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GABINETE DE PREVENÇÃO E INVESTIGAÇÃO DE ACIDENTES COM AERONAVES

FINAL ACCIDENT REPORT

PRIVATE

COLOMBAN MC-15

F-PYNN

S. Bartolomeu do Sul

Castro Marim

09th of October, 2009

FINAL ACCIDENT REPORT Nr. 38/ACCID/2009

NOTE

This report states the technical findings regarding the circumstances and probable causes which led to this accident.

In accordance with Annex 13 to the International Civil Aviation Organisation Convention, Chicago 1944, Council Directive 94/56/EC, 21st NOV 1994, and article 11th nº 3 of Decree-Law nº 318/99, 11th AUG 1999, the sole purpose of this investigation is to prevent aviation accidents. It is not the purpose of any such accident investigation and the associated investigation report to apportion blame or liability.

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

TABLE OF CONTENTS

SYNOPSIS

On the 9th of October, 2009, by 16:10 UTC[1], homebuilt aircraft Colomban model MC 15, Cri-Cri, with French registration F-PYNN, suffered an accident, immediately after take-off from Praia Verde Aerodrome, near Monte Gordo, Vila Real de S. António, Algarve, Portugal.

As soon it left the ground, the aircraft started veering to the right, flying low. After some 700m it was seen performing an undefined manoeuvre, rising its nose and crashing, nose down spinning, on a field and becoming static about four metres ahead, at an upside condition, heading 150º from its flight direction.

First people arriving at scene, found the pilot inanimate. Medical experts from rescue services, arrived some minutes later, declared him dead.

GPIAA was informed of the accident some twenty minutes later, by ANPC[2] and GNR[3], and an Investigator travelled to the site, next day, starting the investigation process.

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 indication, are UTC timings (Universal Coordinated Time). By that date, local time was equal to UTC + 1.
[2] - Civil Defense National Authority.
[3] - Republic National Guard.

1. FACTUAL INFORMATION

1.1 History of the Flight

T he pilot (owner of the aircraft) travelled to France, in order to present the aircraft to an inspection for Airworthiness Certificate renewal, which has been performed at Tarbes, on the 5th of October, 2009, being back to Portugal next day, carrying the aircraft with him in its trail.

During that journey, the pilot visited some local airfields, on his way, trying to perform a short flight. For different reasons he couldn't fulfil his intentions and continued travelling home to Algarve.

On the 9th of October he invited a friend and went to Praia Verde Aerodrome to perform a training & test flight, following annual inspection.

Arriving in the morning at the aerodrome, they noticed the runway absolutely unusable, with grown grass and bush covering the landing strip. The pilot started cleaning it with basic tools but, due the hugeness of the task, he was suggested to use a more suitable mean and he took a tractor, equipped with a scarifier, finishing the job by late noon. Due this work he would operate the flight in the afternoon only.

Prior he refuelled the tank with some fuel (maybe 10L), which have been prepared in France, some days earlier, and brought with him along the journey, expecting to have the opportunity to test fly the aircraft on the way home.

Engines' start was uneventful and the pilot let them warm prior to perform recommended checks. Only then taxied to the beginning of the runway 30 and commenced take-off.

Picture Nr. 1

Airplane ground acceleration seemed to be slow, being airborne only after ±400m, approximately half runway, and starting to veer to the right heading 330º (*picture nr 1*).

The aircraft flew for 700m (*picture nr 2*) maintaining a reduced climb rate (±300ft/min) without increasing speed significantly.

Eye-witnesses located in a village (São Bartolomeu), on a hillside southwest of runway extension, declared the aeroplane kept always low altitude (never passed above horizon), flying at low speed and veering to the right. At a time they saw the aircraft perform a strange *pirouette*, rising the nose and falling, nose down, on the ground.

Picture Nr. 2

When the first witness (*picture nr 3*) arrived at the scene, the pilot was seated lifeless, with seatbelts fastened and he has been declared dead by the paramedics that arrived soon after, with rescue services.

Picture Nr. 3

1.2 Injuries

The pilot, the only person on board, suffered fatal injuries, dying in site (*table nr 1*):

Injuries	Crew	Passengers	Others
Fatal	1	0	0
Serious	0	0	0
Minor/None	0	0	0
Total	**1**	**0**	**0**

Table Nr. 1

1.3 Aircraft Damage

The aircraft suffered substantial damage being considered total loss (*picture nr 4*).

Picture Nr. 4

1.4 Other Damage

There was no third party damage reported.

1.5 Personnel

On board there was only the pilot, male, Portuguese nationality, 44 years old, with following qualifications (*table nr 2*):

Flight License:	Type:	PPL(A); GPL
	Validity:	29-08-2013
	Ratings:	SEP; Gliders
	Last Medical Examination:	24-07-2009
	Restrictions/Limitations:	Nil

Table Nr. 2

Pilot Logbook could not be found and the only experience reported came from Civil Aviation Authority registry, relating to 02-08-2006. At that date he had accumulated 227:55 total flying time, being 212:30 on single engine propeller aircrafts and 15:25 on gliders. Searching in Aircraft Logbook it was discovered the pilot flew 40:05 hours on F-PYNN aircraft, from 11-06-2006 to 13-06-2009.

1.6 Aircraft

Monoplane, low wing, fixed tri-cycle landing gear, metallic skin, homebuilt aircraft (*picture nr 5*), the Colomban MC-15 was classified as an experimental plane, with cabin room for one people, Maximum Take-off Mass (MTOM) of 182kg and following references (*table nr 3*):

Picture Nr. 5

Reference	Airframe	#1 Engines #2	#1 Propellers # 2
Manufacturer:	Colomban	JPX	VECCO
Model:	MC-15 (Cricri)	PUL-212	MC/AS 695.200103
Serial Nr.:	269	2781084D 2791084G	21 20
Year of Manufacture:	1991	N/D	N/D
Flight Time:	59:45	59:45	59:45
Landings / Cycles:	117	117	117
Last Inspection:	13-06-2009	13-06-2009	13-06-2009

Table Nr. 3

The aircraft Restricted Airworthiness Certificate Nr. 280216, issued by French Civil Aviation Authority (DGAC), has been renewed on the 5th of October, 2009, for a twelve months period, after the aircraft was presented for a DGAC inspection, performed that same day.

According with Aircraft Logbook registries, the plane didn't fly between 13-06-2009 and 09-10-2009, approximately four months.

1.7 Meteorology

The weather was fine, with sky clear, moderate to strong Westerly wind and temperature inside normal values for that time of the year, as may be confirmed with meteo reports from Faro airport, in the vicinity:

METAR LPFR 091530Z 25014KT CAVOK 26/18 Q1017
METAR LPFR 091600Z 25016KT CAVOK 24/18 Q1017
METAR LPFR 091630Z 27015KT CAVOK 24/17 Q1018

1.8 Navigation Aids

Not applicable.

1.9 Communications

There were no communications at the aerodrome and the aircraft didn't contact with any other station.

1.10 Aerodrome

Praia Verde airfield (*picture nr 6*), located 2km Northeast of Monte Gordo holiday resort, Algarve, is a private property, being all aircraft operations subject to previous authorization. Being included in Civil Pilot Manual (MPC)[4] list of aerodromes, it was closed by Civil Aviation Authority on the 8th of August, 1996. When the accident happened runway looking was substantially different, as per picture nr 1 (page 5), reason for the pilot to perform a hard cleaning, prior to use it.

Picture Nr. 6

[4] - This Manual has been replaced by the new VFR Manual, since MAR, 2010.

On page "AGA 2-22B" (*table nr 4*) of referred MPC all information regarding aerodrome facilities, movement area, obstacles and special operational recommendations was available.

4. DESCRIÇÃO DA ÁREA DE MOVIMENTO

Terreno liso, plano firme e enxuto. Não praticável fora da pista ou do caminho de circulação.
Placa de estacionamento com 42 m x 18 m.

5. PISTAS

			DISTÂNCIAS DECLARADAS										SUPERFÍCIE	
QFU	Nº	COMPRIMENTO/ LARGURA (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)	ELEV. SOLEIRA (m)	SWY (m)	CWY (m)	STRIP (m)	Declive (%)	LCN/ (RESIS).	RWY	SWY
123°	12	730 X 23	730			730	2						saibrosa	
303°	30	730 X 23	730			730	3						saibrosa	

OBSERVAÇÕES
Caminho de ferro a Sul da pista, distando 160 m da soleira 30 e 70 m da soleira 12.

7. OBSTÁCULOS

NAS ÁREAS DE APROXIMAÇÃO						NOUTRAS ÁREAS CIRCUNVIZINHAS					
APROX.	NATUREZA	DISTÂNCIA	ALTURA	BALIZAGEM		DIRECÇÃO VERDADEIRA	NATUREZA	DISTÂNCIA	ALTITUDE	BALIZAGEM	
				DIA	NOITE					DIA	NOITE
12	Montes	1800 m	44 m			240°	Montes	310 m	39 m		
30	Linha alta tensão	550 m (à soleira)	5 m								

15. INFORMAÇÕES COMPLEMENTARES

No Inverno após chuva intensa as áreas adjacentes à Pista e Placa de Estacionamento por vezes podem ficar inundadas

Operação só com autoridade do proprietário sendo da responsabilidade do operador.

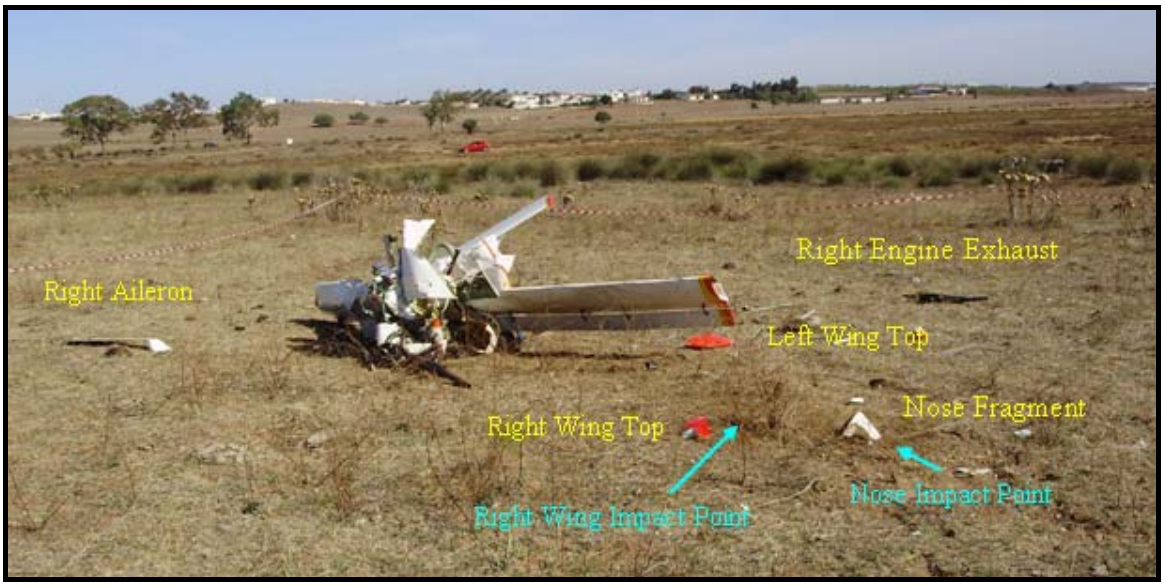
Table Nr. 4

1.11 Flight Recorders

The aircraft was not equipped with flight recorders as it was not mandatory for this type of aircraft.

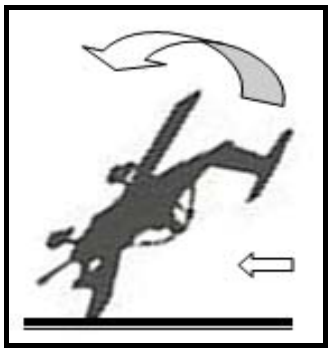
1.12 Wreckage & Impact

Wreckage was assembled in a small perimeter of less than 5m radius, being all main components connected to each other and only a few small pieces were apart (*picture nr 7*). Left wing, rear fuselage, tail section and main landing gear suffered no heavy damage. Flight deck was destroyed. Right wing was dislodged from its root, wrinkled along its surface and respective aileron detached. Forward fuselage was smashed until main spar's station, with nose gear and engines' supports pulled out.



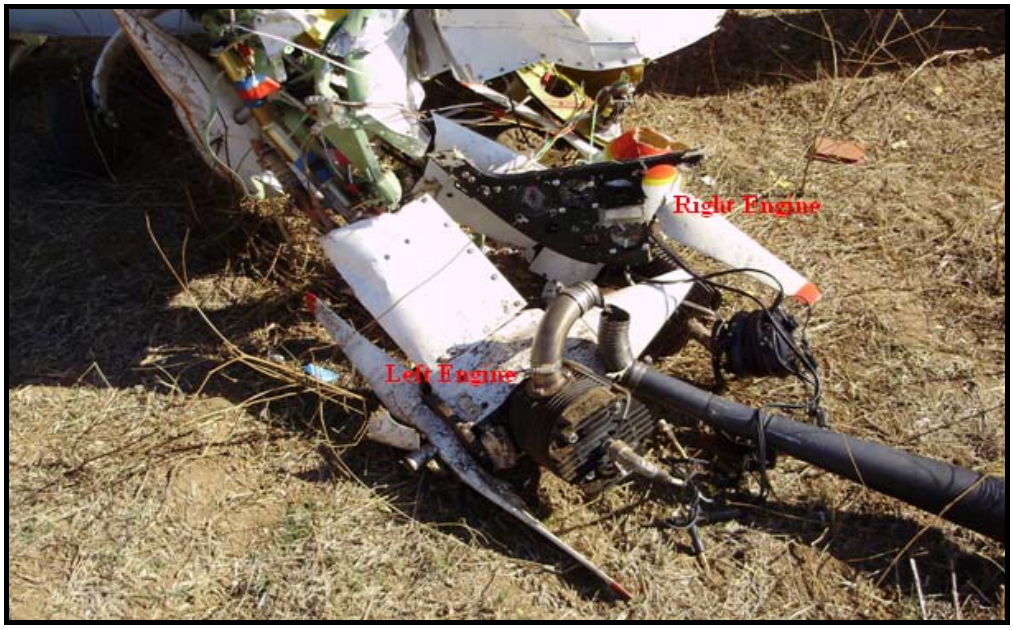
Picture Nr. 7

First ground impact occurred on right wing tip (with nose down and the aircraft on a twisting movement to the right) followed by the nose (on an inverted position). Right wing main spar absorbed major impact forces and penetrated the fuselage, assisting with cabin destruction, which meanwhile hit the ground (*picture nr 8*), breaking nose gear leg and engines' supports. Then the plane flipped over and came to rest on its belly pointing backwards.



Picture Nr. 8

Both engines showed no significant damage and both propellers were complete, with only some splinted blades and cracked domes (*picture nr 9*).



Picture Nr. 9

In spite of fuel tank being destroyed, there were no fuel or oil leak marks on the soil and no fuel odours were smelled in the site.

The "*flaperons*"[5] were extended to the take-off position (12º), with left wing almost entire, with some blisters only and without wing tip, which detached but remained intact.

Rear fuselage had a minor distortion, with tail cone scratched and ruder upper hinge broken.

Inside the cabin, safety belts were intact, being unfastened by rescue personnel.

Flaperons selector lever (picture nr 10) was selected to first notch (12º), as recommended for take-off.

Engine power levers were in extreme positions:

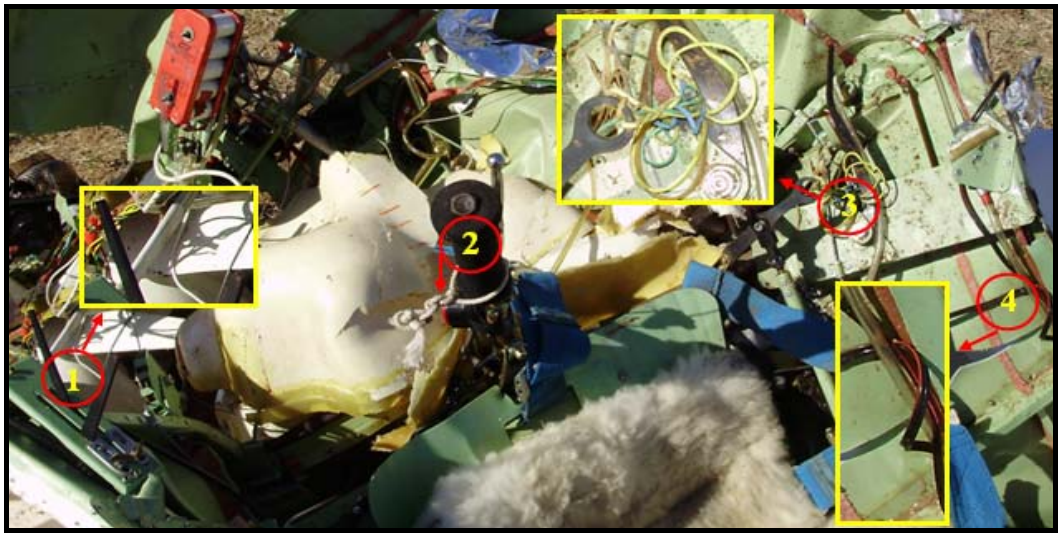
- Left one full back and
- Right one full forward.

Engine ignition switches were selected:

- Left one to "OFF" and
- Right one to "ON".

Picture Nr. 10

Although a significant destruction of forward part of the cabin made difficult the evaluation, some details showed a lack of exigency and amateurishness, with the use of uncommon materials and processes (*picture nr 11*).

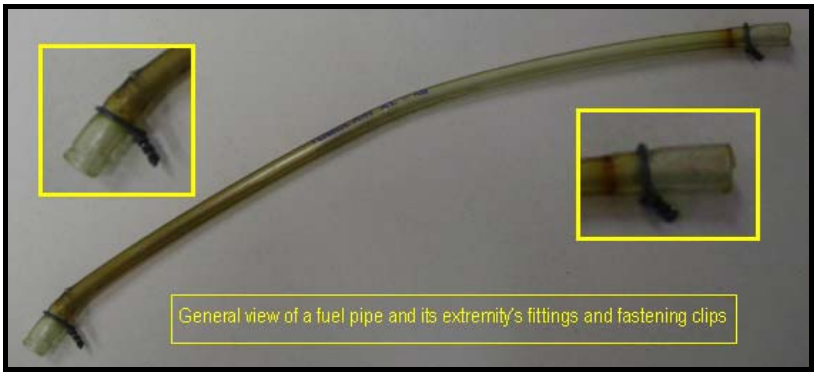


Picture Nr. 11

[5] - Hyper-lift devices integrating flaps & ailerons.

To point out only a few, let's refer the missing power lever's extremity identification balls (1), the engine's starter rope hanging on control stick (2), rubber rings confusion on pitch feeling & trim system (3) and the strange way electric wires were installed and secured (4).

The same could be seen on fuel system installation, not only regarding the hardness of plastic materials used, but the way their fittings and connections were achieved (*picture nr 12*).



Picture Nr. 12

1.13 Medical &/or Pathological

The pilot was declared dead by the Medical Emergency Institute doctor, who appear on site, due injuries caused by the accident.

1.14 Fire

There was no fire.

1.15 Survival Aspects

Emergency Services arrived in 15 minutes, approximately, but the pilot was dead before their arrival

1.16 Tests & Research

Both engines were sent to an engine plant for testing and inspection, in order to establish its condition prior and at accident time. Its examination showed no signals of any defect or abnormality that could preclude a nominal power output and justify its stoppage in flight.

Right engine presented its ignition spool broken but, once exchanged with the one of the other engine it started and run normally. Left engine was perfect but propeller shaft was found bent. A borescopic examination was performed to both engines and cylinders appeared clean and no irregular wear was noticed.

Both engines started and ran smoothly

1.17 Organizational & Management

Being a private operator and an experimental plane, there was no mandatory organized operational and maintenance departments, being pilot responsibility compliance with regulations and procedures established by competent authorities.

Once the aircraft had a French registration, all directives issued by French DGAC should be followed, but at same time, as the aircraft was flying in Portugal, a INAC permit was needed for the plane to operate inside Portuguese controlled airspace.

The pilot got the Aircraft Restricted Airworthiness Certificate renewed by French DGAC, but never asked for INAC authorization to fly it in Portugal.

1.18 Additional Information

There's no other relevant information to refer.

1.19 Special Investigation Techniques

All evidences used for this report were gathered through normal investigation processes, without making use of special investigation techniques.

2. ANALYSIS

2.1 Flight Preparation

Since his journey to France the pilot was planning a test flight of the aircraft, especially considering he had performed required maintenance actions for Airworthiness Restrict Certificate renewal and a test flight was required by French authorities. He tried to do it during his travel, unsuccessfully, so he took the first opportunity to realize his intent.

That day, the pilot drove the aircraft to Praia Verde aerodrome and, arriving there, noticed the runway was unusable. He started a cleaning process of shrub and grass that were obstructing landing strip but, considering that the basic tools he was using were not appropriate for the task, following a friend's advice, he went for a tractor, equipped with a scarifier, in order to finish that work sooner. Even so, it took all the morning and noon, being able to fly late on the afternoon only.

Before flight, the pilot refuelled the aircraft with a fuel/oil mixture he carried from France, some days before, on a plastic container. It was not referred if he made the draining of fuel tank and fuel lines, before the flight, but only the engines warm-up and power check, before take-off.

2.2 Flight Progress

After engine start, warm-up and power checks, the pilot taxied to runway 30 take-off position, lined-up and set maximum power on both engines.

Contrary to the usual 200m run, the aircraft lift-off after 400m only and started to veer (20º/30º) to the right, immediately, continuing to describe an arc until crash point (about 700m)

Pilot's friend, who remained at the aerodrome, took some pictures of the aircraft, along its track, from take-off until it became so far to lose sufficient definition capability (*picture nr 13*).

Picture Nr. 13

Those pictures confirm the flaperons were set to take-off position and they were maintained at that mark until the crash, as they were found. According recommended normal procedures, flaperons should have been retracted to cruise position (3º) 50m above ground and 110km/h speed.

As soon the aircraft lift-off, it showed a deviation to the right (*picture nr 13 - 2 & 3*), contrary to what should be expected, once the wind was blowing strong from the left and the aircraft should point to the wind.

At a certain point, it seems the right engine stopped and the propeller is not rotating (*picture nr 13 - 5*), which is in contrast with engine controls' settings in the cockpit.

All eyewitnesses, the one at the airfield and those at S. Bartolomeu, declared they saw the aircraft with nose down, towards the ground, with a great bank (> 45º), after it performed a "*strange manoeuvre*"

It's acceptable there was a low power output and that left engine stopped in flight, due any unknown reason (possible fuel contamination or starvation), followed by right one soon after. The pilot kept flaperons selected to take-off position, which degraded aircraft flight performance, causing a slow climb and reducing acceleration capability, but confirming the aircraft didn't reach minimum speed/altitude for flaperons retraction.

2.3 Engine Failure on Cri-Cri

2.3.1 General

Reading Aircraft Flight Manual, several references to aircraft behaviour in case of engine failure were found, together with recommended procedures to deal with such failure.

A great emphasis is given to the principle to have always presented that an engine failure on this aircraft doesn't mean there's an imminent danger. By the contrary, this aircraft always keeps its manoeuvrability, if recommended configurations and respective airspeeds are maintained.

On chapter 7, regarding single engine flight, we may read:

- *First care should be speed control, avoiding it to decrease bellow 120km/h, which allows perfect aircraft control, without significant slip;*
- *Never try to identify failed engine looking immediately to the instrument panel, but looking for exterior references and trying to smoothly bring the aircraft back to an attitude close to normal, not forgetting to put nose slightly down to keep speed;*
- *Keep cruise configuration (flaperons at 3º), if speed is above 110km/h, or take-off configuration (flaperons at 12º), if being at a lower speed or if intending to climb or descend at a minimum rate.*

2.3.2 Aircraft Behaviour at Engine Failure

Aircraft reaction to engine failure depends on its configuration, airspeed and attitude, according the flight phase at which the failure occurs.

If engine fails in normal cruise phase, only a small drift and an induced rolling tendency is shown, but in **climb phase**, aircraft reaction would be:

- ***Cruise Configuration** (flaperons at 3º) **& 120km/h** – effective drift movement (± 20º) accompanied by an induced roll of ± 15º bank, followed by a speed reduction;*
- ***Take-off Configuration** (flaperons at 12º) – both movements are manifested but with more intensity and followed by a greater speed reduction.*

***Note:** Several engine failure tests were performed, without pilot immediate action, at different airspeeds down to a minimum of 90km/h, without aircraft control being lost, reason for considering this speed as a tolerance limit for aircraft operation, as a precaution for an engine failure.*

2.3.3 Asymmetric Flight Characteristics

Cricri aircraft, due its engines' installation close to longitudinal axis, doesn't put great control problems when flying asymmetrically, allowing, when in a cruise normal configuration, effective control on all three axis and all speed range (down to stall speed), being impossible to establish a single engine minimum control speed (V_{MC}).

In cruise configuration and one engine inoperative, Cricri may attain a maximum speed of 150km/h and require the application of no more than ¼ of ruder pedal allowable displacements.

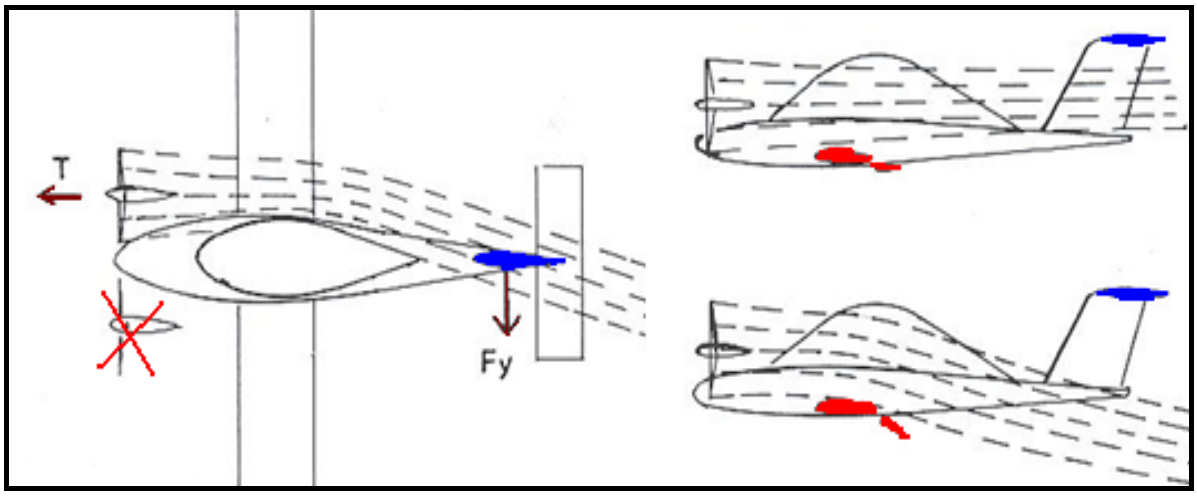
There are no restrictions in turning to either side, but it's recommended to execute smooth and reduced bank turns.

Although there's no need to consider a minimum control speed, special attention is required in order to avoid aircraft to stall as, according with tests carried out, aircraft stall with an engine stopped and the other at full power may cause:

- ***In cruise configuration** – abrupt asymmetric movement, without reaching auto-rotation;*
- ***In Take-off Configuration** – rough stall followed by auto-rotation movement (spin).*

***Note:** To recover, it's enough to reduce power on operating engine and push nose down, having a small altitude loss.*

These flight characteristics result, mainly, from aircraft geometry, which allows an almost perfect laminar flow and, in *cruise* configuration, there's an air stream incidence on vertical fin, without interference with horizontal stabilizer (*positioned above*). In *take-off* configuration, air stream is deflected downwards and does not reach vertical fin (*picture nr 14*).



Picture Nr. 14

2.3.4 Recommended Procedures

Besides general recommendations referred in 2.3.1, Aircraft Flight Manual (AFM) suggests some additional procedures to be followed in case of engine failure. At this moment it's essential to consider engine failure during climb, especially after take-off.

In this situation, the AFM recommends:

- *Continue the circuit, with flaperons retracted, maintaining 120km/h airspeed;*
- *Turn unselectively towards inoperative or operative engine side, with reduced bank angles;*
- *If conditions consent, reduce operating engine to avoid to strain it in vain;*
- *Never use more than 12º flaperons and try to extend them only on final approach, with landing assured.*

In no circumstances AFM refers to perform in-flight engine shut-down procedures, like engine power lever retardation, fuel valve closing or ignition switch disconnection. Only a restart procedure is referred.

Considering the pilot is enclosed in the cockpit (which can not be opened in flight) and has no access to the engine for a rope assisted start, being necessary the propeller to keep rotating by force of aerodynamic effect, a minimum of altitude must be available for this procedure to be initiated.

On chapter 4, the presented restart procedure reads:

- *Decompress the engine (if equipped with such command);*
- *Slightly advance engine power lever (like for a ground start);*
- *Keep ignition switched ON;*
- *Increase airspeed until the engine starts.*

2.4 Flight Evaluation

Based on testimonies, registered images, evidences gathered from wreckage and documentation available, it's possible to speculate about the flight and built up its history.

2.4.1 Preceding

The aircraft have been stored for about four months, without flying, and it was refuelled with an oil/gasoline mixture, which have been prepared more than five days before the flight.

This fuel probably mixed with tank remaining fuel and no fuel tank or fuel line drainage was accomplished, before the flight.

Some fuel lines were hardened and, most probably, with leakage and/or solid deposits deriving from old fuel rotting.

The pilot travelled recently to France (Tarbes) and back, driving a car and towing the aircraft in its trailer, and he had to establish some contacts which required an intense activity. Back in Portugal, immediately before the flight, he had to work hard to clean the field in order to get the minimum safety standards for aircraft take-off on that runway. It's admissible the pilot accumulated a great fatigue level and stress, before the flight, which could reduce his performance and impaired an adequate and quick reaction to any abnormal situation arising in flight.

2.4.2 Take-off & Initial Climb

Even the pilot performed an engine power check before the flight and he got satisfied with output, it's admissible the engines were not delivering the right power, especially the right one. Do not forget the aircraft took almost the double distance it was supposed to use, for take-off and, immediately after lift-off, it pointed to the right when wind conditions dictated it should be heading to the left. The reduced rate of climb and slow acceleration, which gave no chance for flaperons retraction, may be considered as another clue for underpowered engines.

Aircraft configuration deflected air stream downwards and there was no incidence on vertical fin. In this case, any asymmetric power would cause the aircraft to deviate to lower power side and so right engine was, probably, providing less power than left one.

2.4.3 Right Engine Failure

Right engine presumed deficient power output could, by undetermined reasons, take to a full engine stop, as picture 13 – 5 (*page 15*) may induce to believe it happened.

Whether due right engine stoppage or pilot deliberate (mistaken) action stopping left engine, aircraft speed decreased and it stalled, inducing a spin, as testified by eyewitnesses situated

at S. Bartolomeu, who referred they saw the aircraft put nose down and spiralled to the ground, after a strange manoeuvre (*picture nr 8*).

2.4.4 Left Engine Stoppage

Considering that wreckage evidence confirms both engines were not delivering power when the aircraft crashed and left engine controls were found selected to an engine shut-down position, we may suppose that left engine failed with right engine still running, inducing pilot to perform engine shut-down procedures.

Right engine failure, in sequence, may imply there was fuel starvation, which can be confirmed by the absence of fuel marks on wreckage and on adjacent ground.

The high degree of accumulated fatigue, from previous days so many and demanding activities, together with intensive work required to clean-up the field and prepare the aircraft for flight, evolved to a stressful condition that contributed for the pilot to put less concentration on refuelling and impaired his evaluation & decision making capabilities, when he lost both engines, allowing the aircraft to stall and spin.

Aircraft short distance above ground was not enough to execute a spin recovery manoeuvre and get control before its collision with terrain.

3. CONCLUSIONS

3.1 Findings

Based on what has been exposed, we may conclude that:

1st The aircraft exhibited a French registration, it had a Restrict Airworthiness Certificate, issued by French Civil Aviation Authority (DGAC) and valid until 2010-05-10, but there was no document authorizing its operation in Portuguese airspace;

2nd The pilot was an Aeroplane Private Pilot License (PPL(A)) holder, issued by Portuguese Civil Aviation Authority (INAC) and valid until 2010-07-24, qualified to operate single engine propeller aeroplanes (SEP);

3rd In spite of being equipped with two engines, the Columban MC-15 aircraft was classified as group "A" aircraft (single engine propeller);

4th The aircraft suffered an annual inspection on June 2009 and flew the last time, before the accident, on 2009-06-13;

5th The fuel mixture that was used to refuel the aircraft had been prepared five day before the flight and stored in a plastic container;

6th Before flight, the pilot took several hours to clean-up the field, after a long journey, days before, travelling thousands of kilometres by car and towing the aircraft with him;

7th Aircraft take-off took almost the double of usually required distance;

8th As soon the aircraft lift-off it pointed near 20º to the right;

9th Aircraft rate of climb and speed acceleration, after take-off, were well bellow rated values for that aircraft;

10th The aircraft crashed on the ground approximately 700m Northwest of the field, after stalling and entering a spin;

11th Take-off configuration was not altered until impact, but left engine power lever have been retarded to idle position and left engine ignition switch was switched "OFF";

12th Forward fuselage section and cabin were destroyed but both engines appeared in good shape and both propellers were unbroken;

13th Right wing penetrated the fuselage, it was buckled, with wing tip destroyed and aileron detached;

14th Left wing was slightly blistered and wing tip detached but complete;

15th Rear fuselage section and tail suffered minor damage;

16th The pilot suffered fatal injuries and was declared deceased on site.

3.2 Causes of the Accident

3.2.1 Primary Cause

Primary cause for the accident was pilot loss of control of the aircraft, at low altitude, due engine(s) failure for undetermined reasons, leading to the collision with the ground.

3.2.2 Contributory Factors

The following were considered as Contributory factors:

1st Inadequate equipments installation & maintenance procedures used by aircraft owner;

2nd The long period the aircraft was stored without flying;

3rd The mix of fuel being prepared several days before the flight;

4th The absence of fuel tank drain and fuel lines cleaning before the flight;

5th The accumulated fatigue and stress of the pilot, during previous week and on the day of the flight, when he had to work hard to assemble the aeroplane and to clean the field and get the runway usable for take-off.

4. SAFETY RECOMMENDATIONS

No safety recommendations were issued.

Lisbon, 13th of December 2011

The Investigator In Charge,

António A. Alves