Throw "Caution" To the Wind .15 size slow combat

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What is he talking *about* ***"throwing caution to the wind".*** Well the whole project was instigated by trying to get some of the club members to do something more exciting than fly straight and turn left. So what came out of it was a discussion to build a ***"slow"*** combat plane. ***Slow combat?*** Most people think of combat and wild, fast and furious. Well that's true, but its usually reserved for a few with great eyesight, fast reflexes and a very competitive spirit.

So what is ***Slow combat***…..well its no more than a .15 engine, fully symmetrical foam wing, no dihedral, box fuselage construction, no landing gear, no rudder and really cheap and easy to build….and you can see it too when you fly…. There is nothing unique about this aircraft other than the fact that it brings a club together and improves moral actually is one heck of a lot of fun.

OK…so why slow? Well a lot more people will be able to fly slow and it's a heck of lot safer as well. The other reason for all of this is not just to build another plane, but to have a common project that a club can work on without being outright competitive or expensive. It's a very simple design that new as well as season flyers that can have fun, building, sharing ideas and having a few laughs combating each others at a much slower pace than the traditional combat that we are use to hearing about. Its also a great plane (sorry about the pun) to toss into your trunk, go to the field and toss it into the air for some air time.

The other design point was that it must be built within a few days, use existing junk that you have in your junk box and when you finish it…ie cover, paint, tape etc…..just throw "caution" to the wind…..(don't spend any time detailing it). The other way of making these planes is to set aside one weekend afternoon and rather than flying, get a case of your favorite beverage, get the guys that are interested and make a bunch of planes in your basement or garage. Installation of

hardware and covering will be left up to each individual. Cost of the materials will be split up amongst the group. You would be surprised what can be accomplished with 5-6 people going like stink and making these planes. The other benefits are all the jokes that start to fly around when a bunch of guys getting together to work on a common goal.

I have tried to put together a fairly comprehensive description of the plane construction below, however since this is the first draft, I don't expect it to be perfect. Please let me know of any discrepancies, mistakes or whatever so that we can correct the document.

WING DETAILS

The Wing was designed around the NACA 0014 profile….the high tech engineering reasons for this selection of airfoil was "this looks about right" and "looks good to me". The wing overall length was 40" with a 8.25" chord…(the additional .25" dimension was "just because"….. The wing was made from white foam but the pink or blue would have worked just as well. The templates for the wing to do the foam cutting was made from 1/16" aluminum sheet or you can use what ever you have. Each wing was made in two pieces of 20" each. The leading edge was made from a piece of hard ½" x ¼" balsa while the trailing edge was made from ¼" x ¼" balsa. The only glitch here was that these balsa pieces came in 36" lengths, so I had to join the pieces together using a splice joint. (note……editor finally figured out that you can buy 48 inch lengths……duh!!!)

Since there are no standard type spars in the wing but 2 ¼" dowel rod x 18-24" long were pushed into the center of wing about 2.25" from the leading edge and 2" back from the trailing edge to a depth of 9-12" making absolutely sure that they go in square and perpendicular otherwise you will have a wing with a dihedral in it. Sharpen each dowel to a point and gently push them into the wing. Do that for both dowels. Remove the dowels, pour in some white glue or epoxy in the holes and replace the dowels. Wait until the glue dries. Line up both wing halves against a straight edge and push the other wing onto the protruding dowels from the other wing half. Remove, add glue into the holes and spread glue along the faces of the wing. Push the two wing halves together and hold them tightly together using masking or packaging tape making sure that there is no dihedral. Leave over night to set. If you end up with some dihedral….big deal.
(editors note: I have seen some people cut out a slot in the top and bottom wing and inserted a ¼ spar along the full length and then glued it it. Should work as well). While this is drying, start work on the fuselage….(see next section)

Once the wing halves are dry, glue the leading and trailing edges to the wing without sanding or shaping first. Hold them down to the wing using tape and white glue. Cut 2 rectangular pieces of 3/32" balsa 8.5" long x 1.5" wide and glue them to the end of the wings. These will be the wing tips. Do not try to sand or shape them yet. Once the LE, TE and wing tips are dry, shape them to size using a razor plane, followed by sandpaper. Don't get to fancy here….just a nice blunt leading edge, shaped tailing edge and a wing tip that follows the wing profile. This shaping and sanding process should take no more that 5-10 minutes max. Any more than that then you should take up another hobby *S*.

Cut 2 pieces of 1 or 2 oz fiberglass cloth 2 " x 32" long. Center these pieces about 2.25" from the leading edge of the wing and along the wing.. Glue them down using thinned epoxy on both sides of the wing….time about 10-15 minutes. Do not apply gobs of epoxy just a thin layer to bond the

glass to the wing. These will act as spars as well. Do one side first. Do something else while this is curing. Some of the others did not use this additional process and the plane flew quite well. At times the wing did tend to bow in a high G maneuver, but to date no wings have folded up….go figure eh?

Using 1- 2 oz fiberglass cloth, wrap the center section with a piece of cloth that is 5" wide x about 18" long. Use some epoxy, lightly thinned with alcohol and glue the fiberglass to the wing. You will now have one strong wing. This whole process should take about 20 minutes max. I was really amazed how strong this wing has become.

Make the aileron servo mount from 1/8" scrap ply. Make it about 3/8" bigger than the servo on each side. Cut out the opening for the servo and position the servo mount, center on the wing, about 3-4 inches from the trailing edge. Glue this mount to the wing with epoxy. After it dries, cut out the foam to make room for the servo. Cut a whole on the other side of the wing for the servo lead to exit.

To make the ailerons, you can use commercial aileron stock ¼ x 1" or use the 3/16" balsa left over from the tail feathers. Its really up to you. As for the connections between the servo and aileron, you can use torque rods or drive the aileron directly from the servo. I prefer using torque rods and burying them into the wing. Use whatever you have around or feel comfortable with.

Lightly cover the ply with alcohol thinned epoxy to provide a bit of fuel proofing.
Lightly sand the wing to remove any sharp edges left from the epoxy / fiberglass combination.
Make slits in the trailing edge for fabric hinges. I used 3 locations along each side of the wing for the ailerons.

FUSELAGE DETAILS

The fuselage was made from 3/32" x 3" balsa based upon a box type, "ugly stick' construction. The firewall is ¼" ply, F2 and F3 and made from 1/8" ply and F4 and F5 are 3/32" balsa. Some fuses were made using 1/16" balsa, but although it was light, it was very weak. I highly recommend that you use 3/32" balsa for strength.
The sides of the fuse are parallel up to F3 and then are bent to shape at the rear. The tail of the fuse is only ½" wide, so you are going to have to put in a small piece of balsa about 1" high to make the ½ " width.

Start first by cutting out the sides of the fuse, including the wing profile cutout.
Now cut out F1, F2 and F3. Locate the center of F1 and determine the mounting hole location for the motor mount. I used a Dave Brown 1519 mount for this design. Insert the 4-40 "T" nuts and add some epoxy to the sides of the nut for a bit more strength if you like. Glue F1, F2 and F3 to one sides of the fuse, making absolutely sure that they are square and flush to the side. I like to use 12 minute epoxy for these locations. Once this is cured, glue the other side of the fuse together making sure the everything is square and perpendicular. These are the only areas that I would recommend that you take some time.

The firewall F1 must have ¼ x ¼ triangle stock and glued to the sides to provide some strength.
In my planes, Use epoxy just at the firewall and CA every where else. I used the triangle stock on F1, F2 and F3 as well as between the sides and bottom of the fuselage between F1 and F3. After

F3 it doesn't matter. Although this does add a bit of weight, I firmly believe that it adds to the strength, especially during landings. I have personally slammed the plane into the ground at about 45 degrees (sort of ran out of sky!!!) and walked away with only a broken prop. If you want to get fancy here, make a cowling around the engine with some scrap balsa. The cowling look real nice and reduces the drag as well. I am not sure if its worth it. Its up to you.

Once everything is dry or cured, get yourself two straight pieces of wood or angle aluminum. I will use these to hold the back half of the fuse straight while I bend the tail together while gluing it together. Insert and glue into place F4 and F5. Exact location is not important, other than it being a good fit to the sides. Use CA to glue into place. Glue the end of the fuse together as well with a small spacer block to make the width about ½" wide. If you don't use some way of keep the back end of the fuse straight you fuse will bow to the back instead of taper. I will work, but I think that it looks a bit better when it tapers in a straight line instead of bowing.

The top and bottom of the fuse are covered with 3/32" balsa with pieces left over from the sides, but make sure that the grain of the balsa is 90 degrees to the fuse sides. I have found this to be a very strong configuration.

TAIL FEATHERS

The tail fin, stabilizer and elevator are all made from hard 3/16" balsa. Start first by cutting the stabilizer from a piece of 4" 3/16 balsa to a length of 17". Add the ½" cross grain end pieces to make up the total length of 18". The cross grained pieces that are glue to the ends provide a bit more strength to the structure without adding any weight. Do the same for the tail fin. Next cut the elevator 1" x 18" x 3/16" balsa. Make the fin from the rest of the balsa. I beveled the leading edge of the elevator to 45 degrees from the center line to provide clearance for the control. Don't bother tapering the elevator….not worth the effort. I used fabric hinges for the elevator and aileron control surfaces. Glue the stab to the fuse using epoxy making sure that the stab is square to the fuse and centered. Glue the fin to the stab using epoxy. I also glue in a small balsa fillet between the fin and stab to give it a bit more strength.

COVERING

This is really up to you, but I will make a cautionary note here. Try to use a low temperature covering such as Solartek or the like when you cover the foam wing. Heating monokote could cause the wing to melt….don't ask me how I know…. ☹
Some of the guys have cover the wing with clear packing tape and works well.
You might want to try covering the wing with low weight fiberglass cloth and use water based varathane as a paint. I don't know how heavy this will be.
Since this is a "lets slap a plane together and fly" article, we have found that painting the wing really does slow the plane down. Try to cover the wing with something other than paint. I covered my fuse with film as well. I also used colours that were very very bright….flourescent bright….really ugly bright!!! First reason for the colour….SO I CAN SEE IT!!!!….second reasons for bright colour…..SO MY OPPONENT KNOWS THAT I AM COMING AND SCARE THE LIVING DAYLIGHT OUT OF HIM!!!

CONTROLS

Once you have the plane covered, all hardware, engine, radio, battery….etc etc mounted its time to balance it. If you use a standard 600 ma battery pack you might have to unsolder the pack and reconfigure it so that the batteries are in square 2x2 instead of the 4 in a row in order to get the pack into the fuse. A smaller battery pack can also be used to reduce weight. I used small diam pushrods for the control surfaces.

Although this was designed around standard servos, you can use micros if you like. Some of the club members have mounted the aileron servos on the wing but have made it work so that the servo is inside the fuse instead of outside. Its up to you how you decide to mount them.

I have used torque rods to drive the ailerons, others used a direct link to the ailerons. Use whatever you have lying around. I found that the plane flew very well when it was balanced 2 5/8" from the leading edge of the wing. Once you feel a bit more comfortable with the plane, try moving the CG back by 1/8" increments. Elevator and aileron movement was only about ¼" max and you will probable use less….I sure did.

FLYING

For the first flight I recommend that you get a buddy to hand launch into the wind. You don't have to run with the plane to get it going….just a good firm, slightly pointing up launch will work. Once you get the plane trimmed out…you might need to add or remove weight based on you preference, you will find that you can hand launch alone and still have enough time to reach the controls. Another way of launching which I find the most reliable is to toss the airplane underhand instead of overhead. I find it easier, gets the plane in the right attitude and looks cool too!
Inside loops, outside loops are no problem especially when someone is following you and you dive down and pull up behind them….way cool!!
I found that the plane, without a streamer was fast, very stable and maneuverable. With a streamer, she flies just the way a slow combat plane should, fast, gentle and yet maneuverable. Landing is usually a dead stick and I have found that it glides in very smoothly and will land right at your feet if you like. Under a power landing, bring the throttle right down and as you are making your final approach, 4-5 feet up, cut the engine and you will have a perfect belly landing.

SLOW COMBAT RULES

1. There aren't any formal rules
2. Longest streamer wins.
3. There are no prizes for first place….only bragging rights!!!
4. Bragging rights for best NON intentional mid air!!! Intentional mid airs are frowned upon.
5. A congratulatory hand shake to the victor
6. Loser at the end of the day buys coffee or favorite beverage for the combatants.
7. Complaining and whining not allowed when you trash yours or someone else's plane.
8. Have fun.

OH yes…. some other Rules

1. Only 2 combatants up at a time…well at least until everyone has figured out this stuff…..3-4 is great fun. More than 4 would is wild and a real blast!
2. Combat must be within your defined combat flying window….field edges, fences, trees, post….etc,etc
3. All combatants must use the same plane, size and geometry defined in this design or a design that is common to your club or group. Please no variations otherwise it becomes a competition and destroys the original intent of this design.
4. No souped up .15" with tuned pipes, high nitro, ball bearings.
5. 20' string followed by a measured 30' 2" paper crepe streamer.
6. Your clubs safety rules MUST be adhered to.
7. Plane must not weight less than 32 oz.
8. All planes must have mufflers with the baffles in place.

SUMMARY

This plane is easy to build and an excellent club project to create some excitement at the field. There are a multitude of different designs that could have been incorporated such as using Coroplast, plastic drain pipe, plastic baseball bats…etc etc, but we figured that this one was simple, cheap, fun to build and still looks like a plane and is easy to fly yet fast enough to have fun as a slow combat plane. I hope that I have inspired some of you to try this "slow combat" with your friends at the field and remember, when you build and fly it…just "Throw Caution" to the wind and have fun.

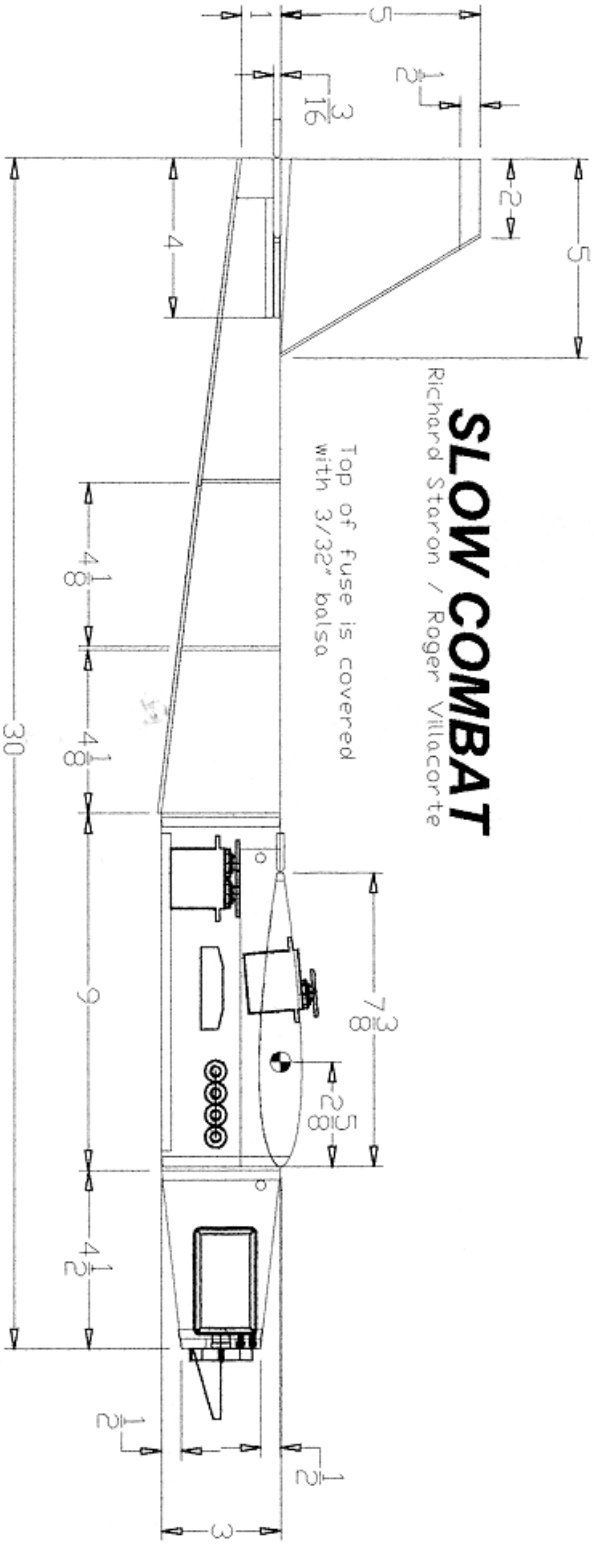
TECHNICAL STUFF

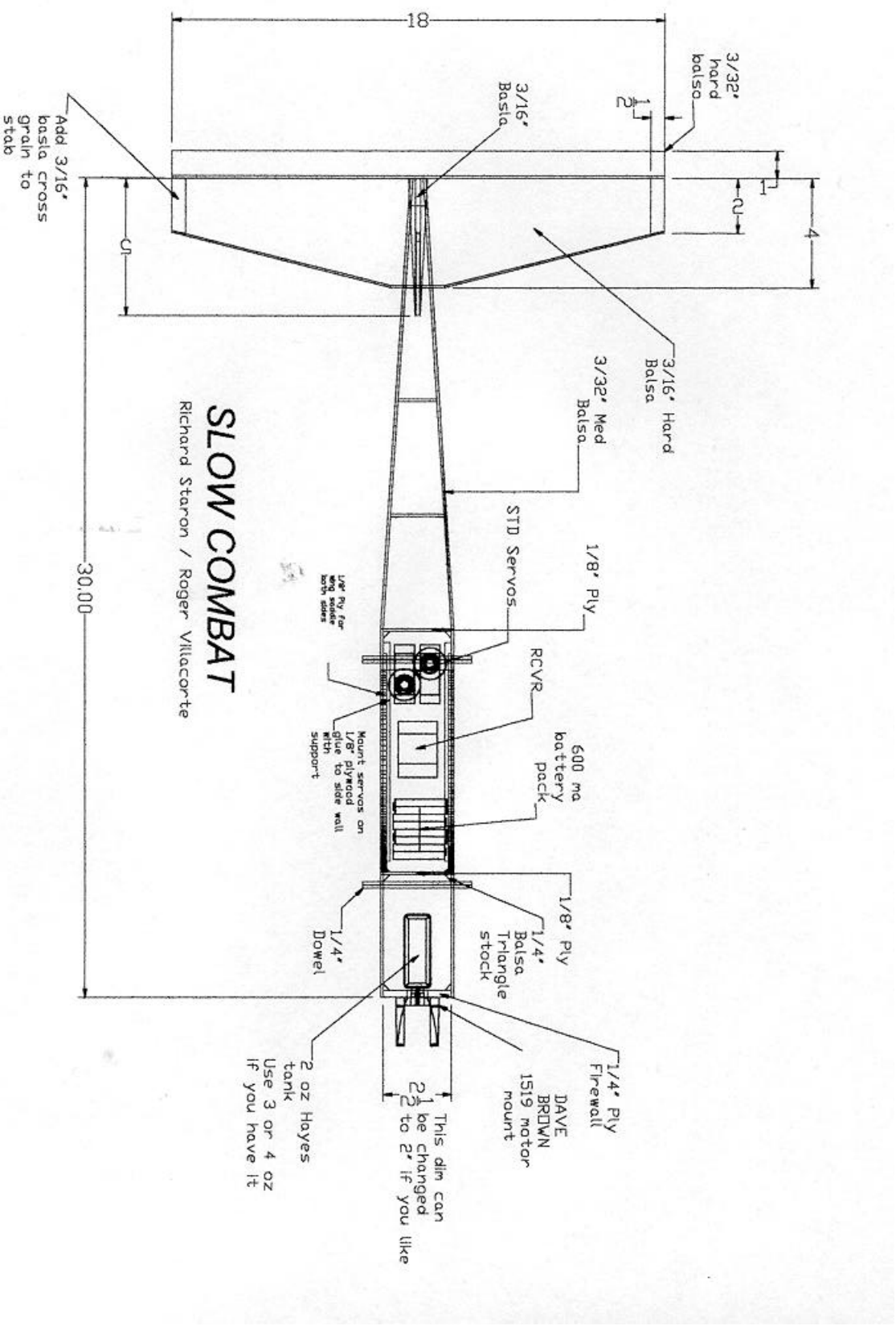
Wing Profile: NACA 0014
Wing Length: 40"
Wing Chord: 8.25"

Engine: .15 stock, no BB
Fuel: 15% Nitro max
Fuel tank: 2oz…ah maybe 3oz – 4oz (whatever you got that fits)

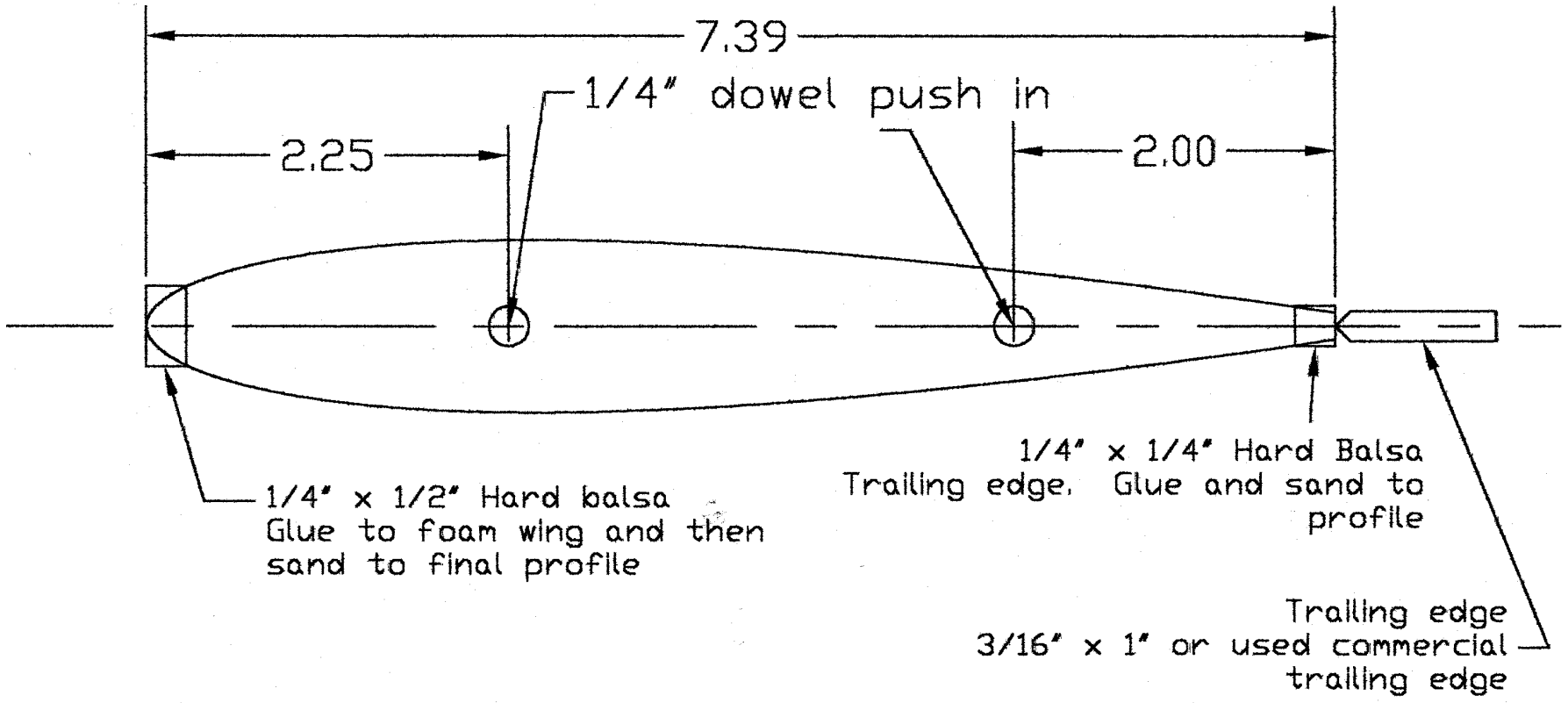
Fuselage length: 30"
Width: 1 ¾ - 2 ½" (depending upon servos and your ability to shove everything inside)
Fuselage height: 3"
Stab: 3/16" hard balsa 18" wide x 4"
Elevator: 3/16" x 1" x 18"
Tail and Rudder…yup…got those as well….not working!
Landing gear: none….belly landing every time

Telephone and Email address if you need help or foam wing cores contact
Richard Staron 416-288-0569 or email: rstaron@eol.ca
Roger Villacorte 416-391-2602


SLOW COMBAT
Richard Staron / Roger Villacorte
Top of fuse is covered with 3/32" balsa
1
5
1/2
3/16
2
5
4
30
4 1/8
4 1/8
9
7 3/8
2 5/8
4 1/2
1/2
1/2
3


SLOW COMBAT
Richard Staron / Roger Villacorte
18
3/32" hard balsa
3/16" Basla
1/2
1
6
4
Add 3/16" basla cross grain to stab
6
30.00
3/16" Hard Balsa
3/32" Med Balsa
STD Servos
1/8" Ply
RCVR
600 ma battery pack
Mount servos on 1/8" plywood glue to side wall with support
1/8" Ply
1/4" Balsa Triangle stock
1/4" Dowel
1/4" Ply Firewall
DAVE BROWN 1519 motor mount
2 oz Hayes tank Use 3 or 4 oz if you have it
This dim can be changed to 2" if you like
2 1/2

Wing profile - full size (real close anyway!!)



NOTE: Due to different printers, the exact size of the wing profile may be slightly off. Please recopy this profile and make correct scale changes during the photocopy process.

Richard Staroi