

**PRELIMINARY PERFORMANCE ESTIMATE FOR PROPELLER DRIVEN AIRCRAFT (EXAMPLE)**

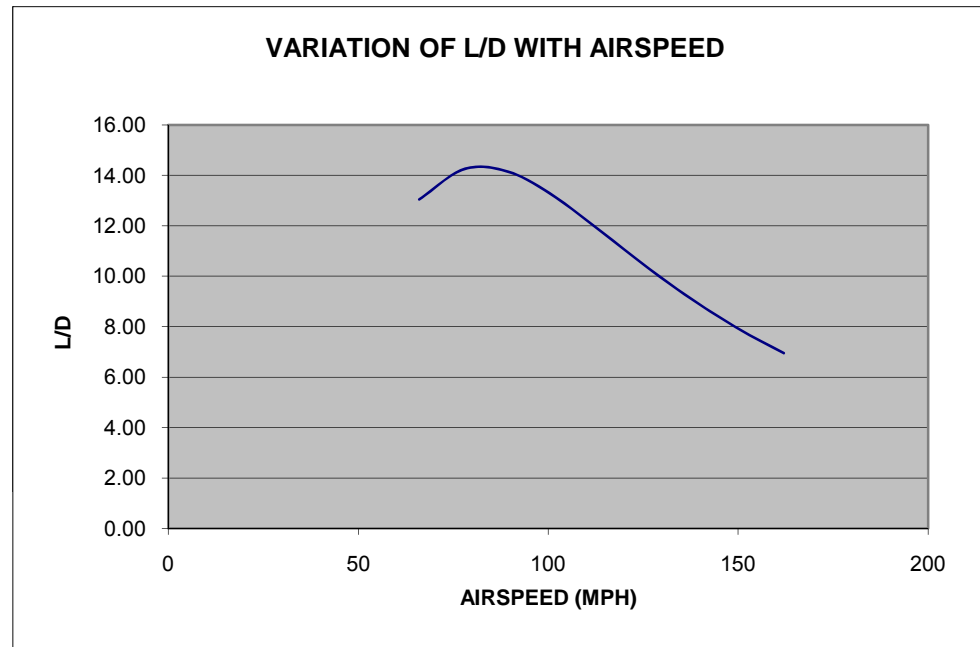
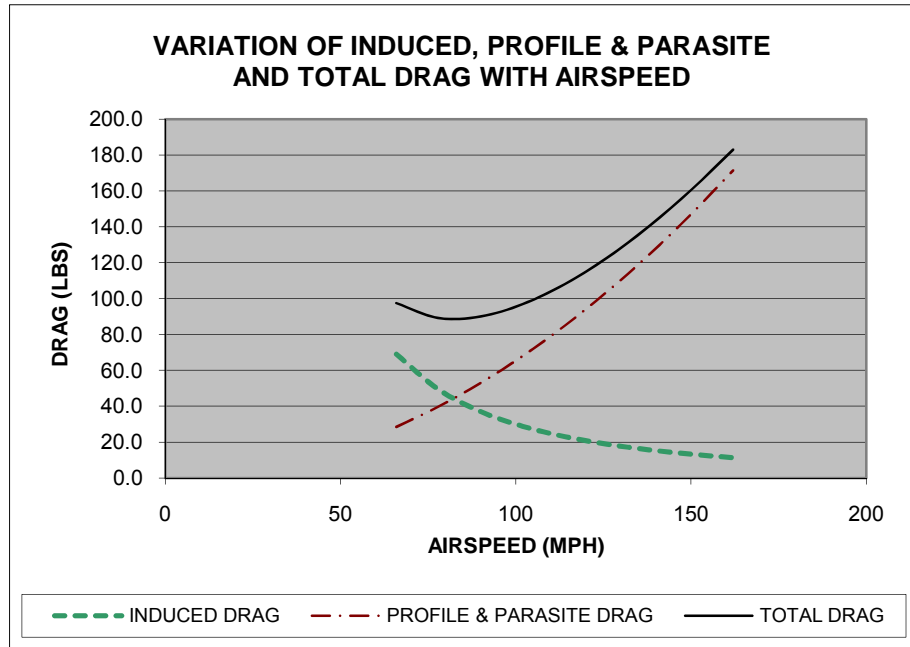
<b>A/C Type: Example</b>
Notes:

Crew weight	340	lbs	
Fuel + baggage weight	130	lbs	
A/C empty weight	800	lbs	
Total weight	1270	lbs	
Stall speed (flaps up) Vs1	60	mph	
Climb airspeed	78	mph	(climb speed = 1.3 x stall speed)
Climb airspeed	114.4	ft/sec	
CLmax	1.35		(flaps up)
CL at 1.3 Vs	0.80		(at 1.3 Vs, CL = CLmax x (1/1.3 <sup>2</sup> ))
Wing area required	102.1	ft <sup>2</sup>	(L=1/2 rho V <sup>2</sup> S CL)
Propeller efficiency at take-off	70	%	
Propeller efficiency in the climb	75	%	
Propeller efficiency in the cruise	85	%	
Cd (profile)	0.01		
Cd (parasite)	0.015		(Speeds between 1.1 Vs and 2.7 Vs)
Aspect ratio	7.2		
Induced drag factor K	1.1		(Cd (induced) = K CL <sup>2</sup> /π A)
			(K = 1.0 elliptical wing, 1.1 moderately tapered, 1.2 rectangular)
Wing span	27.1	feet	
Mean wing chord	3.77	feet	

**ESTIMATED PERFORMANCE WITH AN ENGINE OF YOUR PROPOSED RATED POWER**

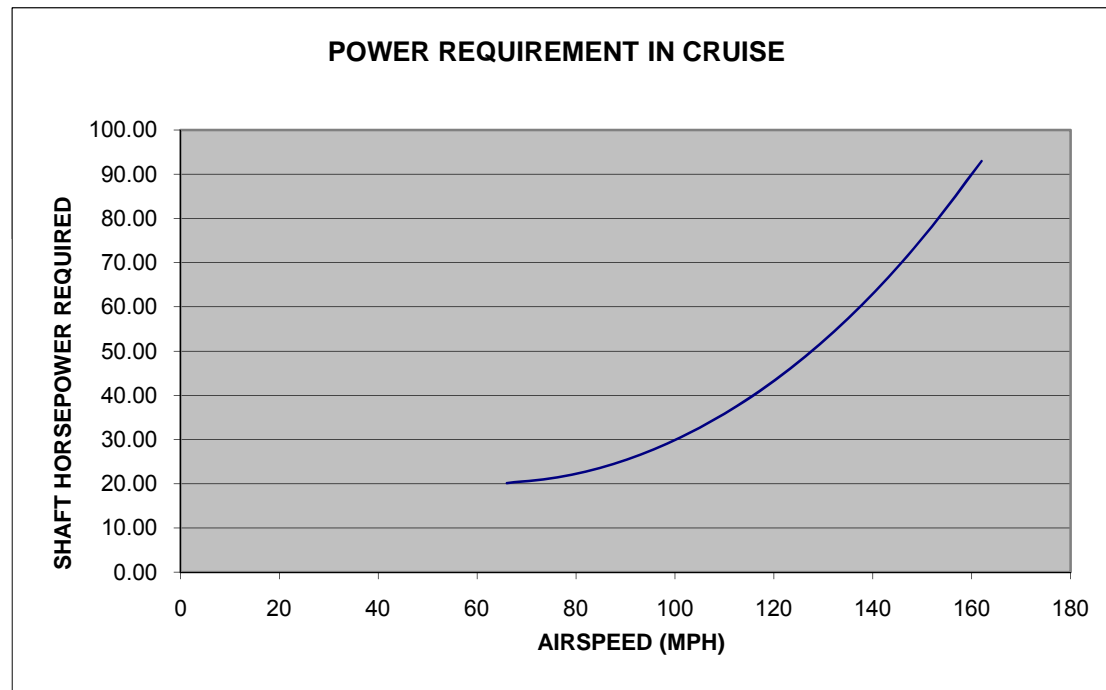
Selected rated shaft power	80.0	BHP
Effective flat plate area	2.72	ft <sup>2</sup>
Take off run	821	feet
Rate of climb at 1.3 Vs	1077	feet per minute
Max level speed	153	mph
Cruise speed at 75% power	139	mph
Flaps up stall speed	60	mph
Glide descent rate at 1.3 Vs	482	feet per minute

## AERODYNAMIC PERFORMANCE DATA



### CRUISE PERFORMANCE

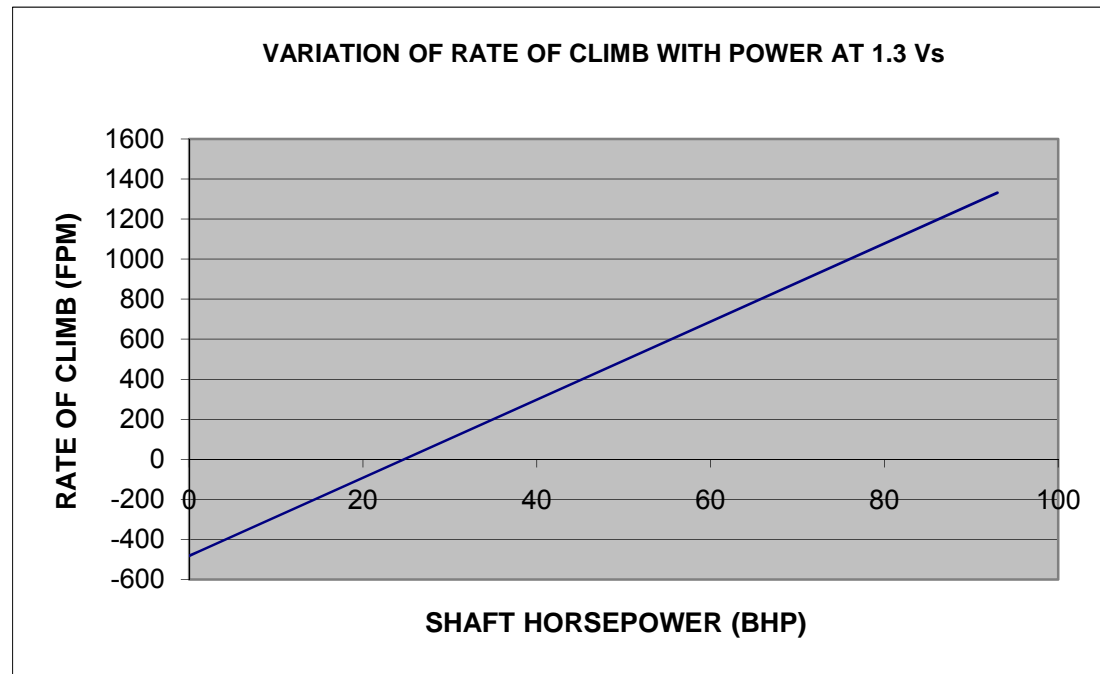
	Airspeed (mph)	Airspeed (ft/sec)	Reynolds number	Lift coefficient	Cd induced	Flat plate area (ft <sup>2</sup> )	Total drag (lbs)	Power (hp)	Shaft power (hp)	L/D	Induced drag (lbs)	Profile & parasite drag (lbs)
1.1 Vs	66	96.8	2.3E+06	1.116	0.061	8.73	97.4	17.1	20.17	13.04	68.9	28.5
1.3 Vs	78	114.4	2.7E+06	0.799	0.031	5.72	89.1	18.5	21.81	14.25	49.4	39.7
1.5 Vs	90	132.0	3.2E+06	0.600	0.018	4.34	90.0	21.6	25.41	14.11	37.1	52.9
1.7 Vs	102	149.6	3.6E+06	0.467	0.011	3.64	96.8	26.3	30.99	13.12	28.9	68.0
1.9 Vs	114	167.2	4.0E+06	0.374	0.007	3.25	108.0	32.8	38.63	11.76	23.1	84.9
2.1 Vs	126	184.8	4.4E+06	0.306	0.005	3.02	122.6	41.2	48.48	10.36	18.9	103.7
2.3 Vs	138	202.4	4.9E+06	0.255	0.003	2.88	140.2	51.6	60.69	9.06	15.8	124.4
2.5 Vs	150	220.0	5.3E+06	0.216	0.002	2.78	160.3	64.1	75.45	7.92	13.3	147.0
2.7 Vs	162	237.6	5.7E+06	0.185	0.002	2.72	182.9	79.0	92.95	6.94	11.4	171.5



### RATE OF CLIMB

(Brake Horsepower)					
Shaft power	Power	Power for level flight	Excess power	ROC ft/min	Climb angle (deg)
0	0	18.53	-18.53	-482	-4.0
19	14.25	18.53	-4.28	-111	-0.9
28	21	18.53	2.47	64	0.5
38	28.5	18.53	9.97	259	2.2
56	42	18.53	23.47	610	5.1
70	52.5	18.53	33.97	883	7.4
75	56.25	18.53	37.72	980	8.2
93	69.75	18.53	51.22	1331	11.2

ROC (ft/min) = excess horsepower x 33,000/weight (lbs)



### TAKE OFF RUN

Shaft pwr (BHP)	Take off run (ft)
19	3457
38	1728
56	1173
75	876

$$\text{Take off run (feet)} = 0.4 \frac{P^2}{S} W$$

where: P = Weight  
S = Wing area  
W = Power

