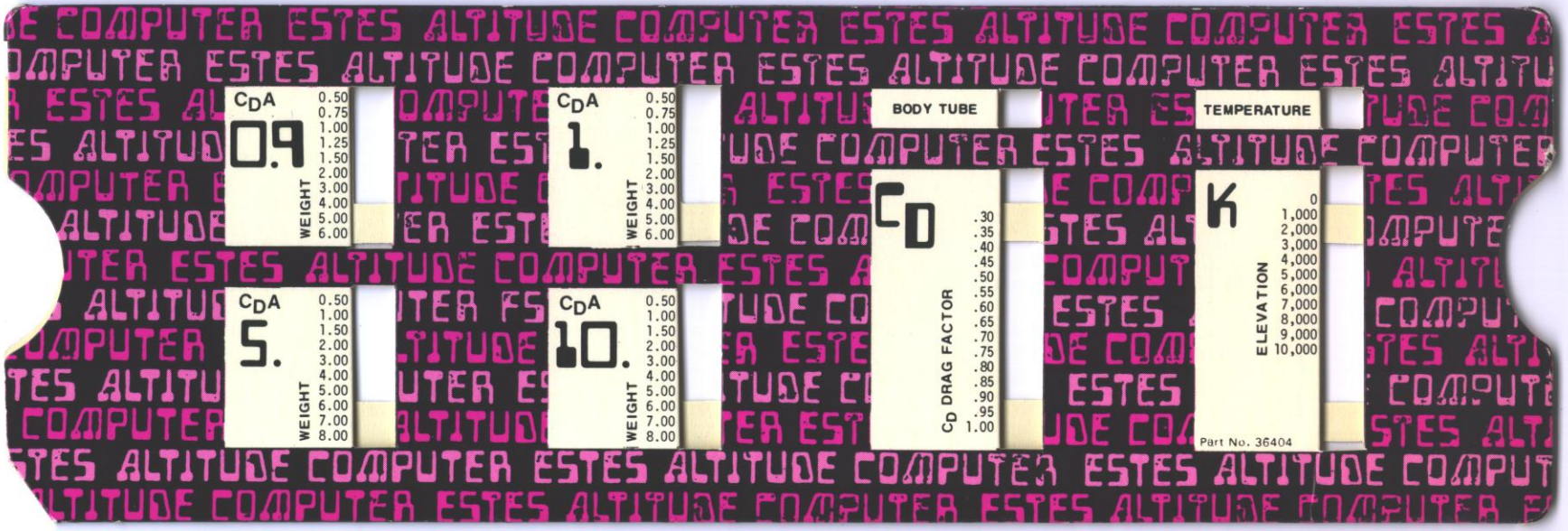


ESTES
A DAMON COMPANY

ESTES INDUSTRIES
PENROSE, COLO. 81240

Part No. 36403

D12	C6	B14	B6	B4	A8	A3	½A6
1970	1410	820	860	870	470	550	290
2040	1420	800	820	830	410	490	220
2080	1400	760	760	770	340	410	160
2100	1360	700	690	700	280	340	120
2120	1310	640	620	610	230	280	90
2090	1170	510	480	480	150	180	
2010	1010	400	380	360	110	120	
1890	850	320	290	270	80		
1760	710	250	230	210	60		
1630	600	210					

4550	3180	1970	1960	2010	870	1300	730
4780	3210	1810	1820	1810	790	1080	480
4870	3110	1590	1590	1510	600	810	300
4850	2910	1310	1290	1250	450	590	190
4740	2640	1090	1060	1080	340	430	130
4590	2380	910	870	870	260	320	90
4390	2120	760	720	710	210	250	70
4140	1870	640	600	590	170	190	
3650	1440	460	430	410	110	120	
3180	1110	350	320	290	80		

2920	2030	1270	1340	1330	750	860	510
3070	2110	1250	1270	1290	640	790	400
3170	2110	1150	1160	1220	510	650	270
3220	2060	1030	1030	1040	400	510	180
3220	1930	910	890	900	310	400	130
3180	1820	790	760	760	250	310	90
3120	1660	680	650	640	200	240	70
3040	1510	590	560	550	170	190	
2800	1250	440	410	390	110	120	
2530	1000	340	310	290	80		

2270	1630	980	1030	1040	610	670	400
2370	1680	980	1010	1030	540	640	330
2460	1680	940	960	970	450	550	240
2500	1640	870	880	880	360	460	170
2520	1590	790	780	790	290	360	120
2510	1510	700	690	690	240	290	90
2480	1410	620	600	590	190	230	70
2440	1310	550	520	510	160	180	
2320	1110	420	390	380	110	120	
2170	910	320	290	280	80		

1710	1230	730	750	760	440	480	260
1770	1240	730	730	740	370	440	210
1810	1230	670	680	690	320	380	150
1830	1210	640	630	640	260	320	140
1850	1170	580	580	570	220	260	90
1830	1060	470	460	450	150	170	
1780	940	380	360	350	110	120	
1710	810	310	280	260	80		
1600	680	240	220	210	60		
1480	570	200					

1530	1100	630	670	680	380	420	230
1570	1110	640	650	670	340	390	190
1610	1110	610	620	630	300	350	150
1630	1090	580	580	590	250	300	110
1650	1060	540	530	540	210	250	80
1650	980	460	440	430	150	170	
1380	870	370	350	340	110	110	
1550	760	290	270	260	80		
1460	650	240	220	200	60		
1380	550	200					

1400	1010	580	610	630	350	380	220
1430	1020	590	610	620	320	370	190
1480	1010	560	570	580	280	320	140
1510	1000	540	540	550	240	290	100
1530	970	510	500	510	200	230	80
1490	910	420	410	410	150	160	
1420	720	290	270	250	80		
1280	530	200					
1120							
950							

1280	930	520	560	580	320	370	210
1320	940	530	550	570	300	340	180
1340	930	520	530	540	260	310	140
1370	920	500	510	510	230	260	100
1380	910	470	470	480	200	230	80
1390	850	410	400	400	150	160	
1330	690	280	260	250	80		
1210	520	190					
1060							
910							

NORMAL PROCEDURE

1. Move slide until proper body tube size appears in BODY TUBE window.
2. Decide on DRAG FACTOR (C_D) for your rocket.
3. Read and record C_DA value in window next to drag factor (C_D) of your rocket.
4. Move slide until proper engine type appears in ENGINE TYPE window.
5. Find model lift-off WEIGHT without engine on proper C_DA panel (C_DA found in step 3 rounded to nearest tenth).
6. Read predicted altitude next to lift-off weight.

1200	860	490	520	540	310	330	190
1220	870	500	520	530	290	320	170
1250	870	490	500	510	250	290	130
1280	860	480	480	480	220	260	100
1290	850	450	450	450	190	220	80
1290	800	390	380	380	140	160	
1250	650	270	260	240	80		
1160	500	190					
1020							
870							

410	310	150	180	200	100	120	70
410	310	160	180	200	100	120	60
420	310	160	180	190	100	110	50
420	300	160	170	180	80	90	
420	280	140	150	150	60		
410	250	120					
400							
380							
360							
340							

1130	810	450	490	510	290	320	180
1150	820	460	480	500	260	300	160
1180	820	460	480	490	240	280	130
1200	820	440	450	460	220	250	100
1210	800	430	430	430	190	210	80
1220	760	370	360	360	140	150	
1180	630	270	250	240	80		
1090	490	180					
980							
850							

280	220	100	120	130	70	70	40
300	220	100	120	130	70	70	40
310	220	100	120	130	70	70	40
310	220	110	120	120	60	70	
310	210	100	110	110	50		
310	190	90					
300							
290							
280							
270							

70	60	55	50	30	20	10	5
CDA	CDA	CDA	CDA	CDA	CDA	CDA	CDA
1.16	0.63	0.41	0.22	0.14	0.13	0.12	0.07
1.35	0.74	0.48	0.26	0.16	0.15	0.14	0.08
1.54	0.84	0.55	0.30	0.18	0.17	0.16	0.09
1.74	0.94	0.62	0.34	0.21	0.19	0.18	0.10
1.93	1.05	0.69	0.37	0.23	0.21	0.20	0.12
2.12	1.16	0.76	0.41	0.25	0.23	0.22	0.13
2.32	1.26	0.83	0.45	0.28	0.26	0.24	0.14
2.50	1.36	0.90	0.49	0.30	0.28	0.26	0.15
2.70	1.47	0.96	0.52	0.32	0.30	0.28	0.16
2.89	1.58	1.03	0.56	0.34	0.32	0.30	0.17
3.09	1.68	1.10	0.60	0.37	0.34	0.32	0.18
3.28	1.78	1.17	0.64	0.39	0.36	0.34	0.20
3.48	1.89	1.24	0.68	0.42	0.38	0.37	0.21
3.66	2.00	1.31	0.71	0.44	0.40	0.39	0.22
3.86	2.10	1.38	0.75	0.46	0.42	0.41	0.23

30	40	50	60	70	80	90	100
1.06	1.04	1.03	1.00	0.98	0.96	0.94	0.93
1.03	1.01	0.99	0.97	0.95	0.93	0.92	0.90
1.00	0.98	0.96	0.94	0.92	0.91	0.89	0.87
0.97	0.95	0.93	0.92	0.90	0.88	0.86	0.85
0.94	0.92	0.90	0.89	0.87	0.85	0.84	0.82
0.91	0.89	0.88	0.86	0.84	0.83	0.81	0.80
0.89	0.87	0.85	0.84	0.82	0.80	0.79	0.77
0.86	0.84	0.83	0.81	0.79	0.78	0.77	0.75
0.83	0.82	0.80	0.78	0.77	0.76	0.74	0.73
0.81	0.79	0.78	0.76	0.75	0.73	0.72	0.71
0.78	0.77	0.75	0.74	0.72	0.71	0.70	0.68

INTRODUCTION:

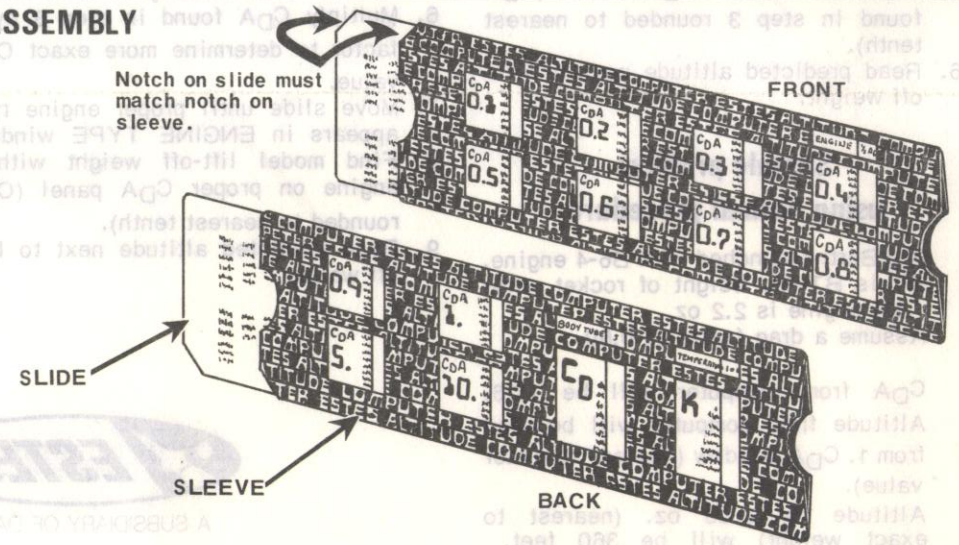
Estes Industries introduced an altitude prediction technical report called TR-10 a few years ago. Although the report has been updated and is still quite accurate, some of the information needed from it takes time to extract. The new ESTES ALTITUDE COMPUTER has been created to provide altitude informa- quickly. After a few short movements of the center slide, the predicted altitude will appear in the appropriate window.

All standard Estes body tube and engine types are represented so that expected altitude performance for almost any single engine – single stage model can be computed.

Use of the computer is quite simple and can be easily mastered. Follow instructions exactly. Two sample problems are provided for practice. Three factors that must be known for each computation are engine type, body tube size, and the model's ready-to-launch weight without engine. (See catalog for this information.) A fourth factor, called C_D, or drag coefficient, is extremely important. C_D is a numerical figure having to do with the aerodynamic properties of the model and is dependent on how well the model is built and finished. The rocketeer must decide on this figure by visual evaluation of the model or by the use of technical report TR-11. For fun flying the visual examination method is actually quite satisfactory.

A C_D value of 0.75 or higher should be used if a model has been built properly but not finished (no balsa filling or painting). It may be safe to use a C_D value as low as 0.3 if the model has been carefully built with airfoiled fins, filleted fin joints, ogive nose cone, and gleaming finish. Remember that a clean model will have a lower C_D value than a poorly finished one. Once the C_D has been determined the computer automatically multiplies it and the various body tube cross sectional areas to form the C_DA factor used from then on.

ASSEMBLY



NORMAL PROCEDURE

1. Move slide until proper body tube size appears in BODY TUBE window.
2. Decide on DRAG FACTOR (C_D) for your rocket.
3. Read and record C_DA value in window next to drag factor (C_D) of your rocket.
4. Move slide until proper engine type appears in ENGINE TYPE window.
5. Find model lift-off WEIGHT without engine on proper C_DA panel (C_DA found in step 3 rounded to nearest tenth).
6. Read predicted altitude next to lift-off weight.

Sample problem using normal procedure

Big Bertha launched with B6-4 engine.
BT is BT-60. Weight of rocket without engine is 2.2 oz.
Assume a drag factor of 0.60.

C_DA from computer will be 1.26.
Altitude from computer will be read from 1. C_DA window (nearest to exact value).
Altitude for 2.00 oz. (nearest to exact weight) will be 360 feet.

PRECISION PROCEDURE

1. Move slide until proper body tube size appears in BODY TUBE window.
2. Decide on DRAG FACTOR (C_D) for your rocket.
3. Read and record the C_DA value in window next to drag factor (C_D) of your rocket.
4. Move slide until TEMPERATURE is most closely correct.
5. The correct K factor is then read next to elevation of your launch site.
6. Multiply C_DA found in step 3 by K factor to determine more exact C_DA value.
7. Move slide until proper engine type appears in ENGINE TYPE window.
8. Find model lift-off weight without engine on proper C_DA panel (C_DA rounded to nearest tenth).
9. Read predicted altitude next to lift-off weight.

Sample problem using precision procedure

Alpha launched with C6-5 engine.
BT is BT-50. Weight of rocket without engine is 0.8 oz.
Assume a drag factor of 0.50.
Assume temperature of 80° F and elevation of 3000 feet above sea level.

C_DA from computer will be 0.37.
K factor for 80°F at 3000 feet elevation will be 0.88.
Exact C_DA will be 0.33 (0.37 x 0.88 rounded to nearest hundredth).
Altitude from computer will be read from 0.3 C_DA window.
Altitude for 0.75 oz. (nearest to exact weight) will be 1680 feet.

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