U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy

ORDER 8200.32B

Effective Date:
08/24/14

SUBJ: Flight Inspection Criteria for Aspen, Colorado, PKN Localizer-Type Directional Aid (LDA)

1. Purpose of This Order. This order establishes special flight inspection criteria and tolerances for PKN (Aspen) LDA which supports only missed approach and instrument departure procedures.

2. Audience: This affects all stakeholders that require flight inspection services Aspen, Colorado.

3. Where Can I Find This Order? The order is available on-line at the FAA Orders and Notices webpage, on both the Employees and public websites.

4. What This Order Cancels. FAA Order 8200.32A, Request for Flight Inspection Services, dated August 24, 1998, including Change 1 dated March 20, 2001, is cancelled.

5. Explanation of Changes.

a. Paragraph 7a. Facility changed from a dual frequency localizer to a single frequency localizer and the facility supports the missed approach for the localizer and VOR approaches and multiple Aspen, Colorado departure procedures.

b. Checklist. Added HMI for modulation equality.

c. Checklist. Added HMI for phasing.

d. Checklist. Added Standby (Alternate) equipment.

e. Checklist. Added footnotes and kept the footnotes consistent with those in FAA Order 8200.1

f. Checklist. Added footnote "(10)" to the transition to make the transition check a single transmitter check.

g. Paragraph 7b. Added the start and stop altitude for the modulation check.

h. Paragraph 7c. Added HMI warning box.

i. Paragraph 7d. Added HMI warning box.

j. Paragraph 7e. Removed the requirement for a comparability check.

k. Paragraph 7f. Removed the requirement for a comparability check.

l. Paragraph 7g. Removed the use of a "well defined checkpoint" to measure the alignment.

m. Paragraph 7g. Removed the requirement to report if alignment was measured in another manor than the preferred method.

n. Paragraph 7g. Lowered the alignment measurement area to 12,200 feet MSL due to the lower ESV altitude is 12,200 feet.

o. Paragraph 7g. Provide pilot and mission specialist actions to complete for measuring alignment.

p. Paragraph 7h. Changed structure distance to 22.0 miles and the altitude to 12,200 feet MSL. Changed because that is as furthest distance and lowest altitude changed for the expanded service volume.

q. Paragraph 7i. Added the description for polarization.

r. Paragraph 7l(1). Changed the altitude to cross at 12,200 feet MSL at 22.0 miles due to the expanded service volume request.

s. Paragraph 7l(1). Added that the structure measured during the RF Power on-course run may be used for the structure analysis.

t. Paragraph 7l(2). Changed the low RF power arc at 22.0 mile to 12,200 feet MSL because the expanded service volume changed.

u. Paragraph 7l(3). Changed the upper RF power arc at 22.0 mile to 17,500 feet MSL because the expanded service volume changed.

v. Paragraph 7l(4). Changed the 10.0 mile RF power arc to 12,200 feet MSL because this is the expanded service volume altitude.

w. Paragraph 7m. Added to explain the inspection requirements of the second transmitter.

x. Paragraph 7p(2). Changed to require at least 25° of coverage on the 150Hz side of the LDA because of the clearances required from the LDA to the approach missed approach point. Based on a map study.

y. Paragraph 7q(3). Add a hazardous and misleading information paragraph.

z. Paragraph 9. Removed the requirement to plot clearances on FAA Form 8240-10.

aa. Paragraph 9a. Editorial change.

6. Rationale for special criteria and tolerances:

a. Existing localizer criteria and tolerances were designed to support a specific type of operation, an instrument approach to a runway. The tolerances were tailored to meet terminal obstructions requirements throughout the various ILS zones and points predicated about a runway threshold.

b. In contrast, due to special site geography, Aspen LDA is being used in place of a conventional non-precision navigational aid to support the missed approach and departure procedures. Since the intended operational use of this facility is related to the performance accuracy requirements of a non-precision navigation aid, all tolerances are established in degrees. The facility is inspected using ILS flight inspection techniques, requiring conversion of degrees to microamperes (μA) in the analysis and reporting of structure and alignment.

7. Flight Inspection Procedures.

a. Checklist. The following procedures pertain to Aspen LDA. The facility is a single frequency localizer, configured to provide back course missed approach and departure guidance.

Type Check	Reference Paragraph	Inspection			Facility Configuration	Measurements Required					
		C	PM (7)	P		Modulation	Width	Symmetry	Clearance	Alignment	Structure
Modulation Level	7b	X	X	X	Normal	X					
Modulation Equality (2) Caution HMI	7c	(1)			Carrier Only	X					
Phasing (3) Caution HMI	7d	(1)			Quadrature	Set to Value of Modulation Equality					
Width & Clearance	7e 7f	X	X	X	Normal	X	X	X	X		
Alignment & Structure	7g 7h	X	X	X	Normal	X				X	X
Polarization (10)	7i	X	X	X	Normal						X

Type Check	Reference Paragraph	Inspection			Facility Configuration	Measurements Required					
		C	PM (7)	P		Modulation	Width	Symmetry	Clearance	Alignment	Structure
Monitors:											
Width	7j	X (11)	X		Wide		X		X		
	7j	X (11)			Narrow		X		X		
Alignment Caution: HMI	7k	(1)			Shifted Alignment					X	
RF Power Monitor Reference(8)(10)	7l	X			Reduced RF Power				X		X
Standby (Alternate) Equipment	7m	X	X								
Identification	7n	X	X	X							X
Transition(10)	7o	X	X	X	As Required				X		

Footnotes:

(1) Maintenance request

(2) Adjustments to carrier modulation balance will require a subsequent check of course alignment.

(3) Width and clearance should be measured prior to the phasing check. If, after the quadrature phase check, the width has remained the same or has narrowed and/or the clearances have increased from the first width and clearance check, then the phasing has been improved. Final determination of optimum phase should be discussed with facilities maintenance personnel.

(4) Reserved

(5) Reserved

(6) Reserved

(7) Same type antenna replacements require PM checks.

(8) Request RF level in watts from ground technician.

(9) Reserved

(10) One XMTR only

(11) PKN is maintained using JO 6750.49, and only requires monitor checks on one XMTR only.

b. Modulation Level. Measure the modulation of the radiated signal while flying the missed approach, departure course outbound, at the minimum climb rate of 152 feet per nautical mile and between 5.0 miles from PKN LDA antenna at 10,000 feet MSL and 15.0 miles from PKN LDA antenna at 11,500 feet MSL. Due to signal reflections, record the modulation level and construct a graphical average for tolerance application. The modulation level may also be established during the modulation equality check.

Measure the average modulation percentage on normal clearance checks. Restrict PKN LDA for out-of-tolerance modulations if antennas are replaced with a new type antenna.

c. Modulation Equality. Conduct this check to obtain a crosspointer value which will be used as a reference for phasing. Position the aircraft on-course, inbound or outbound, between 5.0 and 15.0 miles at 17,000 feet MSL. Adjustments to modulation equality will require a subsequent check of course alignment.

Warning:
Hazardous and Misleading Information
Misleading information is produced by this configuration. Ensure NOTAM is active. Monitor ATC communications for improper clearances to other aircraft.

d. Phasing.

Warning:
Hazardous and Misleading Information
Misleading information is produced by this configuration. Ensure NOTAM is active. Monitor ATC communications for improper clearances to other aircraft.

(1) This check may be conducted to determine that the phase relationship between sideband and carrier energy is optimum. Since the facility is normally phased using ground procedures, airborne phasing is only conducted at the request of maintenance personnel

(2) Position the aircraft on the appropriate azimuth (obtained from facility maintenance personnel), inbound or outbound at 17,000 feet MSL, between 5.0 and 15.0 miles. Transmit the crosspointer values to the ground technician for use in adjusting the phasing. The optimum quadrature phase condition occurs when the microampere deflection is equal to that obtained during the modulation equality check. The quadrature phasing microampere deflection will have frequent fluctuations, and adjustments should be based on long-term averaging.

e. Course Sector Width and Symmetry. The purpose of this check is to establish and maintain the backcourse sector width and ratio between the half-course sectors, that will provide the desired displacement sensitivity required at the procedural missed approach point (MAP). For ease of flyability and to remain within the procedurally protected area, a course width of 10 ° has been selected as the most desirable to meet both of these objectives at Aspen. Measure the width and symmetry between 6-10 miles at 17,000 feet MSL. The optimum distance is 10 miles. Periodic checks may be inspected from 6-14 miles. Verify any unusual indications at a distance of 10 miles or less.

f. Clearance. Clearances ensure that the facility provides adequate off-course indications throughout the facilities service volume. Measure the clearances at 17,000 feet MSL.

Momentary crosspointer deflections less than the tolerance are acceptable in sector 2, provided the aggregate area does not exceed 3° of arc in one quadrant. Clearance deviations less than 100μA are not acceptable. One quadrant is defined as that area between the localizer on-course and a point 90° to the antenna. This exception is acceptable on both sides of the localizer course.

g. Course Alignment. Localizer course alignment is analyzed utilizing GPS, FMS or AFIS in the segment between 6.0 miles and 7.0 miles from the PKN LDA antenna at 12,200 feet MSL. Localizer alignment may be measured inbound or outbound from the PKN LDA.

(1) Pilot actions:

(a) Enter PKN LDA coordinates from AIRNAV into the FMS or GPS.

(b) Enter LINDZ intersection into the FMS or GPS.

(c) Fly the track between PKN LDA and LINDZ at 12,200 feet. If flying outbound from the LDA, start at 5.0 miles from PKN LDA and fly to LINDZ. If flying inbound to PKN LDA, start at LINDZ and fly to a point 5.0 miles from PKN LDA.

(d) If tracking inbound, provide pilot event marks between 7.0 miles and 6.0 miles to PKN LDA. If tracking outbound, provide pilot marks between 15.1 miles and 14.1 miles to LINDZ. A minimum of five (5) on-course event marks in the 1.0 mile segment are required.

(2) Mission specialist actions:

(a) Graphical average the cross pointer between 6.0 miles and 7.0 miles from PKN LDA

(b) Measure the displacement from the baseline to the graphical average where the pilots marked the aircraft was on-course.

(c) Average the displacement measurements. This is the reported alignment micro amp value.

(d) The course is left if the average displacement is predominately in the 90Hz and the course is right if the average displacement is predominately in the 150Hz.

h. Course Structure. Measure structure from graphical average while flying outbound, on the procedural azimuth from 5.0 miles to 22.0 miles (inclusive), maintaining 12,200 feet MSL.

i. Polarization. Polarization check determines the effects of vertical polarization on the course structure. This check may be accomplished concurrently with the course structure check. Bank the aircraft 20° left and right. Activate the event mark at the maximum banked attitudes.

j. Width Monitor. Use the procedures and methods described in paragraph 7e and 7f. At the conclusion of the inspection, return the facility to normal and check and report the resulting course sector width and symmetry.

k. Alignment Monitors. Position the aircraft on the designed procedural azimuth, between 5.0 and 15.0 miles, at an altitude where the signal is free of reflections. Request the course be misaligned to the monitor reference limits each side (90Hz and 150Hz) of the established course. Use both the recording device and meter values to verify course alignment shifts. Measure the alignment shifts by recording the instantaneous course displacements while maintaining a constant track; this may be accomplished on one run during which both alarm points and a return to normal are recorded. This check may also be accomplished by using the "equality of modulation method" as found in FAA Order 8200.1, Chapter 15.

l. RF Power Monitor. This inspection is conducted to determine that the LDA meets specified tolerances throughout its operational service volume while operating at RF power alarm. Check for interference, signal strength, clearance, unlocks, identification, and structure as follows:

(1) Start at 5.0 miles from the LDA at 10,000 feet MSL. Climb outbound on course at a rate of 152 feet per mile. Cross 22.0 miles at 12,200 feet MSL. Alternatively, this run maybe flown inbound starting at 22.0 miles from PKN LDA at 12,200 feet, descend at 152 feet per mile, until crossing 5.0 miles prior to PKN LDA at 10,000 feet. The structure measured during this maneuver may be used for structure analysis.

(2) Fly a 10° - 10° arc across the LDA course at 22.0 miles from the antenna at 12,200 feet MSL.

(3) Repeat step 2, except fly the arc at 17,500 feet MSL.

(4) Fly a 35°-35° arc across the LDA course at 10nm at 12,200 feet MSL.

m. Standby Equipment.

(1) Periodic inspection will check the on air transmitter only.

(2) Periodic with monitors will consist of a periodic on both transmitters and a monitor inspection on the reference transmitter.

(3) Equality in normal limits. FAA Order 8200.1, Chapter 15 contains more information on transmitter equality.

(a) Width should be within +/-0.30°

(b) Clearances should be within +/-25μA

n. Identification. Record the identification during all checks. Restrict the facility if identification cannot be received in all areas of required coverage.

o. Transition. The missed approach routing is a transition from the lowest missed approach point to the operational service volume of PKN LDA. The transition termination point is not identified with a facility other than the PKN LDA course. Check clearances along the missed approach routing during the transition from the lowest minimum descent altitude (MDA) to the intercept of PKN LDA course.

(1) Reconfiguration. Start transition 100 feet below the MDA, at the missed approach point, and PKN LDA must be in RF alarm. Fly the missed approach procedure at the climb rate for the procedure with the lowest MDA, until intercepting the LDA. Repeat the maneuver, except climb expeditiously to and maintain 14,000 feet MSL to intercept.

(2) Periodic. Start transition 100 feet below the lowest MDA, at the missed approach point, and PKN LDA in normal. Fly the missed approach procedure at the procedurally designed rate of climb for the procedure with the lowest MDA, until intercepting PKN LDA.

p. Service Volume. Frequency protection for this facility has been approved to 17,500 feet MSL at 22.0 miles. The operational service volume for flight inspection purposes is as follows:

(1) Longitudinally from 5.0 miles to 22.0 miles.

(2) Laterally.

(a) At least 10° on the 90Hz side and 25° on the 150Hz side to 10 miles.

(b) 10° each side of course beyond 10.0 miles.

(3) Vertically ascending to 12,200 feet MSL at 22.0 miles for the lower limit and 17,500 feet MSL for the upper limit.

q. Analysis.

(1) There is no requirement for inspecting the LDA inside 5.0 miles.

(2) Clearance deviations in Sector 1 to less than tolerance are not acceptable. Momentary crosspointer deflections to less than tolerance are acceptable in sector 2, provided the aggregate area does not exceed 3° of arc in sector 2.

(3) Hazardous and Misleading Information (HMI). When the LDA is configured in abnormal conditions that cause false course guidance that may be misleading to the pilot. Ensure a NOTAM is issued when a configuration is transmitting HMI. More information is located in FAA Order 8200.1, Chapter 4.

r. Tolerances. Course structure, width, and alignment tolerances, similar to what applies to a non-precision air navigation facility (NAVAID), have been used for this facility based on the additional airspace protected by non-precision terminal instrument procedures (TERPS) criteria. Any modification or change to less restrictive procedural, protected areas will invalidate these tolerances. Actual tolerances are in degrees; the μA values shown in parenthesis, based upon a 10° course width. (30μA = 1°), are provided for reporting and analysis purposes.

Codes:
C – Tolerances applied to site, commissioning, or reconfiguration inspections.
P – Tolerances applied to any inspection subsequent to the inspection outlined in Code C.

Parameter	Reference Paragraph	Inspection		Tolerance/Limit
		C	P	
Modulation level	7b	X	X	40% +/- 4% 30%-60% throughout the service volume.
Phasing	7d	As required		No tolerance
Width	7e	X		10° +/- 0.5° (9.50° to 10.50°)
			X	10° +/- 17% (8.30° to 11.70°)
Symmetry	7e	X	X	Facility in normal 40 – 60%
Alignment	7g	X	X	Designed procedural azimuth +/- 2.5° (+/-75μA)
Structure	7h	X	X	+/- 3.0° (+/- 90 μA) from the average course signal
Polarization	7i	X	X	Maximum effect +/- 2.0° (+/-60 μA)

Parameter	Reference Paragraph	Inspection		Tolerance/Limit
		C	P	
Monitors Alignment	7k	As Required		+/- 2.5° (+/- 75μA) from established alignment.
Width	7j	X	X	10° +/- 17% (8.30° to 11.70°)
RF Power	7l	X		Maintained at or above: Signal strength – 5μV Flag alarm – No Flag or indication of invalid signal Clearance and structure – in tolerance.
Transition	7o	X	X	Maintained at or above: Signal strength – 5μV Flag alarm – No Flag or indication of invalid signal Clearance and structure – in tolerance.
Clearance	7q(2)	X	X	Note: Exceptions are authorized in Sector 2
Normal	7f	X	X	Measured from designed procedural azimuth: Sector – Minimum Clearance 1 – Linear increase to 175 μA, then maintain 175 μA to 10° 2 – 150 μA (See Note)
Facility in any alarm configuration	7j	X	X	Clearances are reduced 15μA from those required in normal
Identification	7n	X	X	Clear, correct, identification must have no effect on the course.

8. Periodicity. Inspect Aspen LDA in accordance with the periodicity requirements of Order 8200.1, United States Standard Flight Inspection Manual, Chapter 5.

9. Reporting. Report the results of Aspen, Colorado, LDA inspections on FAA Form 8240-8, Flight Inspection Report – Instrument Landing System in accordance with Order 8240.36, Flight Inspection Report processing System, except for the following fields:

a. Block 1, Runway: Enter “00”

b. Block 1, Category: Leave Blank

c. Block 5, Remarks: Include the comment "Aspen, CO, LDA inspected using criteria and tolerances contained in the current edition of FAA Order 8200.32."

d. Report all results as a back course, and report all structure in zone 1 with distance relative to the LDA antenna position.

Donald L. Hayen

for Edward W. Lucke Jr.
Director
Flight Inspection Services

Appendix A. Administrative Information

1. Distribution. This order is electronically distributed to the following divisions:

- Flight Inspection Services (AJW-3) including
  - Staff offices; and
  - Flight Inspection Field Offices;
- Comm/Nav/Infrastructure NES Team (AJW-292);
- Flight Standards District Offices (AFS-1); and
- Western Service Area (WSA).

2. Directives Feedback Information. Update this order by using the directive feedback form (FAA Form 1320-19) or AJW-3 Manual Change Request form on KSN.