

ESTES F15

CERTIFIED VALUES

Total Impulse: **49.61 newton-seconds**
Delays: **0, 4, 6, 8 seconds**

Propellant Type: **Black Powder**
Propellant Mass: **60.0 grams**

Casing Dimensions: **29 mm X 114 mm**

Certification Type: **Model Rocket**

STATIC TEST DATA

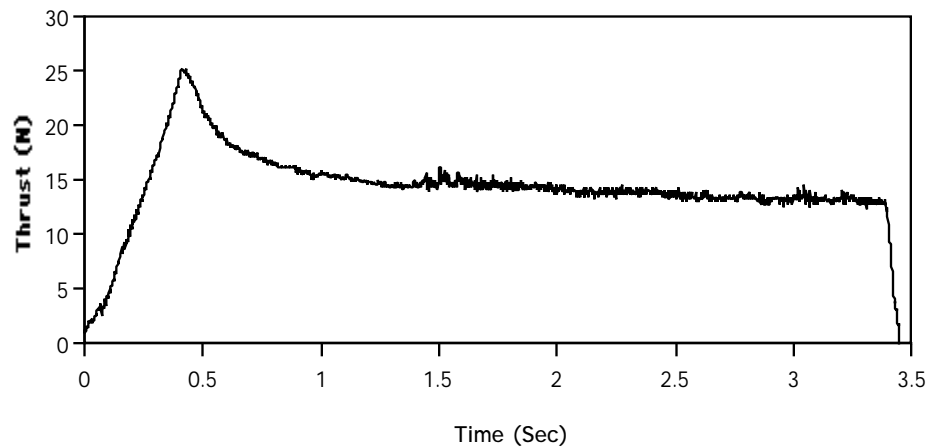
Date Tested: **25-November-2012**

Total Impulse: **49.61 newton-seconds** (**0.83**)
Peak Thrust: **25.26 newtons** (**4.97**)
Burn Time: **3.45 seconds** (**0.06**)
Average Thrust: **14.38 newtons**

Mass After Firing: **33.8 grams**

Delay Time	Average Measured Delay	Initial Mass
0	0.00	94.0 g
4	6.33	101.5 g
6	6.33	103.7 g
8	7.25	104.4 g

TYPICAL THRUST-TIME CURVE



REMARKS

FILE NAME	MOTOR	IT	F-MAX	F-AVG	T-BURN	T-DELAY	M-INIT	M-BO
ES111201	F15-0	48.504	31.489	14.479	3.350	0	94.0	33.0
ES111202	F15-0	47.993	24.616	14.250	3.368	0	94.0	32.9
ES111203	F15-0	48.258	24.954	14.354	3.362	0	94.0	33.1
ES111204	F15-4	50.136	23.309	14.333	3.498	3.414	101.3	34.3
ES111205	F15-4	50.271	26.287	14.513	3.464	3.426	101.6	33.4
ES111206	F15-4	50.473	24.725	14.579	3.462	4.026	101.7	34.0
ES111207	F15-6	50.137	23.477	14.099	3.556	6.058	103.8	34.3
ES111208	F15-6	50.333	26.191	14.397	3.496	6.392	103.4	34.3
ES111209	F15-6	50.466	25.149	14.296	3.530	6.526	103.9	34.3
ES111210	F15-8	49.547	24.497	14.411	3.438	7.046	104.4	33.8
ES111211	F15-8	49.495	24.023	14.355	3.448	7.322	104.4	34.2
ES111212	F15-8	49.682	24.459	14.459	3.436	7.388	104.3	34.3
AVG		49.608	25.265	14.377	3.451			33.825
SD		0.833	4.971	0.014	0.061			
SD %		1.679	19.676	0.098	1.762			

DELAYS

ALLOWABLE RANGE	INDICATED	AVG	DELAYS ACTUAL		
2.5 TO 5.5	4 SEC	3.62	3.41	3.43	4.03
4.5 TO 7.5	6 SEC	6.33	6.06	6.39	6.53
6.5 TO 9.5	8 SEC	7.25	7.04	7.32	7.39

; Estes F15 RASP.ENG file made from NAR published data
; File produced, 2013
; The total impulse, peak thrust, average thrust and burn time are
; the same as the averaged static test data on the NAR web site in
; the certification file. The curve drawn with these data points is as
; close to the certification curve as can be with such a limited
; number of points (32) allowed with wRASP up to v1.6.
F15 29 114 0-4-6-8 .0600 .1030 E

0.148	7.638
0.228	12.253
0.294	16.391
0.353	20.210
0.382	22.756
0.419	25.260
0.477	23.074
0.520	20.845
0.593	19.093
0.688	17.500
0.855	16.225
1.037	15.427
1.205	14.948
1.423	14.627
1.452	15.741
1.503	14.785
1.736	14.623
1.955	14.303
2.210	14.141
2.494	13.819
2.763	13.338
3.120	13.334
3.382	13.013
3.404	9.352
3.418	4.895
3.450	0.000

