-16/62, MPN-14K PAR systems, the RPI (touchdown) will be located at a point where an arc swung from the PAR antenna to the touchdown reflector crosses the runway centerline:

Figure A4.4. PAR RPI Distance from Runway Threshold.



THE RPI IS LOCATED ON THE RUNWAY CENTERLINE. THE DISTANCE FROM THE PAR ANTENNA TO THE RPI IS EQUAL TO THE DISTANCE FROM THE PAR ANTENNA TO THE TOUCHDOWN REFLECTOR. RPI DISTANCE FROM THRESHOLD MAY BE DETERMINED FROM THE FORMULA:

$$RPI = A - \sqrt{B^2 - C^2}$$

$$_{rpi}\quad 3000 \sqrt{(1000^{2} - 750^{2}} = 661.44') = 2338.56'$$

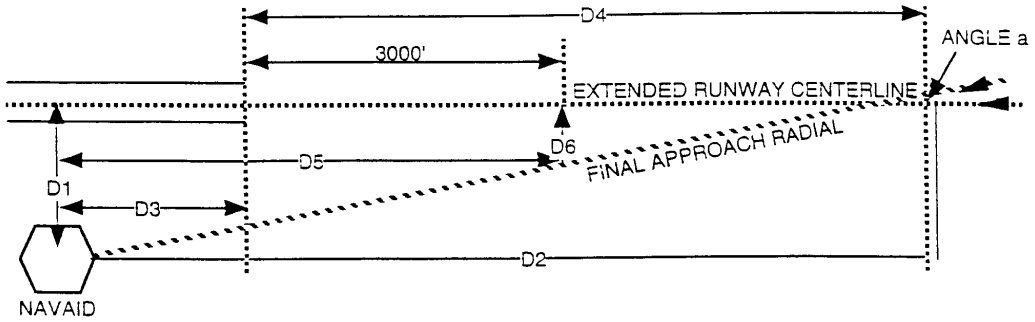
A = DIST ANT TO THLD
B = DIST REFLECTOR FROM ANT
C = DIST ANT FROM CENTERLINE

NOTE: PAR antenna and CLA reflector elevations relative to the elevation of the runway abeam their positions are not considered in these calculations. These elevations are compensated for by adjusting cursor voltages within the radar unit.

A4.1.4. TCH (also referred to as Reference Datum Height (RDH)) is the height of the glideslope directly above the runway threshold. Normally, this value is computed mathematically (see figures A4.1. through A4.3). At some locations, FAA flight inspection personnel apply FAAO 8240.47, ***Determination of Instrument Landing System (ILS) Glidepath Angle, Reference Datum Heights (RDH), and Ground Point of Intercept***. Using the "Best Fit Straight Line (BFSL)" method, flight inspection will determine a RDH based on ILS equipment performance recorded during the flight check. When this method is applied, the flight inspection report will indicate the RDH in the remarks section.

A4.2. Selection of TACAN and VOR Final Approach Radials for on-Airport Facilities. Radials selected must meet specified lateral displacement limits relating to extended runway centerlines. The final approach course should be aligned to intersect the extended runway centerline at a point 3,000 feet from the threshold. If an operational advantage can be attained when the final approach course does not intersect the centerline, the course must lie within 500 feet laterally of the extended centerline at a point 3,000 feet outward from the runway threshold. As it is difficult to determine accurate crossover points from drawings, the following systems can be used to determine the crossover point, lateral displacement of a radial, or determination of the optimum radial. It is paramount to ensure that engineering maps accurately reflect the location of NAVAIDs.

Figure A4.5. Selecting Final Approach Radial (NAVAID past Threshold).



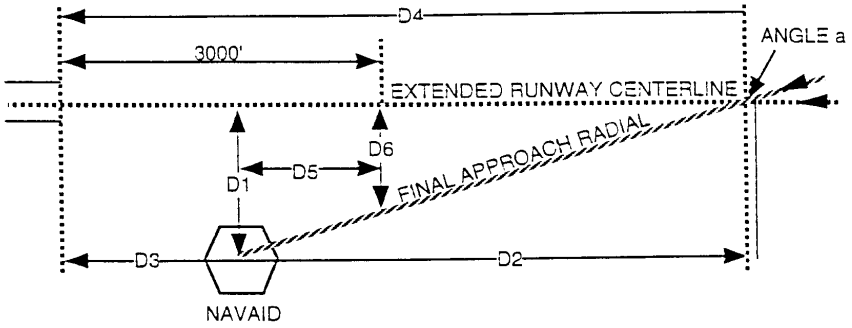
Symbology terminology:
Angle a = The difference between the runway heading and final approach course stated in degrees.
T = Tangent of angle a.
D-1 = Lateral distance from a point on the runway centerline or extended centerline, stated in feet, obtained from survey results or engineering maps.
D-2 = Distance in feet from a point on the runway centerline opposite the facility to the crossover point, derived from calculations explained below.
D-3 = Distance from a point on the runway centerline opposite the facility to runway threshold. This is a negative value if the facility is located behind the threshold (figure A4.5) or a positive value if the facility is located in front of the runway threshold (figure A4.6). Obtain this measurement from actual survey or engineering map.
D-5 = The distance from the facility to a point 3,000 feet from the runway is obtained by adding distance D-3 to 3,000 feet when D-3 is a negative value or by subtracting D-3 from 3,000 feet when D-3 is a positive value.
D-6 = The lateral displacement distance at 3,000 feet between the extended runway centerline and the final approach radial obtained by the following mathematical calculations.

Finding approach radial/runway centerline crossover point. The approach facility behind the runway threshold (figure A4.5):
Step 1. Determine the distance between the facility and the runway center-line (D-1).
Step 2. Obtain the distance between the facility and the runway threshold (D-3).
Step 3. Determine the difference between the inbound heading of the extended runway centerline and the inbound heading of the final approach course radial (angle a).
Step 4. Convert angle a to a tangent.
Step 5. Divide distance D-1 by the tangent.

Finding lateral displacement of approach radial/runway centerline 3,000 feet from runway threshold:
Step 1. Divide distance D-1 by the tangent of the angle a.
Step 2. Add distance D-3 to 3,000 feet to get distance D-5.
Step 3. Subtract distance D-5 from distance D-2.
Step 4. Multiply the result of Step 3 by the tangent of angle a. If the answer to Step 4 (distance D-6) is 500 feet or less, it meets lateral displacement criteria. If it exceeds 500 feet, consider selecting another radial or request a waiver.

Selecting final approach radials. By using the following method, a final approach radial can be selected that meets the lateral displacement criteria:
Step 1. Subtract 500 feet from distance D-1 (figure A4.5).
Step 2. Divide the answer in Step 1 by distance D-5 to obtain the tangent of angle a.
Step 3. Convert the tangent of angle a to degrees. Round up to the next hundredth (.01) of a degree.
Step 4. If the flight path of the aircraft along the final approach course crosses the extended centerline from right to left as in figure A4.5, subtract the results in Step 3 from the runway heading. If the aircraft crosses from left to right , add the results in Step 3. If the facility is located in front of the runway threshold as in figure A4.6, subtract distance D-3 from 3,000 feet in Step 2. The remainder of the calculations are the same. Reducing the distance subtracted from distance D-1, in Step 1, the approach radial will move closer to the centerline at the 3,000 foot point. As an example, by subtracting 0 feet from D-1 in Step 1, a crossover point is established at 3,000 feet.

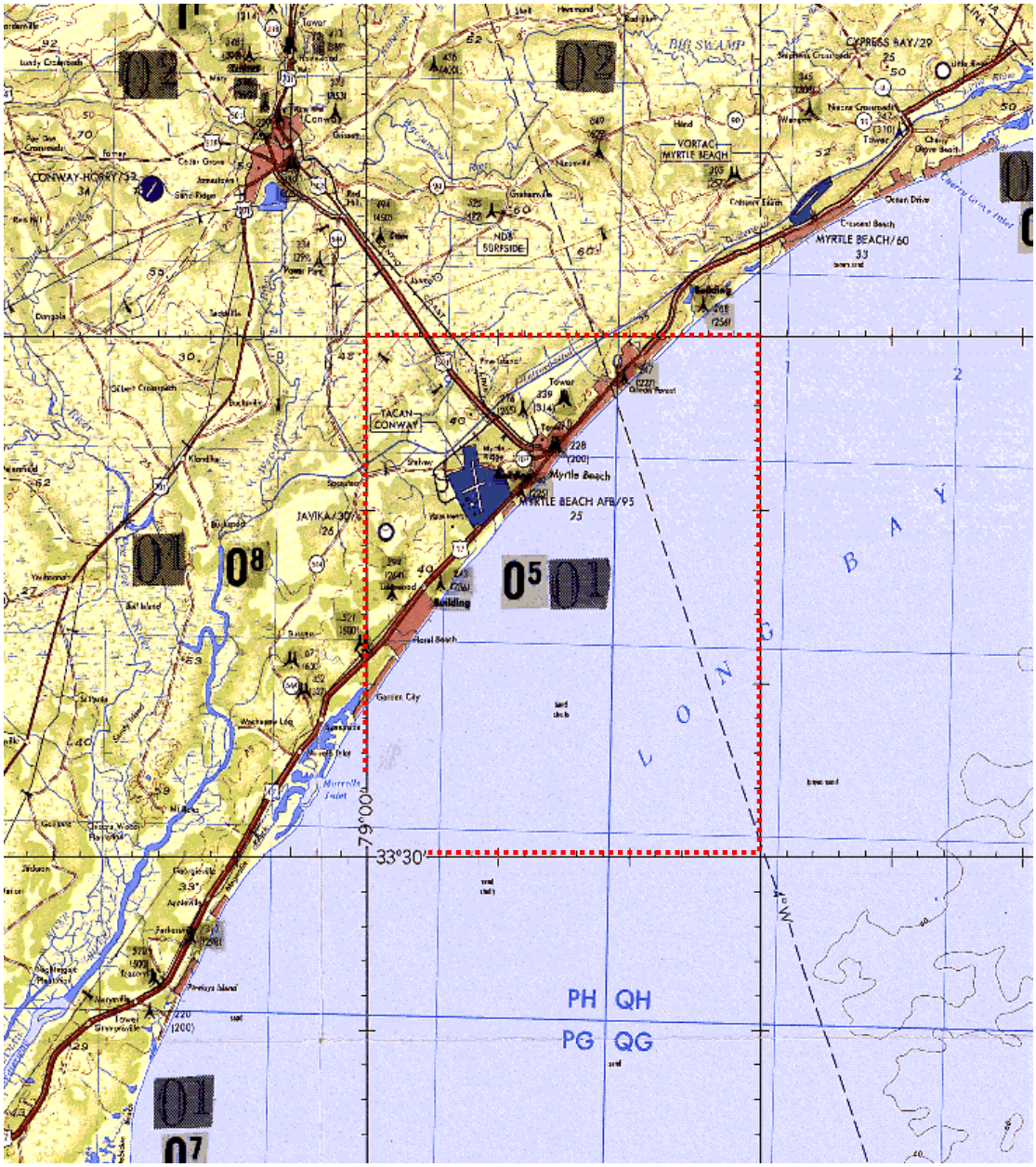
Figure A4.6. Selecting Final Approach Radial (NAVAID prior to Threshold).



A4.3. Determining DME Arc intercept angles. Precision criteria specifies a minimum length of the intermediate segment based on the angle of intercept between the initial segment and the localizer course. Use the formulas outlined in AFMAN 11-226, Volume 3, Chapter 2, General Criteria, to determine this angle.

A4.4. Determining Points on Maps and Charts. Since maps do not always accurately depict the Airfield Reference Point (ARP), NAVAIDs, fixes, or the locations of some man-made obstacles, the TERPS specialist must have the ability to manually plot geodetic (Lat/Lon) coordinates or determine the coordinates of a point depicted on a map. When using an engineer's scale to measure distances, the scale affording the greatest accuracy should be used. The scale selected must then be used throughout the operation.

Figure A4.8. Locating Lat/Lon Grid Rectangle that contains target coordinates.



A4.4.1. Plotting Known Geographical Coordinates. *NOTE*: Instead of Degrees/Minutes/Seconds, coordinates are sometimes recorded as Degrees/ Decimal minutes. See paragraph A4.7 for conversion calculations.

Example: Plot the ARP coordinates at Myrtle Beach International airport (N 33° 40' 47.10" W 078° 55' 42.00")
Step 1. Locate the Lat/Lon grid rectangle that contains the coordinates to be plotted. Figure A4.8 depicts a 1:250,000 Joint Operations Graphic (JOG).

Example: The MYR ARP coordinates are located within the rectangle N 33° 30' 00" W 078° 45' 00" (lower right corner) to N 33° 45' 00" W 079° 00' 00" (upper left corner).

Step 2. Using an engineers scale, determine the number of seconds per "tick" of latitude and longitude on the scale map being used.

Example:

Latitude: Measure the distance between two latitudes that make the top and bottom sides of the rectangle determined in Step 1 with the 60 scale on an engineer's ruler. Our example uses N 33° 30' 00" and N 33° 45' 00"

The difference between N 33° 30' 00" and N 33° 45' 00" is 15'. Convert 15' to seconds by multiplying by 60. (15' x 60= 900")

The measured distance between N 33° 30' 00" and N 33° 45' 00" is 261 "ticks".

261 "ticks" divided by 900" = 0.29 seconds per "tick".

Longitude: Measure the distance between two longitudes that make the right and left sides of the rectangle determined in Step 1 with the 60 scale on an engineers ruler. Our example uses N 78° 45' 00" and N 79° 00' 00".

The difference between N 78° 45' 00" and N 79° 00' 00" is 15'. Convert 15' to seconds by multiplying by 60. (15' x 60= 900")

The measured distance between N 78° 45' 00" and N 79° 00' 00"" is 191 "ticks".

191 "ticks" divided by 900 = 0.21222 seconds per "tick".

Step 3. See figure A4.9. Identify a longitude on the lat/lon grid close to the longitude of the target coordinate. Along this same longitude line, identify the working latitude close to the latitude of the target coordinate. Add or subtract this latitude value from the target latitude as appropriate. ***NOTE***: It is generally easier to select the working latitude that is less than the target latitude, but either way is acceptable

Example 1: Working latitude selected is N 33° 40' 00". Determine the sum of the difference between the target Latitude N 33° 40' 47.10" and the working latitude to determine the number of seconds difference.

33° 40' 47.10"
- 33° 40' 00.00"
47.10"

Example 2: Working latitude selected in N 33° 41' 00". Determine the sum of the difference between the target Latitude N 33° 40' 47.10" and the working latitude to determine the number of seconds difference.

33° 41' 00.00"
- 33° 40' 47.10"
12.9"

Step 4. Determine the number of engineer scale "ticks" for the sum determined in step 3. Measure this distance from the working latitude and mark with a working line perpendicular to the target longitude.

Example 1: 47.10 x 0.29 = 13.659 or 14 "ticks" north of N 33° 40' 00".

Example 2: 12.9 x 0.29 = 3.741 or 4 "ticks" south of N 33° 41' 00"

Step 5. See figure A4.9. Add or subtract the working longitude value from the target longitude as appropriate in the same manner for longitude in Step 3. ***NOTE***: It is generally easier to select a working longitude that is less than the target longitude, but either way is acceptable.

Example 1: Working longitude selected is W 78° 55' 00". Determine the sum of the difference between the target longitude W 78° 55' 42.00" and the working longitude to determine the number of seconds difference.

78° 55’ 42.00”
- 78° 55' 00.00”
42.00”

Example 2: Working longitude selected in W 78° 56’ 00”. Determine the sum of the difference between the target longitude W 78° 55' 42.00" and the working longitude to determine the number of seconds difference.

78° 56' 00.00”
- 78° 55' 42.00”
18.0”

Step 6. Determine the number of engineer scale “ticks” for the sum determined in step 5.

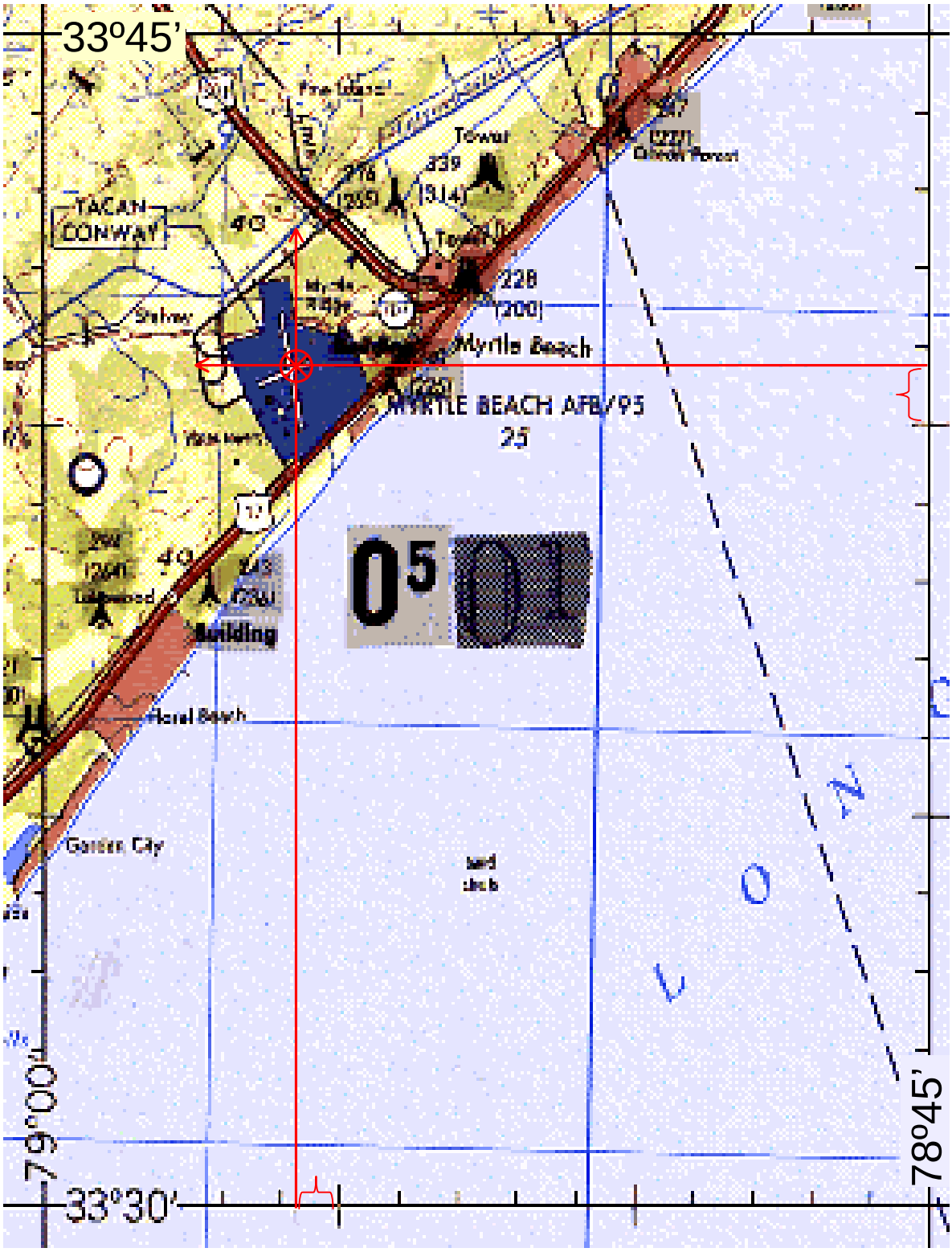
Example 1: 42 x 0.2122 = 8.9124 or 9 “ticks” west of N 78° 55' 00”

Example 2: 18 x 0.2122 = 3.8196 or 4 “ticks” east of N 78° 56' 00”

Measure this distance from the target longitude and mark with a working line perpendicular to the latitude grid. Mark the intersection of the two working lines. This is the location of the target coordinates (ARP).

A4.4.2. Determining Unknown Geographical Coordinates. The process for determining a set of coordinates for an object/point depicted on a map is the reverse of those steps for plotting known coordinates. First take steps 1 and 2 as outlined in paragraph A4.4.1. Next draw two working lines through the point, first perpendicular to longitude, then perpendicular to latitude, making sure the lines are long enough to intersect the lat/lon grid. Determine the working latitude/longitude by finding the nearest hashmark from the points where the working lines intersect the latitude/longitude grid. Using an engineer’s ruler, measure the number of “ticks” between the working lines and the working latitude/longitudes. ***Divide*** the number of “ticks” by the seconds per “tick” values to determine the number of seconds the point is from the working latitude/longitude. Add or subtract as necessary the seconds from the working coordinates to determine the latitude/longitude.

Figure A4.9. Measuring Distance from Working Latitude/Longitude to Target Latitude/Longitude.



A4.5. True Bearing Conversions.
TRUE BEARINGS shown on some engineering maps are depicted as values between 000 and 090, by quadrant. These bearings must be converted to TRUE AZIMUTH (relative to true north) for TERPS application. Using the illustration (Figure A4.10.), convert TRUE BEARING to TRUE AZIMUTH as follows:

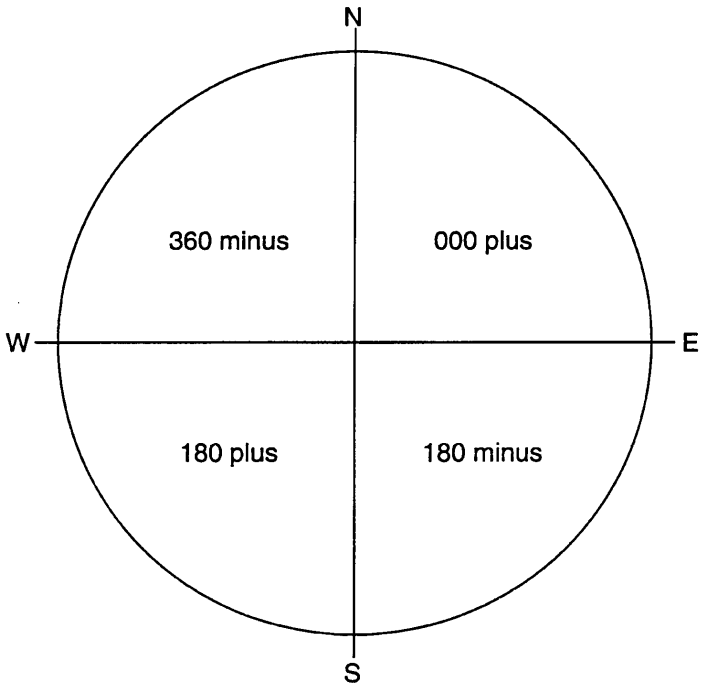
Example: True Bearing N45E
1. N and E identify the quadrant
2. 000 plus 045 = 045° true azimuth

Example: True Bearing S45E
1. S and E identify the quadrant
2. 180 minus 045 = 135° true azimuth

Example: True Bearing S45W
1. S and W identify the quadrant
2. 180 plus 045 = 225° true azimuth

Example: True bearing N45W
1. N and W identify the quadrant
2. 360 minus 045 = 315° true azimuth

Figure A4.10. True Bearing Conversions



A4.6 True/Magnetic Azimuth Conversions.

A4.6.1. To convert from true azimuth to magnetic azimuth (i.e. NAVAID radial or magnetic heading to be flown), add or subtract the NAVAID slaved magnetic variation or the airport magnetic variation of record to the true azimuth per table A4.1. If the result is greater than 360 degrees, subtract 360 degrees to convert the result to a value between 0 and 360 degrees.

Table A4.1. True to Magnetic Azimuth Conversions.

True Azimuth	Variation - East/+ West	= Magnetic Azimuth (NAVAID Radial or Mag Heading)
060º	**010ºE**	**= 050º**
060º	**010ºW**	**= 070º**

A 4.6.2. To convert from a magnetic azimuth (i.e. NAVAID radial or magnetic heading) to true azimuth, add or subtract the slaved magnetic variation of the NAVAID or the airport magnetic variation of record to the magnetic azimuth per figure A4.2. If the result is greater than 360 degrees, subtract 360 degrees to convert the result to a value between 0 and 360 degrees.

Table A4.2. Magnetic to True Azimuth Conversions.

Magnetic Azimuth (NAVAID Radial or Mag Heading)	Variation + East/- West	= True Azimuth
050º	**010ºE**	**= 060º**
050º	**010ºW**	**= 040º**

A 4.7. Miscellaneous Formulas:

1 NM = 6076.11548 feet
1 NM = 1.852 Kilometers

1 SM = 5280 feet
1 Km = 3280.8399 feet

1” Latitude = 101.268594 feet (average)
1 meter = 39.3700787 inches/3.2808399 feet

To Convert	To	Function	By Value
Meters	Feet	multiply	3.2808399
		divide	0.3047999
Feet	Meters	multiply	0.3047999
		divide	3.2808399
Meters	Yards	multiply	1.093613298
		divide	0.91439998
Yards	Meters	multiply	0.91439998
		divide	1.093613298
Kilometers	Statute Miles (SM)	multiply	0.621371193
		divide	1.609343997
Statute Miles (SM)	Kilometers	multiply	1.609343997
		divide	0.621371193
Kilometers	Nautical Miles (NM)	multiply	0.539956804
		divide	1.851999995
Nautical Miles (NM)	Kilometers	multiply	1.851999995
		divide	0.539956804
Nautical Miles (NM)	Statute Miles (SM)	multiply	1.150779447
		divide	0.868976242
Statute Miles (SM)	Nautical Miles (NM)	multiply	0.868976242
		divide	1.150779447

FAF to MAP Calculations - $\frac{\text{Dist(nm)}}{\text{Speed in knots}} \times 60$ = Time in decimal minutes (i.e. 3.5 = 3 minutes, 30 seconds)

Rate of Descent FPM = Ground Speed Knots x $\frac{\text{(G/S angle)}}{(57.29577951)}$ x 101.2685914

Coordinates in Degree/Decimal minutes to Degree/Minutes/Seconds:

Decimal portion of Minutes x 60 = Seconds

Example: N 32º 25.69'

.69 x 60 = 41.4"

N 32º 25.69 = N 32º 25' 41.40"

Coordinates in Degree/Minutes/Seconds to Degree/Decimal Minutes:

(Seconds ÷ 60 = Decimal) + minutes

Example: N 78º 13' 43.20"

(43.20 ÷ 60 =. 72) + 13 = 13.72'

N 78º 13' 43.20" = N 78º 13.72'

To find the length or angle of an arc (Figure A4.11):

$$\text{Length} = \frac{\text{angle x radius}}{57.29577951}$$

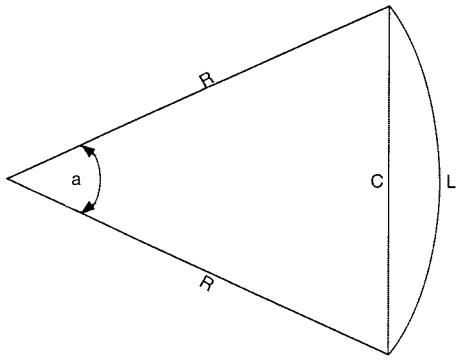
$$\text{Angle} = \frac{57.29577951 \times \text{length}}{\text{radius}}$$

The following formula may be used when it becomes necessary to calculate the straight-line distance between two points on an arc:

$$\text{Chord(C)} = 2\ R \sin \frac{(a)}{2}$$

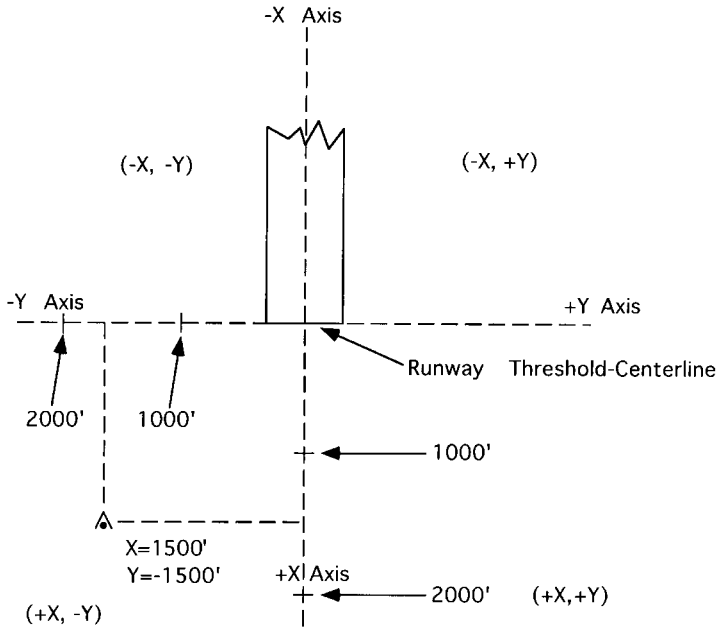
Angle(a) = Number of degrees between Radials
Radius R = Distance (DME) of arc

Figure A4.11. Straight-Line Distance Between Two Points of an Arc.



A4.8. Cartesian Coordinates (X-Y axes). The position of an obstacle or facility can be located by determining its location by referencing it to the threshold of a runway. Use an engineer's scale and the proper measurement scale from the map to find the coordinate (Figure A4.12.).

Figure A4.12. Cartesian Coordinates.



A4.9. Calculating length of Teardrop Initial segment. Use figure A4.13 to determine the length of the turning portion of a teardrop initial segment.

Figure A4.13. Length of Teardrop Initial Segment (turning portion only).

EXAMPLE:

Teardrop Angle: 26 degrees
Amount of Turn: 180 + 26 = 206 degrees
Turn Point Dist: 20 NM

Step 1: Find Teardrop turn radius.

Find halfway radial (26/2 = 13 = a).
Use turn point distance (20 NM = R).
Use formula: 2R sin (a)/2

2 x (20) = 40
sin (13)/2 = .1124
40 x .1124 = 4.499
4.499 = r (Teardrop turn radius)

Step 2: Find length of turn.

Use formula: $\frac{\text{Angle x Radius}}{57.29577951}$ **= Length**

Note: Angle (206 dgrees) is the amount of turn required to complete the teardrop.

$$\frac{206 \times 4.499}{57.29577951} = 16.175 \text{ NM}$$

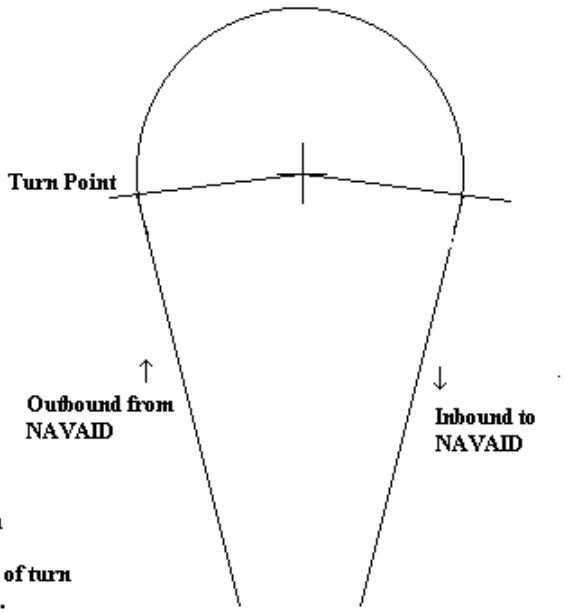


Table A4.3. RNAV Coordinate Conversion Table

SECONDS TO TENTHS OF MINUTES

SECONDS		TENTH OF MINUTE	SECONDS		TENTH OF MINUTE	SECONDS		TENTH OF MINUTE
57-02	=	.0	15-20	=	.3	33-38	=	.6
03-08	=	.1	21-26	=	.4	39-44	=	.7
09-14	=	.2	27-32	=	.5	45-50	=	.8
						51-56	=	.9

SECONDS AND TENTHS OF SECONDS TO HUNDRETHS OF MINUTES

Sec/10th		Min/100th	Sec/10th		Min/100th	Sec/10th		Min/100th	Sec/10th		Min/100th
00.0-00.2	=	0.00	14.7-15.2	=	0.25	29.7-30.2	=	0.50	44.7-45.2	=	0.75
00.3-00.8	=	0.01	15.3-15.8	=	0.26	30.3-30.8	=	0.51	45.3-45.8	=	0.76
00.9-01.4	=	0.02	15.9-16.4	=	0.27	30.9-31.4	=	0.52	45.9-46.4	=	0.77
01.5-02.0	=	0.03	16.5-17.0	=	0.28	31.5-32.0	=	0.53	46.5-47.0	=	0.78
02.1-02.6	=	0.04	17.1-17.6	=	0.29	32.1-32.6	=	0.54	47.1-47.6	=	0.79
02.7-03.2	=	0.05	17.7-18.2	=	0.30	32.7-33.2	=	0.55	47.7-48.2	=	0.80
03.3-03.8	=	0.06	18.3-18.8	=	0.31	33.3-33.8	=	0.56	48.3-48.8	=	0.81
03.9-04.4	=	0.07	18.9-19.4	=	0.32	33.9-34.4	=	0.57	48.9-49.4	=	0.82
04.5-05.0	=	0.08	19.5-20.0	=	0.33	34.5-35.0	=	0.58	49.5-50.0	=	0.83
05.1-05.6	=	0.09	20.1-20.6	=	0.34	35.1-35.6	=	0.59	50.1-50.6	=	0.84
05.7-06.2	=	0.10	20.7-21.2	=	0.35	35.7-36.2	=	0.60	50.7-51.2	=	0.85
06.3-06.8	=	0.11	21.3-21.8	=	0.36	36.3-36.8	=	0.61	51.3-51.8	=	0.86
06.9-07.4	=	0.12	21.9-22.4	=	0.37	36.9-37.4	=	0.62	51.9-52.4	=	0.87
07.5-08.0	=	0.13	22.5-23.0	=	0.38	37.5-38.0	=	0.63	52.5-53.0	=	0.88
08.1-08.6	=	0.14	23.1-23.6	=	0.39	38.1-38.6	=	0.64	53.1-53.6	=	0.89
08.7-09.2	=	0.15	23.7-24.2	=	0.40	38.7-39.2	=	0.65	53.7-54.2	=	0.90
09.3-09.8	=	0.16	24.3-24.8	=	0.41	39.3-39.8	=	0.66	54.3-54.8	=	0.91
09.9-10.4	=	0.17	24.9-25.4	=	0.42	39.9-40.4	=	0.67	54.9-55.4	=	0.92
10.5-11.0	=	0.18	25.5-26.0	=	0.43	40.5-41.0	=	0.68	55.5-56.0	=	0.93
11.1-11.6	=	0.19	26.1-26.6	=	0.44	41.1-41.6	=	0.69	56.1-56.6	=	0.94
11.7-12.2	=	0.20	26.7-27.2	=	0.45	41.7-42.2	=	0.70	56.7-57.2	=	0.95
12.3-12.8	=	0.21	27.3-27.8	=	0.46	42.3-42.8	=	0.71	57.3-57.8	=	0.96
12.9-13.4	=	0.22	27.9-28.4	=	0.47	42.9-43.4	=	0.72	57.9-58.4	=	0.97
13.5-14.0	=	0.23	28.5-29.0	=	0.48	43.5-44.0	=	0.73	58.5-59.0	=	0.98
14.1-14.6	=	0.24	29.1-29.6	=	0.49	44.1-44.6	=	0.74	59.1-59.6	=	0.99
									59.7-59.9	=	1.00

A4.10. Calculating Missed Approach Climb Gradients.

PRECISION:

$$h = Oe - (DA - [\tan(gpa) \times 1460])$$

$$CG = \frac{h}{0.76 \times d}$$

Where Oe = Obstruction MSL elevation

h = *height* of obstruction above the altitude from which the climb is initiated

d = Shortest distance (NM) from end of section 1A to obstruction

gpa = glide path angle

Example:

$$332 = \frac{1549 - (300 - [\tan(3.00) \times 1460])}{0.76 \times 5.26}$$

Where Oe = 1549 feet MSL

DA = 300 feet MSL

gpa = 3.00°

d = 5.26 NM

To determine the altitude where a standard CG can be resumed, add the required ROC to the height of the obstacle. Example: ROC = 0.24(CG x d) 419.11 = 0.24(332x5.26) 420+1549=1969 (round up to next 100 ft. increment).

MA climb gradient of 340 ft/NM until 2000' MSL

NONPRECISION:

$$h = Oe - (MDA - [ROC + Adj])$$

$$CG = \frac{h}{0.76 \times d}$$

Where Oe = Obstruction MSL elevation

h = *height* of obstruction above the altitude from which the climb is initiated

d = Shortest distance (NM) from start of missed approach area

Example:

$$344.95 = \frac{1549 - (420 - 250)}{0.76 \times 5.26 NM}$$

Where Oe = 1549 feet MSL

MDA = 420 feet MSL

d = 5.26 NM

To determine the altitude where a standard CG can be resumed, add the required ROC to the height of the obstacle. Example: ROC = 0.24(CG x d) 435.52 = 0.24(345x5.26) 436+1549=1985 (round up to next 100 ft. increment).

MA climb gradient of 350 ft/NM until 2000' MSL

Attachment 5

CHECKLIST FOR REVIEW OF HOST NATION AIPs
(Accredited Nations)

A5.1. Is the candidate an ICAO member nation?

A5.2. If the AIP is for more than one country, are the candidate's methods and practices clearly discernible?

A5.3. If military procedures are involved, does the AIP specify methods and practices employed by the military authorities? ***NOTE:*** Each country's military and civilian "TERPS" process must be evaluated separately if different methods are used to develop instrument procedures.

A5.4. Is the criteria utilized for the design of instrument procedures U.S. TERPS, ICAO PAN-OPS, or NATO APATC-1?

A5.5. Is flight inspection performed to international standards, for example ICAO Annex 10 or FAAH 8200.1?

A5.6. Have host declared exceptions to criteria and rules been evaluated and forwarded through channels to AFFSA/XOIP for approval?

A5.7. Does the TERPS office have an open line of communication with the host nation instrument procedure/aviation data OPR(s) to ensure AIP currency and maintainability?

A5.8. Does the MAJCOM TERPS office receive host NOTAMs? Timeliness is critical.

A5.9. Is the TERPS staff capable of sending NOTAMs?

A5.10. Have any sources (NIMA, USDAO, FAA, USAASA, NAVFIG, other USAF organizations, etc.) provided any specifics which undermine confidence in the host's products, methods, or practices?
NOTE: Failure of any of the "Confidence" checks required within this checklist will require immediate removal from the list. Procedures that are published in these accredited nations shall be NOTAM'd "Not Authorized" until a satisfactory, TERPS review has been completed and therefore subject to possible waiver actions.

Attachment 6

CHECKLIST FOR SPECIAL ACCREDITATION OF HOST NATIONS/AIRPORTS

A6.1. (NATION/AIRPORT) Is the candidate located within your MAJCOM area of responsibility (AOR) and an ICAO member nation? (YES/NO)

A6.2. (NATION) If the AIP is for more than one country, are the candidate's methods and practices clearly discernible? (YES/NO)

A6.3. (NATION/AIRPORT) If military procedures are involved, does the AIP specify methods and practices employed by the military authorities? (YES/NO EXPLAIN) ***NOTE:*** Each country's military and civilian instrument procedure development process must be evaluated separately if different methods are used.

A6.4. (NATION/AIRPORT) Was U.S. TERPS, Canadian Criteria For Development of Instrument Procedures, ICAO PAN-OPS, NATO APATC-1 criteria utilized for the design of the instrument procedure? (YES/NO; IDENTIFY CRITERIA USED)

A6.5. (NATION and AIRPORT) Is flight inspection performed to international standards, for example ICAO Annex 10 or FAAH 8200.1? (YES/NO EXPLAIN CRITERIA/EXCEPTIONS)

A6.6. (NATION) Has the host declared exceptions to criteria and rules been evaluated and forwarded through channels to AFFSA/XOIP for approval? (YES/NO If there are exceptions to criteria, explain)

A6.7. (NATION/AIRPORT) Does the MAJCOM TERPS office have an open line of communication with the host nation instrument procedure/aviation data OPR(s) to ensure AIP/individual procedure currency and maintainability? (YES/NO)

A6.8. (NATION/AIRPORT) Does the MAJCOM TERPS office receive host nation NOTAMs timely enough to ensure corrective action can be taken? (YES/NO)

A6.9 (NATION/AIRPORT) For the airport(s) being certified, are NOTAMs for Temporary/Permanent instrument procedure changes being sent to the US NOTAM system? (YES/NO)

A6.10. (NATION/AIRPORT) Have any sources (NIMA, USDAO, FAA, USAASA, NAVFIG, other USAF MAJCOMs, etc.) provided any specifics that undermine confidence in the host's products, methods, or practices? (YES/NO – IF YES, EXPLAIN)

A6.11. (NATION) Nations to be accepted for special accreditation shall be on the accredited list for a minimum of two years prior to acceptance to this highest level of credibility. A visit conducted by the MAJCOM TERPS office to the nation's procedure development office shall be conducted to review the host nation procedure development standards and practices. Historical data should be representative of both small and large airports for at least two years. (Provide a statement that these requirements have been met. If a visit to the nations instrument procedure staff could not be conducted, explain and provide rationale on why they should be accepted without this visit.)

A6.12. (AIRPORT) Historical data for the past two years for precision and non-precision procedures to the primary instrument runways have been evaluated and no safety concerns have been identified. A visit conducted by the MAJCOM TERPS office to the airport (nation) procedure development office shall be conducted to review the procedure development standards and practices for that specific airport. (Provide a statement that these requirements have been met. If a visit to the nations instrument procedure staff could not be conducted, explain and provide rationale on why they should be accepted without this visit.)

A6.13. (NATION/AIRPORT) Nations and airports shall be subjected to a biennial review to ensure all standards continue to be met and a determination made if they should remain on this special list. (MAJCOMs shall maintain documented proof that the review was completed)

A6.14. (NATION/AIRPORT) Failure of any of the "Confidence" checks required within this checklist will require immediate removal from the list. MAJCOMs will determine if the Special Accredited Nations can remain on the accredited nation list or removed completely. Special Accredited Airports procedures not in accredited nations shall be NOTAM'd "Not Authorized" until a satisfactory, TERPS review has been completed and subject to possible waiver actions.

A6.15. (NATION/AIRPORT) Approval request and supporting documentation for special accreditation of nations/airports shall be sent to HQ AFFSA/XOIP and forwarded to HQ AFFSA/CC for approval.

Attachment 7

CHECKLIST FOR REVIEW OF FOREIGN TERMINAL INSTRUMENT PROCEDURES

This review determines if the procedure conforms to U.S. TERPS criteria. ***NOTE:*** *If the procedure does not conform to U.S. TERPS criteria, determine if the anomaly meets ICAO PANS-OPS, APATC-1, or the host nations own criteria standards. When anomalies are discovered, determine if/what action is necessary to compensate.*

Review the FAA International Flight Information Manual and FAA Notices To Airman-Domestic/International for potential concerns that may discourage use/ acceptance.

DETERMINE IF HOST NATION HAS ESTABLISHED DEPARTURE PROCEDURES FOR OBSTACLE AVOIDANCE.

MSA
- NAVAID/SOURCE

HOLDING PATTERNS
- LEG LENGTH
- NO COURSE SIGNAL ZONE
- AIRSPEED REQUIREMENTS

INITIAL SEGMENT
- FIX IDENTIFICATION
- ALTITUDES
- TEARDROP ANGLE OF DIVERGENCE
- ARC/SEGMENT LENGTH
- DESCENT GRADIENT
- LEAD RADIAL
- COURSE ALIGNMENT
- SPECIAL NOTES

INTERMEDIATE SEGMENT
- FIX IDENTIFICATION
- ALTITUDES
- SEGMENT LENGTH
- DESCENT GRADIENT
- LEAD RADIAL
- COURSE ALIGNMENT
- SPECIAL NOTES

FINAL SEGMENT
- FIX IDENTIFICATION
- ALTITUDES
- SEGMENT LENGTH
- DESCENT GRADIENT
- COURSE ALIGNMENT
- STEPDOWN FIXE(S)
- MAP LOCATION
- THRESHOLD CROSSING HEIGHT
- MINIMUMS
- SPECIAL NOTES

MISSED APPROACH SEGMENT
- COURSE ALIGNMENT
- ALTITUDE CLIMB GRADIENTS
- SPECIAL NOTES
- REVIEW WORDING OF MISSED APPROACH
- INSTRUCTIONS

CIRCLING
- RESTRICTIONS
- SPECIAL NOTES

PLAN VIEW
- SPECIAL NOTES
- RESTRICTIONS
- LEGIBILITY

PROFILE VIEW
- SPECIAL NOTES
- RESTRICTIONS
- LEGIBILITY

DEPARTURE PROCEDURES
- DER CROSSING HEIGHTS/RESTRICTIONS
- CLOSE-IN OBSTACLE DEPICTIONS
- EARLY TURNS
- CLIMB GRADIENTS
- CROSSING ALTITUDES
- POSITIVE COURSE GUIDANCE
- COMPLEXITY (Determine if text or graphic depiction is required)
- SPECIAL NOTES
- RESTRICTIONS

FLYABILITY CHECK
- IDENTIFY SPECIFIC AREAS OF CONCERN

MISCELLANEOUS
- PROXIMITY TO SPECIAL USE AIRSPACE

Attachment 8

INSTRUMENT PROCEDURE FLYABILITY CHECK INSTRUCTIONS

A8.1. Instrument procedure flyability checks are flown to ensure procedures are safe, practical, and consistent with good operating procedures. Flyability checks are NOT official flight inspections ("flight checks"), but shall include the entire procedure including the missed approach segment and all holding patterns. Flyability Checks are documented on AF Form 3992, ***Instrument Procedure Flyability Check, Instrument Approach Procedure (IAP)*** or AF Form 3993, ***Instrument Procedure Flyability Check, Departure Procedure (DP),*** which ever is appropriate. These forms shall be maintained with the TERPS procedure package. See paragraph 7.3 for additional guidance when conducting Flyability Checks at Host Nation locations.

A8.2. All flyability checks should determine whether the procedure is flyable and safe for a minimally qualified, solo pilot flying an aircraft equipped with basic IFR instrumentation under Instrument Meteorological Conditions (IMC) - could a low time lieutenant flying a single seat fighter in bad weather safely fly the approach?

A8.3. Flyability checks will be flown under visual meteorological conditions (VMC). While conducting the flyability check, the crew must be vigilant for obstructions, especially those not depicted that could be hazardous. Final approach course alignment ("desired aiming point") should also be looked at carefully - you should be able to safely maneuver from the missed approach point to touchdown.

A8.4. Consider the following human factors carefully:
A8.4.1. **Complexity.** The procedure should be as simple as possible. It should not impose excessive work load.
A8.4.2. **Interpretability.** The NAVAID which provides information for the final approach course should be clearly identifiable. Be careful, NAVAIDs located on or near the final approach course, but that are not part of the final approach segment, are often subject to misinterpretation. The depicted procedure should clearly indicate to which runway(s) a circling approach can be made, and what areas, if any, cannot be used during the circling maneuver.
A8.4.3. **Memory Considerations.** An aeronautical chart is a storehouse of information. A pilot must be able to extract information quickly and accurately, so evaluate whether essential data can be quickly and easily found and deciphered.

A8.5. Flyability check forms should be reviewed before the flyability check is flown. Complete the flyability check (See examples at figures A8.1 or A8.2) and sign it. Any comments should be written in the remarks section. Whenever possible, the pilot should personally debrief the TERPS specialist responsible for the procedure. Remember, recommendations are always welcome.

Figure A8.1. Sample AF Form 3992, Instrument Procedure Flyability Check Form (IAP).

INSTRUMENT PROCEDURE FLYABILITY CHECK
INSTRUMENT APPROACH PROCEDURE (IAP)

LOCATION	DATE CHECK FLOWN
Boondock AFB, LA	7 Dec 1997
NAME OF PROCEDURE	**TYPE AIRCRAFT**
TACAN or ILS/DME Rwy 36R	C-17

METHOD *(Check one)*

X	LIVE *(Actually Flown)*		SIMULATOR		TABLE TOP REVIEW ONLY

NOTE: PLEASE REFER TO AFMAN 11-230, ATTACHMENT 9, PARAGRAPHS A9.1 THROUGH A9.5 FOR GUIDANCE/METHODS TO BE FOLLOWED BEFORE CONDUCTING THIS FLYABILITY CHECK.

SEGMENTS NOT FLOWN OR CHECKED SHALL BE ANNOTATED "NF" IN THE "REMARKS" COLUMN. ITEMS THAT ARE NOT APPLICABLE SHOULD BE MARKED "NA". EACH MUST BE MARKED OR ANNOTATED.

1. INITIAL APPROACH FIX (IAF) HOLDING PATTERN. TERPS SPECIALIST COMMENTS/CONCERNS *(Continue on separate sheet of paper)*:
Holding pattern designed to accommodate speeds up to 310 KIAS. If possible, evaluate holding pattern at this speed.

INITIAL APPROACH FIX *(IAF)* HOLDING PATTERN	SAT	UN SAT	REMARKS	INITIAL APPROACH FIX *(IAF)* HOLDING PATTERN	SAT	UN SAT	REMARKS
A. ENTRY	X			D. MANEUVERING	X		
B. LEG LENGTH	X			E. SPEED RESTRICTIONS	X		
C. NAVAID RECEPTION	X			F. ATC COMMUNICATIONS	X		

2. IAF TO FINAL APPROACH FIX (FAF). TERPS SPECIALIST COMMENTS/CONCERNS *(Continue on separate sheet of paper)*:
Intermediate segment is 5 NM. Please determine if this segment length is sufficient in length to configure aircraft after turning on from the 15 DME arc.

IAF TO FINAL APPROACH FIX *(FAF)*	SAT	UN SAT	REMARKS	IAF TO FINAL APPROACH FIX *(FAF)*	SAT	UN SAT	REMARKS
A. CHARTED COURSES/ARCS/ RADIALS, ETC.	X			E. COCKPIT WORKLOAD	X		
B. ALTITUDES	X			F. NAVAID RECEPTION	X		
C. ALTITUDES AIRCRAFT MANEUVERING ALTITUDES	X			G. ATC COMMUNICATIONS	X		
D. TIME/DISTANCE TO PREPARE FOR FAF	X			H. DESCENT GRADIENT	X		

3. FAF TO MISSED APPROACH POINT (MAP). TERPS SPECIALIST COMMENTS/CONCERNS *(Continue on separate sheet of paper)*:
TACAN and Localizer missed approach Point moved from .8 DME to .5 DME.
VDP changed to 1.1 DME due to new installation of PAPI system.

FAF TO MISSED APPROACH POINT (MAP)	SAT	UN SAT	REMARKS
A. OBSTACLE CLEARANCE	X		
B. FINAL APPROACH COURSE ALIGNMENT	X		
C. AIRCRAFT MANEUVERING	X		
D. VISUAL DESCENT POINT (VDP)	X		
E. MAP LOCATION	X		New location works fine.
F. COCKPIT WORKLOAD	X		
G. DESCENT GRADIENT	X		
H. NAVAID RECEPTION	X		
I. APPROACH LIGHTS		X	Trees/shrubs growing up through approach lights (See Block #6)
J. LANDING MINIMUMS	X		
K. ATC COMMUNICATIONS	X		

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Figure A7.1. Continued.

4. MISSED APPROACH *(NOTE: Missed approach should be flown at approximately 160 FPNM (450 Ft/MinVV) at 180 KIAS) or at missed approach climb table gradient, whichever is greater. Vigilance for obstruction is critical.)* TERPS SPECIALIST COMMENTS/CONCERNS:

Procedure requires a missed approach climb gradient of 250 ft/NM due to 1998" (MSL) antenna located approximately 3.5 NM from departure end of runway.

MISSED APPROACH	SAT	UN SAT	REMARKS	MISSED APPROACH	SAT	UN SAT	REMARKS
A. UNDERSTANDABLE	X			E. COCKPIT WORKLOAD	X		
B. AIRCRAFT MANEUVERING	X			F. ATC COMMUNICATIONS	X		
C. OBSTACLE CLEARANCE	X			G. CLIMB GRADIENT	X		
D. NAVAID RECEIPTION	X						

5. CIRCLING AREAS. (NOTE: If the circling maneuvering is not flown ("N/F") make comments as to the safeness of the circling area. For approaches with CAT D. minimums, look for obstacles within 3 NM of the runway in all directions. For approaches with CAT E minimums, look for obstacles within 5 NM of the runway in all directions. The location and estimated height of questionable obstacles should be noted in the remarks section of this checklist.)
TERPS SPECIALIST COMMENTS/CONCERNS:

Please evaluate to Cat E Circling area, paying close attention to 1998' obstacle (antenna) approximately 3.5 NM off departure end of Rwy 36R.

CIRCLING AREAS	SAT	UN SAT	REMARKS
A. AIRCRAFT MANEUVERING	X		See comments below.
B. OBSTACLE CLEARANCE	X		See comments below.
C. ABSENCE OF OPTICAL ILLUSIONS	X		See comments below.
D. ATC COMMUNICATIONS	X		

6. ADDITIONAL COMMENTS:

Paragraph 3I: Trees/shrubs are growing up through the first line of approach lighting bars on approach, obscuring the lights.

Paragraph 5A, 5B,, and 5C: CAT E Circling area was flown and evaluated. We conducted this check during daylight hours, however, the 1998' antenna located in the CAT E circling area could be hazardous during the hours of darkness. The antenna contains the appropriate red lighting, however it may blend in with other ground lighting and difficult to acquire when performing the circling maneuver. I recommend that this circling area be evaluated at night or consider CAT E circling not be authorized in that quadrant.

I CONSIDER THE ABOVE SPECIFIED INSTRUMENT PROCEDURE AS FLYABLE AND SATISFACTORY.

SIGNATURE		DATE
John M. Smith		7 Dec 1997
PRINT/TYPE NAME AND RANK	UNIT AND MAJCOM	DUTY PHONE *(DSN/Commorical)*
John M. Smith, Major, USAF	123 AW AMC	DSN: 777-6789

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Figure A8.2. Sample AF Form 3993, Instrument Procedure Flyability Check Form (DP).

INSTRUMENT PROCEDURE FLYABILITY CHECK
DEPARTURE PROCEDURES (DP)

LOCATION	ICAO IDENTIFICATION
Boondock AFB, LA	KBDA

NAME OF PROCEDURE: BOONDOCK 1 Departure

TYPE AIRCRAFT	PILOT
C-17	Maj. John M. Smith

METHOD

X	LIVE *(Actually flown)*		SIMULATOR		TABLE TOP REVIEW ONLY

TERPS SPECIALIST COMMENTS

Please evaluate the 420 foot per NM climb gradient for acceptability. This climb gradient is required to provide the appropriate obstacle clearance over a 1998' (MSL) antenna located 3.5 NM from Departure End of Runway (DER), approximately 1/4 NM East of proposed ground track.

***NOTE:** Departures are to be flown at 200 feet per Nautical Mile (i.e., 600 Ft/Min. VVI at 180 KIAS) or at the published Rate of Climb as indicated in a Climb Table, whichever is greater. Vigilance for obstructions that could be unsafe is critical. Areas not checked/flown should be annotated "NF" in the remarks section*

SAT	UNSAT		REMARKS
X		AIRCRAFT MANEUVERING	
X		ALTITUDE RESTRICTIONS	
X		NAVAID RECEPTION	
X		COCKPIT WORKLOAD	
X		OBSTACLE CLEARANCE	
X		EASY TO UNDERSTAND	

FLYABILITY CHECK PILOT COMMENTS

Climb gradient (CG) of 420 feet per NM was found acceptable for our particular mission profile, however, it must be noted that this CG may be unacceptable for certain aircraft operating at or near gross weight. Consideration should be given to altering the departure course to the West, if possible, to avoid the obstacle and reduce the climb gradient.

I CONSIDER THE ABOVE SPECIFIED INSTRUMENT PROCEDURE AS FLYABLE IAW THIS CHECKLIST

SIGNATURE		DATE
John M. Smith		1997-12-07
PRINTED/TYPED NAME AND RANK	DUTY PHONE *(DSN/COMMERCIAL)*	UNIT/MAJCOM
John M. Smith, Major, USAF	123AW AMC	DSN: 777-6789

AF FORM 3993, MAR 98 *(EF-V1)* Previous edition is obsolete.

Attachment 9

HORIZONTAL DATUM CODES

1 WGS 1972	Global Definition WGS 72
2 Adindan	MEAN FOR Ethiopia, Sudan Clarke 1880
3 Adindan	Burkina Faso Clarke 1880
4 Adindan	Cameroon Clarke 1880
5 Adindan	Ethiopia Clarke 1880
6 Adindan	Mali Clarke 1880
7 Adindan	Senegal Clarke 1880
8 Adindan	Sudan Clarke 1880
9 Afgooye	Somalia Krassovsky
10 Ain el Abd 1970	Bahrain International
11 Ain el Abd 1970	Saudi Arabia International
12 Anna 1 Astro 1965	Cocos Islands Australian National
13 Antigua Island Astro 1943	Antigua (Leeward Islands) Clarke 1880
14 Arc 1950	MEAN FOR Botswana, Lesotho, Malawi, Clarke 1880
15 Arc 1950	Swaziland, Zaire, Zambia, Zimbabwe Clarke 1880
16 Arc 1950	Botswana Clarke 1880
17 Arc 1950	Burundi Clarke 1880
18 Arc 1950	Lesotho Clarke 1880
19 Arc 1950	Malawi Clarke 1880
20 Arc 1950	Swaziland Clarke 1880
21 Arc 1950	Zaire Clarke 1880
22 Arc 1950	Zambia Clarke 1880
23 Arc 1950	Zimbabwe Clarke 1880
24 Arc 1960	MEAN FOR Kenya, Tanzania Clarke 1880
25 Ascension Island 1958	Ascension Island International
26 Astro Beacon E 1945	Iwo Jima International
27 Astro DOS 71/4	St Helena Island International
28 Astro Tern Island (FRIG) 1961	Tern Island International
29 Astronomical Station	Marcus Island International
30 Australian Geodetic 1966	Australia & Tasmania Australian National
31 Australian Geodetic 1984	Australia & Tasmania Australian National
32 Ayabelle Lighthouse	Djibouti Clarke 1880
33 Bellevue	(IGN) Efate & Erromango Islands International
34 Bermuda 1957	Bermuda Clarke 1866
35 Bissau	Guinea-Bissau International
36 Bogota Observatory	Colombia International
37 Bukit Rimpah Indonesia	(Bangka & Belitung Islands) Bessel 1841
38 Camp Area Astro Antarctica	(McMurdo Camp Area) International
39 Campo Inchauspe	Argentina International
40 Canton Astro 1966	Phoenix Islands International
41 Cape South Africa	Clarke 1880
42 Cape Canaveral Bahamas,	Florida Clarke 1866
43 Carthage	Tunisia Clarke 1880
44 Chatham Island Astro 1971	New Zealand (Chatham Island) International
45 Chua Astro	Paraguay International
46 Corrego Alegre	Brazil International
47 Dabola	Guinea Clarke 1880
48 Djakarta	(Batavia) Indonesia (Sumatra) Bessel 1841
49 DOS 1968	New Georgia Islands (Gizo Island) International
50 Easter Island 1967	Easter Island International
51 European 1950	MEAN FOR Austria, Belgium, Denmark, Finland, International
52 European 1950	France, W Germany, Gibraltar, Greece, International
53 European 1950	Italy, Luxembourg, Netherlands, Norway, International
54 European 1950	Portugal, Spain, Sweden, Switzerland, International

55 European 1950	MEAN FOR Austria, Denmark, France, International
56 European 1950	W Germany, Netherlands, Switzerland, International
57 European 1950	MEAN FOR Iraq, Israel, Jordan, Lebanon, International
58 European 1950	Kuwait, Saudi Arabia, Syria International
59 European 1950	Cyprus International
60 European 1950	Egypt International
61 European 1950	England, Channel Islands, Ireland, International
62 European 1950	Scotland, Shetland Islands International
63 European 1950	Finland, Norway International
64 European 1950	Greece International
65 European 1950	Iran International
66 European	Italy (Sardinia) International
67 European 1950	Italy (Sicily) International
68 European 1950	Malta International
69 European 1950	Portugal, Spain International
70 European 1979	MEAN FOR Austria, Finland, Netherlands, International
71 European 1979	Norway, Spain, Sweden, Switzerland International
72 Fort Thomas 1955	Nevis, St. Kitts (Leeward Islands) Clarke 1880
73 Gan 1970	Republic of Maldives International
74 Geodetic Datum 1949	New Zealand International
75 Graciosa Base SW 1948	Azores (Faial, Graciosa, Pico, International
76 Graciosa Base SW 1948	Sao Jorge, Terceira) International
77 Guam 1963	Guam Clarke 1866
78 Gunung Segara	Indonesia (Kalimantan) Bessel 1841
79 GUX 1 Astro	Guadalcanal Island International
80 Herat North	Afghanistan International
81 Hjorsey 1955	Iceland International
82 Hong Kong 1963	Hong Kong International
83 Hu-Tzu-Shan	Taiwan International
84 Indian	Bangladesh Everest 1830
85 Indian	India, Nepal Everest 1956
86 Indian 1954	Thailand, Vietnam Everest 1830
87 Indian 1975	Thailand Everest 1830
88 Ireland 1965	Ireland Modified Airy
89 ISTS 061 Asto 1968	South Georgia Islands International
90 ISTS 073 Astro 1969	Diego Garcia International
91 Johnston Island 1961	Johnston Island International
92 Kandawala	Sri Lanka Everest 1830
93 Kerguelen Island 1949	Kerguelen Island International
94 Kertau 1948	West Malaysia & Singapore Everest 1948
95 Kusaie Astro 1951	Caroline Islands International
96 L. C. 5 Astro 1961	Cayman Brac Island Clarke 1866
97 Leigon	Ghana Clarke 1880
98 Liberia 1964	Liberia Clarke 1880
99 Luzon Philippines	(Excluding Mindanao) Clarke 1866
100 Luzon Philippines	(Mindanao) Clarke 1866
101 Mahe 1971	Mahe Island Clarke 1880
102 Massawa	Ethiopia (Eritrea) Bessel 1841
103 Merchich	Morocco Clarke 1880
104 Midway Astro 1961	Midway Islands International
105 Minna	Cameroon Clarke 1880
106 Minna	Nigeria Clarke 1880
107 Montserrat Island Astro 1958	Montserrat (Leeward Islands) Clarke 1880
108 M'Poraloko	Gabon Clarke 1880
109 Nahrwan	Oman (Masirah Island) Clarke 1880
110 Nahrwan	Saudi Arabia Clarke 1880
111 Nahrwan	United Arab Emirates Clarke 1880
112 Naparima BWI	Trinidad & Tobago International
113 Observatorio Metereo. 1939	Azores (Corvo & Flores Islands) International
114 Old Egyptian 1907	Egypt Helmert 1906

115 Old Hawaiian	MEAN FOR Hawaii, Kauai, Maui, Oahu Clarke 1866
116 Old Hawaiian	Hawaii Clarke 1866
117 Old Hawaiian	Kauai Clarke 1866
118 Old Hawaiian	Maui Clarke 1866
119 Old Hawaiian	Oahu Clarke 1866
120 Oman	Oman Clarke 1880
121 Ord. Survey G. Britain 1936	MEAN FOR England, Isle of Man, Scotland, Airy
122 Ord. Survey G. Britain 1936	Shetland Islands, Wales Airy
123 Ord. Survey G. Britain 1936	England Airy
124 Ord. Survey G. Britain 1936	England, Isle of Man, Wales Airy
125 Ord. Survey G. Britain 1936	Scotland, Shetland Islands Airy
126 Ord. Survey G. Britain 1936	Wales Airy
127 Pico de las Nieves	Canary Islands International
128 Pitcairn Astro 1967	Pitcairn Island International
129 Point 58	MEAN FOR Burkina Faso & Niger Clarke 1880
130 Pointe Noire 1948	Congo Clarke 1880
131 Porto Santo 1936	Porto Santo, Madeira Islands International
132 Provisional S. American 1956	MEAN FOR Bolivia, Chile, Colombia, International
133 Provisional S. American 1956	Ecuador, Guyana, Peru, Venezuela, International
134 Provisional S. American 1956	Bolivia International
135 Provisional S. American 1956	Chile (Northern, Near 19°S) International
136 Provisional S. American 1956	Chile (Southern, Near 43°S) International
137 Provisional S. American 1956	Colombia International
138 Provisional S. American 1956	Ecuador International
139 Provisional S. American 1956	Guyana International
140 Provisional S. American 1956	Peru International
141 Provisional S. American 1956	Venezuela International
142 Provisional S. Chilean 1963	Chile (South, Near 53°S) (Hito XVIII) International
143 Puerto Rico	Puerto Rico, Virgin Islands Clarke 1866
144 Qatar National	Qatar International
145 Qornoq	Greenland (South) International
146 Reunion	Mascarene Islands International
147 Rome 1940	Italy (Sardinia) International
148 Santo (DOS) 1965	Espirito Santo Island International
149 Sao Braz	Azores (Sao Miguel, Santa Maria Islands) International
150 Sapper Hill 1943	East Falkland Island International
151 Schwarzeck	Namibia Bessel 1841 (Namibia)
152 Selvagem Grande	Salvage Islands International
153 SGS 85	Soviet Geodetic System 1985 SGS 85
154 South American 1969	MEAN FOR Argentina, Bolivia, Brazil, Chile, South American 1969
155 South American 1969	Colombia, Ecuador, Guyana, Paraguay, South American 1969
156 South American 1969	Peru, Trinidad & Tobago, Venezuela, South American 1969
157 South American 1969	Argentina South American 1969
158 South American 1969	Bolivia South American 1969
159 South American 1969	Brazil South American 1969
160 South American 1969	Chile South American 1969
161 South American 1969	Colombia South American 1969
162 South American 1969	Ecuador South American 1969
163 South American 1969	Ecuador (Baltra, Galapagos) South American 1969
164 South American 1969	Guyana South American 1969
165 South American 1969	Paraguay South American 1969
166 South American 1969	Peru South American 1969
167 South American 1969	Trinidad & Tobago South American 1969
168 South American 1969	Venezuela South American 1969
169 South Asia	Singapore Modified Fischer 1960
170 Tananarive Observatory 1925	Madagascar International
171 Timbalai 1948	Brunei, East Malaysia (Sabah, Sarawak) Everest

		(Sabah Sarawak)
172	Tokyo	MEAN FOR Japan, Korea, Okinawa Bessel 1841
173	Tokyo	Japan Bessel 1841
174	Tokyo	Korea Bessel 1841
175	Tokyo	Okinawa Bessel 1841
176	Tristan Astro 1968	Tristan da Cunha International
177	Viti Levu 1916	Fiji (Viti Levu Island) Clarke 1880
178	Wake-Eniwetok 1960	Marshall Islands Hough
179	Wake Island Astro 1952	Wake Atoll International
180	Yacare	Uruguay International
181	Zanderij	Suriname International
182	WGS 1984	Global Definition WGS 84
183	North American Datum 1927	NAD 27
184	North American Datum 1980	NAD 83
999	Other DATUM codes	