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AVIATION ENGLISH
self-study materials

MUST HAVE

updated

Training Center
South Air Navigation
Rostov-on-Don
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Contents

ATC Service

How does ATC service operate?
What units does ATC service usually include?
How do job functions of Area and Approach Controllers differ?

The key role of ATC worldwide is to keep planes safely separated according to the flight rules, to update pilots on changing weather conditions and to arrange for pilots whatever is necessary.

ATC Service in Russia is responsible for the airspace **stretching over** 26 million sq. km. About a million **flights are handled** by the Russian ATC service per year. This **involves cooperation with many related services** such as navigators, meteorologists, military units, engineers, emergency services, airport services, and adjacent ATC units. Air traffic control is **a 24-hour service** as flights operate non-stop. The controlled airspace is **divided into sector groups**, and these sector groups are then **split into sectors**. Each sector is responsible for **a certain block of airspace**. Actually, there are 3 main ATC units: En-route, Approach and Tower.

- **Tower control** is in charge of aircraft and vehicles operating on the airport maneuvering area.
- **Approach control** handles departing and approaching aircraft within a 50-km-radius from the airport.
- **En-route control** manages higher-level traffic transiting between airports or overflying the country.

Key Vocabulary

ATC service	*служба УВД*
stretching over	*протяженностью свыше*
flights are handled	*полеты обслуживаются*
cooperation with related services	*сотрудничество со связанными службами*
a 24-hour service	*круглосуточная работа*
divided / split into sectors	*делится на секторы*
a certain block of airspace	*определенный участок воздушного пространства*
manage traffic	*управлять движением*

ATC Unit

What ATC unit do you work in?
How large is your area of responsibility?
What is special about the ATC unit you work in?

Rostov ACC (Area Control Centre) **provides a 24-hour air traffic service** in the South region of Russia. It covers an area of about 750 thousand sq. km. including civil, military aerodromes and **airfields with joint operations.**

Our airspace is quite complex. It is split into several sector groups. Traffic flows have changed a lot. The volume of domestic flights has increased in our FIR, so our control area is constantly congested. There is a **steady flow** of traffic heading to **major southern airports** as the Black Sea resorts are a **popular tourist destination** and attract a lot of holidaymakers.

Rostov Area Control Center has borders with several foreign States, so we are in constant contact with other control centers.

The most common problems within our operational area are related to restrictions. There are a lot of danger and restricted areas. A lot of the operational airspace is **reserved for the military**. Closure of large parts of airspace creates **bottlenecks** and, as a result, **limits the operational effectiveness**. We constantly handle military aircraft of all sorts. Besides, our area is **prone to severe thunderstorms** and in summer there is a lot of hail shooting activity.

Key Vocabulary

provides a 24-hour service	*обеспечивает круглосуточное УВД*
airfields with joint operations	*аэродромы совместного базирования*
steady flow	*постоянный поток ВС*
major airports	*крупные аэропорты*
popular tourist destination	*популярное туристическое направление*
reserved for the military	*отведено для военных*
limits the operational effectiveness	*уменьшает производственную эффективность*
prone to thunderstorms	*подвержен грозам*

ATC Sector

What are the dimensions of your sector?
What is every sector responsible for?
Which sector do you prefer to work?

There are 17 sectors within our control area. The number of sectors differs depending on the traffic intensity and staffing. As we have **peaks and drops of traffic**, the intensity changes from shift to shift. During rush hours, the airspace gets congested. The best solution is to split sectors when the **traffic builds up**. At less busy times, we combine the sectors. Each sector is responsible for a certain block of airspace. I would say the airspace within the sectors is pretty complex, as there are a lot of **busy crossroads** and **hotspots**, **climb and descend profiles.**

As for me, I have several **sector endorsements** in our sector group. Typically, I work on sector… It is one of the most extended sectors within our FIR. There are **regular traffic flows** inbound Moscow. The airways are **constantly congested,** especially during peak hours.

The **main challenge** is NOTAM restricting FL320 and below. Besides, there are a lot of military restrictions and hail-shooting areas in the sector. This is a **daily headache** for ATC and it obviously **disrupts the traffic flows** and increases the workload.

Key Vocabulary

split /combine	*разъединить/объединить*
busy crossroads	*загруженные трассы*
hotspots	*проблемные участки*
climb and descend profile	*переменный профиль*
traffic flow / stream	*воздушный поток*
disrupt traffic flows	*нарушать потоки движения*
peak / rush hours	*часы пик*
peaks and drops	*рост и спад движения*
constantly congested	*постоянно загруженный*
main challenge	*основная проблема*
daily headache	*ежедневная ‘головная боль’*

Operational Problems

What kind of difficulties may you face in your operating area?
What difficulties may you face when controlling traffic?

Every day **brings different challenges** in ATC job. Speaking about my area of responsibility, **the biggest issues are related to** marginal weather, military restrictions and high traffic density.

Weather
Due to specific terrain with seas and mountains, our area is prone to thunderstorms. In summer, this is the biggest challenge, as aircraft can't fly their usual routes. Every deviation requires special attention and coordination. The new traffic flow is **not easy to anticipate** because of changing intensity of cells, both vertically and horizontally. New crossings may develop due to the disrupted traffic flows.

Military training
Military drills **create operational constraints** in our area. Military aircraft can operate at any altitudes and levels blocking the busiest part of the airspace. The main challenge is unscheduled airborne military aircraft and their unscheduled return to the military base (there are a few joint operations aerodromes in our area). This can unexpectedly **disrupt regular traffic flows** in the sector.

Traffic Congestion
Our area of responsibility is quite busy. During morning and day shift traffic is peaky. We can handle about 20 aircraft at a time. It can be really challenging, but we apply all sorts of procedures to safely manage large volume of traffic.

Key Vocabulary

bring different challenges	*привносить разные сложности*
the biggest issues are related to	*основные проблемы связаны с*
not easy to anticipate	*трудно спрогнозировать*
create operational constraints	*создают ограничения в работе*
disrupt regular traffic flows	*нарушать регулярные потоки*
large volume of traffic	*большой объём движения*

Daily duties

How do you control the traffic / provide safety?
What are your main duties (responsibilities) at work?
What is the role of good teamwork in air traffic control?

As en-route air traffic controller, I manage traffic in the upper airspace. Basically, my duties **depend on my working position** – I can work as **a radar controller or as a planner**. Anyway, my top priority is to keep planes safely separated. I have to **scan and analyze** traffic situation to **prevent conflicts** before they happen. I **update** pilots on weather, restrictions and traffic information. As a planner, I am in constant contact with neighboring units. I analyze traffic entering and leaving the sector; check if the flight plan is valid; coordinate with adjacent sectors and neighboring units, verify the information in the **entry list** for any planned conflicts to **solve problems** before they happen. Teamwork is critical in ATC job to prevent overload and to manage air traffic safely. ATC job is rather complex and responsible. However, due to an extensive training **we are comfortable at dealing with a lot of traffic.** It just **becomes my second nature.**

Key Vocabulary

a radar controller / a planner	*ДРУ /ДПК*
duties depend on…	*обязанности зависят от…*
scan and analyze traffic situation	*отслеживать и анализировать воздушную обстановку*
neighboring / adjacent	*соседние /смежные*
entry list	*список входа*
solve problems	*решать проблемы*
we are comfortable at dealing with a lot of traffic	*мы легко справляемся с сильным движением*
becomes second nature	*входит в привычку*

ATC skills

What skills does a controller need?

Professional air traffic controllers have specific skills which help them to maintain safety and to do their job well:

Spatial awareness – the ability to build a 3-D picture of air traffic situation and to predict potential conflicts in advance.

Multitasking – performing several tasks simultaneously is just a part of routine work for a controller: issuing instructions to pilots, receiving information, coordinating traffic data with the adjacent units, etc.

Excellent memory – the task of controlling aircraft requires air traffic controllers to remember a lot of information.

Decisiveness – air traffic controllers must think faster than an aircraft can fly and make quick decisions. Every wasted minute brings conflicting aircraft.

Paying attention to details – controllers never assume, but determine. Every little detail is important.

Teamwork skills – air traffic controllers must work together to ensure the safe and orderly flow of traffic, so the ability to operate as a team member is absolutely crucial.

Emotional stability – air traffic controllers must keep perfectly calm in any situation.

Key Vocabulary

specific skills	*особые навыки*
spatial awareness	*пространственное мышление*
multitasking	*многозадачность*
excellent memory	*отличная память*
decisiveness	*решительность*
ensure the safe and orderly flow of traffic	*обеспечить безопасный и упорядоченный поток ВС*

ATC job: best and worst sides

Each job has **ups and downs**. If you are really **into aviation** - this job is right for you. It is absolutely cool and amazing. I have been in this profession for all my life and I have **never looked back**. However, managing air traffic can be very challenging and we often work under pressure, especially, when dealing with high traffic intensity combined with marginal weather. It can be tough as **there is no room for error.**

What are the best sides about the work you do?

My job is absolutely **rewarding** every single day. It's well-paid and we have good social benefits. One of the best things about my job is a **convenient shift pattern**: we have a good work-life balance. Besides, there is no routine, every day is fresh. **I never get bored** at work. ATC job involves teamwork, so there is a **friendly team environment**.

What are the downsides of your job?

Night shift is definitely the worst side of ATC job. **It's pretty tough** to stay awake and deal with high traffic intensity. There is a high level of responsibility. Besides, there are a lot of stress-factors such as strict medical checks, professional exams and tests. Managing air traffic can be very challenging if there is an emergency, for example, or equipment failures, bad weather or restrictions in the sector.

Key Vocabulary

ups and downs	*плюсы и минусы*
into aviation	*увлекаться авиацией*
never looked back	*ни разу не пожалел*
there is no room for error	*нет права на ошибку*
convenient shift pattern	*удобный график сменности*
rewarding	*приносящий отдачу*
I never get bored	*никогда не бывает скучно*
friendly team environment	*дружный коллектив*
It's pretty tough	*довольно сложно*

Stress factors

Do you find your work stressful?
What makes your job challenging?
How do you manage stress?

Some factors can cause stress in ATC job. It could be high loads of traffic, very bad weather, or an aircraft in distress that **create pressure points** and add to our stress. There are times when it's really stressful and you have to think very hard about what you are doing. Established procedures keep most operations routine. Sometimes traffic is so slow that the job is actually boring. Other times, our airspace is incredibly busy. However, we are trained to cope with stress.

In a **nap room (break room**), we can **decompress after a busy radar session**. Besides, our authorities provide us with facilities for sport activities. I mean a football **playground** and a swimming pool which help us to **keep fit /be in a good shape.**

Sample answer

Personally, I don't find this job stressful, but we often have to work under pressure. I would say that the most stressful factor for me is… As for me… (a coffee break, chatting to colleagues, going in for sport) is the best way to decompress after a busy radar session. It really works.

Key Vocabulary

create pressure points	*создать повод для стресса*
nap room (break room)	*комната отдыха*
decompress after a busy radar session	*восстановиться после напряженного времени работы за каналом*
keep fit / be in a good shape	*поддерживать себя в форме*
playground	*спортивная площадка*

ATC License

It is **a qualification document** of ATC. It contains details, such as ratings and endorsements, type of ATC unit, ATC class, license validation period and so on. **To get a valid license** and **to prolong** it, controllers must pass training courses, examinations and assessments **at specified time intervals**. Besides, you must demonstrate appropriate level of English **to get endorsed** / **licensed / qualified** as a controller.

To obtain a valid ATC license one has to:

- pass simulator training
- pass theoretical exams
- demonstrate Level 4 in Aviation English
- be medically fit
- pass the on-the-job training

Key Vocabulary

ab-initio training	*первоначальная подготовка*
ATC rating	*квалификация диспетчера*
validation	*действие свидетельства*
to prolong ATC license	*продлить свидетельство диспетчера*
valid ATC license	*действующее свидетельство диспетчера*
sector endorsement	*допуск на сектор*

ATC Training

Ab-initio training
If you want to be a controller, you must **pass a selection** to ensure you have the right skills to do the job. During ab-initio training, you learn the airway system, flight regulations, controller equipment, and aircraft performance characteristics, meteorology, navigation and operational procedures, and other useful information

Simulator training
I would say that simulator training is **the most useful** as we are able to make mistakes and to see the results of our mistakes. If something goes wrong, you may have only seconds to act and your actions must be automatic. Simulator training **covers any scenario** from very severe weather or a technical failure to a bird strike.

On-the-job training
It's a final stage of training to **get a valid controller's license**. At this stage, you will train in the operational environment, dealing with live traffic. Initially, you'll have the on-job-training instructor with you all the time. The instructor will allow you to make your own decisions and control the traffic on your own. The on-the-job training lasts anything between 2 and 6 months.

Refresher courses
ATC job requires constant training, that's why we have refresher courses on a regular basis. I mean we have professional courses once in 3 years. During these courses, we are updated on our procedures, recent changes in flight regulations. Besides, we have English courses as a part of our professional training.

Key Vocabulary

pass a selection	*пройти профессиональный отбор*
ab-initio training	*первоначальная подготовка*
the most useful	*самое полезное*
covers any scenario	*охватывает любые ситуации*
get a valid controller's license	*получить свидетельство УВД*

Simulator Training

ATC simulator **puts controllers in the real control environment** and gives opportunity to learn all the skills, and operating procedures for the specific sectors. It **simulates emergencies** to give air traffic control students a feel for **what it's like to handle live traffic**. Simulator training is the **most useful**, as you get practical knowledge from some of the most experienced professionals in the business.

The first instructor is **very special** for any trainee. He is a sort of **work model** as he will **guide, coach and assess** you on your performance.

ab-initio ATC	advanced rated ATC
training to **get** basic skills	training to **improve** skills

- to **manage** potential traffic conflicts
- to **anticipate** future events
- to **communicate** effectively in all situations
- to **manage** non-standard and emergency situations
- to **operate** as a team member

Key Vocabulary

to give a feel	*дать почувствовать*
to handle live traffic	*управлять реальным движением*
what it's like	*на что это похоже*
a work model	*пример для подражания*
apply rules	*применять правила*
make decisions	*принимать решения*
guide, coach and assess	*направлять, обучать и оценивать*
the most useful	*самое полезное*

Routine shift

As flights operate around the clock **we do shift work**. Our full **shift pattern** is morning shift, day shift and night shift, then we have three days off. So, I have a good work-life balance.

Before every shift we must pass a regular medical check. The purpose of pre-shift medical check is to find out if a controller is **physically fit** to perform his duties. If he doesn't feel well, doctors will **suspend him from duty.**

Briefing is the next step. Our supervisor starts the daily briefing with the most **relevant information** which can **affect our operations** during the shift. Then, we go to the operations room where we **actually manage the air traffic**.

The **radar sessions** typically last about 90 minutes, then we must have a break due to extreme concentration. We can go to **a nap room or a break room** where we can **decompress after a busy radar session**. On an **average day**, there are no problems. Routine situations, even with lots of traffic are **easy to handle**, if you know what to do and when.

At the end of every shift, we **hold a de-briefing**, where we analyze our operations during the shift, discuss non-standard situations to improve our performance in the future.

Key Vocabulary

shift pattern	*график сменности*
physically fit	*физически здоров*
suspend from duty	*отстранить от работы*
relevant information	*важная информация*
average day	*обычный день*
radar sessions	*время работы за каналом*
a nap room / a break room	*комната отдыха*
hold a briefing / a de-briefing	*проводить инструктаж / разбор*
decompress	*восстанавливаться*
easy to handle	*легко справляться*

ATC Equipment

What equipment do you use at work?

Basically, a **standard set-up** for en-route controllers includes a radar screen, a voice communication control panel and an auxiliary flight data display. Our equipment is **highly reliable** because it has several **back-up systems** in case of main station blackout or outage.

How does your equipment help you to manage air traffic?
Our controlling system provides us with many **useful options**, which help us to cope with increased air traffic and to be fully aware of traffic situation. The system:

- **receives** data about the aircraft's flight and transmits it to working positions
- **presents** flight plans in ICAO format
- **calculates** and displays an aircraft's routes according to FPL
- **provides** data about the runway and its status (occupied /free)
- **allows** to enter data about restricted and prohibited areas
- **displays** data about meteophenomena received from meteoradar
- **provides** information on the radars' performance
- **distributes** the available SSR codes
- **integrates** the incoming data on the QNH pressure into the system
- **warns** of unsafe situations.

What information do you need to handle flights safely?

Controllers can adjust radar label settings as standard, extended or selected. Different colours of the label indicate the status of the flight, for example: coordinated, active or handed over, lost, etc. If there is an emergency, a specific red symbol will appear next to the label: EM – emergency (7700); HJ – hijack (7500); RF – radio fail (7600).

A standard track label includes:

- aircraft ID
- altitude
- barometric pressure
- magnetic heading
- indicated air speed
- Mach number
- ground speed
- wind, temperature, turbulence

How does your equipment help you to prevent potential conflicts?

To lower risk levels and to warn ATC of potentially unsafe situations our system provides us with different safety nets:

- Short Term Conflict Alert
- Medium Term Conflict Detection
- Minimum Safe Altitude Warning
- Area Proximity Warning
- Approach Path Monitor
- Dangerous Weather Area Warnings and Alerts

Key Vocabulary

advanced	*продвинутый*
a standard set-up	*стандартный набор оборудования*
useful options	*полезные опции*
a back-up system	*резервная система*
black-out / outage	*обесточивание*
be fully aware of the traffic situation	*быть полностью в курсе воздушной ситуации*
safety nets	*системы безопасности*
adjust radar label settings	*настроить данные формуляра сопровождения*

English and Communication

Controllers should understand crews in every standard or non-standard situation. I have to use standard phraseology whenever possible. However, it **works extremely well** only in routine situations. Plain English helps **to cope with** non-routine and emergency events. Anyway, I must be able **to fix any communication breakdown**.

Several factors can increase the possibility of communication breakdown. Non-standard phraseology, incorrect or incomplete read-backs and omitting or confusing call signs are some examples of typical errors. Most of these communication errors are **minor**, only a few **cause serious problems**. Using standard phraseology and good RTF discipline are **easy** and **effective solutions** to improve communication and they work. For most pilots and controllers their working language (English) is not their first language, so abilities to **understand foreign accents**, to **paraphrase**, to **clarify, to check or to confirm -** are crucial.

Correct phraseology is extremely important and must be used whenever possible. If it isn't used, the results can be catastrophic.

Key Vocabulary

cope with / deal with / non-routine events	*справляться с нестандартными событиями*
fix any communication breakdown	*наладить любые проблемы со связью*
garbled message	*искаженное сообщение*
improper coordination	*неточное согласование*
distractions	*отвлечения*
confusion	*путаница*

Near Miss. TCAS

Near miss is a loss of safe separation between aircraft. Human error, hazardous weather, technical malfunction are the typical reasons for a near miss. In worst cases near miss can develop into a mid-air collision. During slow traffic period controllers may lose attention and quick reaction, give wrong instructions without double-check. Whereas, in congested airspace controllers are too busy or too tired to detect and fix the mistake which can develop into a near miss situation. In this case, pilots have to take evasive action. However, both controllers and pilots have equipment to **warn of potential collision** with other aircraft. Improvements in training, communication and safety nets, and situational awareness are possible **solutions** to avoid Airprox incidents.

Both onboard and ground-based equipment **is designed to warn of potential collision** with other aircraft (ACAS/TCAS). TCAS is only able to interact with aircraft that have a **correctly operating transponder** which sends a constant stream of radio signals identifying them. Pilots are now **strictly instructed to comply** with all TCAS messages. In the case of a conflict between TCAS RA and ATC instructions, the TCAS RA **always has priority.**

TCAS I	**TCAS II**
monitors, warns, doesn't offer what to do (TA)	suggests pilots a change of altitude (RA)

Key Vocabulary

lack of attention	*невнимательность*
distractions	*отвлечения*
confusion	*путаница*
detect and fix a mistake	*заметить и исправить ошибку*
avoid collision / take evasive action	*избежать столкновения*
warn of unsafe situations	*предупреждать об опасных ситуациях*

Emergencies

Priorities for Pilots

AVIATE

- to ensure the safe flying
- to conduct checklist
- to troubleshoot the problem
- to assess all available options

NAVIGATE

- to continue the flight to destination or to divert

COMMUNICATE

- to inform air traffic control, cabin crew, passengers and the company about their intentions and the nature of the emergency

Related Problems

- loss of communication
- poor readability (due to stress, due to oxygen masks)
- language problems (non-standard situation will require plain English)
- unexpected loss of altitude
- high stress level in cockpit
- effect on other aircraft systems
- fuel dumping
- request for emergency services

Priorities for Controllers

CLARIFY

- PAN or MAYDAY
- nature of emergency
- decision / intentions

ANTICIPATE

- the crew will be very busy troubleshooting
- a course deviation
- a descent, deviation to an alternate airport

ARRANGE

- landing options, vectoring
- nearest suitable airfield and weather
- imposing RTF silence if necessary

Emergency Codes

Three transponder codes are reserved for unusual or emergency situations:

- **7700** for general emergencies
- **7600** for loss of communication (radio failure)
- **7500** for hijacking or other unlawful interference.

The squawk is a 4-digit-code to identify the aircraft. Emergency transponder codes help ATC to be aware of the situation and to give proper assistance to pilots.

In case of emergencies, air traffic controllers should follow the '*ASSIST*' code:

A	ACKNOWLEDGE the nature of emergency
S	SEPARATE the distress traffic from other traffic
S	impose SILENCE if necessary
I	INFORM all concerned
S	SUPPORT the crew in any possible way
T	give pilots enough TIME to run the checklists

Any non-standard situation in flights can be **assessed as emergency** and require immediate actions. It depends on the nature and **extent of problems**, stage of flight and the pilot's decisions. An aircraft in a state of emergency should be given priority over other aircraft. During an emergency, the workload is high and the pilots may not immediately inform air traffic controller of the problem (be **unresponsive**) as communication **goes down their priority list**. They will need time to assess the situation to **determine the best options**. Emergency transponder codes help ATC to be aware of the situation and to give proper assistance to pilots. If a crew sets squawk 7700, all ATC facilities in the area are **immediately alerted**. Squawking 7700 makes it clear that the crew needs priority and assistance. If the emergency is under control, the pilot may decide to **downgrade their emergency status** or even to cancel distress.

Key Vocabulary

assess as emergency	*оценить как аварийную ситуацию*
extent of problems	*масштаб проблем*
unresponsive	*нереагирующий*
goes down their priority list	*уходит на второй план*
determine the best options	*определить наилучшие варианты*
immediately alert	*немедленно оповестить*
downgrade their emergency status	*снизить статус аварийной ситуации*

Emergency landing

Emergency landing is a landing of an aircraft in a state of emergency when there is **a threat to the safe operation** of aircraft. There are five different types of emergency landings: a forced landing, a precautionary landing, a ditching, a belly landing, a crash landing.

Emergency landing is a forced measure in case of, for example, a total engine failure, a loss of hydraulics, landing gear faults, fuel emergency, fire or smoke onboard, depressurization. The main reason is to get the aircraft on the ground **to minimize casualties.**

An aircraft in a state of emergency should be given priority over other aircraft. Emergency transponder codes help ATC to be aware of the situation and to give proper assistance to pilots. If a crew sets squawk 7700, all ATC facilities in the area are immediately alerted and are ready to **arrange for the pilot whatever is necessary**.

Ditching is a special term for a water landing of an aircraft. In most cases, it is safer to "crash-land" an aircraft on the ground, as water surface is just **as hard as concrete** and can damage airframe. However, water landing is unpredictable; there can be waves, **invisible or submerged threats**. In case of successful ditching, there is still a risk that people may **drown**, get frozen in the cold water, or get **stranded**. So evacuation must be carried out **quickly, but orderly** via evacuation slides to avoid potential hazards such as fire, toxic fumes, or the risk of the aircraft sinking in water.

During an emergency evacuation, **every second counts.** Cabin crew may need to deploy inflatable slides **to deplane passengers** safely. Aircraft are equipped with various emergency equipment. This includes emergency lighting systems, evacuation slides**, life rafts and vests**, etc.

Emergency landing could **disrupt airport operation** as the **disabled aircraft** can block the active RW, leading to flight delays and cancellations. In case of ‘full emergency status’, it could **suspend airport operations** to give maximum attention to the emergency aircraft.

What do the terms "full emergency" and "local standby" mean?

FULL EMERGENCY - a situation in which all on-airport and off-airport services are activated. A Full Emergency is declared when an aircraft approaching the airport is in danger of an accident.

LOCAL STANDBY – a situation in which only the airport-based services are alerted. A Local Standby is a normal response when the problem on board does not affect a safe landing.

What services must be alerted for an emergency landing?

On-airport (airport-based) services

- rescue and firefighting teams
- medical services
- police and security
- airport authorities
- ATC units
- aircraft operators

Off-airport services

- fire departments
- medical services and hospitals
- law enforcement
- bomb and anti-terrorist squads
- coast guard

Key Vocabulary

a threat to the safe operation	*угроза безопасному полету*
arrange for the pilot whatever is necessary	*организовать все необходимое пилоту*
as hard as concrete	*твердый как бетон*
invisible or submerged threats	*невидимые или скрытые угрозы*
disabled aircraft	*поврежденный самолет*
suspend airport operations	*приостановить работу аэропорта*
deplane passengers /get passengers off the plane	*эвакуировать пассажиров*
stranded passengers	*блуждающие, потерявшиеся*
minimize casualties	*уменьшить количество жертв*

Ditching

Ditching is a special term for a water landing of an aircraft. The **planes are not designed for ditching**; it can be a normal landing only for amphibious aircraft.

Ditching is **a solution** if pilots are **limited in options** or are **short of time** as in case of aircraft on fire. If a plane **suffers a total engine failure**, a total loss of power, engine failure in a single-engine aircraft, or **fuel starvation**, the **best solution** is just to perform an emergency landing. If you can't make it on land, the only option left is to ditch.

Obviously, landing onto a river is safer than onto a sea because rough sea could cause a lot of troubles for a safe ditching. Basically, the **chances of surviving** are high and could result in few injuries to pilots or passengers. People are more likely to die after ditching by **drowning**. Even in summer, **survival time** without **a life raft** and **a life vest** in the open seas is typically just a few hours. So evacuation must be carried out **quickly, but orderly.** At least 19 passenger aircraft in distress performed ditching within past 60 years but only few had a safe outcome.

Key Vocabulary

chances of surviving	*шанс выжить*
survival time	*время спасения*
drown	*тонуть*
a life raft	*спасательная лодка*
a life vest	*спасательный жилет*
quickly, but orderly	*быстро, но организованно*
short of time	*мало времени*
managed to ditch	*удалось приводниться*
break apart	*развалиться на части*
limited in options	*ограничен в выборе*

In-flight fire

An in-flight fire is probably the most serious in-flight emergency, and **must be brought under control** as soon as possible. Fire in the air can lead to the catastrophic loss of aircraft **within a very short period of time**. The crew has approximately 17 minutes to land the aircraft. Smoke may **develop into the worst-case scenario**, because flame **spreads very quickly**. Any fire produces gas and toxic fumes, so people can get intoxicated due smoke inhalation.

The most common sources of fire are electrical problems, short circuit, problems with wiring, dangerous goods, or fuel leak. As soon as pilots detect smoke, they need **to determine its origin** and attempt to **put it out**. The pilot may declare an emergency and may need to land as soon as possible. In this case the air traffic controller will need to alert emergency services, ask for dangerous goods, number of persons on board (POB) and inform landing aerodrome.

Several related problems may arise during fire: communication difficulties due to oxygen masks, reduced visibility, breathing problems, crew incapacitation, and partial or complete control loss. In case of in-flight fire **a controller can expect** immediate descent, diversion to nearest suitable aerodrome and requests for firefighting services upon arrival. Passengers need to be evacuated without delay via emergency slides as in many emergency situations there is a real risk of **post-crash fire.**

In case of in-flight fire, the crew must respond to the situation:

- put on oxygen masks
- find the source of fire
- turn off the faulty equipment / shut down the affected engine
- put the fire out
- report to a controller
- declare an emergency
- advice the controller on further intentions
- land the aircraft as soon as possible
- evacuate the passengers

Key Vocabulary

flames / burning / ignition	*пламя /горение /воспламенение*
catch fire	*загореться*
smell smoke	*почувствовать запах дыма*
determine the origin / source of fire	*определить источник пожара*
put out / extinguish / hose down fire	*потушить пожар*
spread very quickly	*быстро распространяться*
develop into the worst-case scenario	*перерасти в худший сценарий*
deploy/activate/ release	*выпустить*
emergency slides/escape chutes	*аварийный трап*
post-crash fire	*послеаварийный пожар*
smoke inhalation	*вдыхание дыма*
get intoxicated with toxic fumes	*отравиться продуктами горения*

Technical Malfunctions

How can a technical failure affect the flight?

Technical failures present a high-risk scenario. Even a minor problem can quickly develop into an emergency. Scenarios can be different depending on the extent of problem. It can cause an aircraft return or a forced landing. On the other hand, modern planes are highly reliable. Besides, a regular technical maintenance helps to minimize the risks of technical emergencies on board.

Most technical failures are unexpected and **require time to assess them.** Actually, there are very few crashes that occur due to technical problems. Most often they are not **critical to flight safety**. Practically every system on a commercial airliner has a **back-up** (a redundancy system). Even when technical problems occur, a good pilot will still land the plane.

It is important in which phase of flight the failure occurs. **Depending on the phase of flight** technical emergency might result in: aborted take-off, pressurization problems, control difficulties, fuel dumping, FL change, and precautionary approach.

A very important factor during these situations is pilot-controller communication. In a technical emergency the pilots are usually so busy **troubleshooting** and **working checklists** that communication with ATC is **down their priority list**. Controllers follow several principles to help the flight crew to **resolve** their problems.

Key Vocabulary

faults/ issues/ malfunctions	*неисправности*
depending on the phase of flight	*в зависимости от стадии полета*
critical for flight safety	*критично для безопасности*
busy troubleshooting	*занят поиском и устранением проблемы*
down priority list	*менее приоритетный*

Radio communication failure

Radio communication failure is a serious risk to flight safety. It may lead to the **loss of situational awareness**, near miss incidents and even aircraft collisions. Besides, communication failures may mean hijacking and result in military escort and interception. Loss of communication may occur for several reasons, such as equipment malfunctions (transmitter or receiver failure, electrical problems), human errors (wrong frequency selected, turning off the aircraft radio volume), high terrain or dense fog that can weaken or block radio signals.

Radio failures increase the controller's workload a lot. Firstly, the ATC should call the aircraft on the current and previous frequencies, or establish contact via other aircraft and stations. If attempts to establish contact are not successful, the controller should identify the type of communication failure: one-way or two-way. It is necessary to instruct the aircraft to make a turn or set another transponder code. If the turn or squawk are observed, it means that the aircraft receiver is operating. In this case, the controller should continue to pass instructions blind and twice, inform the supervisor and arrange the engineer to check the equipment. When it comes to complete communication failure, the controller should follow special procedures: maintain separation between the **unresponsive aircraft** and other traffic, ask other pilots in the vicinity to relay messages to the aircraft, monitor the aircraft's progress, send necessary information to the pilot, and inform adjacent sectors, military units, landing aerodrome and emergency services.

The crew of the affected aircraft are expected to squawk 7600 and proceed to the destination via flight-planned route. They will conduct a normal instrument approach and land within 30 minutes after the estimated time of arrival. Obviously, they will be transmitting blind until the **communication is restored**.

Key Vocabulary

loss of situational awareness	*потеря ориентировки*
unresponsive	*не отвечающий*
communication is restored	*связь восстановлена*

Engine Failures

How dangerous is an engine failure?

Engine failures can be quite dangerous for aircraft. The seriousness of the situation depends on:

Stage of flight	take-off /cruising phase of flight
Type of aircraft	multi-engine or single-engine aircraft
Nature of the problem	intense vibration, engine stall, flame-out, engine fire, oil reduction issue, etc.
Types of engine failures	contained / uncontained failures or total loss of power

Contained	Uncontained	Total loss of power
Contained engine failures happen in about 98% of all engine cases. In such a case, any mechanical problem remains within the engine and doesn't present a serious risk to anyone on board.	Uncontained engine failures occur when debris from the engine acts as a shrapnel and cause a hazard to all adjacent systems and structures such as pylon, wing and fuselage.	It is a failure of all engines forcing pilots to glide to the nearest landing site.

Engine failures may **result from** fuel emergency, low/high oil indication, engine vibrations, a loss of engine components, hydraulic or electrical problems. Birds can hit the aircraft **causing an engine stall or a failure**. In case of engine failure, we can anticipate different scenarios. The loss of one engine on a multi-engine aircraft will **reduce its power and the ability to fly normally**. However, such a failure on a single engine plane can be deadly. In this case the pilot **has no options but to land** as soon as possible. Engine failures may lead to **limited**

maneuvering and **speed fluctuations**. Typically, pilots shut down **the affected engine.** Most engine malfunctions **can be easily identified thanks to warnings or indications.** Most probably pilots will restart the engines, check fuel, and follow their checklists. The ATC should **arrange** for the pilot **whatever is necessary** in this emergency.

Key Vocabulary

limited maneuvering	*ограниченная маневренность*
sustain /suffer damage	*получить повреждения*
relight / restart engines	*перезапустить двигатели*
engine stall	*помпаж двигателя*
flame-out	*срыв пламени*
assess the damage	*оценить повреждения*
can be easily identified	*может быть легко обнаружено*
the affected engine	*поврежденный двигатель*
speed fluctuations	*колебания скорости*
contained engine failures	*локализованный (внутренний) отказ*
uncontained engine failures	*нелокализованный (внешний) отказ*

Bird Strike

A bird strike is a **common threat** to aircraft safety. It is more likely during spring and autumn as it is **migration time**. Most bird strikes occur at low levels during landing or take off, but geese are detected at over 20000 ft.

Bird strikes on windscreen and engine are the most dangerous. Windscreen can crack and it will lead to communication problems or depressurization. Bird strike on engine can cause **engine surge** or flame out. Bird strike can also cause engine failure and **create emergency**. Extended landing gear can also be damaged by birds. It can lead to malfunction of brakes or nose gear steering systems.

The seriousness of the bird strike depends on size of birds, place of impact, speed of aircraft. In order to prevent bird strikes different **precautionary measures** are used. Airport authorities use sound systems that **emit high frequency sounds** to **scare away** the birds. Specially trained falcons can **scare the birds away**. In addition, airport services **cut the grass near the runways** so that birds cannot settle there.

Key Vocabulary

a common threat	*распространенная угроза*
more likely	*более вероятны*
seriousness of the bird strike depends on	*серьезность ударов птиц зависит от*
precautionary measures	*меры предосторожности*
emit high frequency sounds	*издают высокочастотные звуки*
scare birds away	*отпугнуть птиц*
trained falcons	*тренированные соколы*
cut the grass near the RW	*стричь траву у ВПП*
create emergency	*создать аварийную ситуацию*
can cause engine surge/ flame out	*могут вызвать помпаж двигателя/ срыв пламени*

Decompression

Loss of pressurization is a serious in-flight emergency for aircraft. A failure of the cabin pressurisation system **causes an immediate danger** to the aircraft, crew and passengers. There are several reasons that may lead to depressurization: a bird strike, a structural failure, an unsecure door, in-flight explosion, metal fatigue, uncontained engine failure, malfunctioning of the air-conditioning system, electrical or pneumatic system failure (bleed air system), and bomb detonation. **We can anticipate different scenarios**. It depends on the type of decompression (**slow, rapid or explosive**) and the stage of flight. In case of explosive decompression, pilots need to descend **within a few seconds** to the minimum safe altitude in the area where the passengers can breathe unaided.

During decompression, other aircraft systems could be damaged, for example, the hydraulic system, or structural damage affecting the aerodynamic characteristics of the aircraft. The aircraft will descend through other levels and it **can lead to a loss of separation**. These actions may cause injuries to passengers or crew. Communication will be poor due to noise, as the pilot is now communicating via a microphone in the oxygen mask. In the event of decompression, the flight crew will use oxygen masks as soon as possible **to prevent incapacitation due to hypoxia**. Hypoxia is the main health problem due to lack of oxygen. Besides, during emergency descent **aircraft occupants** may suffer from multiple injuries, concussion of the brain, fractures, and bruises.

Key Vocabulary

a loss of pressurization	*потеря наддува*
pneumatic system failure (bleed air system)	*отказ пневматической системы (системы отбора воздуха)*
breathe unaided	*дышать без масок*
to prevent incapacitation due to hypoxia	*предотвратить потерю сознания из-за гипоксии*
aircraft occupants	*люди на борту самолета*
multiple injuries	*многочисленные травмы*
concussion of the brain	*сотрясение мозга*
fractures and bruises	*переломы и ушибы*

Hydraulic issues

Most commercial aircraft have three **separate hydraulic systems**. Green, yellow and blue systems refer to three of the hydraulic systems on Airbus aircraft. Boeing identifies their hydraulic systems numerically. Several aircraft systems depend on hydraulic power: flight controls, landing gear, brakes, and thrust reversers.

Some examples of **hydraulic issues** in flight are hydraulic system overheating, **hydraulic fluid leak**, a loss of hydraulic pressure or fluid contamination, **jammed flaps** or slats, or a complete loss of hydraulic systems. The **complete loss of a hydraulic system** can cause problems to the secondary flight controls and affect aircraft braking, autopilot and **gear extension or retraction**.

Problems depend on **the extent of the damage** of the hydraulics. The crew could have difficulties controlling the aircraft. After assessing the situation, the pilot may decide to make an immediate landing at the nearest suitable airport. Modern aircraft use various systems to provide status information, **redundancy (backup)** and control. The indicator lights show the status of the landing gear. A green light indicates that gear is down and locked, a red light means there is a problem with gear. The **unsafe indication** may be the first sign of a problem. Unlocked or not fully extended gear could lead to a belly landing, a **gear collapse** with airframe damage, a **runway excursion** and post-crash fire.

Key Vocabulary

separate systems	*отдельные системы*
hydraulic fluid leak	*утечка гидравлической жидкости*
jammed flaps	*заклинило закрылки*
a complete loss	*полная потеря*
gear extension / retraction	*выпуск /уборка шасси*
extent of the damage	*масштаб повреждений*
redundancy (backup)	*резерв*
a runway excursion	*выкатывание с полосы*

Landing gear malfunction

There are many possible problems connected with landing gear such as: **gear retraction or extension issues**, unlocked gears, inoperative nose steering, burst / blown tires, unsafe gear indication. Undercarriage is vital for the safe takeoff and landing stage of flight. Any malfunction in the landing gear can present a high risk to **structural integrity** of the aircraft, its controllability and safety. The landing gear problems may be caused by:

Technical reasons such as hydraulic system failure, electrical problems, burst tires, brakes overheating, rough landing, overweight landing, metal fatigue.

Outside reasons, for example, a foreign object damage on the ground, a malfunction of the gear due to a bird strike.

Human factor including mistakes of ground personnel and pilots (for example, forgetting to extend the gear).

Modern aircraft use various systems to provide gear status information. For example, when a green light is on, it means the landing gear is down and locked; and a red light indicates that there is some gear problem. Unsafe gear indication might be **the first sign of the problem**. Situations when gear is not locked or fully extended could result in emergency belly landing; gear collapse with a possible airframe damage, a runway excursion and a post-crash fire. Belly landing is quite risky and may result in extensive damage to the fuselage, the fuel lines rupture with the risk of explosion, skidding off the runway due to lost control of the aircraft.

The controller should anticipate pilots' requests to delay approach, hold for extra time to troubleshoot, do the checklists and prepare for emergency landing or attempt a manual extension/ retraction of the gears, request a low-pass procedure for visual inspection of the gear status, low speed approach; runway blockage after landing.

Key Vocabulary

gear retraction/extension	*уборка / выпуск шасси*
the first sign of the problem	*первый признак проблемы*
structural integrity	*структурная целостность*

Fuel Problems

There are different ways of experiencing fuel problems, and there are different ways to provide assistance according to the situations. Some of the **most common fuel issues** are fuel **contamination**, fuel leak, **starvation** (running out of fuel), fuel icing, fuel shortage, or **excess fuel**.

Fuel load is critical in aviation. Consumption depends on type of aircraft, the **payload** (weight of passengers and cargo) as well air temperature and wind. Pilots prefer higher levels for cruising because cruising at a higher flight level generally requires less fuel, as air density and temperature decreases with altitude. **Flight cost can be minimized** by appropriate choice of route, height, and speed, and by loading the minimum necessary fuel on board.

To **calculate reserve fuel** and **trip fuel** pilots must **take into account unexpected circumstances** such as circumnavigation of bad weather areas or diversion to an alternate aerodrome or strong head wind.

Key Vocabulary

most common fuel issues	*самые типичные проблемы с топливом*
fuel contamination	*некачественное топливо*
fuel starvation	*нехватка топлива*
excess fuel	*переизбыток топлива*
fuel load	*загрузка топлива*
aircraft payload	*загрузка самолета*
calculate reserve fuel	*подсчитать запас топлива*
trip fuel	*количество топлива на полет*
to take into account	*принимать во внимание*

Computer Problems

For controllers

Computers in control centers contain all safety critical data such as airspace, routes, weather, airfields, runway lengths and widths, etc. Computer system reduces ATC workload. It does all the calculations, warns of potential unsafe situations, and shows any necessary information just one click away. Modern ATC systems include safety nets, which warn controllers of any potential conflicts. Any computer glitch can cause chaos. Any system fault or an IT hack can cause a disruption and affect safety in case of blackout or outage.

For pilots

Computers on board made the job easier and safer for a pilot. Nowadays flight crews rely on computers to fly aircraft and to monitor aircraft systems. Computers replace hundreds of gauges reducing the workload of the flight crew. The latest application of computers "Airborne Internet" connects aircraft by radio and satellite link to a global information system that provides information on the weather, flight plan and aircraft in the vicinity. Pilots have ipad tablet computer applications to do performance calculations and consult operations manuals. However, there is also a downside to it: today most pilots are programming computers rather than flying manually. If some computer fails, they would waste time trying to restart the autopilot or fix other automated systems instead of flying the plane.

Key Vocabulary

just one click away	*по щелчку мыши*
computer glitch	*компьютерный сбой*
cause chaos	*вызвать хаос*
IT hack	*хакерская атака*
cause a disruption	*нарушить работу*
blackout / outage	*отключение питания*
downside	*недостаток*

Flying with gadgets

What are the potential safety risks posed by the use of electronic gadgets on board?

Passengers take a wide range of gadgets as hand luggage, including laptop computers, tablets/iPads, MP3 players/iPods, e-readers and all types of gaming devices. Those gadgets, when not in flight mode, transmit electromagnetic signals that **interfere with the normal operation of aircraft equipment** and can affect the autopilot and fly-by-wire systems. When the aircraft is taxiing, there is a potential risk of mobile phone signals interfering with some aircraft systems and ground communication between flight crew and air traffic controllers. So, electronic devices are not allowed to use during taxi, take-off and landing. During the cruise phase of flight most airlines will allow to use smart phones in 'Flight Mode' or 'Airplane Mode'. The aircraft crew should advise passengers when they can and cannot use mobile phones and other electronic devices.

Besides, electronic gadgets are **powered by lithium batteries**. In case of damage, short-circuit or overheating the batteries can catch fire. This is why passengers should carry portable electronic devices (PEDs) in the hand luggage, not in the checked luggage. They must be individually protected to prevent short-circuits. During security procedures at airports, all laptops must be **inspected for any hidden explosives or weapons**. Security officials examine their internal components more clearly on the X-ray screen to identify potential risks.

Key Vocabulary

interfere with the normal operation aircraft equipment	*мешать нормальной работе систем самолета*
powered by lithium batteries	*на литиевом аккумуляторе*
inspected for any hidden explosives or weapons	*досматривается на наличие скрытых взрывных устройств или оружия*

Medical emergencies

Serious health incidents in the air are **actually pretty uncommon**. If something serious happens, **there are several solutions**.

Most airlines **require flight attendants to be trained** in using an external defibrillator and in **basic first aid** to **provide immediate treatment** for a heart attack or stroke. They can also **handle minor injuries** or dehydration. But if a flight attendant can't solve a problem or if they see **signs of a serious issue**, they can call Med Link. Airlines coordinate with **24-hour medical call centers**. A **consulting physician** will provide a list of recommendations **for a sick passenger**. **Treatment** could involve using drugs from the plane's on-board medical kit which includes medicines for allergic reactions, seizures, tablets for chest pain, or even meds to deal with bleeding if a woman gives birth during a flight.

When the situation is really serious - like in the case of a heart attack, stroke, cardiac arrest, or seizure - the flight crew and the Med Link, along with controllers on the ground, decide if the plane should make an emergency landing. When that happens, **paramedics are notified**, so an ambulance is ready and waiting to **take the patient to the hospital**.

Most of the **medical mishaps** aren't **life-threatening**. It's more likely that passengers will **experience minor health issues** due to the plane's environment. They may faint, have trouble breathing, feel nauseous, or vomit. That's because of dry cabin air and lack of oxygen. That can mean that even healthy people can sometimes feel sick when they fly. Besides, air travel **presents a high risk for** developing deep vein thrombosis, a serious condition where blood clots form in legs.

Key Vocabulary

stroke	*инсульт*
heart attack / cardiac arrest	*сердечный приступ*
minor injuries	*незначительные травмы*
dehydration	*обезвоживание*
seizure	*приступ*
chest pain	*боль в груди*
bleeding	*кровотечение*
baby delivery (giving birth)	*роды*
fainting	*обморок*
troubles breathing	*проблемы с дыханием*
feel nauseous / vomit	*чувствовать тошноту*
deep vein thrombosis (DVT)	*тромбоз глубоких вен*
blood clot	*тромб*
medical mishaps / health incidents / issues	*медицинские проблемы /инциденты*
pretty uncommon	*довольно редки*
there are several solutions	*есть несколько решений*
be trained in basic first aid	*подготовлены оказывать первую помощь*
provide immediate treatment	*оказать немедленную медицинскую помощь*
handle minor injuries	*справляться с незначительными травмами*
signs of serious issues	*признаки серьезных проблем*
24-hour medical call center / Med Link	*круглосуточный медицинский центр*
a consulting physician	*консультирующий терапевт*
medical kit with medicines, drugs, tablets for…	*аптечка с лекарствами, препаратами, таблетками против…*
paramedics are notified	*скорая помощь оповещена*
life-threatening	*угрожающее жизни*
take / bring the patient to the hospital	*отвезти пациента в больницу*

Pilot incapacitation

Pilot incapacitation means inability of a pilot or co-pilot to perform their normal duties during a flight. Despite pilots and cabin crew **undergo regular medical screenings**, medical **mishaps do happen** from time to time. The reasons can be divided into 3 groups:

Personal health issues: pilots, like any humans, can fall ill, catch a cold, feel unwell and suffer strokes, heart attacks or seizures.

Plane's environment: for example, toxic fumes inhalation, hypoxia during decompression, physical injuries due turbulence.

Psychological factors: fatigue, burnout, depression, mental problems.

The first sign of pilot incapacitation for controllers can be a loss of communication, non-compliance with instructions, and even a loss of separation. In the worst cases, it can lead to fatal consequences.

Obviously, for multi-crew cockpits the inability of one pilot is less risky than for single-pilot cockpits. Crew members are trained to provide first aid and can **assume some the pilot's responsibilities**, but it will significantly increase their workload and may affect safety.

To prevent possible pilot incapacitation there are such measures as additional simulator training for this scenario, and ensuring safe conditions during flights (for example, separate meals for each pilot). Pilots' flight time and rest periods are strictly regulated to prevent overload.

Key Vocabulary

undergo regular medical screenings	*проходить регулярные медицинские освидетельствования*
mishaps do happen	*несчастные случаи все же происходят*
assume responsibilities	*взять на себя обязанности*
fall ill	*заболеть*
catch a cold	*простудиться*
feel unwell	*чувствовать недомогание*

Unruly passengers

What may cause unruly behavior on board?
How may an unruly passenger on board affect a flight?
What can be done to prevent air rage?

Safety in the air begins on the ground, and unruly passenger incidents **are best managed before boarding**. Unruly passengers are a very real and **serious safety issue**. There are several reasons behind air rage: queues, delays, lack of information, overbooking, passenger handling at airports and a non-smoking policy on board. As a result, passengers are often tired, bored, frustrated and feeling stressed. Air rage could **affect the safety** of the crew, passengers and aircraft. Incidents happen quite often on all airlines and in every cabin class, distracting cabin crew from safety related duties. In-flight, unruly passenger events can result in aircraft diversion. Any unplanned landings are **costly** and **create additional safety risks.**

I would say drunken passengers are the main troublemakers during flights, so I believe a ban on alcohol on board and at airports will be the best solution to this problem.

Nature of problem	Reasons	Solutions
attempts to open an exit door	influence of alcohol	to ban alcohol on board
abusive behavior	fear of flying	to spot troublemakers before boarding
attacking a flight attendant	side effects of drugs	to blacklist offending passengers
smoking	mental problems	to provide larger seats with more legroom

Some airlines distinguish four **passenger disturbance levels:**

Level 1: Disruptive behavior - suspicious or threatening
Level 2: Physically abusive behavior
Level 3: Life-threatening behavior
Level 4: Attempted or actual breach of the flight deck

Key Vocabulary

violent / threatening / rude/ aggressive / unruly	*жестокий /угрожающий/грубый/ агрессивный /неуправляемый*
abusive behavior	*оскорбительное поведение*
cause harm to other passengers	*причинить вред другим пассажирам*
present a threat to the safe operation of a flight	*представлять угрозу безопасности полета*
calm down/subdue /restrain/ isolate	*успокоить/усмирить/ изолировать*
side effects	*побочные эффекты*
a fear of flying	*страх летать*
a ban on alcohol	*запрет алкоголя*
the best solution	*лучшее решение проблемы*
spot troublemakers	*заметить нарушителей*
blacklist passengers	*внести в черный список*
passenger disturbance level	*уровень угрозы со стороны пассажира*

Weather Hazards

There are some things we can't control. For instance, **we can't control the weather.** Planes can't fly through thunderstorms, so they must deviate around them. That causes more workload, since controllers are not only separating aircraft from other aircraft, but also from adverse weather.

In Area Control Centers, thunderstorm is **a major weather problem** because it can **present hazards** to aircraft. Aircraft will deviate around storms, **reducing the capacity** and **causing congestion** as many aircraft try to move through a single hole in a line of thunderstorms. Occasionally, weather can cause delays to aircraft prior to their departure as routes are closed by thunderstorms.

Strong jet stream winds **create turbulence** at the upper altitudes. Unlike thunderstorms, turbulence can't be observed on radar screens — all information comes from pilot reports.

Dealing with bad weather is one of the most difficult things for air traffic controllers. It means **unusual flight patterns** and additional workload. Bad weather can severely **impact air traffic control** as aircraft are re-routed to avoid the bad weather areas. Dealing with marginal weather **is pretty common** and we **apply procedures to manage the air traffic**, such as 'flow regulations' to **minimize holding and fuel burn**. It results in a very busy shift for controllers.

Key Vocabulary

deal with marginal weather	*иметь дело с непогодой*
impact air traffic control	*повлиять на УВД*
unusual flight patterns	*необычные схемы полета*
pretty common	*довольно распространенный*
apply procedures to manage air traffic	*применять процедуры УВД*
to minimize holding and fuel burn	*снизить время ожидания и расход топлива*
presents the highest risk	*представляет наибольший риск*
may be accompanied by…	*может сопровождаться*

Natural Disasters

How can natural disasters impact flight operations?
Are there any natural disasters specific for your area?

Natural disasters such as tornados, hurricanes, tsunamis, floods, volcanic eruptions, earthquakes can cancel flights, **disrupt schedules**, result in crowds of **stranded passengers** and be costly for operators. They **slow down airport operations** and may **bring airports to a standstill**. They are **more likely** to occur in seismic areas. However, each region has its own challenges.

Earthquakes

Earthquakes are the most devastating and are more common in coastal regions. Ground tremors can confuse ILS, damage runway and taxiway. The extent of damage depends on the magnitude.

Volcano Eruption

Aircraft avoid any airspace that has volcanic ash. It can be catastrophic, as ash ingested by jet engines may affect engine performance and cause engine failure. That is not the only problem. Ash can scratch the windscreens, damage the fuselage and even coat the plane so it becomes heavy.

Flood

Thunderstorms can produce significant floods in a very short period. Obviously, flood and any standing water can cause aquaplaning and a loss of control for any aircraft and airport vehicle on the ground.

Key Vocabulary

earthquake	*землетрясение*
hurricane	*ураган*
slow down operations	*замедлить работу аэропорта*
disrupt schedules	*нарушить расписание*
stranded passengers	*блуждающие пассажиры*
bring airports to a standstill	*парализовать работу аэропорта*
devastating	*разрушительный*
costly for operators	*дорого обходятся авиакомпании*

Dangerous weather phenomena

CB	CB clouds are the sign of intense electrical storm activity and cause the crew to change heading to avoid them. Flying in CB can destabilize the aircraft and damage its electronic equipment.
Rain	It affects visibility, reduces braking efficiency, and makes the approach more difficult. There is a probability of a runway excursion.
Turbulence	It may cause injuries for passengers and lead to speed fluctuations.
Wind	A headwind will delay the arrival of flights. A tailwind increases the ground speed and reduces fuel consumption. A crosswind can make landings and take-offs more difficult and can lead to structural damage to the aircraft's undercarriage and running off the RW.
Thunderstorm	It's among the riskiest weather conditions. It can produce severe turbulence, low-level wind shear, low ceilings and visibility, hail and lightning. Changes in air pressure and temperature inside a thunderstorm can also lead to icing. These hazards can lead to structural damage, injuries to crew and passengers, loss of separation, level bust and loss of control.
Microburst	It is a sudden severe downdraft over a small area. It's difficult to predict and especially hazardous during landing and takeoff.

Dealing with marginal weather

How can pilots get prepared for dealing with adverse weather?

Pilots always **get briefed on** significant weather to **plan a safe route** and to **circumnavigate CB cells** using: significant weather charts, NOTAMs, weather forecasts at airports, ATIS, onboard weather radar, PIREPs, live ATC inputs.

The best solution is avoiding regions or altitudes where adverse weather was reported by other pilots. Pilots typically **file PIREPs to alert other pilots** when they experience in-flight chopping or CB formations. Air traffic controllers should **provide timely information** to pilots and coordinate any deviations with the adjacent sectors. Unfortunately, it is impossible to prepare for all weather threats.

- **Clear Air Turbulence** is the most unpredictable as it occurs in a clear weather.
- **Embedded thunderstorm**. Some extensive vertical clouds can be obscured by other CB formations and can be invisible even while in flight.
- **Wake turbulence** is formed behind large aircraft due wingtip vortices.

What operating practices have been developed for pilots and controllers to deal with marginal weather conditions?

Flight Planning. The weather briefing (SIGMET charts) will show areas of predicted CB activity.

Weather radar. Most aircraft are fitted with weather radar. It scans the area ahead and shows how much precipitation there is en-route and how far it is.

Routing. Thunderstorm area should be avoided by a minimum of 5,000 ft vertically and 20 NM laterally to minimize the risk of encountering severe turbulence.

Speed Reduction. All aircraft have to reduce airspeed if severe turbulence is encountered to minimize stress on the aircraft structure.

Cabin Preparation. Pilots inform the cabin crew and passengers in advance to make the cabin secure and warn people to get fastened.

Turbulence

What causes turbulence?

Wake turbulence forms behind large aircraft. Wake vortices spread up to 5 miles away. The most dangerous situation is for a small aircraft to fly directly into the wake of a larger aircraft.
Clear air turbulence is the leading cause of turbulence related injuries, because it's sudden, unpredictable, and occurs in clear weather.
Jet Stream can create turbulence at the high altitudes, and weather radar can't detect it – all information comes from pilots' reports.
Mountainous area can generate lots of turbulence especially if there are strong winds. Generally, all mountainous terrains are prone to turbulence.

What problems may pilots experience flying in turbulence?

Turbulence is the leading cause of in-flight injuries.
Aircraft may temporarily lose control.
It may result in speed fluctuations.
It may lead to loss of altitude.
It may cause structural damage to airframe.
However, modern jets are quite flexible and can manage turbulence. Serious damage to aircraft due turbulence is extremely rare.

What are possible levels or degrees of turbulence?

Light turbulence. It feels a bit choppy, but it doesn't form any changes in pitch, altitude or heading. The aircraft is fully under control.

Moderate turbulence. It is really bumpy. The aircraft has moderate changes in altitude and heading, but the plane is still under control.

Severe turbulence. Pilots may experience problems controlling the aircraft or reaching the autopilot panel.

Extreme turbulence. Aircraft is completely or partially out of control, it may suffer a possible structural damage. It is found inside a severe thunderstorm.

Icing

In-flight icing	**produces**	errors in instrument readings
	increases	the stall speed of the aircraft
	decreases	lift
	affects	communications systems
	damages	compressor blades of jet engines
	causes	engine failure
	reduces	visibility

Aircraft are **designed to operate** at extremely low temperatures. However, even if an airplane is equipped and **certified to operate in icing conditions**, pilots should avoid flying in icing area.

Accumulation of ice on aircraft can **reduce aircraft performance** in different ways. Fuel freezing can lead to loss of power due to fuel starvation and potentially can result in engine failure.

Pilot may request change in altitude/heading and search for areas clear of clouds or with warmer temperature, climb, descent, 180-degree turn, or immediate landing at a nearby airport. It will depend on traffic, terrain, cloud conditions, and availability of suitable airports.

A pilot in command of an aircraft must advise ATC of a hazardous weather. Those reports should include location and severity of icing. Because icing is forecast for extremely broad areas, AIREPs may be the only information about location of icing, the conditions at a particular time in a specific place.

Spraying the aircraft with special fluids helps to remove any accumulation of ice or snow. Actually, it is a two-step process:
Step 1: De-icing removes ice, frost, and snow from aircraft surfaces.
Step 2: Anti-icing protects the wings from new ice, frost, and snow.

De-icing means the removal of ice.
Anti-icing means preventing ice from forming.

Holdover time is a certain period of time for which an anti-icing fluid will prevent the formation of frost and ice. Deicing is performed after everyone is on board and the plane is ready to take off.

Key Vocabulary

designed to operate	*спроектированный для полетов*
accumulation of ice	*образование льда*
reduce performance in different ways	*ухудшить эксплуатационные характеристики по-разному*
certified to operate	*сертифицированный для полетов*
for a certain period of time	*в определенный промежуток времени*

Aviation Security

Aviation is **an attractive target** for terrorists, so big airports **are busy upgrading their security systems**. Every passenger and every bag boarding a flight **is screened** to reduce the risk of a security incident. **Passengers are screened** for weapons and dangerous goods before boarding an airplane. Security checks are **strict and inconvenient** for passengers; however, they are in place to protect us.

In future terrorists will continue to innovate and design explosive devices. So aviation **security measures must be a step ahead.** Passenger screening may involve **banning liquids and laptops**. But the main factor is human behavior. Airport 'screeners' must be also good psychologists **to spot potential terrorists** in the crowds of travelers.

One of new challenges in aviation today is **cyber terrorism**. Cyber terrorism may replace the hijacker and become a weapon. A hacker could use a plane's onboard Wi-Fi signal or in-flight entertainment system to hack into its avionics equipment, damaging aircraft's navigation and safety systems.

Key Vocabulary

an attractive target for terrorists	*привлекательная мишень для террористов*
upgrade security systems	*улучшать системы безопасности*
biometric scanning	*исследование биометрических данных*
iris recognition	*распознание радужной оболочки глаз*
fingerprinting	*снятие отпечатков пальцев*
screen for weapons	*проверять на наличие оружия*
search for explosives	*искать взрывчатые вещества*
strict and inconvenient measures	*строгие и неудобные меры*

Bomb threat

High altitude operation increases the risk of damage in case of an explosion. It is dangerous as the aircraft can become depressurized or even crash. Aircraft should be cleared to lower flight levels as soon as possible. The pilot may request **bomb squad (bomb disposal team)** to check the aircraft upon landing. To **reduce the impact** at airport the emergency plane will be parked in the remote area. Immediately upon landing the luggage **will be offloaded** for inspection. In fact, **most bomb alerts are fake**, however, some of them are real when terrorists threaten to **set off explosives**.

ATC procedures

If there is a bomb on board the aircraft the controller's reaction is to get the aircraft on the ground as soon as possible. The crew will advise on where they want to divert to, and this is entirely their decision. The controller should clear the airspace and **consider** the following factors:

- a diversion to a more suitable airfield;
- vectoring away of busy areas
- coordination with other units
- requests for step-climb and descent

Key Vocabulary

offload luggage for inspection	*выгрузить багаж для досмотра*
fake bomb alert	*ложный сигнал о бомбе*
reduce the impact	*уменьшить ущерб*
threaten to set off explosives	*угрожать активировать взрывное устройство*
consider	*рассматривать, обдумывать*
bomb squad (bomb disposal team)	*саперы*
remote area	*удаленная стоянка*

Hi-jacking

The term ‘hi-jacking’ means an unlawful activity, when the pilot is forced to fly according to the orders of hijackers. Most aircraft hijackers intend to use the passengers as hostages or can **use planes as missile**. In most cases, hi-jacking involves a great number of casualties, so terrorists are trying to receive publicity in mass media.

Acts of unlawful interference do not **follow any specific scenario**. Many of the early hijacking incidents involved persons seeking for **asylum.**

Possible signs of hi-jacking for a controller can be:

- Partial or complete loss of communication with the crew;
- Immediate descent and landing;
- Flight path deviations;
- Diversion to an airport, not listed in the flight plan;
- Possible on-board bomb threat;
- RW blockage after landing;
- Medical help might be required.

For ATC the first problem is to recognize that an aircraft has been hi-jacked. But the pilot may not be allowed to change his transponder setting to the code of 7500. He is also not allowed to use the radio. So, **from a controller's viewpoint** he has a flight with radio failure. But radio failures are so rare nowadays, that the controller should immediately think of a possible hi-jack. But in this case the controller has **absolutely no control of events.** In this case the controller should **keep other traffic away** from the hi-jacked flight. He should inform his supervisor, the operating company, the military, other air traffic units (especially, adjacent).

Key Vocabulary

unlawful activity	*незаконное действие*
casualties	*жертвы*
publicity in mass media	*резонанс в СМИ*
seek for asylum	*искать политическое убежище*
use planes as missile	*использовать ВС как оружие*

Drones

UAV in aviation stands for **unmanned aerial vehicles**, also known as drones. A drone is an unmanned aircraft that can be **remotely controlled**. It may have different size, type and speed. For example, nano-drones fly less than 30 minutes, while large military strategic drones can stay airborne for more than 2 days. A drone can fly a range from less than 1 km up to 2000 km.

Each month pilots and controllers report about 100 drones flying into restricted airspace. Drones **present a serious risk**, as they can strike a windshield or get into the engine. A single **drone sighting** can lead to delays and airspace/aerodrome closures. Some military drones are **used as weapons**.

Pilots must report the drone sighting to ATC and provide as much information as possible about: location, altitude, distance, maneuvers (moving or stationary), drone size, shape and other details (if it has a camera, color, lighting, etc.).

Current rules restrict drone operators from flying within 5 miles of an airport and above 400 feet. ATC service should be aware of such cases to warn other pilots and alert security to search for the drone operators. If the weight of the drone is more than 30 kg, it must be registered. The owner must obtain a special license to operate a drone. To **launch a drone,** you must get a permission from the local aviation authorities.

Key Vocabulary

UAV	*БПЛА*
remotely controlled	*дистанционно управляемый*
present a serious risk	*представляют серьезный риск*
are used as weapons	*используются как оружие*
launch a drone	*запустить дрон*

Speaking tips

HOW CAN A SITUATION DEVELOP?

We can anticipate different scenarios...
The best scenario is...
In the worst case…
It is typically assessed as an emergency...
In this case the pilot is short of options...

WHAT ARE THE MOST COMMON CAUSES?

Actually, there are many possible reasons for it.
The reasons may be different / numerous / limitless...
The most common / likely reasons...
It typically results from...
It can arise due to...
Another possible reason is...

WHAT ARE THE MOST COMMON CAUSES?

Actually, there are many possible reasons for it.
The reasons may be different / numerous / limitless...
The most common / likely reasons...
It typically results from...
It can arise due to...
Another possible reason is...

HOW SERIOUS IS THE PROBLEM?

It is (not) critical to safety…
It can present a high-risk scenario…
It is typically assessed as an emergency...
It will badly affect…
It is pretty serious / dangerous / risky…
It can be deadly.

WHAT ARE THE RELATED PROBLEMS?

Some related problems may arise such as…
It can create additional problems…
It can lead to…/result in…/ develop into…/ turn into…

Possible Questions

- What is your job?
- What ATC ratings (endorsements) have you got?
- What are your main duties at work?
- Describe your work schedule.
- Do you prefer to work night or day shifts? Why?
- What do you like most about your work?
- Do you find your job challenging? Why? / Why not?
- What is special about the ATC unit you work in?
- Do you like the unit where you work? Why? / Why not?
- Could you tell me about your area structure?
- What are the dimensions of your area?
- What kind of restrictions are there in your area?
- What should you do if the restrictions are in force?
- How does the air traffic service cooperate with the military unit?
- What situations / actions need coordination with the military?
- What difficulties may you face due to military traffic?
- What kind of difficulties may you face in your operating area?
- What difficulties may you face when controlling traffic?
- How do equipment failures affect your operations?
- What actions do you take when you have problems with your equipment?
- How much do weather conditions influence ATC operations on the airfield where you work?
- Who controls your work?
- What role do aviation documents play in your work?
- How do they help in your work?
- What documents have a higher priority: the ICAO or the local ones?

- What problems may occur if two aircraft under your control have similar call signs?
- What may happen if two pilots start transmitting simultaneously?
- What do controllers do if they observe a potential conflict situation?
- What kind of regular training do you do to maintain your professional level?
- What professional courses do you have on a regular basis?
- How often do you do the simulator training?
- Do you ever have problems understanding foreign pilots?
- What skills do you need to pass the English test at ICAO Level 4?
- What is the difference between standard phraseology and plain English?
- In your opinion, what effect do stressful situations have on the ability to communicate in another language?
- What helps you to maintain the necessary level of English proficiency?
- How do your authorities arrange controllers' learning English?
- What language skills should controllers develop?
- Do you think English training is still necessary for air traffic controllers now that our airspace is closed for most foreign flights? Why do you think so?