Interpolation

Not all of the information on the charts is easily extracted. Some charts require interpolation to find the information for specific flight conditions. Interpolating information means that by taking the known information, a pilot can compute intermediate information. However, pilots sometimes round off values from charts to a more conservative figure.

Using values that reflect slightly more adverse conditions provides a reasonable estimate of performance information and gives a slight margin of safety. The following illustration is an example of interpolating information from a takeoff distance chart. *[Figure 11-21]*

Density Altitude Charts

Use a density altitude chart to figure the density altitude at the departing airport. Using *Figure 11-22*, determine the density altitude based on the given information.

Sample Problem 1

Airport Elevation.....5,883 feet

OAT.....70 °F

Altimeter.....30.10 "Hg

First, compute the pressure altitude conversion. Find 30.10 under the altimeter heading. Read across to the second column. It reads "–165." Therefore, it is necessary to subtract 165 from the airport elevation giving a pressure altitude of 5,718 feet. Next, locate the outside air temperature on the scale along the bottom of the graph. From 70°, draw a line up to the 5,718 feet pressure altitude line, which is about two-thirds of the way up between the 5,000 and 6,000 foot lines. Draw a line straight across to the far left side of the graph and read the approximate density altitude. The approximate density altitude in thousands of feet is 7,700 feet.

Takeoff Charts

Takeoff charts are typically provided in several forms and allow a pilot to compute the takeoff distance of the aircraft with no flaps or with a specific flap configuration. A pilot can also compute distances for a no flap takeoff over a 50 foot obstacle scenario, as well as with flaps over a 50 foot obstacle. The takeoff distance chart provides for various aircraft weights, altitudes, temperatures, winds, and obstacle heights.

Sample Problem 2

Pressure Altitude.....2,000 feet

OAT.....22 °C

Takeoff Weight.....2,600 pounds

Headwind.....6 knots

Obstacle Height.....50 foot obstacle

Refer to *Figure 11-23*. This chart is an example of a combined takeoff distance graph. It takes into consideration pressure altitude, temperature, weight, wind, and obstacles all on one chart. First, find the correct temperature on the bottom left side of the graph. Follow the line from 22 °C straight up until it intersects the 2,000 foot altitude line. From that point, draw a line straight across to the first dark reference line. Continue to draw the line from the reference point in a diagonal direction following the surrounding lines until it intersects the corresponding weight line. From the intersection of 2,600 pounds, draw a line straight across until it reaches the second reference line. Once again, follow the lines in a diagonal manner until it reaches the six knot headwind mark. Follow

Conditions	TAKEOFF DISTANCE MAXIMUM WEIGHT 2,400 LB											
Flaps 10° Full throttle prior to brake release Paved level runway Zero wind												
Weight (lb)	Takeoff speed KIAS		Press ALT (ft)	0 °C		10 °C		20 °C		30 °C		40 °C	
	Lift off	AT 50 ft		Grnd roll (ft)	Total feet to clear 50 ft OBS	Grnd roll (ft)	Total feet to clear 50 ft OBS	Grnd roll (ft)	Total feet to clear 50 ft OBS	Grnd roll (ft)	Total feet to clear 50 ft OBS	Grnd roll (ft)	Total feet to clear 50 ft OBS
2,400	51	56	S.L.	795	1,460	860	1,570	925	1,685	995	1,810	1,065	1,945
			1,000	875	1,605	940	1,725	1,015	1,860	1,090	2,000	1,170	2,155
			2,000	960	1,770	1,035	1,910	1,115	2,060	1,200	2,220	1,290	2,395
			3,000	1,055	1,960	1,140	2,120	1,230	2,295	1,325	2,480	1,425	2,685
			4,000	1,165	2,185	1,260	2,365	1,355	2,570	1,465	2,790	1,575	3,030
			5,000	1,285	2,445	1,390	2,660	1,500	2,895	1,620	3,160	1,745	3,455
			6,000	1,425	2,755	1,540	3,015	1,665	3,300	1,800	3,620	1,940	3,990
			7,000	1,580	3,140	1,710	3,450	1,850	3,805	2,000	4,220	- - -	- - -
			8,000	1,755	3,615	1,905	4,015	2,060	4,480	- - -	- - -	- - -	- - -

To find the takeoff distance for a pressure altitude of 2,500 feet at 20 °C, average the ground roll for 2,000 feet and 3,000 feet.

$$\frac{1{,}115 + 1{,}230}{2} = 1{,}173 \text{ feet}$$

Figure 11-21. *Interpolating charts.*