International Civil Aviation Organization
Twenty-Fifth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/25)
Video Teleconference, 27 – 30 October 2020

Agenda Item 2: Review Outcomes of Related Meetings

RASMAG-MAWG AND RMACG REPORTS

(Prepared by the Monitoring Agency for Asia Region)
(Presented by Chairperson)

SUMMARY

This paper presents a brief summary from the Seventh Meeting of the Monitoring Agencies Working Group (MAWG/7) in February 2020 and the Regional Monitoring Agencies Coordination Group (RMACG) virtual discussion in July - August 2020.

1. INTRODUCTION

1.1 The Seventh Monitoring Agencies Working Group (MAWG/7) meeting was held from 3 - 6 February 2020, hosted by the Monitoring Agency for Asia Region (MAAR) in Bangkok, Thailand. Eighteen (18) participants attended the meeting representing AAMA, JASMA, MAAR, PARMO, SEASMA and an ICAO Regional Officer from the Bangkok Office.

1.2 The Regional Monitoring Agencies Coordination Group (RMACG) virtual discussion was held in July through August 2020. The discussion was hosted and facilitated by NAARMO/PARMO on an online discussion platform. This allowed all Regional Monitoring Agencies and the ICAO Secretariat to review the papers and participate in the discussion by writing.

2. DISCUSSION

MAWG/7. During the meeting participants reviewed 24 working papers and 6 information papers covering a wide range of technical subjects relevant to the work of the Asia Pacific monitoring agencies. During its work activity, the MAWG discussed a number of key issues relevant to the Asia/Pacific region and produced additional 2 flimsies.

Consolidated Reports for RASMAG

2.1 The meeting discussed and improved the mechanism to produce a consolidated safety report for RASMAG/25.

2.2 The meeting also decided that the LTHM burden of all Asia Pacific States would be consolidated and reported as one paper to the RASMAG starting from RASMAG/25 in 2020. The paper would also contain a list of proposals to update the APANPIRG List of deficiencies under the LTHM requirements.

2.3 The consolidation of RVSM airspace audit results remained to be decided with RMACG under the Global RMA Bulletin (GRB) discussions. A preliminary idea was to single out aircraft that had been unverified for a long time or confirmed to be non-approved for RASMAG so that the relevant States could take the appropriate actions.

EMA/RMA Safety Monitoring

2.4 The monitoring agencies reported their preliminary safety assessment results of 2019, as the followings.

2.5 In South Asia/Indian Ocean (SA/IO) airspace, the majority of LHDs was Category E: coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues. Almost 70% of the operational risk in this region lied at the interface between Mumbai and Muscat.

2.6 For Southeast Asia (SEA) airspace, SEASMA together with MAAR reported the decreased risk along the boundary of Manila FIR. However, it was noted that while the AIDC implementation mitigated the Category E errors, it had inadvertently introduced errors in Category F: coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues.

2.7 MAAR reported the operational vertical risk of the Mongolian Airspace as zero. However, ICAO expressed their concern about the low number of reports from Ulaanbaatar FIR.

2.8 In Fukuoka FIR, the most frequent LHD events were the TCAS RA (Category J). The meeting discussed and agreed to further investigate the high number of LHD Category J events reported to JASMA, compared to those of other regions which usually did not result in more than 300-ft deviation.

2.9 China RMA reported their progress on LHD hot spot mitigation measures within Chinese RVSM airspace. China RMA and JASMA also established a confirmation mechanism in order to share the information in a timely manner to address the safety occurrence in the AKARA corridor.

2.10 PARMO presented the assessment result for the Republic of Korea where 12 out of 17 reported deviations occurred in the AKARA corridor. PARMO planned to review them with JASMA and China RMA and combine them with reports from other sources to present a comprehensive picture of safety situation in the area.

2.11 PARMO continued to face difficulty in obtaining related safety data from the States in the Pacific airspace, and planned to attend the upcoming Informal South Pacific ATS Coordinating Group (ISPACG) meeting in May 2020 in Tahiti to improve data reporting.

2.12 For Brisbane, Honiara, Melbourne, Nauru and Port Moresby FIRs, the majority of LHDs were Category A (flight crew failing to climb/descend the aircraft as cleared) and B (Flight crew climbing/descending without ATC clearance). There was a high risk LHD due to its long duration of 95 minutes in December 2019 involving a military formation being provided with RVSM separation while RVSM separation was not approved.

2.13 For Jakarta and Ujung Pandang FIRs, the TSD quality improved significantly. The majority of LHDs in these FIRs were Category E. AAMA would continue to work with Jakarta and Ujung Pandang ATC on methods to mitigate the risk associated with coordination errors.

New Online LHD Reporting System

2.14 MAAR updated the meeting on the new online LHD reporting system that had commenced since 1 October 2019. Users from 21 out of 24 FIRs registered in the system while the remaining 3 FIRs still needed to submit LHD information via emails. Viewer accounts were also set up for the FIRs and RMAs adjacent to MAAR's region so that theses POCs and RMAs would also be notified automatically via emails of their relevant LHDs submitted by MAAR States.

2.15 Because of its automatic notification feature, MAAR encouraged other RMAs and/or States around MAAR's responsible region to enter/maintain LHD data using the new online LHD reporting system so that each Cat E occurrence would be notified to the transferring ACC unit while the data could be retrieved from the system for further investigation.

PBCS Implementation and Performance Monitoring

2.16 China RMA reported on the progress of PBCS implementation and performance monitoring mechanism in China since March 2018. The RCP240 and RSP180 were only applied to routes L888 (SANLI-XKC), Y1 and Y2 where CPDLC/ADS-C were the primary means of communication and surveillance.

2.17 MAAR reported that 9 out of 21 States already provided RCP240/RSP180 approval data via the revised F2 form. MAAR also started sharing this data to other monitoring agencies since August 2019 for their FPL check.

2.18 JASMA reported results of their FPL check against RCP240 and RSP180 authorization and the observed ADS-C/CPDLC data link performance. Approximately 400 flights per day (70%) in the Pacific Ocean airspace of Fukuoka FIR indicated 'P2' in their FPL. During their FPL check on a monthly basis, 45% of these flights were confirmed with the PBCS authorization database.

2.19 SEASMA reported results on the monthly PBCS monitoring using the three-month rolling basis since September 2019. A total 922 airframes were monitored and resulted in 58 non-compliance reports during the period of September to November 2019. Out of these 58 cases, 10 airframes indicated 'No' while 20 airframes indicated 'Yes' in the PBCS field. In order to follow up with the non-compliance cases with relevant stakeholders, SEASMA revised the PBCS non-compliance report to include "Airframe Registration" and "Filed PBCS Indicators in FPL".

2.20 JASMA and SEASMA together identified the same airframes exhibiting different RCP/RSP performance results in 2 FIRs and 2 monitoring mechanisms. This issue would be further discussed during the next FIT-Asia meeting to ensure that aircraft would not be prevented from operating in the PBCS environment.

2.21 PARMO presented their lessons learned from PBCS monitoring experience on the following topics: media transitions, HF next-on-busy, operation requirements tables, and satellite coverage areas. They also planned to share these PBCS problems and solutions to the FIT-Asia/10 meeting in August 2020 as some problems might be common to Asia Pacific and could expedite the analysis and resolution process.

Verification on RVSM Approval Status of State Aircraft

2.22 As tasked by RMACG/14 for each RMA to ask its PIRG how to handle State aircraft, the meeting discussed various situations among States. Some State aircraft operators might incorrectly file 'W' in their flight plans mistaking the RVSM certification from the aircraft manufacturer as the full RVSM approval. Moreover, these aircraft might have never been height monitored. These aircraft would impose a risk if they were provided RVSM separation with other civil aircraft. But in some States it could be confirmed that the RVSM approval process for State aircraft was equivalent to the process for civil aircraft. The meeting was suggested that the question to be raised to the APANPIRG would be on how to detect/handle State aircraft operators that incorrectly file 'W' in their flight plans.

RMACG virtual discussion. During the virtual discussion participants reviewed 5 working papers, 21 information papers and 1 flimsy covering a wide range of technical subjects relevant to the work of the Regional Monitoring Agencies. During its work activity, the RMACG discussed a number of key issues relevant to the RASMAG as follows.

Rejection of Flight Plans of Aircraft Listed on the EUR RMA Bulletin

2.23 Recent ICAO European Aviation Systems Planning Group (EASPG) meetings have been investigating various measures that State Authorities could take to address and reduce the number of aircraft, without a confirmed RVSM approval, operating in RVSM airspace which are contained in the EUR RMA Bulletin - particularly those aircraft that have been present on the bulletin for extended periods of time. As State authorities are required to take appropriate action to ensure that safety of operation in RVSM airspace can be maintained, the German State authority requested EUROCONTROL Network Manager to introduce measures to reject aircraft identified in the EUR RMA Bulletin from operating in German RVSM airspace.

2.24 Even though the precise scope, procedure and means to promulgate details to affected operators are currently being elaborated, it was agreed that any policy adopted to improve the situation would apply to both state and civil designated aircraft listed on the bulletin. The process is expected to be implemented over German RVSM airspace by the end of 2020. Then a proposal to extend the scheme throughout the area covered by the EUROCONTROL Integrated Initial Flight Plan Processing System (IFPS) will soon be submitted to the EASPG.

2.25 The latest EUR RMA Bulletin, published as version 10.1 on 15 September 2020, included the following aircraft from Asia Pacific Region:

- 1 aircraft from Air Force of Australia,
- 1 aircraft from Air Force of India,
- 5 aircraft from Air Force of Pakistan,
- 1 aircraft from Air Force of People's Republic of China,
- 1 aircraft from Air Force of Thailand,
- 1 aircraft from DeerJet, China,
- 1 aircraft from Lion Air, Indonesia, and
- 1 aircraft from national air services of Indonesia.

RVSM Minimum Monitoring Requirement (MMR) Update

2.26 The RMACG reviewed and endorsed the updates to the RVSM monitoring groups and minimum monitoring requirements for 2020 as provided in **the Attachment** to this working paper. This revision included 16 changes to the civilian monitoring groups and 1 change to the military monitoring groups.

Height Keeping Performance in Terms of Average ASE by Aircraft Monitoring Groups

2.27 The 2019 average ASE values of major aircraft monitoring groups was calculated based on global height monitoring data from nine RMAs.

2.28 The 2019 global average ASE measurements of each aircraft group did not exceed the MASPS limit of 25 m (80 ft). However, the average ASE value of B744-10 reached the MASPS limit of -80 ft while those of B744-5 and B767 were close to the MASPS limit with the average ASE values of -79 ft and -59 ft, respectively. These groups have been closely monitored for several years and their average ASE trends seem to be stable. Therefore, it was agreed in RMACG/14 (2019) that specific reporting of the B744-10 and B767 groups was not necessary unless any performance degradation was observed.

Height Keeping Performance Monitoring (HKPM) with Space-Based ADS-B Data

2.29 During the COVID-19 pandemic, MAAR's EGMU services for foreign operators were suspended due to the oversea travel restrictions. This prevented an Afghanistan airline from completing its height monitoring requirement as other ground-based monitoring systems were not their viable options either. This led to a discussion among the airline, the Afghanistan CAA, the ICAO, and MAAR for other alternatives. Fortunately, two aircraft of this operator were recently retro-fitted with ADS-B out and Aireon, the provider of an air traffic surveillance system using a space-based ADS-B network, agreed to provide the data of these two aircraft for the purpose of HKPM.

2.30 MAAR was able to process the space-based ADS-B data provided by Aireon and estimate the ASE values for these two aircraft by the current ADS-B Height Monitoring System (AHMS). MAAR believes that the space-based ADS-B network could serve as an alternative data source for fulfilling the LTHM requirements.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper, especially:

i) ICAO's concern about the low number of LHD reports from Ulaanbaatar FIR (paragraph 2.4);

ii) PARMO's difficulties in obtaining related safety data from the States in the Pacific airspace (paragraph 2.11);

iii) MAAR's implementation of the new online LHD reporting system (paragraph 2.14);

iv) Rejection of flight plans of aircraft listed on the EUR RMA Bulletin (paragraph 2.23 - 2.25);

b) review and endorse the new MMR provided in **the Attachment** for applicability in Asia/Pacific region;

c) consider to have State CAAs liaise with State Aircraft operators (e.g. military units) regarding the verification process and status of RVSM approvals in order to prevent their flight plans from being rejected by EUROCONTROL (paragraph 2.23 - 2.25);

i) for States that have RVSM approval processes for State Aircraft equivalent to civil aircraft's, State CAAs are encouraged to share State Aircraft's approval data or confirming the approval status upon queried by the designated RMA;

ii) for all aircraft and operators with no RVSM approvals, State CAAs should communicate with the operators to not file ‘W’ in item 10 of the ICAO Flight Plan; and

d) discuss any other relevant matters as appropriate.

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RVSM MONITORING GROUPS AND MINIMUM MONITORING REQUIREMENTS

AS OF: 7 August 2020

Version: 2020.1

1. UPDATE OF MONITORING REQUIREMENTS TABLE AND WEBSITE. As significant data is obtained, monitoring requirements for specific aircraft types may change. When Table 1 below, is updated, a letter will be distributed by the Regional Monitoring Agencies (RMAs) to the States concerned. The updated table will be posted on the RMA website being maintained by the International Civil Aviation Organization (ICAO). The secure website address is: http://portal.icao.int

2. INITIAL MONITORING. All operators that operate or intend to operate in airspace where RVSM is applied are required to participate in the RVSM monitoring program. Table 1 establishes requirements for initial monitoring associated with the RVSM approval process. In their application to the appropriate State authority for RVSM approval, operators must show a plan for meeting the applicable initial monitoring requirements.

3. AIRCRAFT STATUS FOR MONITORING. Aircraft engineering work that is required for the aircraft to receive RVSM airworthiness approval must be completed prior to the aircraft being monitored. Any exception to this rule will be coordinated with the State authority.

4. APPLICABILITY OF MONITORING FROM OTHER REGIONS. Monitoring data obtained in conjunction with RVSM monitoring programs from other regions can be used to meet regional monitoring requirements. The RMAs, which are responsible for administering the monitoring program, have access to monitoring data from other regions and will coordinate with States and operators to inform them on the status of individual operator monitoring requirements.

5. MONITORING PRIOR TO THE ISSUE OF RVSM OPERATIONAL APPROVAL IS NOT A REQUIREMENT. Operators should submit monitoring plans to the responsible civil aviation authority and the RMA that show how they intend to meet the requirements specified in Table1. Monitoring will be carried out in accordance with this table.

6. AIRCRAFT GROUPS NOT LISTED IN TABLE 1. Contact the RMA for clarification if an aircraft group is not listed in Table 1 or for clarification of other monitoring related issues. An aircraft group not listed in Table 1 will probably be subject to Category 2 monitoring requirements.

7. TABLE OF MONITORING GROUPS. Table 2 shows the aircraft types and series that are grouped together for operator monitoring purposes.

8. TABLE OF NON-GROUP AIRCRAFT: Table 3 shows the aircraft types and series that are Non-Group aircraft (i.e., Not certified under group approval requirements) for monitoring purposes.

9. TRAILING CONE DATA. Altimetry System Error estimations developed using Trailing Cone data collected during RVSM certification flights can be used to fulfill monitoring requirements. It must be documented, however, that aircraft RVSM systems were in the approved RVSM configuration for the flight.

10. MONITORING OF AIRFRAMES THAT ARE RVSM COMPLIANT ON DELIVERY. If an operator adds new RVSM compliant airframes of a type for which it already has RVSM operational approval and has completed monitoring requirements for the type in accordance with the attached table, the new airframes are not required to be monitored. If an operator adds new RVSM compliant airframes of an aircraft type for which it has NOT previously received RVSM operational approval, then the operator should complete monitoring in accordance with the attached table.

11. FOLLOW-ON MONITORING. Monitoring is an on-going program that will continue after the RVSM approval process. Long term minimum monitoring requirements are established in the Annex 6 to the Convention on International Civil Aviation. On a regional basis, a programme shall be instituted for monitoring the height-keeping performance of aircraft operating in RVSM airspace in order to ensure that continued application of this vertical separation minimum meets regional safety objectives.

Table 1: MONITORING REQUIREMENTS TABLE (Civilian)

MONITORING IS REQUIRED IN ACCORDANCE WITH THIS TABLE

MONITORING PRIOR TO THE ISSUE OF RVSM APPROVAL IS **NOT** A REQUIREMENT

CATEGORY		GROUP DESCRIPTOR	MINIMUM MONITORING REQUIREMENTS
1	GROUP APPROVED: DATA INDICATES COMPLIANCE WITH THE RVSM MASPS	A124, A30B, A306, A310-GE, A310-PW, A318, A320, A330, A340, A345, A346, A380, A3ST, AVRO, B712, B727, B737C, B737CL, B737NX, B747CL, B74S, B744-5, B744-10, B748, B752, B753, B764, B767, B772, B773, B787, BD100, BE40, C25A, C25B, C510, C525, C560, C56X, C650, C680, C750, CARJ, CL600, CL604, CL605, CRJ7, CRJ9, DC10, E135-145, E170-190, E50P, E55P, F100, F900, FA7X, GALX, GLEX, GL5T, GLF4, GLF5, H25B-800, J328, LJ40, LJ45, LJ60, MD10, MD11, MD80, MD90, PC12, PRM1, T154	Operators of aircraft types contained in this category shall have a minimum of 2 airframes monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring. Operators with fleets consisting of aircraft from more than one Monitoring Group shall meet this requirement for each group in the fleet. In the event that an operator has a single airframe from a Group, then that aircraft shall be monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring.
2	GROUP APPROVED: INSUFFICIENT DATA ON APPROVED AIRCRAFT	Other group aircraft other than those listed above including: A148, A158, A20N, A337, A339, A350, A35K, AC90, AC95, AJ27, AN72, ASTR, ASTR-SPX, B701, B703, B731, B732, B37M, B38M, B39M, B744-LCF, B779, B78X, BCS1, BE20, BE30, C25C, C441, C500, C550-B, C550-II, C550-SII, C700, CRJ10, D328, DC85, DC86-87, DC91, DC93, DC94, DC95, EPIC, E120, E45X, EA50, E545-550, E290, E295, F2TH, F70, FA10, FA20, FA50, G150, G280, GL7T, GLF2, GLF2B, GLF3, GLF6, GLF7, H25B-700, H25B-750, H25C, HA4T, HDJT, IL62, IL76, IL86, IL96, L101, L29B-2, L29B-731, LJ23, LJ24, LJ25, LJ28, LJ31, LJ35-36, LJ55, MC21, MU30, P180, P180-II, PAY4, PC24, SB20, SBR1, SBR2, SF50, SU95, T134, T204, T334, TBM, WW24, YK42	Operators of aircraft types contained in this category shall have a minimum of 60% of airframes monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring, (the number of airframes to be monitored shall be rounded up to the nearest whole integer). Operators with fleets consisting of aircraft from more than one Monitoring Group shall meet this requirement for each Group in the fleet.

3	NON-GROUP	Aircraft types for which no generic compliance method exists: A225, AN12, AN26, B190, B462, B463, B74S-SOFIA, BA11, BE9L, GSPN, H25A, L29A, PAY3, R721, R722, SJ30, STAR	Operators of aircraft types contained in this category shall have 100% of airframes monitored every 2 years or 1,000 flight hours., whichever is longer calculated from the date of the last successful height monitoring.

Table 2: **MONITORING GROUPS FOR AIRCRAFT CERTIFIED UNDER GROUP APPROVAL REQUIREMENTS**

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
A124	A124	AN-124 RUSLAN	
A148	A148	AN-148	
A158	A158	AN-158	
A30B	A30B	A300	
A306	A306	A300	
A310-GE	A310	A310	Series: 200, 200F, 300, 300F
A310-PW	A310	A310	Series: 220, 220F, 320, 320F
A318	A318	A318	
A320	A319	A319	
	A320	A320	
	A321	A321	
A20N	A19N	A319neo	
	A20N	A320neo	
	A21N	A321neo	
	A21N	A321LR	
	A21N	A321XLR	
A330	A332	A330	
	A333	A330	
A337	A337	AIRBUS BELUGA XL (A330-743L)	
A339	A339	A330-900neo	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
A340	A342 A343	A340 A340	
A345	A345	A340	
A346	A346	A340	
A350	A359	A350-900 A350-900 ULR	
A35K	A35K	A350-1000	
A380	A388	A380	
A3ST	A3ST	A300	600R ST BELUGA
AC90	AC90	COMMANDER 690 COMMANDER 840 COMMANDER 900	
AC95	AC95	AERO COMMANDER 695	
AN72	AN72 AN74	ANTONOV AN-72 ANTONOV AN-74	
ASTR	ASTR	1125 ASTRA	S/n 1-78, except 73
ASTR-SPX	ASTR	1125 ASTR SPX, G100	S/n 73, 79-145 S/n > 145
AVRO	RJ1H RJ70 RJ85	RJ100 Avroliner RJ70 Avroliner RJ85 Avroliner	
B37M	B37M	Boeing 737 MAX 7	
B38M	B38M	Boeing 737 MAX 8	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
B39M	B39M	Boeing 737 MAX 9	
B701	B701	B707	
B703	B703	B707	Series 320, 320B, 320C
B712	B712	B717	
B727	B721	B727	
	B722	B727	
B731	B731	B737	
B732	B732	B737	
B737CL	B733	B737-300	
	B734	B737-400	
	B735	B737-500	
B737NX	B736	B737-600	
	B737	B737-700	B737-700 including the BBJ
	B738	B737-800	B737-800 including the BBJ2
	B739	B737-900	
	B739	B737-900ER	
B737C	B737	B737-700	Series: 700C
B747CL	B741	B747-100	
	B742	B747-200	
	B743	B747-300	
B74S	B74S	B747SP	
	B74R	B747SR	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
B744-5	B744 B74D	B747-400	5 inch Probes up to s/n 25350
B744-10	B744 B74D	B747-400	10 inch Probes from s/n 25351
B744-LCF	BLCF	B747-400	
B748	B748	B747-8	
B752	B752	B757-200	
B753	B753	B757-300	
B767	B762 B763	B767-200 B767-300	
B764	B764	B767-400	
B772	B772 B772 B77L B77L	B777-200 B777-200ER B777-F B777-200LR	
B773	B773 B77W	B777-300 B777-300ER	
B779	B779	B777-9	
B787	B788 B789	B787-8 B787-9	
B78X	B78X	B787-10	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
BCS1	BCS1	BOMBARDIER CS100	
	BCS1	AIRBUS A220-100	
	BCS3	BOMBARDIER CS300	
	BCS3	AIRBUS A220-300	
BD100	CL30	CHALLENGER 300	
	CL35	CHALLENGER 350	Begins at s/n 20501
BE20	BE20	200 KINGAIR	
BE30	BE30	B300 SUPER KINGAIR	
	B350	B300 SUPER KINGAIR 350	
BE40	BE40	BEECHJET 400	
		BEECHJET 400A	
		BEECHJET 400XP	
		HAWKER 400XP	
C441	C441	CONQUEST II	
C500	C500	500 CITATION	
	C500	500 CITATION I	
	C501	501 CITATION I SINGLE PILOT	
C510	C510	MUSTANG	
C525	C525	525 CITATIONJET	
		525 CITATIONJET 1	
		525 CITATIONJET PLUS	
	C25M	C525-M2	S/n 800 and on
C25A	C25A	525A CITATIONJET II	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
C25B	C25B	CITATIONJET III 525B CITATIONJET III	
C25C	C25C	525C CITATIONJET IV	
C550-B	C55B	550 CITATION BRAVO	S/n 550-0801 and on
C550-II	C550 C551	550 CITATION II 551 CITATION II SINGLE PILOT	S/n 550-0001 to 550-0800
C550-SII	C550	S550 CITATION SUPER II	S/n starts with “S”
C560	C560	560 CITATION V 560 CITATION V ULTRA 560 CITATION V ENCORE 560 CITATION V ENCORE PLUS	
C56X	C56X	560 CITATION EXCEL 560 CITATION XLS 560 CITATION XLS PLUS	
C650	C650	650 CITATION III 650 CITATION VI 650 CITATION VII	
C680	C680 C68A	680 CITATION SOVEREIGN 680-A LATITUDE	 “A” in s/n
C700	C700	700 CITATION LONGITUDE	
C750	C750	750 CITATION X	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
CARJ	CRJ1	CRJ-100	
	CRJ2	CRJ-200	
	CRJ2	CRJ-440	
	CRJ2	CHALLENGER 800	
	CRJ2	CHALLENGER 850	
CRJ7	CRJ7	CRJ-700	
	CRJ7	CRJ-550	
CRJ9	CRJ9	CRJ-705	
	CRJ9	CRJ-900	
CRJ10	CRJX	CRJ-1000	
CL600	CL60	CL-600	S/n < 5000
		CL-601	
CL604	CL60	CL-604	S/n 5000-5700
		CL-601-3A	S/n 5001-5134
		CL-601-3R	S/n 5135-5300
CL605	CL60	CL-605	S/n > 5700
	CL60	CL-650	
DC10	DC10	DC-10	
D328	D328	328 TURBOPROP	
DC85	DC85	DC-8	
DC86-87	DC86	DC-8	
	DC87	DC-8	
DC91	DC91	DC-9	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
DC93	DC93	DC-9	
DC94	DC94	DC-9	
DC95	DC95	DC-9	
EPIC	EPIC	Epic E1000	
E120	E120	EMB-120 Brasilia	
E135-145	E135 E145 E35L	EMB-135 EMB-145 EMB-135BJ Legacy 600/650	
E45X	E45X	EMB-145 XR	
E170-190	E170 E170 E75S E75L E190 E190	E170 E175 E170-200 short wing E175 long wing E190 E195	
E290	E290	E190-E2	
E295	E295 E295	E195-E2 E190-400	
E50P	E50P	PHENOM 100	
E545-550	E545 E545 E550 E550	EMB-545 LEGACY 450 EMB-545 PRAETOR 500 EMB-550 LEGACY 500 EMB-550 PRAETOR 600	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
E55P	E55P	PHENOM 300	
EA50	EA50	ECLIPSE	
F100	F100	FOKKER 100	
F2TH	F2TH	FALCON 2000 FALCON 2000-EX FALCON 2000LX FALCON 2000-LXS FALCON 2000-S	
F70	F70	FOKKER 70	
F900	F900	FALCON 900 FALCON 900DX FALCON 900EX FALCON 900LX	
FA10	FA10	FALCON 10	
FA20	FA20	FALCON 20 FALCON 200	
FA50	FA50	FALCON 50 FALCON 50EX	
FA7X	FA7X FA8X	FALCON 7X FALCON 8X	
G150	G150	G150	
G280	G250 G280	G250 G280	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
GALX	GALX	1126 GALAXY G200	
GLEX	GLEX	GLOBAL EXPRESS CLASSIC GLEX GLOBAL XRS GLOBAL 6000 GLOBAL 6500	EXPRESS S/n > 9158 S/n > 9431, and 9313 and 9381 S/n > 60001
GL5T	GL5T	GLOBAL 5000 GLOBAL 5000-GVFD GLOBAL 5500	 S/n > 9434, and 9386 and 9401 S/n > 60001
GL7T	GL7T	GLOBAL 7500	
GLF2	GLF2	GULFSTREAM II (G-1159)	
GLF2B	GLF2	GULFSTREAM IIB (G-1159B)	
GLF3	GLF3	GULFSTREAM III (G-1159A)	
GLF4	GLF4	GULFSTREAM IV (G-1159C) G300 G350 G400 G450	
GLF5	GLF5	GULFSTREAM V (G-1159D) G500 G550	
GLF6	GLF6	G650	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
GLF7	GA5C	G500 GVII	
	GA6C	G600 GVII	
H25B-700	H25B	BAE 125 / HS125	Series: 700A, 700B
H25B-750	H25B	HAWKER 750	
H25B-800	H25B	BAE 125 / HS125	Series: 800A, 800B
		HAWKER 800XP	
		HAWKER 800XPI	
		HAWKER 800	
		HAWKER 850XP	
		HAWKER 900XP	
		HAWKER 950XP	
H25C	H25C	HAWKER 1000	
HA4T	HA4T	HAWKER 4000	
HDJT	HDJT	HONDAJET HA-420	
IL62	IL62	ILYUSHIN-62	
IL76	IL76	ILYUSHIN-76	
IL86	IL86	ILYUSHIN-86	
IL96	IL96	ILYUSHIN-96	
J328	J328	328JET	
L101	L101	L-1011 TRISTAR	
L29B-2	L29B	L-1329 JETSTAR II	
L29B-731	L29B	L-1329 JETSTAR 731	
LJ23	LJ23	LEARJET 23	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
LJ24	LJ24	LEARJET 24	
LJ25	LJ25	LEARJET 25	
LJ28	LJ28	LEARJET 28 LEARJET 29	
LJ31	LJ31	LEARJET 31	
LJ35-36	LJ35	LEARJET 35, 35A LEARJET 36, 36A	
LJ40	LJ40 LJ70	LEARJET 40 LEARJET 70	Begins at s/n 2001 Begins at s/n 2134
LJ45	LJ45 LJ75	LEARJET 45 LEARJET 75	 Begins at s/n 456
LJ55	LJ55	LEARJET 55	
LJ60	LJ60	LEARJET 60	
MC21	MC21	IRKUT MC21-300	
MD10	MD10	MD-10	
MD11	MD11	MD-11	
MD80	MD81 MD82 MD83 MD87 MD88	MD-80 MD-80 MD-80 MD-80 MD-80	
MD90	MD90	MD-90	
MU30	MU30	MU-300 DIAMOND	1A

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
P180	P180	P-180 AVANTI	S/n < 1105 but not 1002
P180-II	P180 P180	P-180 AVANTI II P-180 AVANTI EVO	S/n > 1104 and also 1002
PAY4	PAY4	PA-42 Cheyenne 400	Series: 1000 CHEYENNE
PC12	PC12	Pilatus PC-12	
PC24	PC24	Pilatus PC-24	
PRM1	PRM1	PREMIER 1	
SB20	SB20	SAAB 2000	
SBR1	SBR1	SABRELINER 40 SABRELINER 60 SABRELINER 65	
SBR2	SBR2	SABRELINER 80	
SF50	SF50	CIRRUS SF50	RVSM-capable s/n 8, 89, and 94 or above
SU95	SU95	SUKHOI SUPERJET 100-95	
T134	T134	TU-134	
T154	T154	TU-154	
T204	T204	TU-204 TU-214 TU-224 TU-234	
T334	T334	TU-334	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
TBM	TBM7 TBM8 TBM9	TBM-700 TBM-850 TBM-900	 TBM8 with winglets, begins at s/n 1000
WW24	WW24	1124 WESTWIND	
YK42	YK42	Yakovlev YAK-42 Yakovlev YAK-40	

Table 3: Non-GROUP AIRCRAFT (i.e., Not certified under group approval requirements) (Civilian)

Non-Group Descriptor	A/C ICAO	Manufacturer Type	Additional Defining Criteria
A225	A225	ANTONOV AN-225	Non-Group
AN12	AN12	ANTONOV AN-12	Non-Group
AN26	AN26	ANTONOV AN-26	Non-Group
B190	B190	BEECH 1900	Non-Group
B462	B462	BAe-146-200	Non-Group
B463	B463	BAe-146-300	Non-Group
B74S-SOFIA	B74S	NASA B74SP with Sofia telescope	Non-Group: N747NA (s/n 21441)
BA11	BA11	BAC-111	Non-Group
BE9L	BE9L	Beechcraft King Air C90GT Beechcraft King Air C90GTI King Air Model 90 except F90 and F90-1	Non-Group
GSPN	GSPN	GROB G-180 SPn Utility Jet	Non-Group

Non-Group Descriptor	A/C ICAO	Manufacturer Type	Additional Defining Criteria
H25A	H25A	HS125-400, -600	Non-Group
L29A	L29A	L-1329 JETSTAR 6/8	Non-Group
PAY3	PAY3	PIPER Cheyenne 3	Non-Group
R721	R721	B-727-100: Re-engined	Non-Group
R722	R722	B-727-200: Re-engined	Non-Group
SJ30	SJ30	SWEARINGEN SJ-30	Non-Group
STAR	STAR	BEECH 2000 STARSHIP	Non-Group

Table 1: MONITORING REQUIREMENTS TABLE (Military)

MONITORING IS REQUIRED IN ACCORDANCE WITH THIS TABLE

MONITORING PRIOR TO THE ISSUE OF RVSM APPROVAL IS **NOT** A REQUIREMENT

CATEGORY		GROUP DESCRIPTOR	MINIMUM MONITORING REQUIREMENTS
1	GROUP APPROVED: DATA INDICATES COMPLIANCE WITH THE RVSM MASPS	C17, C130, KC135	Operators of aircraft types contained in this category shall have a minimum of 2 airframes monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring. Operators with fleets consisting of aircraft from more than one Monitoring Group shall meet this requirement for each group in the fleet. In the event that an operator has a single airframe from a Group, then that aircraft shall be monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring.
2	GROUP APPROVED: INSUFFICIENT DATA ON APPROVED AIRCRAFT	Other group aircraft other than those listed above including: A178, A400, C5, C550-552, E3, F18, KC46, KC39, P1, P8	Operators of aircraft types contained in this category shall have a minimum of 60% of airframes monitored every 2 years or 1,000 flight hours, whichever is longer calculated from the date of the last successful height monitoring, (the number of airframes to be monitored shall be rounded up to the nearest whole integer). Operators with fleets consisting of aircraft from more than one Monitoring Group shall meet this requirement for each Group in the fleet.

3	NON-GROUP	**Aircraft types for which no generic compliance method exists:** GLF5-AEW, GLEX-ASTOR **Aircraft types for which the compliance method is not known:** A30B-M, A310-M, A332-M, ASTR-M, B737-AWACS, C12, C21, C32, C35, C37, C40, C550-B-M, C9, CL60-M, E135-M, E4, E6, E8, E530, FA10-M, FA20-M, FA50-M, GLF3-M, GLF4-M, IL76-M, KC10, KC-390, KC46, P180-M, R135, VC25	Operators of aircraft types contained in this category shall have 100% of airframes monitored every 2 years or 1,000 flight hours., whichever is longer calculated from the date of the last successful height monitoring.

Table 2: MONITORING GROUPS FOR AIRCRAFT CERTIFIED UNDER GROUP APPROVAL REQUIREMENTS (Military)

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
A178	A178	Antonov A178	
A30B-M	A30B	A300	B2-100 (Zero-G)
A310-M	A310	A310	MRT, MRTT
A332-M	A332	KC30-A KC45-A Voyager KC2, KC3	MRTT
A400	A400	A400M	
ASTR-M	ASTR	1125 ASTRA	NAV&COM
C12	BE20	C-12	
C130	C130	C-130 Hercules	Series: H only
	C30J	C-130J Hercules	
C17	C17	C-17 Globemaster III	
C21	LJ35	C-21	
C32	B752	C-32	Series: A, B
C40	B737	C-40 Clipper	
C5	C5	C5 Galaxy	
C550-552	C550	552 CITATION II (USN)	
C550-B-M	C550	550 CITATION BRAVO	
C550-M	C550	550 CITATION II	
C35	C560	560 CITATION V	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
		UC-35	
C37	GLF5	C-37 TP102D	Series: A, B Series: C
CL60-M	CL60	CL604	MPA
E135-M	E135	EMB-135	MRT
E3	E3TF E3CF	E-3 Sentry	
E4	B742	E-4	
E6	E6	E-6 Mercury	
B737-AWACS	E7A	B737	B737 AEW&C
E8	B703	E-8 J-Stars	
E530	E530	TEXTRON AIRLAND SCORPION	
FA10-M	FA10	FALCON 10	MRT
FA20-M	FA20	FALCON 20	EW/ELINT, MRT, EXP
FA50-M	FA50	FALCON 50	MPA/SAR
F18H	F18H	McDonnell-Douglas F/A 18 F/A-18 Hornet	
GLF3-M	GLF3	C-20	Series: A, B, C, D, E
GLF4-M	GLF4	C-20 S102B TP102	Series: F, G, H
IL76-M	IL76	IL-76	MRT, T
KC10	DC10	KC-10 Extender	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
		KDC-10 DC-10	
KC46	KC46	Boeing KC46 Boeing KC-46 Pegasus Boeing KC46A or B767-2C	
KC135	B703 K35E K35R	KC-135 Stratotanker KC-135 Stratotanker C-135 Stratotanker	
KC39	KC39	Embraer KC390	
P1	P1	Kawasaki P-1	
P180-M	P180	P-180 AVANTI	
P8	P8	B738-ERX	BOEING P8 POSEIDON
R135	R135	RC-135	
VC25	B742	VC-25	

Abbreviations:

EW/ELINT	Electronic Warfare/Electronic Intelligence
EXP	Experimental
MPA	Maritime Patrol Aircraft
MRT	Multi Role Transporter
MRTT	Multi Role Transporter and Tanker
SAR	Search and Rescue
T	Transporter

Table 3: Non-GROUP AIRCRAFT (i.e., Not certified under group approval requirements) (Military)

Non-Group Descriptor	A/C ICAO	Manufacturer Type	Additional Defining Criteria
GLEX-ASTOR	GLEX	Raytheon Sentinel aka RAF's ASTOR (Airborne Stand-Off Radar)	Non-Group
GLF5-AEW	GLF5	GULFSTREAM G550	Non-Group : AEW

Abbreviations:

AEW Airborne Early Warning