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MINISTÉRIO DAS OBRAS PÚBLICAS, TRANSPORTES E COMUNICAÇÕES
GABINETE DE PREVENÇÃO E INVESTIGAÇÃO DE ACIDENTES COM AERONAVES

FINAL ACCIDENT REPORT

Bragança Flying Club

Piper PA-34

CS-AUE

North Atlantic Ocean

27th of July, 2008

GPIAA

**Homologo, nos termos do nº 3
do artº 26º do D. L. 318/99,
de 11 de Agosto de 1999**

09.JUN.2011

O Director,

Fernando Ferreira dos Reis

FINAL ACCIDENT REPORT Nr: 15/ACCID/2008

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NOTE

The only aim of this technical report is to collect lessons which may help to prevent future accidents.

Safety investigation is a technical process aiming to accident's prevention and comprises the gathering and analysis of evidences, in order to determine the causes and, when appropriate, to issue safety recommendations

In accordance with Annex 13 to the International Civil Aviation Organisation Convention, Chicago 1944, EU Regulation Nr. 996/2010, from European Parliament and Council, 20th OCT 2010 and article 11th n° 3 of Decree-Law n° 318/99, 11th AUG 1999, the sole purpose of this investigation is to prevent aviation accidents. It is not the purpose of any such investigation process and the associated investigation report to apportion blame or liability.

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Flamig
Ch. H.

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SYNOPSIS

On the 27th of July, 2008, the aircraft Piper PA-34, belonging to Bragança Flying Club, registration CS-AUE, departed from Bragança aerodrome (LPBG) at 07:45 UTC¹, with destination Coimbra aerodrome (LPCO). When levelling at 8000ft altitude (Flight Level 080), the pilot referred that he was not feeling well. About 30 minutes later, he declared that he was feeling sick and finished his transmission with ATC, never answering further calls. The aircraft passed its destination and disappeared over the sea, with last radar registered position about 190NM west of Roca cape.

GPIAA was notified of the event on the early stage of alert phase and kept informed about all search & rescue actions development.

Search was not successful and it was cancelled after three days, considering aircraft & pilot as missing.

This report has been released in Portuguese and English Languages.

In case of conflict, Portuguese version will take precedence.

¹ - All timings referred in this report, unless other specified, are UTC (Universal Coordinated Time) time. By that date, local time in Portugal mainland was equal to UTC + 1 hour.

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1. FACTUAL INFORMATION

1.1 History of the Flight

By 07:45 UTC on the 27th of July, 2008, the aircraft Piper, model PA-34-200T Seneca II, s/n 34-7870101, with registration CS-AUE, took off from Bragança aerodrome (LPBG), having on board a lonely pilot.

The scope of such flight was to position the aircraft at Coimbra aerodrome (LPCO), where a certified aircraft maintenance organization would substitute its VHF communication equipment by a new one with short spaced frequency channels (8,33kHz).

According with Flight Plan, submitted to Air Traffic Management Services (ATM) presented at Bragança aerodrome (LPBG), the flight had an estimated time of departure (ETD) at 07:45, direct to Coimbra aerodrome (LPCO), with a flight time of 60 minutes, cruising at an altitude of 8000ft (FL 080) and carrying enough fuel for an endurance of 4 hours (*picture nr. 1*).

Aerodromo Municipal de Bragança
Lat. 41° 51' 18" N - Long. 006° 42' 23" W - Altitude 683 m / 2241 pés
AFIS (a pedido) 122.300 Mz - L (24) 358.0 Kz
Telefone: 273 381 175 Fax: 273 381 065 Nº 0582

PROXIMITY: FF
MESSAGE TYPE: FPL
REGISTRATION: CS-AUE
TYPE OF AIRCRAFT: PA-34
DEPARTURE AIRCRAFT: LPBG
CRUISE ALTITUDE: 080
DESTINATION AIRCRAFT: LPCO
ROUTE: RPT

PERSONNEL ON BOARD:
Pilot: [Handwritten Name]
Crew: [Handwritten Name]

COLOUR: [Handwritten]

Picture Nr: 1



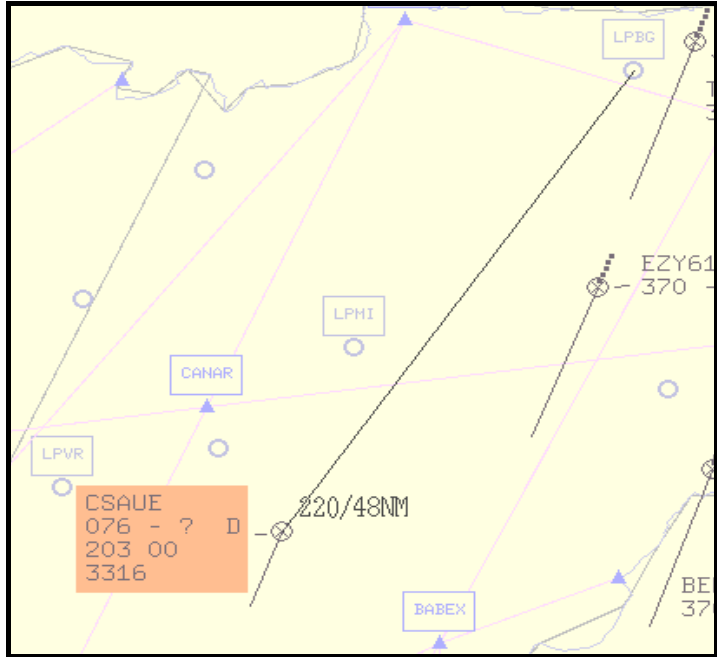
Picture Nr. 2

After airborne, the pilot stabilized on desired route (*Picture nr. 2*) and contacted (at 07:49) Flight Information Service (FIS), on frequency 130.90MHz, receiving flight clearance and squawk code (3316), which has been introduced in “transponder”. He was cleared to climb to FL 060 (6000ft), while waiting clearance for FL 080 (8000ft). Such clearance has been issued at 07:52, and the aircraft continued climbing to requested altitude.

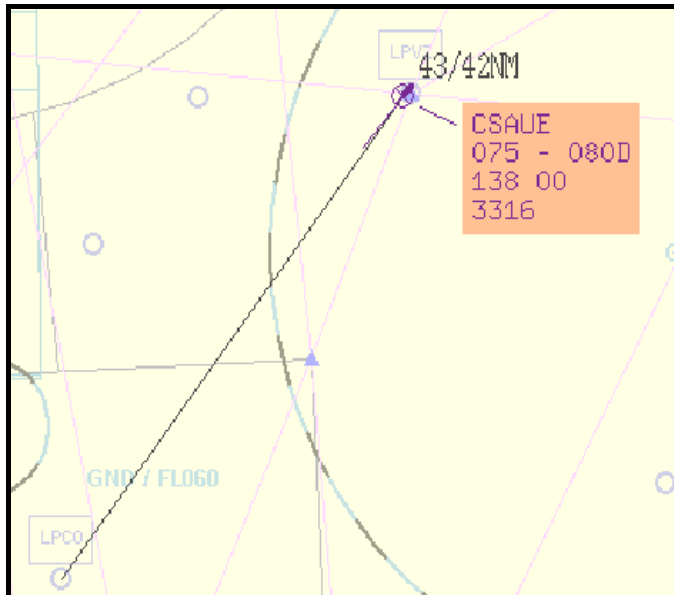
Ten minutes after takeoff (07:55), pilot was called by FIS and instructed to change frequency and contact Lisbon Control Area (LIS ACC) North sector Controller on frequency “**one-three-two-decimal-three**”. By that time the aircraft was climbing through (7500’) and, before changing frequency, the pilot referred “**I’m not feeling well**”, he red back frequency (**three-two-three**) and said (**thank you**).

He contacted LIS ACC North sector Controller, in sequence, getting clearance confirmation and informed of no radar contact at that moment. First radar contact would be established at 08:09:10, when the aircraft was passing abeam Vila Real (LPVR) at an altitude of 7600’ (picture nr. 3).

At 08:26:12, pilot joined the frequency (132.3MHz), didn’t pronounce the call sign and declared “**iii! ... Lisboa ... iii! ... I’m feeling ill! ... iii! ... I’m feeling ill! ... iii!**” and finished transmitting.



Picture Nr: 3



Picture Nr: 4

By that time (08:26:12), the aircraft was abeam Viseu (LPVZ) at an altitude of 7500’ and on course ($\pm 220^\circ$) to destination, with 138kts speed (picture nr. 4). The new LIS ACC north sector Controller didn’t identify that station, being his first contact with that aircraft (*he was starting his duty period*). By part’s exclusion, checking traffic under his responsibility, the Controller identified CS-AUE as probable transmission source and made a call (08:26:44), which had no answer.

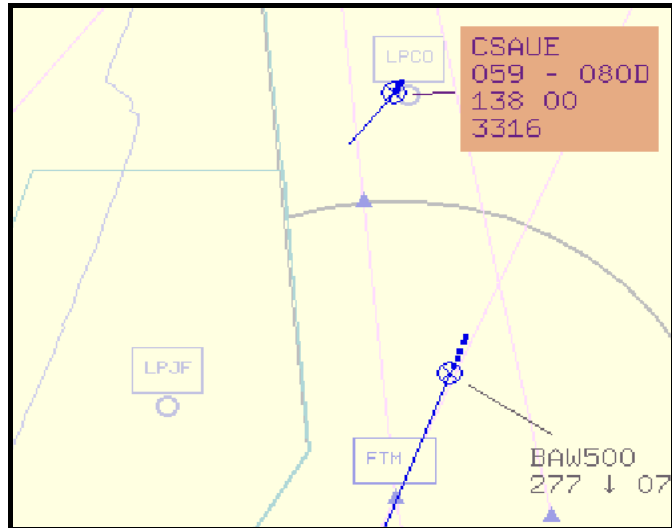
After some more unsuccessful calls he contacted FIS, asking if the pilot had gone back to that frequency and requesting some calls on FIS frequency and on emergency one. At this moment FIS Operator remembered last communication with the pilot and referred his words of “**I’m not feeling well!**” associating them with last events.

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Alerted at 08:29 for the lost contact with the aircraft, FIS operator made some calls on his own frequency (130.9MHz) and on 121.5MHz, without response. Faced with that lack of communications he informed his supervisor, who arranged to transfer traffic to another Operator and appointed this one for exclusive deal with distressed aircraft.

FIS was provided by Air Traffic Independent Squadron (EITA), an Air Force department, on behalf of National Air Traffic Management provider (NAV, E.P.E.), operating close to each other in NAV premises

The aircraft was kept under radar monitoring and passed abeam destination, Coimbra aerodrome (LPCO), at 5900ft, by 08:44 (picture nr 5) turning slightly to the right ($\pm 20^\circ$).



Picture Nr 5

At 08:46 EITA informed Air Force Operational Command (COFA), who determined (08:58) departure of a team of fighters (F-16) to intercept the aircraft, which took-off from Monte Real Air Force Base (AB 5) at 09:07.



Picture Nr 6

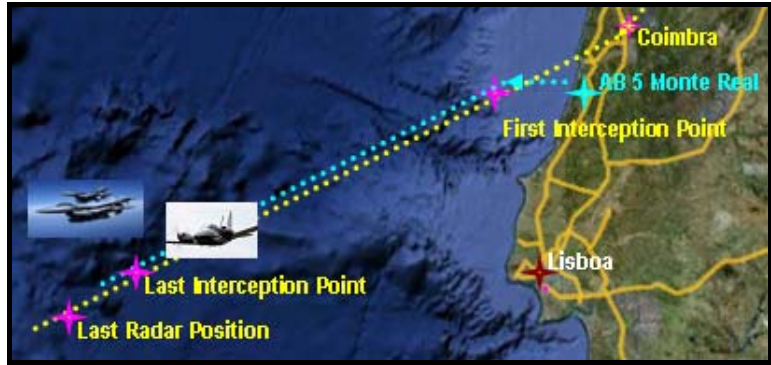
CS-AUE flew abeam Monte Real (LPMR) at 08:55 and was intercepted the first time by 09:13, at position N 39° 41' 39" / W 009° 45' 00" (picture nr 6). The aircraft was flying at 5200ft, heading 250°, keeping a speed of 128kts.

Approaching the aircraft from the right hand side, F-16 pilots saw the pilot seating at controls, but without any sign of reacting to their presence, their visual signs and radio calls performed.

On subsequent passes, they referred it was not possible to visualize the pilot, inside the cockpit.

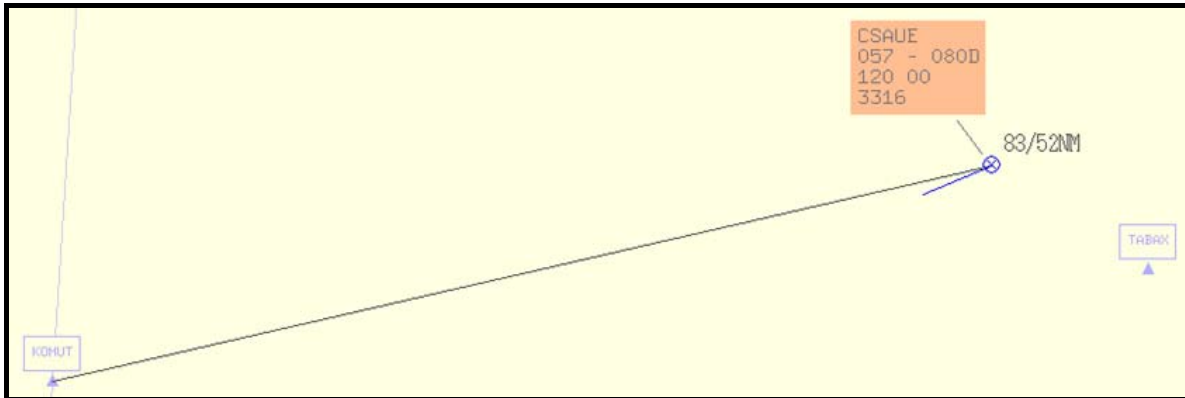
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This F-16 team followed aircraft flight progress until about 208NM from AB 5 (limit of its endurance), registering aircraft last position at N 38° 40' 18" / W 012° 48' 37" coordinates, at 10:29 (picture nr 7), landing back on base at 11:05.



Picture Nr 7

The aircraft proceeded its flight, keeping approximate heading of 250°, until it disappeared from radar displays, by 10:58, at an altitude of 5700ft, speed 120kts, on coordinates N 38° 14' 38" / W 013° 56' 08" (picture nr 8).



Picture Nr 8

During a second sortie, the F-16 team, airborne at 11:53 from AB 5 (Monte Real), was not successful in intercepting the distressed aircraft, but discovered some wreckage floating on the sea at position N 38° 10' 15" / W 014° 10' 29", which showed, after being recovered by cargo ship "ALIANCA MAUA", to be not part of the disappeared aircraft (picture nr 9).

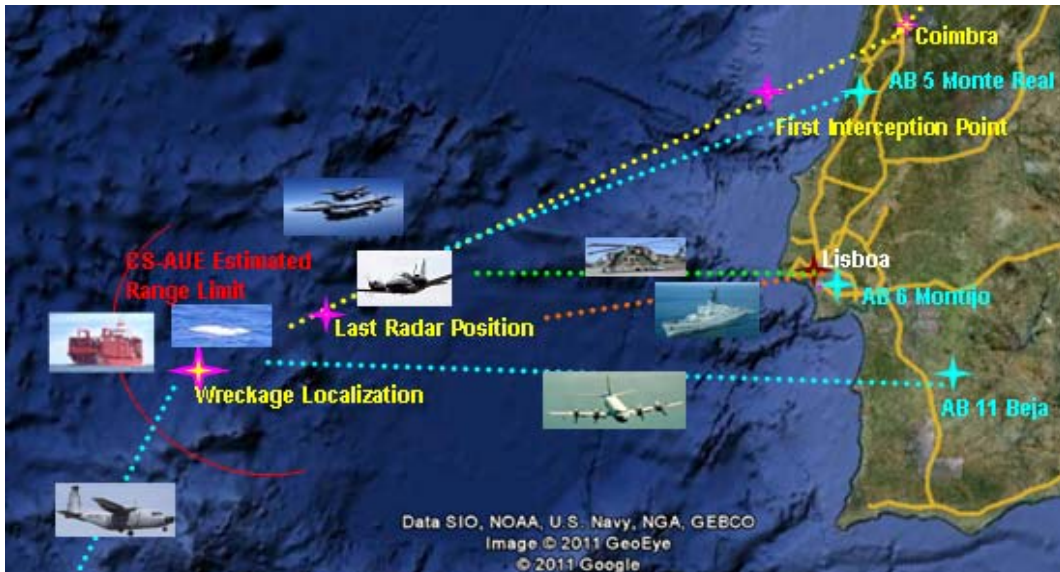


Picture Nr 9

Meanwhile, Search And Rescue Service (SAR) being activated (09:05), an helicopter EH-101 took-off from AB 6 (Montijo) at 09:25, a Navy corvette set sail from Alfeite Naval Base (Lis-

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bon) at 09:45, a Casa C-212 aircraft took-off from Porto Santo (LPPS) at 11:45 and a P-3P (Orion) aircraft departed from AB 11 (Beja) by 13:35 (*picture nr 10*). Next day another C-212, from AB1 (Sintra, near Lisbon) joined the search team.



Picture Nr 10

None of these means got contact with the missing aircraft or detected any sign of aircraft wreckage. After three days of search in the estimated probable aircraft precipitation area, without finding any trace of the aircraft, search was terminated and aircraft and pilot considered missing.

1.2 Injuries

The aeroplane was not found and the people on board were considered as “missing” people, without injuries to report.

1.3 Aircraft Damage

The aircraft was considered as “missing”.

1.4 Other Damage

No third party damages have been reported.

1.5 Personnel

1.5.1 Pilot

On board there was only one pilot, male, 59 years old, Portuguese nationality, with following references:

Qualifications		Flight Experience	
Flight License:	PPL(A)	Total:	841:10
Validity:	20-11-2012	Last 90 days:	
Qualifications:	MEP; SEP	Last 30 days:	*
Last Medical Examination:	28-09-2007	Last week:	
Restrictions/Limitations:	VDL	Last 24 hours:	
*- The only information available reports to pilot Flight Log dated 28-10-2007 with a total of 459:40 as PIC on Single Engine Propellers (SEP) and 381:30 as PIC on Multi Engine Propellers (MEP).			

Table Nr 1

From all gathered information, no previous degenerative or cardiopulmonary disease was reported. Last medical examination, for his license revalidation, was performed on 28-09-2007 and the only restriction was the wearing of corrective lenses and to carry a spare spectacle's set (VDL).

Inside his close friends group it was referred he was not feeling well for the last days and even on the eve he refused to join a party at club premises. Nobody specified what kind of sickness he had, neither its possible source.

It must be highlighted the pilot was a heavy smoker, smoking several cigarette's packets a day. On another side it was referred that some problems arose with hospital administration, relating its professional career as surgeon. All this could induce a high stress and conduct to the discomfort he was feeling during the flight and previous days, as well.

1.5.2 Air Traffic Controllers

Taking off from a non-controlled aerodrome, inside a difficult radio reception area, out of Lisbon Air Traffic Control (LIS ACC) coverage but accessible to Flight Information Service (FIS) coverage, the pilot contacted FIS, immediately after airborne, in order to get flight clearance and identification code, for transponder, once he intended to fly at an altitude of 8000ft (FL080), entering controlled airspace and needing a clearance previously to his entrance in that space. In such conditions, the pilot had to contact with a FIS Radio Operator and with a LIS ACC (North sector) Controller.

1.5.2.1 FIS Radio Operator

Giving support to Flight Information Service, on that sector, there was an Air Traffic Controller (CTA), male, 23 years old, with about four years of experience with Air Force. As a routine procedure, that CTA had to monitor, simultaneously, three VHF frequencies and three HF frequencies, being the 130.90MHz (specially directed to that North sector) one of them.

Even if he was not performing a controller's position, he was qualified to act as such, having the required training and acting as controller before. His preparation used to cover "**human factors**" as one of several curricular subjects.

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His supervisor was a qualified CTA as well, male, 27 years old and about eight years' experience on the job.

When communications with the aircraft were lost, the supervisor transferred FIS duties to another working station and the CTA in charge became dedicated to CS-AUE flight monitoring and interception manoeuvres that were determined by Air Force Operational Command (COFA).

1.5.2.2 LIS ACC Controller

The CTA responsible for the North sector of LIS ACC, at the moment communications were lost with CS-AUE, was a qualified Controller, male, with more than 17 years of experience in several control positions. He relieved the other one at 08:00 and had no previous contact with the pilot, reason for not identify his voice when he entered the frequency without pronouncing the call sign.

Recognizing the anguish of that call he tried to sterilize the frequency, instructing another aircraft to start descent and contact with Oporto APP, becoming available to contact with pilot in distress and dealing with his problems. Extrapolating between all the aircrafts under his responsibility he elected CS-AUE as the most probable source of that emergency communication. Being unable to establish communication with that aircraft, he asked FIS Operator if the aircraft had contacted him back. Only then he got knowledge of previous pilot statement on his health status.

1.6 Aircraft

The aircraft, bought by the pilot and registered in 1989 as Bragança Flying Club property, being flown mainly by him, was a twin engine aeroplane (*picture 11²*), low wing, with retractable landing gear, seating six people, a Maximum Take Off Mass (MTOM) of 4570Lbs (2073kgs) and following references (*table nr 2*):



Picture 11

² - Photo from "JETPHOTOS.NET" by Orlando Silva.

Reference	Airframe	#1 Engines #2	#1 Propellers #2
Manufacturer:	Piper Aircraft Corp.	Continental	Hatzell
Model:	PA-34-200T	TSIO-360-EB2B	PHC-C3YF-2KUF
Serial Number:	34-7870101	265931-R 266474-R	EB5005A EB5003A
Year Built:	1978	Rebuilt 1994	1996
Flight Hours:	3 134:00	462:05	377:50 378:50
Last Inspection:	24-09-2007	24-09-2007	24-09-2007

Table Nr 2

All maintenance works used to be performed by a certified maintenance overhaul and repair station and last Civil Aviation Authority inspection was done on the 19th of October, 2007, being the Airworthiness Certificate valid at the time of the accident.

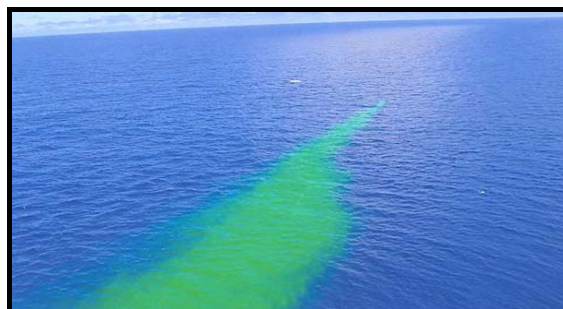
1.7 Meteorology

It was daylight and the sky was almost clear, generally speaking. Meteo Office Report for that day (27-07-2008) was as follow:

- ▲ **North Inland Area (Trás-os-Montes & Beira)** - the sky was clear to scattered (1/8 to 4/8), in the morning, becoming broken, late afternoon, with 5/8 to 6/8 of Cumulus & Stratocumulus at 1500ft. Visibility varied between 10km and 20km and the wind blew from West at <8kts / 10kts, with temperature from 12°C rising to 29°C. At 5000ft the wind was calm to moderate (<15kts), from West and the temperature 12°C to 15°C.
- ▲ **Coastal Centre Area (Coimbra)** - the sky was broken to overcast (5/8 to 8/8), in the morning, becoming scattered (2/8 to 4/8), with Cumulus and Stratus with 1500ft / 2000ft base, by the afternoon. The visibility was good (10 / 20km), the wind calm (<8kts) and the temperature varied from 14°C to 26°C. At 5000ft the wind was <10kts, from West and the temperature between 12°C and 17°C.
- ▲ **Over the Sea** – the sky was broken (4/8 to 6/8), near the coast, becoming scattered to few clouds (4/8 to 1/8) when moving Westerly. The visibility was good (10 / 20km), the wind moderate (8kts /19kts) from West and the air temperature varied from 14°C (near the coast) to 23°C (further to the west).

At 5000ft the wind blew moderate from West, with 10/15kts (near the coast) and 20/25kts (on high seas), the temperature dropping to between 12°C and 15°C.

The sea was calm with waves from West, rounding to Norwest, with less than 2m (picture nr 12).



Picture Nr 12

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1.8 Navigation Aids

Not applicable.

1.9 Communications

The aircraft was equipped for multilateral communications with ATC and the pilot made all necessary calls, while capacitated to do it.

Phraseology was correct and a natural tone was used, being noticed a light trembling on his voice when answering to frequency change requested by FIS operator at 07:55, reporting he was "*not feeling well*" and slurring the words when reading back the new frequency "...three – two – three", returning to normal when saying good-by with an "*obrigado*".

When contacting LIS ACC North sector's Controller, in sequence, pilot's voice had a normal accent and he didn't refer his health state. Only at 08:26:12, when he reported he "*was feeling ill*", his voice showed an anguish tone.

1.10 Aerodrome

Not applicable.

1.11 Flight Recorders

The aircraft was not equipped with flight recorders, as they were not mandatory for that kind of aircraft and operation.

1.12 Wreckage & Impact

During the second sortie, F-16 team detected some wreckage floating in the probable crash zone. Being recovered by the merchant ship "ALIANCA MAUA", it was confirmed as a piece of plastic, most probable detached from a container cover. No aircraft wreckage was found.

1.13 Medical &/or Pathological

The body was not recovered, so there's nothing to refer.

1.14 Fire

No fire evidences were detected during the flight or after it.

1.15 Survival Aspects

After pilot's distress call, at 08:26, having no answer to his repetitive calls, LIS ACC North sector Controller contacted FIS Operator, asking if CS-AUE had returned to his frequency and, due lost communication, requesting him to make some calls on his own frequency (130.90MHz) and on emergency frequency (121.50MHz).

By that time the FIS Operator related this communication loss to pilot's comment to his health state, before changing frequency, and made some calls on both frequencies.

Getting no contact, he informed his supervisor, who relieved him from other duties and appointed him to this aircraft support, only. He continued to monitor aircraft's progress, on radar display, and, noticing it started a smooth descent, he waited until the aircraft passed its destination (08:44) to inform COFA - Air Force Operational Command (08:46), who determined the interception (08:58) and activated RCC – Rescue Coordination Centre (09:05), starting search & rescue activities.

First SAR mean to be activated was a helicopter, equipped with a MA1 Kit, to assist the victims. According with installed mechanism, alerting time for this helicopter used to be 30 minutes. Being advised at 09:05, the helicopter took-off at 09:25, from AB 6 (Montijo) and was radar guided for interception of distressed aircraft, in order to rescue the victim when it crashed in the water (picture nr 13).



Picture Nr 13

1.17 Organizational & Management

1.17.1 Air Traffic Management (ATM)

Air Traffic Management, inside airspace under Portuguese jurisdiction, was assigned to “NAV PORTUGAL, E.P.E. – Navegação Aérea de Portugal” (NAV), being provided in accordance with international requirements & procedures, as referred in AIP Portugal (ENR chapter). Portuguese airspace was divided in two Flight Information Regions (FIR) and corresponding Traffic Control Areas (TCA):

- Lisbon Flight Information Region / Traffic Control Area (LIS FIR / TCA);
 - Sta Maria Oceanic Flight Information Region / Oceanic Control Area (SMA OFIR/OCA);
- served by two Control Centres (ACC), located in those regions (LIS ACC & SMA ACC).

By delegation of NAV, Flight Information Service in Lisbon FIR, inside “G” airspace, was provided by Portuguese Air Force (FAP), through Air Traffic Independent Squadron (EITA). This organ used to maintain closed links with Lisbon ACC, operating in the same room, in NAV premises and connecting with Air Force Operational Command (COFA), responsible for airspace sovereignty and Search And Rescue Services, in national space.

During the extent of this operation, all these services acted according with their competence and responsibility, complying with ICAO Annex 11 established procedures, namely its chapter 5 – Alert Services.

1.17.2 Search And Rescue Services (SAR)

Search And Rescue Service (SAR) is a Portuguese state responsibility (Chicago Convention 1944, art. 25th) and it is organized in accordance with ICAO Annex 12 recommendations and good practices, under the responsibility of Defence Ministry.

Given the interpenetration of Maritime Search & Rescue and Aeronautical Search & Rescue, the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) prepared, in 1998, Doc. ICAO 9731, constituting a common International Aeronautical and Maritime Search and Rescue Manual (IAMSAR).

On its Volume I (Organization and Management) SAR objectives are defined and main lines are drawn, to help on the implementation and management of a SAR Service on a national or regional basis.

Defining basic functions of a SAR System, § 1.4 recalls “search” and “rescue” definitions, expressing:

- 1.4.1 Any SAR system should be structured to provide all SAR services:**
- receive, acknowledge, and relay notifications of distress from alerting posts;
 - co-ordinate search response;
 - co-ordinate rescue response and delivery of survivors to a place of safety; and
 - provide medical advice, initial medical assistance or medical evacuation.

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Also on Volume II (Mission Coordination), chapter 7 calls for the need to perform other emergency assistance operations, other than search and rescue, which, if not carried out, could result in a SAR incident, such as assisting a ship or aircraft which is in a serious situation and in danger of becoming a casualty, thereby endangering persons on board. May be included in this category an interception and escort service aiming to minimize delay in reaching the scene of distress and to eliminate a search for survivors.

Sub-chapter 7.2 deals with situations related to interception and escort of aircrafts in distress.

- 7.2.1 The main purpose of intercept and escort services is to minimize delay in reaching the scene of distress and to eliminate a search for survivors.
- 7.2.4 An aircraft may be considered to need an escort when:
- navigation or radio equipment is suspect;
 - it is unable to maintain altitude;
 - it has suffered structural damage;
 - it is on fire or fire is suspected;
 - the pilot's control of the aircraft is impaired;
 - remaining fuel is suspected to be insufficient;
 - fewer than three out of four, or fewer than two out of three engines are operating normally; or
 - it is threatened by any other grave and imminent danger.

Under Portuguese law, SAR System organization is the Defence Ministry responsibility and it is carried out by Portuguese Navy (Maritime Search And Rescue) and Portuguese Air Force (Aeronautical Search And Rescue), respectively.

Dec. Law Nr 15/94, from 22 of January, created Maritime Search and Rescue Service:

Artigo 1.º
Objecto

1 - O presente diploma estabelece o Sistema Nacional para a Busca e Salvamento Marítimo

2 - O Sistema Nacional para a Busca e Salvamento Marítimo compreende o conjunto de serviços e órgãos responsáveis pela salvaguarda da vida humana no mar, bem como os respectivos procedimentos.

Artigo 2.º
Direcção do Sistema Nacional para a Busca e Salvamento Marítimo

O Sistema Nacional para a Busca e Salvamento Marítimo é dirigido pelo Ministro da Defesa Nacional, que é a autoridade nacional responsável pelo cumprimento da Convenção Internacional sobre Busca e Salvamento Marítimo, de 1979.

Artigo 3º
Comissão Consultiva

1 - O Ministro da Defesa Nacional é apoiado por uma comissão consultiva no âmbito dos assuntos relacionados com a busca e salvamento marítimo.

2 - A comissão consultiva tem a seguinte composição:

.....

Artigo 4º
Competências da comissão consultiva

À comissão consultiva compete apoiar o Ministro da Defesa Nacional na coordenação geral dos assuntos de busca e salvamento marítimo, devendo para tal:

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On its turn, Dec. Law Nr 253/95, from 30 of September, creates Aeronautical SAR Service:

Artigo 1.º
Objecto

1 - O presente diploma estabelece o Sistema Nacional para a Busca e Salvamento Aéreo, o qual é responsável pela salvaguarda da vida humana dentro das regiões de informação de voo (Flight Information Region - FIR) em caso de acidente ocorrido com aeronaves ou de situações de emergência destas.

2 - O Sistema Nacional para a Busca e Salvamento Aéreo compreende o conjunto de serviços e órgãos com responsabilidade nos espaços aéreos sob jurisdição nacional.

3 - O Sistema Nacional para a Busca e Salvamento Aéreo compreende os procedimentos de apoio às aeronaves em situação de emergência, de busca das aeronaves acidentadas, bem como da prestação de socorro imediato às mesmas, e do salvamento dos passageiros e das tripulações, até ao momento em que o Serviço Nacional de Protecção Civil assuma o controlo das operações em terra.

Artigo 2.º
Direcção do Sistema Nacional para a Busca e Salvamento Aéreo

O Sistema Nacional para a Busca e Salvamento Aéreo é dirigido pelo Ministro da Defesa Nacional, que é a autoridade nacional responsável pelo cumprimento do artigo 25.º da Convenção de Chicago sobre Aviação Civil Internacional, de 1944.

Artigo 3º
Comissão consultiva

1 - O Ministro da Defesa Nacional é apoiado por uma comissão consultiva no âmbito dos assuntos relacionados com a busca e salvamento aéreo.

2 - A comissão consultiva tem a seguinte composição:

Artigo 4º
Competências da comissão consultiva

À comissão consultiva compete apoiar o Ministro da Defesa Nacional na coordenação geral dos assuntos de busca e salvamento aéreo, devendo para tal:

Later on, Dec. Law Nr 399/99, from 14 of October, on the basis of what was agreed between International Maritime Organization (IMO) and International Civil Aviation Organization (ICAO), resulting on Doc. ICAO 9731 (IAMSAR Manual), introduced some alterations to both previous Decrees, fusing both existing Consulting Committees on only one enlarged Consulting Committee, as may be read on its preamble:

Nos artigos 3.º e 4.º dos Decretos-lei n.ºs 15/94, de 22 de Janeiro, e 253/95, de 30 de Setembro, são definidas as competências e composição das respectivas comissões consultivas do Ministro da Defesa Nacional, observando-se significativas semelhanças quanto às competências e composição.

A existência de uma comissão consultiva para cada um dos dois sistemas origina frequentemente o alargamento de actividades de uma das comissões à sua homóloga, derivando tal facto da natureza sinérgica e concomitante de ambos os sistemas.

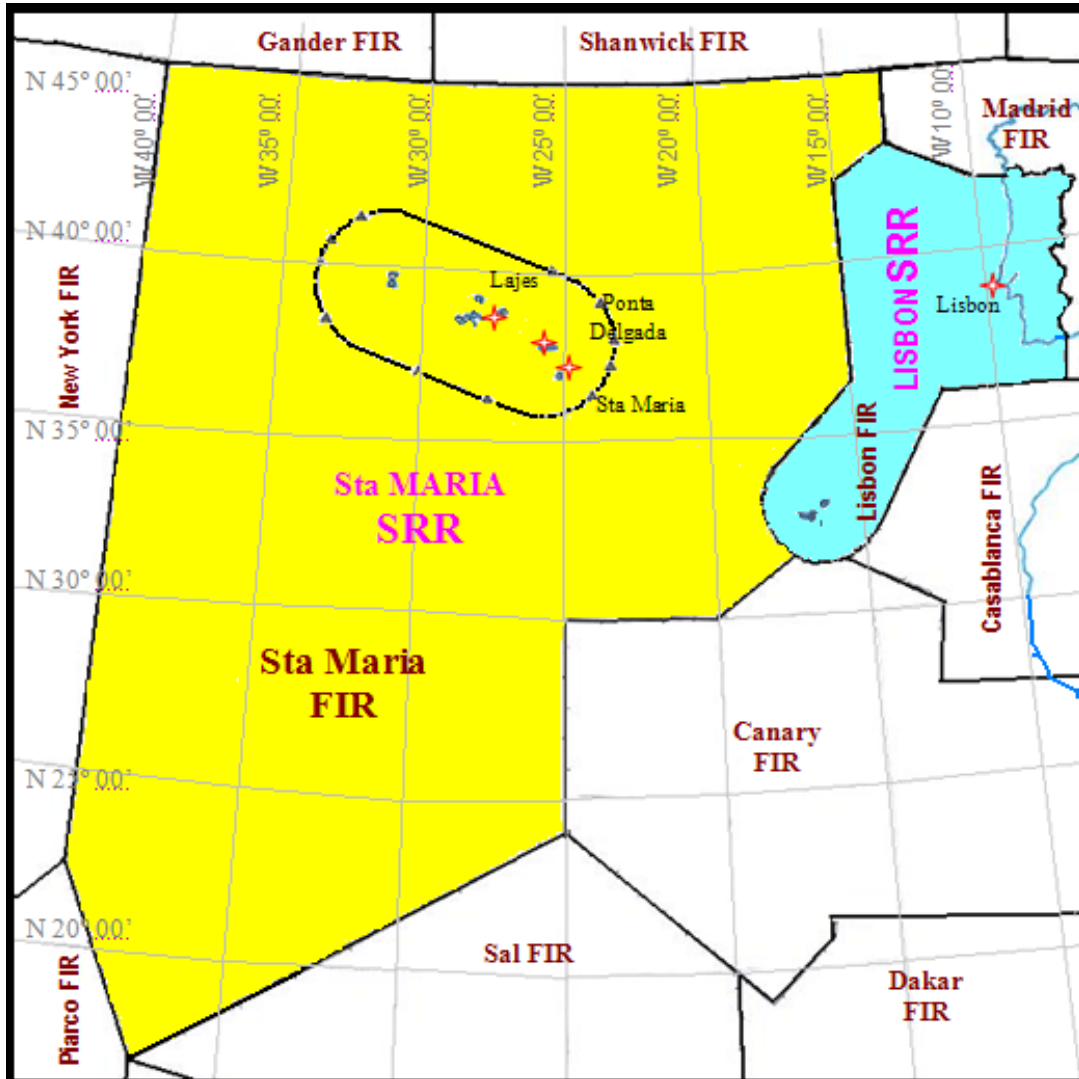
O presente diploma tem por objectivo uma única comissão consultiva para a busca e salvamento, tendo em conta as realidades de cada sistema, a simplificação de procedimentos e o aumento de eficácia no cumprimento das atribuições.

In order to cover all space (land and water) under national responsibility (*AIP Portugal*³ - GEN 3.6), fulfilling what had been stipulated on article 5th of old Dec.-Law Nr 15/94 and Dec. Law Nr 253/95, from 30 of September, two SAR Regions (SRR) were defined (*picture nr 15*):

³ - All references to AIP Portugal are based on accident date in force version.

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- a) **Lisbon Search And Rescue Region** – coincident with geographic limits of Lisbon FIR / UIR / UTA (LPPC) (*blue area*), as described in AIP Portugal - ENR 2.1;
- b) **Sta Maria Search And Rescue Region** – coincident with geographic limits of Sta Maria Oceanic FIR / OCA (LPPO) (*yellow area*), as described in AIP Portugal - ENR 2.1, § 2.1.7.



Picture Nr 15

According article 6th of previous diplomas, in each of those regions was created a Navy Search And Rescue Coordination Centre (MRCC) and an Air Force Search And Rescue Coordination Centre (RCC).

Those Centres should coordinate between them all search and rescue missions and decide on which means to be used, from those allocated to them.

For searching activities of CS-AUE aircraft, developing inside Lisbon SRR, Air Force Lisbon RCC and Navy Lisbon MRCC were involved, with the following allocated means (AIP Portugal, GEN 3.6, § 1.1.1) (*picture nr 16*):

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1.1.1 Rescue Coordination Centre Lisboa (RCC Lisboa)			
SEARCH AND RESCUE REGION:	LISBOA FIR		
RESPONSIBLE AGENCY OR DEPARTMENT:	FORÇA AÉREA PORTUGUESA / COFA		
NAME AND LOCATION OF RESCUE SUB-CENTRE:	NIL		
REMARKS:	DIRECT LINE BETWEEN RCC AND LISBOA ACC		
RESCUE UNITS			
NAME a	LOCATION b	FACILITIES c	REMARKS d
OVAR (Manoeuvre AD NR . 1)	405513.3N - 0083837.6W	1 HEL - L (AL03)	Only to 5NM from coast line
SINTRA (Air Base NR . 1)	384948.6N - 0092018.8W	1 SRG - (C212)	KIT MA1
BEJA Air Base NR. 11	380444.05N - 0075556.63W	1 ELR - (P3)	KIT MA1 + UNIPAC
MONTIJO (Air Base NR . 6)	384217.6N - 0090215.4W	1 VLR - (C - 130) 1 EH 101 - (HEL-H) 1 - (P3)	KIT MA1 KIT MA1
LISBOA (Harbour)	384155.5N - 0090804.6W	2 RESCUE VESSELS	Speed 21 KT Capacity 120 persons
FUNCHAL (Santa Cruz Harbour)	324213.0N - 0165014.7W	1 RESCUE VESSELS	Speed 16 KT Capacity 30 persons
PORTO SANTO (Madeira TMA)	330414.5N - 0162059.4W	1 SRG - (C212) 1 EH101 - (HEL -H)	KIT MA1

Picture Nr 16

1.18 Additional Information

There is no supplementary information to be referred.

1.19 Special Investigation Techniques

No special investigation techniques were used during this investigation.

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2. ANALYSIS

2.1 Flight Planning

Flying track and aerodromes were familiar to the pilot (he used to fly frequently to Coimbra), so he didn't prepare the flight, in detail.

He only filled respective Flight Plan form, performed pre-flight routine checks, started the engines and continued with normal procedures.

2.2 Flight Progress

Once airborne, the pilot headed to 220° (approximately), contacted with FIS (by 07:49), climbing to FL060 (6000ft), while waiting for clearance to climb to requested flight level (FL080).

At 07:52 he was cleared to climb to FL080 and at 07:55 he was transferred to Lisbon Air Traffic Control Centre, North sector. By then, still in contact with FIS, the pilot declared he **was not feeling well**. FIS Operator paid no attention to that message, seeming to him more like a confidence to someone seated by his side than an alerting message. On his side, the pilot, when contacting North sector Controller, made no reference to his health status. Only at 08:26 the pilot entered again the frequency, to say he **was feeling ill**. He didn't pronounce the call sign, didn't finish the communication and gave no answer to subsequent controller calls.

From then on, the aircraft continued on its track, started to loose altitude slowly (08:35), letting the controller suppose he had lost communications and would proceed for landing at Coimbra aerodrome, which didn't happen. The aircraft overflew Coimbra (08:44) at 5900ft and turned slightly to the right (20°/30°), continued on last heading (250° approximately) and reduced its descent rate. Radio contact with the aircraft was never more re-established.

2.3 Operational Procedures

2.3.1 Pilot

Even if he was a surgeon, the pilot never made a wise evaluation of his health status and possible implication with the flight he intended to perform.

Considering he was not feeling well for the last days, he could ask some friend pilot to accompany him, instead of flying alone.

On another way, when he felt sick in flight, having plenty of aerodromes available for an emergency landing (*picture nr 17*), he preferred to continue to destination, over evaluating his physical and emotional capacities.



Picture Nr 17

Checking followed track, after the first upset signs till the moment he became incapacitated, it would be possible to the pilot to perform a safe landing in anyone of reachable aerodromes (which were familiar to him), where adequate medical care would be provided.

2.3.2 Controllers

When the pilot expressed first upset signal, he was in contact with FIS and it was expressed only when called to change frequency. In such a case, FIS Operator, having noticed any other strange behaviour before, when listening to the phrase "*I'm not feeling well*", mixed with surrounding sound as if the speaker was talking to someone close, with whom he was having a normal conversation, he didn't pay due attention to it. So much so, that subsequent transmission appeared normal and flight strip made no reference to total people on board, being the FIS Operator unaware that the pilot was alone. For that reason he made no reference when transferred traffic to LIS ACC North sector Controller. Only when questioned if the aircraft was back with him he realised that the phrase could have been expressed with a different purpose.

On his part LIS ACC Controller, who established the first contact with CS-AUE, noticed no abnormality on pilot's voice and, without receiving any advice relating his health status, took no special action and made no notice to his substitute.

When the pilot entered the frequency to claim "*he was feeling ill*", CTA on duty at that station didn't recognize pilot's voice (it was the first contact with him), didn't identify the aircraft (call sign was not referred by the pilot) and he had to aleatorilly determine message source.

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Forecasting a serious situation, which would require special attention, he tried to sterilize the frequency, advancing descent clearance for another flight (with destination Oporto airport) and transferring it to other Controller (Oporto APP).

About 30 seconds after the emergency call, he called CS-AUE, having no reply. After some more unsuccessful calls, he contacted FIS Operator and showed his apprehension for the loss of communications, asking to try contact on his own frequency and emergency frequency as well. Only then he was informed that pilot had spoken about a discomfort situation, to which nobody paid attention.

In face of this communication's failure, FIS assumed the monitoring of aircraft, appointing an Operator for its tracking in exclusive duty. Once the aircraft didn't land at destination (Coimbra) COFA was alerted for the situation.

2.3.3 Air Force Operational Command (COFA)

2.3.3.1 Air Defence Service

One of Portuguese Air Force duties is national airspace defence against aircraft's invasion, which may be considered as a menace to national sovereignty or perform any terrorist activity (*RENEGADE* aircraft). Coordination of these operations with civil air traffic control activities is organized according NATO recommended guiding principles and expressed in an Operational Memorandum of Understanding signed by COFA Air Operations Centre and Lisbon FIR Air Traffic Service Provider.

When communications with CS-AUE were lost, the aircraft was kept under radar monitoring, expecting it to comply with submitted Flight Plan and land at destination aerodrome, Coimbra. When it became clear that the aircraft wouldn't land at destination, the same aircraft became suspect and was considered as a threat, being Air Defence alerted (08:58) and a team of F-16 fighters ordered to depart and intercept the intruder. The fighters, airborne at 09:07, established the first contact with CS-AUE by 09:13 (*picture nr 6*), at a position close to Air Base nr 5 (AB 5).

It was on an Air Defence primary mission that F-16 fighters intercepted and escorted the aircraft without communications, until it was no more a threat.

2.3.3.2 Search And Rescue Service (SAR)

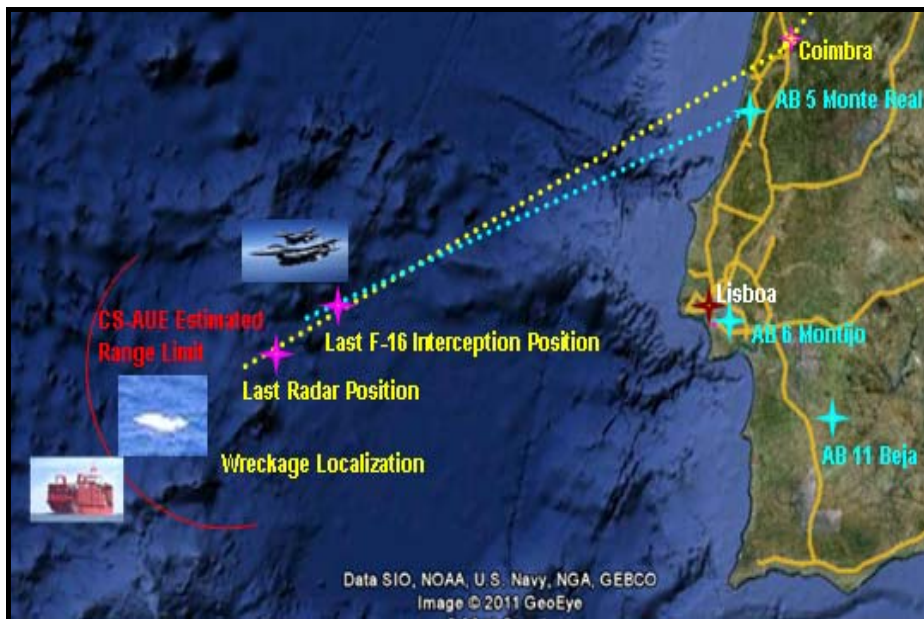
Only after interception (09:13) by F-16 team and confirmation of pilot incapacitation (09:47), the mission was definitively considered and integrated as a SAR mission, even if SAR Service had been activated earlier (09:05), in face of previous aeroplane track and pilot behaviour.

According with established orders, an EH-101 helicopter departed from AB 6 at 09:25 (20 minutes after the call, for an alerting time of 30 minutes), intending to intercept the aircraft in trouble, in order to give assistance immediately after the probable crash. The helicopter, flying at its maximum cruising speed (147kts) and convergent track, never got visual contact with distressed aeroplane, as, by 10:55, being at about 26NM far from the objective (*picture nr 13*), it was forced to return to base due minimum fuel on board.

Disposing of a nominal maximum endurance of 08:30, the EH-101 operated for a three hour's period because, due tactical reasons, it was pre-loaded with that amount of fuel and its refuelling would retard take-off for more half an hour, approximately.

Without continue with the interception, when being so close, it was not possible to be present on site and time of aircraft crash and carry on pilot rescue, in case it was viable.

Considering that the aircraft in emergency departed at 07:45, with four hours endurance, its fuel would presumably be exhausted by 11:45, forcing it to precipitate in the sea. Being lost contact before, it could be forecasted that the aeroplane would crash within a 120NM arc (*picture nr 18*) centred on radar last position registered at 10:58.



Picture Nr 18

Being allocated to Lisbon RCC (*picture nr 16*) other SAR means with more adequate speed and endurance, like Lockheed C-130 "Hercules" aircraft, from AB 6 (295kts / 12:00) or CASA C-212 "Aviocar", from AB 1 (170kts / 06:00), knowing that CS-AUE would exhaust its fuel and precipitate in the sea, presumably out of radar coverage (as it happened), none of these means were in readiness that allowed them to escort the aircraft in distress.

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F-16 fighters served their “*scramble*” mission and intercepted the aircraft, but they were not appropriate for escort, due its performance (*too much fast and shorter endurance to stay on site for enough time*). On the other hand they were not allocated to SAR missions.

CASA C-212 aircraft displacement from Porto Santo (LPPS) could be understandable only as a reinforcement to search activities, once, departing at 11:45 (*CS-AUE endurance limit*) and taking about two hours to reach the scene (*picture nr 14*), it was not possible to visualize the aircraft in flight and to give some support after the crash. It could be different if it was displaced de C-212 based in AB 1 (Sintra) instead, which could intercept the aircraft in flight, probably inside radar coverage, and follow its last moments, registering the crash position.

When F-16 team took-off the second time (11:53), radar contact with the aircraft had been lost and its fuel had been, supposedly, exhausted, which explains why visual contact with lost aircraft couldn't be established.

Loosing radar contact without grant visual contact with the aircraft, it was practically impossible to localize it, especially considering the uncertainty on its reaction after fuel exhaustion.

SAR arrangements didn't consider an escort mission for an aircraft in danger and there was no available SAR aircraft in a readiness status to efficiently carry such emergency mission.

IAMSAR Manual (ICAO Doc. 9731P2) considers that distressed aircraft interception and escort missions should be assigned to Search And Rescue Services since, if not carried out, they will require more expensive and less efficient ones (§ 7.1.1). In most cases these actions would not be foreseen, but SAR personnel may have to provide an appropriate response without any existing plan (§ 7.1.2).

The first (immediate) sortie of EH-101 helicopter could be included in this kind of SAR mission, as a Minimum Time To Scene (MTTS) interception, aiming to be present in the proximity of the site and at crash time. The decision to send this mean before doing an exhaustive situation evaluation and a correct action plan, showed to be inadequate and didn't cope with its intention, once the endurance was insufficient to fulfil that goal.

3. CONCLUSIONS

3.1 Findings

Based on the previously referred facts and its analysis, we may conclude that:

- 1st The flight has been cleared and a Flight Plan was submitted and approved by Air Traffic Management Services (ATM);
- 2nd The pilot was entitled with a valid Pilot License and duly qualified to operate that aircraft on that route;
- 3rd The aircraft had a valid Airworthiness Certificate and complied with all programmed and approved maintenance actions;
- 4th During the flight, the pilot, who had complained on the eve he was not feeling well, declared he was feeling ill and stopped communicating abruptly, having no answer to subsequent calls;
- 5th The aircraft over passed destination and Air Defence and Search And Rescue Services were activated;
- 6th An Air Force fighter team intercepted the aeroplane and confirmed pilot incapacitation;
- 7th A rescue helicopter was sent to intercept and follow the aircraft and rescue the pilot, but was forced to return to base without establishing visual contact with the aeroplane;
- 8th Interceptor fighters returned to base, without other means being in position to escort the aeroplane, losing visual contact and, later, losing radar contact with the aircraft;
- 9th No other escort aircraft, with capacity to follow the distressed aeroplane until its endurance limit, was activated because it was not foreseen and contemplated in SAR orders, being not feasible its convocation in due time;
- 10th Due contact loss it was not possible to determine exact position of aircraft crash;
- 11th All search actions performed by all involved means were unable to locate and identify aircraft wreckage, being terminated after the third day;
- 12th The only wreckage found in the area was recovered by a merchant ship, but it was confirm it was not part of the missing aircraft;
- 13th Pilot and aircraft were considered as "missing".

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3.2 Causes of the Accident

3.2.1 Primary Cause

Primary cause for this accident was pilot incapacitation in flight, which caused the aircraft to continue flying, uncontrolled, until fuel exhaustion, presumably precipitating in the sea.

3.2.2 Contributive Factors

The following may be considered as contributory factors:

- 1st The pilot flying alone, when his health status required some care needs and he could request some friend pilot to accompanied him;
- 2nd The pilot didn't react to first sickness signals, landing at any reachable aerodrome (Bragança, Mogadouro, Chaves, Mirandela, Alijó, Vila Real or Viseu) instead of continuing to destination;
- 3rd The FIS Operator didn't recognize, in due time, the seriousness of the situation and didn't take the initiative to suggest landing at any enroute available aerodrome, where the pilot could have access to specialized medical care;
- 4th The Search And Rescue Services inability to escort the aircraft in distress, keeping a visual contact until its fall in the sea, which prevent to know final fate of aircraft and pilot and the exact place of accident, hindering any effort to rescue the pilot and the aeroplane.

4. SAFETY RECOMMENDATIONS

4.1 Search And Rescue Service (SAR)

After pilot incapacitation was ascertained, it was expected SAR Services to keep permanent monitoring and escort of the aircraft, until its fall in the sea.

Considering that following factors were relevant for the aircraft to become lost, making impossible to confirm final aircraft fate and wreckage localization, hindering possible recovering actions:

- ▶ EH-101 helicopter inadequacy for this kind of interception of an aeroplane with a cruising speed close to its maximum speed, which, together with limited endurance, due its partial fuel loading, reduced helicopter's range and prevented its primary rescue mission;
- ▶ The inadequate readiness status of other more efficient means, attributed to Lisbon RCC, capable of intercept and escort the aircraft in danger until the end of its flight, registering crash position;

It is recommended to:

The Ministry of Defence:

“To evaluate SAR Service allocated mean’s capacity, readiness and suitability, to revise and establish more adequate reaction timings, in order to optimize its operation and provide a better and more efficient support to any aircraft in distress, escorting it and maintaining visual contact, specially during last minutes of its flight”.

(SR Nr 05/2011)

Lisbon, 08 of June, 2011

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