ELIMINATOR II

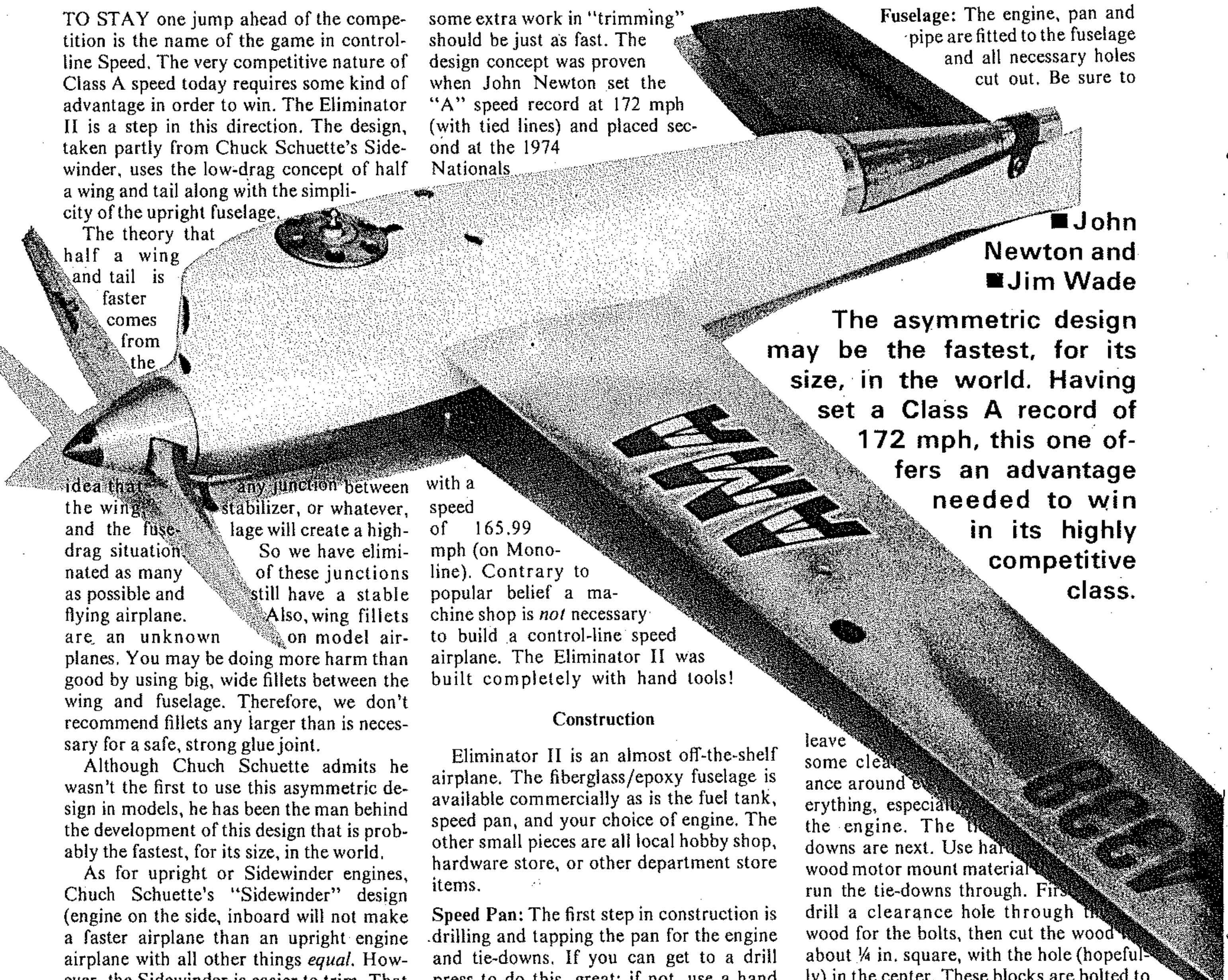
TO STAY one jump ahead of the competition is the name of the game in control-line Speed. The very competitive nature of Class A speed today requires some kind of advantage in order to win. The Eliminator II is a step in this direction. The design, taken partly from Chuck Schuette's Sidewinder, uses the low-drag concept of half a wing and tail along with the simplicity of the upright fuselage.

The theory that half a wing and tail is faster comes from the idea that any junction between the wing, stabilizer, or whatever, and the fuselage will create a high-drag situation. So we have eliminated as many of these junctions as possible and still have a stable flying airplane. Also, wing fillets are an unknown on model airplanes. You may be doing more harm than good by using big, wide fillets between the wing and fuselage. Therefore, we don't recommend fillets any larger than is necessary for a safe, strong glue joint.

Although Chuch Schuette admits he wasn't the first to use this asymmetric design in models, he has been the man behind the development of this design that is probably the fastest, for its size, in the world.

As for upright or Sidewinder engines, Chuch Schuette's "Sidewinder" design (engine on the side, inboard will not make a faster airplane than an upright engine airplane with all other things *equal*. However, the Sidewinder is easier to trim. That is, it will not slow down as much from having the nose yaw slightly in or out when flying. Just look at the frontal area of an upright-engined airplane when the nose is yawed out slightly, then the side-mounted engine. The Sidewinder type will have less frontal area when yawed in or out slightly. Both Sidewinder and upright will have equal frontal areas when trimmed perfectly.

The Sidewinder airplane design requires some uncommon construction techniques and is limited in useable space. So, the Eliminator II with its much simpler fuselage, easy construction techniques, and some extra work in "trimming" should be just as fast. The design concept was proven when John Newton set the "A" speed record at 172 mph (with tied lines) and placed second at the 1974 Nationals with a speed of 165.99 mph (on Monoline). Contrary to popular belief a machine shop is *not* necessary to build a control-line speed airplane. The Eliminator II was built completely with hand tools!



■John Newton and ■Jim Wade

The asymmetric design may be the fastest, for its size, in the world. Having set a Class A record of 172 mph, this one offers an advantage needed to win in its highly competitive class.

Construction

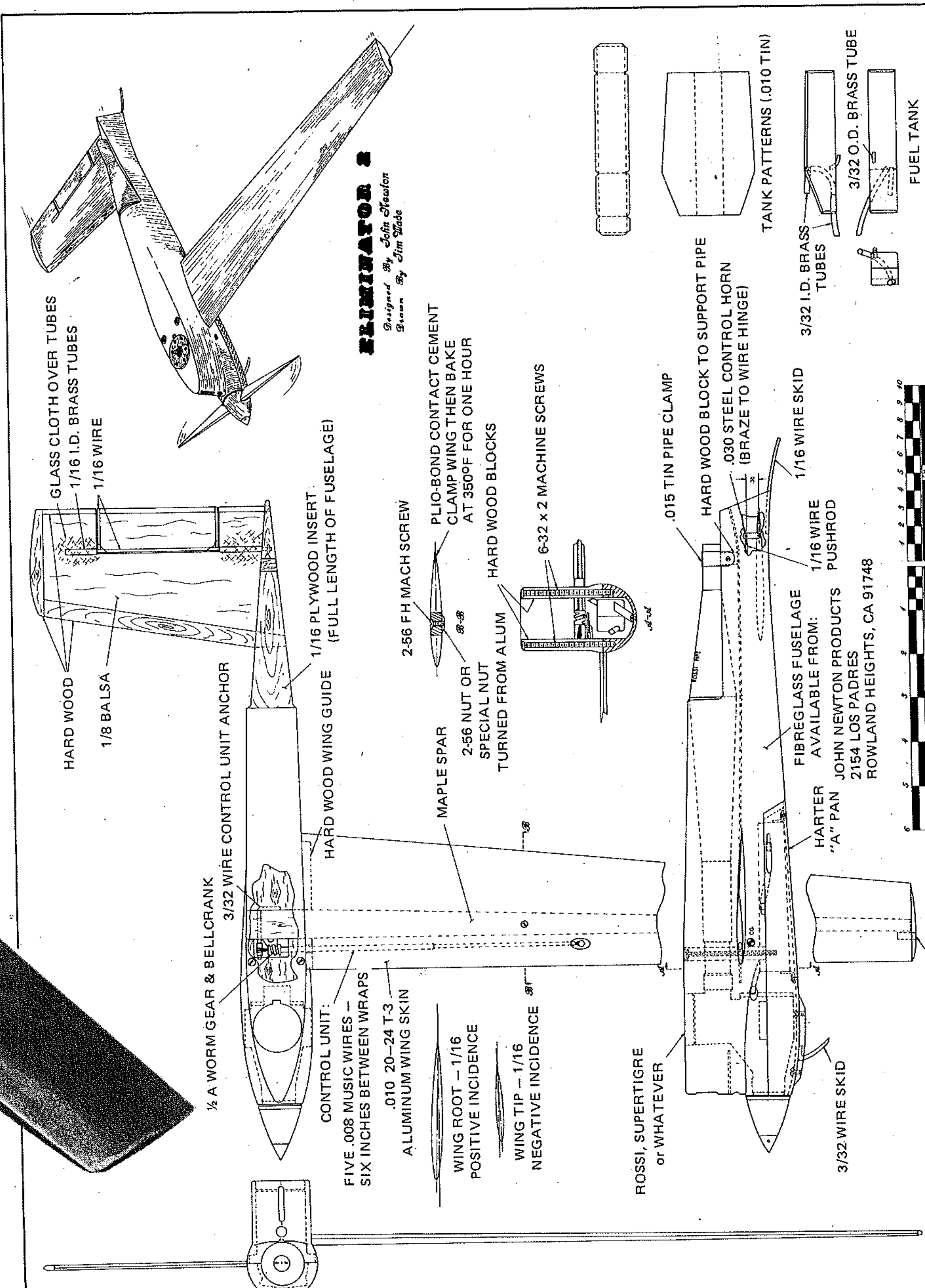
Eliminator II is an almost off-the-shelf airplane. The fiberglass/epoxy fuselage is available commercially as is the fuel tank, speed pan, and your choice of engine. The other small pieces are all local hobby shop, hardware store, or other department store items.

Speed Pan: The first step in construction is drilling and tapping the pan for the engine and tie-downs. If you can get to a drill press to do this, great; if not, use a hand drill. The hand drill method is best done with two people and a couple of right angle triangles to check if your drilling is straight. Do not use an electric drill if you're doing this by hand; you'll wind up with a hole that is too big. You will need to make some kind of clamp to hold the pan while drilling. This can be done with four aluminum bars of equal length bolted together on top and bottom of each end of the pan, then this can be clamped in a vise.

If 4-40 bolts are available for the tie downs, use them; if not, the 6-32 bolts shown on the plans are a standard hardware store item.

Fuselage: The engine, pan and pipe are fitted to the fuselage and all necessary holes cut out. Be sure to leave some clearance around everything, especially the engine. The tie-downs are next. Use hard wood motor mount material to run the tie-downs through. First drill a clearance hole through the wood for the bolts, then cut the wood about ¼ in. square, with the hole (hopefully) in the center. These blocks are bolted to the pan and the fuselage dropped over this (the shell has cut outs for the bolt heads). Tape the pan in place (with alignment correct) on the shell. Now you can reach through the engine head cut out (you did leave the engine out, didn't you?) and tack glue the tie-downs with five-minute epoxy. When dry, unbolt and untape the pan, and permanently glue the blocks in place with glass cloth over them. Use slow drying Hobbypoxy for all final assemblies and the

Above: Half a wing and half a tail eliminate drag of two surface/fuselage junctions, so the theory goes. Noteworthy in this craft are clean fuselage lines with semi-enclosed pipe.



FULL-SIZE PLANS AVAILABLE . . . . SEE PAGE 104

five-minute kind for all tack glueing.

The rear of the pan is waxed and re-bolted on the shell, then run some epoxy down the rear of the pan to form a "key" to hold the rear of the pan in alignment. A couple of keys at the front of the pan might be helpful, but are not absolutely necessary.

Make the cut outs for the wing spar and tail. Also, split the rear top of the fuselage down to the stabilizer cut out.

Don't forget to cut out the 1/16 in. plywood inserts for the fuselage. These inserts strengthen the fuselage and keep hot air (from around the pipe) from entering the engine intake. Coat these with glue before inserting in the fuselage.

Stabilizer: The stabilizer is shaped to a symmetrical airfoil. Coat with slow drying Hobbypoxy before the elevator is cut out. A note of warning: the elevator must be as large as shown! The airplane is so stable that it requires a large elevator to control it properly.

The elevator hinge system will require some brazing. Sears is a good source for brazing wire and a propane torch. Don't expect the first hinge assembly to come out perfect, especially if you have never brazed wire before. I brazed five hinges before one proved acceptable. When all the brazing is done, the assembly is glued into the stabilizer. Some wax in the brass tube bushings is helpful when glueing every thing in place, because the glue likes to run inside of these tubes and stick everything together.

The pushrod is bent and installed on the finished tail before inserting it in the fuselage. Now, with the rear of the fuselage cut open, the whole tail assembly and pushrod is slipped in place and glued. Fiberglass cloth is used inside the fuselage around the stabilizer to strengthen things.

Wing: The wing spar of ⅝ wide × ¼ thick maple is tapered to ⅛ thick at the tip. This taper is done on the bottom side of the spar.

The wing skin is .010-.012, 20-24 T-3 aluminum, but anything close will work. If no metal brake is available, the wing can be bent over the edge of a table or anything else smooth that has a slight radius. Use some wood or metal blocks to back up the wing skin when bending.

After bending, cut the wing roughly to shape with tin snips, scissors or a metal shear. Next, rough up the inside of the aluminum and clean with thinner before applying the plio-bond cement (apply to both sides).

Some kind of clamp is needed to hold the trailing edge of the wing together while you are baking it. We use two aluminum strips with bolts every two inches. The wing should be set up in the clamp and the bolts lightly tightened. Then set this up on a flat surface (glass plate) and bend the wing until the correct incidence for the

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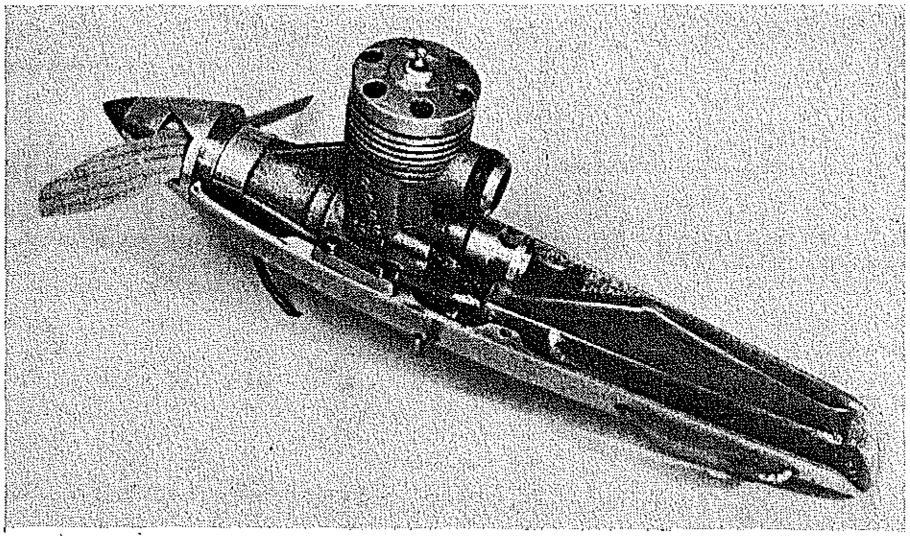
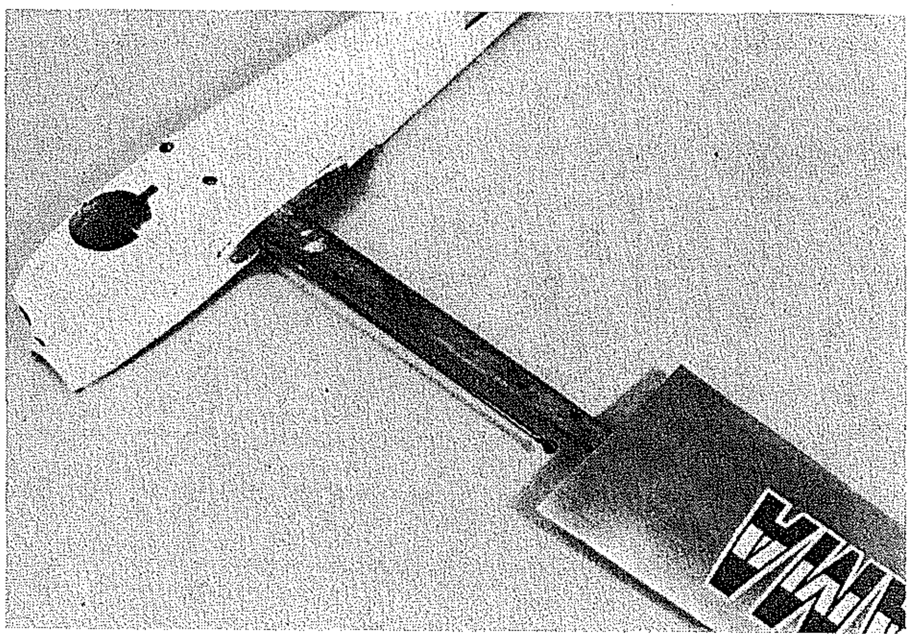
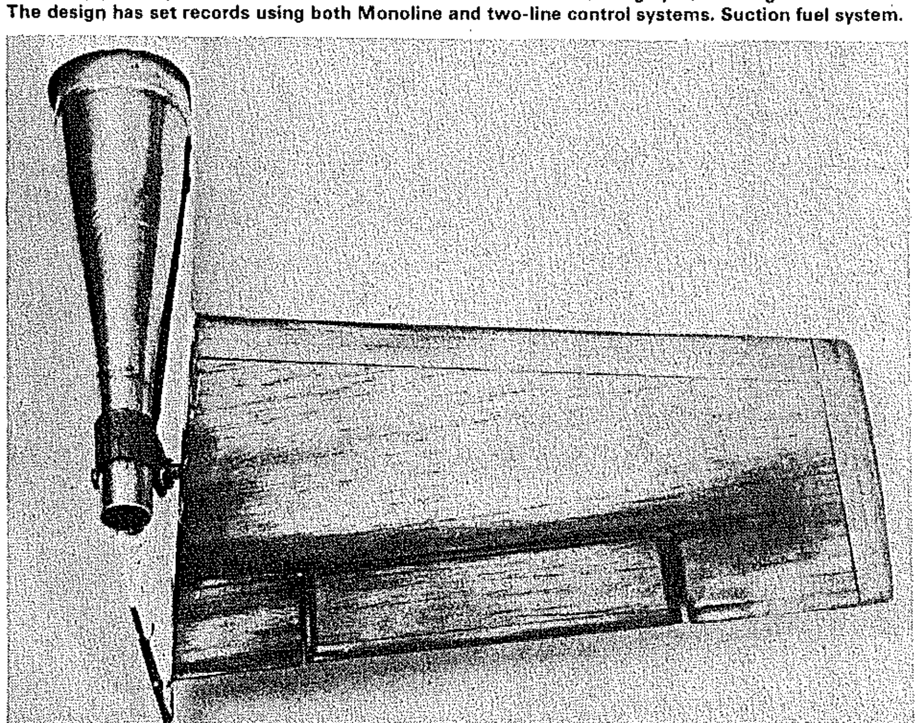


Speed specialists will appreciate the location of fuel tank relative to needle valve, the outside vent tube, and filler tube on tank. The Eliminator was built entirely with hand tools.



The wing partially removed to show the Monoline control unit, wing spar, and alignment blocks. The design has set records using both Monoline and two-line control systems. Suction fuel system.



Tail and hinge detail showing the hardwood outlines that completely enclose the balsa surface.

of the course. They were positioned on a line perpendicular to the start and finish of the course. Between their line of sight and the course ends was a vertical pole which they used for a reference point. As the model passed this point they would activate their stopwatches. The times were electronically relayed back to a master screen manned by a directing official. When the numbers hit the screen, he would vocally report them into a cassette recorder to avoid confusion and error. After the flight was finished, the times were then transferred from the recorder to paper, along with information concerning whether each run was official. In order for a speed run to be accepted on timing there cannot be more than 2/100 of a second difference at each end of the course in the watches of two timers. In other words, the more timers, the more chance of them hitting within this range. The times are then converted into speed.

Now I will explain what official means on a speed run. First of all, to improve our communications we used citizen-band radios to converse from point to point, these points being at the course itself, the master screen, the timers, and also the altitude judge. As the copter flew the course, the altitude judge informed the directing official whether the altitude was between 20 and 60 meters. If the model enters the course correctly and stays within the boundaries of the course, it will be stated as official. Be prepared to repeat your flight over and over, because this will increase your chance of a good flight.

If you get a chance to go for a record be prepared to obtain a lot of signatures; when it comes time to fill out the paperwork, just about everything requires a paper. Photographs and a three-view drawing of your model will also be needed to complete the dossier. You will also be asked to explain how the course was measured, how the altutude was checked, and the method of timing used. They will require some technical data concerning your helicopter, such as weight, overall size, rotor blade area, disc area, power used, tail-blade span, mechanical ratios, and fuel capacity. I must admit there is a lot of work involved in a record but, if I had to do it all over again, I would do so. Believe me, you will know three times more about your machine afterwards than you did before.

There is no excuse for a person not to break this record. Just don't break it too badly because I'm going to give it another shot someday.

I want to acknowledge the Manned Spacecraft Center Radio Control Club for the organizing of this speed trial, because I couldn't have done it without them.

Eliminator/Newton/Wade

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root and tip is achieved. Use a small steel scale marked in hundredths of an inch (.01) to check the alignment. The tip is 1/16 in. negative. The root should be 1/16 in. positive. When the alignment is correct, tighten the bolts and re-check the alignment, then bake for the required time. After the glue is baked and has cooled, the trailing edge is filed smooth and straight.

Control Units: Although a Mono-line unit is shown on the plans we will not go into detail on its construction because parts are not readily available. If you have built a similar control unit before and can find parts, the numbers are on the plans. A two-line system can be substituted very successfully for the Mono-line control unit. In fact, that was one of the reasons for originally designing and building the Eliminator II—so we could fly two lines and still be competitive with Mono-line.

Final Assembly Notes: Set up everything on a glass plate and measure before final assembly to ensure perfect alignment with the thrust line.

Some tooth picks might be helpful when aligning the spar and stab. Drill some 1/16 holes in the outboard side of the shell (where the spar will butt against) and in the spar, then use the toothpicks to align and hold the spar. Do the same for the stabilizer.

Use glass cloth around the spar for added strength (several layers of glass cloth).

We do not paint the tails of any of our airplanes because of the weight build up and the possibility of warping. The tail surface is sealed with epoxy glue rubbed into the wood (as are all unpainted wood surfaces).

Fuel Tank: The suction fuel system is very simple and should provide very constant engine runs. The tank itself can be easily made from .010 tin, or can be ordered from John Newton Speed And Racing Products, completely assembled and ready to bolt into the airplane.

Takeoff Dolly: Any three-wheel dolly with a front wheel spread close to the wing span should prove satisfactory. Ours is the lift-out type with two guide pins extending two to three inches above the wing—one at mid-wing, the other close to the fuselage. Some weight might be needed close to the outboard wheel; it just depends on the dolly design.

Engines, Fuel, Props: We use essentially stock Rossi Rear Rotor 15's. Except for a bar stock head, the engine is stock. We use a bar-stock head to save on the price of Rossi inserts. The Rossi insert is faster, if you can keep the element in for a whole run.

A stock Rossi with a stock 6-7 Rev-Up prop on 65% nitro can very consistently put you in the 162-mph bracket. With more nitro and the Rossi pipe as short as it will go, the 170 mph range is achievable, but not consistently.

The standard fuel mix used is usually 65-75% nitro, 20% oils, and the rest alcohol. We have always used at least 5%-10% castor oil in our fuel with the other oil content being a synthetic oil.

The Rev-Up 6-7 prop seems about right with the 65-75% nitro fuel and most weather conditions, but don't stop there. Experiment!

Flying: The airplane is very smooth flying and should present no real problems. On the takeoff run, hold some down elevator until flying speed is approached, then ease to neutral and the airplane should lift off easily. Don't let the airplane climb too high. Keep at about 5 feet.

If you have any questions or problems feel free to contact us: John Newton, 2154 Los Padres, Rowland Heights, CA 91748; Jim Wade, 1853 Yettford Rd., Vista, CA 92083.

Stripper/Lidberg

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As an example of how handy the stripper can be, I recently built an unlimited rubber model with a long, geodetically braced fuselage. Cross braces were to be 1/16 × 3/16", but the local hobby shop was out of that size, so I bought a sheet of 1/16 × 2". Using a stripper made up for 3/16" width and 1/16" depth, I was able to cut 10 pieces 3/16" wide with a piece about ⅛" wide left over. Each strip had square edges and was of uniform width, so construction and sanding of the finished fuselage was simplified. Looking again at the yield from a piece of sheet balsa, shows that a considerable savings can be made. The 2" sheet cost 51¢ and yielded 10 strips which would have cost 11¢ each or $1.10. That's not bad for just a few minutes work; in addition I was able to finish the model without making an extra trip to search for strip wood.

An Easy Balsa Stripper can be made for just one size or, in 15 or 20 minutes, you can make a half dozen for commonly used sizes. Mark the width on each stripper for ready reference. To prevent throwing the strippers out with the scrap, color them with markers or colored paint. The strippers can be used in two ways. Either way works better when the sheet balsa has one good straight edge, so be sure to check that first. The knife/straightedge routine, or maybe just a sanding block, can be used to produce that straight-edged sheet.

The method I prefer for cutting strips is shown in the photos, with the sheet held down with the left hand and the stripper used with the right hand. Keep a slight amount of pressure toward the sheet to keep the strips consistent in width. You may prefer holding the stripper in the left hand with the blade pointing up, and then pushing the sheet through with the right hand. Rubbing the surfaces of the stripper which slide on the sheet balsa lightly with a small dry bar of soap will speed up the process. A small sharpening stone can be used to touch up the blade, but a new stripper can be quickly made if the blade is chipped or too dull.

Even if you don't need strip balsa right now, remember the Easy Balsa Stripper the next time you need some on a Friday or Saturday night after the hobby shop closes. I hope you'll find it as handy as I do.

Muffler/Weber

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through muffler has the pressure tap on the main body. From the graph it can be seen that the expansion chamber supplies more pressure than the flow-through. The other comparison, between a 10-6 and a 9-6 on the Semco, shows more pressure at a given rpm for the 10-6, but at full throttle the pressure is slightly higher with the 9-6.

When testing muffler pressure with the manometer, the fuel level should be higher on the open side of the U, which indicates muffler pressure exceeding atmospheric pressure. If the fuel level is higher on the muffler side of the U, the muffler has suction instead of positive pressure. To solve this problem, try a different location for your pressure tap, get a different muffler, or just forget about using muffler pressure. A muffler which behaves well will show positive pressure at all rpm, increasing at higher rpm, as found for the examples in the graph.

This same simple manometer setup can also be used to check other pressures, such as crankcase pressure or fuel pump pressure.

FF Duration/Meuser

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awards must somehow represent a significant contribution to the sport, perhaps as evidenced by an outstanding contest record. But under exceptional circumstances, awards have been presented for models not even intended for competition, and awards have been made for things other than specific models. To name a few: the Pennyplane *event*, the Rossi 15 Normale *engine*, the Peanut-Scale *concept*, the Seelig *timer*, the Old-Timer *movement*. Both domestic and foreign candidates are eligible.

Supply as much information as you can: Xeroxes of articles, lists of contest wins and National records, whatever. But if you can't supply that, then send in the name of the designer.

But whatever you do, do it soon! Time is a'wastin'.

New Digest Editor: *Free Flight, the NFFS Digest*, known affectionately as simply *The Digest*, has a new editor. Several, in fact. After being editor for seven months, and just really getting into the swing of it, Keith Varnau found it necessary to give up the job. Bob Stalick and Tom Hutchinson put together one interim issue, and Lee and Vicki Hines put out another. Now it's all in the hands of John Oldenkamp, who lives at 654 India St., San Diego, CA 92101.

Send him your good stuff; photos, sketches, stories, articles, contest results and reports, whatever. I'm sure he'd appreciate receiving club newsletters too.