

# Flight Inspection crew safety and emergency procedures training



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## ABSTRACT

Flight Inspection is rightfully considered to be a risky activity in some respects; flying at low altitude in crowded airspace is of course the first dangerous aspect that comes to mind.

It remains that a flight inspection aircraft is, by definition, packed with electronics, wirings, computers, and batteries. In such an environment the crew has only a few minutes to react quickly and accordingly if smoke or fire occurs. Fortunately rare, those incidents have however to be considered very seriously.

DSNA Flight inspectors work most of the time alone in the cabin and are the first crew member able to react in case of fire. Amongst various recurrent trainings, a very specific one has been implemented for many years in collaboration with the company Air Formation for them to reach a high proficiency in emergency situations.

The proposed paper will present the recurrent training program that the French flight inspectors have to follow and then will describe the safety and emergency procedures training, how it improves flight inspection crew resource management and the educational means and tools used during that training.

## INTRODUCTION

In France, ATSEPs are called IESSA (for Electronic Engineer of Air Safety Systems). They follow a 3-year training course at the ENAC (National School of Civil Aviation). At the end of their training, they are assigned to an operational center or a technical department and occupy maintenance, technical expert, engineering or research and development positions. Depending on their assignment, they follow additional training allowing them to specialize in their field of activity (CNS, ATM, etc.). The flight inspection service is part of the DTI (*Direction de la Technique et de l'Innovation*), the central technical service of the main French ANSP, the DSNA (*Direction des Services de la Navigation Aérienne*).

Flight Inspectors are all ATSEP and have a qualification in the CNS domain. They therefore come from the same body as the maintenance engineers with whom they will work, benefit from the same initial training, and share a common working culture.

## FLIGHT INSPECTOR TRAINING

The training of a DSNA flight inspector is divided into several modules allowing different levels of expertise to be reached.

The first step is training on the flight inspection system and components as well as various courses on measuring instruments and metrology and air traffic control. The trainee flight inspector can then begin training on conventional nav aids which includes several courses on the ILS, VOR and DME systems allowing him/her to acquire very in-depth knowledge of their operation. These theoretical trainings are followed by internships on the equipments used in France (Normarc ILS, Thales ILS and VOR and Indra DME,).

At the same time, the trainee participates in operational flight checks supervised by a qualified flight inspector acting as an instructor. During this course, he/she will be authorized to carry out routine flight checks alone on board, initially supervised from the ground by his/her instructor. This part of his training ends with several commissioning flights during which particular attention is paid to the settings of the M type glide-path equipment.

PBN is obviously another aspect of this course. The trainee first follows an internship on procedure design and then extensive internal training on the PBN concept, RNP procedures, GNSS systems and signals, ARINC424 coding, interferences, and procedure verification. In this part the LPV procedures occupy an important part.

Recently, DSN flight inspectors also received training on procedure flight validation together with the flight inspection pilots.

At the end of this process, which takes about 2 years, the flight inspector obtains an "authorization to exercise" which grants him/her to practice his profession.

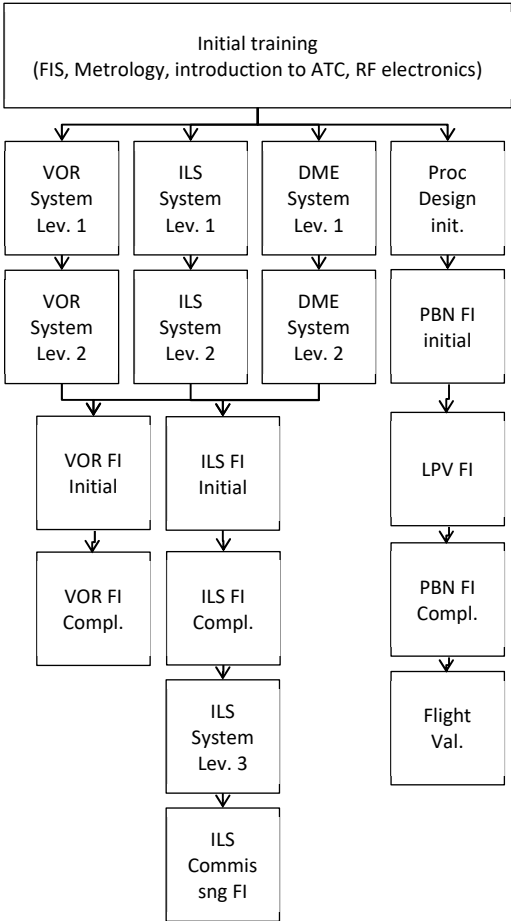


Fig. 1 : Flight Insp. training modules

## RECURRENT TRAINING

The authorization to exercise obtained at the end of this initial training is valid for three years. To renew it, flight inspectors must have recent experience

- The number of flight hours performed each year which must be greater than 50 hours
- At least one ILS commissioning
- At least one PBN procedure commissioning

In addition to this activity monitoring, there are two training courses focusing more specifically on safety.

- First Aid rescuer training
- Fire and emergency procedures training

## FIRST AID TRAINING

First aid training is increasingly offered to employees working in high-risk, isolated, or exposed occupations. For DSNA flight inspectors, it is mandatory and must be renewed every two years.

The specific context of aerial work led us to adapt this training provided by a nurse. The topics generally covered in any first aid training are all adapted to take into account:

- the cramped, enclosed, and cluttered environment of a flight control aircraft cabin,
- the most likely emergencies (trauma and shock due to turbulence, acute airsickness, back injuries, etc.).

Assisting one of the crew members on board an aircraft in flight requires knowing how to quickly assess the situation and the possible dangers incurred, both for the person needing help, for the other people on board and for the rescuer himself. The exercises consist, for example, of rescuing the unconscious FIS operator by extracting him from his workstation to bring him into a position where it will be easier to assess his condition and act accordingly. Practicing cardiac massage in a rather small airplane in flight is something that cannot be improvised and which, once started, cannot be interrupted. It is therefore vital to know how to perform these gestures with maximum efficiency.

Rescuing one of the pilots while he is at his post without disturbing the second pilot who continues to conduct the flight is also a delicate operation which is addressed during these courses.

Finally, the various equipment available on board such as the emergency oxygen mask, pressure bandage or blood pressure monitor are reviewed to understand their use and in which case to use them.



Fig. 2 : First Aid Oxygen Mask in a Be200

## SAFETY AND EMERGENCY PROCEDURES TRAINING

This training is mandatory for flight inspection service agents required to work on board. These are of course flight inspectors and also laboratory engineers who can carry out technical flights.

The usual crew consists of two pilots and a flight inspector alone in the cabin. Of these three people, the latter is clearly the most capable of intervening quickly and efficiently in the event of difficulty in flight inside the aircraft. It is this simple consideration that led us to ask the company *Air Formation* to define an internship adapted to our profession.

*Air Formation* is a company based in Toulouse offering specialized training in aeronautical maintenance and maintaining the skills of flight personnel. It has complete educational resources allowing trainees to be put into situations during exercises in simulators that faithfully reproduce the environment of an aircraft in flight.

A first step is carried out in e-learning. The goal of this module is to review :

- how to perform the preflight check of all safety equipment present on board our King Air Be200,
- how to use and when to use them when confronted to fire onboard, emergency or abnormal situation, survival situation, and first aid situation.

Thorough presentations are dedicated to Protective Breathing Equipment (PBE aka smoke hood) and halon fire extinguishers.



Fig. 3 : PBE and Halon extinguisher

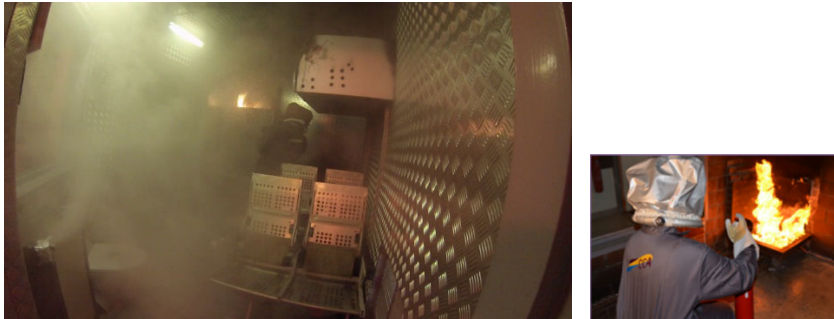
Those two essential pieces of equipment are to be seen as complementary.

The halon extinguisher is one of the most effective means to fight against fire. It contains a liquified and compressed gas that will stop the spread of fire by absorbing the oxygen. It works on flammable liquids electrical fires and most common combustible and is therefore very well suited for an aircraft. The downside of this very effective gas is its toxicity in a confined environment. Inhaling halon compounds may be dangerous for lungs and nervous system. Besides this, the effective duration of use is rather short, between 7 and 15 seconds. The user must be very well prepared to maximize the effect of the gas. The training emphasizes on all those characteristics and constraints.

It is essential, when using this extinguisher, to use adapted breathing equipment. The personal breathing equipment protects from any toxic smoke or fume. But again, the use of those hoods is not as easy as it seems. It is paramount to understand how it works and how to correctly don it.

The second part of the course takes place in the premises of Air Formation where various exercises put the trainees to the test!

A simulator reproducing a cabin makes it possible to carry out several exercises which allow the use of protective equipment and fire extinguishers on real fires in a confined situation.



*Fig. 4 : Fire/smoke training*

These realistic scenarios, in addition to learning how to effectively manage a fire in the cabin, raise awareness of the impact of the startle effect and the importance of having good resilience in these fortunately unusual situations. Besides the purely technical aspects, exercising leadership, maintaining an efficient communication are also important and are not the easiest skills to improve when focused on handling a fire extinguisher.

Having to equip yourself, act as quickly and efficiently as possible while keeping the flight crew informed of the situation in an environment made hostile by fire, smoke, and absence of lighting with a smoke hood over your head is an experience that every flight controller should have had at least once!

One of the scenarios developed makes it possible to approach the action to be taken in the event of an interrupted takeoff a situation which -although rare- must be considered systematically.

Finally, the very singular management of thermal runaways specific to lithium batteries is also reviewed. Given the equipment specific to a flight inspection aircraft, this particular point is of capital importance.



*Fig. 5 : Lithium battery fire*

The following exercises allow to work on the postures to adopt in the event of a crash landing or water landing and the related emergency procedures. A reformed aircraft is used to operate a type III emergency exit and to manage an emergency evacuation by taking into account any passengers or observers present on board.



*Fig. 6 : Type III evacuation door*

Finally, a third part takes place in a natural environment and makes it possible to approach the use of life jackets, lifeboat, emergency pyrotechnic means and to put into practice the basic principles of survival in water or in a hostile environment.

Trainees have to equip, inflate the raft, climb onboard, and use any means at their disposal once ashore to obtain assistance.



*Fig. 7 : Inflatable Raft*

During all these exercises, the notion of CRM (Crew resources Management) is preponderant and involves making optimal use of all the information and resources available at a given moment, whether material or human.

This CRM aspect still needs to be deepened, indeed, at present these courses are only followed by flight inspectors and laboratory engineers, pilots are not required by regulation to take this type of training. It is essential that in the future our flight crews are included in this training process.

## **CONCLUSION.**

By definition, a flight control aircraft contains a lot of electronic and electrical equipment which makes it particularly exposed to the risk of fire in the cabin. A fire, and this is particularly true in a confined space, after a period of development during which growth is weak, reaches a threshold from which growth is extremely rapid (called flashover) and becomes very difficult to control. Being able to intervene in the first minutes is essential.

In addition to the purely technical aspects and the learning of reflexes, this training makes it possible to realize that in this kind of situation the capacities of reflection and reaction are very degraded. Technical skills relating purely to flight inspection are obviously essential, but we cannot ignore the fact that one day or another, we can all be confronted with a particularly critical situation in the cabin. Only regular training adapted to our specific context can allow us to intervene effectively.