



*International Civil Aviation Organization*

North American, Central American and Caribbean Office (NACC)

**Fourth Eastern Caribbean Network Technical Group and Second Eastern Caribbean Radar Data Sharing Adhoc Group Meetings**

**(E/CAR/NTG/4- E/CAR/RD/2)**

Martinique, French Antilles, France, 17 to 18 June 2013

**Agenda Item 3: Radar Data Sharing Activities**  
**3.3 Radar Display Trial Results**

(Presented by France)

<b>SUMMARY</b>	
This paper presents the trial results on the French Radar Displays using Trinidad MRT (Multi Radar Tracker) data	
<b>References:</b>	
<ul style="list-style-type: none"><li>• Meeting between Trinidad and Tobago and France, Trinidad and Tobago, 9-10 April 2013</li><li>• Thirty-third Eastern Caribbean Working Group Meeting (E/CAR/WG/33) Meeting, Christ Church, Barbados from 4 to 8 June 2012.</li><li>• Twenty Fourth Meeting of Directors of Civil Aviation of the Eastern Caribbean (E/CAR/DCA/24), Martinique, France, from 2 to 5 October 2012</li><li>• Third Meeting of the Eastern Caribbean Network Technical Group (E/CAR/NTG/3) Meeting, Christ Church, Barbados, 5 to 6 June, 2012</li></ul>	
<b>Strategic Objectives</b>	<i>This working paper is related to Strategic Objectives: A. Safety – Enhance global civil aviation safety and C. Environmental Protection and Sustainable Development of Air Transport</i>

**1. Introduction**

1.1 French Civil Aviation has developed for the French Airports, a surveillance display called IRMA2000. This display software runs on a Windows PC, associated with 19 to 24 inches screen. French Civil Aviation owns the software and regularly upgrade it with new functionalities.

1.2 Martinique, Guadeloupe, and French Guyane are using these displays for radar control service. French Guyana IRMA2000 is fed with Kourou military radar (Primary and Secondary), Martinique and Guadeloupe IRMA2000 are fed by Martinique MSSR, Guadeloupe MSSR and DACOTA MRT.

1.3 IRMA2000 have been installed in Saint Lucia (Hewanorra and George CHARLES airports), and fed with Martinique MSSR and Dacota MRT.



1.4 IRMA2000 is capable of displaying several categories of Asterix format, for instance :

- a. Monoradar : Cat 1 and 2 (SSR, MSSR, PSR) or 34/48 (mode S)
- b. Multiradar MRT : Cat 30 (DACOTA)
- c. ADS-B (cat 21)

It can process Asterix data under different protocols : Serial HDLC, network MAC/LLC or UDP/IP.

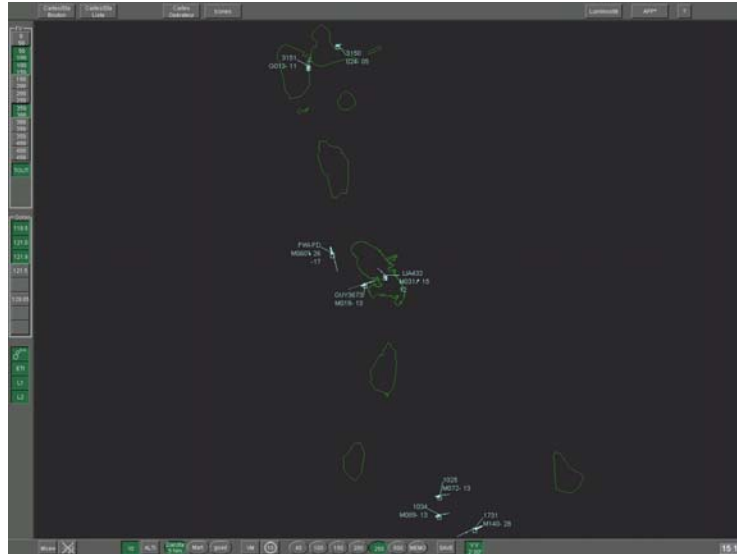
1.5 IRMA2000 is capable of processing two radar inputs at a time.

1.6 IRMA2000 last version (V7) is not yet validated for France (under testing). It is capable of processing directly MRT data in Asterix Cat 62 under UDP/IP (older versions do not).

1.7 TTCAA MRT data is Asterix Cat 62 /UDP/IP.

1.8 To promote the use of radar within ECAR, for testing available radar coverage and radar services in ECAR Region, SNA/AG has proposed to test the compatibility between IRMA2000 V7 (last version) and TTCAA MRT. In case of success, SNA/AG indicated that 10 computers (CPU only no monitor) could be delivered to States for trials. These computers and IRMA2000 software would be delivered free of charge, but States should manage providing and connecting a VGA screen.

1.9 This paper presents the trials realized and the corresponding results.



Picture 1 : IRMA 2000 radar display in Martinique, DACOTA MRT selected.

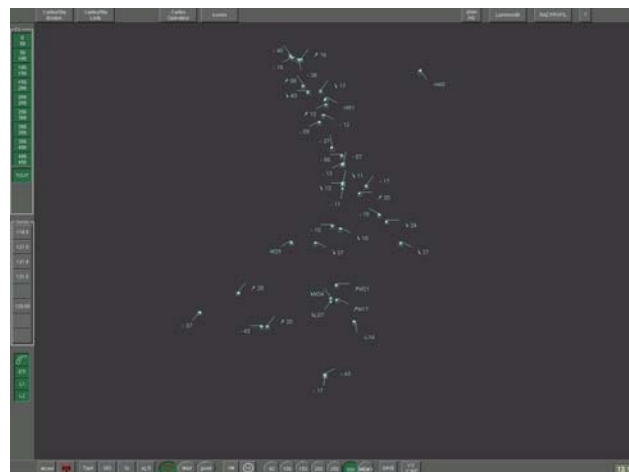
## 2. Trials carried out

2.1 IRMA2000 trials were supposed to be conducted on live traffic. Different solutions were studied to bring the data to Martinique: via ECAR V2 network or via IPLC radar link (direct link from Piarco to Martinique). The last tentative was to open a virtual circuit from the TTCAA MRT through ECAR V2 to the AISS/AMHS switch. Unfortunately, no data is received.

2.2 During a visit to Trinidad TTCAA office in April 2013, SNA/AG got from TTCAA a recorded file with TTCAA MRT data caught on the TTCAA network.

2.3 This data was replayed on our test network.

2.4 Unfortunately, data are not fully correctly displayed on our system: information is not fully decoded and displayed, even if tracks seem to be correctly plotted. Further investigation is ongoing in Toulouse, south of France, by radar engineers, where that last version of IRMA2000 V7 is being developed.



Picture 2 : IRMA2000 screen fed with TTCAA MRT :

### **3. Conclusion**

3.1 Asterix information was processed with a local analyzing tool; at that stage no anomaly was found into the Asterix data. An example of decoding is given in the **Appendix**.

3.2 Further analysis and testing with monoradar information from Trinidad and Tobago will be carried out with the IRMA2000 displays.

3.3 IRMA2000 surveillance display is not capable, in its present state, to process correctly TTCAA MRT data. There is no warranty that the problem could be solved by Toulouse technical service in charge of the software, as they have other priorities.

3.4 IRMA2000 surveillance display can process radar information coming from Martinique MSSR, Guadeloupe MSSR, or DACOTA MRT. That information can be displayed via ECAR V2 network to States closed to FWI that would like to start radar services analysis with French radar data (as for St Lucia).

### **4. Suggested Actions**

4.1 The Meeting is invited to:

- a) take in consideration SNA/AG trials done with IRMA2000 software and the fact that this software cannot process correctly the TTCAA MRT data;
- b) define actions to promote radar displaying in ECAR states via other means;
- c) take in consideration the fact that IRMA2000 software and PCs are still available for local trials (in regions closed to FWI), fed by Martinique or Guadeloupe MSSR, or DACOTA MRT;
- d) take in consideration that distributing those radar information through ECAR V2 network would be a need for these trials. Moreover, radar distribution to Saint Lucia IRMA2000 systems should be realized via ECAR V2 network; and
- e) take note of the future testing with monoradar data from Trinidad and Tobago and the possibility in using the IRMA2000 displays with this data.

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APPENDIX

APPENDIX : Example of decoding a TTCAA MRT Asterix frame.

0000	01 00 5e 09 02 fa 00 1b 21 ce 06 7d 08 00 45 00	..^.....!...}..E.
0010	01 b6 00 00 40 00 01 11 c2 ce c8 00 0a 65 e0 09	....@....e..
0020	02 fa 14 00 14 51 01 a2 66 a6 3e 01 9a bf 4d a3	....Q.. f.>...M.
0030	02 26 31 14 91 de e7 00 32 d9 f5 ff 54 fd eb 04	&1..... 2...T...
0040	21 76 19 12 a6 02 c7 03 02 01 e9 03 59 80 f0 05	!v.....Y...
0050	c8 d5 30 26 31 41 46 52 33 38 35 42 40 48 05 c8	..0&1AFR 385B@H..
0060	00 03 04 40 bf 4d a1 02 26 31 14 91 de e7 00 32	...@.M.. &1.....2
0070	92 15 ff 4d 10 98 fb 13 60 18 be 1f fe 86 00 b5	...M.....
0080	07 d7 05 17 80 f0 02 7c 04 40 bf 4d a1 02 26 31	.....  .@.M..&1
0090	14 91 de ea 00 31 eb d5 ff 4d 95 86 fb aa 27 17	.....1..M.....'
00a0	f6 f7 01 37 ff 8d 02 80 07 d1 81 01 01 02 f0 01	...7.....
00b0	28 04 40 bf 4d a1 02 26 31 14 91 de ec 00 31 86	(.@.M..& 1.....1.
00c0	d1 ff 4a a5 b7 f8 4c fb 17 85 31 02 f3 02 f1 08	..J...L...1.....
00d0	6c 06 dc 80 f0 05 c8 04 40 bf 4d a5 02 26 31 14	l.....@.M..&1
00e0	91 de ee 00 30 fa 3b ff 4f d7 88 fe 3e 90 16 d4	...0.;. o...>...
00f0	63 01 19 ff 33 00 5c 06 0c 80 f8 00 64 ff f4 04	c...3.\...d...
0100	40 bf 4d a1 02 26 31 14 91 de f0 00 30 97 93 ff	@.M..&1...0...
0110	50 1b 1a fe 8b bc 16 5e ab 00 9d 00 86 02 80 06	P.....^.....
0120	83 81 01 01 02 f0 00 38 04 40 bf 4d a1 02 26 31	.....8 .@.M..&1
0130	14 91 de f1 00 2f f8 fd ff 4f bc fc fe 1f 6e 15	...../.o...n.
0140	a1 f5 fe 94 01 bb 0d 5a 06 82 80 f0 02 30 04 40	.....Z.....0.@
0150	bf 4d a1 02 26 31 14 91 de f8 00 2e 9e 42 ff 50	.M..&1...B.P
0160	8f c8 ff 10 be 14 04 9b ff 32 ff 77 06 65 06 be	.....2.w.e.
0170	80 f0 00 50 04 40 bf 4d a5 02 26 31 14 91 de f9	...P.@.M ..&1....
0180	00 2e 3d 87 ff 51 1a b6 ff b0 5f 13 91 52 00 ff	...=.Q...R...
0190	ff ab 03 57 07 e5 80 f4 00 40 00 10 04 40 bf 4d	...W....@...@.M
01a0	a1 02 26 31 14 91 de f9 00 2e 30 58 ff 50 fe ae	..&1.....OX.P..
01b0	ff 90 21 13 81 a4 00 69 00 c0 01 1b 07 c6 80 f0	..!.....i.....
01c0	00 08 04 40	...@

3E	cat 62		
01 9A	long frame : 410 octets		
BF 4D A3 02	FSPEC :		
	<b>BF : 10111111</b>		
1	<b>I062/010</b>	Data Source Identifier	2
0	Spare		
1	<b>I062/015</b>	Service Identification	1
1	<b>I062/070</b>	Time Of Track Information	3
1	<b>I062/105</b>	Calculated Track Position (WGS-84)	8
1	<b>I062/100</b>	Calculated Track Position (Cartesian)	6
1	<b>I062/185</b>	Calculated Track Velocity (Cartesian)	4
1	<b>FX</b>	Field extension indicator	
	<b>4D : 01001101</b>		
0	<b>I062/210</b>	Calculated Acceleration (Cartesian)	2
1	<b>I062/060</b>	Track Mode 3/A Code	2
0	<b>I062/245</b>	Target Identification	7
0	<b>I062/380</b>	Aircraft Derived Data	1+
1	<b>I062/040</b>	Track Number	2
1	<b>I062/080</b>	Track Status	1+
0	<b>I062/290</b>	System Track Update Ages	1+
1	<b>FX</b>	Field extension indicator	
	<b>A3 : 10100011</b>		
1	<b>I062/200</b>	Mode of Movement	1
0	<b>I062/295</b>	Track Data Ages	1+
1	<b>I062/136</b>	Measured Flight Level	2
0	<b>I062/130</b>	Calculated Track Geometric Altitude	2
0	<b>I062/135</b>	Calculated Track Barometric Altitude	2
0	<b>I062/220</b>	Calculated Rate Of Climb/Descent	2
1	<b>I062/390</b>	Flight Plan Related Data	1+
1	<b>FX</b>	Field extension indicator	

	<b>02 : 00000010</b>		
0	<b>I062/270</b>	Target Size & Orientation	<b>1+</b>
0	<b>I062/300</b>	Vehicle Fleet Identification	<b>1</b>
0	<b>I062/110</b>	Mode 5 Data reports & Extended Mode 1 Code	<b>1+</b>
0	<b>I062/120</b>	Track Mode 2 Code	<b>2</b>
0	<b>I062/510</b>	Composed Track Number	<b>3+</b>
0	<b>I062/500</b>	Estimated Accuracies	<b>1+</b>
1	<b>I062/340</b>	Measured Information	<b>1+</b>
0	<b>FX</b>	Field extension indicator	

26 31	Data Source Identifier (SAC-SIC)	
14	Service Identification	
91 DE E7	Time Of Track Information (1/128 s)	20:44:45 TU
00 32 D9 F5		Lat : 17,877443 °
FF 54 FD EB	Calculated Track Position (WGS-84)	Long : - 60,120041 °
04 21 76 19		x : 135355 m
12 A6	Calculated Track Position (Cartesian)	y : 821587 m
02 C7 03 02	Calculated Track Velocity (Cartesian)	Vx : 177,75 m/s Vy : 192.5 m/s
01 E9	Track Mode 3/A Code	000 111 101 001 = 0751
03 59	Track Number	857
80	Track Status	Monosensor track
F0	Mode of Movement	Level - No altitude discrepancy
05 C8	Measured Flight Level	1480/4 = 370 FL
D5 30	Flight Plan Related Data	Presence of Subfield #1, 2, 4, 6, 10, 11
26 31	#1 FPPS Identification Tag (SAC-SIC)	
41 46 52 33		
38 35 42	#2 Callsign	AFR385B
40	#4 Flight Category	General Air Traffic
48	#6 Wake Turbulence Category	H = Heavy
05 C8	#10 Current Cleared Flight Level	370 FL
00 03	#11 Current Control Position	Centre = 00 / Position = 03
04	Measured Information	Presence of Subfield #6
40	#6 Report Type	Single SSR detection/ Actual target
report/		
BF 4D A1 02	FSPEC ....	Report from target transponder