



ICAO

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Monitoring Advisory Group (RASMAG/26)

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Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

JASMA AKARA SAFETY IMPROVEMENT UPDATE

(Presented by JASMA)

SUMMARY

This paper presents updates, progress and proposals of the safety improvement plan for the AKARA - FUKUE Corridor.

1. INTRODUCTION

1.1 The high-level coordination meeting on the AKARA - FUKUE Corridor in the Incheon Flight Information Region (FIR) was held in Montréal, Canada, on 10 October 2018 during the 13th Air Navigation Conference (AN-Conf/13). The International Civil Aviation Organization (ICAO) and three States concerned, China, Japan and the Republic of Korea (ROK), have thereafter organized four rounds of Technical Working Group (TWG) meetings.

1.2 TWG/1 was held in Beijing, China from 16 to 17 January 2019, TWG/2 was held in Tokyo, Japan from 19 to 20 March 2019, TWG/3 was held in Jeju, ROK from 3 to 4 July 2019, TWG/4 was held in Bangkok, Thailand from 7 to 8 November 2019. TWG/5 would be held in Shanghai, China, from 11 to 13 February 2020. It was postponed due to the impact of COVID-19.

1.3 The Japan Airspace Safety Monitoring Agency (JASMA) and ROK stated at the 25th Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/25) that the COVID-19 lower traffic environment was probably an optimal time to consider change, so as to assist airline recovery post-COVID-19 with greater efficiencies.

2. DISCUSSION

2.1 China, Japan and ROK held online meetings to discuss the improvement plan of the AKARA – FUKUE Corridor in November and December 2020. Three states agreed to conduct the improvement plan with a phased approach, the plan reported to the ICAO Headquarters.

2.2 Phase 1 has been implemented since 25 March 2021, and Phase 1 is the current status. **Figure 1** shows the ATS route structure of Phase 1. A new southern RNAV2 route, Y590, is established between SADLI and BEDAR. The lateral separation between the A593 and Y590 is at least 15 NM from each centerline. New waypoints, IKEDO, ELGEP and BEDAR, are established on Y590.

2.3 Y590 is used for only eastbound traffic from China to Japan. Broken lines in the light blue of **Figure 1** mean flight routes expected RADAR vector to reduce the passing frequency of opposite traffic. On the other hand, the Flight Level Allocation Scheme (FLAS) remains the same as before Phase 1.

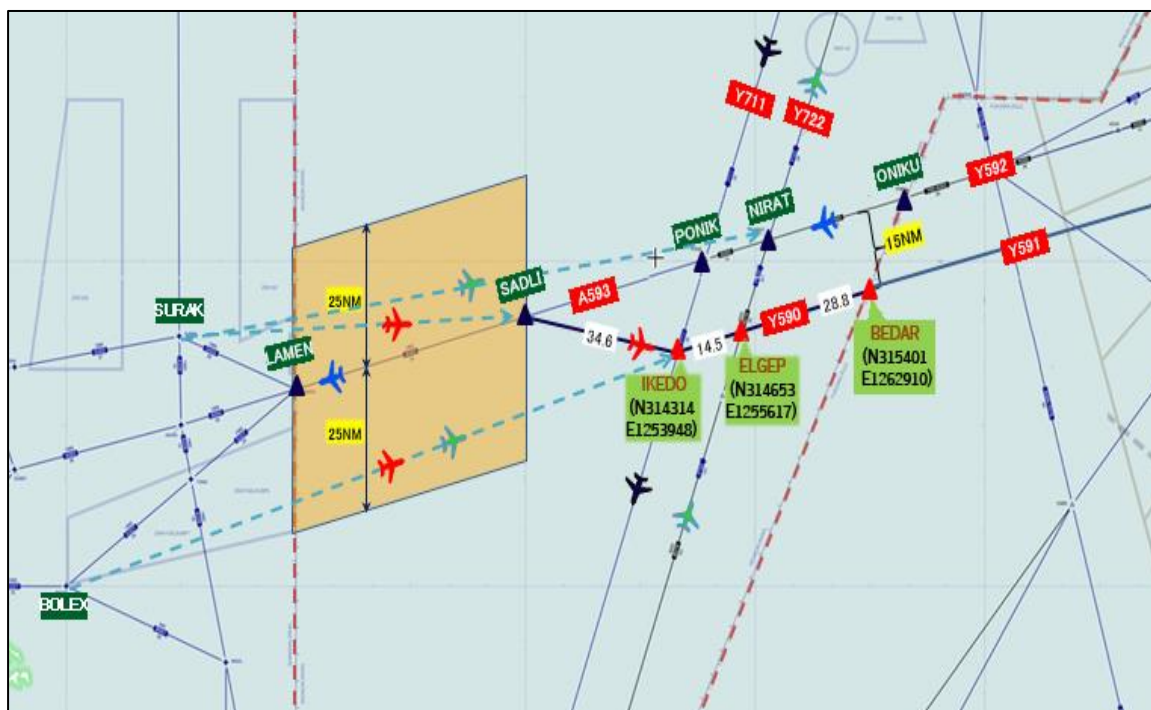


Figure 1: ATS route structure of Phase 1

2.4 Air Traffic Control (ATC) responsibility of A593 between ONIKU and SADLI has been taken over from JCAB to ROK, from Fukuoka Area Control Center (ACC) to Incheon ACC since Phase 1.

2.5 Therefore, ATC transfer points between Fukuoka ACC and Incheon ACC have been established at the FIR boundary. The transfer point of westbound traffic from Fukuoka ACC to Incheon ACC is ONIKU on A593 and eastbound traffic from Incheon ACC to Fukuoka ACC is BEDAR on Y590/Y591.

2.6 The above transfer information is provided by the ATS Inter-Facility Data-Link Communication (AIDC), so there has been no Large Height Deviation (LHD) event at BEDAR and ONIKU reported to JASMA from 25 March 2021 to 31 August 2021.

2.7 **Figure 2** shows the ATS route structure of Phase 2. A new northern RNAV2 route will be established between SURAK and VELVA. The lateral separation between A593 and the new route will be at least 16 NM from each centerline. The southern RNAV2 route will be stretched to BOLEX, and two new routes will be established to connect the northern RNAV2 route and the southern RNAV2 route.

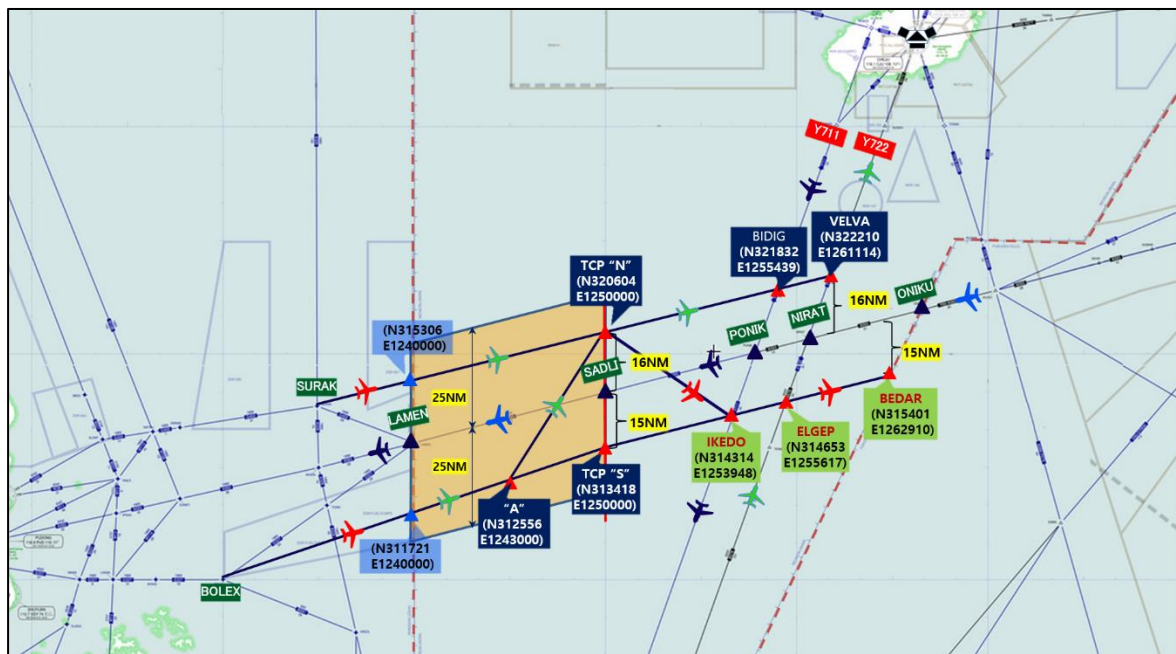


Figure 2: ATS route structure for Phase 2

2.8 The transition from Phase 1 to Phase 2 has been discussed between China and ROK. However, the transition date is not determined as of August 2021, and the transition seems to be stuck.

2.9 JASMA and the Electronic Navigation Research Institute (ENRI) conducted safety assessments for the AKARA corridor airspace of each phase, past (only A593), current (Phase 1) and future (Phase 2) using the fast-time simulation tool developed by ENRI.

2.10 **Table 1** shows the result of the fast-time simulation. The traffic sample data (TSD) is based on the flight records between 0100 UTC and 0700 UTC on 29 December 2019 which was a recently peak hours of traffic volume in the AKARA corridor airspace. The parameters used for the fast-time simulation are shown in the **Attachment**.

AKARA Airspace				
<i>(note: based on Dec 2019 traffic sample data)</i>				
Source of Risk	Same & Opposite Risk	Intersection Risk	Total Risk	Remarks
<i>Technical Risk (only A593 with FLAS)</i>	15.4×10^{-9}	0.16×10^{-9}	15.6×10^{-9}	<i>Past</i>
Technical Risk (Phase 1 with FLAS)	0.03×10^{-9}	0.23×10^{-9}	0.26×10^{-9}	Current
Technical Risk (Phase 1 without FLAS)	0.02×10^{-9}	0.20×10^{-9}	0.22×10^{-9}	
Technical Risk (Phase 2 with FLAS)	0.01×10^{-14}	0.17×10^{-9}	0.17×10^{-9}	
Technical Risk (Phase 2 without FLAS)	0.05×10^{-15}	0.12×10^{-9}	0.12×10^{-9}	Best future

Table 1: Result of fast-time simulation

2.11 As shown in **Table 1**, technical risk estimate might have not met TLS until transition to the Phase 1. In phase 1, establishing new parallel routes of A593 as non-bidirectional routes seemed to decrease the technical risk estimates for the same and opposite directions significantly. Therefore, phase 2, establishing parallel routes in the entire AKARA corridor airspace, will further decrease the technical risk estimates.

2.12 Besides, eliminating the Flight Level Allocation Scheme (FLAS) would be contributed to decreasing technical risk estimates. The reason is that aircraft would have more opportunity to cross other aircraft with over 1,000ft vertical separation if FLAS is eliminated.

2.13 FLAS is one of the mitigation measures to reduce risks due to the past unique ATC operation. However, the unique operation had been eliminated, the objectives and role of FLAS seem to be completed.

2.14 JASMA has received a report of Large Height Deviation (LHD) that occurred more than 100NM East of the AKARA corridor airspace in May 2021. The LHD is due to category D LHD, ATC system loop error, that pilots misunderstood a heading instruction by Fukuoka ACC as descending clearance to the FLAS altitude.

2.15 According to the investigation by Fukuoka ACC, pilots flying the AKARA corridor airspace expect altitude change before entering the corridor. JASMA is wondering that the pilots' expectation for altitude change due to FLAS cannot be overlooked as a potential risk of LHD.

2.16 Based on the result of JASMA's analysis above, JASMA provides RASMAG following two proposals.

2.17 The first proposal is to narrow down the area of Hot spot B from the entire AKARA corridor airspace to airspace between 124E and 12620E, removing BEDAR/ONIKU.

2.18 The second is to encourage relevant States to conduct swift transition from Phase 1 to Phase 2 and eliminate FLAS, as they are required to prepare for the recovery of traffic volume after the COVID-19 pandemic.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) discuss to narrow down the area of Hot spot B;
- c) discuss the way forward to Phase 2 and elimination of FLAS; and
- d) discuss any relevant matters as appropriate.

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Attachment

Parameter	Definition	Value	Source
$P_z(1000)$	Probability that two aircraft nominally separated by the vertical separation minimum 1000 feet are in vertical overlap	1.7×10^{-8}	Value specified in ICAO Doc. 9574
$P_z(0)$	Probability that two aircraft at the same nominal level are in vertical overlap	0.54	Value often used (shown in RVSM/TF-9-IP/2)
$P_y(5)$	Probability that two aircraft nominally separated by the lateral separation on the same track minimum 5 NM are in lateral overlap	1.2×10^{-4}	
$P_y(15)$	Probability that two aircraft nominally separated by the lateral separation on the same track minimum 15 NM are in lateral overlap	1.0×10^{-10}	
L_x	Average aircraft length (B77L)	0.034 NM	TSD (December 2019)
L_y	Average aircraft width (B77L)	0.035 NM	
L_z	Average aircraft height (B77L)	0.0010 NM	
V_x	Individual-aircraft along track speed	480 kt	Value often used
V_{rx}	Average track speed of aircraft pairs	28.9 kt	Surveillance Radar data
$V_{ry(coll)}$	Average along track speed of aircraft pairs	80 kt	$480 \times \sin(9^\circ) = 75.7$ kts
V_{rz}	Average vertical speed of aircraft pairs	1.5 kt	Value often used
$K_p(s)$	The passing frequency of aircraft pair	3.87	Calculated by above data
$K_p, K_p(o)$	The passing frequency of aircraft pair	1.09	Calculated by above data
$N_x^y(o+s)$	The passing frequency	Estimated individually	
N_a^{cross}	The collision risk for crossing routes (operational dimension)	Estimated individually	

$$K(s) = 1 + L_x / V_{rx} * (V_{ry} / L_y + V_{rz} / L_z)$$

$$K = K(o) = 1 + L_x / (2 * V_x) * (V_{ry} / L_y + V_{rz} / L_z)$$