JEPP'S BRIEFING

The Chart Clinic – Database Series

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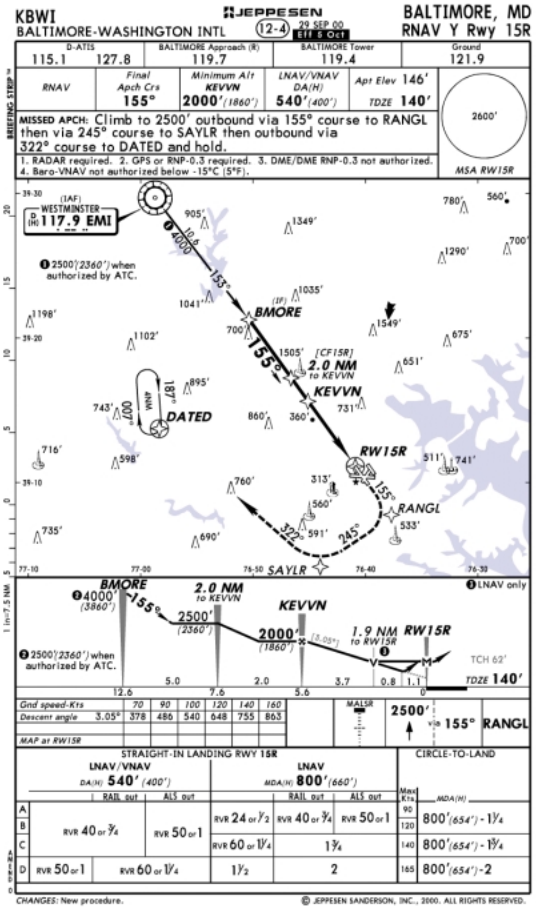
Power is set for cruise, engines are synched, trim is all set, comm radios properly tuned, GPS receiver set to a waypoint close to the destination. Time to engage the autopilot and time to start studying the approach charts again -- before having to use all the numbers and lines on the chart while shooting the approach.

Baltimore is your destination. As you get closer, you tune into the ATIS, weather is 600 broken, 2 miles vis, wind 130° at 12 knots, landing runways 15 left and right. So now you know you'll need to shoot an approach. As you look through the approach charts, you find six approaches to the two parallel runways -- two ILS approaches, one VOR DME, and three RNAV approaches. OK -- it makes sense to have an ILS for each of the two parallel runways, but why three RNAV approaches to two runways?



And if you look closer at the RNAV approaches, there are two of them to the same runway -- Rwy 15R. After looking at the titles a little closer, the RNAV Rwy 15R approaches actually have a small difference. The first one has the letter "Y" after the word "RNAV" and the second approach has the letter "Z" after the word "RNAV."

Multiple RNAV Approaches to the Same Runway

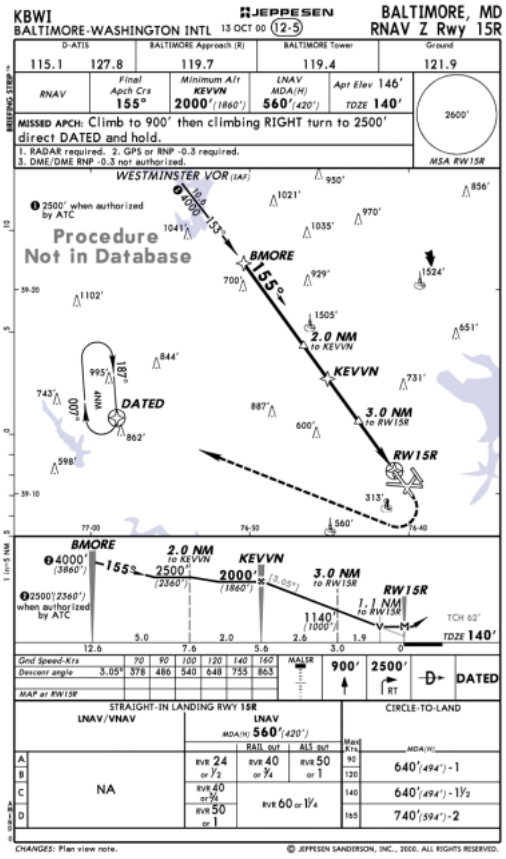
Because databases cannot handle duplicate file names, two approach procedures with the identical name to the same runway cannot be included in the database. Recently, the FAA issued two different RNAV approach procedures to Rwy 15R at Baltimore, Maryland. The FAA coordinated with industry to handle the duplicate name situation and they adopted the use of a phonetic letter as a suffix to the procedure type to handle the duplication problem.

Refer to the two approaches at Baltimore. The first RNAV approach is named RNAV Y Rwy 15R and the second RNAV approach is named RNAV Z Rwy 15R. The policy is to use a letter starting at the end of the alphabet and proceed backward so as not to be confusing with approaches that don't have straight-in landing minimums. You recall that circle-to-land only approaches use the alphabet letters starting at the beginning of the alphabet. That letter appears after the approach procedure type. Then, the runway number is eliminated to indicate no straight-in landing minimums. So, a circling approach would be identified as VOR - A.

When the controller issues a clearance for the approach to Baltimore, the clearance would be " . . . cleared for the RNAV Yankee Rwy 15R approach." The phonetic letter is pronounced by the controller in the clearance.

Why Two Virtually Identical Approaches?

The FAA is trying hard to accommodate both the panel mounted GPS receivers as well as the Flight Management Systems that have VNAV capability. On the RNAV Z approach, there is a stepdown fix (after KEVVN waypoint) to provide better minimums for the GPS receivers that don't have VNAV. The stepdown fix which is 3.0 NM to the runway allows the avionics without VNAV to pass the final approach segment controlling obstacle and continue on down to an MDA of 560 feet.



Since there is VNAV on RNAV Y Rwy 15R, there is no need for a stepdown fix -- the VNAV will keep you above the final approach segment obstacle. Without VNAV, the stepdown fix is necessary to clear the obstacle.

For aircraft with FMSs, the RNAV Y approach was created by the FAA to utilize the VNAV to pass the controlling obstacle on a descending path. Since the VNAV provides descent guidance all the way from the FAF to the RW15R missed approach point, the VNAV guidance clears the obstacle without having to identify the stepdown fix which is included in the other procedure.

On the RNAV Y approach, the LNAV minimums are considerably higher (800 feet) than the LNAV minimums on the RNAV Z approach (560 feet). This is because there is no stepdown fix on the VNAV approach so the controlling obstacle is higher for no VNAV.

Because of the two different means of clearing the obstacle on the final approach segment, you can see some of the main differences in the minimums box of both approaches. The minimums for RNAV Y Rwy 15R include a decision altitude (DA) because the minimums are based on lateral navigation (LNAV) and vertical navigation (VNAV) and the minimums are slightly lower than the RNAV Z Rwy 15R approach. The RNAV Z Rwy 15R approach has minimums which are expressed as a minimum descent altitude (MDA) because there is no vertical navigation.

Visual Descent Point

The visual descent points are in different locations because they are based on reaching the MDA on the descent angle of 3.05° from the FAF down to 62 feet above the threshold. Since the MDA of 800 feet on RNAV Y Rwy 15R is reached before the MDA of 560 feet on RNAV Z Rwy 15R, the VDP is further from the runway on RNAV Y Rwy 15R. The FAA has a policy of adding more and more VDPs on RNAV approaches and other approaches where there is a DME that can be used on the approach.

One of the main differences can be found by looking at the missed approach procedures on both charts. The missed approach on RNAV Y Rwy 15R climbs straight ahead to 2,500 feet direct to RANGL waypoint, then a right turn direct to SAYLR, and then a right turn direct to DATED waypoint which is the missed approach holding fix. The missed approach point and missed approach holding fix both have a symbol with a circle around them. This means they are fly-over fixes. The RANGL and SAYLR waypoints are fly-by fixes and are depicted as waypoint symbols without circles around them. On the missed approach depiction (with dashed lines), the actual track does not pass through RANGL and SAYLR since turn anticipation at each fix will cause them to be passed on the missed approach, but you will not fly over them.

All missed approach points and missed approach holding fixes are fly-over waypoints by definition. Virtually all other fixes are fly-by fixes. The advantage of a fly-by waypoint is that a good rate of turn will cause you to be on the centerline of the next leg after passing the waypoint rather than trying to re-intercept the course after over shooting the fix when turning.

Procedure Not in Database

In the plan view of the Baltimore RNAV Z Rwy 15R approach, there is a note "Procedure Not in Database." As stated earlier, the FAA and industry coordinated the use of the phonetic alphabet starting with the letter "Z" and moving backward in the alphabet to indicate duplication of approach procedures. The coordination of the phonetic letter was accomplished but the coordination of the implementation date was not.

This meant that the avionics systems and the databases were not ready to implement the duplicate function when the FAA began issuing the new duplicate approaches. A decision was then made to include one approach procedure in the database and not both. The approach procedure with the best minimums and VNAV capability was selected so the RNAV Y Rwy 15R approach was selected. This left RNAV Z Rwy 15R as an approach procedure on paper without a database. Since the FAA requires that the GPS approaches must be in the database, it was decided to publish the RNAV Z Rwy 15R in the approach manuals, but include the note "Procedure Not in Database" to indicate that a clearance for that approach could not be accepted since there were no database records to support it.

The industry should be able to support multiple approaches of the same type to the same runway sometime in the Spring 2001 so the chart will be revised to take the "Procedure Not in Database" note off the chart when duplicate approaches can be utilized in airborne databases.

In the next article, we will begin exploring why some information is different on the charts then on the avionics displays.

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