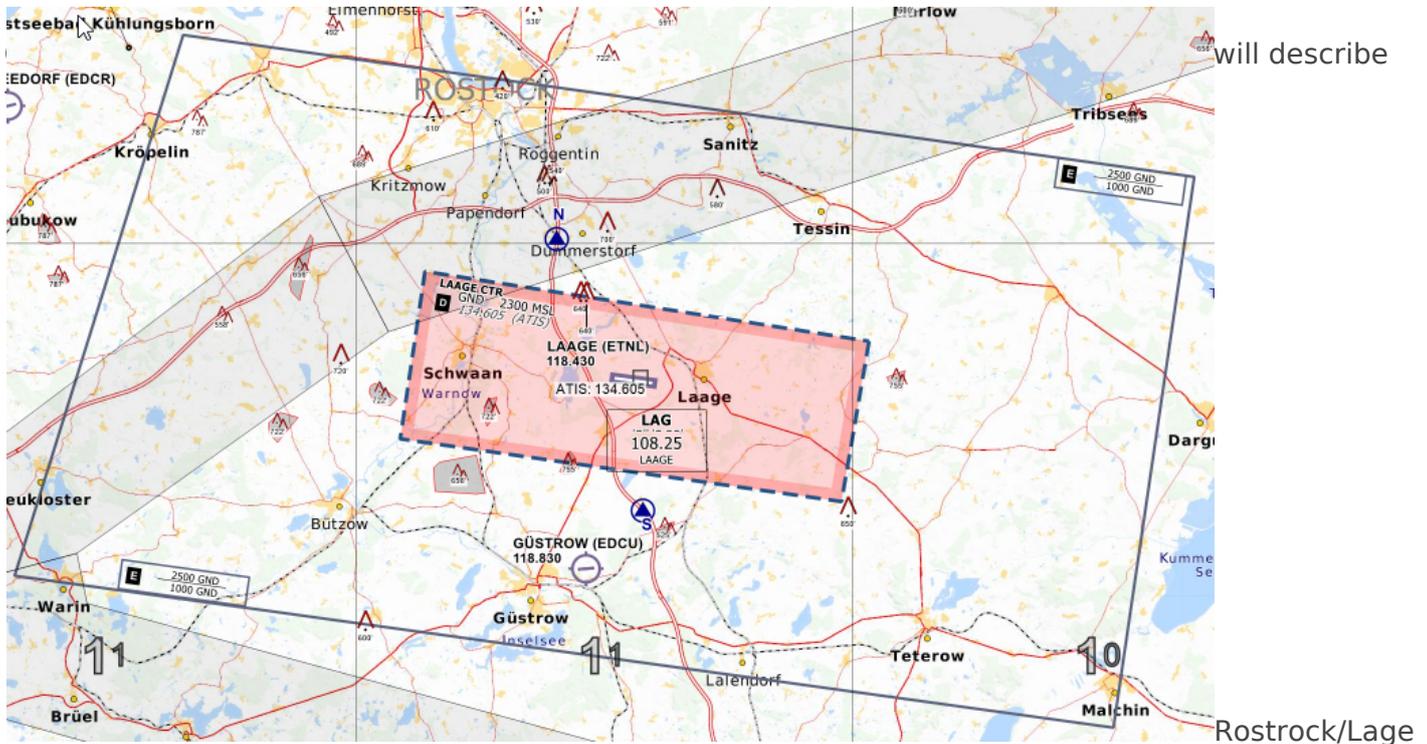


# Military Radar

## Airspace



Airport - © [openflightmaps.org](http://openflightmaps.org)

We will start with Rostock Laage. As you can see, the airport has a D-CTR just like all other airports in Germany. Additionally, the airport has a lowered airspace E around the CTR. Almost all military airports have that. The horizontal boundary of the area of responsibility of the Radar coincides with the lowered E airspace. The horizontal boundary is 5500ft. Below 5500 ft and inside that lowered E, the radar controller is responsible for the IFR traffic. As always in airspace E, VFR may enter the airspace without contacting ATC.

Two more examples of this are Diepholz and Wittmund. Just like in the previous example, the vertical limit of the area of responsibility of the military Radar is 5500ft. The horizontal limit coincides with the lowered airspace E. In case of Wittmundhafen, the area of responsibility is the inner rectangle of the TMZ. With this knowledge you can estimate how big the area of responsibility of any military radar is. The upper limit is 5500ft in most cases. The actual area of responsibility can be found in the military AIP (MILAIP, AD2, Minimum vectoring altitude/Area of responsibility

chart for each airport).

# General Controlling

In general the military Radar has the same responsibility as a typical APP controller. However, you have to remember that you are working with high performance military aircraft and possibly VFR aircraft that call for FIS. In this case you should not rely on visual separation alone as the closing speeds of a 300kt military jet and a 80kt VFR aircraft is too great to simply ignore. In this case working with vertical separation is the easiest solution.

In general military Radars seldom work with procedures. They mostly use headings and altitudes. Speeds are also avoided. VFR and IFR departures are possible. If the pilot departs IFR, he will be handed over to the responsible DFS controller fairly early due to the low airspace boundary. If the pilot departs VFR, he has to follow the VFR departure route which can be found in the Military AIP (VAD). Every deviation from the departure route has to be requested by the pilot and approved by ATC ("request to leave CTR on top").

If the aircraft is arriving IFR, it will be handed over from Center descending FL70 and as early as possible. The aircraft should be released for descent by Center before handoff to allow the Radar controller to control the aircraft. The pilot may decide if he prefers to land VFR or IFR. VFR the arrival is done on TWR frequency as published in the VAD charts (overhead approach maneuver as described below). Sequencing is then done using traffic infos and by telling the pilot which number he is in the sequence.

Station	Example Flight with IFR Cancellation on entry
<b>GAF123</b>	ETNL_APP, GAF123, 5000ft
<b>ETNL_APP</b>	GAF123, ETNT_APP identified, weather code BLU, runway 27, QNH1013
<b>GAF123</b>	GAF123 blue, runway 27, QNH1013 cancelling IFR
<b>ETNL_APP</b>	GAF123, IFR cancelled at 45z, proceed to Entry South 27
<b>GAF123</b>	GAF123, IFR cancelled at 45z, proceed to Entry South 27
<b>ETNL_APP</b>	GAF123, contact ETNT_TWR 118.425
<b>GAF123</b>	GAF123, contact ETNT_TWR 118.425
<i>On TWR frequency</i>	

<b>GAF123</b>	ETNL_TWR, GAF123, proceeding to entry south
<b>ETNL_TWR</b>	GAF123, ETNL_TWR, enter CTR via Entry South 27
<b>GAF123</b>	GAF123, enter CTR via Entry South 27
<i>Over Entry South</i>	
<b>GAF123</b>	GAF123, Entry South 27, 1700ft
<b>ETNL_TWR</b>	GAF123, ETNL_TWR Roger, report initial, number 2 following EUFI on downwind 27
<b>GAF123</b>	GAF123, wilco

If VFR arrivals aren't possible then the military jet will be vectored to procedure and it will fly a PAR, ILS, TACAN, NDB or RNAV approach but without the procedures as described below.

Lastly, we will discuss IFR pickups. IFR pickups are mainly used for military aircraft that enter the area of responsibility of the Radar controller with the intention to land IFR. Departing traffic to leave will already receive the clearance on ground. IFR pickups for military aircraft are much simpler than what you usually do for civil aviation. You just have to make sure that the jet is above the MVA, that it has been assigned a HDG and an altitude (or you have assign either or both during the IFR pickup) and then you say "IFR starts now" and that's it. You should also include the clearance limit (e.g. "cleared to Schleswig") but that is often left out in real life. If you give a IFR pickup for an aircraft that is leaving your sector, you need to coordinate an actual IFR clearance with the DFS station. However, if necessary you can start IFR immediately (mind the MVA) and coordinate the clearance with the DFS station later.

## Instrument Approaches/Procedures

In general military airfields tend to have a mix of ILS, NDM (DME), TACAN (DME) and RNAV approaches. However, most do not have an ILS. Instead the Precision Approach Radar (PAR) is used as a precision approach. However, that is not an instrument approach and thus will be explained in a later chapter.

As mentioned before, instrument approaches are mainly used without the procedure. Most military procedures include a DME Arc and then the familiar final approach. The waypoints on the procedure usually don't have a name so if you want to clear someone to fly the approach via the procedure, it's best to use the terms "Initial Approach Fix" (e.g. "out of IAF cleared TACAN rwy 27") or in general just explain to the pilot what you want him to do (e.g. "Join 12 DME Arc of TACAN rwy 27, cleared TACAN approach runway 27"). That is not quite the way they do it in real life but it will probably work well enough on Vatsim.

In general though it is enough to vector the aircraft to the final approach track and clear them for the approach. Remember that these are non precision approaches so the intercept must be done before the FAF and on the published altitude. You should also make sure that the aircraft has 2NM of straight and level flight before initiating the descent.

## Surveillance Radar Approach (SRA)

In this approach the pilot is provided with instructions and information on the aircraft's location relative to the extended centerline and distance from touchdown. During this approach there should be only one aircraft on frequency. If you ever need to give an SRA during operations with multiple approach controllers, you can let the director handle the SRA while the arrival controller handles all other traffic as usual.

In general the procedure for the controller is:

- The pilot needs to be told when the SRA terminates before beginning the descent and the OCA ("This will be a SRA approach, runway 25 terminating at the missed approach point, OCA 840ft, check your minima")
- The final turn onto the runway heading should not be more than 30° and there should be sufficient time before the start of the descent
- The pilot needs to be warned prior to descent ("11NM from T/D, 1NM prior to descend")
- The pilot does not read back the altitudes. He only confirms with his callsign.
- The pilot needs to be told when to initiate the descent ("10NM from T/D, commence final descent now")
- The pilot needs to be informed about the altitude each mile ("7NM from T/D, altitude should be 2500 feet")
- The pilot needs to receive heading adjustments when necessary or otherwise be told that the heading looks good ("left heading 245" or "heading is good"). Heading adjustments by 1 degree should be avoided.
- At 4NM the pilot needs to be reminded to check gear down ("4NM from T/D, altitude should be 1600ft, remember OCA 840ft, check gear down locked")
- From 4NM to T/D transmissions should not be interrupted by more than 5 seconds.
- The pilot needs to be reminded one mile before approaching OCA ("2NM from T/D, altitude should be 1000ft, approaching OCA, report field in sight")
- Between 2NM and T/D altitude and heading instructions should be given each 1/2 NM.
- If pilot reports field in sight he can be transferred to TWR or can be given the landing clearance after coordination between APP and TWR
- If the pilot does not report the field in sight, ATC should remind him to go around or continue visually ("passing MAP, continue visually or go around" or "go around, follow published missed approach procedure")

## Precision Approach Radar (PAR)

The PAR is very similar to the SRA but with better radar equipment to provide precise guidance. That's why it is considered a precision approach. If you have the ground radar plugin and its approach path function available for your airport, you can provide more accurate guidance to undertake such an approach.

The main different to the SRA is that the controller does not stop talking so there is no time for the pilot to confirm any instruction. ATC continues talking until the threshold of the runway.

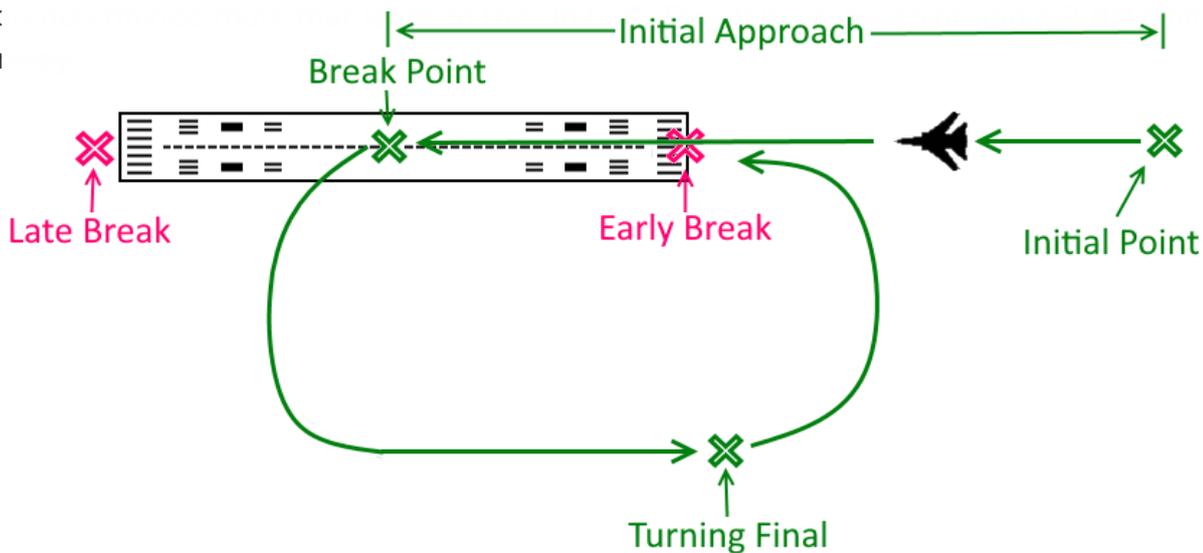
If you want to get an idea watch this [video](#).

You will notice in this video that in addition to heading instructions, ATC also gives information about the position of the aircraft in relation to centerline ("right of centerline", "correcting" etc.) and glide path ("below glide path" etc.) while in the SRA ATC only gives headings and recommends an altitude.

## Overhead Approach Maneuver (Jet)

The Overhead Approach Maneuver is a visual procedure that is used at military airports for the use of military jets flying VFR. These jets usually carry a lot more kinetic energy than civil aircraft do and need to dissipate that energy before landing. For this purpose the procedure is published on military airports. This is equivalent to a carrier approach. You can find the charts in the [German Military AIP](#) designated as VAD. Some examples for airports with this procedure are ETHC, ETNG, ETSB, ETSB, ETNL, ETNT but there are more. In these charts you will always find an Entry Point and

a p  
rui



*Approach Maneuver*

The procedure after the Initial is depicted on the right. The Military jet will approach with 300 kts indicated airspeed and descend to the published altitude of the procedure. Usually, the published

altitude is about 1000ft-2000ft higher than the airport elevation. The aircraft will then overfly the runway until reaching the break point. The standard break point is in the middle of the runway upon which the aircraft will enter a 3G turn to either side and decelerate in that turn. It is possible to fly this procedure faster but then the pilots needs to pull harder and thus increase the centrifugal force in the turn. In simple words: The harder the pilot pulls the better the deceleration.

The jet will then continue in the traffic circuit while still decelerating. On downwind the pilot also puts down flaps and gear. The pilot should reach the approach speed before initiating the final turn. After about half of the final turn the jet will start descending towards the runway on which it will land. As you can see in the picture, the break can be flown early and late which gives ATC the opportunity to sequence aircraft in case ATC deems it necessary, however, because this is a visual maneuver, the sequencing should be done with traffic information and numbering.

In general, it is very easy to dissipate energy in this maneuver which is why it is preferable for military jets. Furthermore, this procedure minimizes the time that aircraft spend low and slow, thus, minimizing the time that these jets are most vulnerable.

Important points:

- Initial is a mandatory reporting point
- On downwind the pilot can be asked whether he intends to do a touch and go, low approach or full stop landing.
- This procedure is an easy way to dissolve a formation for individual landings if requested by the pilot. The formation will continue to the break point like with the normal procedure. At the break point the first aircraft will enter the break turn. After a few seconds the second aircraft will enter the break turn and this will continue until the last aircraft enters the break turn and the formation proceeds to land individually.
- As always with military jets: On Crosswind or final the pilot has to be reminded to check the landing gear "Check gear down" unless he has reported gear down before that point.
- To reemphasize: If published, this is the way that visual approaches ought to be flown in military jets unless a "straight in" visual approach is requested and accepted by ATC.

If you let a formation fly this overhead approach then they will break individually during the procedure and also land individually one after another. When the first aircraft is on downwind you can ask the pilot about his intentions. If he wants to do a final landing then you can ask all other pilots of the formation if they also want to do a final landing. If they confirm that they want to perform the final landing, you can clear the whole formation for landing at once (e.g. "wind 25005kts, runway 27 cleared to land as formation").

Below you find a Phraseology example for a published overhead approach. At this point ATC should already be in contact with the aircraft, should already have told the aircraft the runway in use, QNH and color code.

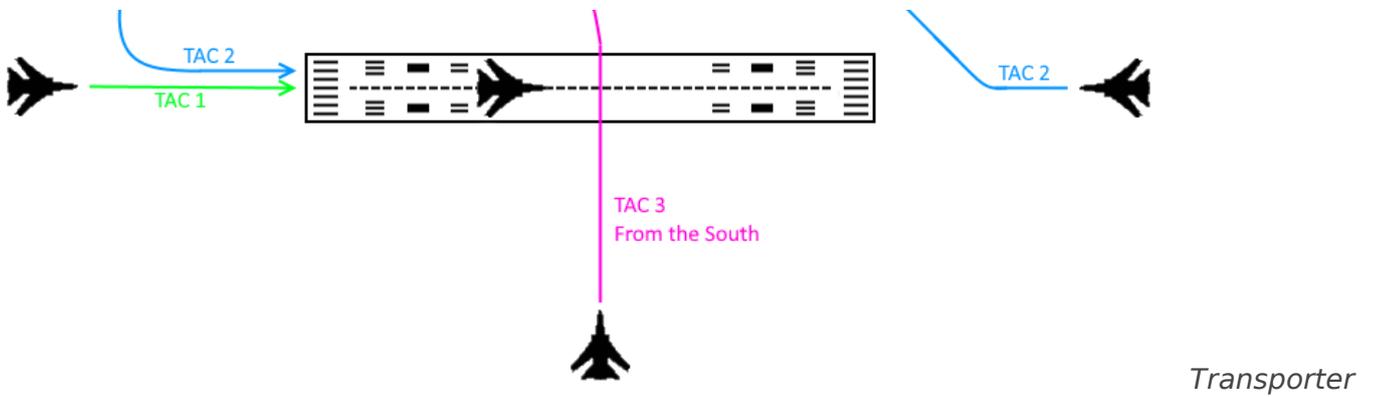
Station	Overhead Approach Maneuver
ETNT_TWR	GAF123, enter CTR via Entry East

<b>GAF123</b>	GAF123, enter CTR via Entry East
<i>At Entry East</i>	
<b>GAF123</b>	GAF123 at entry east, 1500ft
<b>ETNT_TWR</b>	GAF123, Roger, report initial
<b>GAF123</b>	GAF123, wilco
<i>At Initial</i>	
<b>GAF123</b>	GAF123, Initial
<b>ETNT_TWR</b>	GAF123, number 2, following EUFI on right downwind 26
<b>GAF123</b>	GAF123, Roger
<i>On Downwind</i>	
<b>ETNT_TWR</b>	GAF123, report intentions
<b>GAF123</b>	GAF123, Full Stop Landing
<b>ETNT_TWR</b>	GAF123, roger, wind 25005kt runway 26 cleared to land, check gear down
<b>GAF123</b>	GAF123, runway 26 cleared to land, gear down

In case you ever want to do this on an airport that has no published procedure for the overhead approach maneuver, you should tell the pilot the pattern altitude and the direction of the pattern. You also have to tell the pilot which initial to report(e.g. "runway 26, pattern altitude 1500ft, right turns, report 2 NM initial").

## Transporter Tactical Approach

There isn't much to talk about for transporter approaches. In general Military transporters try to spend as little time as possible close to the ground. Therefore, the standard combat approach for a transporter is an approach that is as steep as possible. In general, transporters prefer to maintain altitude as long as possible. They will configure for landing like landing gear down, flaps and even speed brakes and then descend for the runway with up to 4000 ft per minute.



### *Tactical Approach*

Additionally there are Transporter Tactical Approaches called TAC 1, TAC 2, and TAC 3 which can be seen in the picture of the right. They are designed to make the approach direction of a transporter less predictable by changing between TAC 1, 2 and 3. TAC 1 is basically the straight-in approach. TAC 2 is just like a circling approach and TAC 3 an approach orthogonally to the runway. TAC 3 has two directions it can approach from so additionally North, South, East and West should be added to specify which direction is used.

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