JEPP'S BRIEFING

The Chart Clinic – Twenty Fifth in a Series

By James E. Terpstra
Sr. Corporate Vice President, Jeppesen

The typical non-precision approach procedure may not require tuning of a myriad of radios, but neither does it allow minimums as low as a precision approach. This article will continue the discussion of the approach charts by looking at the non-precision minimums table.

VOR Approach Minimums

The minimums table for VOR and NDB approaches normally contains significantly less data than for ILS approaches since fewer options are available. However, some VOR and NDB approaches give credit for approach lighting systems, high-intensity runway lights, and runway alignment indicator lights. These approaches use more complex minimums tables to reflect increased minimums when the visual aids are unavailable and visibility credits are taken away.

Gnd speed-Kts	70	90	100	120	140	160	REIL PAPI-L	6000′ RT	AKO 114.4
MAP at D1.7 or VOR to MAP 1.7	1:27	1:08	1:01	0:51	0:44	0:38			

	STRAIGHT-IN LANDING RWY 29 MDA(H) 5120′(439′)	Max Kts	CIRCLE-TO-LAND MDA(H)
A	1	90	5160′(446′)-1
B	1	120	5180′(466′)-1
C	1¼	140	5300′(586′)-1½
D	1½	165	5300′(586′)-2

AMDT 0

CHANGES: Procedure ident, new chart format. © JEPPESEN SANDERSON, INC., 1999. ALL RIGHTS RESERVED.

AKRON, COLO VOR Rwy 29

Non-precision approaches, such as VOR and NDB approaches, only include minimum descent altitudes (MDAs) in the minimums boxes and do not include a DA(H) (decision altitude and height) as minimum altitudes. Similar in philosophy to the ILS minimums, the lowest landing visibility minimums are included at the left of the minimums table. The straight-in landing runway is specified both in the minimums box and in the title. Refer to the landing minimums for the VOR approach for Akron, Colorado and note that only Runway 29 is authorized for straight-in landing minimums. When landing straight-in, you may descend to the MSL altitude of 5,120 feet. Since straight-in landing minimums are authorized, the number in parentheses (439') to the right of the MDA represents the Minimum Descent Height above the touchdown zone (HAT), and not the height above the airport (HAA). On this approach, Category A, B, C, and D aircraft are authorized for the same straight-in landing MDA(H), but have different visibility minimums.

The circle-to-land minimums are included at the right side of the minimums table similar to the circle-to-land minimums on ILS approaches. The big difference in the minimums, however, is that the numbers in parentheses are Heights Above Airport (HAA) since circling minimums are based on the airport elevation and not a runway or TDZ elevation. In most cases, as is seen at Akron, the faster categories of aircraft have higher circle-to-land minimums. Although not shown on the chart, the TERPs circling areas for each category are not to be exceeded while making a circling approach, regardless of the published visibility. The TERPs circling area radii for category A is – 1.3 NM, B – 1.5 NM, C – 1.7 NM, and D – 2.3 NM. The circling minimum visibilities sometimes are larger than the circling areas – *but the TERPs circling areas still apply*. If you fly the circling approach at a higher speed than the straight-in landing, you should move to a higher approach category in many cases.

Sometimes, only circle-to-land minimums are authorized on an approach chart. When that happens, the conditions required for straight-in landing minimums were not met. In order for straight-in landing minimums to be authorized, three conditions must be met. First, the final approach segment must be aligned within 30° of the straight-in landing runway. Second, the final approach segment must cross the runway threshold, or at least the extended runway centerline within 3,000 or 5,200 feet (depends on whether the navaid is on or off the airport). And third, the final approach segment descent gradient cannot exceed 400 feet per nautical mile (3.77°). In some cases, the final approach segment is exactly lined up with the runway but the descent gradient is too steep. In these cases, you can still land straight in even though only the circling minimums are published.

Complex Approach Minimums

The minimums for Pasco, Washington VOR or GPS Rwy 21R represent one of the most complex sets of minimums for a non-precision approach. To get the lowest MDA(H) of 840 feet at Pasco, you must meet all of the following conditions: (1) obtain a local altimeter setting; (2) be able to identify the 2.5 DME fix; and (3) land straight-in on runway 21R. With this many options available, the minimums seem to take up most of the space on the approach chart. These options also affect the size of the profile view of the approach chart.

	STRAIGHT-IN LANDING RWY 21R With D2.5 / Without D2.5 — With Local Altimeter Setting					CIRCLE-TO-LAND With D2.5 / Without D2.5 — With Local Altimeter Setting	
	MDA(H) 840′(440′)			MDA(H) 1040′(640′)		Max Kts	MDA(H)
	RAIL out	ALS out		RAIL out	ALS out		
A B	RVR 24 or ½	RVR 40 or ¾	RVR 50 or 1	RVR 24 or ½	RVR 40 or ¾	RVR 50 or 1	90 120	880′(473′)-1 / 1040′(633′)-1
C	RVR 40 or ¾	RVR 60 or 1¼		RVR 60 or 1¼	1¾		140	880′(473′)-1½ / 1040′(633′)-1¾
D	RVR 50 or 1	1½		1½	2		165	1040′(633′)-2 / 1040′(633′)-2
	With Walla Walla Altimeter Setting					With Walla Walla Altimeter Setting	
	MDA(H) 1000′(600′)			MDA(H) 1200′(800′)		Max Kts	MDA(H)
	RAIL out	ALS out		RAIL out	ALS out		
A B	1¼	1¾		1¼	1¾	90 120	1040′(633′)-1¾ / 1200′(793′)-1¾
C	1½	2		2	2½	140	1040′(633′)-2¼ / 1200′(793′)-2½
D	1¾	2¼		2¼	2¾	165	1200′(793′)-2¾ / 1200′(793′)-2¾
	MAP at VOR						

AMDT 4

CHANGES: See other side. © JEPPESEN SANDERSON, INC., 1986, 2000. ALL RIGHTS RESERVED.

PASCO, WASH VOR or GPS Rwy 21R

When a stepdown fix, such as the 2.5 DME fix, is provided, the altitude over the stepdown fix typically becomes the MDA(H) if the fix is not identified. At Pasco, the altitude over the stepdown fix is 1,040 feet, assuming a local altimeter setting is obtained at the airport. The Ball Flag 1 to the left of the stepdown fix altitude in the profile refers you to the note which specifies an altitude of 1,200 feet over the 2.5 DME fix if the Walla Walla altimeter setting is used.

When a double stacked set of minimums is provided, the lowest minimums are to the left in the upper box. When the 2.5 DME fix Intersection is not identified, the MDA of 1,040 feet is shown in the right side of the upper straight-in landing minimums box. All of the minimums in the upper minimums box are authorized only when a local altimeter setting is available. This applies to both the straight-in landing and circle-to-land minimums.

When the altimeter setting is derived from a remote source more than five miles from the airport reference point (ARP), the MDA(H) is increased by a factor that considers both the distance to the remote altimeter as well as the elevation difference between the landing airport and the remote altimeter airport. At Pasco, this raises the MDA 160 feet when the altimeter setting is obtained from Walla Walla. This change in the altimeter source

requires you to look in the lower set of minimums to find the appropriate MDA(H) for straight-in and circle-to-land minimums.

The preceding discussion of minimums at Pasco should remind us of one important thing – you should review the approach chart before flying the final approach segment inbound.

Conversion Table

Toward the bottom of each approach procedure chart, a conversion table is provided. This table relates the airplane ground speed to the recommended descent rate and time from the FAF to the non-precision missed approach point (MAP). To be a real purist, the ground speed in the conversion table should be calculated by applying pressure altitude and temperature to the calibrated airspeed to arrive at the true airspeed. Then, the wind should be applied to the true airspeed to get an accurate ground speed. And – this means you have to fly the same numbers all the way down final. If you have DME and the DME station is directly in front or behind you, you can get your ground speed from the DME.

On ILS approaches, the glide slope angle is expressed in decimal degrees on the line below the ground speeds. The figures in the ground speed line represent the recommended rates of descent to maintain the glide slope at the stated ground speeds. Some pilots use this as a check to monitor the wind shear, which is noticed by a significant increase or decrease in the descent rate to maintain the glide slope.

The bottom line of the conversion table specifies the time from the final approach fix to the missed approach point ***for non-precision approaches***. This timing will ***not*** work correctly for determining the distance from the final approach fix to the decision altitude since the decision altitude is usually one-half mile prior to the end of the runway. The distance of 6.3 (nautical miles) in the bottom line is the distance from the FAF to the runway threshold at the Denver Centennial Airport. This distance will not be the same when the non-precision missed approach point is at a location other than the end of the runway or displaced threshold. There are some cases where timing is not included. This means that timing is not authorized, and another means of identifying the missed approach point is required, such as DME for a DME-only fix at the MAP on a VOR DME approach.

Gnd speed-Kts	*70*	*90*	*100*	*120*	*140*	*160*
GS 3.00°	379	487	542	650	758	866
CASSE to MAP 6.3	5:24	4:12	3:47	3:09	2:42	2:22

DENVER, COLO ILS Rwy 35R

In the next issue, we will analyze additional approach minimums. Additionally, missed approach procedures will be discussed.

James E. Terpstra is senior corporate vice president, flight information technology at Jeppesen. His ratings include ATP, single and multi-engine, airplane and instrument flight instructor. His 6,000+ hours include 3,200 instructing. For comments, please Email: JimTerps@jeppesen.com