U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Air Traffic Organization Policy

ORDER
JO 7100.9E

Effective Date:
September 27, 2013

SUBJ: Standard Terminal Arrival Program and Procedures

1. Purpose of This Order. This order provides policy, guidance, and standardization for initiating, developing, and processing Standard Terminal Arrival (STAR) procedures.

2. Audience. This order applies to all Federal Aviation Administration (FAA) employees, military entities, and other proponents responsible for the development and implementation of civil STAR procedures. This order provides guidance for aviation industry proponents and other members of Performance-Based Navigation (PBN) Working Groups on developing STAR procedures.

3. Where Can I Find This Order? This order is available on the MyFAA employee Web site at https://employees.faa.gov/tools_resources/orders_notices/ and on the FAA Web site at http://www.faa.gov/regulations_policies/orders_notices/.

4. Cancellation. This order cancels FAA Order 7100.9D, Standard Terminal Arrival Program and Procedures, dated December 15, 2003.

5. Explanation of Policy Changes. This order has been revised to conform to current FAA branding criteria. The order is updated to reflect the most current STAR program information and has been harmonized with FAA Order 8260.46, Departure Procedure (DP) Program, to the extent possible.

a. Related publications have been referenced, including the Notices to Airmen (NOTAM) and Flight Management System (FMS) instrument procedures development orders, International Civil Aviation Organization (ICAO) documents, and RTCA, Inc. publication DO-236, Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation.

b. Removed example graphic depiction of STAR obstacle clearance areas.

c. Implements use of criteria for feeder routes in FAA Order 8260.58, United States Standard for Performance Based Navigation (PBN) Instrument Procedure Design, as a primary reference document for RNAV and Required Navigation Performance (RNP) STAR design. Conventional STARs use feeder route criteria in FAA Order 8260.3.

d. The Guidelines for Implementing Terminal RNAV Procedures is revised, and moved to a separate document.

e. Levels of criteria for RNAV STARs have been aligned with the guidance in Advisory Circular (AC) 90-100, U.S. Terminal and En Route Area Navigation (RNAV) Operations.

f. Levels of criteria for RNP STARs have been aligned with the guidance in AC 90-105, Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System.

g. Required chart notes have been revised to align with the guidance in AC 90-100, U.S. Terminal and En Route Area Navigation (RNAV) Operations.

h. Clarifies that RNAV or RNP STARs terminating at an initial approach fix (IAF), intermediate fix (IF), or a pronounceable named fix on the Final Approach Course of a standard instrument approach procedure (SIAP) must end with a fly-by (FB) waypoint (WP), and STARs not ending at a SIAP must terminate with a fly-over (FO) waypoint.

i. Adds: Where a STAR terminates at an SIAP and that SIAP has a course reversal, the STAR must terminate at a segment that is designated "NoPT" so the need for a course reversal is negated. This may require concurrent amendment of the SIAP to assure that the STAR avoids a course reversal.

j. Clarifies when it is appropriate to provide lost communication instructions on the chart.

k. Provides guidance for the use of runway transitions in RNAV STAR design.

l. This order has been reorganized to segregate information exclusive to conventional STARs from RNAV and RNP STAR information.

m. Provides guidance on the use of radius to fix (RF) leg types.

6. Procedures.

a. Request for Original STARs. STARs may be requested by Air Route Traffic Control Centers (ARTCC) for areas under their control, by the terminal facility, or by proponents. Proponents requesting STARs should contact the appropriate facility with their request and justification for the procedure. Conventional STARs should only be developed where RNAV STARs do not satisfy operational needs.

(1) Requests must be routed through the appropriate Service Center to the Operations Support Group (OSG). The OSG Flight Procedures Team (FPT) will forward the completed STAR package to AeroNav Products.

(2) Request for RNAV and RNP STARs must include:

(a) Expected benefits and advantages to users or providers, for example, reduced inter/intra-facility coordination; increased airspace flexibility, management, and sectorization due to repeatable and predictable flight tracks; fuel savings; noise reductions; and reduced communications.

(b) A description of the STAR, including the ground track, fixes, WPs, tracks, and altitude/speeds.

(3) Requests for conventional STARs must include:

(a) Expected benefits and advantages for preferring conventional instead of RNAV/RNP STARs.

(b) Description of the STAR, including the proposed ground track with navigational aids (NAVAID)/fixes, courses, radials, and altitudes/speeds.

b. STAR Amendments. Standard Terminal Arrivals may be amended using either the full amendment or an abbreviated amendment process as specified below. An amendment must ensure periodic review requirements have been met for the procedures and documented. A full amendment requires a complete procedure package (that is, all necessary forms, maps, and supporting documentation) be developed and submitted for processing. An RNAV STAR abbreviated amendment requires submission of the Forms 7100-3 and 7100-4 and Conventional STARs require Form 7100-4. STAR full amendments must be evaluated by Flight Inspection Service for possible flight inspection requirements prior to publication.

ARRIVAL." Update Arrival Name, Number, STAR Computer Code, Superseded Number, Dated, and Effective Date. Number each Original STAR "ONE." Renumber a STAR whenever a revised FAA 7100-serise form is required.

(2) A full amendment and procedure submission package is required whenever a change is made to the following items:

(a) Form 7100-3:
(1) LAT/LONG
(2) FO/FB
(3) LEG
(4) TC
(5) DIST
(6) ALTITUDE
(7) SPEED

(b) Form 7100-4:
(1) Arrival Route Description
(2) Transition Routes
(3) Airports Served. (Only when airports are added.)
(4) Holding Patterns

(3) An **abbreviated amendment** may be submitted when a change is made to the items listed below as specified on Forms 7100-3 and/or 7100-4. A P-NOTAM must not be used to effect an abbreviated amendment for STARs.

(a) Procedural Data Notes
(b) Lost Comm Procedures
(c) Controlling Obstacle
(d) Additional Flight Data
(e) Airports Served. (Only when airports are deleted.)
(f) Communications
(g) Fixes and/or Navaids. (Only those requested for charting purposes, but are not included in the textual description of the arrival or entered in the transition route data.)
(h) Remarks

(4) Whenever the "Arrival Name" changes the procedure must be cancelled and a new procedure developed.

c. Reviews. FAA Order 8260.19 assigns the responsibility for a review of existing STARs to AeroNav Products to ensure conformance with criteria. Reviewing the operational need for procedures by air traffic is a continuous process. Procedures no longer valid, needed, or used, should be considered for cancellation.

d. Cancellation. May be for the following reasons:

(1) A proponent recommendation to cancel a STAR requires notification of the Air Traffic Control (ATC) facilities involved and coordination with the Regional Airspace and Procedures Team (RAPT).

(2) Whenever the “Arrival Name” changes the procedure must be cancelled and a new procedure developed.

(3) When ATC determines a STAR is no longer required.

Note: ATC facilities requesting cancellation of STARs must prepare FAA Form 7100-4 and FAA Form 8260-2 (worksheets) and forward to the OSG with a cover letter requesting cancellation. Forward copies to all affected ATC facilities.

e. Accuracy Verification and Responsibilities. Users of this order must notify the National Flight Data Center (NFDC), flight service station, or local facility whenever errors are discovered with the procedure or supporting data.

(1) STAR NOTAM Issuance.

(a) FAA Order JO 7930.2, Notices to Airmen (NOTAM) prescribes procedures used to obtain, format, and disseminate information on unanticipated or temporary changes to components or hazards in the National Airspace System until the associated aeronautical charts and publications are amended. The NOTAM system should not be used to advertise data already published or charted.

(b) Changes to STARs requiring dissemination must be originated by the affected ARTCC in whose airspace the STAR originates.

(c) A separate FDC FI/T NOTAM must be prepared for each airport affected by the procedure. NOTAM must not be used as a source to effect charting changes for these procedures. Permanent changes or amendments to STARs must be made via a new or amended FAA Form 7100-4 and submitted to the Service Center OSG within 224 days of the issuance of the associated NOTAM.

(d) When STARs serve multiple airports, a separate NOTAM must be issued for each airport.

(2) FAA Form 7100-3 and/or FAA Form 7100-4 must be submitted for permanent charting changes. NOTAMs on STARs will be carried on the system until published. Once published, the facility that submitted NOTAMs must ensure they are cancelled through the USNOF.

NOTE-
Procedure modifications disseminated by the NOTAM system may not be reflected in the database coded procedure. This does not alter the expectation that the pilot will execute the procedure as NOTAM'ed or advise if unable.

f. Waivers. Requests for waivers to design criteria are processed per FAA Order 8260.19.

(1) The OSG forwards the original FAA Form 8260-1 and supporting data for approval per FAA Order 8260.19.

(2) Requests for deviation from non-criteria items e.g. ATC waivers, are processed through the service area OSG.

g. Military STAR Procedures. The FAA will develop STARs at joint-use airfields. STARs developed by military proponents for military airfields are coordinated, processed, and charted in the same manner as civil STARs. Military proponents are responsible for ensuring coordination with the RAPT and affected ATC facilities.

7. Roles and Responsibilities. *For RNAV or RNP STARs, the OSG will form a working group, designate a project facilitator a TARGETS operator, and begin the procedure development process.*

a. Air Traffic Control Facilities must:

(1) Provide assistance to determine the STAR operational feasibility and to verify expected benefits.

(2) Conduct a thorough review of existing procedures. Procedures no longer operationally viable should be considered for cancellation.

(3) When requested, provide data regarding traffic flows and operational constraints e.g. arrival/departure routes, aircraft types and characteristics, minimum instrument flight rules (IFR) altitudes, airspace boundaries, and sector requirements.

(4) Where local training and resources permit, and when requested by the Service Center OSG, provide personnel and resources to support the STAR design, development, and implementation.

(5) Provide radar tracking data to the STAR procedure designers and identify required video maps.

(6) Coordinate with other facilities concerning letters of agreements (LOA), hand-off procedures, controller notifications, and SOPs.

(7) Review automation requirements (En Route Automation System [EAS], ARTS/STARS/MEARTS, update cycles, moratoriums, coding options, etc.), and coordinate with adjacent facilities regarding automation changes.

(8) Serve as the focal point for ATC-related coordination and provide assistance in resolving issues identified during the development process.

(9) Provide five-letter pronounceable names for all new fixes and WPs. Coordinate with the associated ARTCC to preclude similar sounding fix names. Complete Form 8260-2 Data Worksheets as required by FAA Order 8260.19 for each fix or WP being established, modified, or cancelled, and submit to the OSG.

(10) Establish a minimum altitude for segment of the STAR. The altitude will be established based upon obstacle clearance over the terrain or manmade obstacles, adequacy of navigation coverage, and communication coverage. Follow the guidance in FAA Order 8260.19 to determine the communication requirements. Conventional, RNAV and RNP STARs follow guidance in FAA 8260 series orders to establish the minimum altitudes. At, at or above, and block altitudes may be charted to accommodate ATC requirements and profile descents. If possible avoid use of at or below altitudes. The termination altitude for STARs ending on a SIAP IAF, IF or pronounceable Fix on the Final Approach Course must be compatible with the SIAP's published altitude. For RNAV and RNP STARs, use and evaluate feeder route criteria, Obstacle Evaluation Area (OEA).

(11) Depict conventional STAR off airway routing on a VFR Sectional Chart. When use of a Sectional Chart is not viable, a Terminal Area Chart may be used. The depiction must include the STAR primary and secondary obstacle clearance areas and identification of the controlling obstacle or terrain used to establish the minimum obstruction clearance altitude (MOCA) for each segment published for use at or below FL180 in the contiguous US and at or below FL230 for Alaska and Hawaii. FAA Order 8260.3, Feeder Route criteria applies to the development of conventional STARs. Depiction of turn expansion areas where two segments are joined is required on this chart. Charts produced electronically are acceptable and must accurately reflect the scale of the type of chart used and be similar in quality to the original printed version to facilitate use by the flight inspection crew in-flight.

(12) For RNAV and RNP STARs, use TARGETS to produce depictions of the obstacle clearance areas and the controlling obstacles/terrain. The depiction must include the STAR obstacle clearance areas and identification of the controlling obstacle or terrain used to establish the MOCA for each segment published for use at or below 18,000 feet MSL and at or below FL230 for Alaska and

Hawaii. Where two segments are joined, ensure TARGETS calculates and displays the required turn expansion areas. The chart depiction must accurately reflect the chart scale and be similar in quality to the original printed version to facilitate use by the flight inspection crew in-flight.

(13) Complete and forward the applicable forms and procedure depictions to the OSG. An RNAV STAR abbreviated amendment requires submission of the Forms 7100-3, 7100-4 and 8260-2 worksheets. Conventional STARS require only Form 7100-4 and 8260-2 worksheets.

(14) Continuously review procedures for operational need and accuracy. Forward requests for changes to the OSG.

(15) To cancel a STAR, complete and forward Forms 7100-4 and 8260-2 worksheet to the OSG.

b. The Service Center Operations Support Group must:

(1) Use the information contained in Appendix B, Standard Terminal Arrival Design, for guidance on STAR design requirements.

(2) For RNAV or RNP STARs, the OSG will form a working group, designate a project facilitator and begin the procedure development process. Use information contained in FAA 8260 series Orders for RNAV and RNP STAR design criteria guidance.

(3) Refer to Safety Risk Management (SRM) processes or current interim safety guidance.

(4) Ensure coordination with affected ATC facilities, adjacent regions and adjoining service areas.

(5) Review each new or revised STAR to ensure accuracy and compliance with the provisions of this order.

(6) Ensure that the proposed procedure has been evaluated for potential environmental impacts in accordance with FAA Order 1050.1 and FAA Order JO 7400.2, Chapter 32. The Service Center environmental specialist assesses the preliminary environmental package to validate that proper environmental guidance has been applied to the proposed procedure.

(7) Complete an initial distance measuring equipment (DME)/DME infrastructure assessment in accordance with FAA Order 7470.1, DME/DME Infrastructure Evaluation for RNAV Routes and Procedures. This is not required when use of an RNAV or RNP procedure is intended to be limited to GPS equipped aircraft or for conventional procedures.

(a) When required, request an Expanded Service Volume (ESV) through the ESV Management System (ESVMS). For RNAV procedures, if an acceptable DME/DME screening cannot be obtained, the failed segment must be annotated “GPS Required.” Assistance in completing the DME/DME screening is available from the Performance Based Navigation (PBN) Policy and Support Group.

(b) If any DME facility limitations are identified as a result of flight inspection, another DME/DME infrastructure assessment will be conducted with the DME limitations identified during the previous flight inspection included in the analysis.

(8) Identify items requiring specific approval or waiver. (See FAA Order 8260.19E Para 8-30 for waiver procedures). Provide supporting documentation as needed, e.g., flight simulator results.

(9) Forward procedure documentation to the respective Service Center Operational Support Group - Flight Procedures Team (OSG-FPT). The documentation includes:

(a) FAA Form 7100-3(not required for conventional procedures).

(b) Scanned original signed FAA Form 7100-4.

(c) Scanned or electronic version of each FAA Form 8260-2 data worksheet.

(d) Terminal Area Route Generation, Evaluation and Traffic Simulation (TARGETS) software tool Distribution Package (required for RNAV and RNP STARs).

(e) DME/DME infrastructure assessment results derived from RNAV Pro (RNAV STARs only); including DME limitations based upon line-of-sight or altitude restrictions. Global Positioning System (GPS) performance is not included as a function of the RNAV-Pro screening model; DME/DME assessment is not necessary for "GPS required" procedures.

(f) Copies of DME/DME ESVs or Conventional ESVs.

(g) The results of the completed environmental pre-screening filter or the results of the Service Center environmental review.

(h) Include a visual flight rules (VFR) sectional chart depicting the STAR off-airway routing and the route protected areas. Depict the controlling obstacles or terrain for each segment published for use at or below 18,000 feet MSL in the contiguous United States (CONUS) and at or below FL230 for Alaska and Hawaii. A terminal area chart may be used when it is not possible to develop the procedure on a VFR sectional chart.

(i) For RNAV and RNP STARs, a TARGETS-generated depiction of the route, protected areas, and controlling obstacles or terrain for each segment of the procedure may be submitted in lieu of a sectional chart.

(j) For RNAV and RNP STARs submit an electronic file of the TARGETS project.

(k) The facility point of contact name and contact information.

(l) For abbreviated amendments, up number, review and submit FAA Forms 7100-3 and 7100-4 to AeroNav Products via the FPT.

NOTE-
An electronic copy of the procedure package should also be forwarded to AeroNav Products. At the discretion of AeroNav Products, subsequent modifications to RNAV procedures must be coordinated through the OSG using the electronic document. Procedure revisions require new copies of the appropriate forms, worksheets and/or TARGETS distribution package to effect changes.

(10) Forward copies of completed documentation received from AeroNav Products to all affected ATC facilities.

(11) STARs developed with AFS validated, certified or approved software, such as TARGETS, may be submitted electronically to the AeroNav Products Quality Assurance section.

c. The PBN working groups must:

(1) Coordinate with the Service Center OSG to ensure that a qualified TARGETS operator is designated.

(2) Use current implementation guidelines and the Project Tracking Tool.

(3) Use the TARGETS design tool.

(4) If submitting procedure directly to AeroNav Products, include a copy to the Service Center OSG and FPT.

d. The Flight Procedures Team must:

(1) Provide technical assistance on STAR development.

(2) Evaluate for impact of airport airspace analysis, facilities and equipment, national change proposals or other applicable projects.

(3) Review STAR documentation.

(4) Contact the submitting facility or OSG to resolve any problems found during the review.

(5) Facilitate discussion of the STAR with the RAPT.

(6) Review the Frequency Management Office (FMO) approval of ESV request to ensure they match the procedure requirement.

(7) Transmit the STAR documentation to AeroNav Products.

(8) RNAV STARs developed with validated software may be submitted directly to AeroNav Products Quality Assurance for processing.

(9) Advise the RAPT and OSG of any charting issues or publication delays.

e. Flight Standards Regional NextGen Branch (RNGB) Manager must:

(1) When requested by the OSG, assist in developing an equivalent level of safety for procedure waivers.

(2) Provide technical assistance on the development of new or significantly modified existing STARs.

(3) Assist in identifying procedures no longer needed.

f. AeroNav Products must:

(1) Review STAR documentation and verify courses, distances and altitudes. Conduct data integrity check against data contained in approved databases for continuity.

(2) Review the STAR to ensure charted altitudes are at or above appropriate MEA/MOCA(s) and correct bearing/distance between fixes/WP.

(3) Review waiver requirements in accordance with paragraph 6f.

(4) When required, complete and update fix and waypoint databases based on the submitted FAA Form 8260-2s data worksheets.

(5) After a STAR is complete, forward STAR documentation or data to the Flight Inspection Services for review and possible flight inspection.

(6) Forward original forms or digitally signed data to NFDC for further processing and a copy to the originating Service Center. Critical DME facilities must be annotated on the FAA Form 7100-4.

(7) Publish the STAR on the effective date assigned by NFDC.

(8) Submit abbreviated STAR amendments to NFDC for charting in the next available chart cycle. Forward a copy of FAA Forms 7100-3 and 7100-4 to Flight Inspection for review.

g. NFDC must:

(1) Conduct a pre-publication review of submitted forms to resolve data conflicts with Aeronautical Products and the OSG.

(2) Verify that fix names are not duplicated.

(3) Assign an effective date and publish the STAR and associated fixes/WP in the NFDD authorizing charting agencies to publish the STAR.

(4) File and maintain the original signed copy of the forms or digitally signed data.

(5) When a STAR or WP is cancelled, ensure names are made available for future use.

h. The PBN Policy and Support Group must:

(1) Provide interpretation and guidance on the application and implementation of this order.

(2) Review waiver requests and evaluate requests to deviate from non-criteria related provisions of this order.

i. Flight Inspection Services must:

(1) Execute the flight inspection of STARs as required by current guidance.

(2) Provide flight inspection results to AeroNav Products.

8. Distribution. This order is distributed in Washington Headquarters at the Division level of Flight Standards; Director level of Air Traffic, the offices of Airport Safety and Standards and Communications, Navigation, and Surveillance Systems, the Regulatory Standards Division at the Mike Monroney Aeronautical Center; regional Flight Standards offices, Air Traffic Organization (ATO) Service Centers, all air traffic field offices and facilities, and special military and public addresses.

9. Background. The STAR program was designed to improve operational efficiencies by reducing phraseology, providing guidance on designing Optimized Profile Descent procedures and increasing situational awareness by providing preplanned arrival procedures published in a graphic form.

10. Definitions. Appendix A, Acronyms, Terms, and Definitions, contains a glossary of additional terms, abbreviations, and acronyms used in this order.

11. Related publications.

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

b. FAA Order 1100.161, Air Traffic Safety Oversight.

c. FAA Order 7100.xx Performance-Based Navigation (PBN) Implementation Process.

d. FAA Order 7130.3, Holding Pattern Criteria.

e. FAA Order JO 7110.65, Air Traffic Control.

f. FAA Order 7110.79, Charted Visual Flight Procedures (CVFP).

g. FAA Order JO 7400.2, Procedures for Handling Airspace Matters.

h. FAA Order JO 7470.1, Distance Measuring Equipment (DME)/DME Infrastructure Evaluation for Area Navigation (RNAV) Routes and Procedures.

i. FAA Order JO 7930.2, Notices to Airmen (NOTAM).

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

k. FAA Order 8260.19, Flight Procedures and Airspace.

l. FAA Order 8260.26, Establishing and Scheduling Civil Public-Use Standard Instrument Procedure Effective Dates.

m. FAA Order 8260.40, Flight Management System (FMS) Instrument Procedure Development.

n. FAA Order 8260.43, Flight Procedures Management Program.

o. FAA Order 8260.46, Departure Procedure (DP) Program.

p. FAA Order 8260.58, The United States Standard for Performance Based Navigation (PBN) Instrument Procedure Design.

q. ARINC Specification 424, Navigation System Data Base.

r. ICAO Annex 11, Air Traffic Services.

s. ICAO ATM 4444, Air Traffic Management.

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

u. RTCA Document DO-236, Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation.

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

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

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

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

z. AC 90-105, Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace.

12. Forms and Reports. Appendix C contains an example of FAA Form 7100-3 and FAA Form 7100-4. Instructions for Forms 7100-3 and -4 are in Appendix D.

W. A. Quinn for

Vice President, Mission Support Services
Air Traffic Organization

9 . 19 - 2013
Date Signed

Appendix A. Acronyms, Terms, and Definitions

Acronym/Term	Definition
AC	Advisory Circular
AFS	Flight Standard Services
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATNS	Air Traffic Noise Screening Model
AWO	All Weather Operations
CF	Course to fix leg type
Common Route	The segment of a procedure that is common to all runway and en route transitions. The common route may consist of a single fix.
DF	Direct to fix leg type
DG	Descent Gradient
DME	Distance Measuring Equipment - Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.
DP	Departure Procedure
EAS	En Route Automation System
En Route Transition	The segments of a procedure between an en route transition fix and the common route/point. Most procedures will contain more than one en route transition.
ESV	Expanded Service Volume
FAA	Federal Aviation Administration
Fix	A generic term used to define a predetermined geographical position used for route definition. A fix may be a ground-based NAVAID, WP, or defined by reference to one or more radio NAVAIDs.
FMO	Frequency Management Office
FB	Fly-by WP - Requires the use of turn anticipation to avoid overshoot of the next flight segment.
FL	Flight Level
FO	Fly-over WP - Precludes any turn until the WP is over-flown and is followed by an intercept maneuver of the next flight segment.
FM	From a fix to a manual termination leg.
FMC	Flight Management Computer
FMS	Flight Management System
ft/NM	Feet Per Nautical Mile
FPT	Flight Procedures Team
GPS	Global Positioning System
IAF	Initial Approach Fix
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organization
IF	Path terminator denoting the initial fix of a route leg. See “path and terminator.” Also, intermediate fix on a Standard Instrument Approach Procedure (SIAP).
IFR	Instrument Flight Rules
INT	Intersection
IRU	Inertial Reference Unit

K	The speed suffix used on certain FAA forms (See Appendix C) to represent speed restrictions in KIAS.
KIAS	Indicated Airspeed in Knots
Lead Operator	The lead operator serves as the focal point for PBN procedures at specific airport. The lead operator agrees to help develop PBN procedures and conduct simulator validations.
Leg Type	See “path and terminator.”
LOA	Letter of Agreement
LNAV	Lateral Navigation
MAA	Maximum Authorized Altitude
MEA	Minimum En Route Altitude
MEARTS	Micro-En Route Automated Radar Tracking System
MIA	Minimum IFR Altitude
MOCA	Minimum Obstruction Clearance Altitude
MSL	Mean Sea Level
MV	Magnetic Variation
MIA	Minimum IFR Altitude
MVA	Minimum Vectoring Altitude
NM	Nautical Mile
NAVAID	Navigational Aid
NFDD	National Flight Data Digest
NFDC	National Flight Data Center
NOTAM	Notice to Airmen
NM	Nautical Mile
OEA	Obstacle Evaluation Area
OPD	Optimized Profile Descent
Operator	A commercial operator, which holds a certificate issued in accordance with 14 CFR Part 121 or 135.
OSG	Operations Support Group
OSV	Operational Service Volume
Obstacle	An existing manmade object, object of natural growth or terrain at a fixed geographical location with reference to which vertical clearance is or must be provided during flight operations. (See FAA Order 8260.3B, TERPS.)
Path and Terminator	An ARINC 424 term that is defined by set of two alphabetic characters. The first identifies the type of flight path and the second indicates where the route leg terminates; e.g., TF, DF, CF, VI, VM, FM.
PBN	Performance Based Navigation
POI	Principal Operations Inspector
Proponent	The originator of a STAR request. This may include an individual, user group, ATC, AeroNav Products, or other appropriate government agency.
RAPT	Regional Airspace and Procedures Team (see Order 8260.43)
RNAV	Area Navigation - A system of enhanced navigational capability that can compute aircraft position, actual track, and ground speed, and then provide meaningful information relative to the route of flight selected by the pilot.
RNGB	Regional NextGen Branch
RNP	Required Navigation Performance - A statement of the navigational performance accuracy necessary for operation within defined airspace.
Runway Transition	The segments of a procedure between the common route/point and the runway(s). Procedures may contain one or more runway transitions, or no runway transitions. Runway transitions are not a required segment.

SIAP	Standard Instrument Approach Procedure
Segment	A route between two fixes or waypoints
Significant Benefits	Tangible or intangible advantages resulting from the implementation of a STAR such as fuel savings from reduced flight tracks and time, reduced inter/intra facility coordination, reduced communication between ATC and pilots, increased flexibility of airspace management or sectorization due to more predictable ground tracks, or similar benefits to users or ATC.
SMS	Safety Management System
SOP	Standard Operating Procedures
SRM	Safety Risk Management
STAR	Standard Terminal Arrival - A preplanned instrument flight rule (IFR) air traffic control arrival procedure published for pilot use in graphic form. STARs provide transition from the en route structure to an outer fix or an instrument approach fix/arrival WP in the terminal area.
STARS	Standard Terminal Automation Replacement System
TACAN	UHF Tactical Air Navigation Aid
TARGETS	Terminal Area Route Generation, Evaluation and Traffic Simulation software tool
TERPS	United States Standard for Terminal Instrument Procedures
TF	Track to fix leg type
TPP	Terminal Procedures Publication
Transitions	See “en route transition” and “runway transition.”
UHF	Ultra High Frequency
USNOF	US NOTAM Office
VFR	Visual Flight Rules
VHF	Very High Frequency
VM	Heading to a manual termination leg.
VNAV	Vertical Navigation
VOR	VHF Omni-directional Radio
VORTAC	A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site.
WP	Waypoint - A predetermined geographical position used for route definition and/or progress reporting purposes defined by latitude and longitude and may include elevation.

Appendix B. Standard Terminal Arrival Design

1. General. Safety is a primary concern in the design of Standard Terminal Arrival (STAR) procedures.

a. STARs must:

(1) Be evaluated for possible environmental effects in accordance with FAA Order 1050.1, Policies and Procedures for Considering Environmental Impacts, to ensure that the requirements of the National Environmental Policy Act (NEPA) have been met.

(2) Commence at an en route fix; for example, navigational aid (NAVAID), intersection, distance measuring equipment (DME) fix or waypoint (WP).

(3) Be compatible with local ATC SOPs and traffic flow management procedures.

(4) Include in the graphic depiction holding patterns referenced in the narrative of the STAR.

(5) Not require automated vertical navigation.

(6) Depict a minimum en route altitude for each en route segment of the STAR.

(7) Terminate in a fly-by waypoint at a point in space, or at a fix that is also charted on an instrument approach procedure outside of the Final Approach Fix (FAF). When terminating at a charted fix of a SIAP:

(a) The fix may be an initial approach fix (IAF), an intermediate fix (IF), or any other fix prior to the IF. In each of these cases, the SIAP segment following the termination point must meet the minimum segment length standard required by the amount of turn at the fix when transitioning from the STAR to the SIAP. Segment length standards are contained in 8260 series orders.

(b) The termination fix may also be a charted fix located inside of the IF along the extended final approach course, provided it is at least 3 NM prior to the FAF, and the amount of turn required for the transition from the STAR to the final approach course does not exceed 30 degrees.

(c) A STAR that terminates at the start of, or within a radius-to-fix (RF) turn, must meet RF entry requirements as specified in 8260 series orders.

(d) The STAR termination fix attitude must be the same as that published on the SIAP. If the procedure allows radar vectors from the termination fix, the termination fix altitude must be at or above the MVA.

(e) Ensure consistency between speeds/altitudes for shared fixes.

(f) When a STAR terminates at the IF or any fix prior to the IF, but may also allow for radar vectors, provide that information in the procedure description.

(g) Where a STAR terminates at an SIAP and that SIAP has a course reversal, the STAR must terminate at a segment that is designated “NoPT” so the need for a course reversal is negated. This may require concurrent amendment of the SIAP to assure that the STAR avoids a course reversal.

(8) When terminating at a point in space that is not associated with a SIAP, the STAR must be:

(a) Charted with air traffic vectors instructions and lost communication instructions (if lost communication procedures differ from 14 Code Federal Regulations [CFR] 91.185.)

(b) At or above the minimum vectoring altitude (MVA) or minimum IFR altitude (MIA) for the area.

(c) Annotated "RADAR Required."

(d) If RNAV, terminate at a fly-over (FO) waypoint and a heading to a manual termination leg (VM) or terminate from a FO waypoint with a specified track over the ground until manual termination (FM Leg). When a STAR terminates at an IAF/IF, but may also allow for radar vectors, use a fly-by waypoint to support the SIAP and provide information regarding radar vectors for other aircraft in the procedure description.

(9) When necessary to manage compression, establish speed restrictions to assist managing deceleration or descent speeds. Limit speed restrictions to one per fix per STAR segment.

(10) Meet minimum obstacle clearance requirements for feeder route criteria:

(a) The minimum Required Obstacle Clearance (ROC) is 1000 ft. The minimum ROC within areas designated in 14 CFR Part 95 as "mountainous" is 2000 ft. Order 8260.3 paragraphs 1720 b(1), b(2) and 1721 apply.

(b) Mountainous terrain 2000 ft. ROC may not be reduced for segments where the OEA overlies precipitous terrain. Automation tools (such as TARGETS) may assist in identifying precipitous terrain areas to avoid when a reduction in the mountainous terrain ROC is required to integrate the STAR with SIAPs.

(11) Contained within controlled airspace.

b. STARs should:

(1) Be developed to accommodate as many different types of aircraft as possible.

(2) Provide for a user/system benefit.

(3) Reduce pilot/controller communication and enhance situational awareness.

(4) Use the minimum number of fixes, turns, and speed or altitude changes necessary to depict the route.

(5) Not use DME arcs in RNAV or RNP STAR designs.

(6) If required, establish crossing altitudes for traffic deconfliction.

(7) Intercept angles must meet applicable TERPS or ATC requirements where a Hold-in-lieu of a Procedure Turn is not provided.

(8) Be designed to allow aircraft to minimize thrust from the en route structure to the terminal environment. A STAR designed with an optimized profile descent (OPD) will be subject to specific aircraft performance, flight weight, environmental conditions (i.e., wind and temperature), altitude, traffic flows and operational constraints. To establish an OPD use an advanced aircraft flight modeling or simulation tool to output specific optimal descent gradients on the STAR given traffic flow and operational constraints. Guidance for designing an OPD includes:

(a) Design from the termination point of the OPD outward.

(i) Determine where the OPD will terminate; for example, at a pronounceable named fix on a SIAP at a point in space for radar vectors, etc.

(ii) Determine speed and altitude at the termination point of the OPD.

(iii) Careful design for unique operational requirements is needed. OPDs that terminate at a point in space or on a final approach course may have to be developed with runway transitions for specific traffic flow.

(iv) Consider designing approach transitions to instrument approach procedures as opposed to developing runway transitions.

(b) Consider terminal airspace stratification and constraints including Class B containment.

(c) Consider altitudes and speeds at the en route/terminal transfer of control point. Mach transition speeds or speeds modeled to specific operations may be used to manage compression.

(d) Determine the furthest point out in the en route structure to establish an OPD initiation fix and when possible, place the STAR initial fix on an ATS route.

(e) Evaluate different start and end points on the ODP to determine maximum benefits of the procedure.

(9) Be published with lost communication procedures for STARs that terminate with radar vectors. Lost communication procedures should be published if other than as provided for in 14 Code of Federal Regulations (CFR) 91.185.

(a) The local air traffic facility is responsible for determining the adequacy of lost communications procedures.

(b) The guidance should provide specific instructions that permit the aircraft to proceed to an IAF for the approach in use and/or provide an appropriate fix or fixes to proceed to and hold prior to executing an instrument approach.

(c) Lost communications procedures on STARs are not coded into the FMS. Do not describe the lost communication procedure using terms or verbiage that could be mistaken for a coded route; for example, “track to RUSSH.”

c. STARs may:

(1) Serve multiple airports.

(2) RNAV/RNP STARs may be designed to overlay vector patterns from an en route fix to a SIAP, or to a WP from which a heading may be used to terminate the procedure.

(3) STARs must be contained within Class B airspace where applicable.

(4) Include runway transitions where operationally beneficial. Avoid a radar transition to one airport and a runway transition to another airport from the same fix.

(a) All runways served by the STAR must be coded when developing runway transitions. For seldom used runways, consider developing RNAV procedures that end with a radar vector.

(b) Evaluate use of approach transitions in place of runway transitions if operationally feasible and beneficial.

2. Charting.

a. Do not combine conventional and RNAV or RNP STARs on the same chart.

b. Use procedural data notes when limitations are necessary.

EXAMPLE-
“RADAR REQUIRED”

c. Do not include items of an ATC clearance in notes.

(1) Notes specifying runway transition use for a specific traffic flow are acceptable.

(2) Notes specifying how the pilot is to select the runway transition to load may be developed. With the note, advise where to expect the specific runway assignment.

EXAMPLE-
"Landing South use runway 19L transition. Expect runway assignment from TRACON prior to JOHNN."

d. Include in the graphic depiction holding patterns referenced in the narrative of the STAR.

e. Publish fixes and associated holding patterns on en route low-altitude and high-altitude charts when they are used for en route ATC.

f. Publish fixes and holding patterns on arrival charts when they are used for the control of arrival traffic into a specified area.

g. Chart at least one very high frequency (VHF) one ultra high frequency (UHF), (where available) and the Automatic Terminal Information System (ATIS) frequency at each airport served by the STAR.

h. The maximum number of airport frequencies that may be charted may not exceed one VHF and one UHF (where available) for tower and ground control.

i. Include one VHF and one UHF air route traffic control center frequency only when there is no terminal facility involved.

j. Do not include control frequencies in the arrival text.

k. A STAR shall be named to correspond with a waypoint, fix, or NAVAID on the common route, normally where the common route begins, (for example, "NASCR ONE ARRIVAL"). An RNAV STAR will include the term RNAV in the name (for example, "TOEZZ ONE ARRIVAL [RNAV]"). An RNP STAR will include the term RNP in the name (for example, "JACKO THREE ARRIVAL [RNP]").

l. The STAR computer code will be assigned by using the NAVAID identifier, fix, or WP identifier, name of the STAR, separated by a dot, and then the NAVAID identifier/name of the STAR, suffixed with the revision number (1-9), e.g. "(PWL.PWL2, NASCR.NASCR1)".

m. En route transitions also require a computer code. En route transitions are assigned by using the NAVAID, fix, or WP identifier name where the en route transition begins, separated by a dot, and then the NAVAID identifier/name of the STAR, and suffixed with revision number (1-9), e.g. "(DNY.PWL2, FLO.NASCR1)".

n. If the STAR or any of its transitions cannot be named in compliance with this paragraph, procedure designers must coordinate with the OSG and Flight Procedures Team (FPT) to determine an acceptable name.

3. Magnetic Variation. The magnetic variation (MV) program is discussed in FAA Order 8260.19, Flight Procedures and Airspace. AeroNav Products is the focal point for all information relating to application of MV to instrument flight procedures. Questions regarding application of MV to STARs should be referred to the FPT. RNAV and RNP STARs are designed using the primary destination airport magnetic variation.

4. RNAV and RNP STARs. This section describes the elements specific to RNAV and RNP STAR procedures.

a. Segment Types. The design of an RNAV and RNP STAR may include three segment types: en route transitions, a common route and runway transitions.

(1) En route transitions are the segments of the STAR between an en route fix/Navaid and the start of the common route or common point. Most procedures will contain more than one en route transition.

(2) A common route or common point is the segment of a procedure that is common to all runway and en route transitions. Only one common route may exist for each airport served on any one procedure and it may consist of a series of legs or a single point. There may be more than one common route where multiple airports are served from the end of the en route transitions.

(3) Runway transitions are segments of the STAR from the last fix/waypoint of the common route or common point and ending at a termination point for radar vectors or a fix/waypoint on an instrument approach procedure. If required, runway transitions should be developed to all instrument runways. Consideration must be given to the requirement for ATC to assign the runway a minimum of 10 nautical miles (NM) prior to the beginning of the runway transition(s).

b. Waypoints. RNAV and RNP STARs should be designed using existing WPs, fixes and NAVAIDS whenever possible. Fly-by WPs must be used, except the last waypoint on a STAR that terminates at a point in space must be coded as a FO waypoint. STARs terminating at an IAF or IF on an SIAP must end in FB waypoint. When a procedure terminates at an IAF but vectors may be issued to alternate runways, use an FB waypoint.

(1) Design STARs using the fewest number of WPs necessary to depict the route.

(2) Charted waypoint names must be coordinated to preclude similar sounding fix names.

(3) Use existing NAVAIDs, fixes, holding patterns or WPs whenever possible. WPs that are co-located with existing NAVAIDs must use the NAVAID three-letter location identifier.

(4) WPs may be assigned crossing altitudes and speed restrictions to assist ATC in controlling the descent and deceleration from the en route to the terminal environment. For OPD designs, speed restrictions at waypoints should be used to assist in managing compression. Waypoint altitude crossings must be defined as “at,” “at or above,” or “at or below.” When an altitude range at a waypoint is needed, use a block altitude (for example, “At or Above 12,000 and At or Below 16,000” or “Between 12,000 and 16,000”). If an RNAV or RNP STAR is designed without altitude and speed restrictions, but there is desire for ATC to communicate expected restrictions, use chart notes that indicate “Expect” altitude or speed at a waypoint. Charted altitudes must be at or above the MEA/MIA.

NOTE-
“Expect” altitudes or airspeeds are not coded into an aircraft navigation database.

(a) Limit the number of altitude and speed requirements to the minimum necessary. Limit the use of both “at or above” and “at or below” restrictions on a STAR to avoid complexity and confusion.

(b) The lowest altitude assigned to any waypoint on an RNAV or RNP STAR terminating with radar vectors must be at or above the MVA/minimum IFR altitude (MIA).

(c) Fixes on the procedure can only have one speed and altitude restriction per fix. Do not allow a fix to have multiple speed or altitude restrictions.

c. Leg Types (path terminators). TABLE B-1 shows permissible leg types for use with RNAV and RNP STARs.

TABLE B-1
Permissible Leg Types

From Waypoint	Leg type	To Waypoint
FB	TF[1]	FB/FO
IF[2]	TF	FB/FO
FB	RF[3]	
FO	FM[4]	
FO	VM[4]	

[1] Track to fix (TF) is the preferred leg type for most STAR segments.
[2] An Initial Fix (IF) is used to designate the first waypoint of a STAR segment (en route transition, common route, and runway transition).
[3] RF leg types must be preceded by, and followed by a TF leg or RF leg. Radius to Fix legs can only be used on RNP STARs and must contain the note adjacent to fix name beginning the first RF segment, "RF Required."
[4] A track until manual termination (FM) or a heading until manual termination (VM) leg type should only be used as the last leg of an RNAV or RNP STAR when the STAR terminates with radar vectors. A VM leg or FM leg type must be preceded by a FO waypoint and the last charted altitude must be at or above the MVA/MIA.

d. Course Change. Procedure designers must consider the combined impact of altitude/airspeed and course changes on a procedure. Generally, large course changes at higher altitudes and airspeeds may result in decreased path repeatability and predictability. The maximum course change between TF segments is 70 degrees at and above FL195, and 90 degrees (70 degrees preferred) below FL195.

e. Descent Gradients (DG) and Deceleration Segments. STARs should be designed as OPDs to allow aircraft to set engines near idle and to minimize level offs as it descends from the en route structure to the terminal environment. Use the WP minimum altitude for DG calculations.

(1) A descent gradient of 318 feet per nautical mile (ft/NM) (a 3-degree vertical path angle [VPA]), should be used from the en route environment to 10,000 feet mean sea level (MSL). The STAR designer shall allow for deceleration at any waypoint that has a speed restriction. 310 KIAS should be used as a beginning reference speed for deceleration segment calculations. As a general guideline for a DG of 318 ft/NM, the leg distance between the waypoints should be increased at least 1 nautical mile (NM) per 10 knots of deceleration required. See FAA Order 8260.58 Volume 6, Chapter 1, for guidance on calculating Descent Gradients.

(a.) The maximum descent gradient is 500 ft/NM.

(b.) The optimum descent gradient for segments where deceleration is required is 250 ft/nm.

(2) If the STAR ends within 20 NM of the landing runway, the STAR design should also account for the deceleration necessary to slow the aircraft from 250 KIAS to 200 KIAS or as necessary to comply with terminal airspace requirements.

(3) All altitudes published on a STAR procedure shall be at or above the MEA or MIA.

f. Segment Width. For conventional STARs, apply FAA Order 8260.3 Feeder Segment criteria and for RNAV STARs apply FAA Order 8260 series Feeder Segment criteria to determine segment width and OEA.

g. Charting. The following applies to RNAV and RNP STARs only and is in addition to the information contained in paragraph 2.

(1) RNAV 1 is the default designation for RNAV STARs. Annotate procedures with a standard note: "RNAV 1" on FAA Form 7100-4.

(2) RNP 1 (in lieu of RNAV 1) is used when a STAR contains an RF leg or when surveillance (radar) monitor is not desired for when DME/DME/IRU will be used. Annotate the procedure with a standard note: "RNP 1" on FAA Form 7100-4.

(3) For RNAV and RNP STARs that terminate on a heading at a fix not on an SIAP, annotate on the chart that radar vectors will be provided; e.g., expect radar vectors to final.

(4) All STARs will contain a note that describes the equipment sensor limitations. Notes as appropriate are as follows:

EXAMPLE-
Note: DME/DME/IRU or GPS REQUIRED

Note: GPS REQUIRED

(5) A note may be required to address the need for specific DME facilities to be operational. These are referred to as "critical DME facilities."

EXAMPLE-
Note: FOR NON-GPS EQUIPPED AIRCRAFT, ABC, JKL, AND XYZ DMES MUST BE OPERATIONAL

(6) All STARs that are annotated "DME/DME/IRU or GPS REQUIRED" must be annotated as follows:

EXAMPLE-
Note: RADAR REQUIRED FOR NON-GPS EQUIPPED AIRCRAFT

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Appendix C. Instructions for Completing FAA Form 7100-3, RNAV STAR (Data Record) and Sample Form

1. Title Line

a. Arrival Name. Enter the name of the STAR (for example, LACEE RNAV 1 or JOEHE RNP 1).

b. Number. Enter the STAR revision number spelled out (see appendix B) (for example, TWO).

c. STAR Computer Code. Enter the computer identification code (see appendix B).

d. Superseded Number. STAR revision number superseded by this STAR. If original, insert "None."

e. Dated. Published or revision date of superseded STAR. Format: DD MMM YYYY (for example, 12 MAR 2009).

f. Effective Date. Leave Blank. The effective date will normally completed by NFDC. Enter an effective date only when a specific effective date is required (for example, Magnetic Variation rotation). If the procedure is a "Special," enter "Special" on this line. Date Format: DD MM YYYY.

2. Fix/NAVAID. Enter the name of the fix or navigational aid (NAVAID) as follows:

a. Enter transition type prior to the first Fix or NAVAID for each transition type (for example, En Route Transition, Common Route, or Runway Transition).

b. Enter the approved five-letter pronounceable name (for example, CETUV).

c. Enter the three letter facility identification and type (for example, OLM VORTAC).

d. For procedures with runway transitions, enter the transition runway in the final box after the last fix or NAVAID along with the ICAO airport code (for example, KSEA: RWY34L).

3. LAT/LONG. Enter the latitude followed by the longitude (separated by a "/ ") associated with the item listed in in degrees, minutes, seconds, and hundredths of a second; for example, 401900.22N / 0785030.21W. When using a VM or FM termination leave blank.

4. C. Enter a "Y" (yes) if the item in the Fix/NAVAID is to be charted. Enter an "N" (no), if charting is not required. When using a VM or FM termination leave blank.

NOTE-
All fixes or NAVAIDs requiring a change in altitude, speed or direction (heading), require charting.

5. FO/FB. Enter "FB" to indicate a fly-by waypoint or "FO" to indicate a fly-over waypoint.

6. Leg Type. Enter the two-letter leg-type code (for example, IF, TF, RF, VM or FM).

7. MC. Enter the magnetic course (MC) to the nearest hundredth of a degree (for example, 167.12).

8. TC. Enter the true course (TC) to the nearest hundredth of a degree (for example, 164.12).

9. DIST. Enter the distance to the nearest hundredth of a nautical mile; for example, 24.64. Do not enter distances for leg type ending in an "M" (for example, FM, VM legs).

10. Altitude. Enter the altitude rounded to the nearest 100 feet or flight level (FL) in 1,000 foot increments. Do not enter expect altitudes. For "block altitude" use the indicator "B" between the altitude values. Label each altitude restriction with the appropriate indicator as listed in TBL C-1. Do not enter altitude for leg type ending in an "M" (for example, FM, VM legs).

TBL C-1
Altitude Indicator

AT/ABOVE	AT/ABOVE FL210
AT	AT 12000
AT/BELOW	AT/BELOW 5000
B	5000B12000

11. Speed. Enter speed restrictions where necessary for procedure containment or traffic flow requirements. Label each speed restriction with the appropriate indicator as listed in TBL C-2 followed by KIAS.

TBL C-2
Speed Indicator

AT	AT 240K
AT/BELOW	AT/BELOW 280K

12. Remarks. Enter the en route transition computer code (see Appendix B) and any other pertinent information that would clarify the reason for a data entry.

a. Enter en route transition and common route computer code.

b. Enter RF leg radius, turn direction (clockwise [CW] or counter-clockwise [CCW]), arc center waypoint, and latitude/longitude. For example, 7.5 NM RADIUS CCW (ARCWP)/4.21.

Note: The arc radius, direction, and CNF used to make up the RF leg are shown in parenthesis will not be published on the chart. This information is provided for database use only. Only the RF track distance and altitude will be published on an RF turn.

FIG C-1
FAA Form 7100-3 - RNAV

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STAR (DATA RECORD)

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
EAGUL (RNAV 1)	FIVE	EAGUL.EAGUL5	FOUR	11 FEB 2009	

FIX/NAVAID	LAT/LONG	C	FO/FB	LEG TYPE	TC	DIST (NM)	ALTITUDE	SPEED	REMARKS
En Route Transition									
INW VORTAC	350341.76N / 1104742.07W	Y		IF					INW.EAGUL5
EAGUL	340754.25N / 1110457.74W	Y	FB	TF	194.43	57.49	FL180BFL230	AT 270K	
En Route Transition									
ZUN VORTAC	345756.71N / 1090916.23W	Y		IF					ZUN.EAGUL5
DOJOE	344722.57N / 1093809.16W	Y	FB	TF	246.19	26.00			
SLIDR	344227.42N / 1095126.39W	Y	FB	TF	245.91	12.00			
TINIZ	342938.87N / 1102538.95W	Y	FB	TF	245.80	31.00	AT/BELOW FL330	AT 270K	
PAYSO	342116.04N / 1104742.05W	Y	FB	TF	245.47	20.07	FL240BFL280	AT 270K	
EAGUL	340754.25N / 1110457.74W	Y	FB	TF	227.09	19.56	FL180BFL230	AT 270K	
Common Route									
EAGUL	340754.25N / 1110457.74W	Y		IF			FL180BFL230	AT 270K	EAGUL.EAGUL5
HOMRR	335249.72N / 1112416.01W	Y	FB	TF	226.93	22.00	AT/BELOW 16000	AT 250K	
Runway Transition									
HOMRR	335249.72N / 1112416.01W	Y		IF			AT/BELOW 16000	AT 250K	
SMAAK	335034.02N / 1112832.92W	Y	FB	TF	237.68	04.22	14000B15000	AT 250K	
GEENO	334309.59N / 1114238.37W	Y	FB	TF	237.87	13.88	AT 10000	AT 250K	
QUENY	333620.03N / 1115511.74W	Y	FB	TF	237.03	12.50	AT 9000	AT 210K	
HINEY	333130.40N / 1120427.13W	Y	FB	TF	238.12	09.11	AT 7000	AT 210K	
OBASE	333132.53N / 1121203.56W	Y	FB	TF	270.35	06.36			
BASBL	333133.43N / 1121853.33W		FO	TF	270.18	05.71			

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STAR (DATA RECORD)

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
EAGUL (RNAV 1)	**FIVE**	**EAGUL.EAGUL5**	**FOUR**	**11 FEB 2009**	

KPHX:RWY 08				**FM**	**270.20**			
Runway Transition								
HOMRR	**335249.72N / 1112416.01W**	**Y**		**IF**			**AT/BELOW 16000**	**AT 250K**
VNNOM	**334930.20N / 1112707.51W**	**Y**	**FB**	**TF**	**215.66**	**04.08**	**10000B11000**	**AT 250K**
ESDEE	**333838.66N / 1113627.09W**	**Y**	**FB**	**TF**	**215.71**	**13.34**	**8500B10000**	**AT 210K**
BASSL	**333333.95N / 1114042.04W**	**Y**	**FB**	**TF**	**215.02**	**06.19**	**6000B8000**	**AT 210K**
DERVL	**332804.92N / 1114519.77W**	**Y**	**FB**	**TF**	**215.28**	**06.70**	**AT/ABOVE 5100**	**AT 210K**
JAGAL	**332625.74N / 1114846.39W**	**Y**	**FB**	**TF**	**240.22**	**03.32**	**AT/ABOVE 4500**	
KPHX:RWY 26								

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FIG C-1

FAA Form 7100-3 (continued) – RNAV

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STAR (DATA RECORD)

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
COMPT (RNP 1)	ONE	OLM.COMPT1			

FIX/NAVAID	LAT/LONG	C	FO/FB	LEG TYPE	TC	DIST (NM)	ALTITUDE	SPEED	REMARKS
En Route Transition									
BTG VORTAC	454452.12N / 1223529.53W	Y		IF					BTG.COMPT1
MALAY	462521.99N / 1224539.29W	Y	FB	TF	350.16	41.12	AT/ABOVE FL210		
TONNO	464146.95N / 1224950.85W	Y	FB	TF	350.03	16.68			
OLM VORTAC	465817.90N / 1225406.60W	Y	FB	TF	349.98	16.78	14000B17000	AT/BELOW 280K	
En Route Transition									
CETUV	463559.91N / 1232120.75W	Y		IF					CETUV.COMPT1
OLM VORTAC	465817.90N / 1225406.60W	Y	FB	TF	039.83	29.12	14000B17000	AT/BELOW 280K	
Common Route									
OLM VORTAC	465817.90N / 1225406.60W	Y		IF			14000B17000	AT/BELOW 280K	OLM.COMPT1
LACEE	470249.33N / 1224821.23W	Y	FB	TF	041.00	06.00			
COMPT	470935.92N / 1223941.35W	Y	FB	TF	041.07	09.00			
Runway Transition									
COMPT	470935.92N / 1223941.35W	Y		IF					
ARVAD	471321.49N / 1223451.60W	Y	FB	TF	041.18	05.00	AT 12000	AT 250K	
FOURT	471751.95N / 1222902.93W	Y	FB	TF	041.24	06.00			
RWYEP	474358.51N / 1223102.17W	Y	FB	TF	357.06	26.16	AT 6000	AT 210K	
NOTTT	474425.08N / 1221855.79W	Y	FB	RF		12.82			4.09 NM RADIUS CW ARCCP (474411.04N/1222458.93W)
AGANN	474115.76N / 1221839.90W	Y	FB	TF	176.76	03.16			
KSEA:RWY 16R									

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FIG C-2
FAA Form 7100-3 – RNP

FIG C-2
FAA Form 7100-3 (continued) – RNP

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STAR (DATA RECORD)

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
COMPT (RNP 1)	**ONE**	**OLM.COMPT1**			

Runway Transition

COMPT	470935.92N / 1223941.35W	Y		IF				
ARVAD	471321.49N / 1223451.60W	Y	FB	TF	041.18	05.00	AT 12000	AT 250K
FOURT	471751.95N / 1222902.93W	Y	FB	TF	041.24	06.00		
BECHR	471808.51N / 1222144.07W	Y	FO	TF	086.78	04.99		
KSEA:RWY 34L, 34C, and 34R				VM	067.00			

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Appendix D. Instructions for Completing FAA Form 7100-4, RNAV and Conventional STARs and Sample Forms

1. Title Line.

a. Arrival Name. Enter the name of the STAR (for example, CALEB, LACEE RNAV, JOEHE RNP).

b. Number. Enter the STAR revision number spelled out (see appendix B) (for example, TWO).

c. STAR Computer Code. Enter the computer identification code (see appendix B).

d. Superseded Number. STAR revision number superseded by this STAR. If original, insert "None."

e. Dated. Published or revision date of superseded STAR. Format: DD MMM YYYY (for example, 12 MAR 2009).

f. Effective Date: Leave Blank. The effective date will normally completed by NFDC. Enter an effective date only when a specific effective date is required (for example, Magnetic Variation rotation). If the procedure is a "Special," enter "Special" on this line. Date Format: DD MM YYYY.

2. Transition Routes.

a. Transition Name. Enter the name of each en route transition according to the fix or navigational aid (NAVAID) where the en route transition(s) begins. For a transition starting at an existing NAVAID, use the NAVAID name and not the three-letter location identifier. Do not include the word "transition."

b. Transition Computer Codes. Enter computer code (see appendix B).

c. From Fix/NAVAID. Enter the identifier/name of fix/NAVAID where each en route transition begins. Also, include the NAVAID type (for example, CETUV or OLM VORTAC).

d. To Fix/NAVAID. Enter the identifiers/name(s) of all fix/NAVAID(s) that describe the en route transition after the first point, to and including the common point. Also, include the NAVAID type (for example, CETUV or OLM VORTAC).

NOTES-
If a transition has multiple segments, use one line for each segment. Document the transition starting fix/NAVAID in the To Fix/NAVAID column for each transition route.

e. Mag Course. Enter the magnetic course for the transition segment. Specify the magnetic course to the hundredth of a degree; for example, 354.24. For conventional procedures also include the radials (for example, TWN R-077 & WSN R-260).

f. Distance. Enter the distance for each transition segment. Specify the distance to the hundredth of a mile (for example, 072.48).

g. MEA. Enter the MEA along each en route segment. Common segments must have the same MEA.

h. MOCA. Enter the MOCA along the route segment. To reduce chart clutter, MOCAs less than 500 feet below the MEAs should not be published.

i. MAA. Enter the maximum authorized altitude (MAA) along each en route transition.

j. Crossing Altitudes / Fixes. Enter altitude at specified fix when necessary for traffic flow requirements and/or vertical descent profile (for example, AT/ABOVE FL210). For "block altitude" use "Between" prior to the altitude values (for example, "Between 5000 and 8000"). The altitude must not be lower than the MEA.

3. Arrival Route Description. Provide a textual description of the STAR from the common route starting point to the ending point on the STAR. Include only information pertinent to the arrival procedure. If the arrival route can be clearly understood from a graphic depiction, a complete textual description is not necessary. Describe the first segment then state, "…thence as depicted to" the last point on the route.

a. Document all courses, headings, tracks, and distances to the nearest hundredth unit of measurement. In parenthesis, list the MEA (MOCA when needed) for each segment.

NOTE-
1. The arrival route description entries will be published verbatim on the chart, with the exception of courses, headings, tracks, and distance which will be rounded to the nearest whole unit.

2. Do not enter distance and altitude for leg type ending in an "M," e.g. FM, VM legs.

b. RNAV and RNP STARs. The textual description of RNAV and RNP STARs requires specific narrative wording to match the leg type information depicted on associated FAA Form 7100-3, RNAV STAR (Data Record). (See TBL D-1 for required wording). For RNAV and RNP STARs that contain runway specific routing specify the landing runway (for example, Landing Runway 16L).

(1) Ensure courses, tracks, headings, distances, altitude, and speed entered on FAA Form 7100-4, STAR – Standard Terminal Arrival, match the equivalent values and distances entered on FAA Form 7100-3.

(2) Turn directions shall be specified as either "left" or "right" for all RF and DF legs. Turn directions shall be specified as either "left" or "right" for all TF legs when the course change exceeds 90 degrees. (See TBL D-1.)

TBL D-1
Leg Type Wording and Required Information

TF	"Track"	Course/ distance/ turn direction*****
DF	"Direct"	Distance/ turn direction
RF	"Radius"	Distance/ turn direction
FM	"Track"	Course
VM	"Heading"	Heading

***** Only specify turn direction for CF or TF legs when amount of turn exceeds 90°.

4. Procedural Data Notes. Enter any information that will appear in note form on the published chart; for example, RADAR Required.

a. List expect altitude (for example, Vertical Navigation Planning Information: Expect to cross FOURT at 6,000).

b. List expect speed restrictions (for example, CHART: Expect to Cross OLM at or above 280 KIAS).

c. RNAV 1 will be the default designation for RNAV STARs. RNP 1 will be designated for all RNP 1 STARs. Annotate procedures with a standard note: "RNAV 1 or RNP 1" on FAA Form 7100-4. STARs requiring GPS or DME/DME/IRU must be annotated "GPS Required" or "RADAR Required" and noted "GPS Required" or "RADAR Required" on FAA Form 7100-4.

d. List critical DMEs if they exist (for example, BTG Transitions: For non-GPS equipped aircraft OLM must be operational).

e. RNP STARs with RF legs must contain the note adjacent to the fix name beginning the first RF segment, "RF Required."

f. List equipment restrictions (for example, "Turbojet aircraft only").

g. STARs that require radar vectors must have a note "RADAR Required."

5. Fixes And/Or Holding Patterns. Enter those fixes and/or NAVAIDs for which charting is requested but are not included in the textual description of the STAR or entered into transition route data. Also, enter those fixes and/or NAVAIDs at which holding is required and enter the applicable holding instructions. Ensure the accompanying FAA Form 8260-2, Data Worksheet, contains the same charting instructions.

6. Communications. Enter the name of all radio communications to be charted; for example, ATIS, AWOS, APP CON. Specify the frequency only if different than what is currently published.

7. Airports Served. Enter all airports served by the STAR. List the city and two letter state code for each airport listed.

8. Lost Communication Procedure. ATC is responsible for determining the content of lost communications instructions.

a. Where potential for confusion exists (for example, a procedure terminating on a heading), it is preferable to publish specific lost communication guidance on the chart. The guidance should provide specific instructions that permit the aircraft to proceed to an IAF for the approach in use. In order to provide for contingencies, instructions should also provide an alternate procedure with the appropriate WP to proceed to and hold prior to executing an instrument approach. Do not describe the lost communication procedure using terms or verbiage that could be mistaken for a coded route; for example, "track to RUSSH."

b. This may be left blank when lost communication procedures are the same as in 14 CFR Part 91.185 (standard) and there is no potential for confusion. However, it is preferable to provide an appropriate fix to proceed to and hold prior to executing an instrument approach.

9. Remarks. List information/data that is not to be charted; for example, administrative data or notes for controller information (requested by air traffic control). These items will not be seen in the National Flight Data Digest.

10. Additional Flight Data. List any additional charting instructions, items essential to clarify charting, or information a specialist has determined needs charting as other than a note.

a. Data may include items such as terrain features, Special Use Airspace or landing obstacles. Airports not served by the procedure should not be charted unless accompanied by a note in (Procedure Data Notes) indicating the reason for charting, for example, "FTR jet arrivals below 5,000 MSL."

b. For RNAV and RNP STARs place the reference (arrival airport) magnetic variation of record used to develop the STAR in this section; for example, REFERENCE MAG VAR: KSEA 17E/2010.

c. Enter the results of the DME/DME Assessment after completion of the flight inspection. Results will be recorded as: "DME/DME ASSESSMENT: SAT (RNP 1.0 OR 2.0 AS APPROPRIATE)", "DME/DME ASSESSMENT: UNSAT (RNP 1.0), SAT (RNP 2.0)," or "DME/DME ASSESSMENT: UNSAT."

d. If the DME/DME assessment indicates "UNSAT" or "NOT CONDUCTED," the note "GPS Required" must be entered in (Procedure Data Notes).

11. Flight Inspected By. Leave Blank. Flight inspection will enter the name of the airspace system inspection pilot who conducted the flight inspection and date.

12. Developed By. Enter the name of the procedure specialist. This individual must sign in the "developed by" space and enter the date.

13. Approved By. Enter the name of the originating Air Traffic Manager or delegated representative. This individual must sign (may be electronic) in the "approved by" space and enter the date signed. If the procedure is a "Special," this line will contain the name of and be signed by AFS-400.

14. Changes. List changes relating to data entries.

15. Reasons. List reasons for changes identified.

16. Graphic Depiction. Include a graphic depiction of the STAR. Identify on the depiction the WPs, navigational aids, altitude restrictions, speed restrictions, runways, and holding patterns.

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STANDARD TERMINAL ARRIVAL (STAR)

Bearings, headings, courses, tracks and radials are magnetic. Elevations and altitudes are in feet. MSL. Altitudes are minimum altitudes unless otherwise indicated.
Distances are in nautical miles (NM). Graphic depiction attached.

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
EAGUL (RNAV 1)	**FIVE**	**EAGUL.EAGUL5**	**FOUR**	**11 FEB 2009**	

TRANSITION ROUTES:

Transition Name	Transition Computer Codes	From FIX/NAVAID	To FIX/NAVAID	Mag Course	Distance	MEA	MOCA	MAA	Crossing Altitudes / Fixes
WINSLOW	**INW.EAGUL5**	**INW VORTAC**	**INW VORTAC**						
			EAGUL	**182.43**	**57.49**	**FL180**			**BETWEEN FL180 AND FL230**
ZUNI	**ZUN.EAGUL5**	**ZUN VORTAC**	**ZUN VORTAC**						
			DOJOE	**234.19**	**26.00**	**FL200**			
			SLIDR	**233.91**	**12.00**	**FL200**			
			TINIZ	**233.80**	**31.00**	**FL200**			**AT/BELOW FL330**
			PAYSO	**233.47**	**20.07**	**FL180**			**BETWEEN FL240 AND FL280**
			EAGUL	**215.09**	**19.56**	**FL180**			**BETWEEN FL180 AND FL230**

ARRIVAL ROUTE DESCRIPTION:

FROM EAGUL ON TRACK 214.93/22.00 TO CROSS HOMRR AT OR BELOW 16000 AND AT 250 KIAS (MEA 12000).

LANDING RWY 08: FROM HOMRR ON TRACK 225.68/4.22 TO CROSS SMAAK BETWEEN 14000 AND 15000 AND AT 250 KIAS (MEA 12000), THEN ON TRACK 225.87/13.88 TO CROSS GEENO AT 10000 AND AT 250 KIAS (MEA 8600), THEN ON TRACK 225.03/12.50 TO CROSS QUENY AT 9000 AND AT 210 KIAS (MEA 8000), THEN ON TRACK 226.12/9.11 TO CROSS HINEY AT 7000 AND AT 210 KIAS (MEA 6000), THEN ON TRACK 258.35/6.36 TO OBASE (MEA 4400), THEN ON TRACK 258.18/5.71 TO BASBL (MEA 4000), THEN ON TRACK 258.20. EXPECT RADAR VECTORS TO FINAL APPROACH COURSE.

LANDING RWY 26: FROM HOMRR ON TRACK 203.66/4.08 TO CROSS VNNOM BETWEEN 10000 AND 11000 AND AT 250 KIAS (MEA 10000), THEN ON TRACK 203.71/13.34 TO CROSS ESDEE BETWEEN 8500 AND 10000 AND AT 210 KIAS (MEA 8500), THEN ON TRACK 203.02/6.19 TO CROSS BASSL BETWEEN 6000 AND 8000 AND AT 210 KIAS (MEA 6000), THEN ON TRACK 203.28/6.70 TO CROSS DERVL AT OR ABOVE 5100 AND AT 210 KIAS (MEA 5100), THEN ON TRACK 228.22/3.32 TO CROSS JAGAL AT OR ABOVE 4500 (MEA 4300). EXPECT ILS OR LOC RWY 26

PROCEDURAL DATA NOTES:

NOTE: RADAR REQUIRED.
NOTE: RNAV 1.
NOTE: DME/DME/IRU OR GPS REQUIRED.
NOTE: TURBOJET AIRCRAFT ONLY.
NOTE: CROSS EAGUL AT 270 KIAS. CROSS TINIZ AT 270 KIAS. CROSS PAYSO AT 270 KIAS. CROSS HOMRR AT 250 KIAS. CROSS SMAAK AT 250 KIAS. CROSS GEENO AT 250 KIAS. CROSS QUENY AT 210 KIAS. CROSS HINEY AT 210 KIAS. CROSS VNNOM AT 250 KIAS. CROSS ESDEE AT 210 KIAS. CROSS BASSL AT 210 KIAS. CROSS DERVL AT 210 KIAS.

NOTE: INW TRANSITION: FOR NON-GPS EQUIPPED AIRCRAFT DRK, PXR, AND IWA MUST BE OPERATIONAL.

FIXES AND/OR HOLDING PATTERNS:

FIG D-1
FAA Form 7100-4 – RNAV STAR

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STANDARD TERMINAL ARRIVAL (STAR)

Bearings, headings, courses, tracks and radials are magnetic. Elevations and altitudes are in feet. MSL. Altitudes are minimum altitudes unless otherwise indicated.
Distances are in nautical miles (NM). Graphic depiction attached.

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
EAGUL (RNAV 1)	**FIVE**	**EAGUL.EAGUL5**	**FOUR**	**11 FEB 2009**	

CHART HOLDING AT ZUN: E, LT, 253.00 INBOUND, 10 NM LEGS.
CHART HOLDING AT HOMRR: W, RT, 214.00 INBOUND, 8 NM LEGS.

COMMUNICATIONS:

PHX ATIS, PHOENIX APPROACH CONTROL

AIRPORTS SERVED:

Phoenix Sky Harbor International, Phoenix, Arizona

LOST COMMUNICATIONS PROCEDURE:

REMARKS:

ADDITIONAL FLIGHT DATA:

DME/DME ASSESSMENT: SAT (RNP 1.0).
REFERENCE MAGNETIC VARIATION: KPHX 12E/2000.

FLIGHT INSPECTED BY:

Name	Organization	Date	Signature

DEVELOPED BY:

Name	Organization	Date	Signature
John Smith, Manager, Operations	Albuquerque ARTCC	20 MAR 2010	

APPROVED BY:

Name	Organization	Date	Signature

CHANGES:

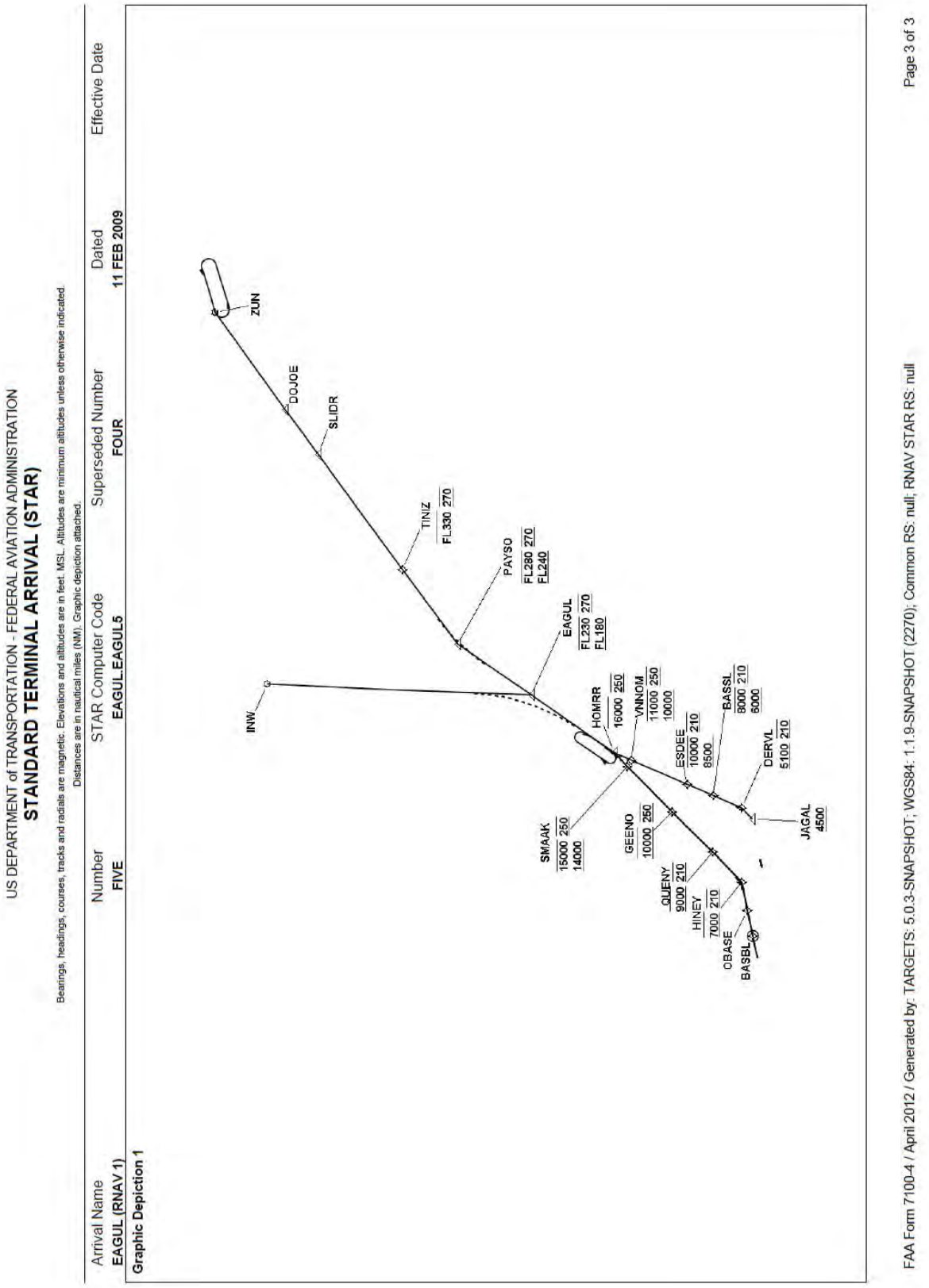
1. Added holding at ZUN and HOMRR.
2. Revised altitude and speed constraints

REASONS:

1 and 2. ATC Requested.

FIG D-1
FAA Form 7100-4 – RNAV STAR (continued)

FIG D-1
FAA Form 7100-4 – RNAV STAR (continued)



US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STANDARD TERMINAL ARRIVAL (STAR)

Bearings, headings, courses, tracks and radials are magnetic. Elevations and altitudes are in feet. MSL. Altitudes are minimum altitudes unless otherwise indicated.
Distances are in nautical miles (NM). Graphic depiction attached.

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
DYLIN	FIVE	DQO.DYLIN5	FOUR	10MAR2011	

TRANSITION ROUTES:

Transition Name	Transition Computer Codes	From FIX/NAVAID	To FIX/NAVAID	Mag Course	Distance	MEA	MOCA	MAA	Crossing Altitudes / Fixes
FLAT ROCK	FAK.DYLIN5	FAK VORTAC	FAK VORTAC						
			SHONA	41.69 (FAK R-042)	20.00	6000		FL450	
			OTT VORTAC	41.84 (FAK R-042)	67.24	6000			
			PALEO	51.96 (OTT R-052)	26.01	6000			
			PEEDS	52.19 (OTT R-052)	09.20	6000			
			FUBRR	52.28 (OTT R-052)	10.07	6000			AT FL270
			DQO VORTAC	52.37 (OTT R-052)	33.53	6000			AT FL200
GORDONSVILLE	GVE.DYLIN5	GVE VORTAC	GVE VORTAC						
			OTT VORTAC	63.59 (GVE R-064 & OTT R-248)	78.35	6000		FL450	
			PALEO	51.96 (OTT R-052)	26.01	6000			
			PEEDS	52.19 (OTT R-052)	09.20	6000			
			FUBRR	52.28 (OTT R-052)	10.07	6000			AT FL270
			DQO VORTAC	52.37 (OTT R-052)	33.53	6000			AT FL200
PATUXENT	PXT.DYLIN5	PXT VORTAC	PXT VORTAC						
			PEEDS	18.30 (PXT R-018)	51.73	6000		FL450	
			FUBRR	52.28 (OTT R-052)	10.07	6000			AT FL270
			DQO VORTAC	52.37 (OTT R-052)	33.53	6000			AT FL200

ARRIVAL ROUTE DESCRIPTION:

FROM DQO VORTAC ON DQO R-053 TO STEFE (MEA 6000), THEN ON ARD R-233 TO ARD VOR/DME (MEA 5000), THEN ON ARD R-057 TO DYLIN (MEA 5000), THEN ON ARD R-057 TO MERSR (MEA 5000), THEN ON ARD R-057 TO METRO (MEA 4000).

LANDING RWYS 4L, 4R: APPROACHING METRO EXPECT RADAR VECTRS TO FINAL.
LANDING RWYS 22L, 22R, 11: CROSSING METRO EXPECT RADAR VECTORS TO FINAL.

PROCEDURAL DATA NOTES:

FIG D-2
FAA Form 7100-4- STAR

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STANDARD TERMINAL ARRIVAL (STAR)

Bearings, headings, courses, tracks and radials are magnetic. Elevations and altitudes are in feet. MSL. Altitudes are minimum altitudes unless otherwise indicated.
Distances are in nautical miles (NM). Graphic depiction attached.

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
DYLIN	**FIVE**	**DQO.DYLIN5**	**FOUR**	**10MAR2011**	

NOTE: RADAR REQUIRED.

NOTE: TURBOJET AIRCRAFT ONLY.

FIXES AND/OR HOLDING PATTERNS:

CHART HOLDING AT PALEO: SW, LT, OTT R-051.96 INBOUND
CHART HOLDING AT STEFE: SW, TR, DQO R-052.87 INBOUND, 210 KNOTS
CHART HOLDING AT ARD VOR/DME: SW, RT, ARD R-053.32 INBOUND, 210 KNOTS
CHART HOLDING AT MERSR: SW, RT, ARD 0R057.01 INBOUND, 210 KNOTS
CHART HOLDING AT METRO: SW, LT, ARD R-075.01 INBOUND, 210 KNOTS

COMMUNICATIONS:

NEWARK ATIS 115.7/134.82
WASHINGTON CENTER 132.52/307.25
NEW YORK APP CON 128.55/379.9

AIRPORTS SERVED:

NEWARK LIBERTY INTL (EWR), Newark New Jersey

LOST COMMUNICATIONS PROCEDURE:

REMARKS:

Publication to be concurrent with changes to the PHLBO RNAV Arrival.

ADDITIONAL FLIGHT DATA:

CHART: RIC R-334 AT SHONA, AML R-091 at PALEO, BAL R-133 at PALEO,BAL R-106 at PEEDS, BAL R-089 at FUBRR, PTW R-147 at STEFE, PTW R-113 at SOMTO, RBV R-297 at DYLIN, RBV R-303 at MERSR, SBJ R-171 at METRO

FLIGHT INSPECTED BY:

Name	Organization	Date	Signature

DEVELOPED BY:

Name	Organization	Date	Signature
John Doe, Airspace Specialist	New York ARTCC	27 APR 2011	

APPROVED BY:

FAA Form 7100-4 / April 2012 / Generated by: TARGETS: 5.0.3-SNAPSHOT; WGS84: 1.1.9-SNAPSHOT (2270); Common RS: null; RNAV STAR RS: null

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FIG D-2
FAA Form 7100-4- STAR (continued)

FIG D-2
FAA Form 7100-4- STAR (continued)

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION
STANDARD TERMINAL ARRIVAL (STAR)

Bearings, headings, courses, tracks and radials are magnetic. Elevations and altitudes are in feet. MSL. Altitudes are minimum altitudes unless otherwise indicated.
Distances are in nautical miles (NM). Graphic depiction attached.

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
DYLIN	**FIVE**	**DQO.DYLIN5**	**FOUR**	**10MAR2011**	

Name | Organization | Date | Signature

CHANGES:

1. Added SHONA on the FAK transition.
2. Changed crossing restriction at FUBRR from at or above FL270 to cross at FL270.
3. Raised MEA through STEFE INT from 5000 to 6000.
4. Changed Note "RADAR Required above FL290" to "RADAR REQUIRED"

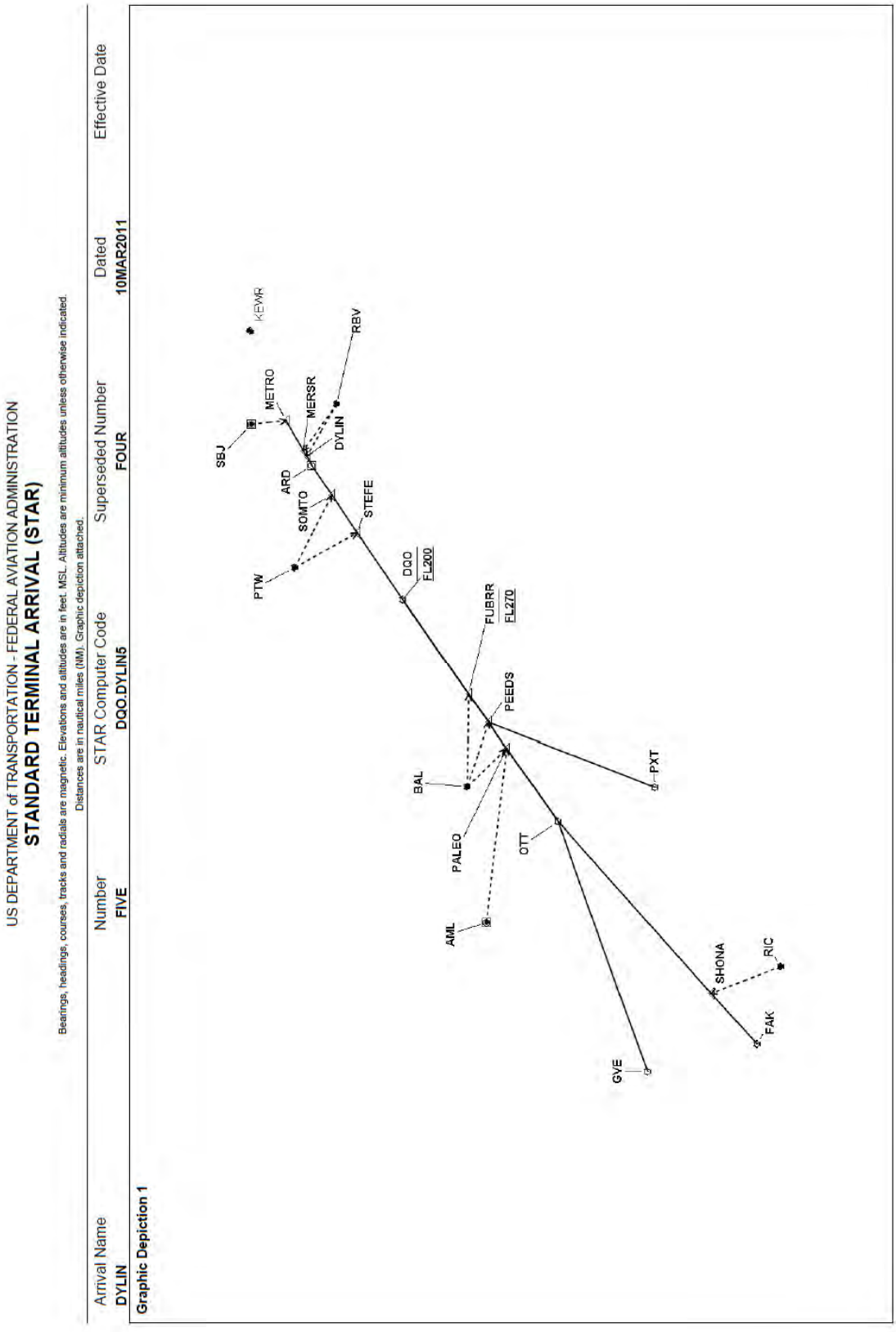
REASONS:

1. To be used as a fix ATC can short cut arrivals to or have A/C rejoin the arrival route following vectors for sequencing.
2. Request from user group (Continental Airlines)to assist crew in complying with ATC crossing restrictions.
3. Crossing Radial from PTW VORTAC was restricted to 6000, ATC agreed to change.
4. Procedure ends in mandatory Radar Vectors.

FAA Form 7100-4 / April 2012 / Generated by: TARGETS: 5.0.3-SNAPSHOT; WGS84: 1.1.9-SNAPSHOT (2270); Common RS: null; RNAV STAR RS: null

Page 3 of 4

FIG D-2
FAA Form 7100-4- STAR (continued)



US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STANDARD TERMINAL ARRIVAL (STAR)

Bearings, headings, courses, tracks and radials are magnetic. Elevations and altitudes are in feet. MSL. Altitudes are minimum altitudes unless otherwise indicated.
Distances are in nautical miles (NM). Graphic depiction attached.

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
COMPT (RNP 1)	ONE	OLM.COMPT1			

TRANSITION ROUTES:

Transition Name	Transition Computer Codes	From FIX/NAVAID	To FIX/NAVAID	Mag Course	Distance	MEA	MOCA	MAA	Crossing Altitudes / Fixes
BATTLE GROUND	BTG.COMPT1	BTG VORTAC	BTG VORTAC						
			MALAY	333.16	41.12	FL190			AT/ABOVE FL210
			TONNO	333.03	16.68	16000			
			OLM VORTAC	330.98	16.78	14000			BETWEEN 14000 AND 17000
CETUV	CETUV.COMPT1	CETUV	CETUV						
			OLM VORTAC	20.83	29.12	14000			BETWEEN 14000 AND 17000

ARRIVAL ROUTE DESCRIPTION:

FROM OLM VORTAC ON TRACK 024.00/6.00 TO LACEE (MEA 12000), THEN ON 024.07/9.00 TRACK TO COMPT (MEA 12000).

LANDING RWY 16R: FROM COMPT ON TRACK 024.18/5.00 TO CROSS ARVAD AT 12000 AND AT 250 KIAS (MEA 7000), THEN ON 024.24/6.00 TRACK TO FOURT (MEA 7000), THEN ON 340.06/26.16 TRACK TO CROSS RWYEP AT 6000 AND AT 210 KIAS (MEA 5000), THEN RIGHT TURN RADIUS TO NOTTT (MEA 4000), THEN ON 159.76/3.16 TRACK TO AGANN (MEA 3500). EXPECT ILS OR LOC RWY 16R.

LANDING RWY 34L, 34C, AND 34R: FROM COMPT ON TRACK 024.18/5.00 TO ARVAD AT 12000 AND AT 250 KIAS (MEA 7000), THEN ON 024.24/6.00 TRACK TO FOURT (MEA 7000), THEN ON 069.78/4.99 TRACK TO BECHR (MEA 4000), THEN ON 050.00 HEADING OR AS ASSIGNED BY ATC. EXPECT RADAR VECTORS TO FINAL APPROACH COURSE.

PROCEDURAL DATA NOTES:

NOTE: RADAR REQUIRED.
NOTE: RNP 1.
NOTE: DME/DME/IRU OR GPS REQUIRED.
NOTE: RF LEG REQUIRED.
NOTE: TURBOJET AIRCRAFT ONLY.

NOTE: CROSS OLM AT OR BELOW 280 KIAS, CROSS ARVAD AT 250 KIAS, CROSS RWYEP AT 210 KIAS.

FIXES AND/OR HOLDING PATTERNS:

COMMUNICATIONS:

ATIS, APP CON

AIRPORTS SERVED:

SEATTLE-TACOMA INTERNATIONAL, SEATTLE, WA

LOST COMMUNICATIONS PROCEDURE:

FIG D-3
FAA Form 7100-4 – RNP STAR

US DEPARTMENT of TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

STANDARD TERMINAL ARRIVAL (STAR)

Bearings, headings, courses, tracks and radials are magnetic. Elevations and altitudes are in feet. MSL. Altitudes are minimum altitudes unless otherwise indicated.
Distances are in nautical miles (NM). Graphic depiction attached.

Arrival Name	Number	STAR Computer Code	Superseded Number	Dated	Effective Date
COMPT (RNP 1)	**ONE**	**OLM.COMPT1**			

LANDING RWY 34L, 34C, AND 34R AT BECHR LEFT TURN, INTERCEPT AND EXECUTE RWY 34L ILS APPROACH.

REMARKS:

ADDITIONAL FLIGHT DATA:

DME/DME ASSESSMENT: SAT (RNP 1.0).
Reference Magnetic Variation: KSEA 17E/2010

FLIGHT INSPECTED BY:

Name	Organization	Date	Signature

DEVELOPED BY:

Name	Organization	Date	Signature
John Smith, Support Specialist	Seattle ARTCC	04 APR 2012	

APPROVED BY:

Name	Organization	Date	Signature

CHANGES:

REASONS:

FIG D-3
FAA Form 7100-4 – RNP STAR (continued)

FIG D-3
FAA Form 7100-4 – RNP STAR (continued)