



ICAO

International Civil Aviation Organization

**Fifth Meeting of the Surveillance Implementation
Coordination Group (SURICG/5)**

Web-conference, 22 – 24 September 2020

Agenda Item 4: Review the Action Items from SURICG/4 Meeting

MODE S RADAR SURVEY TO SUPPORT II/SI MIXED OPERATION IN CHINA

(Presented by China)

SUMMARY

This paper presents a brief introduction of the Mode S radar survey activities conducted in China, the aim of this survey is to evaluate the Mode S radar capability to support the II/SI mixed operation, which will be introduced foreseen in China in the near future.

1. INTRODUCTION

1.1 The Air Traffic Management Bureau of CAAC (ATMB of CAAC) is running more than 140 SSRs currently in China, among which 78 are Mode S capable. More than 60 Mode S Radars are under construction. And according to the next “5-year rolling plan” of ATMB, more than 38 Mode S interrogators will be introduced, and by the end of 2030, ATMB will have around 220 Mode S interrogators running in China.

1.2 According to the Conclusion 19/40 made on the APANPIRG 19th meeting, the Mode S interrogator installed in ICAO APAC region shall only use Interrogator Identifier (II) code. So all the Mode S interrogators operating in China now are running with II code.

1.3 Since China has a high density of Mode S interrogators, and will upgrade and install a number of Mode S interrogators in the near future. It will become very difficult to operate all the Mode S interrogators by II code then. The SI code will be the solution. China hence conducted a radar survey which included the Mode S support capabilities for the potential future II/SI mixed operation.

2. DISCUSSION

2.1 This survey covers all the running Mode S interrogator models in China now, including systems from foreign companies like Thales, Selex (Leonardo) and Indra, and also systems from domestic companies like Nriet, Suncreat and Jiuzhou. The Mode S support capabilities related with II/SI mixed operation is part of the survey.

2.2 All the survey activities were conducted in the laboratories of ATMB and our domestic partners. The test bench composed the radar systems and the RASS kits, by using the RASS event generator, we simulated serials of II/SI mixed scenarios, the radar systems were observed and analysed under these scenarios. The result of the survey shows that all the radar models operating in China now are capable of II/SI mixed operation. Detailed information of the result summary please refers to the appendix.

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2.3 Since the number of Mode S interrogators is increasing fast in China, and the II code resource is very limited (only 16 codes technically available, and according to the ATMB’s regulation, the code 0 and 14 are reserved for other purpose), we suggest that ICAO APAC RO to consider the introducing of SI code in ICAO APAC region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) discuss the introducing of SI code in ICAO APAC region; and
- c) discuss any relevant matters as appropriate.

Appendix

II/SI Mixed Operation Related Mode S Radar Survey Summaries

A.1 The test bench composed the radar system and the RASS kits (IE product), the Event Generator simulates the scenarios, and the simulated signals coupled from the RF cable into the radar system show as follows:

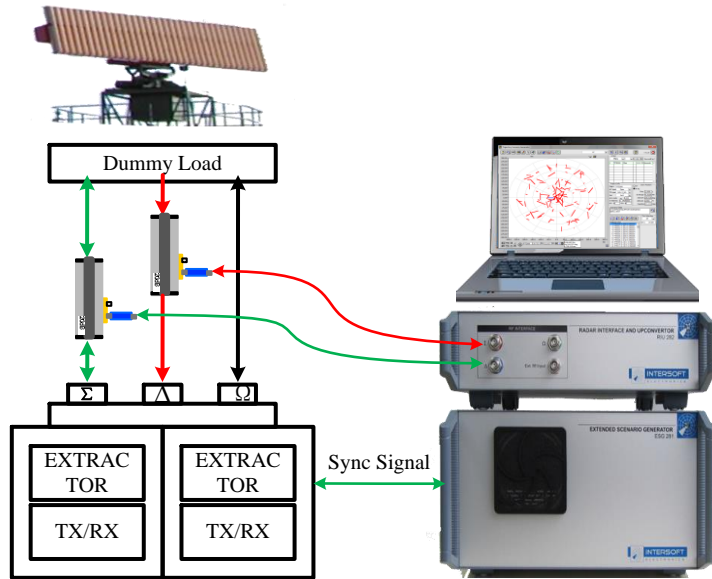


Figure A-1 The Illustration of the Test Bench

A.2 The Mode S radar survey covers all the running systems in China now, including the following radar models:

Table A-1 Mode S Radar Models

No	Companies	Models	Note
1	Thales	RSM970-S	France
2	Selex	SIR-S	Italy
3	Indra	IRS-20MP/L	Spain
4	Nriet	DLD-100C	China
5	Suncreat	SCR-22SS	China
6	Jiuzhou	JZDAB01	China

A.3 The Mode S radar survey includes a lot of items, and the items related with the II/SI mixed operation are listed as follows:

Table A-2 II/SI Mixed Operation Related Survey Items

No	Items	Note
1	IC Configure Supporting	Check whether the radar can work properly with II and SI code
2	IC Sectorized Programming	Check whether the radar IC can be sectorized programming
3	Non-SI Target Processing	Check how the radar processing the Non-SI targets

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A.4 The results of the survey items are as follows:

Table A-3 IC Configure Supporting Survey Results

No	Radar Models	Work with II	Target Tracking with II	Work with SI	Target Tracking with SI
1	Thales/RSM970-S	Yes	OK	Yes	OK
2	Selex/SIR-S	Yes	OK	Yes	OK
3	Indra/IRS-20MP/L	Yes	OK	Yes	OK
4	Nriet/DLD-100C	Yes	OK	Yes	OK
5	Suncreat/SCR-22SS	Yes	OK	Yes	OK
6	Jiuzhou/JZDAB01	Yes	OK	Yes	OK

Table A-2 IC Sectorized Programming Survey Results

No	Radar Models	II Prog.	II Prog. Resolution	SI Prog.	SI Prog. Resolution
1	Thales/RSM970-S	Yes	Unknown	Yes	Unknown
2	Selex/SIR-S	Yes	360/32=11.25	Yes	360/32=11.25
3	Indra/IRS-20MP/L	Yes	360/256=1.4	Yes	360/256=1.4
4	Nriet/DLD-100C	Yes	360/256=1.4	Yes	360/256=1.4
5	Suncreat/SCR-22SS	NO	NA	NO	NA
6	Jiuzhou/JZDAB01	Yes	0.022	Yes	0.022

Note: The programming resolution of Thales radar is unknown for lack of manual; the Suncreat radar doesn't support IC sectorized programming

Table A-3 Non-SI Target Processing Survey Results

No	Radar Models	Target Acquisition	*Lockout Status	Target Tracking
1	Thales/RSM970-S	Yes	Configurable	OK
2	Selex/SIR-S	Yes	No Lockout	OK
3	Indra/IRS-20MP/L	NA	NA	NA
4	Nriet/DLD-100C	Yes	Configurable	OK
5	Suncreat/SCR-22SS	Yes	Configurable	OK
6	Jiuzhou/JZDAB01	Yes	Configurable	OK

Note: The Lockout Status means whether the radar lockout the Non-SI target with 'Matching II' when working with SI and with All-Call Lockout