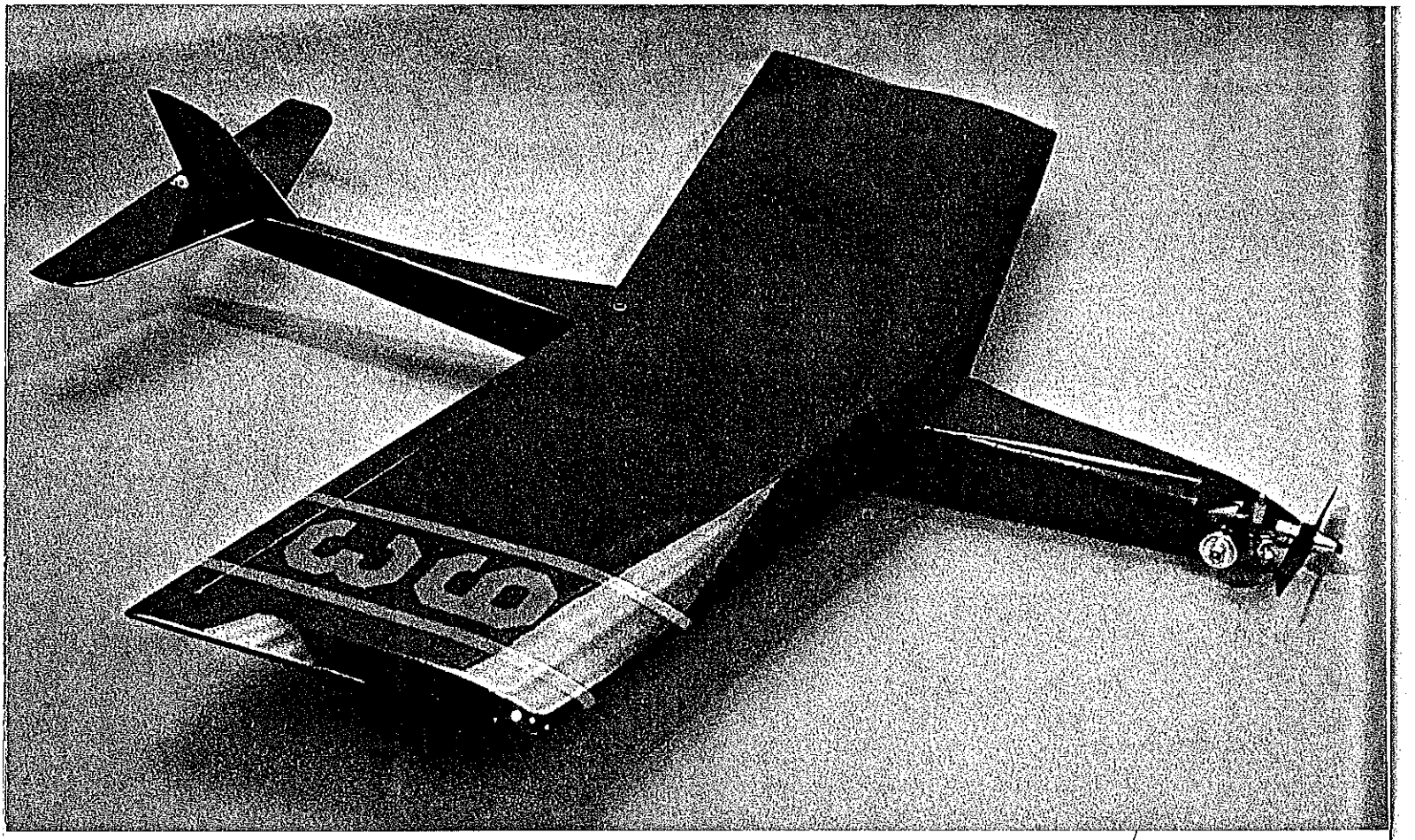

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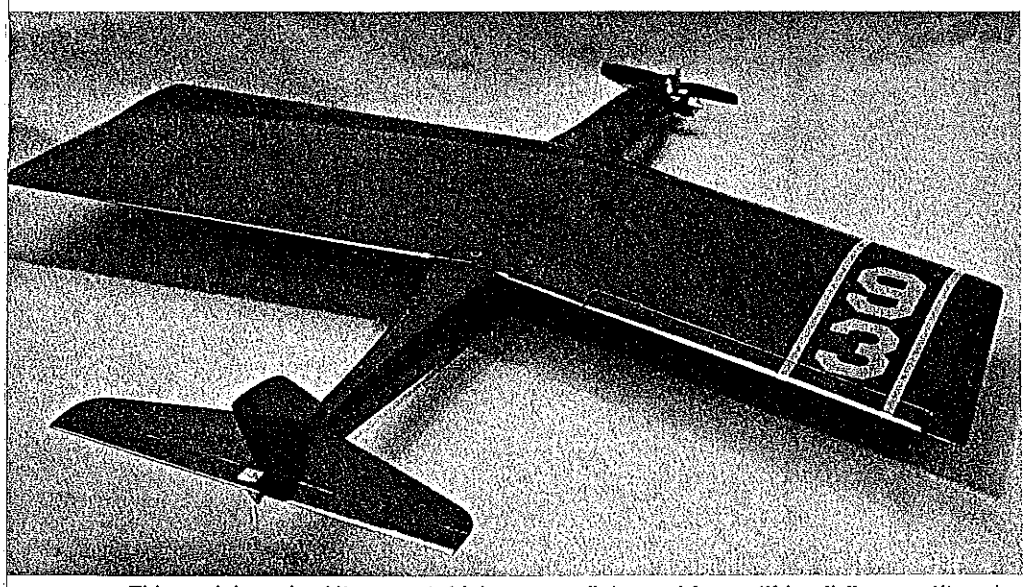
4/63

James Gilgenbach



This model received its name (which means a flat worm) from a "friendly" competitor who said the airplane looked like a worm he had viewed under a microscope in college. In addition to identification, wing numbers help with orientation when going around the pylons.

½A PYLON RACING, using the WILLI (Wisconsin-Illinois) rules, has proven to be the most interesting aspect of my aeromodeling hobby. There are many reasons for this; however, some of the more obvious ones are:

Friendly competition. Each racer's success is dependent upon how well he does against his fellow contestants in each of five rounds. A heat assignment system is used wherein no individual competitor has to continually race against the known "hot dogs" on the circuit. Even though each individual wants to win, the real enjoyment is due to the friendly, competitive spirit of all the WILLI contestants.

Lack of sophisticated equipment and rules. All that is required to conduct a contest is a stopwatch, a flag, three pylon poles, a starting line, a caller for each contestant (optional), three pylon judges, and a starter. Fellow contestants often handle the lap counting and pylon judging without adversely affecting the integrity of the contest.

Everyone who tries RC Pylon Racing tells us that it gets in your blood—and you want more of it. An easy way to get started is in the ½A class. This model was built for, and has done well in, the WILLI races (the rules for which are a bit different than for AMA ½A Pylon). The text has a lot of good advice about how to make these small models really perform.

minthes

Upon notification from the starter, the contestant has 90 seconds to start his engine and get to the starting line. The contestant hand launches his plane after the flag signal from the starter. From that point on, the objective is to make 10 laps around the pylons without cutting, and to finish ahead of the other racers.

Simple design parameters for the aircraft. The wing must be of constant chord with a minimum area of 200 sq. in. and minimum thickness of ⅞ in. The fuselage must be at least 2½ in. high (including wing thickness) and must have a minimum cross-sectional area of 6 sq. in. with both of these dimensions occurring between the wing leading and trailing edges. The overall weight tolerance, less fuel, is 20 to 32 oz.

The engines used are stock .049 or .051 Cox TDs with no modifications allowed other than lapping of the piston and crank. Any kind of needle valve assembly may be used. The fuel (normally 25% nitro) is supplied by the hosting club. No fuel pressurization is allowed. Regardless of what anyone may tell you, smooth, consistent runs can easily be attained with Cox TD engines without fuel pressurization.

No flying wings or pod-and-boom aircraft are allowed. A means of remotely stopping the engine is required.

Winning strategy. Don't get the mistaken notion that the WILLI circuit is comprised of cream-puff rules that neutralize contestant ingenuity. On any given day, any racer who has his act together can "beat your pants off" if you're not prepared. Throughout the years I have tried many different aircraft designs and racing techniques in my quest to consistently win regardless of whom or where I was racing. Through this experimentation, I have reached the following conclusions:

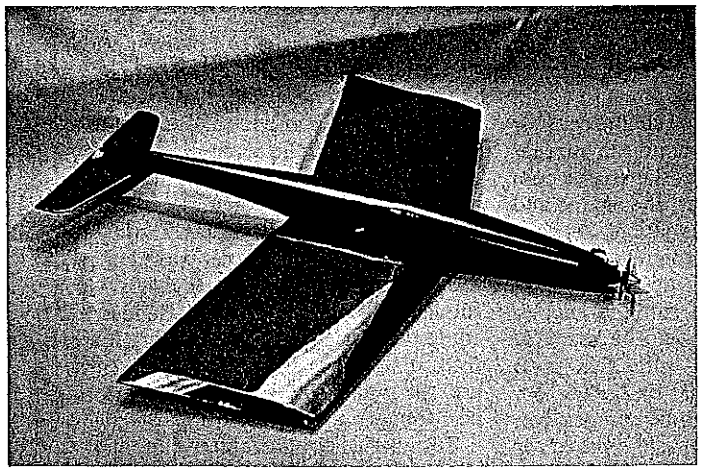
The Cox TD engine must run reliably at full power. This can be achieved by properly lapping the engine and correctly mounting the engine and fuel tank. The rigidity of the fuselage is also very important to avoid vibration.

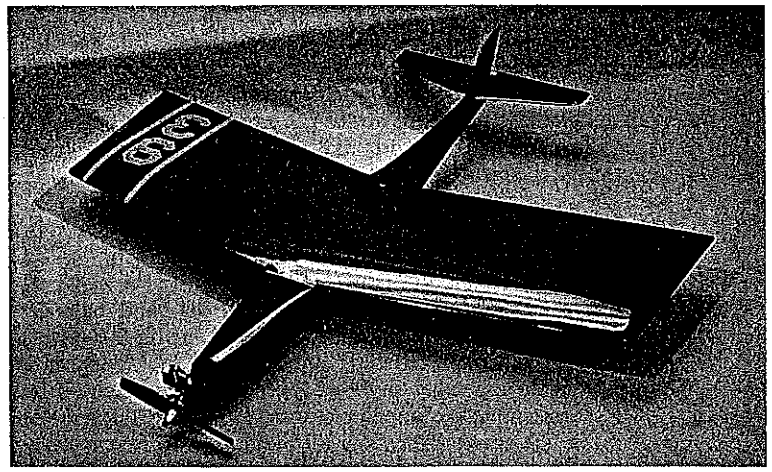
The easy way to lap-in a piston and cylinder is with the use of an old Cox Babe Bee crankcase assembly and an electric starter. First, closely inspect the piston and cylinder for loose metal particles, burrs, and gouges or scratches. Remove the loose particles and burrs. If the gouges or scratches are serious, get a new piston and cylinder assembly.

Second, using a rod-setting tool, snug up the rod in the piston socket to eliminate any end play. Be careful, however, not to tighten it too much. The rod should still freely pivot from side to side and freely rotate in the piston.

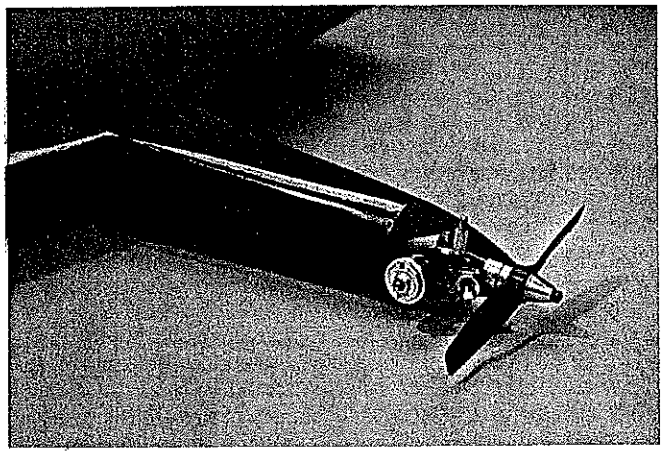
Third, add a light oil to the rod crank pin hole and piston ball joint, and install the piston and cylinder onto an old Babe Bee or other Cox .049/.051 crankcase which has approximately 1/32 in. removed from the portion where the cylinder mounts. This will allow the piston to travel above its normal top limit for lapping purposes.

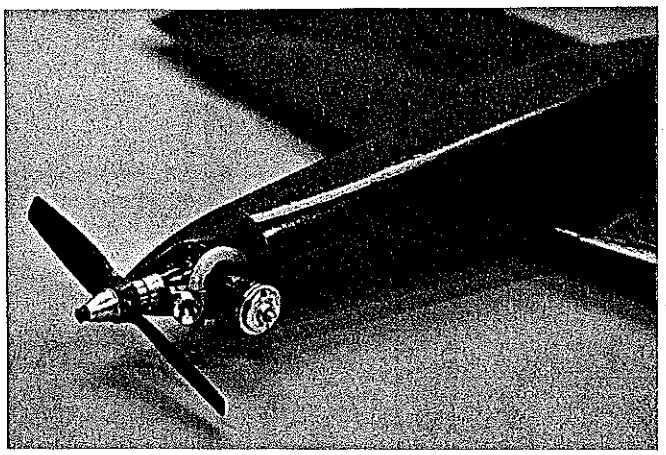
Fourth, apply automotive polishing compound to the cylinder with the piston at the bottom of its stroke. Crank over the assembly by hand to work in the compound. Next, turn over the engine for



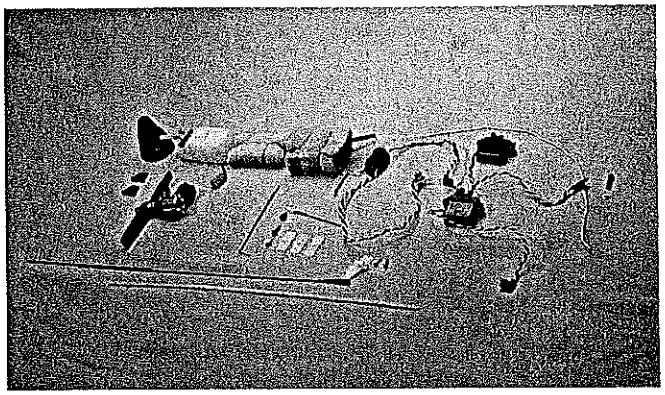


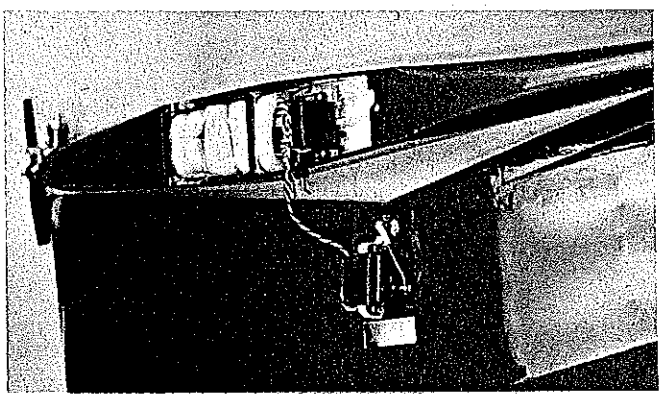
The model is aerodynamically very clean. The only exposed hardware consists of the engine, Du-Bro switch and elevator horn, and the antenna trailing out the back. Though this version of the design has conventional tail surfaces, author prefers the T-tail configuration (even though the T-tail is more susceptible to damage if you happen to make a bad landing). This model has much success on the WILLI circuit.



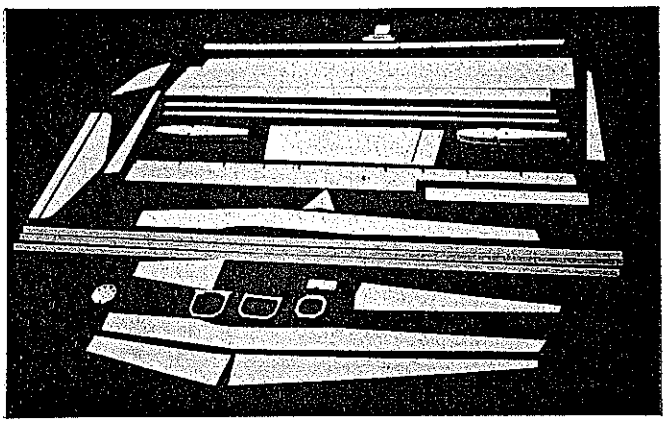


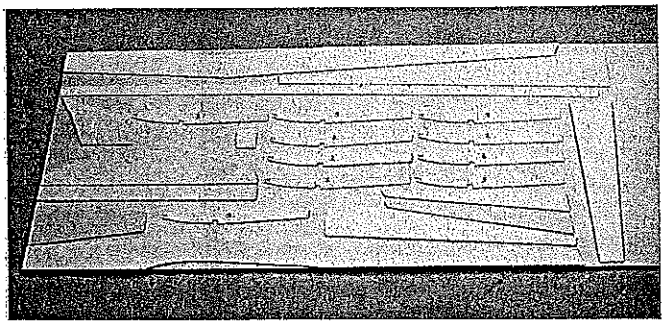
Side-mounting allows a more consistent fuel draw because the centerlines of the venturi and fuel tank match up. Running the fuel lines through the firewall and mount produces a clean frontal profile. Note use of a 5-40 socket head cap screw for mounting the propeller.





Left: This is a collection of the airborne hardware required for the model. The short base-loaded antenna allows enough range and doesn't produce the drag of a full-length one. Right: A well-organized, neat radio installation assures flawless performance flight after flight.





Left: Make all the parts before beginning assembly, and the actual building time can be reduced to less than 20 hours. Above: All of the Lite Ply parts can be made from one ⅛ sheet sized 12 x 16 in. Make sure that the Lite Ply sheet you use doesn't have large warps.

about five seconds with an electric starter.

Fifth, remove the piston and cylinder assembly, and clean it thoroughly with soap and water. Be careful not to get any water into the piston/rod ball joint. Reassemble the piston to the cylinder, and push the piston to ½₂ in. above top dead center. The piston should stick in place with the assembly held in a vertical position; however, it should fall out if given a slight tap with your finger. If the assembly is too tight, relap it; if the assembly is too loose, it's too late to do anything about it, but test run the assembly anyhow.

Sixth, reassemble the lapped piston and rod to the TD crankcase, oiling all parts thoroughly.

Seventh, mount the engine to a test stand, and run it at a rich setting at 20,000 rpm for about 2 min. (The prop that should be used for test running is a Master Air Screw (MAS) 5½-4 cut down to 4¾ in. dia. and balanced.) Let the engine cool for about 2 min., then restart and run another 2 min. at 22,000 rpm. Let the engine cool for another 2 min. Restart the engine and run for 20 min., alternating between 20,000 rpm and 23,000 rpm every 2 min. Install a MAS 5½-4, cut down to 4¾ in. dia. and balanced, and run the engine. This is the prop that should be used for racing. Maximum rpm with this prop should range from 21,000 to 22,000 rpm in order for the engine to be competitive.

You must go to the contest prepared for the worst. Make sure your starting equipment and radio equipment are in A-1 shape and fully charged. Check your glow plug performance in comparison with a new plug. If the rpm drops by 250 or more, don't use the old plug.

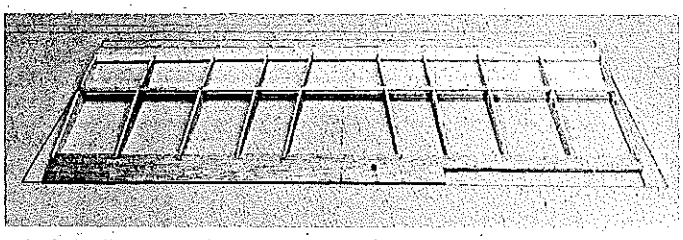
A backup airplane is an absolute necessity if you plan to be competitive throughout the season. Why drive hundreds of miles to a race and then sit and watch everyone else having fun without you, because your only plane was damaged during one of your test flights? A log should be kept on all your engines and equipment in order to document the effects of changes that are made. Always use the *same* test prop for monitoring performance.

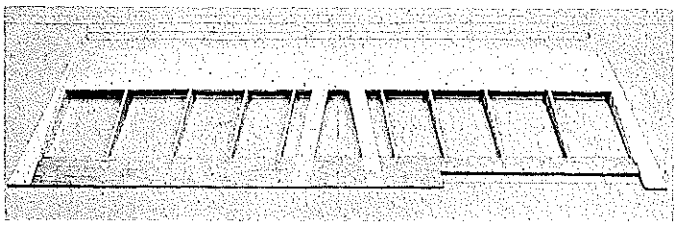
Test flights are absolutely essential to ensure a proper engine run and to trim out the aircraft.

The aircraft must be simple, clean,

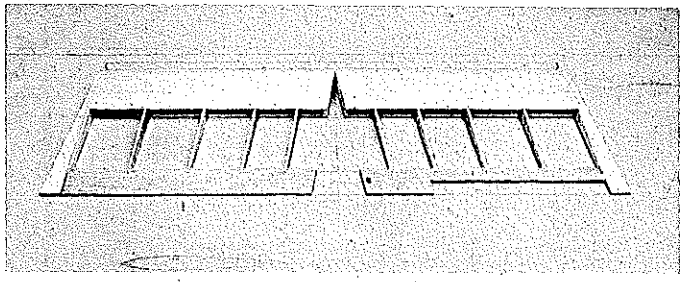
CHUCK WOOD by Hank Clark

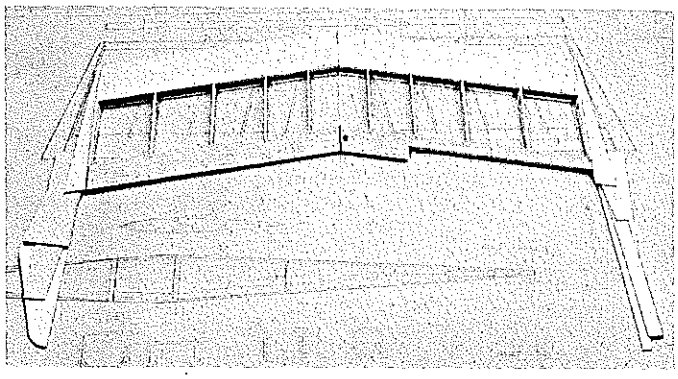
'THE PLOT CHICKENS'



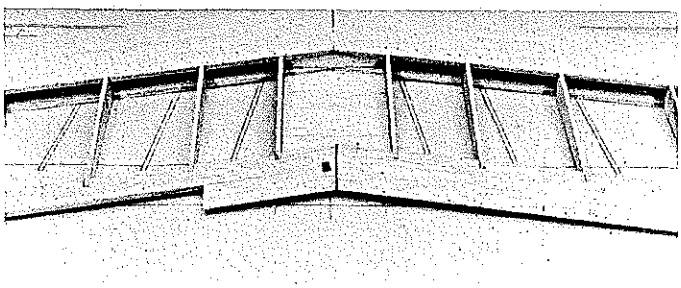


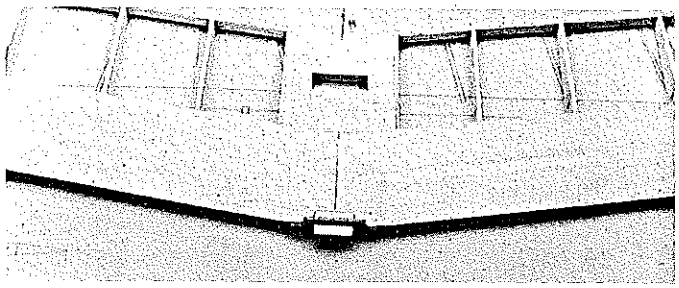
Left: Build the wing straight over the plan. Author recommends use of a thick cyanoacrylate glue. Notches in the leading and trailing edges help with alignment. Right: Use masking tape to mark the saw lines for the sweepback. Be sure the sawing is perpendicular to the bottom.





Above: After sawing the wing into halves, recheck to make sure the saw lines are straight. Right: Glue the wing halves together with the leading and trailing edges at the same height off the building board. Use whatever scraps you have laying around to shim as necessary.





Left: Add 1/16 balsa sheeting to the center of the wing. Note that the sheeting is inset between the center ribs, not on top of them. Right: Here you see the cutout in the wing sheeting for clearing the elevator servo and the tongue for holding the wing front to the fuselage.

strong, light, stable, and predictable. I have thus far gone through at least a dozen different designs trying to achieve the ultimate WILLI ½A Pylon Racer. The Platyhelminthes series has proven to be the most successful, allowing me to accumulate the most WILLI points for the 1983 racing season. This aircraft has all of the above qualities — plus it is quick-building and inexpensive.

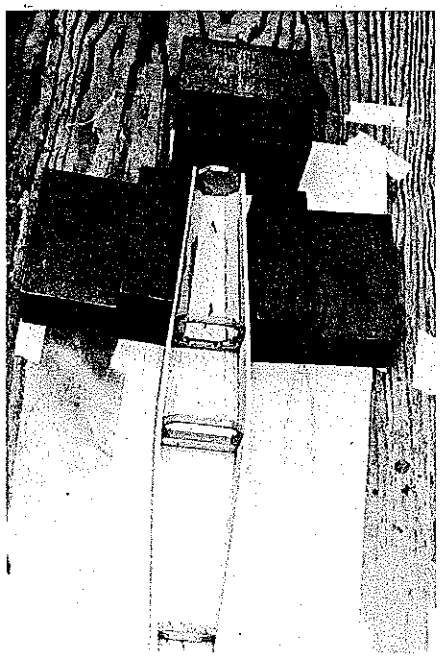
Construction. The first step to ensure a short and successful building session is to cut out and rough-sand all of the parts. This is done by lightly contact-cementing an extra set of plans onto the wood and then sawing out each component. The ribs should be cut in groups of five to ensure uniformity and to save time. Also, cut out the aileron and install the aileron torque rod tube. All of the construction is straightforward, and you should be able to complete the entire assembly in approximately 20 hours.

Start by taping one set of plans to a building board and taping waxed paper over the plans.

The wing should be constructed first. Position and tape the trailing edge flat onto the plans. Assemble the ribs to the trailing edge. Insert the leading edge into the ribs, and align it with the plans. Glue the ribs to the leading and trailing edges; I recommend using a thick cyanoacrylate (CyA). Position and glue the top main spar.

Remove the wing from the plans. Turn it over, and install and glue the bottom main spar. Add the bottom leading edge sheeting; trim and sand at the leading edge.

Remove the wing from the plans, and add the top leading edge sheeting; trim it. Glue on the wing tips.



Steel squaring blocks are used for aligning the fuselage sides, firewall, and formers. Firewall misalignment can be disastrous.

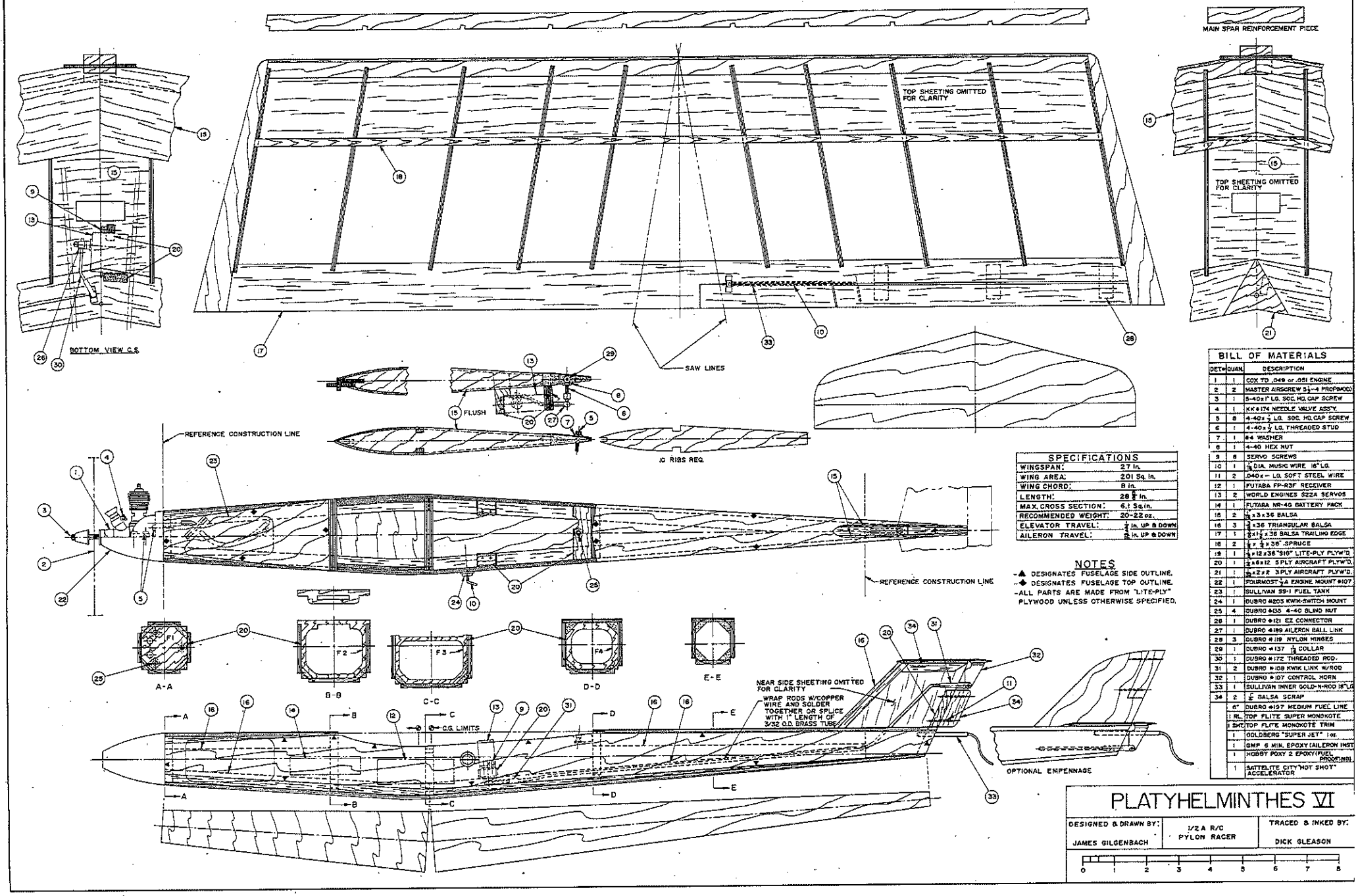
Mark the saw lines with masking tape and saw out the center tapered portion. Glue the wing halves together. Shim the leading edges and trailing edges at the same height from the building board before gluing, or you will have unwanted anhedral or dihedral.

Install the tongue to the front of the wing. Add the main spar reinforcement piece, the sheeting to the center section, and the plywood top plate onto the trailing edge.

Sand the entire wing to finish size. Be careful to maintain a minimum wing thickness of ⅞ in. at the main spars. The wing is now ready for servo installation and covering.

Fuselage. Install the blind nuts into F1, and drill the fuel line holes in the Fourmost mount and F1. Pin the front and rear *top* portions of the fuselage *down* onto the plans, and glue the fuselage sides to the top, rear portion only.

Locate and glue F4 and the triangular stock between the top and sides. Glue F2 to the front, top portion of the fuselage, and glue the sides to F2 — with F3 in place but not glued. Position F1 using a squaring block, and glue it to the front top only. Glue the triangular stock to the top between F1 and F2.



SPECIFICATIONS	
WINGSPAN:	27 in.
WING AREA:	201 Sq. in.
WING CHORD:	8 in.
LENGTH:	28 1/2 in.
MAX. CROSS SECTION:	6.1 Sq.in.
RECOMMENDED WEIGHT:	20-22 oz.
ELEVATOR TRAVEL:	1/2 in. UP & DOWN
AILERON TRAVEL:	7/16 in. UP & DOWN

NOTES

- ▲ DESIGNATES FUSELAGE SIDE OUTLINE.
- ◆ DESIGNATES FUSELAGE TOP OUTLINE.
- ALL PARTS ARE MADE FROM "LITE-PLY" PLYWOOD UNLESS OTHERWISE SPECIFIED.

BILL OF MATERIALS

DET.	QUAN.	DESCRIPTION
1	1	COX TD .049 or .051 ENGINE
2	2	MASTER AIRSCREW 8-4 PROPMOD
3	1	5-40 x 1" LG. SOC. HD. CAP SCREW
4	1	KK #174 NEEDLE VALVE ASS'Y.
5	8	4-40 x 1/2 LG. SOC. HD. CAP SCREW
6	1	4-40 x 1/2 LG. THREADED STUD
7	1	#4 WASHER
8	1	4-40 HEX NUT
9	8	SERVO SCREWS
10	1	1/16 DIA. MUSIC WIRE 16" LG.
11	2	.040 x -- LG. SOFT STEEL WIRE
12	1	FUTABA FP-R3F RECEIVER
13	2	WORLD ENGINES 522A SERVOS
14	1	FUTABA NR-4G BATTERY PACK
15	2	1/16 x 3 x 36 BALSA
16	3	3/4 x 36 TRIANGULAR BALSA
17	1	3/4 x 1 1/2 x 36 BALSA TRAILING EDGE
18	2	1/4 x 1/2 x 36" SPRUCE
19	1	1/16 x 12 x 36 "SIG" LITE-PLY PLY'W'D
20	1	1/32 x 6 x 12 5 PLY AIRCRAFT PLY'W'D.
21	1	1/16 x 2 x 2 3 PLY AIRCRAFT PLY'W'D.
22	1	FOURMOST 1/4A ENGINE MOUNT #107
23	1	SULLIVAN 59-1 FUEL TANK
24	1	DUBRO #203 KWIK-SWITCH MOUNT
25	4	DUBRO #633 4-40 BLIND NUT
26	1	DUBRO #121 EZ CONNECTOR
27	1	DUBRO #189 AILERON BALL LINK
28	3	DUBRO #119 NYLON HINGES
29	1	DUBRO #137 1/8 COLLAR
30	1	DUBRO #172 THREADED ROD.
31	2	DUBRO #108 KWIK LINK W/ROD
32	1	DUBRO #107 CONTROL HORN
33	1	SULLIVAN INNER GOLD-N-ROD 18" LG.
34	2	1/8 BALSA SCRAP
	6"	DUBRO #197 MEDIUM FUEL LINE
	1 RL.	TOP FLITE SUPER MONOKOTE
	1 SHT.	TOP FLITE MONOKOTE TRIM
	1	GOLDBERG "SUPER JET" 10c
	1	GMP 6 MIN. EPOXY (AILERON INST.
	1	HOBBY POXY 2 EPOXY (FUEL PROOFING)
	1	SATTELITE CITY "HOT SHOT" ACCELERATOR

PLATYHELMINTHES VI

DESIGNED & DRAWN BY:	1/2A R/C PYLON RACER	TRACED & INKED BY:
JAMES GILGENBACH		DICK GLEASON

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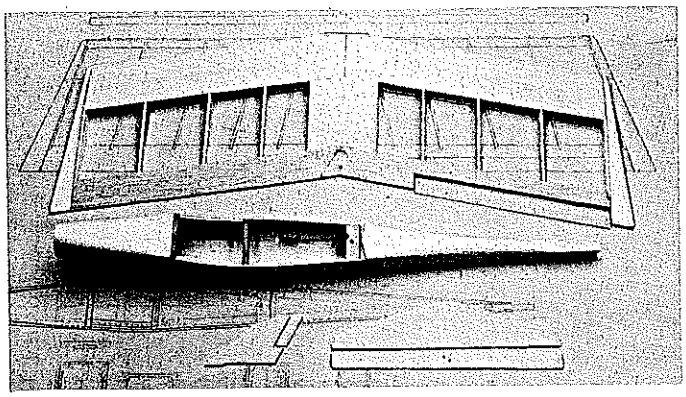
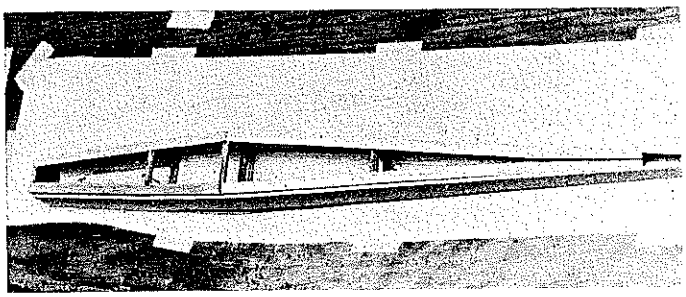
Full-Size Plans Available . . . See Page 180





Left: You can see from this view of all the wood parts ready for covering that the required number of parts for this model is small. Above: The fuselage is built upside down over the plan. The balsa triangular stock extends past the Lite Ply sides as shown.

Glue the sides to F1 and the triangular stock. Position and glue F3 to the sides. Position and glue the bottom triangular stock and add the rear bottom portion.

Remove the assembly from the plans. Fuel proof the fuel tank and radio compartments, including the inside portion of the front bottom. Glue on the front bottom portion. Install the Fourmost mount and sand the fuselage to shape.

Assembly. The wing can now be fitted to the fuselage. Position the wing to the wing saddle and shape the saddle so that the wing leading and trailing edges are parallel to the top of the fuselage, both side to side and front to back (i.e. 0° incidence).

Install the rear wing hold-down plate. Align the wing so that the wing tips are equidistant and square to the fuselage centerline within 1/16 in. Clamp the wing in this position, and spot-drill through the wing into the rear wing hold-down plate in the fuselage. Remove the wing, drill through the hold-down plate, and add the blind nut. Now, align and install the front wing plate.

If you wish to build the aircraft as a T-tail, the vertical stabilizer should be added at this point. The radio, engine, fuel tank, and all the hardware should now be installed to ensure that no binding or interference exists.

Disassemble the parts, and finish-sand the entire aircraft. My recommendation for covering and finishing is to use an iron-on covering throughout. This allows easy repair after those unfortunate accidents occur while racing, and it saves time while finishing. Super MonoKote hinges have also worked out well on the horizontal stabilizer.

After covering, reassemble all the components. Position the aircraft on the building board with the fuselage top parallel to the building board, front to back and side to side. With a 6-in. ruler, measure up from the building board to the leading and trailing edges to check for warps. Set up the wing absolutely true or with 1/16-in. washout at the trailing edge. Use a heat gun and twist to get it right.

Now, check the balance point.

Trimming and flying. On 1/2A Pylon Racers, the most critical trim adjustment is made with a rudder trim tab. If the vertical stabilizer is only slightly misaligned, the aircraft will screw into the ground right after launch, especially if the stabilizer causes a left-hand turn. I, therefore, suggest that the vertical stabilizer be aligned with extreme care and that you follow the "first flight procedure" listed below:

1. Select a day on which the wind is between 5 and 15 mph.
2. Range-check the radio, and to make sure all the controls move freely.
3. Test run the engine, and set it to run just a tad rich.
4. Set the rudder trim tab 1/64 in. to the right at the back edge.
5. Trim the elevator at level to 1/64 in. down.
6. Have an assistant launch the plane straight into the wind, giving a fairly strong heave, while keeping the wing straight and level.
7. Avoid giving much up-elevator after launch, until a good flying speed has been reached.
8. Adjust the aileron and elevator for level flight with a very slight left turn.
9. Observe how the plane corners around a pylon. If it turns nose-high, the rudder trim tab will have to be adjusted to the left slightly. If it turns nose-low, the tab will have to be adjusted to the right slightly. After any rudder adjustment, it will be necessary to retrim the aileron.
10. The aircraft is set up with a fixed pickup in the fuel tank such that the engine will quit while flying inverted; however, if the fuel tank is nearly full, it is difficult to kill the engine, so burn off some fuel during your test flights before attempting to stop it.

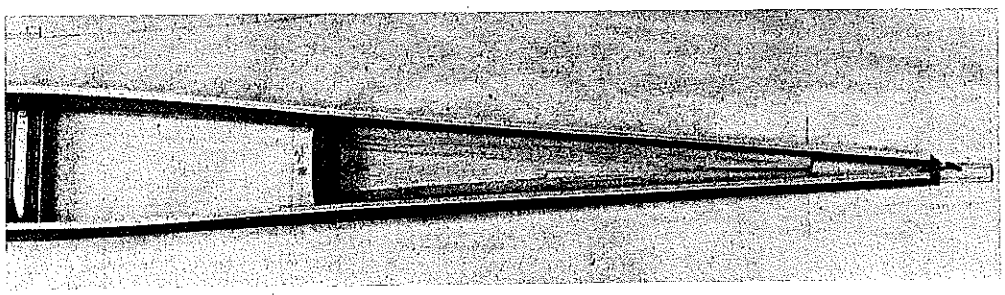
Once the aircraft is trimmed properly, it will be rock-stable on launch and groove around the course like it was on rails.

If an average flier follows the racing tips I have mentioned and builds a Platyhelminthes to the suggested specifications, I will guarantee that flier would be very competitive on the WILLI circuit.

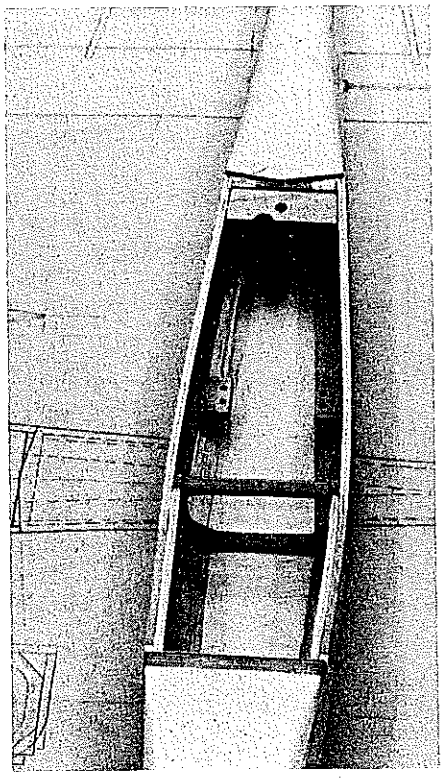
For more information concerning the WILLI racing circuit, write or call me: James Gilgenbach, Rt. 5 Nelson Road, Fond du Lac, WI 54934, (414) 921-7455.

PROTECT YOUR RIGHT TO FLY!

Safe Flying Is No Accident!



Pin the front and rear *top* portions of the fuselage *down* onto the plan, and glue the fuselage sides to the top, rear portion only at this step. The text details all the important points.



Note the installation of the rear wing hold-down plate, the elevator servo mounts, and the fuselage doublers between F2 and F3.