**U.S. DEPARTMENT OF TRANSPORTATION**
FEDERAL AVIATION ADMINISTRATION

**NOTICE**
**N 8000.325**

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7/3/06

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7/3/07

## SUBJ: SPECIAL AREA NAVIGATION (RNAV) TRANSITION PROCEDURES

**1. PURPOSE.** This notice provides guidance and standardization for the development and administration of special stand-alone Area Navigation (RNAV) Transition procedures. Specifically, these criteria are designed to allow a lead operator, in cooperation with a local Air Traffic Control (ATC) facility, to develop RNAV Transition procedures.

**2. DISTRIBUTION.** This notice is distributed in Washington Headquarters to the branch level in the Offices of Airport Safety and Standards, and Communications, Navigation, and Surveillance Systems, to Air Traffic, Flight Standards, and Airway Facilities Services, to Air Traffic Airspace Management Program and Air Traffic Planning and Procedures Program; to Aviation System Standards National Flight Procedures Office and Flight Inspection Operations Division, and FAA Academy Regulatory Standards Division at the Mike Monroney Aeronautical Center; to all Regional Administrators, to the branch level in the regional Flight Standards, Air Traffic, Airway Facilities, and Airports Divisions; to all Flight Standards and Air Traffic Field Facilities; to all Airway Facilities Systems Management Offices; and Special Military and Public Addressees.

**3. BACKGROUND.** Flight Operational Quality Assurance (FOQA) and Aviation Safety Action Program (ASAP) reports indicate flight crews at certain locations sometimes exceed normal flight profiles by descending at excessive rates, resulting in unstabilized approaches. A large percentage of these reports come from flight crews conducting visual approaches to runways not served by vertically guided approach procedures. However, this situation can also exist at airports with vertically guided approaches when ATC is conducting visual approach operations, which require altitude restrictions that interfere with the flight crews' ability to establish a stabilized approach. Many of the aircraft involved in such operations are equipped with RNAV systems capable of being programmed to provide lateral, vertical, and airspeed guidance/reference. Procedures such as RNAV Transitions, which use the capabilities of these RNAV systems, are beneficial in that they may reduce air traffic communications, promote flight path repeatability, and enhance safety. Procedure designers should consider the use of other type procedures, designed in accordance with approved FAA criteria, before development of an RNAV transition. Designers should give due consideration to anticipated safety benefits and required levels of participation in this decision.

**4. DEFINITIONS**. The following terms are defined for the purposes of this notice.

**a**. **Operator.** A commercial operator, which holds a certificate issued in accordance with 14 CFR Part 121 or 135.

**b. Lead Operator.** An operator, which acts as a proponent for the development, coordination, and implementation of RNAV Transitions.

**c. RNAV Transition.** An RNAV procedure which overlays common ATC assigned flight paths and transition altitudes, at or above minimum vectoring altitude (MVA), and which is intended to terminate with a visual segment for a visual approach to the designated runway.

**d. Accepted Procedure.** An RNAV Transition, which has been developed and agreed upon by the lead operator and respective ATC facility.

**5. APPLICABILITY.** Inspectors will provide these criteria to operators for the development, processing, and operation of RNAV Transitions.

**6. RELATED PUBLICATIONS.** A list of related publications follows.

**a. Order 1050.1E,** Policies and Procedures for Considering Environmental Impacts.

**b. Order 7100.9D,** Standard Terminal Arrival (STAR).

**c. Order 7110.79D,** Charted Visual Flight Procedures (CVFP).

**d. Order 7400.2E,** Procedures for Handling Airspace Matters.

**e. Order 8260.3B,** United States Standard for Terminal Instrument Procedures (TERPS).

**f. Order 8260.19C,** Flight Procedures and Airspace.

**g. Order 8260.26D,** Establishing and Scheduling Civil Public-Use Standard Instrument Procedure Effective Dates.

**h. Order 8260.40B,** Flight Management System (FMS) Instrument Procedure Development.

**i. Order 8260.43A,** Flight Procedures Management Program.

**j. Order 8260.44A,** Civil Utilization of Area Navigation (RNAV) Departure Procedures.

**k. Order 8260.46B,** Departure Procedure (DP) Program.

**l. Order 7110.65,** Air Traffic Control.

**m. Advisory Circular (AC) 20-129,** Airworthiness Approval of Vertical Navigation (VNAV) Systems for use in the U.S. National Airspace System (NAS) and Alaska.

**n. AC 20-130A,** Airworthiness Approval of Navigation or Flight Management Systems Integrating Multiple Navigation Sensors.

**o. AC 25-15,** Approval of Flight Management Systems in Transport Category Airplanes.

**p. ARINC Specification 424-11,** Navigation System Database.

**q. RTCA Document DO-187,** Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Multi-Sensor Inputs.

**r. AC 90-100,** U.S. Terminal and En Route Area Navigation (RNAV) Operations.

## 7. DEVELOPMENT AND PUBLICATION INSTRUCTIONS.

**a. General.** RNAV Transitions developed under this guidance are for use only by aircraft equipped with Instrument Flight Rules (IFR)-approved RNAV systems. Lead operator and local ATC facility coordination will ensure procedural design requirements. While these procedures are not "public" in nature and have an approval process similar to that of "special" instrument approach procedures (IAPs), RNAV transitions are not "special IAPs" by definition. Rather, RNAV transitions are "special" procedures designed through the cooperation of a lead operator and an ATC facility, with additional acceptance and oversight by the FAA Flight Standards Service.

**b. Emulation of Common Air Traffic Radar Vector Tracks, Altitudes, and Speeds.** The RNAV Transitions should be designed to emulate common ATC assigned flight paths. These transitions should include all normal operational and/or desired altitude and speed restrictions. It is the responsibility of the lead operator to ensure procedure coding accurately defines the common ATC flight paths, altitudes, and speed restrictions. Use of a design tool, such as Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS), is recommended in the design process.

**c. Relationship of Minimum Vectoring Altitude (MVA) to Procedure Design.** All segments of an RNAV Transition, before the visual portion, must be conducted at altitudes equal to or higher than the underlying MVA. The procedure must have adequate vertical guidance incorporated in its design, so as to not allow the aircraft to descend below the MVA until in visual meteorological conditions and cleared for a visual approach. The local ATC facility must ensure these requirements are met prior to acceptance of the procedure.

**d. Descent Gradients, Turn Angles, and Vertical Guidance.** The lead operator will determine descent gradients and turn angles with concurrence of the ATC facility. Adherence to current or draft FAA RNAV design criteria, while not required, is recommended where practicable. A runway to which an RNAV Transition is published must be equipped with a visual or electronic vertical guidance system, for example, a Visual Approach Slope Indicator (VASI) or Instrument Landing System (ILS). The vertical path provided in the visual segment of the RNAV Transition must be coincident or steeper than either the guidance provided by the visual or electronic systems.

**e. RNAV Equipment Requirements and Flyability.** Only RNAV systems compliant with the specifications of the current version of Advisory Circular (AC) 90-100 U.S. TERMINAL AND EN ROUTE AREA NAVIGATION (RNAV) OPERATIONS, using Distance Measuring Equipment (DME)/DME/Inertial Reference Unit (IRU) and/or Global Positioning System (GPS) sensor inputs, may be used for guidance on RNAV Transition procedures. It is the operator's responsibility to determine to the satisfaction of the POI and respective ATC facility that all the maneuvers required to emulate the radar vector tracks (lateral and vertical) are flyable with the intended equipment.

**f. Weather Requirements.** The ceiling and visibility values required to conduct these procedures must equal or exceed the requirements for visual approach operations, as determined by ATC standards (reference 7110.65 paragraph 7-4 "Visual Approaches") and any local ATC facility policies.

**g. Flight Inspection.** Since air traffic radar has already been flight inspected, flight inspection is not required.

**h. Naming Convention.** So that overlays of common ATC assigned flight paths are not confused with other current procedures or criteria, the naming convention is based on the actual operation and runway served e.g., "RNAV TRANSITION RWY XX."

**i. Charting.** Each operator is responsible for providing a graphical depiction of the procedure to its pilots. See Appendix 1 for charting requirements.

**8. PROCESSING AND OPERATIONAL ACCEPTANCE.** Operators should use one of the following processes for procedure development and operational acceptance. Operators must have authorization to operate on U.S. RNAV Standard Terminal Arrivals (STARs), in accordance with AC 90-100 and applicable operations specifications, in order to conduct RNAV Transition operations.

**a. Process for the Lead Operator.**

**(1)** The lead operator will contact the respective ATC facility and POI regarding the prospective procedure.

**(2)** When the lead operator has finalized the RNAV Transition design and it is accepted by the local ATC facility and POI, the ATC facility manager will provide written acceptance of the proposed procedure to the respective Flight Standards Region All Weather Operations Program Manager (AWO), ATC-530, and lead operator. The lead operator, with the assistance of the regional AWO and the Air Traffic Organization (ATO) RNAV and Required Navigation Performance (RNP) group, will assess the available DME infrastructure to support all segments of the procedure prior to the visual portion, via use of RNAV-Pro. Procedures that do not have the necessary infrastructure to support DME/DME/IRU operations will be charted as "GPS required." The lead operator will document the RNAV Transition procedure on FAA Form 8260-7 with an amended title of *RNAV Transition Procedure*.

**(3)** The lead operator will submit the procedure package to the regional AWO. The procedure package will include the ATC facility manager's written acceptance of the procedure, completed FAA Form 8260-7, TARGETS documentation if applicable, a prototype chart, and a statement of the POI's initial concurrence. The regional AWO will forward the procedure package with any comments to Flight Standards Service, Flight Technologies and Procedures Division, AFS-400, for final review at a Procedures Review Board (PRB).

**(4)** If the procedure package is approved at the PRB, any special aircraft, operational, and/or training requirements will be documented on FAA Form 8260-10 by AFS-410, Flight Operations Branch. AFS-400 will then forward the procedure package with any Form 8260-10 to the regional AWO. The regional AWO will coordinate with the lead operator upon receipt of the approved procedure package and any Form 8260-10.

**(5)** The operator will equip aircraft, develop operating procedures, and conduct training as applicable and required by Form 8260-10.

**(6)** If satisfied with the operator's equipage, procedures, and training, the POI will issue final approval with the procedure to the lead operator in writing.

**(7)** If the procedure package is disapproved, AFS-400 will either request changes to the procedure or return the procedure package to the lead operator via the regional AWO and respective POI.

**b. Approval Process for Other than the Lead Operator**.

**(1)** Submit request to use the accepted procedure to the regional AWO via the POI.

**(2)** The regional AWO will provide to the operator, via the POI, all applicable procedure documentation.

**(3)** The operator will equip aircraft, develop operating procedures, and conduct training as applicable and required by the procedure and any associated Form 8260-10.

**(4)** After the POI has initially concurred with the procedure use, the operator will provide a copy of the POI's letter of concurrence along with a letter requesting participation to the respective ATC facility manager.

**(5)** The ATC facility manager will accept or deny the operator's request in writing with a copy provided to the POI.

**(6)** If satisfied with the operator's equipage, procedures, and training, the POI will issue final concurrence with the procedure to the operator in writing.

**9. ATC USE OF RNAV TRANSITIONS.** ATC may use RNAV transitions only when visual approaches are in use, at the discretion of the local facility, and upon request by participating flight crews. ATC may suspend RNAV Transition operations at any time. Appendix 2 contains example phraseology and procedures for use with RNAV Transitions.

**10. ROLES AND REPONSIBILITIES**.

**a. Operator and Pilot.**

**(1)** Pilots must be adequately trained on the procedure. This training must include RNAV Transition phraseology, procedures, and requirements specified on any associated Form 8260-10.

**(2)** The RNAV Transition must be coded in the aircraft RNAV system database and retrievable by name. Pilots are not authorized to build these procedures manually.

**(3)** Pilots planning to execute an RNAV Transition must request the procedure from the controlling agency on initial contact.

**(4)** Pilots cleared for an RNAV Transition *must fly the published route* and, unless otherwise cleared by ATC, comply with charted mandatory altitudes and speeds.

**(5)** Upon receipt of a visual approach clearance, pilots must comply with the visibility, cloud clearance, and all other requirements of a visual approach clearance.

**b. Local ATC.**

**(1)** Controllers must be trained on these procedures. This training must include the following subjects.

**(a)** RNAV Transition phraseology.

**(b)** Intervention policies and procedures.

**(c)** Actions to be taken if a pilot has not reported the airport in sight by the beginning of the visual portion of the procedure.

**(2)** The controlling facility must radar monitor, as defined in the Pilot/Controller glossary, aircraft operating on any portion of an RNAV Transition.

**(3)** When clearing aircraft for the visual approach the controller has removed course, altitude, and speed restrictions unless the controller advises the pilot to comply with published restrictions.

**11. DISPOSITION.** This notice will not be incorporated into Order 8400.10. Questions concerning this notice should be directed to the Flight Operations Branch, AFS-410, at (202) 385-4613.

ORIGINAL SIGNED BY
Carol Giles for

James J. Ballough
Director, Flight Standards Service

# APPENDIX 1. CHARTING REQUIREMENTS FOR RNAV TRANSITIONS

**1. The procedure must be charted** and available to pilots using the procedure. The following items must be included on the chart:

**a. Procedure name**, for example, *RNAV TRANSITION RWY 18R*.

**b. The statement "RADAR REQUIRED."**

**c. The applicable statement "DME/DME/IRU or GPS required" or "GPS required."**

**d. A depiction of segments to be flown** under visual meteorological conditions (VMC) as dashed lines. The start point of the dashed lines depicts the last point at which the pilot must have received a visual approach clearance.

**e. Weather requirements** for the procedure in terms of ceiling and visibility.

**f. A statement that pilots are to advise ATC**, prior to the VMC portion of the procedure, when either the airport or the preceding traffic is in sight and a visual approach clearance may be accepted.

**g. All altitude and speed restrictions.**

**h. A statement that pilots planning to execute an RNAV Transition** must request the procedure from the controlling agency on initial contact.

*NOTE 1: Missed approach instructions should not be depicted.*

*NOTE 2: Lost communications procedures may be charted as agreed upon by the lead operator and local ATC facility.*

*NOTE 3: 'Descend Via' phraseology must not be used if 'Expect' altitudes are depicted on RNAV Transitions.*

**2. Charts should adhere as closely as possible to standard charting conventions** but may be tailored as necessary to meet user needs.

# APPENDIX 2. EXAMPLE PHRASEOLOGY AND PROCEDURES

## SCENARIO FOR A PILOT REQUESTING RNAV TRANSITION RUNWAY 18R FROM NEEMO WAYPOINT

Aircraft is arriving from northwest of Orlando International Airport (MCO).

Pilot: On initial contact with the Arrival Controller include, “REQUEST RNAV TRANSITION RUNWAY ONE EIGHT RIGHT.”

Arrival Controller: “EXPECT RNAV TRANSITION RUNWAY ONE EIGHT RIGHT.”

When traffic permits, ATC assigns 9,000 feet. Pilot remains on last assigned route and descends to 9,000 feet.

Arrival Controller: Approximately 20 miles northwest of the Orlando VORTAC, and traffic permitting, “DESCEND AND MAINTAIN SIX THOUSAND, PROCEED DIRECT NEEMO.”

Pilot proceeds direct NEEMO descends to 6,000 feet. Arrival controller performs a radar hand-off to the Final Controller.

Pilot: On initial contact to the Final Controller, “PROCEEDING DIRECT NEEMO DESCENDING TO SIX THOUSAND.”

Final Controller: “CROSS NEEMO AT SIX THOUSAND, DESCEND VIA THE RNAV TRANSITION RUNWAY ONE EIGHT RIGHT.”

Pilot: Pilot configures aircraft to cross NEEMO at 6,000 feet, speed 220 knots (as depicted at NEEMO), then complies with all charted crossing altitudes and speeds. When the pilot has the airport in sight and is willing to accept a visual approach clearance, the pilot reports the “AIRPORT IN SIGHT.”

Final Controller: After pilot reports airport in sight, “CLEARED VISUAL APPROACH RUNWAY ONE EIGHT RIGHT.” Other instructions may be included in this clearance per Air Traffic Control Order 7110.65, Section 7-4.

Pilot executes a visual approach to Runway 18R in accordance with all charted routes, altitudes, and speeds.