57th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 4: AIR NAVIGATION

IMPLEMENTATION OF SHORT RNAV/PBN STANDARD ARRIVAL ROUTE (STAR) AND STANDARD INSTRUMENT DEPARTURE (SID) PROCEDURES INITIATIVE IN MALAYSIA

Presented by Malaysia

INFORMATION PAPER

SUMMARY

This paper presents information related to the introduction of shorter Approach and Departure Procedures Initiative in Kuala Lumpur International Airports (KLIA/WMKK/KUL), Malaysia. This paper describes the innovative approach by Civil Aviation Authority of Malaysia (CAAM) in facilitating further fuel saving to airlines operating in and out of KLIA, which in turn contributes to reduction of carbon emission by aviation activity.

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1. INTRODUCTION

1.1 Modern Aircraft RNAV/RNP capabilities has enabled the SID/STAR Design that was not possible in conventional method. It allows pilots to use onboard GPS technology to follow precise tracks independently with the aids of ground beacon. This RNAV/RNP SID/STAR design shorten the distance that an aircraft has to fly (en-route and TMA) and reduces fuel burn, exhaust emissions and noise pollution amongst communities near airports. Moving forward we will also witness the reduction in terms of traffic congestion as well as flight delays which will in directly benefit the ATC.

1.2 RNAV/RNP will bring benefits to both operators and Air Navigation Service Provider (ANSP), whereby airline will be able to fly to the station that are not fitted with ground aids, given more direct routing and increases flight safety and efficiency. On the other hand, it also enables the ANSP to take advantage by designing Airways, SID and STAR that will assist ATC in minimizing traffic conflict and flights spacing for arrivals and departures.

1.3 Regardless of the above, Air Traffic Control Officer on real time often offer direct track to pilot, which will further reduce the actual track mile flown by aircraft. While that generally benefits the aircraft in fuel saving, it could however be further improved had the pilot has the information early and plan the fuel uplift as close as possible to the actual track mile. This will avoid pilot uplifting unnecessary extra fuel that contributes to the aircraft mass.

2. DISCUSSION

2.1 In order to reduce aircraft carried fuel CAAM has taken steps to design and offer PBN Based short STARs and short SIDs for KLIA that mimic the real time direct track offered by ATC. Pilot will have the opportunities to plan their flights using these short SIDs/STARs, during certain period of time which were determined based on the traffic pattern studied by CAAM. It will not be compulsory and is up to the company's or pilot's discretion. There are two (2) types of short STARs and one (1) SID being developed by CAAM;

(i) Short STARs (2 K Arrival)

These are STARs that will most likely be used by the ATC during certain period of the day, to manage arrivals into KLIA. These STARs do not require the airline to fly the Point Merge Systems (PMS) legs of the normal STARs due to typically low to moderate traffic volume during certain time of the day and night hours (refer Table 1 & 2 and Appendix A)

(ii) Shorter STARs (3 K Arrival or dubbed as midnight STARs)

These are the special STARs that are shorter in track miles compare to the Short STARs in 2(i). ATC in KLATCC normally give track shortening to the aircraft by vectoring the arrival to Intermediate or Final Approach Segments into KLIA. Based on the study carried by CAAM, the track shortening given by ATCC usually happened during the wee hours of the night (i.e., 1600 – 1900 UTC/0200 – 0500 LT) where traffic volume is extremely low (Table 1 & 2 and Appendix A).

TRACK MILES COMPARISON BETWEEN CURRENT STAR (1K ARR) and NEW RNAV STARs SHORT STAR (2K), MIDNIGHT STAR (3K) - 14R/14L/33					
STAR / Trasition	Track Miles				
	1K Arrival (NM)	2K Arrival (NM)	2K vs 1K Saving	3K Arrival (NM)	3K Vs 2K Saving
PUGER	97.9	82.4	**15.5**	80.7	**1.7**
NIREN	89.1	73.8	**15.3**	71.2	**2.6**
KAKAK	68.5	57.5	**11**	47.8	**9.7**
PULIP	77.1	66.1	**11**	45.6	**20.5**
SAROX	136.1	125.1	**11**	87.3	**37.8**
GUPTA	152.1	141.1	**11**	92.2	**48.9**
SALAX	125.1	83.4	**41.7**	56.4	**27**
Average Track Miles Saving			**16.6 NM**		**37.8 NM**

Table 1: Track miles saving for the Short STARs of 2K and 3K Arrival compared to the Normal 1K STARs;

TOTAL ARRIVAL PERMONTH (2019)		**SHORT STAR UTILIZATION 38% FROM TOTAL ARRIVAL FLIGHT PERDAY**		**MIDNIGHT STAR UTILIZATION 7% FROM TOTAL ARRIVAL FLIGHT PERDAY**	
		SAVING IN DISTANCE (NM)	SAVING IN FUEL (USD)	SAVING IN DISTANCE (NM)	SAVING IN FUEL (USD)
JAN	16855	106321.34	1,109,676	44598.33	465,473
FEB	15511	97843.39	1,021,191	41042.11	428,356
MAR	17184	108396.67	1,131,336	45468.86	474,559
APR	16938	106844.90	1,115,140	44817.95	467,765
MEI	16405	103482.74	1,080,049	43407.63	453,045
JUN	16272	102643.78	1,071,293	43055.71	449,372
JUL	17408	109809.66	1,146,083	46061.57	480,745
AUG	17538	110629.70	1,154,642	46405.55	484,335
SEP	16914	106693.51	1,113,560	44754.44	467,102
OCT	17381	109639.35	1,144,306	45990.13	479,999
NOV	16958	106971.06	1,116,457	44870.87	468,317
DIS	18184	114704.67	1,197,173	48114.86	502,175
TOTAL SAVING		**1283980.78**	**13,400,907**	**538588.01**	**5,621,243**

Table 2: Distance and fuel saving with the implementation of Short STAR & Midnight STAR

** Fuel saving amount in USD as of 31st March 2022*

** Traffic volume are based on traffic movement data (2019)*

(iii) Short SIDs (2 B Departure or dubbed as midnight SIDs)

Similar to Shorter STARs, these SIDs will also be deployed by ATC during the wee hours of the night, in which full legs of normal SIDs to minimize conflicting traffic during rather high workload is not required. (refer Table 3 & 4 and Appendix B)

COMPARISON TRACK MILES BETWEEN CURRENT SID WITH NEW TRACK SHORT SID (2B) - 14R			
STAR / Transition	Track Miles on		
	1B DEPARTURE (NM)	2B DEPARTURE (NM)	1B DEP Vs 2B DEP (NM)
PUGER 1B DEP	129.3	123.8	**5.5**
IBUKU 1B DEP	111.5	109.6	**1.9**
ATIMU 1B DEP	113.1	106.8	**6.3**
BIKDU 1B DEP	128.0	103.8	**24.2**
PIBOS 1B DEP	79.7	66.5	**13.2**
KIMAT 1B DEP	65.9	62.2	**3.7**
RUSBU 1B DEP	64.8	63.5	**1.3**
MITOS 1B DEP	50.3	49.8	**0.5**
SALAX 1B DEP	39.1	39.0	**0.1**
AVERAGE TRACK MILES SAVING			**6.3 NM**

Table 3: The track miles saving for 2B Departure compared to the Normal 1B Departure;

TOTAL DEPARTURE PER MONTH (2019)		**MIDNIGHT SID UTILIZATION 3.3% FROM TOTAL DEPARTURE FLIGHT PERDAY**	
		SAVING IN DISTANCE (NM)	SAVING IN FUEL (USD)
JAN	16873	3507.90	36,612
FEB	15450	3212.06	33,524
MAR	17194	3574.63	37,308
APR	16931	3519.95	36,738
MEI	16424	3414.55	35,638
JUN	16261	3380.66	35,284
JUL	17413	3620.16	37,784
AUG	17477	3633.47	37,923
SEP	16892	3511.85	36,653
OCT	17363	3609.77	37,675
NOV	16948	3523.49	36,775
DIS	18182	3780.04	39,452
TOTAL SAVING		**42288.52**	**441,365**

Table 4: Distance and fuel saving with the implementation of the Midnight SID

** Fuel saving amount in USD as of 31st March 2022*

** Traffic volume are based on traffic movement data (2019)*

2.2 As mentioned above, once published, airlines are allowed to plan their flight based on the above SIDs/STARs during the specified period of the day. It will be notified together with short SIDs/STARs publication.

2.3 Malaysia will;

(i) Publish the short STARS and SIDs by AIP Supplements – expected implementation September 2022;
(ii) Develop the ATC procedure; and
(iii) ATC Briefing and Familiarization Training.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

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