Spray Painting on Linde Field
on Saturday, 9 April 2016
from 1 pm to 3 pm.

E80 Spring 2016

FIELD TESTS & FLIGHT SAFETY

This Week

- Transfer breadboard circuit to PC board.
- Verify everything still works.
- Get data logger working.
- Pass off consists of:
  - Power PC board with data logger & start logging.
  - Test each sensor.
  - Stop logging and display logged data on computer.

Next Week

- Finish all circuit and rocket construction.
- Test that everything works.
- Go through complete launch checklist.
- Prep your motors.
- Make sure you've tested and practiced everything.

Before you get on the bus

- Practice the rocket checklist.
- Practice electronics prep.
- Practice recovery and analysis.
- You'll want to do analysis between flights.
- Practice anything else you'll need to do in the field.

Rocket Modifications

- Longer Payload Section
- Longer body tube for I205W.
- Fiberglass
  http://www.aerotech-rocketry.com/customersite/resource_library/Instructions/Kit_Instructions/arreaux_in_8-04.pdf
- Longer Motor Mount
- Motor Retainer instead of Motor Hook, Thrust Ring, & Thrust Ring Flange

Flight Dates

- 16APR 2016
- 23APR 2016
  - 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

9 APR 2015 (Optional)

- ROC Monthly Launch
- FIll out Liability Waiver and take with you.
- Level 1 cert
- Test Flight
- There are rocket supply vendors on site.

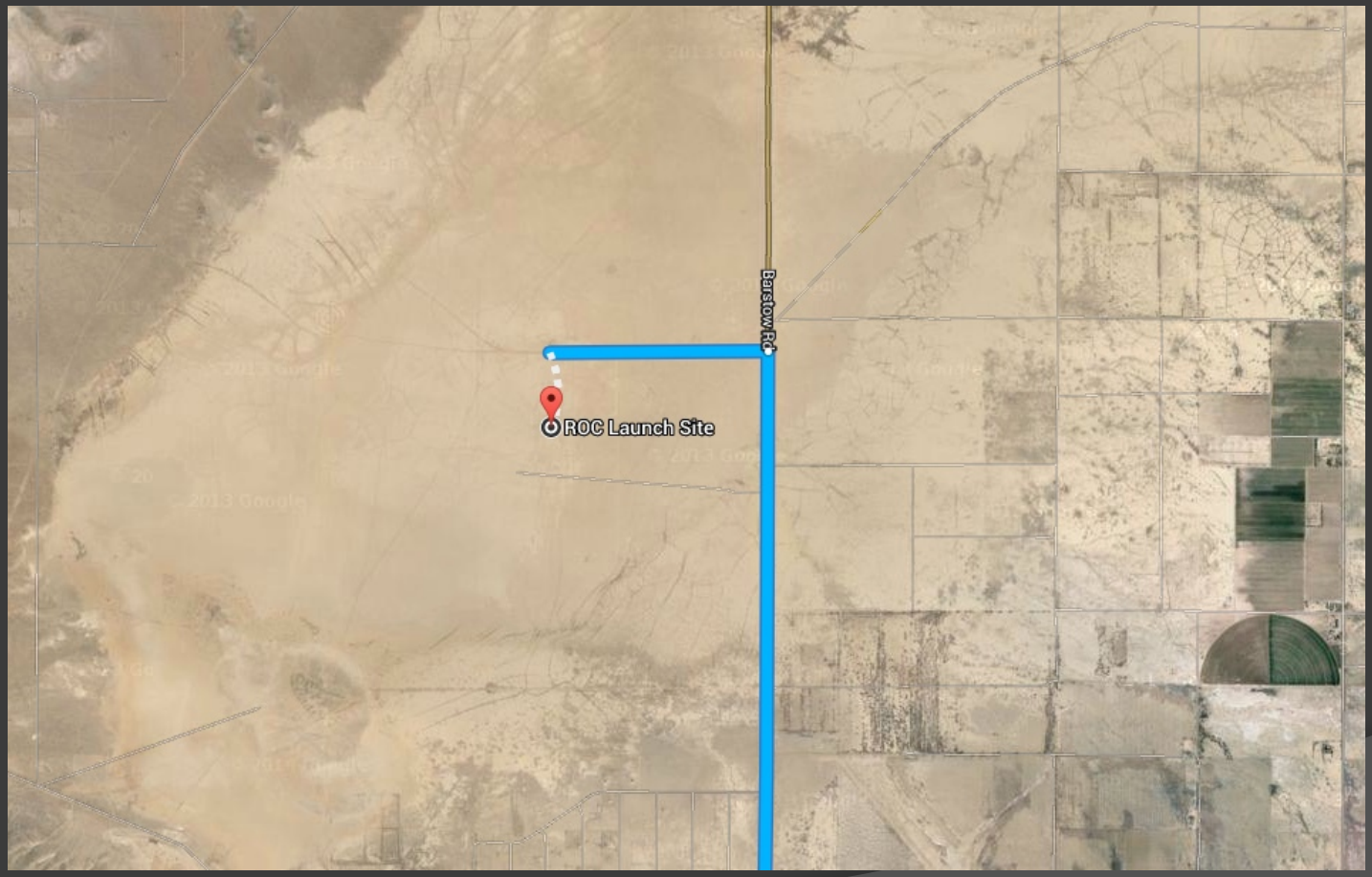
16, 23 APR 2015

- Must fill out checklist & E80 Flight Card (we will have them for you).
- 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

https://goo.gl/maps/Wfgqg

Lucerne Valley Dry Lake Bed



https://goo.gl/maps/Wfgqg

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
  - Actual lake or mud
  - Clouds lower than 5000 feet AGL

Risk Mitigation

- About ½ of the time, one of the two Saturday launches gets scrubbed.
- If it's the first Saturday, all four launches on second Saturday and return delayed.
- If second Saturday scrub looks likely, you may fly three motors first Saturday.
- If second Saturday scrub looks certain, all four launches on first Saturday and return delayed.

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	H	1,500	100	200
640.00	I	2,500	100	200
1280.00	J	½ max alt	100	200
2560.00	K	½ max alt	200	300

Our Safety Rules

- Follow the checklist.
- 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

Flight Safety Video

The Delay Grain

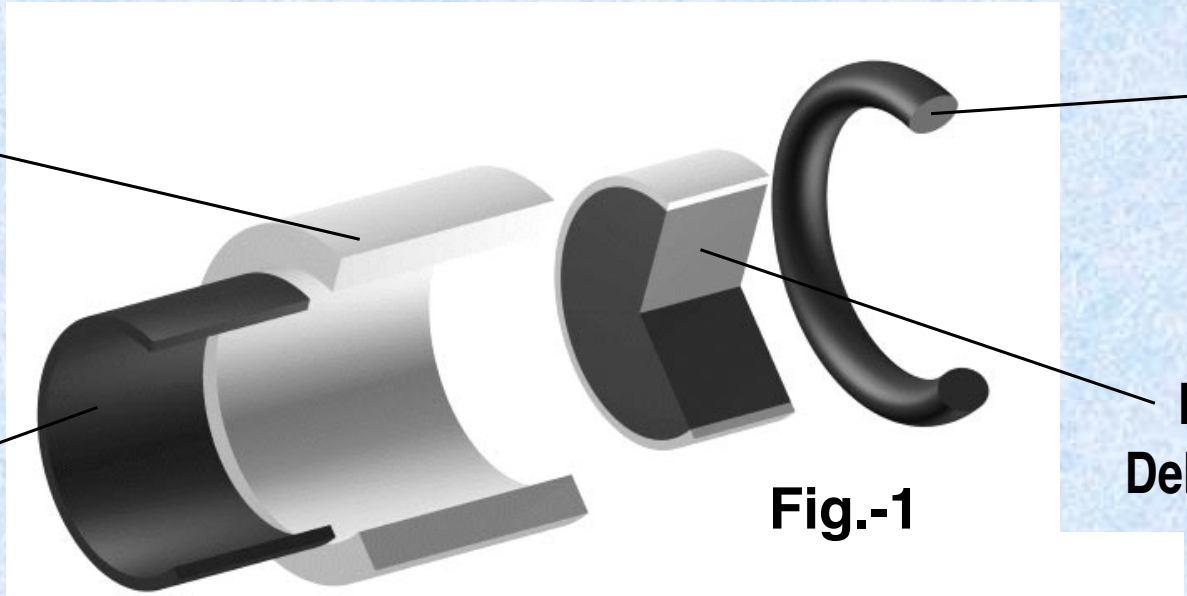


Fig.-1

Don't get grease on the Delay Element.

http://www.aerotech-rocketry.com/customersite/resource_library/Instructions/HP-RMS_Instructions/29mm/29_120-240w_in_20051.pdf

The Delay Grain (cont.)

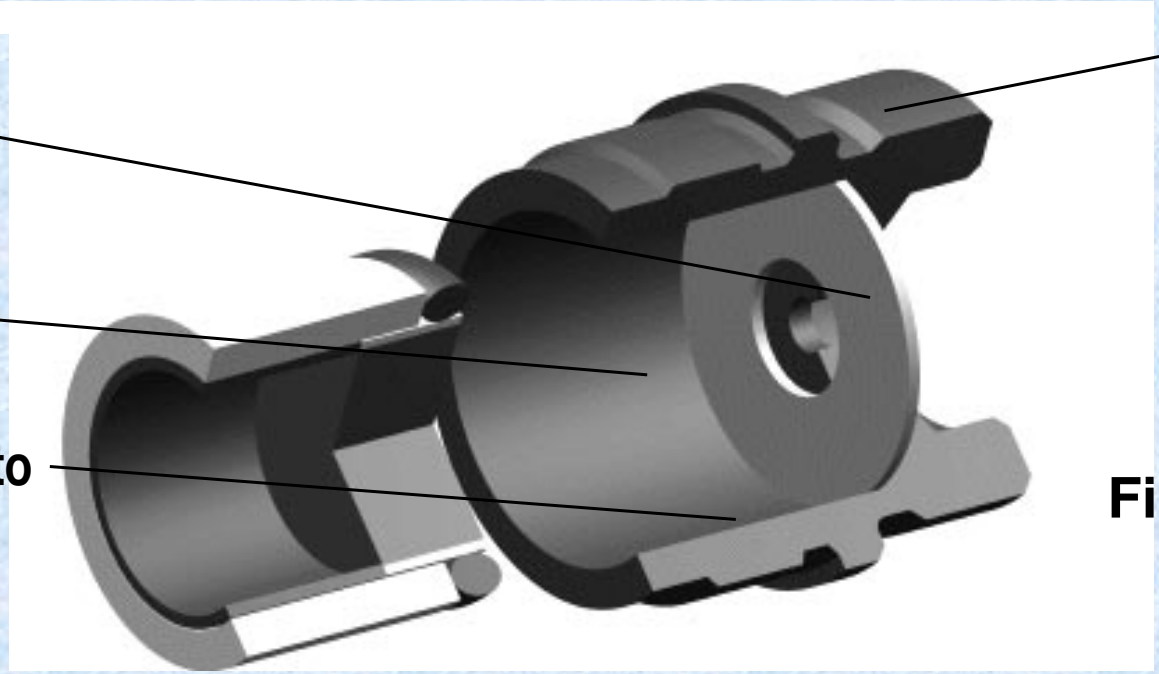


Fig.-2

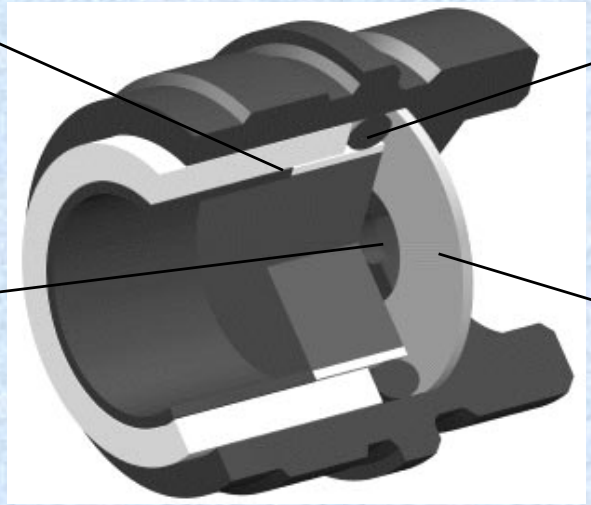
Don’t get grease on the Forward Delay Spacer.

http://www.aerotech-rocketry.com/customersite/resource_library/Instructions/HP-RMS_Instructions/29mm/29_120-240w_in_20051.pdf

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.

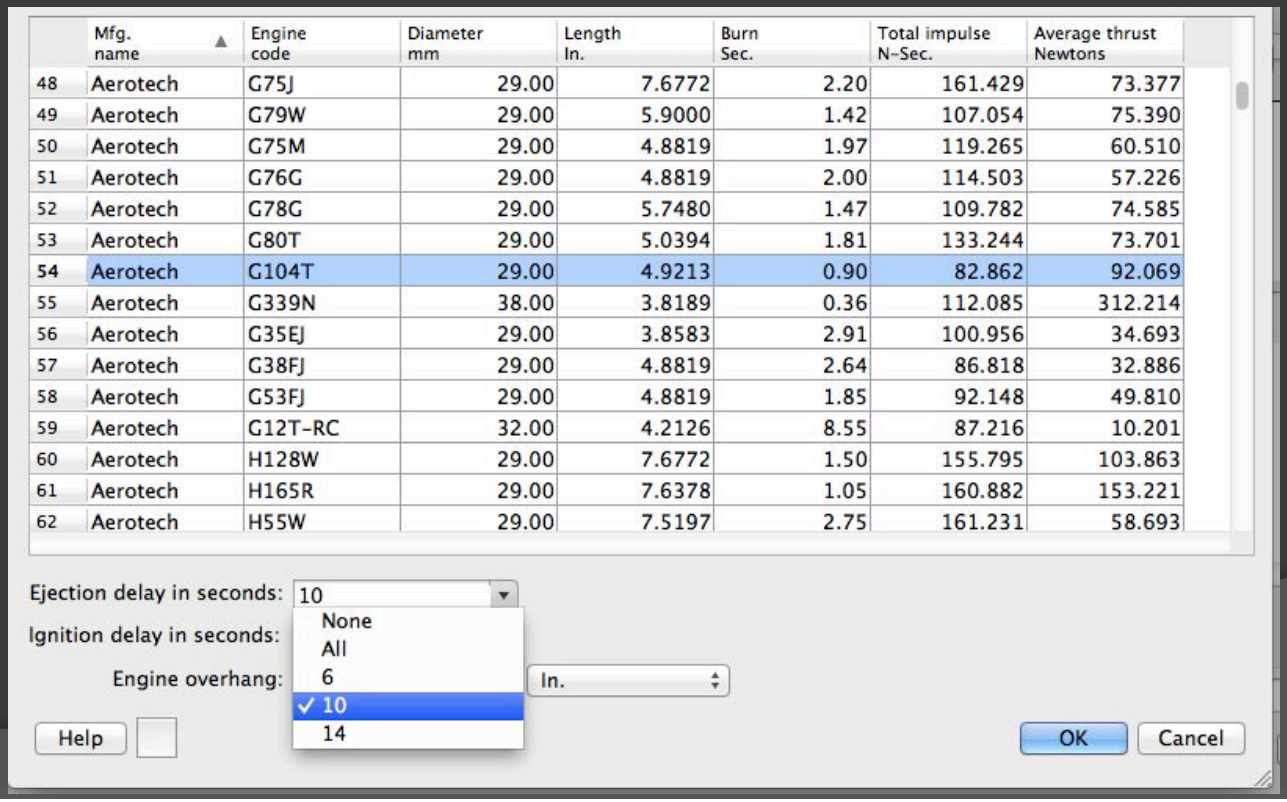
http://www.aerotech-rocketry.com/customersite/resource_library/Instructions/HP-RMS_Instructions/29mm/29_120-240w_in_20051.pdf

We have the following Long Delays (14 seconds)

- RDK-06 – H238T, H165R
- RDK-07 – H128W, G79W

How to Set the Delay Time (1)

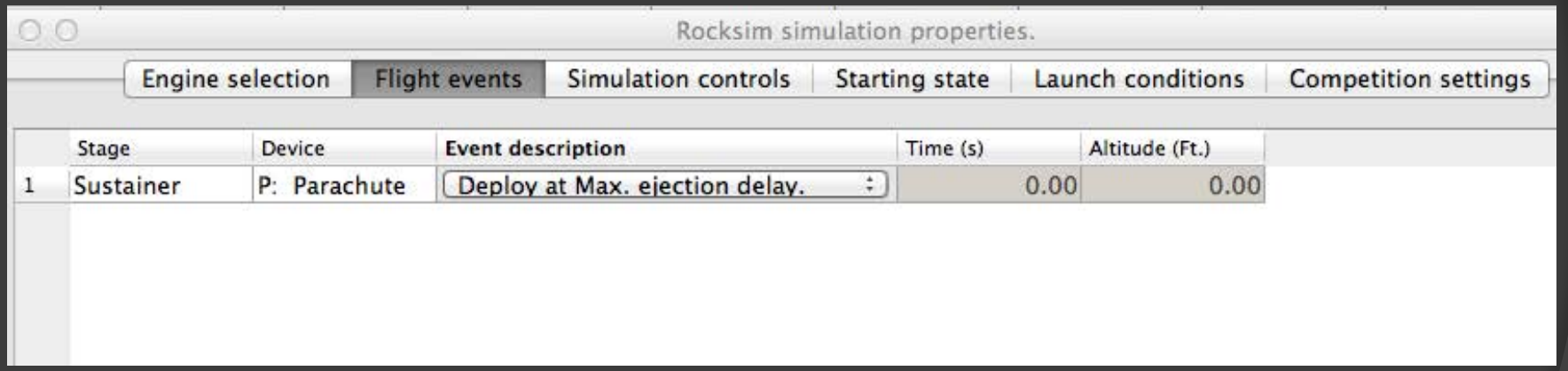
- Set the delay time to 10 seconds for “M”.
  Set to 14 seconds for “14A” or “L”.



	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

How to Set the Delay Time (2)

- Set Flight Event to Deploy at Max. ejection delay

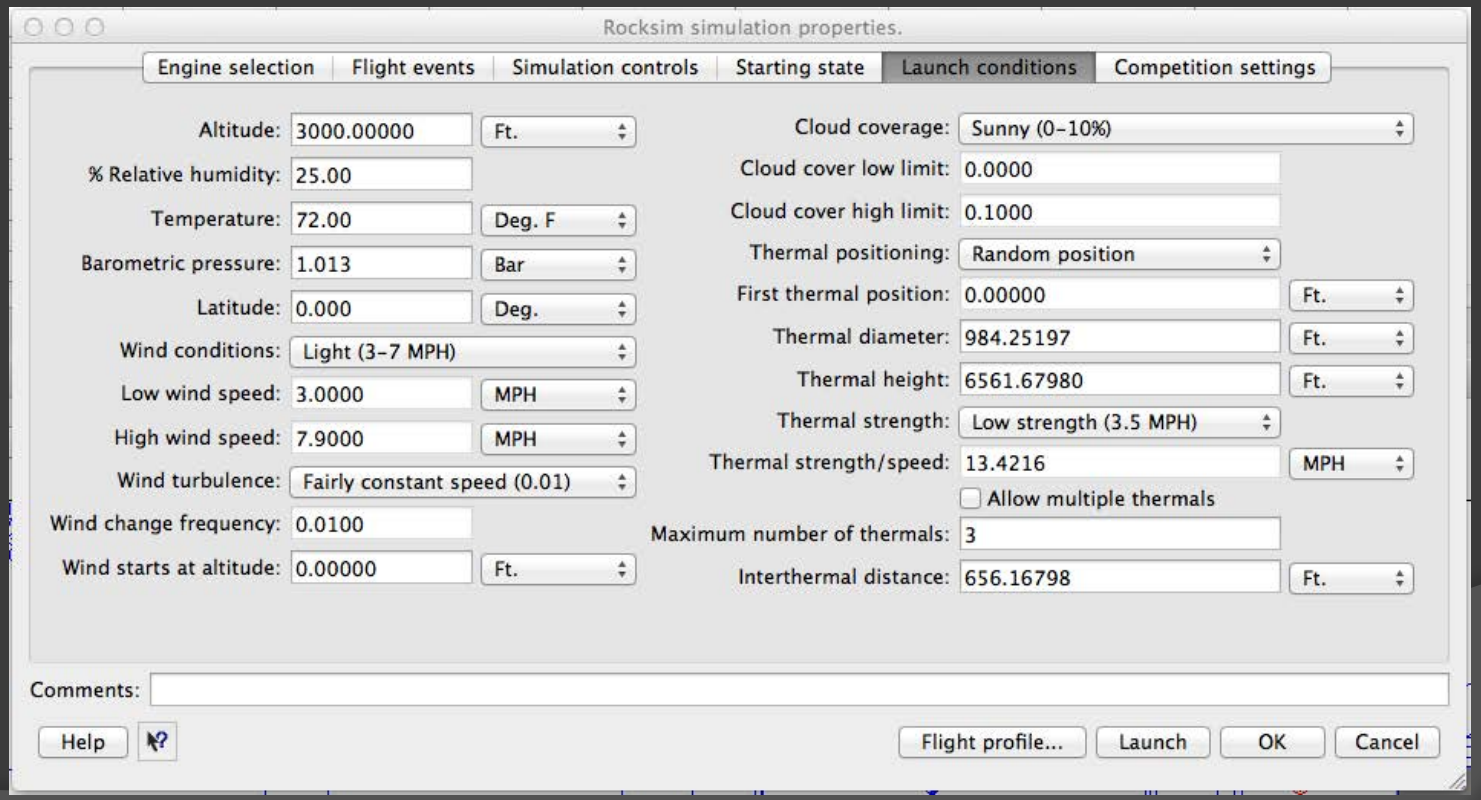


How to Set the Delay Time (3)

- Set Launch guide length to 48 or 60 In.

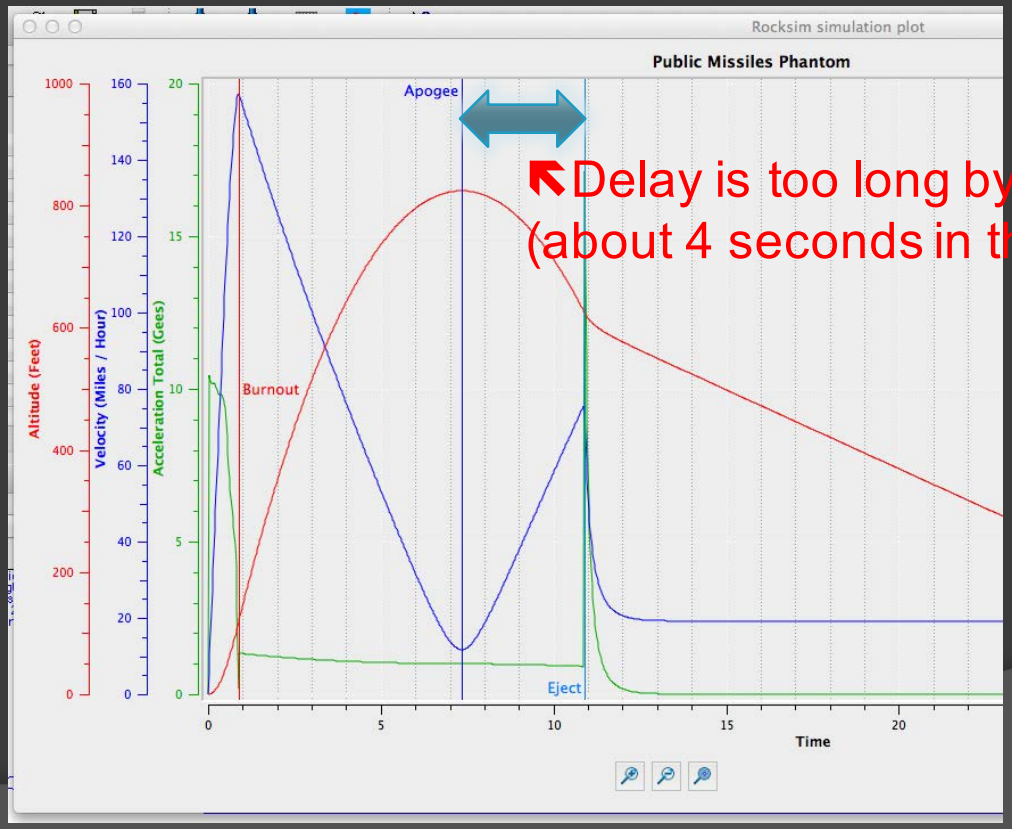
How to Set the Delay Time (4)

- Set Launch conditions to those at your launch site.



How to Set the Delay Time (5)

- Click Launch and then plot your results.



Adjust the Delay, RMS vs. DMS

- The RMS motors use the metal reusable cases.
  - Adjust the delay as first step in assembly.
  - Use the RMS Delay Drilling Tool.
  - The **drilled end faces** the propellant grains.
- The DMS are single use motors.
  - Adjust the delay as first step in assembly.
  - Use the Universal Delay Drilling Tool.

RMS Delay Drilling Tool

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

http://www.aerotech-rocketry.com/uploads/76469aad-577b-4972-a6b6-6f955effb89b_Drill%20Tool%201_640.jpg

Adjust the Delay DMS (1)

1.1 **WARNING:** Do not smoke and ensure that there are no open flames or heat sources nearby when setting the time delay. Assemble the AeroTech Universal delay drilling tool with the desired amount of delay time removal (i.e., the - 4 or - 8 seconds removal marked on the tool label) facing the exposed drill bit and motor bulkhead.

Washer

1.2 **Optional:** Place the washer between the drill knob and the tool if you want to remove 2 seconds less than the value printed on the tool (i.e., - 2 or - 6 seconds removal). **CAUTION: Do not** shorten the time delay to a value of less than 6 seconds.

http://www.aerotech-rocketry.com/uploads/13a7ea1c-0211-44d4-8954-b76c23bd97ea_DMS%20Instructions%207-9-14%20Small.pdf

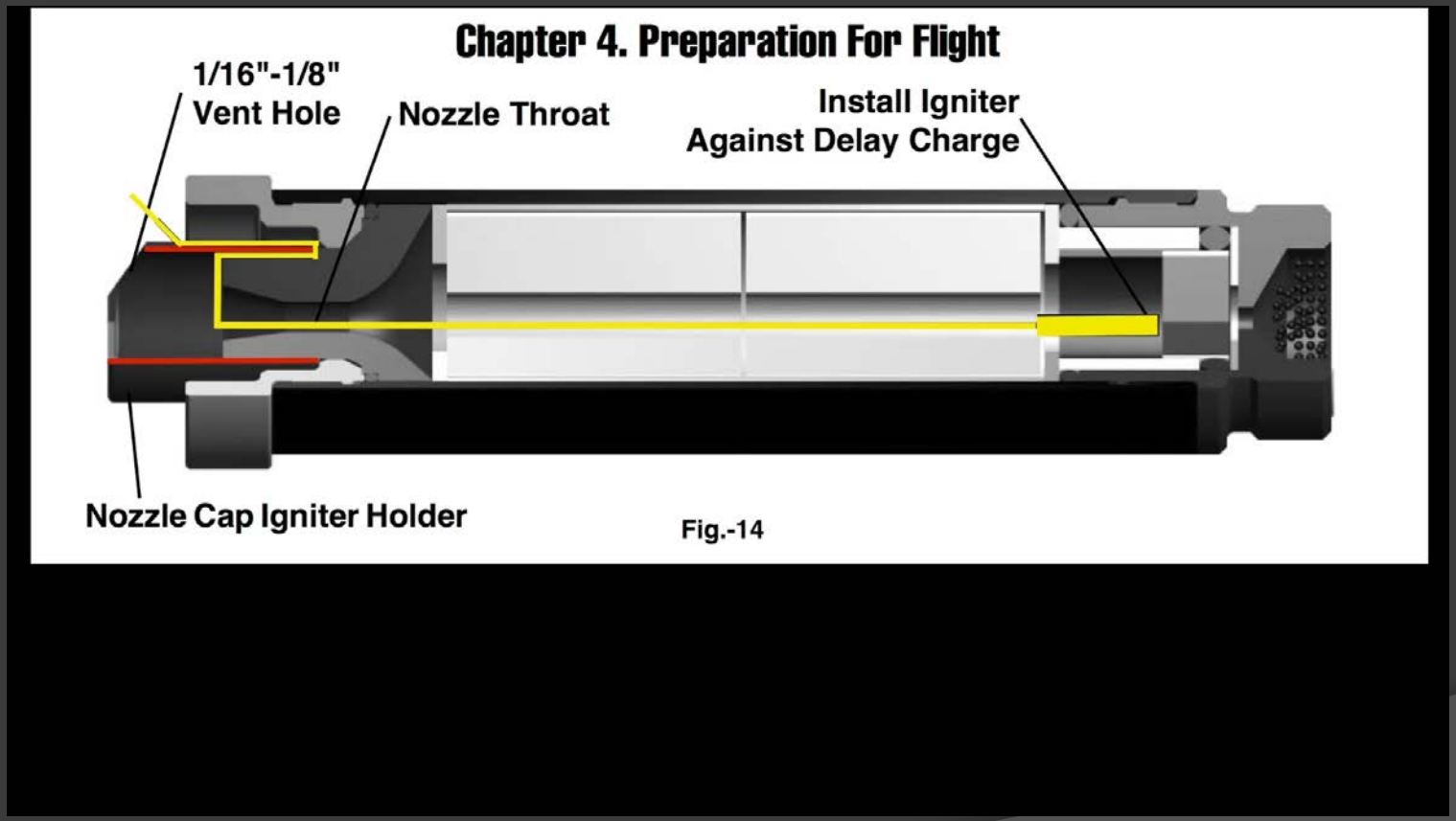
Adjust the Delay DMS (2)

1.3 Place the open end of the tool over the motor bulkhead, hold the tool and motor firmly against each other and turn the drill knob several times clockwise until the drill knob sits flush against the drill tool body.

1.4 Remove the tool and shake out the shavings from the tool and motor bulkhead. Collect the shavings to give to a proctor or professor for proper disposal.

http://www.aerotech-rocketry.com/uploads/13a7ea1c-0211-44d4-8954-b76c23bd97ea_DMS%20Instructions%207-9-14%20Small.pdf

Flight Safety Video II



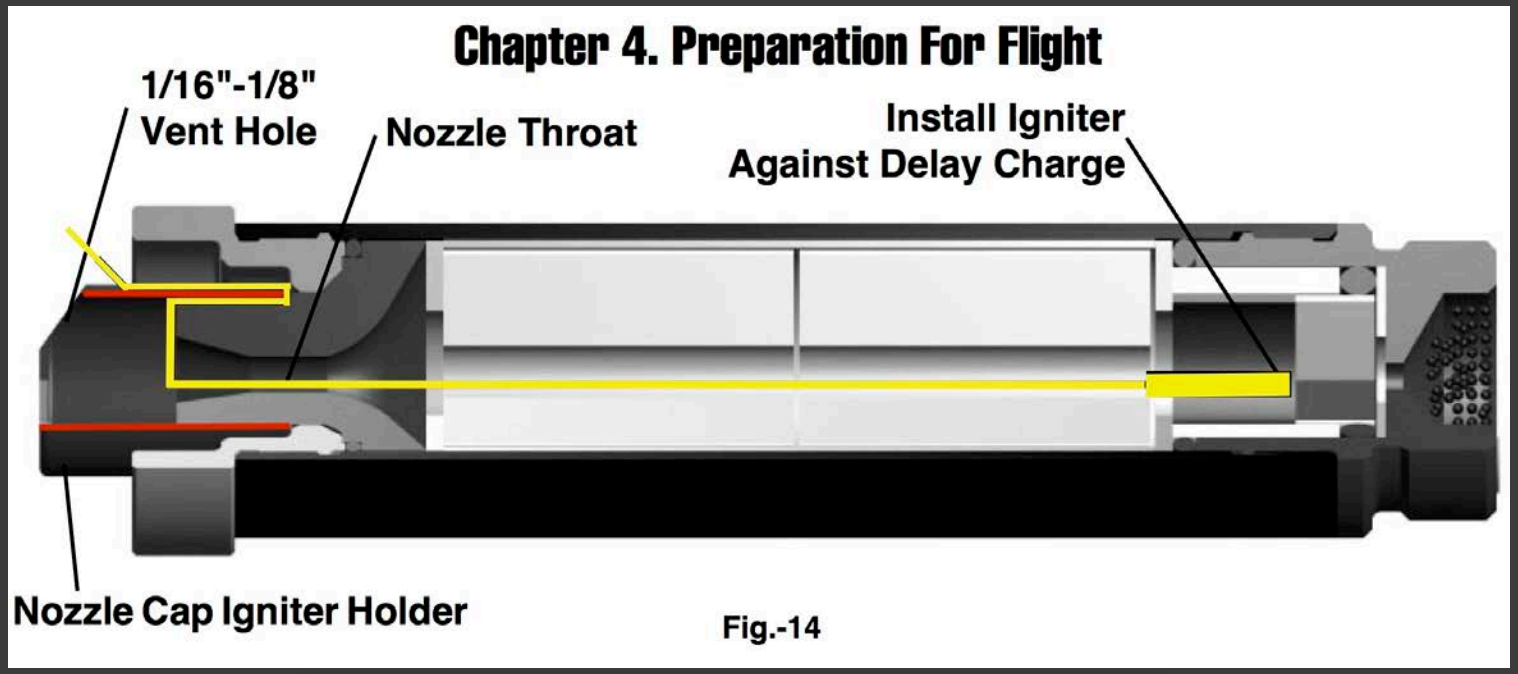
CTI-Style Igniter Installation

Fig. 3: Igniter installation

Fig. 4: Igniter installed

- Carefully uncoil the igniter leads. Remove any kinks or twists and straighten the wires for about 24" (60 cm) from the igniter head. Remove the yellow nozzle cap from the motor and feed the shunted ends of the igniter leads through the inside of the nozzle cap and out through the hole.
- Insert the igniter head into the nozzle and push until it stops against the igniter pellet. With the igniter in this position, bend a loop into the igniter leads one cap length from the nozzle exit (Figure 3 – igniter shown outside motor for indication of approximate location of the igniter pellet).
- Slide the nozzle cap up to the loop made in the previous step and firmly push the yellow nozzle cap over the nozzle and loop previously made to retain the igniter (Figure 4).
- Remove the shunt and separate the wire leads **ONLY** while the rocket is installed on the pad and the launch control system is rendered safe (i.e. disarmed and shunted where applicable).

Aerotech-Style Igniter Installation (Deprecated)

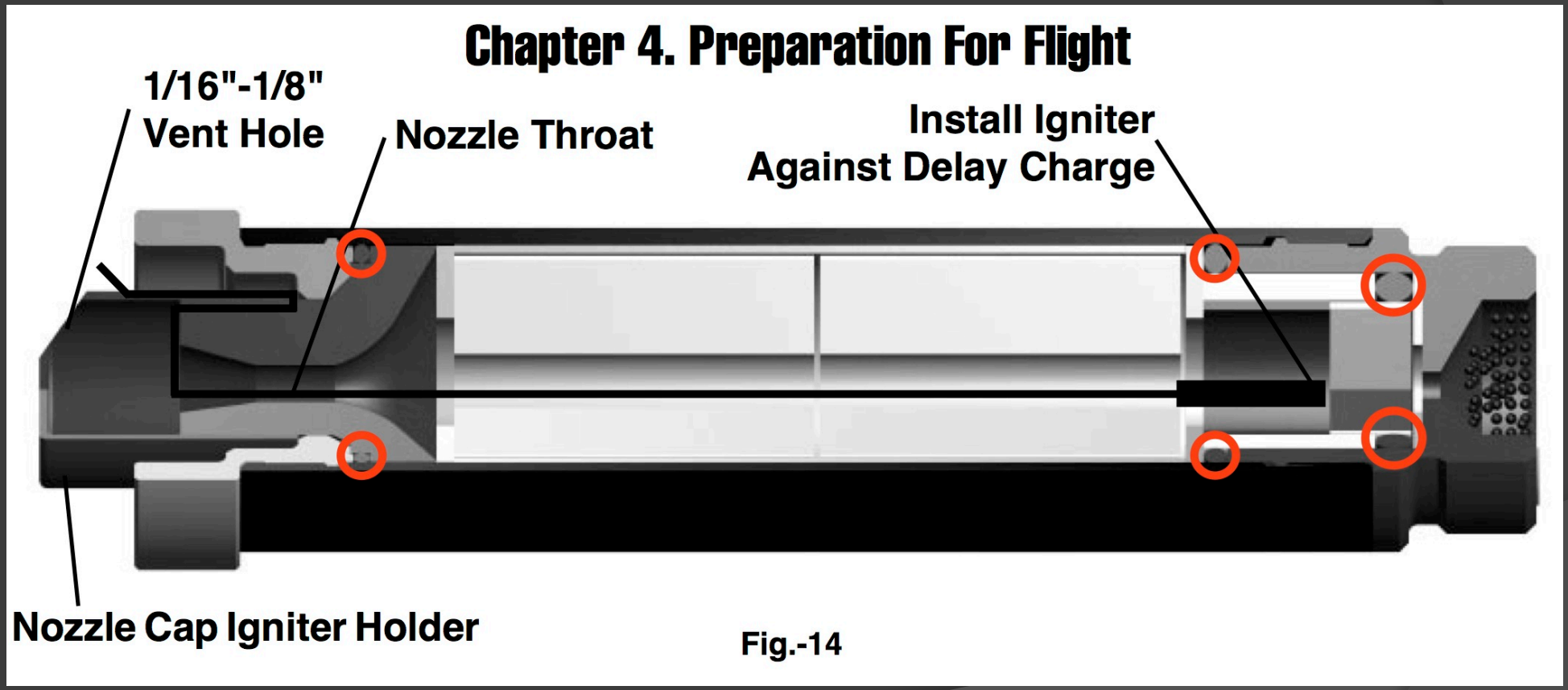


4-1. **Fig.-14:** Using a hobby knife, cut a corner off the red nozzle cap (empty ejection charge container) to create a small (1/16"-1/8") vent hole. Set the nozzle cap aside.

4-2. **Fig.-14:** Insert the coated end of the FirstFire™ or other igniter through the nozzle throat until it stops against the delay element or forward insulator.

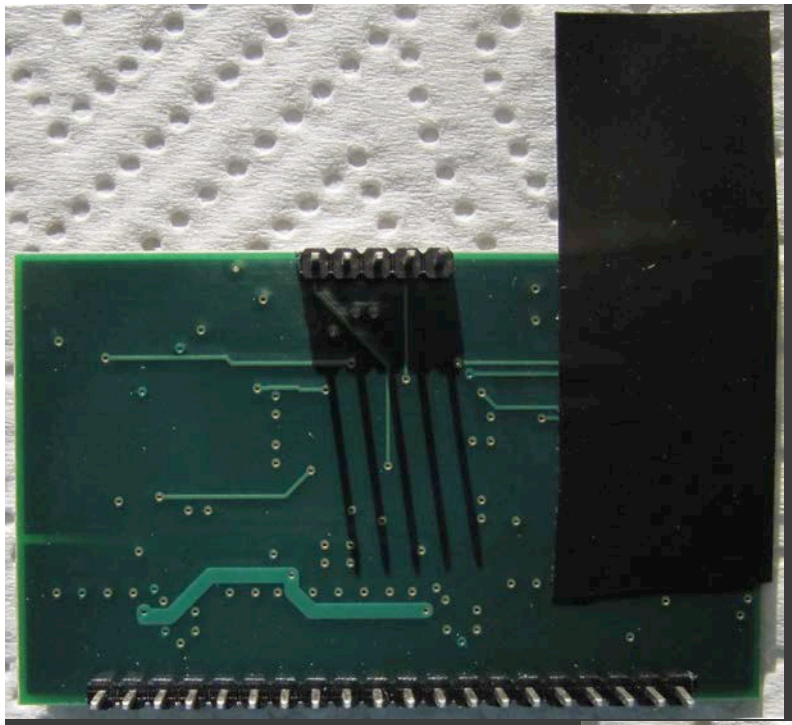
4-3. Push the vented nozzle cap igniter holder over the igniter lead(s) and nozzle until it stops.

Aerotech 29 mm O-Ring Locations

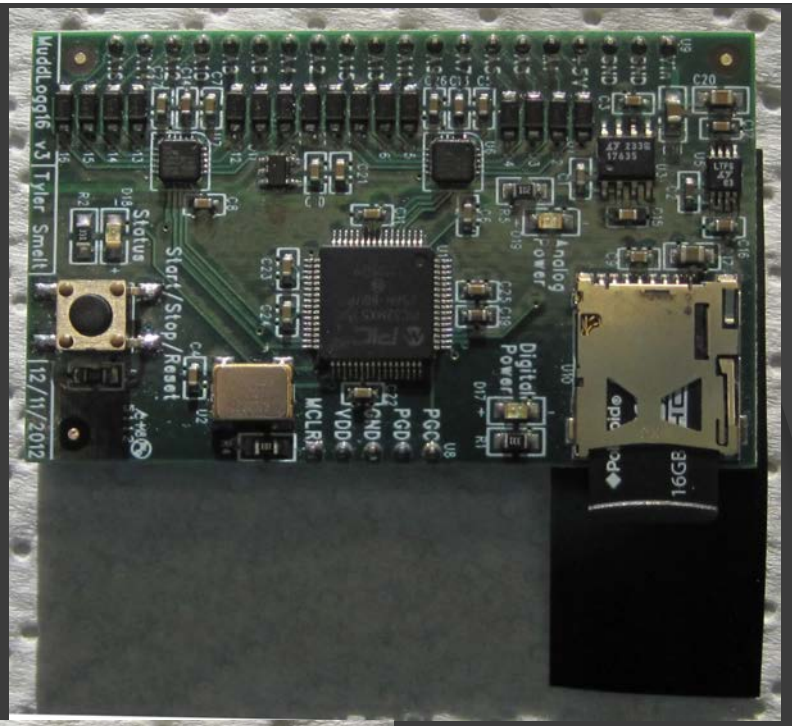


Securing your microSD card (v3)

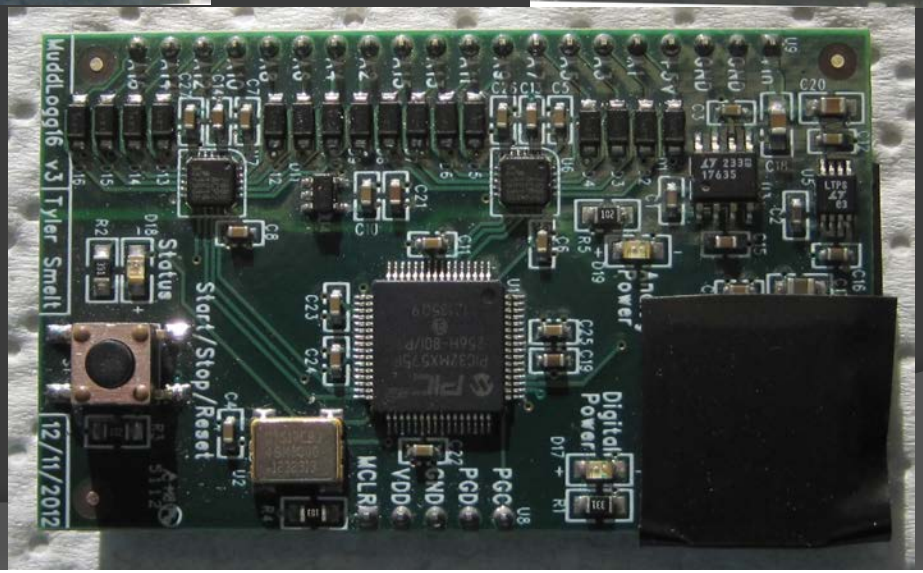
1. Attach electrical tape on the underside of your data logger.
2. Insert the microSD card part way.
3. Wrap the tape around the card to fully insert it.
4. Secure the tape on top of the card holder.



1


MuddLogg16 v3 Tyler Smelt
Status
Start/Stop/Reset
12/11/2012
Analog Power
Digital Power
MCLR
VDD
GND
PGD
PGC

2


MuddLogg16 v3 Tyler Smelt
Status
Start/Stop/Reset
12/11/2012
Digital Power
MCLR
VDD
GND
PGD
PGC

4

Questions for you

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

Your Questions?

- Data Logger?
- PC Board layout?
- $50 Budget?
- Calibration?