

Chart 8 - The dispersal of leaflets on 9 January 1996 as reported by Cuba

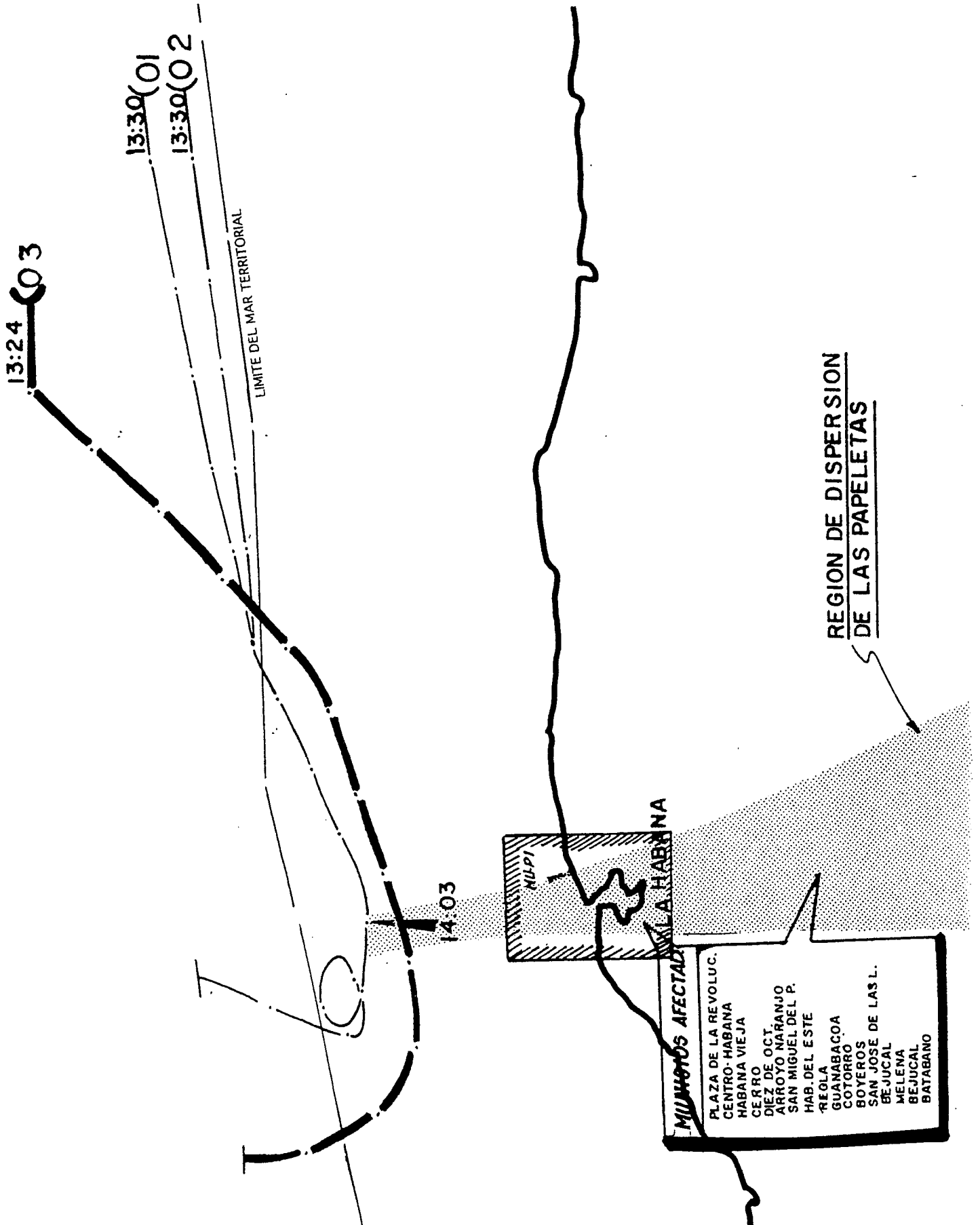


Chart 9 - The dispersal of leaflets on 13 January 1996 as reported by Cuba  
**APPENDIX E (pt. 2)**

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# COMPAÑEROS ¡NO! HERMANOS



Este es uno de los 30 Artículos de la *Declaración Universal de los Derechos del Hombre* de la cual Cuba es signataria (Naciones Unidas).

#### Artículo 19

Todo individuo tiene derecho a la libertad de opinión y de expresión; este derecho incluye el de no ser molestado a causa de sus opiniones, el de investigar y recibir informaciones y opiniones y el de difundirlas, sin limitaciones de fronteras, por cualquier medio de expresión.

Cubano ¡lucha por tus derechos!

# EL CAMBIO ¡SOY YO!

Este es uno de los 30 Artículos de la *Declaración Universal de los Derechos del Hombre* de la cual Cuba es signataria (Naciones Unidas).

#### Artículo 11

1. Toda persona acusada de delito tiene derecho a que se presuma su inocencia mientras no se pruebe su culpabilidad conforme a la ley y en juicio público en el que se le hayan asegurado todas las garantías necesarias para su defensa.
2. Nadie será condenado por actos u omisiones que en el momento de cometerse no fueron delictivos según el Derecho nacional o internacional. Tampoco se impondrá pena más grave que la aplicable en el momento de la comisión del delito.

Cubano ¡lucha por tus derechos!

2.1.3.6 In response, the Ministry of Foreign Affairs of Cuba, by Diplomatic Note dated 31 January 1996, forwarded a letter dated 15 January 1996 from the President of the IACC to the FAA Administrator with the following evidence attached:

- "1. Photocopies of Flight Plans (FPL) of aircraft N108LS and N2506.
2. Photocopy of reproduction of the video-radar obtained on 13th of January, 1996, at 18:30 UTC where it can be appreciated, close in a circle, the location within the Cuban airspace of aircraft N2506 and N108LS, whose codes SSR 1222 and SSR 1223 correspond the notified respective Flight Plans (FPL).
3. Transcription of the communications of aircraft N2506 and N108LS with Havana ATC through the commercial aircraft AAL975."

The letter continued that on 15 January 1996, the Government of Cuba had issued a public declaration giving notice that:

"...Cuba has the necessary measures to guarantee integrity of the national territory, in this way how to interrupt flights not authorized in their airspace, because violators should also be prepared to face the consequences.

Before this situation, we appeal again to this administration to adopt necessary measures to prevent occurrence of this nature to be repeated."

2.1.3.7 By Diplomatic Note dated 20 February 1996, the Department of State informed Cuba that the FAA was continuing its investigation of Mr. Basulto, who was charged with violating FARs 91.703 and 91.13, resulting from "Mr. Basulto's alleged flight on July 13, 1995 ... into Cuban airspace without permission from the Government of Cuba." Expressing the appreciation of the FAA for the information provided by Cuba, the Department conveyed a request from the FAA for certain additional information.

#### 2.1.4 **Summary of the situation in Cuba prior to 24 February 1996**

2.1.4.1 The Cuban authorities stated that as a result of the repeated violations of their airspace, they had been forced to close temporarily the international Girón corridor to civil aircraft and to restrict entry to and departure from Varadero International Airport. They further stated that on numerous occasions, the incursions into Cuban airspace had taken place in danger areas, activated and duly promulgated in accordance with international standards.

2.1.4.2 According to IACC, the overflight of Havana on 13 July 1995 was a key event leading to the events on 24 February 1996. The co-operation between IACC and FAA had been good, and according to IACC there was a certain trust in the FAA and that the FAA Administrator would resolve the situation. However, IACC alleged that the FAA enforcement actions against the Brothers to the Rescue and individual pilots were being deliberately delayed in the later part of 1995.

2.1.4.3 According to the Commander of the Anti-Aircraft Defence and the Air Force of Cuba, the overflight of Havana on 13 July 1995 was humiliating to Cuba, the Cuban people and the Air Force. He stated that the Anti-Aircraft Defence could have been much more assertive on 13 July 1995, but that the Cuban leadership thought that it was possible for the United States government to resolve the situation; that after the events of 9 and 13 January 1996 it was realized that control of the Brothers to the Rescue organization was beyond the United States government. He stated that a few days after the event

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on 13 January 1996, he was instructed that violations of Cuban territorial airspace should no longer be tolerated, and that he was authorized, if such a situation arose again, to decide personally on military interception and shooting-down, if so required.

## 2.2 Developments in the United States on 23 February 1996

2.2.1 According to authorities in the United States, the "Concilio Cubano, an umbrella human rights organization in Cuba" had been denied permission by the Cuban government to hold a public meeting planned for 24 February 1996; the Brothers to the Rescue had publicly stated their support for the Concilio Cubano and had filed an application with the Department of Treasury for a licence to send financial assistance to the group.

2.2.2 In the early afternoon of 23 February 1996, the Department of State's Office of Cuban Affairs contacted the FAA's Office of International Aviation (FAA/AIA), to indicate that "because of crackdown against dissidents in Havana the BTTR [Brothers to the Rescue] might attempt a flight to demonstrate solidarity with dissidents and in defiance of the Cuban government during the following day(s)." The Department of State also indicated that "information suggests that the Cubans are in a 'rough mood'."

2.2.3 The FAA/AIA then sent, at 14:40 hours on 23 February 1996, a message via electronic mail to FSDO, FAA in Miami and to FAA Headquarters, as follows:

"... The Government of Cuba's crackdown on dissidents has resulted in a number of arrests (in Havana) and the cancellation of a meeting that was to have been convened by the umbrella dissident organization 'Concilio Cubano' tomorrow.

We have received a call from the State Department indicating that since Brothers to the Rescue (BTR) and its leader Basulto support and endorse the Concilio Cubano, it would not be unlikely that the BTR attempted an unauthorized flight into Cuban airspace tomorrow, in defiance of the GOC and its policies against dissidents. State Department cannot confirm that this will happen and is in touch with local law enforcement agencies to better determine what is the situation. I've reiterated to State that the FAA cannot PREVENT flights such as this potential one, but that we'll alert our folks in case it happens and we'll document it (as best we can) for compliance/enforcement purposes.

State has also indicated that the GOC would be less likely to show restraint (in an unauthorized flight scenario) this time around ..."

FSDO was requested to convey the above message to the military liaison officer at Miami ARTCC.

2.2.4 The military liaison officer received this message at 18:00 hours. He then briefed the Miami ARTCC shift supervisor and military liaison officer on duty of the "potential activity for the following day." According to the authorities in the United States: "The specifics of the briefing were that the Miami AIFSS and Opa Locka Tower were to be advised to co-ordinate all flight plans and departure time information with the Watch Supervisor; the Watch Supervisor and/or the Military Liaison Specialist were to track the Brothers to the Rescue transponder codes as long as possible, take detailed notes and advise other facilities (DAICC, NORAD, etc.) of the activity." The military liaison officer then called DAICC (Customs facility in California) supervisor, briefed him on the potential Brothers to the Rescue activity and requested their assistance. Furthermore, the manager of FSDO in Miami requested that the B94 aerostat radar balloon at Cudjoe Key, Florida, to be "put up".

### 2.3 **Events on 24 February 1996**

#### 2.3.1 **Situation in Cuba on 24 February 1996**

2.3.1.1. According to the Commander of the Anti-Aircraft Defence and the Air Force of Cuba, 24 February 1996 was a special day, the one hundred and first anniversary of the Cuban War of Independence. There were carnivals and several other large public activities in Havana. The Brothers to the Rescue group had announced support for counter-revolutionary activities, and hence the Commander went to the command centre. At about 09:40 hours flight plan messages were received for flights by the Brothers to the Rescue aircraft. From 10:16 hours three unidentified aircraft violated at various moments Cuban territorial airspace and activated danger areas. No SSR transponder codes were seen on radar for these aircraft. The Commander further stated that he ordered military interceptor aircraft to take-off and to persuade the unidentified aircraft to withdraw, and that when the unidentified aircraft saw the MiGs, they withdrew. Two MiGs stayed north of Havana until the unidentified aircraft retired to the north, and the MiGs returned to base at 11:30 hours. By noon, three new flight plan messages for flights by the Brothers to the Rescue aircraft were received, and the Commander decided to stay in the command centre.

2.3.1.2 According to the authorities in the United States, their radar did not record any Cuban military aircraft activity, nor any unidentified aircraft, north of Havana between 10:12 and 11:30 hours. According to the authorities in the United States, they had no evidence that any Brothers to the Rescue aircraft departed from the United States in the morning of 24 February 1996. The Brothers to the Rescue confirmed that they had no flights that morning. However, United States radar recorded Cuban military aircraft activity north of Havana between 12:15 and 12:45 hours. According to the authorities in Cuba, no such activity took place at that time.

#### 2.3.2 **Situation in the United States on 24 February 1996**

2.3.2.1 According to the authorities in the United States, the Office of Cuban Affairs at the Department of State requested, through the FAA Operations Center, Washington, D.C., Miami ARTCC and Miami AIFSS, information on the departure of Brothers to the Rescue aircraft. Opa Locka TWR confirmed to Miami AIFSS at 13:08 hours that three Brothers to the Rescue aircraft had taxied out for departure, and confirmed to Miami ARTCC at 13:15 hours that the three aircraft had departed and were just north of the airport. Opa Locka TWR was requested to inform Miami ARTCC if any additional Brothers to the Rescue aircraft departed. In addition, other agencies, including Customs had been notified. According to the authorities in the United States, any incursions into Cuban airspace were to be documented for compliance/enforcement purposes.

#### 2.3.3 **The flights of N2456S, N5485S and N2506**

##### 2.3.3.1 **General**

2.3.3.1.1 The movements of N2456S, N5485S and N2506, from 14:50 to 15:46 hours on 24 February 1996, were assessed from the following records: radar data provided by Cuba, in the form of plots from four air defence radar stations and an integrated plot; CARIBROC, NORAD's SEAD sector and Miami ARTCC radar data provided by the United States; recordings of the Cuban military radio communications provided by Cuba and the United States; recordings of radio communications provided by Havana ACC and Miami AIFSS; recordings of radio communications between the Cessnas, other civil radio communications and the intercom onboard N2506; statements by eyewitnesses, particularly from

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the *Majesty of the Seas* and the *Tri-Liner*; statements by the Cuban military pilots involved; and statements by the occupants of N2506.

2.3.3.1.2 Prior to 15:00 hours the Cessna aircraft were north of the 24N parallel and heading west. All three Cessnas called Havana ACC, reported that they were about to enter the Havana FIR and gave their transponder codes.

#### 2.3.3.2 The flight of N2456S

2.3.3.2.1 At 14:57 hours N2456S called Havana ACC and reported crossing the 24N parallel in 5 minutes. The Cuban air defence radar data showed that at 15:00 hours N2456S was already south of the 24N parallel, within the MUD-9 danger area, at position 23 41N 082 07W; N2456S continued south from that position, entered Cuban territorial airspace at 15:07 hours, and turned southwest. The United States radar data showed that N2456S crossed the 24N parallel at approximately 15:00 hours and headed south, between 082 20W and 082 40W, through the MUD-8 and MUD-9 danger areas towards the city of Havana.

2.3.3.2.2 At 15:17 hours N2456S had an exchange with N2506 about a "boat" ahead of N2506 which N2506 then reported overflying. There was no further radio communication recorded between N2456S and either Havana ACC or the other Cessnas.

2.3.3.2.3 The Cuban radar data showed that N2456S continued in a southwesterly direction until it was shot down at about 15:21 hours. The United States radar data showed that N2456S reached a southernmost point at 15:19 hours at 23 22.2N 082 30.0W (about 2 NM outside Cuban territorial airspace), with the Mode C altitude response indicating 1 500 ft. This position was 12.8 NM south of the planned easterly search track (23 35N) of that aircraft.

2.3.3.2.4 At approximately 15:18 hours the Cuban MiG-29 was attempting to identify a small aircraft, which it had had in sight for about a minute and which the military ground control had indicated as being 25km (13 NM) north of Santa Fe. The MiG-29 pilot reported that the colour was white and blue and that he was going to give it a warning pass. According to the radio communications record provided by the United States, the pilot also reported that there were some vessels in the area. When interviewed by the ICAO team, the MiG-29 pilot was specific about his warning manoeuvre and stated that the Cessna took no notice but continued towards Havana at an altitude of 270 m. He described the warning manoeuvre as a "combat turn"; he approached close on the left side of the Cessna and turned sharply to the right, above and ahead of it. Authorization to the MiG-29 pilot to destroy the Cessna was given by the military ground control at 15:19 hours and repeated several times. At 15:20 hours the MiG-29 pilot reported a missile locked-on and that the small aircraft was a Cessna 337. The MiG-29 pilot launched a missile from a position on the right quarter at a range of 2 to 2.5 km.

2.3.3.2.5 There was no record in the radio communications between the Cessnas that the pilot of N2456S had reported seeing a MiG, nor that a MiG had manoeuvred close to N2456S. It was reasonable to expect that such an encounter would have been reported to the other Cessnas. The tape recorder in N2506 was recording at that time.

2.3.3.2.6 The United States radar data showed that N2456S moved north from its southernmost position and continued north at an altitude of 1 500 ft, until destroyed at position 23 25.8N 082 25.6W at 15:22 hours. It was not possible to determine the movements of the MiG-29 from the United States radar data other than an initial approach from the west immediately prior to the shoot-down.

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2.3.3.2.7 The Cuban authorities provided a time and position for the shoot-down of N2456S of about 15:21 hours at 23 09.4N 082 32.6W, 5 NM north of Baracoa. The United States authorities provided a time and position for the shoot-down of N2456S of 15:22 hours at 23 25.8N 082 25.6W, 5 NM outside Cuban territorial airspace.

2.3.3.2.8 The shoot-down of N2456S was observed by the crew of the fishing boat *Tri-Liner* to have occurred almost overhead their boat. The shoot-down was observed by the crew of the cruise ship *Majesty of the Seas* at 15:23 hours on a bearing of 115°T at a range of 6 to 7 NM, near a boat that they were monitoring. The position of the cruise ship at 15:23 hours was 23 30.9N 082 35.1W; plotting the bearing and distance observed gave a position for the shoot-down of N2456S at 23 29N 082 28W, 8.7 NM outside Cuban territorial airspace.

2.3.3.2.9 According to the transcript of military radio communications provided by the United States, the pilot of the MiG-29, immediately after calling the military ground control to mark his position as the position of the shoot-down, reported that there was a "lancha" (*launch*) near the impact site.

2.3.3.2.10 The occupants of both N2506 and N5485S saw smoke and a "flare" and were aware of MiGs in the area. The occupants of both Cessnas tried repeatedly to contact N2456S.

### 2.3.3.3 The flight of N5485S

2.3.3.3.1 At 14:56 hours N5485S called Havana ACC and reported crossing the 24N parallel with the intention of remaining in the area for 5 hours. N5485S crossed the 24N parallel heading south, between 082 20W and 082 40W, at approximately 15:00 hours. This heading put the aircraft on a course towards the city of Havana, through the MUD-8 and MUD-9 danger areas. SSR Mode C responses recorded by United States radar indicated that N5485S was at an altitude of 1 100 ft.

2.3.3.3.2 At 15:18 hours N5485S called N2506, reported that he had reached 23 28N 082 29W and asked if he should wait in that position. At 15:19 hours N5485S reported that he was going to stay around 082 30W, but did not give a latitude. The Cuban radar record showed that N5485S reached its southernmost point at 15:21 hours, approximately 4 NM north of Havana. The United States radar data showed N5485S at its southernmost point at 23 25.1N 082 29.7W at 15:17 hours, 4.5 NM outside Cuban territorial airspace and 4.9 NM south of its intended eastbound search track (23 30N).

2.3.3.3.3 The United States radar data showed that at the time N2456S was shot down N5485S was about 3 NM to the north of N2456S, and heading south. N5485S then moved to the north and was seen circling close to the *Majesty of the Seas* and the *Tri-Liner*. SSR Mode C responses indicated that N5485S was at an altitude of about 100 ft.

2.3.3.3.4 At 15:23 hours the pilot of the MiG-29 reported that he had another small aircraft in sight and at 15:24 hours he reported that it was heading 090°. At 15:25 hours the MiG-29 was authorized to destroy the second aircraft. When interviewed by the ICAO team, the MiG-29 pilot stated that he had made a warning pass on the second aircraft, in the same manner as for the first aircraft, and that the pilot took no notice but continued his flight towards Havana. The MiG-29 then turned behind N5485S and fired a missile from a position on the right rear quarter of the Cessna.

2.3.3.3.5 The pilot of N5485S had reported seeing MiGs and a "flare" and smoke (from the destruction of N2456S). There is no record of his reporting a warning pass by a MiG on his aircraft. Again, it was reasonable to expect that such an encounter would have been reported to N2506. There



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was a record of several exchanges between N5485S and N2506 in the few minutes prior to the shoot-down of N5485S, as well as many attempts to contact N2456S.

2.3.3.3.6 The Cuban authorities provided a time and position for the shoot-down of N5485S of 15:25 to 15:27 hours at 23 11.0N 082 34.1W, 6 NM north of Havana. The United States authorities provided a time and position for the shoot-down of N5485S of 15:28 hours at 23 30.2N 082 27.1W, 10 NM outside Cuban territorial airspace.

2.3.3.3.7 The crew of the *Tri-Liner* had observed a small aircraft circling in their vicinity. When this aircraft was north of their position, they observed a military aircraft approach the small aircraft from behind, fire a missile, and destroy it. The crew of the *Tri-Liner* stated that this had occurred 3 to 5 NM ahead of the cruise ship that they had in sight. The crew of the *Majesty of the Seas* had observed a small aircraft at 15:27 hours on a northerly course; it approached them weaving back and forth and then turned back to a northerly course. Two minutes later, at 15:29 hours, when the ship was at 23 31.4N 082 33.5W, they saw the aircraft on a bearing of 095°T at 4 to 5 NM. At the same time they saw a military jet, high on their starboard side, fire a missile which destroyed the small aircraft. N5485S had moved east in the last two minutes of flight and was due north of the *Tri-Liner* when it was shot down. A plot of the bearing and distance from the cruise ship gave a position for the shoot-down of N5485S at 23 30.1N 082 28.6W, 10 NM outside Cuban territorial airspace.

2.3.3.3.8 The occupants of N2506 saw what they reported as another flare and another ball of smoke and immediately tried to call both N2456S and N5485S. They also saw, to their left, what they reported as a big boat and a smaller one which appeared to be approaching the smoke.

2.3.3.3.9 The United States radar data showed N5485S to have been on an easterly track when it was shot down.

2.3.3.3.10 According to the transcript of the military radio communications provided by the United States, the MiG-29 pilot reported at 15:25 hours that there was a fishing boat in the area; at 15:30 hours he reported that there was a large passenger boat close to the area, on a course of approximately 90° and that the event was to the right of that boat.

#### 2.3.3.4 **The flight of N2506**

2.3.3.4.1 The pilot of N2506 called Havana ACC, when still north of the 24N parallel, and reported his intentions. Havana ACC replied that N2506 was entering active danger areas. N2506 crossed the 24N parallel heading south, between 082 20W and 082 40W, at approximately 15:00 hours. This heading put the aircraft on a course towards the city of Havana, through the MUD-8 and MUD-9 danger areas. At 15:17 hours N2506 had an exchange with N2456S about a "boat" in their area which N2506 reported overflying and which was seen by the occupants of N2506 to their left. SSR Mode C responses recorded by United States radar indicated that N2506 was at a low altitude.

2.3.3.4.2 The Cuban radar record showed that N2506 reached its southernmost point at 15:19 hours, approximately 4 NM north of Havana. The United States radar data showed N2506 at its southernmost point at 23 18.6N 082 25.6W at 15:20 hours, about 1.5 NM inside Cuban territorial airspace and 6.5 NM south of the intended eastbound search track (23 25N). When interviewed by the ICAO team, the pilot of N2506 maintained that the aircraft was not inside Cuban territorial airspace. Both the Cuban and the United States radar data showed that after having reached its southernmost point, N2506 headed northeast maintaining that heading for the next six minutes. Just after turning northeast, at approximately 15:20 hours, the pilot of N2506 called Havana ACC, passed a greeting message and

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said that he was 12 NM north of Havana. When interviewed by the ICAO team, the pilot of N2506 maintained that he had been flying an easterly search track for some ten minutes before turning to the north.

2.3.3.4.3 At 15:21 hours there was an indication on the intercom in N2506 that the occupants saw a Cuban MiG in their area and assessed that the MiG would shoot. Immediately after this, the occupants of N2506 saw what they described as a flare and had other sightings of MiG aircraft. N2506 was approximately 5 NM southeast of N2456S when N2456S was shot down. Still heading northeast, N2506 established radio contact with N5485S, exchanged warnings about MiGs and repeatedly tried to contact N2456S. Just prior to 15:24 hours, N2506 gave a position of 23 25N 082 20W. At 15:27 hours the pilots of N2506 and N5485S discussed their earlier observation of smoke, a flare and a MiG, and confirmed that there was no contact with N2456S. At approximately 15:28 hours N2506 turned left to a northwesterly heading at about the same time that N5485S was shot down about 10 NM to the west. The occupants of N2506 saw another flare and another ball of smoke and continued to call N2456S and N5485S. United States radar data indicated that N2506 was very low (at about 100 ft) at that time.

2.3.3.4.4 When interviewed by the ICAO team, the occupants of N2506 stated that they again saw the cruise ship on their left and a smaller boat which was heading towards the smoke. At 15:30 hours, as recorded on the intercom, one of the occupants suggested that they should fly to one of the vessels in sight and contact it by radio to ask it to investigate the smoke. The pilot and the other occupants of N2506 realized then that something was wrong and decided to leave the area. The pilot stated that he climbed into the scattered cloud layer between 3 000 and 5 000 ft, switched off the SSR transponder and did not use the radio. According to the United States radar records, N2506 continued to the northwest and from 15:33 hours there were no Mode C returns. The Mode C returns were again received at 15:42 hours and gave an altitude of 2 900 ft. Both the Cuban and the United States radar data showed that by 15:46 hours N2506 was north of the 24N parallel and still heading northwest. N2506 subsequently returned to Opa Locka and landed at 17:08 hours.

#### 2.3.4 Cuban military radio communications

##### 2.3.4.1 General

2.3.4.1.1 Radio communications between the Cuban military interceptors, SAR helicopters and their ground control had been recorded by Cuba, as well as by the United States. The transcripts of these recordings and their translation into English provided the basis for an analysis. The recordings were digitized, which facilitated precise measurements of time between recorded transmissions, simplified the verification of the transcripts, and permitted a limited analysis of the sound spectra.

##### 2.3.4.2 Recording provided by Cuba

2.3.4.2.1 Cuba provided the original tape of the recording of the radio communications between the military interceptors and their ground control, a cassette tape copy of this recording and the recorder on which the original recording had been made.

2.3.4.2.2 The original tape was checked and no physical damage was found. The digitized copy of the original tape was compared to the digitized copy of the cassette tape. Parts of the recording were very noisy, voices were frequently distorted and some transmissions transcribed could not be detected. However, these differences were deemed not significant.

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2.3.4.2.3 The transcript provided by Cuba covered the time period from 15:08:24 to 15:51 hours. Except for the starting time (15:08:24), time references were in full minutes only. Time references in seconds were derived by measuring the elapsed time of the recording on the digitized copy.

#### 2.3.4.3 **Recording provided by the United States**

2.3.4.3.1 On 3 and 4 June 1996, the ICAO team analyzed the original tape as recorded by the United States of the radio communications between the Cuban military aircraft and their ground control. The recording covered the time period from 15:00 to 16:30 hours.

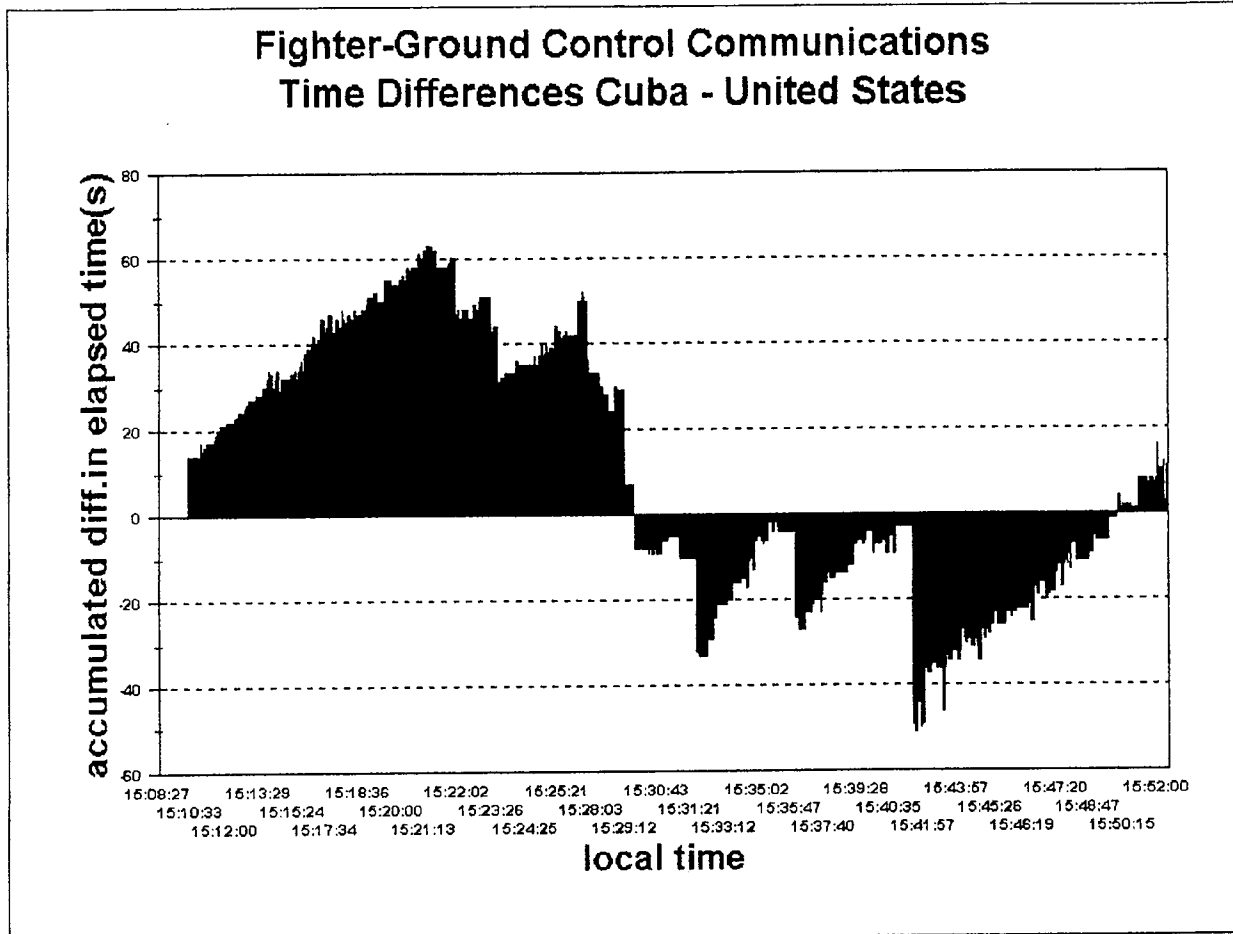
2.3.4.3.2 The original tape comprised 4 tracks; one track contained the recorded sound and another a coded time signal. The time in seconds for each transmission was read from a time signal decoder. The time references in the transcript were verified.

2.3.4.3.3 The recording was digitized and compared to the transcript; no significant differences were found. In general, the quality of the recording was good. Transmissions by the aircraft were mostly loud and clear. Transmissions by the ground control were significantly fainter.

#### 2.3.4.4 **Differences between the recordings**

2.3.4.4.1 Significant differences were noted between the recording provided by Cuba and the recording provided by the United States. Several transmissions in the recording provided by the United States could not be found in the recording provided by Cuba.

2.3.4.4.2 Tests were carried out to determine if it was possible that these transmissions were not recorded because of other radio communications being recorded at the same time. The elapsed time from a common starting point of the radio communications ("Al Norte") was calculated for each radio transmission. The elapsed time on the recording provided by Cuba was compared with the elapsed time of the recording provided by the United States.



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2.3.4.4.3 The elapsed time of all matching radio transmissions on the recordings provided by Cuba and by the United States was calculated. The above graph shows the accumulated difference in elapsed time. The accumulated difference increased when a longer elapsed time was measured on the Cuban recording as compared to the recording provided by the United States, and decreased when a longer elapsed time was measured on United States recording.

2.3.4.4.4 At 15:52 hours, the end of the analyzed recording, the graph shows that a difference of only about 10 seconds existed between the two recordings. A small, continuous increase or decrease in the difference in the elapsed time of the two recordings would not, by itself, be a cause for concern.

2.3.4.4.5 From 15:08 to 15:22 hours, the accumulated difference in elapsed time increased to one minute. The graph shows an almost straight line indicating a linear relationship between the speed of the recordings provided by Cuba and by the United States. The accumulated difference in elapsed time then drops to 47 seconds. Similar significant discontinuities in the accumulated difference were found in six other places. All significant discontinuities in the accumulated difference in elapsed time corresponded to significant differences in the transmissions recorded by Cuba and those recorded by the United States. These discontinuities are analyzed in detail below.

2.3.4.4.6 Discontinuity at 15:21 hours. The duration of the Cuban recording of this segment was 3 seconds; the duration of the same segment of the United States recording was 16 seconds, a difference of 13 seconds. References to a launch contained in the United States recording were not found in the Cuban recording.

Time Cuba	Time US	Cuba	United States
15:21:57	15:22:23	CORRECTO, CORRECTO <i>Correct, correct</i>	CORRECTO <i>Correct</i>
			HAY UNA LANCHA CERCA DE ELLA. LA AVIONETTA CAYO CERCA DE ELLA  <i>OK. There's a launch near it. The aircraft fell near the launch.</i>
15:22:00	15:22:39	OYE, MARCARON EL LUGAR PARA IRNOS  <i>Hey, did you mark the place, so we can leave?</i>	OYE, MARCARON EL LUGAR PARA IRNOS  <i>Listen, they marked the spot so we can go.</i>

2.3.4.4.7 Discontinuity at 15:22 hours. The duration of the Cuban recording of this segment was 33 seconds; the duration of the same segment of the United States recording was 41 seconds, a difference of 8 seconds. References to a launch contained in the United States recording were not found in the Cuban recording.

Time Cuba	Time US	Cuba	United States
15:22:53	15:23:28	FIJATE, VAMOS A TREPAR ALTURA 3200-4000 M POR ENCIMA DEL OBJECTIVO DESTRUIDO AHI... Y MANTENGA VELOCIDAD ECONOMICA  <i>Listen, let us climb to height 3200 to 4000 m above the contact destroyed there, and maintain economic speed.</i>	SI RESERVAMOS A TREPAR ALTURA 3200-4000 M POR ENCIMA DEL OBJECTIVO DESTRUIDO AHI Y MANTENGA VELOCIDAD ECONOMICA  <i>OK, climb to 3200, 4000 meters above the destroyed target and maintain economic speed.</i>
		2972, ANTONIO	OYE, LA LANCHA PARECE QUE GIRO PARA AHI.  <i>Hey, it looks like the launch turned towards there.</i>
		72, ANTONIO	LA LANCHA GIRO PARA AHI, OISTES  <i>The launch turned toward there, got it?</i>
			LA LANCHA GIRO PARA DONDE ESTABA. PARA DONDE GIRO EL OBJECTIVO  <i>The launch turned to where the target was, where it fell.</i>
		08,CISNE-2	08, CISNE-2
15:23:26	15:24:09	ADELANTE  <i>Come in</i>	ADELANTE  <i>Go ahead</i>

2.3.4.4.8 Discontinuity at 15:28 hours. The duration of the Cuban recording of this segment was 3 seconds; the duration of the same segment of the United States recording was 17 seconds, a difference

of 14 seconds. References to a ship contained in the United States recording were not found in the Cuban recording. The transmission on the United States recording ("En el lugar....") would have had to fit into an interval of 0.2 seconds in the Cuban recording.

Cuba time	US time	Cuba	Unites States
15:27:56	15:28:32	OK, EL 08 TINE EL UNO 12 YA <i>OK, 08 has 1200 already</i>	TIENE EL UNO EN 12 YA <i>The one has 12 now</i>
			EN UNO 12
			EN EL LUGAR DE LOS HECHOS ESTA EL BARCO RECOGNIENDO AHI PARECE. UN BARCO RECOGNIENDO.. EN LA PRIMERA. <i>In the place where events took place, it looks like the boat is picking up now. A boat is picking up...in the first...</i>
15:27:59	15:28:49	EL UNO 12 REGRESANDO <i>One 12 returning</i>	EN LA PRIMERA ESTA RECOGNIENDO UN BARCO. EL UNO 12 REGRESANDO <i>A boat is picking up in the first...the one 12, returning...</i>

2.3.4.4.9 Discontinuity at 15:29 hours. The duration of the Cuban recording of this segment was 28 seconds; the duration of the same segment of the United States recording was 1 minute and 13 seconds, a difference of 45 seconds. References to a ship contained in the United States recording were not found in the Cuban recording.

Cuba time	US time	Cuba	United States
15:29:05	15:30:02	08, HAGA CONTACTO CON EL 2972, Y DIRIJALO MAS O MENOS AL LUGAR <i>08, contact 2972 (SAR) and lead him to the place more or less.</i>	08, HAGA CONTACTO CON EL 2972, Y DIRIJALO MAS O MENOS AL LUGAR <i>Contact 2972 and direct the...to the location.</i>
		2772,08	2972, 08
			"OCA, HAY UN BARCO GRANDE DE PASAJEROS, DE PASAJEROS, QUE ESTA CERCA DE LA ZONA. ES DECIR EL BARCO VA CON RUMBO 90 APROXIMADAMENTE. Y ESO QUEDA A LA DERECHA DEL BARCO ESE, DEL BARCO GRANDE" <i>OK. There is a large passenger boat that is close to the zone. That is, the boat is going on a course of 90 approximately. And that is to the right of that boat, the big boat.</i>
		ESTAMOS CHEQUEANDO, MAS O MENOS, MENELAO MORA, AQUI EN LA ZONA DE PLAYA BARACOA <i>We are checking, more or less, Menelao Mora, here in the Baracoa Beach area.</i>	ENTERADO, NOSOTROS ESTAMOS CHEQUEANDO, MAS O MENOS, MELELAO MORA, AQUI EN LA ZONA DE PLAYA BARACOA <i>Understood. We are checking more or less Menelao Mora here in the zone of Playa Baracoa.</i>
		ESTA BIEN <i>Roger</i>	

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		ANTONIO, .... ,ANTONIO, 08	
		ADELANTE <i>Come in</i>	
			<p>ROMPE 360 Y BUSCA EL BARCO, EL BARCO GRANDE Y A LA DERECHA DEL BARCO ANTES DE LLEGAR AL BARCO GRANDE ESTA EL OBJETIVO. NO VALLAN MUY BAJITO. NO TE APROXIMES DEBAJO. TEN CUIDADO QUE EN LA ZONA DE DONDE CAYO LA PRIMERA HAY UN OBJETIVO.. UN BARCO. TEN EN CUENTA ESO. TEN CUIDADO CON ESO.</p> <p><i>Go to 360 and look for the boat, the big boat, and to the right of the boat, before you get to the big boat, is the target. Don't go too low. Don't approach it low. Be careful, in the zone where the first one fell there is a target a boat. Take it into account. Be careful of it.</i></p>
			<p>ENTERADO</p> <p><i>Understood</i></p>
15:29:33	15:31:07	<p>HACE FALTA QUE DESPEGUE UN RAPIDO PARA LA REGION.</p> <p><i>A fast one must take off for the area.</i></p>	<p>HACE FALTA QUE DESPEGUE UN RAPIDO PARA LA REGION.</p> <p><i>A rapid ... needs to take off for the region.</i></p>

2.3.4.4.10 Discontinuity at 15:31 hours. The duration of the Cuban recording of this segment was 35 seconds; the duration of the same segment of the United States recording was 1 minute and 2 seconds, a difference of 27 seconds. References to ships contained in the United States recording were not found in the Cuban recording.

Cuba Time	US Time	Cuba	United States
15:30:54	15:32:25	HAY UN BARCO AHI AL NORTE DE LA ACADEMIA NAVAL A UNOS 5 KILOMETROS  <i>There is a ship over there, west of the naval academy about 5 km.</i>	TENGO UN BARCO AHI AL NORTE DE LA ACADEMIA NAVAL A UNOS 5 KILOMETROS, GRANDE.  <i>I have the vessel there north of the academy, about 5 km. from the naval academy, large.</i>
			PERO ES UN BARCO IMENSO, BLANCO DE PASAJEROS  <i>But it is a very large vessel, white, passenger type</i>
			CORRECTO  <i>Correct</i>
			NO ESTA A 5 KILOMETROS, ES LEJOS.  <i>That is not at 5 km, it is far out.</i>
		45, ANTONIO,... ,ARRANQUE, TAXEO Y DESPEGUE  <i>45, Antonio...start up, taxi and take-off</i>	
		2908, HAGA CONTACTO CON EL 2972 PARA VER POSICION  <i>2908 contact 2972 (SAR) to check position.</i>	HAGA CONTACTO CON 2L 2972 A VER LA POSICION.  <i>Make contact with 2L 2972 to check the position.</i>
		2972, ANTONIO, EHH 08  <i>2972, Antonio...uh...08</i>	
		08 TENGO EL OBJETIVO A LA VISTA, TENGO EL OBJETIVO  <i>08, I've got a target in sight, I've got the target.</i>	08 TENGO EL OBJETIVO A LA VISTA, TENGO EL OBJETIVO  <i>I have the target in sight, I have the target</i>
		08, ANTONIO	COPIADO, HAY UNA LANCH AHI QUE ESTA RECONGIENDO AHI  <i>Copied, there is a launch there that is picking up.</i>
			OYE, ESTOS A UNOS 10 KILOMETROS DEL OBJETIVO  <i>Listen, I am about 10 km from the target</i>



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			<p>ESO ES CORRECTO. O SEA EL BARCO GRANDE TE VA SENALAR MAS O MENOS A LA DERECHA Y UN POQUITO ANTES DE LLEGAR AL BARCO ESTA UN BARCO CHIQUITO AHI DONDE ESTA, DONDE CAYO LA PRIMERA</p> <p><i>That is correct. That is, the large vessel is going to signal you, more or less to the right and a little before you reach the large vessel there is a small vessel there where it is, where the first fell.</i></p>
			<p>NO PERO ESTOY CON RUMBO DE 320 DE ..</p> <p><i>No, but I am on course 320 from...</i></p>
		<p>ADELANTE</p> <p><i>Come in</i></p>	<p>ADELANTE</p> <p><i>Go ahead</i></p>
		<p>EL 45 YA VA PARA ALLA</p> <p><i>45 is headed over there</i></p>	
		<p>RECIBIDO</p> <p><i>Roger</i></p>	<p>RECIBIDO.</p> <p><i>Roger</i></p>
		<p>EL 08, ME ENCUENTRO AL SUR DE BOYEROS</p> <p><i>I'm south of Boyeros</i></p>	<p>ME ENCUENTRO AL SUR DE BOYEROS</p> <p><i>I am south of Boyeros</i></p>
		<p>ALTURA?</p> <p><i>Height?</i></p>	<p>ALTURA?</p> <p><i>Altitude?</i></p>
15:31:29	15:33:27	4500 M	4500 METROS.

2.3.4.4.11 Discontinuity at 15:35 hours. The duration of the Cuban recording of this segment was 42 seconds; the duration of the same segment of the United States recording was 1 minute and 2 seconds, a difference of 20 seconds. References to ships contained in the United States recording were not found in the Cuban recording.

Cuba time	US time	Cuba	United States
15:35:38	15:37:08	YA TIENES EL OBJETIVO <i>You have the target</i>	YA TIENE EL OBJETIVO <i>Do you have the target?</i>
		NEGATIVO. <i>Negative.</i>	NEGATIVO, ESTOY A UNOS 5 KILOMETROS, A UNOS 3 KILOMETROS DEL BARCO DE TRANSPORTE BANCO CON RUMBO 330 AL MOMENTO <i>Negative, I am at about 5 km, about 3 km from the white transport vessel on course 330 at this time</i>
		ENTERADO. <i>Roger</i>	ENTERADO. APROXIMANDOSE AL BARCO DE TRANSPORTE AHORA <i>Understood, you are approaching the transport vessel now</i>
			HAY UN BARCO MAS CHIQUITO ES ESA ZONA, DICELO QUE ES EL DE.. <i>There is a smaller vessel in that zone, tell him it is the one...</i>
			CORRECTO, AL SUR DEL BARCO GRANDE HAY UNO MAS CHIQUITO DE COLOR CARMELITA <i>Correct, to the south of the large vessel is a smaller brown one</i>
			ES AHI DONDE ESTAN, AHI DONDE ESTAN. AHI DONDE CAYO LA PRIMERA AHI ES DONDE ESTA EL BARCO <i>That is where they are, there where they are. There where the first (one) fell is where the vessel is</i>
		DEME UN CHANCE PARA ATERIZAR LOS CAZAS. DEMEN UN CHANCE. <i>Give me a chance to land the fighters. Give me a chance.</i>	
		EN POSICION DE FLAPS. <i>In flaps position.</i>	
		CONTINUE <i>Carry on</i>	
		EL 22, ME DIRIJO AL NORTE DE CELIMAR <i>22, I'm heading north of Celimar</i>	
15:36:20	15:38:10	ALTURA 45 <i>45, Height?</i>	ALTURA <i>Altitude?</i>

2.3.4.4.12 Discontinuity at 15:40 hours. The duration of the Cuban recording of this segment was 36 seconds; the duration of the same segment of the United States recording was 1 minute and 22 seconds, a difference of 46 seconds. References to ships contained in the United States recording were not found on the Cuban recording.

Cuba time	US time	CUBA	UNITED STATES
15:40:49	15:42:18	COPIADO, 360 EN 3 MINUTOS <i>Copy, 360, 3 min.</i>	COPIADO, 360 EN 3 MINUTOS <i>Copied, 360 for three minutes</i>
		PONTE COMODO...PONTE COMODO PARA QUE LE BUSQUES <i>Make yourself comfortable...make yourself comfortable to search for it</i>	NO TE <i>I do not...you</i>
			PREGUNTELE AL 2972 EL ... OBJETIVO <i>Ask 2972 the...target</i>
			TENOMOS EL BARCO A LA VISTA <i>We have the vessel in sight</i>
			EL BARCO, PERO EL CHIQUITO O EL GRANDE, EL CHIQUITO O EL GRANDE <i>The vessel, but the small one or the large one?</i>
			EL BARCO GRANDE, UN BARCO GRANDE <i>The large vessel, a large vessel</i>
			ENTERADO, AHORA USTEDES TIENEN A LA VISTA EL BARCO GRANDE <i>Understood, now you have the large vessel in sight</i>
			ES UN TRANSPORTE <i>It is a transport</i>
			ES UN BARCO DE TRANSPORTE, ESTAN CERCA <i>It is a transport vessel, they are close</i>
		FIJATE 45. DESPUES DE VOLAR 3 MIN VAMOS A HACER UN PATRON AHI POR LA DERECHA, AHI POR LA DERECHA <i>Pay attention 45, after flying 3 min., we will make a pattern there to the right, there to the left.</i>	DESPUES DE VOLARLO A LOS 30 MINUTOS QUE HAGAS UN PATRON AHI POR LA IZQUIERDA... POR LA DERECHA. <i>After...at 3 minutes in order to make a pattern to the left...to the right.</i>
15:41:25	15:43:40	45	45

2.3.4.4.13 The differences between the recordings provided by Cuba and by the United States could not be reconciled. They could not be explained as the result of simultaneous transmissions recorded differently by different stations, nor could they be explained as the result of technical difficulties in the recording.

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2.3.4.4.14 All the differences noted above related to radio transmissions in which vessels in the area of shoot-down were mentioned.

2.3.4.5 **Time of the shoot-downs**

2.3.4.5.1 Based on the Cuban recording and the matching segments of the United States recording, the time of the first shoot-down was 15:21 hours and the time of the second shoot-down was 15:27 hours.

2.3.4.6 **Location of the shoot-downs**

2.3.4.6.1 The military ground control transmitted the following geographical references to the interceptors (Cuban recording):

15:11:51 "... BUSQUELO POR DEBAJO DE UDS. ES POR DEBAJO... AL NORTE DE BARACOA UNOS 30 KM"

*"... search below you guys, it is below...north of Baracoa some 30 km."*

15:13:06 "...NORTE DE SANTA FE, DISTANCIA 35 KM. ESTA EL OBJETIVO"

*"...north of Santa Fe, distance 35 km...there is the contact."*

15:16:48 "...EL OBJETIVO ESTA AL NORTE DE SANTA FE, DISTANCIA 25 KM".

*"...the contact is north of Santa Fe, distance 25 km."*

The first "OBJETIVO" (contact) was sighted 16 seconds later. Based on this, a possible area of the shoot-down (N2456S) would be some 25 - 30 km north of Baracoa on the Cuban coast, some 5 km west of Havana.

2.3.4.6.2 The position of the second aircraft (N5485S) was referred to in a transmission at 15:23:54 hours (Cuban recording) as the area in which the first aircraft fell:

"ESTA EN LA REGION, ESTA EN LA REGION DONDE CAYO",

*"It's in the area, it's in the area where it fell".*

This information was repeated by the military interceptor at 15:24:48 hours (Cuban recording):

"ESTA EN LA REGION DE LOS HECHOS, DONDE CAYO EL OBJETIVO, HACE FALTA QUE NOS AUTORICEN".

*"It is in the area where the event took place, where the target went down. We need authorization."*

Both transmissions were contained in the recordings provided by Cuba and by the United States. This would confirm that the position of the second shoot-down was in the same area as the first shoot-down.

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2.3.4.6.3 The recording provided by Cuba contained directions given to a Cuban SAR helicopter to a position north of Baracoa, at 15:28:17 hours: "DE BARACOA PONGA CURSO 330, A 5 KM" (*From Baracoa take course 330, to 5 km*). This radio transmission was not contained in the United States recording. The helicopter was later re-directed to another position.

2.3.4.6.4 The radio transmissions contained in the United States recording made several references to vessels in the area. They linked the positions of these vessels to the positions of the shoot-downs. The following time references and radio transmissions were contained in the United States recording:

15:15:11 "LO QUE TENGO A LA IZQUIERDA EN ESTOS MOMENTOS ES UN BARCO DE PASAJEROS GRANDE"

*"What I have to the left right now is a large passenger ship."*

15:20:04 "VAMOS A DARLE UN PASE. PORQUE SE ESTAN ACERCANDO UNOS BARCOS AHI, LE VOY DAR UN PASE"

*"We are going to give it a pass. Because some vessels are approaching there, I am going to give it a pass."*

15:22:31 "HAY UNA LANCHA CERCA DE ELLA. LA AVIONETTA CAYO CERCA DE ELLA"

*"OK. There's a launch near it. The aircraft fell near the launch."*

15:23:39 "OYE, LA LANCHA PARECE QUE GIRO PARA AHI."

"LA LANCHA GIRO PARA AHI, OISTES?"

"LA LANCHA GIRO PARA DONDE ESTABA, PARA DONDO GIRO EL OBJECTIVO."

*"Hey, it looks like the launch turned towards there."*

*"The launch turned toward there, got it?"*

*"The launch turned to where the target was, where it fell."*

15:28:35 "EN EL LUGAR DE LOS HECHOS ESTA EL BARCO RECOGNIENDO AHI PARECE. UN BARCO RECOGNIENDO... EN LA PRIMERA." EN LA PRIMERA ESTA RECOGNIENDO UN BARCO. ..."

*"In the place where events took place it looks like the boat is picking up now. A boat is picking up...in the first..."*

15:29:02 "TEN EN CUENTA QUE HAY UN BARCO AHI, TENGA CUIDADO"

"HAY UN BARCO PESQUERO"

*"Keep in mind that there is a boat there, be careful."*

15:30:08 "OCA. HAY UN BARCO GRANDE DE PASAJEROS QUE ESTA CERCA DE LA ZONA. ES DECIR EL BARCO VA CON RUMBO 90 APROXIMADAMENTE. Y ESO QUEDA A LA DERECHA DEL BARCO ESE. DEL BARCO GRANDE."

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*"OK. There is a large passenger boat that is close to the zone. That is, the boat is going on a course of 90 approximately. And that is to the right of that boat, the big boat."*

15:30:36 "ROMPE 360 Y BUSCA EL BARCO, EL BARCO GRANDE Y A LA DERECHA DEL BARCO, ANTES DE LLEGAR AL BARCO GRANDE, ESTA EL OBJETIVO. NO VALLAN MUY BAJITO. (PAUSE) NO TE APROXIMES DEBAJO. TEN CUIDADO QUE EN LA ZONA DE DONDE CAYO LA PRIMERA HAY UN OBJETIVO, UN BARCO, TEN EN CUENTA ESO. TEN CUIDADO CON ESO."

*"Go to 360 and look for the boat, the big boat, and to the right of the boat, before you get to the big boat, is the target. Don't go too low. Don't approach it low. Be careful, in the zone where the first one fell there is a target a boat. Take it into account. Be careful of it."*

### 2.3.5 Radar data related to the shoot-downs

#### 2.3.5.1 Radar information provided by Cuba

2.3.5.1.1 Havana ACC noted the Cessna aircraft on its surveillance radar, north of the 24N parallel. The aircraft were observed crossing the 24N parallel and heading south. The transponder codes were noted to be of the same series of codes normally used by Brothers to the Rescue aircraft. The progress of the flight of the three aircraft was not continuously monitored by Havana ACC because service not was provided to VFR flights. Due to a malfunction of the automatic radar data recording system, the radar data at Havana ACC was not recorded on that day.

2.3.5.1.2 Four air defence radars in Cuba were used to monitor the flights of the three Cessna aircraft and to direct the military interceptor aircraft. The positions of the three Cessnas were recorded and plotted by hand; the facilities were not equipped with automatic radar data recording systems.

2.3.5.1.3 According to the Cuban air defence radar records, one aircraft (N5485S) was first observed at 14:39 hours just north of the 24N parallel and heading west. A second aircraft (N2506) was observed at 14:51 hours also just north of the 24N parallel and heading west. These two aircraft were observed on a westerly track before turning south along 082 30W and crossing the 24N parallel at about 15:00 hours.

2.3.5.1.4 The third aircraft (N2456S) was first observed at 15:00 hours at position 23 41N 082 07W, well within the MUD-9 danger area, and heading south. According to the Cuban radar records, this aircraft penetrated the 12 NM Cuban territorial limit at 15:07 hours and continued on a southwesterly track until it was shot down in an area about 5 NM north of Baracoa at about 15:21 hours.

2.3.5.1.5 N2506 and N5485S penetrated the 12 NM limit at about 15:17 and 15:19 hours, respectively. The track of N5485S continued south until this aircraft was shot down in the same area as the first aircraft. N2506 turned northeast at about 15:20 hours and left Cuban territorial airspace at 15:24 hours. At 15:28 hours N2506 turned northwest and crossed the 24N parallel northbound at 15:43 hours at about 082 30W.

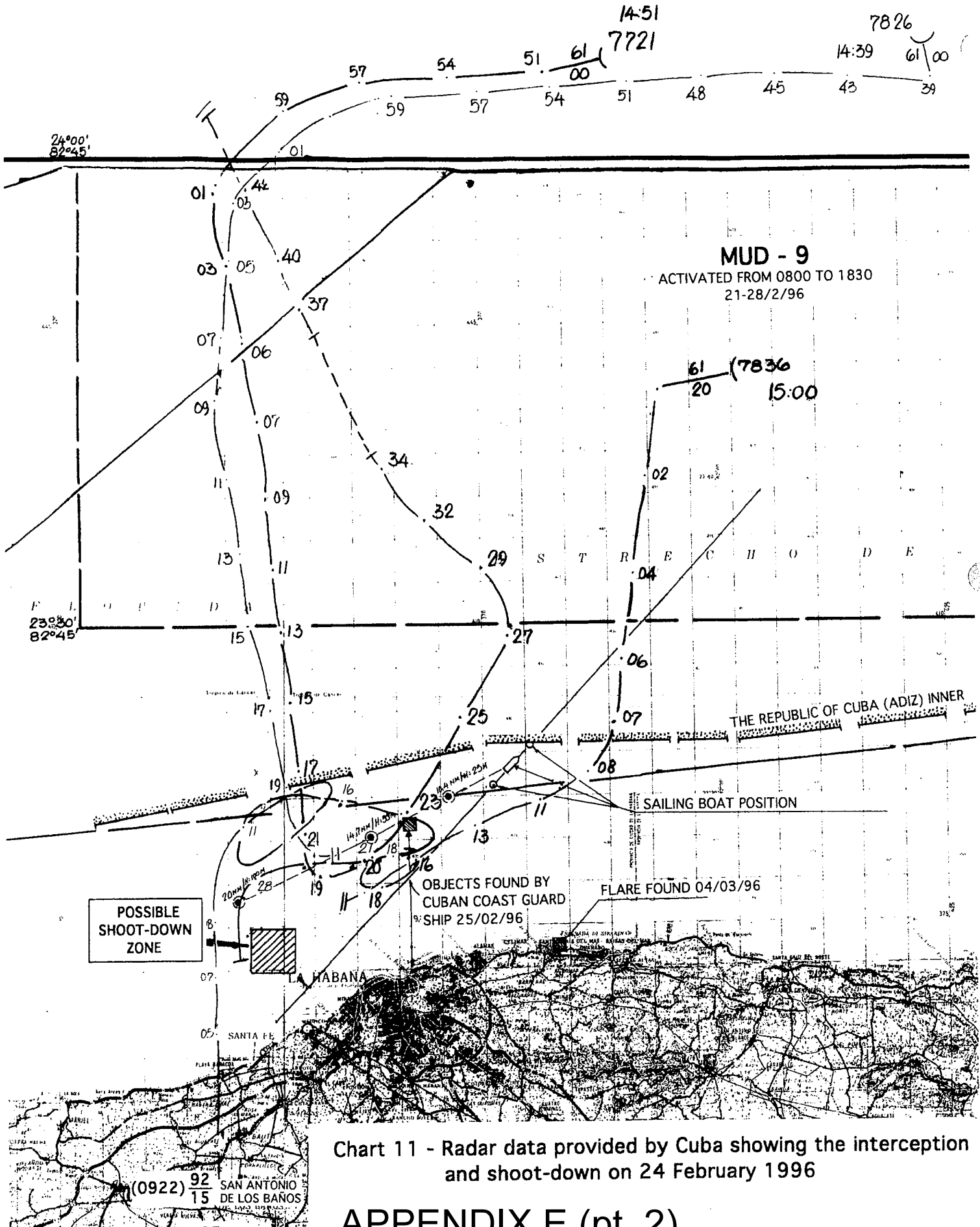


Chart 11 - Radar data provided by Cuba showing the interception and shoot-down on 24 February 1996

APPENDIX E (pt. 2)

2.3.5.1.6 The Cuban radar records also showed the positions of the military interceptor aircraft plotted once a minute. Due to the high speed manoeuvres of the interceptors, with positions plotted by hand and only once every minute, it was not possible to reconcile the radar plot of their tracks with the manoeuvres described in the radio communications. Furthermore, the radar plot did not permit a determination of the relative positions of the MiG-29 and the two Cessna aircraft, which were shot down, or of the locations of the shoot-downs.

#### 2.3.5.2 Radar information provided by the United States

2.3.5.2.1 Several radar facilities in the United States covered part or all of the flights of the three Cessna aircraft. The air route surveillance radar (ARSR) of Miami ARTCC, comprising both primary surveillance radar (PSR) and SSR, was used to monitor the flights, and its radar data was automatically recorded. Three other radars, located at Tamiami (J06), Cudjoe Key (B94) and Key West (J07) and connected to a central processing and recording facility at Riverside, California, were used by several United States agencies, including NORAD's SEAD sector, CARIBROC and DAICC. The B94 radar, a primary surveillance radar with SSR, was located in an aerostat balloon at an altitude of at least 4 000 ft at position 24 42.1N 081 30.4W. The B94 radar was able to follow the three Cessna aircraft at low level during their entire flight. While the source radar information was the same, the processing and presentation of radar information at each of the agencies was different. A radar data recording made of the surveillance radar (ASR-8) used by Naval Air Station Key West was not retained beyond 15 days and was not available.

2.3.5.2.2 The Miami ARTCC radar record showed the progress of the three Cessna aircraft southbound along 082 30W until well south of the 24N parallel. Radar contact with N2506 was lost at 15:09 hours at position 23 42.1N 082 31.6W; N2506 reappeared on radar at 15:31 hours at position 23 37.7N 082 22.1W when tracking north. Radar contact with N5485S was lost also at 15:09 hours, at position 23 42.7N 082 30.0W, Mode C altitude 1 200 ft. Radar contact with N2456S was lost at 15:18 hours at position 23 24.3N 082 31.4W, Mode C altitude 2 200 ft. Due to limitations in low-level coverage, N2456S and N5485S were not within Miami ARTCC radar coverage at the time they were shot down.

2.3.5.2.3 Radar data and plots (SSR, combined SSR/PSR and PSR alone) were provided by NORAD's SEAD sector for the three Cessna aircraft and the military interceptors. For the three Cessnas, turning points, SSR Mode C altitudes, southernmost positions and last observed radar positions were provided. The ICAO team reviewed the recorded flight progress in detail, including the manoeuvring of N2456S and N5485S during the final minutes of their flights. N2456S was heading north for some two minutes until its last observed position of 23 26N 082 27W. N5485S was also heading north until it turned on an easterly heading at 15:24 hours and was last observed on radar at 23 29N 082 26W. Position information on the MiG aircraft was also provided. However, as a result of the update rate of this radar information, the manoeuvres of the MiG-29 during the final stages of the interceptions of N2456S and N5485S could not be established.

2.3.5.2.4 A video tape of the CARIBROC radar data showed that the radar data had been processed by a radar tracking programme before being displayed. At 15:18 hours, N2456S was manoeuvring some 16 NM north of the Cuban coast and at 15:21 hours it was heading north as N5485S was approaching it in opposite direction at a distance of about 3 NM. The last radar position of N2456S was about 18 NM north of the Cuban coast. N5485S turned north and was manoeuvring some 24 NM north of Cuba at 15:24 hours. N5485S was on an easterly heading between 15:24 and 15:28 hours, and was last observed on radar at about 24 NM north of the Cuban coast.



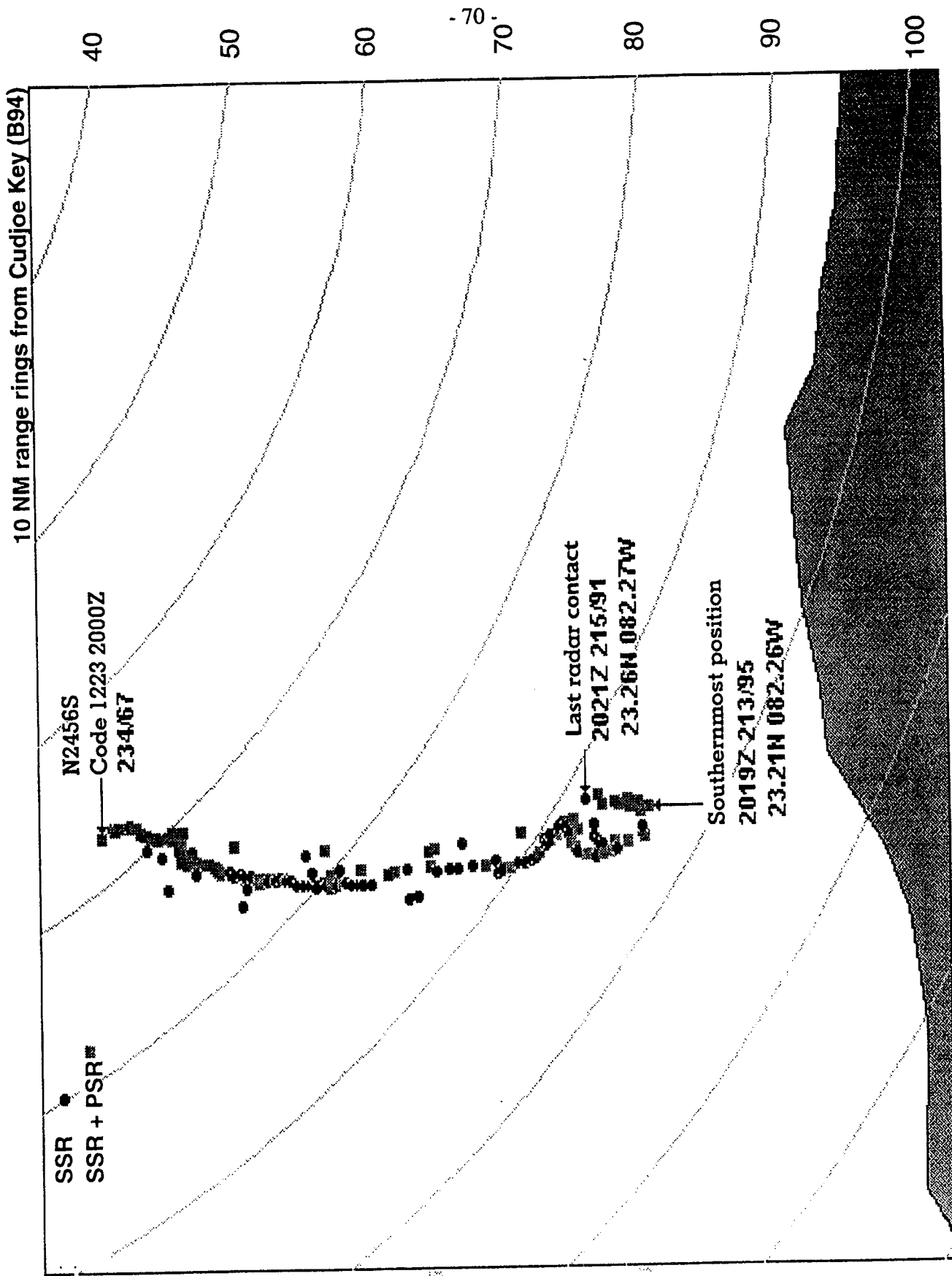


Chart 12 - The flight of N2456S as recorded by United States radar

10 NM range rings from Cudjoe Key (B94)

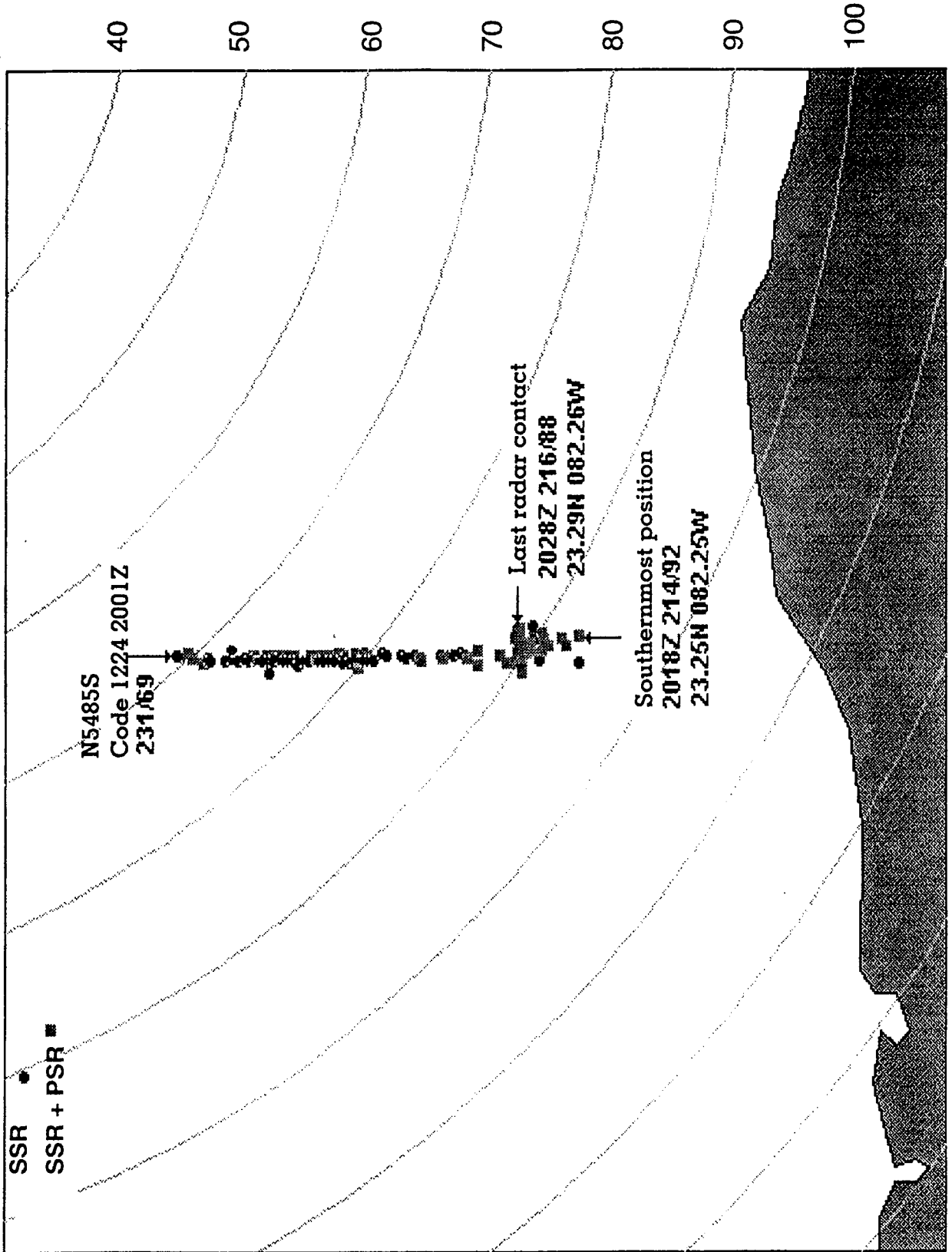


Chart 13 - The flight of N5485S as recorded by United States radar

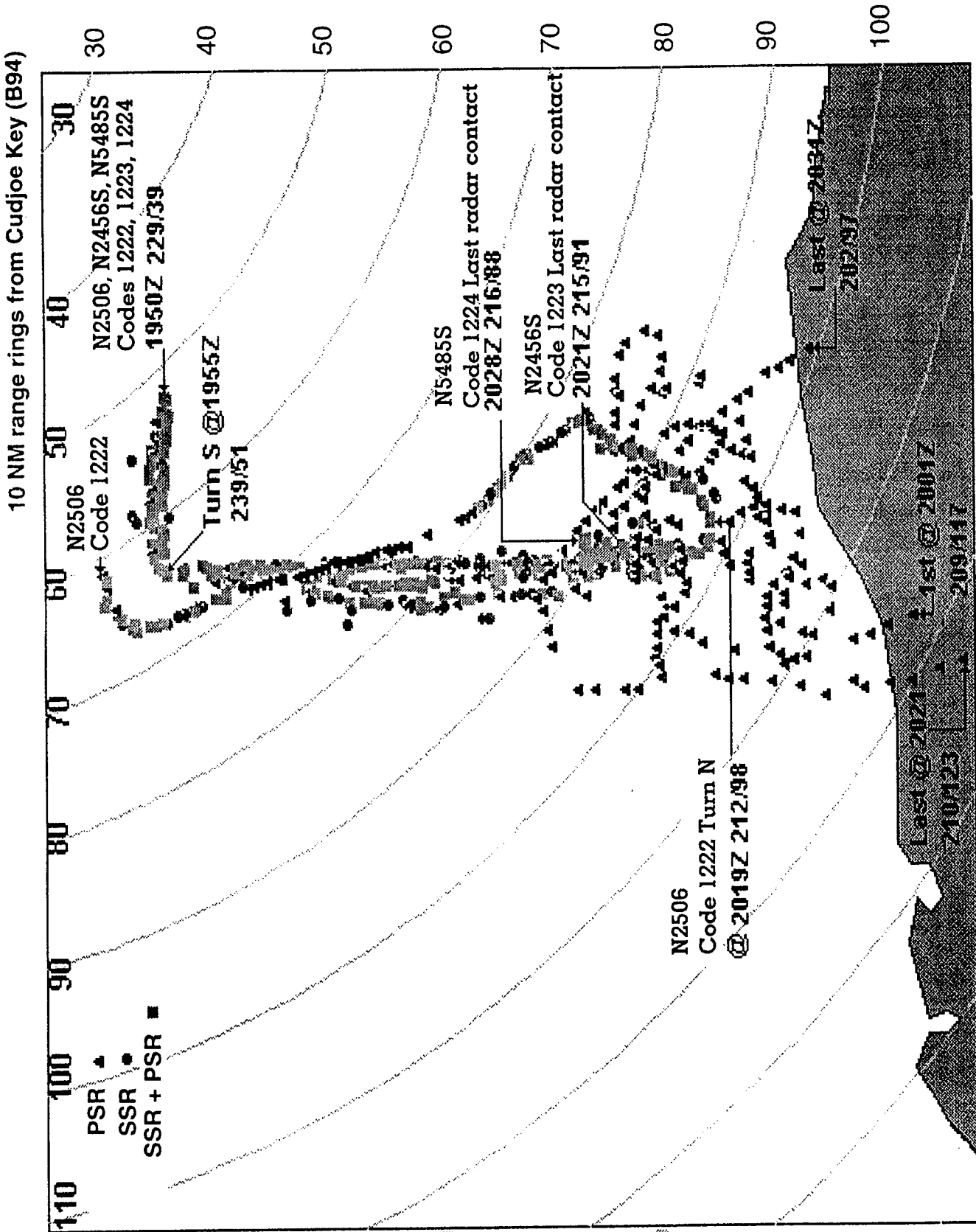


Chart 14 - The flights of N2506, N2456S, N5485S and Cuban MiGs as recorded by United States radar

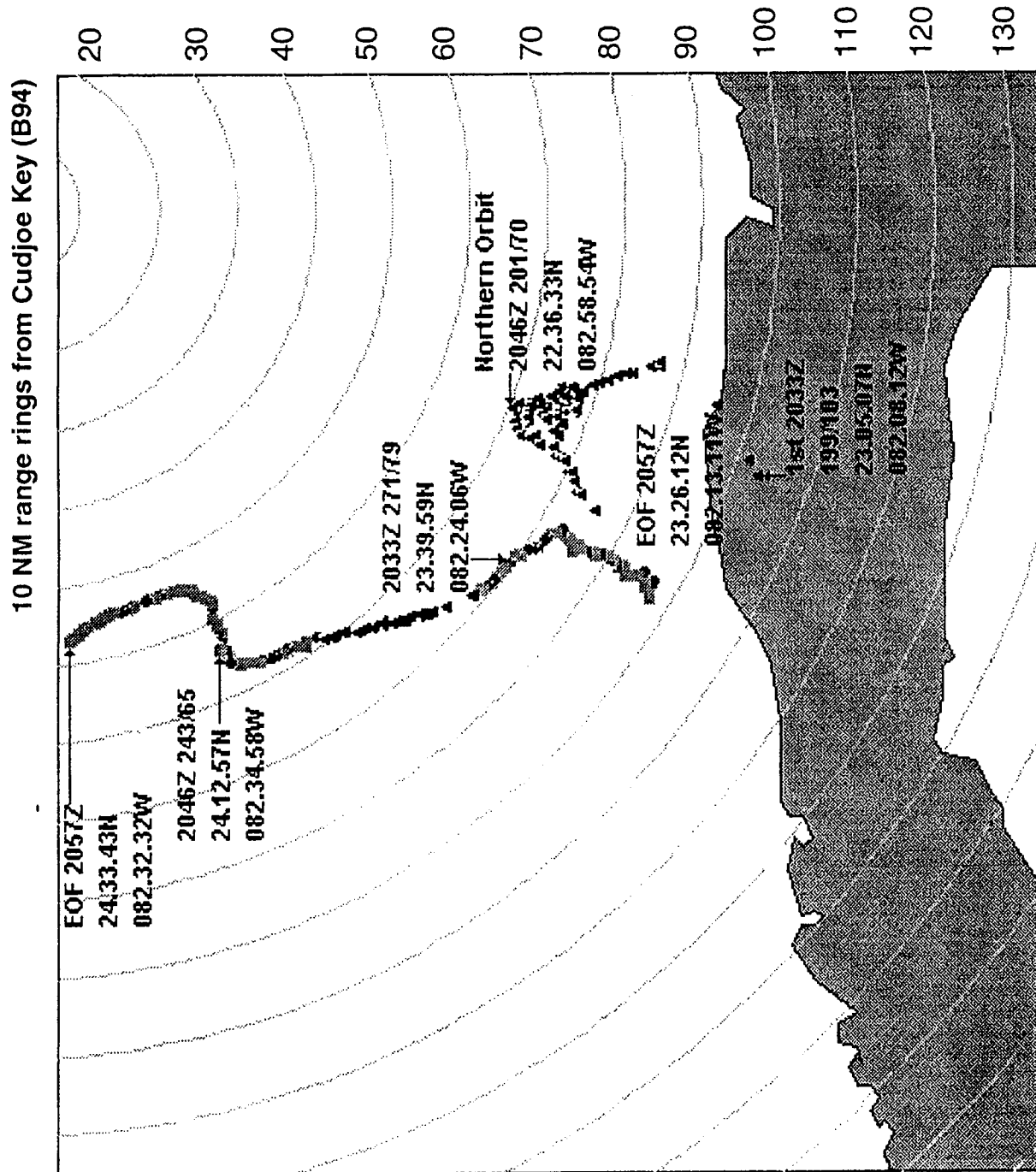


Chart 15 - The return flight of N2506 and the second pair of Cuban MiGs as recorded by United States radar

small pieces. The largest piece lays burning on the surface for about one half minute before disappearing."

2.3.6.1.4 Based on the ship's position and the bearings and distances recorded, the following positions for the shoot-downs were plotted: first shoot-down at position 23 29N 082 28W, and second shoot-down at position 23 30.1N 082 28.6W.

2.3.6.2 **Evidence provided by the crew of the fishing boat *Tri-liner***

2.3.6.2.1 At the time of the first shoot-down the fishing boat *Tri-liner* was proceeding to Key West to discharge its catch. It was heading north about 25 NM north of Havana when an aircraft was observed to explode and fall into the sea 200 to 400 yards astern of the boat. A military aircraft, which the crew stated looked "like a F-15", was also seen.

2.3.6.2.2 The boat turned around and remained at the impact site for approximately 10 minutes. On resuming course to the north, a military aircraft was observed to fire a missile at, and to destroy, another small aircraft ahead of the boat. The crew of the fishing boat also observed a white cruise ship in the area and stated that the second aircraft fell into the sea 3 to 5 NM in front of that ship. The crew of the fishing boat believed the occurrences to have been some form of naval manoeuvres, and continued north towards Key West.

2.3.6.2.3 Whilst the *Tri-liner* was equipped with a GPS receiver, the crew did not record time or position when either of the events occurred. The master later estimated a position for the first shoot-down at 23 30N 082 17W and for the second shoot-down at 23 36N 082 17W. The positions estimated by the master would place his boat approximately 17 NM east of the cruise ship *Majesty of the Seas*. The watchkeeping staff on the bridge of the cruise ship stated that they were monitoring the fishing boat on their radar at 6 to 7 NM, as a collision hazard to their ship. The watchkeeping staff on the ship would not have been concerned about the *Tri-Liner*, had it been 17 NM distant. The observation of the crew of the fishing boat that the second aircraft fell into the sea 3 to 5 NM ahead of the cruise ship and north of the *Tri-Liner*, also supported the observation of the *Majesty of the Seas* that the distance between the two vessels was 6 to 7 NM rather than 17 NM. It was determined by the ICAO team that, whilst the visual observations of the crew of the *Tri-Liner* were credible, the positions provided by the master of the fishing boat were not accurate.

2.3.6.3 **Evidence provided by the yachtsman in the sailing boat**

2.3.6.3.1 Sometime after 15:10 hours the yachtsman heard a double explosion and saw an object trailing smoke fall towards the sea. He did not see the object enter the sea.

2.3.6.3.2 The sailing boat was proceeding along a track from 23 05.4N 082 30.6W to 23 44N 081 49.5W, having passed the initial position on the track at approximately 11:00 hours. The yachtsman did not maintain a log of times and positions. Since the sailing boat was being steered by an autopilot coupled to a GPS with a maximum expected cross-track error of  $\pm 0.1$  NM, it was reasonable to assume that the sailing boat was on the intended track.

2.3.6.3.3 The yachtsman later made an estimate of his position based on an assessment of progress along the intended track. His estimated position at 15:00 hours was between 23 19.6N 082 15.3W (4 hours at 5 kt) and 23 22.6N 082 12.3W (4 hours at 6 kt). He estimated the falling object to be 20 degrees right of the axis of the boat looking towards the stern, at a distance of 4 NM, since this was the distance to the horizon. Based on this he estimated that the position of the event had been between

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2.3.5.2.5 Annotated print-outs of a labelled radar display were provided by DAICC, but did not contain information additional to that provided by other agencies.

2.3.5.2.6 Based on the radar data from Miami ARTCC, NORAD's SEAD sector, CARIBROC and DAICC the progress of the flight of N2506, N2456S and N5485S could be established. However, an accurate assessment of the manoeuvring of N2456S, N5485S and the MiG-29 aircraft in the final stages of the interceptions was not possible on the basis of radar information provided.

### 2.3.5.3 Comparison of radar data

2.3.5.3.1 Data provided by Cuba showed that the three Cessna aircraft penetrated the 12 NM territorial limit and that two of them were shot down in Cuban territorial airspace 5 to 6 NM north of Havana: N2456S at position 23 09.4N 082 32.6W and N5485S at position 23 11.0N 082 34.1W. The United States data showed that only N2506 entered Cuban territorial airspace; that N2456S was shot down at position 23 25.9N 082 25.6W, 5 NM outside the Cuban territorial limit; and that N5485S was shot down at position 23 30.2N 082 27.1W, 10 NM outside the Cuban territorial limit.

2.3.5.3.2 The significant differences between the radar data provided by Cuba and the United States, could not be reconciled. Additional position information from an independent source would be required to resolve this discrepancy.

### 2.3.6 Witnesses

#### 2.3.6.1 Evidence provided by the staff of the cruise ship *Majesty of the Seas*

2.3.6.1.1 At the time of the interceptions the Norwegian cruise ship *Majesty of the Seas* was in the sea area about 26 NM north of Havana proceeding to the port of Miami on a heading of 069°T. The ship preserved a record of time, position and heading, taken automatically from its GPS navigation system every five minutes. Other parameters, such as speed and relative wind speed and direction, were also recorded. A hand written log was also kept, recording GPS position each hour from the display on the bridge.

2.3.6.1.2 An entry was made on 24 February 1996 in the ship's log which read:

"15:23 Position 23 30.9N 082 35.1W Observed small explosion followed by burning material falling from an altitude of about 500 - 1 000 ft in bearing 115°. Estimated distance to object is 6 - 7 NM. A small vessel, probably a fishing vessel of about 60 ft is heading north but turns around and heads toward the burning material 1 - 2 NM southeast of it. Called Captain to the bridge."

2.3.6.1.3 The ship's log continued:

"15:27 Observed a small aircraft approach from starboard on a northerly course. The plane turns and heads directly towards us, maintains this heading for about one minute before veering north.

15:29 Position 23 31.4N 082 33.5W The plane is now in bearing 095°. Estimated distance to it is 4 - 5 NM. A fighter jet appears high up on our starboard side. What seems to be a missile, is fired from the jet and hits the small plane a few seconds later. The plane and the missile explode in a ball of fire and fall slowly to the surface in mainly

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23 18.0N 082 19.3W and 23 22.5N 082 16.0W. In a later statement he indicated that the distance might have been more than 4 NM, but not more than 10 NM.

2.3.6.3.4 An estimate of the position of the event observed by the yachtsman was made by the Cuban authorities. Their estimate was based on speeds of 5 and 6 kt for 4 hours and 21 minutes. This established a position for the boat between 23 20.9N 082 14.2W and 23 24.2N 082 10.8W. The estimate of the Cuban authorities showed that the distance of the event, as observed from the boat, could have been 20 NM if the event occurred 100 m above sea level.

2.3.6.3.5 An estimate of the position of the boat and the direction of the observation was made by the ICAO team applying the following tolerances: time of passage of the initial point of the track 11:00 hours  $\pm 10$  minutes; track speed 6 kt  $\pm 1$  kt; observed relative bearing  $20^\circ \pm 10^\circ$  to the right of the axis of the boat when facing the stern; and the axis of the boat relative to the track of  $044^\circ T \pm 5^\circ$ . This resulted in a position between 23 06N 082 14.4W (4 hours 15 minutes at 5 kt) and 23 28.4N 082 06.1W (4 hours 35 minutes at 7 kt). The possible observation sector was from  $229^\circ T$  at the southernmost position to  $259^\circ T$  at the northernmost position.

2.3.6.3.6 This estimation gave a distance from 20 to 31 NM to the impact positions of the aircraft provided by the Cuban authorities. Furthermore, this estimation gave a distance from 16 to 21 NM to the mean of the positions provided by the *Majesty of the Seas*; this area was, however, some 15 degrees to the north of the estimated observation sector. The estimated position of the sailing boat and the observations of the yachtsman could therefore not be reconciled with the positions of the shoot-downs as provided by either the Cuban authorities or the *Majesty of the Seas*.

2.3.6.3.7 It was conceivable that the yachtsman observed an event, possibly outside the tolerances of the sailing boat's estimated position and his observation parameters. However, due to the uncertainty in the accuracy of the parameters used, his observations could not be used in determining the location of the shoot-downs.

#### 2.3.6.4 The observer in Havana

2.3.6.4.1 An alert about intruding aircraft had been given to an observer on duty at an observation post in Havana. Some 10 minutes later, he saw a military aircraft and, shortly thereafter, an aircraft in flames falling into the sea at an estimated distance of 5 to 6 NM northwest of his position. The observer only saw one event, which could support the position of either the first or the second shoot-down as provided by the authorities in Cuba. However, it could not be determined why the observer saw only one event, when two events were reported to have occurred in the same direction from the observation post within a time span of 7 minutes and only 2 NM apart.

#### 2.3.6.5 Flotsam found by Cuba on 25 February 1996

2.3.6.5.1 A bag was recovered at 10:00 hours on 25 February 1996 by a Cuban search and rescue vessel at position 23 18N 082 22W. The bag was a type used to carry photographic or video equipment, and contained a battery charger and two aeronautical charts. The charger, Concord model 217010, had been manufactured in Japan and distributed by Console Consumer Electronics, Indianapolis, Indiana, United States. The two Jeppesen charts of the Caribbean area were charts in general use. None of the items carried personal identification. It was not possible to determine what particular items might have been carried on board N2456S and N5485S that day or whether the items recovered were possessions of the occupants of these aircraft. It could not be determined whether the bag recovered had been on board either of the two Cessna aircraft.

2.3.6.5.2 The Institute of Oceanology of Cuba had carried out an analysis of surface drift to estimate the probable drift of a floating object, subject to water movement but not to wind effects (zero leeway), that had been released into the sea at the time and wreckage impact positions provided by Cuba. The Institute established that such an object could have drifted to the position at which the bag was recovered the next morning.

### 2.3.7 Location of the shoot-downs

2.3.7.1 In order to determine the locations of the shooting down of the two Cessna aircraft (N2456S and N5485S), all information obtained from different sources was analyzed. This included radar data from several radars in Cuba and the United States, the radio communications between the MiG pilots and their ground control, position information derived from observations by the MiG pilots, testimony by the occupants on board N2506, search and rescue efforts by Cuba and the United States, observations by the staff of the cruise ship *Majesty of the Seas*, observations by the crew of the fishing boat *Tri-Liner*, observations by the yachtsman of the sailing boat, and observations by the observer in Havana.

2.3.7.2 The Cuban radar record, the reference in the communications recording provided by Cuba directing the SAR helicopter initially to an area 5 km north of Baracoa, the observer in Havana and, to a lesser extent, the observations of the yachtsman, supported the position of Cuba that the shoot-downs occurred in an area 5 to 8 NM from the coast, well within its territorial airspace. The United States radar record, the communications recording provided by the United States, and the evidence from the *Majesty of the Seas* and the *Tri-Liner* supported the position of the United States that the shoot-downs occurred in an area between 5 and 10 NM outside Cuban territorial airspace.

2.3.7.3 There were significant, irreconcilable differences between the radar information provided by Cuba and by the United States. While the Cuban radar recording was plotted by hand and the United States radar information was automatically recorded, it was considered that the method of recording by itself could not validate or invalidate the information. Therefore, additional corroborating information was necessary to determine the location of the shoot-downs. The communication recording provided by Cuba, in particular the reference to directing the SAR helicopter initially to an area 5 km north of Baracoa, supported the shoot-down positions provided by Cuba. On the other hand, the communications recording provided by the United States, in particular the reference to a large passenger ship and a fishing boat, supported the view that the shoot-downs occurred near those vessels. In view of the significant differences which existed between the communications recordings provided by Cuba and by the United States, each supporting the positions of the shoot-downs provided by the respective States, this source of information was of limited value in determining the location of the shoot-downs.

2.3.7.4 Eyewitness accounts obtained from the *Majesty of the Seas* and the *Tri-Liner* were mutually supportive. Therefore, the information from these two vessels was considered to be the best available from witnesses to the shoot-downs. The occupants of N2506 noted the presence of a large passenger boat and a small vessel in the area where smoke was seen. The recorded positions and track of the *Majesty of the Seas*, the observations by its crew and passengers, the position of the *Tri-Liner* relative to the *Majesty of the Seas*, and the resulting estimated locations of the shoot-downs could therefore be considered to be the most reliable position estimates. These position estimates were compared to the shoot-down positions provided by the United States; there was a 4 NM difference for N2456S and 1 to 2 NM difference for N5485S. These position estimates were also compared to the shoot-down positions provided by Cuba and there was a 20 NM difference for both aircraft.

2.3.7.5 Because most of the evidence provided by Cuba and by the United States regarding the shoot-down positions was incompatible with each other, it was considered desirable to seek verification



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of the position of the *Majesty of the Seas* from another source, such as satellite photographs from space agencies. By 14 June 1996, the ICAO team had not been able to obtain such corroborative evidence of the position of the *Majesty of the Seas* between 13:00 and 18:00 hours on 24 February 1996. With this qualification and based on the recorded positions of the *Majesty of the Seas*, N2456S was shot down approximately at position 23 29N 082 28W, 9 NM outside Cuban territorial airspace and N5485S was shot down approximately at position 23 30.1 N 082 28.6W, 10 NM outside Cuban territorial airspace.

### 2.3.8 P-3 Orion aircraft

2.3.8.1 When interviewed by the ICAO team, the pilot of N2506 stated that the three Cessna aircraft sighted a United States Navy P-3 Orion flying in the opposite direction as they proceeded west along 24 10N parallel at about 14:55 hours and just before they turned south along 082 30W.

2.3.8.2 Radar data from NORAD's SEAD sector showed that the P-3 Orion was flying back and forth (east-west) approximately along 24 10N parallel between 081 22.8W and 082 37.1W. At about 15:10 hours the P-3 Orion turned northeast to Key West.

2.3.8.3 The United States provided, *inter alia*, the following information regarding the mission of the P-3 Orion:

"The P-3 operating in the Florida Straits prior to the incident was in support of research, development, test, and evaluation (RDT&E) of the Air Deployed Acoustic Receiver project. The mission was in no way connected to the situation in Cuba, the flight of the MiGs, or the flight of the Brothers to the Rescue aircraft;"

"The P-3's turn to the north-northeast at approximately 15:10 hours EST was not related to the Cuban MiG activity. It was due to the fact that the crew had completed their RDT&E mission and were returning to base. The fact that the time of occurrence corresponded with the flight of the MiGs is purely coincidental;" and

"Between 14:45 and landing, the P-3 was in contact with Key West approach control and NAS Key West air traffic control tower as it returned to its base of operations, NAS Key West."

2.3.8.4 A statement by the pilot of the P-3 Orion read, *inter alia*, as follows:

"On the afternoon 24 February 1996, the day of the Brothers to the Rescue shootdown by Cuban MiGs, I was the pilot in command of a sonobuoy test flight operating in an area to the SSW of Key West approximately 5 to 8 miles north of the Cuban ADIZ. By mid-afternoon we were conducting a series of range runs which involved flying legs east to west and back at 1 500 feet AGL centred on a previously deployed sonobuoy. After reaching the end of our west bound leg we turned east and proceeded back to the sonobuoy at 250 KIAS, 1 500 feet and on a heading of 090 magnetic. Shortly after commencing this leg the Flight Engineer called traffic at our altitude opposite direction and closing. I sighted 2 small aircraft at our 11 o'clock at our altitude, opposite heading passing to the north at 500 to 1 000 yards. Sufficient separation existed so no evasive action was taken and we continued to complete our range run. We completed one more run to the east side of the buoy, returned to it and departed station to return to base;" and

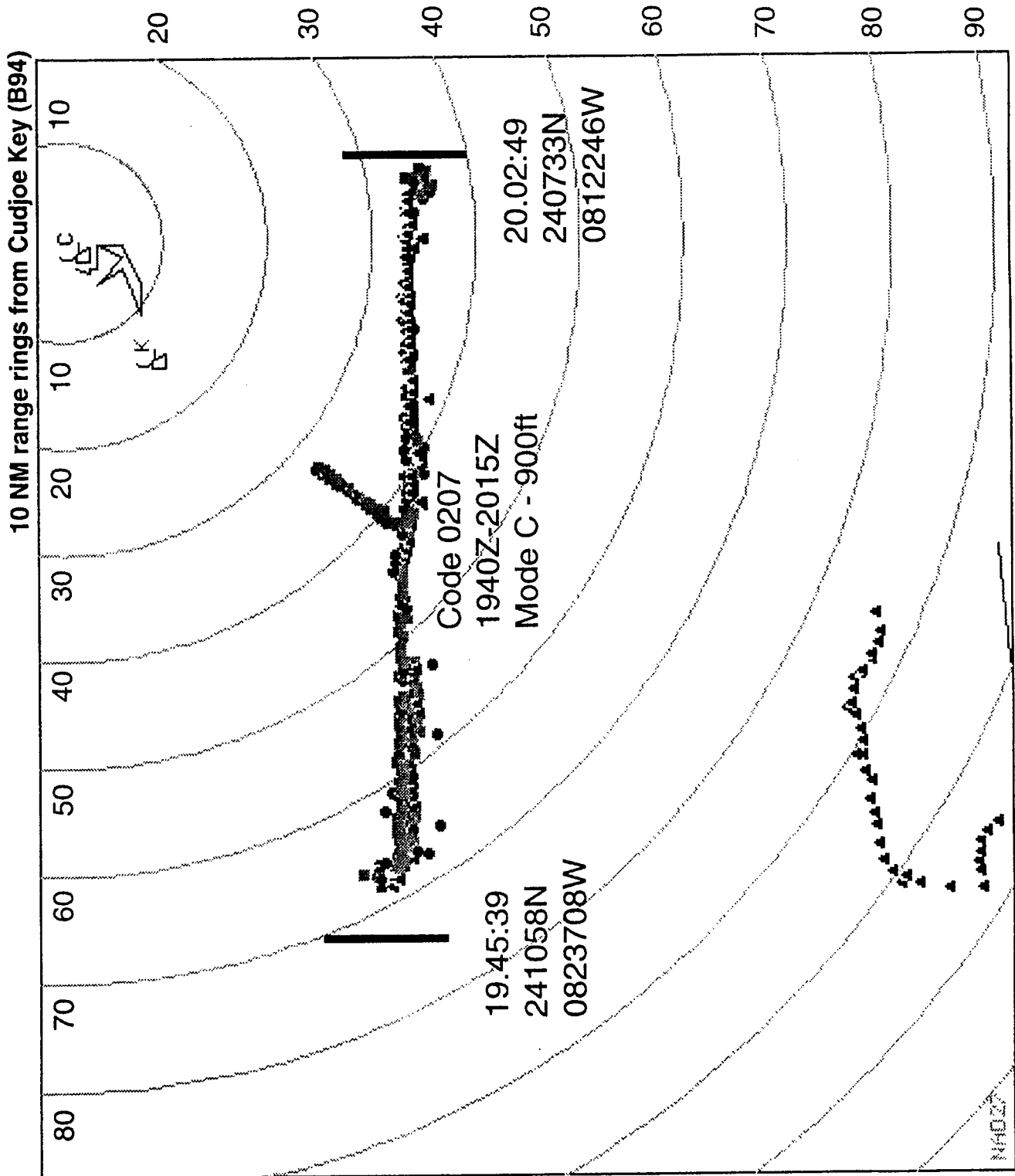


Chart 16 - The flight of US Navy P-3 Orion as recorded by United States radar

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"At no time did we establish communication with the subject aircraft. We were operating VFR, using a working frequency in the UHF range to maintain communication with the "38" boat which was adjacent to the deployed sonobuoy. We were monitoring UHF guard and heard no traffic calls or any other communication on 243.0 MHz. All of this occurred at the end of a planned 6-hour mission, and since we were approaching our minimum recommended fuel reserve of 8 000 lbs we proceeded directly to NAS Key West after checking off station with the "38" boat. During the flight we were in communication with Miami Center, Key West Departure and Approach control and NAS Key West tower during transit to and from our operating area. From time of sighting the aircraft until touchdown was approximately 30 minutes."

## 2.4 **Flight planning and changes**

2.4.1 The planned route for the VFR flight of the three Cessna aircraft would cross MUD-8, MUD-9 and MUD-14 danger areas within Havana FIR, promulgated as being active from 08:00 to 18:30 hours from 21 to 28 February 1996. NOTAMs A0268/96, A0269/96 and A0270/96 had been issued on 19 February 1996. In accordance with the United States Aeronautical Information Manual (AIM), it was the responsibility of the pilots to review current NOTAMs for foreign locations. NOTAMs were included in the publication "International Notices to Airmen", published bi-weekly. In addition, the AIM stated that "current foreign NOTAMs are also available from the U.S. International NOTAM Office in Washington, D.C., through any local FSS [flight service station]". The pilot who submitted the flight plans for the Cessna aircraft confirmed to Miami AIFSS that he had checked the applicable NOTAMs. There was no obligation for Miami AIFSS to point out specifically that the flights would cross active danger areas.

2.4.2 Acceptance of the flight plans by Miami AIFSS did not imply its approval or its responsibility for the aircraft to remain clear of Cuban airspace. This responsibility remained with the pilot. The AIM stated: "Foreign airspace penetration without official authorization can involve both danger to the aircraft and the imposition of severe penalties and inconvenience to both passengers and crew. A flight plan on file with the ATC authorities does not necessarily constitute the prior permission required by certain other authorities. The possibility of fatal consequences cannot be ignored in some areas of the world."

2.4.3 The three aircraft deviated from the route given in the VFR flight plans. Annex 2 to the Convention on International Civil Aviation stated that, for a VFR flight not operating as a controlled flight, "significant changes to a flight plan shall be reported as soon as practicable to the appropriate air traffic services unit." The term "significant change" was not defined.

2.4.4 A flight plan was required for any flight crossing the Miami/Havana FIR boundary. Cuban regulations required all flights from other countries into Cuba, or overflying Cuba through the designated corridors, to be conducted under instrument flight rules (IFR).

## 2.5 **Interception procedures**

### 2.5.1 **Principles and signals**

2.5.1.1 ICAO Annex 2, paragraph 3.8.1 governing interception of civil aircraft states that "...in drafting appropriate regulations and administrative directives, due regard shall be had to the provisions of Appendix 1, Section 2 [Signals for use in the event of interception] and Appendix 2, Section 1 [Principles to be observed by States]". Appendix 2, section 1 read as follows:

"1. Principles to be observed by States

1.1 To achieve the uniformity in regulations which is necessary for the safety of navigation of civil aircraft due regard shall be had by Contracting States to the following principles when developing regulations and administrative directives:

- a) interception of civil aircraft will be undertaken only as a last resort;
- b) if undertaken, an interception will be limited to determining the identity of the aircraft, unless it is necessary to return the aircraft to its planned track, direct it beyond the boundaries of national airspace, guide it away from a prohibited, restricted or danger area or instruct it to effect a landing at a designated aerodrome;
- c) practice interception of civil aircraft will not be undertaken;
- d) navigational guidance and related information will be given to an intercepted aircraft by radiotelephony, whenever radio contact can be established; and
- e) in the case where an intercepted civil aircraft is required to land in the territory overflown, the aerodrome designated for the landing is to be suitable for the safe landing of the aircraft type concerned.

*Note.— In the unanimous adoption by the 25th Session (Extraordinary) of the ICAO Assembly on 10 May 1984 of Article 3 bis to the Convention on International Civil Aviation, the Contracting States have recognized that 'every State must refrain from resorting to the use of weapons against civil aircraft in flight.'*

1.2 Contracting States shall publish a standard method that has been established for the manoeuvring of aircraft intercepting a civil aircraft. Such method shall be designed to avoid any hazard for the intercepted aircraft.

*Note.— Special recommendations regarding a method for the manoeuvring are contained in Attachment A, Section 3.*

1.3 Contracting States shall ensure that provision is made for the use of secondary surveillance radar, where available, to identify civil aircraft in areas where they may be subject to interception."

2.5.1.2 The signals for use in the event of interception, as contained in Annex 2, Appendix 1, Section 2, were also contained in AIP Cuba.

**2.5.2 Interception procedures used by Cuba**

2.5.2.1 Flight plan information on N2506, N2456S and N5485S had been transmitted to Havana ACC. The three aircraft contacted Havana ACC prior to entering Havana FIR, confirming their assigned transponder codes. Through the military liaison officer, this information was made available to CNCPV, and the Cuban air defence was thus informed. Havana ACC alerted the aircraft to the active danger areas.

2.5.2.2 The ICAO Council's special recommendations recognized that "It is essential that close co-ordination be maintained between an intercept control unit and the appropriate air traffic services unit during all phases of an interception of an aircraft which is, or might be, a civil aircraft, in order that the air traffic services unit is kept fully informed of the developments and of the action required of the intercepted aircraft." Havana ACC was not informed of developments during the interceptions of the Cessna aircraft.

2.5.2.3 The Cuban military ground control did not establish radio communications with the aircraft, either on the Havana ACC frequency used by the three Cessna aircraft or on the emergency frequency 121.5 MHz. The Cuban military interceptor aircraft patrolling the coastal area north of Cuba were directed towards a radar contact by their ground control. They did not attempt to establish radio communications with the Cessna aircraft. Therefore, not all means other than interception had been exhausted in accordance with principle 1.1 a), as contained in Appendix 2 to Annex 2, that interception of civil aircraft will be undertaken only as a last resort.

2.5.2.4 Principle 1.2 called for publication of a standard method for the manoeuvring of aircraft intercepting a civil aircraft, which shall be designed to avoid any hazard for the intercepted aircraft. The special recommendations of the ICAO Council stated that "Such method should take due account of the performance limitations of civil aircraft, the need to avoid flying in such proximity to the intercepted aircraft that a collision hazard may be created and the need to avoid crossing the aircraft's flight path or to perform any other manoeuvre in such a manner that the wake turbulence may be hazardous, particularly if the intercepted aircraft is a light aircraft." Specific manoeuvres were recommended for interception, and illustrated in the *Manual concerning Interception of Civil Aircraft* (Doc 9433). AIP Cuba contained the same specific manoeuvres by intercepting aircraft.

2.5.2.5 The MiG-29 pilot stated that, having established visual contact, he made a warning pass on the first Cessna (N2456S). Such a warning pass was not contained in the interception manoeuvres recommended by ICAO and published in AIP Cuba. The available radar information did not enable an assessment of the manoeuvres of the MiG-29 aircraft in close proximity to N2456S. There was no evidence that the MiG-29 initiated the required signals for interception as published in Annex 2 and in AIP Cuba.

2.5.2.6 The interception of the second Cessna (N5485S) was similar to the first interception.

2.5.2.7 Means other than interception were available to Cuba, such as radio communication, but had not been utilized. This conflicted with the ICAO principle that interception of civil aircraft should be undertaken only as a last resort. During the interceptions, no attempt was made to direct N2456S and N5485S beyond the boundaries of national airspace, guide them away from a prohibited, restricted or danger area or instruct them to effect a landing at a designated aerodrome. In executing the interception, the standard procedures for manoeuvring and signals by the military interceptor aircraft, in accordance with ICAO provisions and as published in AIP Cuba, were not followed.

## 2.6 Brothers to the Rescue

2.6.1 The Brothers to the Rescue was a group formed in 1991, based in Miami. It was formed to search for, and assist, Cuban rafters fleeing the island. It was a volunteer pilots group, funded by voluntary contributions. The pilots flew search missions over the waters of the Florida Straits.

2.6.2 Prior to 9 September 1994, the United States allowed entry into its territory of refugees from Cuba. On that date, an agreement was signed between the two States to regulate the migration

situation. Thereafter, refugees were no longer admitted to the United States but were instead sent to the United States Guantánamo Naval Base. Subsequent to the conclusion of an agreement on 2 May 1995 between the two States, Cuban refugees were returned to Cuba.

2.6.3 Before the 2 May 1995 agreement, the Brothers to the Rescue would often inform the United States Coast Guard of the dates of their intended flights. When rafters were spotted by the Brothers to the Rescue, the Coast Guard was informed of the positions so that the rafters could be rescued. After the 2 May 1995, the contacts between the Brothers to the Rescue and the Coast Guard withered away because rafters rescued by the Coast Guard were returned to Cuba.

2.6.4 In addition to their search missions, the Brothers to the Rescue also provided assistance to Cubans in refugee camps, including those in the Bahamas.

2.6.5 In an interview published in the Miami Herald on 8 March 1996, the President of the group, Mr. Basulto, said that the group had flown approximately 1 800 missions, but had not spotted any rafters since August 1995. When interviewed by the ICAO team, he stated that the group had "saved more than 4 000 Cubans."

2.6.6 According to the authorities in Cuba, apart from the search missions, the group devoted itself from the time of its inception to political, subversive and para-military activities against Cuba. The provocative actions of the group increased after the migration agreements led to an elimination of irregular migration, and the group became "systematically devoted to the violation of Cuban airspace." The authorities in Cuba further stated that, members of the group, *inter alia*, dropped subversive propaganda over Cuban territory, threw objects from their aircraft, disrupted and interfered with Cuban air traffic radio communications and that the pilots did not listen to communications from Havana ATC or follow their flight plans.

2.6.7 At the invitation of the authorities in Cuba, the ICAO team interviewed Mr. Juan Pablo Roque, a former Cuban MiG pilot. He arrived as a refugee in the United States in 1992, via Guantánamo Naval Base. In 1993, he made contact with Mr. Basulto and joined the Brothers to the Rescue.

2.6.8 According to Mr. Roque, he began to be "trained to violate Cuban airspace." He stated that the pilots of the group would file flight plans for the Bahamas, but would in fact enter Cuban airspace. He said that he personally violated Cuban airspace over 12 times, the last time being 9 January 1996 when "We approached the northern shores of Havana and threw out thousands of leaflets [that] called people to civil disobedience." On 13 July 1995, when flying with the group, he threw pamphlets and smoke bombs. He said that he was the one who did the most violations of Cuban airspace. He also said that on several occasions, he flew in an aircraft with United States Air Force markings and that some of the aircraft which flew with the Brothers to the Rescue were military versions of Cessna 337 (0-2). He stated further the group had planned to introduce anti-personnel weapons into Cuba and to blow up high tension pylons to interrupt the energy supply. On 23 February 1996 he clandestinely left his Miami home. He stated that he arrived in Cuba on 25 or 26 February 1996.

2.6.9 According to the authorities in the United States, Mr. Roque volunteered in 1993 to provide information to the FBI "regarding the possible criminal activities of individuals involved in anti-Castro groups in the south Florida area. One of these groups was Brothers to the Rescue." The authorities stated that Mr. Roque "provided information on approximately 30 occasions, beginning in the summer of 1993, and ending in late November 1995. Several of the reports concerned individuals involved in drug trafficking. ...Twelve of the contacts were related to the Brothers to the Rescue. These

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reports include discussions of possible plans to smuggle or airdrop weapons into Cuba, and other plans to violate Cuban airspace."

2.6.10 In an article published in the Miami Herald on 8 March 1996, Mr. Basulto was quoted as saying:

"...We are in a mode of confrontation with the Cuban government. It's a civic confrontation. I think the next move is for the Cuban people, within Cuba."

"Remember this, we're just one factor. The main protagonists of this are things like Concilio Cubano..., forces within the island that are getting themselves together. They need to be reinforced and supported from the outside. I believe that what we did [by dropping leaflets with the U.N. (*sic*) Declaration of Human Rights] was to boost their morale."

"I am orienting all my resources to the people in Cuba. I'm trying to place this in its proper context which is a confrontation between Castro and the Cuban people. I consider myself part of that."

2.6.11 When interviewed by the ICAO team, the occupants of N2506 explained that the week before 24 February 1996, there were newspaper reports of a sighting of about ten rafters leaving Cuba. When a planned flight on 24 February 1996 to the Bahamas was cancelled because of a riot at the destination refugee camp, the group decided to fly a search and rescue mission in the Florida Straits.

## 2.7. Actions taken by the United States authorities

2.7.1 FAA addressed a letter of investigation dated 3 August 1995 to Mr. José Basulto, c/o Brothers to the Rescue, as follows:

"On July 13, 1995, you were the Pilot-in-Command of aircraft N2506. On that date, you operated that aircraft from Opa Locka Airport, Miami, Florida, to a point or points inside the Havana Flight Information Region and inside the Havana Terminal Control Area without clearance. Activities of this type are contrary to Federal Aviation Regulations.

This letter is to inform you that this matter is under investigation by the Federal Aviation Administration. We would appreciate receiving any evidence or statements you might care to make regarding this matter within ten (10) days of receipt of this letter ..."

2.7.2 On 31 August 1995, FAA issued a "Notice of Proposed Certificate Action" to Mr. Basulto, which stated:

"...

2. On or about July 13, 1995, you operated civil aircraft N2506, a Cessna 337, the property of another, on a passenger carrying flight departing from Opa Locka Airport, Miami, Florida.
3. During the course of said flight you operated N2506 into the Cuba Flight Information Region.

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4. During the course of said flight you operated N2506 into and through the Cuba Air Defense Identification Zone (ADIZ).
5. During the course of said flight you operated N2506 into the Havana, Cuba, Terminal Control Zone.
6. At the time of your operation of N2506 into the Cuba Flight Information Region, Cuba ADIZ, and Havana, Cuba, Terminal Control Zone, you did not have a clearance from the Cuban government air traffic control authority for entry into, and operation within, that airspace.
7. As a result, you violated the following sections of the Federal Aviation Regulations:
  - a. Section 91.703(a)(2) in that you operated a civil aircraft of U.S. registry within a foreign country and you did not comply with the regulations relating to the flight and manoeuvre of aircraft there in force;
  - b. Section 91.703(a)(3), and Section 91.13(a), in that you operated a civil aircraft of U.S. registry within a foreign country in a careless or reckless manner so as to endanger the life or property of another.

Taking into consideration all of the circumstances of this case, we propose, pursuant to the authority vested in the Administrator by 49 U.S.C. Section 44709, to issue an Order suspending any and all Commercial Pilot certificates you hold for a period of one hundred and twenty (120) days.

An Order for such suspension will be issued unless, on or prior to fifteen (15) days after your receipt of this letter, you elect to proceed in accordance with the enclosed information with respect to certificate action."

2.7.3 On 21 September 1995, Mr. Basulto requested an informal conference on his proposed 120-day suspension. The informal conference was not held.

2.7.4 The FAA addressed another letter of investigation dated 4 April 1996 to Mr. José Basulto, as follows:

"Personnel of this office are investigating incidents that occurred on January 9, January 13, and February 24, 1996 which involved the operation of Cessna N2506 in the territorial airspace of the Republic of Cuba. These operations were conducted without authorization. Information indicates you were Pilot-in-Command of N2506, in one or more of these incidents. Activities of this type are contrary to Federal Aviation Regulations.

This letter is to inform you that this matter is under investigation by the Federal Aviation Administration. We would appreciate receiving any evidence or statements you might care to make regarding this matter within ten (10) days of receipt of this letter ..."

2.7.5 In response to questions by the ICAO team, the authorities in the United States provided an explanation of the specific Federal Aviation Regulations believed to have been violated by Mr. Basulto:



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"The Federal Aviation Regulations that Mr. Basulto was alleged to have violated on July 13, 1995, are 14 CFR 91.703(a)(2) (a civil aircraft of U.S. registry operating within a foreign country must comply with the regulations relating to the flight and manoeuvre of aircraft there in force); 14 CFR 91.703(a)(3) (such aircraft must be operated in accordance with most provisions of Part 91 so far as they are not inconsistent with the regulations of the foreign country or Annex 2 of the Convention on International Civil Aviation). In this situation, the Part 91 rule involved is 14 CFR 91.13(a) (prohibits careless or reckless operation of an aircraft). The investigation into the incidents of January and February 1996 is not completed, but any enforcement action that might result would likely involve the same regulations."

2.7.6 The authorities in the United States also provided "a statement regarding the timeliness of the MIA FSDO's handling of the above investigative and enforcement matters." which read as follows:

"The Miami Flight Standards District Office (FSDO) began the enforcement action involving the July 13, 1995 incident, and has been the office primarily responsible for investigation of the alleged incidents in January and February 1996. ...

The July 13, 1995 overflight incident became known to the FSDO on July 13 after it occurred. The enforcement investigative report (EIR) was signed out of the Miami FSDO on August 18, 1995. Review of the EIR by the Flight Standards division in the regional office was completed on August 25, 1995. On August 31, 1995, the Assistant Chief Counsel for the Southern Region issued a notice of proposed certificate action, proposing the suspension of Mr. Basulto's pilot certificate for 120 days. The quickness with which the FAA issued the notice reflected the FAA's interest in deterring other possible regulatory violations in connection with a flotilla event scheduled for September 2. (The Government of the Republic of Cuba had previously conveyed to the FAA its concern regarding unauthorized entry of U.S.-registered civil aircraft into Cuban airspace.)

The FAA, through the Department of State, requested that the Cuban Government provide evidentiary materials that support the proposed certificate action. The matter requested included copies of the pertinent Cuban regulations violated and statements by air traffic controllers who had observed the flight into Cuban airspace. These items of evidence were requested from the Cuban Government in order to officially confirm elements of the violations alleged: e.g., that Cuban regulations prohibited the July 13 overflight, and that the Cuban air traffic control authority had not authorized Mr. Basulto's entry into Cuban airspace. The requested evidentiary materials were received by the FAA in December, but still needed to be translated into English. The translation was not completed until early February 1996. On February 14, 1996, the FAA asked the Department of State to request additional, specific information related to the sworn statement of a Cuban air traffic controller, which statement had earlier been provided by the Cuban Government.

Several days before the February 24 incident the FAA received information from the Cuban Government relating to an alleged unauthorized entry into Cuban airspace on January 13. Prior to receipt of that information, FAA efforts to substantiate Cuban complaints that violations had occurred on January 9 and 13, 1996 had been unsuccessful. Following the February 24 incident and the receipt of information from Cuba regarding

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January 13, the FAA opened an investigation of the alleged incidents of January 9 and 13 and the February incident. That investigation continues. The outcome of the investigation could well affect the already-initiated enforcement action concerning the July 13 incident. Accordingly, no action has been taken to convene the informal conference between Mr. Basulto and his attorney and the FAA's attorneys on the notice proposing to suspend his pilot certificate for the July 13 incident. (An informal conference is a step in the enforcement process following issuance of a notice of proposed certificate action.)"

2.7.7 On 29 February 1996, the FAA issued an Emergency Cease and Desist Order and Notice of Enforcement Policy, which read in part:

"... Unauthorized operation of U.S.-registered civil aircraft in Cuban territorial airspace is prohibited by the Federal Aviation Regulations. The United States Government has issued statements warning of the serious consequences that could occur should any person conduct such operations.

Notwithstanding such advice and warnings of the United States Government and the unlawfulness of the conduct, operations without authorization in Cuban territorial airspace have occurred.

Based on the circumstance described above, I find that an emergency exists relating to safety in air commerce, and that there is an immediate need to take action for reasons of safety of flights in the vicinity of the Florida Straits and to ensure against the unauthorized entry of U.S. civil aircraft into Cuban territorial airspace. Unauthorized operation of U.S.-registered civil aircraft into the territorial airspace of the Republic of Cuba is prohibited.

NOW, THEREFORE, IT IS ORDERED that any person holding a U.S. airman certificate and/or operating U.S.-registered civil aircraft, who has conducted unauthorized operations within Cuban territorial airspace, CEASE AND DESIST from this unlawful activity.

IT IS FURTHER ORDERED that all persons holding U.S. airman certificates and/or operating U.S.-registered civil aircraft comply with the Federal Aviation Regulations prohibiting unauthorized operation within Cuban territorial airspace.

#### ENFORCEMENT POLICY

TAKE NOTICE that, effective immediately, any person who makes unauthorized entry into the territorial airspace of the Republic of Cuba in violation of the Federal Aviation Regulations will be subject to enforcement action to the maximum extent permitted by law, including, but not limited to the following:

**Immediate revocation of pilot certificate;**  
**Maximum civil penalties;**  
**Seizure of aircraft involved in such a violation; and**  
**Appropriate judicial remedies.**

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(Authority: 49 U.S.C. Sections 40113(a), 44709, 46105(c), 46301, 46304(b), 46106, and 46107.)

Further, any person who operates or attempts to operate an aircraft after pilot certificate revocation, or otherwise without a valid airman certificate, is subject to criminal penalties of up to 3 years in prison, and/or fines (49 U.S.C. Section 46306(b)(7))."

2.7.8 On 1 March 1996, the U.S. authorities issued FDC NOTAM 6/1335 which read:

"Due to recent incidents involving civil aircraft of U.S. registry the FAA recommends that any operators conducting flight in the Florida Straits and nearby international waters remain vigilant for other air traffic in the area and strictly abide by the international and FAA Federal Aviation Regulations. The Administrator has issued a Cease and Desist Order and Notice of Enforcement Policy effective February 29, 1996. Any person holding a U.S. airman certificate and/or operating U.S.-registered civil aircraft shall comply with Federal Aviation Regulations prohibiting unauthorized operation within Cuban territorial airspace. Unauthorized entry into this airspace will subject the individual to enforcement action to the maximum extent permitted by law, including: revocation of pilot certificate, maximum civil penalties, seizure of aircraft, and judicial remedies. Further, any person attempting to operate an aircraft after revocation or without a valid certificate is subject to criminal penalties of up to 3 years in prison and/or fines."

Accompanying GENOT RWA 6/18 mandates that FDC NOTAM 6/1335:

"... be briefed to all flights with destinations in the Florida Straits or nearby international waters. The contents of FDC NOTAM 6/1335 shall be read verbatim .... This referenced NOTAM will be read verbatim each time a flight plan is filed."

2.7.9 On 7 March 1996, a "Letter to Airmen" was issued by the FAA, intended to provide "the broadest notice" of the Cease and Desist Order and the Notice of Enforcement Policy. The letter stated that:

"FAA has been given access to and will use all available government radar sources to establish whether Cuban airspace has been violated. Airmen should be aware that if the evidence obtained from any source establishes a violation of Cuban airspace, their airman certificates will be revoked on an emergency basis. In addition, maximum civil penalties, seizure of aircraft and judicial remedies will be pursued in appropriate cases."

2.7.10 On 16 May 1996, the FAA issued an "Emergency Order of Revocation" of Mr. Basulto's commercial pilot certificate. The Order stated that the Administrator of the FAA had determined that safety in air commerce or air transportation and the public interest required the immediate revocation of said certificate.

2.7.11 The Order stated that on or about 11 July 1995, representatives of the Miami FSDO met with Mr. Basulto in his capacity as President of the Brothers to the Rescue and advised him of the potential serious consequences of unauthorized entry into Cuban territorial airspace and that any violations of FARs or international regulations would be vigorously investigated. It further stated that on or about 13 July 1995, Mr. Basulto operated civil aircraft N2506 on a passenger-carrying flight departing from Opa Locka Airport into the territorial airspace of Cuba, into the Havana, Cuba, Terminal Control Zone

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and into Prohibited Area MUP-1 of Cuba. At all relevant times, these areas were either restricted areas or prohibited areas. At the time of such operation of N2506, Mr. Basulto "did not have authorization from the Cuban government air traffic control authority for entry into, and operation within, that airspace." Such unauthorized entry and operation was contrary to certain specified laws of Cuba.

2.7.12 The Order continued by stating that on or about 24 February 1996, Mr. Basulto operated civil aircraft N2506 on a flight departing from Opa Locka Airport, on a VFR flight plan, into the territorial airspace of Cuba which was at all relevant times a restricted area or prohibited area of Cuba. At the time of operation, Mr. Basulto did not have authorization from the Cuban government air traffic control authority for entry into, and operation within, that airspace, contrary to specified Cuban laws.

2.7.13 The Order stated that Mr. Basulto's operation of N2506 was careless or reckless so as to endanger the lives or property of others, and that he had demonstrated that he lacked the degree of care, judgement and responsibility required of the holder of an airman certificate.

2.7.14 The Order specified that Mr. Basulto had violated:

- 1) Section 91.703(a)(2) of the FARs (operation of a civil aircraft of U.S. registry within a foreign country and not complying with the regulations relating to the flight and manoeuvre of aircraft there in force), in particular, by violating certain listed laws and regulations of Cuba;
- 2) Sections 91.703(a)(3) and 91.13(a) of the FARs (operation of a civil aircraft of U.S. Registry within a foreign country in a careless or reckless manner so as to endanger the life and property of another).

The Order was made effective immediately on the basis that an emergency requiring immediate action existed.

### 3. CONCLUSIONS

3.1 The authorities in Cuba notified the authorities in the United States of multiple violations of Cuban territorial airspace, which took place on seven specific dates from 15 May 1994 to 4 April 1995, by aircraft operating out of the United States, and repeatedly demanded that the United States adopt measures to put an end to these violations.

3.2 At least one aircraft, N2506, overflew the city of Havana at low altitude on 13 July 1995, and released some leaflets and religious medals. Cuba requested the United States to prevent such violations.

3.3 In a public statement issued on 14 July 1995, the government of Cuba declared its firm determination to take all the necessary steps to prevent provocative actions and warned that any aircraft intruding into Cuban territorial airspace may be shot down.

3.4 According to the authorities in Cuba, two light aircraft violated Cuban territorial airspace on 9 and 13 January 1996, and released leaflets which fell on Cuban territory. According to the pilot of one of the aircraft, N2506, half a million leaflets were released on 13 January 1996; on both dates they were released outside the 12 NM Cuban territorial limit and the wind carried them to Havana.

3.5 Prior to 24 February 1996, the United States authorities issued public statements and NOTAMs, advising of the potential consequences of unauthorized entry into Cuban airspace, and initiated legal actions against the pilot of N2506.

3.6 Under Article 12 of the Chicago Convention, each contracting State undertakes to adopt measures to insure that every aircraft carrying its nationality mark, wherever such aircraft may be, shall comply with the rules and regulations relating to the flight and manoeuvre of aircraft there in force.

3.7 The Brothers to the Rescue was a volunteer group of pilots, based in Miami, Florida, United States, formed to search for, and assist, Cuban rafters fleeing the island. There was evidence to indicate that some members of the group sought to influence the political situation in Cuba.

3.8 After the events on 9 and 13 January 1996, the authorities in Cuba realized that control of the Brothers to the Rescue Organization was beyond the United States government; the Commander of the Anti-Aircraft Defence and the Air Force of Cuba was instructed that violations of Cuban territorial airspace should no longer be tolerated, and he was authorized, if such a situation arose again, to decide personally on military interception and shooting down, if so required.

3.9 On 23 February 1996, the Department of State in the United States alerted FAA/AIA to the tense situation in Cuba and the possibility that the Brothers to the Rescue might attempt an unauthorized flight into Cuban airspace; FAA/AIA alerted FAA Headquarters, FSDO, FAA in Miami, and the military liaison officer at Miami ARTCC.

3.10 On 24 February 1996, the Department of State in the United States requested, through the FAA Operations Center in Washington, D.C., information on the departure of Brothers to the Rescue aircraft. In addition to FAA facilities, other agencies, including Customs, had been notified. According to the authorities in the United States, any incursions into Cuban territorial airspace were to be documented for compliance/enforcement purposes.

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3.11 N2456S, N5485S and N2506 deviated from the route given in their VFR flight plans; they were flying within the MUD-8 and MUD-9 danger areas within Havana FIR, promulgated as being active on 24 February 1996.

3.12 At 15:21 hours on 24 February 1996, N2456S was destroyed by an air-to-air missile fired by a Cuban MiG-29 military aircraft.

3.13 At 15:27 hours on 24 February 1996, N5485S was destroyed by an air-to-air missile fired by a Cuban MiG-29 military aircraft.

3.14 There were significant differences between the Cuban military radio communications recordings provided by Cuba and by the United States. Several transmissions in the recording provided by the United States could not be found in the recording provided by Cuba, all of which related to vessels in the area of shoot-down. The differences could not be explained as the result of simultaneous transmissions recorded differently by different stations, nor could they be explained as the result of technical difficulties in the recording.

3.15 There were significant differences between the radar data provided by Cuba and by the United States, which could not be reconciled.

3.16 The recorded positions and track of the *Majesty of the Seas*, the observations by its crew and passengers, the position of the *Tri-Liner* relative to the *Majesty of the Seas*, and the resulting estimated locations of the shoot-downs were considered to be the most reliable position estimates.

3.17 No corroborative evidence of the position of the *Majesty of the Seas* was obtained. With this qualification and based on the recorded positions of the *Majesty of the Seas*, N2456S was shot down approximately at position 23 29N 082 28W, 9 NM outside Cuban territorial airspace and N5485S was shot down approximately at position 23 30.1 N 082 28.6W, 10 NM outside Cuban territorial airspace.

3.18 Means other than interception were available to Cuba, such as radio communication, but had not been utilized. This conflicted with the ICAO principle that interception of civil aircraft should be undertaken only as a last resort.

3.19 During the interceptions, no attempt was made to direct N2456S and N5485S beyond the boundaries of national airspace, guide them away from a prohibited, restricted or danger area or instruct them to effect a landing at a designated aerodrome.

3.20 In executing the interception, the standard procedures for manoeuvring and signals by the military interceptor aircraft, in accordance with ICAO provisions and as published in AIP Cuba, were not followed.

3.21 The Protocol introducing Article 3 *bis* into the Chicago Convention had not entered into force. Neither Cuba nor the United States had ratified it.

3.22 The rule of customary international law that States must refrain from resorting to the use of weapons against civil aircraft in flight, as codified in Article 3 *bis* of the Chicago Convention, and the ICAO provisions concerning interception of civil aircraft, apply irrespective of whether or not such aircraft is within the territorial airspace of that State.

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4. **RECOMMENDATIONS**

4.1 Every Contracting State to the Chicago Convention should, in the light of Assembly Resolutions A25-2 and A31-15, Appendix C, and Council resolutions and decisions, ratify the Protocol introducing Article 3 *bis* into the Convention;

4.2 Pending ratification and formal entry into force of the Protocol introducing Article 3 *bis* into the Convention, States should comply with all the provisions of the Protocol.

GLOSSARY

ACC	Area Control Centre
ADF	Automatic Direction Finder
ADIZ	Air Defence Identification Zone
AIFSS	Automated International Flight Service Station
AIM	Aeronautical Information Manual (United States)
AIP	Aeronautical Information Publication
AMIS	Aircraft Movement Information Service
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATS	Air Traffic Services
CARIBROC	Caribbean Regional Operations Center (United States)
cm	Centimetre(s)
CNCPV	Joint National Centre for Flight Planning (Cuba)
CTA	Control Area
CVR	Cockpit Voice Recorder
DAICC	Domestic Air Interdiction Co-ordination Center, Customs (United States)
°C	Degrees Centigrade
°T	Degrees True
DFDR	Digital Flight Data Recorder
DME	Distance Measuring Equipment
FAA	Federal Aviation Administration (United States)
FAR	Federal Aviation Regulation (United States)
FBI	Federal Bureau of Investigation (United States)
FDR	Flight Data Recorder
FIR	Flight Information Region
FL	Flight Level
FSDO	Flight Standards District Office, FAA (United States)
FSS	Flight Service Station (United States)
ft	Foot/feet
GPS	Global Positioning System
HF	High Frequency (3 000 to 30 000 kHz)
hPa	Hectopascal
IACC	Civil Aviation Institute (Cuba)
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
INS	Inertial Navigation System
kg	Kilogram(s)
kHz	Kilohertz
km/h	Kilometres per hour



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km	Kilometre(s)
kt	Knot(s)
lb	Pound(s)
m	Metre(s)
MHz	Megahertz
mm	Millimetre(s)
MUD	Danger area designated by Cuba
MUP	Prohibited area designated by Cuba
N	North
NBC	National Broadcasting Corporation (United States)
NM	Nautical Mile(s)
NORAD	North American Air Defense (United States)
NOTAM	A notice containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations
NTSB	National Transportation Safety Board (United States)
PSR	Primary Surveillance Radar
QNH	Altimeter sub-scale setting to indicate elevation (above mean sea level) when on the ground
RAC	Rules of the Air and Air Traffic Control
SAR	Search and Rescue
SEAD	South East Air Defense sector, NORAD (United States)
SIGMET	Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations.
SSR	Secondary Surveillance Radar
STOL	Short Take-off and Landing
TWR	Aerodrome Control Tower
UHF	Ultra High Frequency (300 to 3 000 MHz)
UTC	Co-ordinated Universal Time
VFR	Visual Flight Rules
VHF	Very High Frequency (30 to 300 MHz)
VOR	VHF Omnidirectional Radio Range
W	West

- END -