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Remember the old adage you learned back in ground school? "High to low, hot to cold, look out below." Well, it seems to be taking on a whole new level of importance. The "high to low" is based on altimeter settings which can cause a problem with an altimeter setting at the airport which is lower than the altimeter setting in your airplane. This can be corrected by adjusting the altimeter in your aircraft to the local altimeter setting when shooting an approach and landing.

## The Chart Clinic – Twenty Seventh in a Series

The "hot to cold" situation is a more serious consideration. When flying into an airport with very low temperatures, the error will work itself to zero when touching down at the airport with the correct altimeter setting, but there can be a *significant difference* when still shooting the approach. The altimeter does not compensate for extreme low temperatures away from the airport even with a correctly set local altimeter setting.

With a temperature at the airport that is -30° C, your true altitude at the final approach fix could be more than 200 feet lower than your altimeter indicates you are. And with the required obstacle clearance of 500 feet approaching the FAF, you have already used up much of the safety margin of the approach obstacle clearance protection.

### Temperature Note

The FAA has issued a new series of approach procedures which became effective on 24 February, 2000. On these charts, the temperature note has appeared for the first time. Look at the bottom of the Briefing Strip™ on the Atlantic City RNAV Rwy 13 chart and you will see the note: 1. Baro-VNAV NA below -15° (5°F). VNAV (vertical navigation) is authorized on this chart, but extreme low temperatures would place the airplane too close to the obstacles while following the VNAV path. This is true not only for VNAV, but it is also true for flying the altimeter without VNAV guidance.

What to do if the temperature is below -15°? The remainder of the approach procedure is still good, it's just the VNAV that is not authorized. Even though the VNAV is the only thing that is affected by temperature on the chart, it is still wise to consider the extreme low temperatures for all segments of the approach.

The FAA will be issuing an Advisory Circular, "Altimeter Errors at Cold Temperatures," that spells out many of the conditions surrounding extreme temperatures. One of the statements in the Advisory Circular is, "It's particularly important to make altitude adjustments on initial, intermediate, and final approach segments in mountainous areas or any obstacle-rich environment because unusually cold surface temperatures can cause significant differences between true and indicated altitudes."

### Terminal Arrival Areas (TAA)

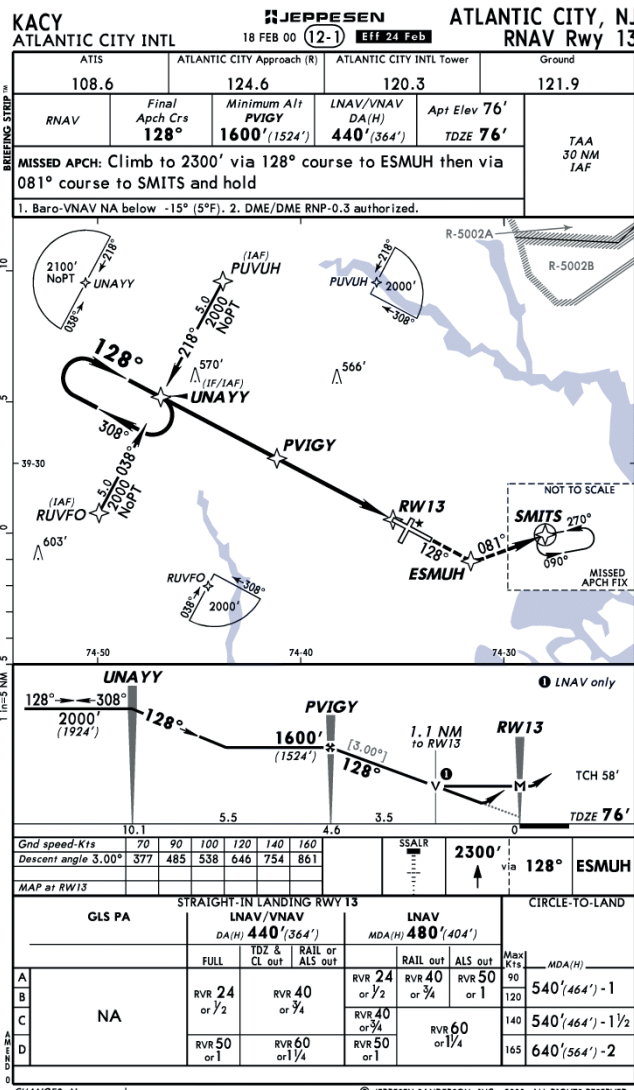
Imagine that you are arriving at Atlantic City from the southwest and are given radar vectors, and then a clearance direct to the UNAYY intersection and cleared for the approach. Without the TAAs, there are differences of opinion between controllers and pilots in various parts of the US about whether there is a requirement or an expectation on whether or not you are required to execute the course reversal at UNAYY. Also, if the controller gives you an altitude of 2,100 feet until UNAYY – is that a good altitude? A healthy skepticism of clearances and altitude assignments is valuable and you now have something to refer for your own check and balance system for altitude assignments.

Look at the Atlantic City, New Jersey RNAV Rwy 13 approach chart plan view, and you will note a new type of transition for approaches. In the best sense, the TAAs are the first true free flight procedures because you now have altitude and course information for *any direction* when arriving at Atlantic City to shoot an approach. In the upper left corner of the plan view, there is a half circle with a waypoint symbol on the straight line segment. The waypoint name is UNAYY, the same as the waypoint on the final approach course. Inside the half circle is the number 2100' and the letters NoPT. The straight line of the TAA is defined by the 218° inbound course and the 038° inbound course.

What does this mean? It means that when you get a clearance for the RNAV Rwy 13 approach from any inbound course of 038° clockwise around to 218°, you can descend down to 2,100 feet as soon as you are within 30 nautical miles of UNAYY, you not only do not have to make a procedure turn (holding pattern course reversal in this case), but you cannot do the course reversal unless you request one from ATC and get approval to do so.

The FAA has designed the TAAs so that it will be very unusual to have to perform a course reversal such as a procedure turn or holding pattern. With the design of the TAA, it is possible in virtually all cases to fly the approach from any direction and fly to a fix from which a straight-in approach without a procedure turn is possible.

When you arrive from the southeast, you would fly to RUVFO on any course from 308° clockwise to 038°. Once you have arrived at RUVFO, you would then fly to UNAYY and then turn on to final to the airport. Look at the TAA quarter circle toward the bottom of the plan view and you



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can see a slight distance from the RUVFO waypoint symbol to the 308° line. This distance represents the distance from RUVFO to UNAYY and shows that the area is protected from the centerline of the final approach course outbound to RUVFO as the IAF. There was a considerable amount of flight testing conducted to determine the default distance of five nautical miles from the IAF (such as RUVFO) to the IF (such as UNAYY) to be sure the distance was short enough to allow flying "by" the RUVFO and UNAYY fixes with fast airplanes. The distance of the segment should also be short enough so you don't have an excessive amount of miles when shooting the approach.

## Where is the MSA?

With the introduction of TAAs, there is no need for MSAs since the TAAs are essentially in the same location as the MSAs. However, in the case of TAAs, they represent flight procedures and altitudes that can be flown in IMC conditions whereas MSAs cannot be used as flight altitudes since they are considered emergency use altitudes only.

## GLS PA

There is a new column of minimums on the RNAV charts labeled GLS PA which appeared for the first time effective 24 February. GLS is the acronym for GNSS Landing System (or global navigation satellite system.) Although there no landing minimums in the column for the approach at Atlantic City, the minimums will be available for aircraft equipped with precision approach capable WAAS receivers operating to their fullest capability when WAAS becomes operational. WAAS augments the basic GPS satellite constellation with additional ground stations and enhanced position/integrity information transmitted from geostationary satellites. The WAAS capability, when available, will support minimums as low as 200 feet HAT and 1/2 statute mile visibility.

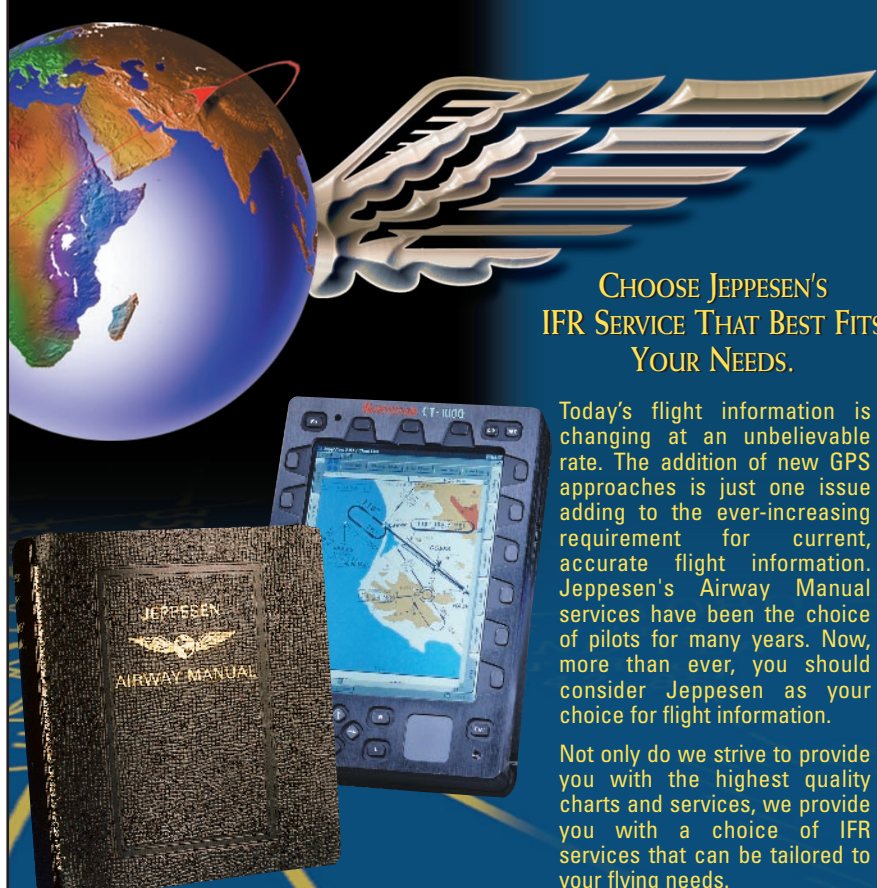
The letters PA indicate precision approach runway markings. When the letters PA are not in the title of the minimums column, this means the runway doesn't have precision approach markings and the lowest minimums will not be available.

## LNAV/VNAV

The second main column heading is LNAV/VNAV which stands for lateral navigation/vertical navigation. Since the LNAV/VNAV systems provide vertical guidance, the procedure minimum altitude is a DA(H) instead of an MDA. Without the WAAS, the VNAV is a computed descent path based on the descent angle published on the chart and in the database and the electronic signal sent by an appropriately equipped altimeter into the airborne computer. Since the vertical navigation is computed from the altimeter information, any anomalies in the altimeter based on incorrect altimeter settings, etc. will cause the VNAV path to be incorrect. *This is why it is very important to have the correct local altimeter setting and a compensation for extremely low temperatures.*

Aircraft which are RNP 0.3 approved with an approved IFR approach barometric (BARO) VNAV systems are allowed to use the VNAV path and the decision altitude at Atlantic City. Aircraft equipped with other IFR RNAV systems such as FMS and BARO-VNAV may also use the

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LNAV/VNAV minimums. For aircraft equipped with GPS receivers (and no VNAV), the minimums to be used are those in the column with the title labeled LNAV. RNP, by the way, stands for required navigation performance and could be the subject of a whole article.

In the profile view, note that the solid line for the descent path continues below the MDA for VNAV equipped aircraft and the line also levels off at the MDA for aircraft without VNAV.

In the next issue, we will look at the airport charts. 



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