Survivability rate among pilots in case of ejection

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Abstract: *The current paper presents a statistical analysis of a recent research made by the author [1], showing the factors causing the accidents that happened in Romanian Air Force from 1952 to 2014. Also the decision of ejection is analyzed. The study contains 225 events: 110 catastrophes and 115 accidents. 280 fighter pilots and 235 aircraft were involved in this analysis. The below information is a personal one and does not reflect an official position of the Ministry of National Defence.*

Key Words: *ejection, human factor, fighter pilot*

1. INTRODUCTION

Since the beginning of jet aircraft operational service in Romania, about 1100 aircraft have operated in the Air Force. The airplanes included in the study are those with jet engine and ejection seat. They are listed below in chronological order by year of entry into operational service. YAK-17 (1951-1956), YAK-23 (1951-1960), MiG-15 (1952-1992) with five variants (MiG-15, MiG-15 BIS, MiG-15 UTI, S-102, CS-102), MiG-17 (1955-1990) (PF and F), MiG-19 (1958-1972) (P and PM), MiG-21(1962-present) (F-13, U-400/600, RFM, RFMM, C, US, M, MF/MF-75, LanceR A – air-ground variant, LanceR B – double seated, LanceR C – air-air), L-29(1966-2005), IAR-93(1974-1998), MiG-23 (1979-2001) (MF, UB), L-39 (1981-2007), IAR-99 (1985-present)(STD, ŞOIM), MiG-29 (1989-2001)(A, UB). 235 aircraft were destroyed in aviation accidents. The types of aircraft destroyed in accidents are as follows: YaK-23 6,38%, MiG-15 34,46%, MiG-17 2,12 %, MiG-19 4,68%, MiG-21 36, 59%, L-29 2,97 %, IAR-93 4,68%, MiG-23 2,97 %, L-39 0,42%, IAR-99 3,4%, MiG-29 1,27%. The greatest losses are recorded on MiG-15 and MiG-21, of which 81 and 86 aircraft respectively were destroyed.

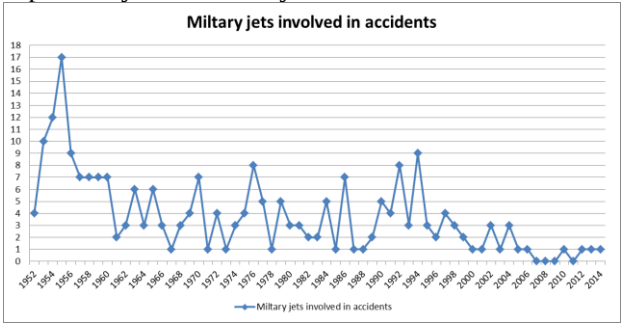

Fig. 1 Military jets involved in accidents

The analysis was performed for the accidents that happened in Romanian Air Force during 1952-2014. 225 evens were analyzed. There were 280 pilots and 235 aircraft involved in the analysis. It should be noticed that the aircraft included in the analysis are only those with ejection seat and the pilot was directly involved. In 110 air disasters, 134 pilots lost their lives.

2. MAIN CAUSE OF ACCIDENTS

In terms of the cause which led to accidents four major categories were determined, namely: the human factor, mechanical failure, weather, and unknown cause. It was concluded that the human factor is by far the most important cause of inflight accidents. About 60% of the accidents had the human factor as the main cause. It is followed by the mechanical failure (29%), the weather with 4% of accidents while 7% of events have no clear cause.

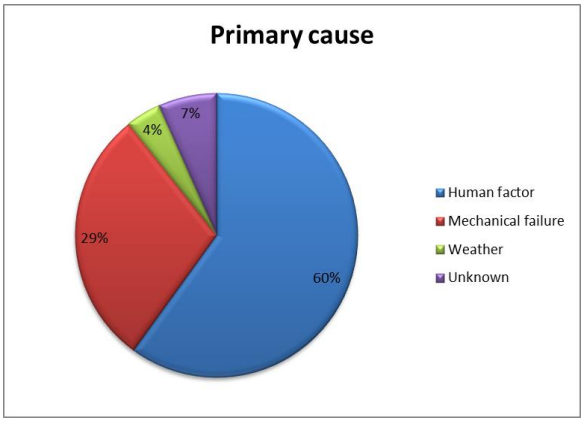

Fig. 2 The main cause of accidents

The human factor is responsible for 135 aviation accidents. 98 cases were caused by pilot error, which caused the stall of the aircraft or an emergency landing on an unknown environment, or mid-air collision.

21 cases happened due to the pilot's spatial disorientation: either the loss of orientation in the flight area leading to uncontrolled flight up to the fuel limit and landing on unknown area or spatial disorientation in relation to the aircraft's position with respect to the ground under condition of compact ceiling of clouds or during night.

Seven events happened due to pilot's health problems or hypoxia occurrence. One event that marked the aviation world at that time took place in 1972, when a student pilot with a MiG-15 deliberately crashed the aircraft.

Another unique event linked to the human factor, refers to the pilot's inattention. He hit accidentally the ejection seat lever with his boot when he got out of the cockpit. The pilot was ejected and died on impact.

Seven flight events were caused by the ground personnel. Two events were caused by the maintenance personnel and three events caused by the traffic controllers resulted in the collision of two aircraft and ground collapse of the third.

Two accidents were caused by the support staff. Both events occurred at night. One was produced by a reckless driver circulating on the taxiway without headlights on, and the other was caused by a soldier who crossed the runway during the take-off of a MiG-21, he was killed on impact with the plane.

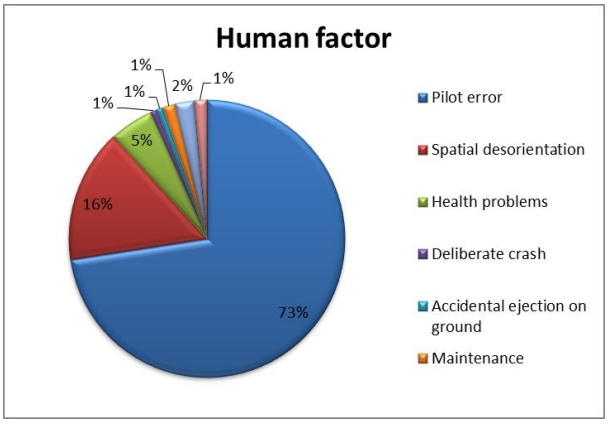

Fig. 3 Human factors involved in aviation accidents

3. EJECTION DECISION

The events that occurred in flight have raised attention in terms of decision to eject. Since the beginning of the reactive aviation in Romania, 87 pilots had chosen the rescue method by ejection.

The first decade of the analyzed period was the bloodiest one, making the most victims among pilots. At that time they don't have the culture of salvation through ejection, most of the time choosing the emergency landing or trying to regain control till last moment,./ which unfortunately is still practiced today.

The first ejection took place on 10 August 1955 when Lieutenant Aurel Rain, pilot of a MiG-15 subsonic fighter performing acrobatics at the aerodrome, lost control due to inadvertent entry into a tailspin. He could not regain control of the airplane and took the appropriate decision in such situations to eject and save himself from death. He represented a model for his colleagues, so the ejection method becoming more and more used, but not used enough in all situations that would require its use. Out of the 280 pilots involved in flight accidents, 193 have not used the ejection system. The rate of the ejection use would therefore be of 1 to 3.

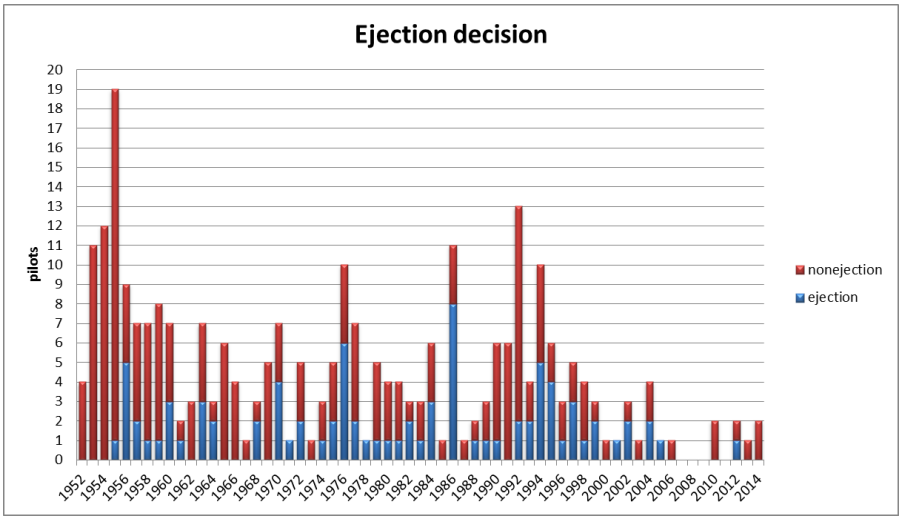

Fig. 4 Salvation decision among the fighter pilots

Out of the 87 pilots that appear on the ejection list, 9 died. One is the case of a lieutenant who accidentally pulled the ejection lever on the ground, and 8 cases of pilots who ejected out of the operating envelope of the ejection seat.

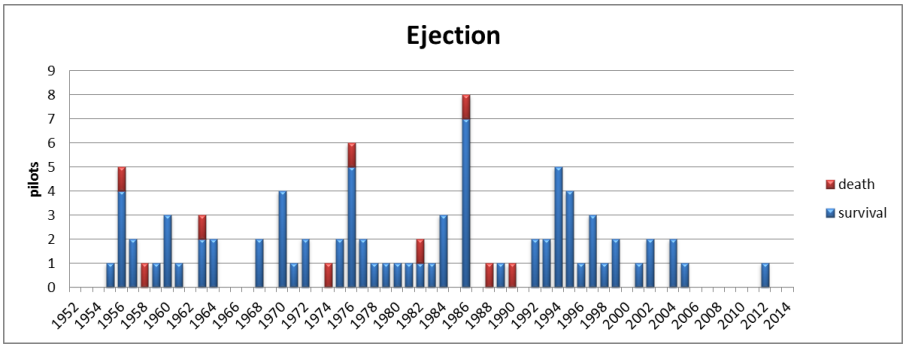

Fig. 5 Ejection decision

Out of the 193 who did not eject, 68 pilots survived. They were involved in flying accidents that happened on ground or the emergency landing could be done without any injuries.

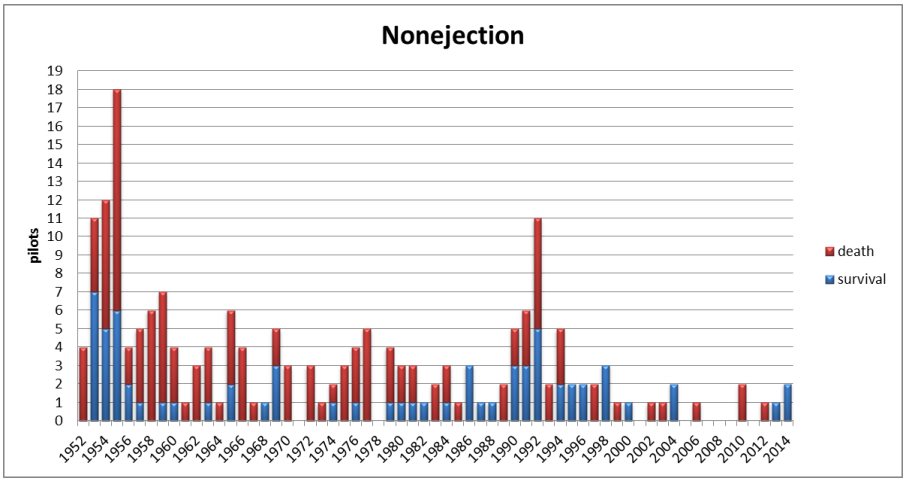

Fig. 6 Nonejection decision

Of the 280 pilots involved in aviation accidents, 134 (48%) died and 146 (52%) have survived.

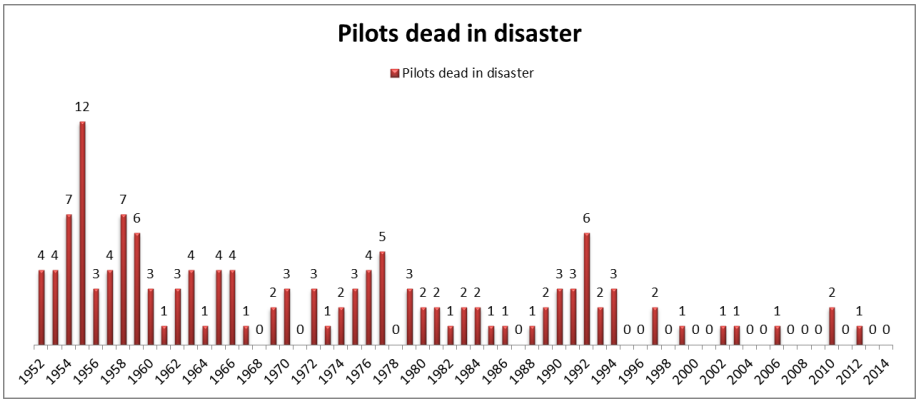

Fig. 7 Pilots dead in disaster

4. CONCLUSION

Given that the proportion of death/ survival in case of an aviation accident is very close (48% to 52%), but with a very high impact of non-ejection it can be said that in case of a major flight event in which the pilot loose the control of the aircraft and cannot regain it in a short time, it is imperative to use the ejection safety system.

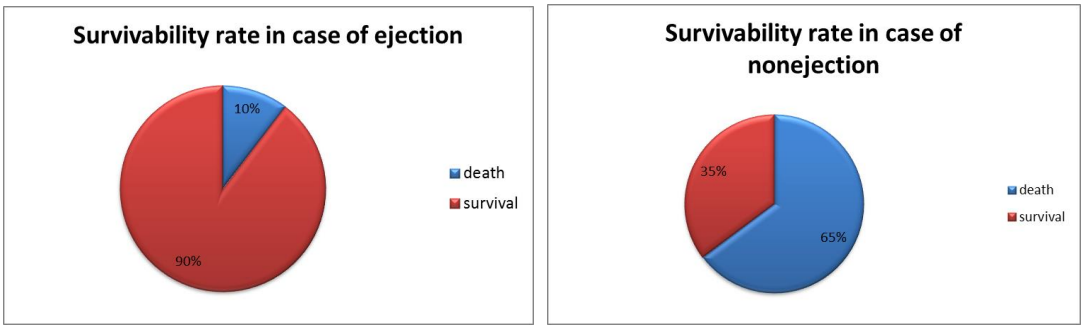

Fig. 8 Survivability rate among fighter pilots

In case of ejection, the survivability rate is about 90% while in case on non-ejection it is of 35%.

It should be known that the rate of survivability in case of non-ejection is high, because many accidents have happened near the ground at low altitude, and the pilot could land safely on an unknown environment.

For all categories of aircraft included in this analysis, the survival by ejection had a very high success rate.

The current aircraft that are in operational service are equipped with ejection seats that provide salvation in almost any moment of the aircraft evolution.

The present study aims to alert the pilots and to increase their confidence in the rescue systems.

ACKNOWLEDGEMENT

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