

ARVT Guide

What is ARVT?

ARVT is AstraLab's text format for describing an educational rocket simulation. An ARVT file starts with a rocket declaration, followed by optional component blocks and simulation commands.

```
rocket StudentRocket

simulate
report
```

Rocket Definition

Every file must begin with:

```
rocket RocketName
```

Names should use letters, numbers, or underscores.

Nosecone

```
nosecone {
    shape ogive
    length 0.25m
    mass 0.08kg
}
```

Supported fields:

- ? shape
- ? length
- ? mass

Body

```
body {
    length 1.2m
    diameter 0.08m
    mass 0.35kg
}
```

Supported fields:

- ? length
- ? diameter
- ? mass

Fins

```
fins {  
    count 4  
    span 0.12m  
    sweep 0.05m  
    mass 0.06kg  
}
```

Supported fields:

- ? count
- ? span
- ? sweep
- ? mass

Motor

```
motor {  
    thrust_curve E12  
    propellant_mass 0.025kg  
    impulse 40  
}
```

Supported fields:

- ? thrust_curve
- ? propellant_mass
- ? impulse

The current motor model is an educational designation-based approximation. Impulse values are interpreted as newton-seconds.

Recovery

```
recovery {  
    parachute_area 0.8m2  
    deploy_delay 0.5s  
    mass 0.05kg  
}
```

Supported fields:

- ? parachute_area
- ? deploy_delay
- ? mass

Environment

```
environment {  
    wind 3m/s  
    temperature 288K  
}
```

```
}
```

Supported fields:

```
? wind
? temperature
```

Mission

```
mission {
    launch_angle 3deg
    rail_length 1.0m
    max_time 90s
}
```

Supported fields:

```
? launch_angle
? rail_length
? max_time
```

Simulation Commands

Place commands after the rocket blocks.

```
simulate
graph altitude
graph velocity
graph acceleration
graph dynamic_pressure
graph trajectory
export csv
export graphs
report
```

Supported commands:

```
? simulate
? report
? graph altitude
? graph velocity
? graph acceleration
? graph mach
? graph dynamic_pressure
? graph trajectory
? export csv
? export report
? export graphs
? montecarlo N
? help
? clear
```

Reports

Reports include project name, rocket name, timestamp, apogee, maximum velocity, maximum acceleration, maximum Mach number, maximum dynamic pressure, landing distance, CG, CP, static margin, mass and thrust checks, and simulation warnings.

For projects, reports are written to:

```
reports/report.txt
```

Example Files

Bundled examples:

```
? examples/student_rocket.arvt  
? examples/high_altitude.arvt  
? examples/sounding_rocket.arvt  
? examples/two_stage_demo.arvt
```

Starter templates:

```
? examples/templates/basic_rocket.arvt  
? examples/templates/project_main.arvt
```