# Aeronca Defender

## A Little History

*Aeronca, A Photo History* by Hollenbaugh and House is highly recommended to anyone with an interest in Aeroncas. This delightful soft-cover book includes an excellent section on the numerous variations of the T (trainer) series. This was Aeronca's first tandem-seat aircraft, and their first design with a four-longeron box fuselage and aluminum wing ribs.

When the threat of war became apparent in 1939, the US military had a serious shortage of aircraft and an even more alarming undersupply of pilots. The government instituted an emergency program to train a pool of civilians in the basic piloting skills, to be activated as aviation cadets when the military training programs were developed.

This program was called Civilian Pilot Training (CPT). It contracted with operators of private pilot training facilities for flight instruction, and with colleges and universities to conduct ground schools. Suddenly, many grass-strip operations went from near-starvation to being overwhelmed with students.

There were very few pilot training operations with large enough facilities or an inventory of suitable training aircraft. Emergency contracts for the production of tandem-seat light training aircraft were issued. The US light plane industry responded by expanding what few facilities it had and by adding newly designed aircraft.

Actually, there were very few suitable stock aircraft designs anyway. Only Piper had the ability to manufacture more than a few tandem trainers per month. Rearwin, Porterfield, Cessna, Beech, Ryan, Fairchild, etc. had no tandem designs or were developing heavier and higher-powered trainers for the military.

Into this shortage Aeronca introduced the Model T, with the prototype completed February 27, 1940. The design used tail surfaces from the Aeronca Chief, and many existing parts from other products.

It was first designated model T-65 (with a letter corresponding to the engine manufacturer); when the Civilian Pilot Training program came into effect, the designation was changed to TA Defender. Many CPT pilots who first flew in Defenders went on to active military duty and were among the first to compete aviation cadet programs.

In military drab the designation became YO-52, then L-3 (the version I saw on the golf course). Further refinements lead to O-58 and L-3 A, B, and C designations. The Defender also became the Grasshopper, with a delightful logo designed by Walt Disney.

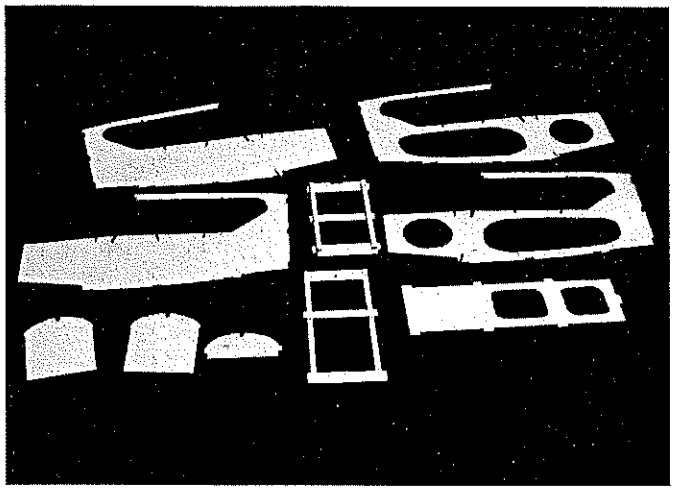
After the CPT program had completed its mission, a shortage of suitable larger military trainers for the graduates logically developed, so Aeronca then built Fairchild PT-19s and PT-23s under license.

*D.B. Mathews*

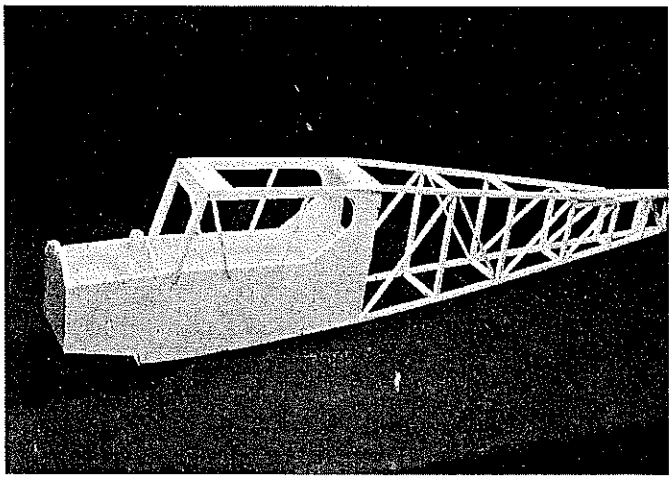
**In 1943 an L-3**—the military version of the Aeronca Defender—made an "emergency" landing on my little village's golf course (we didn't have an airport). By strange coincidence, the pilot's girlfriend lived nearby, but that was beside the point in the eyes of a bunch of twelve-year-old kids.

While he visited, we all rushed to the scene on our bikes and ogled the airplane, enthralled by the fact that it was a "real" Army airplane. In retrospect, the thing was olive drab and actually rather ugly, but not to our young eyes. I've had a special spot on my "someday I'll build" list for the Defender ever since.

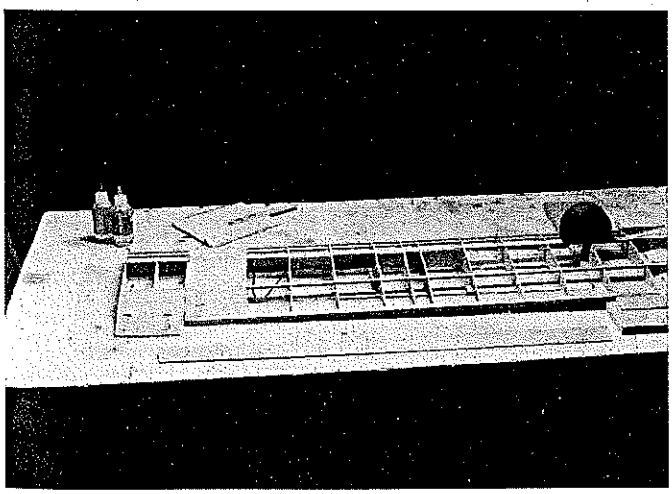
One thing has always been in the way of developing a Defender model, however: lack of any sort of consistent scale drawings. Although my extensive model magazine collection contains several free flight designs of the prototype, as well as some three-views,



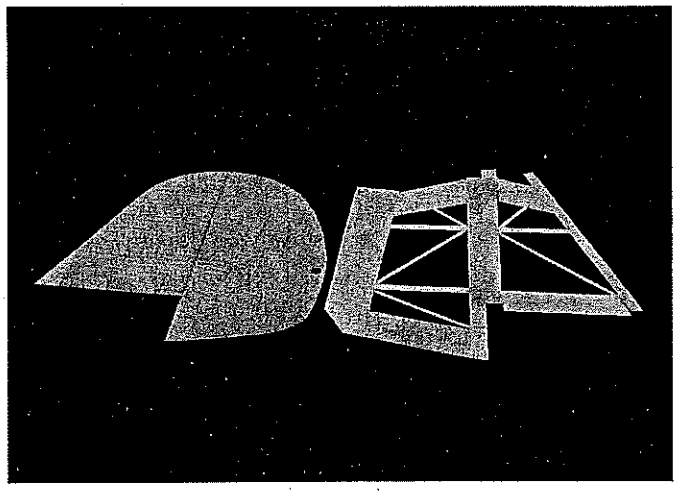
**The Aeronca's forward fuselage sides are laminated from 3mm Lite Ply. Note interlocking tabs and "ladders."**



**The basic Lite-Ply-and-stringer fuselage box assembles easily and straight using "ladders."**



**Wingtip has been blocked up to dihedral angle, sanded to angle, and is epoxied to center section.**



**The outline of the vertical stabilizer is cut to rough shape using a paper pattern.**

none of them agree. Perhaps the confusion lies in the numerous variations and identifying numbers; or maybe those free flight designs were done without three-views.

Several years ago a I encountered and photographed a delightful orange Defender at Oshkosh, and it set off the desire to finally design and build the model. I wrote to Walt Mooney, asking if he had anything of reasonable reliability on Aeroncas, since he had published several. Walt sent copies of everything he had (most of which duplicated my own material), but he did include a *1941 Aircraft Yearbook* drawing, which seems to most closely match the available photos.

In the style of Mooney, the design presented here is not super-Scale; compromises have been made in the name of simplicity and flyability. Yet even a casual glance immediately identifies the prototype. Just a few simple touches of Scale detail add a lot of charm and "cuteness" to the model without adversely affecting its excellent flying traits (or working the builder to death).

## CONSTRUCTION

Although this design looks rather large for a .40-.45 four- stroke or .25 two-stroke, it is lightly structured and absolutely should *not* be powered with a .40 two-stroke! One must consider and aircraft size and weight when choosing power plants. Select props on the large end of the engine's recommended diameter and the low end of pitch, for a more realistic flying speed.

Our prototype used some metric-sized basswood in the fuselage. Arraignments have been made with Riley Wooten's Lone Star Balsa ([800] 687-5555) for a stripwood package. Alternately, it is a relatively simple matter to sand down 1/4 basswood stock to the 6mm size needed to match the two layers of 3mm Lite Ply of the fuselage sides. (Although it's commonly referred too as 1/8 Lite Ply, the material is actually 3mm thick.)

All balsa-to-hardwood joints are glued with aliphatic resin such as Sig Bond or Titebond. All hardwood-to-plywood and plywood-to-plywood joints should be epoxied. Cyanoacrylate (CyA) adhesives will be fine for the remainder of this project. No unusual tools are required, but a jig saw (Dremel etc.) would certainly be convenient.

The metal landing gear works very well and is both sturdy and easily maintained. The plywood plates are attached by coarse-sanding them, etching the aluminum with citric acid (lemon juice), and adhering the plywood fairings to them with thick CyA. If the

builder just *has* to have a bent-wire gear, the system used on Sig's 1/6 J-3 Cub kit would adapt well.

The superb fiberglass cowl has been custom developed by Myron Pickard of Fiberglass Master. The dummy cylinders were constructed by outline-cutting them from block balsa; double-stick tape was used to hold coarse sandpaper on the cowl while the cylinder bases were rubbed against the sandpaper to create a neat joint. Dowel sections were used to "nail" the cylinders to the cowl, running them through drilled holes in both. Other engine details are scrap balsa.

The inverted four-stroke has been no problem whatsoever. The tank is carefully located low relative to the carburetor centerline to avoid any possibility of siphoning and flooding the engine. An onboard glow driver provided reliable idle; as a matter as fact, the engine won't idle consistently without it.

While we used a two-servo aileron setup for simplicity, a classic strip aileron system using standard hardware could be substituted. "Y" wire harnesses are available for most connector brands. Sections of Estes rocket body tube were used for wire tunnels, but one could easily form them from CyA-soaked paper.

**Tail Feathers:** The empennage is straightforward in construction. For the sake of simplicity, we like to cut the outlines after assembly. This is easily done by using carbon paper to develop a card-stock pattern, drawing its outline onto the surface with a soft pencil (no ball-point pens, please), then jigsawing the outline.

Do not separate the elevator halves until the wire joiner has been installed. The rearmost edges of the hinged surfaces are sanded to a V and the hinge slots cut. Install the "Hot Hinges" after covering.

**Wing:** The wing rib master patterns can be developed by placing carbon paper between the drawing end and a section of plywood. Use the resulting patterns to cut the ribs from stacks of light C-grain sheet, using a jig saw or by carving and block-sanding to final contour.

We used a band saw to cut the strip ailerons from a section of tapered trailing-edge stock. This provides properly tapered and matching pieces for the trailing edges. A section of properly sized strip could be razor-planed to the matching contour, or the strip could be carefully cut from the preformed stock using a metal straightedge.

Build the wing panels over the drawings from the bottom up, with some of the bottom sheeting in place. Cut the bottom spars flush with the outside of the tip ribs, then position the Lite Ply tips.

*Continued on page 33*

## Aeronca Defender

**Type:** RC Scale

**Wingspan:** 70 inches

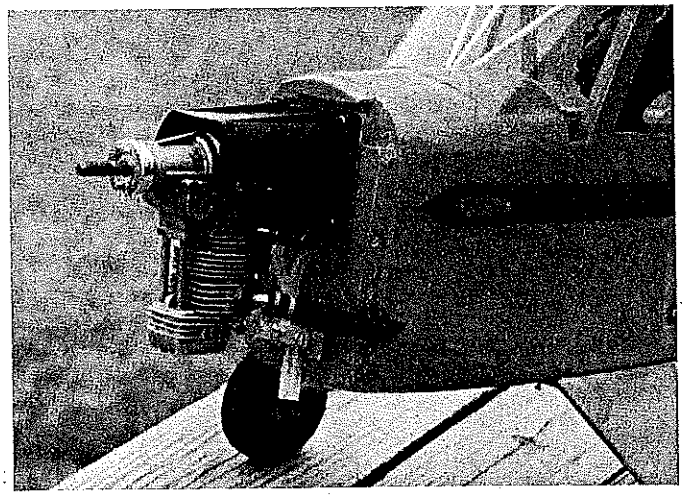
**Engine:** .40-.45 four-stroke; .25 two-stroke

**Number of channels:** Four

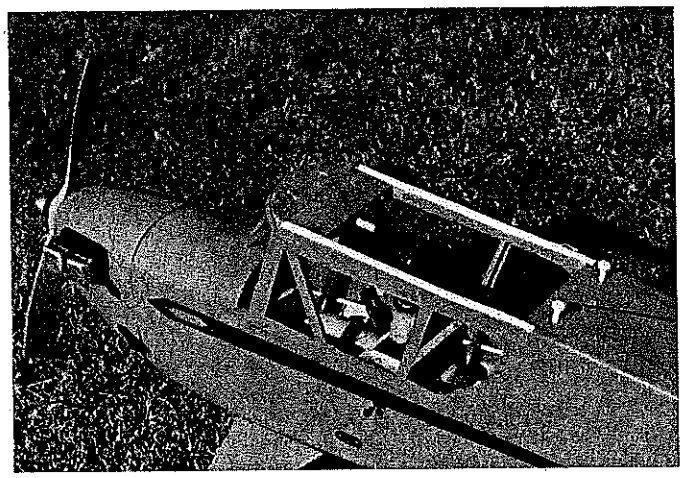
**Flying weight:** 84 ounces

**Construction:** Built-up

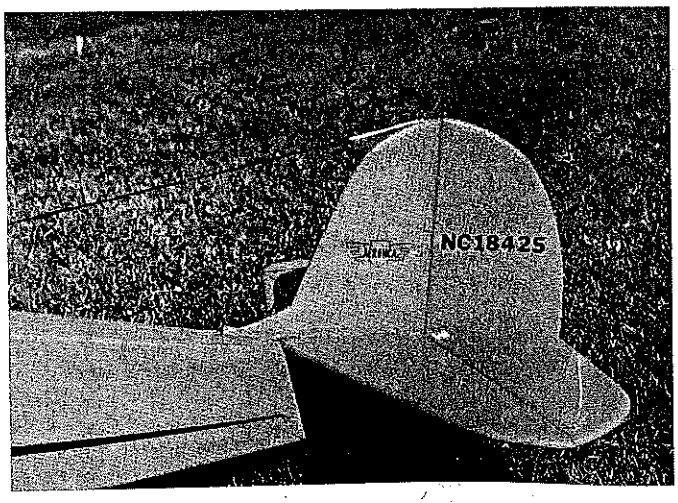
**Covering/finish:** Iron-on film



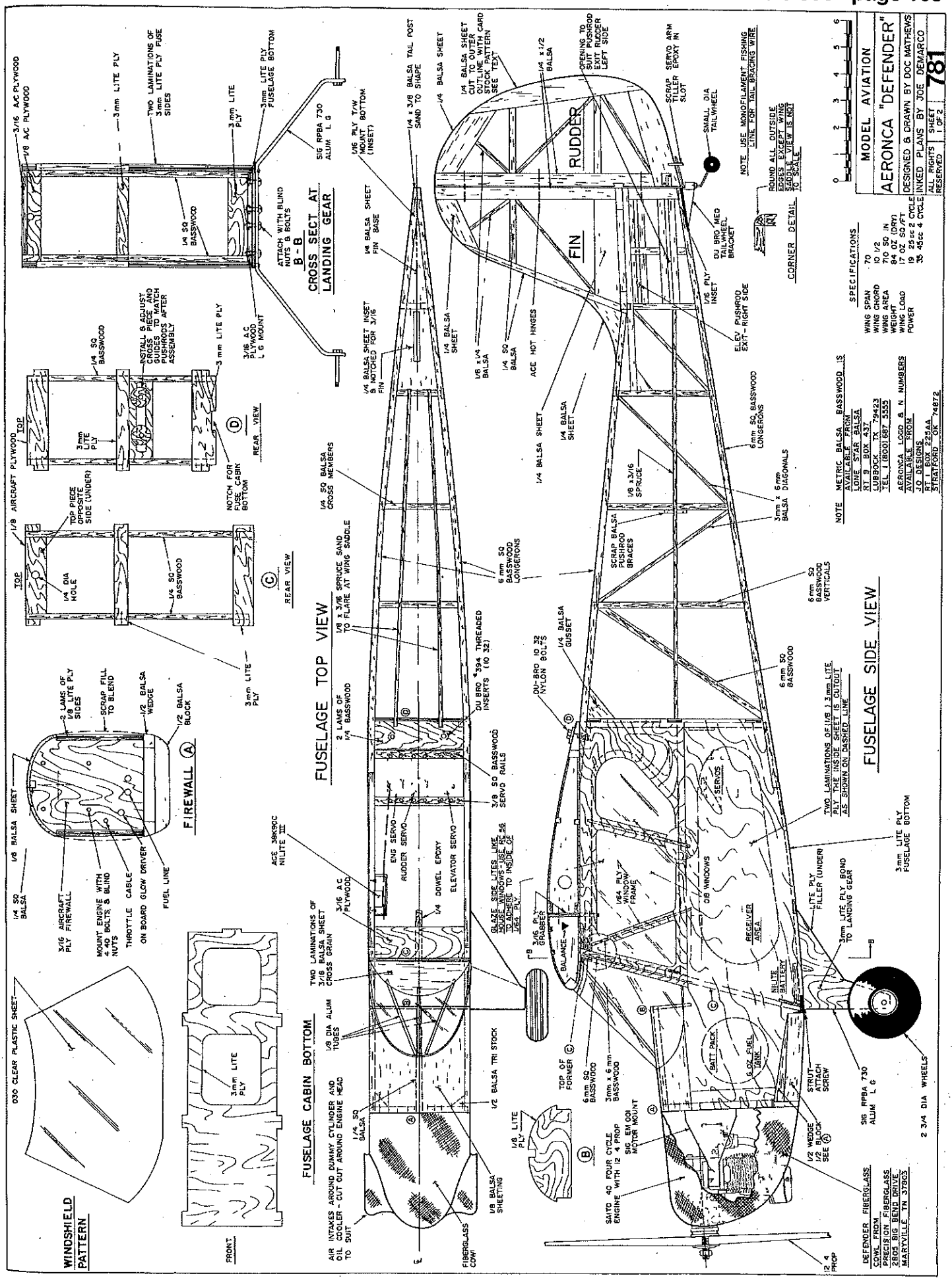
**Inverted engine runs and idles well with onboard glow lighter. Stock exhaust pipe with rubber tubing and plumbing for tank.**

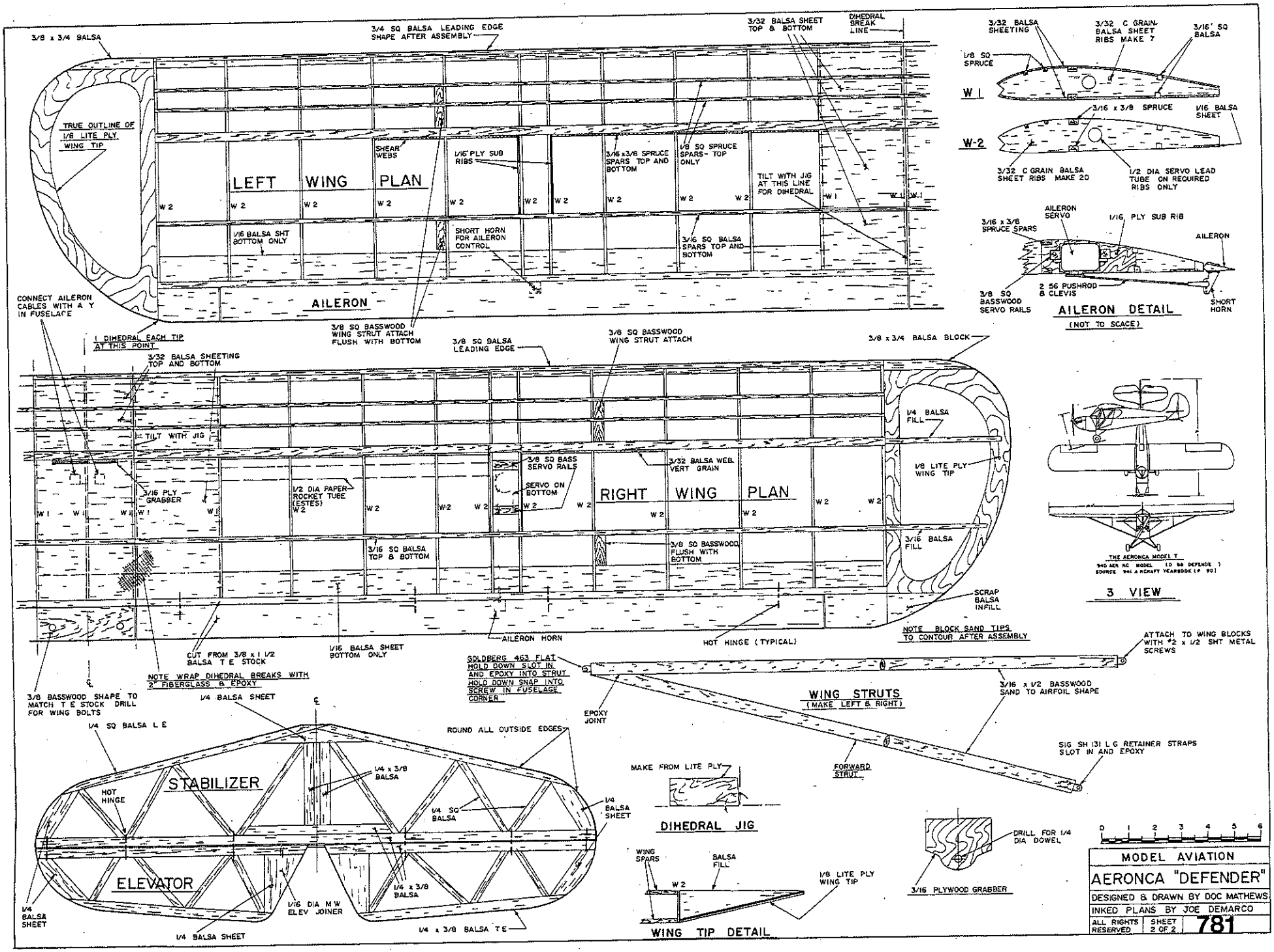


**Wing hold-down system, windshield top, and window-frame details. Cowl, struts, and landing gear were sprayed with LustreKote.**




**Aeronca logo and fictitious registration numbers are custom-made vinyl stick-ons by JO Designs (address in text).**


MODEL AVIATION
AERONCA "DEFENDER"
DESIGNED & DRAWN BY DOC MATHEWS
INKED PLANS BY JOE DEMARCO
781
ALL RIGHTS RESERVED
SHEET 1 OF 2
FUSELAGE SIDE VIEW
FUSELAGE TOP VIEW
FUSELAGE CABIN BOTTOM
CROSS SECT AT LANDING GEAR
B - B
RUDDER
FIN
CORNER DETAIL
REAR VIEW
FIREWALL (A)
WINDSHIELD PATTERN
SPECIFICATIONS
WING SPAN 70
WING CHORD 10 1/2
WING AREA 710 SQ IN
WEIGHT 84 OZ (DRY)
WING LOAD 17 OZ SQ/FT
POWER 19 25cc 2 CYCLE
35 45cc 4 CYCLE
NOTE METRIC BALSA BASSWOOD IS AVAILABLE FROM LONE STAR BALSA RT 9 BOX 437 LUBBOCK TX 79423 TEL 1 (800) 687 5555
AERONCA LOGO & N NUMBERS AVAILABLE FROM JO DESIGNS RT 2 BOX 224AA STRATFORD OK 74872
DEFENDER FIBERGLASS COWL FROM PRECISION FIBERGLASS 2805 BIG BEND DRIVE MARYVILLE TN 37803
SIG RPBA 730 ALUM L G
SAITO 40 FOUR CYCLE ENGINE WITH 12 4 PROP
SIG EM 001 MOTOR MOUNT
2 3/4 DIA WHEELS
12-4 PROP
ACE 38K90C NILITE III
NILITE BATTERY
6 OZ FUEL TANK
RECEIVER AREA
SERVOS
ENG SERVO
RUDDER SERVO
ELEVATOR SERVO
SCRAP BALSA PUSHROD BRACES
6mm SQ BASSWOOD LONGERONS
6mm SQ BASSWOOD VERTICALS
3mm x 6mm DIAGONALS
ACE HOT HINGES
ELEV PUSHROD EXIT-RIGHT SIDE
SCRAP SERVO ARM FOR TILLER SLOT
SMALL DIA TAILWHEEL
DU BRO MED TAILWHEEL BRACKET
NOTE USE MONOFILAMENT FISHING LINE FOR TAIL BRACING WIRE
ROUND ALL OUTSIDE EDGES EXCEPT WING TIP VIEW IS NOT TO SCALE
TWO LAMINATIONS OF 1/8 & 3mm LITE PLY THE INSIDE SHEET IS CUTOUT AS SHOWN ON DASHED LINE
3mm LITE PLY FUSELAGE BOTTOM
3mm LITE PLY BOND TO LANDING GEAR
LITE PLY FILLER (UNDER)
STRUT ATTACH SCREW
1/2 WEDGE 1/2 BLOCK SEE (A)
DU-BRO 10-32 NYLON BOLTS
1/4 BALSA GUSSET
DU BRO #394 THREADED INSERTS (10-32)
3/8 SQ BASSWOOD SERVO RAILS
1/8 x 3/16 SPRUCE
1/8 x 3/8 SPRUCE SAND TO FLARE AT WING SADDLE
1/4 SQ BALSA CROSS MEMBERS
1/4 BALSA SHEET FIN BASE
1/4 BALSA SHEET FIN NOTCHED FOR 3/16
1/4 x 3/8 BALSA TAIL POST SAND TO SHAPE
1/4 BALSA SHEET CUT TO OUTER OUTLINE WITH CARD STOCK PATTERN SEE TEXT
1/4 x 1/2 BALSA
OPENING TO SUIT PUSHROD EXIT RUDDER LEFT SIDE
1/16 PLY INSET
1/16 PLY T/W MOUNT BOTTOM (INSET)
SIG RPBA 730 ALUM L G
ATTACH WITH BLIND NUTS & BOLTS
3mm LITE PLY FUSELAGE BOTTOM
3mm LITE PLY
TWO LAMINATIONS OF 3mm LITE PLY FUSE SIDES
3/16 A/C PLYWOOD
1/8 A/C PLYWOOD
1/4 SQ BASSWOOD
INSTALL & ADJUST CROSS PIECE AND GUIDES TO MATCH PUSHRODS AFTER ASSEMBLY
3/16 A/C PLYWOOD L G MOUNT
NOTCH FOR FUSE CABIN BOTTOM
TOP PIECE OPPOSITE SIDE (UNDER)
1/4 DIA HOLE
1/8 AIRCRAFT PLYWOOD
TOP
REAR VIEW
1/8 BALSA SHEET
1/4 SQ BALSA
3/16 AIRCRAFT PLY FIREWALL
MOUNT ENGINE WITH 4-40 BOLTS & BLIND NUTS
THROTTLE CABLE
ON BOARD GLOW DRIVER
FUEL LINE
2 LAMS OF 1/8 LITE PLY SIDES
SCRAP FILL TO BLEND
1/2 BALSA WEDGE
1/2 BALSA BLOCK
2 LAMS OF 1/4 BASSWOOD
3mm LITE PLY
TWO LAMINATIONS OF 3/16 BALSA SHEET CROSS GRAIN
3/16 A/C PLYWOOD
1/8 DIA ALUM TUBES
1/4 SQ BALSA
1/2 BALSA TRI STOCK
1/8 BALSA SHEETING
AIR INTAKES AROUND DUMMY CYLINDER AND OIL COOLER - CUT OUT AROUND ENGINE HEAD TO SUIT
FIBERGLASS COWL
3/16 PLY GRABBER
1/64 PLY WINDOW FRAME
GLAZE SIDE LITES LINE WINDOW INSIDE OF 56 TO ADHERE TO INSIDE OF 1/64 PLY
.018 WINDOWS
BALANCE
TOP OF FORMER (C)
6mm SQ BASSWOOD
3mm x 6mm BASSWOOD
1/8 LITE PLY
3mm LITE PLY
FRONT
.030 CLEAR PLASTIC SHEET
WINDSHIELD PATTERN


3/8 x 3/4 BALSA
3/4 SQ BALSA LEADING EDGE SHAPE AFTER ASSEMBLY
3/32 BALSA SHEET TOP & BOTTOM
DIHEDRAL BREAK LINE
TRUE OUTLINE OF 1/8 LITE PLY WING TIP
LEFT WING PLAN
SHEAR WEBS
1/16 PLY SUB RIBS
3/16 x 3/8 SPRUCE SPARS TOP AND BOTTOM
1/8 SQ SPRUCE SPARS - TOP ONLY
TILT WITH JIG AT THIS LINE FOR DIHEDRAL
W 1
W 2
1/16 BALSA SHT BOTTOM ONLY
SHORT HORN FOR AILERON CONTROL
3/16 SQ BALSA SPARS TOP AND BOTTOM
AILERON
CONNECT AILERON CABLES WITH A Y IN FUSELAGE
1 DIHEDRAL EACH TIP AT THIS POINT
3/32 BALSA SHEETING TOP AND BOTTOM
3/8 SQ BASSWOOD WING STRUT ATTACH FLUSH WITH BOTTOM
3/8 SQ BALSA LEADING EDGE
3/8 SQ BASSWOOD WING STRUT ATTACH
3/8 x 3/4 BALSA BLOCK
TILT WITH JIG
3/16 PLY GRABBER
1/2 DIA PAPER ROCKET TUBE (ESTES) W 2
3/8 SQ BASS SERVO RAILS
SERVO ON BOTTOM
3/32 BALSA WEB VERT GRAIN
RIGHT WING PLAN
1/4 BALSA FILL
1/8 LITE PLY WING TIP
3/16 SQ BALSA TOP & BOTTOM
3/8 SQ BASSWOOD FLUSH WITH BOTTOM
3/16 BALSA FILL
SCRAP BALSA INFILL
1/16 BALSA SHEET BOTTOM ONLY
AILERON HORN
HOT HINGE (TYPICAL)
NOTE BLOCK SAND TIPS TO CONTOUR AFTER ASSEMBLY
CUT FROM 3/8 x 1 1/2 BALSA T E STOCK
NOTE WRAP DIHEDRAL BREAKS WITH 2" FIBERGLASS & EPOXY
3/8 BASSWOOD SHAPE TO MATCH T E STOCK DRILL FOR WING BOLTS
1/4 BALSA SHEET
GOLDBERG 463 FLAT HOLD DOWN SLOT IN AND EPOXY INTO STRUT HOLD DOWN SNAP INTO SCREW IN FUSELAGE CORNER
ATTACH TO WING BLOCKS WITH #2 x 1/2 SHT METAL SCREWS
WING STRUTS
(MAKE LEFT & RIGHT)
3/16 x 1/2 BASSWOOD SAND TO AIRFOIL SHAPE
EPOXY JOINT
FORWARD STRUT
SIG SH 131 L G RETAINER STRAPS SLOT IN AND EPOXY
1/4 SQ BALSA L E
ROUND ALL OUTSIDE EDGES
STABILIZER
1/4 x 3/8 BALSA
HOT HINGE
1/4 SQ BALSA
1/4 BALSA SHEET
ELEVATOR
1/16 DIA M W ELEV JOINER
1/4 x 3/8 BALSA
1/4 BALSA SHEET
1/4 x 3/8 BALSA T E
MAKE FROM LITE PLY
DIHEDRAL JIG
WING SPARS
BALSA FILL
1/8 LITE PLY WING TIP
W 2
WING TIP DETAIL
DRILL FOR 1/4 DIA DOWEL
3/16 PLYWOOD GRABBER
3/32 BALSA SHEETING
3/32 C GRAIN BALSA SHEET RIBS MAKE 7
3/16" SQ BALSA
1/8 SQ SPRUCE
W 1
3/16 x 3/8 SPRUCE
1/16 BALSA SHEET
W-2
3/32 C GRAIN BALSA SHEET RIBS MAKE 20
1/2 DIA SERVO LEAD TUBE ON REQUIRED RIBS ONLY
AILERON SERVO
1/16 PLY SUB RIB
3/16 x 3/8 SPRUCE SPARS
AILERON
2 56 PUSHROD & CLEVIS
3/8 SQ BASSWOOD SERVO RAILS
SHORT HORN
AILERON DETAIL
(NOT TO SCALE)
THE AERONCA MODEL T
3 VIEW
0 1 2 3 4 5 6
MODEL AVIATION
AERONCA "DEFENDER"
DESIGNED & DRAWN BY DOC MATHEWS
INKED PLANS BY JOE DEMARCO
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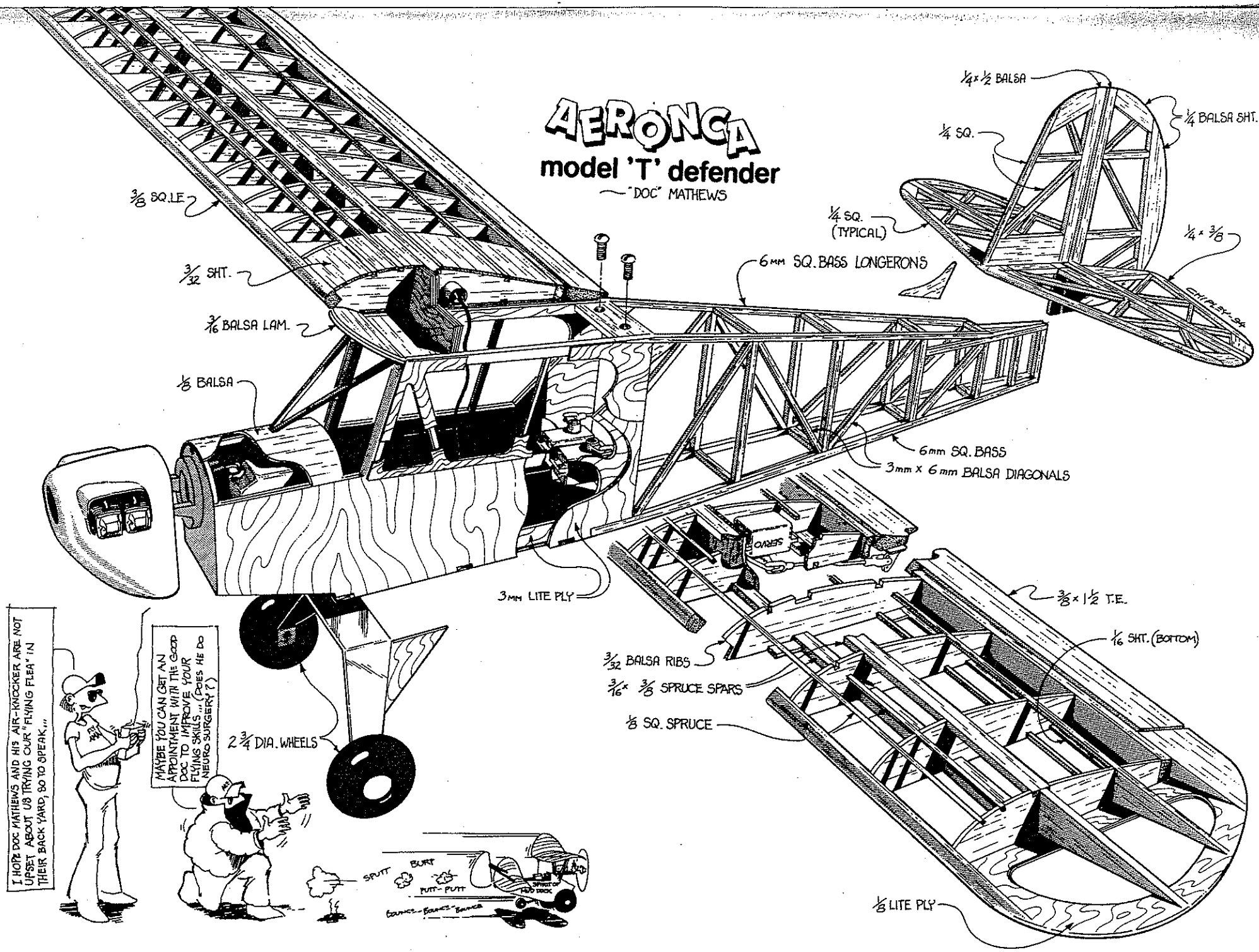
SHEET 2 OF 2
781


AERONCA
model 'T' defender
— "DOC" MATHEWS
3/8 SQ. LE.
3/32 SHT.
3/16 BALSA LAM.
1/8 BALSA
6mm SQ. BASS LONGERONS
1/4 x 1/2 BALSA
1/4 SQ.
1/4 BALSA SHT.
1/4 SQ. (TYPICAL)
1/4 x 3/8
6mm SQ. BASS
3mm x 6mm BALSA DIAGONALS
3mm LITE PLY
3/8 x 1 1/2 T.E.
1/16 SHT. (BOTTOM)
3/32 BALSA RIBS
3/16 x 3/8 SPRUCE SPARS
1/8 SQ. SPRUCE
1/8 LITE PLY
2 3/4 DIA. WHEELS
I HOPE DOC MATHEWS AND HIS AIR-KNOCKER ARE NOT UPSET ABOUT US TRYING OUR "FLYING FLEA" IN THEIR BACK YARD, SO TO SPEAK...
MAYBE YOU CAN GET AN APPOINTMENT WITH THE GOOD DOC TO IMPROVE YOUR FLYING SKILLS... (DOES HE DO NEURO SURGERY?)
SPUTT
BURT
PUTT-PUTT
BOUNCE-BOUNCE-BOUNCE

## Aeronca/Mathews

*Continued from page 28*

Cut the top spar extension fillers to match the angle. The center section is built integrally with the right wing, then cut and removed.

Space should be left in the top and bottom center section sheeting to provide access when the "grabber" is being installed onto the fuselage hold-down dowel in a later step.

By tilting the inside ribs using the jig, one need only block up the wing panel and sand in the bevel using a table edge and sanding block. This creates a tight joint and requires a minimum of epoxy.

No dihedral gussets were shown on the plans, as our experience over many designs proves they are not needed; tight joints combined with epoxy and glass cloth provide superior strength. After the panels have been epoxied together at the rib faces, and the "grabber" installed, simply wrap glass and epoxy over the joints.

The leading-edge and tip filler blocks should be rough-sanded to outline, them finish-sanded after the wing is complete.

**Fuselage:** The fuselage sides are developed using the carbon-paper transfer technique. Note the inside sections have lightening holes.

The sides are developed one atop the other in classic 25-cent model fashion, using scraps of masking tape to keep them from sticking to each other. The triangular stock and some gussets are fitted after separation. *Be sure to build a left* and *right side!*

The "ladders" are fabricated directly over the drawings. All holes should be located and drilled at this time.

The engine can be rough-positioned in the cowl by laying the engine and mount into it, cutting the appropriate shaft-exit and head-passage holes in the fiberglass unit, then placing the mount onto the precut firewall and adjusting things to match the cowl.

When satisfied, spot-glue the mount to the firewall with CyA, remove the cowl, and mark and drill the proper holes for the mounting bolts and blind nuts. Drill the other required holes in the firewall at this time.

As with any cowled engine there should be a much larger total exit than entry for the cooling air. I cut a hole in the cowl bottom approximately the size of the cylinder head. Entry air is routed through the scale locations and by clearing some of the glass around the dummy cylinders.

Pin the right fuselage side flat over the side view, install the four major forward sections, checking for squareness in all planes with a triangle, then join them using medium CyA.

Insert the left side onto the bulkheads, check for squareness in all planes, then adhere.

The completed forward fuselage basic box should be strong and true following this simple technique.

Block up the tail post 1/2 the fuselage width at the midline and pull the left post down onto the right. Use two clothespins to hold this joint while you checking alignment, then CyA the tail post together.

Balsa crosspieces are cut in pairs over the top view and glued in place with the fuselage still pinned down.

With a little care and some measuring it is almost impossible to build a crooked or out-of-line fuselage with this technique.The hardwood cabin crossmembers, gussets, etc. should now be added. The sheeting for the tank area top is moistened with diluted ammonia, then carefully pulled over formers A and B. Release and flow medium CyA on the joints and pull the sheet down, starting at the sides and working toward the strip.

Use a steel straightedge to cut the midline, being careful to cover 1/2 of the center strip. Repeat the technique for the other half. Carefully use the straightedge to trim the second sheet until it fits tightly against the first.

The windscreen top is formed of two crossgrain precut pieces of balsa that have been moistened with diluted ammonia water and clamped against the bottom of the forward section of the wing. Use masking tape to hold them in place while they dry. Use aliphatic resin between the halves and tape them again to the underside of the wing center section. Install onto the fuselage with epoxy.

The three braces inside the windscreen are purely fake. They are sections of 1/8 aluminum tubing CyAed into holes in the balsa coaming and the windscreen top unit.

Epoxy the 1/4 dowel onto the front crossmember with the fuselage inverted. This needs to be in the center and parallel with the sides.

Place the assembled wing onto the saddles. Check alignment using the classic pin-and-string-at-the-tailpost system to arrange the wing square to the fuselage. Drill the trailing edge basswood down into the rear crosspiece of the fuselage. Remove the wing and either tap the rear bass for nylon bolts or use threaded inserts.

Bolt the wing onto the fuselage, place the "grabber" flush against the front wing spars using clothespins to hold it. Adjust the grabber for a tight fit into the wing saddle. Epoxy the "grabber" to the spar rears, then finish sheeting the center section.

Use the preformed Sig aluminum gear to mark the landing gear mount for the proper holes and blind nuts. Although not terribly scale, one can use Du-Bro axles to mount the wheels. Hubcaps for the wheels can be made by carefully scribing, then popping out the bottoms of aluminum soft-drink cans to the desired diameter. These can be adhered to the wheel hubs with RC-56 adhesive.

Radio installation utilizes 3/8 square bass crossmembers for the servos epoxied to the Lite Ply sides. The battery pack and fuel tank fit nicely inside the forward compartment. The tank should be kept just as low as possible with an inverted engine.

We used flexible nylon tube pushrods for rudder and elevator, and cable for the throttle. Rough up the pushrods at the point they pass through the anti-flex mounts and tail exit for better adhesion of the CyA.

Spruce side and top contour stringers are glued in the locations shown, the block-sanded to blend them into the sides. The 1/64 plywood window frames are larger than the underlying Lite Ply and stringers. This allows for an edge or "sill" into which the clear plastic can be adhered with RC-56, using a glue gun, after the fuselage has been covered.

The side windows are developed by simply scoring the plastic to the proper outline. Break at the score marks—do not try to cut through the plastic!

The windscreen will require some trimming to fit perfectly. It is installed by cutting a narrow strip of covering material away from the bottom border, then slipping

the plastic into the sills and adhering all edges with RC-56. Use strips of masking tape to hold everything in place overnight. The edges can easily be dressed with trim tape.

Struts are assembled over the drawing using epoxy. Slots are cut for the nylon landing gear straps and Goldberg snap fittings. The struts are then sanded to an airfoil shape. The straps and fittings are CyAed into the slots.

I initially used wire jury struts that were held to the hardwood with female halves of Robart mini hinges. The wire entered the wing via two nylon eyelets. They looked nice, but didn't prove to be very durable. Do them if you wish.

The fuselage ends of the struts are snapped into screws mounted just forward of the landing gear. This has worked out well, as the struts can be flexed slightly and the straps snapped in easily.

**Finish:** This is one of those designs that needs the torsional strength added by the stiffer iron-on coverings such as MonoKote, UltraCote, or Oracover.

I sprayed the cowl, wing struts, and landing gear with MonoKote LustreKote, but any paint that matches would be just fine. After all, your Defender might not be orange. Black and silver hobby enamels were used on the dummy engine.

For some ideas on color and markings variations, contact Bob Banka's Scale Model Research, 3114 Yukon Ave., Costa Mesa CA 92626 for color foto paaks.

The neat Aeronca logo for the tail and the numbers are available from JO Designs, Rt. 1 Box 225 AA, Stratford OK 74672.

**Flying:** If you've ever flown an RC-assist Old-Timer or a lightly loaded high wing trainer, you'll know what to expect.

The Defender is very light and will take off with virtually no forward roll.

There is a tendency for the nose to tuck down when the throttle is slammed open, so bring the throttle up slowly. Feed in only enough up elevator to keep the model level; apply judicious amounts of right rudder and the model will take off very realistically. If too much up is applied, the Defender will be airborne before you are ready.

No thrust settings are shown on the drawings. This is simply due to the alignment variations that will creep into even the most accurately built model, as well as the wide variations introduced by varying power and prop combinations.

With a .40 four-stroke and a 11 x 5 prop, the positive incidence built into the wing seems to provide sufficient downthrust. Just a tad of right thrust was used. On the other hand, if a .25 two-stroke and a 9 x 6 prop are used, be prepared to add at least three degrees of down and right thrust.

Actually, the .40 four-stroke is run in about 1/2 throttle most of the time for just "putting around the patch" type flying. On the other hand, the model will climb rather briskly at full throttle and the recommend control throws will be excessive in full-throttle level flight.

The only problem with landing the fool thing is slowing it down enough to stop it from flying. Line it up, cut down to low throttle way out there, and let it sort of float to earth. In any sort of breeze, stick with wheel landings. In a way, the Defender is almost easier to land dead-stick; it is a floater, with no tendency to stall and snap.

This is just plain old-fashioned flying for fun. The Defender is not only an attractive alternative to the plethora of Cubs, but has a distinctive cuteness and delightful flying characteristics all its own.

The Defender was worth the long gestation period, as it is truly an easy model to *enjoy*!

*This article is dedicated to the memory of Walt Mooney. Though Walt is deceased, his legacy of simply built but highly flyable model airplane designs lives on. Hopefully, this design embodies the spirit of his models.* ✈