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PROVIDING ON BOARD AIRCRAFT SECURITY

Summary. This article presents the threats to civil aviation, which may be committed on board aircraft. There are also described solutions, which implemented can increase the security of aircraft. This directly influences the security of the entire civil aviation sector. Many procedures can be introduced by airlines (air carriers) on board aircraft, within the aircraft while its layover, or stand on the airport's surfaces for protection against threats.
Keywords: security, civil aviation, aircraft, aircraft's board, acts of unlawful interference

1. INTRODUCTION

In aviation, there are two similar areas, which are directed on almost the same goals. These areas are flight safety and security of aviation. Flight safety is defined as the conditions which ensure the performance of a flight by an aircraft without endangering the safety of the crew, passengers and the aircraft itself, as well as the population and ground equipment [7, p.40]. Civil aviation security is understood as all activities, methods and measures taken following the regulations by the security service to ensure the safety of air transport [6], [4, p.92]. Ensuring adequate security of civil aviation is aimed at preventing the generation of any threats in the form of acts of unlawful interference, as well as other acts that could disturb the security at airports and on board aircraft. Security aims to ensure that the activities aimed at providing

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the safety and security of civil aviation are preventive measures, which will lead to preventing or early detection and mitigation of the risk of generating a threat to the safety and security of civil aviation.

The essence of ensuring the security of civil aviation is to counteract threats, as well as take actions that will ensure the safety and adequate protection of people, property, and in the event of a threat or committing acts of unlawful interference, reducing to a minimum, material and non-material victims and losses. These activities must be undertaken and carried out at airports and on board aircraft. This elaboration shows the solutions which when implemented on board aircraft increase the security of civil aviation.

2. THREATS TO AIRCRAFT SECURITY

In legal acts, threats, which may jeopardise the security (which is strictly connected and influence on safety) of civil aviation are called acts of unlawful interference. They may be committed at the airports and on board aircraft. According to Annex 17 to the Convention on International Civil Aviation, the acts of unlawful interference, which may be committed on board aircraft, are [1]:
- unlawful takeover of control of an aircraft (with or without passengers) in flight,
- destruction of an aircraft in service,
- hostage-taking on board an aircraft,
- unlawful trespassing on board an aircraft,
- bringing on board an aircraft, weapons, dangerous devices or materials intended for criminal purposes, which are prohibited in air transport by law, as well as in the conditions of transport of a given air carrier,
- use of an aircraft in maintenance to cause death, serious injury, or serious damage to property or the environment,
- providing false information that may threaten the safety or security of an aircraft in flight, as well as the safety or security of passengers, crew, ground staff or the public.

In the event of committing any act that could create a threat to aviation security, the consequences (usually severe) are drawn, because ensuring, maintaining safety and adequate protection is a priority in the air transport sector. The essence of ensuring the security of civil aviation was generated by the numerous acts committed over time, leading to security disturbances, causing enormous material and non-material damages and huge loss of life.

3. PROCEDURES AIMED AT SECURITY BEFORE FLIGHT

Ensuring adequate security on board aircraft, in addition to ensuring security at airports, is a key aspect to achieving the security of the entire civil aviation sector. The implementation and assurance of proper security of an aircraft is the result of procedural, organisational and technical solutions used, implemented and taken on board it.

One of the activities aimed at ensuring the security of aircraft is to provide them with adequate protection. Aircraft are protected during parking and in service[2]. A parked aircraft on an apron or parking space at the airport should be protected against:
- placing on board dangerous and prohibited materials that pose a threat to air transport, such as weapons, explosive materials,
- access by unauthorised persons to the aircraft's board, as well as potential interference by strangers.

According to European regulations, air carriers are responsible for the protection of their aircraft while its standing on the ground. Most often, this duty is outsourced to handling companies. On the other hand, the airport's security services are responsible for the safety and security of aircraft left at airports. These organisations are responsible for security during the day and at night, which comes from their main task of patrolling the manoeuvring areas of the airports. The prevention of unauthorised access to an aircraft's board, as well as the placing on board of hazardous devices and substances, may be performed as a result of the implementation and taking of actions such as:
- control of passes/IDs of people who have access to the aircraft,
- control of objects, tools, substances being brought to the airport's restricted zones, then to the boards of aircraft by passengers, employees as well as the aircrew and airport service in terms of identification and detection of attempts of bringing in prohibited items (for example, weapons, explosives),
- capturing and handing over to the appropriate services, that is, the Police, Border Guard, people who placed or tried to put on board an aircraft or in their proximity, weapons, materials, substances, explosive devices or devices that could pose a threat to the safety and security of air transport.

Entities responsible for securing aircraft against threats, that is, air carriers and owners of aircraft, to ensure effective protection, are implementing security measures such as:
- pre-departure check of aircraft's board procedure,
- procedure for checking in-flight supplies,
- securing the aircraft during its stay at airports.

The pre-departure check of an aircraft's board procedure is performed every time after a short and longer layover, during rotation of the aircraft, after passengers disembark, and when an indication of threat to the aircraft appears or to the performed air operation. Usually, this checking procedure is performed in normal/standard circumstances by cabin crew members or cockpit staff (if there are no cabin crew members on board). In the event of detection or suspicion of locating an object that may generate a threat, the aircraft inspection is carried out by the security services. The inspection includes checking the passenger compartment (shelves above the seats, wardrobes, toilets, kitchens, rubbish bins, backrests and pockets of passenger seats, spaces between and under the seats, trolleys and catering containers), the cockpit and external elements, which could be hidden prohibited and dangerous materials (for example, luggage compartments). In a situation, when the aircraft departs from or arrives from a higher

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[2] An aircraft is in service from the moment, when the ground staff or crew begin preparing it for a specified flight, until 24 hours after each landing; the duty period shall, in any case, extend to the entire period during which the aircraft is in flight [2].

risk destination, the control may be carried out by the Border Guards. After holding, all controls and checks must be prepared in the *aircraft security check report*.

The checking of in-flight supplies procedure is also performed by the cabin crewmembers or the cockpit crew. This procedure obliges to verify the security features placed on the in-flight supplies packaging or containers, compare the numbering of security features, as well as include the visual inspection.

Although the entity to which the aircraft belongs is directly responsible for securing the aircraft during parking, the security procedure is often performed by the handling or maintenance organisation. Sometimes (mainly at small airports and in the case of smaller, general aviation aircraft) the crew is responsible for the security aspects during a stopover. Securing aircraft during standstill includes placing and checking the seals and their compliance with the *sealing report*. If the seals have been broken, there is an inaccuracy in their numbering or there have been any changes in the place of sealing, the personnel should immediately inform the security service, the agent who ordered the security checking or inspection, as well as the aircraft commander (designated for the operation, for which the security is performed).

The procedure for securing the aircraft during parking should commence immediately after the handling and maintenance personnel have completed all activities and ordered services on board the aircraft. If the containment procedure is initiated when, for example, the maintenance staff is still in the aircraft maintenance area, then the deck and the aircraft's luggage compartments should be re-checked. The security features take the form of security labels placements. They should be glued in such a way that doors and luggage compartments cannot be open without damaging them or breaking them off. The exact places of affixing the stickers and confirmation of their placement on individual elements of the aircraft are included in the *Airplane Security Report* by the person, who put the security features on. This report is kept by the crew or by the company that is responsible for applying the seals. The report must be kept until the security integrity has been verified before proceeding with the preparation of the aircraft for the next flight operation. When it is found that the security stickers have not been tampered with, the report should be archived and kept at least for one month. However, if the seals are discovered to be broken, then the aircraft may be allowed to perform flight operations under strict restrictions, including a thorough search of the aircraft board by security services (following the procedures in force at the airport) and issuing a confirmation that no external interference was found.

4. SECURITY PROCEDURES IMPLEMENTED BY AIRLINES

The procedures implemented by airlines to ensure the security of civil aviation in the field of security on board aircraft are:
- verification of the passenger list,
- combining checked luggage with passengers (reconciliation),
- taking action in the case of dangerous passengers and passengers violating the conditions of air transport,
- compliance with procedures for the transport of weapons and other hazardous materials,
- refraining from attempting to transport items prohibited to be transported by air,
- application of strictly defined procedures in the event of a bomb threat,
- application of strictly defined procedures in the event of a threat of committing an act of unlawful interference.

Before the departure of an aircraft, the aircraft personnel check the documents required for the check-in of passengers. First, the number of checked passengers is verified in comparison to the number of people admitted on board the aircraft. If the number of passengers on board is different from the number indicated in the documents prepared for the cruise (in the load sheet), then the passenger's service agent verifies the correctness of the checks made by passengers. Additionally, he/she is obliged to check whether the number of boarding cards is equal to the number of issued tickets. The comparison of the number of passengers that passed through the gate in the airport's terminal with the passenger list generated after closing check-ins is automatically carried out by the dedicated check-in system. If a discrepancy exists after the verification, then it is most likely that someone did not board or someone got on board the aircraft without authorisation. Both situations pose a threat to the security of civil aviation, therefore, measures should be taken immediately to find this person (missing or additional). Wherein a passenger who has not arrived is not located and he or she has checked baggage, then the ground handling agent has to locate such baggage. It is not permissible for the baggage to be on board the aircraft without its owner.

A crucial aspect for safeguarding the security of civil aviation, mainly aimed at ensuring the security of aircraft, is the procedure of pairing checked baggage with a passenger who checked in for a given flight, as well as with the transfer and transit of passengers. The baggage linkage procedure was first implemented at airports after the terrorist's bombings at Lockerbie in 1988.

The baggage security procedure covers 5 stages. These are, respectively:
1) check-in done by the passenger,
2) sending the luggage to a luggage sorting office,
3) check-in at the exit of the passenger terminal (boarding gate),
4) verification of lost luggage in the lost and found office,
5) verification by the load control officers, as part of the service on the ramp.

Check-in for flight is made personally by the passenger. The check-in procedure can be done online, at the automatic check-in desk, in the KIOSK or in a traditional way, at the check-in desk. However, baggage check-in can only be done at the check-in desk at the airport, where the handling agent verifies the compliance of the data on the airline ticket with the identity document (passport, ID card, appropriate visas). In addition, the validity of the identity documents is verified. The baggage check-in procedure includes checking the weight, counting the pieces of luggage and noting the information on the passenger's ticket, as well as sticking an automatically generated appropriate baggage tag, which must contain information such as:
- name of the passenger,
- date,
- reservation number,
- number of pieces of luggage checked-in by the given person,
- baggage number with a barcode,
- flight route (including transit and destination airports),
- booking class (which determines the priority).

The ground handling agent is responsible for the entire process of generating the documentation during the passenger's check-in. In the case of incorrectly prepared documents, this unit is obliged to destroy these documents.

Flight crews do not have to check their luggage, they are allowed to take them on board the aircraft. However, if crewmembers choose to hand over their baggage for check-in, it is subjected to the same screening procedures for passengers.

Checked baggage after its check-in, until it is loaded onto the aircraft, is under continuous and strict protection by the handling staff and airport security service employees. In the baggage centre, the checked baggage is counted and the number is compared with the value received by the ground handling agents who were responsible for the passengers' and baggage's checking in. As part of the luggage security task, the relevant employees are required to check that no additional item is misdirected to a batch of luggage intended for a specific flight and that someone has not accidentally or intentionally placed anything in the checked luggage, intended for reaching an aircraft (also during transport from the sorting room to the aircraft's board). Luggage in the sorting room is secured against interference by third parties, by creating a restricted access zone, as well as by carrying out security checks of employees and people who seek access to the sorting room. If a piece of baggage is located in the sorting room without the appropriate tag generated at the check-in desk, it is sent back, for security reasons, it cannot be loaded onto the aircraft's board without information issued on tags.

Once it is determined that the baggage is safe and can be loaded into the aircraft's hold, there is still a risk that it will be withdrawn and not transported on board the aircraft. Such a situation may occur when the passenger who checked in the luggage does not show up at the gate. Rather, in such situations, the ground handling agents look for the "lost" passengers through megaphones, as searching for a specific suitcase that belongs to a given person among a large amount of luggage in a relatively small luggage compartment is quite time-consuming. However, if a passenger misses his/her flight, the aircraft, for security reasons, cannot perform air operations without the baggage owner; therefore, the baggage is withdrawn from the air transport.

Carriers are also obliged to take action in response to a crisis caused by, inter alia, an act of unlawful interference, as well as to inform the relevant organisations and institutions about such incidents. In the event of a threat or commission of an act of unlawful interference on board an aircraft in flight, the pilot in command of the aircraft is obliged to provide information about this fact to the airport's air traffic services units. Such information must be sent to the air traffic management unit as well as others:

– security services at the destination airport for the given aircraft,
– states whose airspace the aircraft is or will be flying over,
– air security services.

The air traffic management authority must take all necessary measures required to safely end an affected aircraft of the threat in flight.

The organisational elements of aircraft security include the cooperation of the appropriate bodies, staffs and units. The services provided and activities performed by them contribute to the maintenance of security and adequate protection of civil aviation in the event of a threat or commission of acts classified as acts of unlawful interference. Thus, it is important to appoint and provide (depending on the situation, threat and circumstances) entities whose aim is to increase security of the aircraft, such as:

– crisis management staff,
– crisis coordination centre,
– air marshals,
– police officers,
– officers of uniformed services.

Moreover, the aircraft security system is strengthened by technical solutions. These solutions include providing and following a sterile cockpit procedure, installing strong doors to the cockpit, equipped with cameras and microphones, which allows to visually and acoustically verify the person requesting access to the cockpit. For security reasons, it is also strictly forbidden to bring passengers into the pilot's cabin.

5. CONCLUSIONS

There are many threats capable of jeopardising the security of civil aviation. In legal documents, these threats are called acts of unlawful interference. All acts of unlawful interference are specified in Annex 17 "Safeguarding International Civil Aviation Against Acts of Unlawful Interference" to the Convention on International Civil Aviation. These acts in the field of civil aviation may be committed mainly against airports and within aircraft. They are considered as huge threats when committed against aircraft, as well as on board aircraft. To avoid any situations exposing the security of aircraft, there are implemented solutions on its boards, as well as are in force procedures, which are directed at increasing security of civil aviation in general.

To achieve the security of aircraft, are introduced many procedures before the flight, during aircraft's parking, standing on the ground, layovers, as well as those introduced by the airlines. For those procedures required by airlines to increase the security of civil aviation, we count, among others, verification of the passenger list, pairing checked luggage with passenger, taking action in the case of dangerous passengers and passengers violating the conditions of air transport, compliance with procedures for the transport of weapons and other hazardous materials, refraining from attempting to transport items prohibited to be transported by air, application of strictly defined procedures in the event of a bomb threat, application of strictly defined procedures in the event of a threat of committing any act of unlawful interference. In addition, there are some technical solutions, implemented on board aircraft, such as strong cockpit's doors, equipped with cameras and microphones, which allows identifying the person requesting access to the pilot's cabin.

As observed, many elements contribute to the aircraft security system. Some elements are closely related to the airport security system, which is justified as these two systems interact with each other and their dependence comes from the same goal, that is, ensuring safety, security and adequate protection of civil aviation.

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