



INTERNATIONAL CIVIL AVIATION ORGANIZATION

The Thirteenth Meeting of the FANS Implementation Team for the Bay of Bengal (FIT-BOB/13) and the Fifth Meeting of the Bay of Bengal Reduced Horizontal Separation Implementation Task Force (BOB-RHS/TF/5)

Bangkok, Thailand, 7 – 11 February 2011

Agenda Item 4: Safety Analysis and Airspace Monitoring Issues

**Examination of Operations Conducted
On ATS Routes in the Bay of Bengal Region**

(Presented by Singapore)

SUMMARY

This information paper provides an analysis of operations conducted on Bay Of Bengal ATS routes L301, L510*, L759, M300, M770, N563, N571*, N877, P570, P574, P628* and P762* based on December 2009 traffic sample data (TSD) sets from the Bangkok, Chennai, Colombo, Delhi, Karachi, Kathmandu, Kolkata, Lahore, Male, Mumbai and Yangon flight information regions. The paper reviews the operators, aircraft types, origin-destination pairs, use of ATS routes and operator/aircraft-type combinations observed in the TSDs in light of the planned introduction of 50NM longitudinal separation standards L510, N571, P628 and P762.

Action by BOB/RHS/TF5 is at Paragraph 4.

* ATS Routes identified for Phase I implementation.

1. INTRODUCTION

1.1 In November 2009, the First Meeting of the ICAO Bay of Bengal Reduced Horizontal Separation Implementation Task Force, BOB/RHS/TF-1, agreed to a step-by-step or phased implementation of reduced horizontal separation. At the BOB/RHS/TF3 and BOB/RHS/TF4 meetings, the ATS routes L510, N571, P628 and P762 were identified for Phase 1 implementation. For Phase 2, the ATS routes affected are L301, L759, M300, M770, N563, N877, P570 and P574. The meeting agreed, further, that any introduction of reduced separation minima would be subject to the satisfactory outcome of a safety assessment of proposed changes. India advised the meeting that, they are prepared to establish an Enroute Monitoring Agency (EMA) in accordance with ICAO provisions.

1.2 At the BOB/RHS/TF4, held in Bangkok from 18 – 22 October 2010, India requested for South East Asia Safety Monitoring Agency (SEASMA) to support and assist in the conduct of the initial safety assessment of Phase 1 implementation of reduced horizontal separation in the Bay of Bengal region, as well as to provide continued safety monitoring services until such time when India is endorsed by RASMAG as a competent EMA.

1.3 The ATS routes affected for Phase 1 and 2 were considered in the conduct of the initial safety assessment for Phase 1 implementation. The purpose of this information paper is to summarise some of the information used to support the conduct of the initial safety assessment for Phase 1 implementation.

2. BACKGROUND

2.1 One of APANPIRG's conclusion is that the traffic sample data within the Asia/Pacific Region should be collected by all States for the month of December each year for the purpose of Reduced Vertical Separation Minimum (RVSM) monitoring. During 2009, APANPIRG/20 expanded the usage of this data under certain conditions to support regional air traffic management implementations, including reduced horizontal plane separation minima. The TSD contains the following information for each flight during the month:

- a) call sign;
- b) aircraft type;
- c) aircraft registration;
- d) PBN approval type;
- e) origin aerodrome;
- f) destination aerodrome;
- g) on entry into the airspace of the FIR, the entry fix, entry time, entry flight level and route followed after the entry fix;
- h) on exit from the airspace of the FIR, the exit fix, corresponding time and flight level, and route followed after the exit fix; and
- i) for fixes internal to the airspace, the fix name, corresponding time and flight level and routing after the fix

2.2 These data contribute to the conduct of a safety assessment for the implementation of 50-NM lateral and longitudinal separation minima.

2.3 Twelve FIRs – Bangkok, Chennai, Colombo, Delhi, Karachi, Kathmandu, Kolkata, Kuala Lumpur, Lahore, Male, Mumbai and Yangon – have air traffic control responsibility for L301, L510*, L759, M300, M770, N563, N571*, N877, P570, P574, P628* and P762*. Records of all flights operating on L301, L510*, L759, M300, M770, N563, N571*, N877, P570, P574, P628* and P762* from each of the twelve TSDs were merged through a software process to avoid duplicate counting of flights. The resulting combined TSD was compared to the TSD from each FIR in order to check for flights missing from individual TSDs but reported in others, and for agreement of times at fixes common to two TSDs. The combined December 2009 TSD provides an insight into the airspace characteristics of flight operations on L301, L510*, L759, M300, M770, N563, N571*, N877, P570, P574, P628* and P762*.

2.4 After processing and merging the TSD, a total of 22510 flight operations were observed on L301, L510*, L759, M300, M770, N563, N571*, N877, P570, P574, P628* and P762* during December 2009.

3. DISCUSSION

3.1 Flights operating on L301, L510*, L759, M300, M770, N563, N571*, N877, P570, P574, P628* and P762* in the combined December 2009 TSD were examined to identify and quantify several important characteristics of airspace use. The characteristics identified included the profiles of operators using the routes, the aircraft types observed on the routes, the origin-destination

aerodrome pairs for operations and the operator/aircraft-type pairs seen to have used L301, L510*, L759, M300, M770, N563, N571*, N877, P570, P574, P628* and P762*.

* ATS Routes identified for Phase I implementation.

Operator Profile

3.2 Each traffic movement was examined to determine the operator conducting the flight. A total of 258 unique three-letter ICAO operator designators were observed in the merged TSD. Table 1 presents the top 25 of these operator-designator counts, which accounted for nearly 84 percent of the operations. As noted, the top 8 operators account for nearly half of the operations.

Number	Operators	Count	Proportion	Cumulative Count	Cumulative Proportion
1	UAE	2513	0.1116	2513	0.1116
2	SIA	1604	0.0713	4117	0.1829
3	JAI	1492	0.0663	5609	0.2492
4	AXB	1431	0.0636	7040	0.3127
5	QTR	1088	0.0483	8128	0.3611
6	MAS	1030	0.0458	9158	0.4068
7	SVA	951	0.0422	10109	0.4491
8	IAC	913	0.0406	11022	0.4896
9	AIC	810	0.0360	11832	0.5256
10	ABY	808	0.0359	12640	0.5615
11	ETD	795	0.0353	13435	0.5968
12	GIA	703	0.0312	14138	0.6281
13	GFA	627	0.0279	14765	0.6559
14	OMA	608	0.0270	15373	0.6829
15	ALK	554	0.0246	15927	0.7076
16	AXM	487	0.0216	16414	0.7292
17	THA	465	0.0207	16879	0.7498
18	CPA	464	0.0206	17343	0.7705
19	QFA	294	0.0131	17637	0.7835
20	KAC	292	0.0130	17929	0.7965
21	KFR	200	0.0089	18129	0.8054
22	BAW	197	0.0088	18326	0.8141
23	DLH	188	0.0084	18514	0.8225
24	SLK	187	0.0083	18701	0.8308
25	SQC	178	0.0079	18879	0.8387

Table 1: Top 25 Operator Designators Observed in Combined December 2009 TSD

3.3 A total of 118 unique ICAO four-letter aircraft-designators were found in the combined December 2009 TSD. The top 15 aircraft types, accounting for 92 percent of the December 2009 operations, are shown in table 2.

Number	Aircraft Type	Count	Proportion	Cumulative Count	Cumulative Proportion
1	B777	4452	0.1978	4452	0.1978
2	B738	3440	0.1528	7892	0.3506
3	A320	3051	0.1355	10943	0.4861
4	A332	2224	0.0988	13167	0.5849
5	B744	1929	0.0857	15096	0.6706
6	A333	1072	0.0476	16168	0.7183
7	A343	875	0.0389	17043	0.7571
8	A321	727	0.0323	17770	0.7894
9	B763	625	0.0278	18395	0.8172
10	A319	511	0.0227	18906	0.8399
11	A306	399	0.0177	19305	0.8576
12	A310	394	0.0175	19699	0.8751
13	B743	343	0.0152	20042	0.8904
14	A388	322	0.0143	20364	0.9047
15	A345	259	0.0115	20623	0.9162

Table 2: Top 15 Aircraft-Type Designators Observed in Combined December 2009 TSD

Origin-Destination Aerodromes

3.4 A total of 266 aerodromes appeared as either origins or destinations of flights in the combined December 2009 TSD. These aerodromes gave rise to a total of 980 origin-destination pairings.

3.5 The top 30 origin-destination pairs, in terms of operations, are shown in table 3.

Number	Origin	Destination	Count	Proportion	Cumulative Count	Cumulative Proportion
1	VABB	OMDB	348	0.0155	348	0.0155
2	OMDB	VABB	332	0.0147	680	0.0302
3	VOMM	WSSS	247	0.0110	927	0.0412
4	EGLL	WSSS	239	0.0106	1166	0.0518
5	VHHH	OMDB	218	0.0097	1384	0.0615
6	WSSS	EGLL	217	0.0096	1601	0.0711
7	WSSS	VABB	204	0.0091	1805	0.0802
8	WSSS	VOMM	204	0.0091	2009	0.0892
9	VABB	WSSS	199	0.0088	2208	0.0981
10	OEJN	WIDD	197	0.0088	2405	0.1068
11	EDDF	WSSS	188	0.0084	2593	0.1152
12	OMDB	VOMM	186	0.0083	2779	0.1235
13	VTBS	OMDB	186	0.0083	2965	0.1317
14	OMDB	WSSS	178	0.0079	3143	0.1396
15	VOMM	OMDB	178	0.0079	3321	0.1475
16	VOCI	OMSJ	170	0.0076	3491	0.1551

Number	Origin	Destination	Count	Proportion	Cumulative Count	Cumulative Proportion
17	OMDB	VOHS	166	0.0074	3657	0.1625
18	OMSJ	VOCI	163	0.0072	3820	0.1697
19	WSSS	OMDB	155	0.0069	3975	0.1766
20	VABB	VTBS	153	0.0068	4128	0.1834
21	VTBS	VABB	153	0.0068	4281	0.1902
22	VOHS	OMDB	147	0.0065	4428	0.1967
23	WSSS	VIDP	147	0.0065	4575	0.2032
24	WSSS	EDDF	145	0.0064	4720	0.2097
25	VCBI	OMDB	141	0.0063	4861	0.2159
26	VOMM	WMKK	132	0.0059	4993	0.2218
27	VABB	OOMS	130	0.0058	5123	0.2276
28	VOBL	OMDB	129	0.0057	5252	0.2333
29	WMKK	OMDB	129	0.0057	5381	0.2390
30	OOMS	VABB	124	0.0055	5505	0.2446

Table 3: Top 30 Origin-Destination Pairs Observed in Combined December 2009 TSD

Use of the ATS Routes

3.6 Table 4 shows use of the twelve routes in the combined December 2009 TSD.

Number	ATS Routes	Count	Proportion	Cumulative Count	Cumulative Proportion
1	L301	4685	0.2081	4685	0.2081
2	N571*	3820	0.1697	8505	0.3778
3	P574	3713	0.1649	12218	0.5428
4	M300	3271	0.1453	15489	0.6881
5	P570	2159	0.0959	17648	0.7840
6	L759	1702	0.0756	19350	0.8596
7	P628*	1043	0.0463	20393	0.9060
8	P762*	590	0.0262	20983	0.9322
9	N563	545	0.0242	21528	0.9564
10	L510*	416	0.0185	21944	0.9749
11	M770	290	0.0129	22234	0.9877
12	N877	276	0.0123	22510	1.0000

* ATS Routes identified for Phase I implementation.

Table 4: Count of Operations on the twelve ATS routes

Operator/Aircraft-Type Combinations

3.7 In all, 629 combinations of operator and aircraft type were observed in the combined December 2009 TSD. The top 25 such combinations, accounting for 50 percent of the operations, are shown in table 5, with both the operator and aircraft type designations shown in standard ICAO notation.

Pair Number	Operators/Aircraft Type	Count	Proportion	Cumulative Count	Cumulative Proportion
1	AXB/B738	1383	0.0614	1383	0.0614
2	JAI/B738	1329	0.0590	2712	0.1205
3	ABY/A320	797	0.0354	3509	0.1559
4	UAE/B77W	794	0.0353	4303	0.1912
5	UAE/A332	746	0.0331	5049	0.2243
6	SIA/B772	618	0.0275	5667	0.2518
7	IAC/A320	583	0.0259	6250	0.2777
8	OMA/B738	545	0.0242	6795	0.3019
9	SIA/B77W	502	0.0223	7297	0.3242
10	MAS/B744	347	0.0154	7644	0.3396
11	MAS/B772	327	0.0145	7971	0.3541
12	SVA/B743	308	0.0137	8279	0.3678
13	QTR/A321	288	0.0128	8567	0.3806
14	ETD/A320	284	0.0126	8851	0.3932
15	UAE/B772	280	0.0124	9131	0.4056
16	AXM/A320	263	0.0117	9394	0.4173
17	GFA/A320	257	0.0114	9651	0.4287
18	ALK/A332	256	0.0114	9907	0.4401
19	GIA/A333	227	0.0101	10134	0.4502
20	ALK/A343	223	0.0099	10357	0.4601
21	GIA/B744	211	0.0094	10568	0.4695
22	THA/A333	210	0.0093	10778	0.4788
23	AXM/A322	204	0.0091	10982	0.4879
24	UAE/B773	201	0.0089	11183	0.4968
25	SIA/A388	197	0.0088	11380	0.5056

Table 5: Top 25 Operator/Aircraft-Type Combinations Observed in Combined December 2009 TSD

4. ACTION BY THE MEETING

4.1 The meeting is invited to inspect the summary information concerning the combined December 2009 TSD presented in this paper.

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