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GLOSSARY

BEA	Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile
CFIT	Controlled Flight into Terrain
GPS	Global Positioning System
IMC	IFR Meteorological Conditions
TT	Private Pilot License
VFR	Visual Flight Rules

1 PRESENTATION

Many pilots use their aircraft in visual flight conditions for their personal and professional trips. The question must be asked, however, as to whether visual flying is best adapted for trips arranged on a long-standing basis for which the pressures and stakes are sometimes determining factors.

This study, "The Get-home-itis Syndrome:", analyzes accidents which occurred between 1991 and 1996 where pilots were trying to reach their destination at all costs.

1.1 Introduction

For this study, the BEA database was consulted and certain accidents were selected: accidents which occurred in France to French or foreign aircraft flying under Visual Flight Rules (VFR) at the time of the accident, in general aviation, and in which a very strong desire on the part of the crew to reach their destination was observed. The criteria used to quantify this "fascination with the objective" are directly linked with the motivations for the trip (trip planned a long time in advance, professional meetings, etc).

The study covers the period 1991-1996, during which sixty accidents corresponding to these criteria were noted. Among these accidents, forty were fatal and caused the deaths of one hundred people.

	1991	1992	1993	1994	1995	1996
Accidents	11	12	11	9	11	6
Fatal accidents	5	9	9	7	5	5
Fatalities	18	26	21	11	10	14
Injured	2	1	3	0	2	0

1.2 Comparison with Overall Statistics

In an average year between 1991 and 1996, in general aviation, there were two hundred and sixty five accidents and forty eight fatalities in accidents of all types (French or foreign aircraft flying in France).

The accidents analyzed represent 4.5 % of the total number of accidents in an average year. These accidents, which result from the desire of the pilot to reach his destination at all costs, cause 41.5% of total deaths in general aviation.

1991-1996	Total	Get-home-itis	Percentage
accidents	1,325	60	4.5%
fatalities	240	100	41.5%

1.3 Distribution of Accidents

In flight the pilot can be confronted with three types of problems that may occur singly or in combination:

- insufficient fuel autonomy,
- unfavorable meteorological environment,
- lighting conditions (nightfall).

2. ANALYSIS

2.1 Analysis of the accidents Categories

2.1.1 Fuel management

In the sixty accidents considered in this study, there were ten fuel starvation events, including 4 during approach phases. Only one of these ten accidents was fatal (2 fatalities).

Generally these fuel starvation events occur:

- during a track diversion in the course of a trip,
- after having gone astray during a trip,
- during navigation with a strong head wind.

Only one accident listed in the chapter on fuel starvation events was due to tank selection, but in that case, the fuel starvation event came on top of a situation that was already critical (unfavorable meteorological conditions) and only added to the pilot's workload.

2.1.2 Meteorological conditions

The problems linked to deteriorating meteorological conditions can be broken down into two categories:

- the loss of visual references which may lead either to a loss of control or to collision with terrain,
- the desire to maintain visual references, which leads the pilot to fly at a very low height.

2.1.2.1 Loss of visual references

IMC should not be confused with the loss of external visual references. In fact, the term « IMC » is an air traffic concept (rules of the air). It is quite possible to be in IMC conditions whilst maintaining external visual references that allow the pilot to fly the airplane correctly, without using gyroscopic instruments such as the artificial horizon.

2.1.2.1.1 Loss of control due to loss of external visual references

Basic pilot training is based on the use of external visual references, in particular the earth's horizon. The pilot uses his vision, though the other senses are also involved in piloting. During a flight, information perceived by the sense organs combines to maintain orientation.

In the course of a flight without external visual references, the representation of the aircraft's attitude and bank is provided by the artificial horizon. Without extensive training on the automatic reflexes for a visual circuit in IMC and the instrumental use thereof, the pilot's sensations enter into conflict with the artificial horizon. Spatial disorientation follows, its severity depending on the individual.

According to the night flying instruction manual, several senses allow balance and orientation to be maintained.

The sense of position: has its origins in body muscle movements. With no vision, it is difficult, in positional terms, to distinguish between a load factor originating in a centrifugal force generated by a turn, a climb or a descent.

The sense of balance: is centered in the inner ear. The latter records linear or angular accelerations and decelerations, but cannot discriminate between gravity and centrifugal force. Nor can it detect a constant speed or a small change in speed.

Vision: an attempt to fly with visual references when the conditions impose the use of instruments may cause illusions to occur:

- Light reflected by the glass of the canopy can give the impression of a steep bank,
- Entering and exiting clouds may lead to a belief in changes in the angle of attack,
- At night, lights from the ground may, to the pilot's eyes, be confused with the stars, in the same way as an anti-collision light in a cloudy environment may give an impression of banking,
- In clouds, the luminous halo caused by the flashes from the wingtip (anti-collision) lights may disturb the pilot.

A pilot trained in flight without external visual references puts his trust in his instruments. A beginner has difficulty in freeing himself from his feelings and cannot concentrate only on his instruments, especially if he has had no training in their use. Such spatial disorientation can lead to loss of control.

Twelve accidents occurred following loss of control in the six previous years, causing the deaths of twenty-seven people. In general these accidents are fatal (eleven cases).

These accidents mainly involve pilots with less than four hundred flying hours experience (70% of cases). One of the pilots was rated for instrument flying and another was rated for night flying.

2.1.2.1.2 In-flight break-ups

During the period under consideration, there were six cases of in-flight break-up, which caused fourteen fatalities. Three of these accidents were caused by loss of control. In-flight break-up occur under load factors when the pilot has lost control of his aircraft.

2.1.2.1.3 Controlled Flight Into Terrain

The term Controlled Flight Into Terrain (CFIT) involves collisions with the ground, during which the pilot has maintained control of his aircraft, but does not perceive or is not aware of obstacles on the ground.

Nineteen CFIT's were reported, leading to forty-two fatalities. In these accidents, 70% of the pilots had over six hundred hours of flying experience. Some were IFR rated.

Since 1994, five of the aircraft involved in CFIT's were equipped with GPS. These aircraft were found on the intersection between two waypoints but the safety altitudes had not been taken into account (this information is not displayed by the GPS).

Note: two accidents occurred over the sea and it was impossible to determine if they resulted from collisions with the surface of the sea or from loss of control; these two accidents caused seven fatalities.

The three other accidents occurred during passage through stormy areas.

2.1.2.2 Desire to maintain visual references: flight at low height

Four accidents occurred when the pilots were flying below five hundred feet in order to maintain external references. These accidents caused eight fatalities.

Accidents occur following a collision with an obstacle or after a loss of control (stall, during a turn, etc).

2.1.3 Lighting conditions (nightfall)

In the case of six accidents the lighting conditions, linked to the atmospheric conditions, were a determining factor. They occurred at a time between fifteen minutes before sunset and one hour after sunset. Four of these events were classified among the accidents occurring in poor weather conditions. The two others were due forced landings.

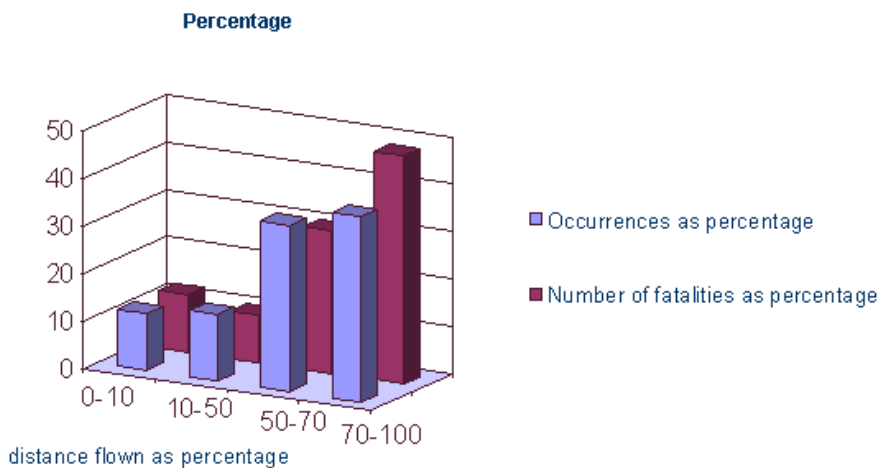
2.2 DECISION-MAKING AND FLIGHT PREPARATION

2.2.1 Decision-making

Decision-making is a complex process that depends on the diagnosis of the situation and the evaluation of possible solutions. This must obviously be done under pressure of time.

In flight, in marginal situations (unfavorable meteorological condition, etc), decisions are often made under stress. Stress may stimulate judgment but may also, when excessive, lead to false or inhibited decision-making. Fatigue accumulated during a long flight can also alter decision-making.

The following table represents the percentage of accidents in relation to the track flown. It is noticeable that the more the objective approaches, the more the risk of an accident increases.



Distance flown as percentage	0	10	50	70	100
Occurrences as percentage	12	14	35	39	
Number of fatalities as percentage	12	10	30	48	

In the period under consideration, there were ten accidents resulting from forced landings. These accidents did not cause any fatalities. The fact that there was an accident relates to the management of the forced landing. It should be emphasized that to decide to make a forced landing at the appropriate moment, in unfavorable conditions, considerably increases

the crew's chances of survival.

The initial decision, on the ground, after the flight preparation, can also be called into question. At that time, time limits and stress are less constraining.

2.2.2 Flight preparation

Flight preparation is a key point in training. This training is defined by a standard program, though the way it is delivered may condition pilots' subsequent judgment.

Thus any flight, whatever it may be, requires preparation, though it is difficult to know how it is prepared. From the preceding it is clear that in almost all cases good preparation would have prevented pilots being in dangerous situations. Whether it is the study of the meteorological situation, the navigation, the fuel check, or knowledge of the aircraft used, flight preparation allows the pilot to take opportune decisions on the ground and in flight and thus increase his availability.

3. CONCLUSIONS

One hundred people were killed, in general aviation, during the period 1991-1996, in accidents that occurred when the pilot's objective was to reach the destination he had determined.

These pilots had to face several obstacles:

- fuel starvation,
- unfavorable meteorological conditions,
- marginal lighting conditions.

The great majority of the events occurred in unfavorable meteorological conditions, thus underlining problems with training, over-confidence, inadequate decision-making and flight preparation. This latter, basic point should once again be emphasized. Good flight preparation comes from:

- good knowledge of the aircraft,
- gathering the appropriate documentation to perform the flight,
- a close study of the complete meteorological dossier and the route to be followed,
- precise calculation of the fuel to be loaded as well as the balance,
- correct flight planning.

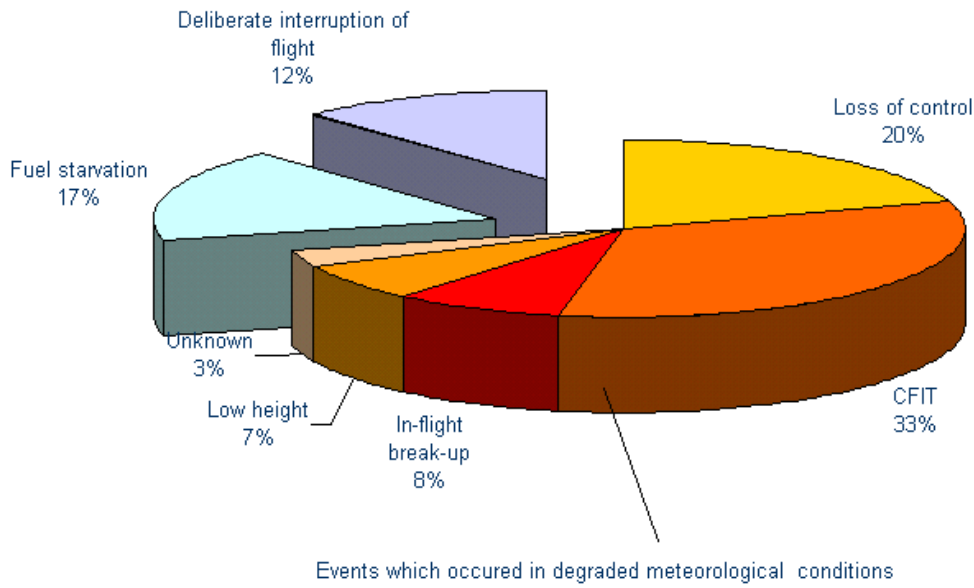
In addition, this preparation will also allow the pilot to take the right decision in the right place: on the ground.

APPENDICES

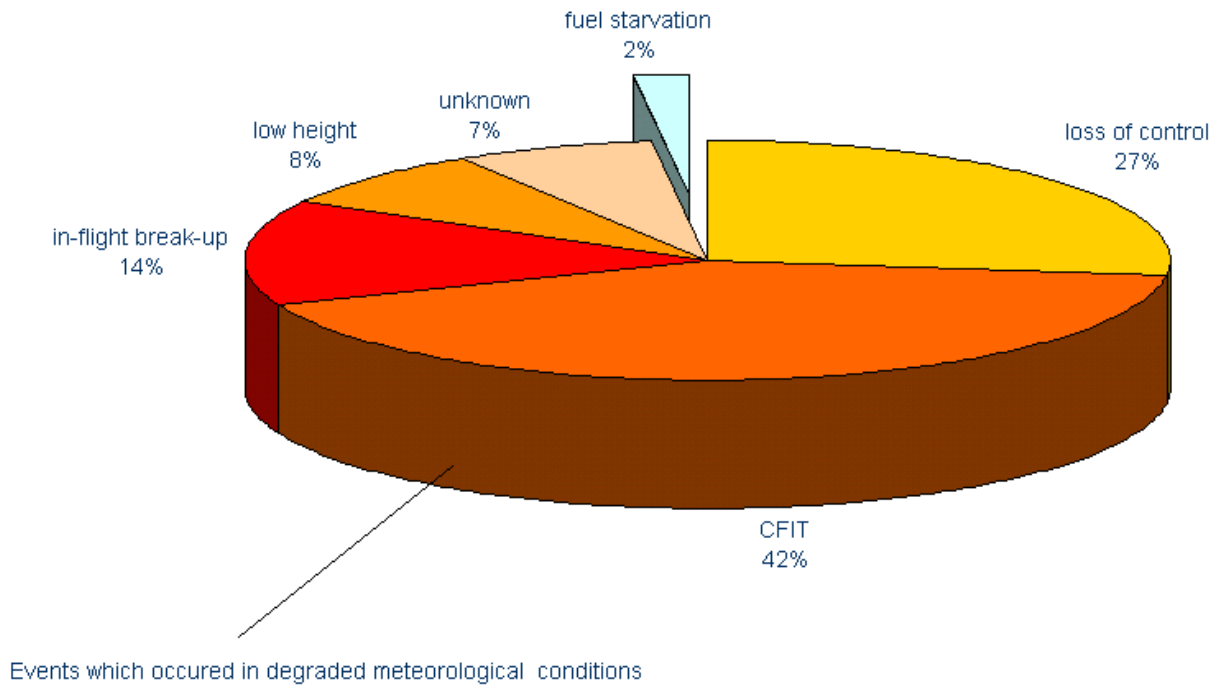
APPENDIX 1: Summary.

The following table summarizes data relating to accidents in general aviation from 1991 to 1996, in which the pilots manifested a particular desire to get to their destination.

	Number of accidents	Number of fatal accidents	Number of fatalities	Number of injured
Loss of control	12	10	27	1
CFIT	19	18	42	3
Loss of control or CFIT	2	2	7	0
In-flight break-up	6	6	14	0
Low height	4	3	8	0
TOTAL Meteorology	43	39	98	4
Fuel starvation	10	1	2	3
Forced landing	7	0	0	0
TOTAL	60	40	100	7



Number of fatalities



APPENDIX 2: Definitions and regulatory provisions.

Accident(*ICAO Annex 13*):an occurrence associated with the operation of an aircraft which takes place between the time any person boards with the intention of flight until such time as all persons have disembarked, in which:

a) a person is fatally or seriously injured as a result of:

- being in the aircraft, or
- direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
- direct exposure to engine blast,
- except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to passengers and crew; or

b) the aircraft sustains damage or structural failure which:

- adversely affects the structural strength, performance or flight characteristics of the aircraft, and
- would normally require major repair or replacement of the affected component,

except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories ; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or

c) the aircraft is missing or is completely inaccessible.

Fatal injury: (*ICAO Annex 13*) any injury suffered by a person in the course of an accident which causes death within thirty days following the date of the accident.

Damage: The classification of damage caused to aircraft is as follows:

intact

lightly damaged: from 1 to 30 %

severely damaged: from 31 to 80 %

destroyed: more than 80%.

VFR flight (*Air traffic regulations RCA1*): flight performed according the Visual Flight Rules. Except in the case of a special VFR clearance, VFR flights must be performed in conditions of visibility and distance in relation to clouds at least equal to those which are given in the table below.

VFR flights apply the speed limits given in the table below, except in the case of a contrary clearance in controlled class C or D airspace.

Table of visual flight meteorological conditions and speed limitations.

Class	Controlled airspace			Uncontrolled airspace
	A	B	C	F,G
Distance relative to clouds		Outside cloud (1)	horizontally: 1,500 metres	
			vertically: 300 metres (1000 feet)	
Visibility in flight	N/A (1)	at and above FL 100 (2): 8 km		
		above FL 100 (2) : 5 km		at and below "S":The higher of the values: 1,500 metres (3) or distance flown in 30 seconds of flight
Speed limitations		N/A(1)	above FL 100 (2) : indicated airspeed ≤ 250 kt	
			except IFR (1)	

(1) in case of radio failure, apply class D conditions

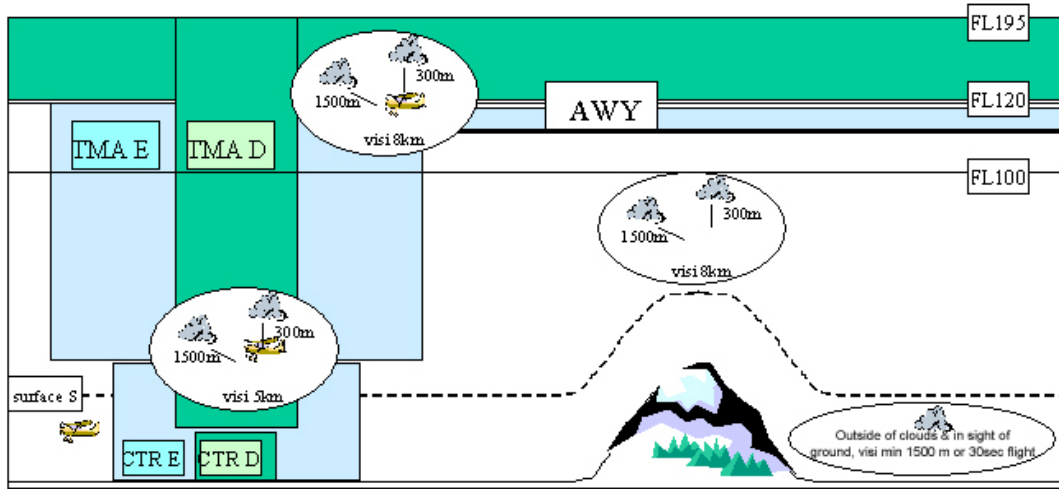
(2) or three thousand and fifty metres (ten thousand feet) if the transition altitude is higher than this value

(3) eight hundred metres for helicopters.

Note 1: for the purposes of this table, "S" means the surface which is the higher of the following two levels: nine hundred metres (three thousand feet) above the average sea level or three hundred metres above the surface.

Note 2: defense aircraft, which for technical or operational reasons cannot respect the two hundred and fifty knots speed limit, apply the rule linking visibility and distance flown in thirty seconds of flight.

In France, where class A airspace is not applicable for VFR and where neither class B nor class C airspace is found, (except for the Geneva TMA) the table can be summarized as follows:



- Controlled airspace
- Class D
 - Class E
- Uncontrolled airspace
- Class G

Note: There are exceptions for entering class A airspace (Paris region) for transit. The meteorological conditions relative to these routes are published in the aeronautical documentation.

VMC (RCA1): Visual meteorological conditions.

Special VFR (RCA1): a special VFR clearance is required enter or to fly in aerodrome traffic of an aerodrome situated within a control zone, or in a specialized control zone, when the parametres communicated by the air traffic organization specify ground visibility of less than five km or a ceiling lower than four hundred and fifty metres.

IMC (RCA1): Instrument meteorological conditions.

CFIT: Controlled flight into terrain; collision with terrain where the pilot has maintained control of his aircraft.

Level (RCA1): Generic term used to indicate the vertical position of an aircraft in flight and indicating, according to the case, a height, an altitude or a flight level.

Minimum VFR level (RCA1): Except in the case of takeoff, landing and the associated maneuvers, no VFR flight may be performed:

- a) over densely populated areas, towns or other built-up areas or open-air gatherings at less than three hundred metres above the highest obstacle located within a radius of six hundred metres around the aircraft;
- b) apart from those places defined above, at a height of less than one hundred and fifty metres above the ground or water and at a distance of less than one hundred and fifty metres from any person, any vehicle or ship on the surface or from any artificial obstacle.

Minimum IFR level (RCA1): Except in the case of takeoff, landing and the associated maneuvers, an IFR flight must be performed at a level which is not lower than the minimum level determined by the relevant air traffic control authorities and circulated to users via aeronautical information channels or, where no minimum level has been established, at a level which is at least three hundred metres above the highest obstacle located within a radius of eight km around the estimated position of the aircraft. This distance is reduced to six hundred metres in hilly or mountainous areas.

On-board Fuel (in general aviation) (order of 24/7/91 relating to the conditions for use of civil aircraft in general aviation): The captain must ensure that, before any flight, the quantities of fuel, lubricants and any other consumable products allow the planned flight to be undertaken with an adequate margin of safety.

In no case may these quantities be less than those necessary to reach the planned destination, taking into account the weather forecast, the planned speed and altitude or, failing that, the necessary quantities without any wind plus ten percent;

In addition, in IFR conditions, if one or more alternate aerodromes are included in the flight plan, to be able to reach the most distant aerodrome;

and to continue the flight at economical cruising speed:

in VFR flight in daytime for twenty minutes, except for microlights and lighter-than-air craft;

in IFR and night VFR flight, for forty-five minutes, whatever the type of aircraft may be.

APPENDIX 3: List of accidents.

Date	Type	Fatalities	Injuries	Event	Cause
Jan-91	C-303	5	0	Loss of control	Loss of visual references
Feb-91	TB-09	3	0	Loss of control	Loss of visual references

Mar-91	D-119	0	0	Forced landing	Failure to take into account meteorological conditions
May-91	Victa	0	0	Forced landing	Poor flight preparation (nightfall)
May-91	PA-28	3	1	CFIT	Loss of visual references
Jun-91	G-115	0	0	Forced landing	Late decision-making and poor fuel management in deteriorating meteorological conditions
Jun-91	PA-28	4	1	CFIT	Loss of visual references
Jun-91	Rutan	0	0	Forced landing	Poor fuel management
Aug-91	TB-09	0	0	Collision with an obstacle	Flying at low height
Oct-91	C-177	3	0	CFIT	Loss of visual references
Feb-92	MS-893	4	0	Loss of control	Loss of visual references
Apr-92	PA-28	2	0	CFIT	Loss of visual references
Apr-92	C-182	2	0	CFIT	Loss of visual references
May-92	ATL	0	0	Forced landing	Poor fuel management
Aug-92	C-177	0	0	Forced landing	Late decision-making and poor fuel management in deteriorating meteorological conditions (+ nightfall)
Aug-92	DR-400	4	0	Loss of control	Loss of visual references
Aug-92	DR-400	2	0	CFIT	Loss of visual references at low height
Aug-92	C-310	6	0	Collision with an obstacle	Flying at low height
Aug-92	MS-892	2	0	CFIT	Loss of visual references
Sep-92	TB-09	3	1	CFIT	Loss of visual references
Oct-92	PA-34	0	0	Forced landing	Poor fuel management
Dec-92	C-210	1	0	Loss of control	Loss of visual references
Feb-93	PA-32	1	0	CFIT	Loss of visual references and artificial horizon out of service
Apr-93	BE-33	5	0	In-flight break-up	Failure to take into account meteorological conditions
May-93	PA-32	4	0	CFIT	Loss of visual references over high ground
Jun-93	Amat	1	0	CFIT	Loss of visual references
Jul-93	TB-09	2	0	Loss of control	Loss of visual references
Jul-93	TB-09	0	2	Forced landing	Late decision-making and poor fuel management in deteriorating meteorological conditions
Jul-93	Bucker	0	1	Loss of control	Loss of visual references
Aug-93	RK-14	2	0	CFIT	Loss of visual references over high ground
Aug-93	DR-400	3	0	Loss of control	Flying at low height
Aug-93	MS-894	1	0	Loss of control	Loss of visual references
Dec-93	PA-28	2	0	In-flight break-up	Flight at high altitude (FL165) without oxygen and icing
Mar-94	DR-400	1	0	Loss of control	Loss of visual references
Apr-94	MO-2J	1	0	CFIT	Loss of visual references over high ground
Apr-94	PA-28	1	0	Loss of control or CFIT	Failure to take into account meteorological conditions
May-94	JUMJ5	2	0	CFIT	Loss of visual references over high ground
May-94	DR-400	0	0	Forced landing	Failure to take into account des meteorological conditions
Jun-94	PA-34	2	0	In-flight break-up	Failure to take into account meteorological conditions
Aug-94	GY-80	1	0	In-flight break-up	Loss of visual references
Sep-94	PA-28	3	0	In-flight break-up	Loss of visual references
Sep-94	PA-28	0	0	Forced landing	Failure to take into account meteorological conditions
Feb-95	DR-340	0	0	Collision with an obstacle	Loss of visual references
Mar-95	DR-400	0	0	Forced landing	Inadequate flight preparation
May-95	C-172	0	0	CFIT	Loss of visual references
May-95	C-310	3	0	CFIT	Loss of visual references
May-95	MO-2J	2	0	CFIT	Loss of visual references over high ground
Jun-95	PA-28	2	0	CFIT	Loss of visual references
Jun-95	D-18	0	1	Forced landing	Late decision-making and poor fuel management in deteriorating meteorological conditions

Jul-95	BE-55	2	1	Forced landing	Poor fuel management
Jul-95	D-18	1	0	Loss of control	Failure to take into account meteorological conditions
Jul-95	YAK	0	0	Forced landing	Failure to take into account meteorological conditions
Sep-95	C-172	0	0	Forced landing	Late decision-making and poor fuel management in deteriorating meteorological conditions
Mar-96	PA-ZT	3	0	CFIT	Loss of visual references
Jun-96	DR-400	2	0	Collision with an obstacle	Flight at low height
Jun-96	DR-400	2	0	Loss of control	Flying at low height
Jul-96	Rutan	1	0	In-flight break-up	Failure to take into account meteorological conditions
Sep-96	PA-32	6	0	Loss of control or CFIT	Loss of visual references
Dec-96	PA-28	0	0	Forced landing	Failure to take into account meteorological conditions

APPENDIX 4: Examples of accidents.

Collision with high ground without loss of control

Loss of control, collision with water

Collision with high ground

Forced landing.

Precautionary forced landing.