INTERNATIONAL CIVIL AVIATION ORGANIZATION

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP
SEVENTEENTH MEETING (APIRG/17)
(Burkina Faso, 2 to 6 August 2010)

Agenda Item 3.4, 5 : ARMA RVSM Monitoring Report

Presented By: AFI Regional Monitoring Agency (ARMA)

SUMMARY:

This Working Paper Presents the Mandatory AFI RVSM Monitoring Report to APIRG Containing an Overview of the Five Key Performance Areas as well as the recently completed Post Operational Safety Case.

1. INTRODUCTION

1.1 The ARMA on behalf of ICAO and mandated by APIRG, is tasked to conduct five primary functions, (Key Performance Areas), and report the results appropriately to APIRG, as documented in the ICAO RMA Manual, Doc 9574 and in other relevant ICAO provisions. Together with this a brief overview of the Post Operational Safety Case is provided.

1.2 The paper presents the status of RVSM in the AFI Region twenty two months after implementation.

1.3 A power point presentation will ensure that the salient facts are adequately portrayed.

1.4 Throughout the paper the meeting should recall the Commitment that all AFI participating States made to support RVSM when authorizing their RVSM National Safety Plans (NSP's).

1.5 Further to this the meeting should recall Recommendation 6/8 documented at the Special AFIRAN 8 meeting in 2008. The recommendation is provided hereunder for ease of reference.

Recommendation 6/8 — Reduced vertical separation minimum (RVSM) monitoring and follow-up activities

That AFI States support:

a) the long-term submission of State RVSM operationally approved aircraft to the AFI Regional Monitoring Agency (ARMA);

b) provision of long-term support to the AFI height monitoring programme;

c) long-term collection of safety assessment data;

d) the availability of personnel to fulfil the role of RVSM National Programme Managers;

e) the establishment of the ARMA scrutiny group in 2009; and

f) measures to reduce the large number of horizontal incidents in the AFI Region.

2. DISCUSSION

2.1 The five Key Performance Areas will be briefly discussed hereunder.

Maintain a Data Base of AFI RVSM Approvals (1)

2.2 ARMA maintains the RVSM Operational Approvals Data Base of all AFI State RVSM Operational Approvals to facilitate the safe and efficient flight of RVSM Operationally Approved aircraft in RVSM airspace as published globally. Experience is showing that CAA's appear to be hesitant to engage in the process indicating the need to put more emphasis on this aspect. Further to this it appears that CAA's have under estimated the amount of work and human resources that is required to maintain the AFI RVSM system. This may explain the increase of unapproved aircraft operating in AFI RVSM airspace

2.3 A total of 641 AFI RVSM Operational Approvals were recorded in the latest dataset at the end of June 2010. This is an increase of 336 aircraft measured against the figure presented at APIRG 16. The increase equates to 110%. This section has direct reference to Section 2 of the AFI NSP as submitted by States.

2.4 States are urged to follow the RVSM approval process to inter alia enhance RVSM safety and contribute towards decreasing the collision risk.

Monitor Aircraft Height-Keeping Performance and the Occurrence of Large Height Deviations (2)

Height Keeping Monitoring (2)

2.5 The AFI Height Monitoring Program is well established with limited State CAA's cooperating with ARMA to maintain the height monitoring targets for each operator's fleet. The meeting should recall that AFI implemented a height monitoring program during the pre implementation phase and then continued with Long Term Height Monitoring thereafter. This initiative will further be supported by the implementation of Long Term Minimum Monitoring due to be published as an Amendment to Annex 6 in November 2010.

2.6 Altimetry stability within AFI calculated from ASE measurements is stable. The GMU method is returning good results with a total of 172 aircraft having been monitored. In addition 140 HMU and AGHME results have been used to supplement the program and count towards the monitoring targets for AFI operators.

2.7 To date the GMU has recorded results mostly south of the equator which is rather disturbing as there are many operators to the North of the Equator that urgently need Height Monitoring. States should be urged to ensure that their fleets are monitored in accordance with the Long Term Monitoring Provisions in Annex 6 and the regional requirements.

2.8 The Minimum Monitoring Requirements will be covered in the paper, Long Term Height Monitoring and Minimum Monitoring Requirements. Section 8 of the NSP contains the State commitment in this regard.

2.9 ARMA is aware that various fleets are overdue for height monitoring. State CAA's are urged to co-operate in this respect.

Large Height Deviations (2)

2.10 A total of 36 height deviations, as opposed to 13 previously, were reported directly to ARMA of which 7 were included in the CRA. A considerable increase has occurred.

2.11 When processing the AIAG data the 70 AIRPROX reports produced, 41 vertical events, 20 horizontal events, 5 no error/risk events, and 4 TCAS nuisance alerts. This shows a considerable increase in the number of vertical events compared with that for the last pre-implementation CRA 3, for which there were 13 vertical reports and 34 horizontal reports. It is encouraging to note that the horizontal events have decreased probably due to the awareness campaign and then the availability of additional flight levels.

2.12 Further to the above mentioned observations it was calculated that incorrect flight level crossings was approximately 12% larger than in the last pre-implementation CRA.

2.13 It is thus evident that vertical incidents have increased since the implementation of RVSM which can largely be attributed to aircraft operating at the wrong flight levels. This aspect appears to be coupled to lapses in ATM. A concerted effort from ATM will be required to rectify this tendency.

2.14 States are urged to maintain a sharper RVSM awareness attitude whilst operating in and controlling RVSM airspace in order to bring the Total Vertical Risk back towards the TLS. RVSM vigilance cannot be over emphasized.

Conduct Safety Assessments (3)

2.15 The 4th Collision Risk Assessment is the first full Assessment after the implementation of RVSM in AFI and covers the time period from the 25 September 2008 until the end of September 2009. The CRA also forms part of the POSC. The assessment addresses two of the AFI RVSM Safety Policy objectives, namely an assessment of the technical vertical collision risk against a Target Level of Safety (TLS) of 2.5×10^{-9} fatal accidents per flight hour, and an assessment of the total vertical collision risk against a TLS of 5×10^{-9} fatal accidents per flight hour.

2.16 The estimate of the technical vertical collision risk meets the technical vertical TLS of 2.5×10^{-9} fatal accidents per flight hour but the estimate of the total vertical collision risk does not meet the total vertical TLS of 5×10^{-9} fatal accidents per flight hour.

2.17 The total vertical TLS was found to be exceeded by a factor of approximately 6. The dominant component of the total vertical risk was the risk due to aircraft having levelled off at the wrong flight level. This had to be estimated conservatively due to a lack of precise information on the duration of the pertinent events. The estimate is most likely affected by under-reporting of vertical incidents involving large height deviations. Measures are required to ensure proper incident reporting.

2.18 The technical risk estimate calculated is expressed in fatal accidents per flight hour and is compared with the ICAO technical vertical TLS of 2.5×10^{-9} fatal accidents per flight hour. It can be concluded that the technical vertical TLS is met. Moreover, it is being met with a factor of approximately 10.

Monitor Operator Compliance with State Approval Requirements (4)

2.19 Numerous CAA's have been contacted with regards to RVSM operations where no State RVSM approval can be traced. Aircraft captured in the traffic flow data are analyzed and additionally where possible flight plans are obtained and aircraft are verified with the RMA database to confirm the integrity of the "W" filed on the flight plan. The lack of response from certain CAA's is problematic and States are urged to co-operate. Calculated from APIRG 16 approximately 156 aircraft that have been found lacking in the RVSM approvals aspect. Unapproved RVSM aircraft operating in RVSM airspace has escalated and is a reason for concern which will inevitably negatively impact on the collision risk. Once again the meeting should recall the commitment made in the NSP.

Initiate Remedial Actions if RVSM Requirements are not met (5)

2.20 Remedial actions have been negotiated with various CAA's to find solutions for large height deviations and unapproved RVSM aircraft. Approximately 156 letters have been routed to CAA's recommending remedial actions. The success rate is approximately 50%.

Post Operational Safety Case

2.21 The strategy to demonstrate the achievement of the AFI RVSM Safety Policy has been supported by three principle safety arguments:

- That RVSM in AFI is safe in principle after operational experience is measured against the safety requirements in the PISC
- That the AFI RVSM application is safe by applying and realizing the safety requirements based on the availability of safety data over time period 25 September 2008 to 30 September 2009.
- That the issues that were identified in the PISC, and the assumptions made therein, have been satisfactorily addressed.

2.22 The above mentioned arguments were fully processed throughout the POSC document which leads to the three conclusions summarized as follows:

- It was concluded that AFI RVSM continues to be safe in "principle".
- It was not concluded that the AFI RVSM concept is safe as some safety requirements were shown to have not been achieved. The Total Vertical Risk was exceeded by a factor of 6 over the set TLS. The ARMA requirements for monitoring have not been fully realized in the fields of RVSM Aircraft Approvals, traffic flow data, incident reporting and Height Monitoring.
- It has not been concluded that the outstanding issues in the PISC have been satisfactorily addressed as flight at incorrect flight levels continues to arise. The matter concerning the migration to class A airspace has not been fully achieved.

2.23 The four main persistent hazards that were identified during the FHA preparations for the POSC.

H1 Non RVSM aircraft is given 1000FT separation in RVSM airspace.
Undetected by ATS or detected on first contact
H2 Non RVSM aircraft operates in RVSM airspace
Detected by ATS
H3 Aircraft is assigned a potentially conflicting Flight Level
H4 Aircraft deviates from cleared flight level
Unknown or known by flight crew and undetected by ATS

2.24 As a result of the above mentioned 23 safety recommendations have been compiled in order to assist AFI in creating a safe RVSM operating environment. These recommendations are due to be published in a State Letter. States are urged to action those recommendations that are applicable to their scenario. See Attachment A to this Working Paper.

3. CONCLUSION

3.1 As an overall POSC conclusion it was concluded that AFI RVSM operations are not yet safe. This conclusion was based on all events and safety data submitted over time period 25 September 2008 to 30 September 2009.

4. ACTIONS BY THE MEETING

4.1 The meeting is invited to:

- Take note of the contents of the working paper
- Urge States to comply with Recommendation 6/8 adopted at the Special AFIRAN 8 meeting held in 2008.
- Urge States to consider those safety recommendations which are due to be published in a State Letter as applicable to their situation.

RVSM MINIMUM MONITORING REQUIREMENTS:

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 secure website being maintained by the International Civil Aviation Organization (ICAO) and replicated in each specific RMA website.

2. MONITORING PROGRAM. All operators that operate or intend to operate in airspace where RVSM is applied are required to participate in the regional RVSM monitoring program. Table 1 addresses requirements for monitoring the height-keeping performance of aircraft in order to meet regional safety objectives. In their application to the appropriate State authority for RVSM approval, operators must show a plan for meeting the applicable monitoring requirements. Initial monitoring should be completed as soon as possible but not later than 6 months after the issue of RVSM approval and thereafter as directed by the regional RVSM monitoring program.

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 or Category 3 monitoring requirements.

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

8. 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.

9. 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.

Table 1: MONITORING REQUIREMENTS TABLE

MONITORING IS REQUIRED IN ACCORDANCE WITH THIS TABLE

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

CATEGORY		**AIRCRAFT GROUP**	**MINIMUM OPERATOR MONITORING FOR EACH AIRCRAFT GROUP**
1	GROUP APPROVED: DATA INDICATES COMPLIANCE WITH THE RVSM MASPS	A124, A300, A306, A310-GE, A310-PW, A318, A320, A330, A340, A345, A346, A3ST, AVRO, B712, B727, B737CL, B737C, B737NX, B747CL, B74S, B744-5, B744-10, B752, B753, B767, B764, B772, B773, BD100, CL600, CL604, CL605, C17, C525, C560, C56X, C650, C680, C750, CARJ, CRJ7, CRJ9, DC10, E135-145, E170-190, F100, F900, FA10, GALX, GLEX, GLF4, GLF5, H25B-800, J328, KC135, LJ40, LJ45, LJ60, MD10, MD11, MD80, MD90, PRM1, T154	Two airframes from each fleet of an operator to be monitored
2	GROUP APPROVED: INSUFFICIENT DATA ON APPROVED AIRCRAFT	Other group aircraft other than those listed above including: A148, A380, AC95, AN72, ASTR, ASTR-SPX, B701, B703, B703-E3, B731, B732, BD700, BE20, BE30, BE40, B744-LCF, B748, C130, C500, C25A, C25B, C25C, C441, C5, C510, C550-552, C550-B, C550-II, C550-SII, D328, DC85, DC86-87, DC93, DC95, E120, E50P, EA50, F2TH, F70, FA20, FA50, FA7X, G150, GLF2, GLF2B, GLF3, H25B-700, H25B-750, H25C, HA4T, IL62, IL76, IL86, IL96, L101, L29B-2, L29B-731, LJ31, LJ35-36, LJ55, MU30, P180, PC12, SB20, SBR1, SBR2, T134, T204, T334, TBM, WW24, YK42	60% of airframes (round up if fractional) from each fleet of an operator **or** individual monitoring
3	Non-Group	Non-group approved aircraft	100% of aircraft shall be monitored

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

Monitoring Group	A/C ICAO	A/C Type	A/C Series
A124	A124	AN-124 RUSLAN	ALL SERIES
A148	A148	AN-148	100
A300	A30B	A300	B2-100, B2-200, B4-100, B4-100F, B4-120, B4-200, B4-200F, B4-220, B4-220F, C4-200
A306	A306	A300	600, 600F, 600R, 620, 620R, 620RF
A310-GE	A310	A310	200, 200F, 300, 300F
A310-PW	A310	A310	220, 220F,320
A318	A318	A318	ALL SERIES
A320	A319 A320 A321	A319 A320 A321	CJ , 110, 130 110, 210, 230 110, 130, 210, 230
A330	A332 A333	A330 A330	200, 220, 240 300, 320, 340
A340	A342 A343	A340 A340	210 310
A345	A345	A340	500, 540
A346	A346	A340	600, 640
A380	A388	A380	800, 840, 860
A3ST	A3ST	A300	600R ST BELUGA
AC95	AC95	AERO COMMANDER 695	A
AN72	AN72	AN-72 AN-74	ALL SERIES
ASTR	ASTR	1125 ASTRA	ALL SERIES
ASTR-SPX	ASTR	1125 ASTR SPX, G100	ALL SERIES
AVRO	RJ1H RJ70 RJ85	AVRO AVRO AVRO	RJ100 RJ70 RJ85
B701	B701	B707	100, 120B
B703	B703	B707	320, 320B, 320C
B703-E3	B703	B707	E-3
B712	B712	B717	200
B727	B721 B722	B727 B727	100, 100C, 100F,100QF 200, 200F
B731	B731	B737	100
B732	B732	B737	200, 200C
B737CL	B733 B734 B735	B737 B737 B737	300 400 500

Monitoring Group	A/C ICAO	A/C Type	A/C Series
B737NX	B736 B737 B738 B739	B737 B737 B737 B737	600 700, BBJ 800, BBJ2 900
B737C	B737	B737	700C
B747CL	B741 B742 B743	B747 B747 B747	100, 100B, 100F 200B, 200C, 200F, 200SF 300
B74S	B74S	B747	SR, SP
B744-5	B744	B747	400, 400D, 400F (With 5 inch Probes up to SN 25350)
B744-10	B744	B747	400, 400D, 400F (With 10 inch Probes from SN 25351)
B744-LCF	B744	B747	LCF
B748	B748	B747	8F, 81
B752	B752	B757	200, 200PF, 200SF
B753	B753	B757	300
B767	B762 B763	B767 B767	200, 200EM, 200ER, 200ERM, 300, 300ER, 300ERF
B764	B764	B767	400ER
B772	B772	B777	200, 200ER, 200LR, 200LRF
B773	B773	B777	300, 300ER
BD100	CL30	CHALLENGER 300	ALL SERIES
BD700	GL5T	GLOBAL 5000	ALL SERIES
BE20	BE20	200 KINGAIR	ALL SERIES
BE30	BE30	B300 SUPER KINGAIR B300 SUPER KINGAIR 350	ALL SERIES
BE40	BE40	BEECHJET 400 BEECHJET 400A BEECHJET 400XP HAWKER 400XP	ALL SERIES
C130	C130	HERCULES	H, J
C17	C17	C-17 GLOBEMASTER 3	ALL SERIES
C441	C441	CONQUEST II	ALL SERIES
C5	C5	C5	ALL SERIES
C500	C500	500 CITATION 500 CITATION I 501 CITATION I SINGLE PILOT	ALL SERIES
C510	C510	MUSTANG	ALL SERIES
C525	C525	525 CITATIONJET 525 CITATIONJET I 525 CITATIONJET PLUS	ALL SERIES
C25A	C25A	525A CITATIONJET II	ALL SERIES
C25B	C25B	CITATIONJET III	ALL SERIES

Monitoring Group	A/C ICAO	A/C Type	A/C Series
		525B CITATIONJET III	
C25C	C25C	525C CITATIONJET IV	ALL SERIES
C550-552	C550	552 CITATION II (USN)	ALL SERIES
C550-B	C550	550 CITATION BRAVO	ALL SERIES
C550-II	C550	550 CITATION II 551 CITATION II SINGLE PILOT	ALL SERIES
C550-SII	C550	S550 CITATION SUPER II	ALL SERIES
C560	C560	560 CITATION V 560 CITATION V ULTRA 560 CITATION V ENCORE	ALL SERIES
C56X	C56X	560 CITATION EXCEL	ALL SERIES
C650	C650	650 CITATION III 650 CITATION VI 650 CITATION VII	ALL SERIES
C680	C680	680 CITATION SOVEREIGN	
C750	C750	750 CITATION X	ALL SERIES
CARJ	CRJ1 CRJ2 CRJ2 CRJ2	REGIONALJET REGIONALJET CHALLENGER 800 CHALLENGER 850	100, 100ER, 200, 200ER, 200LR ALL SERIES ALL SERIES
CRJ7	CRJ7	REGIONALJET	700, 700ER, 700LR
CRJ9	CRJ9	REGIONALJET	900, 900ER, 900LR
CL600	CL60	CL-600 CL-601	CL-600-ALL SERIES CL-601- ALL SERIES,
CL604	CL60	CL-604	CL-604- ALL SERIES
CL605	CL60	CL-605	CL-605- ALL SERIES
DC10	DC10	DC-10	10, 10F, 15, 30, 30F, 40, 40F
D328	D328	328 TURBOPROP	100
DC85	DC85	DC-8	50, 50F
DC86-87	DC86 DC87	DC-8 DC-8	61, 62, 63 71, 72, 73
DC93	DC93	DC-9	30, 30F
DC95	DC95	DC-9	51
E135-145	E135 E145	EMB-135 EMB-145	ALL SERIES
E170-190	E170 E170 E190 E190	EMB-170 EMB-175 EMB-190 EMB-195	ALL SERIES
E120	E120	EMB-120 BRASILIA	ALL SERIES
E50P	W50P	PHENOM 100	ALL SERIES
EA50	EA50	ECLIPSE	ALL SERIES

Monitoring Group	A/C ICAO	A/C Type	A/C Series
F100	F100	FOKKER 100	ALL SERIES
F2TH	F2TH	FALCON 2000 FALCON 2000-EX FALSON 2000LX	ALL SERIES
F70	F70	FOKKER 70	ALL SERIES
F900	F900	FALCON 900 FALCON 900DX FALCON 900EX	ALL SERIES
FA10	FA10	FALCON 10	ALL SERIES
FA20	FA20	FALCON 20 FALCON 200	ALL SERIES
FA50	FA50	FALCON 50 FALCON 50EX	ALL SERIES
FA7X	FA7X	FALCON 7X	ALL SERIES
G150	G150	G150	ALL SERIES
GALX	GALX	1126 GALAXY G200	ALL SERIES
GLEX	GLEX	BD-700 GLOBAL EXPRESS	ALL SERIES
GLF2	GLF2	GULFSTREAM II (G-1159)	ALL SERIES
GLF2B	GLF2	GULFSTREAM IIB (G-1159B)	ALL SERIES
GLF3	GLF3	GULFSTREAM III (G-1159A)	ALL SERIES
GLF4	GLF4	GULFSTREAM IV (G-1159C) G300 G350 G400 G450	ALL SERIES
GLF5	GLF5	GULFSTREAM V (G-1159D) G500 G550	ALL SERIES
H25B-700	H25B	BAE 125 / HS125	700A, 700B
H25B-750	H25B	HAWKER 750	ALL SERIES
H25B-800	H25B	BAE 125 / HS125 HAWKER 800XP HAWKER 800XPI HAWKER 800 HAWKER 850XP HAWKER 900XP HAWKER 950XP	800A, 800B ALL SERIES
H25C	H25C	HAWKER 1000	ALL SERIES
HA4T	HA4T	HAWKER 4000	ALL SERIES
IL62	IL62	ILYUSHIN-62	ALL SERIES

Monitoring Group	A/C ICAO	A/C Type	A/C Series
IL76	IL76	ILYUSHU-76	ALL SERIES
IL86	IL86	ILYUSHIN-86	ALL SERIES
IL96	IL96	ILYUSHIN-96	ALL SERIES
J328	J328	328JET	ALL SERIES
KC135	B703	KC-135	ALL SERIES
L101	L101	L-1011 TRISTAR	ALL SERIES
L29B-2	L29B	L-1329 JETSTAR 2	ALL SERIES
L29B-731	L29B	L-1329 JETSTAR 731	ALL SERIES
LJ31	LJ31	LEARJET 31	ALL SERIES
LJ35-36	LJ35 LJ36	LEARJET 35 LEARJET 36	ALL SERIES ALL SERIES
LJ40	LJ40	LEARJET 40	ALL SERIES
LJ45	LJ45	LEARJET 45	ALL SERIES
LJ55	LJ55	LEARJET 55	ALL SERIES
LJ60	LJ60	LEARJET 60	ALL SERIES
MD10	MD10	MD-10	ALL SERIES
MD11	MD11	MD-11	COMBI, ER, FREIGHTER, PASSENGER
MD80	MD81 MD82 MD83 MD87 MD88	MD-80 MD-80 MD-80 MD-80 MD-80	81 82 83 87 88
MD90	MD90	MD-90	30, 30ER
MU30	MU30	MU-300 DIAMOND	1A
P180	P180	P-180 AVANTI	ALL SERIES
PC12	PC12	PC-12	ALL SERIES
PRM1	PRM1	PREMIER 1	ALL SERIES
SB20	SB20	SAAB 2000	ALL SERIES
SBR1	SBR1	SABRELINER 40 SABRELINER 60 SABRELINER 65	ALL SERIES
SBR2	SBR2	SABRELINER 80	ALL SERIES
T134	T134	TU-134	A, B
T154	T154	TU-154	A, B, M, S
T204	T204 T224 T234	TU-204 TU-224 TU-234	100, 100C, 120RR 200, 214, C
T334	T334	TU-334	ALL SERIES
TBM	TBM7 TBM8	TBM-700 TBM-850	ALL SERIES
WW24	WW24	1124 WESTWIND	ALL SERIES
YK42	YK42	YAK-42	ALL SERIES