



**Federal Aviation
Administration**

EN ROUTE - STAGE IV

**Refresher Unit 03
Vectoring**

Course 55055



FOREWORD

Purpose. This Air Traffic Refresher Unit provides for the systematic review of current Air Traffic Control operational procedures.

This publication is for use in the technical training of FAA Air Traffic Control Specialists. It does not replace, substitute for, or supersede official regulations, procedures, or directives.

Review. Training programs established under the Government Employees Training Act are based on actual needs, and a review of these training needs is conducted at least once every three years.

Recommended Changes. Suggested changes and corrections to this training material should be forwarded to:

DOT, FAA, Mike Monroney Aeronautical Center
En Route Training Section, AMA-511
P.O. Box 25082
Oklahoma City, OK 73125

PREFACE

This refresher unit replaces all previous versions of ER-11-3, Vectoring, and reflects the latest technical changes found in the referenced source documents through February 2010, including FAA Order JO 7110.65. See "Stage IV Changes 02/11/10 on the lesson materials download page. The contents of this unit are current as of the date shown on the cover. The material herein will be kept current through unit replacement. This unit is not to be used as a Standard Operating Practice (SOP). In all cases, a controller's good judgment is uppermost in applying the procedures advocated.

INSTRUCTIONS

1. Write your answers to the questions in the Question Section on a separate piece of paper. This will allow the unit to be reused.
2. Compare your answers with those in the Answer and Discussion Section.
3. If you answer any questions incorrectly, study the discussion paragraph(s).
4. Review the references given in the Answer and Discussion Section.
5. An informal discussion of this unit with other specialists may help clarify any ambiguities.

VECTORIZING

Question Section

DIRECTIONS: ITEMS 1 THROUGH 17 REQUIRE A SHORT ANSWER OF ONE OR TWO SENTENCES.

1. N6523 is under radar control and is proceeding into an area that is heavily congested with IFR traffic. What action could you take to ensure that N6523 does **NOT** become a part of the congestion?
2. DAL56 is operating on an RNAV route. There is **NO** other traffic. What should you consider before suggesting a vector that you feel will shorten DAL56's route?
3. N5792 is under radar control, and you observe the aircraft approaching a designated noise abatement area. What action should you take?
4. What are the six circumstances prescribed in FAA Order JO 7110.65 that authorize a controller to vector an aircraft?
5. You have just taken a handoff on N2453, and the aircraft is now on your frequency. N2453 is still in the airspace delegated to the previous controller, but you wish to issue a vector for traffic. What action should you take?
6. You are working N64T on an IFR flight plan in radar contact in Class G airspace. What condition would permit you to issue a vector to N64T?
7. N8264K is operating in the vicinity of the PNC airport. Must the aircraft be at or above the MIA/MVA before you can issue a radar vector?
8. N6255M is departing an airport on a Special VFR clearance. What must you ensure before issuing radar vectors to N6255M?
9. N23194 is in your sector, but is about to enter a nonradar sector. What must you ensure before you vector N23194?
10. Write the phraseology to clear AAL345 to turn left to a heading of 030 degrees.
11. N546, a BE18, has advised you that the aircraft's gyro is inoperative. Write the phraseology to advise N546 that you will be issuing "NO-GYRO" vectors.

VECTORIZING
Question Section *(Continued)*

12. AAL825 is about to be vectored off a previously assigned nonradar route. What information should be given to AAL825 concerning the anticipated vector?
13. N8759V has been vectored off V6, which was its original nonradar route. When may radar service be terminated?
14. When terminating radar navigational guidance, when may position information be omitted?
15. DAL23 is under your control and flying an assigned random RNAV route. You have issued a radar vector for traffic, but the traffic is no longer a factor. What should be the next instruction issued to DAL23?
16. N5674, a BE36, is being vectored for separation. The vector will take the aircraft across the END 035 radial, which is part of N5674's previously assigned nonradar route. Write the phraseology to advise N5674 that this vector will cross the END 035 radial.
17. You have just received a handoff on AAL27. The aircraft is now on your frequency requesting radar vectors, but is still 10 miles from entering your sector. What action should you take if you are unable to coordinate with the previous sector?

VECTORIZING

Answer and Discussion Section

1. N6523 is under radar control and is proceeding into an area that is heavily congested with IFR traffic. What action could you take to ensure that N6523 does **NOT** become a part of the congestion?

ANSWER: *Vector N6523 around the area of congested traffic.*

REFERENCE: *JO 7110.65, par. 5-6-1*

*DISCUSSION: Good planning prior to departure would have prevented this situation. However, once an aircraft is en route, there are several factors which could cause congestion, such as weather, airport closings, and NAVAID outages. When we become aware of the congestion occurring, an **operational advantage** might be gained by vectoring the aircraft if a reroute is not feasible.*

2. DAL56 is operating on an RNAV route. There is **NO** other traffic. What should you consider before suggesting a vector that you feel will shorten DAL56's route?

ANSWER: *Consider whether or not the pilot would want the vector.*

REFERENCE: *JO 7110.65, par. 5-6-1*

DISCUSSION: To the extent possible, allow aircraft operating in accordance with RNAV routes and procedures to remain on their own navigation.

3. N5792 is under radar control, and you observe the aircraft approaching a designated noise abatement area. What action should you take?

ANSWER: *Vector N5792 around the designated area.*

REFERENCE: *JO 7110.65, par. 5-6-1*

DISCUSSION: N5792 should be vectored to conform to established noise abatement procedures.

4. What are the six circumstances prescribed in FAA Order JO 7110.65 that authorize a controller to vector an aircraft?

ANSWER: *Separation, safety, noise abatement, operational advantage, confidence maneuver and pilot request*

REFERENCE: *JO 7110.65, par. 5-6-1*

DISCUSSION: Controllers should be aware that although these are six circumstances that warrant vectoring aircraft, there is really no substitute for good planning. Except for confidence maneuvers, good planning could minimize vectoring, thus reducing frequency congestion and time-consuming coordination.

VECTORIZING

Answer and Discussion Section (Continued)

5. You have just taken a handoff on N2453, and the aircraft is now on your frequency. N2453 is still in the airspace delegated to the previous controller, but you wish to issue a vector for traffic. What action should you take?

ANSWER: *Obtain control of N2453 from the previous controller, and then issue the necessary vector.*

REFERENCE: *JO 7110.65, pars. 2-1-15, 5-6-1*

DISCUSSION: Controllers shall not vector an aircraft until that aircraft is in their area of jurisdiction. Prior coordinated approval shall be obtained from the transferring controller before vectors may be issued outside your control jurisdiction.

6. You are working N64T on an IFR flight plan in radar contact in Class G airspace. What condition would permit you to issue a vector to N64T?

ANSWER: *Since N64T is in Class G airspace, the pilot must request the vector.*

REFERENCE: *JO 7110.65, par. 5-6-1*

DISCUSSION: Controllers shall not arbitrarily vector an aircraft outside of controlled airspace. The pilot must specifically request the vector, and the vector should be provided as an additional service.

7. N8264K is operating in the vicinity of the PNC airport. Must the aircraft be at or above the MIA/MVA before you can issue a radar vector?

ANSWER: *Yes, unless authorized for radar approaches, Special VFR, or VFR operations*

REFERENCE: *JO 7110.65, pars. 5-6-1, 5-6-3*

DISCUSSION: In areas where 3 miles separation is permitted within 40 miles of the antenna, vectors below minimum altitude may also be authorized for departing aircraft and aircraft executing a missed approach in order to provide separation from obstructions. Also, VFR aircraft not at an altitude assigned by ATC may be vectored at any altitude. It is the responsibility of the pilot to comply with all applicable FARs.

VECTORIZING

Answer and Discussion Section (Continued)

8. N6255M is departing an airport on a Special VFR clearance. What must you ensure before issuing radar vectors to N6255M?

ANSWER: *Ensure that N6255M is still within the confines of the Class B, C, D, or E surface area, whichever is applicable, for the departure airport.*

REFERENCE: *JO 7110.65, par. 5-6-1*

DISCUSSION: *You may vector aircraft operating Special VFR only within Class B, C, D, or E surface areas.*

9. N23194 is in your sector, but is about to enter a nonradar sector. What must you ensure before you vector N23194?

ANSWER: *Ensure that N23194 is able to resume its own navigation within radar coverage.*

REFERENCE: *JO 7110.65, par. 5-6-1*

DISCUSSION: *An aircraft vectored off of its original routing could be beyond NAVAID limitations and may not be able to get reestablished on a nonradar route without radar assistance. Therefore, ensure that an aircraft on a vector is able to resume its own navigation within radar coverage.*

10. Write the phraseology to clear AAL345 to turn left to a heading of 030 degrees.

ANSWER: *“American Three Forty-five, turn left heading zero three zero.”*

REFERENCE: *JO 7110.65, par. 5-6-2*

DISCUSSION: *Specify direction of turn and magnetic heading to be flown after completion of turn.*

11. N546, a BE18, has advised you that the aircraft's gyro is inoperative. Write the phraseology to advise N546 that you will be issuing “NO-GYRO” vectors.

ANSWER: *“Twin Beech Five Four Six, this will be a no-gyro vector.”*

REFERENCE: *JO 7110.65, par. 5-6-2, Pilot/Controller Glossary*

DISCUSSION: *Before issuing any vectors, inform the aircraft of the type of vector or the purpose of the vector. In this case, the pilot has a malfunctioning gyro-compass or directional gyro. Instead of providing headings to be flown, the controller observes the radar track and issues control instructions “TURN RIGHT/LEFT” and “STOP TURN” as appropriate for the situation.*

VECTORIZING

Answer and Discussion Section (Continued)

12. AAL825 is about to be vectored off a previously assigned nonradar route. What information should be given to AAL825 concerning the anticipated vector?

ANSWER: *AAL825 should be informed of the purpose of the vector and/or the airway, point, or route to which the aircraft is being vectored.*

REFERENCE: *JO 7110.65, par. 5-6-2*

DISCUSSION: *Informing the pilot of the purpose of a vector and where the aircraft is being vectored will allow the pilot to revise an ETA, recalculate the fuel remaining, and determine which NAVAIDs will be used.*

13. N8759V has been vectored off V6, which was its original nonradar route. When may radar service be terminated?

ANSWER: *Provide radar navigational guidance until N8759V is established within the airspace to be protected for V6 or on a heading that will, within a reasonable distance, intercept the nonradar route to be flown, and until N8759V is informed of its position.*

REFERENCE: *JO 7110.65, par. 5-6-2*

DISCUSSION: *Ensure that when the vector is issued, the aircraft will be able to intercept the airway or routing before discontinuing radar navigational guidance.*

14. When terminating radar navigational guidance, when may position information be omitted?

ANSWER: *When the aircraft is RNAV, FMS, or DME equipped and is being vectored toward a VORTAC/TACAN or waypoint, and is within the service volume of the NAVAID*

REFERENCE: *JO 7110.65, par. 5-6-2*

DISCUSSION: *RNAV, FMS, and DME all provide the aircraft with the ability to determine its own position in relation to a waypoint or NAVAID.*

VECTORIZING

Answer and Discussion Section (Continued)

15. DAL23 is under your control and flying an assigned random RNAV route. You have issued a radar vector for traffic, but the traffic is no longer a factor. What should be the next instruction issued to DAL23?

ANSWER: *DAL23 should now be cleared to the next waypoint on the filed route of flight.*

REFERENCE: *JO 7110.65, pars. 5-6-1, 5-6-2*

DISCUSSION: An aircraft vectored off an assigned random RNAV route shall be recleared to the next waypoint or issued a new clearance as requested by the pilot. Allow aircraft operating on an RNAV route to remain on their own navigation to the extent possible.

16. N5674, a BE36, is being vectored for separation. The vector will take the aircraft across the END 035 radial, which is part of N5674's previously assigned nonradar route. Write the phraseology to advise N5674 that this vector will cross the END 035 radial.

ANSWER: *"Bonanza Five Six Seven Four, expect vector across END zero three five radial for separation."*

REFERENCE: *JO 7110.65, par. 5-6-2*

DISCUSSION: An aircraft is expected to remain on the assigned heading unless specifically cleared to intercept a previously issued route or procedure.

17. You have just received a handoff on AAL27. The aircraft is now on your frequency requesting radar vectors, but is still 10 miles from entering your sector. What action should you take if you are unable to coordinate with the previous sector?

ANSWER: *Do NOT issue radar vectors to AAL27 until it is in the airspace for which you have control jurisdiction.*

REFERENCE: *JO 7110.65, pars. 2-1-15, 5-6-1*

DISCUSSION: Limit radar vectors to your area of responsibility unless prior coordination has been accomplished with the transferring controller or facility.

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