MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL AVIATION UNIVERSITY

FACULTY OF AIR NAVIGATION, ELECTRONICS AND TELECOMMUNICATIONS

AIR NAVIGATION SYSTEMS DEPARTMENT

PERMISSION FOR DEFENCE

Head of the Department
Doctor of Sciences (Engineering), prof.
_____V.Yu. Larin
"_____" _____ 2020

MASTER'S THESIS
ON THE EDUCATIONAL PROFESSIONAL PROGRAM "AIR TRAFFIC SERVICE"

(EXPLANOTARY NOTE)

Theme: "Organization of aviation security in airports of Ukraine"

Performed by: **I.R. Khomenko**

Supervisor: associate professor **M.M. Bogunenko**

Standards Inspector: **T.F. Shmelova**

Kyiv – 2020

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ АВІАЦІЙНИЙ УНІВЕРСИТЕТ
ФАКУЛЬТЕТ АЕРОНАВІГАЦІЇ, ЕЛЕКТРОНІКИ ТА ТЕЛЕКОМУНІКАЦІЙ
КАФЕДРА АЕРОНАВІГАЦІЙНИХ СИСТЕМ

ДОПУСТИТИ ДО ЗАХИСТУ
Завідувач кафедри
д-р техн. наук, проф.
_____В.Ю. Ларін
«__»_____2020 р.

ДИПЛОМНА РОБОТА
(ПОЯСНЮВАЛЬНА ЗАПИСКА)

ВИПУСКНИКА ОСВІТНЬОГО СТУПЕНЯ МАГІСТРА
ЗА ОСВІТНЬО-ПРОФЕСІЙНОЮ ПРОГРАМОЮ
«ОБСЛУГОВУВАННЯ ПОВІТРЯНОГО РУХУ»

Тема: «*Організація авіаційної безпеки в аеропортах України*»

Виконавець **Хоменко І.Р.**

Керівник:доцент **Богуненко М.М.**

Нормоконтролер: **Шмельова Т.Ф.**

Київ 2020

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
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«__»_____2020 р.
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ЗАВДАННЯ

на виконання дипломної роботи магістра

Хоменко Ірини Романівни

1. Тема дипломної роботи: «Організація авіаційної безпеки в аеропортах України » затверджена наказом ректора від № 2524 ст від 29.10. 2019р.

2. Термін виконання роботи : 14.10.2019 – 24.01.2020.

3. Вихідні дані до роботи: додаток 17 до Міжнародної конвенції цивільної авіації, document 8973 ICAO, Повітряний кодекс.

4. Зміст пояснювальної записки: проведення контролю на безпеку в аеропортах України, рекомендації щодо застосування поліпшених процедур контролю.

5. Перелік обов'язкового графічного (ілюстративного) матеріалу: 18 рисунків, 5 таблиць.

6. Календарний план-графік

№ пор.	Завдання	Термін виконання	Відмітка про виконання
1.	Підготовка та написання 1 розділу «Аналіз міжнароднихдокументів, що регулюють процедури авіаційної безпеки в аеропортах України»	14.10.19-30.10.19	виконано
2.	Підготовка та написання 2 розділу «Аналіз національних документів і внутрішніх інструцій»	31.10.19-21.11.19	виконано
3.	Підготовка та написання 3 розділу «Необхідна кількість штату та обладнання для нормального функціонування точки контролю»	22.11.19-10.12.19	виконано
4.	Підготовка та написання 4 розділу «Покращення в сфері авіаційної безпеки (для Міжнародного аеропорту «Жуляни»)»	11.12.19-04.12.19	виконано
5.	Підготовка презентації та доповіді	05.01.20-24.01.20	виконано

7. Дата видачі завдання: «14 » жовтня 2019 р.

Керівник дипломної роботи _____ Богуненко М.М.
(підпис керівника) (П.І.Б.)

Завдання прийняв до виконання _____Хоменко І.Р.
(підпис випускника) (П.І.Б.)

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APPROVED BY

Head of the Department
Doctor of Sciences (Engineering), prof.
_____V.Yu. Larin
"_____" _____ 2020

Graduate Student's Degree Thesis Assignment

Iryna Khomenko

1. The Thesis topic: « Organization of aviation security in airports of Ukraine» approved by the Rector's order of 29 October 2019 № 2524 /st.

2. The Thesis to be completed between 14.10.2019 – 24.01.2020.

3. Initial data to the thesis: Doc.8973, Annex 17 ICAO, Air Code.

4. The content of the explanatory note (the list of problems to be considered): carrying out of aviation security control in the airports of Ukraine, recommendations for usage of improved control procedures.

5. The list of mandatory graphic (illustrated) materials: 18 figures of explanatory material, 5 tables.

6. Calendar timetable

№	Completion stages of Degree Thesis	Stage completion dates	Remarks
1.	Preparation of chapter 1: «Analyzing of international documents that regulate aviation security procedures in airports»	14.10.19-30.10.19	complete
2.	Preparation of chapter 2: « Analysis of national documents and internal instructions»	31.10.19-21.11.19	complete
3.	Preparation of chapter 3: «Needed number of personnel and equipment for normal functioning of control point»	22.11.19-10.12.19	complete
4.	Preparation of chapter 4: «Improvements in the sphere of aviation security (for Kyiv International Airport)»	11.12.19-04.12.19	complete
5.	Preparation of presentation and report	05.01.20-24.01.20	complete

Supervisor of graduate work _____ Bogunenko M.M.

(signature) (name, surname)

The task is obtained for fulfillment by_____Khomenko I.R.

(signature) (name, surname)

РЕФЕРАТ

Пояснювальна записка до дипломної роботи «Організація авіаційної безпеки в аеропортах України»: 92 сторінки, 19 рисунків, 5 таблиць, 16 використаних джерела.

Мета дипломної роботи – покращення процедур контролю на безпеку в Міжнародному аеропорті «Ки́їв» імені Ігоря Сікорського.

Засоби досягнення – аналіз існуючих процедур в авіаційній безпеці, розробка рекомендацій реалізації кращих міжнародних практик в Україні.

Об'єкт удосконалення – Міжнародний аеропорт «Ки́їв» імені Ігоря Сікорського.

Предмет удосконалення – процедури авіаційної безпеки.

Прогнозовані припущення щодо розвитку об'єкта дослідження –

Міжнародний аеропорт «Київ» один з головних аеропортів України. Так як він розташований в межах міста, дуже легко до нього дістатися, використовуючи лише міський транспорт. Аналізуючи статистику аеропорту, стає очевидним, що обсяг авіаційних перевезень значно зростає. Відповідно спостерігається збільшення кількості авіакомпаній, що здійснюють рейси з цього аеропорту, частота рейсів та їх періодичність. У зв'язку з цим можливі подальші утворення асоціацій та спільнот між компаніями, які за спільну мету матимуть покращення умов перевезень, аеропортових процедур та підвищення рівня безпеки. Тому що, як ми знаємо, зі збільшенням кількості перельотів, процедура контролю на безпеку стає складнішою, внаслідок цього зростає і кількість ризиків та загроз, які варто вчасно виявляти та намагатись уникати.

АВІАЦІЙНА БЕЗПЕКА, ПРОЦЕДУРА КОНТРОЛЮ НА БЕЗПЕКУ, АКТ НЕЗАКОННОГО ВТРУЧАННЯ, ІНЦИДЕНТ, ПЛАН НАДЗВИЧАЙНИХ СИТУАЦІЙ.

ABSTRACT

Explanatory note to a graduate work «Organization of aviation security in airports of Ukraine»: 92 pages, 19 figures, 5 tables, 16 references.

The aim of graduate work – improvement of procedures and techniques for security control procedures in Kyiv International airport.

Means of improvement – analysis of existing procedures in the sphere of aviation security, creation of recommendations of realization of best international practices in Ukraine.

The object of improvement – Kyiv International Airport.

The subject of improvement – Improvement of aviation security procedures.

Projection according the research object – Kyiv International Airport is one of the main airports in Ukraine. As it is located in the vicinity of Kyiv, it is easy to get to it, using only public transport. Analyzing statistics of given airport, it is clear that amount of aviation transportations is significantly growing. Correspondingly, it is observed increasing of number of airlines, which perform their flights from this airport, frequency of flights and their periodicity. According to this, further creation of associations and organizations is possible between airlines, which as mutual aim will have improvement of transportation conditions, airport procedures and increasing of safety level. Because, as we know, with rising of flights number, security control procedure becomes more complicated, therefore number of risks and threats is also increasing and they must be detected and averted in time.

AVIATION SECURITY, SECURITY CONTROL PROCEDURE, EMERGENCY PLAN, ACT OF UNLAWFUL INTERFERENCE, INCIDENT.

LIST OF REMARKS

CONTENT

LIST OF ACRONYMS, TERMS

AFS - aeronautical fixed service

ATC - Air Traffic Controller

AWG - American Wire Gauge

CMT - Crisis Management Team

EDS - explosive detection system

EOC - Emergency Operation Centre

FCP - forward control point

ICAO - International Civil Aviation Organization

IFSO - In-Flight Security Officer

NCCC - National Coordination and Control Centre

NTSB - National Transportation Safety Board

PIC –pilot-in-command

RDC - Rest and Debriefing Centre

SCO - status, which is used when cargo is allowed for carriage only by cargo flights and aircrafts

SHR – status of cargo, which means high risk of damage

SPX – status, which is used when cargo is allowed for carriage by passenger flights

TIC - Telephone and Information Centre

TWA- Trans World Airlines

SAA - State Aviation Administration

VIP – very important person

Acts of Unlawful Interference. These are acts or attempted acts such as to jeopardize the safety of civil aviation and air transport, i.e.

a) unlawful seizure of aircraft in flight;

b) unlawful seizure of aircraft on the ground;

c) hostage-taking on board aircraft or on aerodromes;

d) forcible intrusion on board an aircraft, at an airport or on the premises of an aeronautical facility;

e) introduction on board an aircraft or at an airport of a weapon or hazardous device or material intended for criminal purposes;

f) communication of false information such as to jeopardize the safety of an aircraft in flight or on the ground, of passengers, crew, ground personnel or the general public, at an airport or on the premises of a civil aviation facility.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Baggage. Personal property of passengers or crew carried on an aircraft by agreement with the operator.

Cargo. Any property carried on an aircraft other than mail, stores and accompanied or mishandled baggage.

Contingency plan. A "proactive" plan to include measures and procedures addressing various threat levels, risk assessments and the associated security measures to be implemented, designed to anticipate and mitigate events as well as prepare all concerned parties having roles and responsibilities in the event of an actual act of unlawful interference. A contingency plan sets forth incremental security measures that may be elevated as the threat increases. It may be a stand-alone plan or included as part of the Crisis Management Plan.

Crew member. A person assigned by an operator to duty on an aircraft during a flight duty period.

Dangerous goods. Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.

Emergency plan. The plan setting forth the procedures for coordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency.

Explosive Detection System (EDS). A system or combination of different technologies which has the ability to detect, and so to indicate by means of an alarm,

explosive material contained in baggage, irrespective of the material from which the bag is made.

Incident. An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the maneuvering area and the apron(s).

Permits. A permit system consists of cards or other documentation issued to individual persons employed on airports or who otherwise have need for authorized access to the airport, airside or security restricted area. Its purpose is to
identify the individual and facilitate access. Vehicle permits are issued and used for similar purposes to allow vehicular access. Permits are sometimes referred to as airport identity cards or passes.

Pilot-in-command. The pilot responsible for the operation and safety of the aircraft during flight time.

Screening The application of technical or other means which are intended to detect weapons, explosives or other dangerous devices which may be used to commit an act of unlawful interference.

Security. Safeguarding civil aviation against acts of unlawful interference. This objective is achieved by a combination of measures and human and material resources.

Security control. A means by which the introduction of weapons, explosives or other dangerous devices, articles or substances which may be used to commit an act of unlawful interference can be prevented.

Security equipment. Devices of a specialized nature for use, individually or as part of a system, in the prevention or detection of acts of unlawful interference with civil aviation and its facilities.

Terminal. The main building or group of buildings where the processing of commercial passengers and freight and the boarding of aircraft occurs.

INTRODUCTION

As we can see from different sources, especially in annual reports of qualified organizations, flow of aviation traffic is growing sharply. At that time passenger, cargo and other air transportations are also increasing. Next to them risks of terrorism, acts of unlawful interference, seizing in airport/aircraft can appear. With the aim to protect people and infrastructure from threat such unit as aviation security service was created. After analyzing situations and problems that arise in "safety" sphere we can understand the importance of this unit.

The objective of diploma work is organization of aviation security in airport of Ukraine and problems of its establishment. The object of our investigation is Kyiv International Airport (Zhuliany).

Tasks:

a) to get acquainted with current aviation security system: relative to passengers, crew, cargo; documentary base of it;

b) pros and cons of actual system and problems that appeared before or can arise;

c) main recommendations how to improve today's security in Kyiv airport.

To execute diploma's tasks we have to follow such steps:

a) analyze international documents that regulate aviation security procedures in airports;

b) analyze national documents, which regulate security aspects in Ukrainian airports;

c) consider number of personnel and equipment needed for normal functioning of control point;

d) to sum up all possible improvements in the sphere of aviation security (for Kyiv International Airport).

CHAPTER 1

ANALYZING OF INTERNATIONAL DOCUMENTS THAT REGULATE AVIATION SECURITY PROCEDURES IN AIRPORTS

1.1. Annex 17 as basic regulatory document in aviation sphere

As we know with growth of aviation flow there arise risks of threat and unexpected dangerous situations. Each occasion has become as a start point to change, replace or create new regulations. All orders and documents in the sphere of security can be distributed into four main groups:

a) International level(laws that were created by international organizations and became as a base for all further instructions):

1) Annex 17 to ICAO convention “Security. Safeguarding international civil aviation against acts of unlawful interference”;

2) Document 8973 “Security Manual for Safeguarding Civil Aviation Against Acts of Unlawful Interference”;

3) Document 9808 “Human Factors in Civil Aviation Security Operations”.

b) Regional level: Document 30 “European civil aviation committee policy statement in the field of civil aviation facilitation.

c) National level:

1) Air code;

2) Instruction on the organization and performing of security control at airports of Ukraine;

3) State aviation security program;

4) Statement about aviation security of aviation subject;

5) Program of quality control of aviation subjects;

6) Program for training of aviation security officers.

d) Operating level (orders and instructions that are formed by local service or handling companies, or airport leadership for everyday operations):

1) job responsibilities (according to each position).

2) instructions for device and equipment usage (explosives detectors, metal detectors, x-ray installations).

3) plan of actions in case of unexpected or dangerous situations and others.

The main fundamental document that serves as a base for implementations of standards and recommendations is Annex 17 “Security” (figure 1.1).

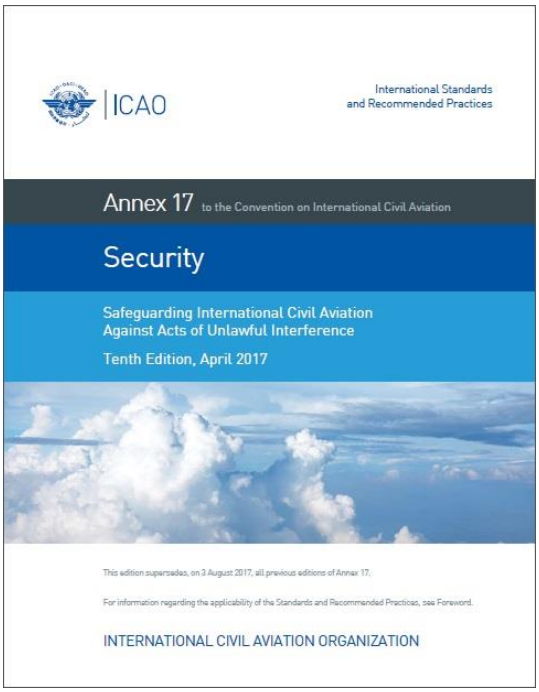

Figure 1.1 - Annex 17 “Security”[1]

According to it, threat in aviation or acts of unlawful interference are acts or attempted acts such as to jeopardize the safety of civil aviation, including but not limited to:

a) unlawful seizure of aircraft;

b) destruction of an aircraft in service;

c) hostage-taking on board aircraft or on aerodromes;

d) forcible intrusion on board an aircraft, at an airport or on the premises of an aeronautical facility;

e) introduction on board an aircraft or at an airport of a weapon or hazardous device or material intended for criminal purposes;

f) use of an aircraft in service for the purpose of causing death, serious bodily injury, or serious damage to property or the environment;

g) communication of false information such as to jeopardize the safety of an aircraft in flight or on the ground, of passengers, crew, ground personnel or the general public, at an airport or on the premises of a civil aviation facility.

In accordance with [1] all airports and airport facilities should have as a main principle of operations the safety of crew, handling personnel, people in the airport vicinity. Contracting states should create regulations and standards with the aim to manage and reduce possible risks of unlawful interference. Each state, which is member of ICAO, should ensure that in case of requests from other countries for additional security precautions and measures it can perform them or propose alternate alike operations.

In keeping with document all States should implement written program in sphere of civil security with the aim to protect aviation operations and its users from acts of unlawful interference through regulations, formed procedures. Each authority is responsible for the development of these program and maintenance of it in airport, air traffic service, and aircraft operations; training of operators and personnel to ensure effectiveness of predefined actions.

Also Annex 17 specifies that professional training should be certified, including screening operations and basic duties. Each provider should perform background checks of procedures and staff actions, tests and inspections to verify the compliance with national program.

Each State should ensure that access to restricted areas is limited and is provided only according to appropriate permission at aviation security checkpoints, presence of permit-card, screening of all items that are carried or other security controls in accordance with risk assessment. All passengers, their checked bags and hang baggage prior to boarding should be scanned and have documents that allow transportation.

If we regard cargo, mail or other goods transportation, all boxes or packed items should have declaration which confirm that its contents were checked with the help of special devices, such as metal detector, trace detector (for existence of parts of explosive materials) and manual control (for existence of hidden things). All hold

baggage should be protected from unauthorized interference; access to baggage area should be only for personnel, who serve given flight; until departure it should be separated, identified and cannot be left unaccompanied.

In case of transportation of high- risk cargo: should have appropriate package, documents with stamps of customs, passport and aviation security control units; such cargo should be marked according to risk possibility of its characteristics: SPX (if cargo can be transported in passenger or cargo aircraft), SCO (for cargo that can be carried only by cargo or mail aircraft, without passengers) and SHR, high risk (if cargo is classified as high risk baggage).

If we speak about special categories of passengers (escorted, deported, passengers with weapon), it can be noted that there exist predefined procedures which are followed. Such persons are always separated from general flow of passengers; pilot-in-command is always informed about such passengers and their seats in aircraft; additionally carriage of weapon is regulated by national regulations in accordance with the laws of States, involved in this procedure; if carriage of weapon is performed by law-enforcement officers, their actions and duties performance should be authorized by States and airline operators.

According to Annex 17 if there exists reliable information about possible act of unlawful interference, for instance, defined aircraft that is arriving to given airport may be as a target for attack, each States have to provide notifications about such situation to all specified services or groups and also to airline operator. All personnel must be professionally trained and ready to act in different situations: fire on board, hijacking, problem with electricity and others.

Each Country is responsible for passenger’s safety if case of unlawful interference in its territory until the flight can be continued. Also each State must collect all information as possible with the aim to notify adjacent air traffic control units, country of aircraft registration, airport of given or presumed destination. In case of real damage and expected situation States ensure assistance to an aircraft in provision of navigation aids, permission to land as it can be necessary. If the aircraft

was subject of unlawful interference and landed at airport of Contracting State authority of it, government shall report relevant information to:

a) state of operator and State of registry;

b) each State whose citizens who are involved in this situation or were injured, and who were on board;

c) each State whose people are defined as hostages;

d) International Civil Aviation Organization.

Those States which are not involved in an act of unlawful interference, but can inform important details or confidential information that can be efficiently used in investigation of this situation should report it to ICAO, as main authority in the sphere of civil aviation [1].

1.2. Document ICAO 8973 "Aviation Security Manual" as main instruction for security procedures creation

Another influential document that describes aviation security procedures in most details is document 8973 "Aviation Security Manual" (figure 1.2).

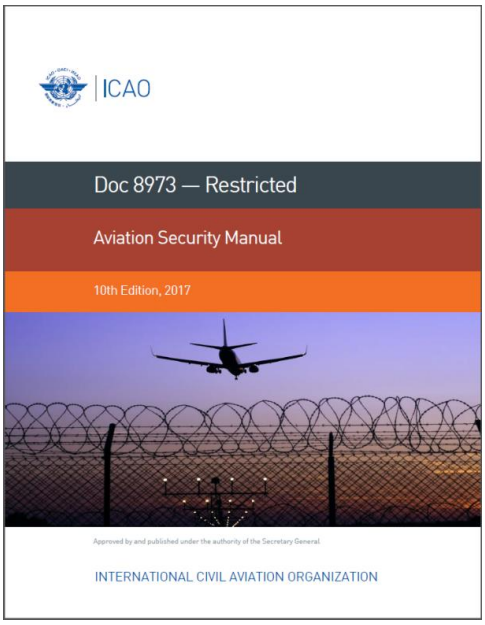

Figure 1.2 - Document ICAO 8973 "Aviation Security Manual" [2]

For example, in case of unlawful interference, this document specifies that States should ensure that airports always remain open for operations. If we imaging, when aircraft is in danger and airport operator denies use of air navigations aids, air

traffic control units, lights and equipment of taxiways, runways it can lead only to worsening of situation, endanger of passengers lives. It can cause injury of people on board of an aircraft, inflight damages, problems with fuel and electricity and other unexpected emergencies.

In case of unlawful interference, when aircraft is the object of it such facts should be taken into account:

a) the safest place for dealing in such situation is the ground;

b) the main objective of such operation is the safe of passengers on board, crew and staff which overrides other options as punishment of terrorists and property protection;

c) such situations must be resolved by professionally trained, organized personnel and actions must be effective;

d) decisions should be made in conversations instead of force applying with the aim to reduce injuries and damage;

e) the aircraft that is an object of hijacking or terrorism should be parked and isolated from other airport equipment to minimize infraction of airport operations.

In the event of occurrence dangerous situation the information must be collected and transmitted as soon as practicable in whole amount, because different details can be important for different units and operators in resolving this problem and investigation of it. Notifications must be disseminated to all security services and air traffic control services which can be involved in such case. Such circumstances should be mentioned: direction of flight, type of aircraft, proximity to State borders or next flight information regions, projection of predicted flight path. Information should be transmitted in at least one hour or two (as soon as possible).

According document, such important information should be collected and forwarded:

a) known and predicted flight path;

b) known and expected destination, estimated and actual time of arrival/flight;

c) additional data about fuel endurance, exact number of passengers and crew;

d) presence of In-Flight Security Officers (IFSOs) on board and supplementary navigation charts, documentation;

e) flight time limitations of crew, considering amount of hours already flown;

f) number, names of passengers, injured people on board, their condition (and physical condition of flight crew on board);

g) if known, number, type and other information relative to weapon, explosive materials, devices that can be used to cause harm.

Due to such fact that information must be transmitted immediately, kept in confidentiality and according to prescribed requirements, data may be disseminated by means: telephone, secured mail and telegram, special aeronautical fixed service (AFS) circuits. When a State has approved information about possible act of hijacking or terrorist act, where aircraft will be as a subject of it, airline operator and related airlines, airports, appropriate authority must be notified to enable them correspondent implementation and preparation of professionally educated staff, service and equipment to reduce risk of possible incident.

In this document it is mentioned that if the aircraft is unlawfully seized and it is not fitted with a transponder, it cannot send 7500 code of alert, the flight crew must use plain language, phraseology to inform ground, air control units and authorities. Notification system should be made in such way that if one system is not available another one can substitute it or just supplement it. Alerting system must include voice communication, coded transmissions, visual signals and other appropriate methods. In case, when coded transmission is not available, phrase “channel 7500” after aircraft call sign must be immediately regarded as alerting signal and prescribed options must be started.

Air traffic controllers should be prepared to:

a) to distinguish plain language and recognize message that was sent, about threat, seizure;

b) instantly inform the chief; after receiving such information the chief should report to appropriate administration, airport authority, if it is needed, search and rescue service, related air traffic service units;

c) uninterrupted communication with pilot; respond to all his/her request; monitor flight path of aircraft.

If it was needed, in case of emergency, an aircraft entering to airport traffic without authorization is possible and air traffic controller should be prepared to handle such situation and give all possible assistance. After receiving information about threat of unlawful interference to an aircraft ATC should:

a) if the aircraft is on the ground deny given clearance for take-off; procedures can be continued only if it was proved that threat was false and there is no any risk for flying performance; all taxiways and runways(if there exists more than one) should be cleared for aircraft in damage with the aim to isolate it from general flow of airport operations, to reduce possible effects; at the same time firefighting, search and rescue, medical services should be alerted and do what is prescribed in approved instructions;

b) if the aircraft is airborne final decisions are taken by pilot. If conditions allow continuing flight to airdrome of destination it can be continued, but ATC units should provide such separation from other aircraft that influence of dangerous situation could be reduced.

Document 8973 also specifies that every airport should prepare alternative, contingency plan that defines instructions in case of unlawful interference or possible threat for aviation security. This plan should be done in understandable manner and include: policies, options for every airport unit and responsibilities, available resources, steps for decision making.

The main 3 “C” key points in this plan are command, control and communication. Threat and risk levels should always be monitored on regional, domestic and international degree, with the aim to detect more vulnerable sides of aviation and prescribe commands from the highest authority to the on-site control. As we know terrorism is a problem that appears in one country, but can have consequences in another state, through the whole world. Communication among state should be permanent, stable and protected from interference; information should be transmitted by coded lines and access to it must be only to authorized units.

Contingency plans should be trained, practically performed to detect weak sides of these plans. Such great trainings should be done at least every two years, but at the same time planned tests, inspections, audits should be organized on everyday basis.

All these inspections are created in order to detect all possible problems and weakness of preparation of airport staff. If it is needed, instructions should be modified, improved and be instead of old regulations. Additional screening of baggage, passenger's things, and cargo should be discussed by airport authority and implemented in everyday operations.

Depending on the crisis situation such two teams should be created:

a) Crisis Management Team at the Emergency Operation Centre;

b) National Coordination and Control Centre (NCCC).

NCCC represents high-level government and executive staff, while CMT represents operational staff, which is located at the airport. If incident include taking hostages, the contingency plan should prescribe need for negotiation and further armed options to finish the incident. All CMT members must be competent and professionally trained.

In case of unlawful interference, when aircraft is the object of it such facts should be taken into account:

a) the safest place for dealing in such situation is the ground;

b) the main objective of such operation is the safe of passengers on board, crew and staff which overrides other options as punishment of terrorists and property protection;

c) such situations must be resolved by professionally trained, organized personnel and actions must be effective;

d) decisions should be made in conversations instead of force applying with the aim to reduce injuries and damage;

e) the aircraft that is an object of hijacking or terrorism should be parked and isolated from other airport equipment to minimize infraction of airport operations.

In the event of occurrence dangerous situation the information must be collected and transmitted as soon as practicable in whole amount, because different details can

be important for different units and operators in resolving this problem and investigation of it. Notifications must be disseminated to all security services and air traffic control services which can be involved in such case. Such circumstances should be mentioned: direction of flight, type of aircraft, proximity to State borders or next flight information regions, projection of predicted flight path. Information should be transmitted in at least one hour or two (as soon as possible).

According to manual 8973, such important information should be collected and forwarded:

a) known and predicted flight path;

b) known and expected destination, estimated and actual time of arrival/flight;

c) additional data about fuel endurance, exact number of passengers and crew;

d) presence of In-Flight Security Officers (IFSOs) on board and supplementary navigation charts, documentation;

e) flight time limitations of crew, considering amount of hours already flown;

f) number, names of passengers, injured people on board, their condition (and physical condition of flight crew on board);

g) if known, number, type and other information relative to weapon, explosive materials, devices that can be used to cause harm.

Due to such fact that information must be transmitted immediately, kept in confidentiality and according to prescribed requirements, data may be disseminated by means: telephone, secured mail and telegram, special aeronautical fixed service (AFS) circuits.

When a State has approved information about possible act of hijacking or terrorist act, where aircraft will be as a subject of it, airline operator and related airlines, airports, appropriate authority must be notified to enable them correspondent implementation and preparation of professionally educated staff, service and equipment to reduce risk of possible incident.

In this document it is mentioned that if the aircraft is unlawfully seized and it is not fitted with a transponder, it cannot send 7500 code of alert, the flight crew must use plain language, phraseology to inform ground, air control units and authorities.

Notification system should be made in such way that if one system is not available another one can substitute it or just supplement it.

Alerting system must include voice communication, coded transmissions, visual signals and other appropriate methods. In case, when coded transmission is not available, phrase “channel 7500” after aircraft call sign must be immediately regarded as alerting signal and prescribed options must be started.

It is important that Chief of CMT must be assigned by the highest State government, because in case of crisis it should be clear who will regulate operations, give instructions and who is responsible for appropriate solution. Such data as title, name, and written responsibilities should be given in contingency plan.

The structure of methodological approach is based on three main principles: identify threat, implement and sustain risks. Group profile of investigators can be defined as having such principles:

a) *leadership* characterizes hierarchy of group, presence of legitimate political representation;

b) *system essential* can be described as wish of group to use written theory in practical actions through trainings and surveillance operations;

c) *infrastructure* includes communication among “cells”, subgroups and effective transportation;

d) *population* relates to the existence of other people who may provide group with safe food, money and haven;

e) *fighting mechanism* - these group members are referred to as “warriors”, for example, “technicians”.

The risks management matrix describes three levels of suggested countermeasures according to table 1.1.

Table 1.1 - Suggested security measures for baseline, intermediate and high threat conditions [2]

№	*FOCUS AREA*	*BASELINE*	*INTERMEDIATE*	*HIGH*
1	2	3	4	5
1	Landside and airside boundaries	Establish boundaries between landside and airside areas. Protect and inspect all passages through such boundaries at irregular intervals.	Apply baseline measures plus increased vigilance and patrols.	Apply intermediate measures.
2	Security restricted areas	Control access into security restricted areas at all times. Employ a pass system or other means for vehicles, staff and crew. Check all IDs and passes at access points.	Apply baseline measures plus search at least 20% of staff, items carried and vehicles before access is allowed.	Apply baseline measures plus search 100% of staff, items carried and vehicles before access is allowed.
3	Passenger screening (where centralized)	Search all departing passengers by hand or screen them with metal detection equipment before access is allowed into the security restricted area.	Apply baseline measures plus search 10% of passengers by hand at the departure gate.	Search all departing passengers again at the departure gate by hand or screen them with metal detection equipment before boarding the aircraft. Search 20% of passengers by hand who have been screened by metal detection equipment.
4	Cabin baggage screening (where centralized)	Search all cabin baggage of departing passengers either by hand or by X-ray equipment hand.	Apply baseline measures plus search 10% of cabin baggage by hand.	Search the cabin baggage of all departing passengers again at the departure

Table 1.1 - Suggested security measures for baseline, intermediate and high threat conditions (cont.) [2]

1	2	3	4	5
				gate either by hand or by X-ray equipment before being taken on board an aircraft.
5	Separation of screened and unscreened passengers	Separate screened departing passengers from inbound passengers. Where physical separation cannot be achieved, application of compensatory measures in accordance with threat assessment by national authority.	Apply baseline measures.	Apply baseline measures and enhance monitoring of compensatory measures.
6	Aircraft security checks and searches	Check/search originating aircraft prior to departure and aircraft in transit to ensure no weapons, explosives or other dangerous devices have been placed or left on board.	Apply baseline measures. X-ray technology.	Conduct thorough search of aircraft supported by appropriate detection techniques at the discretion of appropriate authority.
7	Access control to aircraft	Access to aircraft restricted to authorized staff having duties on board, and passengers. Aircraft doors should be closed and steps removed when unattended or air bridges withdrawn.	Apply baseline measures.	Access to aircraft to be strictly controlled with guards at each door in use. All staff seeking access to be searched by hand together with items carried.

Table 1.1 - Suggested security measures for baseline, intermediate and high threat conditions (cont.) [2]

1	2	3	4	5
8	Reconciliation of hold baggage	Conduct positive hold baggage match with crew and passengers before loading by either manual or automated means. All unaccompanied baggage to be identified.	Apply baseline measures.	Apply baseline measures or positive passenger/bag identification.
9	Hold baggage screening	Screen 100% of originating and transfer hold baggage either by hand, conventional X-ray equipment or explosive detection system (EDS) equipment. With respect to transfer hold baggage, an exception can be made where a validation process and continuous implementation of procedures have been established for screening at the point of origin, and baggage is subsequently protected from unauthorized interference from the originating airport to the departing aircraft at the transfer airport.	Apply baseline measures, plus where conventional X-ray is used, 10% of bags also to be searched by hand or subjected to advanced.	Apply intermediate measures but use best available technology and procedures.

Table 1.1 - Suggested security measures for baseline, intermediate and high threat conditions (cont.) [2]

1	2	3	4	5
10	Protection of hold baggage	Protect hold baggage from unauthorized interference from the point of its screening or acceptance, whichever is earlier, until departure of the aircraft. If the integrity of hold baggage is jeopardized, it shall be re-screened before being placed on board an aircraft.	Apply baseline measures.	Apply baseline measures plus keep hold baggage under constant supervision by designated security guards or transported in sealed containers and verified.
11	Air cargo	All items to be subjected to security controls by aircraft operators and/or designated regulated agents and/or any appropriate entity before being placed on the aircraft.	Apply baseline measures with added random screening and increased checks. (Exception for regulated agents.)	All air cargo to be subjected to security controls and then protected until loaded. Aircraft carrying only cargo apply intermediate measures only.
12	Protection of air cargo	Protect air cargo from unauthorized interference from the point security controls are applied until departure of the aircraft.	Apply baseline measures.	Apply baseline measures plus keep air cargo under constant supervision by designated security guards or transported in sealed, tamper-evident containers and verified.

Table 1.1 - Suggested security measures for baseline, intermediate and high threat conditions (cont.) [2]

1	2	3	4	5
13	Mail	All items to be subjected to security controls by aircraft operator and/or designated regulated agents and/or any appropriate entity before being placed on the aircraft.	Apply baseline measures with added random screening and increased checks. (Exception for regulated agents.)	All mail to be screened, then protected until loaded. Aircraft carrying only cargo apply intermediate measures only.
14	Protection of mail	Control until departure of the aircraft	Apply baseline measures.	Apply baseline measures plus keep mail under constant supervision by designated security guards or transported in sealed, tamper-evident containers and verified.
15	Aircraft catering supplies and stores	All items to be subjected to appropriate security controls, i.e. to prevent introduction of dangerous items into catering supplies or stores taken on board an aircraft, and thereafter protected until loaded onto the aircraft.	Search a reasonable proportion of catering supplies and stores and either escort to the aircraft or transport in sealed, tamper-evident containers.	All catering supplies and stores to be prepared under direct aircraft operator security supervision or searched before loading and either escorted to the aircraft or sent under seal.

In case of incident, there should be established defined controlled area that covers incident. Such areas should be created in order to restrict access for anyone who is not involved in this situation. There should be established outer and inner cordons and forward control point (FCP), which will regulate access to inner cordon (in normal conditions these cordons protected by armed staff).

The main objective of outer cordon is to prevent access to the place by non-related people, public, while the main idea of inner cordon is to protect site from anyone, who is straightly not connected with crisis resolution. Entrance to inner cordon is concerned with forward control point (depending from situation FCP can be mobile). As an example of typical incident site can be represented in figure 1.3.

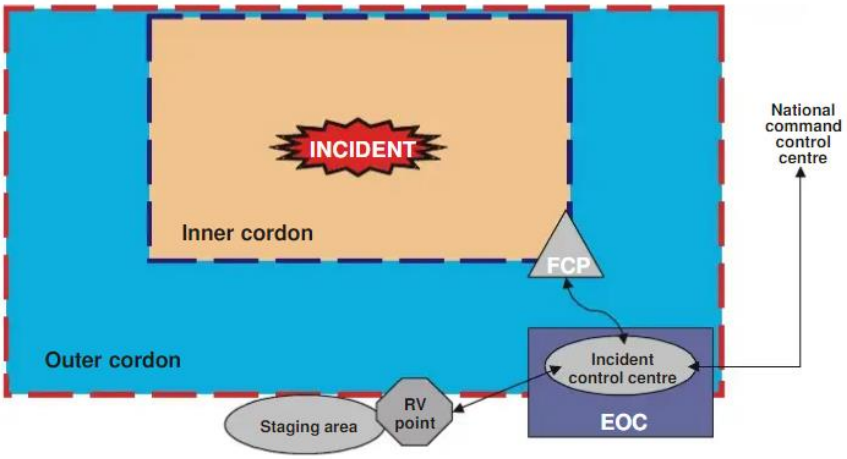

Figure 1.3 - Example of incident site [2]

Such services as firefighting, ambulance should be on stand-by position outside the outer cordon and react immediately in case of explosion.

If it is known that there are explosive materials, bomb on board of aircraft, such aircraft must be insulated from normal airport operations to special isolated parking place. Such position should be minimum 400 m from any other parking places, navigation aids, airport buildings, runways, taxiways. This spot should be located in such way that it cannot be observed from public places, because it can also be used for special servicing of another aircraft. The place should be chosen to assure that there is no any gas, fuel pipelines, and electricity cables. If the territory of airport

allows, it is better to define even two protected areas. So, in defining parking points, such factors should be considered:

a) presence of near buildings, natural features;

b) need for quick access for police, ambulance;

c) potential danger for other aircraft in the vicinity of airport;

d) isolation from public is also needed;

e) possibility of normal operation flow of airport.

If there is information about explosive materials on board of aircraft or equipment it is essential to deal with it as soon as possible. For such purpose in addition to restricted parking place should be isolated area, where specialists can disable explosives. This location has to be not less than 100 m from parking, but, in ideal, close to it. Also airport officers should predetermine safe routes (more than one) how theses explosives could be transported to isolated area, to avoid dangerous effects of them. Moving by these routes should avoid other parking, installations, and communication lines.

Some explosive devices can be activated by pressure-sensitive mechanisms, when appropriate pressure level is reached. To verify suspicious luggage, cargo, a chamber that simulates pressure change is used.

As it was mentioned above, contingency plan is controlled by specially created unit, called emergency operation center (EOC), which coordinates all procedures in case of unlawful interference. It is important that airports provide flexible and continuous communication of EOC and ATS, assisted security services. EOC should be situated in an area off airport that is easily available, in the shortest possible time

The EOC should have at least listed equipment and features:

a) enough space and office supplies (computers also) to accommodate all officers of team;

b) display boards, maps, plans of related territory, infrastructure;

c) area for press, public;

d) updated materials of instructions, orders, plans;

e) telecommunication means.

For flexible communication radio can be used. But it must be taken into account that radio waves can be penetrated by other resources (for instance, press). At the same time, should be established secured landlines, which can used for communication with government, emergency services, control tower. Mostly should be used hard-wired telephones, but if it needed mobile phoned can be used.

In communication with press representatives of EOC should give information only in facts, and approved investigation results. Regular press briefings should be made in designed room (for example, every hour).

As a separate facility Telephone and Information Centre (TIC) need to be set up with available telephone number, professionally trained staff to deal with great number of calls from public, relatives of people who are involved in incident/accident. TIC staff should be at the same time as professional workers, psychologists and know at least English, because can be calls in different languages. It is important to create special collection system in which essential facts from in(out)coming calls can be received, especially name, language, nationality of injured passengers.

Additionally to TIC operations Rest and Debriefing Centre (RDC) should be prepared and separated from general public. The main objective of RDC is to assist relatives in such difficult situation, give them professional psychological help, separate them from general flow of public, especially press and also collect as much information as possible and keep in one unified format.

Every message about possible bomb, unlawful interference must be considered as serious and all prescribed actions must be conducted according to written instructions and orders. Operation must be finished only if information about risk is approved as false.

Also Security manual specifies the power of pilot-in-command. After analyzing the situation he/she should contact ATS unit, to obtain recommendations relative to flight and inform about appeared situation. Pilot-in-command should give instructions to all personnel on board as it is provided in operator’s manual. If pilot

cannot regulate actions of crew, as it is prescribed, another flight attendant should do it and all crew members should assist him.

When it was assessed that there is bomb in the aircraft that is still on the ground, airline operator and airport authorities should:

a) disembark all passengers and crew members;

b) replace aircraft to restricted parking area;

c) unload cargo, passengers' baggage;

d) re-screen all unloaded baggage; perform procedure of aviation security control once again to all related personnel and passengers.

In the case when bomb threat is evaluated during flight the responsibility for decision taking is on pilot-in-command. Following options could be taken:

a) evaluate risks which possibly can have effect on flight operation, especially pressurization;

b) arrange assignments for crew members;

c) announce about appeared situation by pilot-in-command to passengers on board, assure keeping in calm for safety reasons;

d) organize order of search and possible participation of passengers in search of unknown items;

e) organize emergency procedures if bomb location is detected;

f) rerouting of flight (with recommendations of ATS units).

If we regard situation, when search procedure has to be done during flight. Aircraft operator should create special search checklist for every type of aircraft and it should be as a unit of flight crew security kit. Regular trainings should be performed by crew members who are acknowledged with checklist and assigned to every part of aircraft.

Particular attention should be paid to areas on board, to which passengers had access, easy access doors. Such by-step check should be performed with flashlights, mirrors when inspecting dark places. Special attention must be given to equipment, because explosives could be hidden behind, below or under it and to unidentified items that should not be on that place or out of place.

After occurrence of every threat, detailed review should be reported to authority of security and government. According to type of threat, reports from all participants can be needed, where role of every of them should be described; report about operation compliance with approved contingency plan; communication effectiveness or problems.

Appropriate authority in the sphere of security should analyze given reports and if it is required criticize or accept them. These analyses should be done in order to share the experience with people who were not involved and other personnel, airline operators, so that they can be better prepared for next possible situations.

Reports about acts of unlawful interference should be given to ICAO as soon as practicable. This information can be used in further development of procedures, Standards and Practices and additional guidance. If new procedures or techniques were used, these details should be disseminated to other airports at the shortest period of time with the aim to implement them in current orders and used later as effective and approved.

Preliminary reports, in at least one of working language should be ready and delivered to ICAO authority within thirty days. Final reports, if it practicable, can be sent within sixty days by each State, where accident origin and investigation to:

a) state which conducted investigation;
b) state of registry;
c) operator of aircraft;
d) states, whose citizen where injured or killed;
e) states, which helped in investigation, gave important information;
f) ICAO.

If we regard situation that information about threat is obtained by telephone. It can be received by airline operator, airport staff, media, directly from people who is involved in it. Due to that, all personnel of airport should be trained and informed what she/he has to do immediately. Any person, receiving information about threat should:

a) listen attentively and make notes, if it is possible;

b) use another devices to record the call;

c) alert colleagues in order to start preventive actions;

d) receive information as much as possible;

e) ask itemized questions;

1) WHAT type of aircraft can be in danger, type of explosives or weapon can be used;

2) WHERE is the bomb, possible terrorist;

3) WHEN planned unlawful interference can be;

4) WHO is involved in this situation;

5) WHY terrorist want to do it, the main aim of it.

All these key steps should be followed in order to identify possible performer (maybe it is a person who is calling now), to build up a picture of incident, to start evacuation or procedures required.

According to logical assessment the bomb threat can be classified into three groups (table 1.2):

Table 1.2 - Classification of threat [2]

GREEN	A warning , which cannot identify target or group of it, or if it is lack of credibility	Present measures can be used. No need for extra measures
AMBER	When there exists warning with one or more targets and there is hesitance about the effectiveness of current methods	Additional countermeasures can be taken
RED	A warning where the threat permits identification of object, or where organization is identified	Take all measures, which are prescribed or possible

In risk assessment such factors also should be taken into account:

a) history of incidents, all warnings relative to airport, airline operator;

b) influence of event in current days: industrial debates concerning operator, disputes relative to environmental protests, other communities, alike incidents, which happened recently;

c) any information about passengers refused boarding;

d) particularities about checked baggage.

If threat was detected in flight pilot-in-command should consider:

a) whether the threat originated before departure or during flight performance;

b) if there is a person on board who can be as a subject of threat;

c) whether there are people on board who can be chargeable for a threat.

If any suspect materials were found, to ensure safety, staff should follow contingency plan and key steps: CONFIRM, CLEAR, CORDON, CONTROL.

Subject should be confirmed as unknown and reported to authority as suspect explosive item. All labels, mark that detect owner should be checked. At the same time, it is prohibited to move bag, because it can cause detonation of substance. Exact location of this item should be known and noted if it is needed.

Passengers should be evacuated from the area, where suspect material is located. Distance must be at least one hundred meters, but if there are large areas of glass, flammable objects in the vicinity of suspected material, airport authority can enlarge distance. All personnel of airport must be notified about possible risk and act according to instructions. Defined cordon should be established, to restrict access to this area. Personnel should be out of line of sight of the item.

Only one entrance to restricted area can be approved. Appeared situation should be controlled not only by airport staff, but also by police, ambulance and service which is responsible for explosive materials neutralizing.

Search groups should be equipped with special mirrors with tripod, flashlights, radio transmitters. Chief of group should report all necessary information by transmitter, as well as results of search in given territory, fill post operating document, report of realized operation. All rooms or defined area should be conditionally divided into three levels:

a) edges of room, inside fireplaces, behind curtains, windows, furniture. The sweep should finish were it began;

b) in the furniture and floor; furniture should be removed, floor should be lifted if there are visible signs of its disturbance;

c) the third sweep should cover ceilings.

The decision for evacuation must be taken by coordinator, while aviation security officer and police may be ready to advise and help in operation. There are four actions, which can be taken by coordinator:

a) do nothing if the message about threat appears from an intoxicated person or a child, but it should not be deflected until it is absolutely sure that it is malicious call or joke;

b) search and evaluate. If bomb was found, people must be evacuated, if nothing was found and there are no significant factors, the coordinator;

c) search and partial evacuation. When there is no reason to believe that can be explosion or suspected device is too small, coordinator can decide to provide safe distance from device, evacuate only one terminal of one floor, if it is practicable, and leave in terminal only aviation security personnel, police;

d) evacuate immediately. If the incoming call is considered as a high risk, there can be decision to evacuate as soon as possible, without previous search, particularly when immediate explosion can be.

To be sure that evacuation is conducting in the safest way, the coordinator should appoint “evacuation marshals”, who will help people to leave building without panic in determined routes. Such marshals should be trained and be informed about their role in this situation.

As evacuation can be in different period of day, season and weather and evacuated people could remain outside for a long time, till the building is considered as safe, it is better to seek accommodation for them or evacuate in another building or terminal. This provides refuge for passengers and staff, better communication, announcing and catering of needs.

If it is possible, car parking cannot be used as assembly area, because under cars other explosive devices can be hidden. If an evacuation is started, all doors and windows should be unlocked, particularly in the vicinity of device.

If an evacuation has been done, the coordinator with police and security services can decide whether people can be re-occupied or not. It also should be noted that

even if explosive device is detected and deactivated, search should be continued, because explosives can exist somewhere else in the building and re-occupation can be only when territory is known to be safe. Where the time for explosion was given and there were no explosion, the coordinator has to assure that one hour passed before search continuance. [2]

1.3. Accidents, incidents in aviation security and further solutions of them

As we know, every document creation, changing or amendment is based on particular incidents which happened before, in order to prevent occurrence of similar ones.

Like an example of such situation can be shoe bomb attempt in 2001 year, on American Airlines Flight 63, where 197 passengers were on board and crew members. The perpetrator was Richard Reid an Islamic fundamentalist and self-proclaimed Al-Qaeda operative. He carried shoes, which were packed with two kinds of explosives. After departure passengers noticed smell of smoke, after meal service. One flight attendant walked along an aisle to detect source of smoke, but she found passenger, Richard, who were trying to light a match. She decided that he wanted to smoke a cigarette and said to him that it is not allowed on board, it is prohibited, and he promised to stop. Later he unsuccessfully tried to get his attention, grabbed flight attendant, having one shoe in his lap, a fuse connected with shoe and matches. But, fortunately, substances were not able to detonate: perspiration from his feet dampened explosives and prevented possible fire. The perpetrator was subdued by other passenger and immobilized. Aircraft was diverted to Boston and escorted by Two F-15 fighter jets. After landing aircraft was parked in the middle of runway, Richard Reis was arrested and other passengers were evacuated to terminal. Later over 200 grams of plastic explosives were found; that is enough to detonate and obtain a big hole in the aircraft fuselage. After that incident airport security check procedure were changed: now people have to remove their shoes, it must be scanned, using X-ray installation [11].

One more example of accident can be flight Gulf Air Flight 771 on 23 September 1983, were all crew members and passengers died due to bomb explosion (it was located in baggage area). After detonation it caused fire in compartment. Despite the fact that plot-in-command sent distress signal, it was too late to manage situation after big explosion and aircraft crashed in the desert near Mina Jebel Ali between Abu Dhabi and Dubai. The investigation was completed by the American National Transportation Safety Board (NTSB). In the report it was explained that bomb is the main cause of crash and as an additional factor, it was noted that bag with explosive was checked by passenger who never boarded the aircraft. After that procedures regarding baggage control were changed and other measures were added [12].

Now checked baggage is checked using X-ray scanning, explosive materials detector; if during control procedure something seemed to be wrong or suspicious, aviation security officer can open and manually check bag, using additional devices (but in presence of passenger, owner of bag or police, if it is needed).

Another example is hijacking Air France flight 8969 on 24 December 1994 at Houari Boumediene Airport, Algeria. At that time Algeria was in the state of civil war, because of such fact, flight crews of Air France for this route were made of volunteers. Air France airline representative asked Algeria authority, whether it is safe to continue flights to their country; but before 8969 flight the respond was not received. 24 of December: the aircraft was ready to start departure procedure, when four men dressed as Algerian presidential police, in blue uniform, boarded the aircraft. Two of them started to check passenger's passports, one stood guard and another one entered the cockpit. One of flight attendant notices that "police" were carrying arm, while real police usually not armed when inspecting documents. The Algerian military discerned that flight appeared to have unexpected delay and they decided to surround aircraft, while near it had already been representatives of Special Intervention Group (GIS) so-called " ninjas". Then hijackers seized the aircraft. The reason why they decided to hijack exactly this flight is because the national airline Air France was a symbol of France, which for them was as foreign invader. Islamic

men were armed with guns, two dynamite packs, which they placed one in the cockpit and another under the seat in the middle of aircraft. To confuse army snipers of Algeria, they also took the uniform of crew members. The hijackers even forced people to submit their Islamic beliefs: they objected to men and women who were sitting together, used the same toilet; they forced women to cover their heads (some of passengers-women used aircraft blankets as head covering). Later hijackers demanded to direct flight to Paris, where they wanted to give press conference, but captain could not do it, because runway was blocked with parking service vehicles. When men forced pilot-in-command to request for departure, authorities rejected it, they decided not to satisfy any demands to terrorists. In order to attract attention to government, to force them to comply with demands, hijackers killed two passengers, on the boarding stairs.

But Algerian authorities still refused requests of Islamic men, while they continued killing people. Then French government told that Algerian power will be responsible for all consequences, if they will not intervene the situation. And after thirty nine hours of hijacking start Air France flight was cleared to depart. As there was insufficient fuel on board, it was decided to do technical stop in Marseille and then proceed flight. The aircraft arrived the early hours of 26 December. The hijackers did not know that National Gendarmerie Intervention Group was already in Marseille. Later Islamic men asked for 27 tonnes of fuel (while for flight to Paris only 9 is needed), and such demand indicated for French authorities that aircraft is planning to use as bomb. During negotiation it was decided that press conference will be in Marseilles. While waiting, additional food and water was giving, toilet tanks were cleaned. All “service” work was done by National Group operatives, who were dressed as usual airport personnel. They installed microphones on the fuselage. Operatives noticed that the aircraft doors were not blocked and can be opened from the outside.

Twelve hours later after arrival it was known were hijackers were located and how many of them are on board. Islamic men forced pilot-in-command to move aircraft closer to airport terminal and tower of air traffic controllers. In such location

effects of explosion will be greater than on remote parking. By the time, that was agreed, fuel was not delivered, so hijackers started fire directing it to control tower. After that national operators decided that is enough for negotiations and began to attack from rear doors. Snipers which were on the control tower could not start to fire, because the copilot blocked their view. Few minutes later he jumped out of the cockpit and snipers started to fire, while other operators evacuated some people in the rear of the aircraft. For people who was still in aircraft they ordered to het down as low as possible, hide and not to move. Incident was over after fifty four hours of its beginning and all four hijackers were dead [13].

After such incident procedure regarding carrying of arm was reapproved and changed as like as conditions of access to restricted areas and additional security measures to people who is directly involved in flight preparation. Today there is special instruction how arm can be carried: one part describes procedures when passenger confirm arm as checked bag in baggage compartment and is he/she carries arm in luggage, in cabin on board.

Another incident happened with Trans World Airlines (TWA) flight 840 on April 2, 1986. It was regular flight from Los Angeles to Cairo. Twenty minutes before arrival there was explosion of bomb. This was hidden underneath tenth F seat, making the hole in fuselage near the wing. Four passengers were killed after being sucked out, seven were injured by sharps from fuselage as aircraft suffered decompression. As aircraft was approaching to Athens (for technical stop) situation was not as critical as it could be, because effects of explosion and destruction on higher altitudes could be more dangerous; other 110 passengers survived. It was suspected that bomb was located beneath the seat of Lebanese woman, who was sitting there on previous flight. She worked for the Abu Nidal Organization, which was chargeable to the destruction of Israel [14]. After that incident, procedures regarding pre-flight check of aircraft and check of hand luggage/ baggage were changed and improved. Now before every flight crew members have to inspect cabin for presence of inappropriate items, possible ways of unlawful interference and fill defined documents, which confirm that check of prescribed objects was done. If during procedure some signs of intervention were detected, it should be noted in this

check-list and aviation security unit should be informed in order to do special supervision of given aircraft.

One more accident happened in Russia Federation on 24 August 2004. It was suicide bombing on two different aircraft, which were performing domestic flights. The first crash was to Volga-AviaExpress Flight 1353, which was flying to Volgograd from Moscow. The communication with aircraft was lost in twenty six minutes after departure and several hours later remains of it were found. The flight data recorders indicated some type of energy near the right side (as it was investigated, the explosion was at seat row nineteen). In result fuselage was destructed and all passengers on board died. The second crash was just a few minutes later, Siberia Airlines Flight 1047, which disappeared from screens of air traffic controllers. It was flying to Sochi from Moscow. The data from flight data recorder and investigation of wreckage showed an almost similar type high-energy explosion, near seat row twenty five. Also in investigation it was found out that several people helped to do this terrorist acts (they did not know in what their misdeed and illegal actions could result). One ticket seller was bribed approximately 140 € to make out reservation for person with incorrect, invalid ID card. And another airport check-in agent was bribed with 25 €, who helped terrorists to get on board, without corresponding ID. In this example we can see how corruption in minimum amount can affect normal, defined procedures [15].

After that accident to improve security measures and reduce risks of unlawful interference more video surveillance cameras were installed: in areas where access is restricted, in areas where there is open access to people, under all check-in desks, aviation security and passport control points.

CONCLUSION TO CHAPTER 1

In this chapter we considered: main documents, which regulate performing of aviation security procedures, incidents and accident in aviation. Basic instructions, which we considered are ICAO documents: Annex 17 and document 8973 “Aviation Security Manual”.

Annex 17 specifies how every Contracting State should be prepared, what steps should be followed in case of unlawful interference, what written programs should be implemented in order to provide safe operations of aviation. Annex also defines that personnel should be appropriately trained, equipment should be certified and correspond to requirements; specifies that access to restricted areas should be controlled; in case of cargo transportations, should be appropriate marked package and documents, which assure safety of carriage.

Another document 8973 defines procedures of unlawful interference handling in details: what information should be collected, how, to whom and in what time it should be transmitted; how rescue operation should be separated from general flow of normal procedures of airport; what unit should be created during this operation; how differs rescue operation in air from operation on the ground; main steps which must be followed to save lives and minimize risks and outcomes.

Also there were considered several accidents, incidents which occurred in the history of aviation, how these situations were resolved and what was changed in regulations and instructions, what spheres were improved, to avoid further similar problems.

CHAPTER 2

ANALYSIS OF NATIONAL DOCUMENTS AND INTERNAL INSTRUCTIONS

2.1. National documents, which regulate security aspects in Ukrainian airports

Important document at national level is “Instruction about organization and maintaining of security control in airports”. It defines security procedures in airports in more detailed manner. For instance, personal control of passengers and crew shall be carried out in the case of:

a) detection by technical means of control metal objects in passenger clothing;

b) notification of the possibility of theft of an aircraft flying a specific flight on a specific route;

c) receipt of information on the presence of a firearm, explosives, ammunition, poisonous and other dangerous substances, objects prohibited for transportation by air;

d) detection of firearms, other dangerous objects and substances in the baggage and carry-on baggage forbidden for carriage by air;

e) the presence of signs of suspicious behavior and actions of the passenger, which may indicate his criminal intentions.

Each control point, which has a complete set of special technical means for safety, is serviced by a group (shift) of aviation security officers consisting of 4 persons (operators). The technological responsibilities are divided between them in the following order:

Operator N 1:

a) checks the boarding passes at the checkpoint;

b) compares documents with the identity of the passenger;

c) keeps records of passengers;

d) directs passengers to the control point, thus regulating its rhythm of work;

e) informs passengers of the necessity and procedure of the security controls;

f) invites passengers to carry hand luggage, baggage, personal things, and items forbidden for carriage to be checked if the passenger intends to carry them aboard an aircraft;

g) propose to passengers to show liquids separately from bag, in another box; (liquids should be packed in transparent, plastic bag with volume not more than one liter, which can be easy fasten; each volume should be not more than one hundred milliliters, grams; in exclusive cases there are exceptions relative to medication, baby and diet food, necessary during flight);

h) before passing through metal detector propose to passenger to take-off coat/jacket, personal belongings (belt, watch), hat, shoes with big platform or heels and put them on the x-ray line;

i) propose to passenger to put electronics separately from other staff.

Operator N 2:

a) controls the contents of carry-on luggage and luggage using an X-ray introscope;

b) decide, if necessary, to disclose carry-on luggage and luggage for visual inspection;

c) in case if he/she detected arm, forbidden items in baggage, while screening, inspector should stop x-ray machine, leave dangerous item in machine and push special bottom to inform police of airport and security authority about found object and nonstandard situation;

d) time of unstoppable work of operator with x-ray introscope must be not more than twenty minutes.

Operator N 3:

a) conducts, in the presence of the passenger, security check of carry-on luggage and baggage in accordance with the decision of Operator N 2;

b) works with manual metal detector and explosives detector;

c) conducts surveillance of hand luggage and luggage that have undergone security controls before being handed over to their passengers;

d) directs passengers to undergo a control procedure using a fixed metal detector;

e) participates in drafting acts for the removal of prohibited articles and substances;

f) conducts personal security controls.

Operator N 4:

a) works with a fixed metal detector;

b) if necessary, carry out personal control of the passengers using a portable metal detector and visually;

c) affixes marks on airline tickets that have passed control; maintains accounting records at the control point.

Operator N 2 and Operator N 3 periodically change working places in a technology-defined time period.

The senior officer of group of the relevant security control point manages the work of the operators in the technological process of security control and keeps the timing of the work of the security control equipment.

According to instruction apart from the main passenger flow, safety controls are carried out to: aircraft crew members; passengers with disabilities; persons with weapons in the course of their official duties; potentially dangerous passengers and deported. In case when control procedure was completed in the absence of passenger or representative of cargo, special certificate of control should be filled and one copy of it put in the bag. Such procedure is carried out at the motivated decision of the head of the airport aviation security officer (airline) or the internal affairs body at the airport in the presence of two witnesses. The time for conducting security controls shall not exceed the total time provided for the flight timetable. The simplification of the procedure of such control under any conditions is prohibited. In case of delay of passenger to boarding the aircraft in connection with passing the security control, the airport (airline) administration must ensure passenger depart on a regular flight or fully reimburses the cost of the ticket or its unused part.

General organizational and technical measures for the implementation of security controls include:

a) timely detection and prevention of illegal carrying by passengers, crew, other persons of weapons, explosives, poisons, flammable, radioactive substances, ammunition, various dangerous objects that can be used for the purpose of carrying out act of unlawful interference or causing damage to people, as well as carrying other dangerous items prohibited from transporting the aircraft;

b) mutual transfer of operational information in accordance with the alert scheme developed at each airport (airline);

c) qualitative inspection of carry-on luggage, baggage, cargo, mail, courier and express dispatch, board supplies and personal control of passengers and crew members of aircraft of civil aviation to ensure a high level of aviation security requirements;

d) effective usage of special technical means for control and maintaining them in appropriate good technical state;

e) observing the behavior and communication of passengers at the airport, checking public areas for search of deliberately left items by passengers before passing security controls;

f) depending on the number of passengers and flights, security control areas may have one or more control points. At the entrance to the control point there are signs «Security Control Zone», «Control Point»;

g) if the control zone consists of several control points, one of them is determined as a reserve for the treatment of passenger traffic in case of emergency situations and is equipped with an additional set of technical equipment;

h) arrangements of control areas (points) shall be carried out in such a way that unauthorized persons are not able to communicate freely with the passengers who have undergone the control;

i) control zones (points), cabins for personal control must comply with sanitary and hygienic and regulatory and fire-fighting requirements for rooms with a mass occupancy; these rooms should be provided with emergency electric lighting.

Scope of manual security controls:

a) the amount of manual security controls is limited by the number of visible or minor indications of the presence in hand luggage, baggage of items and substances that may present a real threat or are prohibited for carriage by air;

b) the amount of manual control over the security (inspection) of cargo depends on cargo dimensions and previous check of the compliance of accompanying documents with the actual cargo provided for transportation by air;

c) the repeated security screening is determined by the detection of contact of a registered passenger who has undergone a security screening with persons who have not undergone such a procedure or by aviation personnel who do not serve passengers on a particular flight.

Control of potentially dangerous passengers:

a) convoyed persons pass security controls accompanied by convoy composition prior to commencement of control of passengers of a particular flight; the procedure for controlling this category of passengers is determined by the appropriate technology for each airport, taking into account local conditions;

b) the aircraft crew should be informed of the presence of escorts and the composition of the convoy on board; flight notes should be made in the flight documents; the boarding of the convoy on the aircraft is carried out firstly, the unloading - after the unloading of all passengers; the competent authority shall inform the operator in writing of the date of carriage, the flight number, convoy conditions and the level of danger of the escorted person (s) in writing on the transportation of passengers under escort.

On-board safety controls (board supplies, etc.) are monitored by aviation security staff before loading onto a special vehicle. Airborne supplies delivered to the airport by the supplier's vehicles are subject to control when boarding the aircraft before performing a particular flight. The postal items which have arrived at the airport for the purpose of their further transportation by air transport outside the established order (not via mail channels) shall be considered as constituting an increased source of danger and shall be subject to comprehensive security control both by the use of technical means and by visual review.

Product safety controls for shops in sterile waiting rooms are carried out by the airport's aviation security control staff by verifying documents to identify the type of product and the amount of it, and its contents using special technical means.

Items which are prohibited for carrying in hand luggage and baggage should be detected and taken away. Each fact of detection should be fixed in special act. Items and substances that are freely sold but not allowed for carriage by air, can be given to escorts, or stored at the airport until passengers decide to take back their things.

Separate premises (boxes) or metal cabinets are allocated and properly equipped to store seized objects and substances at airports. The storage of such items and substances in the control areas is prohibited. The seized objects can be also put in checked baggage, to restrict access of passenger to it (for example, when we speak about scissors). [3]

One more operational procedure, that should be regarded is providing of aircraft special supervision. And the first point is responsibility for aircraft safety.

Appointed responsible worker while servicing aircraft:

a) allow access to aircraft only to persons who take part in its handling and exploitation according to issued airport permits;

b) in case, when unauthorized person got to aircraft parking, responsible employee ask about aim of visit and immediately informs aviation security staff;

c) informs airport authority about all unusual and dangerous situations, which happened near aircraft or inside of it;

d) locks and seals all defined equipment or details of aircraft after finishing all handling procedures;

e) hand over aircraft to airport security according to defined checklist.

Authority of airport is responsible for providing safety of aircraft in accordance with agreements with airline and:

a) provides access to control areas only to defined personnel with official permit, issued by airport administration;

b) organize surveillance of aircraft, movement of personnel to or from aircraft in order to prevent act of unlawful interference;

c) organize security control procedure relative to crew members, passengers, personnel, baggage and other sendings;

d) effectively react in case of unlawful interference, acts according to defined instructions;

e) takes part in aircraft supervision together with representatives of airline and airport;

f) takes another, additional measures according to signed agreement with airline.

Pre-departure and after-departure supervision of aircraft.

The main aim of it – providing of passengers and aircraft safety, detecting of items which are prohibited for carriage or can be used for act of unlawful interference or aviation accident. Order of check is defined for each type of aircraft and it should be obviously followed. Pre-flight check should be performed by crew members and engineers of given airline directly before flight (if aircraft was parked on the territory of airport). Area and order is divided for every crew member. While checking the main attention should be paid to integrity and undamaging of structure of aircraft and its equipment, without opening locks, seals. Crew members have to notify pilot-in-command about results of check; after that pilot fill special act, which confirm that check was done correctly, without remarks (or if there are any remarks they should be written and pilot should decide further actions). After departure check should be performed in order to detect foreign object, which possibly were left by passengers or other people. When suspicious objects were detected, check should be stopped immediately and after decision of pilot aircraft detailed supervision has to be started.

Special supervision is regulated by this current instruction and Air law of Ukraine. It should be carried in such cases:

a) if there were information about possible danger and risks for aircraft safety and passengers' safety on this board during flight or on the ground (it is not important from which source this message was obtained: in written form or even verbally; all message have to be regarded as serious ones and supervision must be started).

b) if during pre-flight check signs of possible act of unlawful interference were detected;

c) in all cases when there is justified misdoubt about location of danger items on board or near it;

d) on the request of operator;

e) on pilot's request.

In every airport should be created instructions that describe order of supervision for every type of aircraft, which are handled in it; additionally detailed scheme of check should be prescribed.

There are such methods of supervision.

Check during flight

Decision to do special supervision should be made if:

a) there is information that possible explosive has barometric type of detonation (depends on barometric pressure and its changes);

b) if forced landing is not possible;

c) in all cases when pilot decides that supervision is obvious for safe completion of flight.

While performing supervision pilot should:

a) provide safety of people on board; maintain communication with air traffic controller;

b) receives instruction how to deal unknown, suspicious items;

c) do all possible to avoid panic among passengers and, with the aim to not to worse situation;

d) gives instructions to crew members.

In the process of check such rules should be followed:

a) firstly, apartments which can easily be opened should be checked;

b) locked doors, if there are no signs of its damaging, should be opened at last;

c) every checked place must be marked with the help of whiting, highlighter, other substance or adhesive tape;

d) detected dangerous item must be checked according to operator's instructions;

e) pilot should describe detected object to air traffic controller;

f) any removal of object can be allowed only after advising with specialists;

g) found object must be located in such place, where in case of explosion it can cause minimum damage to aircraft structure; it should be covered with wet tissues or clothes;

h) after detecting dangerous item supervision should be continued till its full finishing;

i) pilot-in-command should inform air traffic controller about results of check;

j) after arrival aircraft must be parked to individual parking area and aircraft must be again checked by explosive group specialists;

k) crew members should be ready for emergency landing and evacuation.

Special supervision on the ground

Every message about possible explosive must be regarded as reliable till the moment of its detection or accurate disproof of it, after check. If there was information about possible danger, but without specifying aircraft, all aircraft, that can be as object of seizing should be supervised (flight for the same destination, the same operator). Supervision should be performed by engineers of airport or airline together with personnel who is responsible for security. If it should be done in the airport that is not aircraft basing airport, check should be performed by certified engineer and one of crew members.

Before supervision such safety measure must be taken:

a) do careful check of parking area of aircraft, taxiing routes;

b) do outside check of aircraft in order to regard its possible taxiing to another, isolated parking area;

c) prepare aircraft for supervision: open locks, doors, unload cargo, baggage, and evacuate passengers for further check by aviation security officers;

d) restrict access to aircraft for persons who are not involved in its handling and estrange them at least for one hundred meters;

e) prepare firefighting, police, medical assistance access to defined area.

Head of operation divide area of supervision into separate zones and appoint responsible persons for every zone, give checklist of places which should be observed, give highlighters or other items to mark checked places, give lighters to

check dark places and give mirrors on movable tripod. For the purpose of detection of mechanism sounds, group carefully listen to all sounds, during several seconds, inside aircraft (doors should be closed). Supervision must be started from floor and places of easy access to places of hard access. If object of possible threat is found, group members should leave aircraft at least for one hundred meters and specialists of explosive materials should deal with it and disable it. Obtained results must be prepared in written form and signed by all group members. Head of operation should inform airport authority, airline operator and pilot-in-command about given results and possibility of departure. Decision to proceed flight or not should be made by pilot. [4]

Another document that should be regarded is Rules of aircraft protection and other important objects of civil aviation, providing to access control system to them. Every airport should install access control system in order to provide only authorized access to restricted areas and avoid penetration of people or transport which is not involved in airport operations or aircraft handling. With the aim to provide safety of territory every airport should have defense, which can be made of reinforced concrete slab, metal robs, metal net, barbed wire, combined system with different types of defense. It must be uninterrupted, to avoid even capsizing of dangerous items. Minimum height of defense is 2.13 meters and maximum is 2.44 meters. Along defense, from three to five meters from it, territory should be cleared (for example, be without high trees and obstacle) to not to restrict line-of-sight of surveillance equipment. If buildings of airport are as a part of defense, access to it must be controlled and restricted. Integrity of defense should be obviously monitored by security personnel at day and night, periodically.

Requirements to access control points:

a) every control point should be equipped with turnstile, communication, radio means, space for documents saving, examples of current permit;

b) control points which have barrier should also have gates, that can be closed in case of possible threat appearance;

c) control point and territory near it should be lighted during day and night;

d) amount of control points, which are protected, should provide dynamic and safe operation of airport and be minimal;

e) control points, which are not open round-the-clock must be reliably locked and periodically checked by aviation security officers.

To have access to appropriate zone of airport or restricted area worker must have authorized permit. Permits can be divided:

a) by expiration date – one-time, temporary and permanent;

b) by appointment – personal, material and transport.

All permits according to appointment are official documents, which allow:

a) personal permit – pass and staying in controlled areas and zones of restricted access; in personal permit zone of access is coded by letters, numbers or colors (figures 2.1 - 2.2); personal permanent permits are given to people who work permanently in defined zones; personal temporary – for employees who works on temporary base but not more than thirty days (for example, in case of assignment);

b) personal one-time permits are given according to application of authorized person; such permit is valid for defined time, which is fixed in it; person who prepared application is responsible for return of permit in time; person with one-time permit should be accompanied during all time of being in controlled zone by representative of given company.

<table>
<tr><td rowspan="5">Фото</td><td colspan="3">КП "Аеропорт XXXXX"</td><td>Логотип аеропорту</td></tr>
<tr><td colspan="4">Перепустка N 234</td></tr>
<tr><td colspan="4">Діброва
Володимир Петрович</td></tr>
<tr><td colspan="4">Агент з наземного обслуговування
ТОВ "ОООО"</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Термін дії:
31.12.2018</td><td colspan="4">Підпис відповідальної посадової особи</td></tr>
</table>

Figure 2.1 - Permanent personal permit [5]

Одноденна перепустка			N 1234
Кому видана	ШОСТЕНКО		
	Марія		
	Павлівна		
Дійсна до:	08.30 - 20.30		
	25.10.2018		
Замовник:	Служба ПАРЗП		
Зона:	1	2	X
Супровід:	БОРТНЯК		
	Іван		
	Анатолійович		
М.П.	(Підпис та П. І. Б. відповідальної посадової особи)		

Figure 2.2 - One-day personal permit [5]

a) Material permit – for carrying of material things, cargo, mail to/from controlled area and areas of restricted access, which are protected. For example, when workers have to bring different kinds of equipment or details. This equipment should be checked by aviation security, with the help of technical means.

b) Transport permit – for transport entrance/exit on the territory of airport (figure 2.3).

ТРАНСПОРТНА ПЕРЕПУСТКА N 123	
Назва транспортного засобу	DAF
Державний реєстраційний номер	АБ 1234 ВГ
Власник транспортного засобу	ТОВ "XXXXX"
Зони доступу	1, 2, 3
Проїзд через КПП	КПП-1, КПП-3
Термін дії перепустки	31.12.2018

Figure 2.3 - Transport permit

For the period of expiration permits can be: permanent (for one year), temporary (to thirty days), one-time.

Permits must be on the visible place, for example, on the front glass of car, of if permit belongs to worker – it should be fixed on the jacket. Crew members should have permit, given by State Aviation Administration, which identifies person, airline and has day of issue and expiration. Lists of actual and invalid permits should be always renewed and be in control point.

Each temporary or permanent permit on its front side has:

a) emblem and name of organization, airport;

b) name, surname of owner and his/her photo;

c) position of owner;

d) category of permit, zone of access;

e) day of issue and expiration.

Heads of departments and authority of State Aviation Administration can pass to controlled area of aviation subject ad its adjacent objects in such conditions:

a) Execution of official duties in accordance with appointment and functions. Special order of assignment should be given to aviation security officer in order to check it: coincidence of surname, name in assignment with ID card of State Aviation Administration, day and time of assignment, presence of signature and signet.

b) Giving permit: because officer has to check its validity and compare it with list of invalid or lost permits.

c) Obligatory escort by worker of aviation security unit or another unit, in which SAA representative has assignment for inspection.

Moving of vehicles, pedestrians (passengers) at the controlled area of the aviation subject the routes are defined. Transport in the controlled area is moving in accordance with the movement scheme approved by the supervisor of aviation entity and agreed with the head of the aviation security. Drivers of vehicles are allowed to drive only after proper training. Vehicles, whose drivers do not have appropriate permission, move through the territory of aviation subject, accompanied by an employee of the service of interest.

To provide effectiveness of internal regime it is prohibited:

a) enter in controlled area using own transport, even for workers of airport, leave own car in airport's garage, hangar;

b) usage of unregistered transport on the territory of airport;

c) being in the controlled area after work-shift end or days-off;

d) enclose the territory with construction and other materials, objects that impede the movement of citizens and transport as well may be used in negative situation in the event of an act of unlawful interference;

e) leave windows open after work;

f) being drunk on the territory of airport or on shift. [5]

The main document in Ukraine which regulates arm carrying is Instruction on the procedure for transportation of weapons and ammunition in passenger flights by air transport, order №199 of State aviation administration. It regulates responsibilities of every unit which is directly involved in this procedure.

If we regard situation when weapon will be transported in baggage hold, instruction specifies *in the airport of departure*:

a) passenger must inform agent of check-in desk or aviation security officer about presence of weapon;

b) agent informs aviation security head of shift and police in airport with the aim to sigh all necessary documents;

c) aviation security head of shift together with police representative: check the identity documents of passenger; check document which allow carrying, buying weapon.

Aviation security head of shift:

a) fill card of temporary withdrawal of weapon (four copies);

b) give signed copies: first for passenger, second for check-in agent, third for pilot-in-command, fourth keeps for aviation security unit;

c) takes weapon and ammunition from passenger, with passenger signature;

d) controls passenger check of weapon discharge;

e) locates weapon in separate container, ammunition in another one, seal them;

f) escort containers to aircraft and gives them to crew members, after signs in copies three and four.

Crew member locates container in baggage compartment and gives keys of sealed box to pilot-in-command.

Responsible person of carrier informs airport of destination about: flight number of aircraft, kind and amount of weapons, surname of passenger who is holder of them, number of baggage tags.

Passenger passes security check on a common basis.

In the airport of destination representative of carrier informs head of shift of aviation security about time of arrival this flight.

Person who is responsible for unloading the aircraft opens containers with weapon and ammunition and give it to aviation security officer after signing in card copy number three.

Escorts weapon to room where it can be given to its owner.

Check documents which identify person.

Obtains baggage tags from passenger and give him back his weapon, after signing in card copy number one (which remains one year in archives of aviation security office).

If juridical person wants to transport arm and ammunition he/she have to inform airline not later than three days before departure, in written form; weapon should be delivered to aircraft baggage compartment only through cargo terminal.

If arm is going to be carried in cabin:

Organization-sender:

a) send request to operator to allow transportation of armed person on board not later than three days before departure; in the request sender indicates defined route and necessity to carry weapon;

b) controls whether passenger is informed how to behave himself if he has weapon, especially what is prohibited to do; check documents which identify person; permission to carry weapon; task for assignment.

Airline operator:

a) informs time for passenger check-in (before general flow of passengers) and features of this procedure;

b) informs aviation security at airport and handling company about time of check-in for passenger with arm;

c) if it is needed informs second/third airline operator if passenger has flight with transfers in other airports;

d) informs passenger that in case of incident on board or any conflict situation, he/she cannot intervene without agreement with pilot-in-command.

Aviation security head of shift:

a) given instructions about behavior on board after signing in special document; first copy of signed document is given to pilot-in-command, second – remains in aviation security unit;

b) escort passenger from aviation security check to aircraft and oversee correctness of all procedures;

c) informs flight attendant about amount of armed passengers, their seat on board and gives signed documents.

Crew of carrier:

a) flight attendant informs other crew members and pilot-in-command;

b) do not sell alcohol to the passenger.

Boarding of the passenger can be only before general boarding and unloading – after all other passengers. [6]

2.2. Instructions created by administration of airport and security department particularly

Personnel who have access to restricted areas should have permit with defined zones of access and carry it in the visible place, for example, attach it to jacket. If we speak about Kiev International Airport, according to area access there are five types of permit: red – restricted access (for example, for territory cleaners, sellers in duty-free shop), blue – access to apron, green – apron, parking area of aircraft, yellow – apron, parking area of aircraft, aircraft, white – access to all areas. Before obtaining

permit, a person should pass special inspection, including law enforcement bodies, with the aim to avoid employment of people who can do possible acts of unlawful interference, or any damage to airport, passengers or airport equipment. A person who penetrated or attempted to penetrate to controlled area or area of restricted access which is protected must be punished in accordance with law.

Security in uncontrolled area is achieved by:

a) on the stage of designing and building;

b) avoidance of installation of direct access roads to airport;

c) installation of artificial obstacles and curbs of increased height on such roads;

d) the location of parking spaces and parking spaces of vehicles at least 50 meters from the airport terminal;

e) installation of shock-proof windows in airports;

f) use of garbage cans that in the event of an explosion reduce its power;

g) installing enough surveillance cameras;

h) the constant presence of police patrols;

i) control of car parks located in the vicinity of airports;

j) use of service dogs (according to threat level).

Crew members who have not permanent pass to airport, in which their aircraft is located, must give to aviation security officer general declaration, flight assignment, identification documents, certificates of aviation personnel and pass to aircraft accompanied by ground handlers or representative of airline. If the aircraft is not used, all doors and hatches must be closed and aircraft should be sealed. In order to detect explosives and damage items crew members should do preflight check and issue it in special document, signing it. Secure zone and critical parts of protected areas of restricted access, to which passengers go after security check, are provided with reliable locks and controls. Such zones and critical areas are required before passengers are allowed to pass should be regularly monitored and carefully inspected by aviation security personnel who will perform security controls for the purpose of detection of foreign objects.

Check is provided by authorized personnel of security control units for passengers, crew, their carry-on luggage and luggage, personal belongings with the use of special technical security controls. Manual check control is applied in case of detection by special technical means suspicious items in carry-on luggage, luggage, and personal effects or on the body of persons. Selective manual control is used as an additional security measure to the safety. That procedure must cover at least 10 percent of all passengers and more than 10 percent items of carry-on luggage and luggage. At each airport to inform passengers about prohibited things and substances information boards are installed in the registration areas and in front of the security control zones. Items prohibited for carriage by air are removed by security control personnel, with filling of the relevant act. Such objects, unless they are a weapon, explosive device, or substance, other objects, that can be used to commit an act of unlawful interference are stored in airport no more than 15 days according to the paid storage agreement. A person who refuses to pass security control and give luggage for control is not allowed to board the plane. Aviation security measures should exclude contact between passengers who passed control and those who have not already passed, including non - scheduled flight staff and passengers who arrive from other airports. In the case of contact between passengers who have passed the security check and persons who are not have undergone such controls, such actions are required:

a) control zone and critical parts of areas of restricted access, which are protected, must be completely released and fully checked by aviation security officers with the help of special equipment;

b) passengers and their carry-on luggage must be re-examined;

c) if passengers who ready for departure came to aircraft after accidentally contact with people, who have not already passed it, additional security review of plane must be done.

Aviation personnel and other staff who are not passengers in case of need pass to control zone through control points with obvious security check procedure. Passengers who have diplomatic status pass control check on a common basis.

Control of the security of diplomatic mail and consular bags is carried out only using technical means or biosensors. Diplomatic mail and consular suitcases cannot be opened or delayed. Every diplomatic mail and consular bags should have visible external characteristics that determine their character and may only contain diplomatic documents, diplomatic correspondence or items intended for business use. If there appear substantial grounds to believe that the diplomatic mail does not contain the specified documents, correspondence or items, the authorized bodies may require that diplomatic mail or consular bags be opened out by an authorized foreign diplomatic representative in Ukraine. If such a representative refuses to comply with this requirement, diplomatic mail and consular suitcase are returned to the sender.

From passage of security control such categories are released:

a) persons who protected by the state in accordance with the Law of Ukraine «On State Protection of authorities of Ukraine and officials»;

b) officials of foreign countries who are in accordance with the protocol of stay in Ukraine are subject of state protection;

c) hand luggage, luggage belonging to these persons.

An operator has the right to refuse the carriage of persons belonging to potentially dangerous passengers, in the absence of the necessary documents for the carriage, or if there are reasonable grounds to believe that such persons may endanger the safety and health of other passengers or cause damage to the safety of civil aviation. Potentially dangerous passengers are subject to increased security controls. Convoys of potentially dangerous passengers pass control on a common basis before or after a security check on potentially dangerous passengers. Delivery of potentially dangerous passengers on board of an aircraft (from board of an aircraft) is carried out separately from other passengers. Seats for this category of passengers are provided in the tail section of the passenger cabin of the aircraft. Whenever possible, potentially dangerous passengers are separated from the other passengers by one / two rows of free seats.

Access to, sort, accumulate and overload security control areas (secure restricted areas and critical areas parts of such zones) are only allowed to persons who has

permission to stay in the area concerned. Checked luggage of a person who is not accepted for carriage for security reasons or due to a person's refusal to undergo security controls should be unloaded.

Cargo and mail intended for carriage by passenger are subject to mandatory control and, if necessary, manual security control prior to loading on board the aircraft. Cargo and mail intended for carriage by passenger flights to which security control was not applied, are not accepted for carriage and loading on board an aircraft. Controls are determined on the basis of the results of the threat and risk assessment carried out by the competent civil aviation authority. In any case, checks are done, in particular, for the presence of documents, the physical examination of the condition of packaging and the identification of registered agents and / or known shippers. If possible, cargo and mail are inspected with the help of special technical security controls. Biosensors can be used as needed.

Aviation operators use the following technical means of security:

a)equipment for protection against intrusion into controlled and restricted areas:

1) protective fences;

2) checkpoints;

3) automated access control systems;

4) coded locks and others.

b)equipment for detecting, preventing the preparation and recording of the commission of acts of unlawful interference:

1) alarms triggered in case of unauthorized penetration through protective fences;

2) closed-circuit television surveillance system;

3) access alarm in the room.

c)equipment for aviation security procedure:

1) radio-television introscopes;

2) stationary metal detectors;

3) portable (manual) metal detectors;

4) explosives detectors;

5) scanners to control individuals;

6) other technical controls for safety, including the new ones.

d)other equipment and devices, such as portable and stationary radioset, mobile communications.

In case when arm or other dangerous items are found in bag of passenger while scanning it with X-ray, aviation security office should:

a) stop X-ray line, leaving dangerous item inside of device, push special bottom to warn and inform police of airport, airport authority and head of current shift about nonstandard situation;

b) using coded word informs colleagues and senior officer;

c) senior officer stops given control point and coordinate further actions of other officers, but doing it in such manner to not to pay attention of passenger, like everything is going in routine way;

d) officers should do all for avoiding contact of passenger with prohibited item in his/her bag till the moment when police come to control point;

e) after police arriving, senior officer together with police make decision, whether passenger proceed to boarding, or exclude detected thing, or even seize given passenger for further clarification, not allowing him to board the aircraft.

The same key steps should be followed when prohibited item was found during checking bag manually (physical control). But it should be added that in such case officer have to restrict access of passenger to his/her bag, putting it down, or moving to another table, but doing without paying attention to passenger, as all is going in normal way, not to scare off and start panic. Scheme is the same: push bottom, say coded word, stop procedures at given control point, wait for police coming and further instructions of head of shift and police officer.

When danger item is found during personal (manual) control aviation security officer should stop procedure, distract passenger’s attention, stay calm and using coded word inform colleagues about appeared situation. Another officer, after hearing coded word, should push bottom as quickly as possible.

Coded word is a special phrase, simple word or combination of words that can be used in procedures of airport staff to inform each other and authority about nonstandard situation that should be regulated according to predefined algorithm. All personnel should know this word and be informed what to do, in what sequence act after hearing it. Coded word or phrase should be changed frequently to avoid using of it for unlawful acts. This word should be announced by head of each shift while briefing before shift and changed after using in defined situation.

If we regard situation, when explosives detector gives positive result and signal such key steps should be followed:

a) officer, who is performing control using explosive detector should inform senior officer or head of shift in order to obtain further actions coordination (but doing it in such way not to pay attention to passenger, not to scare him/her off);

b) such passenger should be separated from general flow of passengers to another control point and second test has to done;

c) in case when second test showed positive result – careful personal control and control of bag should be done in separate room for control procedures (but repeated control should be in the presence of another officer or head of current shift, with the help of different means of control);

d) during personal control if any object that can be unknown or suspicious should be checked again using X-ray, explosives detector and metal detectors;

e) control should be performed till the moment when possible danger will be refuted;

f) in case when possible danger is confirmed, verified further actions according to instructions should be started (as act of unlawful interference);

g) in case when danger is rejected control procedure should be considered as finished.

In the next paragraph we have to regard steps in case of detection of leftover, forgotten things in the area of free access, for example, parking areas or zones in front of terminal:

a) avoid intervention of people in such zone to found object, restrict access to it; inform aviation security officers about find and place it is;

b) it is forbidden to touch this thing, move it till the moment when officer affirm that it is safe;

c) together with police officer aviation security officer should check found object with the help of special technical devices:

1)using explosives detector check found bag/object; only after that, decision about further security procedure should be made;

2) if detector shows negative result officer can perform control on the nearest control point using X-ray, metal detectors and check manually all contents of bag;

3) if after all steps object is considered to be safe appropriate act should be filled in two copies, one for aviation security, another for police; found object should be given to police for storage (for one month);

4) if control affirmed that object is unsafe and dangerous, special actions for deactivation of it should be performed and further instruction in case of unlawful interference should be started;

d) when such object is found in control area, all previously mentioned actions have to be done, but in the presence of board and customs control representatives.

As we know, each position of work, each worker has prescribed order of duties and rights. Let's regard duties of aviation security officer, what he/she has to do during work shift:

a) during work, officer should be guided only by official documents in the sphere of civil aviation, labor legislation, government resolutions, standards and recommended practices of ICAO, instructions of occupational health, requirements of program of aviation security;

b) clearly, qualitatively, in time work according to defined instructions relative to passengers, crew, cargo, baggage, mail sending check; carry out orders of senior officer, head of shift, head of department, authority of airport in the sphere of civil aviation;

c) be on work shift on time (come on time to briefing before shift beginning);

d) before and after shift obviously pass medical check;

e) obtain from senior officer departure plan and be able to use it;

f) have neat look, be in uniform of defined template, have permit on visible place;

g) take on and hand over working place according to prescription, check technical state of it; report about check to senior officer and fill defined documents;

h) execute rules and requirements of safety, occupational health and maintain I appropriate sanitary level in control point;

i) save equipment in normal state;

j) do not leave work place without permission of senior officer or head of shift;

k) be attentive, polite relative to passengers, crew members, personnel of airport and airlines, and other people; do not allow violation of the law relative to them;

l) know types of permits, which give possibility to enter to controlled areas of airport;

m) be vigilant, strictly follow rules of entrance and internal regime, do not allow entrance of foreign persons to the territory of controlled zones; in case when there were detected such offenders immediately inform senior officer or head of shift;

n) do not allow entrance of passengers who rejected to pass security control procedure; in case, when there are such passengers do all possible to separate them from general flow of passengers, inform senior officer with the aim to clarify refuse;

o) do not allow unwarranted delays of passengers, crew members, personnel of airport, airline representatives and others;

p) in situation when leftover things (bags, clothes, substances etc) were found in controlled areas or zones of free access, officer should report to senior officer or head of shift; do not move or even touch such things; provide protection and surveillance of it till decision making and obtaining further instructions.

q) in case of emergency situation, possible threat for passengers, aircraft and receiving of information about possible acts of unlawful interference in civil aviation act according to instructions and urgently report to senior officer (head of shift);

r) carry out security control of transit (transfer) passengers, their hand luggage and checked baggage;

s) submit data about passengers control passing: how many people passed and how many their bags were checked;

t) in case when was obtained information about need to find passenger (for additional check of baggage) search him/her, checking boarding passes and baggage tags;

u) by order of senior officer (head of shift) perform check of critical areas of restricted zones, which are protected, controlled areas and zones of free access;

v) by order of senior officer (head of shift) perform check of sealed rooms;

w) by order of senior officer (head of shift) perform special supervision of aircraft (aviation objects);

x) by order of senior officer (head of shift) escort passengers or baggage (to or from aircraft);

y) by order of senior officer (head of shift) perform duties of senior officer in control point in full.

When officer uses airport vehicles he has to:

a) receive vehicle technically serviceable and with fuel;

b) check technical state of transport and all equipment in it (after and before work shift);

c) strictly follow operating rules, saving vehicle and equipment;

d) do not allow outsiders enter to transport; do not use it without special permission;

e) use service vehicle only for work, do not use it for personal reasons;

f) strictly follow rules of movement on airdrome territory;

g) in case when damages or malfunctions were detected immediately inform to head of shift and technical support.

CONCLUSION TO CHAPTER 2

In this chapter we considered second important point of diploma: national documents, which regulate security operations in Ukrainian airports. As Ukraine is a member of ICAO, all documents are created on the basis of international standards and recommendations and changed according to national, airport requirements.

We regarded access control system in terminals, access to restricted areas, how permit can be obtained, what types of permits are and how they differ from each other. Also there were considered kinds of territory defense and requirements which should be done.

Ukrainian documents specify such internal procedures as control of deported passengers, passengers with diplomatic status, persons, who are protected by the state, potentially dangerous passengers.

Also we considered duties of each security officer and their actions in case of prohibited items detection (during control procedures), obtaining of information about act of unlawful interference by phone, personally or by mail. Important parts of this chapter are: carriage of weapon on board/in baggage hold, special supervision of aircraft before/after/in flight.

CHAPTER 3

NEEDED NUMBER OF PERSONNEL AND EQUIPMENT FOR NORMAL FUNCTIONING OF CONTROL POINT

3.1. Needed number of equipment

In control point such technical equipment should be used:

a) Stationary metal detectors are devices, that using electromagnetic field which passes through metal objects, signalize about detection of them.

b) Portable metal detectors are similar detectors as stationary ones, but are used for hand control, have smaller size and can be used in any place.

c) Explosives detectors are detector of possibly dangerous items, which can be exploded. They also can be stationary or portable

d) X-ray introscope is a special device, which scans things in bag and defines them depending on size and material.

If we regard Kyiv International airport, for operational usage Rapiscan systems equipment is used. X-ray introscope Rapiscan 620/622 XR are used for passenger control check. In table 3.1, figures 3.1- 3.4 characteristics and depiction of them are represented.

Table 3.1 - Comparison of Rapiscan 620 XR and 622 XR [7]

Characteristics	Rapiscan 620 XR	Rapiscan 622 XR
Main purpose for usage	For passenger baggage check	For check of cargo, baggage of big size
Physical dimensions	Length 2570 mm Height 1381 mm Width 640 mm Tunnel size 620mm(W) x 450 mm(H) Speed of line 0.22 m/s Maximum weight 165 kg	Length 2282 mm Height 1467 mm Width 1030 mm Tunnel size 750mm(W) x 550 mm(H) Speed of line 0.20 m/s Maximum weight 165 kg

Table 3.1 - Comparison of Rapiscan 620 XR and 622 XR (cont.) [7]

1	2	3
Image quality	Expansion 38 AWG guaranteed	
Penetration in metal	27 mm guaranteed	28 mm guaranteed, 30 mm (standard)
Operational conditions	Storage temperature 20 – 50^0 C Working temperature 0 – 40^0 C Relative humidity 5 – 95 %	
Standard possibilities	Function “Crystal clear”(CC) ,“High penetration”(HP), “Black and white”, organic and non-organic material, contour function, possibility to zoom in 2/4/6/8 times, counter of checked bags, archive of checked bags	

Figure 3.1- Image of Rapiscan 620 XR [7]

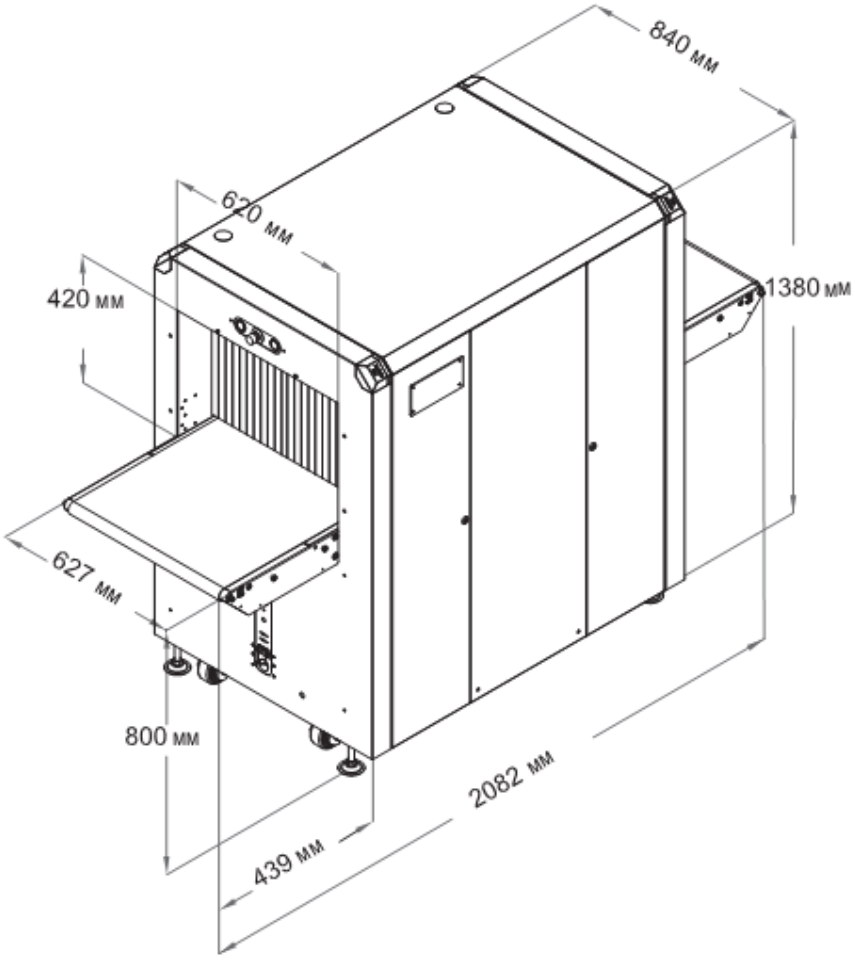

Figure 3.2 - Dimensions of Rapiscan 620 XR [7]

Figure 3.3 - Image of Rapiscan 622 XR [7]

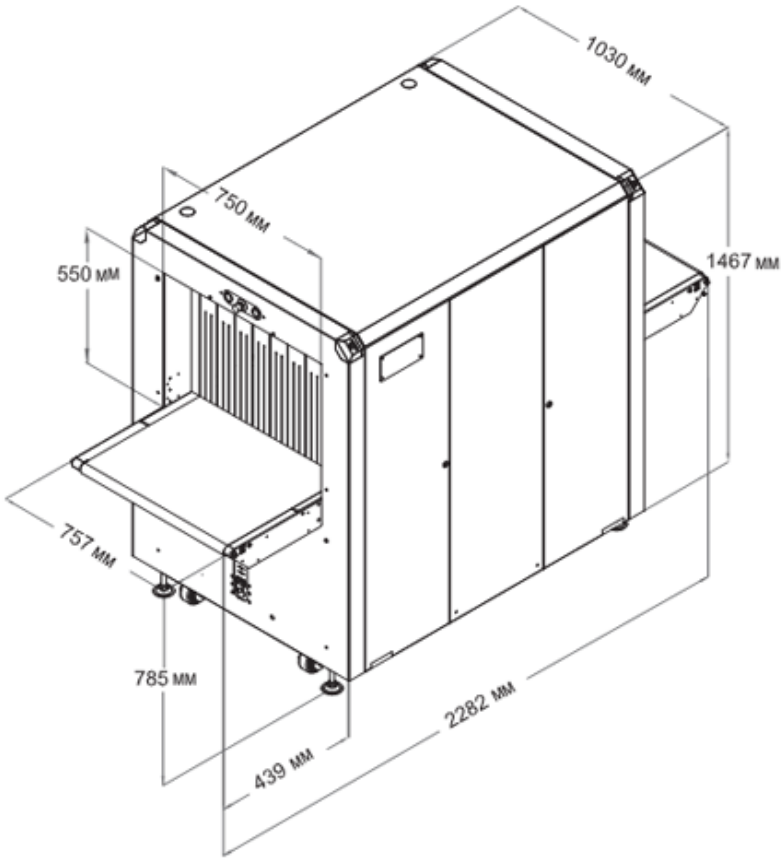

Figure 3.4 - Dimensions of Rapiscan 622 XR [7]

Another important equipment is stationary metal detector. This technical mean for control is used for weapon/knives/metal items detection. It allows visualization of zone, where prohibited item is located on the body of passenger. As a technical possibility of Metor 6M is random warning about damage, which allows to aviation security officers conduct additional control check, chosen accidentally.

Due to electromagnetic stability, detectors can be located near other equipment, so it gives possibility to plan equipment arrangement in airport in flexible way. In Kyiv airport Rapiscan Metor 6M is used. Characteristics of it are represented below in table 3.2 and figures 3.5-3.6.

Table 3.2 - Characteristics of Rapiscan Metor 6M [7]

Characteristics	Rapiscan Metor 6M
Physical dimensions	Internal dimensions: width – 760 mm, height – 2050 mm External dimensions: width – 900 mm, height – 2240 mm, depth – 700 mm

Table 3.2 - Characteristics of Rapiscan Metor 6M (cont.) [7]

Operational temperature	-20^0C - $+60^0$C
Indication of damage	Audio and light indication Detection of zone of possible damage
Calibration	Automatic or manual installation
Safety standards	Corresponds to international requirements relative to people safety. Safe for pregnant woman, cardio stimulators

Figure 3.5 - Image of typical metal detector Rapiscan Metor 6M [7]

Figure 3.6 - Image of physical dimensions of Rapiscan Metor 6 M [7]

3.2. Needed personnel for normal operation of control points

To calculate needed number of officer we should regard statistics of passenger flow in airport. The object of investigation is Kyiv International airport. According to official data reports (if we analyze month with the greatest amount of passengers, August) 265700 passengers had passed through airport in August. Approximately, if we divide this number by 30 days of month, and suppose that workload is distributed evenly, we will obtain

a) 8857 passengers per one working shift
b) 369 passengers per one hour
c) 6 passengers per one minute.

According to instructions 4 security officers should be in control point for its normal functioning (figures 3.7- 3.8):

a) number 1 – checks passengers documents, compares boarding passes with identity cards, directs passengers to control point, informs about procedure and order of security check;

b) number 2 – controls content of baggage with the help of X-ray introscope and decide further action: additional hand check or approve control;

c) number 3 – conducts hand check of luggage (after decision of operator 2), conducts personal control, works with manual metal detector and explosives detector;

d) number 4 – works with stationary metal detectors, if necessary, conducts personal control of passengers;

Figure 3.7 - Security control points in Kyiv International Airport [8]

Approximately one working shift of aviation security service in Kyiv International Airport consists of 45 officers, but not all of them are involved in passengers control check. There are such control points in Zhuliany airport:

a)control point 1 – at the entrance of airport – one officer works there at regular base, other ones on request – for check of board food, which is delivered before flight; check of duty free goods, which are sold in the terminal; check of "special"

category of passengers (for example, such who will be transported by medical board) and equipment that is imported with him/her;

Figure 3.8 - Security control points in Kyiv International Airport [8]

b) control point 2 – at special cargo terminal – four officers – if there is cargo that should be checked and delivered to aircraft for its further transportation;

c)control point 3 – two officers work at regular base - security control of administrative personnel, authority of airport;

d)control point 4 – in the baggage area – one operator - with the help of Rapiscan 5000 on the screen of operator there appear image of bags, that can be as a possible threat; one officer makes decision whether his bag should be checked additionally or it can be approved as safe one – for such decision making officer has not more than 20 seconds; if operator has not approved bag as safe, it automatically will be rejected by system and dropped from general line to additional control to next officer;

e) control point 5 – in the baggage area – one operator – after decision of operator number 4, provides repeated control of dropped bag and if there is prohibited item in it, operator should call to dispatchers in order to announce surname, name of

passenger, his destination to call him to baggage area and make control, confiscate what it is not allowed and fill approved act;

f) control point 6 – on the first floor of the terminal, exit to apron– two officers – for security control of personnel who is directly involved in pre-flight procedure, baggage delivering, for customs, boarding control personnel, loaders, check of crew for domestic flight;

g) control point 7 – for security control of passenger and their hand luggage;

h) control point 8 – two operators – for security check of boarding, customs control personnel, duty free sellers;

i) control point 9 – two operators – this point works on request – for security control of passengers, who have not passed boarding control for arrival to Ukraine and will be deported to country of departure; also this control point works for transfer passengers, who arrived in Ukraine and will proceed their flight to the point of destination;

j) control point 10 – terminal for domestic flight - four officers – security control of passengers and their hand luggage of domestic flights;

k) control point 11 – baggage area in domestic terminal – one operator – control check of passenger's baggage;

l) control point 12 – two officers – business terminal of airport – security control of VIP passengers.

Not all control points work on regular base, several of them work "on request", but if we regard situation, when all mentioned above points work together, we can calculate, that 22 aviation security officers are involved in previously defined procedures. As it was noted above, that one working shift consists of approximately 45 operators, it is clear that for security control of passengers of regular flight remains 23 officers. But from general number we should separate head of shift, who coordinates all actions in case of nonstandard situation, keeps contact with authority of airport, adjacent units and dispatcher, who keeps contact directly with shift members, makes statistics, informs officers about corrections and amendments to current flight plan.

As for normal operation of one control point 4 officers are needed, we can obtain number of points – 5 appropriately. So, approximately 73 passengers will pass through one control point per one hour. As operator number 1 is responsible for document check, operator number 2 works with X-ray check, operator 3 and 4 are chargeable for personal check of passengers and check of hand luggage (due to decision of operator №2). If we divide workload of 73 passengers per hour by 2 officers, we will obtain workload for 1 operator – approximately 36 passengers per hour. But we should note that load can be disproportional, when number of women is not equal to number of men and one operator can do only personal control of passengers and another one will be responsible for hand luggage check. In the figure 14 there will be represented passenger flow per months.

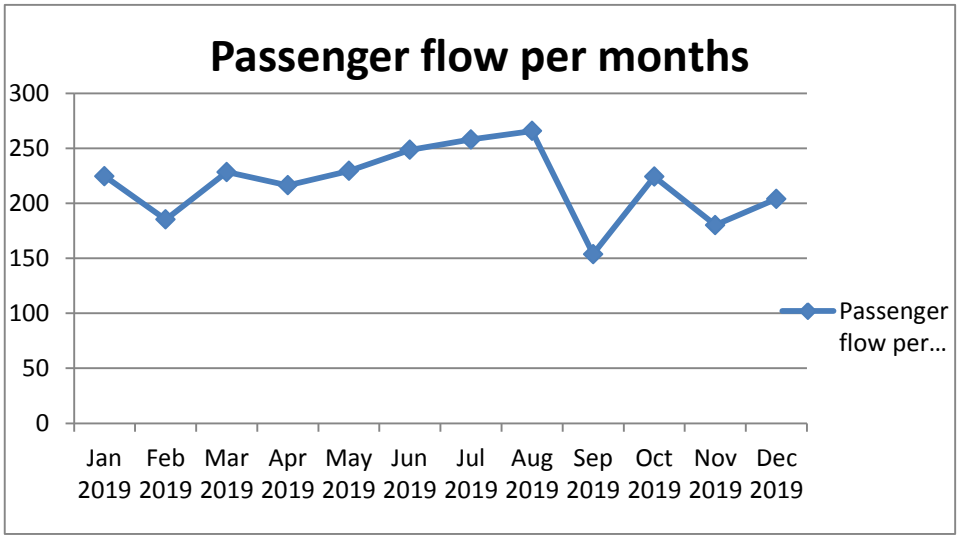

Figure 3.9 - Passenger flow per months (in thousands) [9]

CONCLUSION TO CHAPTER 3

In this section there are considered required number of personnel and installed equipment needed for normal operational procedures. Stationary and portable metal detectors, X-ray scanners, explosives detectors are obligatory for security procedures in all control points. Different scanners modes and types are used for different aims. For example, Rapiscan system's company has Rapiscan 620 XR and 622 XR, one is mostly used for passengers and bags check, another, with respect to its characteristics, is preferably used for cargo, mail check and control of big-size, non-regular sendings.

According to requirements, four aviation operators should be on working security point, and be responsible for control of passengers. As there are twelve control points (in Kyiv International Airport) and in general 45 operators are on work shift, correspondingly, in can be calculated that in case when all points work and it is time of complete workload (special supervision of aircraft, control of domestic flights, cargo check in cargo terminal) it can be calculated that there are 36 passengers per one operator (per one hour), who provides personal control and hand luggage control. Appropriately, such workload, reduced and accelerated security control procedure can lead to appearance of professional errors, especially human factor can have great effect.

CHAPTER 4

IMPROVEMENTS IN THE SPHERE OF AVIATION SECURITY (FOR KYIV INTERNATIONAL AIRPORT)

4.1. Installation of new X-ray and body scanners

Considering aviation security on national or regional level, we can analyze, that currently used methods of control correspond to minimum requirements and ensure minimum demanded check: detection of metal hidden objects, explosives or other prohibited items. But technologies and especially passenger flow (as it is illustrated in the figure 4.1) are increasing so it was decided that instead of conventional equipment should be used new ones, improved, which have the same function of work, but can detect items, possible danger during shorter period of time, with less number of errors and system delays.

According to ICAO Global Aviation Security Plan Contributing states and stakeholders can enhance the effectiveness, level of safety and security operations in countries by focusing on several main points, illustrated below in figure 4.2.

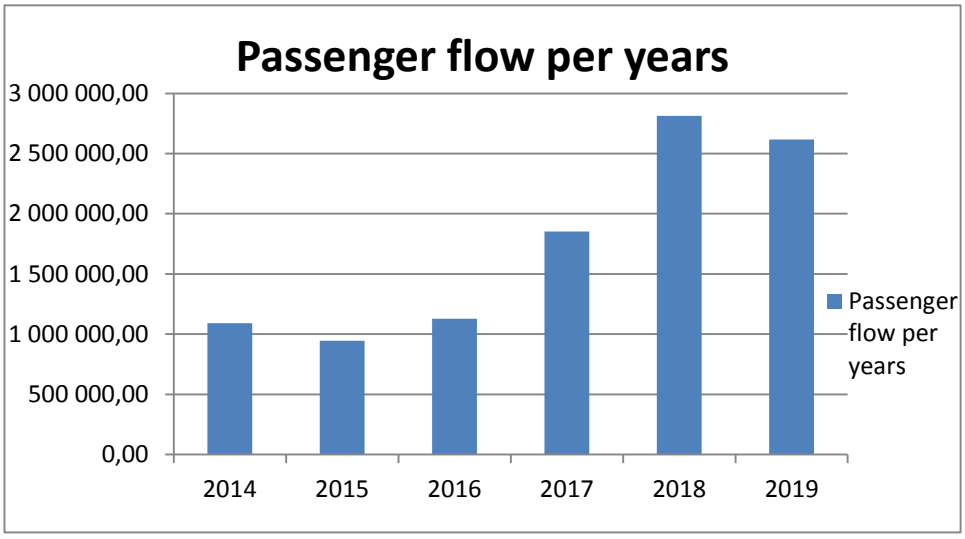

Figure 4.1 – Passenger flow per years in Kyiv International Airport [9]

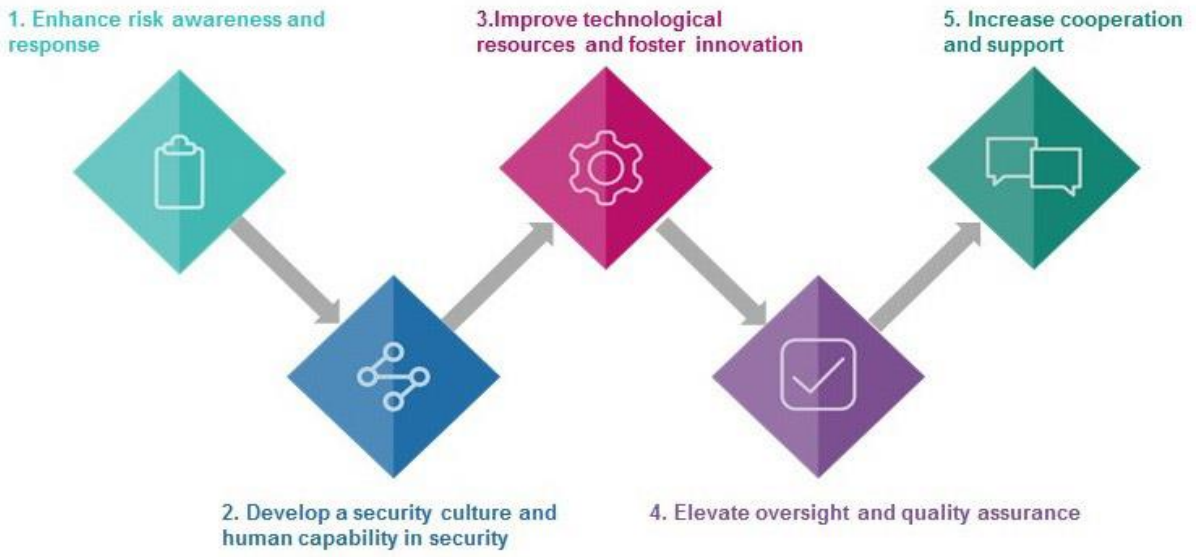

Figure 4.2 - ICAO Global Aviation Security Plan priorities [10]

So, we decided to highlight such propositions.

New X-ray scanners for baggage and hand luggage screening, which can reduce possible risks of interference.

CT (computer tomography) technology can significantly improve also queuing time at airports as it will speed up security screening at checkpoints. This equipment can allow passengers to leave their liquids and electronic items in their bags while passing security control.

Innovative X-ray scanners can produce clearer image of baggage and items in it, which will reduce number of errors by operators. There were cases, in my practice, when due to indistinct, blurred picture we had to perform additional manual check procedure, herewith delaying other passengers and creating queue.

Installation of new body scanners instead of conventional stationary metal detectors. Powerful body scanners are able to recognize potential hidden threats on the human body. The scanner produces images of body heat and utilized computer database in order to define what can be threat and what is not. The machine processes an image using yellow boxes to point out any areas that may need additional screening, as it is presented in the figure 4.2. If there’s no issue, a green “OK” appears on the screen without an outline or box.

As an example of such new equipment can be Advanced Imaging Technology (AIT) machine, presented in the figure 4.3 below. The AIT systems are considered to be “Active” millimeter wave and operate within the frequency range of 24 – 30 gigahertz.

As the passenger steps into the AIT machine, transmitters produce millimeter waves that are either absorbed, scattered, or reflected as they pass through clothing, bounce off the person’s skin and any potential threats—then return to the receivers.

The AIT applies the necessary algorithms to the reflected signals to determine the location of possible anomalies on the body. If it detects an anomaly, a bounding box indicates its location on a generic human image. When the system identifies an anomaly, an operator is required to step in and resolve the alarm with a pat-down. The total processing time for this system, from the start of the scan to the automatic decision, is less than six seconds.

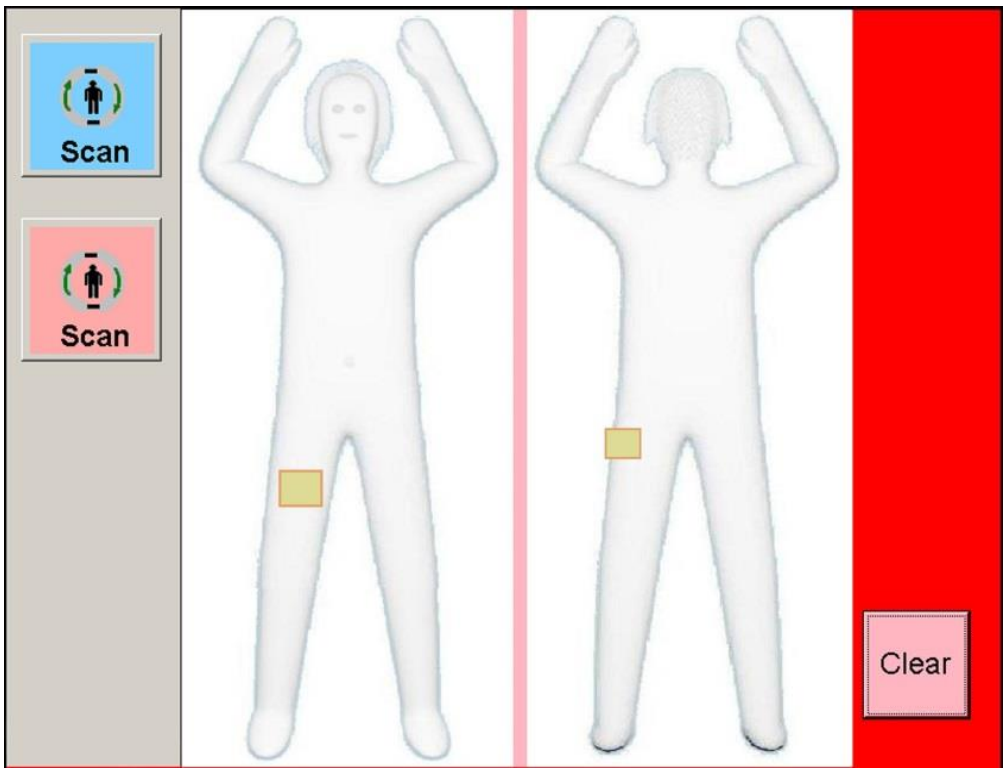

Figure 4.3 - Image of threat detection, obtained by body scanners

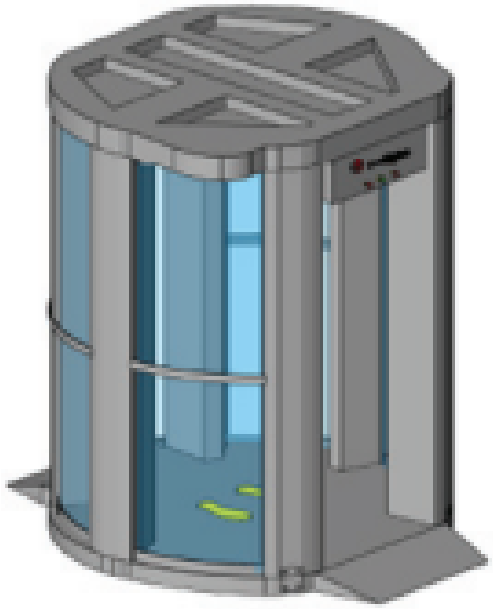

Figure 4.4 - Illustration of an AIT machine

4.2. Extension of number of operators and installation of facial recognition system as additional measure to do check faster

Another point, to my mind, as an improvement of current security system in defined airport should be reapproving of operators rights and duties, especially increasing of operator's power. As for me, in the list of rights there should be added point, that in case of inadequate behavior and demonstrating of aggression (in exclusive situations) officer can exert force to passenger for further clarification of circumstances (if there is need for self-defense and defense of colleagues).

While working as aviation security operator I was a witness of such aggression from passengers, who were in a state of drag or alcohol intoxication. Such people cannot control themselves and can injure others, so I propose expansion of operators' power.

Next my suggestion is increasing number of personnel for each shift. Due to lack of personnel we obtain less working control points and appropriately more time for security check needed. In my practice, there were a lot of situations, when in one time there were need to do special supervision of aircraft, check of cargo, mail in another cargo terminal, regular domestic flights, and security control of transfer passengers.

One more proposition is related to facial recognition software (figure 4.4).

Figure 4.5 - Facial control check [16]

Such option will allow doing security check more fast, reducing staying in queue. When you use e-passport machines they will scan your face to establish whether it matches with one in the passport that you have presented.

Special software contains achieve of all previous flights of given passenger, information about them and nonstandard, curious situations, which are also fixed. If person, for example, frequent flier, who travels a lot for business or vacation, and does not have any evil-minded intentions he or she can pass security check in accelerated manner.

For example, if we speak about control in United States, practice of facial recognition is currently in use. Photographs taken of US citizens are deleted in 12 hours, of non-US citizens within 14 days. Raoul Cooper, British Airways' representative noted «One of our best times was boarding 240 customers in about 10 minutes, without causing massive queues on the aircraft».

So, as we can see from practice of our colleagues, check using biometric data is future of security control. But there is also exception from general rule: for those who had problems with passport, security, customs control or had any problems with law,

aviation security procedure should be extended, with additional personal, baggage and hand luggage check.

4.3 Metal detectors and X-ray scanners prior to entrance in airport as an additional security measure

If we consider Kyiv International Airport, in my opinion, there should be installed metal detectors previously to entrance to terminal. In my practice there were cases, which happened several days in raw (in May 2019), when there were obtained information about possible terroristic act, hidden explosive materials inside of terminal, where passengers are waiting for their flights.

According to instructions, all passengers and personnel, except to aviation security officers should be evacuated from building and special service should check all buildings in the territory of airport, where passengers can have access. Correspondingly, as a result of evacuation, taken time for inspection, explosives finding and deactivation, we obtain delays of flights, massive queue of passengers, who are late for departure.

Additional control point will require more personnel for working shift to ensure normal operation of it, more financial investments to buy needed number of equipment. But if we analyze all advantages and disadvantages of such proposition, it will be clear that level of safety and security prevail over money.

The installation of metal detectors, X-ray scanners and check of all people who can pass into the terminal will allow reducing risk of explosives, weapon and other prohibited items bringing into terminal area and it will be safe for all people who are in it.

CONCLUSION TO CHAPTER 4

This chapter refers to improvements in the sphere of aviation security. Conventional equipment, which is used in Kyiv airport, corresponds to all international requirements, it is certified and constantly checked. But, as we know, with increasing of amount of passengers, technology progress, terrorists try to overcome all programs of defense and plan their acts of unlawful interference. To protect civil aviation and provide safety of all passengers and personnel, international organizations and companies always should be one step ahead, to avoid possible dangerous situations. As science is developing very fast there are a lot of modern equipment that can be changed instead of conventional one and provide safety and control procedure on better level, that current one. Especially, new metal detectors, X-ray scanners, explosives detectors can be installed.

Modern equipment, as a result of computed analyzing, can define whether bag content is safe or not, without decision of security operator, metal detectors can analyze whether passenger has prohibited items on his/her clothes, body (for example, fixed knife or weapon) or not and even detect where are these items located.

As additional measures facial recognition and archived data about history of passengers' flights, data about customs, boarding control and other important documents can be used. Such improvements can assure that security procedure can be faster, without staying in long queue waiting for additional hand luggage check by operator.

GENERAL CONCLUSION

As we know, airport is one of the main points in the network of aviation transportations. Especially such unit as security plays important role in this system and procedures in this sphere should be constantly monitored and improved according to innovations. That is why we decided to choose this theme for investigation.

First chapter is related to international legal base of aviation security and incidents that happened in history. Main documents, which regulate operations, are Annex 17 to ICAO Convention «Safety» and document ICAO 8973 «Aviation Security Manual».Annex 17 defines general principles of aviation security, how Contracting States should be prepared in case of unlawful interference; how safety can be provided in normal operations; control of access to restricted areas; peculiarities of cargo transportation. At the same time, document 8973 «Aviation Security Manual» describes security procedures in details: organization of rescue operation, collection of information and correct transmission of it; what factors should be taken into account in case of unlawful interference and what principles must be followed. Also in this chapter we regarded several incidents, which happened before in order to analyze, what operations have vulnerable sides and how they were changed or should be changed to avoid similar dangerous situations.

Second chapter is dedicated to national regulations, approved internal orders and instructions. Ukraine is a participant of ICAO and all regional documents are created only on the basis of international standards, but reapproved according to national requirements. We regarded duties of every security operator and their actions according to defined situations: detection of unaccompanied baggage, detection of hazard and prohibited items in baggage, on the body of passenger, in the X-ray scanner and what steps must be followed; control of special categories of passengers (with diplomatic status, with arm, potentially dangerous passengers). Another important procedure, which is investigated, is special supervision of aircraft: in what cases it can be completed, who can do it and what key points should be done. Also

we regarded access control requirements, especially how permits can differ one from another (types according to period of validity, territory of access), who can obtain them and how, features of each type of permit. This chapter describes such operational procedure as arm carrying and steps, which should be done.

Next part of our diploma work is consideration of needed number of equipment and personnel on the control point and work shift in general. We found out what equipment is currently used in Kyiv International Airport: stationary metal detectors Metor 6 M; X-ray scanners Rapiscan 620 XR for check of passengers' baggage and Rapiscan 622 XR for check of mail, cargo, non-regular sendings; explosive detectors; portable metal detectors. This equipment should always be on the control point for its normal and efficient operation. Also we investigated that in general 45 security operators are on shift and if we have complete workload, when all control points are working, in accordance with airport statistics, there are 36 passengers per one officer/per one hour. In such case, to reduce possible risks of flight delay, security procedures are performed in accelerated manner and it can lead to professional errors and dangerous, prohibited items can be unnoted and carried through control point to the board of aircraft.

Last chapter we decided to dedicate to improvement in the sphere of security, for our object of investigation – Kyiv International Airport. Equipment, that is used now, corresponds to all defined requirements, but as we know, technologies are not staying without changes and there are new devices, which can provide better safety level, reduce time for control procedure, without reducing its efficiency. To reduce risk of danger and protect all participants of aviation, international organizations have already prepared new metal detector, X-ray scanners, new systems with artificial intelligence, which use computer analysis, stored, achieved data to check whether bag safe or not, should passenger pass additional security check procedure or not. As additional measure of security, we proposed installation of stationary metal detectors at the entrance of airport, it can allow reducing of carriage of prohibited items into the terminal and their further carriage on the board of aircraft; increasing of number of personnel in order to decrease workload of operator and number of human errors.

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