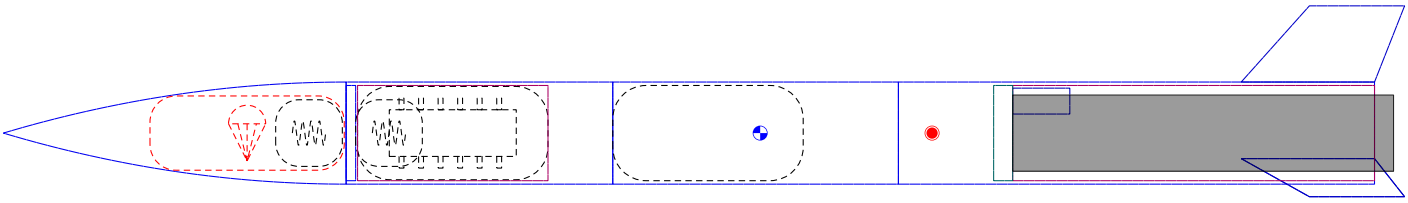
# Rocket Design



Rocket

Stages: 1

Mass (with motor): 1293 g

Stability: 1.68 cal

CG: 397 mm

CP: 488 mm

### G74W-4

| | |
|---|---|
| Altitude | 251 m |
| Flight Time | 82.3 s |
| Time to Apogee | 7.52 s |
| Optimum Delay | 6.4 s |
| Velocity off Pad | 11.6 m/s |
| Max Velocity | 71.8 m/s |
| Velocity at Deployment | 14.7 m/s |
| Landing Velocity | 3.44 m/s |

| Motor | Avg Thrust | Burn Time | Max Thrust | Total Impulse | Thrust to Wt | Propellant Wt | Size |
|---|---|---|---|---|---|---|---|
| G74W | 76.2 N | 1.12 s | 91.2 N | 85.3 Ns | 7.54:1 | 39.3 g | 29/83 mm |

### F37-6

| | |
|---|---|
| Altitude | 76.8 m |
| Flight Time | 27.8 s |
| Time to Apogee | 4.7 s |
| Optimum Delay | 3.11 s |
| Velocity off Pad | 7.58 m/s |
| Max Velocity | 33.4 m/s |
| Velocity at Deployment | 10.5 m/s |
| Landing Velocity | 3.39 m/s |

| Motor | Avg Thrust | Burn Time | Max Thrust | Total Impulse | Thrust to Wt | Propellant Wt | Size |
|---|---|---|---|---|---|---|---|
| F37 | 32.6 N | 1.55 s | 46.5 N | 50.7 Ns | 3.16:1 | 28.2 g | 29/99 mm |

### E15-7

| | |
|---|---|
| Altitude | 27.9 m |
| Flight Time | 12.2 s |
| Time to Apogee | 3.37 s |
| Optimum Delay | 0.8 s |
| Velocity off Pad | 5.36 m/s |
| Max Velocity | 20.4 m/s |
| Velocity at Deployment | 17.1 m/s |
| Landing Velocity | 3.64 m/s |

| Motor | Avg Thrust | Burn Time | Max Thrust | Total Impulse | Thrust to Wt | Propellant Wt | Size |
|---|---|---|---|---|---|---|---|
| E15 | 15.7 N | 2.53 s | 28.8 N | 39.8 Ns | 1.61:1 | 20.1 g | 24/70 mm |

**B1-P**

| | |
|---|---|
| Altitude | 0 m |
| Flight Time | 2.91 s |
| Time to Apogee | 0 s |
| Optimum Delay | N/A |
| Velocity off Pad | N/A |
| Max Velocity | 0 m/s |
| Velocity at Deployment | N/A |
| Landing Velocity | 0 m/s |

| Motor | Avg Thrust | Burn Time | Max Thrust | Total Impulse | Thrust to Wt | Propellant Wt | Size |
|---|---|---|---|---|---|---|---|
| B1 | 1.88 N | 2.42 s | 3.87 N | 4.61 Ns | 0.18:1 | 24 g | 24/40 mm |

**F46-P**

| | |
|---|---|
| Altitude | 114 m |
| Flight Time | 37.5 s |
| Time to Apogee | 5.6 s |
| Optimum Delay | 4.18 s |
| Velocity off Pad | 7.2 m/s |
| Max Velocity | 42.9 m/s |
| Velocity at Deployment | 10 m/s |
| Landing Velocity | 3.59 m/s |

| Motor | Avg Thrust | Burn Time | Max Thrust | Total Impulse | Thrust to Wt | Propellant Wt | Size |
|---|---|---|---|---|---|---|---|
| F46 | 47.9 N | 1.47 s | 52.5 N | 70.3 Ns | 3.80:1 | 142 g | 40/70 mm |

**F87-P**

| | |
|---|---|
| Altitude | 106 m |
| Flight Time | 34.7 s |
| Time to Apogee | 5.03 s |
| Optimum Delay | 4.37 s |
| Velocity off Pad | 10.4 m/s |
| Max Velocity | 44.1 m/s |
| Velocity at Deployment | 6.09 m/s |
| Landing Velocity | 3.82 m/s |

| Motor | Avg Thrust | Burn Time | Max Thrust | Total Impulse | Thrust to Wt | Propellant Wt | Size |
|---|---|---|---|---|---|---|---|
| F87 | 91.9 N | 0.686 s | 119 N | 63.1 Ns | 7.25:1 | 130 g | 40/200 mm |

## G168-P

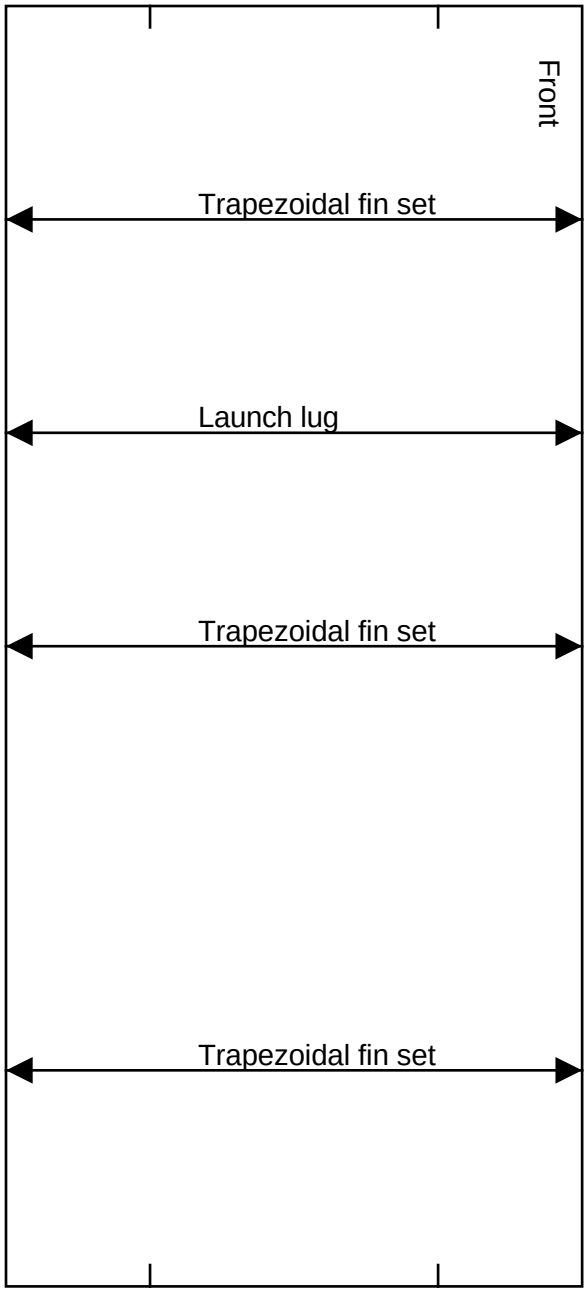
| | |
|---|---|
| Altitude | 358 m |
| Flight Time | 107 s |
| Time to Apogee | 8.67 s |
| Optimum Delay | 8.03 s |
| Velocity off Pad | 14.2 m/s |
| Max Velocity | 90.6 m/s |
| Velocity at Deployment | 12.2 m/s |
| Landing Velocity | 3.59 m/s |

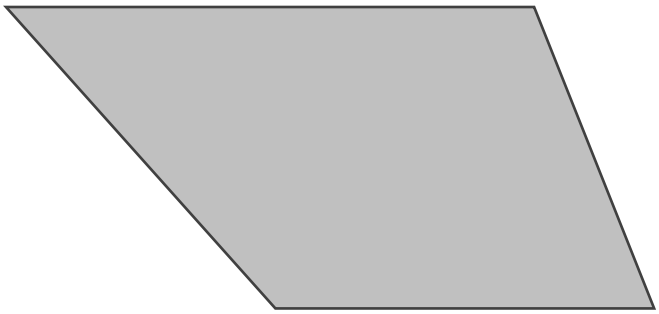
| Motor | Avg Thrust | Burn Time | Max Thrust | Total Impulse | Thrust to Wt | Propellant Wt | Size |
|---|---|---|---|---|---|---|---|
| G168 | 176 N | 0.686 s | 240 N | 121 Ns | 13.91:1 | 130 g | 40/200 mm |

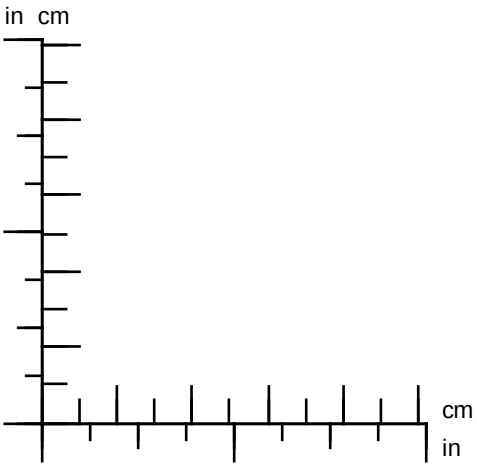
## Parts Detail

Sustainer

| | | | | | |
|---|---|---|---|---|---|
|  | Nose cone | PLA (1.3 g/cm³) | Parabolic series | Len: 180 mm | Mass: 47 g |
|  | Parachute | Ripstop nylon (67 g/m²) | $Dia_{out}$ 1782 mm | Len: 102 mm | Mass: 174 g |
| | Shroud Lines | Elastic cord (flat 6 mm, 1/4 in) (4.3 g/m) | Lines: 8 | Len: 200 mm | |
|  | Shock cord | Tubular nylon (25 mm, 1 in) (29 g/m) | | Len: 200 mm | Mass: 5.8 g |
|  | Body tube | PLA (1.3 g/cm³) | $Dia_{in}$ 50 mm<br>$Dia_{out}$ 53.6 mm | Len: 140 mm | Mass: 53.3 g |
|  | Shock cord | Tubular nylon (25 mm, 1 in) (29 g/m) | | Len: 200 mm | Mass: 5.8 g |
|  | Altimeter | | $Dia_{out}$ 49 mm | | Mass: 300 g |
|  | Electronics bay | Cardboard (0.68 g/cm³) | $Dia_{in}$ 49 mm<br>$Dia_{out}$ 50 mm | Len: 100 mm | Mass: 5.29 g |
|  | Extra trube | PLA (1.3 g/cm³) | $Dia_{in}$ 50 mm<br>$Dia_{out}$ 53.6 mm | Len: 150 mm | Mass: 57.1 g |
|  | Tolerance | | $Dia_{out}$ 50 mm | | Mass: 100 g |
|  | Tail | PLA (1.3 g/cm³) | $Dia_{in}$ 50 mm<br>$Dia_{out}$ 53.6 mm | Len: 250 mm | Mass: 95.2 g |
|  | Trapezoidal fin set (3) | PLA (1.3 g/cm³) | Thick: 3.6 mm | | Mass: 33.7 g |
|  | Launch lug | PLA (1.3 g/cm³) | $Dia_{in}$ 10 mm<br>$Dia_{out}$ 13.6 mm | Len: 30 mm | Mass: 2.6 g |
|  | Motor bracket | PLA (1.3 g/cm³) | $Dia_{in}$ 48 mm<br>$Dia_{out}$ 50 mm | Len: 190 mm | Mass: 38 g |
|  | Engine block | PLA (1.3 g/cm³) | $Dia_{in}$ 0 mm<br>$Dia_{out}$ 50 mm | Len: 10 mm | Mass: 25.5 g |


Front
Trapezoidal fin set
Launch lug
Trapezoidal fin set
Trapezoidal fin set

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