



## **TRANS-REGIONAL AIRSPACE AND SUPPORTING ATM SYSTEMS STEERING GROUP FIRST MEETING (TRASAS/1)**

### **FIRST MEETING**

*(Paris, 2-3 May 2007)*

**Agenda Item 2: Review of the requirements of the airspace user community for a rational, modern, and economically viable airspace structure and ATM services**

### **REVIEW OF THE 30<sup>TH</sup> MEETING OF THE ICAO RVSM IMPLEMENTATION TASK FORCE**

*(Presented by ICAO Asia and Pacific Office)*

#### **SUMMARY**

The Thirtieth Meeting of the ICAO RVSM Implementation Task Force (RVSM/TF/30) was held from 12 to 16 March 2007 at ICAO Asia and Pacific Office, Bangkok, Thailand. The RVSM/TF/30 was the first meeting to consider planning of RVSM in Chinese FIRs. This paper informs the TRASAS/1 of its outcomes

Action by the TRASAS/1 is in paragraph 3.

#### **1. Introduction**

1.1 The Thirtieth Meeting of the ICAO Reduced Vertical Separation Minimum Implementation Task Force (RVSM/TF/30) was held at ICAO Asia and Pacific Office, Bangkok, Thailand from 12 to 16 March 2007. The RVSM/TF/30 was attended by 106 participants from China, Hong Kong China, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, Myanmar, Pakistan, Republic of Korea, Russian Federation, Singapore, Sri Lanka, Thailand, United States, Uzbekistan, Viet Nam, IATA, IFALPA and IFATCA.

1.2 The Task Force planned and implemented RVSM in the Pacific area in 2000, in the Western Pacific/South China Sea (WPAC/SCS) area in 2002, in the area south of the Himalayas and over the Bay of Bengal and beyond in 2003, and in the Japanese domestic airspace and the Incheon FIR in 2005. The RVSM/TF/30 was the first meeting to consider planning the RVSM implementation in Chinese FIRs.

**2. Discussion**

Operational Considerations

*Review of RVSM Flight Level Allocation System (FLAS) in China*

2.1 China advised the meeting that aircraft operating in China were currently required to fly at a feet flight level corresponding to a metric level. An air traffic controller instructs a pilot to fly at a level in meter and the pilot consults with the Flight Level Orientation Scheme Table to fly at a feet flight level corresponding to the metric level instructed by the controller.

2.2 The meeting was informed that China would continue applying metric system to level allocations when implementing RVSM, taking into account the current situation of China’s legal environment and the metric system. To harmonize the level allocation as much as possible in case of using the metric system in level allocations in China while the neighboring States use feet system, and to reduce differences thereby, China would establish a 500 m vertical separation between the levels of 8 400 m and 8 900 m, and apply a 300 m vertical separation between other altitude levels at or below 12 500 m. The actual vertical separation between the aircraft is 1 000 feet when aircraft flies in accordance with the corresponding feet flight level in the RVSM airspace.

2.3 The meeting also noted that the greatest challenge in RVSM implementation in China was the conversions from meter to feet, which may result in errors after being rounded. Therefore, it was significantly important to define a flight level allocation system that would be operationally acceptable, and safe for both pilots and air traffic controllers.

2.4 The proposed metric FLAS and the study result presented to the meeting by China are at **Attachment** to this paper.

2.5 The Chairperson of the Task Force said that there would be a possibility of a breakdown in separation during the transition between a China RVSM level and a feet flight level. For example, a Chinese ACC assigns an eastbound aircraft 8 900 m which would correspond to FL 291 whereas the westbound aircraft could be operating at FL 300 from a neighboring FIR. As such, the transition procedures should ensure that there was no breakdown in the vertical separation.

*Transition Process Expected for RVSM Operations in China Airspace*

2.6 In light of the above, in order to identify the transition activities resulting from the implementation of RVSM with the metric system in China and to facilitate the amendment process of the LOAs by China and States concerned, the meeting worked out a table of the transition activities listing the Chinese FIRs and its neighboring FIRs, the necessary transition activities and the responsibility of the transition as follows:

Chinese FIR	Adjacent FIR	Transition Process	Responsible for Transition
Beijing	Lanzhou	N/A	N/A
	Shanghai	N/A	N/A
	Shenyang	N/A	N/A
	Ulaanbaatar	China Metric – Metric CVSM	
	Wuhan	N/A	N/A

<b>Chinese FIR</b>	<b>Adjacent FIR</b>	<b>Transition Process</b>	<b>Responsible for Transition</b>
Guangzhou	Hanoi	China Metric – Feet	
	Hong Kong	China Metric – Feet	
	Kunming	N/A	N/A
	Shanghai	N/A	N/A
	Wuhan	N/A	N/A
Kunming	Guangzhou	N/A	N/A
	Hanoi	China Metric – Feet	
	Katmandu	China Metric – Feet	
	Lanzhou	N/A	N/A
	Urumqi	NA	NA
	Vientiane	China Metric – Feet	
	Wuhan	N/A	N/A
	Yangon	China Metric – Feet	
Lanzhou	Beijing	N/A	N/A
	Kunming	N/A	N/A
	Wuhan	N/A	N/A
	Ulaanbaatar	China Metric – Metric CVSM	
	Urumqi	N/A	N/A
Sanya	Guangzhou	N/A	N/A
	Hanoi	China Metric – Feet	Sanya ACC
	Ho Chi Minh	N/A	N/A
	Hong Kong	N/A	N/A
	Manila	N/A	N/A
Shanghai	Fukuoka	China Metric – Feet	
	Incheon	China Metric – Feet	
	Shenyang	N/A	N/A
	Beijing	N/A	N/A
	Guangzhou	N/A	N/A
	Taibei	N/A	N/A

<b>Chinese FIR</b>	<b>Adjacent FIR</b>	<b>Transition Process</b>	<b>Responsible for Transition</b>
	Wuhan	N/A	N/A
Shenyang	Chita	China Metric – Metric CVSM	
	Khabarovsk	China Metric – Metric CVSM	
	Pyongyang	China Metric – Metric CVSM	
	Vladivostok	China Metric – Metric CVSM	
	Beijing	N/A	N/A
	Blagoveshchensk	China Metric – Metric CVSM	
	Shanghai	N/A	N/A
	Ulaanbaatar	China Metric – Metric CVSM	
Urumqi	Almaty	China Metric – Metric CVSM	
	Barnaul		
	Bishkek		
	Delhi	China Metric – Feet	
	Dushanbe		
	Katmandu	China Metric – Feet	
	Kunming	N/A	N/A
	Lahore	China Metric – Feet	
	Lanzhou	N/A	N/A
	Osh		
	Semipalatinsk		
	Ulaanbaatar	China Metric – Metric CVSM	
Wuhan	Beijing	N/A	N/A
	Guangzhou	N/A	N/A
	Kunming	N/A	N/A
	Lanzhou	N/A	N/A
	Shanghai	N/A	N/A

*Air Navigation System of the Republic of Kazakhstan*

2.7 Kazakhstan reported that four different level systems were currently being used in the region: metric CVSM by Kazakhstan, Kyrgyzstan, Russian Federation and Uzbekistan, China metric CVSM by China, feet RVSM by Azerbaijan, and feet CVSM by Turkmenistan. The difficulties in the transition were highlighted.

*Safety and Airspace Monitoring Considerations*

2.8 The meeting reviewed the readiness of aircraft and airlines for RVSM operations that will be operated in the China RVSM airspace, and noted that 78 % of Chinese operators' domestic fleets had been RVSM approved and some Chinese operators had already had experience of operating in RVSM airspace.

2.9 For the RVSM implementation of the Asia and Pacific Region, including the WPAC/SCS, the Bay of Bengal and Japan/Republic of Korea airspace, the 90 % measurement of the RVSM approved aircraft operated in the planned RVSM airspace has been adopted to ensure the readiness of the RVSM implementation in these regions. China would also follow the same target of 90 %. It was confirmed that China was responsible for the safety assessment for RVSM implementation in the Chinese airspace.

*Implementation Management Considerations*

2.10 In light of the foregoing, the meeting agreed to progress the work to introduce RVSM in the Chinese FIRs on 22 November 2007 and considered the implementation management.

*Publication of Document*

2.11 The meeting reviewed a draft AIC which will be applicable to the implementation of RVSM in China. Further, the meeting reviewed a draft AIP Supplement which will be applicable to the implementation of RVSM in Chinese FIRs.

*Harmonization of RVSM Flight Level Allocation System (FLAS)*

2.12 It was noted that Russian Federation was also considering the implementation of metric RVSM level. China was coordinating with Russian Federation on the possibility of enhancing mutual coordination with Mongolia and Russia Federation, and implementing the same RVSM level allocation system in case that these countries still use metric level. The meeting had before it a proposal by China of two options for a common China and Russia RVSM level system. The only difference between the Option One and Two was 8 400 m vs. 8 500m. Advantage of Option One was: using 8 400 m is consistent with the current arrangement of eastbound level being odd, westbound level being even. Advantage of Option Two was: level 8 500 m is closer to FL 280.

2.13 In light of the above, China held a side meeting with delegations from Kazakhstan, Mongolia, Myanmar, Russian Federation and Uzbekistan during the meeting. United States and IATA were invited to be present at the meeting.

2.14 It was noted that Russian Federation had studied the China FLAS carefully and agreed that the difference was 8 400 m or 8 500 m only.

2.15 Mongolia advised the meeting that they had no plan to implement RVSM in the foreseeable future due to the lack of surveillance facilities.

2.16 With regard to the possibilities of submitting a joint proposal for amendment of ICAO Annex 2 – *Rule of the Air*, Russian Federation agreed to fully support China FLAS (including the adoption of 8 400 m) and will make a joint proposal for amendment of ICAO Annex 2 with China in due time. The meeting discussed the possibilities of establishing more new entry/exit points and direct routes by China for meeting the needs of traffic growth, improving airspace capacities for Beijing Olympic Game in 2008 and strengthening China CNS facilities to realize radar coverage of Chinese northeastern and western areas proposed by Russian Federation and Kazakhstan. China committed to hold other meetings on these issues at an appropriate time and monitor progress through exchange of information by email.

Future Work – Meeting Schedule

2.17 In order to facilitate the planning and implementation process, China suggested a Special Coordination Meeting be convened under the auspices of ICAO with participation of China, Mongolia, Russian Federation, the Chairpersons of the Task Force and its Work Groups, IATA, and observers from Kazakhstan. The objectives of the Special Coordination Meeting would be a review of the RVSM implementation actions taken by China. The Special Coordination Meeting will be held from 16-18 May 2007 in Beijing, China.

**3. Action by the meeting**

3.1 The meeting is invited to:

- a) note that:
    - i) the thirtieth meeting of the ICAO Reduced Vertical Separation Minimum Implementation Task Force (RVSM/TF/30) was held at ICAO Asia and Pacific Office, Bangkok, Thailand from 12 to 16 March 2007; and
    - ii) the Russian Federation agreed to support China FLAS (including the adoption of 8 400 m) in submitting a joint proposal for amendment of ICAO Annex 2 – *Rule of the Air*.
  - b) note the metric RVSM level allocation proposed by China as in Attachment to this paper.
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## **RVSM FLIGHT LEVEL ORIENTATION SYSTEM (FLAS) IN CHINA**

Implement metric RVSM level in China, 300-meter vertical separation is applied between 600 meters and 8400 meters (maintain current situation unchanged); 500-meter vertical separation is applied between 8400 meters and 8900 meters; 300-meter vertical separation is applied between 8900 meters and 12500 meters; 600-meter vertical separation is applied above 12500 meters. Airspace from 8900 meters to 12500 meters is defined as RVSM Airspace.

Meanwhile, in order to ensure that the vertical separation between two pairs of flight levels is equal or above 1000 feet after converting metric flight level into feet and rounding the result by 100feet:

For Metric flight level from 8900 meters to 9800 meters, the corresponding flight level in feet shall be rounded down to the nearest 100 feet. For instance, 8900meters (namely 29,199 feet) shall be rounded down to 29100feet;

For Metric flight level from 11900 meters to 12500 meters, the corresponding flight level in feet shall be rounded up to the nearest 100 feet. For instance, 12,500 meters (namely 41,010 feet) shall be rounded up to 41,100 feet.

Thus, between 8900meters and 12500meters, all the actual vertical separations during flight for Boeing, Airbus and internationally manufactured aircraft will be 1000 feet when they fly the corresponding feet flight level.

Detailed RVSM metric flight level option: fly eastward: 8900, 9500, 10100, 10700, 11300, 11900, 12500meters, etc; fly westward: 9200, 9800, 10400, 11000, 11600, and 12200meters. Corresponding feet flight levels: fly eastward: 29100, 31100, 33100, 35100, 37100, 39100, 41100feet; fly westward: 30100, 32100, 34100, 36100, 38100, and 40,100 feet.

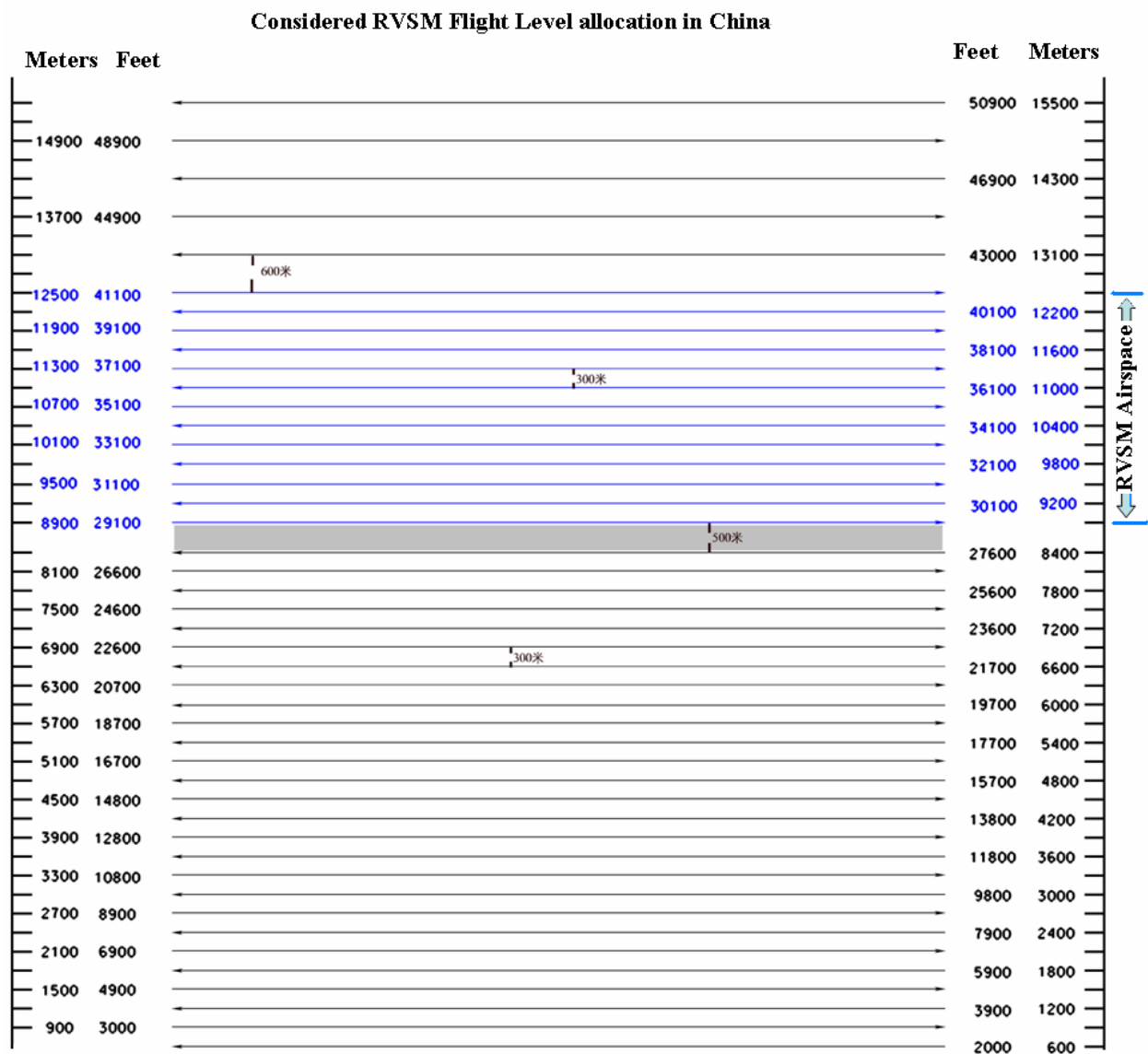
### ***Advantages:***

Satisfy military requirements of applying metric levels, and overcome the relatively big altitude difference between metric RVSM level and ICAO RVSM flight levels of neighboring countries; eliminate the phenomena of 900feet vertical separation and make the vertical separation during actual flight be 1000 feet or above to ensure safety. For metric level, eastbound level is odd and westbound level is even. For the corresponding RVSM flight levels (from 29100 to 41100) in feet, each flight level is 100 feet above ICAO RVSM FL, so it is very easy for pilot to operate and use, and it is also easy for the transition to/from neighboring countries RVSM FL. Airspace from 8900 meters to 12500 meters is defined as RVSM Airspace, so 500 meters vertical separation between 8400 to 8900m can act as a buffer and non-RVSM aircraft will fly at and below 8400 m or above 12500 m. Pilots shall use the China RVSM FL reference table/map and strictly fly the corresponding flight level in feet when instructed to fly a specific metric flight level. The pilots DO NOT need to remember how to round off (up or down), just follow the China RVSM FL reference table/map.

### ***Disadvantages:***

In the case of 12500 meters, 1253 (which means 12530 meters) may be shown on the radar display of the controller due to the difference between the actual flight altitude and RVSM metric flight level (The maximum difference is only 90feet and the maximum difference displayed by radar is 30 meters. As indicated in ICAO DOC4444, the tolerance value used to determine that Mode C-derived level information displayed to the controller shall be accurate within  $\pm 60$  m ( $\pm 200$  ft) in RVSM airspace. An aircraft is considered to be maintaining its assigned level as long as the SSR Mode C-derived level information indicates that it is within

±60 m (±200 ft) tolerance of the assigned level). The controller should be well aware of this and also adapt to it. Certainly, this kind of phenomena also exists in the flight levels presently used in China which the controllers are already familiar with. Through RVSM radar simulation in Guangzhou Area Control Center, the controllers think that this kind of phenomena can be overcome with necessary training.





**Considered RVSM Flight Level allocation in China**

<b>Orientation</b>	<b>Metric RVSM FL Meters</b>	<b>Metric RVSM FL Converted into feet Feet</b>	<b>Metric RVSM FL Converted into feet and round to 100 feet (Pilots actually fly FL) Feet</b>	<b>Actual altitude displayed by controller radar (4-digit number)</b>
Eastbound	14900	48885	48900	1490
Westbound	14300	46916	46900	1430
Eastbound	13700	44948	44900	1369
Westbound	13100	42979	43000	1311
Eastbound	12500	41010	<u>41100</u>	1253
Westbound	12200	40026	<u>40100</u>	1222
Eastbound	11900	39042	<u>39100</u>	1192
Westbound	11600	38058	38100	1161
Eastbound	11300	37073	37100	1131
Westbound	11000	36089	36100	1100
Eastbound	10700	35105	35100	1070
Westbound	10400	34121	34100	1039
Eastbound	10100	33136	33100	1009
Westbound	9800	32152	<u>32100</u>	0978
Eastbound	9500	31168	<u>31100</u>	0948
Westbound	9200	30184	<u>30100</u>	0917
Eastbound	8900	29199	<u>29100</u>	0887
Westbound	8400	27559	27600	0841
Eastbound	8100	26575	26600	0811
Westbound	7800	25591	25600	0780
Eastbound	7500	24606	24600	0750

CAAC RVSM Contact Point:

Mr. Xiao Jing  
 Deputy Director of Air Traffic Control Division  
 Air Traffic Management Bureau of CAAC  
 Tel: (+86 10) 87786812  
 Fax: (+86 10) 87786810  
 E-mail: xiaojing@263.net.cn

Your comments and suggestion will be much appreciated.

### **SOME CONSIDERATIONS IN MORE DETAILS ABOUT RVSM IMPLEMENTATION IN CHINA**

We understand clearly the requirement to use feet worldwide. To use metric flight level in China is our national policy and metric is also the SI and feet is NON-SI. All the national aviation industry is based on meters. China will not follow the feet system and continued argument on this issue will only result in delaying the implementation on RVSM. So the question is how to implement metric RVSM flight level in China.

China has implemented 300 meters vertical separation below 8400 meters for many years, so it is natural that we can implement 300 meters vertical separation below 12500 meters in a safely manner. ICAO documentation prescribes 300 meters or 1000 feet, which indicates that 300 meters is also ICAO standard. It is advised that you can consult the pilots who have experience in operating in Chinese airspace.

For China RVSM Flight level, Pilots shall use the China RVSM FL reference table/map and strictly fly the corresponding flight level in feet when instructed to fly a specific metric flight level. The pilots DO NOT need to remember how to round off (up or down), just follow the China RVSM FL reference table/map. Pilot will not incorrectly round off the next 100m as long as they follow the China RVSM FL reference table/map. How you do it today, and then how you will do it in future in terms of the flight level setting, there is no big difference.

It is likely that the China RVSM flight level option is: fly eastward: 29100, 31100, 33100, 35100, 37100, 39100, 41100feet; fly westward: 30100, 32100, 34100, 36100, 38100, and 40,100 feet. Just forget the meters! All RVSM Flight Levels are 100 feet above ICAO. As indicated in DOC4444, the tolerance value used to determine that Mode C-derived level information displayed to the controller is accurate, shall be  $\pm 60$  m ( $\pm 200$  ft) in RVSM airspace. An aircraft is considered to be maintaining its assigned level as long as the SSR Mode C-derived level information indicates that it is within  $\pm 60$  m ( $\pm 200$  ft) tolerance of the assigned level. It is very easy for the transition to other adjacent countries.

ICAO AN-Conf/11 Recommendation 4/9 — Harmonization of flight level assignment methodology across flight information boundaries

That relevant States, when planning for the introduction of reduced vertical separation minimum (RVSM) at interfaces between airspaces where different units of measurement are used, taking into account relevant operational and technical considerations, should apply a common cruising levels structure in accordance with the tables of cruising levels expressed in meters or feet, as outlined in Annex 2 — Rules of the Air, Appendix 3.

At the Eleventh Air Navigation Conference (ANConf/11), Montreal, 22 September to 3 October 2003, the WP119 indicates that:

Annex 2 — Rules of the Air, Appendix 3, Table of Cruising Levels. When the common cruising levels structure and corresponding vertical separation minima, expressed in meters or feet, as outlined in Annex 2 were adhered to, the maximum difference in cruising level experienced by any aircraft transitioning between meters and feet was 23 m (75 ft). By contrast, on some regional boundaries where this conversion was made today using State-specific procedures for conventional vertical separation (500 m or 2 000 ft), the cruising level difference was as great as 287 meters (941 ft) and averaged over 165 m (541 ft). Differences between individual ATS units cruising level procedures were mitigated in many cases by sterilization of altitudes within one or both flight information regions.

Now, China RVSM FL is only 100 feet above the ICAO feet flight level, which is only slightly larger than the 23 m (75 ft) as indicated above.

Before RVSM, China needs to conduct flight level transition with all adjacent countries, and after implementing RVSM, the flight level transition will be very easy with adjacent countries except for Russia, Mongolia and DPRK. But after the implementation by Russia and Mongolia, the flight level transition will not be a problem any more.

There is no problem for the STL. Some one said that altitude band will have variances from the ICAO safety assessment done on separation std based on 1000ft - a direct impact on the TLS assessment and future implications in regional safety assessment, however small. Actually, the corresponding flight level in feet is 1000 feet in RVSM airspace. The STL shall be the same when we use RVSM flight level such as 29100, 30100, 31100, ... or we use flight level such as 29000, 30000, 31000, .... Of course, for the military aircraft which use meters, we will use 600 meters vertical separation.

Most of the military aircraft can only fly in metric flight level and only metric flight level setting is available. There are also very small number of China manufactured transport aircraft which can only fly in metric flight level and only metric flight level setting is available. China will follow the exclusive RVSM airspace policy. For all these aircraft, we will apply 600 meters vertical separation if they can operate in RVSM airspace. In this way, we can eliminate the phenomena of 270 meters vertical separation when one aircraft flies actually the corresponding flight level in feet (such as 30100 feet, which equal to 9170 meters) and another one flies actually the metric flight level (such as 8900 meters). 1000 feet will only be applied among the aircraft which is actually flying the RVSM flight level such as 29100, 30100, 31100 feet...

- END -