



THE ULTIMATE 4-120 BIPE

By D.B. Mathews

The Ace R/C 4-120 biplane has been called the most "bashed" kit ever. That well may be, and the reasons are pretty obvious: the design is completely straightforward, it seems to fly well regardless of how it is changed, and it builds quickly and straight.

When the flood of Ultimate Bipe kits and designs hit a few years ago I, like so many others, was attracted to this awesome biplane. After checking through the various available models it suddenly hit me "why not rework the aesthetics of the 4-120 biplane kit to resemble an Ultimate?"

A few hours spent at the drafting table playing with a pencil on some Clearprint taped over the original kit drawings, convinced me still another "bashing" was well within the realm of practicality.

I then cut out the required new pieces and conned master craftsman John Walker into building from my drawings. A month or so later the model was delivered and flown. John has actually had other modelers accuse

him of "putting them on" when he tells them our Ultimate 120 is a modified Ace kit.

So what we have here are some really simple modifications to a stock 4-120 biplane kit, resulting in a big model that bears enough resemblance to an Ultimate biplane to be instantly recognizable. This "bashing" utilizes nearly everything in the kit while retaining the nearly idiot proof cabane

mounting jig and other really neat features, of the original concept.

This project was drawn up with no intent of publication, but while flying mine over the last two years a surprising number of modelers have asked for copies of my drawings. There are now at least four other Ultimate 120's flying that I know of, all with enthusiastic reports. So, I've decided to share the project with you.

**"BASHING"
ONE OF THE
MOST POPULAR
KITS AROUND**

ULTIMATE 120

Designed By:

D.B Mathews

TYPE AIRCRAFT

Sport Biplane

WINGSPAN

69 Inches (Top & Bottom)

WING CHORD

12½ Inches (Top & Bottom)

TOTAL WING AREA

1700 Sq. In.

WING LOCATION

Biplane

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Swept/Constant Chord

DIHEDRAL, EACH TIP

1/2" (Top & Bottom)

OVERALL FUSELAGE LENGTH

62 Inches

RADIO COMPARTMENT SIZE

(L) 11" x (W) 4½" x (H) 4"

STABILIZER SPAN

29 Inches

STABILIZER CHORD (incl. elev.)

10 Inches (Avg.)

STABILIZER AREA

290 Sq. In.

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

15 Inches

VERTICAL FIN WIDTH (incl. rud.)

8½ Inches (Avg.)

REC. ENGINE SIZE

1.20-3.0 cu. in. 4-stroke/2-3 cu. in. 2-stroke

FUEL TANK SIZE

Up To 24 Ozs.

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Spruce, Balsa & Lite Ply
Wing Balsa, Spruce
Empennage Lite Ply, Balsa
Wt. Ready To Fly 224-272 Ozs. (14-17 Lbs.)
Wing Loading 19-23 Oz./Sq. Ft.



Arrangements have been made with Ace R/C to package the longer heavy duty landing gear, the canopy, and the fiberglass wheel pants as an accessory item. Of course the kit itself is available at most any hobby shop. For price and details on the supplemental package call Ace at (800) 322-7121.

The drawings that accompany this article are intended to be cut and pasted over the kit

engine up to a gas burner in the 2.0-3.0 cu. in. range. The best flying ones I've seen combine the lighter weight of the ST3000 with 18 x 6-10 prop. The 3½ lbs. saved over chain saw units definitely produces stronger vertical performance.

Speaking of performance: the Ultimate 120 can be slowed way down on final with no tendency to lose aileron effectiveness or snap and burn, just like its "plain Jane"

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plans. It is not intended that this be a scratch-builder project, since the kit can be purchased for less than the price of the materials and hardware.

This is an excellent first project for the modeler who would like to try his hand at "bashing" a kit with assurance the outcome will fly well and not fall apart in heavy handed use. Unlike some of the other Ultimate designs around, this structure is quite strong and durable.

Power can range from a 120 4-stroke

older sibling. On the other hand, in the hands of a skilled aerobatic flier there doesn't seem to be any limit to this model's repertoire. As a matter of fact, I asked Harold Norfalise of Joplin, Missouri (one of the finest free style aerobatic pilots in the Midwest) to fly mine at an IMAA event last summer. He proceeded to do a rolling 360° turn the first time he ever flew the Ultimate 120!

The whole ball of wax seems to be well within this design's bag of tricks. Inverted





flat spins, vertical rolls with snaps at the top, knife-edge spins, etc. Yet the model is robust and easy to maintain.

If the appearance, simplicity, flying profile, and novelty of this project has you interested, let's get to building!!

CONSTRUCTION

Since this construction article is meant as a supplement to the kit instructions, we will not use a detailed step by step format but rather explain the variances from the kit.

As with any high performance model

has the most potential for frightening off prospective builders is the cowl. While a lost foam fiberglass unit could be easily constructed, there really is nothing difficult about carving one from balsa! That is if relatively lightweight soft balsa is used. If the balsa is as dense as basswood don't even try.

We writers have tended to use the phrase "carve from balsa" with no real explanation. After all; many of us were carving balsa long before fiberglass came

towards the front, this further reduces the amount to be carved off. The sheets are then glued together and tacked to the fire wall.

A rough outline is gross carved using a good sharp blade such as an X-Acto No. 26. Dull blades are dangerous; they will jump out of the wood and cut you! The blade is just used to remove the large chunks of excess wood. Do think before you cut, however.

The fire wall is the pattern for the rear of the cowl, and the plywood ring that has been positioned behind the spinner is the front pattern.

The real carving is best done with 80 grit sandpaper on a block. Change the paper as it gets dull (you'll need several sheets). You'll be astonished how quickly a balsa cowl can be made. Smooth up with progressively finer sandpaper, of course.

Pop it loose from the fire wall and it's ready to be covered and finished. This particular cowl can be successfully covered with heat shrink if the heat-pull-stretch-seal technique is used. Read the instruction sheet enclosed with the material! The interior should be sealed and reinforced with glass cloth and surfacing epoxy.

Wings:

Changes to the wings involves placing two aileron servos in the lower wing which drives the top ones through 4-40 rods and clevises. Cut off extra ends of heavy duty servo horns make ideal transfer horns on the outside edges of the four ailerons. The lower wing needs to be lengthened by splicing spars and adding a pair of ribs.

The top wing bolt attachment plates must be new to compensate for the sweep back. The dihedral has been reduced so don't use the kit's dihedral angle gauge; rather, use the one from the supplemental drawings.

The interplane struts may or may not add to the strength of the wings, but they need to be attached well enough to avoid blowing off in flight. The illustrated mounting system has worked well, just be sure the studs are in the wing before covering.

John closed the aileron gaps on this model by covering the wing and ailerons in one piece. This involves permanently installing the hinges then sealing the covering along the borders of the wing, ironing into the hinge line, then deflecting

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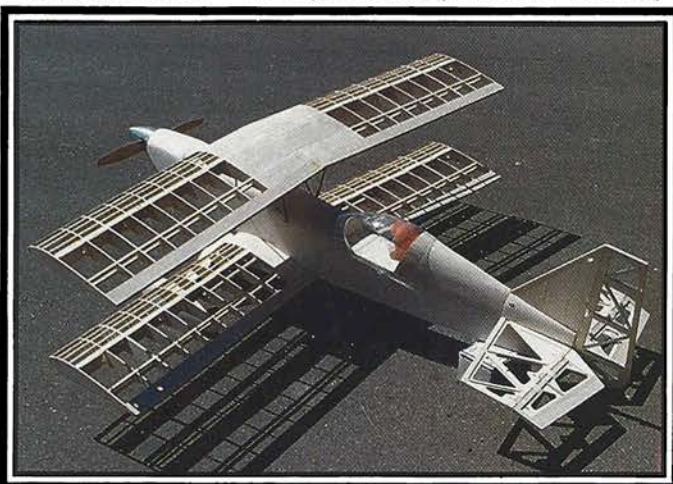
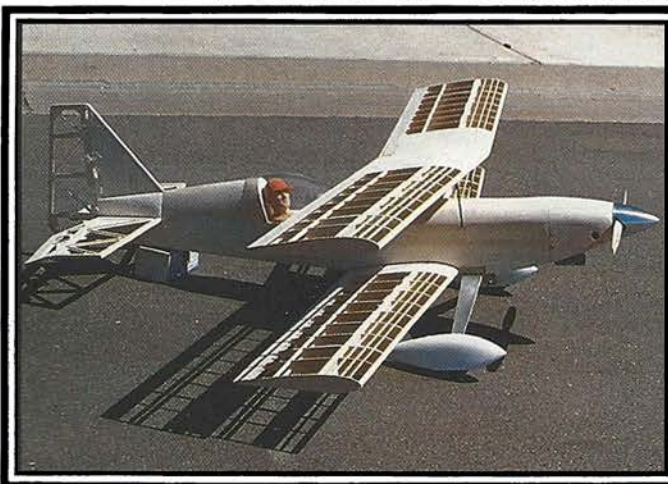
every effort should be made to hold weight down on this project. As an example: the layered stab construction is intended for CA adhesives, not epoxy!

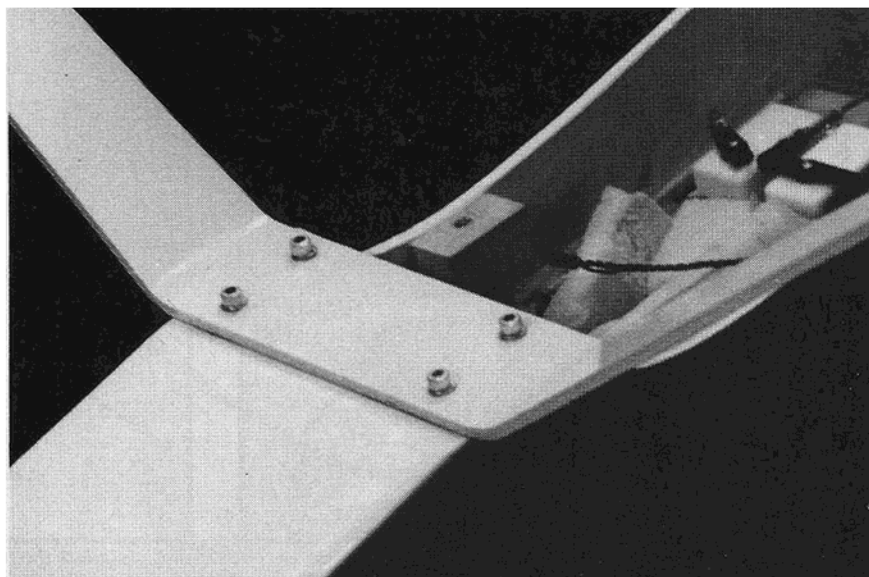
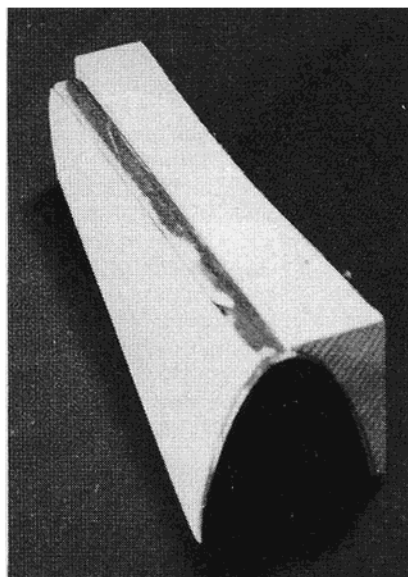
This model's structure (especially the wings) depends on the covering for part of its torsional rigidity. We do not recommend using any of the lower heat iron-on coverings! MonoKote, UltraCote, Ora-cover, and of course, Coverite will all work well on the Ultimate 120.

I have a notion the part of this project that

on the scene. This phrase tends to conjure up visions of sitting down with a knife and whittling away on some monster block of wood until a finished product emerges from this mountain of balsa chips. Not so!

By using sheet balsa and triangular stock in the corners, a rough cowl is created around the plastic wrapped engine (needle valve out usually). Interior cut outs are made with a Robart carbide stone in a Dremel until the sheets clear the engine. Sand the fore and aft ends of the sheet to tilt





LEFT: This shows the use of the carving jig for the tail cone. As drawn, the unit will carve a set that fits and makes it easy to do. **RIGHT:** Substituted Ace heavy duty metal gear attached to kit's landing gear plate with 6-32 socket head bolts and blind nuts.

the aileron to its maximum deflection while adhering the covering to it. This allows enough material to prevent binding on movement, with a neat and tight seal in place. The surface deflections given are for sealed surfaces, if you do not seal, it will be necessary to double the throws!

Empennage:

The gas burner and ST powered prototypes have both come out nose heavy, so there is not a problem with the rather beefy tail feathers shown. If a lighter engine such as a 120 stroker or G-23 or A&M 2.0 are being used, some lightening of the tail might be judicious.

These units are basically kit cores to take advantage of the neat hinge installations with extra balsa added to the outlines for added **oomph** in aerobatics. Be sure the clearance slot in the elevator is widened to allow increased deflection of the rudder for knife-edge flight.

The one piece cover and seal technique works well on these structures too.

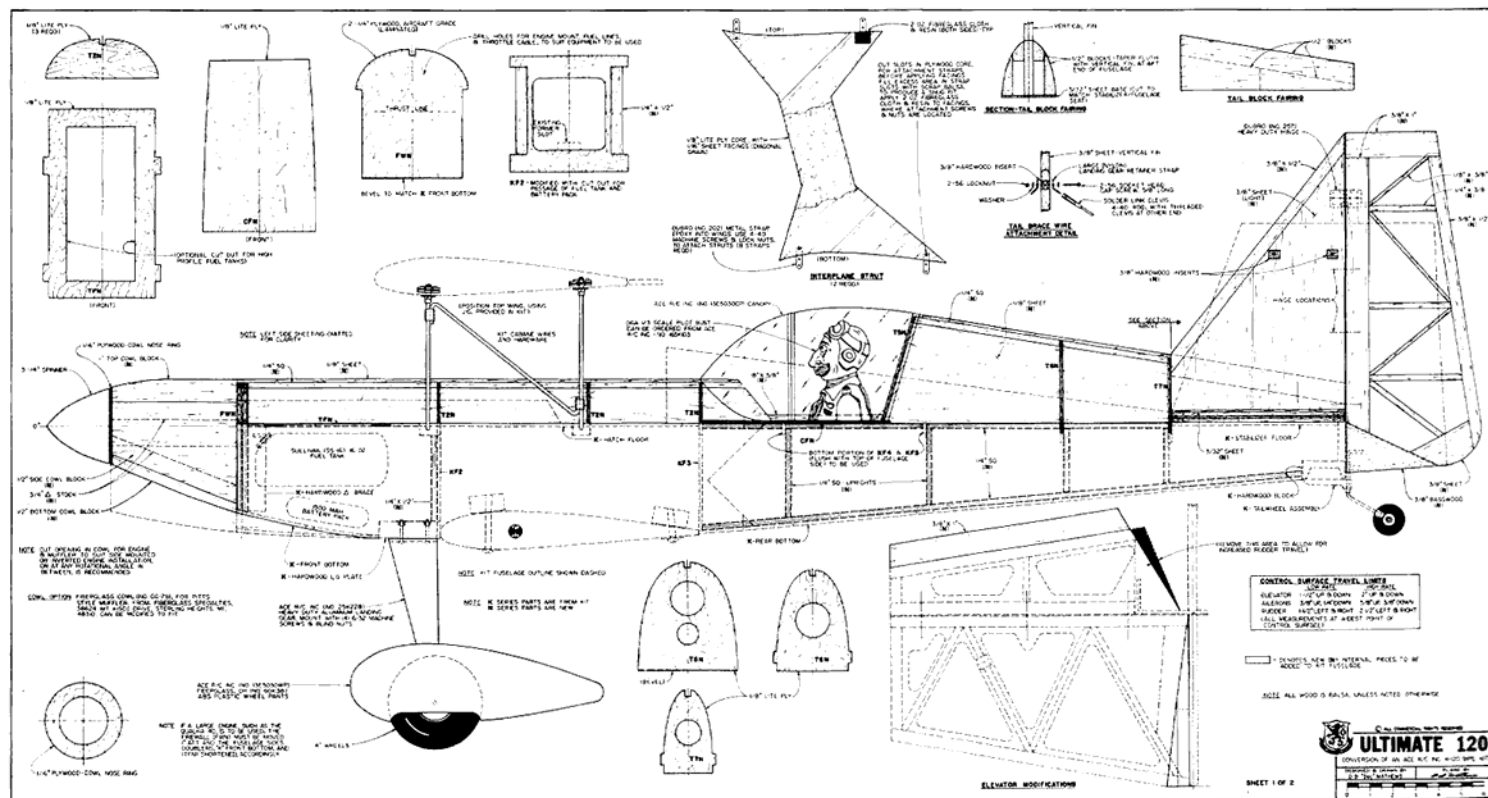
We modified the kit's tail brace technique. The method shown is stronger and not at all difficult to fabricate. The braces definitely must be used and kept in good working order. Snap rolls and Lomcevak's place incredible strains on tail feathers.

Fuselage:

Obviously, the first step will be to cut out the new formers. My pet technique is the use of carbon paper between the plans and the wood. Use a straightedge wherever possible to draw the outline over the plans. Cut out the parts and set them aside for now.

Be certain you have increased the opening in kit former F-2. This particular project doesn't use a tank hatch so the tank will have to be installed through the former. I don't like it, but it does look better.

Construct the fuselage exactly per the kit, merely changing the new top formers for the old. Notice the wing cabane trunnion blocks



have not been moved on this project.

Do not close off the forward area of the fuselage until the kit's wing positioning jig has been used to align the top and bottom wings. Follow the kit's instructions for this step to assure perfect positioning.

The sheeted portions of the turtledeck and cowling can be easily installed if the wood is sprayed with a diluted solution of household ammonia and water. Allow the wood to soak for a few minutes, wipe off the excess, then CA the balsa edge to the fuselage top. Next, slowly bend the wood down onto the formers and over the center strip of wood. Adhere the first side then use a straightedge to cut a clean line at the middle of the top strip.

Repeat for the other half, but run the CA onto the formers before pulling the sheet down. The center joint is fitted by carefully slicing along a straightedge until the seam meets, then CA it.

The tail fairing can be carved using the illustrated jig. This greatly simplifies fabrication. Again, the fairings should be hollowed out if tail weight is going to be a problem.

On the photo model we changed to a Klett tail wheel unit. The kit's tail wheel bracket and prebent wire will work fine, however. If the Klett option is used it will be necessary to add a section of 1/4" ply forward of the kit's tail wheel block (which must be installed upside down) to accommodate the necessary sheet metal screws.

The kit fire wall is not going to work! Most sidewinder or inverted engine set-ups will place bolt holes above the original plywood, this is flat dab dangerous! Cut two new patterns and epoxy them together.

The Ace canopy will be considerably oversized and require some trimming. The plastic can be reduced best by scoring the outside and bending the material until it cracks. This is much more accurate than trying to cut the excess off. Ours is held on with RC56 glue after cutting through the covering to create a glue to bare wood joint. It will not stick well directly onto the covering.

Radio and Hardware:

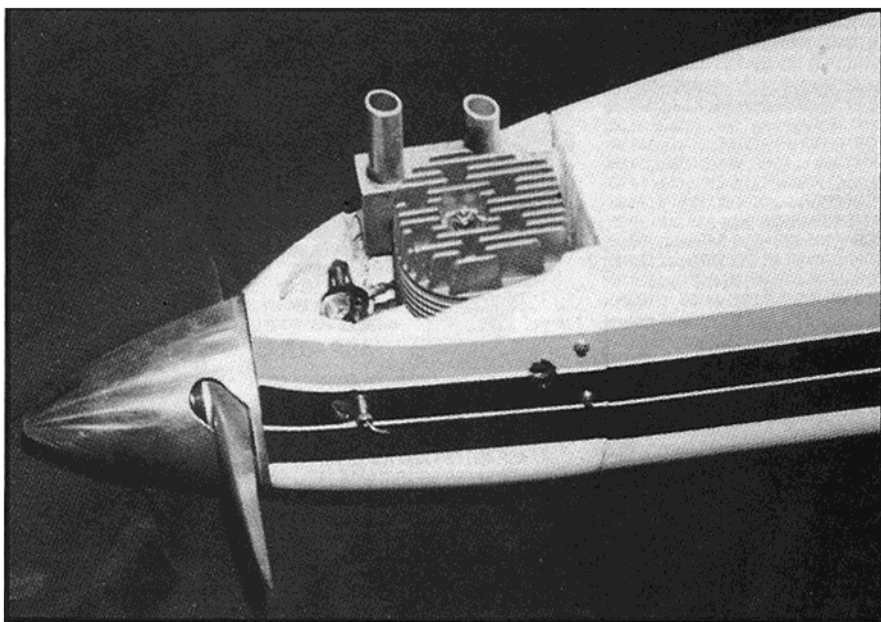
The new landing gear should be installed into the kit block using 8-32 bolts and blind nuts. We used a Du-Bro external fuel filler accessible through the engine cowl for easy fueling.

The fiberglass pushrods and heavy duty hardware from the kit will work just fine; we did use high torque servos on the elevator and rudder. Aileron and throttle servos can be standard units. The kit hinges and control horns are more than adequate.

Our Super Tigre is mounted at about the eight o'clock position to better cowl the muffler; the only negative with this has been a tendency for the plug to fill with residual oil when the model is sitting. We routinely remove the plug and clean it before every flight. By doing this the big Tigre starts and runs flawlessly. If I hand crank an engine this big, you know it's docile.



Ace R/C Canopy is neatly adhered with RC56 Glue and Multi Stripe Tape. Pilot figure is part of D.G.A. 1/4 scale pilot bust kit, painted with model car enamel.



Super Tigre 3000, angle mounted Bennett Muffler, Tru Turn Ultimate Spinner, hole is for Du-Bro Filler Fitting. Shows a simple carved balsa cowl.

Set Up For Flying:

If the Ultimate 120 is balanced at the point shown, there are no wing warps, and the throws are set as called out, your Ultimate 120 is going to astound you with its combination of slow speed civility and high speed wildness.

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Fire up the engine, point the nose into the wind, add just a tad of right rudder as it accelerates, and watch it take off on its own.

Landings are surprisingly gentle; slow down on the downwind leg, line up on final, and cut the power when about three feet high. The model will settle down on its mains for a beautiful wheel landing. I wouldn't advise using a flared three point touch down as the mains are exceptionally long and the tail has to be very low relative to the wing to get onto the tail wheel. Wheel landings are so easy and so lovely to look at, why land stalled?

And Finally:

What started out as an exercise in creating a 4-120 biplane with a different look, ended up with a model that is noticeably different than the kit, not only in appearance but flying characteristics. This neat looking kit "bash" is a delight to build and fly. It also is very easy to enjoy! □