TABLE I
Angle of Glide, Glide Velocity, and Sinking Velocity Variation with Angle of Attack

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)	(10)	(11)	(12)
a	Ky	Kx	Kx + Kp	Tan ⊖	⊖	Glide Angle	Cos ⊖	Sin ⊖	V	Vs
					Degree				m.p.h.	ft./sec.
0	.000396	.0000204	.00002406	.0608	3.47	1— 16.45	.9981	.0606	97.0	8.65
2	.000844	.0000255	.00002816	.0324	1.85	1— 30.82	.9995	.0324	66.6	3.17
4	.001286	.0000332	.00003686	.0286	1.64	1— 34.99	.9996	.0286	53.9	2.27
6	.001760	.0000448	.00004846	.0275	1.58	1— 36.40	.9996	.0275	46.1	1.87
8	.002205	.0000613	.00006496	.0294	1.68	1— 34.00	.9996	.0294	41.2	1.78
10	.002670	.0000843	.00008796	.0329	1.89	1— 30.40	.9995	.0329	37.5	1.81
12	.003118	.0001095	.00011316	.0363	2.10	1— 27.50	.9993	.0363	34.6	1.85
14	.003528	.0001505	.00015416	.0438	2.50	1— 22.80	.9990	.0938	32.6	2.10
16	.003834	.0001990	.00020266	.0528	3.00	1— 18.90	.9986	.0524	31.2	2.41

In Table I, the second and third columns give the lift and drag coefficients for the unstalled range of angles of attack corrected for an aspect ratio of 18.6. The fourth column is an addition of the wing drag coefficient to the parasite drag coefficient.

Equation (a) can now be used in solving for the tangent of the glide angle through the entire range of angles of attack. With numerical values of the tangents of the glide angles solved for, it is only necessary to refer to a table of trignometric functions to obtain the corresponding angles in degrees. This has been done in the sixth column.

With the glide angles determined it is now possible by means of equation (b) to solve for the velocity of the glide for any glide angle. This has been done to obtain the values given in the eleventh column of Table I.

Equation (c) can now be used to obtain the sinking velocity of any given glide angle. The values thus obtained for this illustration are represented in the last column of Table I.

SELECTION OF AIRSPEED

A study of columns 7, 11 and 12 of Table I will reveal the proper piloting technique in flying this hypothetical sailplane. After the take-off it is natural to be eager to attain altitude as rapidly as possible. This is accomplished by flying at the speed that gives the lowest sinking velocity which in the table is given as 1.78 feet per second coincidently maintained with 41.2 miles per hour glide velocity. If the area of the rising air current is too small to allow this glide velocity, the glide velocity may be reduced, with a slight increase in sinking velocity to 31.2 miles per hour.

After the flight has progressed to an altitude sufficient to permit it to proceed toward its planned destination, the most efficient use of altitude will be made by gliding with the speed that will maintain the flight at the minimum glide angle. The minimum glide angle is 1 in 36.4 (Column 7) coincidently maintained with a glide velocity of 46.1 miles per hour. If, however, the rising air currents are numerous and very active, the speed may be increased, sacrificing as a result a portion of the maximum radius of glide. Referring to Table I again, increasing the speed to 66.6 miles per hour will increase the glide angle to 1 in 30.82 and the sinking velocity will be increased to 3.17 feet per second. If the rising air currents are numerous, vigorous, and large enough, the flight may continue at this inefficient speed.

USE OF BALLAST

Presuming the parasite drag to have been reduced to an irreducible degree on this hypothetical sailplane, the only avenue open to smaller glide angles and increased all around performance is by increased aspect ratios. To date, structural limitations have restricted the aspect ratios for the average wing areas to around 18. And the use of these remarkably high aspect ratios have been possible by employing a single spar to resist the bending moments. By employing a fully stressed-skin structure in which the torsion forces are resisted entirely by the outer surface of the wing, some remarkable increases in aspect ratio are possible.

Increased aspect ratios result in increased spans which are objectionable from the standpoint of maneuvering and ground handling. However, the only restriction to

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TABLE II
Variation of Glide Velocity and Sinking Velocity with Wing Loading

	w = 5 lbs./sq. ft.		w = 6 lbs./sq. ft.		w = 7 lbs./sq. ft.		Glide Angle
a	V	Vs	V	Vs	V	Vs	
0	112.1	10.0	123.0	11.0	133.0	11.85	1— 16.45
2	77.0	3.67	84.0	4.02	90.9	4.34	1— 30.82
4	61.6	2.60	68.2	2.87	73.6	3.10	1— 34.99
6	53.1	2.15	58.2	2.35	63.0	2.55	1— 36.40
8	47.5	2.03	52.2	2.25	56.2	2.43	1— 34.00
10	43.2	2.09	47.3	2.28	51.1	2.47	1— 30.40
12	40.0	2.17	43.8	2.34	48.4	2.59	1— 27.50
14	37.6	2.42	41.1	2.65	44.4	2.85	1— 22.80
16	36.0	2.77	39.4	3.04	42.5	3.28	1— 18.90