

Five Clans Rocket Team

Presents:

“Firebird”

2007-2008 USLI Proposal

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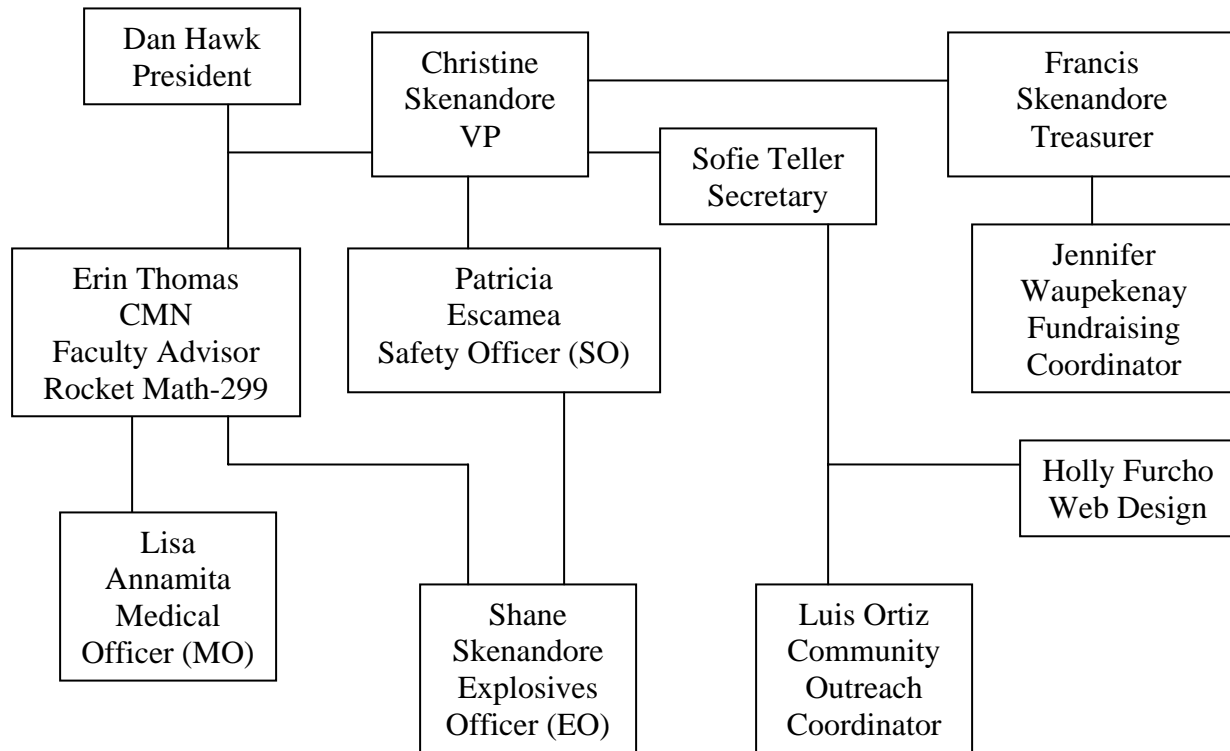
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Deliverable:

1. A reusable rocket with target apogee of 5,280 feet, with science payload available for display and launch for NASA at Marshall Space Flight Center, Huntsville AL in April 2008.

School Information:

1. Project “Firebird”. Firebird is designed to detect heavy metals in the atmosphere, launched through a plume of smoke from a forest fire.
2. Team Official: Dan Hawk, College of Menominee Nation.
3. FCRT is not currently using APCP motors.
4. Safety Officer: Patricia Escamea.
5. FCRT expects six dedicated student/ team members for the USLI launch. Our rocket team is currently forming an organizational chart. The tentative depth of the chart is below:



- Dan Hawk, President, Resume:
 - Human Biology Major with pre-med and nutrition emphases, Chemistry Minor. I am a full-time student.
 - I split classes between the College of Menominee Nation and the University of Wisconsin Green Bay.
 - I am an Army/Navy military veteran. Served on board two Fast Attack Submarines as a nuclear reactor operator.

- Pat Escamea, Safety Officer, Resume:
 - My major is the Arts.
 - CMN is a small college and I could get more help with my classes.
 - I want to work with the art program for the Oneida Tribe.
 - I plan to go to the Santa Fe Art College.
 - I think the rocket team will help me with my math class.

- Luis Ortiz, Community Outreach Coordinator, Resume:
 - Business Management.
 - I chose CMN because, it's a small but very well rounded college, perfect for me to get one on one with the teachers if I need to, and I enjoy their help with my two year education and transition to my bachelor's degree.
 - I plan on going on to a four year after I receive my associate's degree from CMN.
 - I will attend UWGB.
 - The rocket team has opened things up to new people and opportunities, and gave me motivation; that if you work hard at something it will pay off.
 - The best part I have to say would be to see the Golden eagle fly; soar into sky for the WI Space Grant Student Launch Competition last year.

- Sofie Teller, Secretary, Resume:
 - Education
 - I chose CMN because of the diversity and Native classes offered to students.
 - I heard that there is going to be a 4 year degree program opening up here at CMN for education majors, so if this is true I most definitely will then plan on staying here. Otherwise I would like to attend UWGB.
 - I have a lot of fun helping the rocket team out the other day, and I'm actually quite interested in seeing how a rocket works. I think it's going to be an awesome experience, even if I'm not there to launch it.
 - I like helping with the minor detail stuff, but I would most enjoy helping design it. A brief summary on how the rocket works would be some cool information to have also for future reference.

- Lisa Annamita, Resume:
 - Human Services/A.O.D.A
 - I attend CMN because I heard how friendly the staff is, and how they help you to pass all your classes, they don't like people to fail.
 - I want to help Native people understand that alcohol/drugs aren't a way of life, that there is help out there.
 - I plan on going to a four year program, I hope at Eau Claire Wis.
 - I like building, designing, being part of the team, working with other students, just having fun.

- Shane Skenandore, Secretary, Resume:
 - Accounting and Business Administration Major
 - I chose CMN because it looked different for its class size and friendly atmosphere on campus. I would like to obtain my bachelors degree, but am unsure on where to go for the next step.
 - I would stay here if CMN if it had a program that offered a bachelors degree in my field. The Rocket team has really opened my eyes in doing things on a difficult level, at which I have no knowledge of, but am willing to do to help out.
 - From the first classes of Rocket Math-299 in the Spring of 2007, I liked all aspects of rocketry from building, to watching it launch.

Facilities and Equipment:

1. The FCRT utilizes the resource library of the College of Menominee Nation. The library consists of some round tables. At present, the team brings in basic hand tools and scrap parts such as toys and other items that nobody else wants. We scrap the parts to obtain what we need, then design and build what we want. An example is using a diaper genie as a transition from nose cone to payload bay (a \$3.50 five gallon plastic bucket). Unfortunately, we don't have any club our or facilities to utilize on a daily basis. We currently work on our rockets every Wednesday between noon and 3:00 pm., concurrently we offer a bake sale as a FCRT fundraiser. After 3:00 pm we clean the library floor and wipe down the tables, and scrape epoxy if needed. We make our own parachutes, and we test them by throwing them off the top of the college roof by attaching plastic screw on cap one-gallon milk jugs. The science payload is a special air filtration system, designed to harbor heavy metals.

2. Reagents will be used to provide comparative chromatography. Reagents have not been purchased as of this writing. And the MSDS sheets will be included in one of the future reports. The reagents will be applied in the College of Menominee Science Laboratory. The Chemistry instructor that will mentor the science project is John Ochsner. We plan to purchase a storage magazine to hold propellant, similar to that shown to us at the UAH rocket club (metal box with wood lining, and special multi-tumbler lock). The FCRT will be dedicated to Firebird, for design and construction. We will also provide an on board flight altimeter manufactured PerfectFlite to verify altitude.

3. The CMN library resource room has six desk top computers available for access. These computers are Dell Pentium D Optiplex GX620's. One computer has an Epson Perfection 4490 Photo scanner. CMN is now in the process of negotiating several RockSim8 licenses for several computers. Currently RockSim8 is not installed in the library resource room. Holly Furcho is currently designing the FCRT web presence. We do have CMN support and will be provided a link from www.menominee.edu. We are establishing a procedure for web updates. Communication with the team official can be made via email at the following address: hawkd_0212@menominee.edu. We have video teleconferencing capability at the main campus in Keshena Wisconsin, this resource room is called the ITV room. The ITV room has interactive whiteboard technology and projection capabilities from document camera, computer, VHS, and DVD. We have access to Microsoft PowerPoint presentation software.

Safety and Mission Assurance:

1. Dan Hawk and Shane Skenandore recently completed the USLI workshop and are currently seeking the National Association of Rocketry (NAR) level I certification. Dan Hawk and Shane Skenandore are currently researching the requirements to complete the level II certification needed before attending the April 2008 USLI launch. We are attaching a FCRT NAR Safety Plan as Appendix I. We are actively engaged in safety. Recently, one of our team members became ill; the use of epoxy is a possible suspect contributor. Therefore, we have taken steps to ensure she does not contact or inhale epoxy vapors. Furthermore, we have taken steps to purchase a pair of safety glasses for every team member. The SO will ensure that they are distributed and marked for specific individual use.
2. All team members are equally responsible for safety, and to follow the FCRT Safety Plan at all times.
3. The EO reports directly to Erin Thomas, faculty advisor, to ensure overall safety. The EO and SO coordinate efforts to ensure proper magazine storage and access in addition to other aspects of rocketry such as building, and launching. The EO is directly responsible for the magazine while in transport, while stored at the launch site, during loading of motors, and for proper handling of any motor that fails to ignite.
4. The EO and the SO are responsible for checking motor retention and pre-launch flight checks.
5. Erin Thomas will ensure that we are briefed on applicable laws pre-launch and she will also conduct a debriefing post launch noting any problems so that they can be addressed and fixed before the next launch.
6. The FCRT is different than most other teams; as we have will have to abide by tribal laws when launching on Indian Reservations. In this case the president will be responsible for making sure that tribal laws are adhered to.
7. All hazardous materials will be identified and MSDS sheets will be obtained. The SO is responsible for briefing the Team on a quarterly basis of what the hazardous materials and relative dangers.

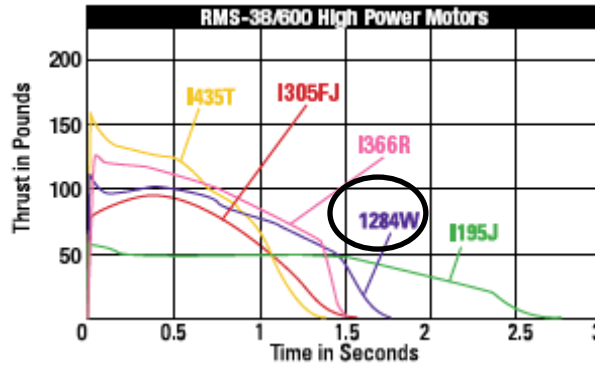
8. The MO is responsible for taking care of all aspects of injury, such as minor cuts, debris in the eye, and allergic reactions to chemicals. The MO is responsible for maintaining a fully stocked first aid kit. The MO is responsible for the first aid kit while in storage, transport to launches and for its use. The MO is responsible for first aid kit inventory *before* launch and will immediately request re-supply from the treasurer. Upon any medical attention, the MO is to write a brief of the incident along with action taken if any. The report is provided to the faculty advisor. Although, the SO, EO, and MO all work together, the faculty advisor would be the person making a call for changes if any. This would be like a checks and balances system to ensure all around team safety.
9. We have designated Shane Skenandore as the Explosives Officer (EO). In this respect we want team members to respect the nature of rocket propellant and black powder charges. Both the EO and Dan Hawk are pursuing a low order explosives permit from the ATF in regards to high-power rocketry. Shane Skenandore is checking with the WI DOT for transporting the low order explosives regarding high-power rocketry. If a commercial license is needed for transport, the team will pay the costs to obtain the permit or special class of motor vehicle license.
10. The EO is responsible for the motors. The purchase, transport, and storage; cradle to grave. The EO is responsible for meeting applicable laws to include tribal laws. The EO is the only team member who will have access to the storage magazine.
11. All FCRT members will be briefed on safety. A short one-page safety notice to be determined by the SO, will be drafted, it will be discussed at team meetings on a quarterly basis. This safety notice will be posted in the library resource room where we currently build our rockets. In addition, each team member will have a signed copy on record. The safety notice will be included on the next required report. It will also be posted on our website under a special safety button link.

Technical Design:

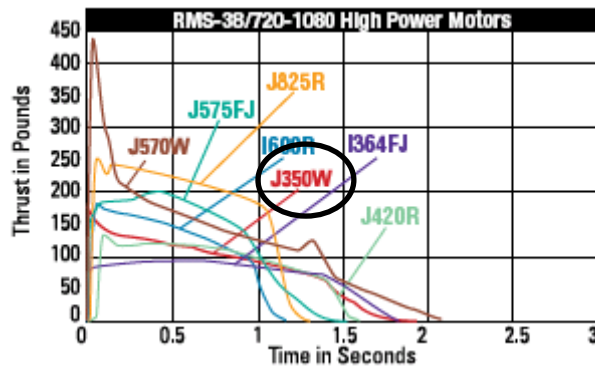
1. Firebird is a complex rocket, designed for a special fire mission; to fly through a forest fire smoke plume, to capture heavy metal contaminants in a special filter that have been released from the fire. The Menominee Tribe is known for its sustainable forestry, Firebird is designed to be a tool that the Menominee Tribe can use to manage their forest and to monitor the atmosphere before and after a forest fire, if one should occur. Firebird could be used as a global warming tool regarding atmospheric contaminants.
2. Firebird is designed to be fire resistant.
3. Firebird is designed to slip through trees (snag resistant) using two trapezoidal fin sets one forward and one aft, it will also be attached to 50' Para cord. The CAD drawing is not accurate regarding the forward fin set. It will be changed on the next update. The reason is that CMN is installing RockSim8 and have yet to complete installation pending licensing agreements. We have included an initial design see Appendix III.
4. Firebird is designed to hit the target apogee of 5,280 feet.
5. The preliminary design is as follows:
 - 6" diameter
 - Length 84.5"
 - ~140 oz without motor

- Fiberglass Kevlar skin
6. Firebird will deploy two parachutes:
 - 20" drogue deployed at neo-post apogee
 - 70" main deployed at 800 feet
 7. Firebird will use three different motors. Two Level I motors (I284W & J350W) for a Christmas test launch and A Level II motor (K550W) for competition and for forest fire flight missions.

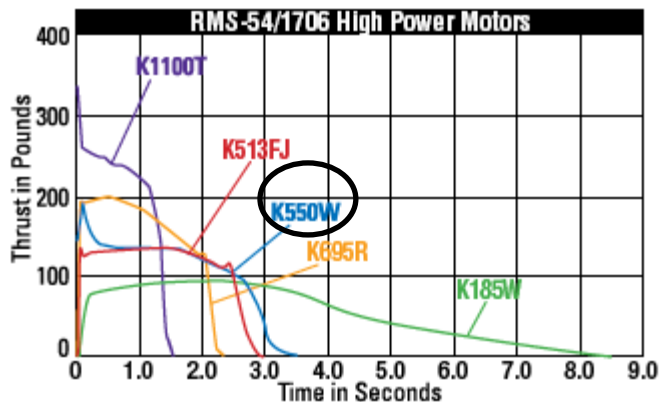
- Level I motor, I 284W thrust curve:



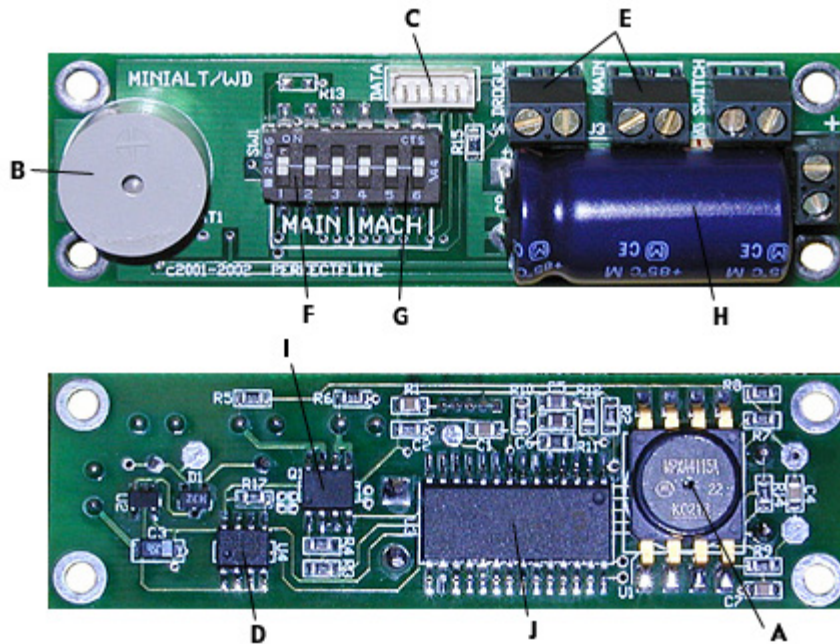
- Level I motor, J350W thrust curve:



- Level II motor, K550W thrust curve:



8. The Firebird fin sets will be G-10. The tail fins will have an aircraft aluminum outlay, designed to withstand forces of landing in a tree. The aluminum shell will cause more drag than the front fin set with target apogee of 5,280 feet in mind. Thus the tail fin set will be wider and slightly larger than the front fin set.
9. Firebird will have an avionics bay which will include a Perfect Flite MAWD altimeter (see diagram below), GPS-3D, camera, and other electronic weather instruments. The characterization of payload electronics is not yet determined and will be updated in future reports.



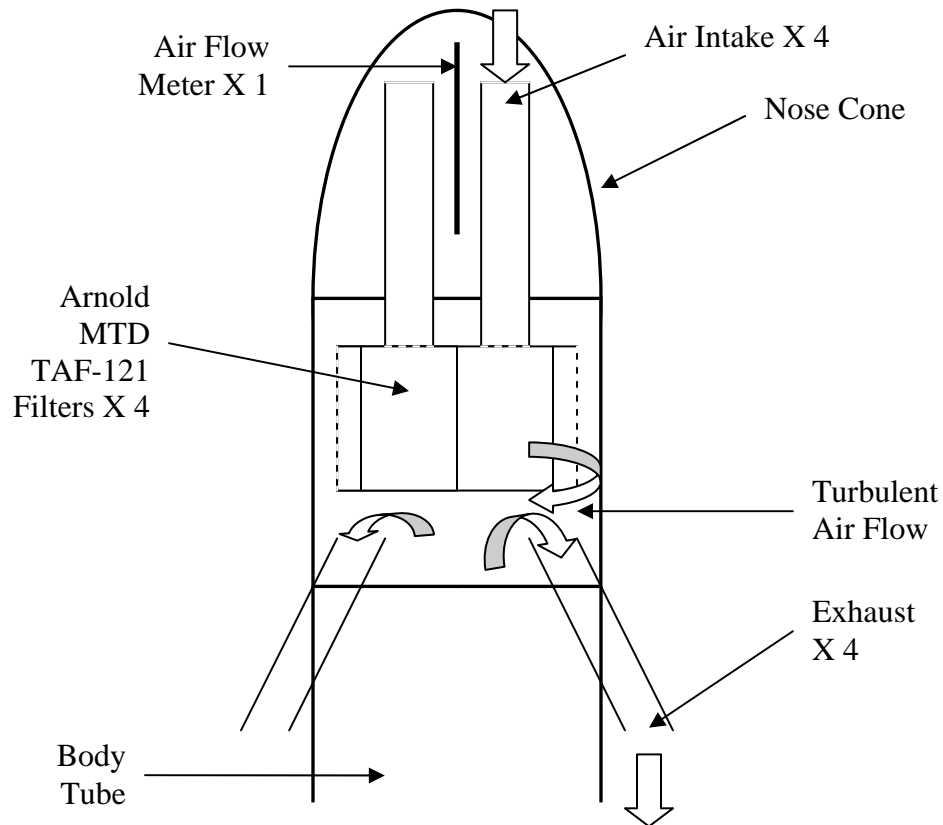
Key Features

- A. Precision sensor works to 25,000 feet MSL
- B. Audibly reports peak altitude after flight
- C. Stores over 5 minutes of flight data at 20 samples per second for later [download to PC/Mac/PDA](#)
- C. In-flight telemetry output for real-time data via your RF link
- D. All data is stored in nonvolatile memory and is preserved even if power is lost
- E. Deploys drogue and main chutes with audible igniter continuity check
- F. Main chute deployment altitude is adjustable from 300' to 1,700' in 200' steps
- G. Mach delay is adjustable from 0 to 14 seconds for high performance flights
- H. Robust power supply is not affected by up to two seconds loss of power in flight
- I. Will fire 10 parallel-redundant ematches even after 24 hours operation on standard 9V battery
- J. High accuracy A/D and precise factory calibration yeilds +/- 0.5% typical accuracy
- J. FLASH program memory for future firmware updates

10. The drag from air filtration is and will be demonstrated on RockSim8 by increasing the diameter of the rocket equal to $4 \times 3.14 r^2$ of the air intake tubes plus 20%; approximately equal to 5 intake tubes or $5 \times 3.14 r^2$.

Science Payload :

1. Firebird will have specially designed high-pressure air filtration system. A simplified diagram is as follows:



2. See Appendix II for more details of the science payload.
3. The reagents used in the experiment will be Dithizone, Morin, Alizarin, and PAN. The MSDS will be obtained for these reagents. The reagents will be held in the CMN science lab where the chromatography will take place. This experiment and procedure will be placed on the rocket team website. We will look for global warming experiments and commercial viability of using rockets to help fight global warming, to monitor sustainable forestry and identification of invasive species.

Outreach:

The FCRT has outlined six major areas of outreach:

1. The College of Menominee Nation has a relatively inactive American Indian Science and Engineering Society (AISES) can be viewed at www.aises.org. It if the FCRTs intent to approach the CMN-AISES chapter to see if they want to design and build a rocket. We hope that this sharing of information will help activate the CMN-AISES chapter into doing more activities.
2. The College of Menominee Nation has received a grant for a family science night, where the FCRT will be traveling to four elementary schools on or near the Indian Reservations of Stock-Bridge Munsee and Menominee. We will be doing "NASA" nights. We will be presenting our rocket launch video and will provide Styrofoam glider kits for the students and their parents. There will be some rocket math and a small competition to see which glider will fly the farthest, there will be an award. The gliders will go home with the kids and their parents for participation.
3. We have contacted Carolyn Hoover (Carolyn.S.Hoover@nasa.gov) for help with the application process for the Menominee Tribal High School to be designated a NASA Explorer School. We have downloaded and printed the NASA explorer school worksheet. We will approach the Menominee H.S. principal and four educators with at least 3 years experience. Our intent is to prepare the application for the H.S. to achieve designation.
4. Team America Rocketry Challenge for Menominee Tribal School District, this years parameters are to design and build a safe and stable model rocket flight vehicle and use it to lift a fragile payload (two raw hen's eggs) to an altitude of exactly 750 feet and also for a total flight duration score of exactly 45 seconds, then return this payload safely and undamaged.
5. Our team will be making a poster presentation with rockets for the American Indian Higher Education Consortium (AIHEC) conference in Bismarck ND in Spring 08. The goal is to get other Native American colleges interested in a rocket competition between schools. AIHEC represents 34 Native American colleges throughout America. Can be viewed at www.aihec.org.
6. The last outreach activity is to seek help and support from local business, and tribal entities. In exchange for support we offer to recognize them by placing their logo on our rockets.

Project Plan:

Date/ Timeframe	Project Description
October 24, 2007	Change Fin Design
October 24, 2007	Order Firebird Nose Cone (Fiberglass)
November 22, 2007	Complete Rocket Completed (Primer Paint)
December 15, 2007	Launch Pad & Fire Control System Completed
Christmas	Test Launch (Level I)
January 3, 2007	Complete Level II Certification
January 15, 2007	Explosives Permit Completed
February 12, 2007	Complete Avionics Bay Package
March 25, 2007	Final Paint

Budget Plan:

Item	Amount in \$
Apogee Nose Cone (Hand Built)	15
Airframe (Body Tube)	20
Centering Rings (Shopko Mailing Box)	3.5
Launch Lugs	9.5
Tube Couplers (Fiberglass Mesh)	0
Boat Tail	13
Shock Cord .1" Kevlar 10 feet	4.2
Fin Sets	
3/16 pegboard	7
Fiberglass Mesh	Donated
Engines	
I284W (x2)	92 www.performancehobbies.com
J350W	53
K550W	90
Gun Grease (1 oz syringe)	7.5
Hoppe's No. 9 Solvent (16 oz)	9.2 www.midwayusa.com
Motor Retention System	
Bolt, Stainless Steel	0.40
Washer (Retainer)	0.07
Self-Locking Nut (Nylon)	0.20
Parachutes	
Drogue (20")	5
Main (70")	15
Para cord 550lb Nylon 100 feet (SKU 182)	9.90 www.armynavydeals.com
Avionics Package	
Perfect Flite MAWD	0
Fly One Camera	0
GPS Antenna	66
GPS Expansion Card	318
RDAS Telemetry 433 MHZ Receiver	205
RDAS Telemetry 433 MHZ Transmitter	195
RDAS 4.0 Altimeter	359
Epoxy / Kevlar Epoxy (need to order)	80
First Aid Kit	Donated (Fire Department)
Safety Glasses (\$7 x 15)	105
Launch Pad	250
Explosives Magazine	Donated (Police Department)
Permits	100
Outreach	250
Emergency Fund	500
Travel	1500
Total	\$4282.47

Appendix I

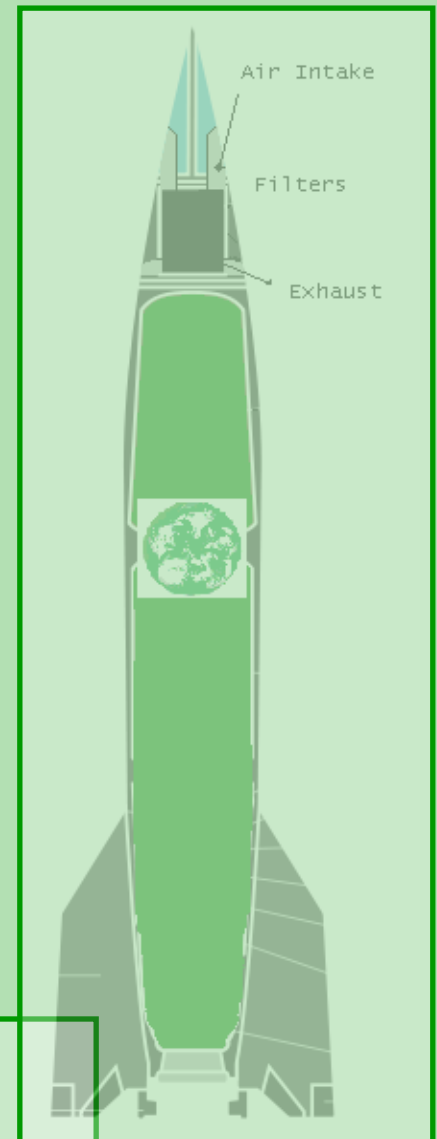
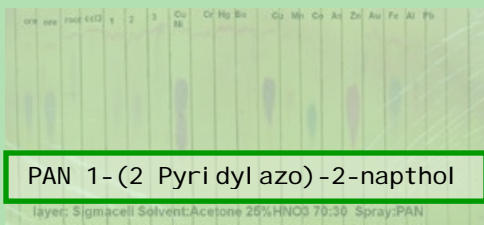
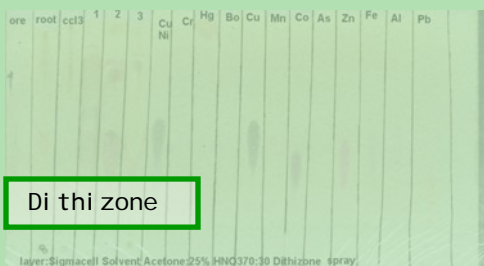
FCRT Safety Plan

1. The EO will handle the motors and explosive from cradle to grave. Only NAR certified members will handle FCRT rockets.
2. FCRT is an innovative and creative team, making many parts from scratch, converted or scavenged from things that are of little value or are being thrown away. Therefore, there is a chance of mechanical failure and parts that may break when used in ways they were not designed. To minimize the risks of damage from homemade parts (even though most are superior to store bought), we analyze the risks failure before being tested. This provides one more level of protection for the team members.
3. We will use an electrical launch system. There will be visual light on the control console when continuity is achieved. A key switched to the “on” position and a spring loaded “push to start” button must be used to launch. There will be a visual alarm (flashing strobe) when the battery is connected so that everyone on the range will know that power is available for launch and that the range must be clear.
4. Rocket motors will only be used for rocket launches. Igniters or electric matches will only be installed on the rail or in a preparation area.
5. There are no smoking, open flames, butane soldering, or use of any type of heat source within 25 feet of the magazine storage locker.
6. If a rocket does not launch, we will wait a timed 3 minutes after battery disconnect.
7. We will have a five-second countdown; this will allow us another opportunity to ensure the range clear, sky clear.
8. All rockets will have a preflight check to ensure they are flight-ready. Any rocket deemed un-flyable will not be launched. However, FCRT will be available to help anyone who needs help in making their rocket flight-ready.
9. We will launch our rockets from a steel platform, < 20 miles/ hr winds, using a “V” blast deflector, 10 foot rail; plus or minus 20 degrees from vertical.
10. Grass around the launch pad will be sprayed with water to prevent burning. Exception, when snow covers the ground.
11. We will have <1:3 weight to thrust ratio.
12. We will launch away from spectators and ground crew members. The range and the sky must be clear before launching. The local airport will be notified of launch dates at least 14 days in advance.
13. No explosive payloads. Exception deployment charges, e.g., parachutes.
14. We will launch from no less than 40 acres.
15. Only recoverable rockets will be launched.
16. Rockets landing in power lines will be recovered by the utility company. Rockets landing in trees will be on a case by case basis.
17. Attempting to catch a rocket is strictly forbidden.

Comparative Chromatography Metal Cations from Remote Sensing High-Powered Rocketry

ABSTRACT

Pollution has carried heavy metals to the boreal forests. Forest fires emit gaseous mercury. Rocketry can be used as a remote sensing vehicle.



Methods & Discussion

Di thi zone, Morin, PAN, and Alizarin reagents offer inexpensive, convenient qualitative analysis of heavy metals. Rocket acceleration forces air into filtration system. Acetone-25% HNO₃ is used for elution, and then sprayed with reagents. Sample results are shown above.

Rocket could be used before, during, and after a forest fire or anytime monitoring of atmospheric heavy metals is desired.

Acknowledgment

I would like to thank GMRSGC,



National Aeronautics
and Space Administration

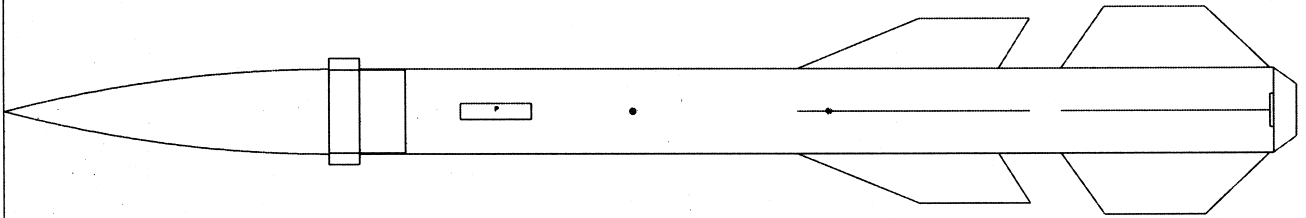
Firebird

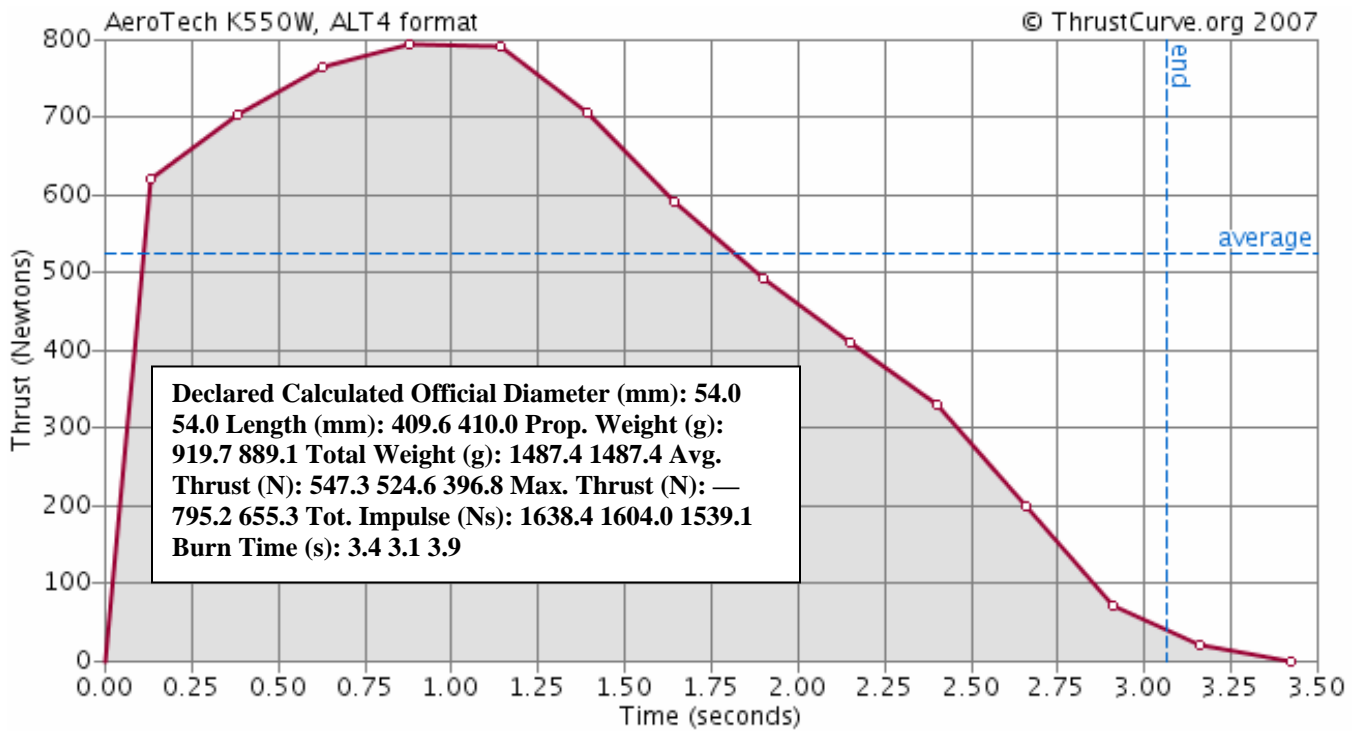
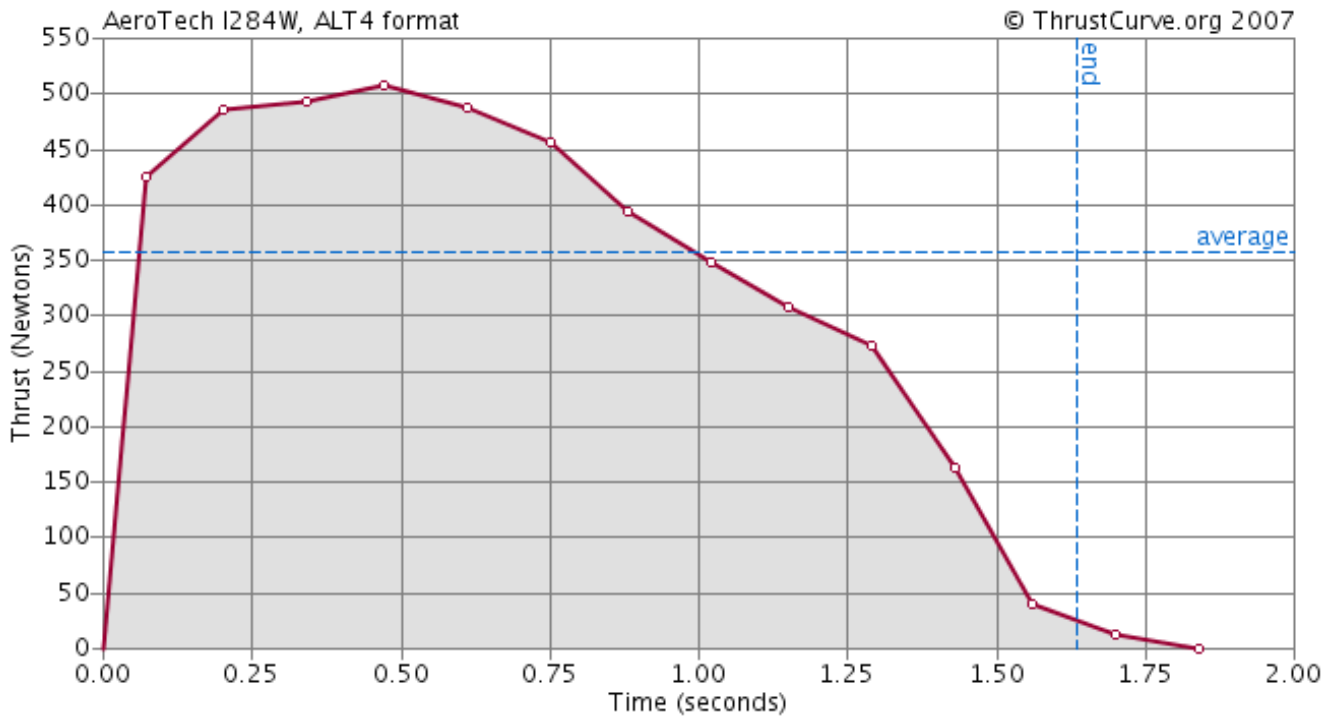
Length: 84.5000 In. , Diameter: 6.8750 In. , Span diameter: 13.5000 In.

Mass 113.0688 Oz. , Selected stage mass 113.0688 Oz.

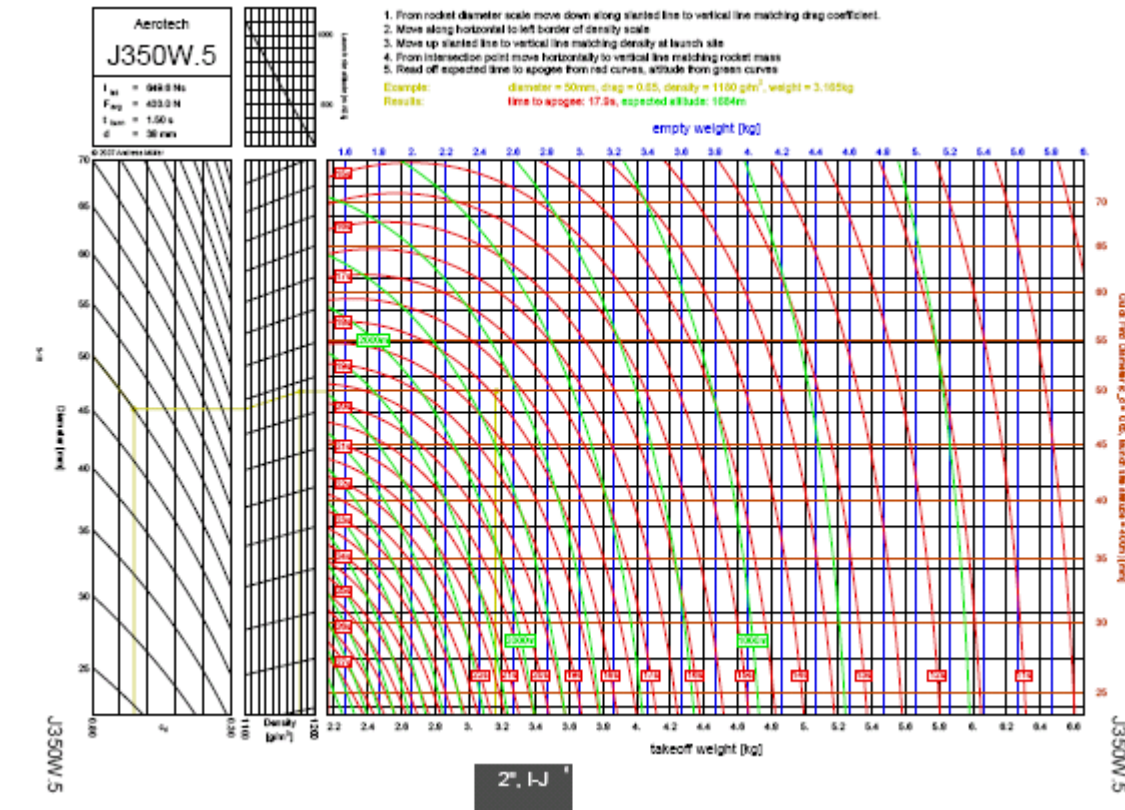
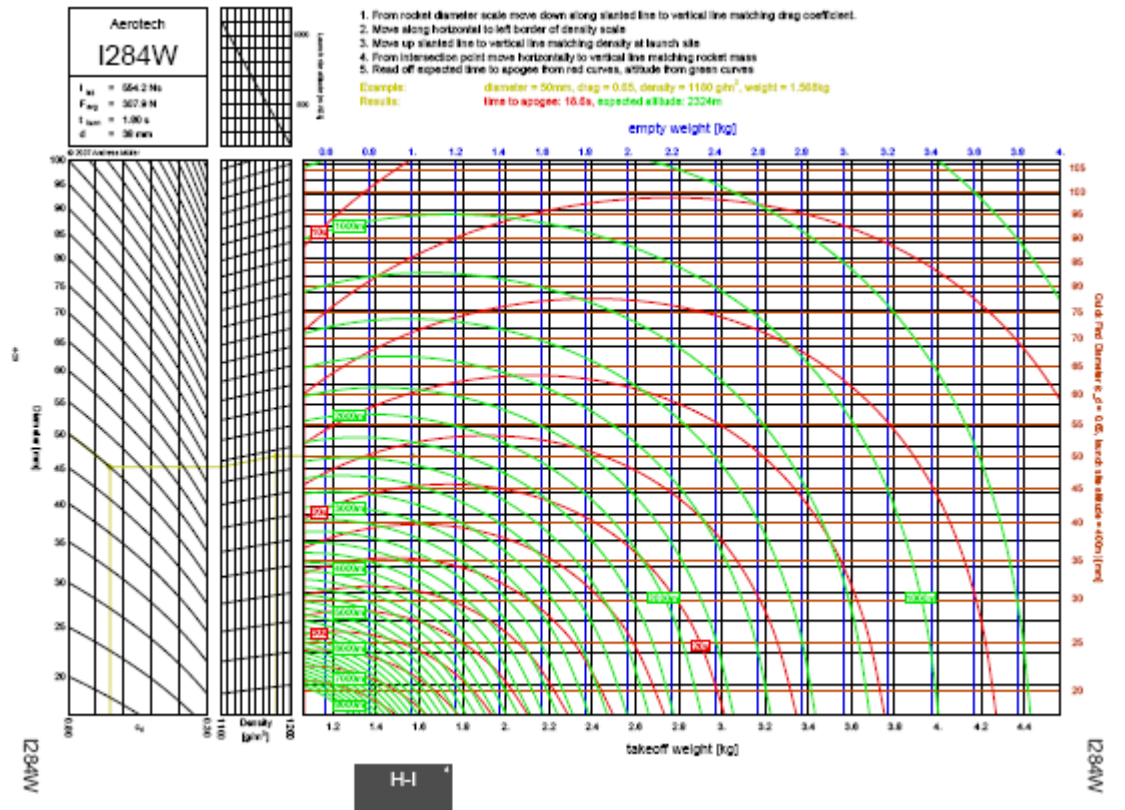
CG: 41.0112 In., CP: 53.7902 In., Margin: 2.32

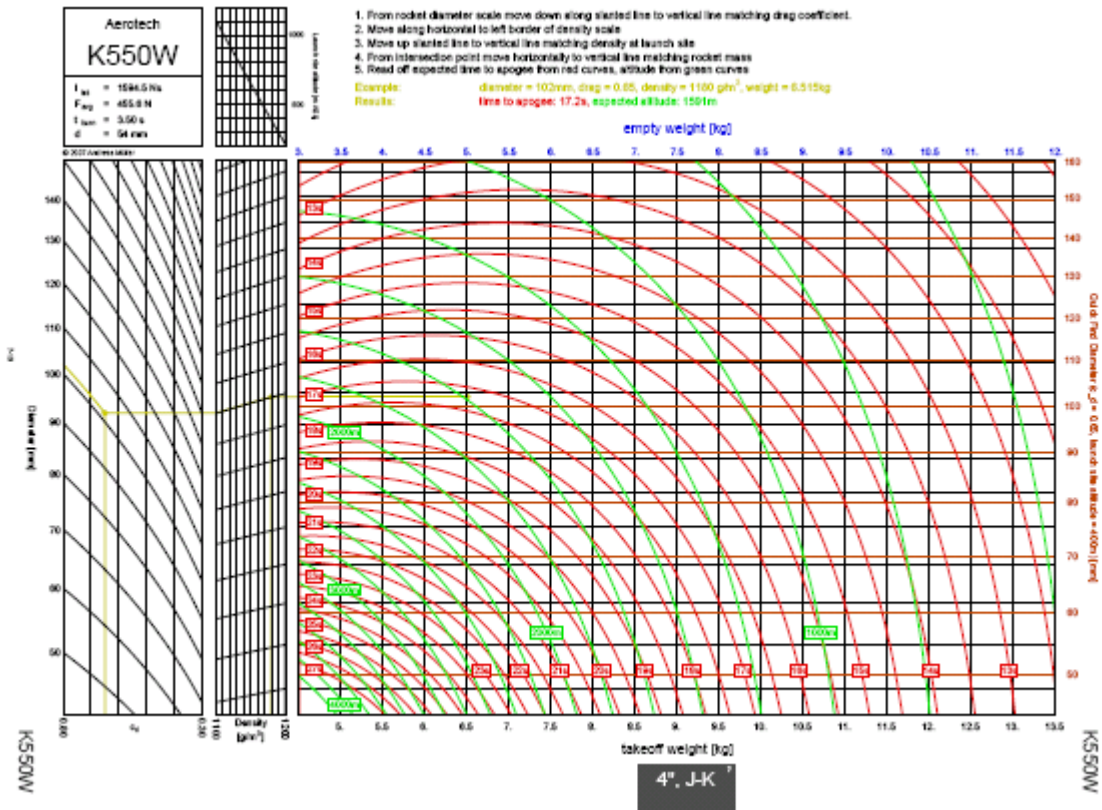
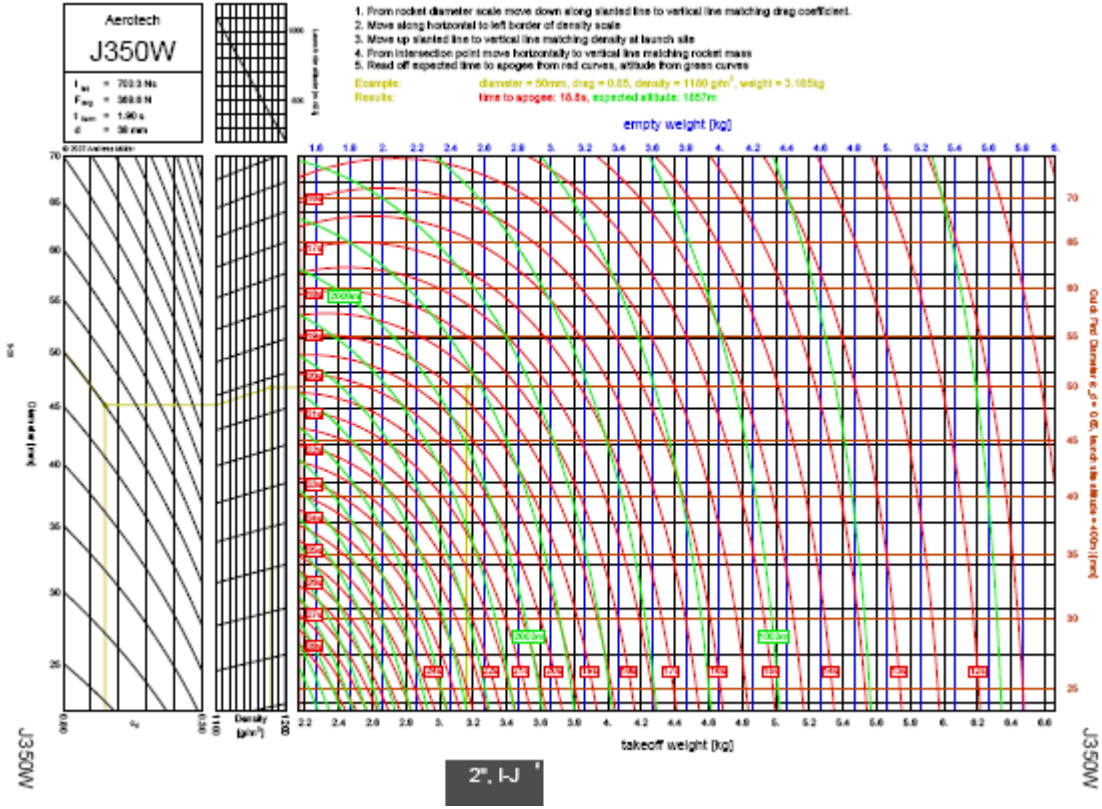
Shown without engines.





Appendix V





▶ Home

▶ Science Experiment

▶ Team members / BIO'S

▶ Reports

▶ Donations

▶ Outreach activities

5 Clans Rocket Team

This is the first page of your Web site that visitors will see. On this page, explain your site's purpose, content, and layout. Include tips on how to move through your site and where to find key information.

Change the picture to one of your own, such as a picture of your company.



Caption describing picture or graphic.

~~▶ BELONG TO ME~~

▶ MEMBERSHIP

▶ PHOTOS

▶ CALENDAR

To contact us:

College of Menominee Nation
Green Bay Site
2733 So. Ridge Road, Suite 3
Green Bay, WI 54304
920-965-0070
Website-www.menominee.edu

Main Campus
N172 St. Hwy 47/55
P.O. Box 1179
Keshena, WI 54315
715-799-5600 or 1-800-567-2344

Home | [Blank](#) | [Blank](#) | [Blank](#) | [Blank](#) | [Blank](#)

Five Clans Rocket Team – Individual Safety Agreement

To all FCRT members and flight crews (anyone who wants to launch their rocket), please read and sign the ISA below.

FCRT NAR certified members will perform pre-flight inspections to determine if a rocket is flight-ready. Any rocket that does not pass a pre-flight check will not be allowed to launch.

Motors and igniters are assembled in the designated prepping area only.

The FCRT Range Safety Officer has the final say on all rocket safety matters. Even if a rocket passes pre-flight inspections the RSO may still deny the launch if the RSO feels that rocket may be a safety hazard.

All FCRT members must be compliant with the FCRT Safety Plan.

I _____, have read and understand the ISA and will abide by
Print Name
all safety rules and procedures.

X _____ Date _____
Sign Name

Permatex, Inc.
10 Columbus Blvd.
Hartford, CT 06106 USA
Telephone: 1-87-Permatex
(877) 376-2839
Emergency: 800-255-3924

Material Safety Data Sheet

1. PRODUCT IDENTIFICATION

Product Name: 84107 PERMA POXY 30 MIN CRYSTAL CLEAR EPOXY 25ML PART 1
Item No: 202002D
Product Type: Epoxy resin

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	Weight Percent	ACGIH TLV:	OSHA PEL:
BISPHENOL A/EPICHLOROHYDRIN BASED EPOXY RESIN 25068-38-6	>60	Not Listed	Not Listed

3. HAZARDS IDENTIFICATION

Toxicity: Causes moderate eye irritation. Causes moderate skin irritation. May cause skin sensitization.
Primary Routes of Entry: Eyes Dermal - skin.
Signs and Symptoms of Exposure: May cause pain, redness or swelling of the eyes and excessive blinking and tear production. Repeated skin contact may cause allergic skin reactions. Contact with product at elevated temperatures can result in thermal burns. Ingestion may cause nausea and vomiting. Based on testing, this product is not likely to be an inhalation hazard and is considered to have a low order of acute toxicity.

Medical Conditions Recognized as Being Aggravated by Exposure: Preexisting eye, skin and respiratory disorders may be aggravated by overexposure to this product.

4. FIRST AID MEASURES

Ingestion: If swallowed, DO NOT induce vomiting. Keep individual calm. Obtain medical attention.
Inhalation: Move to fresh air in case of accidental inhalation of vapors. Oxygen or artificial respiration if needed.
Skin Contact: Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. If skin irritation persists, call a physician.
Eye Contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

5. FIRE FIGHTING MEASURES

Flash Point (°F/C): >400°F Method: PMCC
Recommended Extinguishing Media: Carbon Dioxide, Dry Chemicals, Foam.
Special Fire-Fighting Procedures: Material will not burn unless preheated. Firefighters should wear self-contained breathing apparatus. Use water spray to cool exposed containers.
Hazardous Products of Combustion: Oxides of carbon, Aldehydes, Acid vapors
Unusual Fire/Explosion Hazards: May decompose above 300 degrees F.; may polymerize above 500 degrees F. in which case closed containers may rupture or explode. Fumes and vapor from thermal and chemical decomposition vary in composition and toxicity. Do not breathe fumes. .
Lower Explosive Limit: Not determined.
Upper Explosive Limit: Not determined.

6. ACCIDENTAL RELEASE MEASURES

Spill Procedures: Eliminate all sources of ignition. Maintain good ventilation. Take up with an inert absorbent. Store in a closed waste container until disposal. Prevent from entering waterways or sewers.

7. HANDLING AND STORAGE

Storage: Store in a cool, dry area. Store away from heat.
Handling: Avoid contact with vapors from heated material. Avoid contact with skin and eyes. Wash thoroughly after handling. Discard contaminated leather gloves and shoes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eyes:	Safety glasses with side shields or chemical goggles.
Skin:	Rubber or plastic gloves. Wash contaminated clothing before re-use.
Ventilation:	General; local exhaust ventilation as necessary to control any air contaminants to within their exposure limits (or to the lowest feasible levels when limits have not been established) during the use of this product.
Respiratory Protection:	Not required under normal use. An approved respirator (i.e. NIOSH, etc.) should be worn when exposures are expected to exceed the applicable limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear viscous liquid
Odor:	Slight
Boiling Point:	>500°F
pH:	Neutral
Solubility in Water:	Negligible
Specific Gravity:	1.17
VOC Content(Wt.%):	0
Vapor Pressure:	0.03 mmHg @ 171°F
Vapor Density (Air=1):	>1
Evaporation Rate:	<1 (butyl acetate = 1)

10. STABILITY AND REACTIVITY

Chemical Stability:	STABLE
Hazardous Polymerization:	WILL NOT OCCUR
Incompatibilities:	Acids, Avoid contact with bases and strong oxidizers
Conditions to Avoid:	Heat
Hazardous Products of Combustion:	Oxides of carbon, Aldehydes, Acid vapors

11. TOXICOLOGICAL INFORMATION

Oral LD50 (rat) = 11.4 g/kg
Dermal LD50 (rabbit) = >20 ml/kg
Inhalation LC50 (rat) = no deaths (4h)
IARC Group 3; Not classifiable as a carcinogen

12. ECOLOGICAL INFORMATION

No data available

13. DISPOSAL CONSIDERATIONS

Recommended Method of Disposal: Disposal should be made in accordance with federal, state and local regulations.
US EPA Waste Number: NH - Not a RCRA Hazardous Waste Material

14. TRANSPORTATION INFORMATION

DOT (49CFR 172)

Domestic Ground Transport

DOT Shipping Name:	Unrestricted
Hazard Class:	None
UN/ID Number:	None
Marine Pollutant:	None

IATA

Proper Shipping Name:	Not regulated
Class or Division:	None
UN/NA Number:	None

IMDG

Proper Shipping:	Unrestricted
Hazard Class:	None
UN Number:	None

Product name: 84107 PERMA POXY 30 MIN CRYSTAL
CLEAR EPOXY 25ML PART 1

Item No: 202002D

15. REGULATORY INFORMATION

SARA 313 Chemicals: The following component(s) is listed as a SARA Section 313 Toxic Chemical.

NONE

CALIFORNIA PROP 65:

WARNING: This product contains a chemical known to the State of California to cause cancer.

TSCA Inventory Status:

Listed on Inventory: YES All components of this product are listed (or exempt) on the EPA TSCA inventory.

16. OTHER INFORMATION

Estimated NFPA Rating: HEALTH 2, FLAMMABILITY 1, REACTIVITY 0

Estimated HMIS Classification: HEALTH 2, FLAMMABILITY 1, PHYSICAL HAZARD 0

NFPA is a registered trademark of the National Fire Protection Assn.

HMIS is a registered trademark of the National Paint and Coatings Assn.

Prepared By:

Denise Boyd, Health and Safety Manager

Company:

Permatex, Inc. 10 Columbus Blvd. Hartford, CT USA 06106

Revision Date: 11/07/2005

Revision 1

Number:

Permatex, Inc.
10 Columbus Blvd.
Hartford, CT 06106 USA
Telephone: 1-87-Permatex
(877) 376-2839
Emergency: 800-255-3924

Material Safety Data Sheet

1. PRODUCT IDENTIFICATION

Product Name: 84107 PERMA POXY 30 MIN CRYSTAL CLEAR EPOXY 25ML
Item No: PTX203006D
Product Type: Curing agent

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	Weight Percent	ACGIH TLV:	OSHA PEL:
NONYLPHENOL 25154-52-3	75-85	Not Listed	Not Listed
2-PIPERAZINE-1-YLETHYLAMINE 140-31-8	15-25	Not Listed	Not Listed

3. HAZARDS IDENTIFICATION

Toxicity: May be harmful if swallowed. Harmful if absorbed through the skin. The aminophenol can cause severe irritation and may be corrosive on prolonged contact. It may be a sensitizer. It can also be corrosive to eye tissue, leading to permanent injury including blindness. It may irritate the respiratory tract and may cause delayed lung damage upon overexposure to fumes or vapors. It can cause fatigue, muscular weakness, labored breathing or gastrointestinal irritation if swallowed.

Primary Routes of Entry: Eye and skin contact, ingestion, inhalation.

Signs and Symptoms of Exposure: Can cause severe and painful burns on contact to eyes, skin and if taken internally. Repeated skin contact may cause allergic skin reactions.

Medical Conditions Recognized as Being Aggravated by Exposure: Preexisting eye, skin and respiratory disorders may be aggravated by overexposure to this product. Persons with respiratory problems such as emphysema and asthma should avoid inhalation.

4. FIRST AID MEASURES

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Inhalation: Move to fresh air in case of accidental inhalation of vapors. Oxygen or artificial respiration if needed. Obtain medical attention.

Skin Contact: Remove product and immediately flush affected area with water for 15 minutes. Remove contaminated clothing and shoes. Destroy contaminated leather apparel. Cover the affected area with a sterile dressing and seek medical care. Do not apply greases or ointments. Launder contaminated clothes prior to reuse..

Eye Contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

5. FIRE FIGHTING MEASURES

Flash Point (°F/C): >200 degrees F.

Recommended Extinguishing Media: Carbon dioxide, Dry chemical, Alcohol foam

Special Fire-Fighting Procedures: Firefighters should wear self-contained breathing apparatus. Use water spray to cool exposed containers.

Hazardous Products of Combustion: Oxides of carbon, Oxides of nitrogen, Ammonia, Amines

Unusual Fire/Explosion Hazards: Irritating or toxic gases or fumes may be generated by thermal decomposition or combustion.

Lower Explosive Limit: Not determined.

Upper Explosive Limit: Not determined.

6. ACCIDENTAL RELEASE MEASURES

Spill Procedures: Maintain good ventilation. Take up with an inert absorbent. Store in a closed waste container until disposal.

7. HANDLING AND STORAGE

Storage: Store in a cool, dry area. Keep away from oxidizers.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Avoid breathing vapors, if exposed to high vapor concentration, leave area at once. Discard contaminated leather gloves and shoes. Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Do not mix with sodium nitrite or other nitrosating agents as cancer-causing nitrosamines could be formed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eyes: Chemical goggles; also wear a face shield if splashing hazard exists.
Skin: Neoprene or nitrile gloves recommended.
Ventilation: General; local exhaust ventilation as necessary to control any air contaminants to within their exposure limits (or to the lowest feasible levels when limits have not been established) during the use of this product.
Respiratory Protection: Not required under normal use. An approved respirator (i.e. NIOSH, etc.) should be worn when exposures are expected to exceed the applicable limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Amber liquid
Odor: AMMONIA LIKE
Boiling Point: >390°F
pH: Alkaline (5% solution or slurry in water)
Solubility in Water: Soluble
Specific Gravity: 0.97
VOC Content(Wt.%): 0
Vapor Pressure: <1 mmHg @ 70°F
Vapor Density (Air=1): Heavier than air
Evaporation Rate: <1 (butyl acetate = 1)

10. STABILITY AND REACTIVITY

Chemical Stability: STABLE
Hazardous Polymerization: WILL NOT OCCUR
Incompatibilities: Strong oxidizers, acids, chlorinated hydrocarbons., Active metals., Strong oxidizers such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite., Peroxides
Conditions to Avoid: Heat
Hazardous Products of Combustion: Oxides of carbon, Oxides of nitrogen, Ammonia, Amines

11. TOXICOLOGICAL INFORMATION

Oral LD50 (rat) = 1620 mg/kg
Dermal LD50 (rabbit) = >1000 mg/kg

12. ECOLOGICAL INFORMATION

No data available

13. DISPOSAL CONSIDERATIONS

Recommended Method of Disposal: Disposal should be made in accordance with federal, state and local regulations.
US EPA Waste Number: NH - Not a RCRA Hazardous Waste Material

14. TRANSPORTATION INFORMATION

DOT (49CFR 172)

Domestic Ground Transport

DOT Shipping Name: CONSUMER COMMODITY
Hazard Class: ORM-D
UN/ID Number: None
Marine Pollutant: Nonylphenol

IATA

Proper Shipping Name: Consumer Commodity (Not more than 1 liter)
Class or Division: Class 9
UN/NA Number: ID 8000

Product name: 84107 PERMA POXY 30 MIN CRYSTAL
CLEAR EPOXY 25ML

Item No: PTX203006D

IMDG

Proper Shipping:	Corrosive liquids, basic, organic, n.o.s. (N-aminoethylpiperazine, nonylphenol)
Hazard Class:	Class 8 PGIII
UN Number:	UN 3267

15. REGULATORY INFORMATION

SARA 313 Chemicals: The following component(s) is listed as a SARA Section 313 Toxic Chemical.

None

CALIFORNIA PROP 65:

No California Prop 65 chemicals are known to be present.

TSCA Inventory Status:

Listed on Inventory: YES All components of this product are listed (or exempt) on the EPA TSCA inventory.

16. OTHER INFORMATION

Estimated NFPA Rating: HEALTH 3, FLAMMABILITY 1, REACTIVITY 0

Estimated HMIS Classification: HEALTH 3, FLAMMABILITY 1, PHYSICAL HAZARD 0

NFPA is a registered trademark of the National Fire Protection Assn.

HMIS is a registered trademark of the National Paint and Coatings Assn.

Prepared By: Denise Boyd, Health and Safety Manager
Company: Permatex, Inc. 10 Columbus Blvd. Hartford, CT USA 06106

Revision Date: 04/21/2005
Revision Number: New

MATERIAL SAFETY DATA SHEET

Product Identity: **OUTERS GUN GREASE**
See page 4 for Product stock numbers.

Manufactured by: Ammunition Accessories Inc.
Onalaska Operations
P. O. Box 39
Onalaska, WI 54650
Telephone #: (608)781-5800
CHEMTREC #: 1-800-424-9300 **DAY OR NIGHT**

MSDS #: 907
Prepared by: RLZ
Date of Preparation: March 1, 2005
Supersedes MSDS Dated: November 14, 2002

SECTION I - PRODUCT INFORMATION

TRADE NAME: Outers Gun Grease
CHEMICAL NAME & SYNONYMS: NA
C.A.S.REGISTRY #: NA
CHEMICAL FAMILY: Petroleum rust proof
FORMULA: NA
MOLECULAR WEIGHT: NA

SECTION II - HAZARDOUS INGREDIENTS

<u>INGREDIENT</u>	<u>CAS #</u>	<u>TLV LEVEL/PEL LEVEL</u>
Wool Wax	8020846	Not Established
Complex mixture of Petroleum hydrocarbons	8009038	2 mg/m ³ (fume)
Stoddard Solvent	8052413	100 ppm ACGIH
Severely hydrotreated heavy naphthenic petroleum distillates	64742525	5 mg/m ³ (ACGIH 1992-1993) TWA, oil mist

SECTION III - PHYSICAL DATA

BOILING POINT (DEG C): ND	SPECIFIC GRAVITY (60 deg F):ND
FREEZING POINT (DEG C): ND	PERCENT VOLATILE by VOLUME: 100%, if heated
VAPOR PRESSURE: ND	EVAPORATION RATE(nBuAc): negligible
VAPOR DENSITY (AIR=1): Not determined	pH: NA
SOLUBILITY IN WATER: Negligible	VISCOSITY: ND
PHYSICAL STATE (60 DEG F): Semi-solid	
APPEARANCE & ODOR: Brown semi-solid with petroleum solvent odor	

NA = Not Applicable
ND = Not Determined

SECTION IV - FIRE & EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): 155° F COC	AUTO IGNITION TEMP: Not Determined
FLAMMABLE LIMITS: LEL: Not Determined	UEL: Not Determined

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical foam, or water spray.

SPECIAL FIRE FIGHTING PROCEDURES: When product is heated to decomposition, it gives off acrid fumes. Use water spray to cool containers exposed to heat flame.

UNUSUAL FIRE & EXPLOSION HAZARDS: Fire fighters should use self-contained breathing apparatus. Do not spray water directly on fire as this may contribute to spread of burning debris.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Mixture unknown. 100ppm for Stoddard Solvent

PRIMARY ROUTE OF EXPOSURE: Eyes, and skin contact, or inhalation

EFFECTS OF OVEREXPOSURE (ACUTE):

EYE CONTACT: Can cause reversible eye irritation.

SKIN CONTACT: Can cause reversible skin irritation to skin & dermatitis.

INHALATION: Inhalation of vapors can cause drowsiness if used in poorly ventilated & confined spaces.

INGESTION: DO NOT induce vomiting, aspiration may cause chemical pneumonia.

EFFECTS OF OVEREXPOSURE (CHRONIC): See acute effects.

EMERGENCY AND FIRST AID PROCEDURES:

EYE CONTACT: Flush with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. If irritation persists, get medical attention.

SKIN CONTACT: Remove contaminated clothing. Wash with soap and water. Get medical attention if irritation develops or persists.

INGESTION: If swallowed, DO NOT induce vomiting. Call physician immediately. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. Get medical attention if irritation persists.

CARCINOGEN CONTENT

% PPM INGREDIENT

IARC No

NTP No OSHA No

SECTION VI - REACTIVITY DATA

STABILITY: X STABLE __ UNSTABLE at ambient temperatures

CONDITIONS TO AVOID: Strong oxidizers.

INCOMPATIBILITY: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition can produce toxic vapor of carbon monoxide and carbon dioxide, asphyxiants, acrid fumes, and soot.

HAZARDOUS POLYMERIZATION: MAY OCCUR WILL NOT OCCUR

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Contain spills & prevent entry into waterways & sewers. Wipe up or absorb with absorbent materials, (hydrocarbon type).

WASTE DISPOSAL METHOD: Disposal must be in accordance with Federal, State, and Local regulation.

SECTION VIII - SPECIAL PROTECTION INFORMATION

CONSULT SAFETY EQUIPMENT DISTRIBUTOR

RESPIRATORY PROTECTION: When TLV is exceeded, use NIOSH approved respirator for organic vapors.

VENTILATION: Provide general ventilation to keep vapors below TLV.

PROTECTIVE GLOVES: Use mineral oil resistant gloves when working in product.

EYE PROTECTION: Use splash goggles.

OTHER PROTECTIVE EQUIPMENT: Oil resistant aprons may be required for some industrial uses.

SECTION IX - STORAGE & HANDLING PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep in tightly closed container. Keep away from heat, flame or spark. Store in cool, well ventilated areas. Do not mix refuse with strong oxidizers. Isolate from incompatible substances.

PRECAUTIONS DURING USE: Keep containers closed. Wash hands before eating, drinking, or smoking after use of any chemical. Wear protective gear. Work in well-ventilated area. DO NOT smoke around this product.

SECTION X - TRANSPORTATION & REGULATORY INFORMATION

PROPER SHIPPING NAME: Combustible liquid, n.o.s. (Petroleum distillates)

CLASS: Combustible liquid

UN IDENTIFICATION #:NA 1993 PG III

HAZARD LABEL: None

ERG # 27

There is an exemption, which applies to certain consumer products:

DOT PROPER SHIPPING NAME: Consumer Commodity

DOT Class: ORM-D

Check regulations for details for air, maritime and international shipments.

SECTION X - TRANSPORTATION & REGULATORY INFORMATION
--

SARA TITLE III INFORMATION

Title III 302/304 Extremely Hazardous Substance: None
 CERCLA Section 102(a) Hazardous Substances: None
 Title III Section 111 Hazard Categorization: Acute
 Title III Section 313 Toxic Chemicals: None

WHIMIS Classification: Class B. Div. 3

HMIS Ratings		HMIS RATING KEY	PRODUCT NAME AND SIZE	STOCK No.
HEALTH	2	4 Severe Hazard	Outers Gun Grease 1.5 oz	42057
FLAMMABILITY	2	3 Serious Hazard	Outers Gun Grease 42g	42058
REACTIVITY	0	2 Moderate Hazard		
		1 Slight Hazard		
		0 Minimal Hazard		

<p>For chemical emergency, spill, leak, fire, exposure or accident call: Inside US: CHEMTREC:1-800-424-9300 DAY OR NIGHT Outside US: CHEMTREC:010-202-483-7616. DAY OR NIGHT</p>
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NOTE: The information contained in this Material Safety Data Sheet is to the best of Ammunition Accessories, Inc. knowledge and belief, accurate and reliable. However, no representation, warranty or guarantee is made to its accuracy, reliability or completeness. However, since conditions of use are outside our control it should not be taken as a warranty or representation for which Ammunition Accessories, Inc. assumes legal responsibility. This information is provided solely for your consideration, investigation and verification. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use.



MATERIAL SAFETY DATA SHEET

SAFETY PUBLICATION	
SP 6228	
RELEASED	5-22-87
PREPARED	5-8-87
PREVIOUS REV	2-19-88

SECTION I

MANUFACTURER'S NAME: AMP INCORPORATED
 ADDRESS: P. O. BOX 3608, HARRISBURG, PA 17105-3608
 EMERGENCY TELEPHONE NO. (717)-561-8800

PRODUCT NAME &/OR NUMBER: Cleaning Solvent, PN 602972
 TRADE NAME & SYNONYM: Hoppe's #9 Gun Cleaning Solvent

CHEMICAL NAME & SYNONYM: Not applicable
 CHEMICAL FAMILY: Petroleum Distillates
 FORMULA: Not applicable

SECTION II INGREDIENTS

COMPONENT	CAS#	%	EXPOSURE LEVELS (UNITS)
Ethyl Alcohol	64-17-5	40-60	OSHA PEL=ACGIH TLV=1000 ppm
Petroleum Naptha	8030-30-6	40-60	OSHA=500 ppm;ACGIH=100 ppm
Trade Secret Ingredients	Trade Secret	< 20	Not established

Carcinogenicity: NTP - No; IARC - No; OSHA - No; ACGIH - No.

SECTION III PHYSICAL DATA

BOILING POINT (F/C): 250/121 SPECIFIC GRAVITY (H2O=1): 84 gm/cc
 VAPOR PRESSURE (mm Hg): Negligible % VOLATILE BY VOLUME: Not established
 VAPOR DENSITY (Air=1): 4.5 EVAPORATION RATE (BA=1): Not established
 SOLUBILITY IN WATER: Not established
 APPEARANCE AND ODOR: Kerosene odor and smell.

SECTION IV FIRE AND EXPLOSION HAZARD DATA FLAMMABILITY (NFPA) = 3

FLASH POINT (METHOD USED): 59F (TOC) FLAMMABLE LIMITS: Not established.
 AUTOIGNITION TEMP (F/C): Not established
 EXTINGUISHING MEDIA: CO2, dry chemical, "alcohol" foam.
 SPECIAL FIRE FIGHTING PROCEDURES: Do not use water as an extinguishing medium.
 Water may be used to keep containers cool.
 UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

SECTION V HEALTH HAZARD DATA HEALTH (NFPA) = 1

THRESHOLD LIMIT VALUE OF PRODUCT: Not established (see Section II).
 EFFECTS OF OVEREXPOSURE: Will irritate skin, eyes and throat. Headache, drowsiness and fatigue may result from inhalation of vapors. Dermatitis is possible. There is no evidence of toxicological testing having been performed on this product. Target organ data not available.
 EMERGENCY AND FIRST AID PROCEDURES: If swallowed, do not induce vomiting. Contact physician immediately. Wash affected skin and clothing with soap and water. If in eyes, flush for at least 15 minutes with plenty of water. If inhaled, remove to fresh air at once. If breathing has stopped, perform artificial respiration and get medical attention immediately.

SECTION VI REACTIVITY DATA REACTIVITY (NFPA) = 0

STABILITY: Stable.

CONDITIONS TO AVOID: Oxidizing materials, extreme heat, open flames.

INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Fumes, smoke and CO.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: None.

SECTION VII SPILL, LEAK AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Remove all ignition sources. Ventilate area of spill or leak. Collect material in inert absorbent media for disposal. Do not discharge to sewer or watercourses.

WASTE DISPOSAL METHOD: Industrial waste incineration is the recommended method of disposal, to be performed in accordance with Federal, State and local regulations.

"EMPTY" CONTAINER WARNING: "Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with government regulations.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): None in normal use. If needed, use NIOSH-approved organic vapor cartridge respirator.

VENTILATION

LOCAL EXHAUST: Preferred. SPECIAL: None. MECHANICAL (GENERAL): May be satisfactory. OTHER: None.

PROTECTIVE GLOVES: Use neoprene gloves to minimize skin contact.

EYE PROTECTION: Safety glasses or goggles.

OTHER PROTECTIVE EQUIPMENT: Safety showers and eyewashes should be available.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not store in areas of extreme heat or open flame. Do not reuse container.

OTHER PRECAUTIONS: Observe good personal hygiene practices. Contact lenses should not be worn when working with this material.

PREPARED BY: RONALD D. SCHAIBLE, CIH

TITLE: MANAGER, RISK ASSESSMENT
TELEPHONE: (717)-558-5813

Ronald D. Schaible
THE INFORMATION CONTAINED HEREIN IS DERIVED FROM THE BEST AVAILABLE SOURCES AND IS BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THE DATA OR THE USE OF THIS PRODUCT.

MATERIAL SAFETY DATA SHEET

MSDS NO: C3070
DATE: October, 1988

=====
I IDENTIFIER CONTROLLED PRODUCT - CLASS B: FLAMMABLE AND
COMBUSTIBLE MATERIAL
CLASS D: POISONOUS AND
INFECTIOUS MATERIAL
=====

ISOPROPYL ALCOHOL 99%	WHMIS CLASSIFICATION	RATING
C3070-03 250mL	Health Hazard:	2-Moderate
C3070-06 500mL	Flammability Hazard:	3-Serious
C3070-09 4L	Reactivity Hazard:	0-Minimal
C3070-10 4L	Specific Hazard:	Flammable/ Toxic

=====
II PREPARATION: INGRAM & BELL - QUALITY ASSURANCE DEPARTMENT
REVISION: New format to comply with WHMIS
=====

III CHEMICAL INGREDIENTS

HAZARDOUS MATERIAL	CONC.	CAS NO.	LD50	LC50
Isopropyl Alcohol 99%	min 99% v/v	67-63-0	5.8 g/kg rat-oral	Not available

NON HAZARDOUS MATERIAL (listed in decreasing concentration)
None

=====
IV PHYSICAL DATA
=====

CHEMICAL NAME: 2-propanol, isopropanol
PRODUCT USE: Solvent, body rub, preparation of lotions
PHYSICAL STATE: Liquid
ODOUR & APPEARANCE: Colourless clear mobile liquid with
characteristic alcohol odour
ODOUR THRESHOLD: Not available
SPECIFIC GRAVITY: 0.7830 to 0.7870 @ 25 deg C (approx. 0.79 @ 20
deg C)
VAPOUR PRESSURE: 33mmHg @ 20 deg C
VAPOUR DENSITY: 2.1 (air=1)
EVAPORATION RATE: 1.4 (butyl acetate=1)
BOILING POINT: 83 deg C
FREEZING POINT: -89.5 deg C
pH: 6.5 to 7.5
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

=====
V FIRE AND EXPLOSION HAZARD
=====

FLAMMABLE: YES: x NO:

IF YES - CONDITIONS IT WILL BURN UNDER:
If subjected to open flame or spark
MEANS OF EXTINCTION: Alcohol foam, carbon dioxide, dry chemical (preferred),
water fog

SPECIAL PROCEDURES: Evacuate hazard area, wear adequate respiratory and clothing protection, cool fire exposed containers with water

FLASH POINT: 14 deg C (closed cup)
UPPER FLAMMABILITY LIMIT: 12.0%
LOWER FLAMMABILITY LIMIT: 2.0%
AUTO-IGNITION TEMPERATURE: 455.6 deg C
HAZARDOUS COMBUSTION PRODUCTS: Not available

EXPLOSION DATA:
SENSITIVITY TO IMPACT: Stable
SENSITIVITY TO STATIC DISCHARGE: Not available
NOTE: Vapour forms explosive mixture between upper & lower flammable limits

=====
VI REACTIVITY DATA
=====

CHEMICAL STABILITY: YES: x NO:
IF NO - CONDITIONS UNDER WHICH NOT STABLE:

INCOMPATIBILITY TO OTHER SUBSTANCES: YES: x NO:
IF YES - LIST INCOMPATIBLE SUBSTANCES

Avoid contact with strong oxidizing agents - may react with aluminum at high temperatures

CONDITIONS OF REACTIVITY: Avoid heat, sparks, open flames and other ignition sources

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide and carbon monoxide produced on combustion

=====
VII TOXICOLOGICAL PROPERTIES
=====

ROUTE OF ENTRY: SKIN CONTACT: x SKIN ABSORPTION:
INHALATION: x INGESTION: x
EYE CONTACT: x

EFFECTS OF ACUTE EXPOSURE:

EYES: Slight to moderate irritation with possible corneal injury
SKIN: Irritant on prolonged or repeated exposure
INHALATION: Headache, dizziness, nausea, incoordination, drowsiness, loss of consciousness, irritation of respiratory tract
INGESTION: Headache, dizziness, nausea, incoordination, drowsiness, loss of consciousness

EFFECTS OF CHRONIC EXPOSURE: None known

EXPOSURE LIMITS: TLV 400ppm (1983-84, ACGIH)
IRRITANCY: May Occur on repeated or prolonged exposure
SENSITIZATION: May occur in sensitive or allergic people
SYNERGISTIC MATERIALS: None known
CARCINOGENICITY, REPRODUCTIVE TOXICITY, TERATOGENICITY, MUTAGENICITY: Not available

=====
VIII PREVENTATIVE MEASURES
=====

PROTECTIVE EQUIPMENT: GLOVES: rubber gloves for prolonged usage
EYE PROTECTION: Chemical safety goggles
RESPIRATORY PROTECTION: Not required

OTHER: not required

ENGINEERING CONTROLS: Adequate ventilation

LEAK & SPILL PROCEDURE:

SMALL: Wipe with absorbent paper

LARGE: Absorb with inert absorbent material and remove to tightly sealed containers (aluminum not recommended for storage) for disposal

WASTE DISPOSAL: Controlled burning in approved incinerator or land fill in approved site

HANDLING PROCEDURES & EQUIPMENT: Electrical and mechanical equipment should be spark proof- avoid sparks and open flame sources - avoid prolonged contact with skin - use normal, good personal hygiene

STORAGE PROCEDURES: Store in cool well ventilated area away from heat, sparks and open flame

SHIPPING INFORMATION:

SHIPPING NAME: Isopropanol

UN: 1219

CLASS: 3.2 PKG. GROUP: II

LABEL: #3 - flammable

=====
IX FIRST AID
=====

EYES: Flush eyes with large amounts of water for at least 15 minutes, contact physician immediately

SKIN: Wash with soap and water

INHALATION: Remove to fresh air and restore breathing if necessary

INGESTION: Do not induce vomiting - contact physician immediately

OTHER INFORMATION: There is no specific antidote - treatment of overexposure should be directed at control of symptoms and chemical condition

REFERENCES: Information on MSDS taken from supplier's original MSDS

ISN: 114810



**MATERIAL SAFETY DATA SHEET &
EMERGENCY RESPONSE INFORMATION**

Revised: 3/1/05

Manufacturer: Industrial Solid Propulsion Division
RCS Rocket Motor Components, Inc.

Address: 2113 W. 850 N. St.
Cedar City, UT 84720

**Emergency Response
Telephone Number:** (800) 535-5053

SECTION I - PRODUCT IDENTIFICATION

Product Name: Rocket Motor

Synonyms: RDS Motors, Fin Motors, Sounding Rocket Motors

Basic Description: Rocket Motors, 1.3C, UN0186, PG II

SECTION II - HAZARDOUS INGREDIENTS

Rocket motors contain a propellant composition which consists primarily of ammonium perchlorate (NH₄ClO₄) dispersed in synthetic rubber.

SECTION III - PHYSICAL DATA

Boiling Point Range: Decomposes

Specific Gravity: Propellant ranges from .058 to .076 lb/cubic inch

Appearance: Black plastic or metallic cylinders

Odor: None

Physical State: Solid

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Autoignition Temp.: 550 Deg. F

Flammability Class: Flammable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (Cont'd)

Extinguishing Media: Water only

Special Fire Proc.: **Rocket motors present a propulsive hazard.** Protect against toxic fumes.

Unusual Fire Hazard: **Rocket motors will likely become propulsive in a fire.** Burning propellant gives off hydrogen chloride gas.

Unusual Explosion Hazard: None Anticipated

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Acute: None Known.

Chronic: None Known.

Overexposure -

Eyes: Ammonium perchlorate is a mild irritant to the skin, eyes, mucous membranes and the digestive tract.

Skin: Ammonium perchlorate is a mild irritant to the skin, eyes, mucous membranes and the digestive tract.

Inhalation: No information available.

Ingestion: Ammonium perchlorate is a mild irritant to the skin, eyes, mucous membranes and the digestive tract.

SECTION VI - EMERGENCY FIRST AID PROCEDURES

- Ingestion:** If swallowed, induce vomiting. Call a physician.
- Inhalation:** Avoid breathing exhaust fumes.
- Skin Contact:** For mild exhaust burns use a first aid burn ointment. For severe burns see a physician immediately.
- Eye Contact:** Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.
- Note to Physician:** Chemical of exposure is ammonium perchlorate, a mild gastric irritant.

SECTION VII - REACTIVITY DATA

- Conditions to Avoid:** Heat (propellant autoignites at 550 Deg. F).
- Incompatibility:** Acids
- Haz. Decomp. Products:** Oxides of carbon, hydrogen chloride gas

SECTION VIII - SPILL OR LEAK PROCEDURES

- Spills:** Replace rocket motors in boxes and seal securely.
- Waste Disposal Method:** Pack motor firmly in hole in ground with nozzle pointing up. Ignite motor electrically and wait 5 minutes before approaching. Dispose of spent motor in inert trash.

SECTION IX - SPECIAL PROTECTION INFORMATION

- Ventilation Requirements:** None. Do not use rocket motors indoors.

Specific Personal Protective Equipment

- Respiratory:** None. Avoid breathing exhaust fumes.

Other Handling and Storage Requirements:

Store rocket motors away from sources of heat and highly flammable materials.