



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
8260.56

National Policy

Effective Date:
08/02/2011

SUBJ: Diverse Vector Area (DVA) Evaluation

- 1. Purpose of This Order.** This order prescribes guidance for instrument procedure designers to evaluate and establish Diverse Vector Areas (DVA) when requested by air traffic control (ATC) facilities to support departure operations. The criteria contained within this order must be used in place of the DVA criteria contained in Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS), Volume 4, paragraph 2.3 (including subparagraphs) and figure 2-9.
- 2. Audience.** The primary audience for this order is Air Traffic Organization (ATO), Mission Support Services, Aeronautical Navigation Products (AJV-3) personnel within the Federal Aviation Administration (FAA), and Department of Defense (DoD) agencies who are directly charged with the development of instrument flight procedures.
- 3. Where You Can Find This Order.** You can find this order on the Federal Aviation Administration's (FAA) Web site at http://www.faa.gov/regulations_policies/orders_notices.


John M. Allen
Director
Flight Standards Service

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Appendix A. Diverse Vector Area (DVA) Evaluation

1. General. A DVA is utilized by air traffic control (ATC) radar facilities pursuant to Order JO 7210.3, Facility Operation and Administration, to allow the radar vectoring of aircraft below the minimum vectoring altitude (MVA), or for en route facilities, the minimum instrument flight rules altitude (MIA). A DVA consists of designated airspace associated with a departure runway where the utilization of the applicable departure criteria specified in Order 8260.3 and this order have been applied to identify and avoid obstacles that penetrate the departure obstacle clearance surface (OCS). Avoidance of obstacles is achieved through the application of a sloping OCS within the boundaries of the DVA. Since a sloping OCS is applicable to climb segments, a DVA is valid only when aircraft are permitted to climb uninterrupted from the departure runway to the MVA/MIA (or higher). A DVA is not applicable once an aircraft's climb is arrested.

a. Evaluate a DVA at the request of an air traffic facility for any candidate runway. Candidate runways are those runways where a diverse departure assessment has identified obstacles that penetrate the 40:1 OCS that require a climb gradient greater than 200 ft/NM to an altitude more than 200 ft above the departure end of runway (DER) elevation. Do not establish a DVA when obstacles do not penetrate the departure 40:1 OCS, or when the only penetrations are those that require a climb gradient termination altitude of 200 ft or less above the DER elevation (low, close-in obstacles).

b. No obstacles that require a climb gradient of more than 200 ft/NM to an altitude greater than 200 ft above the departure end of runway elevation may be located within the obstacle evaluation area (OEA) of the DVA unless isolated in accordance with paragraph 3a. The OEA must not extend beyond the diverse departure evaluation distance.

c. A DVA is only applicable to the facility that requested it.

DoD Only: DoD radar facilities may require the establishment of a DVA even in the absence of any 40:1 OCS penetrations. They may also authorize climb gradients greater than 200 ft/NM; see applicable service directives.

2. Initial Departure Assessment. Assess the runway from which ATC desires to vector departing aircraft below the MVA/MIA using Order 8260.3, Volume 4, paragraphs 2.0 and 2.1 to determine the location of 40:1 OCS penetrations which are not considered as low, close-in obstacles. The length of the initial climb area (ICA) is based on a climb to 400 ft above the DER. When requested, provide the requesting ATC facility a graphical depiction of the departure penetrations to assist facility managers in visualizing the departure obstacle environment (not applicable to the Department of the Navy).

3. Select a DVA Method. Establish a DVA that either: (a) isolates penetrating obstacles; (b) uses a range of authorized headings to define a sector; (c) climbs to an initial MVA/MIA within a range of headings; (d) defines an area which avoids penetrating obstacles (DoD option only), or (e) uses a combination of these methods.

a. Isolate Penetrating Obstacles. This method is generally suitable for isolating single obstacles, or a group of obstacles in proximity to each other. Boundaries surrounding obstacles that penetrate a departure runway's OCS are established that define an area where vectors below the

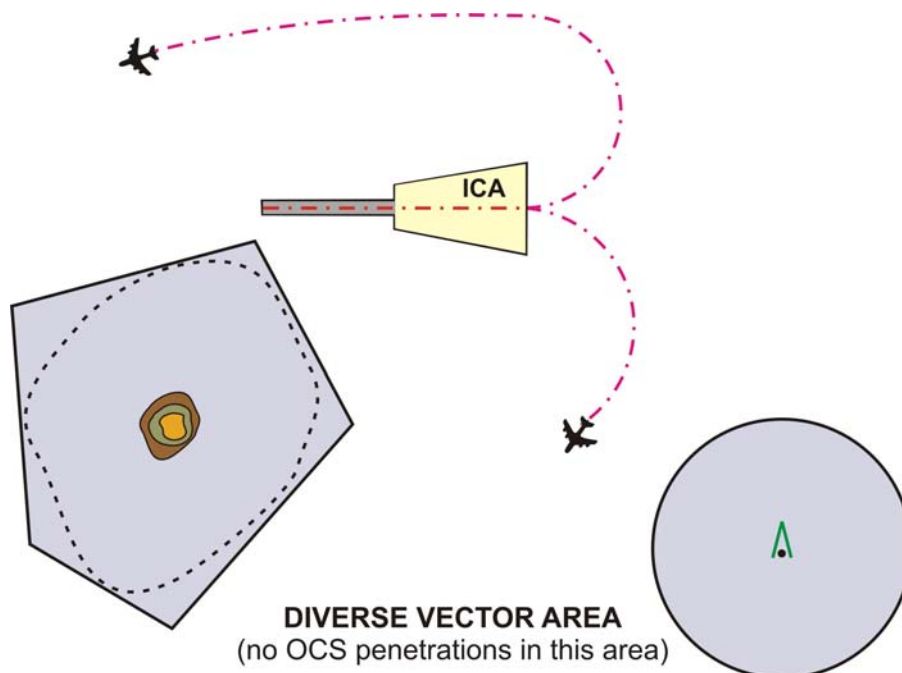
MVA/MIA are prohibited. Vectors below the MVA which avoid the isolation areas are permitted within the diverse departure evaluation area (25 /46 NM from departure reference point as applicable), minus 5 NM to account for worst case radar separation requirements.

(1) Construct isolation area boundaries around all penetrating obstacles using the MVA sector construction specified in Order 8260.3, Volume 1, chapter 10, paragraph 10.2.4b, except a DVA for an Air Route Traffic Control Center (ARTCC) must use an isolation boundary that provides 5 NM of separation from an obstacle. Consider the ease in constructing and documenting isolation area boundaries when determining the shape of an isolation area which surrounds multiple obstacles or terrain points (zone feature). For example, to simplify construction, documentation, and radar video mapping of an isolation area, it may be preferable to construct the area using only a circle or by using only a minimal series of points and lines. Figure A-1 depicts an example with two isolation areas; one is a circle around a single obstacle and the other is defined by points and lines to define the prohibited area around a terrain contour of uneven shape.

(2) Isolation areas must not overlie any part of the departure runway between the departure reference point (DRP) and the DER, nor any part of the ICA associated with the departure runway.

(3) Isolation areas must be located so that sufficient room to vector departing aircraft is provided which would allow ATC to issue vectors as necessary to avoid the areas. This determination must be made in collaboration with the air traffic facility.

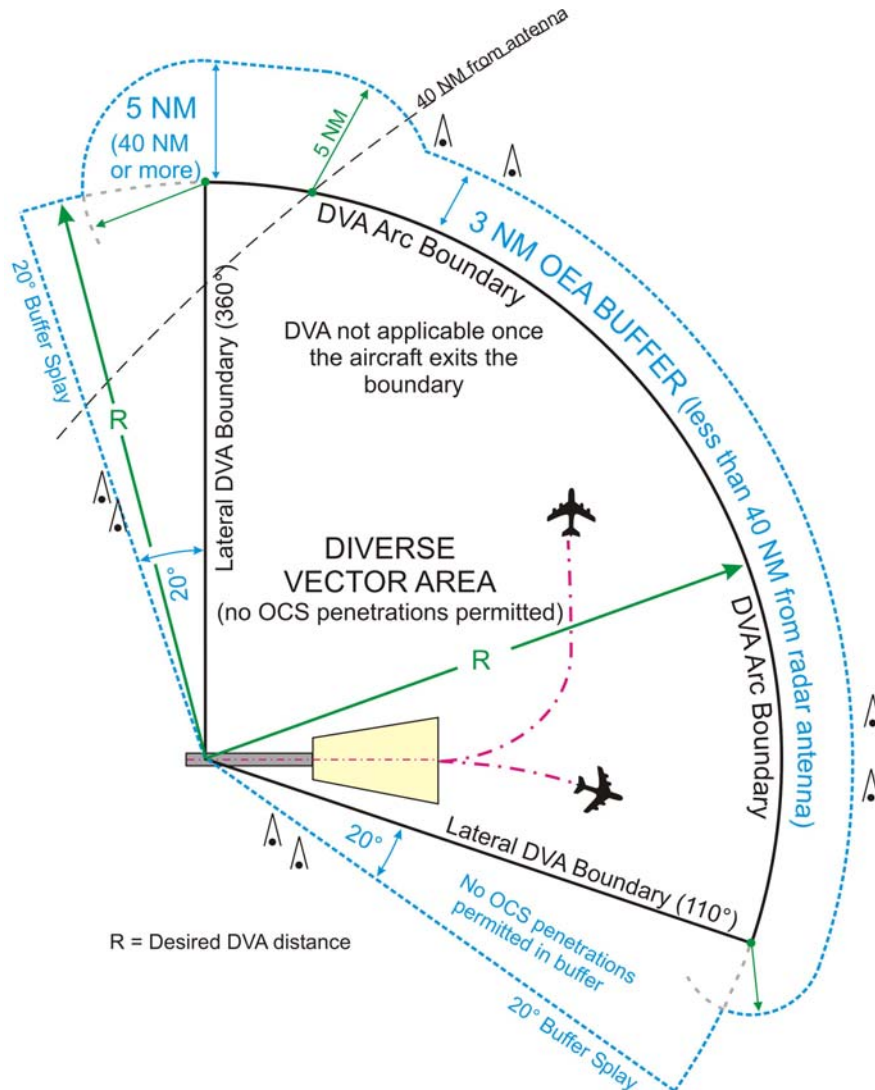
Figure A-1. Isolation Areas



b. Define a Range of Authorized Headings. An ATC facility may desire the establishment of a DVA sector which is comprised of a range of authorized headings from the departure runway. For example, the DVA may permit the assignment of headings 360 clockwise through 110 within the

DVA evaluation area. The assignment of radar vectors that exceed the authorized range of headings is not permitted until the aircraft reaches the MVA/MIA. See figure A-2.

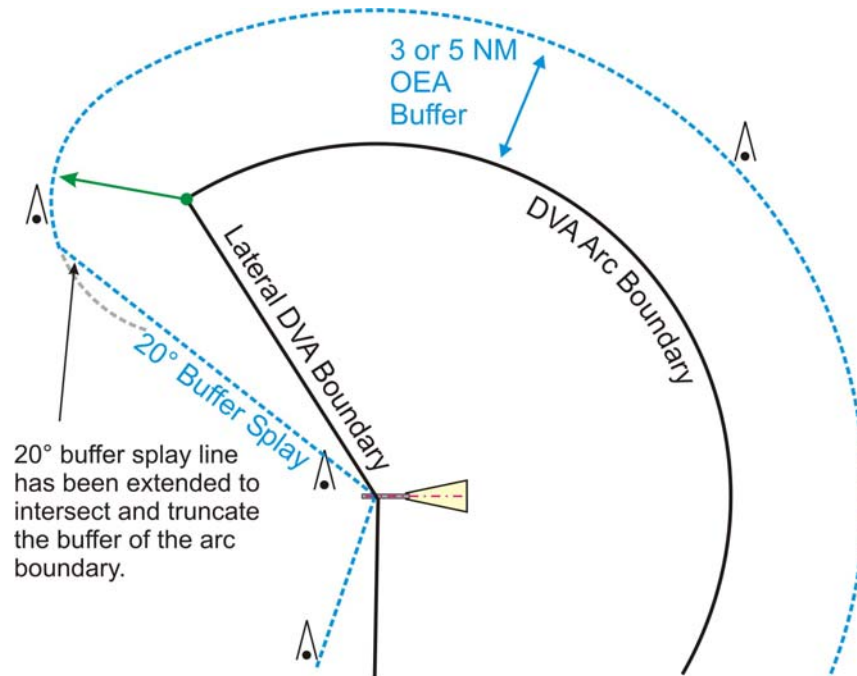
Figure A-2. Range of Headings Sector



- (1) Construct lateral sector boundaries from the DRP which correspond to the desired headings using the *Departure Sector* criteria of Order 8260.3, Volume 4, paragraph 2.2.
- (2) Connect each lateral boundary with an arc centered on the DRP using radius “R” which is equivalent to the desired distance for the DVA.
- (3) An OEA buffer expands outward from the DVA boundaries. The buffer of the DVA arc boundary must meet the distance requirements of Order 8260.3, Volume 1, chapter 10, paragraph 10.2.4a, except a 5 NM buffer always applies to a DVA that will be used by an ARTCC. The lateral buffers begin at DRP and splay outward from the lateral boundaries by 20 degrees.

- (4) Connect the 20-degree buffer splay lines with the buffer of the arc boundary as follows:
- When the 20-degree splay line is outside the buffer of the arc boundary, join the two buffers with an arc centered on the DRP using radius “R.” See figure A-2.
 - When the 20-degree splay line is inside the buffer of the arc boundary, extend the splay line until it intersects and truncates the buffer of the arc. See figure A-3.

Figure A-3. Truncation of Lateral Boundary Buffer



(5) The DVA boundaries must provide sufficient maneuvering area to permit ATC to vector an aircraft to remain within the DVA until the aircraft can climb to the MVA/MIA. Determination of sufficient maneuvering area must be made in collaboration with the ATC facility.

c. Climb to an Initial MVA/MIA. ATC may request a DVA based on a range of headings to an initial MVA/MIA e.g., “009 CW 190 to 3500 ft.” For a DVA of this type, it is necessary to obtain and refer to the currently approved MVA/MIA chart which depicts the sector boundaries and minimum altitudes. See figures A-4 through A-8.

Note: “Initial MVA/MIA” is defined as the altitude at which the DVA terminates and the MVA/MIA is used to provide radar vector service. It will be identified by the requesting ATC facility.

- Determine the preliminary 40:1 search boundary’s radii (in feet); R_A and R_B .

- a. $R_A = (\text{Initial MVA/MIA} - \text{DER Elevation} - 951 - 304) * 40$
- b. $R_B = (\text{Initial MVA/MIA} - \text{Airport Elevation} - 951 - 400) * 40$

Note: 951 represents the least amount of ROC possible (after rounding) within an MVA sector.

Example calculation where MVA is equal to 3500 and DER equal to 618:

$$\begin{aligned} R_A &= (3500 - 618 - 951 - 304) * 40 \\ &= 1627 * 40 \\ &= 65,080 \end{aligned}$$

(2) Construct a preliminary search area on the Diverse A side of the departure reference line (DRL). Establish point Y and point Z at distance R_A from each corner of the ICA end line (ICAE) in the direction of the departure along a line which is parallel to the runway centerline. Swing an arc with radius R_A centered on each corner of the ICAE from points Y and Z away from the runway centerline until it intersects the DRL. If the distance from the DRP to the intersection of the arc and the DRL is less than R_A , then the preliminary search area must be expanded. Expand the area by establishing Points W and X along the DRL at a distance equal to R_A and tangentially connect each arc to each respective point (figure A-5). Complete the search area with a line that connects point Y to point Z. See figures A-4 and A-5.

(3) Construct a preliminary search area on the Diverse B side of the DRL using the radius R_B . Swing a 180-degree arc centered on the DRP beginning at the DRL to encompass the start end of the runway. See figure A-4.

(4) Identify all 40:1 OCS penetrations (other than low, close-in) located within the preliminary search area boundaries, or 3/5 NM (appropriate MVA buffer distance per Order 8260.3, Volume 1, chapter 10, or 5 NM for an MIA) beyond the next higher MVA/MIA sector boundary, whichever is encountered first. See figures A-6 and A-7.

(5) Establish lateral boundaries and associated buffers that avoid the 40:1 penetrations using the Departure Sector criteria of Order 8260.3, Volume 4, paragraph 2.2. The maximum range of permitted headings (e.g., 310 CW to 050) corresponds to the lateral boundaries. All headings are available when no 40:1 penetrations are located within the search area boundaries. The final OEA includes those areas within the boundaries of the search area located between the 20-degree splay lines. See figure A-8.

Figure A-4. Preliminary Search Area Boundary

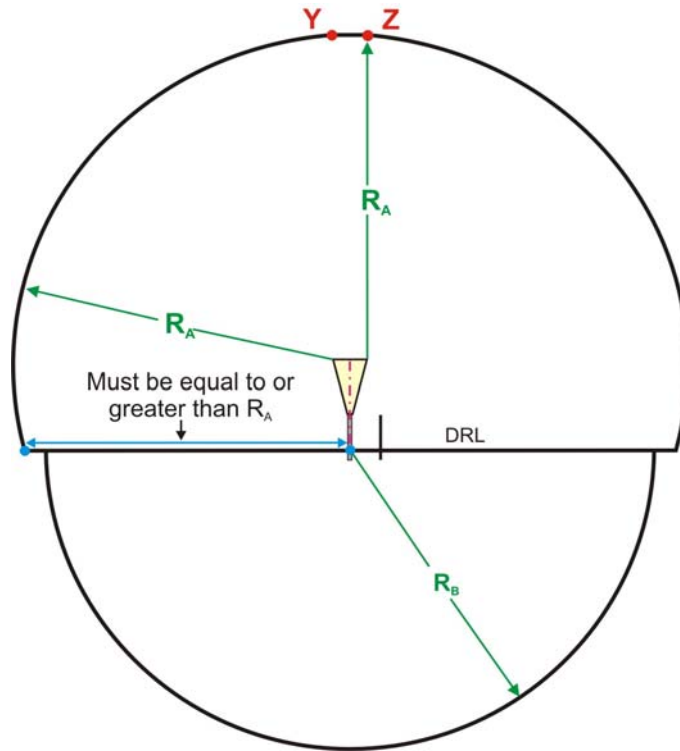


Figure A-5. Construction with Points W and X

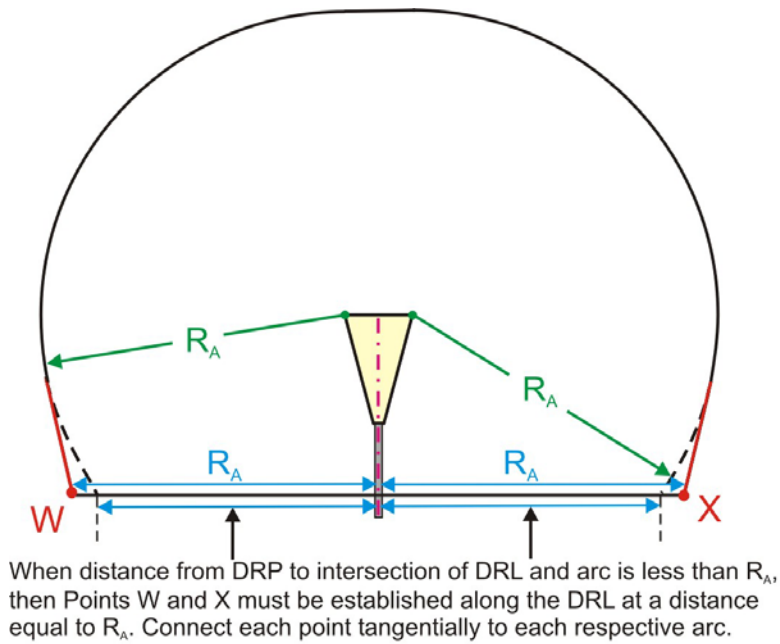


Figure A-6. MVA Chart With Applicable Buffer Areas

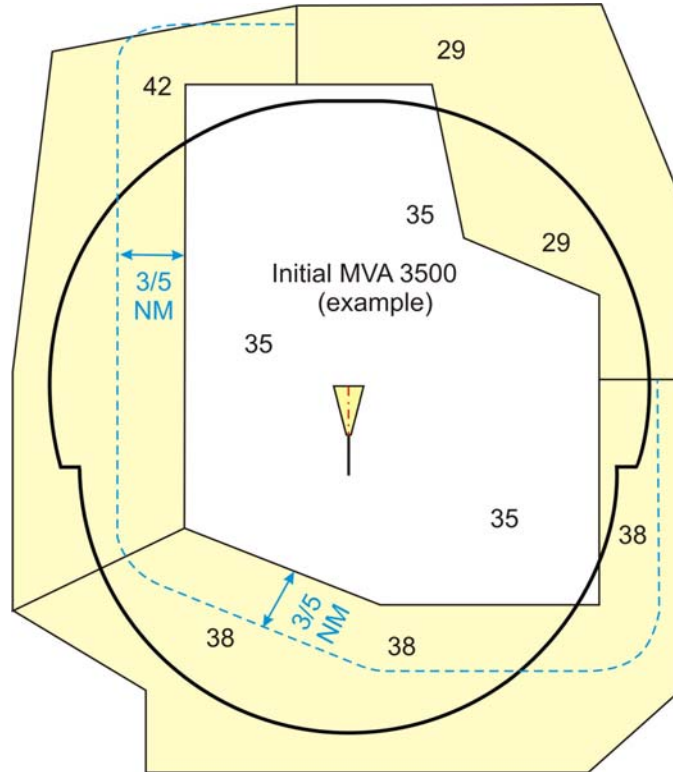


Figure A-7. Obstacle Search Area

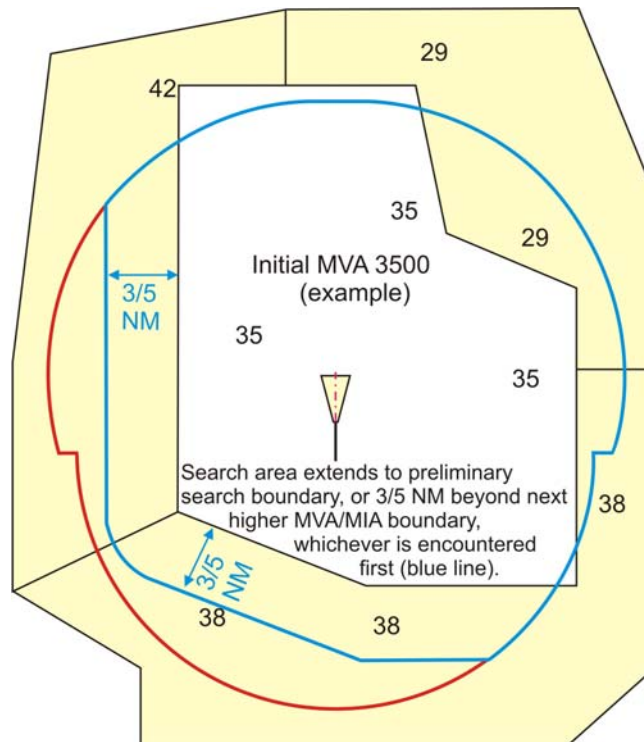
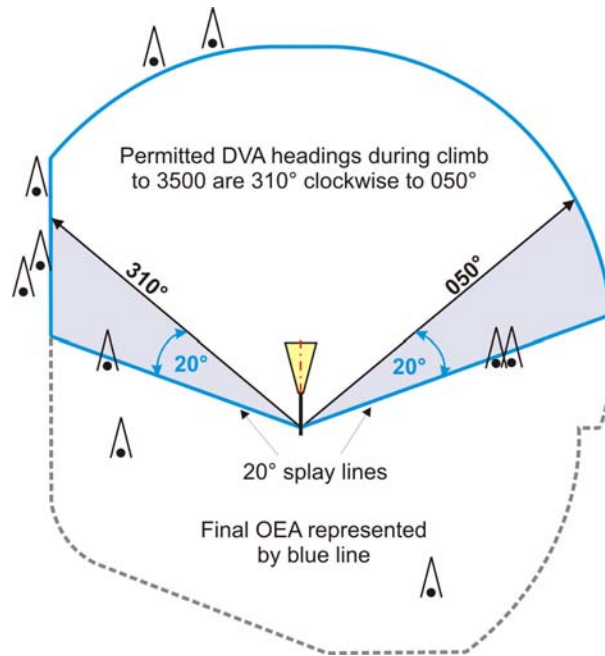


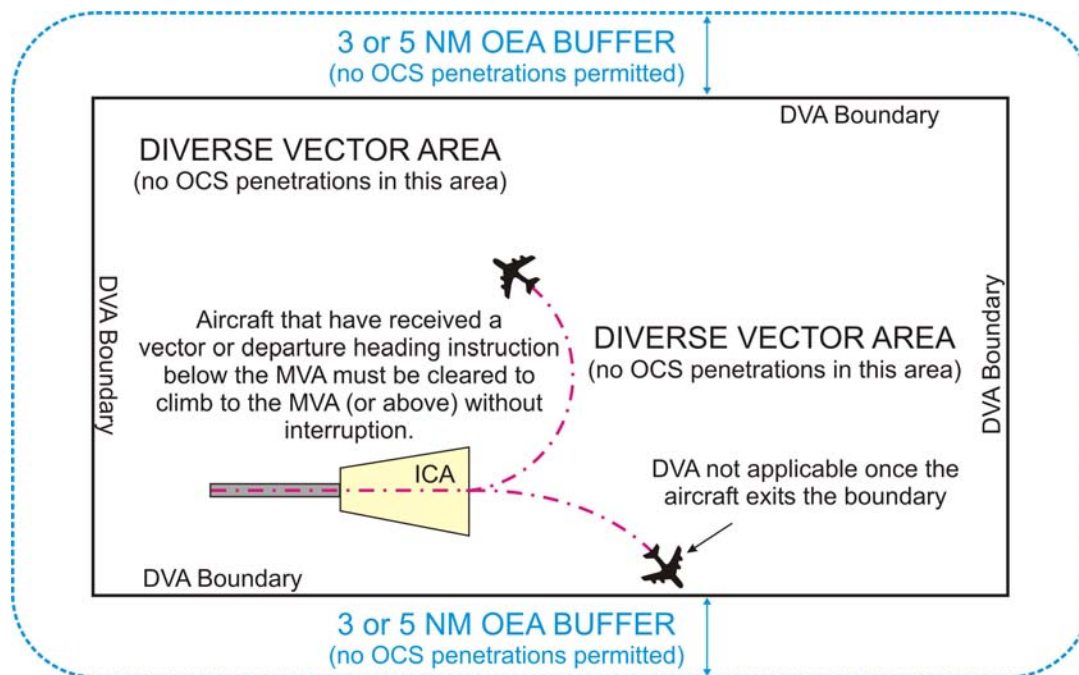
Figure A-8. Permitted DVA Headings Based on Obstacles



d. Define an Area (DoD Option). An area may be defined which excludes all obstacles (low, close-in obstacles are permitted) that penetrate the departure OCS. See figure A-9.

(1) Construct the area boundary and an OEA buffer using the MVA sector construction specified in Order 8260.3, Volume 1, chapter 10, section 3. The defined area may take the form of any shape, however it must be determined in consultation with the ATC facility to ensure it meets their operational needs and to ensure it provides sufficient maneuvering area for ATC to vector an aircraft to remain within the DVA until the aircraft can climb to the MVA/MIA.

(2) The area boundary must fully encompass the entire width of the departure runway from the DRP towards the DER, as well as the entire ICA associated with the departure runway.

Figure A-9. Defined Area (DoD Option)

4. Documentation. Document the DVA on an FAA Form 8260-15D, Diverse Vector Area, in accordance with appendix B of this order (DoD refer to applicable service directives).

5. Maintenance and Periodic Review.

a. Review the DVA for accuracy and currency whenever:

(1) The ODP for the same runway is reviewed as part of the periodic review process of Order 8260.19, Flight Procedures and Airspace, chapter 2, section 8 (or applicable military directive).

(2) Whenever the ODP for the same runway is reevaluated due to a change of the airport or runway data.

(3) A new obstacle is constructed within the OEA of the DVA.

(4) A DVA is based on a climb to an initial MVA/MIA (paragraph 3c) and the FAA Form 7210-9 (or military equivalent) has been revised.

b. Procedure designers must immediately notify the air traffic manager and the facility procedures support specialist that a DVA is no longer valid whenever the review indicates the DVA does not comply with this order (e.g., a new obstacle penetrates the OCS). Provide the initial notification via telephone and email, and then follow up with a memorandum and/or fax indicating the previously approved Form 8260-15D (or military equivalent) is no longer valid. Evaluate and establish a revised DVA and provide the new Form 8260-15D to the ATC facility.

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Appendix B. Instructions for Completing FAA Form 8260-15D.

1. Documentation. Complete a single FAA Form 8260-15D (or applicable military form) for each airport where a DVA has been developed and forward to the requesting ATC facility. The information on the form will be used by the facility to establish the DVA procedure. See figure B-1.

Note: For a complex DVA, consider providing a graphic depiction of the area to the facility in addition to the Form 8260-15D.

a. City and State. Complete this section with the same location data as on the associated Form 8260-15A.

b. Airport. Complete this section with the same airport name data as on the associated Form 8260-15A.

c. Effective Date. The effective date is the date of approval.

d. Amendment Number. Enter the amendment number as applicable. When the 8260-15D is an original, enter "ORIG."

e. DVA. List each runway assessed for a DVA followed by a description of the area. Do not include the buffer areas within the description since these descriptions may be used by ATC facilities to develop radar video maps of the DVA.

(1) Isolation Area. Include the latitude/longitude of the DRP and a distance from DRP determined by the diverse departure evaluation distance (25/46 NM) minus 5 NM. Describe in detail the isolation area(s) that must be avoided.

Example:

RWY 31: ALL AREA WITHIN 20 NM OF 352336.01N/0973607.80W
(DEPARTURE REFERENCE POINT) EXCEPT FOR THE FOLLOWING AREAS: 1)
WITHIN 3 NM RADIUS OF 352557.45N/0974109.53W AND 2) WITHIN 3 NM
RADIUS OF 353405.64N/0972920.85W.

(2) Range of Authorized Headings. Describe the authorized range of headings (corresponding to the lateral sector boundaries) beginning with the extreme left heading, clockwise to the extreme right heading as would be viewed from the departure runway in the direction of the departure, as well as the distance from the DRP to which the DVA is applicable. Also provide a detailed point to point description of the area to assist in the creation of a video map.

Example:

RWY 6: AUTHORIZED HEADINGS 270 CLOCKWISE TO 150 WITHIN 20 NM OF 384457.07N/0902229.98W (DEPARTURE REFERENCE POINT).

INCLUDES ALL AREA WITHIN 384457.07N/0902229.98W TO 384454.27N/0904803.87W THEN VIA 20 MILE ARC CENTERED ON 384457.07N/0902229.98W TO 382736.10N/0900946.11W TO 384457.07N/0902229.98W.

(3) Climb to Initial MVA/MIA. Describe the authorized range of headings beginning with the extreme left heading, clockwise to the extreme right heading as would be viewed from the departure runway in the direction of the departure. The DVA description must state it is applicable only within those areas where the MVA/MIA sector altitude is equal to or less than the initial MVA/MIA.

Example:

RWY 36: AUTHORIZED HEADINGS 310 CLOCKWISE TO 050 TO 3500 WITHIN ANY MVA SECTOR WITH A MINIMUM ALTITUDE OF 3500 OR LESS.

(4) Defined Area (DoD Option). Use latitude/longitude points, lines, arcs, and arc center points (as applicable) to describe the area.

Example:

RWY 21L: WITHIN THE AREA BOUNDED BY A SERIES OF LINES FROM
381458.00N/1215805.00W TO
381014.00N/1220922.00W TO
380200.00N/1215823.00W TO
381831.00N/1213839.00W TO
382207.00N/1214546.00W TO
381458.00N/1215805.00W.

f. Obstacle Evaluation Area. This area is used to document and describe the OEA (including buffer areas where utilized) of the DVA and will primarily be used for identifying and evaluating the aeronautical effect of proposed obstacles. Enter a description of each OEA (using as necessary latitude/longitudes, bearings, arcs, radii, etc) for which a DVA has been established.

g. Developed By. Enter the name of the procedure specialist and the routing identifier of the specialist's branch. This individual must sign in the "developed by" space and enter the date signed.

h. Approved By. Enter the name of the Aeronautical Navigation Products manager, or the delegated representative. This individual must sign in the "approved by" space and enter the date signed.

Note: A DVA does not require a flight inspection; therefore, no additional signatures are required.

i. Authorized Facility. Specify the ATC facility which requested the DVA and for which the DVA is applicable. Do not specify more than one facility on the same form.

j. FAA Form 7210-9 Date. For a DVA based on a climb to an initial MVA/MIA, enter the date of the FAA Form 7210-9 that was used to evaluate the DVA. Leave blank for other DVA types.

k. Changes. List changes from the Form 8260-15D which immediately preceded the current version. Leave blank for an original.

l. Reasons. List reasons for any changes annotated on the form.

Figure B-1. FAA Form 8260-15D

| U.S. DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION | | | |
|--|-------------------|----------------|-------------|
| DIVERSE VECTOR AREA (DVA) | | | |
| Bearings, headings, courses, tracks, and radials are magnetic. Elevations and altitudes are in feet, MSL. Distances are in nautical miles. | | | |
| City, State | Airport | Effective Date | Amdt No. |
| SANTA MONICA, CA | SANTA MONICA MUNI | 7/31/2011 | ORIG |
| <u>DVA:</u> | | | |
| RWY 21: AUTHORIZED HEADINGS 165 CLOCKWISE TO 255 WITHIN 20 NM OF 340100.39N/1182700.64W (DEPARTURE REFERENCE POINT). INCLUDES ALL AREA WITHIN 340100.39N/1182700.64W TO 334058.22N/1182700.64W, THEN VIA 20 MILE CLOCKWISE ARC CENTERED ON 340100.39N/1182700.64W TO 335729.36N/1185041.37W, TO 340100.39N/1182700.64W | | | |
| <u>OBSTACLE EVALUATION AREA (not for video mapping use):</u> | | | |
| RWY 21: FROM 340100.39N/1182700.64W TO 334210.45N/1181848.69W, THEN VIA 20 NM CLOCKWISE ARC CENTERED ON 340100.39N/1182700.64W TO 334114.51N/1182324.59W, THEN VIA 3 NM CLOCKWISE ARC CENTERED ON 334058.22N/1182700.64W TO 333757.89N/1182700.64W, THEN VIA 23 NM CLOCKWISE ARC TO 335657.31N/1185414.31W, THEN VIA 3 NM CLOCKWISE ARC CENTERED ON 335729.36N/1185041.37W TO 340028.62N/1185105.74W, THEN VIA 20 NM CLOCKWISE ARC CENTERED ON 340100.39N/1182700.64W TO 340426.85N/1185043.31W, TO 340100.39N/1182700.64W | | | |
| <u>AUTHORIZED FACILITY:</u> | | | |
| SCT APP CON | | | |
| <u>FAA FORM 7210-9 DATE:</u> | | | |
| <u>DEVELOPED BY:</u> | | | |
| <i>Joe Developer</i> | AJV-35 | 07/31/2011 | |
| <u>APPROVED BY:</u> | | | |
| <i>Jolene Manager</i> | AJV-35 | 07/31/2011 | |
| <u>CHANGES:</u> | | | |
| <u>REASONS:</u> | | | |
| FAA Form 8260-15D / JULY 2011 (Computer Generated) | | | |
| | | | Page 1 of 1 |

Appendix C. Administrative Information

1. Distribution. This order is distributed in Washington headquarters to the branch level in the Offices of Aviation Policy and Plans, Aviation Research, Airport Safety and Standards, the Air Traffic Organization (Safety, En Route and Oceanic Services, Terminal Services, System Operations Services, Mission Support, and Technical Operations Services), and Flight Standards Service; to the Aeronautical Information Management Group, National Aeronautical Navigation Products Office (AeroNav Products), Airspace, Regulations and ATC Procedures Group, and the National Airway Systems Engineering Group; to the Regulatory Standards Division; to the branch level in the regional Flight Standards and Airports Divisions; to the Air Traffic and Technical Operations Service Areas; to all Flight Standards Field Offices; Special Mailing List ZVN-826; and Special Military and Public Addressees.

2. Related Publications.

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

b. FAA Order 8260.19, Flight Procedures and Airspace

c. FAA Order JO 7210.3, Facility Operation and Administration