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Agenda Item 5: Other Business

EMBRAER ANALYSIS THROUGH FOR MONITORING GROUP E135-145

(Presented by CARSAMMA)

EXECUTIVE SUMMARY	
This information paper presents the results of the monitoring of the EMBRAER E135-145 aircraft group, revealing that the E35L model did not meet RVSM requirements. EMBRAER's analysis resulted in the reclassification of its aircraft into four distinct groups (E135-145, E45X, E135BJ1 and E135BJ2) in the most up-to-date version of the MMR document.	
<i>Strategic Objectives:</i>	<ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency
<i>References:</i>	<ul style="list-style-type: none">• DOC 9937 – Operating Procedures and Practices for Regional Monitoring Agencies in Relation to the Use of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive.• WP/19 (RMACG/19), Montreal, Canada, 11 - 14 June 2024.• MMR Version: 2024.1

1. Introduction

1.1 The airworthiness requirements for operations in RVSM space in Annex 6 specify that for a group of airplanes of identical design, the sum of the mean Altimeter System Error (ASE) and three standard deviations (SD) of ASE should not exceed 245 ft, as outlined in the DOC 9937.

2. Analysis

2.1 In the RMACG/18, the WP/07 presented its monitoring results for monitoring group E135-145 obtained by RMA EURASIA in 2022. This monitoring group comprises three aircraft types: E135, E145 and E35L, all manufactured by EMBRAER.

2.2 The results indicated that monitoring group E135-145 and/or aircraft type E35L failed to meet the requirements outlined in Annex 6 regarding the Altimeter System Error (ASE) and three standard deviations (SD). Consequently, in the same working paper, EURASIA proposed that all Regional Monitoring Agencies (RMAs) estimate the ASE+3*SD for monitoring group E135-145 and its aircraft types using their available ASE measurements and provide a collective estimate. This estimate will be reviewed at the next RMACG meeting, where a decision will be made regarding the necessity for a joint appeal to both the manufacturer and the States.

2.3 As foreseen in paragraph 2.2.23 d) of Doc 9937, RMAs shall inform the state authority and the manufacturer of observed inadequate ASE performance. CARSAMMA, using a cooperative approach, notified the manufacturer regarding the issues EURASIA had reported.

2.4 Subsequently, EMBRAER conducted a detailed analysis, revealing potential discrepancies in the original monitoring group classification. The data showed that the E35L aircraft exhibited distinct behaviour compared to other aircraft in the E135-145 group, suggesting the existence of two separate groups instead of one. Introducing new Air Data Computer (ADC) part numbers and installations in the E35L fleet, accompanied by a new Static Source Error Correction (SSEC), has influenced the observed fleet behaviour.

2.5 Further data from monitoring agencies was deemed necessary to characterize the observed issue fully. RMA EURASIA provided additional data in September 2023, while NAARMO/PARMO submitted data in April 2024. Considering the data provided, EMBRAER's initial analysis confirmed the presence of two distinct groups within the E35L fleet.

2.6 Based on the RVSM MONITORING GROUPS AND MINIMUM MONITORING REQUIREMENTS (**Appendix**) AS OF 6 April 2023, version: 2023.1, the E135-145 and E45X are distributed into two distinct groups. EMBRAER has concluded that four MMR distinct groups should exist instead of the current two, which implied in an update the RVSM Monitoring Groups and Minimum Monitoring Requirements. The updated group classification is designed to address these discrepancies and ensure accurate monitoring of RVSM altitude-keeping performance. According to EMRAER's findings, the proposed groups are as follows:

- a) Group E135-145: This group covers all EMB-135, EMB-140, and EMB-145 aircraft models; the group would be updated by adding the EMB-140.
- b) Group E45X: Covers all EMB-145XR aircraft models and maintains the same characteristics as the current RVSM MMR table.
- c) Group E135BJ1: Covers all EMB-135BJ aircraft except those specified in Group E135BJ2.
- d) Group E135BJ2: Covers EMB-135BJ S/N 586, 1144, 1193, 1219, 1220, 1223 thru 1227, 1229 and on; and any other A/C that incorporates Service Bulletin SB145LEG-34-0039.

2.7 The Regional Monitoring Agencies Coordination Group endorsed the proposal to redefine aircraft into four distinct groups in the most up-to-date version of the RVSM MONITORING GROUPS AND MINIMUM MONITORING REQUIREMENTS AS OF 14 June 2024, version: 2024.1.

RVSM MONITORING GROUPS AND MINIMUM MONITORING REQUIREMENTS**AS OF: 14 June 2024****Version: 2024.1**

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 Table 1. 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)

<p style="color: blue; font-weight: bold;">MONITORING IS REQUIRED IN ACCORDANCE WITH THIS TABLE</p> <p style="font-weight: bold;">MONITORING PRIOR TO THE ISSUE OF RVSM APPROVAL IS <u>NOT</u> A REQUIREMENT</p>			
CATEGORY	GROUP DESCRIPTOR	MINIMUM MONITORING REQUIREMENTS	
1	<p>GROUP APPROVED: DATA INDICATES COMPLIANCE WITH THE RVSM MASPS</p>	<p>A124, A20N, A30B, A306, A310-GE, A310-PW, A318, A320, A330, A339, A340, A345, A346, A350, A380, A3ST, AVRO, B38M, B39M, B712, B727, B737C, B737CL, B737NX, B747CL, B74S, B744-5, B744-10, B748, B752, B753, B764, B767, B772, B773, B787, B78X, BCS1, BD100, BE40, C25A, C25B, C25C, C510, C525, C550-B, C560, C56X, C650, C680, C750, CARJ, CL600, CL604, CL605, CRJ7, CRJ9, CRJ10, DC10, E135-145, E135BJ1, E135BJ2, E170-190, E290, E295, E545-550, E50P, E55P, F100, F2TH, F900, FA7X, GALX, GLEX, GL5T, GL7T, GLF4, GLF5, GLF6, GLF7, H25B-800, J328, LJ35-36, LJ40, LJ45, LJ60, MD10, MD11, MD80, MD90, PC12, PC24, PRM1, T154, TBM</p>	<p>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.</p>
2	<p>GROUP APPROVED: INSUFFICIENT DATA ON APPROVED AIRCRAFT</p>	<p>Other group aircraft other than those listed above including: A148, A158, A321XLR, A337, AC90, AC95, AJ27, AN72, ASTR, ASTR-SPX, B701, B703, B731, B732, B744-LCF, BE20, BE30, C441, C500, C550-II, C550-SII, C700, C919, D328, DC85, DC86-87, DC91, DC93, DC94, DC95, EPIC, E120, E45X, EA50, F70, FA10, FA20, FA50, G150, G280, GLF2, GLF8, GLF2B, GLF3, H25B-700, H25B-750, H25C, HA4T, HDJT, IL62, IL76, IL86, IL96, L101, L29B-2, L29B-731, LJ23, LJ24, LJ25, LJ28, LJ31, LJ55, MC21, MU30, PA46, P180, P180-II, PAY4, SB20, SBR1, SBR2, SF50, SU95, T134, T204, T334, WW24, YK42</p>	<p>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.</p>
3	<p>NON-GROUP</p>	<p>Aircraft types for which no generic compliance method exists: A225, AN12, AN26, B190, B462, B463, B74S-SOFIA, BA11, BE9L, FA6X, GSPN, H25A, L29A, PAY3, R721, R722, SJ30, STAR</p>	<p>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.</p>

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 A320 A321	A319 A320 A321	
A321XLR	A21N A21N	A321XLR A321neo XLR	
A20N	A19N A20N A21N A21N	A319neo A320neo A321neo A321LR	
A330	A332 A333	A330 A330	
A337	A337	AIRBUS BELUGA XL (A330-743L)	
A339	A339 A338	A330-900neo A330-800neo	
A340	A342 A343	A340 A340	
A345	A345	A340	
A346	A346	A340	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
A350	A359	A350-900	
	A359	A350-900 ULR	
	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	
AJ27	AJ27	ARJ21-700	
AN72	AN72	ANTONOV AN-72	
	AN74	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	RJ100 Avroliner	
	RJ70	RJ70 Avroliner	
	RJ85	RJ85 Avroliner	
B38M	B38M	Boeing 737 MAX 8	
	B38M	B737-MAX8-200	
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	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
B737CL	B733 B734 B735	B737-300 B737-400 B737-500	
B737NX	B736 B737 B738 B739 B739	B737-600 B737-700 B737-800 B737-900 B737-900ER	B737-700 including the BBJ B737-800 including the BBJ2
B737C	B737	B737-700	Series: 700C
B747CL	B741 B742 B743	B747-100 B747-200 B747-300	
B74S	B74S B74R	B747SP B747SR	
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	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
B773	B773	B777-300	
	B77W	B777-300ER	
B787	B788	B787-8	
	B789	B787-9	
B78X	B78X	B787-10	
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	
C919	C919	COMAC C919	
CARJ	CRJ1 CRJ2 CRJ2 CRJ2 CRJ2	CRJ-100 CRJ-200 CRJ-440 CHALLENGER 800 CHALLENGER 850	
CRJ7	CRJ7 CRJ7	CRJ-700 CRJ-550	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
CRJ9	CRJ9 CRJ9	CRJ-705 CRJ-900	
CRJ10	CRJX	CRJ-1000	
CL600	CL60	CL-600 CL-601	S/n < 5000
CL604	CL60	CL-604 CL-601-3A CL-601-3R	S/n 5000-5700 S/n 5001-5134 S/n 5135-5300
CL605	CL60 CL60	CL-605 CL-650	S/n > 5700
DC10	DC10	DC-10	
D328	D328	328 TURBOPROP	
DC85	DC85	DC-8	
DC86-87	DC86 DC87	DC-8 DC-8	
DC91	DC91	DC-9	
DC93	DC93	DC-9	
DC94	DC94	DC-9	
DC95	DC95	DC-9	
EPIC	EPIC	Epic E1000	
E120	E120	EMB-120 Brasilia	
E135-145	E135 E135 E145	EMB-135 EMB-140 EMB-145	Does not contain any EMB-135BJ (E35L) aircraft
E135BJ1	E35L	EMB-135BJ Legacy 600/650	All EMB-135BJ aircraft, except those in E135BJ2

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
E135BJ2	E35L	EMB-135BJ Legacy 600/650	EMB-135BJ aircraft with S/n 586, 1144, 1193, 1219, 1220, 1223 thru 1227, 1229 and on; Any other EMB-135BJ that incorporates Service Bulletin SB145LEG-34-0039.
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	
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	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
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	
GALX	GALX	1126 GALAXY G200	
GLEX	GLEX	GLOBAL EXPRESS CLASSIC GLEX GLOBAL XRS GLOBAL 6000 GLOBAL 6500	BD700 (BD-700-1A10) S/n > 9158 S/n > 9431, and 9313 and 9381 S/n > 60001
GL5T	GL5T	GLOBAL 5000 GLOBAL 5000-GVFD GLOBAL 5500	BD700 (BD-700-1A11) 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)	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
GLF4	GLF4	GULFSTREAM IV (G-1159C) G300 G350 G400 G450	
GLF5	GLF5	GULFSTREAM V (G-1159D) G500 G550	
GLF6	GLF6	G650	
GLF7	GA5C GA6C	G500 GVII G600 GVII	
GLF8	GA7C	G700 GVIII	Begins at s/n 87001
H25B-700	H25B	BAE 125 / HS125	Series: 700A, 700B
H25B-750	H25B	HAWKER 750	
H25B-800	H25B	BAE 125 / HS125 HAWKER 800XP HAWKER 800XPI HAWKER 800 HAWKER 850XP HAWKER 900XP HAWKER 950XP	Series: 800A, 800B
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	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
L101	L101	L-1011 TRISTAR	
L29B-2	L29B	L-1329 JETSTAR II	
L29B-731	L29B	L-1329 JETSTAR 731	
LJ23	LJ23	LEARJET 23	
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
PA46	PA46	PA46-500TP PA46-600TP	

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	
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
FA6X	FA6X	Falcon 6X	Non-Group
GSPN	GSPN	GROB G-180 SPn Utility Jet	Non-Group
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, KC2, 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	<p>Aircraft types for which no generic compliance method exists:</p> <p>GLF5-AEW, GLEX-ASTOR</p> <hr/> <p>Aircraft types for which the compliance method is not known:</p> <p>A30B-M, A310-M, A332-M, ASTR-M, B737-AWACS, BE30, C12, C21, C32, C35, C37, C40, C550-B-M, C9, CL60-M, E135-M, E4, E6, E8, E530, EGRT, FA10-M, FA20-M, FA50-M, GLF3-M, GLF4-M, IL76-M, KC10, KC-390, KC46, P180-M, R135, VC25</p>	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	
		UC-35	
C37	GLF5	C-37	Series: A, B
		TP102D	Series: C
CL60-M	CL60	CL604	MPA
E135-M	E135	EMB-135	MRT
E3	E3TF	E-3 Sentry	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
	E3CF		
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
KC2	KC2	KAWASAKI KC2 C-2 RC-2 XC-2	
KC10	DC10	KC-10 Extender 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	

Monitoring Group	A/C ICAO	Manufacturer Type	Additional Defining Criteria
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