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ANALYTICAL STUDIES OF COMPLEX TECHNOLOGY INTERRUPTIONS OF AVIONICS

Currently, it is provided avionics of modern aircrafts is a very reliable, which is associated with a complete set of modern microelectronics. However, modern digital techniques is sometimes there are some interruptions that impact on safety. Ways for solving this negative phenomenon dedicated our report.

According to DSTU 2860-94 - an interruption is a dissociated itself from failure or a single failure removed by insignificant operator's intervention. If in the household appliances it is not threatened serious consequences, but the misinformation of a crew lead to an airplane crash. Improving the safety of civil aviation is an important task for aviation professionals, especially for those who has a deal with the human factor, and reliability of technique.

Due to ICAO every year an increasing number of aviation accidents caused by human factors, caused by reducing accidents, failure of of aircraft. Basic directions of improving flight safety is to train the crew.

Training is carried out by the so-called standard programs, such as training programs for flight crew (TPFC). In TPFC considered flying in normal and special situations.

Training of operators is by developing certain skills, develop skills to analyze information and make decisions in simple and complex flight situations. On complex simulators occurs training of flight skills, including the action of single failure.

But in this state, the it is not enough. Significant increase in flight safety can be achieved by improving the quality of training operators in the process of lining on them factors.

One of the features of the operator in civil aviation is that its activity is occurring against a background of of increased tensions psychic and psysiology. In this regard, of particular importance in the present conditions aircraft operation faced with questions of development methods and technical evaluation of of the psycho-physiological tension in ergonomic control systems.

Complicated structures of avionics led to the fact that the flow of failures and malfunctions of avionics in its composition qualitatively changed. Central methods of onboard equipment and avionics of modern aircrafts are interruption. Interruption - the most difficult type of failure of avionics suddenly appearing and disappearing while aircraft maintenance.

The peculiarity of-interruptions is impossibility of diagnosis by airborne and ground-based means of monitoring. Currently, it is provided intensive work against with failures on the A380. The main types of interruptions on the A380 - are the

interruptions of sensors of all types, specially single and group. Dramatically increased the number of interruptions in a variety of connectors, bundles, cables, connective boxes of different connector types, etc. Considering that the modern aircrafts have 15-20 systems and onboard equipment there are some interruptions in solving problems of the electromagnetic compatibility of different systems, "anti-synchronized" interruptions (interruptions due to lack of on-board single-time counter clock of the main systems), interruption of "Buritanov ass" - the uniform of choice for solving the problem of " interruption-no interruption." In 2012, Russia had the first work on the theory of errors and "without interruptions" as a general theory of faultless hardware.[1]

Table1

General analytical model of research technology interruptions in air accidents

Basic stages of analytical research		
Investigations of existing series of aviation accidents	The consequences of the results of the dichotomous analysis	Investigations of the international standard ICAO
- destruction of the tail fin	Overall assessment under investigation for new target ICAO standards	New categories of aviation accident 27.07.02 according to the main and immediate causes
- Performance of free-ance aerobatic maneuvers	Detection of limits of the methods dichotomy in logic and other sciences	Analysis of the data voice recorder
- Engine surge	An overall analysis of the diagnostic evaluation tables of the crew actions	Analysis of the data of on-board (parametric) recorders
- Engine thrust asymmetry		
- Lack of training of the flight crew	The basic orientation of the motive in the causes of the dichotomy in aviation accidents	Joint analysis of data due to voice and parametric inf.
- Non-conditioned fuel		Magnification Selection of graphs and decodings of COK
- Taking the mockup of academic training aircraft for aerobatics, etc.		Construction of generalized charts, graphs, inf.
The process approach to analytics complex technological failures in in aviation accidents 27.07.2002		

Table 2

The mathematical apparatus of the study of complex technology interruptions

The theory of mathematical transformations due to groups, rings and structures			
linear transformations	conformal transformations	topological transformations	free transformations
Lorentz' type transformations	Schwarz-Christoffel transformations	invariant transformations	multiplicative transformations
Linear fractional transformations	Integral-differential transformations and generalized Lebesgue' transformations	entropy transformations	additive transformations
operator transformations		Transformations of correlation fields	mixed transformations
functional transformations			

This scheme is oriented as mathematical apparatus of the of interruptions is not well developed. Our investigation of the nature of interruptions by analyzing the structure of correlation fields in this regard is the first in the world. These studies showed that the overall approach to the mathematical problems of on-board equipment of interruptions is promising.[2]

Table 3

Dichotomy as a way of primary analytical orientation in logic

Dichotomous phenomenon	
Voume of concepts	
Negative part of the concept - the lack of feature	Positive part of the concept - presence of a finding
Features and application limits	
<ul style="list-style-type: none"> - Undefined by the volume part of the concept; - A significant difficulty in defining the boundaries of the part; - fuzzy concept; - Disproportionate part; - The allocation of an infinite number of varieties of feature; 	<ul style="list-style-type: none"> - Defined by the volume part of the concept; - May purchase valuable form of dichotomy; - Hallmarks for positive approach is sometimes difficult to separate;
The role of the dichotomy in the scientific classification of objects and phenomena is very limited. Dichotomy is normally used only as a prior, supporting one reception of orientation.	

Examples:

- Inadequate and adequate actions of pilots;
- Piloting and not piloting pilot;

Civil aviation is a complex automatized production. The amount of air transportations, number of people and technique, used by this kind of transport increases beginning with every year. Nowadays the most important problem is the providing of high level flight safety.

This problem has many aspects, as flight safety depends on complex factors including the level of technical reliability of the aircraft and its systems, in conjunction with ground equipment, level of staff training, organization work of flight, technical and medical services, discipline pilots and technical staff, people interact with technology and with each other, the intensity and flight conditions and much more.

The problem of increasing safety is complex and can be solved together will flight, engineering, medical staff as well as scientists, designers and experts from other professions.

One of the main causes of errors in the integrated pilot action failure is increasing tension. The problem of limited movements pilot rationalism it in response to the comprehensive failure is very crucial, albeit poorly understood. In due proportionate action pilot flying in special cases arose not one flight adventure. And limitations of these actions in a very dependent on tension of pilot.

The level of safety can be significantly increased through the introduction of the practice requirements and recommendations of ergonomics in the design of aircraft, with training (retraining) and aviation specialists directly in operation and maintenance of aircraft and their flight machines. Domestic and foreign civil aircraft operating experience has shown that aviation accidents are rarely the result of one factor. Of course they are due to a combination of factors (variations in the equipment, crew, air traffic control service, etc.), each of which individually may not cause serious danger.

Conclusion

So, interruption - the most difficult type of failure of avionics suddenly appearing and disappearing while aircraft maintenance. It significantly influence the flight safety and we have found out how to avoid interruption.

References

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