VACC LITHUANIA

Tower Controller Handbook

Version 1.0

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Document Revision Information

Version	Date	Reason for Revision
0.1	01 JUN 2025	Initial draft
0.2	28 JUN 2025	Styling, layout, incorporated internal feedback
0.3	03 JUL 2025	Incorporated external feedback
1.0	05 JUL 2025	Initial Release

0. Introduction

0.1. Purpose and Applicability

This vACC Lithuania Tower Controller Handbook (hereafter - Handbook) is intended to be used in the virtual airspace of Lithuania on the VATSIM network for non-radar Tower (TWR) Air Traffic Control Officers (ATCOs) at Vilnius airport. This Handbook is a general document that shall be used for providing **virtual** air traffic control services. Any additional required laws, rules and parts of documents will be placed in the text where it is applicable, and needed references will be added otherwise.

0.2. Requirement Characterization

The requirements in this Handbook conform to the following keyword conventions with formatting as indicated:

- Requirements using the operative verb **"<u>shall</u>"** are mandatory;
- Requirements using the operative verb **"<u>should</u>"** are recommended;
- Requirements using the operative verb **"<u>may</u>"** are optional.

Requirements may be followed by a free text note or example to give additional explanation or supplementary information.
Other markup and text styling can be freely used to point out certain situations or special cases.

0.3. Other Notes

English **<u>shall</u>** be the primary language used for providing ATC service on the VATSIM network within the airspace of vACC Lithuania.

In case of any questions or feedback, don't hesitate to contact vACC Staff via email or Discord as listed on the website.

1. General Tasks of an ATCO

Air Traffic Control Officers (ATCOs) are the people responsible for providing Air Traffic Control Service, according to **ICAO Doc 4444 - Air Traffic Management** (this document is something like the bible of air traffic control, setting international standards) and **ICAO Annex 11 - Air Navigation Service**. Annex 11 provides the following definition:

> ***Air traffic control service.*** A service provided for the purpose of:
>
> a) preventing collisions:
>
> 1) between aircraft, and
>
> 2) on the manoeuvring area between aircraft and obstructions; and
>
> b) expediting and maintaining an orderly flow of air traffic.

Point a) can be summarized with the term ***Safety***. This point has the highest priority. Within the framework of air traffic control service, we prevent collisions between aircraft by establishing and ensuring separation. To prevent collisions on the ground, we issue safe taxi instructions.
Point b) can be summarized with the term ***Efficiency***. According to the mentioned regulations, the air traffic controller is also obligated to handle traffic not only safely but also *expeditiously* and in an *orderly manner*.
At the start of your training, the primary focus is safety, but we also want to train you to become an efficient controller within a reasonable amount of time. It will be very important for you to correctly prioritize and manage the many tasks of an ATCO, demonstrate good planning and efficient use of your frequency.
However, the topic of traffic control efficiency is difficult to describe theoretically, which is why our mentors will work on it with you during practical sessions.

2. Tasks of an ATCO in the Tower Position

2.1. Checking of Flight Plans

Before a pilot receives their enroute clearance, the flight plan **shall** be checked for accuracy. Particular attention should be paid to:

- Valid Callsign - the ICAO 3-letter code **shall** be used, not the IATA 2-letter code, e.g.: BTI and *not* BT;
- Appropriate Flight Rules - IFR or VFR;
- Valid Flight Plan - depending on SOPs, the first waypoints **shall** be checked for restrictions.

2.2. Issuing Enroute Clearances

The enroute clearance, also known as an IFR clearance, is typically the first clearance that a controller provides to departing IFR traffic, where the pilot, in addition to being assigned a transponder code and initial altitude, also receives a departure route and the flight route itself. Generally, the departure route is a SID, issued according to local procedures. However, under certain circumstances (e.g.: for a local IFR flight or if the pilot is unable to comply) a vectored departure **should** be assigned.

2.3. Issuing Startup Clearances

Startup clearance **should** only be issued if the flight can expect pushback soon, or if it can expect to depart shortly. At non-ACDM airports (Vilnius included), startup clearance **shall not** be given if the expected delay exceeds 20 minutes.

2.4. Issuing Pushback Clearances

Depending on the parking position, an aircraft may need to be pushed back before it can taxi to the runway. The controller **should** arrange this in such a way that other aircraft are minimally delayed.

2.5. Issuing Taxi Clearances

One of the core tasks of a tower controller is the issuance of taxi clearances. Departing aircraft need to reach the runway, and arriving aircraft need to be directed from the runway to a parking position. A key characteristic of a great controller is their ability to pre-plan traffic. Without pre-planning, aircraft may have to wait unnecessarily because a taxiway is blocked, or taxi conflicts may occur. This wastes time, fuel and harms the environment. The general controller principle is *"Safe, Orderly, Expeditious"* meaning an accident-free, well-organized and punctual flow of traffic.

2.6. Timely Recognition and Resolution of Taxi Conflicts

The airport is where aircraft operate closest to each other. Therefore, it is all the more important to identify potential conflicts between moving (pushing back and taxiing) aircraft early on. This goes hand in hand with good pre-planning. Under no circumstances should two aircraft end up blocking each other's way because neither knows who should go first. And an "opposite", a situation where two aircraft face each other with no safe way out **shall** be avoided at all costs.

2.7. Determining the Runway Direction

The tower controller **shall** decide the runway in use at an airport. This primarily depends on the direction and speed of the prevailing wind, which can be obtained from the latest METAR and TAF. The active runway **shall** then be published via ATIS and passed on to other controllers.

2.8. Takeoff, Landing and other Runway Area Movements

The runway is the sanctuary of the tower controller. They are the one to issue clearances for takeoff and landing as well as line up, crossing and backtrack. Takeoffs **shall** be timed so that either radar separation, wake turbulence separation, or minimum spacing is ensured in the air. Landing clearance **shall** be granted only once no one else has clearance for that runway, and separation is guaranteed. *Correct runway separation* ***shall*** *be maintained at all times.* Besides a standard lineup clearance, conditional clearances **should** be used to optimize efficiency. Under certain circumstances, such as when handling heavier aircraft with larger wingspans, a backtrack **shall** be issued.

2.9. Creating a Departure and Arrival Sequence

The principle of "first come, first served" generally applies in air traffic control. This means the first aircraft at the runway holding point **should** the depart first. However, in scenarios where it makes sense and would be beneficial, the tower controller may deviate from this, to minimize average delay, for example. The arrival sequence for IFR traffic is predetermined, as arriving aircraft are handled by the approach controller, and the tower controller cannot alter the sequence themselves. However, the tower has control over VFR traffic and **shall** determine which VFR aircraft should fit into which gap between IFR traffic. The tower **may** also determine an approach sequence for multiple VFR aircraft.

2.10. Handling Missed Approaches

A missed approach or go-around can be initiated by either the pilot or a controller. As a tower controller, you should be aware of the old saying "plan every approach as a go-around, with an optional landing" and **shall** be prepared to issue or receive and manage a go-around.

2.11. Control of VFR Traffic within the Control Zone

The tower controller **shall** be responsible for the flow of VFR traffic in and out of the control zone and the issuing of necessary clearances. Since VFR traffic is not required to be separated from each other, traffic information **shall** be provided if two aircraft are approaching each other. The tower controller also **may** delay VFR traffic within the control zone, by issuing instructions for orbits, extending the downwind leg, or setting an approach sequence. Additionally, the tower **may** grant VFR traffic various training approaches, such as low approaches or touch-and-goes. VFR traffic **shall** be separated from IFR traffic though, and for this, the designated VFR holding areas published in AIPs and SOPs are used.

2.12. Monitoring and Maintaining Separation

Separation **shall** be assured between IFR aircraft within the control zone. This applies equally to departures, arrivals and aircraft executing missed approaches. For departures, the tower **shall** decide when to issue takeoff clearances such that safe separation is attained. Arrivals **shall** be handled by the approach controller in such a way that the tower controller usually does not need to intervene. However, situations may arise where a pilot unexpectedly reduces speed early, causing the following aircraft to catch up. Therefore, the tower **shall** also monitor separation and instruct a missed approach if there is a risk of separation loss. In the case of a missed approach, the tower controller **shall** continue to ensure separation between all aircraft under his control.

3. Wake Turbulence Separation

WTS **shall** be applied between aircraft in the **approach or departure phases** when:

- an aircraft directly follows another at the same altitude or less than 1 000 ft below it;
- an aircraft is crossing behind another aircraft, at the same altitude or less than 1 000 ft below it;
- both aircraft are using the same runway or parallel runways less than 760 m apart;
- the aircraft use crossing or parallel runways (distanced by 760 m or more) and one aircraft flies through the flight path of the preceding aircraft at the same altitude or less than 1 000ft below it.

WTS **shall not** be applied to:

- approaching VFR flights;
- approaching IFR flights that are performing a visual approach, have reported the preceding aircraft in sight and have been instructed to follow it and maintain their own separation.

With the latter cases, a **wake turbulence warning** (CAUTION WAKE TURBULENCE) **shall** be issued.

Please see this SKYbrary article for more information.

3.1. Wake Turbulence Categories

WTC	MTOM
Light (L)	MTOM ≤ 7 t
Medium (M)	7 t < MTOM < 136 t
Heavy (H)	MTOM ≥ 136 t
Super (J)	Types A388; A225

Of course, you don't need to memorize how heavy each aircraft is. In addition to the aircraft type, the corresponding WTC can always be found in the flight plan.

3.2. Minimum Separation Values for Departing Traffic

Preceding ACFT WTC	Succeeding ACFT WTC	Separation Value (Full length T/O)	Separation Value (TWY E or D intersection T/O)
M	L	2 min	3 min
H	L	2 min	3 min
	M	2 min	3 min

J	L	3 min	4 min
	M	3 min	4 min
	H	2 min	3 min

If a category combination is not listed, standard separation **shall** be used.

4. Separation Minima Between Flights Inside Vilnius CTR

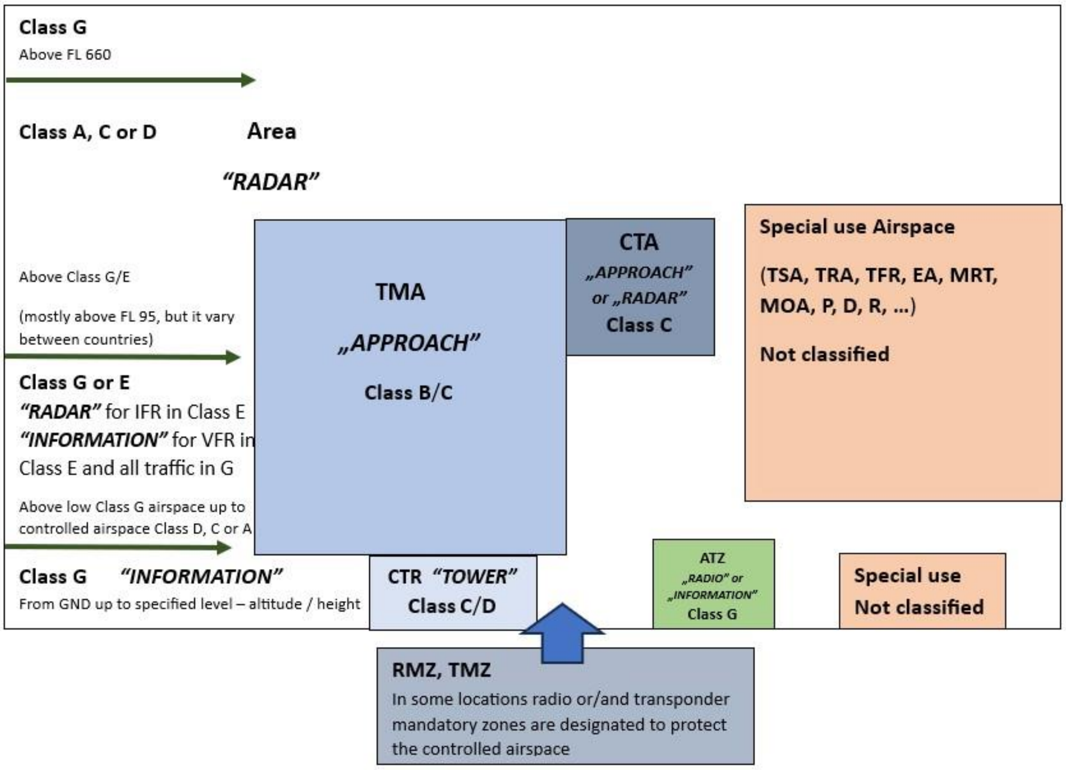
Vilnius CTR is class C airspace, thus separation between IFR-IFR and IFR-VFR flights of minimum 3 NM is mandatory. According to ICAO Doc 4444, this separation **may** be reduced in the vicinity of aerodromes if the situation demands it, provided that:

- Otherwise adequate separation can be provided by aerodrome controller when each aircraft is continuously visible to the controller; or
- Each aircraft is continuously visible to flight crews of the other concerned aircraft and the pilots thereof report that they can maintain their own separation; or
- In the case of one aircraft following another, the flight crew of the succeeding aircraft reports that the other aircraft is in sight and separation can be maintained.

5. Airspace Classes

In Lithuania, three airspace classes are used: C, D and G. Your task is to study and know them.

Please see [this SKYbrary article]() and the [relevant VATSIM Learning Center section]() for more information.



The name in italics (i.e. *"TOWER")* – indicates the ATS unit responsible for the part of airspace

Some special use airspace elements are flexible (TSA, TRA, TFR, EA, MRT, D, ...) their hours of activity are published for every day in airspace use plan (AUP). Areas P and R are usually permanent as well as CTR, TMA, ATZ. However, at small controlled aerodromes in some periods the ATC may not be available, at that time the airspace is downgraded to Class G and automatically the aerodrome becomes uncontrolled, so the CTR and sometimes also the adjacent TMA disappears, note that it is not published in AUP but in NOTAM.

Illustration credit: [*VFR-Europe.eu*]()

6. Flight Plans

A flight plan specifies how a flight is planned to be conducted. Along with the callsign and aircraft type, it **shall** also include the planned route, altitude, and speed. This ensures that both the pilot and the controller are on the same page with the intentions of the pilot.

6.1. Flight Plan Format

The format of flight plans is identical worldwide and prescribed by ICAO. This format includes all the key information that air traffic control needs to know from the pilot. Here is an example:

```
(FPL-FPY26W-IS
-A320/M-SDE1E2FGHIJ1RWXYZ/SB1
-BIKF1520
-M077F370 DCT OSKUM DCT 63N010W/M076F370 DCT ERSER/N0458F370 DCT VATEX DCT
GELDA DCT DOKOT DCT OTNAV
-EYVI0328 EYKA
-PBN/A1B1C1D1O1S2 NAV/RNP2 GPS SUR/260B DOF/250601 REG/9HMLY EET/OSKUM0012
63N010W0049 ERSER0127 ENOR0127 ESAA0214 EVRR0251 EYVL0300 SEL/GMQR
CODE/4D2476 RVR/75 OPR/MLH PER/C RMK/TCAS EQUIPPED)
```

Don't worry if you can't understand all of it at this time, it will make sense with practice.

7. Surveillance

Surveillance provides vital information such as the position, height and identification of aircraft. It is primarily powered by radar and transponders.

7.1. Radar Essentials

There are two types of radar for monitoring air traffic:

- **Primary Surveillance Radar (PSR):** These are the large, rotating radar antennas that detect so-called primary targets. According to a simple physics principle, the radar emits pulses that are reflected by aircraft. The radar can then calculate the distance to the detected target based on the time between transmitting the pulse and receiving the reflection. A return from this radar alone will show only a blip with no other information, the transponder plays no role for this type of radar.
- **Secondary Surveillance Radar (SSR):** Secondary radar is used to obtain information about the aircraft's callsign and altitude in addition to its position. This is based on a question-and-answer principle. The radar sends a trigger signal to the transponder, which then sends the code and altitude back to the ground station.

7.2. Transponder Code and Correlation

The pilot can enter a four-digit numeral code into their transponder. The transponder has the numbers 0-7 available for each digit. The system is therefore based on an octal code and offers 4096 different possibilities for a transponder code. The pilot receives the code to be set in the transponder from Air Traffic Control. But why do we see a callsign on the radar and not a four-digit number? As soon as the controller has assigned the transponder code on the ground, this code is stored in the database as belonging to this specific aircraft. As an example, let's assume that flight DLH414 is assigned the code 2301. When flight DLH414 takes off, it emits code 2301 and is detected by a secondary radar. The radar then sends the position, altitude and code of 2301 to the air traffic control center. The radar system then checks this with the database and recognizes that code 2301 belongs to flight DLH414. The system therefore displays the callsign DLH414 and the corresponding altitude to the controllers at the reported position.

Notable transponder codes:
7700 – General Emergency;
7600 – Radio Failure;
7500 – Hijacking (prohibited in VATSIM);
7000 – Standard VFR Code (when no other code assigned);
2000 – Standard IFR Code (when no other code assigned);
1000 – Code used with Transponder Mode S Identification.

The topic of surveillance goes much deeper than was covered here, for further reading we recommend the following SKYbrary articles on surveillance, PSR, SSR and transponders, as well as relevant sections of the VATSIM Learning Center.

8. IFR Basics

8.1. Enroute Clearance

The enroute clearance, often also called an IFR clearance, is usually the first clearance that an air traffic controller gives to any departing IFR pilot. As the name suggests, it contains important instructions for the flight route the pilot is cleared for.
Fortunately, the structure of an enroute clearance is always the same. It consists of the following elements:

- Clearance limit
- Departure route
- Route clearance
- Initial climb
- Transponder code

These elements will be explained in more detail below, followed by phraseological examples at the end.

8.1.1. Clearance Limit

This is typically the destination of that flight.

8.1.2. Departure Route

In the second part of the IFR route clearance, the pilot is told which departure route to take off on. There are a handful of possibilities for that:

- **Standard Instrument Departures (SIDs)** are the most common departure procedure type for IFR flights. A valid flight plan with these always contains the end point of a SID as the first waypoint, for example, UPASI, for the UPASI1A departure out of Vilnius. From this point onwards, the pilot has various airways and waypoints listed in the flight plan that will ultimately take them to the destination aerodrome. If the airways are regarded as highways, the SIDs would be the slip roads, i.e. routes from a connection point (airfield) to the highways (airways). The published SIDs depend on the airport's operating direction and contain information on flight direction, altitude and speeds.
- **Omnidirectional Instrument Departures (OIDs)**, unlike SIDs, do not end at specific waypoints, but consist of one or more headings (often just the runway heading) without a defined endpoint. Therefore, the aircraft on an OID must receive instructions or radar vectors to the first enroute waypoint. An OID usually has to be coordinated between the tower controller and the approach controller.

8.1.3. Route Clearance

With the first two items of the clearance, we have told the pilot up to which point their enroute clearance applies and how they should fly to the first waypoint in the flight plan. What is still missing, however, is how they should fly from the first waypoint or the SID endpoint to the clearance limit. Most often this is simply the route filed in the flight plan.

8.1.4. Initial Climb

Even if a SID has an assigned initial climb in the charts or the AIP, it **shall** still be explicitly mentioned in every enroute clearance. The initial climb is the altitude up to which the pilot may climb independently after take-off without further clearance.

8.1.5. Transponder Code

Last, but not least, the transponder. The purpose of this is to uniquely identify an aircraft on the radar. The transponder code is provided after the word SQUAWK.

8.1.6. Examples

If we bring these items together we can create our first IFR enroute clearance.
As an example, let's assume a flight from Vilnius to Warsaw with the point UPASI from runway 01. The transponder code is 7135. The callsign is LOT776.
The complete transmission is:

ATC: *LOT776*, **CLEARED TO** *WARSAW*, **VIA** *UPASI1A* **DEPARTURE**, **FLIGHT PLANNED ROUTE**, **CLIMB TO** *FL90* INITIALLY, **SQUAWK** *7135*, *(additional information or instructions)*.

The words in **bold** are always the same, the words in *italics* are to be adapted to each flight and prevailing conditions.
A clearance for an OID would look like:

ATC: *LOT776*, **CLEARED TO** *WARSAW*, **OMNIDIRECTIONAL DEPARTURE RUNWAY** *01*, CLIMB ON *RWY HEADING* TO *FL90*, **FLIGHT PLANNED ROUTE**, **SQUAWK** *7135*, **AFTER DEPARTURE CONTACT VILNIUS APPROACH ON 120.705.**

You may be wondering why the departure frequency is mentioned in the OID. All SID charts in Vilnius say that the pilot should call 120.705 after take-off, so if a pilot is cleared for UPASI1A, for example, the instruction to call 120.705 after take-off is included with that. For a vectored departure, however, there is no chart. Therefore, this instruction **shall** be provided separately with the enroute clearance.

9. Approach

The approach is an important phase of flight where an aircraft is guided to align with the runway and prepares for landing.
The segments of an instrument approach are as follows:

I. **Arrival Segment:** This segment represents a transition from the enroute phase to the approach phase of the flight;
II. **Initial Approach Segment:** This segment begins with the Initial Approach Fix (IAF) and ends at the Intermediate Fix (IF);
III. **Intermediate Approach Segment**: This segment usually begins at the Intermediate Fix (IF) and ends at the Final Approach Fix (FAF) (non-precision) or Final Approach Point (FAP) (precision);
IV. **Final Approach Segment:** This segment normally starts at the FAF/FAP and ends at the Missed Approach Point (MAPt);
V. **Missed Approach Segment:** This segment begins at the MAPt and usually ends in the published holding procedure or at the IAF. It is intended to provide protection against obstacles during the entire missed approach procedure.

Below is are overviews of the most common types approaches:

ILS Approach

The ILS approach is the most widely used approach procedure at controlled airports in Europe and is accurate and reliable enough to be classed as a **precision approach**.
ILS stands for **I**nstrument **L**anding **S**ystem and consists of ground-based landing course transmitter, or localizer (LOC), and glide path transmitter, or glide slope (G/S). The former provides horizontal guidance (displayed as deviation to the left or right of the extended centerline), while the latter provides vertical guidance (displayed as the deviation from the ideal glide path for the approach). The combination of these two components guides the pilot precisely onto the runway, even in poor weather conditions, and in some cases also enables completely automatic landings. In order to use this approach procedure, the airport and aircraft must be equipped accordingly.

RNP/RNAV Approach

RNP (**R**equired **N**avigation **P**erformance) approaches, formerly called RNAV approaches, use GNSS for guidance. In contrast to an ILS approach, they are classed as a **non-precision approach**. These approaches are usually flown when the ILS is inoperative, not installed, or for training purposes. With a well-equipped aircraft, however, this approach type can offer low decision altitudes, similar to those of an ILS.

VOR Approach

Sometimes no ILS or RNAV is available at the destination airport or the expected runway. In that case, a VOR approach could be used. This approach type is classed as a **non-precision approach** as well. On this approach, the pilot utilizes a fixed radio navigation beacon on the ground and follows its radial.
It is important for the controller to know that this approach procedure is very imprecise compared to those discussed earlier. The aircraft may deviate noticeably to the left or right of the extended centerline. They fly the approach to the missed approach point (MAPt) or until the runway is in sight. As there is no precise vertical guidance for this approach, the decision height is relatively high. Therefore, VOR approaches are not recommended in poor weather.

Visual Approach

Visual approaches are mostly requested in good weather conditions. Although there are many airports in real life where such an approach is no longer permitted for noise protection reasons, it can be used more often on the VATSIM network. A visual approach is not an instrument procedure and does not constitute a flight rule change - the flight does *not* become VFR.
The following conditions must be met for a visual approach to be carried out:

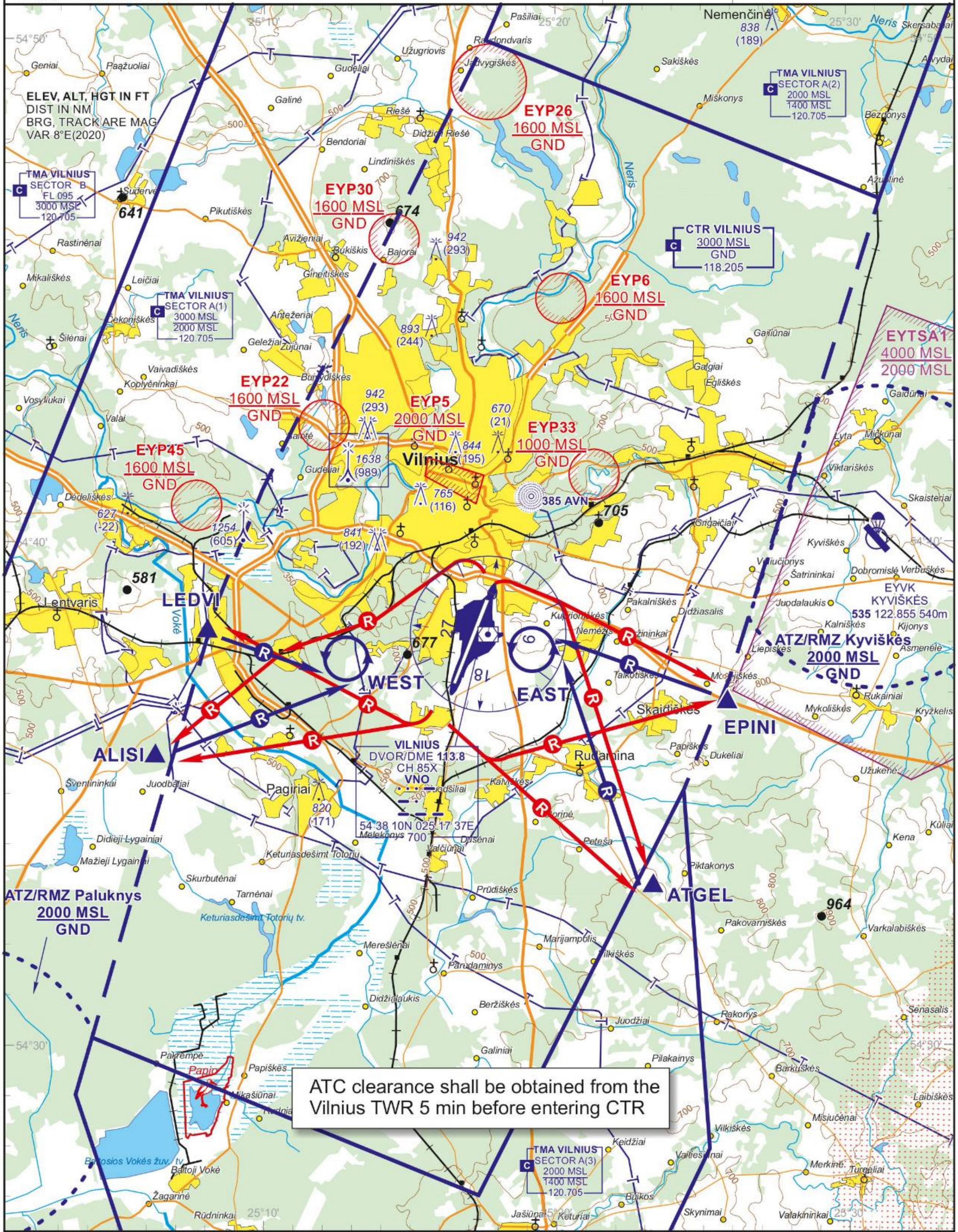
- Pilot requests or, upon offering, accepts the visual approach;
- Aircraft is below the ceiling, which is above the MVA or the pilot confirms that the visibility conditions are sufficient for the approach;
- Pilot has the airport and the traffic ahead in sight.

A visual approach **shall** always be coordinated with the tower controller.

10. VFR Basics

Visual Flight Rules (VFR) traffic navigates primarily by sight, using roads, rivers and other landmarks as guides. There are specific visual flight charts for this purpose, which pilots and controllers at an airport must be familiar with. Among other things, these charts show the mandatory reporting points used to enter and leave the control zone (see chart below). Furthermore, certain routes and holding patterns may be specified, which a pilot must adhere to.

VISUAL APPROACH CHART - ICAO TRANSITION LEVEL By ATC TRANSITION ALT 5000	AERODROME ELEV 649 THR RWY 01-ELEV 595 THR RWY 19-ELEV 649 HEIGHTS RELATED TO AD ELEV	TWR 118.205 APP 120.705 ATIS 125.805 INFO 123.855	VILNIUS (EYVI) RWY 01/19



CTR REP		
ALISI	R-242/D7.0 VNO	54 35 46N 025 06 19E
ATGEL	R-138/D6.0 VNO	54 33 11N 025 23 21E
EPINI	R-097/D5.0 VNO	54 36 50N 025 25 54E
LEDVI	R-263/D5.5 VNO	54 38 15N 025 08 06E

SCALE 1 : 200 000

PAPI(MEHT)
RWY 01: Left/Right 3.0° (53 FT)
RWY 19: Left/Right 3.0° (53 FT)

Changes: lateral and vertical limits of EYP22; EYP45 added.

VFR aircraft on approach are not separated in relation to other VFR traffic and are responsible for maintaining the necessary distance autonomously. To make this possible, traffic information **shall** be used. Wake turbulence separation **shall** be applied to VFR departures.
English is the preferred language for VFR radio communications on the VATSIM network.
Depending on the volume of traffic, it may be necessary to delay VFR flights in order to slot them in between the usually faster IFR inbounds. Various delaying tactics can be used for this purpose.

10.1. VFR Entry and Exit

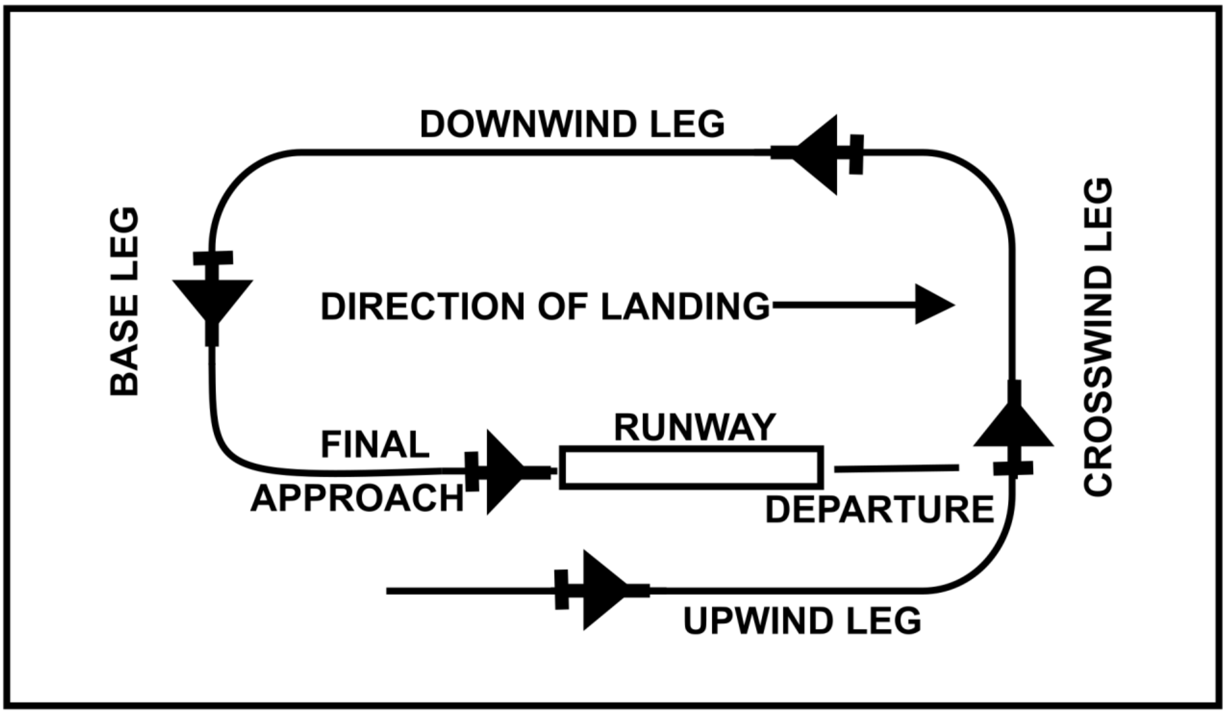
For the purpose of flying in and out of the control zone, there are published **entry and exit routes** that lead from the airfield out of the control zone or from outside the control zone into a **holding pattern** that is close to the aerodrome traffic circuit.
On the chart in the previous page, along the edges the control zone, you will find filled blue triangles. This symbol indicates a compulsory reporting point. This means that every VFR pilot **shall** report any overflight of this point and their flight altitude. If the triangle were not filled in, it would be an optional reporting point. The pilot would not independently report overflying this point, but you **may** request them to do so. Next to the blue triangles you will see the names of the mandatory reporting points (LEDVI, ALISI, EPINI, ATGEL), which are also the names of the routes that start or end with them.
If you assign an **entry** via LEDVI, the pilot **shall** fly over LEDVI, report the overflight with their altitude and other relevant information, then enter the CTR along the **blue** route. If the pilot approaches the airfield and receives no further instructions, they **shall** enter the published holding procedure. The clearance to enter the control zone is therefore not a clearance to enter the aerodrome traffic circuit.
For an **exit** from the control zone, the whole process is somewhat simpler: if you give the pilot an instruction to leave via a route, the pilot **shall** follow the **red** route after take-off and report their current altitude when flying over the mandatory reporting point.

10.2. VFR Crossing

Sometimes there are pilots who, for various reasons, simply want to fly through the control zone without performing any maneuver on the runway.
Initially these pilots **shall** be handled identically to an entry. As soon as they approach the airfield, clearance **shall** be issued to leave via a published route **or** they **shall** be released directly to a mandatory reporting point on the departure route. From this point onwards, the flight counts as an outbound and is treated as such.

10.3. Traffic Circuit

The **traffic circuit** or **traffic pattern** ensures that approach and departure procedures at airfields run smoothly and, above all, safely. They provide orientation and prevent serious collisions. They also help pilots to develop their flying skills, as they can use the circuits to make as many landings as possible in a short amount of time. Particularly in private pilot training, traffic circuits are flown at the beginning to give the student pilot a feel for take-offs and landings. Traffic circuits are published only for uncontrolled aerodromes. At controlled aerodromes air traffic controllers direct traffic, but the vocabulary remains the same.



A traffic circuit consists of the following legs:

10.3.1. Departure/Upwind

In this phase, the pilot is climbing and performs all the necessary actions after take-off: Retract the landing gear, switch the lights as necessary, retract the flaps, and perform other important actions prescribed by the checklist.

10.3.2. Crosswind

During the crosswind leg, the airplane should reach the altitude of the traffic circuit. The circuit altitude for EYVI is 2 000 ft.

10.3.3. Downwind

This leg flows parallel to and in the opposite direction of the active runway. Here the pilot makes their first position report by radio, transmitting their callsign and the leg of the traffic circuit they are in. Shortly afterwards, the tower confirms this, and every station at the airfield and traffic in the circuit knows where the aircraft is located. The reason why the pilot only reports their position in this leg is that other aircraft, e.g. those coming from another airfield, may enter the circuit via this leg and might not notice other aircraft if they were not paying enough attention.

10.3.4. Base

Here the pilot slowly begins the descent and makes a position report. The landing checklist should also be performed.

10.3.5. Final

In the last and most demanding phase, the pilot should have initiated all actions necessary for landing. After the position report, Tower provides the pilot with wind information so that it can be taken into account for landing, as well as the landing clearance at controlled airfields. Unnecessary radio contact should be avoided so that the pilot can concentrate fully on the landing.
Note: If a pilot is cleared for one section of a traffic circuit, they are also cleared for all following sections of that circuit and is allowed to fly them autonomously. If, for example, you clear a pilot for downwind, they will turn into base and final on their own whenever they see fit.

10.4. Runway Movements

In addition to standard take-offs and landings, there are often VFR pilots who only want to fly traffic circuits within the control zone for training purposes. Of course, in this case it makes little sense for pilots to vacate the runway after landing and then taxi straight back to a holding point for the next take-off.
The following are the most common runway movements performed in conjunction with aerodrome circuits:

- Touch and Go - the pilot touches down on the runway, then immediately applies full power and lifts off again. The flight is treated as an approach until touchdown and then as a take-off;
- Low Approach – if the pilot only wants to practice approaches without landings, they often make a low approach. They never touch the runway, but fly just above it. The flight is treated as an approach until it crosses the runway threshold and then as a take-off.

Note: For both of these flight procedures, the pilot **shall** be provided with the next action to perform (e.g.: enter the *right* circuit, fly over *XYAB*) ideally before, but at the latest together with the clearance for a touch and go or low approach. The same applies to go-arounds. If you instruct a go-around, you **shall** instruct the VFR pilot what to do afterwards. You **should not** give IFR pilots any additional instructions for a go-around, as they will fly the missed approach procedure as published in the charts.

10.5. Delaying Techniques

VFR aircraft are usually significantly slower than larger commercial aircraft. For this reason, a gap of around 7 to 9 NM is required to get slow VFR aircraft from downwind to final approach. The size of the gap depends very much on the speeds of both aircraft and the length of the final approach for VFR traffic. The longer the final approach, the larger the gap.
To enable the shortest possible final approach, it is advisable to keep VFR traffic close to the airfield until it can turn into the final approach. The following tactics can be used for this:

10.5.1. Orbits

Orbits are used to keep VFR traffic within a certain area. The instructions and conditions can vary greatly. Relative position information (e.g.: 3 o'clock) **shall not** be used for traffic information while orbiting.

10.5.2. Landing Sequence

Together with traffic information, you can instruct a VFR pilot to follow the mentioned traffic onto final approach. The responsibility for initiating a turn that keeps the necessary separation is then transferred to the VFR pilot.

10.5.3. Extended Downwind

Instead of orbits or a landing sequence which tells the pilot when to turn into final, the pilot can also be asked to extend their downwind. It must be noted, however, that a longer downwind also means a longer final which will take more time. This, in turn, requires larger gaps between incoming IFR traffic, so extended downwinds should be used with caution.

10.6. Employment of Traffic Information

As soon as VFR flight enters controlled airspace, traffic information is your best friend. Without this information, a VFR pilot would be unable to assess the situation around him in a way that enables them to remain clear of other traffic.
Before you let a VFR pilot enter the control zone or let them depart, you **shall** ensure that you will be able to inform them about traffic at all times and also inform the nearby IFR traffic about the VFR pilot. If you are unable to ensure this due to workload or other reasons, you **should not** accept VFR traffic into the control zone and/or **may** instruct VFR traffic in the air to leave the control zone or to land.
Examples where traffic information **shall** be provided:

- IFR approach on final (<4 NM);
- VFR in the traffic circuit, VFR departure via a route, VFR entry via the same route;
- Two VFR departures/arrivals via the same route, where the following aircraft is faster;
- IFR departure and VFR in the circuit near the departure sector.

11. Traffic Information

Traffic information **shall** be transmitted whenever air traffic control needs to inform a pilot about other traffic. Traffic information **should** contain precise information to make it as easy as possible for the pilot to identify the mentioned traffic.

11.1. Structure of Traffic Information

Traffic information **shall** be structured according to this principle:
(Unknown) Traffic, [type of traffic], [traffic aircraft type], [position of the traffic], [distance to the traffic], [traffic direction of movement], [level of the traffic], [any other information].

11.1.1. Type of Traffic

With this component, you **may** state the flight rules of the traffic. If you have no precise knowledge about the traffic, i.e. only a primary radar target on the radar screen, "Unknown traffic" **shall** be used.

11.1.2. Traffic Aircraft Type

With this part, you **may** provide information about the aircraft type of the traffic. The common abbreviation (e.g.: EM DI ELEVEN for an MD11, AIRBUS TREE-TWENTY for an A320) **should** be used, alternatively, the ICAO code (PAPA ALPHA TREE-FOUR for a Piper PA34 Seneca) **may** be used. For helicopters, the term "Helicopter" **shall** suffice.

11.1.3. Position of the Traffic

With this component, you **shall** provide information about the position of the traffic relative to the addressed pilot using clock bearings. If the traffic is currently in a turn, you **should** state the position using a cardinal direction or the location (e.g.: east; on final approach).

11.1.4. Distance to the Traffic

With this part, you **shall** provide information about the distance of the traffic relative to the addressed pilot in nautical miles.

11.1.5. Traffic Direction of Movements

With this component, you **may** provide information about the direction of movement of the traffic relative to the addressed pilot.

11.1.6. Level of the Traffic

With this part, you **may** provide information about the vertical position of the traffic. To prevent IFR traffic from interpreting this information as a clearance, you **should** state the altitude relative to the addressed pilot instead of the true altitude. If the Mode C readout is not confirmed, the addition of "indicating" or "not confirmed" **shall** be used.

11.1.7. Other Information

With this component, you **may** provide other information about the traffic, for example, if the traffic is climbing/descending or is in a traffic circuit. In principle, anything that could be helpful to the addressed pilot **may** be mentioned here, but it **shall** be limited to relevant information.

11.2. Examples

The words in **bold** are always the same, the words in *italics* must be adapted to the respective flight and conditions at the time.

ATC: *BTI34K*, **TRAFFIC,** *BOEING 738*, *1* **O'CLOCK,** *10* **MILES, SAME LEVEL, CROSSING** *RIGHT TO LEFT*, YOU WILL PASS *6* MILES *BEHIND*.

ATC: *BTI34K*, **VFR TRAFFIC,** *12* **O'CLOCK,** *7* **MILES, OPPOSITE, INDICATING** *100FT BELOW*, **NOT CONFIRMED,** REPORT IN SIGHT.

ATC: *BTI34K*, **UNKNOWN TRAFFIC,** *10* **O'CLOCK,** *5* **MILES, CROSSING** *LEFT TO RIGHT*, **TYPE AND LEVEL UNKNOWN.**

ATC: *LYKLL*, **VFR TRAFFIC,** *PA34*, *2* **O´CLOCK,** *3* **MILES, CROSSING** *RIGHT TO LEFT*, **ALTITUDE** *2000FT*.

ATC: *LYKLL*, **IFR TRAFFIC,** *HEAVY BOEING 744*, **DEPARTING RUNWAY** *08*, TURNING *LEFT* AFTER DEPARTURE.

12. Phraseology

Here we provide samples of typical pilot and controller communications. An effective transmission from a pilot is typically comprised of five basic elements:

- **I.** Who is being called;
- **II.** Who is the caller;
- **III.** Where is the caller;
- **IV.** What the caller is doing;
- **V.** What the caller wants.

However, as you will see, some elements irrelevant to the current stage may be omitted for brevity.

The words in **bold** are always the same, the words in *italics* must be adapted to the respective flight and conditions at the time. Controller transmissions are marked with "**ATC:**", while pilot transmissions are marked with their respective callsign.

CLEARANCE DELIVERY

DLH897: VILNIUS TOWER, DLH897, **REQUEST CLEARANCE** TO FRANKFURT AS FILED.

ATC: *DLH897*, VILNIUS TOWER**, CLEARED TO** *FRANKFURT* **VIA FLIGHT PLANNED ROUTE,** *UPASI 1A* **DEPARTURE**, *FL090* **INITIALLY, SQUAWK** *4247*.

DLH897: CLEARED TO FRANKFURT, VIA FLIGHT PLANNED ROUTE, UPASI 1A DEPARTURE, FL090 INITIALLY, SQUAWK 4247, DLH897.

ATC: *DLH897*, **READBACK CORRECT.**

NOTE: Pilot readback of the clearance must be correct and complete. If the readback is incomplete or any part is read back incorrectly, the discrepancy **shall** be corrected before proceeding.

PUSHBACK/STARTUP

DLH897: VILNIUS, DLH897 AT STAND 208, **REQUEST PUSHBACK**

ATC: *DLH897*, **PUSHBACK APPROVED**, *FACING NORTH*, **QNH** *1019*, (**INFORMATION** *A* **VALID, RWY IN USE** *19)*

DLH897: PUSHBACK AND START-UP APPROVED, FACING NORTH, QNH 1019 (WITH INFORMATION A, RWY 19), DLH897

OR

DLH897: VILNIUS, DLH897 AT STAND 208, **REQUEST PUSHBACK AND START-UP**

ATC: *DLH897*, **PUSHBACK AND START-UP APPROVED,** *FACING NORTH*, **QNH** *1019*, (**INFORMATION** *A* **VALID, RWY IN USE** *19)*

DLH897: PUSHBACK APPROVED, FACING NORTH, QNH 1019 (WITH INFORMATION A, RWY 19), DLH897

NOTE: The readback must be correct and complete, otherwise corrective action **shall** be taken.

TAXI OPERATIONS

DLH897: VILNIUS, DLH897 **REQUEST TAXI.**

ATC: *DLH897***, TAXI TO HOLDING POINT** *RUNWAY 19* **VIA** *J, Z.*

DLH897: TAXI TO HOLDING POINT RUNWAY 19 VIA J, Z, DLH897.

NOTE: By definition, the phrase TAXI never exists without a closely following VIA or TO.
TAXI VIA provides a route to follow. However, such an instruction **shall** always contain a clearance limit. So, if you start your instruction with TAXI VIA, there must always be a HOLD SHORT or HOLDING POINT in the same instruction that acts as the clearance limit.
TAXI TO provides the clearance limit up to which the pilot may taxi. If you start your instruction with TAXI TO, there must always be a VIA in the same instruction that describes the route.

ATC: *DLH897*, **HOLD POSITION.**

DLH897: HOLDING, DLH897.

ATC: *GJT2XJ*, **TAXI TO** *STAND 18* **VIA** *F, L.*

GJT2XJ: TAXI TO STAND 18 VIA F, L, GJT2XJ.

ATC: *DLH897*, **GIVE WAY TO** *AIRBALTIC AIRBUS 220* CROSSING *LEFT TO RIGHT* ON *J*, **BEHIND TRAFFIC TAXI VIA** *J, Z* **TO HOLDING POINT** *RUNWAY 19.*

DLH897: GIVE WAY TO AIRBALTIC AIRBUS 220 ON J, BEHIND TRAFFIC TAXI VIA J, Z, TO HOLDING POINT RUNWAY 19 DLH897.

NOTE: The crew must read back the "behind traffic" instruction fully and correctly, otherwise corrective action **shall** be taken.

RUNWAY OPERATIONS

DLH897: VILNIUS, DLH897 **READY** FOR DEPARTURE.

ATC: *DLH897*, **LINE UP AND WAIT RUNWAY** *19*.

DLH897: LINE UP AND WAIT RUNWAY 19, DLH897.

ATC: *DLH897*, **WIND** *190* DEGREES *4* KNOTS, **RUNWAY** *19* **CLEARED FOR TAKEOFF.**

DLH897: CLEARED FOR TAKEOFF RUNWAY 19, DLH897.

ATC: *FIN1PL*, **WIND** *190* DEGREES *4* KNOTS, **RUNWAY** *19* **CLEARED TO LAND.**

FIN1PL: CLEARED TO LAND RUNWAY 19, FIN1PL.

ATC: *LYKLL*, **WIND** *190* DEGREES *4* KNOTS, **RUNWAY** *19* **CLEARED TO TOUCH AND GO.**

LYKLL: CLEARED TO TOUCH AND GO RUNWAY 19, LYKLL.

ATC: *LYKLL*, **WIND** *190* DEGREES *4* KNOTS, **CLEARED LOW APPROACH RUNWAY** *19*.

LYKLL: CLEARED LOW APPROACH RUNWAY 19, LYKLL.

ATC: *LTC601*, **REPORT LANDING** *FINNAIR ATR 2 MILES FINAL* **IN SIGHT.**

LTC601: TRAFFIC IN SIGHT, LTC601.

ATC: *LTC601*, **BEHIND LANDING** *FINNAIR ATR 1 MILE FINAL*, **LINE UP RUNWAY** *19*, **BEHIND.**

LTC601: BEHIND LANDING FINNAIR ATR, LINE UP RUNWAY 19, BEHIND.

NOTE: The crew must read back the "behind" instruction fully and correctly, otherwise corrective action **shall** be taken.

ATC: *HST2354*, **GO AROUND.**

HST2354: GOING AROUND, HST2354.

VFR CIRCUITS

ATC: *LYKLL*, **CLEARED TO ENTER CONTROLED ZONE VIA** *LEDVI*, **RUNWAY IN USE** *19*, **QNH** *1014*.

LYKLL: CLEARED TO ENTER CONTROLED ZONE VIA LEDVI, QNH 1014, LYKLL.

NOTE: The pilot is not yet cleared for the traffic circuit. If he receives no further clearance, he flies towards the published holding procedure.

ATC: *LYKLL*, **JOIN RIGHT TRAFFIC CIRCUIT RUNWAY** *19*.

LYKLL: JOINING RIGHT TRAFFIC RUNWAY 19, LYKLL.

NOTE: The pilot is now cleared for the traffic circuit.

ATC: *DEIPA*, **JOIN LEFT DOWNWIND RUNWAY** *19*.

DEIPA: JOINING LEFT DOWNWIND RUNWAY 19, DEIPA.

NOTE: The pilot was cleared to enter the downwind. They are also automatically cleared for the remaining parts of the circuit.

ATC: *DEIPA*, **EXTEND DOWNWIND UNTIL FURTHER ADVISED.**

DEIPA: EXTENDING DOWNWIND UNTIL FURTHER ADVISED, DEIPA.

NOTE: The pilot must remain on the downwind until he receives a further instruction from the controller.

ATC: *DEIPA*, **JOIN FINAL RUNWAY** *19*.

DEIPA: JOINING FINAL RUNWAY 19, DEIPA.

ATC: *DEIPA*, **NUMBER** *2* **FOR APPROACH, FOLLOW** *B737* **ON** *4* **MILE FINAL RUNWAY** *19*, CAUTION WAKE TURBULENCE, MAINTAIN OWN SEPARATION.

DEIPA: NUMBER 2 FOR APPROACH, FOLLOW B737 ON FINAL FOR RUNWAY 19, MAINTAINING OWN SEPARATION, DEIPA.

NOTE: If an extended downwind was instructed, this phrase can be used to request the pilot to turn into the final approach by himself after approaching traffic. The addition of *CAUTION WAKE TURBULENCE, MAINTAIN OWN SEPARATION* shall be used if the two flights need to be separated by wake turbulence separation

ATC: *LYKLL*, **ORBIT** *RIGHT*.

LYKLL: ORBITING RIGHT, LYKLL.

NOTE: The pilot shall orbit at the current position until he receives a further instruction.

ATC: *LYKLL*, **MAKE A** *LEFT* **THREE SIXTY.**

LYKLL: LEFT THREE SIXTY, LYKLL.

NOTE: The pilot should make one orbit at the current position and then continue with the previous clearance.

ATC: *DEIPA*, **AFTER** *TOUCH AND GO* **LEAVE CONTROLLED ZONE VIA** *ALISI*.

DEIPA: AFTER TOUCH AND GO LEAVE CONTROLLED ZONE VIA ALISI, DEIPA.

ATC: *LYKLL*, **LEAVE CONTROL ZONE VIA** *LEDVI*.

LYKLL: LEAVE CONTROL ZONE VIA LEDVI, LYKLL.

13. Efficiency on the Frequency

The controller is responsible for the frequency, as only they know who needs to receive which instruction next. For this reason, the controller **shall** be calm, friendly, but also assertive and confident on the frequency.

13.1. Use Standard Phraseology

For all radio communications, the rule is: as short as necessary and as precise as possible. This is exactly what the phraseology is designed for. You **should** avoid filler words and your own creations that the pilot may not understand. Further reading: SKYbrary article.

13.2. Speak Clearly, Distinctly, and at Reasonable Pace

Every controller and pilot has their own pronunciation and dialect. Therefore, a controller **shall** speak clearly, distinctly, and at a reasonable pace so that the other side can understand. Otherwise, it may lead to radio communications having to be repeated multiple times until the other side understands. This would significantly increase frequency congestion and your workload, leaving less time for other important instructions.

13.3. Standby

Issuing of "standby" **shall** be done with caution, as it often has further implications. The more pilots that are waiting, the more pilots will eventually need to be called back, while more pilots will keep contacting you during high traffic situations. Thus, while "standby" initially helps, it only postpones the problem, depending on the traffic situation. Eventually, you will become overwhelmed and start working reactively rather than proactively just to clear the queue.
If it is foreseeable that the pilot will have to wait longer than 2 minutes for a response, they **should** be informed of the reason (e.g.: traffic is pushing behind), or provided with an approximate waiting time (e.g.: call you in 5 minutes OR number 3 for clearance). This avoids additional frequency congestion caused by potential inquiries by impatient pilots. Additionally, you **should** mark which pilots have received a standby by using ground states or other means to prevent forgetting them.

13.4. Keep Frequency Clear for Time-Critical Instructions

This often requires pre-planning, sometimes beyond your own area of responsibility, and involves setting priorities. If you see that a pilot will soon contact you and must immediately receive an instruction (e.g.: after crossing a runway or for a turn onto the ILS), long instructions (like enroute clearances) **should not** be issued at that moment.

13.5. Blocked Frequency

On busy frequencies, it often happens that two transmissions are sent simultaneously and, due to properties of VHF radio, block each other. If neither sender can be identified, pilots **shall** be informed with a "blocked." If one pilot can be identified, they **should** be addressed directly. The same applies to the second pilot.

13.6. Use of "BREAK BREAK"

Instead of separating two radio transmissions with a "break break", which is often unnecessary, a short pause between transmissions **should** be employed, or the transmit button is briefly released. In a continuous speech flow, as with the use of this phraseology, a pilot can easily miss his callsign because they do not initially feel addressed.
A "break break" be **shall not** be used between two transmissions that both require a readback. The risk is too high that the pilots will block each other.

14. Coordination Between Tower / Approach

Communication and coordination are indispensable for smooth, safe and efficient traffic handling. Even though most standard operations are regulated in the form of SOPs, there are situations that require coordination between two ATC units. Broadly speaking, coordination communications can be divided into 2 categories: notifications and requests.

- **Notifications** are employed to inform a neighboring unit of conditions that may impact their operations, or for which the responsibility falls on the receiving unit.

Required notifications:

  - Any type of non-standard IFR departure is imminent (including OIDs);
  - Emergencies, including relevant details;
  - Presence of VFR traffic in controlled airspace;
  - Missed approaches, including reason and other relevant information;
  - Closing and opening of runways or change of active runway;
  - Start and end of Low Visibility Procedures (LVPs);
  - Insufficient arrival spacing to accommodate current departure flow.

- **Requests** require immediate action or some response from the receiving unit. The receiving unit has the right to refuse a request as long as doing so does not constitute a denial of service to any aircraft and is justified by a valid operational reason.

Required requests:

  - IFR aircraft is requesting a non-standard departure (including OIDs) or if an aircraft is unable to comply with a standard departure clearance;
  - Non-standard approach procedures (e.g. visual approach);
  - An aircraft is requesting to use a runway that isn't the current active runway;
  - An aircraft is ready to depart from a runway other than the currently active runway.

There's generally no standard phraseology for coordination between units. Therefore, normal language is used during coordination. However, you **should** keep your inquiries as short and straight to the point as possible, as your colleague may be very busy with pilots.

This will conclude your introduction to the Tower position. You will learn a lot more together with your mentor and by providing air traffic control services on the VATSIM network. Feel free to come back to and reference this document whenever you find it necessary.

Have fun and good luck on your journey!