CMASS

THE SENTINEL

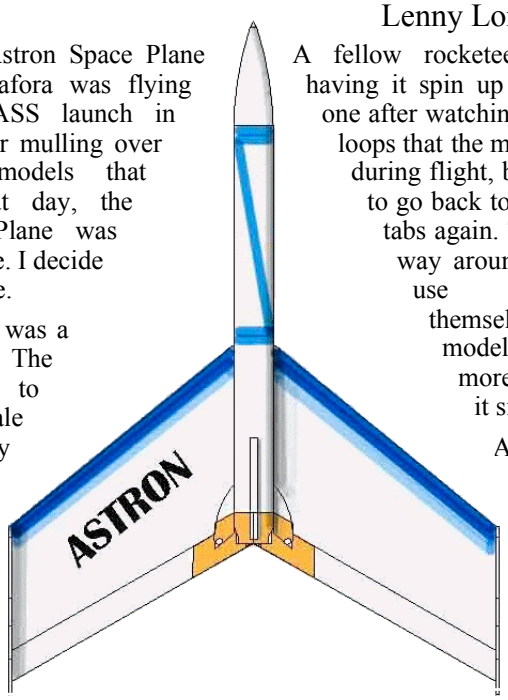
Issue 50 A Publication of the Central Massachusetts Spacemodeling Society May 2006

Astron Space Plane D

Lenny Loranger

I first saw an Astron Space Plane when Bill Spadafora was flying one at a CMASS launch in Tewksbury. After mulling over several B/G models that people had that day, the Astron Space Plane was really my favorite. I decide to try to build one.

My first attempt was a complete failure. The model seemed to chase its tale around the sky only to break into several pieces when it hit the ground. I tried taking the spin tabs off and making the fuselage longer. This made it more stable on the way up, but after multiple flights and repairs, the C.G. kept moving further and further back. To compensate for this, I had to keep adding more and more nose weight which made the model heavier. Then I would have to pitch the elevons higher to get a good glide. If the C.G. was at the same point as the C.P. the model would make large inside loops then crash into the ground. The 1/16" wings on some of my smaller models after time would look like propeller blades from all the stresses of flight. The elevon stops on the bottom of the wings kept coming off during flight even on the larger sturdier D powered models. Large amounts of glue or the kind of balsa I used made no difference.



A fellow rocketeer recommended having it spin up like the original one after watching the large inside loops that the model would make during flight, but I did not want to go back to those awful spin tabs again. There had to be a way around this. Why not use the elevons themselves to spin the model? Why make this more difficult? Keep it simple.

After building several models of different sizes and nine months of one problem after another, I finally came up with this version.

The information in these instructions is basically the same as that used for the original Astron Space Plane. But since this rocket is a little larger and uses a lot more power, dimensions and part sizes are going to be a little different. Some parts have been omitted all together for simplicity. Regardless of your previous experience you'll need to read carefully every detail. Do not try to hurry. Every pattern and part should be cut out carefully, following the lines exactly. Close attention to detail must be adhered to when aligning the wings, stabilizers, elevons, etc. An exact balance of weight and frontal area is extremely important for flight. Remember it is more important to do a good job than to get it done in one day or one afternoon.

Before you mark, cut, or glue, read the complete instructions. Become familiar with the different drawings and parts before you assembly the boost glider.

Creating Parts

Let's talk about the type of balsa that we will be using. C-grain balsa is very rigid and stiff and is heavy compared to A and B-grain balsa. A quick search on the internet may help you to find more information about the different varieties of balsa.

Cut out all balsa parts. Using a ball point pen, outline each pattern on the

You Will Need

In addition to the materials listed you'll need the following:

1) Sharp modeling knife or single edge razor blade.
2) Scroll saw, it will greatly facilitate cutting the balsa wood
3) Yellow wood glue (carpenters preferred)
4) Ballpoint pen or pencil
5) Scissors
6) 2 Spent 24 mm motor casings
7) Small scrap 1/8" plywood
8) Small plastic bolts (3/16" x 3/4" long)
9) Medium weight elastic thread
10) 4 Dubro plastic airplane hinges
11) Fine grit sandpaper
12) Primer and paint for finishing the model (prototype was covered in monokote)
13) Drill press (to be used for nosecone and hinge slots
14) Dremel #420 15/16" diameter x .045 thick cut off wheel
15) Tap that's similar in size to plastic bolts

proper piece of balsa wood as indicated on the pattern sheet. Be sure to transfer all assembly guide markings to the balsa wood part as indicated. Before cutting any of the pieces, be sure all of the parts have been completely marked out. Carefully cut out each piece using a modeling knife, single edge razor blade or scroll saw. Check each right hand part against its identical left hand part. Sand or trim until the matching parts are exactly the same shape and size.

I made my control tabs from wood composite materials which would prevent it from splitting. I used 1/8" thick balsa with 1/64" thick veneer wood glued on opposite sides of the balsa. Run the grains perpendicular to each other like plywood. This makes it strong and light. Screw holes in the control tabs are to be drilled with a 1/16" drill and threaded with a similar size tap. To avoid splitting, drill these holes first, and then thread the holes through them before cutting them out. Test fit the glide control bolts to make sure they are not too loose. If this is the case, you may have to fill in the holes with instant glue and trial fit again.

After you are through cutting, check to be sure you have the following list of wood parts:

2 wings

1 right stabilizer

1 left stabilizer

2 elevons with holes for elastic thread

2 control tabs with holes for screws and threaded with tap

1 right elevon lock

1 1" length of spent 24 mm motor casing

1 1/8" x 1" diameter plywood plate

1 turned nose cone to match Loc precision 24 mm tube

Fuselage

The fuselage is made up of 24 mm x 10.75" Loc Precision tubing. This Phenolic tubing is great because it can withstand the stresses from continuous flights launch after launch.

Cut out the body tube marking guide. Carefully cut around the outside edges, cutting each notch as indicated. Wrap this marking guide tightly around the body tube. Align the marking guide so that the rear of the guide is exactly even and straight with the rear end of the body tube. Tape the marking guide in place with scotch tape. Mark around the elevon recess and the vee-shaped alignment notches on each end of the marking guide. Remove the marking guide. Examine the body tube for correct markings.

Look at the motor block detail to get an idea of how the motor block assembly is put together. An empty 24 mm casing is cut out to 1" in length, and then a 1/8" thick x 1" diameter. plywood plate is glued to one end. When the assembly is dry, pour a little glue on the inside of the motor casing to help reinforce the plywood plate.

The motor block is to be glued into position 2.75" from the rear of the body tube. Look at the motor block detail for direction of thrust. The motor when installed should hit against the plywood plate. When the motor ejects, this should place less stress on the plywood plate. Place a little dab of glue near the end of a cotton swab. Reach through the rearward end (end with the elevon recess cutout) of the body tube 2 7/8" forward and make a circular pattern with the cotton swab. Be very careful not to get any of the glue near the rearward end of the body tube. Insert the motor block with the plywood plate facing the rear in the end of the body tube. Then, using a spent D engine casing, push it forward until the end of the engine casing is just the even with the rearward end of the body tube. Caution: once you have inserted the nose block far enough to come in contact with the glue to not allow it to stop until it is in the proper position. Some glues dry very quickly, and stopping for as long as a second may cause it to freeze in the wrong place. Remove the spent engine casing as soon as the nose block is in place.

Nose Cone Construction

Loc Precision does not sell nose cones for their 24 mm tubing. You can have a nosecone made by an outside vendor or do it yourself. A nosecone can be turned from a balsa block that is 1 1/2" x 1 1/2" x 4 1/2". I used 5/16" dowels top and bottom to hold the block in a drill press. I also made a support plate at one end to support the cone better. Marking a center spot top and bottom of the block, I drilled a 1/16" center hole and gradually worked my way up to a 5/16" x 1" deep hole. Use some yellow glue to hold these dowels in place. Let dry overnight. With a small wood plane or modeling knife you can carve off the 4 sharp corners until the block has 8 sides to it. When it comes time to shape the cone, this will make it easier to work with. Use low rpm's to rough shape the cone to the desired shape as shown on the plans. As you gradually go to higher speeds you can refine the shape to match the pattern outline. When you get to the cone tip, don't sand all the way through the dowel as this is the only piece you have for support. When the cone has reached the final shape you're happy with, you can cut the tip off after. Keep the dowel on the shoulder side of the cone attached. I liked to prime and paint the nosecone and wet sand the finish while it's spinning on the drill press. Trial fit the nose cone on the body tube. If the shoulder is too loose, use strips of tape to build it up. You do not want the cone permanently on because you may need to add extra weight sometime in the near future.

Making Wings

Use 1/4" thick C-grain balsa for the wings. After cutting a left and right wing, sand a rounded edge on the front and back of both wings to give a smooth airfoil. Place the root ends of the wings tightly together and secure with 2 strips of tape. Lay the elevons in position so that there is a 3/16" clearance provided between the ends of the elevons. A good way to obtain 3/16" space is to use some 3/16" scrap balsa as the thickness gauge. Space the elevons so that they are equally distant 3/32" from the projected center line between the two wings sections. Now is the time to mark location centers for all 4 hinges for the wing and the elevon.

Let's look at the hinge Dremel slot detail. Using the Dremel #420 cut off wheel, set the wheel in the drill press chuck and raise the drill press table with the wing on it so that the cut off wheel is half way up the thickness of the wing. Then using a small round sanding tool make a small 1/8" hole where the center mark locations are. Then proceed to cut out a slot as far as the cut off wheel will allow. This should leave enough room for the plastic hinge to slide in. Repeat this process 8 times. Rough up the hinges with rough sand paper glue all 4 hinges into place on the wing. When the glue is dry, attach and glue the elevons in

place. Sand the elevons to shape as shown in the drawings.

Wing and Fuselage Assembly

The amount of dihedral angle is very critical (dihedral is the angle made by the wings and the body tube where the wings point slightly upward rather than straight out). This angle is indicated on the rear view drawing. The Astron Space Plane 2 has been copied from the original design, so the dihedral is the same. The outer edges of the wings are even with the top surface of the fuselage body tube. The following method will make the right amount of dihedral angle. Lay the wing section with the tape strips up and place a thick, heavy strip of yellow glue across the root joint between the two wing sections. Do not get glue on the elevons or on the back or bottom surfaces of the wings. Next, turn the wings over and lay the wings on the fuselage body tube so that the glued area makes contact with the tube and the joint between the two wings exactly follows the alignment mark on the tube. The back edges of the wings are to be even with the forward edge of elevon recess cut out. The trailing edge of the elevons then will be approximately even with the rear edge of the tube. Press the glue joint firmly to be sure the wings are set evenly and tightly against the fuselage body tube. Then lay the model aside to dry with the elevons projecting over the edge of the work table. While the model is drying, the wingtips and the complete length of the body tube should be lying flat against the table. Use small weights to accomplish this. Do not handle the model until this glue joint is completely dry.

Stabilizers

The stabilizer patterns have markings which show where they are to be attached to the wingtips. When properly marked, each stabilizer should have a guide mark on the inside of the stabilizer for attaching to the wingtips. After the wing and body tube joint has dried thoroughly, glue the stabilizers in place. The stabilizers should have the pointed ends forward and be positioned even with the leading edge of the wing. The vertical stabilizers should be aligned so that when the glider is in a horizontal position the stabilizers set vertically and parallel to each other. Use the stabilizer guide pattern for alignment. When this is dry, reinforce the stabilizer joints with fillets.

A Few More Parts

Install the control tabs following the markings on the side of the fuselage. The 3-view drawing will give you a good idea where to place them.

Glue the launch lug and spacer together as an assembly then place along line as shown in the 3-view drawing.

Cut out an elevon block from scrap balsa and glue this to the right elevon. Sand or build up this block until you get 11 degrees pointing down. The left elevon may have to be sanded down to provide 11 degrees up dihedral.

Run the elastic thread through the holes drilled in the trailing edge of the elevons. Tie the end of thread with a knot large enough not to pass through the hole. Make the thread long enough so that it can pass around the plastic bolts and in front of the launch lug spacer yet have enough tension to get the elevons to snap up once the motor pops out.

Fill the wing joint crack between the wings with glue.

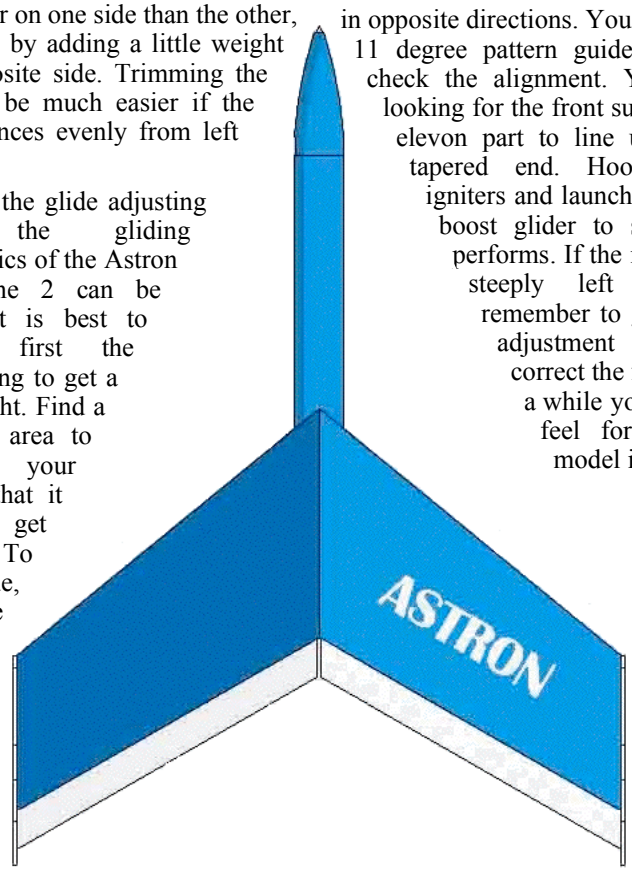
Glide Trim

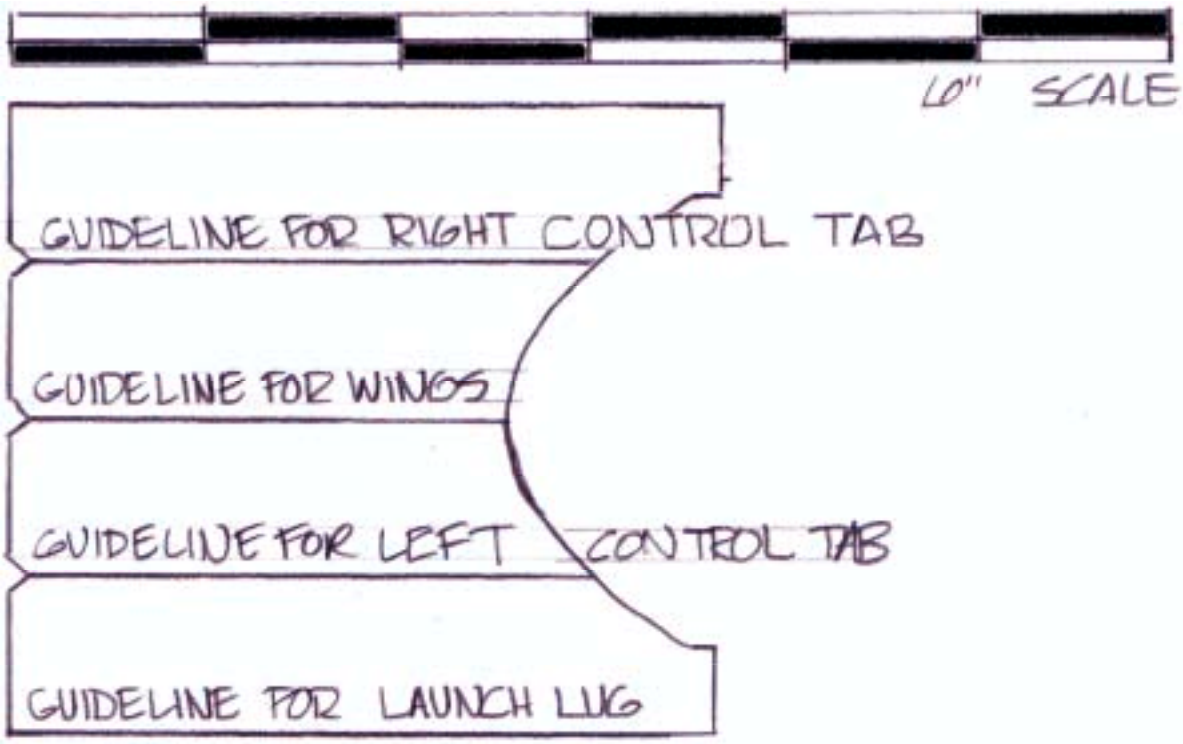
Make sure your model balances evenly left to right. You can check this by balancing a ruler down the center of the body tube lengthwise. If the model is a little heavier on one side than the other, compensate by adding a little weight to the opposite side. Trimming the glider will be much easier if the model balances evenly from left to right.

By turning the glide adjusting screws, the gliding characteristics of the Astron Space Plane 2 can be changed. It is best to determine first the proper setting to get a straight flight. Find a tall grassy area to test glide your model so that it won't get damaged. To test the glide, grasp the model by the fuselage body just ahead of the wings and throw it through the air into the wind. If the model nose dives, adjust the elevons so that they pitch up. This can be accomplished by turning both glide control adjusting screws so that the elevons move up. If the model stalls, reverse the process. Repeat this testing and adjusting until the model glides straight ahead when thrown. The model should glide for about 15-20 feet. To set the glider for a right turn, adjust the right elevon so that it sits a little higher than the left one. This can be done by turning the adjusting screw counter clockwise. Turning the adjusting screws in 1/4 or 1/2 turn increments can make for more accurate changes in flight. If you want the model to turn left repeat the same procedure for the left elevon. A close circle and fast recovery can be made by turning the adjusting screw 1/2 to one complete turn. On windy days (10-15 mph winds) a fast recovery is best in order to keep your glider from landing too far way from the launch area. For contests and exhibitions you'll find these adjustment features very useful.

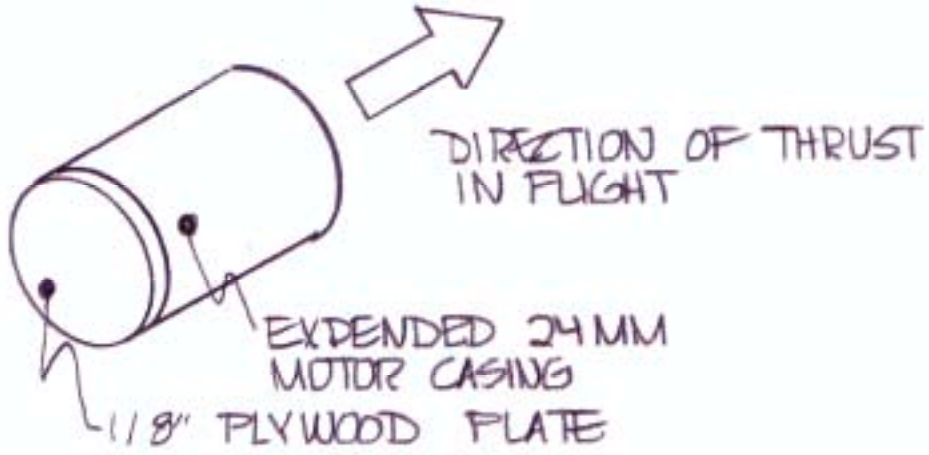
Ready for Liftoff

Astron Space Plane D requires 1 Estes D12-3 motor. This model can be launched from a standard 3/16" x 36" launch rod. When inserting the motor make sure that the elevons are deflected in opposite directions. You can use the 11 degree pattern guide to double check the alignment. You're only looking for the front surface of the elevon part to line up, not the tapered end. Hook up the igniters and launch. Watch the boost glider to see how it performs. If the model turns steeply left to right, remember to go over the adjustment features to correct the flight. After a while you will get a feel for what the model is doing.

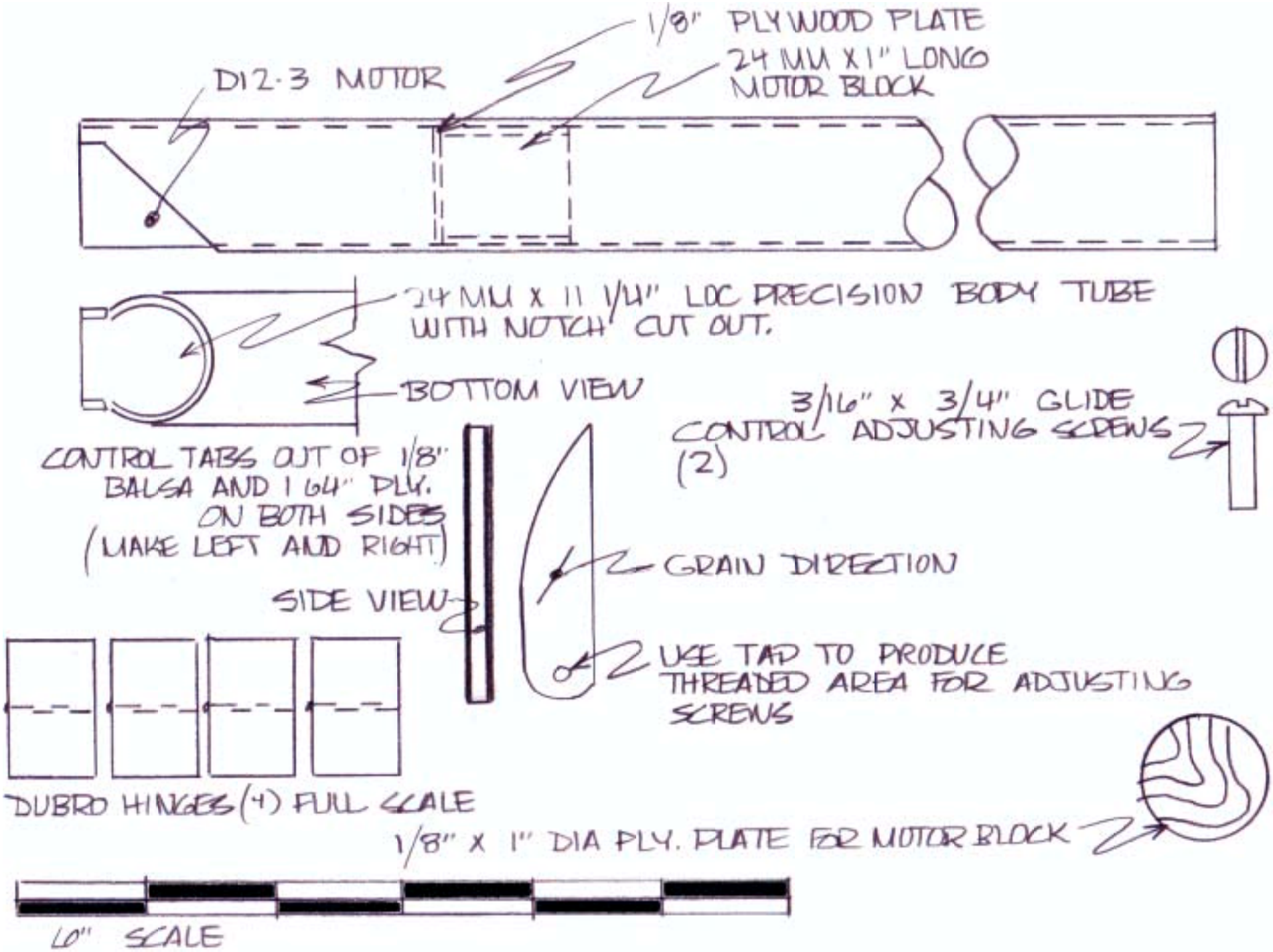


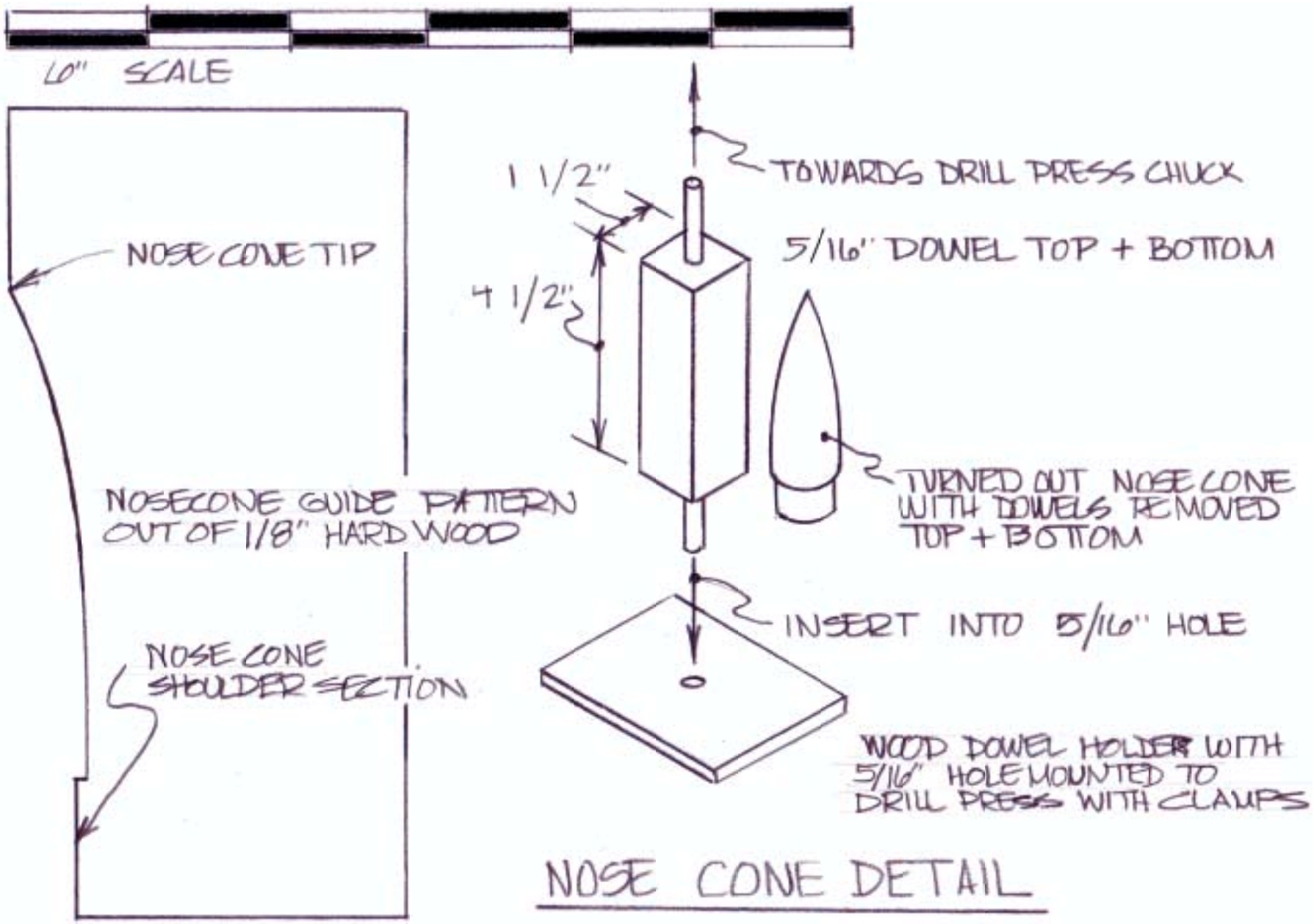


FUSELAGE TUBE MARKING GUIDE

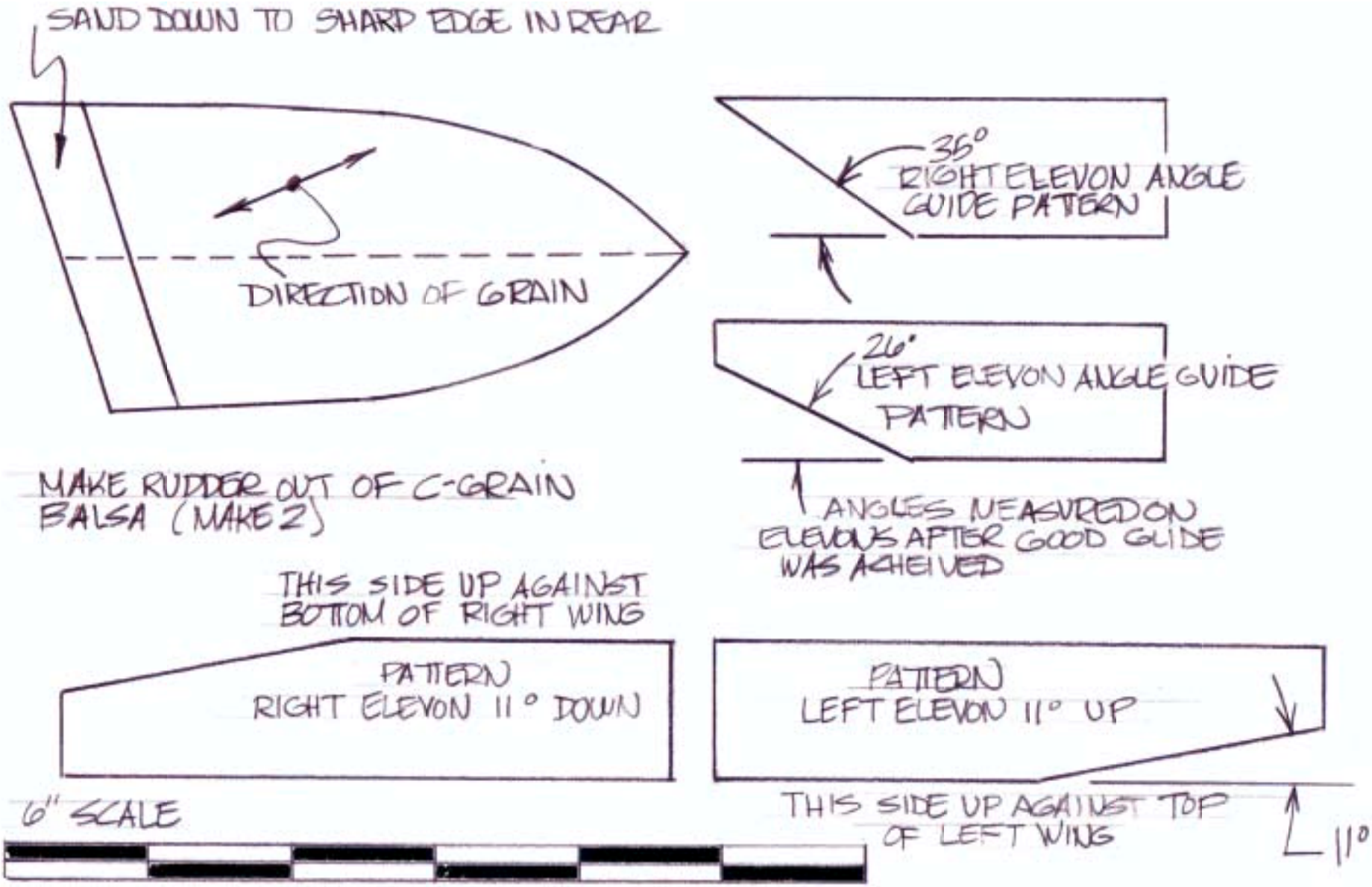


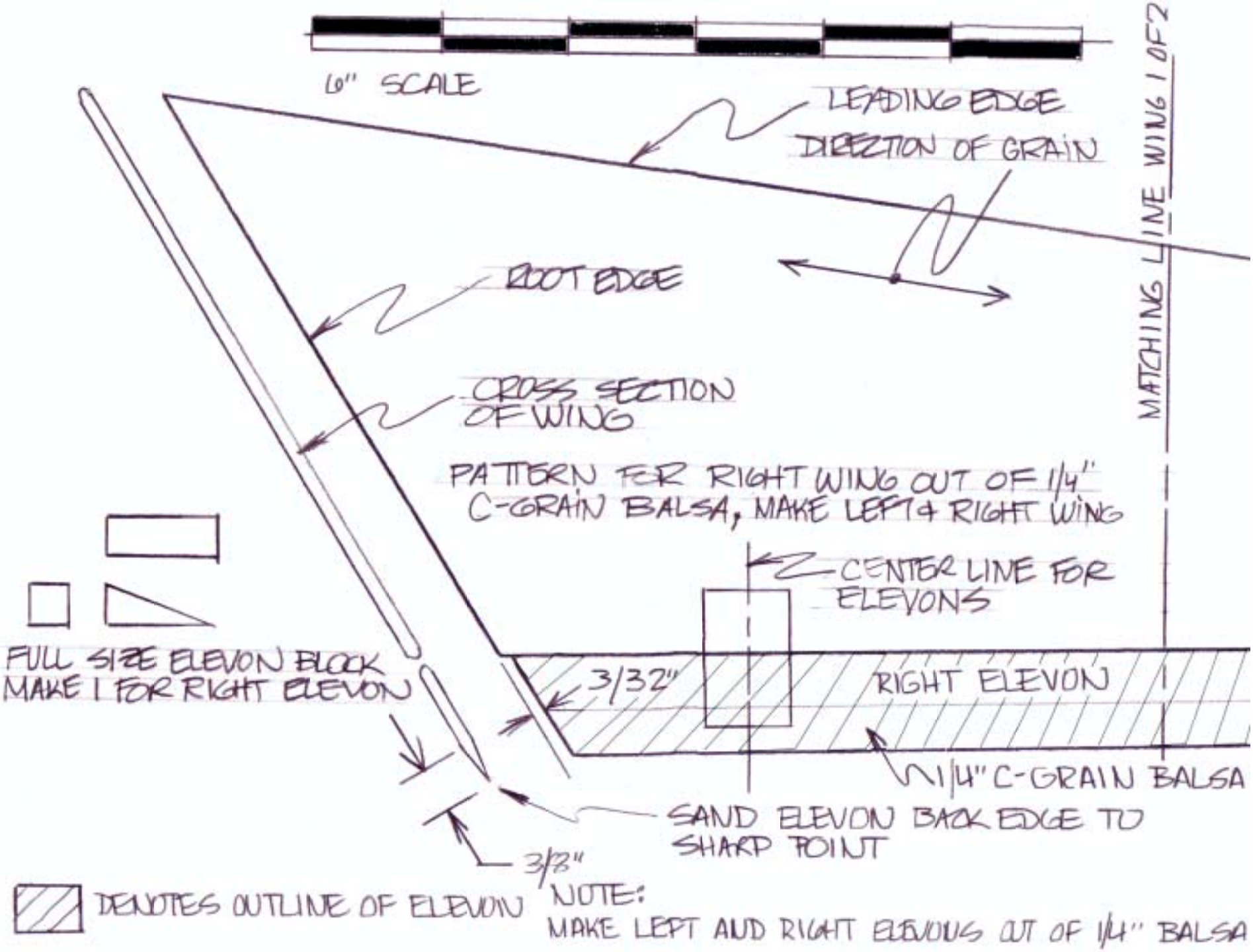
MOTOR BLOCK DETAIL


1/8" PLYWOOD PLATE
24 MM X 1" LONG MOTOR BLOCK
D12-3 MOTOR
24 MM X 11 1/4" LOC PRECISION BODY TUBE WITH NOTCH CUT OUT.
BOTTOM VIEW
3/16" X 3/4" GLIDE CONTROL ADJUSTING SCREWS (2)
CONTROL TABS OUT OF 1/8" BALSA AND 1/64" PLY. ON BOTH SIDES (MAKE LEFT AND RIGHT)
SIDE VIEW
GRAIN DIRECTION
USE TAP TO PRODUCE THREADED AREA FOR ADJUSTING SCREWS
DUBRO HINGES (4) FULL SCALE
1/8" X 1" DIA PLY. PLATE FOR MOTOR BLOCK
10" SCALE



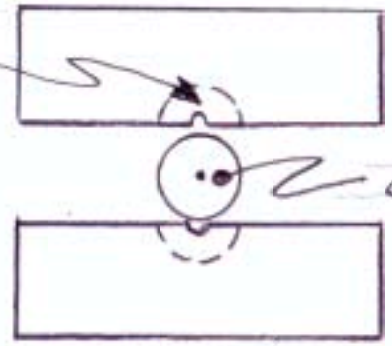
NOSE CONE DETAIL


SAND DOWN TO SHARP EDGE IN REAR
DIRECTION OF GRAIN
35°
RIGHT ELEVON ANGLE GUIDE PATTERN
26°
LEFT ELEVON ANGLE GUIDE PATTERN
MAKE RUDDER OUT OF C-GRAIN BALSA (MAKE 2)
ANGLES MEASURED ON ELEVONS AFTER GOOD GLIDE WAS ACHEIVED
THIS SIDE UP AGAINST BOTTOM OF RIGHT WING
PATTERN
RIGHT ELEVON 11° DOWN
PATTERN
LEFT ELEVON 11° UP
6" SCALE
THIS SIDE UP AGAINST TOP OF LEFT WING
11°

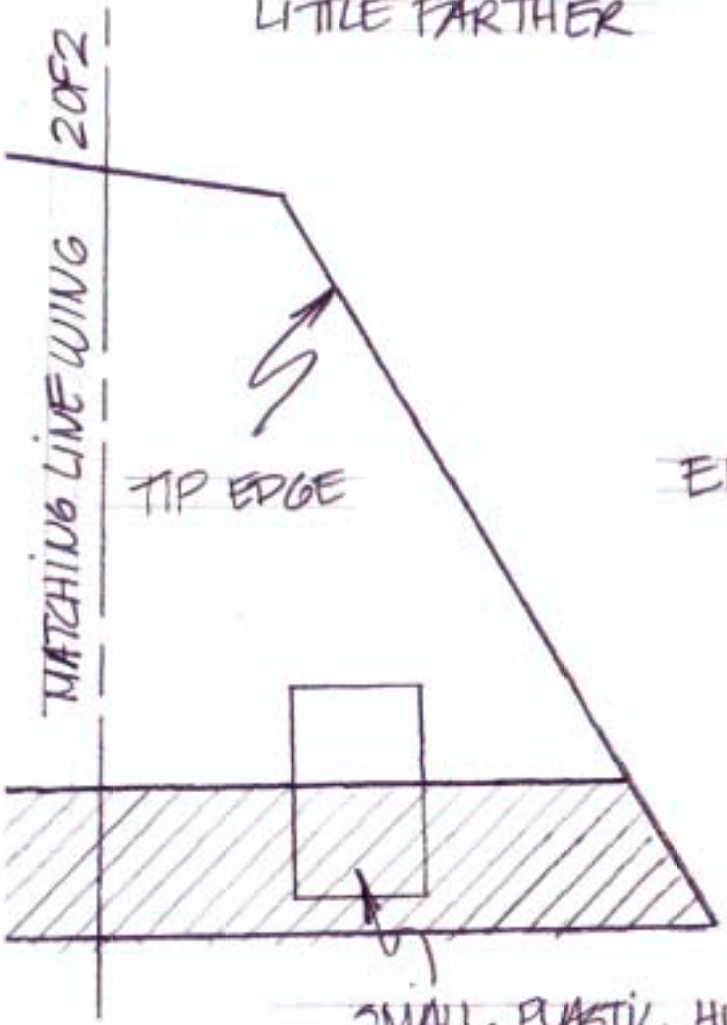

6" SCALE
LEADING EDGE
DIRECTION OF GRAIN
MATCHING LINE WING 1 OF 2
ROOT EDGE
CROSS SECTION OF WING
PATTERN FOR RIGHT WING OUT OF 1/4" C-GRAIN BALSA, MAKE LEFT & RIGHT WING
CENTER LINE FOR ELEVONS
FULL SIZE ELEVON BLOCK MAKE 1 FOR RIGHT ELEVON
3/32"
RIGHT ELEVON
1/4" C-GRAIN BALSA
SAND ELEVON BACK EDGE TO SHARP POINT
3/8"
DENOTES OUTLINE OF ELEVON
NOTE:
MAKE LEFT AND RIGHT ELEVONS OUT OF 1/4" BALSA

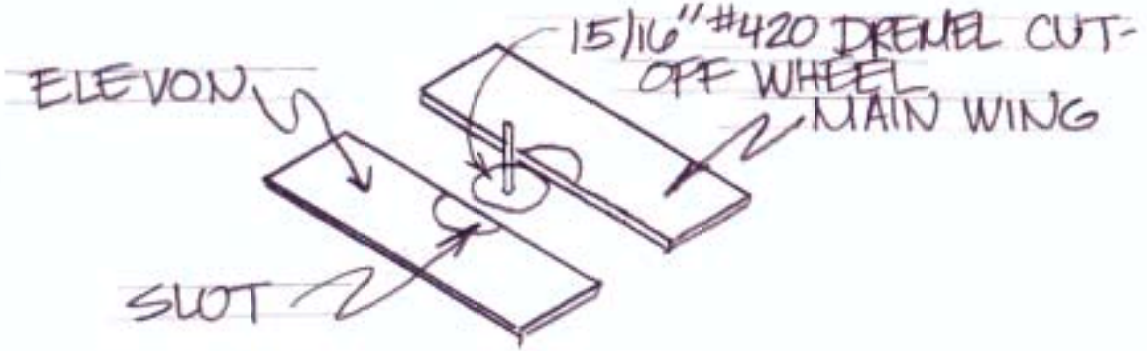
6" SCALE

CUT OUT HALF CIRCLE THRU WING AND ELEVON SO THAT CUT OFF WHEEL CAN GO IN A LITTLE FARTHER



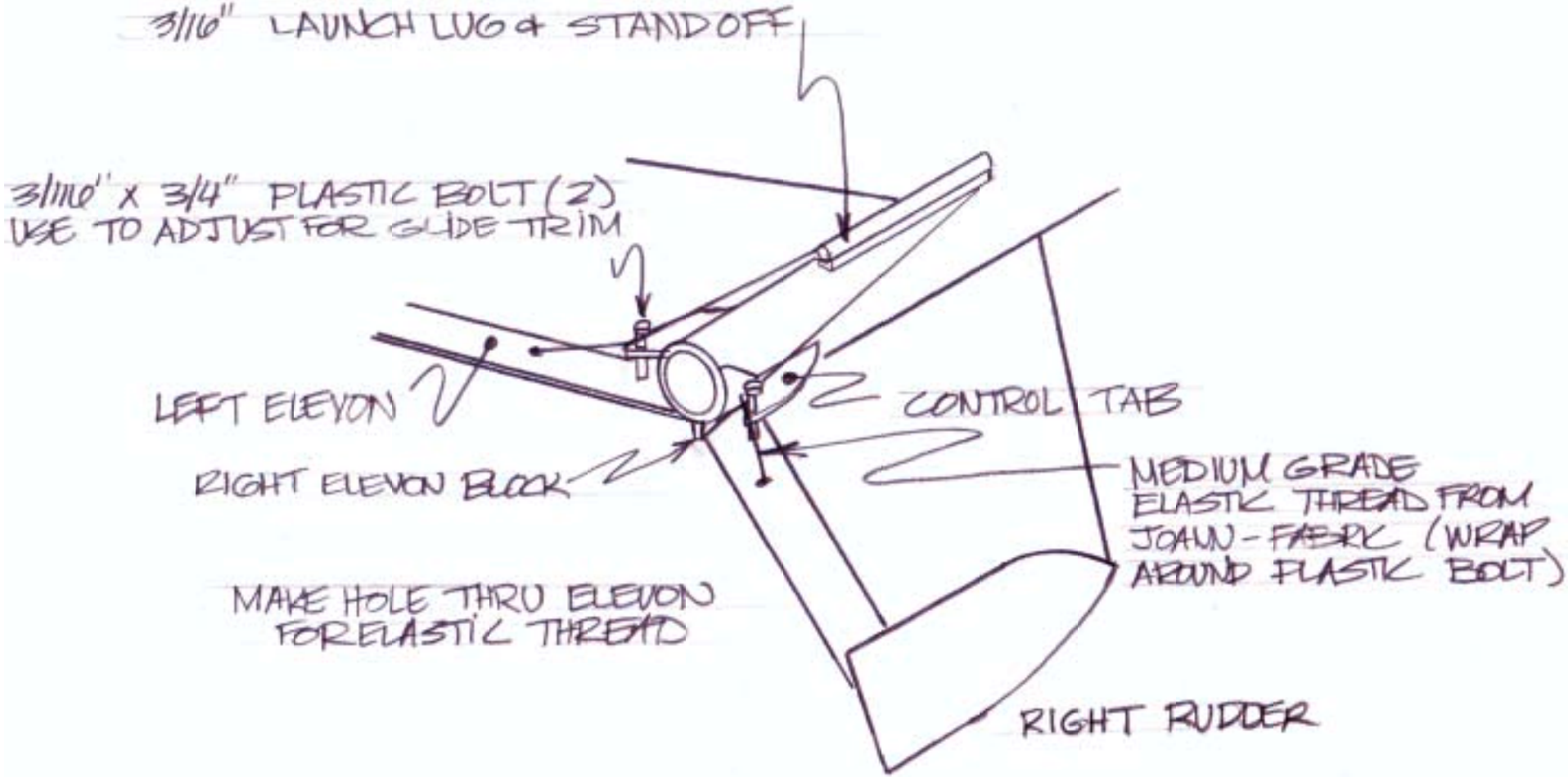
TOP VIEW





DREMEL SLOT DETAIL

SMALL PLASTIC HINGES GLUED TO INSIDE OF WING AND ELEVON (ROUGH UP PLASTIC HINGE WITH SAND PAPER BEFORE USING SLOW CURING GLUE FOR BETTER BOND.



ELEVON, WING AND FUSELAGE DETAIL ASSEMBLY

Paper Rocket Workshop

A continuing series about paper modeling techniques.

18-mm Motor Mount Tube

Mike O'Malley

You can find many static display card models on the Web. Most of these paper models can be converted to flying model rockets with the addition of a Motor Mount Tube (MMT), launch lug and recovery system. Fashioning a MMT from paper is an easy project, and will provide a foundation for your paper modeling skills.

A typical motor mount for low-power rockets consists of a motor tube, thrust ring and two centering rings. This article outlines construction of a MMT that fits inside a 1-inch diameter body tube (BT-50). Hereafter, we'll use metric dimensions as it's easier to work in millimeters versus fractions of an inch.

Let's create a motor mount for the standard 18-mm Estes motors (A, B and C-class motors). Of course, these same techniques can be applied to 13-mm and 24-mm MMT's. Please read the entire article before assembling your first motor mount.

Paper Stock

Copy the pattern sheet to 67 lb. cardstock. The 67 lb weight is a typical paper stock used for card modeling. The 110 lb cardstock is stiffer, but it's harder to roll and fold. More to the point, a double layered tube of 67 lb. cardstock is stronger than a single layer of 110 lb. paper. Laminates form strong building systems, and this principle translates to paper construction as well.

Additional high-quality pattern sheets, in Adobe Acrobat (PDF) format, are available at the following web page:

http://www.cmass.org/member/Michael.OMalley/mmt.htm

Cut out all parts using sharp scissors or a hobby knife. Cut on top of the black lines. Do not cut the dashed lines.

Mandrel

A superior body tube is created when a mandrel is used to roll the tube. For a MMT, the mandrel will be a spent 18-mm motor casing. Sometimes a tight fitting tube is created using a spent casing. Adding one or two layers of clear plastic packaging tape will increase the mandrel diameter, thus increasing the diameter of the motor tube. Also, the tape provides a water-resistance covering to the spent motor casing.

Adhesives

For low-power rockets a glue stick will be adequate, Elmer's Glue-All is a common selection, while paper cement such as Best-Test Paper Cement will provide the strongest glue joints.

Double glue joints provide greater adhesion than a single layer of glue. Coat one surface with a thin layer of glue and let dry. Apply a thin layer to the opposite side of the paper joint, then press to two layers together and hold for a few seconds. Caution: double glue joints can not be adjusted as the glue will immediately grasp the paper.

An old credit card can be used to quickly spread a thin layer of white glue to paper parts. Be sure to use wax paper to protect your work surface. Keep your paper parts clean from dirt or dust.

Motor Tube Assembly

The Motor Tube Wrap is 118 x 70 mm. Pre-shape the paper wrap by rolling it around the spent motor casing (mandrel).

For a double glue joint, apply a thin layer of glue to the top side of the inner layer (Layer #1). Let glue dry. Next, apply a thin layer of glue to the bottom side of the outer layer (Layer #2). Slowly roll the wrap around the mandrel, applying even pressure as you progress. Remove the mandrel from the tube. Set aside for one minute as the glue dries.

Centering Rings

The Centering Ring Wraps are 7 x 216 mm. Four strips of paper are needed to build up a

A Visit from the UK

Bill Spadafora

We had a guest speaker at our May 16 meeting. Phil Charlesworth from the UK tries to make it to a club meeting whenever he's in the US on business. This time his trip coincided with one of our meetings and he offered to stop by and tell us about model rocketry in the UK. He even had a slide show and videos on his laptop.

There are far fewer fliers in the UK than I thought, around 300. Because of the small market and a tariff on imports they see mostly Estes, Aerotech, and Cesaroni products. They get very little Quest stuff, and a few kits and no motors from other countries in Europe.

Their regulatory environment is very similar to ours, with an equivalent to the FAA that is reasonably easy to deal with. Getting clearance up to 24,000 feet is not difficult in most areas and in most cases getting a NOTAM issued involves a process that is similar to what we have to do to for a LMR notification. There is an agency similar to the BATFE that recently made a classification change that makes some rocket motors difficult to buy and store. Sound familiar? I suspect an international conspiracy.

They have a really large field that they fly on. In the pictures it appeared flat with no trees although there were power lines at the edge. Most launches are much smaller than your average CMASS launch and it's a bring your own pad arrangement. Flyers must be insured.

Phil showed us pictures and videos of several launches. Evidently flyers over there are just as strange as ours. There was a flying picnic table, a flying pig and a rocket-powered Mini Cooper (not a model!) was sent down a ski jump.

I may have forgotten but is it possible that we got through a meeting with a guy from the UK without an obscure Monty Python reference? [*You may have missed it; John Buscaglia made a very brief reference to "Quest for the Holy Grail" and Phil perked up. -ed*]

You can get more information on Phil's Web site:

http://hometown.aol.co.uk/chrlswrphl

or UKRA's:

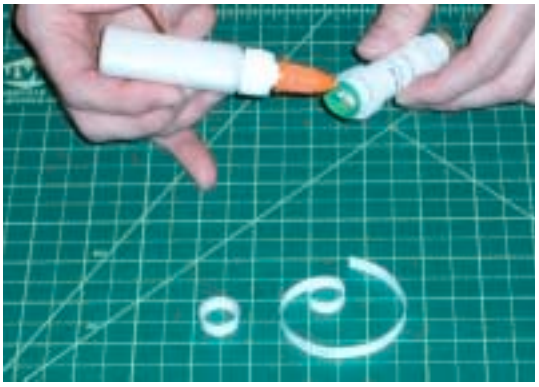
http://www.ukra.org.uk/index.html

Motor Mount Tube

Continued from Page 11

ring to fit inside a BT-50 body tube. Apply the First Wrap (7 x 60 mm) on the motor tube. Next, add three more full-length strips (7 x 216 mm) on top of each other, building the ring thicker as each layer is applied.

Spread a thin layer of glue on one side, and roll the strip of paper around the motor tube at the indicated locations. Start the first paper wrap aligned with the vertical seam on the motor tube. Start the additional wraps at the end of the previous strip. The mandrel can be inserted inside the motor tube for support. Roll the part slowly, applying even pressure, so no voids occur between layers. Repeat for second ring. Set the MMT aside to allow the glue to dry.



Thrust Ring

The Thrust Ring Wrap is 7 x 216 mm. Roll the thrust ring in to a circle smaller than the motor tube diameter. Insert the thrust ring in to the tube, let it expand to fill the tube, apply one drop of white glue to the inside most wrap of the thrust ring. Press firmly between your fingers and remove the thrust ring from the body tube. Let the glue dry for one minute.

Apply a thin layer of glue along the inside of the entire wrap. Roll the paper wrap upon itself to create a multi-layer thrust ring. Press the paper firmly as you buildup the ring. Set aside for one minute as the glue dries. Install the thrust ring to the forward end of the motor tube. Apply a normal layer of glue to the outside of the thrust ring and insert into the MMT.

Motor Retention

For A, B or C-motors, a friction fit within the motor tube will suffice. Before installing a motor in your rocket, apply one or two layers of masking tape around the motor. Too little tape and the motor will kick-out at ejection. Too much tape and the spent motor may be difficult to remove from the MMT. Trial and error is required.

If positive motor retention is preferred, a motor hook can be fashioned from a jumbo paper clip. A sample motor hook design is presented on the pattern sheet. Use small needle-nose pliers to fashion the paper clip in to the shape of a motor hook. Tack the motor hook to the motor tube with Scotch tape, and then install the centering rings. The rings will secure the motor hook to the tube.

Your motor mount tube is complete and ready for installation in your next model rocket or flying card model.

The Paper Rocket Workshop is a continuing series about paper modeling techniques. Contributing writers are welcome; send articles to the editor at:

sentinel@cmass.org

Erratum

In the December 2006 issue of The Sentinel, Issue 49, the patterns for the Sayonara Paper Tiger were not printed exactly to scale.

To use the patterns, copy to 67 lb. cardstock. Adjust the copier to print at 93-percent of original size. This setting should output precise patterns. Additionally, there are high-resolution pattern sheets on the following Web page:

http://www.cmass.org/member/Michael.OMalley/sayonara.htm

18-mm Motor Mount

Michael J. O'Malley, NAR #83900

Pattern Sheet
Print on 67 lb. cardstock

Motor Tube Wraps (118 x 70 mm)

Layer #1
Inner Layer (56 x 70 mm)

Double glue joint:
Glue this side
Let dry

Forward centering ring - glue here

Layer #2
Outer Layer (62 x 70 mm)

Glue back side

Aft centering ring - glue here

25 mm
Square

Layer #1
Inner Layer (56 x 70 mm)

Double glue joint:
Glue this side
Let dry

Forward centering ring - glue here

Layer #2
Outer Layer (62 x 70 mm)

Glue back side

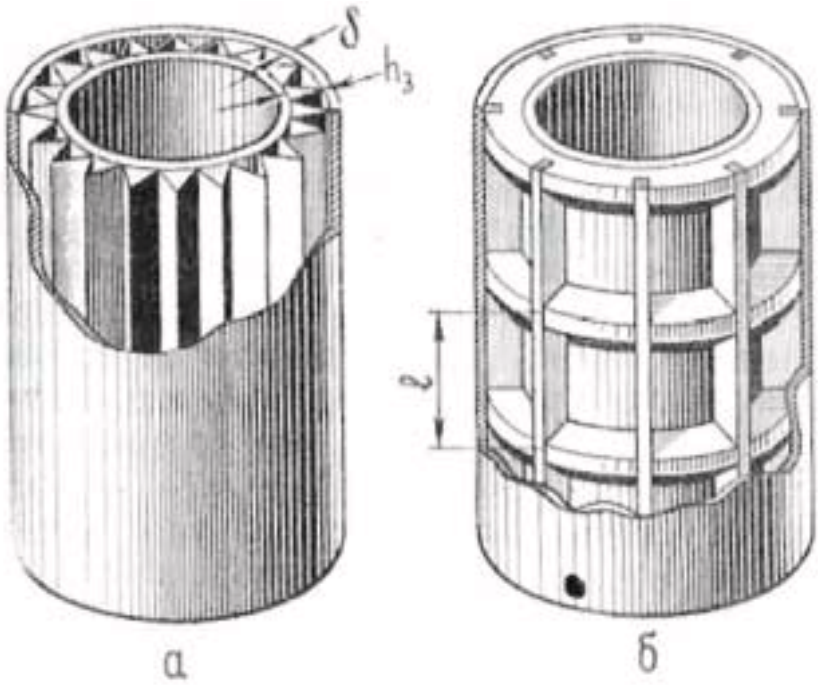
Aft centering ring - glue here

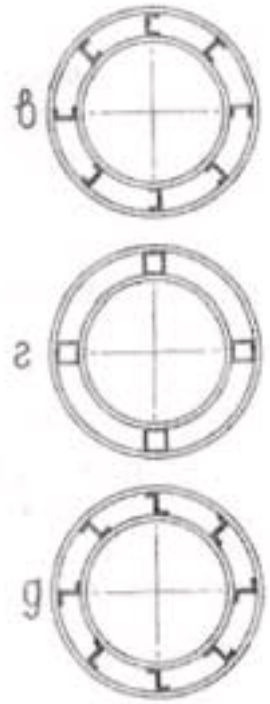
Motor Hook Pattern

Thrust Ring & Centering Ring Wraps (Cut strips the full width of the page, 216 mm)

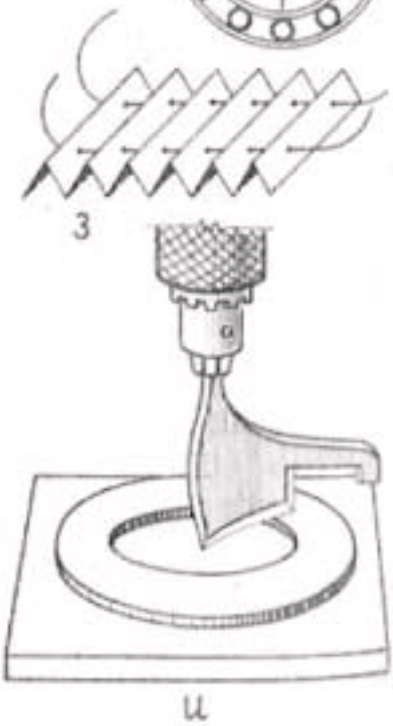
Thrust Ring (7 x 216 mm)		
Centering Ring (7 x 216 mm) - Wrap #2		
Wrap #3		
Wrap #4		
Centering Ring (7 x 216 mm) - Wrap #2		
Wrap #3		
Wrap #4		
First Wrap (7 x 60 mm)		First Wrap (7 x 60 mm)

Border is 6.50 inch x 9.75 inch (165.10 mm x 247.65 mm)





Techniques for centering motor mount tubes from Модели Ракет by И.В. Кротов published in the Soviet Union in 1979



THE SENTINEL

The Sentinel is published irregularly by the Central Massachusetts Spacemodeling Society (CMASS) of Auburn, Massachusetts, which is section number 464 of the National Association of Rocketry (NAR).

CMASS Club Contacts

President
Bill Spadafora, NAR 2097, L2
5 Granby Street
Saugus, MA 01906
781-233-0339
Bill.Spadafora@cmass.org

Senior Advisor
Bob Krech, NAR 78096
26 Ballard Street
Saugus, MA 01906
978-317-3512
Robert_Krech@cmass.org

Webmaster
John LoVerso
webmaster@cmass.org
Web Site: www.cmass.org

Secretary
Peter Chestna, NAR 78787, L1
248 Millbury Street
Auburn, MA 01501
508-832-9313
Peter.Chestna@cmass.org

Treasurer
John Buscaglia, NAR 27366, L1
3 Raymond Court, #18
Hudson, MA 01749
978-568-9337
John.Buscaglia@cmass.org

Editor
Ed Pattison-Gordon, NAR 56764
sentinel@cmass.org

Please feel free to contact any or all of us with questions you have about CMASS, the NAR, or rocketry in Massachusetts.

CMASS Membership Form

Name _____ Birth Date _____

Street _____ Phone _____

City _____ State _____ Zip _____ Email _____

Membership type

☐ NAR: Member number _____ HPR level: ☐ None ☐ 1 ☐ 2 ☐ 3

☐ Associate: I agree to abide by the NAR Safety Codes when flying at CMASS launches.

Dues for twelve month's membership

☐ $4, 14 or younger

☐ $6, 15-17

☐ $8, 18 or older

Membership renewals are due either January 1st or July 1st, whichever is closest to the day you joined. Your membership expiration date is printed on the mailing label.

Make check payable to CMASS and mail with this form to:
CMASS, 248 Millbury Street, Auburn, MA 01501

CMASS Launches

2005 Proposed Launches

April 22	Amesbury
May 13	Tewksbury
June 3	Tewksbury
July 8	Amesbury
July 22	Amesbury
August 12	Acton
September 9	Tewksbury
September 23	Amesbury
October 7	NEMROC, Amesbury
October 21	Amesbury
November 4	Amesbury
November 18	Amesbury

Launch Day Schedule

9:30	setup range
10:30	launching starts
4:30	take down range

Amesbury: Woodsom Farm Park, Amesbury, MA
Tewksbury: Livingston Street Park, Tewksbury, MA
Acton: School Street soccer fields, Acton, MA

Directions. Send email to:
secretary@cmass.org

Schedule Changes. Our schedule may change, for the latest information go to our Web site:
www.cmass.org

Weather Cancellation. *After* 8:00 AM on the day of the launch, if the weather looks questionable, call 781-231-1018 before heading to the site.

CMASS Club Meetings

Meeting Schedule

June 6, 20	Saugus
July 11, 25	Marlborough
Aug 8, 22	Saugus
Sept 5, 19	Marlborough
Oct 3, 17	Saugus
Nov 7, 21	Marlborough
Dec 5, 19	Saugus

Meetings are usually held the first and third Tuesday of each month from 7:00-10:00 pm. The location alternates each month between:

- ☞ Bill Spadafora, 5 Granby Street, Saugus, MA 781-233-0339
- ☞ Doug Steinfeld, 72 Prendiville Way, Marlborough, MA 508-481-9337

Please call for directions or to confirm a meeting. Changes in date or location are sent to the meeting@cmass.org mailing list (email webmaster@cmass.org to be added).

Note:Meetings shifted one week in July and August..

THE SENTINEL
Central Massachusetts Spacemodeling Society
248 Millbury Street
Auburn, MA 01501_