DELTA FLY!

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Delta Fly JANUARY ISSUE

From the President's Desk

December 2005

I trust that you and your family had an enjoyable holiday and now look forward to a new year. I wish you all a happy, joyous and prosperous New Year. May you have time to fly your favorite aircraft as frequently as you wish.

The switch to a dedicated server is complete. You should notice crisp responses, as our server and programming is state-of-technology. Work continues to make enhancements and refine ACARS. A gee-whiz thing to do is to complete a flight using ACARS. Download from your flight report the Google Earth file. Install Google Earth and view your flight paths in 3-D. Data points recorded by ACARS are displayed along the flight path.

The Flight Academy under George Lewis's direction is beginning to serve our pilots with one-on-one pilot training and Private Pilot License instruction for certification.

Our on-line group events under Andrew Dalrymple's direction have attracted a great deal of attention as participation in the Sunday night group flights is averaging 40 pilots. Other pilots are seeing our activity and join in the fun including swamping VATSIM's servers. Group flights are meant to enjoyable and memorable experiences that challenge technology and pilot skills.

Your staff is working hard with the emphasis on enhanced enjoyment of virtual aviation. The key word is enjoyment. Please provide feedback as to how you would like your experience enhanced. If it fits our business model, we will do our best to incorporate your ideas.

Thank you for flying Delta Virtual Airlines,

Terry Eshenour
President, Senior Captain 777
DVA057

Delta Fly JANUARY ISSUE

From The Editor

Matt Reamy

A new year is upon us. We've shared the Christmas holidays with our friends and families, those lucky enough took advantage of the opportunity to fit in some flying. We all crossed our fingers and hoped for the green light on some new pay ware product. Others produced the credit card bills and asked for forgiveness, I'm sure.

Delta FLY is now in its third month here at DVA. It was a hectic month of December and believe me I'm looking forward to the new year as much as anyone.

It was a bit of a struggle for me personally to put this issue together, and I'd like to thank George Lewis for helping me out. I tend to go through periods where apathy takes hold and won't let go. But between George Lewis and my own desire to not let you guys down, here it is.

In this issue, George writes an excellent column on navigating direct to VOR stations. VOR is the foundation of all flight navigation and this is excellent series. Hopefully those of you who are confused about VOR navigation are learning a lot, and the rest of us should take advantage of this opportunity to refresh our knowledge. With all the FMC and GPS technology out there, it's easy to forget the basics.

I continue my series on flight planning with a discussion of STARs. This series has been extremely fun to write, and I've learned a lot myself. And there's more to come.

This issue is a slim one, and for that I apologize. Our schedules are all very hectic this time of year.

I'd like to once again remind our pilots that they are free to give us feedback. Let us know what you think and what you want to see in future issues. Contact us at delta_fly_mag@hotmail.com .

Flight Academy
Flying Direct to the VOR

By George Lewis

Previously in the Delta Fly! I presented an overview of the basics of radio navigation systems in order to navigate properly in the skies. They are NDB (non-directional beacon), DME (distance measuring equipment) and VOR (very high omni range).

What we will teach in the PPL course concerning VOR navigation will be "direct to the VOR" and in fact, this article includes material I have written for the PPL course.

We have already learned how to use the NDB and the ADF. It is quite handy. It shows us where the NDB is located. There are 2 problems with NDB/ADF. The first is that you have no real idea how far away from the NDB you are. The other problem is the range. The NDB has about a 40 mile range. While the NDB is a useful navigational aid, it is time to move up to the primary navigation tool of real world professional pilots – the VOR.

Keep in mind that while you can read this material, we can show you how this works very easily using FSNET/Copilot in a training session. It really is very simple to learn!

Flying using the VOR

Many people fear the VOR – I have no idea why – it is very simple to use. Along with the VOR we have what is called the DME (Distance Measuring Equipment).

We will be learning how to fly direct to a VOR. The more advanced uses of the VOR will be coming in future Delta Fly! articles.

The VOR beams a signal in all 360 degrees of direction. Each signal is unique – this means that you can tell, from this signal and a VOR receiver, where you are in the sky.

DME

DME is Distance Measuring Equipment - If you were to tune in the VOR and the mileage on the DME says 25, you are 25NM away from the DME. This is a very useful piece of equipment that we will utilize on nearly every flight we fly. Please keep in mind that not all VORs are created equal – some are not equipped with a DME – this is more common in Europe than in the USA.

Slant range

Another thing you should know is that the DME gives its distance in slant range – meaning it is the distance from the airplane to the DME station, not the ground distance. So as you fly near the DME, the mileage indicator will slow down. If you fly over the DME at 30,000 ft AGL, you are approximately 6NM high, or 6NM from the DME, so the distance given will be 6NM and it will never go any lower.

The HSI

The HSI (Horizontal Situation Indicator) is really several instruments combined into one instrument. The HSI is a combination of the heading indicator, VOR, ADF and DME.

Here is a breakdown of the DVA EMB-120 HSI

CDI, Airplane and To/From

The part circled in yellow shows 3 things.

1 – the long green line is the CDI (course deviation indicator) but it is also called "*the needle*"

2 – the white cross is a depiction of an airplane – this is you

3 – the white triangle is the inbound / outbound indicator *Some VORs use a To/From flag instead.*

Heading, ADF and Course

The upside down white triangle is the present course – it has a white line that goes straight down so it is easier to see it on the compass row. We are currently heading about 122 degrees

The pink cross is the direction to the tuned in NDB on ADF1

The green triangle and line point to the current course heading, which is 139.

DME Closure Rate

This says we are approaching the DME at 213 knots. It does not tell us we are flying at 213 knots.

If we are not flying directly to or directly away from the VOR station where the DME is located, this number is pretty much worthless information.

VOR1 DME Information

We can see here that we are tracking the VRB VOR and that we are 10.4 nautical miles away from this VOR.

Heading Bug

The heading bug is useful for the autopilot and the flight director.

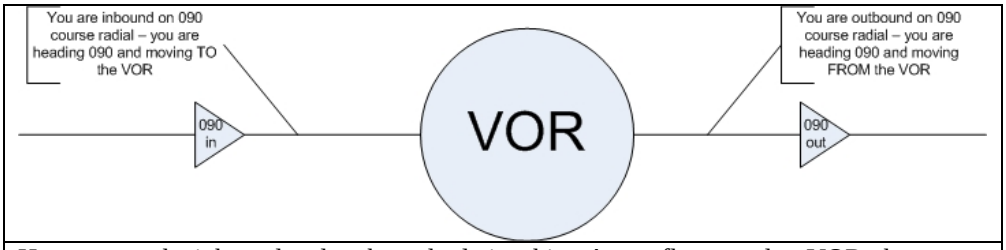
Course Heading

The HSI is tuned into CRS 139 on the VRB VOR.

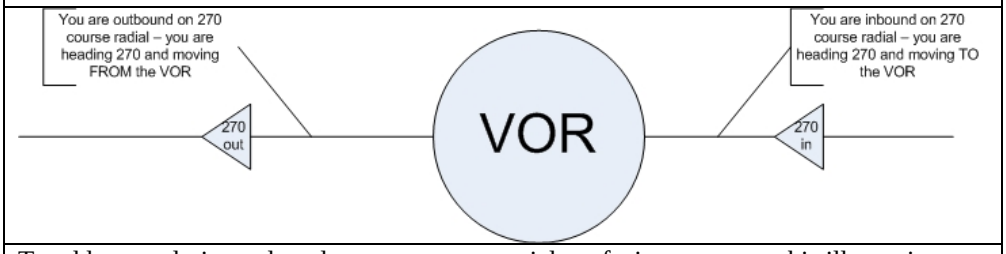
		
BRG ADF1 This just means that ADF Bearing is on the pink indicator on the HSI.	**NAV/GPS mode** If you change to GPS, the HSI will track and fly the GPS waypoints if you using a FS2004 flight plan	**Course Indicator** This tells us that the Course Indicator is set to 139 degrees.

Understanding Inbound and Outbound

Inbound and Outbound concepts are important to understand. Here are a couple of drawings to hopefully better illustrate this concept.



Here we see the inbound and outbound relationship. As we fly towards a VOR, the imaginary line going through the center of the VOR is inbound – the flag on the VOR will show TO or point upwards towards the VOR. As we pass over the VOR, there is no signal and we are neither inbound nor outbound. As we fly away from the VOR, we are flying outbound. This is still the same course radial, but depending on which side of the VOR you are on, you are inbound or outbound.



To add more clarity and to clear up some potential confusion, compare this illustration with the one above. Here you see that we are flying on the same line – the above illustration showed the course radial as 090 however in this example we are on course radial 270. Study these 2 illustrations for a better understanding of inbound and outbound.

Flying direct to a VOR

VOR flying in the PPL course focuses on the basics – flying direct to the VOR. We simply tune the needle until it is inbound and centers, then turn and fly that heading, keeping the needle centered due to drifting such as wind and torque. When we fly cross country flights we may fly to several VORs during the course of the flight. This means we will fly to VOR1 and when we get there, tune in VOR2 and fly to it, then VOR3, then VOR4 and so on until we get to where we are going. These VORs are not always on a straight path to our destination.

Sometimes it is beneficial for us to skip one of the VORs and flying VFR we can get away with this. All we have to do is see that the 2nd VOR is in range of the VOR receiver and simply fly to it and leave your present course, as the illustration below shows:

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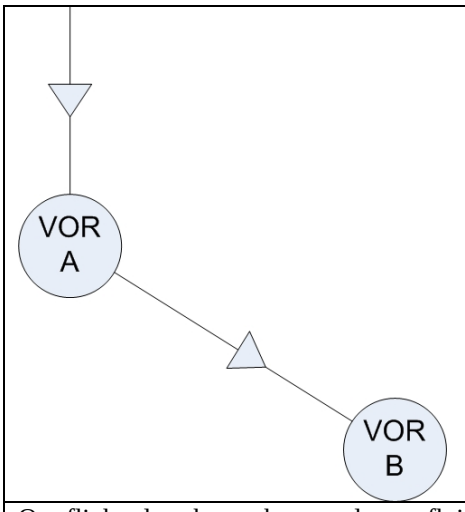
<tr>
<td> 
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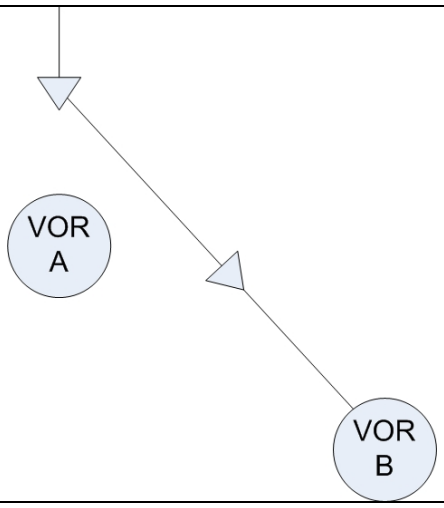
<td> 
</td>
</tr>
<tr>
<td>Our flight plan shows that we plan on flying to VOR A and then from there to VOR B.</td>
<td>VOR B has come into range on the VOR receiver so we will bypass VOR A and fly directly to VOR B</td>
</tr>
</table>

The above example is one that you can use to save time on a VFR trip. If you are flying online, ATC may say “cleared direct to the VOR B” (replace VOR B with whatever VOR it is that is on your flight plan). The same principle applies in this situation.

If there is bad weather in your way, ATC can give you vectors to get out of the weather or fly to another VOR to steer around it. ATC may say “fly direct to VOR ABC” and give you the frequency. The idea is that if you fly direct to this new VOR, you will steer clear of the bad weather.

Whether ATC vectored or done on your own, there are a couple of things to keep in mind if you plan on doing this.

- You should ensure you are not crossing any restricted airspaces when you take the shortcut.
- If you are deviating from a flight plan you might want to advise ATC you are deviating. This way ATC doesn’t get worried that you are off course and lost.
- If you think you might be able to take a shortcut, in your flight planning, note the weather and make sure you aren’t running smack into some bad weather.

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The following information is taught in the Cessna 182 and the Boeing 727-200. This will give you some experience with other VOR and HSI equipment.

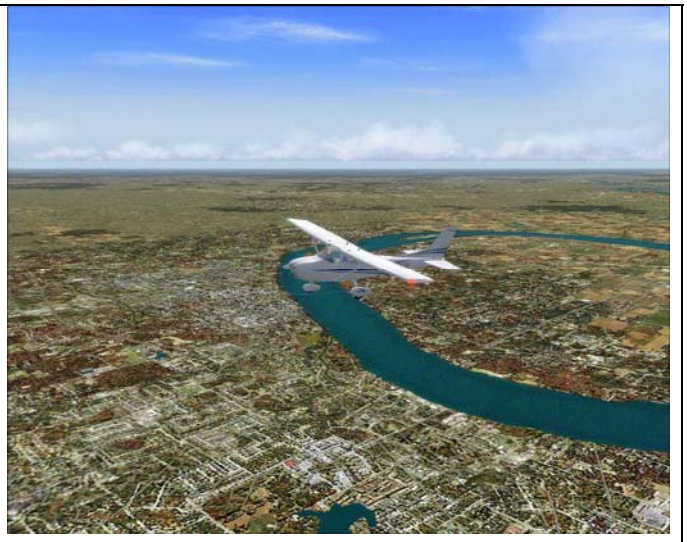
Getting it done

Now that we realize what flying direct to a VOR is all about, let's demonstrate how you do it in the airplane.

We are flying here in the Cessna 182 and we will demonstrate tuning in a VOR and flying direct to it.

The basics of flying direct are simple: tune in the VOR frequency and then turn the course selector until it centers and shows inbound or TO. Turn and fly that heading and keep the needle centered.

In the bigger airplanes such as the Boeing and Airbus jets, the turn rate is not nearly as good as in the smaller airplanes. This means you will probably need to adjust the course heading by the time you finish making the turn.



Flying Direct to the VOR in the Cessna 182

We tune in the VOR and of course the needle isn't centered, so we want to center the needle – we tune the OBS knob until the flag changes from outbound which it is showing here, to inbound

Now we have the flag showing inbound – it is the small white triangle by the word NAV on the VOR gauge. The needle is not totally centered but we are close.

The needle is now pretty much centered – we need to turn to a heading off about 155 degrees to fly direct to this VOR. Since we are flying direct, we can even tune the VOR a degree or two to the left or the right to center it even more once we have finished the turn.

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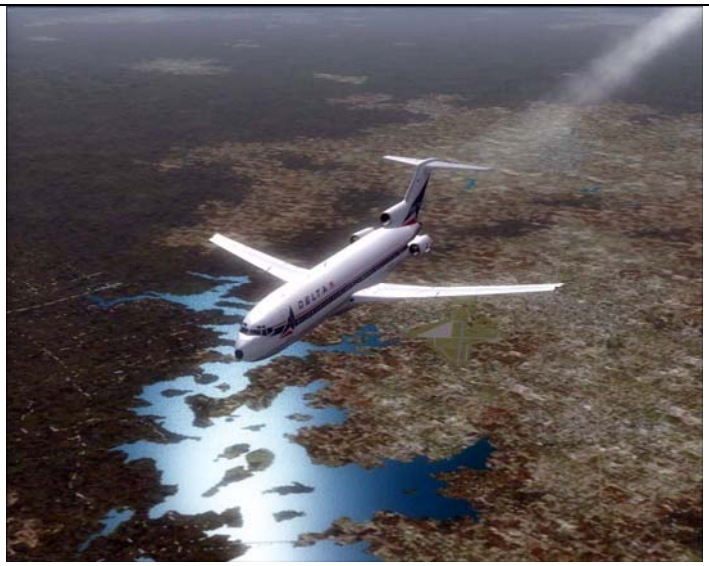


The Boeing 727-200

The next series of screenshots demonstrates the same thing that we just did in the Cessna 182, only this time we move to the HSI – the Horizontal Situation Indicator – in the Boeing B727-200, seen here in the 1971 Old Colors scheme

The HSI, as previously discussed, also shows our heading, so I included more screenshots so you could see the process a little better. We are departing runway 22 at KEVV and need to climb to about 3,000 feet before we can pick up the VOR signal. Then we center the needle and fly direct to the BNA VOR.

Flying Direct to the VOR in the Boeing 727-200

We takeoff and are climbing – we haven't picked up the VOR signal yet.

Crossing 3000' we pick up the VOR signal. You see that the default course heading of 116 is tuned in.

We turn the course indicator till the needle centers. However, the course is outbound – *note the small triangle is not pointing in the same direction as the course indicator.*

So we continue to turn the course indicator – note we are at course 286 now and the HSI is indicating that course 286 is an outbound course.

We are still turning the course indicator but now we have an inbound indicator.

The needle finally centers on course 159; this is the direction we need to fly to go direct to the VOR.

We begin turning to a heading of 159.

We turn to a heading of 159 and then begin to track the VOR – we are 117 nm from the BNA VOR here.

Using the RMI

Remember the RMI? This handy instrument has the ADF built into it and it points directly to the NDB and all you have to do is turn your airplane towards it and fly directly to the NDB. As previously stated, the problem with the NDB is that it has neither a very long range nor mileage information.

You may remember that the RMI had a second needle on it for the VOR2. Yes, that's right, the yellow needle is for the ADF and the green one is for the NAV2 radio frequency tuned VOR2. With this in mind, we can simply tune the NAV2 radio frequency for the VOR station. Once it comes in, the RMI will point to the VOR station, just like the NDB.

Using the RMI with VOR2	
	
Finding the VOR This time you see that the ADF is sitting in the "not tuned" position and we have VOR2 tuned in and it is pointed towards about 135 heading. This is where the VOR station is located.	**Flying Direct to the VOR** We have now turned our airplane to the left until the needle is pointing straight ahead. We can now fly direct to the VOR using the RMI.

If the VOR has a DME, and most VORs in the USA do, you can change your DME to N2 to get distance to the VOR. If you are flying directly towards the VOR you can use the speed and the time to the VOR as well. This is a very useful thing to use!

You may be wondering why we even use the HSI to fly to a VOR since RMI is so simple. Once you understand the basics, you will want to progress to IFR flying, which will require flying using SIDs and STARs and jet airways. The RMI is not precise enough of an instrument to use for these types of flying. It is wonderful for situational awareness but it doesn't work well for flying a precise course radial outbound from a VOR, but that is beyond the scope of this article. We'll cover those concepts and techniques in future issues of Delta Fly!

Planning flights with the VOR overcomes the problems with NDB. With DME we have mileage information for our flight planning. There are several different types of VORs in flight simulator. There are 3 you need to know about for cross country flying:

- Terminal VOR – this has a range of about 25 NM
- Low altitude VOR – this has a range of about 60 NM
- High altitude VOR – this has a range of about 194 NM

Practical application of "Direct to the VOR"

Captain Lewis is shown here in his Boeing 727 tracking direct to the DRK VOR. VOR2 is dialed into the BCE VOR. The flight is KABQ-KSLC and is being flown by hand without the use of GPS, autopilot or FSNAV.

I hope you've enjoyed learning how to fly direct to the VOR – now go out there and give it a try! If you get stuck and need some help, I am only an email (training@deltava.org) or a Water Cooler post away! Also, you can ask just about any Boeing 727 pilot how to fly using the VOR – they can tell you because it's how they get from point A to point B on every flight – just like the one shown above…

Flight Planning: Standard Terminal Arrival Routes

By Matt Reamy

Welcome back. In the previous two issues, we've talked about the overall flight plan and we discussed Standard Instrument Departures. This month, we're going to break down the Standard Terminal Arrival Routes or STARs.

Just as the SID is a means of routing traffic away from the airport environment, a STAR serves the purpose of funneling traffic into the airport environment. Simply put, a STAR is a SID in reverse.

From all points of the compass, a STAR collects air traffic and gives each a means of terminal arrival without complicated clearance instructions from ATC.

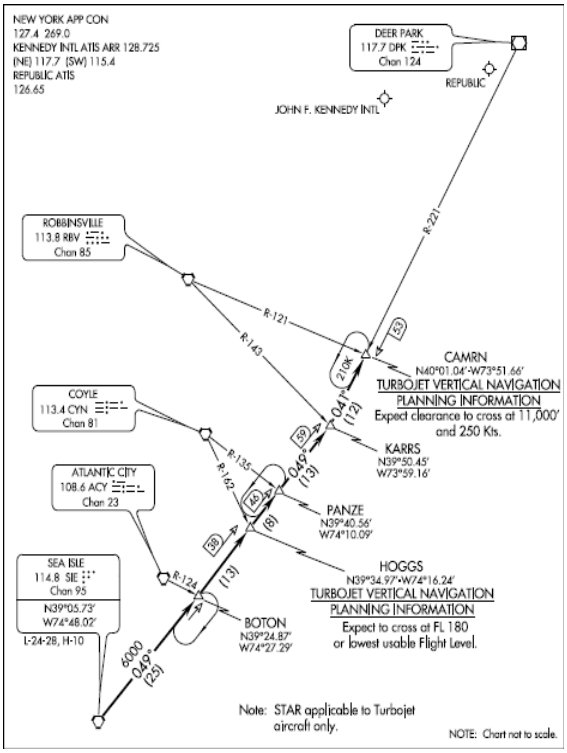
Let's look at our trusty flight plan from Atlanta to New York: KATL-EATWO-GRD-J209-ORF-J121-SIE.CAMRN4-KJFK. We broke this down by segment in the first article, and looked at the SID last month. Our focus now is on the last three items: SIE.CAMRN4-KJFK.

SIE is the called the *transition*. The transition is typically a VOR station. There are STARs that transition over an intersection; Los Angeles's SADDE6 Arrival is one. But for the most part, this transition will be a VOR.

Following the transition, is a series of waypoints and crossing altitudes that serve to deliver aircraft to a point where they can perform the approach.

Finally, the destination airport.

Again, CAMRN4 is an extremely simple STAR. It's almost straight in from the transition.



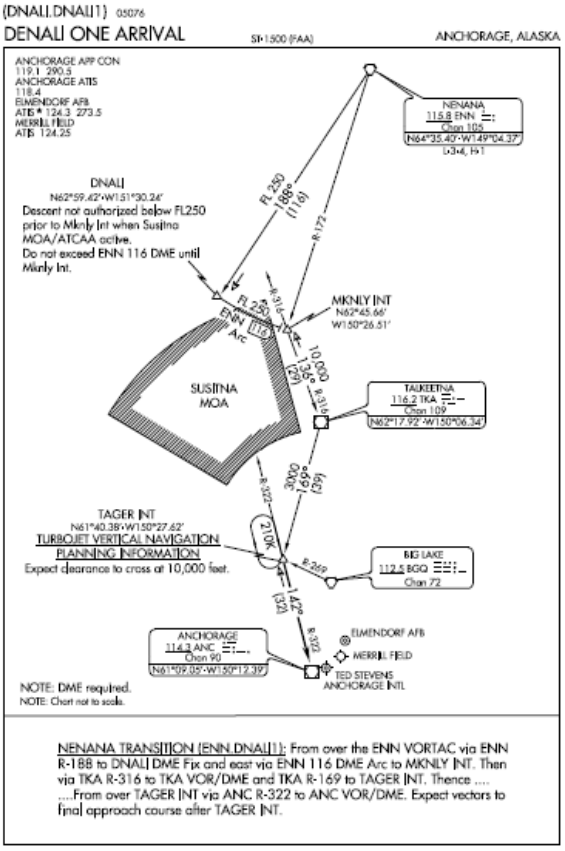
When you file a plan with a STAR in it, pick one that logically fits in with your route of travel. It's preferable to have a transition VOR that is a waypoint along the last airway you travel before your STAR. In this way, there's less maneuvering time spent getting into position for your arrival.

SIE.CAMRN4-KJFK is perfect as SIE is a waypoint on the J121 airway.

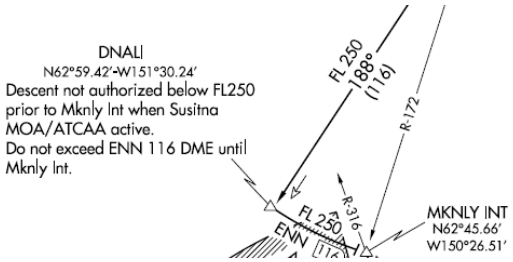
As we discuss STARs, keep in mind that these aids are not mandatory; the pilot is the final authority on whether to accept a clearance or not. That being said, it's not advisable to get haughty with ATC. If you refuse a STAR as part of a clearance, you may end up holding a remote fix or vectored all over creation, even if you have a good reason for the refusal such as not having the chart. It's good to file NO CHARTS in the

comments of your flight plan, if this is the case.

So let's dig into a STAR, break it down and explain the parts, shall we? We're going to look at Anchorage's DENALI ONE ARRIVAL. Here it is (there's a larger one following this article).



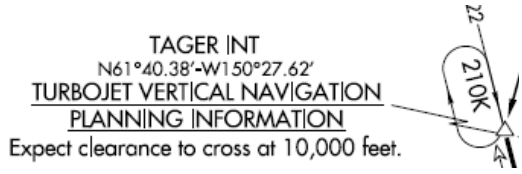
We'll look at another one in a bit. I chose to look at DNALI1 because this one throws a curve at you. Obviously, this STAR is for aircraft arriving into PANC from the north. The transition is a VOR, NENANA: ENN.DNALI1-PANC. Transitioning the ENN VOR, fly heading 188 until the DME reads 116. The DME arc described ends over the Susitna Military Operations Area. Military Operations Areas are not always active. For simulation purposes, this isn't necessarily important; however, it shows a higher level of knowledge and preparation if you inquire from ATC the status of the MOA.



As it states on the chart, if the MOA is active descent below FL250 is unauthorized. Furthermore, penetration beyond the 116nm DME arc from the ENN VOR is unauthorized as well. From DNALI intersection, fly the DME arc to MKNLY intersection, which is along the 172 radial from the ENN VOR. Radials, if you'll recall, are straight lines outbound from a VOR station. You'll be at the MKLNY intersection when your navigation radio, still tuned to ENN's frequency, points to 352 and the DME is 116; remember, an arc is a segment of a circle and the DME shouldn't change as you follow the arc from DNALI to MKLNY.

From there, turn south again, to heading 136. The VOR not tuned to ENN should be tuned to the Talkeetna VOR, TKA.

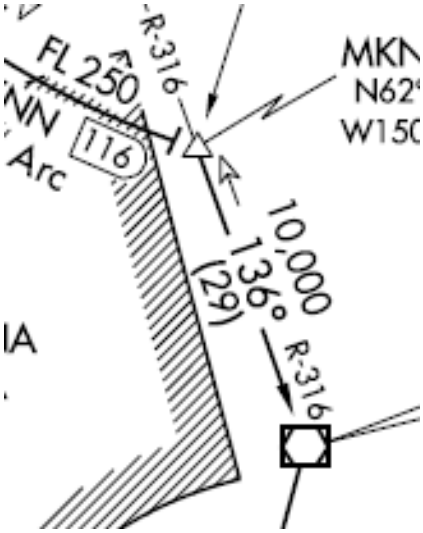
Following the 169 radial from TKA for 39nm brings you to TAGER intersection.



There are specific instructions for TAGER intersection: *Expect to cross at 10,000 feet.* Sometimes instructions like this will include a speed at which to

cross, as well. Since this crossing altitude is 10,000, you already know the airspeed restriction will be 250KIAS.

If you'll notice there are altitudes given for each leg of the STAR as well as heading and distance information.

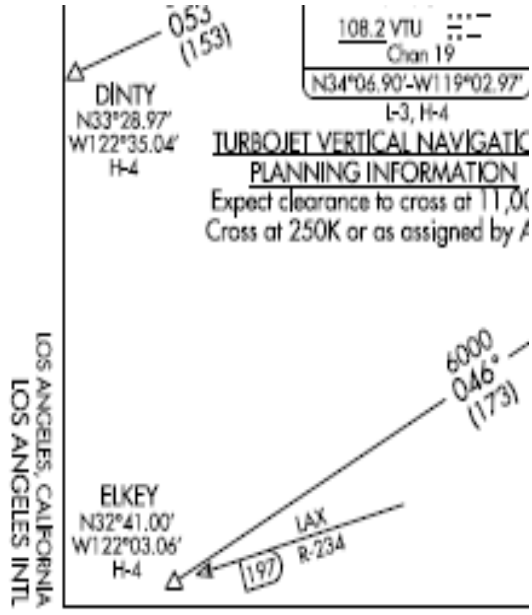


This is a Minimum Enroute Altitude. Descent below the MEA is not authorized; nor is it safe. MEAs are in place to ensure obstacle clearance, so ensure you stay above the published MEA.

You'll remember I mentioned Los Angeles's STAR, SADDE SIX ARRIVAL. We'll be taking a look at SADDE6 as an example of a STAR with multiple transitions. There's not special trick to these; they're not any different in execution, they simply have different points of entry.

All aspects in the execution of the STAR are the same: transition, MEAs, and headings.

Two of SADDE6's transitions are intersections, DINTY and ELKEY. The reasoning for this is obvious if you look at it. LAX is close to the coast. The intersection transitions are a necessity, giving the aircraft the distance they need for the descent phase of the flight.



Proper use of STARs can help alleviate a lot of work, not only for you but for the controller as well.

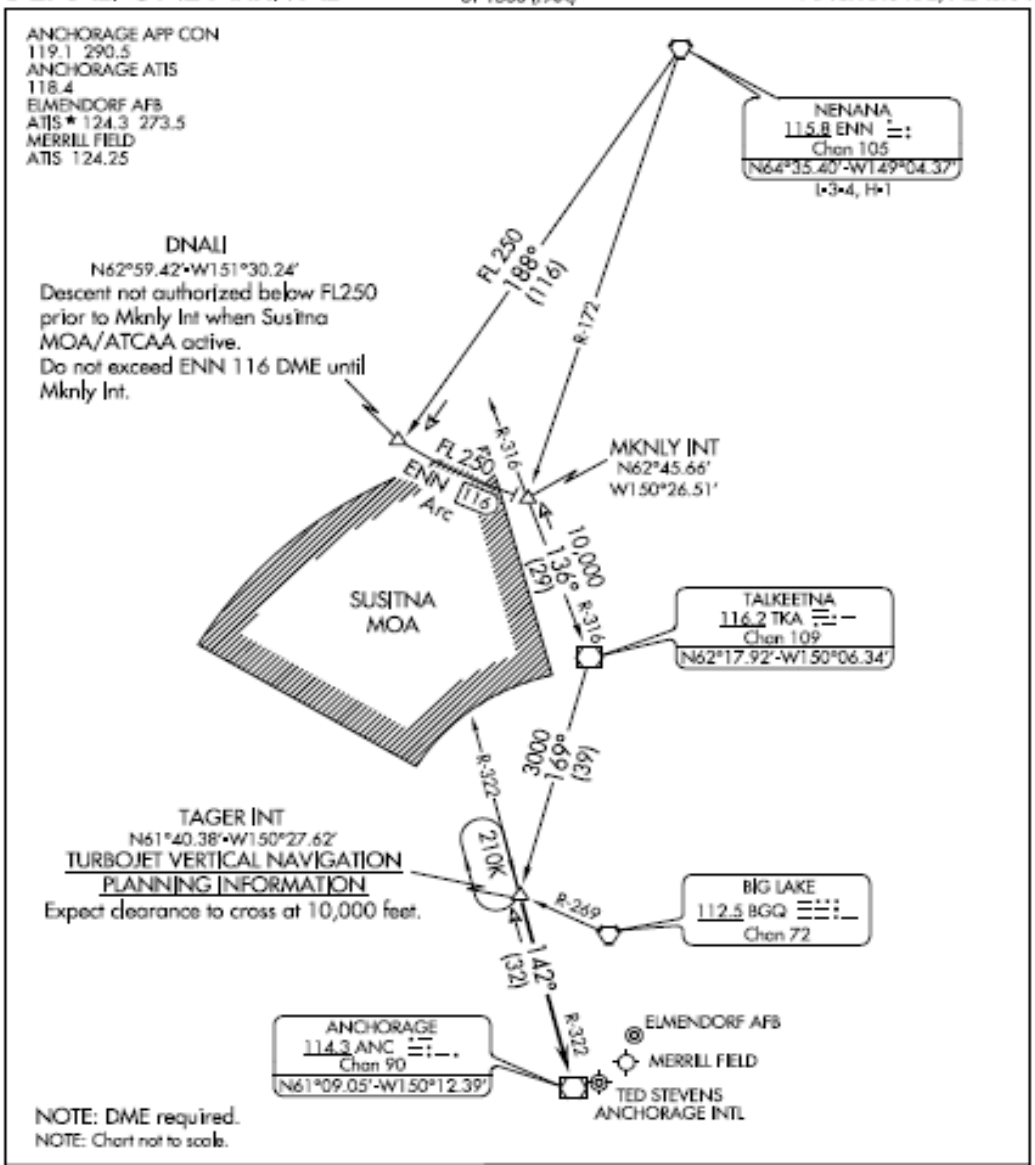
Questions or comments can be sent to delta_fly_mag@hotmail.com with the topic flight planning.

(DNALI.DNALI1) 05076

DENALI ONE ARRIVAL

ST•1500 (FAA)

ANCHORAGE, ALASKA



NENANA TRANSITION (ENN.DNALI1): From over the ENN VORTAC via ENN R-188 to DNALI DME Fix and east via ENN 116 DME Arc to MKNLY INT. Then via TKA R-316 to TKA VOR/DME and TKA R-169 to TAGER INT. Thence ....
....From over TAGER INT via ANC R-322 to ANC VOR/DME. Expect vectors to final approach course after TAGER INT.

DENALI ONE ARRIVAL

ANCHORAGE, ALASKA

(DNALI.DNALI1) 05076

Charts available from www.myairplane.com

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On The Cover: MD-11 on approach to KLAX.

If you want your photo to be considered for the cover of a future edition of Delta Fly, send an email to the above email address with the subject Cover Photo. Please do not send the photo itself, but instead provide a link to the photo (ie from the Water Cooler). Photos must be your own work. Please do not recommend photos that are not yours. Photo copyrights belong to the original author and will not be used without permission.

If you want a photo to be used as filler within Delta Fly, the same rules apply.

MD-11 enroute to Tokyo
Photo by Jimmi Cranford