SE 212

CAST Safety Enhancement (SE)

EQUIPMENT AND PROCEDURES TO IMPROVE ROUTE ENTRY FOR RNAV DEPARTURES

SECTION I: SE OVERVIEW

Study Topic Overview Summary	FAA and industry stakeholders asked the ASIAS program to proactively conduct studies in 2010 and 2012 to identify new or increased risks associated with area navigation (RNAV) departure procedures and optimized descent profile Standard Terminal Arrival Route (STAR) procedures before the potential risks result in an accident. ASIAS forwarded the study results to CAST in 2012, and CAST chartered the RNAV/STAR Joint Safety Analysis and Implementation Team (JSAIT) to examine the findings and develop risk mitigations. The RNAV JSAIT found most pilot reports indicate lateral deviations on RNAV departure procedures before the first fix as a result of not having the flight management system programmed correctly for the departure runway, and altitude deviations (missed crossing restrictions) on STARs, particularly on optimized descent profile procedures.

SE Objective	CAST recommends regulators and air carriers work to reduce the frequency of flightcrew errors during initial flight management system (FMS) programming of departure routes by taking steps to address issues concerning pre-departure clearances (PDC) and pre-departure route changes.

Primary Risks Mitigated	Airprox/TCAS[1] Alert/Loss of Separation/Near Midair Collisions/Midair Collisions (MAC)

Action	Organization(s)	Strategy	Description	Due Date
Action 1	Air Carrier Dispatch Orgs.	Procedures	Improve the likelihood that air carrier dispatch files a route that is not changed in the cleared route of flight.	02/28/2015
	Comments: CAST closed this action based on information from air carrier dispatch associations.			
Action 2	FAA ATO	Policy	Standardize PDC format, with PDC changes from the flight plan clearly alerted in a consistent manner.	02/28/2016
	Comments: CAST closed this action based on reported air carrier use of new PDC format in FAA Order 7110.113E.			
Action 3	FAA ATO	Policy	Implement tower ability to provide Data Communications Clearance Delivery (DCL) and encourage operator deployment of the capability to autoload pre-departure route clearances, with flightcrew acknowledgement, into the FMS.	12/31/2019
	Comments: CAST closed this action based on implementation at 65 airports as of 2019. CAST will continue to monitor airport and operator implementation.			

See section II of this SE for detailed action descriptions.

References: The detailed analysis in the RNAV Departures and STAR[2] Operations Joint Safety Analysis and Implementation Team (RNAV/STAR JSAIT) Final Report (February 12, 2015) is available through CAST.

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[1] Traffic alert and collision avoidance system
[2] Standard Terminal Arrival Route

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SECTION II: DETAILED ACTION INFORMATION

Action 1: Update procedures to minimize ATC changes to filed routes

Primary Implementer	**Air Carrier Dispatch Organizations**
Action Objective	Air carrier dispatch organizations should improve the likelihood that air carrier dispatch files a route that is not changed in the cleared route of flight.
Action Timeline	Flow Time: 12 months ○ 12 months for operators to review and update dispatch procedures. ○ 12 months for the FAA Air Traffic Organization (ATO) to confirm that published departure routes are updated and used to issue pre-departure clearances (PDC) (in parallel with operator review of dispatch procedures). Due Date: 02/28/2015
Timeline/Flow for Future Adopters	TBD
CAST Lead	Airlines for America (A4A)

#	Organization(s)	Detailed Steps
1a	Air Carrier Dispatch Orgs.	Review and update procedures to coordinate with FAA ATO to minimize the changes by air traffic control (ATC) to the filed routing.
	Complete.	
1b	FAA ATO	Ensure published departure routes are updated and used to issue PDCs.
	Complete.	
Notes		

Note: See Section III for detailed costs and resources.

SECTION II: DETAILED ACTION INFORMATION

Action 2: Standardize PDC format

Primary Implementer	**FAA Air Traffic Organization (ATO)**
Action Objective	FAA ATO should standardize pre-departure clearance (PDC) format, with PDC changes from the flight plan clearly alerted in a consistent manner.
Action Timeline	Flow Time: 24 months
	Due Date: 02/28/2016
Timeline/Flow for Future Adopters	TBD
CAST Lead	FAA ATO

#	Organization(s)	Detailed Steps
2a	FAA ATO	Update the guidance for PDC in FAA Order 7110.113D, Procedures for Issuing Automated Clearances, with input from air carrier dispatch organizations.
		FAA Order 7110.113E issued April 10, 2015.
2b	FAA ATO	Implement new PDC format.
		Complete.
2c	FAA ATO	Modify PDC format and update as appropriate to clearly communicate PDC to pilots and reduce flightcrew errors.
		Reported air carrier use of new PDC format in FAA Order 7110.11E.

Notes	• PDC format will consistently identify changes to the Standard Instrument Departure (SID) in a common field in the PDC. The detailed filed route of flight will not be included in the PDC if the cleared route is different from the filed route of flight.
	• Air carriers customize presentation of PDC to the flightcrew as needed, leveraging new PDC format.

SECTION II

Note: See Section III for detailed costs and resources.

SECTION II: DETAILED ACTION INFORMATION

Action 3: Encourage use of DCL and pre-departure route clearances

Primary Implementer	**FAA Air Traffic Organization (ATO)**
Action Objective	FAA ATO should implement tower ability to provide Data Communications Clearance Delivery (DCL) and encourage operator deployment of the capability to autoload pre-departure route clearances, with flightcrew acknowledgement, into the flight management system (FMS).
Action Timeline	Flow Time: 70 months
	Due Date: 12/31/2019
Timeline/Flow for Future Adopters	TBD when CAST closes this action.
CAST Lead	FAA ATO, Airlines for America (A4A)

#	Organization(s)	Detailed Steps
3a	FAA ATO	Implement tower DCL.
		CAST accepted the implementation level of 65 airports as of 2019 and will continue to monitor future implementation.
3b	FAA ATO	Encourage equipage and use of tower data communication services by operators.
		CAST will continue to monitor operator implementation.

Notes	FAA to deploy tower data link services (begin deployment in 2015, and expect full deployment in 2019).

Note: See Section III for detailed costs and resources.

SECTION III: SUPPLEMENTAL INFORMATION

Source Study	RNAV Departures and STAR Operations Joint Safety Analysis and Implementation Team (RNAV/STAR JSAIT) Final Report (February 12, 2015)
Related Initiatives	• Collaborative air traffic management. • Revision of FAA Order 7110.113D, Procedures for Issuing Automated Clearances. • Implementation of tower data communication (begin deployment in 2015, and expect full deployment in 2019).

Total Cost	**$2,940,000**	*Note: For labor, 1 Full Time Equivalent (FTE) = $250,000*
Action 1	$20,000	
Action 2	$2,900,000	
Action 3	$20,000	

	Organization	Resources Needed
Direct Resource Overview – Government	FAA ATO	• Action 1: Ensure published departure routes are updated and used to issue PDCs. o 8 hours/Air Route Traffic Control Centers (ARTCC), 21 ARTCCs to conduct first published departure routes update and add this check to the routine update. o After the first update, it is assumed that this check will be integrated into the normal processes, and no additional costs are assigned to the SE. *Note: No FAA ATO labor costs are included for interactions with air carriers as part of Action 1, as these actions are assumed to be part of normal responsibilities.* • Action 2: 5 FTE to develop and implement changes to pre-departure clearance (PDC) format, which translates to $1,250,000. • Action 3: No additional cost since currently underway.

	Organization	Resources Needed
Direct Resource Overview – Industry	A4A	• Action 3: Cost to encourage deployment by air carriers = 4 weeks (160 hours) at $250,000 per year FTE translates to $20,000.
	Air Carriers	• Action 1: No incremental costs are included for air carriers to conduct analysis of changes in Action 1 and follow up on significant discrepancies since this is a normal part of dispatch review. • Action 2: For each air carrier, 5 weeks (200 hours) to modify PDC format as appropriate, 1 week (40 hours) to create and distribute bulletins; and 240 hours for each of 55 air carriers translates to $1,650,000. *Note: 55 air carriers are represented by three CAST-member air carrier industry associations:* o *Airlines for America (A4A),* o *Regional Airline Association (RAA), and* o *National Air Carrier Association (NACA).*

SECTION III: SUPPLEMENTAL INFORMATION

Indirect Resource Overview	The organizations identified in this section are not expected to incur direct costs associated with implementing this SE, but they may incur indirect costs within their normal line of work.

Organization	Description
N/A	N/A

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SECTION IV: REVISION LOG

Major revisions (whole numbers) represent CAST-approved changes to SE language. Minor revisions (decimals) represent minor changes to target dates or completion notes that do not affect implementer actions.

Revision	Date	Description
1.1	12/05/2019	Action 3 closed based on the current DCL implementation level.
1.0	09/17/2018	New SE format. Content reorganized and terminology updated. No substantive changes. Action 1 closed at June 2015 CAST meeting. Action 2 closed at February 2016 CAST meeting.
Original	02/06/2014	CAST adopted SE 212.

SECTION IV