CAREFULLY READ ALL STEPS BEFORE ASSEMBLING

SUNWARD Flying Umbrella Model Rocket

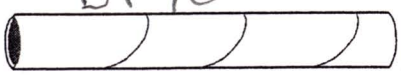
Recommended for Ages 10 and up
Ages 10-12 with adult supervision

Parts List Rev 1

www.sunward1.com
info@sunward1.com

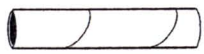
Use only single stage engines in this model
Recommended engines: D12-3
Launch Pad, Ignition System, Engines, Igniters
and Recovery wadding not included

MAIN BODY TUBE 8" LONG
BT-70



2 ENGINE CENTERING RINGS

1 ENGINE TUBE



1 ENGINE THRUST RING

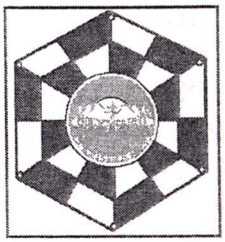
1 PARACHUTE ASSEMBLY STRING

1 PLASTIC NOSE CONE

CAREFULLY USE A HOBBY KNIFE TO CUT OFF EXCESS PLASTIC
DO NOT CUT OFF EYELET RING

1 LAUNCH LUG

1 PARACHUTE SHEET

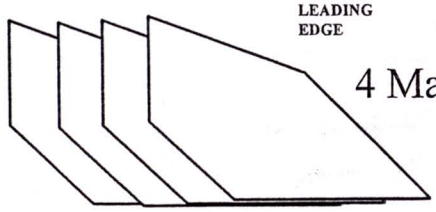


1 METAL ENGINE HOOK

LASER CUT BALSA WOOD FIN

1 ELASTIC SHOCK CORD

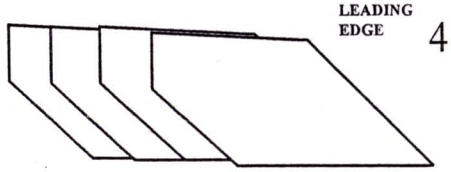
LEADING EDGE



4 Main Fins

6 PARACHUTE REINFORCEMENT RINGS

LEADING EDGE



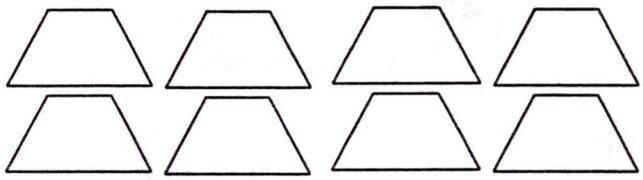
4 Secondary Fins

You will also need:

A ruler, 3/4" (2cm) thick book, white glue, scissors, hobby knife, cellophane tape, pencil, fine sandpaper, spray paint.

To install and ignite rocket engine, follow the instructions that are included with the engines or launch pad

This model is built to work with igniters, engines, recovery wadding and launch pads built by the leading manufacturers



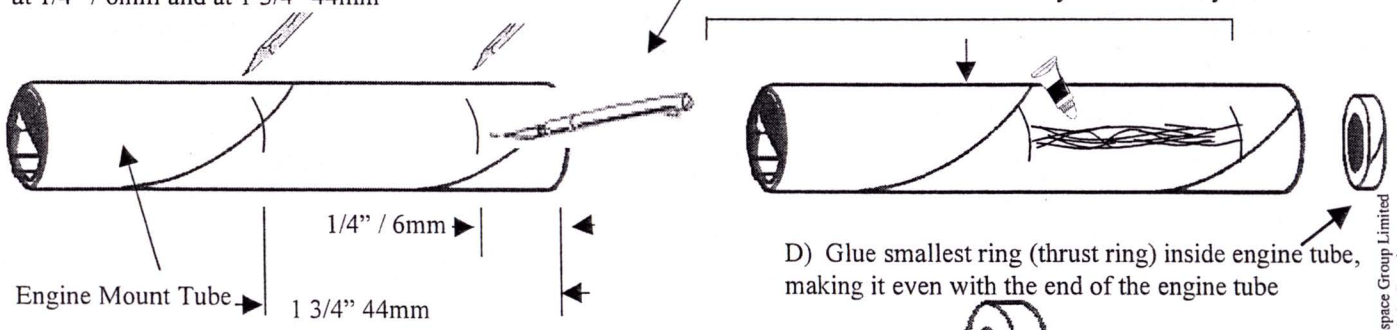
8 Base Plate Fins

Motor Assembly Instructions

1 A) On the engine tube, mark two lines at 1/4" / 6mm and at 1 3/4" 44mm

B) Cut 1/4" 6mm slit

C) Place glue as shown. Position hook. Hook may not be exactly as shown.

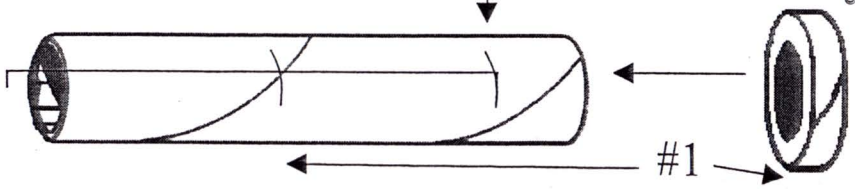


D) Glue smallest ring (thrust ring) inside engine tube, making it even with the end of the engine tube

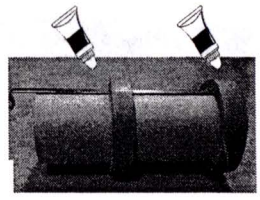
End "a"

E) Slide one engine centering ring (#1)to pencil mark shown from end "a"

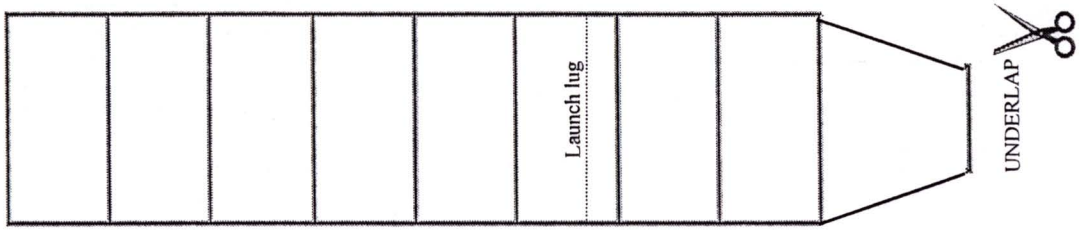
F) Slide second engine centering ring flush with end of engine tube



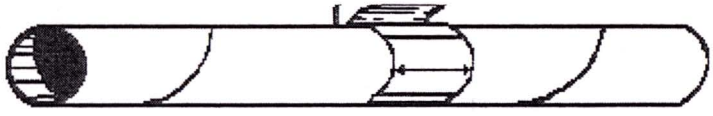
G) Complete tube should be as shown.



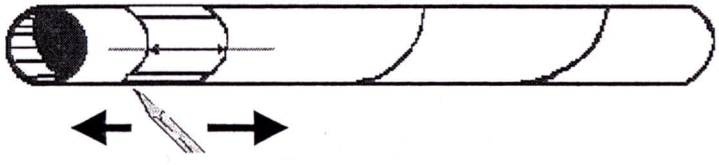
2) CUT OUT THIS MARKING TEMPLATE ALONG THE OUTSIDE EDGE



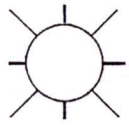
3) Wrap template around body (larger) tube so that it overlaps itself with the "fin" marking visible.
Make sure the template lines up with itself squarely and that the area marked "underlap" is underneath. Tape the template together.



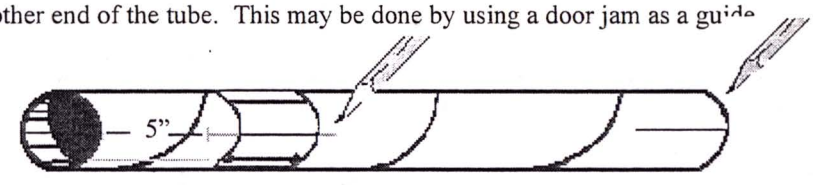
4) Slide template to one end of the body tube. Temporarily tape in place. Mark the fin positions with a straight edge.
The lines should extend at least 4 1 /2" from the end of the tube.



If done properly the marks are positioned like this

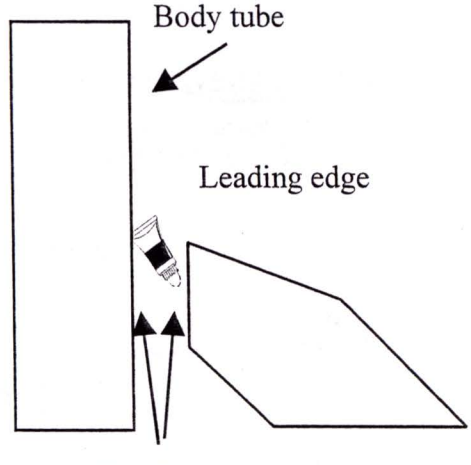


5) Slide the template up the tube until it is about 7" from the end you just marked. Temporarily tape the template in place. Then mark the "launch lug" position. Using a straight edge draw a 2" line , starting exactly 5" from the end of the tube. Extend this line for about 2" at the other end of the tube. This may be done by using a door jam as a guide

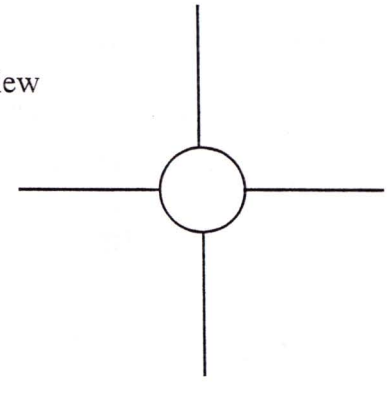


6) Main Fins:

A) If not done so, from the balsa wood sheet, carefully cut out the main fins with a hobby knife
B) With the edge shown, test fit each of the 4 main fins and mark on the body tube where the fins go.
C) With each of the 4 main fins, place some glue on the edge shown. Place some glue on the corresponding edge of the body tube.
D) The 4 main fins go on each second line on the marking template.
E) Before the glue dries, Place the body tube with the 4 fins and stand upright as shown. From above, ensure all fins are straight and true. Let dry



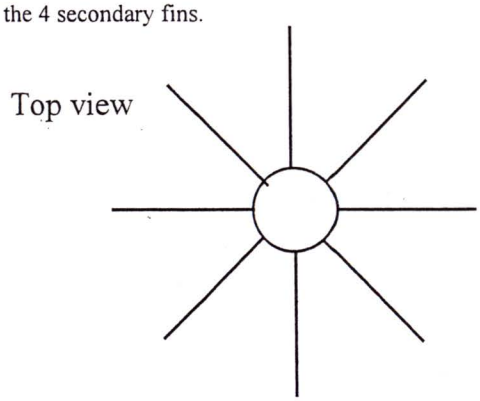
Top view

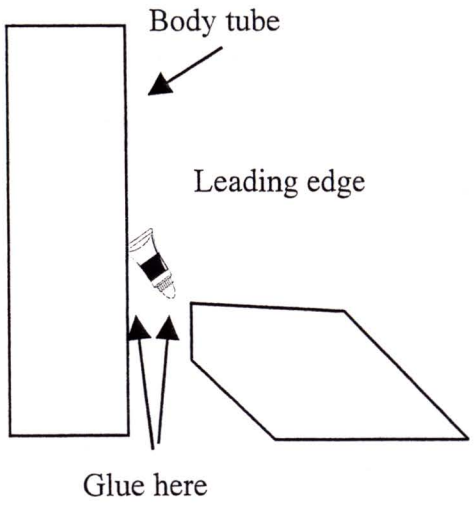


Note: The bottom of the fin is flush with the bottom of the body tube.

7) Secondary Fins

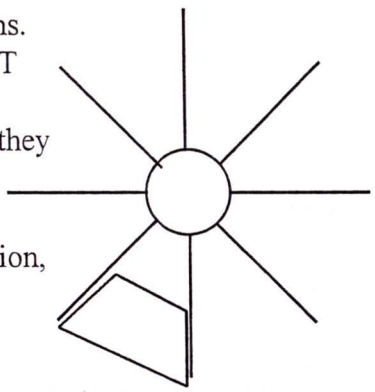
A) Repeat step 6 for the 4 secondary fins.
B) Let dry





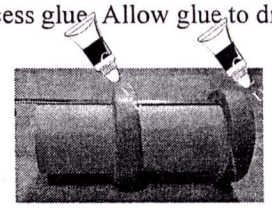
8) Base Plates TAKE YOUR TIME.

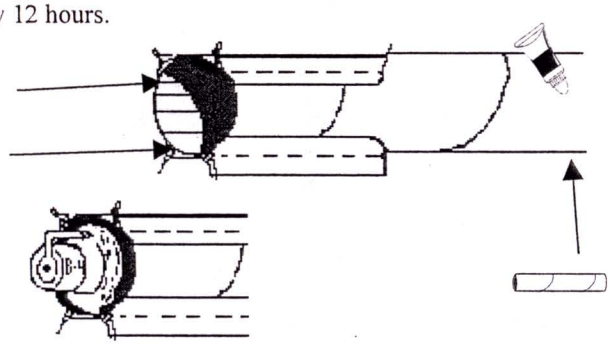
A) Place each of the base plates around the bottom of the fins. THE BASE PLATES GO INBETWEEN THE 8 FINS. NOT UNDER.
B) Adjust them until all in the same position. Even though they are laser cut, there are 8 areas for error to build up. Some adjusts in one place will affect all other areas.
C) Once you are satisfied the base plates are in a good position, start gluing them to the 8 fins
d) Let dry.



TIP: Place the pattern on plastic or wax paper so it doesn't stick to the work surface.

9) A) Run a bead of white glue around each of the engine centering rings, also run a bead of white glue around the inside of the back of the body tube.
B) Push engine mount into the body tube until the engine tube is even with the edge of the body tube and the engine hook still sticks out. Wipe off excess glue. Allow glue to dry 12 hours.



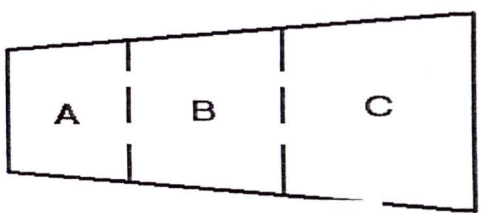


Fins not shown

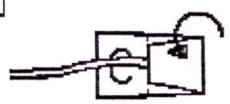
10) Glue the launch lug on the launch lug line. Let dry.

11) Cut Out the Following Shock Cord Mount:

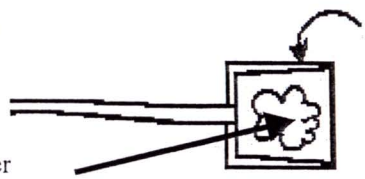
A) Put a blob of glue on the section marked "a" lay the end of the "shock cord" in the glue.



B) While the glue is still wet fold section "A" over on the dotted line and press it together with section "B"



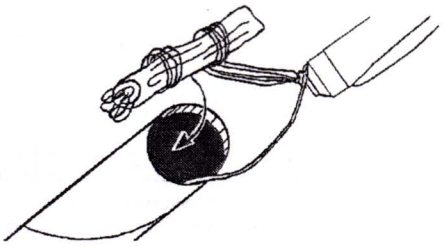
C) Fold over sections "A"&"B" and glue them over to section "C" and press it together



D) Put a blob of glue here

C) Loosely wrap parachute strings around parachute and drop the parachute into the body tube

D) Push the rest of the string and "shock cord" into the body tube and then insert nose cone.



TO INSTALL AND IGNITE ROCKET ENGINE, FOLLOW THE INSTRUCTIONS THAT ARE INCLUDED WITH THE ENGINES OR LAUNCH PAD

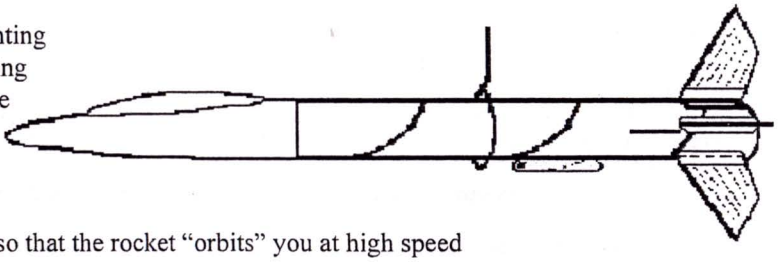
THIS MODEL IS BUILT TO WORK WITH IGNITERS, ENGINES, RECOVERY WADDING AND LAUNCH PADS BUILT BY THE LEADING MANUFACTURERS

RECOMMENDED ENGINES: D12-3 **USE ONLY SINGLE STAGE ENGINES!!!**

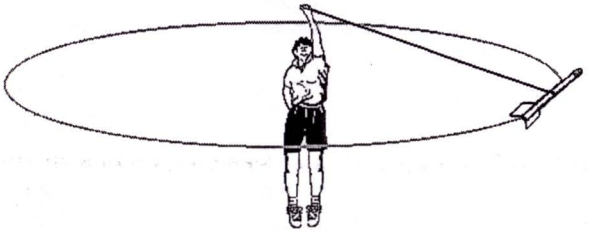
Preparing the rocket for launch: ***Important***

Flight test: every rocket must be tested for stability, here is a simple way to test stability:

A) With engine, wadding, and parachute installed and painting done, tie a 10' (3m) string around the rocket on its balancing point (the spot where it will hang level) tape string in place



B) "Fly" the rocket by twirling the string over your head so that the rocket "orbits" you at high speed



C) If the rocket flies straight, nose first, it is stable. If it does not, add weight to the nose cone. This can be done by dropping small balls of plasticine into the nose cone and pressing them into the point with the flat end of a pencil.
Keep on testing, and if necessary, adding more weight to the nose cone until the rocket is stable.When the rocket is stable, it may be launched.
Never launch an untested rocket.

ROCKET COMPONENTS WARRANTY

Sunward Model Aerospace guarantees that the components of this kit will reach you in good condition. If the kit does not reach you in good condition, simply return it* to the address below and we will send you a replacement as soon as possible.
Since building and launching skills vary from one hobbyist to another, Sunward Model Aerospace will not take responsibility for a rocket's performance, altitude loss or damage to property or injury to persons resulting from the use or misuse of any of our products. The buyer assumes all risks and liabilities therefrom and accepts and uses our products on these conditions. Your purchases from Sunward Model Aerospace affirms your agreement to these conditions.

*Return Merchandise Authorization is required for all exchanges.
Please contact Sunward Model Aerospace Customer Service at info@sunward1.com

Model Rocket Safety Code National Association of Rocketry www.nar.org
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1) Materials. I will use only lightweight, non-metal parts for the nose, body, and fins of my rocket.
2) Motors. I will use only certified, commercially-made model rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer.
3) Ignition System. I will launch my rockets with an electrical launch system and electrical motor igniters. My launch system will have a safety interlock in series with the launch switch, and will use a launch switch that returns to the "off" position when released.
4) Misfires. If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.
5) Launch Safety. I will use a countdown before launch, and will ensure that everyone is paying attention and is a safe distance of at least 15 feet away when I launch rockets with D motors or smaller, and 30 feet when I launch larger rockets. If I am uncertain about the safety or stability of an untested rocket, I will check the stability before flight and will fly it only after warning spectators and clearing them away to a safe distance.
6) Launcher. I will launch my rocket from a launch rod, tower, or rail that is pointed to within 30 degrees of the vertical to ensure that the rocket flies nearly straight up, and I will use a blast deflector to prevent the motor's exhaust from hitting the ground. To prevent accidental eye injury, I will place launchers so that the end of the launch rod is above eye level or will cap the end of the rod when it is not in use.
7) Size. My model rocket will not weigh more than 1,500 grams (53 ounces) at liftoff and will not contain more than 125 grams (4.4 ounces) of propellant or 320 N-sec (71.9 pound-seconds) of total impulse. If my model rocket weighs more than one pound (453 grams) at liftoff or has more than four ounces (113 grams) of propellant, I will check and comply with Federal Aviation Administration regulations before flying.
8) Flight Safety. I will not launch my rocket at targets, into clouds, or near airplanes, and will not put any flammable or explosive payload in my rocket.
9) Launch Site. I will launch my rocket outdoors, in an open area at least as large as shown in the accompanying table, and in safe weather conditions with wind speeds no greater than 20 miles per hour. I will ensure that there is no dry grass close to the launch pad, and that the launch site does not present risk of grass fires.

LAUNCH SITE DIMENSIONS

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Dimensions ft / m
0.00--1.25	1/4A, 1/2A	50 /15
1.26--2.50	A	100 / 30
2.51--5.00	B	200 / 60
5.01--10.00	C	400 / 120
10.01--20.00	D	500 / 150
20.01--40.00	E	1,000 / 300
40.01--80.00	F	1,000 / 300
80.01--160.00	G	1,000 / 300
160.01--320.00	Two Gs	1,500 / 450

Revision of February, 2001

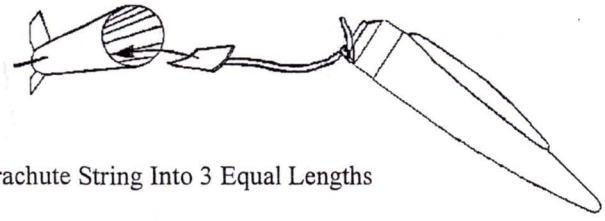
10) Recovery System. I will use a recovery system such as a streamer or parachute in my rocket so that it returns safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.
11) Recovery Safety. I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.

CANADA'S MODEL ROCKET SAFETY CODE

1) CONSTRUCTION. I will always build my model rocket using only lightweight materials such as paper, wood, plastics or rubber without any metal airframe components. My model shall include aerodynamic surfaces or a mechanism to assure a safe, stable flight.
2) MOTORS. I will use only pre-loaded, commercially available model rocket motors or motor reloads approved by Energy Mines and Resources Canada. I will never subject these engines to excessive shock, extremes of temperature, nor will I ever attempt their reloading or alteration. I shall always employ recommended manufacturer handling and ignition procedures.
3) RECOVERY. My model rocket will always use a recovery system to return it safely to the ground so that my model rocket may be reflown. I shall prepare the recovery system with due care to assure that it will properly deploy.
4) WEIGHT LIMITS. My model rocket will not weigh more than 1500 grams at lift-off, and the model rocket engine(s) will contain no more than 125 grams of propellant and produce no more than 160 N-s combined total-impulse..
5) FIRING SYSTEM. I will always use a remote electrical system to ignite the model rocket engine(s). My firing system will include an ignition switch that returns to "off" when released, and a safety interlock to prevent accidental ignition. I will never leave the safety interlock key in my firing system between launches.
6) LAUNCH SYSTEM. My model rocket will always be launched from a stable platform having a device to initially guide its motion. My launcher will have a jet deflector to prevent motor exhaust from directly contacting the ground. To protect myself and other from eye injury, I will position the launch rod or rail so that the upper end is above eye level, or else I will place a large guard on the upper end between launches.
7) LAUNCH SITE. I will never launch my model rockets near buildings, power lines, or within 9.1 kilometres from the centre of an airport. The area immediately around the launch system will be cleared of any flammable materials. I will always obtain the permission of the launch site owner prior to using the launch site for my model rocket activities.
8) LAUNCH CONDITIONS. I will never launch model rockets in high winds or in conditions of low visibility which may impair the observation of my model rocket in flight, or in a direction below 30 degrees from the vertical.
9) LAUNCH SAFETY. I will remain at least 5 metres away from any model about to be launched. I will always announce to persons within the launch site that I am about to launch my model rocket, and I shall give a loud countdown of at least 5 seconds duration. I shall immediately remove the safety interlock key from my firing system after the launch of my model rocket.
10) MISFIRES. In the event of an ignition misfire, I shall not immediately approach my model rocket, but remove the safety interlock key and remain back for a safe period until assured that no ignition will occur.
11) ANIMAL PAYLOADS. I will never endanger live animals by launching them in my model rocket.
12) TARGETS. I will never launch my rocket so that it will fall on, or strike, ground or air targets. Nor will I include any explosive or incendiary payload.
13) HAZARDOUS RECOVERY. I will never attempt to recover my model rocket from a power line, high place, a tree, or other dangerous location.
14) PRE FLIGHT TESTS. Whenever possible, I will always test the stability, operation and reliability of my model rocket designs prior to flight. I will launch unproven designs in complete isolation from other persons.

12) A) Glue the "shock cord mount about 1 ½" (4.5cm) down inside the top of the body tube.

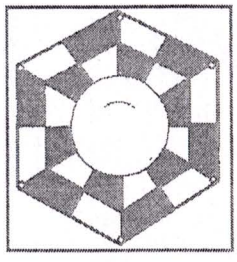
B) Tie the other end of the "shock cord" to the ring on the nose cone (ring may need to be cut open with a hobby knife so that the shock cord" can be fed through)



13) PARACHUTE

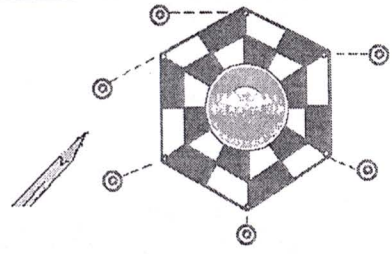
B) Cut Parachute String Into 3 Equal Lengths

A) Cut out parachute with sharp scissors



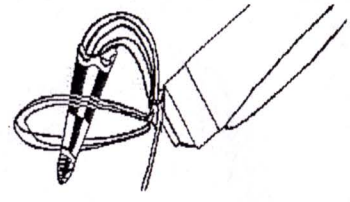
C) Stick the reinforcement rings to the parachute over the circles printed on the parachute

D) With a pencil, punch a hole through the circles printed on the parachute



E) Attach the Strings to the Parachute by Tying Them Through the Rings and Holes

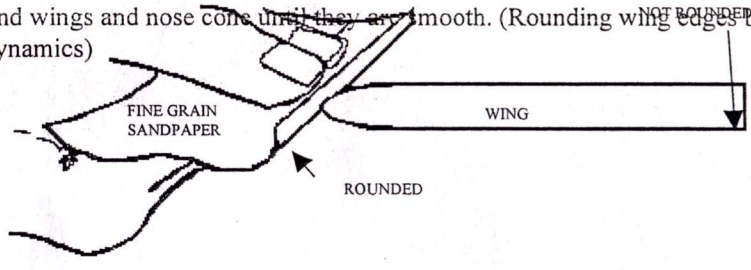
F) Pinching the parachute in the centre, bring all strings to form one loop, pass loop through eyelet on nose cone



G) Pass parachute through loop and pull tight.

14) Painting your model: AS THIS ROCKET SHOWS TERMINAL VELOCITY, SANDIN THE EDGES WILL NOT HELP MUCH

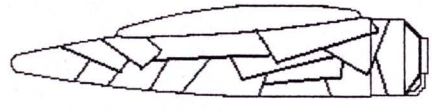
A) Sand wings and nose cone until they are smooth. (Rounding wing edges by careful sanding will improve appearance and aerodynamics)



B) Sand nose cone thoroughly.

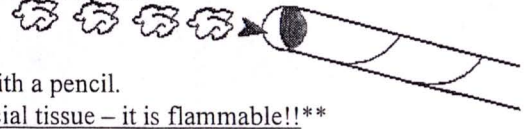
15) A) Spray paint entire model with polyethelyne – safe paint. Use light coats. Use only enough paint to cover model evenly. Keep paint can at least 14" from model

B) (Option step) when paint is <u>completely</u> dry, use masking tape to cover nose cone, except for canopy. Paint Black. Carefully remove masking tape after painting



16) Preparing rocket for launch *preparation du vol de la fusée*

A) Stuff 4 loosely crumpled squares of rocket recovery wadding (available from your local hobby retailer) into the top of rocket body tube



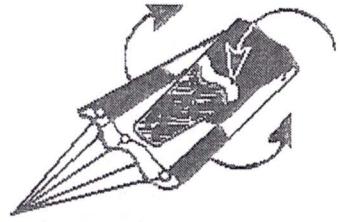
B) Push down with a pencil.

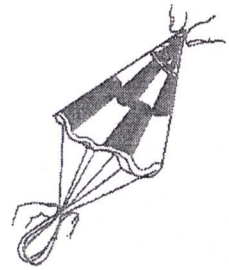
<u>Do not use facial tissue – it is flammable!!</u>

17) FOLD AND INSERT PARACHUTE

A) Pinch parachute in the centre and straighten its strings

B) Loosely fold over and roll outside edges inward.





1/8" balsa
Make 4

STAEDTLER® MARS 562 05-12 Chips

1/8" balsa
Make 4

1/16" balsa
make 8
STAEDTLER MARS 552 05-12 Germany

SUNWARD
AEROSPACE GROUP LIMITED

Model Rockets Components Accessories

FLYING UMBRELLA
Model Rocket Kit

Skill Level 3

- Over 14" / 36 cm high and 13" / 33cm wide!
- Low altitude - Perfect for Showing Terminal Velocity
- High Quality Laser Cut Balsa

- Safe 18" parachute recovery
- Full instructions
- Recommended Engines: D12-3

One Model Rocket Kit

Recommended for ages 10 and up.
Adult supervision required for children 10-16.
Check local regulations for engine age requirements.
Use only with 3/16" diameter rod for launching.
This model requires assembly.
Glue, paint, wadding, engines, igniters, launch system, and tools not included.
Plastic bags should be always kept away from babies and children to avoid suffocation.
Contents subject to change.

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SUNWARD
Flying
Umbrella
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