VACC-SAG Tower Study Guide

1. Introduction

After you have received your student rating the tower lesson will be the next step for you in order to provide air traffic control service within the VACC-SAG area. This manual in combination with a tower lesson held by an authorized VACC-SAG mentor from the FIR you are assigned to will help you.

This study guide is kept as common as possible. However sometimes it is necessary to use specific local area examples that may be handled in a slightly different manner in your FIR.

Remember that you will need a lesson for every position within the SAG area before you can provide ATC service there.

2. Training aims for this study guide

We will cover every duty a VACC-SAG tower controller must be able to perform. Beginning with enroute clearances up to VFR traffic control within the control zone.

3. How is an aerodrome controlled?

An airport can be controlled by a single person that is referred to as the tower controller, but you will understand that an airport the size of Munich or Frankfurt cannot be run as a ‘one man show’. There must be more. And that’s exactly how it is done in real. The workload is divided into three single positions with different tasks that are:

Clearance Delivery

Providing enroute clearances and start-up instructions. Basically everything that must be done with an aircraft before it gets into motion.

Ground Controller

Is responsible for all traffic on the ground on every apron and taxiway.

Local Controller

This is the person who actually listens to the call sign “Tower”. The tower controller is responsible for all traffic on the runways and for airborne traffic within the boundaries of the airport‘s control zone.

All three positions can be divided into certain areas of responsibility, e.g. north and south ground control.

Serving as a VACC-SAG tower controller means that you are able to act in all three working areas simultaneously. Usually you are alone on the tower position and have to serve all under laying positions as well. This will also be the scenario in your controller practical test that you have to perform In order to get the next higher rating of senior student.

But we will get to that step by step.

First I will show you all of the positions one by one and later then what it is like to do them all at once. So we can cover coordination between ATC stations as well as traffic management and reducing workload.

4. Preparations of the controller

Depending on your ATC Station you will have to set an ATIS. ATIS is short for Automated Terminal Information Service. Let's have a closer look at this. In reality not every single controller has an own ATIS. It is issued once per aerodrome and contains a lot more information than we need here. In reality the pilot can retrieve lots of weather information from the ATIS, which would not make any sense here, because of the limitations and possibilities of our simulated environment you can not assume that every pilot flies with real weather. Furthermore there are some references to things that are not simulated anyway. For that reasons you should see our simulated ATIS as an information source for the pilots where we can state common information that is equal for all pilots, like active runways. And even it is far away from a real ATIS I will continue to call it ATIS.

All IFR aircraft must listen to the ATIS and confirm the reception in the initial call to the controller, wherever it is relevant. All pilots need to know the active runway(s) and the local QNH.

A typical ATIS as you would enter it in the ATIS field could look like this:
(rem.: the format used is valid for the VRC client)

This is $radioname() Information %id%:
%runways%, TRL 60, QNH $altim(EDDL), departure frequency 128.550

By policy the length of the ATIS is limited to a maximum of four lines, but it should be kept at three lines length.
The first line contains your own station's name. This is to verify for the pilot that he is tuned on the right frequency.

In the same line the ATIS designator will follow. This designator is incremented by one letter at any change that is made to the ATIS. If anything of the information in your ATIS changes you will have to amend your ATIS and increase the designator by one letter. So next would be INFO B (C, D, and so on). If you reach INFO Z it will start over at A again.

The second line contains the core information of the ATIS sorted by their priority, starting with the runways in use. Next is the transition level which can change depending on the QNH. QNH (local air pressure recalculated to mean sea level in hPa). This is needed by the pilot to calibrate his barometric altimeter to have the correct altitude indicated. If tuned in correctly the altitude shown should be quiet equal to the aerodrome elevation that is published in the charts. Additional information can be added when needed. In the example above we stated the frequency of our departure controller.

The ATIS is presented to the pilot like this:

This is Dusseldorf Tower information Alpha:
Runways in use 23L for departing, 23R for landing, TRL 60, QNH 1016, departure frequency 128.550

5. Clearance Delivery

5.1 Flight plans

You have to deal with two different types of traffic at your airport. One is flying by visual flight rules (VFR) and one is flying by instrument flight rules (IFR). We leave VFR aside for the time being, because it is usually irrelevant for the delivery controller. Let's start with some IFR traffic. All IFR flights are supposed to file a flight plan. This plan consists of several things that are necessary for us controllers to guide an aircraft safely from its point of departure to its destination. As a delivery controller we are interested in the aircraft type and the departure route. A typical flight plan will look like this:

STV620 H/B744/Q T450G219 583 01	I EDDK-KSFO KOAK	320	 320	NOR Y868 UBEXI DCT NAPSI UZ28 SPY UL7 SUM UM125 SIDER G11 MY G3 KEF DCT GIMLI DCT DA DCT SF DCT YFB N554C YYQ NCAE YYN J530 GTF J7 FMG SEL/RSKL NAV/RNAV OPR/STEVENS REG/D-ASSI RMK/STEVENS	0000 KSFO

As you can see there are lots of information presented, but not all of them are relevant for every position in the ATC network. As a delivery controller you are interested in the information marked in red as shown below.

STV620 H/B744/Q T450G219 583 01	I EDDK-KSFO KOAK	320	 320	NOR Y868 UBEXI DCT NAPSI UZ28 SPY UL7 SUM UM125 SIDER G11 MY G3 KEF DCT GIMLI DCT DA DCT SF DCT YFB N554C YYQ NCAE YYN J530 GTF J7 FMG SEL/RSKL NAV/RNAV OPR/STEVENS REG/D-ASSI RMK/STEVENS	0000 KSFO

What do we know about this flight?

Its call sign is "STeVens 620"

Tip:
At the beginning of your controller career all these call signs may be a bit difficult to memorize, but that will become better with growing experience. A good source for call signs is the ACC programme that can be found on www.vacc-sag.org.

The aircraft is a Boeing 747-400 (B744)

It is an IFR flight from Cologne-Bonn airport (EDDK) to San Francisco International airport (KSFO) with the alternate airport Metropolitan Oakland International (KOAK).

The pilot requests flight level 320 as his cruise altitude.

The first waypoint on its Route is NOR (Nörvenich VOR)

No squawk code has been issued (0000)

At some time the pilot of the aircraft will call us:

P: "Köln delivery, Stevens 620 good evening, position gate F10, request start up, information alpha received"

What the hell does that mean?

Every initial call from an aircraft to an ATC station or vice versa has to begin with the call sign from the station called followed by your own call sign. The pilot calls ATC in this case, so the answer is Köln delivery followed by Stevens 620.

Good evening is good evening. Not necessary, but polite ☺

Position gate F10. So we know where to find the aircraft, even if this is rather unimportant for delivery.

Request start-up, information alpha received is the core of the radio transmission. The pilot wants something from us.

As stated earlier in preparations of the controller we talked about ATIS. The pilot announces that he has received the contents of the ATIS and we do not have to provide information like active runways and QNH to him. This will safe you quite some time. All you have to do is verifying that the reported designator letter is correct. If the pilot reports a wrong ATIS code letter you should tell him the correct one including significant changes:

"… information bravo now current, QNH 1021"

Tip:
Not all pilots confirm that they have received the ATIS even if they almost all have. This is some kind of bad habit and you should not be afraid to point this out to the pilot by asking for a confirmation of ATIS reception. All IFR flights are supposed to listen to the ATIS.

That leaves us with the start up request. Start up means exactly what you might think right now: The permission to start the engines.

Tip:
The pilot will not start the engines right after he has got your permission to do so. The correct sentence to approve start-up is just 'start up approved'. So it is just a permission, not an instruction. This task is performed by the ground crew that is directly working on the aircraft while it is on the gate. The engines are started when the area around the engines is clear of equipment and people, usually during the pushback procedure. The start-up approval just means that there is an expected delay less than 20 minutes.

So, if we do not expect a delay of more than 20 minutes, we can issue start up approval. At the same time we should issue the enroute clearance. The pilot needs it anyway and if he requests start up he usually expects the enroute clearance as well.

Please note that all of the following should be done before the aircraft first calls us.

If we want to issue an enroute clearance we have to check some things first. Let's have a look on that flight plan again.

STV620 H/B744/Q T450G219 583 01	I EDDK-KSFO KOAK	320	 320	NOR Y868 UBEXI DCT NAPSI UZ28 SPY UL7 SUM UM125 SIDER G11 MY G3 KEF DCT GIMLI DCT DA DCT SF DCT YFB N554C YYQ NCAE YYN J530 GTF J7 FMG SEL/RSKL NAV/RNAV OPR/STEVENS REG/D-ASSI RMK/STEVENS	0000 KSFO

First thing to do is to check if we are looking at the right aircraft. This is important for all ATC stations, because issuing wrong instructions based on wrong information can be fatal. As a delivery controller we have basically two ways to verify if the aircraft corresponds with the flight plan. First by checking its call sign and second by verification of its position. If we have an aircraft waiting at F10 and its call sign is STV620 we can be pretty sure, that we have the aircraft we are looking for.
We will issue an enroute clearance from the departure airport to the destination airport, regardless if we are familiar with the entire route.

Our next step is the first waypoint. Almost all larger airports have so called standard instrument departure routes (SID). These SIDs have two purposes. One is to guide the aircraft on a defined route from its departure airport to an airway and therefore to avoid collisions with arriving traffic and the other one is for noise abatement. As a side effect it safes the departure controller a lot of work, because without a SID he would have to 'talk' the aircraft through its way by issuing turn instructions.

If you take a look at your airport's departure charts you will find the SIDs for each runway. Mostly they are named after the fix they are ending, followed by a single digit which is some kind of version number. The range is from 1-9 and is incremented by 1 on each amendment of the SID. When it reaches 9 the next update will reset the count to 1 again. After that there is a letter. You can often, but not always associate that letter to a specific runway.

Tip:
Try to memorize your training airport's SIDs. There are not much of them and once you get used to it, you can issue enroute clearances much faster, because you do not have to look up the SIDs every time.

As we can see in this flight plan, there is no SID filed by the pilot. We are supposed to clear him on a SID that matches his flight plan best. Let's assume we have runway 14L in use which utilizes all of the foxtrot and one papa SID. Why are there now two SIDs leading to the same fix?
Some SIDs have different kinds of restrictions or requirements. These are explained in the airport information document that comes with the chart package. Let's have a look on the first NOR SID. That's NOR5F. It says that the aircraft must be able to climb with 880ft/NM. The B747-400 is a category heavy aircraft and this particular aircraft is on a long haul flight, so we assume its tanks are full. As a result the climb performance may not be suitable for that requirement. NOR6P is the better choice here. We will now amend the flight plan:

STV620 H/B744/Q T450G219 583 01	I EDDK-KSFO KOAK	320	 320	NOR6P NOR Y868 UBEXI DCT NAPSI UZ28 SPY UL7 SUM UM125 SIDER G11 MY G3 KEF DCT GIMLI DCT DA DCT SF DCT YFB N554C YYQ NCAE YYN J530 GTF J7 FMG SEL/RSKL NAV/RNAV OPR/STEVENS REG/D-ASSI RMK/STEVENS	0000 KSFO AMMENDED

Finally we assign a code for the secondary surveillance radar (SSR), simply called squawk-code, to the aircraft. With that code together with some other information the radar controllers can identify the aircraft. Our flight plan will look like this now:

STV620 H/B744/Q T450G219 583 01	I EDDK-KSFO KOAK	320	 320	NOR6P NOR Y868 UBEXI DCT NAPSI UZ28 SPY UL7 SUM UM125 SIDER G11 MY G3 KEF DCT GIMLI DCT DA DCT SF DCT YFB N554C YYQ NCAE YYN J530 GTF J7 FMG SEL/RSKL NAV/RNAV OPR/STEVENS REG/D-ASSI RMK/STEVENS	2201 KSFO AMMENDED

Tip:
It is known to happen that there are some entries in fields like temporary altitude or the scratchpad that are left by other controllers. Usually that happens on aircraft that have just landed and filed a new flight plan for a new flight. You should have a look at that and clear the fields if needed. Your adjacent radar controllers would appreciate this.

Now we can issue the enroute clearance to the aircraft:

C: "Stevens 620, Köln delivery, good evening, startup approved, cleared to San Francisco international via Nörvenich six papa departure, flight planned route, squawk 2201"

The pilot will read that back to us, so we can verify if the contents of our enroute clearance have been received as we issued it:

P: "Stevens 620, startup approved, cleared San Francisco via Nörvenich six papa, flight planned route, squawk 2201"

As you noticed in the further conversation the pilot will only state his own call sign.

But what did we do here? We approved the filed flight plan with some additional instructions (SID and squawk). The pilot can start his engines and he is now generally allowed to fly to his destination along his planned route.

Our work is almost done. We just have to confirm, that the pilot's read back has been free of errors and hand him over to the next station:

C: "Stevens 620 read back correct, contact ground on 121.720, bye"

P: "Stevens 620, contact ground on 121.720, bye"

Well let's say in the above example you have cleared the aircraft for a NOR5F departure route and after a short while the pilot tells you that he can not fly that departure route and requests the NOR6P departure route. You will now have to change the clearance. Of course you could cancel the first clearance and issue a completely new one, but that costs unnecessary time. So we simply re-clear the aircraft and only give the amended details in a form like this:

C: "Stevens 620, recleared via Nörvenich six papa, rest of clearance unchanged"

That is all a delivery controller has to do. Depending on local procedures, clearance delivery is also authorized to issue a departure frequency, meaning the controller's frequency that the pilot has to call after he is airborne, if the frequency deviates from the published frequencies on the charts.

6. Ground Control

6.1 Pushback

Now that the pilot has permission to start up the engines and the flight plan has been approved, we need the aircraft to get away from the gate, actually start the engines and roll from its parking position to a runway where it can perform the takeoff roll and get in the air.

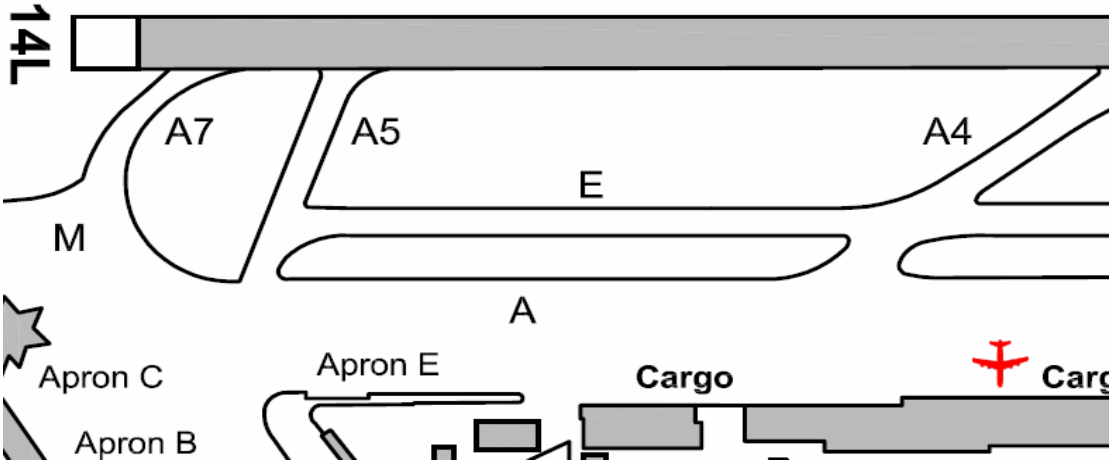
Those are the tasks of the ground controller. He is the master of all taxiways on the airport.

Our aircraft will call in:

P: “Köln Ground, Stevens 620, Gate F10, request pushback.”

We have an initial contact here again, so the pilot will use the controller’s call sign followed by his own.

The aircraft stands on Position F10, which is on the cargo apron Foxtrot and we need this aircraft to go to our active runway 14L. Let’s have a look at the ground chart that you already printed out I assume?



F10 is a nose-in position, as you can see the aircraft stands with the nose facing to the terminal buildings and aircraft usually do not have a reverse gear ☺. That’s why the pilot requested a pushback. In real life this is done by a custom build tractor, but here it is only simulated and the pilot must do all the work by himself. He just needs an approval from ground control, because as it is in real life, the pilot can not see what is happening behind his aircraft.

We assume that there is no threat on taxiway alpha, so we can issue the pushback approval:

C: “Stevens 620, Köln ground, pushback approved, facing north”

Remember, that we are still in initial contact procedure, so we have to state our own call sign as well.

We approved the pushback request and issued a direction for the pilot how he has to align his nose. Even if it is not necessary here, there are other airports where it is not clear for the pilot on which route the ground controller will let him roll to the active runway.

Tip:
The runway configuration is not only dependent on the wind direction and strength, but also on local procedures. Refer to your local operating procedures or ask your mentor to find out how it is done at your training airport.

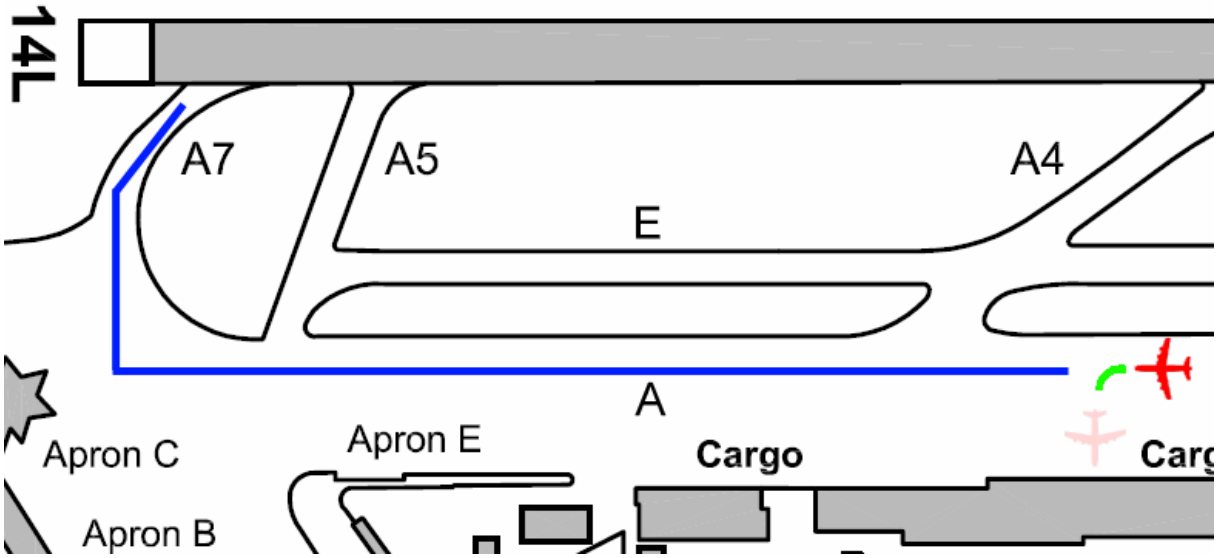
6.2 Taxi

All you have to do now is to find a taxi route where the aircraft can

a) Taxi due to its dimensions and weight
b) Not collide with other aircraft on the aprons or taxiways

Airport design assists you to provide a way where you can send aircrafts from and to the active runway simultaneously without any conflicts. However it is your duty to monitor enroute traffic on the ground to prevent any collisions and dead end situations.

Tip:
Remember that an aircraft usually occupies the whole width of a taxiway. Avoid any instructions that lead to a nose to nose situation on a taxiway. Medium and heavy sized jets can not turn on a spot. So you will need trucks to get the taxiway clear again. That costs time and will block your entire airport for that amount of time in the worst case.



The routing is pretty simple in this scenario, and as the pilot calls in like that:

P: “Stevens 620, request taxi”

We will issue that simple taxi instruction:

C: “Stevens 620, taxi to holding point runway one four left, via alpha, alpha seven”

And the read back from the pilot:

P: “STV620, taxi to holding point runway 14L via A, A7”

The aircraft will now pick up some speed and rolls to the holding point for runway 14L via the instructed route. It is your duty now to monitor if the pilot follows exactly the instructed route. On any deviation you will have to intervene. You can stop the aircraft at any time by issuing the following instruction:

C: “STV620, hold position”

If it is urgent add the word ‘immediately’ to that instruction.

However, you should add additional information, why the aircraft has to stop, if time permits.

6.3 Hand over to tower

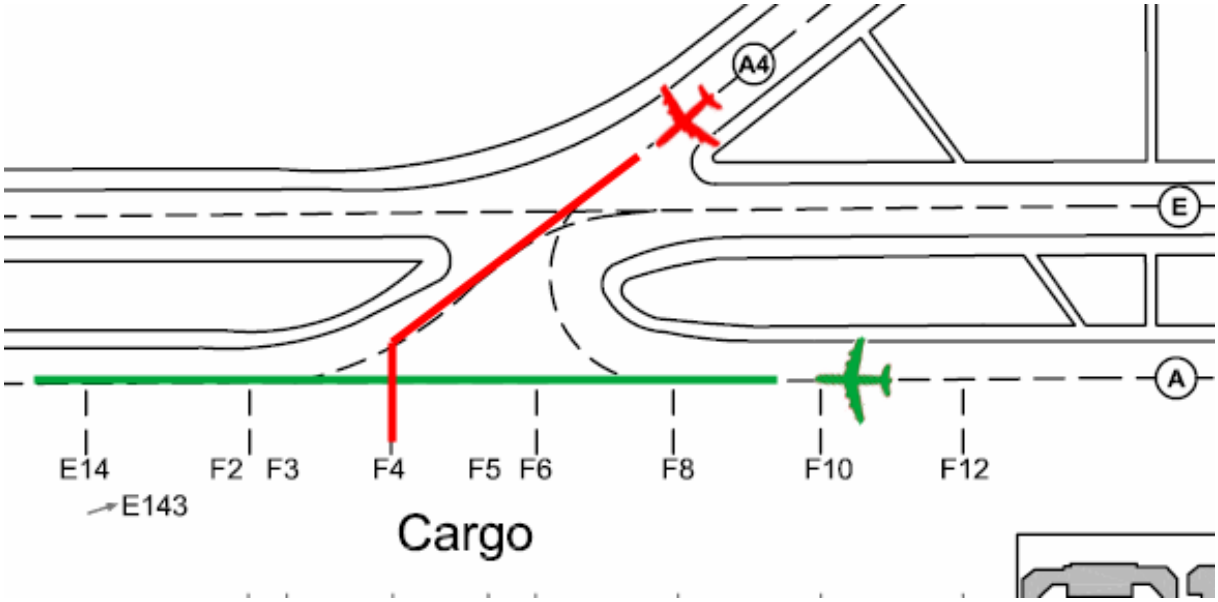
At some point we will have to hand over the aircraft to the next instance, the tower controller. But when should we do that? Simple answer: as soon as possible.

Tip:
Local procedures may indicate strict hand over points from one ATC station to another. Refer to your local standard operation procedures for that or ask your mentor.

As soon as possible means that we do not need to communicate and nothing can happen to the aircraft anymore. In the specific situation above a good point of transfer would be as the aircraft makes the turn into A7.

6.4 Advanced ground movement

This is what you basically do as a ground controller. But this is not always that easy, because usually you have more than one aircraft at a time and all of them want to taxi from and to the runways. It is unavoidable that two or more aircraft have to cross their paths. Let's have a look at the following situation:



We already instructed the green aircraft to taxi on alpha to holding point runway 14L. The red aircraft just landed and vacated runway 14L on taxiway A4 and calls us:

P: "Köln ground, Lufthansa 4711, position A4, request taxi."

We want this aircraft at gate F4, but to get there he must cross the path of the green aircraft at some time.

Tip:
Remember. You are responsible for collision free traffic movements on the ground. Even if you issue an instruction where it is very unlikely that something could result in a conflict situation you should always consider that everything can happen. When you give an instruction make sure, that the resulting situation is always safe, regardless what ever may happen.

You may think, ok the green aircraft is in motion and the time the pilot and I need to do our communication would be enough that the green aircraft has passed the point of interest before the red aircraft begins to roll. But what if the green aircraft has to stop for whatever reason? And as the green aircraft's instruction permits him to taxi on alpha, he can resume his roll anytime.

There are several ways to handle this situation.

You could instruct the red aircraft to hold where he is right now and wait until the green aircraft is out of the way. That would be accomplished by the simple instruction:

C: “Lufthansa 4711, Köln ground, hold position, Airbus 320 crossing left to right on Alpha”
P: “Lufthansa 4711, holding position”

This would be the worst way of controlling you could do. It is not very good service for the pilot and you are blocking an exit of the runway, where the next landing aircraft may vacate the runway as well.

Another way would let the red aircraft taxi to F4 and watch them both all the time to stop either one of them in the right moment. That would be accomplished by instructing him like this:

C: “Lufthansa 4711, Köln ground, taxi to gate F4 via A4, A”
P: “Lufthansa 4711, taxi to gate F4 via A4, A”

At the right moment you may stop the aircraft again:

C: “Lufthansa 4711, hold position”
P: “Lufthansa 4711, holding position”

That would work, but you need two instructions and you will have to watch the developing situation all the time and is also bad controlling. That will drag your attention away from other important things that may happen at the same time on different places on the airport and you do not have that much time.

A better way is to instruct the red aircraft to taxi to the gate and let him hold before he reaches the point of interest. Later then you can allow him to resume:

(From now on I will use the ICAO designators for the aircraft’s call signs)

C: “DLH4711, Köln ground, taxi to gate F4 via A4, A . Hold short of A”
P: “DLH4711, taxi to gate F4 via A4, A. Holding short of A”

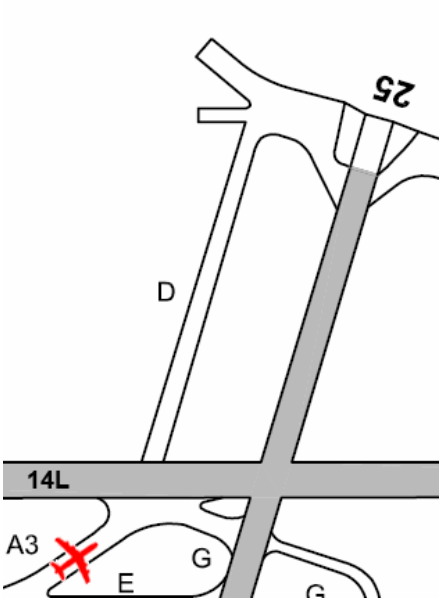
So the pilot can taxi until he reaches the intersection A4/A where he has to stop.
After the green aircraft has passed you can let him resume taxi:

C: “DLH4711, continue taxi”
P: “DLH4711, continue taxi”

Well, there are still two things that I do not like here:
The pilot of the red aircraft still does not know why he has to stop and we have to give two instructions. Is there a way to put this all together and get rid of the red aircraft? If we assume the green aircraft to be an A320 we could do this:

C: “DLH4711, Köln ground, taxi to gate F4 via A4, A . Give way to A320 crossing on alpha from left to right.”
P: “DLH4711, taxi to gate F4 via A4, A, give way to crossing A320 on A”

Now we have what we want. The red aircraft will start his roll. Looking out on taxiway alpha for the crossing traffic and let him pass. Then he will continue taxi to gate F4 and we do not have any further work with him.



Have a look at this. Let's assume the red aircraft is again our DLH4711. He came from his gate and was sent to the holding point runway 25 for departure with an instruction like that:

C: "DLH4711, taxi to holding point runway 25 via A, A3, D, hold short RWY 14L"

As a ground controller you must not let cross an aircraft any runway on its way to his destination. Every runway crossing must be approved by tower. That's why you build in a hold short instruction into the taxi clearance to make sure that the aircraft will stop there. However, you should always try to keep the traffic in motion and to achieve that a good timing is very important. It does not make any sense if you ask tower for a runway crossing approval if the aircraft has 10 minutes to taxi before approaching the runway. On the other hand you should not start your coordination too late, because the aircraft has a certain breaking distance.

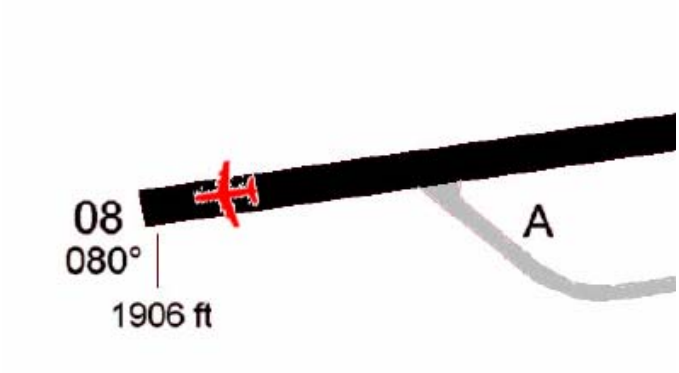
Once you have the runway crossing approval by tower, let the aircraft continue his taxi roll:

C: "DLH4711, cross RWY 14L"

Coordination is everything. Let's say that runway 14L is not active, maybe blocked due to construction work. In order to expedite the traffic flow you could make a general coordination with tower where you are authorized to issue runway crossing approvals without prior coordination with tower. In that case the taxi instruction could be like this:

C: "DLH4711, taxi to holding point runway 25 via A, A3, D, cross RWY 14L"

Tip:
As we are talking about clearances: Any clearance of movement for an aircraft has a start and an end. This end is called the clearance limit, means "until you reach that point and not further". A clearance is valid until it is changed somehow or being entirely cancelled. Hold short instructions do not change the clearance. So if you have an aircraft to stop for any reason you will only have to revoke that stop instruction and the pilot can resume on his cleared route. There are no further instructions necessary.



A little excursion to LOWI shows us the above situation. An aircraft has landed on RWY26 and during the slow down he passed the last possible exit (A). Of course he is calling us for a taxi instruction to his parking position:

P: “Innsbruck Tower*, DLH4711, request taxi”

(*) There is no ground controller at LOWI.

We said earlier, that there will not be enough space to turn around an aircraft in a deadlock situation on a taxiway. At airports where the procedure shown above is common practise, there is often a turn area present at the end of the runways. So it should not be a problem for the pilot to turn his aircraft around. All we have to do is to allow him to taxi on the active runway. The word you are looking for is “backtrack”.

Tip:
Any taxi movement on a runway is referred to as “backtrack” disregarding the direction of movement.

C: “DLH4711, Innsbruck Tower, taxi to apron entry via A, backtrack on runway 26 approved”

7. Tower Control

7.1 General introduction

Tower has two main duties. One is the responsibility for all active runways and the traffic on the ground handed over to him by ground control. The other one is the management of airborne traffic within his control zone.

7.2 Determination of runways in use

Tower is also responsible to set the active runway(s). Determining the active runway(s) is generally depending on the wind direction and strength. Local procedures may differ from this, but you should always choose a runway that is most aligned with the wind, means it should be possible for to aircraft to depart/land against the wind and not with the wind.

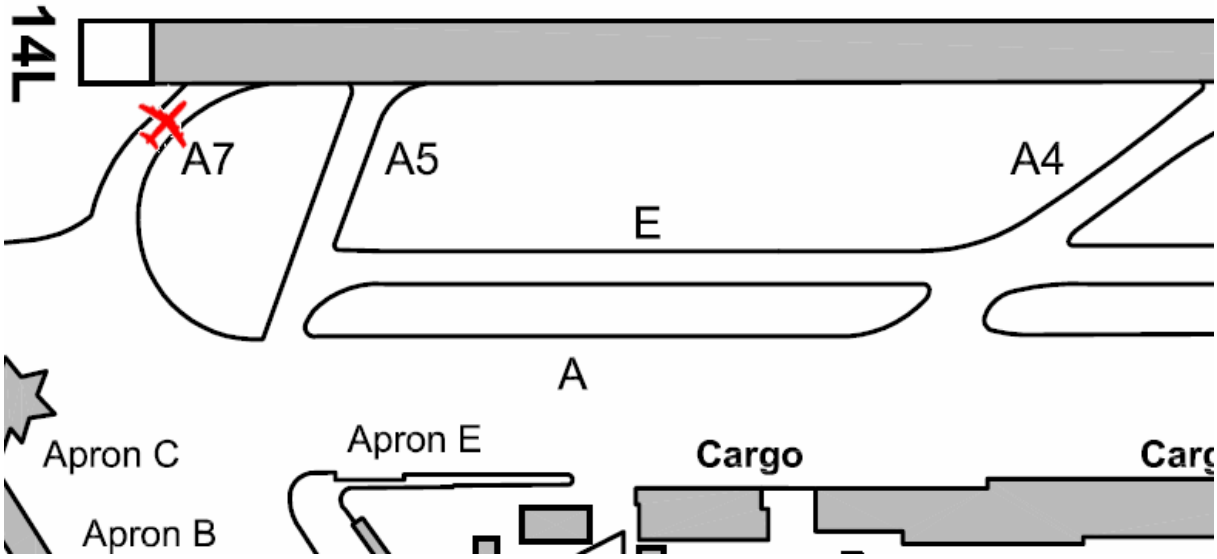
To stay with our example airport Cologne Bonn, we have runways 14L and 07 or their opposites 32R and 25. If we assume a wind of 100° and 10 knots strength we would most likely use runway 14L and runway 07 because the two of them are most aligned with the wind. Do not get confused by that. The wind direction is always the direction from where the wind is blowing. The runway designator is simplified the direction to where the runway is aligned.

If you would have wind from 50° you could assume that it is almost equal which runway to open, because you have either way full crosswind. In such a case it is a good idea to have a look into the terminal area forecast (TAF) of the airport. Other than a metar which is only a snapshot of the moment a TAF will provide you the tendencies, including the development of wind direction and strength. You should choose the runway which will become most aligned with the wind, just to prevent of changing runways later.

7.3 IFR traffic

7.31 Departure

We will start on the ground where we left our aircraft from the ground control examples at holding point runway 14L.



The aircraft has been handed over to us by ground control and calls in:

P: “Köln Tower, STV620, holding point runway 14L, ready for departure”

Tip:
It still could happen that some pilots report „ready for take-off“. This is definitely a mistake. As a rule of thumb you can say that you as a tower controller are the first person who uses the word take-off. Every other reference to that term is called departure. This is to make sure, that the word take-off is only connected to the take-off clearance and nothing else. You should also avoid to include any important information in the take-off clearance, because everything after „cleared for take-off“ may not be recognized anymore.

If there is no other traffic on the runway or on approach for that runway, there is no reason for us to hold back the take-off clearance at that point:

C: “STV620, Köln Tower, wind one hundred degrees, one zero knots, runway one four left, cleared for take-off“

And the pilot will respond:

P: “STV620, runway 14L, cleared for take-off”

The pilot will not read back the wind. Even if the wind information is part of the take-off clearance it has only informational character. Just the core clearance has to be read back by the pilot.

He will now taxi into take-off position runway 14L and align his aircraft with the departure direction means the nose is aligned to approximately 140°. Then he will set his thrust, accelerates and at some point he will become airborne, starting his climb to the initial climb altitude if nothing else has been instructed. Simultaneously he will begin to follow the course of the SID for what he has been cleared earlier by Clearance Delivery.

He will of course follow his course and will not climb beyond the initial climb altitude, but he is still on our frequency. If Clearance Delivery already gave him something like this:

C: “STV620, cleared to …. when airborne contact arrival on 118.750”

Then there is nothing more to do for us, because the pilot will change the frequency and call in at approach on his own.

If this is missing, we will have to hand him over to arrival as soon as possible with an instruction like this:

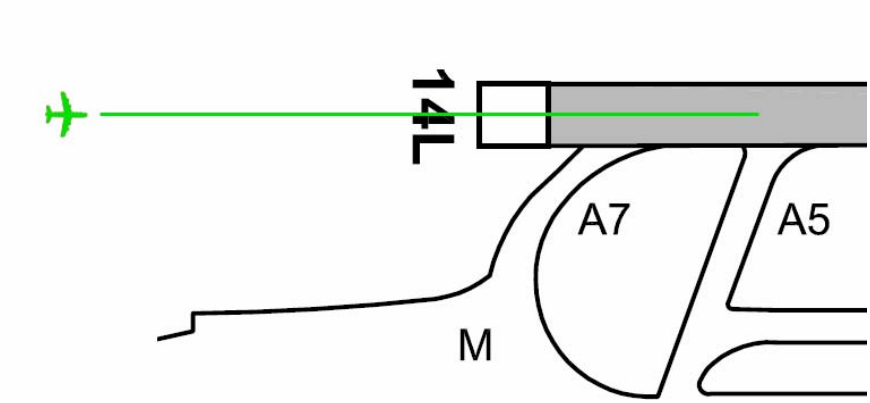
C: “STV620, contact Köln Arrival on 118.750, bye!”

Refer to your local charts or ask your mentor about when to issue the frequency change command, because this may vary from airport to airport.

Tip:
Only call a pilot during take-off or the final stages of approach and landing if you can not avoid a dangerous situation otherwise. The pilot has a lot of work to do and must concentrate on what he is doing. The earliest call to a departed aircraft should be when it reaches a stable climb rate, a landing aircraft should not be called until it is on the ground and clearly slowing down.

An IFR departure with no other traffic around is truly the easiest scenario we can encounter as a tower controller.

7.32 Landing



Here we have the other easy scenario. One aircraft is arriving on RWY14L with no other traffic around and calls us:

P: “Köln Tower, DLH4711, RWY14L”

The only thing for us to do is to clear him to land:

C: “DLH4711, Köln Tower, wind one hundred degrees, one zero knots, runway one four left, cleared to land”

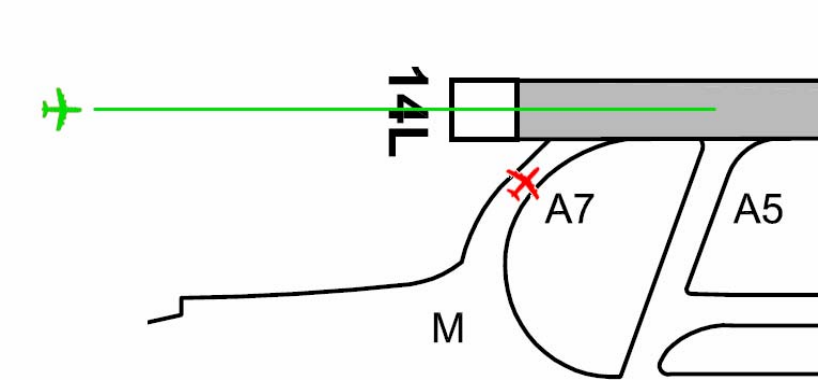
As in the take-off clearance the pilot will spare the wind in his read back:

P: “DLH4711, RWY14L, cleared to land”

A landing clearance can be issued anytime, as long as you think that the pilot has a reasonable chance to get his aircraft safely landed and stopped:

1. At this point or even more far out on final approach landing clearance should be issued if the situation permits.
2. At this point landing clearance should be issued at the latest. If you plan to do so, inform the pilot that he has to expect late landing clearance.
3. You could do that as well, even if you should try to avoid it. It is Very important to inform the pilot: “expect landing clearance above the numbers”.

7.33 Landing / Departure



Here we have two aircraft. FDX100 is on final approach of RWY14L and our well known DLH4711 is at the holding point RWY14L. Both aircraft calling in:

P: “Köln Tower, FDX100, RWY14L”

P: “DLH4711, holding short RWY14L, ready for departure”

Almost always there is more than one solution for a situation.

Tip:
If you are not sure about what to do in a certain situation remember these few rules of priority:
1. Emergencies have always top priority
2. Landing aircrafts
3. Departing aircrafts IFR
4. Departing aircrafts VFR

First thing to do should be clear. We issue the landing clearance for FDX100.

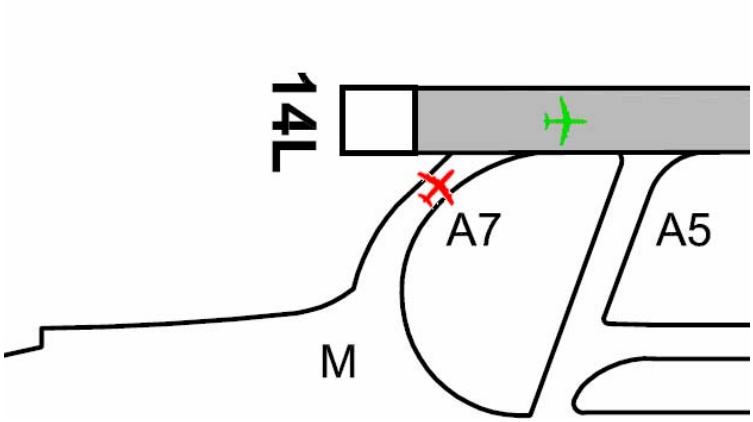
Rule:
If you issue a clearance for a runway that runway is occupied by the aircraft to which the clearance has been given, regardless if the aircraft is physically present on that runway. Once a runway is occupied, no other aircraft is allowed to enter or to cross that runway until the validity of the clearance has been revoked by the controller or the adjacent manoeuvre is completed. In this context we understand:

in case of a departing aircraft:
- It has over flown the end of the runway
- It is airborne and turned away from runway heading

In case of a landing aircraft
- The preceding departing aircraft has met one of the conditions of departing aircrafts
- The previous landed aircraft has vacated the runway.

We could now wait until FDX100 has landed and vacated the runway before we issue the take-off clearance for DLH4711. It would work, it would be safe and the pilot of DLH4711 would fall asleep. So this is not a good solution because we would let pass time where we do not do anything.

What can we do to get rid of DLH4711 a bit faster? You can wait until the following condition exists:



Then issue the following instruction to DLH4711:

C: “DLH4711, line up RWY14L and wait”

DLH4711 will now enter the runway and align his aircraft at the take-off position. You can do that, because there is reasonable assurance that DLH4711 will not commence take-off prior to FDX100 has vacated the runway. We did not issue a take-off clearance for DLH4711, yet.
Knowing this we can take another step forward and delegate the whole line-up process to the pilot of DLH4711. We can do this by issuing a conditional clearance.

Rule:
A conditional clearance can safe you a lot of workload, but you are only allowed to issue one under good visibility conditions. If the airport is in clouds and you can barely see your own feet, it would be very dangerous and merely impossible to rely on the pilot’s view. And that’s exactly what a conditional clearance is based on.

Let’s assume FDX100 is a Beech 1900:

C: “DLH4711, behind Beech 1900 on 3NM final, line up RWY14L and wait behind.”

We expect the pilot to watch out for the landing aircraft and after this landing aircraft has passed his position he is allowed to line up RWY14L and wait.

Notice the double use of the word behind. This is to make sure that in case the pilot did not realise the first ‘behind’ he would probably get it on the second time. This is important. Just imagine what would happen if the pilot would taxi onto the runway while FDX100 is still on approach.

7.34 Runway and wake turbulence separation

In addition to the rule stated above about the clearances there are some items more to consider. The big airports have more than one runway in different configurations. Basically you can encounter parallel runways, crossing runways or a mix of both. Both, parallel and crossing systems have their own separation rules and as a tower controller you are responsible for the strict enforcement of these rules as prescribed in sections 7.35 and 7.36 .

Furthermore there is another thing called wake turbulence separation. Every aircraft generates wake turbulences that are caused by the pressure difference between the up- and downside of the wings. There is a connection between the strength of the generated wake turbulence and the weight of the aircraft. Therefore aircrafts are classified into wake turbulence categories based on the maximum take-off weight. Those categories are:

LIGHT: 7t or less
MEDIUM: 7t to 136t
HEAVY: 136t and above

Tip:
Most general aviation aircraft are LIGHT. The top end of the scale is set by DC-10, B747, B767, and A300. B757 is also classified as HEAVY, even if its maximum take-off weight is below 136t. As a rule of thumb you can say, if in doubt just classify an unknown aircraft one category higher than you think it is in. That puts you almost always on the safe side.

If an IFR pilot declares, that he will not need wake turbulence separation you can disregard the wake turbulence separation minima, but still issue a warning about the wakes.
There is no VFR wake turbulence separation within the controlzone. VFR flights just get a warning about wake turbulences:

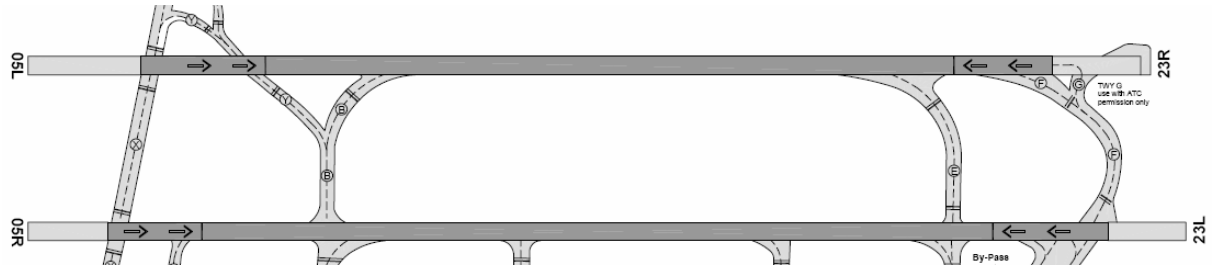
C: “D-ELCH, wind 220 degrees, 5 knots, RWY 14L, cleared for takeoff, caution wake turbulence”

Tip:
In local procedures you can often read something about reduced runway separation minima and therefore some kind of independent usage of the two runways. Remember that this is mostly based on terms like reasonable visual assurance of a specific condition. Due to the limitations of tower control within the VATSIM network, we have no way to provide such a reasonable visual assurance:

We have only a radar scope to see movements on the ground and in the air with an update interval of five seconds.
The same conditions are valid for the pilots.
We have network lags that may lead to missing position updates of the aircrafts.
Different sceneries with more or less offsets.

We try to live up to real world procedures, but we have to accept the fact that not all real world procedures can be simulated today and if you can not provide a certain condition you simply can not allow the adjacent procedure to be executed.

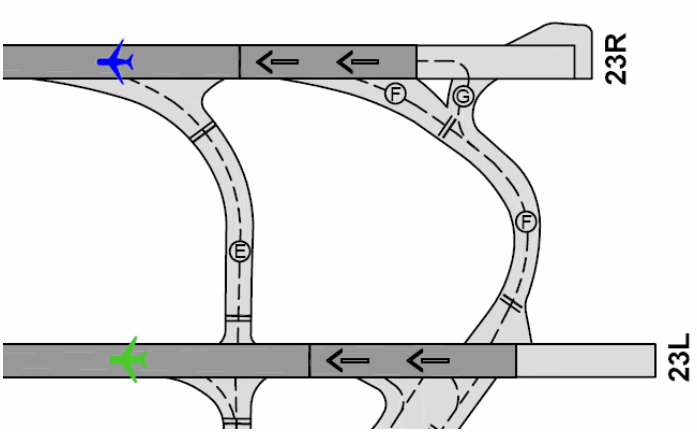
7.35 Parallel configuration



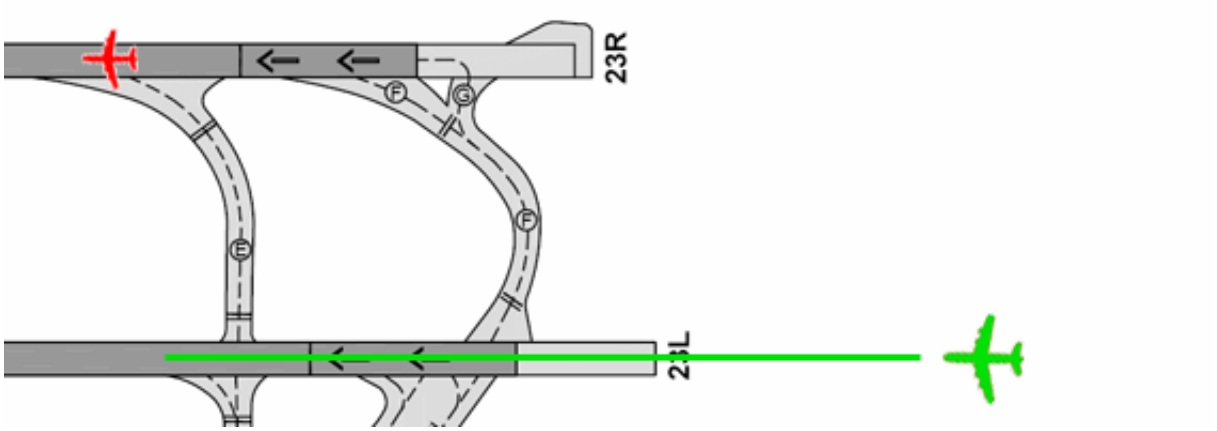
Generally you can use them both at a time, but not independent of each other. To use both runways independently one of the following conditions has to be met:

The runways are at least 1500 meters away from each other
It is stated in local procedures

Otherwise the two runways have to be seen as a single runway when issuing take-off or landing clearances. You may authorize simultaneous same direction operations on parallel runways, but not opposite direction operations.



Here you can issue the take-off clearance to one of the two aircrafts. Then you will have to wait at least until this aircraft has over flown the end of the runway or has initiated a turn to either side in order to follow its assigned departure route. (Do not forget wake turbulence separation if applicable) However, you will have to take into account, that the second aircraft may use the same departure route and you as a tower controller have no influence to the speeds of the aircrafts to maintain separation minima. If you issue the take-off clearance too early for the second aircraft it may catch up to the first one too fast. This would give the approach controller a lot of trouble. Keep in mind, that approach must maintain a separation of at least three nautical miles between two IFR aircrafts that are on the same altitude and it is your responsibility to provide him a way to do so. It is also a good idea to inform approach if you have two aircrafts using the same departure route on two different runways, taking off in sequence.

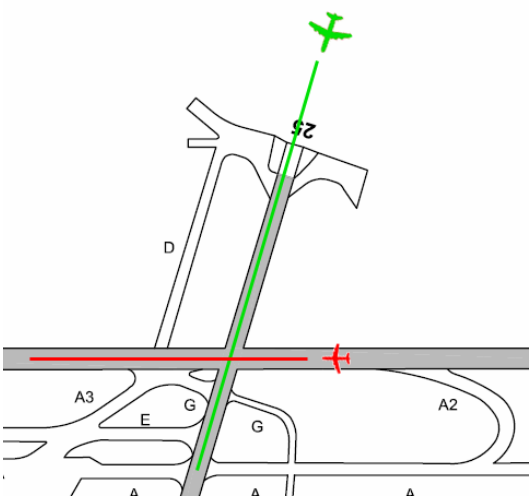


The red aircraft stands on runway 23R at the take-off position. The green aircraft is about to land. No problem here, you can issue the landing clearance to the green aircraft anytime you want.

What if you already have issued the take-off clearance for the red aircraft?
In that case you will have to wait with the landing clearance for the green aircraft until one of the following conditions exists, before the green aircraft passes the threshold of RWY 23L:

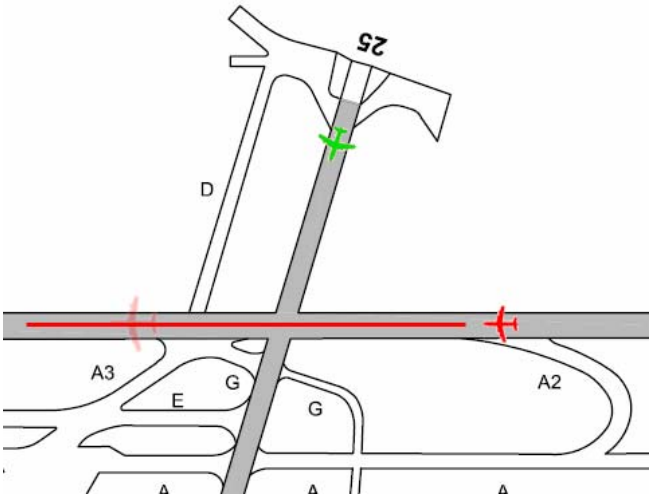
The red aircraft is airborne and has over flown the threshold of RWY 23R
The red aircraft is airborne and has initiated a turn in order to follow its assigned departure route that must not interfere with the flight path of the green aircraft in case it executes a missed approach manoeuvre
You can be sure, that one of the first two conditions exist, when the green aircraft passes the threshold of runway 23L

7.36 Intersecting runways



In an intersecting configuration we have different situations that require our attention. If we assume, that the red aircraft performs his take-off run and the green aircraft is about to land. Other than in the parallel configuration we can issue the landing clearance for the green aircraft as soon as the red aircraft has passed the intersection or if you can be sure, that the red aircraft will have passed the intersection when the green aircraft is passing the threshold of runway 25. Be carefull with „to be sure“. The red aircraft could abort his take-off and come to a full stop exactly on the intersection in the worst case.

In another situation the red aircraft may have just landed and is on its roll out. You can issue the landing clearance for the green aircraft after the red aircraft has passed the intersection as in the example above. You can also instruct the red aircraft to hold short of the intersection if applicable and then issue the landing clearance to the green aircraft.



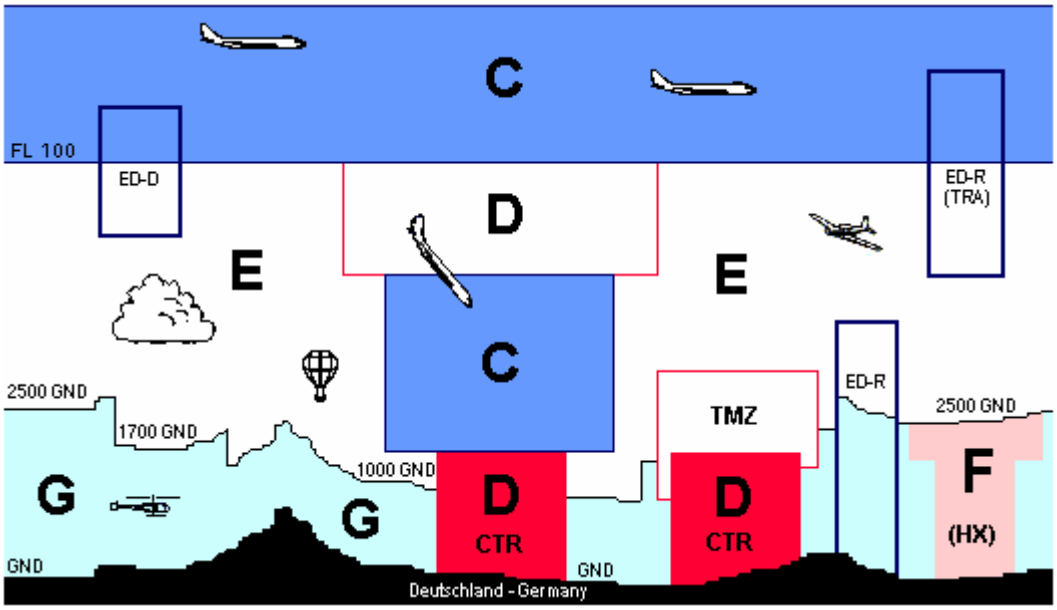
Both aircraft are holding short at their take-off positions. You issued the take-off clearance for the red aircraft. As it is stated above at the landing procedures you can issue the take-off clearance for the green aircraft as soon as the red aircraft has passed the intersection.

7.4 VFR Traffic

7.41 Introduction

I spared this part until now to teach you the basics first. Even if VFR traffic is easy to handle it often confuses those who are new to air traffic control. Let's have a look at this from a pilot's point of view.
VFR stands for visual flight rules and that's exactly what the pilot has to do. Flying related on visual references and his charts of course.
Basically you can say, that a VFR pilot has to make sure to have visual reference to the ground, he has to stay clear of clouds and a certain visibility in flight direction. For a better understanding we will have a look on the different airspaces, what will give you also a better understanding where your airport or aerodrome is located in the system.

7.42 Airspace classifications



It looks more complicated than it is and I will not explain the entire structure because most of it is rather unimportant for a tower controller. Interesting for us are just the two squares marked in red.
Generally there are two different types of airspace. One is controlled airspace and one is uncontrolled airspace. This is about controlled separation between aircrafts. Most larger airports have a control zone (CTR), which is the tower controller's area of responsibility. This CTR covers a more or less large three dimensional area around the airport facility. The CTR is often located within airspace delta (D) .
Airspace D allows IFR and VFR flights and the following rules apply:

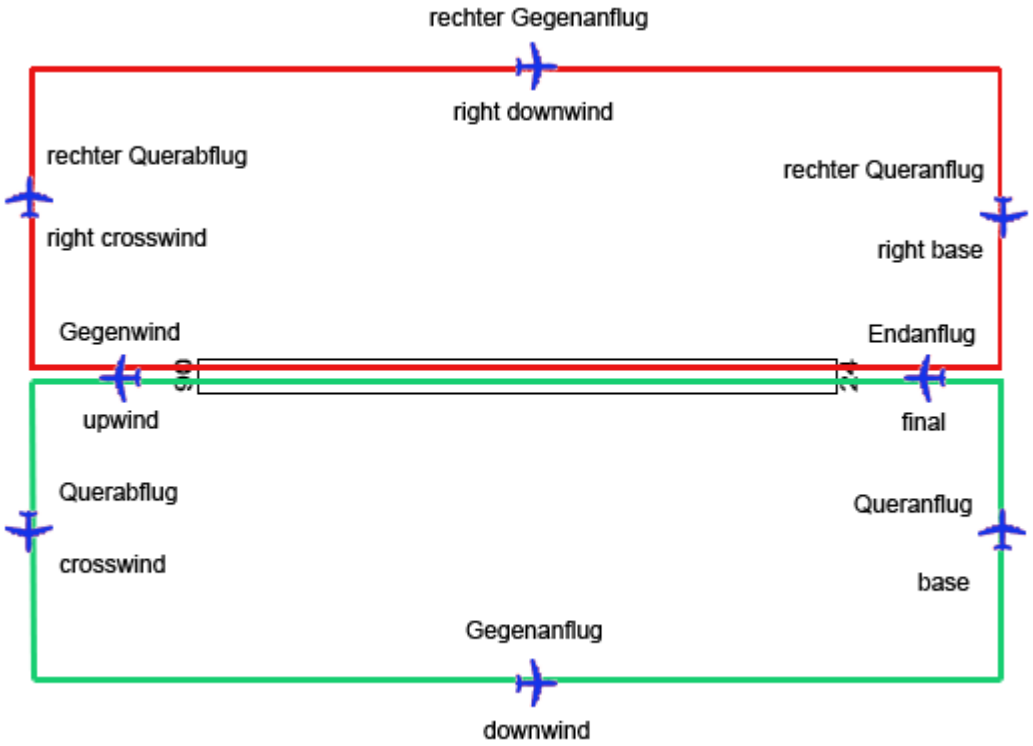
IFR is separated from IFR by air traffic control.
VFR is not separated from IFR or other VFR.
Air traffic control provides traffic information to IFR about VFR and to VFR about IFR and VFR.
Air traffic control will provide evasive manoeuvre advices on request.

That means for us, that VFR pilots are responsible for their own separation to other traffic within our control zone, but they need a permission to enter and to leave our CTR. Therefore they need to be in radio contact with the tower controller.

Even if larger airports have defined paths for VFR traffic to enter and to leave the CTR it is much more important to know about how such an aircraft is handled within the CTR. You could provide vectors, but that is not what VFR flying is all about, even in controlled airspace.

7.43 Traffic circuit

Every pilot, VFR and IFR, is familiar with the traffic circuit. In order to provide a safe way of traffic flow to departing and arriving aircrafts in the vicinity of the runways, there is a defined system on which the aircrafts have to move and that is called the traffic circuit:



English is the global aviation language, but it is also allowed and common practise to do VFR flights in the country's native language. In case of Austria and Germany that would be German and so I wrote the names of the traffic circuit's parts in German as well. Standard traffic circuit is flown with all turns to the left. If you want the aircraft to fly it using right turns you have to state the word "right" in front of the specific part or the whole circuit, except upwind and final where it does not make sense.
This concept is something that you will have to memorize, because of its essential nature.

Tip:
At large airports you will hardly see any VFR traffic, but in your controllers practical test there is a good chance that there will be some of them and then you must know how to handle them. It is always a good advice to practise handling of VFR traffic at a small airfield. Maybe you will find some pilots who want to practise some traffic circuits as well. So you both will benefit from this. The regular VFR events within the VACC-SAG area are also a good training opportunity. Ever tried a VFR flight in French language in Switzerland?

7.44 VFR within the CTR / departing aircraft

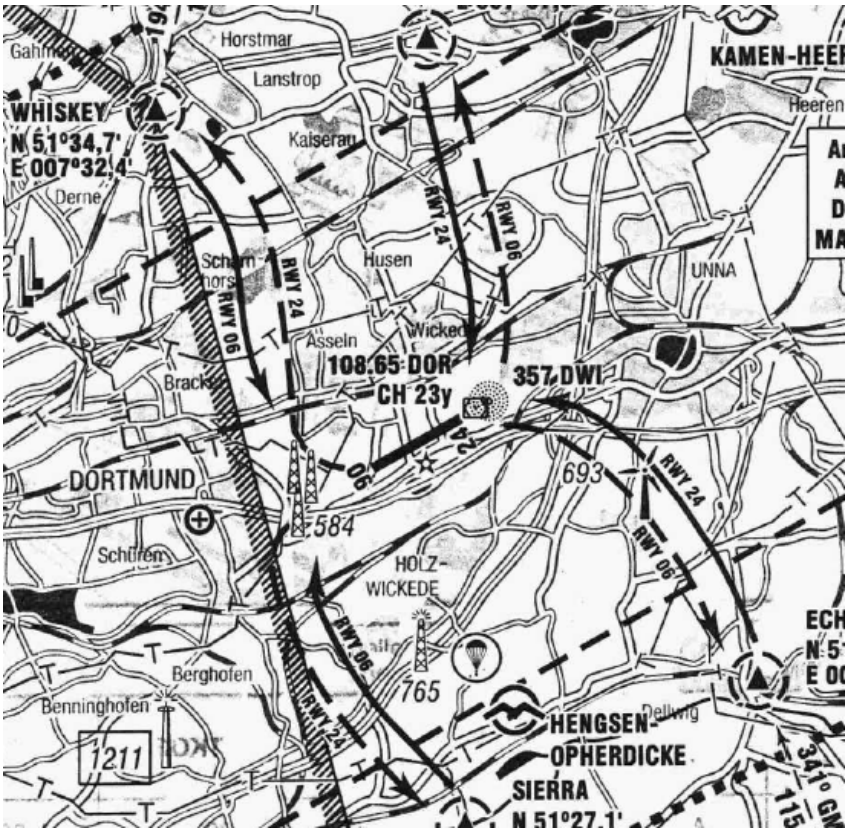
VFR aircraft generally will not need to file a flight plan as IFR has to. So they will not contact clearance delivery. The first call is made to the ground controller (In the VFR section of this study guide I will state all instructions and calls in both languages):

P: “DEXYZ, Dortmund ground, good day“
P: “DEXYZ, Dortmund Rollkontrolle, guten Tag”

C: “DEXYZ, Dortmund ground, good day“
C: “DEXYZ, Dortmund Rollkontrolle, guten Tag“

P: “DEXYZ, Cessna 172, general aviation parking, VFR via Whiskey“
P: “DEXYZ, Cessna 172, Parkplatz allgemeine Luftfahrt, VFR über Whiskey“

VFR does not need to listen to our ATIS information, but he will need to know about the active runways and the local QNH. As a ground controller we can provide him with the active runways, the QNH and the taxi instruction. Most larger airports have defined routes for VFR traffic to enter and to leave the CTR. There is an own set of charts for VFR where those routes are pointed out and every VFR pilot is supposed to have those charts on board. In his initial call the pilot already told us which route he wants to use to leave the CTR. We can now simply write this information into the flight strip or coordinate this with tower using the preferred method in your FIR to do so.



C: “DEXYZ, Dortmund ground, good day, taxi to holding point runway 24 via L, M, D, QNH 1012”
C: “DEXYZ, Dortmund Rollkontrolle, guten Tag, rollen sie zum Rollhalt Piste 24 über L, M, D, QNH 1012“

This does not much different from a taxi instruction as you would issue to an IFR flight. In fact we just added the local QNH. The pilot gets the runway in use from the taxi instruction itself so there is no reason to add this in a separate instruction.

The pilot will read back the essential parts of the instruction just like an IFR departure would do.

At a certain point we will hand over the aircraft to tower:

C: “DEXYZ, contact tower on 134.170”
C: “DEXYZ, rufen Sie Turm auf 134.170”

P: “Dortmund Tower, DEXYZ, on D, ready for departure”
P: “Dortmund Turm, DEXYZ, auf D, abflugbereit“

Tip:
All VFR aircraft are supposed to fly the standard traffic circuit if there is no other instruction given or stated in the charts.

Tower will now issue the takeoff clearance together with the departure route. The aircraft has to perform a right turn in order to follow the route to Whiskey and even if the route to Whiskey is a defined route, the right turn has to be approved:

C: “DEXYZ, leave controlzone via Whiskey, right turn approved, wind 210 degrees, 5 knots, runway 24, cleared for take-off”
C: “DEXYZ, verlassen sie Kontrollzone über Whiskey, Rechtskurve genehmigt, Wind 210 Grad, 5 Knoten, Piste 24, start frei“

The aircraft will perform the take-off now, turning right direct to Whiskey, climbing to a maximum of 2500ft. After some time the aircraft will leave our CTR. Whiskey is a reporting point for VFR aircrafts and the pilot will do so accordingly:

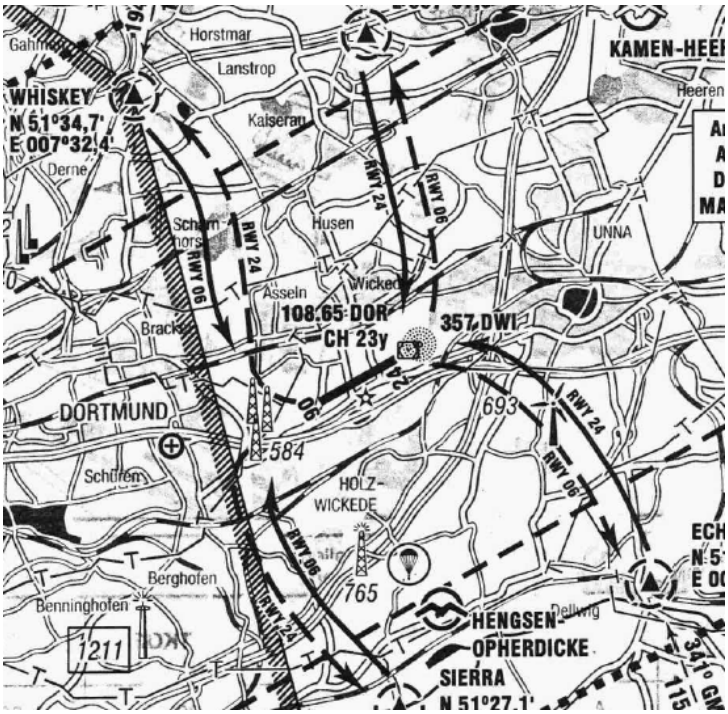
P: “DEXYZ, Whiskey, 2500ft”
P: “DEXYZ, Whiskey, 2500ft”

When he is leaving our CTR he is entering uncontrolled airspace and all we have to do is to permit leaving our frequency:

C: “DEXYZ, approved to leave (the frequency)”
C: “DEXYZ, Verlassen (der Frequenz) genehmigt”

The parts in brackets are optional and that’s it with a VFR departure.

7.45 VFR within the CTR / arriving aircraft



After a while the aircraft is returning to us and he wants to land. To do so he has to call us at least five minutes prior planned entering of the CTR. Remember that he will need permission to enter the CTR first, before he can think of a landing request. Maybe in the meantime the weather has changed and the aerodrome is not under VFR conditions anymore. In that case we could not allow the aircraft to enter the CTR.

Tip:
Within the Vatsim environment you can not assume that all pilots fly with real weather. So a denial to enter the CTR due to weather conditions has to be avoided, unless you are for example in an event where it is clearly stated that real weather is mandatory. But those events are generally announced, so everyone should be prepared.

The pilot calls us:

P: “Dortmund tower, DEXYZ, good day”
P: “Dortmund Turm, DEXYZ, guten Tag”

C: „DEXYZ, Dortmund tower, good day“
C: „DEXYZ, Dortmund Turm, guten Tag“

P: “DEXYZ, Cessna 172, VFR, seven miles northeast of November, altitude 2000ft, for landing“
P: “DEXYZ, Cessna 172, VFR, sieben Meilen Nordost von November, Höhe 2000ft, zur Landung”

Even if he has left our CTR for just one minute you must provide him again with the local QNH and the runway he has to expect. He will need that information to check the accuracy of his altimeter and to prepare for flying appropriate traffic circuits when needed.

C: “DEXYZ, Dortmund tower, enter control zone via November, runway 24, QNH1012”
C: “DEXYZ, Dortmund Turm, fliegen Sie in die Kontrollzone über November, Piste 24, QNH1012“

Tip:
The permission to enter the CTR does include the permission to enter the traffic circuit, except if there is a holding pattern published in the VFR charts. In that case the published holding pattern is the clearance limit for the VFR pilot and he has to wait there until he gets further instructions.

At some point the pilot will report us November:

P: “DEXYZ, November 2500ft”
P: “DEXYZ, November 2500ft”

From now on we have different ways to get this aircraft on the ground. Since there is no other traffic around we can allow the pilot to shorten the traffic circuit and give him a direct approach to runway 24:

C: “DEXYZ, join direct right base RWY 24”
C: “DEXYZ, fliegen sie direkt in den rechten Queranflug Piste 24”

In case it is impossible at the moment to give him a straight in approach you may let him join the traffic circuit. You can provide him with additional instructions as well, so he can prepare himself for the following maneuvres:

C: “DEXYZ, join right traffic circuit, extend right downwind, stand by for base, no. 3“
C: “DEXYZ, fliegen sie in die Rechtsplatzrunde, verlängern sie Gegenanflug, warten sie auf Queranflug, nr. 3“

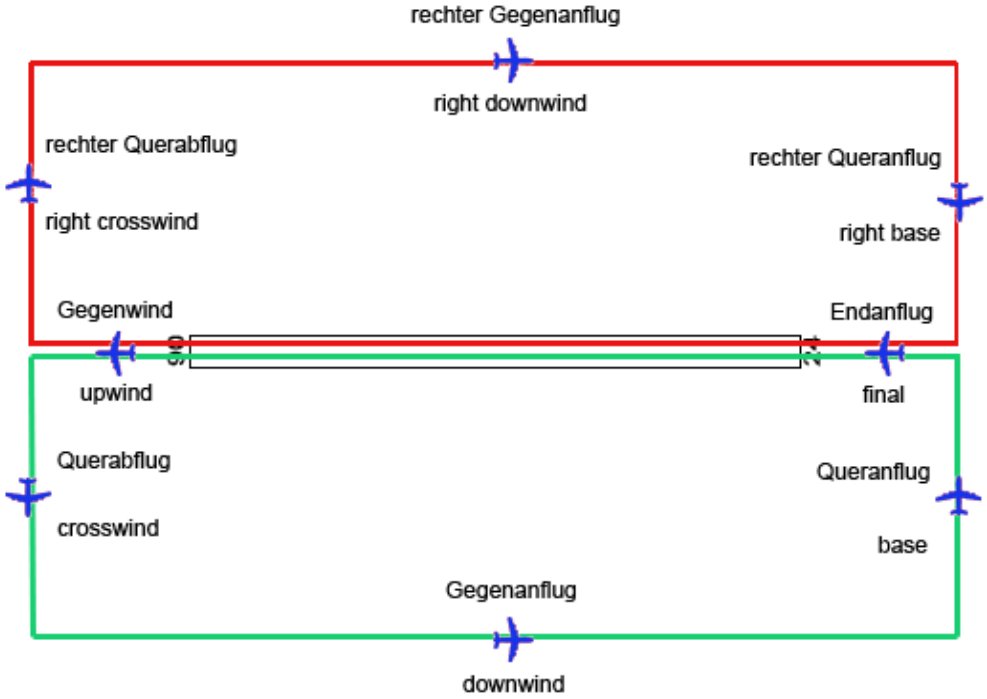
Using this you will have to clear him for right base at some time.

Later then he will get the landing clearance:

C: “DEXYZ, wind 210 degrees, 5 knots, runway 24, cleared to land”
C: “DEXYZ, wind 210 Grad, 5 Knoten, Piste 24, Landung frei“

7.46 VFR in the traffic circuit

Flying the traffic circuit is one of the essential abilities for all pilots. In order to practise this you can fly some manoeuvres were you can do this over and over. These are called “low approach” and “touch and go” . Basically you fly the traffic circuit until you reach final. On a low approach you will over fly the runway at low altitude without touching it. On a touch and go you will actually land, but you do not decelerate and become airborne again.



We will create a scenario here, where D-EXYZ will fly four traffic circuits. The first one will be just a complete circuit. The second one will lead into a low approach. The third one will be a touch and go and the fourth will be a full stop landing. We as a tower controller will use different instructions each time to demonstrate what is possible. This is a typical training pattern for a VFR pilot that can occur anytime at any airfield. We assume that we already issued required information like QNH and runway in use and the aircraft is holding short of runway 24:

1. Traffic circuit

P: “DEXYZ, ready for departure”
P: “DEXYZ, Abflugbereit”

C: “DEXYZ, wind 210 degrees, 5 knots, runway 24, cleared for take-off“
C: “DEXYZ, wind 210 Grad, 5 Knoten, Piste 24, start frei”

The aircraft will depart and follow the traffic circuit through upwind, crosswind, downwind, base and final, because that’s what we have cleared him for. There is nothing for us to do so far. Once the aircraft is on final again we issue instructions for the next manoeuvre.

2. Low approach

He is still in the traffic circuit with no altitude changes so far. Let’s say we have an Air Berlin Boeing 737 on final runway 24, that we have cleared to land. This is what makes VFR so easy to handle. The pilot is self responsible to maintain separation to other traffic. All we have to do is to inform him of the other traffic:

C: “DEXYZ, number two, follow Boeing 737 on final runway 24, caution wake turbulence”
C: “DEXYZ, Nummer zwei, folgen Sie Boeing 737 im Endanflug Piste 24, Vorsicht Wirbelschleppen”

Now our VFR flight is supposed to follow the landing aircraft and maintain own wake turbulence separation. We should also inform the pilot of the Boeing of the VFR traffic:

C: “BER1234, Cessna 172, downwind runway 24, report traffic in sight”

Once the runway is clear again we can issue the low approach clearance for our VFR flight:

C: “DEXYZ, wind 210 degrees, 5 knots, cleared low approach runway 24, thereafter join right traffic circuit”
C: “DEXYZ, Wind 210 Grad, 5 Knoten, frei zum Tiefanflug Piste 24, danach fliegen Sie in die Rechtsplatzrunde“

We cleared the aircraft for the low approach and instructed him to join the right traffic circuit after he has completed the low approach. We put him on the right traffic circuit, because there is another VFR departure that wants to leave our CTR to the south. Once our D-EXYZ has initiated the turn to crosswind, we can issue the take-off clearance for the other VFR departure. This aircraft will follow the traffic circuit (left) to leave the CTR via Sierra. You can also inform both pilots of each other.

3. Touch and go

D-EXYZ is in right traffic circuit and as soon as the departing VFR aircraft has initiated the turn to crosswind you can issue the clearance for D-EXYZ for the touch and go:

C: “DEXYZ, wind 210 degrees, 5 knots, cleared touch and go runway 24”
C: “DEXYZ, Wind 210 Grad, 5 Knoten, frei zum Aufsetzen und Durchstarten Piste 24“

When he is airborne again we instruct him to join the traffic circuit. That leaves us with the full stop landing.

4. Full stop landing

D-EXYZ is on downwind again. You have two IFR arrivals on final and so you instruct D-EXYZ to remain on downwind.

C: “DEXYZ, extend downwind, stand by for base”
C: “DEXYZ, Verlängern Sie Gegenanflug, warten sie auf Queranflug“

Remember that he has to go all the way back on final afterwards and he can not fly on downwind forever. At some point your CTR ends ☺ . If you realize that keeping that aircraft on downwind will

C: “DEXYZ, make a right threesixty“
C: “DEXYZ, machen sie Vollkreis rechts“

If one threesixty is not enough you can also instruct the aircraft to circle until further notice:

C: “DEXYZ, orbit right“
C: “DEXYZ, kreisen sie rechts“

You can end the circling by either let him continue on the approach:

C: “DEXYZ, continue approach, stand by for base“
C: “DEXYZ, setzen sie Anflug fort, warten sie auf Queranflug“

Or just leave the stand by for base part if you want him to continue the traffic circuit on his own.
If you have an aircraft on final, which you want the VFR to follow, you can use this:

C: “DEXYZ, number two, follow ATR-72 on final runway 24, caution wake turbulence”
C: “DEXYZ, Nummer zwei, folgen Sie ATR-72 im Endanflug Piste 24, Vorsicht Wirbelschleppen”

and as soon as the runway is clear again issue the landing clearance:

C: “DEXYZ, wind 210 degrees, 5 knots, runway 24, cleared to land”
C: “DEXYZ, Wind 210 Grad, 5 Knoten, Piste 24, Landung frei”

For further information about how to handle VFR traffic you can also refer to our forum at http://board.vacc-sag.org/60/5082/ .

7.47 General VFR topics

VFR can be the most flexible and easiest traffic in your CTR if you respect the concept of VFR flying. The VFR pilot must separate himself to all other traffic and you can count on that. He will not produce any conflicts if there is reasonable assurance that he can avoid it and other than the large airliners he is able to turn around and look what’s going on behind him. Basically you will not have to tell him what exactly to do next, like “turn left HDG 120“. Just tell him how far he can go, like “join traffic circuit, stand by for base“. Information is everything. Do not try to do the flying for the pilot, just provide him with the necessary information that he needs to plan his flight by himself. Instead of turning him to base right after an aircraft on final has passed, just tell him about the aircraft on final and instruct him to follow this aircraft. The adjacent maneuvre will be executed much quicker.

You should also keep in mind that a small C172 is much quicker in turns, because it does not need so much space for that. On the other hand the C172 is not as fast as an A320 would be, even on final approach. Anyway, leave the decision to the VFR pilot. Just inform him about the traffic and how much time or distance he has. He will not execute a maneuvre that is unsafe. Considering this it is possible to put a VFR aircraft between two IFR arrivals on final. With a small aircraft you can plan your touchdown at a point where you can almost imediately vacate the runway without extensive taxi on the runway itself. It is all about the speed on final approach that makes this work or not. Much easier is a touch and go. Remember the conditions under which you can issue landing clearances. He can touch, he can go and immediately turn away from runway heading. So the way is free for the next landing aircraft.

You should provide more tight control to VFR aircraft only when it is unavoidable due to safety reasons or the VFR pilot can not overview the whole situation. And even then you should not use vectors as you would do on an IFR flight. Let him wait somewhere, flying circles, let him extend downwind or just assign another runway if the airport’s structure permits this. You may also restrict altitudes.

Depending on the size of the aerodrome and therefor the size of the CTR, you may encounter some more complex VFR procedures. That may include holding procedures (maybe on nautical mile north of the runway with exactly defined dimensions), restrictions of the traffic circuit (maybe no right traffic circuit allowed) and there may be defined routes to enter and exit the CTR. These routes may consist of more than one reporting point.

Talking about reporting. The VFR pilot is not supposed to report you anything except the reporting points or if you instruct him to report something.
The clearance to enter the traffic circuit gives the pilot permission to fly the whole traffic circuit through upwind, crosswind, downwind, base and final. So be careful of what you tell the pilot. If you want to keep control better use something like “join right downwind, stand by for base”, to be sure that the pilot will remain on downwind until you issue further instructions. The term “extend downwind” without further information can be anything as well. The pilot may extend the downwind for let’s say one minute and then turn to base anyway. So better inform him why he has to extend the downwind or give more specific instructions like “extend downwind for two minutes” or “extend downwind, follow A320 on 4NM final, caution wake turbulence”.

7.48 Helicopters

Another type of traffic you will encounter are helicopters. They are used for different purposes, but they are mostly VFR, too. They are treated the same way as any other VFR aircraft, but due to the special abilities of a helicopter there are some differences in the instructions and maybe in the whole handling. A helicopter usually has no wheels, so it can not taxi like a normal aircraft. He also does not need a runway for take-off or landing and he has not to stay in motion in order to maintain altitude. You can take advantage of these features to expedite the flow of traffic. The following table shows the differences in instructions for helicopters:

Fixed wing aircraft	Helicopter
taxi to holding point runway xx via yy	air-taxi to holding point runway xx via yy
rollen Sie zum Rollhalt Piste xx über yy	Schweben Sie zum Rollhalt Piste xx über yy
---	air-taxi to helipad (on a direct path)
---	Schweben sie zum Hubschrauberstartplatz (auf direktem Weg)

Helicopters may also be instructed to orbit, even if it sounds a bit illogical at first, because of the ability to simply hover over a certain point. But remember, that this type of aircraft needs to be in lateral movement to use the autorotation effect in case of an engine failure. If you want a helicopter to wait somewhere leave the decision to the pilot which procedure he wants to use:

C: “DHELI, hold south of the field”

Now the pilot may fly small circles or just enter a static hover.

Notice that you can allow the helicopter to change position on the ground on a direct path without using any taxiways. However the helicopter needs permission to cross active runways as well as other aircrafts on the taxiways would need.