

E80 Spring 2013

# FIELD TESTS & FLIGHT SAFETY

# Rocket Modifications

## ◎ PML Modifications

- Launch Lugs
- Motor Retainer

<https://publicmissiles.com/pml/images/Phobosinstructionbooklet.pdf>

## ◎ Aerotech Modifications

- Longer Motor Mount
- Motor Retainer instead of Motor Hook, Thrust Ring, & Thrust Ring Flange
- Longer or shorter Payload Section

[http://www.aerotech-rocketry.com/customersite/resource\\_library/Instructions/Kit\\_Instructions/arreaux\\_in\\_8-04.pdf](http://www.aerotech-rocketry.com/customersite/resource_library/Instructions/Kit_Instructions/arreaux_in_8-04.pdf)

# Flight Dates

- ◎ 20 APR 2013
- ◎ 27 APR 2013
  - Meet in Parsons Parking Lot
  - Buses leave at 6 AM sharp
  - All teams expected to go
  - Bring your rocket
  - We will have food, water, & sunscreen

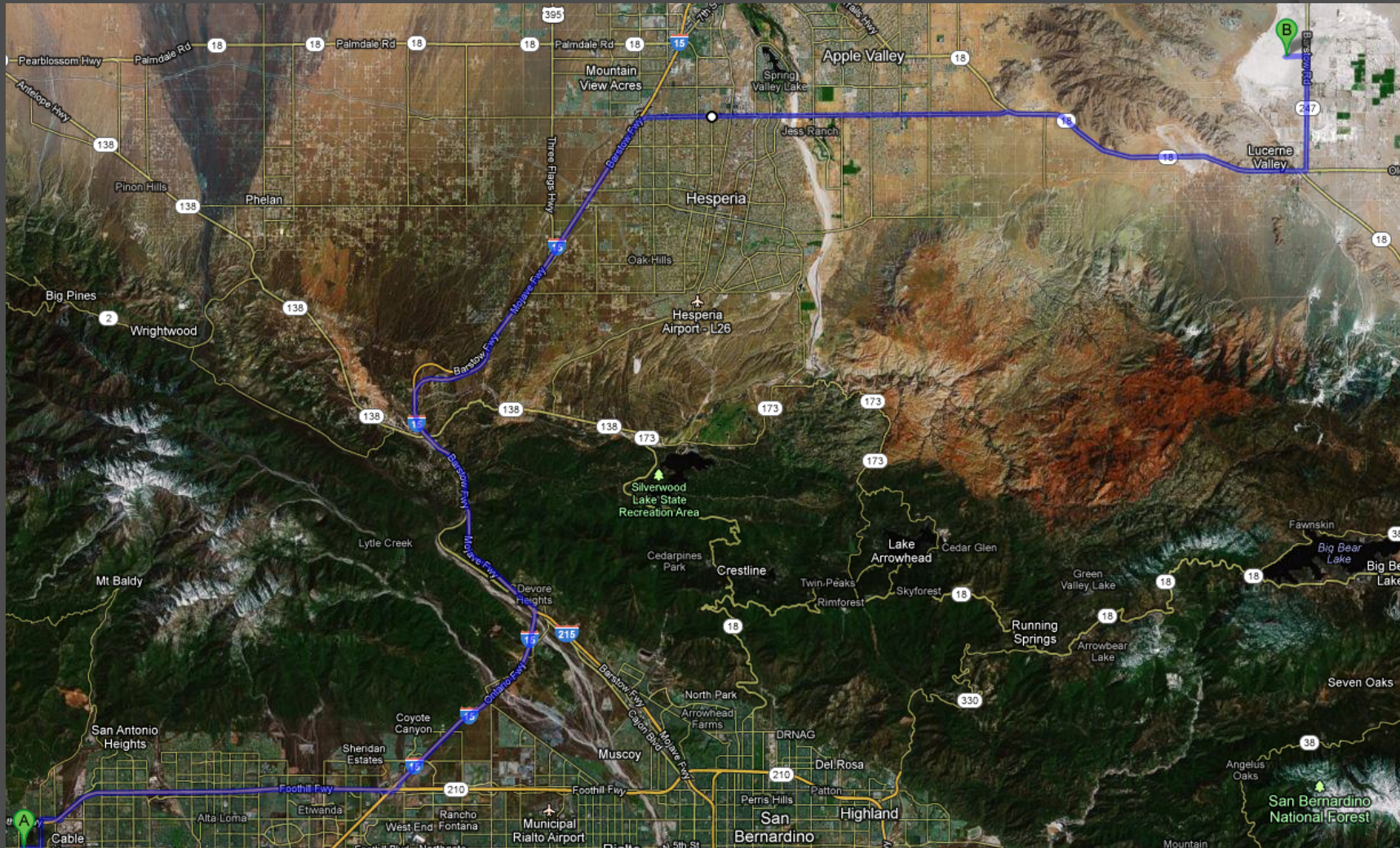
# 13 APR 2013 (Optional)

- ◎ [ROC](#) Monthly Launch
- ◎ Fill out [Liability Waiver](#) and take with you.
- ◎ Level 1 cert
- ◎ Test Flight
- ◎ There are [rocket supply vendors](#) on site.
- ◎ I will be picking up last minute needs.

# 20, 27 APR 2012

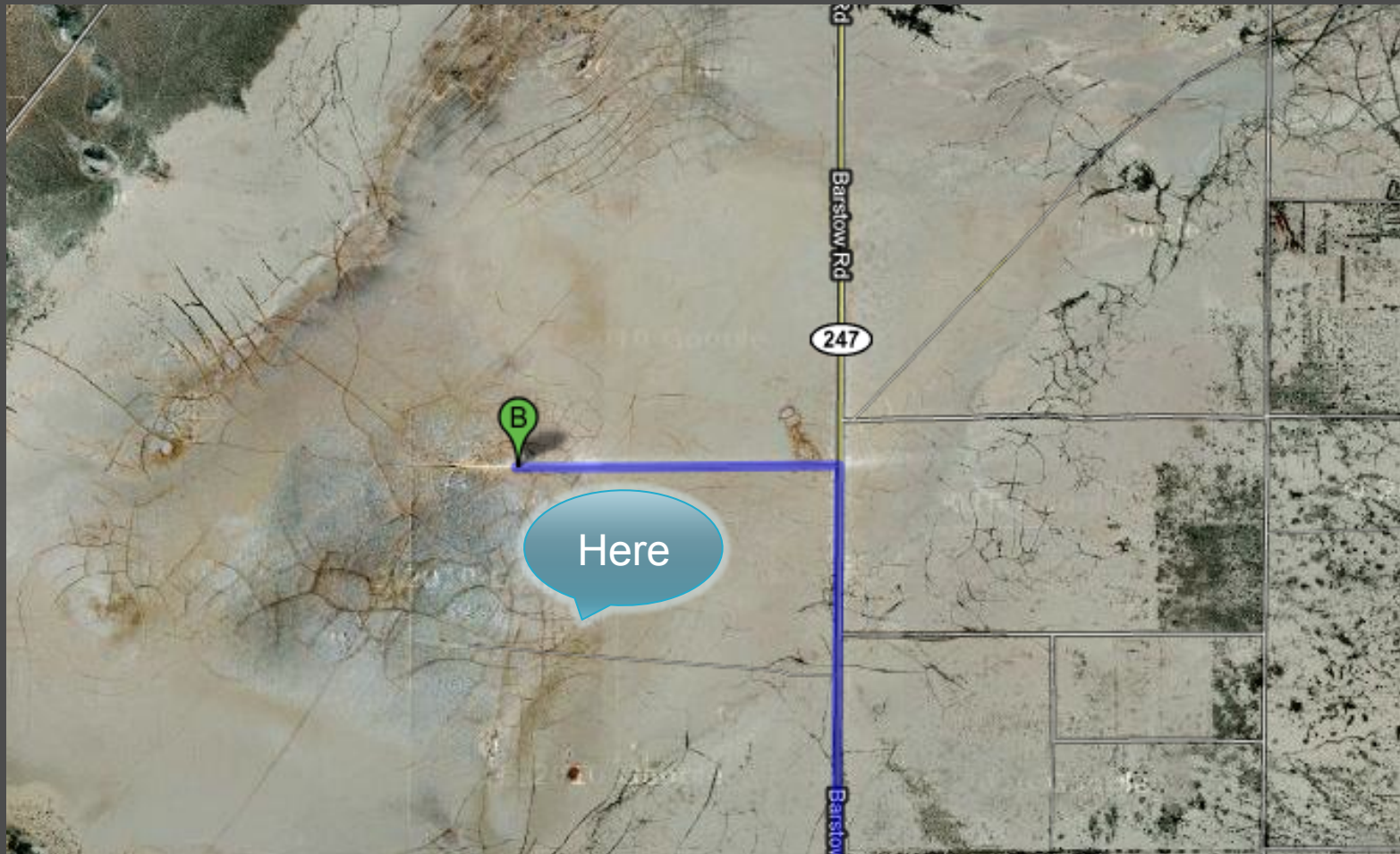
- ⦿ Must fill out checklist & E80 Flight Card.
- ⦿ Might want team checklist.
- ⦿ You may launch personal projects after your team finishes their launch.
- ⦿ We will have set up:
  - Tables
  - Computers
  - Canopies
  - Low power and high power launch stands
  - PA system

# Launch Site



<http://g.co/maps/76a8v>

# Lucerne Valley Dry Lake Bed



[http://maps.google.com/maps?daddr=%2B34%20+30%27+7.02%22,+116%20+57%27+33.60%22+\(34.501950,+116.959333\)&geocode=&dirflg=&saddr=260+E+Foothill+Blvd.,+Claremont,+CA+91711&f=d&sl=34.50195,-116.959333&ssp=0.011052,0.019526&ie=UTF8&t=h&z=10](http://maps.google.com/maps?daddr=%2B34%20+30%27+7.02%22,+116%20+57%27+33.60%22+(34.501950,+116.959333)&geocode=&dirflg=&saddr=260+E+Foothill+Blvd.,+Claremont,+CA+91711&f=d&sl=34.50195,-116.959333&ssp=0.011052,0.019526&ie=UTF8&t=h&z=10)

# Weather Conditions

- Can range from cold (upper 20's) to hot (mid 80's)
- Usually sunny and clear (high to very high UV index)
- We cannot launch if:
  - Wind >20 mph
  - Precipitation
  - Clouds lower than 5000 feet AGL



# Dress Code

- Long pants required, cotton recommended (I know, just deal with it)
- Close-toed shoes required
- Hats recommended
- Sunglasses recommended
- Safety glasses required around motors and loaded rockets
- We will bring sunscreen

# High Power Safety Codes

- ◎ [Tripoli Rocketry Association](#)(TRA)
- ◎ [National Association of Rocketry](#) (NAR)

# Distance Table

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Dimensions (ft.)	Minimum Personnel Distance (ft.)	Minimum Personnel Distance (Complex Rocket) (ft.)
1.25	1/4A, 1/2A	50	15	15
2.50	A	100	15	15
5.00	B	200	15	15
10.00	C	400	15	15
20.00	D	500	15	15
40.00	E	1,000	30	30
80.00	F	1,000	30	30
160.00	G	1,000	30	30
320.00	Two Gs	1,500	100	200
320.00	H	1,500	100	200
640.00	I	2,500	100	200

# Our Safety Rules

- Follow the checklist ([PML](#) or [Aerotech](#)).
- Obey all PA announcements.
- Drink plenty of water.
- Wear safety glasses around motors, black powder, and loaded rockets.
- Never point loaded rocket at anyone.
- Igniter goes in motor as last thing on launch pad.

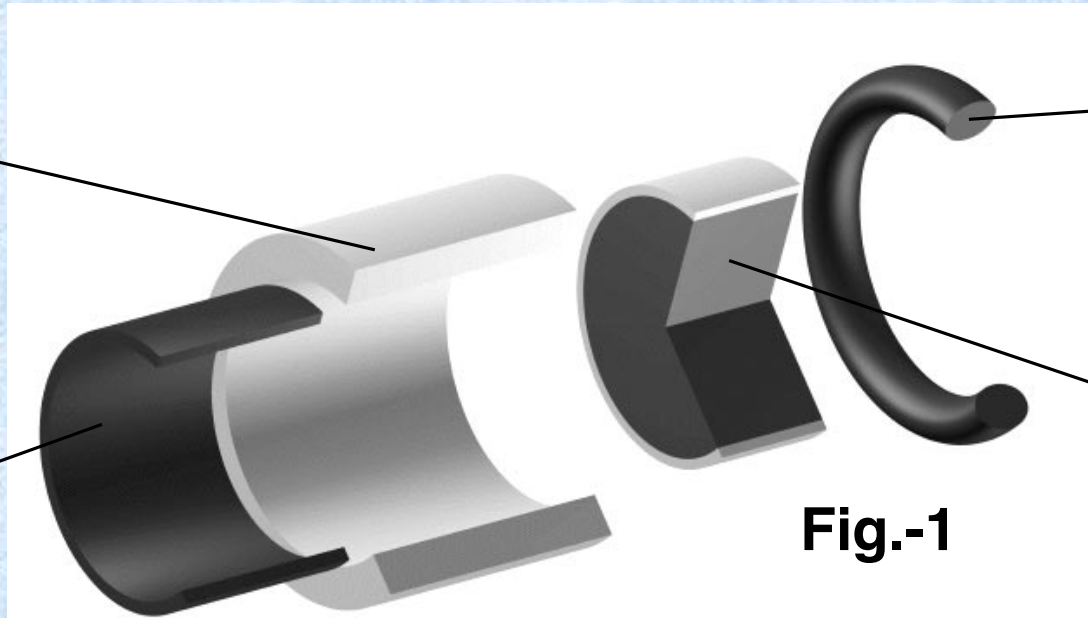
# From countdown until safe 'chute deployment

- ⦿ Everyone on their feet
- ⦿ Everyone watches rocket

# The Delay Grain

Delay  
Insulator  
(Chamfered)

Aft Delay  
Spacer



**Fig.-1**

Delay  
O-Ring

RMS-Plus™  
Delay Element

**Don't get grease on the Delay Element.**

# The Delay Grain (cont.)

Forward Delay  
Spacer (13/16"  
O.D. Washer)

Delay  
Cavity

Apply Grease to  
This Surface

RMS™  
29mm  
Forward  
Closure

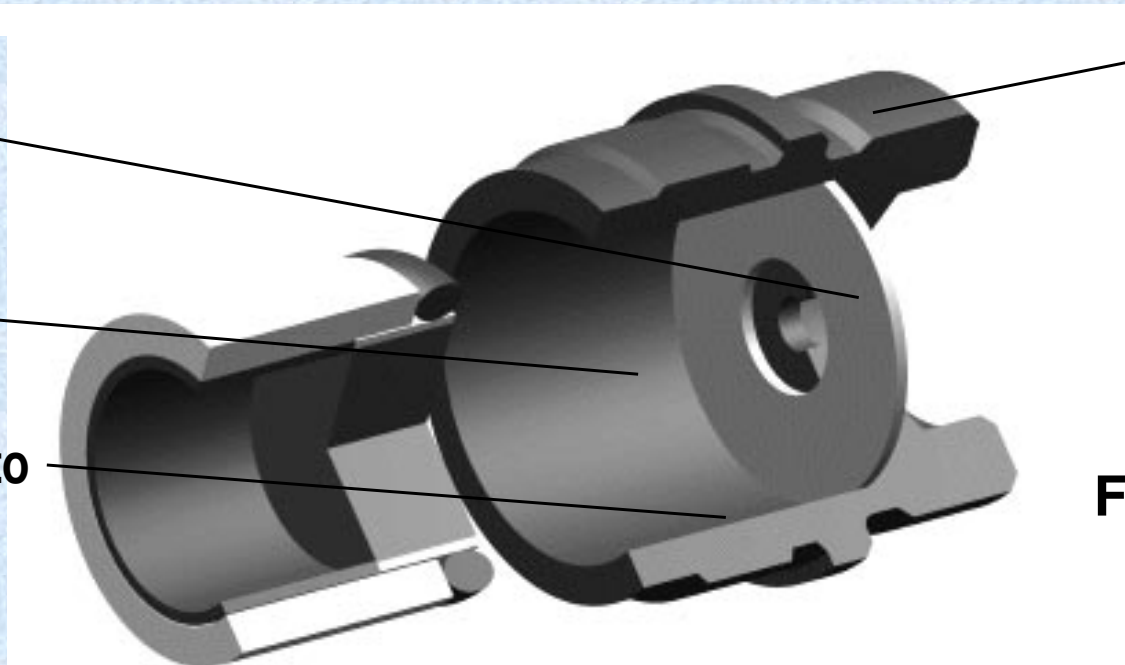


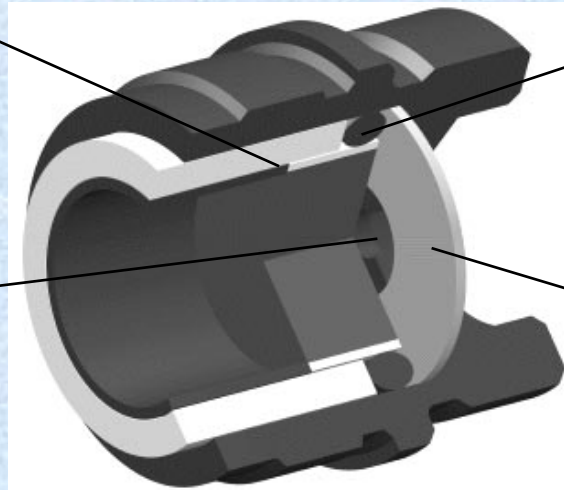
Fig.-2

**Don't get grease on the Forward Delay Spacer.**

# The Delay Grain (cont.)

Delay Charge  
Assembly Inserted  
Completely Into  
29mm Forward  
Closure

Fill with grease  
when using  
*plugged* forward  
closure ONLY



Delay  
O-Ring

Forward  
Delay  
Spacer

Fig.-3

**Make sure the Aft Delay Spacer is behind the Delay Grain.**



# How to Set the Delay Time (1)

- Set the delay time to “M” (10 seconds)

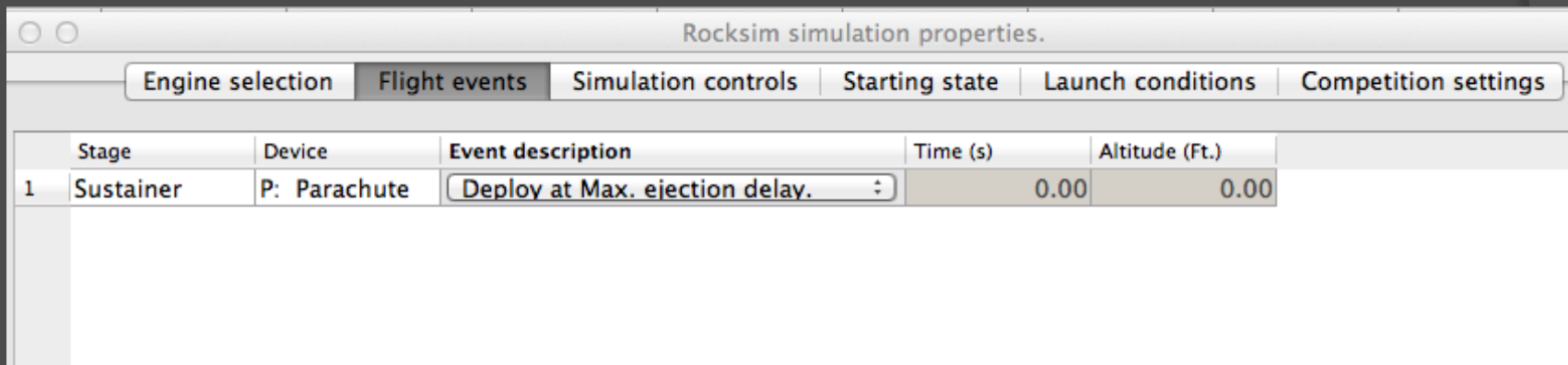
	Mfg. name ▲	Engine code	Diameter mm	Length In.	Burn Sec.	Total impulse N-Sec.	Average thrust Newtons
48	Aerotech	G75J	29.00	7.6772	2.20	161.429	73.377
49	Aerotech	G79W	29.00	5.9000	1.42	107.054	75.390
50	Aerotech	G75M	29.00	4.8819	1.97	119.265	60.510
51	Aerotech	G76G	29.00	4.8819	2.00	114.503	57.226
52	Aerotech	G78G	29.00	5.7480	1.47	109.782	74.585
53	Aerotech	G80T	29.00	5.0394	1.81	133.244	73.701
54	Aerotech	G104T	29.00	4.9213	0.90	82.862	92.069
55	Aerotech	G339N	38.00	3.8189	0.36	112.085	312.214
56	Aerotech	G35EJ	29.00	3.8583	2.91	100.956	34.693
57	Aerotech	G38FJ	29.00	4.8819	2.64	86.818	32.886
58	Aerotech	G53FJ	29.00	4.8819	1.85	92.148	49.810
59	Aerotech	G12T-RC	32.00	4.2126	8.55	87.216	10.201
60	Aerotech	H128W	29.00	7.6772	1.50	155.795	103.863
61	Aerotech	H165R	29.00	7.6378	1.05	160.882	153.221
62	Aerotech	H55W	29.00	7.5197	2.75	161.231	58.693

Ejection delay in seconds: 10  
Ignition delay in seconds:   
Engine overhang: 6 In.   
Help    
OK Cancel

- None
- All
- 6
- ✓ 10
- 14

# How to Set the Delay Time (2)

- Set Flight Event to Deploy at Max. ejection delay



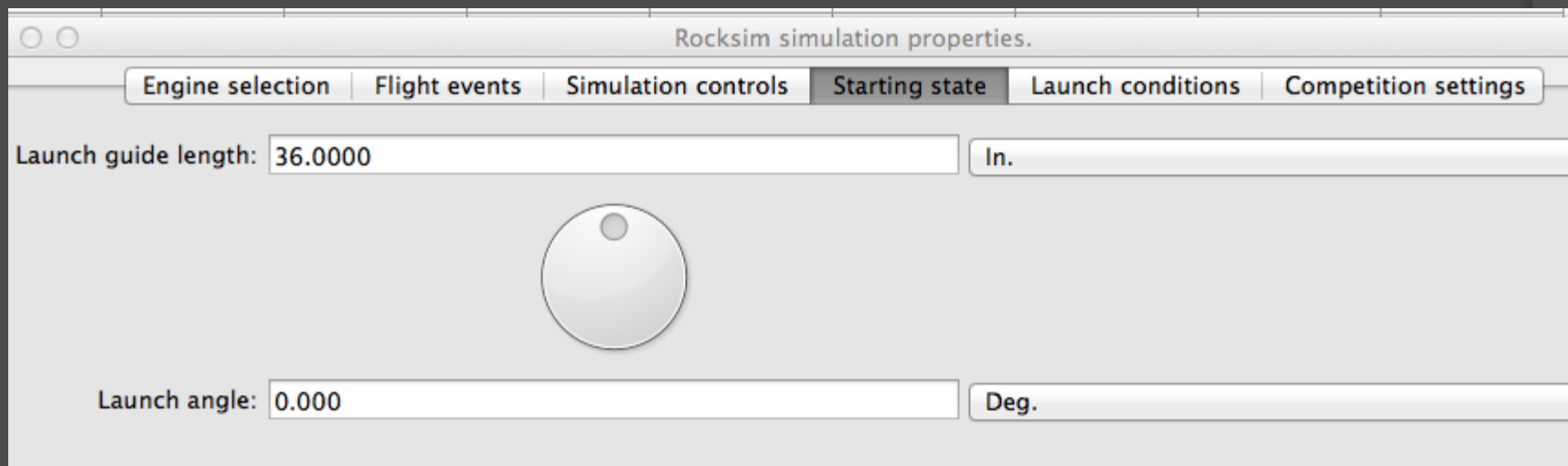
Rocksims simulation properties.

Engine selection | **Flight events** | Simulation controls | Starting state | Launch conditions | Competition settings

	Stage	Device	Event description	Time (s)	Altitude (Ft.)
1	Sustainer	P: Parachute	Deploy at Max. ejection delay.	0.00	0.00

# How to Set the Delay Time (3)

- Set Launch guide length to 48 or 60 In.



# How to Set the Delay Time (4)

- Set Launch conditions to those at your launch site.

The screenshot shows the 'Rocksims simulation properties' dialog box with the 'Launch conditions' tab selected. The dialog is divided into two columns of settings. The left column contains atmospheric and wind-related parameters, while the right column contains cloud and thermal parameters. At the bottom, there is a 'Comments' field and several action buttons.

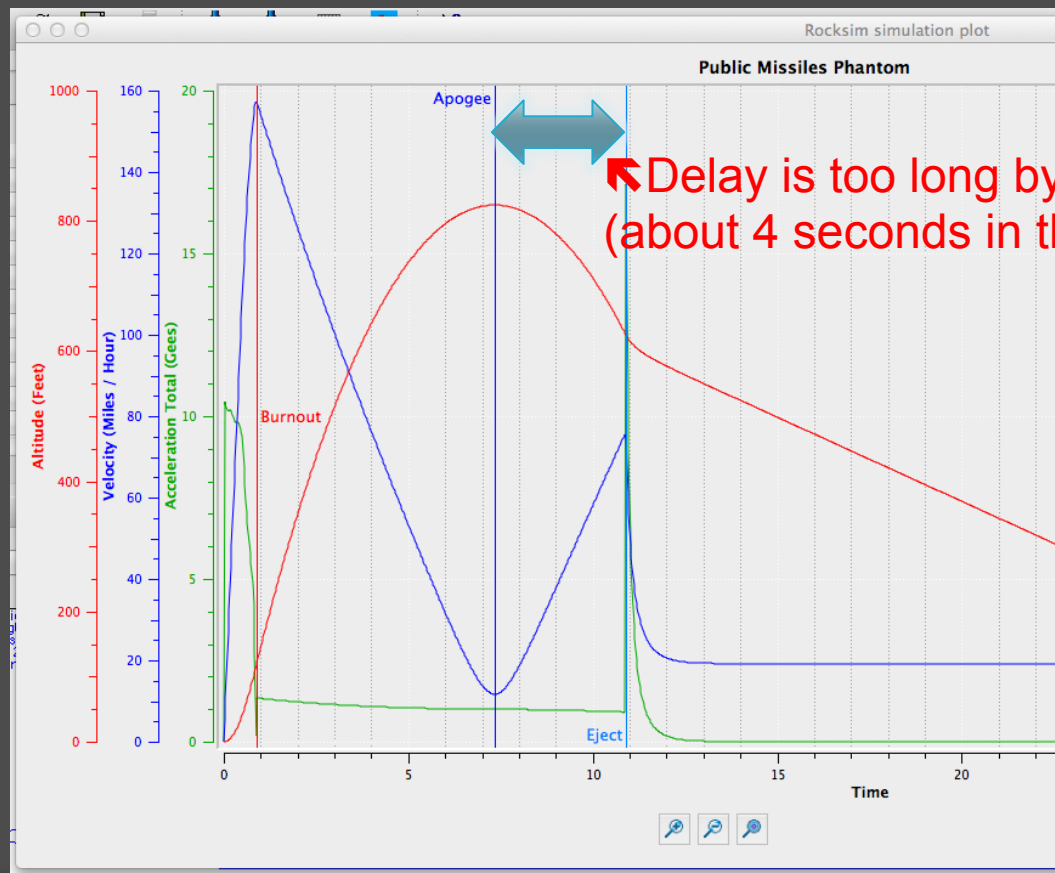
Parameter	Value	Unit
Altitude	3000.00000	Ft.
% Relative humidity	25.00	
Temperature	72.00	Deg. F
Barometric pressure	1.013	Bar
Latitude	0.000	Deg.
Wind conditions	Light (3-7 MPH)	
Low wind speed	3.0000	MPH
High wind speed	7.9000	MPH
Wind turbulence	Fairly constant speed (0.01)	
Wind change frequency	0.0100	
Wind starts at altitude	0.00000	Ft.
Cloud coverage	Sunny (0-10%)	
Cloud cover low limit	0.0000	
Cloud cover high limit	0.1000	
Thermal positioning	Random position	
First thermal position	0.00000	Ft.
Thermal diameter	984.25197	Ft.
Thermal height	6561.67980	Ft.
Thermal strength	Low strength (3.5 MPH)	
Thermal strength/speed	13.4216	MPH
Allow multiple thermals	<input type="checkbox"/>	
Maximum number of thermals	3	
Interthermal distance	656.16798	Ft.

Comments:

Buttons: Help, Flight profile..., Launch, OK, Cancel

# How to Set the Delay Time (5)

- Click Launch and then plot your results.



# How to Set the Delay Time (6)

- Use the Delay Drilling Tool on your delay grain.
- The drilled end faces the propellant grain(s).



# We have the following Long Delays (14 seconds)

- RDK-06 – H238T, H165R
- RDK-07 – H128W, G79W
- RDK-12 – H242T, I357T
- RDK-13 – I245G
- RDK-14 – H148R, I218R
- RDK-15 – H123W, I161W

# Questions for you

- ① How many teams want a stand-alone altimeter?
- ① How many potential Level 1 Certs do we have?