



Dr. Brown's Invictus is not only unusual in appearance, but easy to build. Aerodynamically sound, it will do the complete AMA and FAI patterns as well as the more conventional multi aircraft.

INVICTUS II

Undefeatable . . . or, if you prefer, unbeatable. If you're good, this twin boom pusher will make you even better.

'By J. Anthony Brown, M.D.

INVICTUS

*It matters not how straight the gate;
How charged with punishments the
scroll;*

*I am the Captain of my fate;
I am the master of my soul.*

William Ernest Henley

Invictus — it means undefeatable, or if you prefer, unbeatable. That is the way I feel about this design. I am delighted to see the present trend of multi design aircraft finally swinging away from the super-modified TaurusKwikFlyOrionAstrohog and toward more creative ends. During the past year or so many new and fascinating designs have come out; however, I feel that many of them suffer from one of two faults: They are either a bit too difficult to construct, except for the more ambitious builders, or they are really not good stunt pattern aircraft. I believe this design cures these two faults and still remains creative. Let's face it. It is about as different as you can get! And I guarantee you it will stand out on any flight line!

It all started several years ago when a fellow Chicagoland R/C member, Bob Halvorsen, and I were flying pusher deltas around the Windy City skies. I was satisfied with the pusher engine concept, the sleek military nose, and the ease of construction, but let's be honest — you can seldom, if ever, get a delta to spin, snap roll or knife edge. So this present design evolved. I wanted to retain the pusher engine, sleek military nose, and still have a ship that would be truly different, aerodynamically sound, and do the complete AMA and FAI pattern as well as a standard multi ship. After the

first test flights, I realized (with knees shaking) that this beauty had exceeded all my expectations. First of all, she is beautiful to behold in flight. With the swept wing and twin booms it looks more like a real jet than anything I have ever seen. Spins, snap rolls and knife edge flight are extremely smooth and easy to perform. The rolls are axial without a trace of yaw. She is an extremely easy aircraft to fly and is quite fast. Interested? Read on, McDuff!

The stab was placed on top for two reasons. First, because I thought it looked good, but mainly to get it away from the prop blast just sixteen inches away. This does not seem to adversely affect the axial rolls at all. The fin area may look a little large, but it is in keeping with this type of design. At first glance the linkage problem may look like a nightmare, but bear with me. It's quite quick and simple if you use cable inside of teflon or nylon tubing. If you use bellcranks or Nyrods you're on your own. The choice of engine and tank are up to you. The prototype used a Super Tiger 60 with a German made 11 x 7- $\frac{3}{4}$ pusher fiberglass prop. Notice I use the past tense. The prototype finally joined an elite group: The German Mid-Air Club. I think I cried for two days.

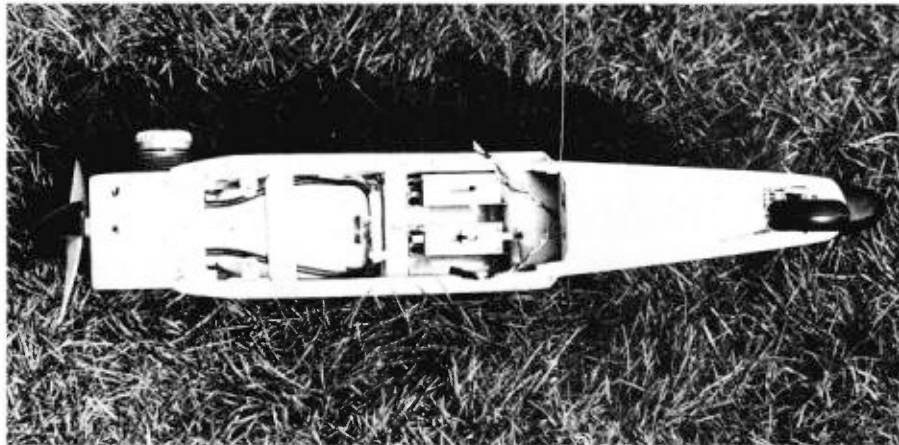
The Super Tiger 60 is more than adequate as this ship should weigh out no heavier than 5- $\frac{3}{4}$ to 6 pounds dry. I'm sure a good .45 would do the job. A standard tank put in backwards has worked well with the Super Tiger, although theoretically, a balloon tank should be better.

There is plenty of room inside the

SPECIFICATIONS

SPAN: 58"
LENGTH: 49"
WEIGHT: 5 $\frac{3}{4}$ lbs. dry
WING AREA: 600 sq. in.
SWEEP: 50° total. 25° each panel.
AIRFOIL: 15% fully symmetrical constant cord.
POWER: 45-61





fuselage for any radio gear on the market. In fact, with the new small, lightweight gear, a few ounces of lead may be required in the nose to put the CG where it belongs at twenty-five per cent of the mean chord. Do not — I repeat — do not make the first test flights with the CG any further back. Mine spins and snap rolls with this setup, so leave it alone.

The fuselage is made removable for ease of transportation and to facilitate getting at the radio gear. The integral wind and boom-and-stab assembly will fit nicely into any standard car trunk. There are no hatches except for a small area just in front of the nose wheel assembly which you can use for a few ounces of lead ballast if necessary. The prototype required four ounces. The present model required none. Still interested? Then on to construction.

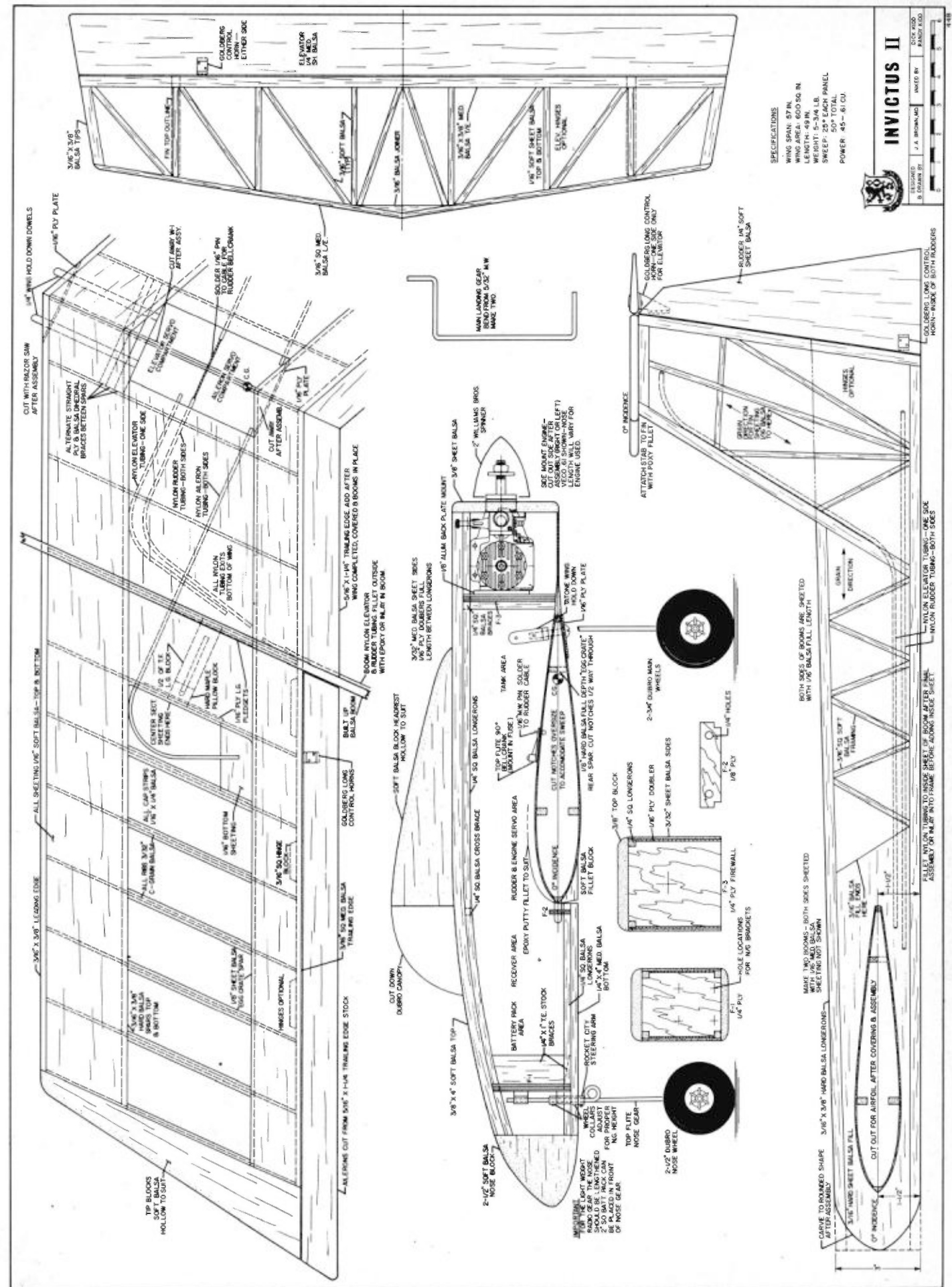
CONSTRUCTION

As you have guessed by now, I am strictly a "Kwik Fly" type construction man. I believe in maximum achievement with minimum effort. A glance at the plans will indicate that construction methods used are very simple and quick. Anyone with a minimum of building experience should have no trouble with basic construction. If you should have any difficulties drop me a line: J. Anthony Brown, M.D., 1347 Lamont Avenue, Thousand Oaks, California 91360.

The one important thing to keep in mind during building is the sequence in which to do things. The wing should be built first. It is the most time consuming, contains most of the control linkage, and you will need it in order to mate the booms and fuselage. A built-up wing is shown. A foam wing could certainly be used, but the linkage problems would have to be worked out; so again you're on your own.

If you do not have a wing jig, and I don't, block the leading and trailing edges up high enough to get the ribs off the board. Both wing panels can be built separately and completely sheeted, except for the center sheeting. Add the wing tips and rough shape. Next, join the panels together on a flat surface. No dihedral is needed with all that sweep — add dihedral braces and bottom center sheeting. Using a sharp razor saw cut off the center leading edge section and add the 1/16 inch front plate. Now reinforce the center section with three inch wide fiberglass tape. Don't worry — the fuselage will cover this. The front part of the

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SPECIFICATIONS
 WING SPAN: 57 IN.
 WING AREA: 600 SQ. IN.
 LENGTH: 49 IN.
 WEIGHT: 5-3/4 LB.
 SWEEP: 50° TO 60° PANEL
 POWER: 45-60 CU

INVICTUS II
 DESIGNED BY: J. A. BROWN, M.D.
 DRAWN BY: B. DAVEN ET AL.
 SCALE: AS SHOWN
 MODEL NO.: 88000

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trailing edge sheeting can now be cut away as indicated to make room for the goodies.

The wing is now ready for the linkage. Add all the nylon tubing indicated and cut it flush with the bottom sheeting. Keep it smooth and free from any binding. The rubber cable tubing should be placed between the aileron and elevator servos and as close to the top as possible. A small 1/16 wire pin will be added later to mate with the rudder servo bellcrank in the fuselage. This may appear like a hell of a lot of bellcranks and tubing to go through in order to activate twin rudders, but a little diligence at this point and it will work smoothly with a minimum of slop. Complete the top center section sheeting; sand and cover the wing with silk or Super MonoKote and set it aside.

Next build the booms and the stab. They are simple and easy to construct utilizing the "sandwich" type construction. At this point you must decide whether to inlay the tubing in the booms or use the quick and dirty method of running them along the outside of the inner boom sheeting after construction is completed. I have used both methods. Both work well, but inlaying the tubing is a little neater. Again, make sure to cut the tubing flush with the balsa sheeting. Keep construction of the fin part of the booms and the stab light. This will obviate the need for lead nose ballast later. The booms, although rather frail looking, are surprisingly strong and will withstand the normal rigors of flying and bad landings.

After completion of the booms and stab, sand and cover them now with silk, silkspan, or Super MonoKote. Place the wing airfoil template over the booms and cut them out. Make sure you are accurate. This will insure an exact zero-zero wing-stab incidence. Cut a 1/2 inch wide strip of covering material away from the wing at the proper boom location point, slip the booms over the wingtips, and slide them into precise alignment. Here is where good trammeling pays off to insure proper alignment. Use strings,

tape measures, carpenter's levels, and whatever else you can think of. Spot glue the booms in place. Next carefully glue the stab on top of the fin, again making sure of exact alignment. Using a good grade of epoxy or epoxy putty, fillet in the booms and stab. You have now formed a strong lightweight box structure.

Add the center section trailing edge stock. Cover this and you are finished. Up to now we have had no use for the fuselage, whatsoever, as the wing-boom-stabilizer group is a separate entity.

The fuselage construction is, again, quite simple. Cut out the fuselage sides, 1/16 inch plywood doublers and bulkheads, and assemble. Add the bottom nose sheeting. Don't worry too much about weight here as you will need it to counterbalance the tail. Now carefully mate the fuselage to the wing. Add the wing lock dowels and the Tatone or Camlock bolt assembly and fasten it on securely over waxed paper or Saran Wrap. Make the wing fillets from epoxy or epoxy putty.

It is now time to locate the rudder bellcrank assembly before the top fuselage sheet is added. This should work out so the fuselage can easily be removed and replaced. A 1/16 inch music wire pin soldered to the rudder cable works nicely as a key and should fit easily into the rudder bellcrank. Add the top fuselage sheeting. It may be necessary to wet this and block it up over night to achieve the necessary bend. Tack on the nose block and razor plane and sand to a smooth, rounded contour.

COVERING AND FINAL FINISHING

Any good finish will do. The prototype had a standard butyrate finish. The second one was covered with Super MonoKote, which, in my opinion, is the best way to achieve a quick and very acceptable finish. A word of warning to lovers of butyrate dope and silk: be very careful with the booms or you will end up with a lot of warps. This problem does not occur using Super MonoKote or Hobby epoxy enamel. Finishing Touch Decals add a lot to this design, so if you are inclined, please use them.

Flying this design is no different than a standard pattern ship so I won't insult your intelligence by telling you to make sure the switch is on. A little engine side thrust may be necessary depending on your engine-prop combination. So fire it up and let her go. Good Luck with your INVICTUS. I hope to see you in the winner's circle.