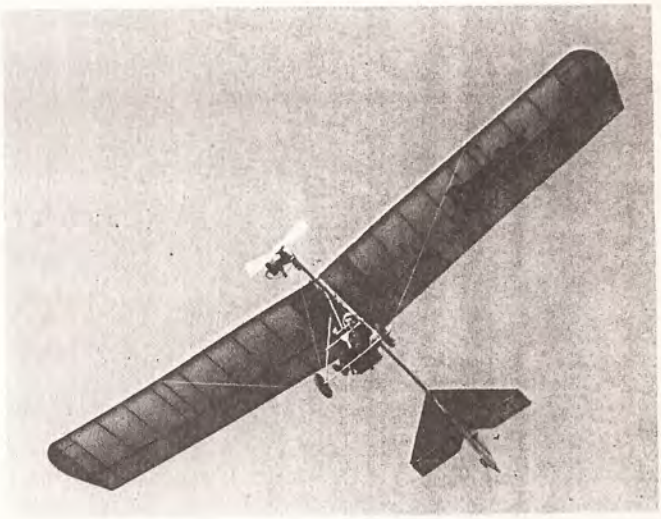
WOODHOPPER

by Weedhopper of Utah, Inc.



Ultralight flying has become quite popular in the last few years, but like everything else today, the prices are constantly rising. The Woodhopper™ offers a unique opportunity to trade some of your time for a significant savings in dollars.

The Woodhopper is designed to be built from plans out of as many common materials as possible. Some items such as cables and hardware should be of aircraft quality.

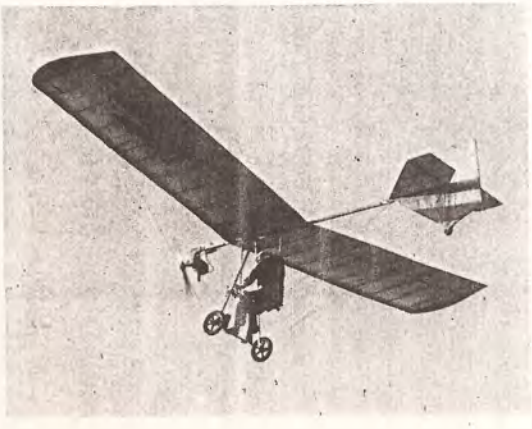
The construction methods are quite simple. Still, it will take 250 to 300 hours to build. Because of the relatively low cost for the plans, we will not be able to answer questions by telephone. If you have a problem during construction, we will answer it by mail if you will send a self-addressed, stamped envelope along with your question. There will be no exceptions to this policy.

The Woodhopper is very light and quite efficient to allow use of a broad variety of engines. The engine should be 240 cc displacement minimum for direct drive or 100 cc minimum if a prop speed reduction system is used.

The basic wooden structure is braced with stainless steel aircraft cable and provides a light and strong airframe. The extruded styrofoam wing ribs and planking are easy to work with and quite strong when reinforced with the fiberglass strips and glue. While the Woodhopper has adequate strength in the air, it is more fragile than most ultralights on the ground and should be handled very carefully to avoid damage, especially during transport.

Because of the very light wing loading and the long wing span, the Woodhopper is more sensitive to winds and gusts than the Weedhopper™ design. The long wings are necessary to fly with engines of less power than the Chotia 460. In calm weather the simple 2 axis control system and stability of the Woodhopper make it quite easy to fly. The builder must realize, however, that there are a few people who will never be able to fly any airplane no matter how "Easy to fly" or stable it is. Be sure to take dual instructions in a normal aircraft before learning to fly the Woodhopper.

Some minor improvements have been made since the first photos were taken for the Popular Mechanics article. Most notable is the change in the control system from a yoke to a control stick. The stick is easier to build, stronger, and feels more natural in flight.



In flight, the Woodhopper is well balanced on the controls. The rudder control produces smooth coordinated turns and there are no ailerons. The elevator control gives positive pitch control and stalls are very mild with rapid recovery and little altitude loss. Bank angles up to 45° are approved as well as pitch up or down of 30°. These maneuvering limits should not be exceeded. Absolutely no aerobatics should be attempted since the strength limits could be easily exceeded causing inflight structural failure. The strength factors are quite adequate for normal sport flying.

Also of importance is not using ground speed as a reference, due to the low (25 MPH) flying speed, a 10 MPH wind will give a drastic ground speed change when you turn down wind (15 MPH upwind to 35 MPH down wind). This phenomenon causes the most common accident, a down wind turn at low altitude and a resultant stall/mush/noseover. Experienced pilots have been most guilty here! The WOODHOPPER is so easy to fly, they take one hop then off they go, turn down wind at 50 ft. (thinking they are 200 ft. up!), and, watching the ground rather than airspeed, slow too much and mush/stall in, down wind. Thus far the only injury has been a sprained ankle, but it always costs over $100. No matter how many hours you have, take time to get used to these new references and sensations. The beginner actually has an edge, his limited confidence and flight skill causes him to take enough time to learn altitude reference in this plane.

TURNS

The WOODHOPPER is capable of up to 45° bank and it can complete a 360° turn in 15 seconds and only about a 75 ft. radius (if you don't mind eating your own wake).

When you initiate a turn you will have to apply slight back pressure on the control stick to avoid losing altitude. This is caused by centrifugal force being added to the force of gravity to create a tangential load greater than the weight of the plane and pilot. This increase in apparent weight requires a higher angle of attack at the wing to increase lift to offset the increase in load.

AEROBATICS
- - -NO!

We have no idea of proper entry speeds, flutter speed, etc. The aerodynamic cleanliness allows rapid speed buildup and red line is only 45 MPH. The WOODHOPPER **is not** designed for aerobatics. . .don't try it.

BUILDING YOUR WOODHOPPER

General Construction Information

All of the parts used in the WOODHOPPER are designed for adequate strength if you use the materials specified. **Do not** use different alloys or materials. . .you may introduce cracking, fatigue, or corrosion problems which did not exist before.

The information contained in these plans is not guaranteed to be without fault and no guarantee is made as to its accuracy. Use of the WOODHOPPER ultralight airplane described in these plans could result in your injury or death.

At the time these plans were prepared we had no knowledge of any serious faults in the design but that doesn't mean there could not be some undiscovered fault. The designer flew the prototype and trusted it in his own judgement; you must decide for yourself if you wish to fly it. It is your responsibility to be well enough informed to make such a choice.

Normal aircraft construction rules apply: No deep scratches should be allowed on any metal part. Always observe correct grain on sheetmetal parts. All edges and holes should be carefully deburred and smoothed. All internal and external tube reinforcements must have rounded and smoothed ends.

All bolts, cables and hardware must be aircraft quality. **NEVER** use hardware store turnbuckles or bolts. Double NICO sleeves should be used on all cables. All cable is stainless steel aircraft cable. Don't put turnbuckles on any flying wires.

The wood used in your WOODHOPPER can be Douglas Fir (as on prototype) or aircraft Spruce. The fiberglass cloth is standard boat type cloth of approximately 7.5 oz. per yard. White glue (Elmer's) was used extensively on the prototype. The white glue has proven much stronger than the wood and foam parts it holds together! For planes which will be subject to extremely humid conditions or outdoor storage, Epoxy (Safe-T-Poxy from WICKS aircraft Company or "Aircraft Spruce & Specialty" Co.) would be better. The foam plastic used is extruded styrofoam, not expanded polystyrene beads. I cannot guarantee how well polyurethane will respond to the vibration, it is more rigid so I don't recommend it.

All pop rivets are 1/8" stainless steel. A drill size of .128" works best (#31 Drill).

Be careful how much paint is applied since the weight can build with surprising effects on performance. You could easily end up with an extra 20 pounds of paint!

WING CONSTRUCTION

Make 1 left and 1 right

Make template using rib pattern.

Cut main ribs, 11 per wing. Cut with hot knife or jigsaw and sand smooth. Cut wing spars, compression, trailing edge and cap strips, (see materials list and blue prints for dimensions). Wrap spars with fiberglass reinforcement tape and white glue and drill (see pictures). Wrap all wood with fiberglass and glue where holes are drilled.

Lay out spars on flat surface. Do not let wing twist.

Make sure spars are evenly spaced (42 1/8") and squared.

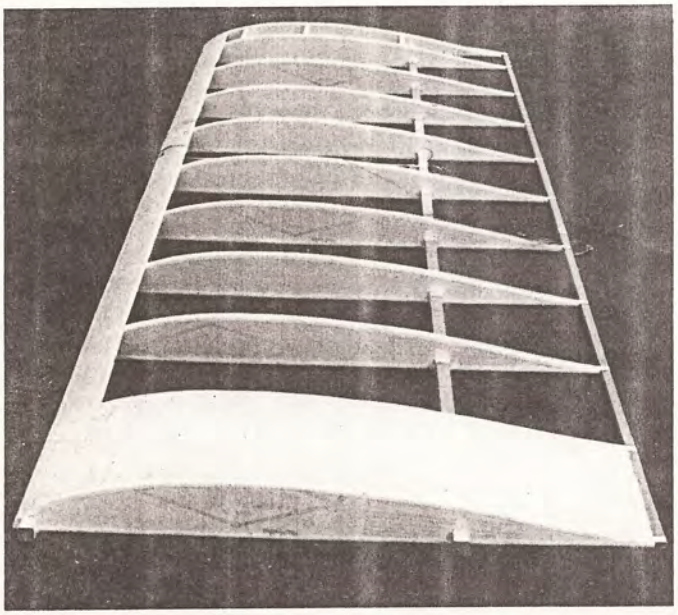
Install main ribs (Note picture for details) cover top and bottom of ribs with 2" fiberglass tape. Let dry then glue 17" cap strips in place, use masking tape to hold in place while glue dries.

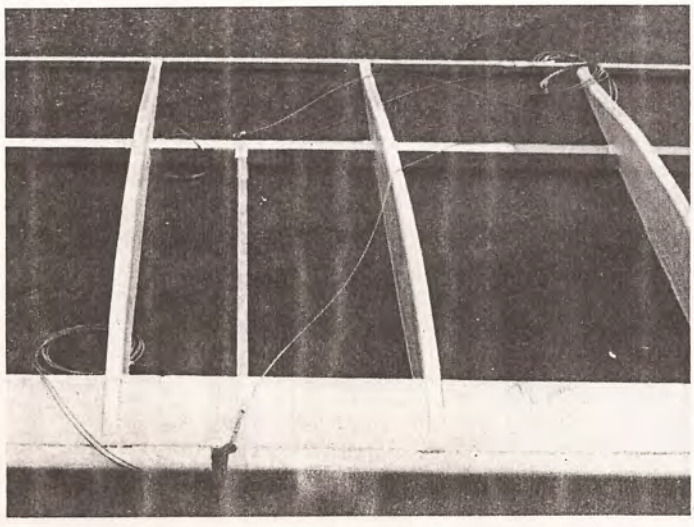
Install compression struts.

Install trailing edge.

Install foam leading edge, braces, wingtip and planking. (Top and bottom) Use hot knife or rasp and contour to airfoil. Sand all parts smooth.

Cover all foam parts with 3 coats of white glue thinned 75% glue 25% water so dope won't attack foam. Sand between coats.

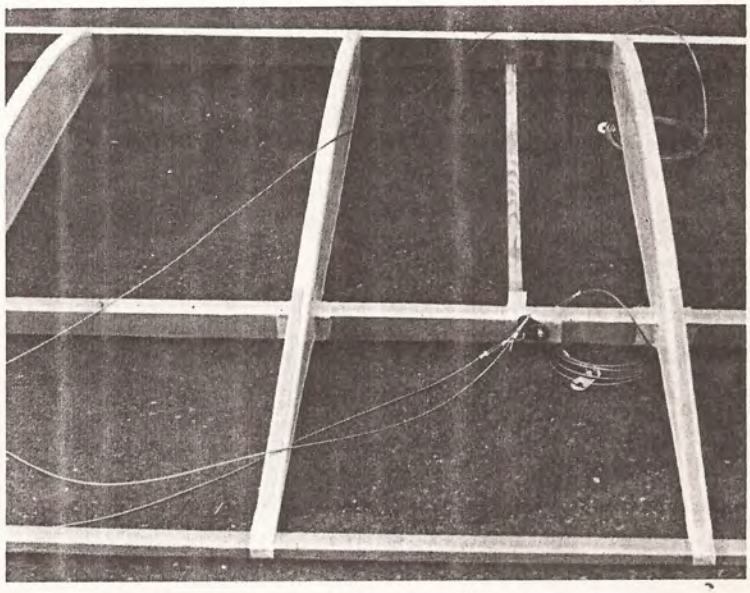




Install cables to spars. Cut to approximate lengths. C1-13 ft. ea., C2 & C3-11 ft. ea., DD1-24 ft. ea., D2-12 ft. ea., D3-17 ft. ea., D4-15 ft. ea.

Cover wing with 3.0 oz. fabric shop 100% dacron or 1.7 oz. Ceconite Dacron (Aircraft supplier). Use white glue thinned 75% glue 25% water to bond fabric to foam and wood.

Dope wing fabric with 3 coats of Butyrate dope thinned 50-50 (Aircraft supplier)

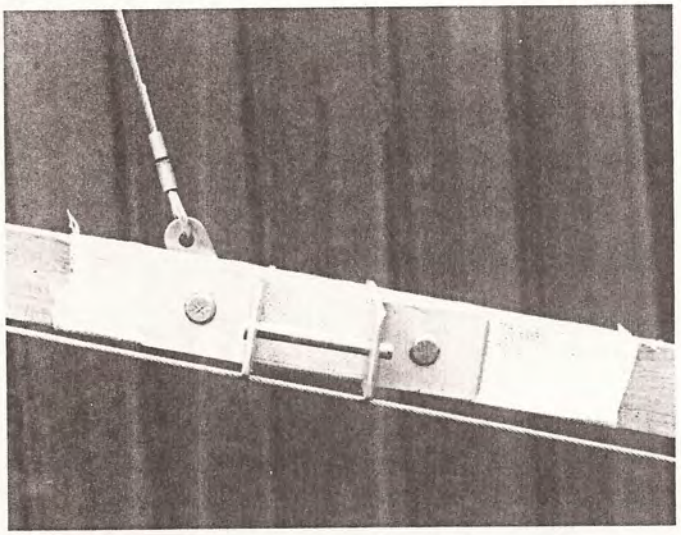


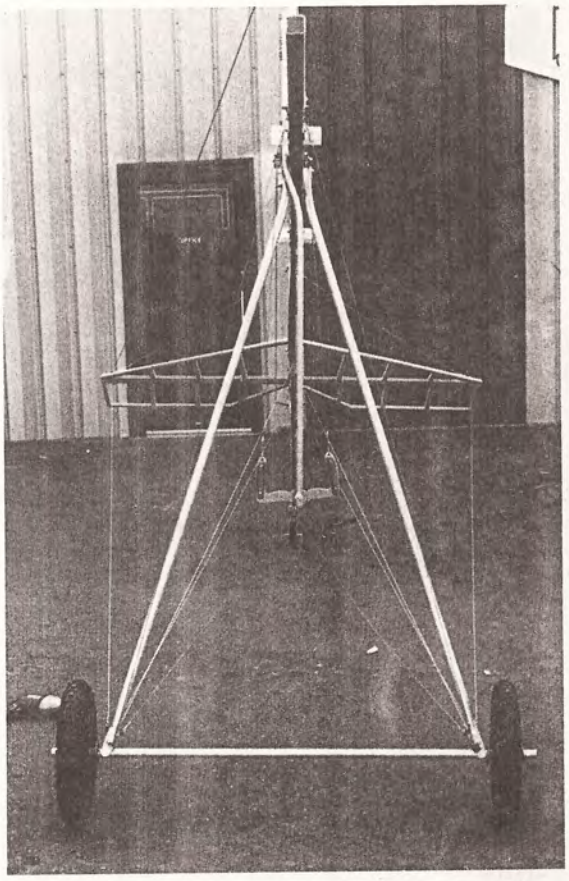
NOTE: Wire C-1 L. & R. attached to trailing edge with fiberglass tape reinforcement.

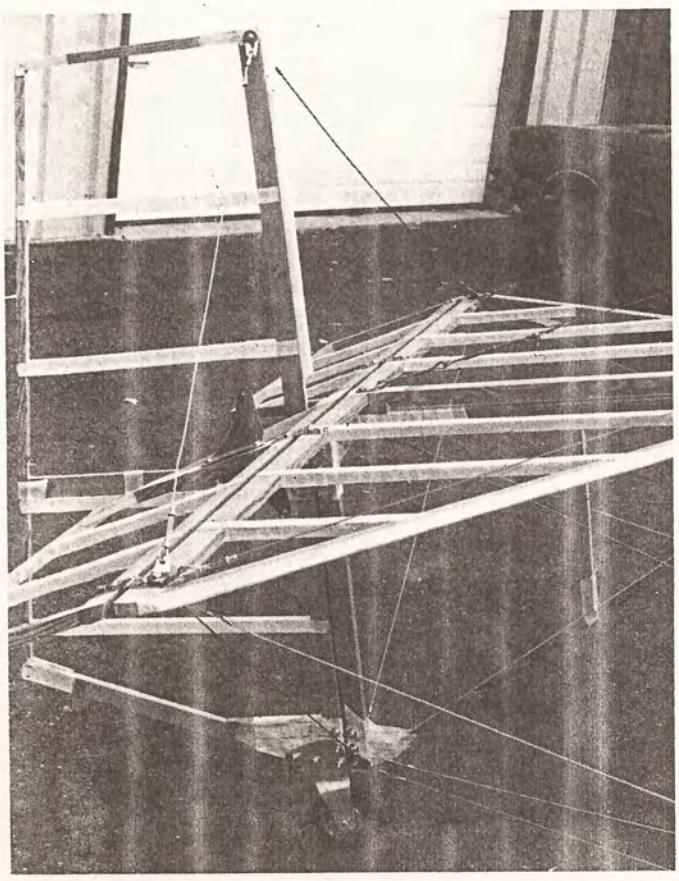
FUSELAGE

Make 1

Cut fuselage boom. See material list and blue prints for dimensions.
Wrap with fiberglass reinforcing tape where there are holes, then drill holes.
Cut, layout and install sub fin.
Make all fuselage hardware, axle, down tubes, king post, seat tubes, brackets etc.
Install down tubes.
Install axle.
Rig wires, down tubes should be 90° to fuselage. See blue prints and fuselage rigging instructions..
Install seat and king post and control systems.







FUSELAGE RIGGING

See blue prints for rigging.

Make sure cables are equally tight.

Use cable clamps to hold wire while rigging.

Use turnbuckles where noted.

Rig B-1 L & R, and B-5 L & R

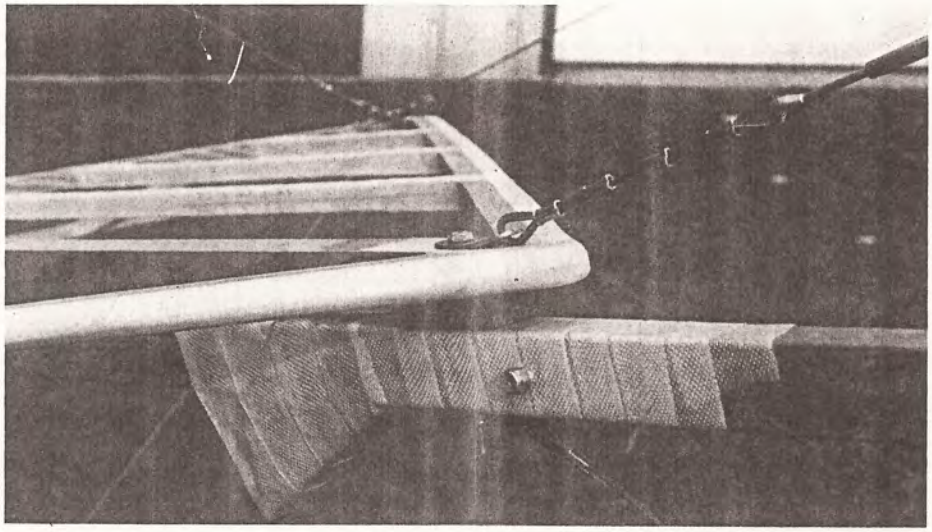
Use cable clamps to hold wires while rigging before swagging. These cable clamps can be bought at the hardware store.

Rig A-1, L & R and A-2

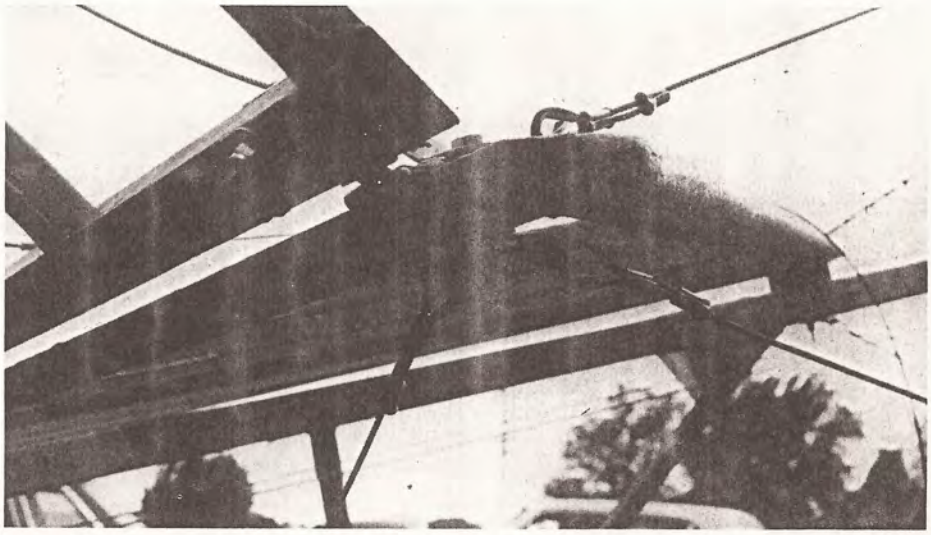
Install rudder and elevator and rig B-3, L & R; B-5, L & R; B-6, L & R; B-7, L & R; B-8, L & R, (then A-3, A-4, use turnbuckles here) A-5, L & R; A-6, L & R.

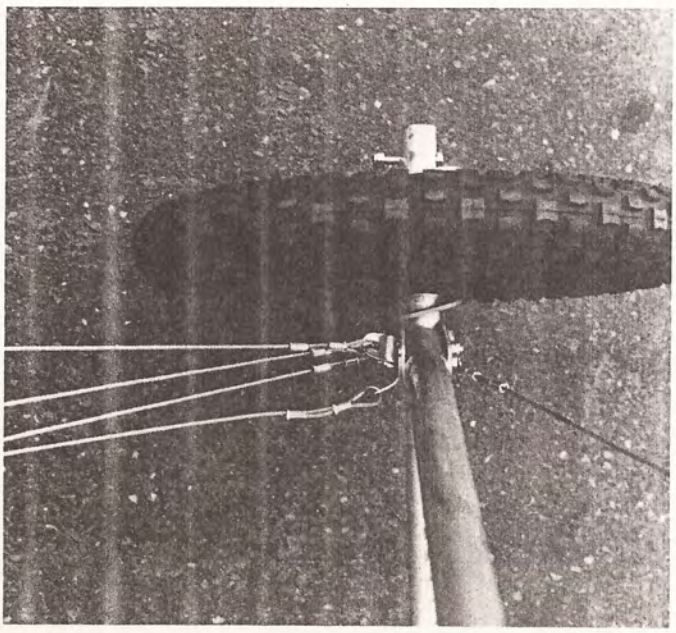
Use 3/4" x 1 1/2" block under front and back bolt of stabilizer (See picture)

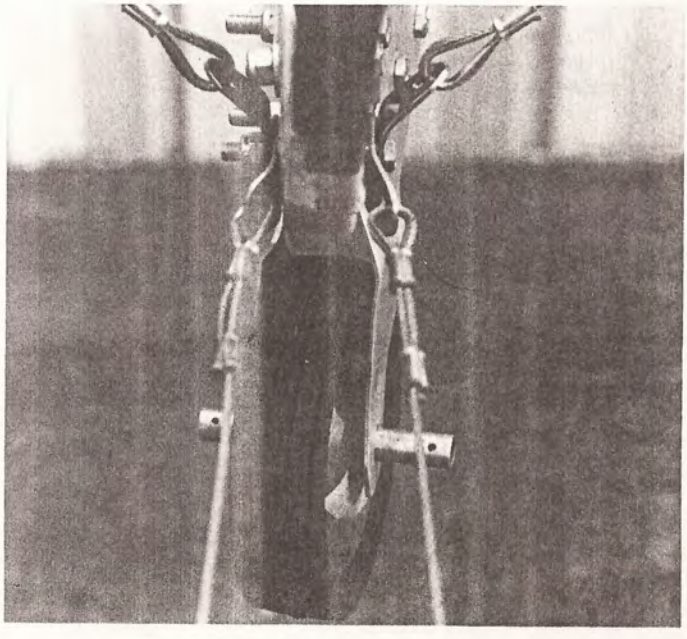
Install seat assembly and rigging B-2, L & R; B-4.



NOTE: Note spacer block at forward edge of stabilizer. An identical spacer is used at the rear of the stabilizer. Note also the turnbuckle in the upper right hand corner of the photo.



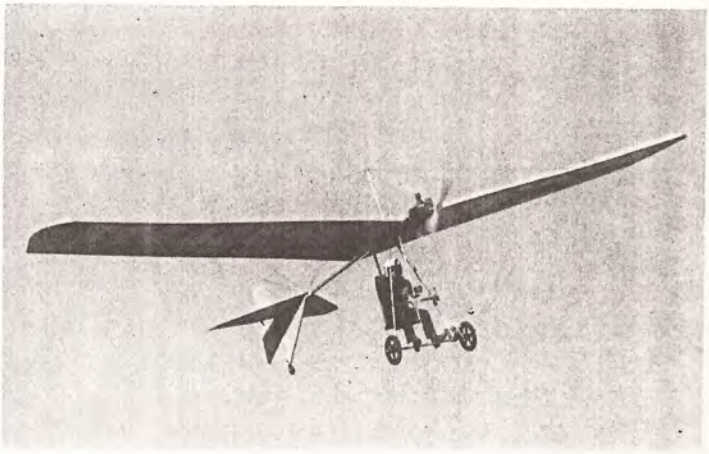


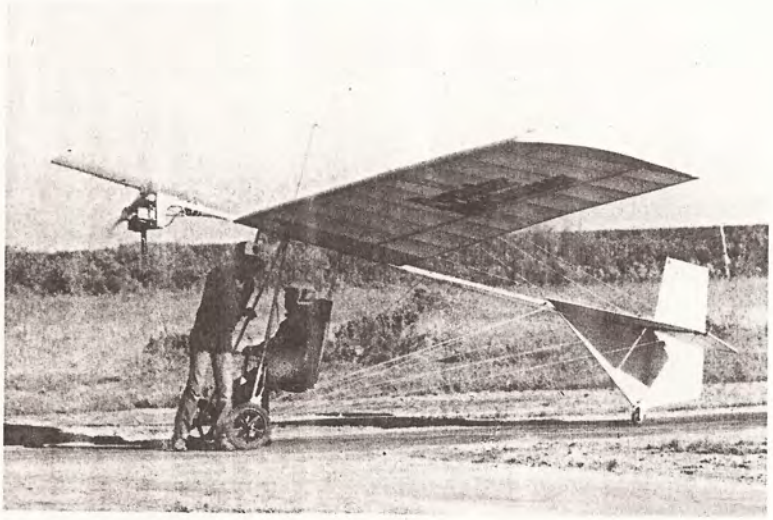


The wings may be removed in halves for easy transporting; assembly takes about 20 minutes for two people. The Woodhopper should not be left tied down and unattended. The very light construction does not withstand weather well so it should be stored inside a reasonably cool and dry place.

The construction methods will be very familiar to anyone who has built many model airplanes and actually goes rather quickly for a full sized airplane. We have found it much easier to get a smooth covering job on a full size plane than on a model, so don't let that scare you.

The overall look and feel of the Woodhopper is like a giant tissue covered stick model. This can be a very satisfying project. Materials can be purchased a little at a time. Overall, considering the low cost and moderate construction time, you end up with very impressive results. The sensations of cruising along a few hundred feet up on a calm evening just cannot be described. The total experience of cutting, shaping, gluing, painting and then flying your own Woodhopper gives such an incredible feeling of accomplishment that it is definitely worth the effort and minor frustrations along the way.



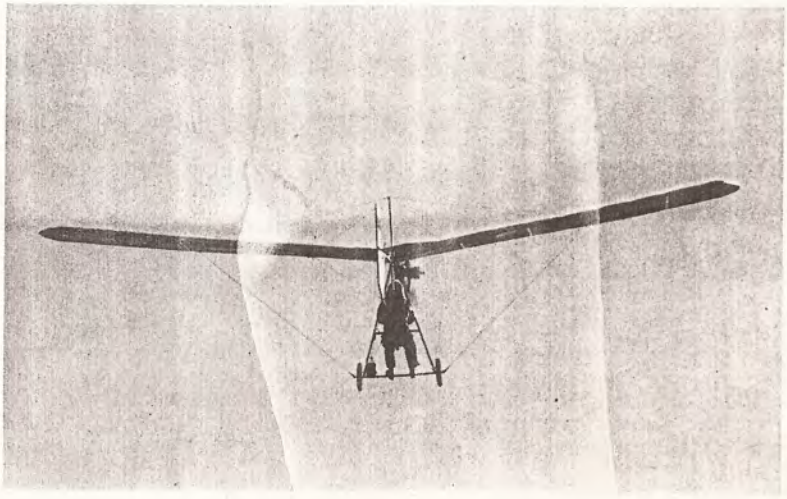


Woodhopper Plans
c/o Weedhopper of Utah, Inc.
PO Box 2253
Ogden, UT 84404

WOODHOPPER SPECIFICATIONS

Wingspan	32 ft.
Wing area	157 sq. ft.
Length	17½ ft.
Weight, empty	145 lbs.
Maximum pilot weight	200 lbs.
Cruise speed	35 mph
Redline speed	45 mph
Stall speed	20 to 21 mph
Landing speed (approach)	25 mph
Takeoff speed	27 mph
Climb speed	26 to 27 mph
Range (with 1-gal. tank)	30 to 35 mi.
Stress limit	+3½ Gs
Power	15 to 30 hp
Takeoff run	80 ft. or less
Landing roll (on grass)	50 to 60 ft.
Ceiling	10,000 + ft.
L/D (glide ratio)	9:1
Climb rate	250 to 450 f.p.m.*
Sink rate	250 f.p.m.
Cost to build	$700 to $1,500+
Construction time	250-300 hrs.

*Varies with engine choice, pilot weight & weather conditions.
+Varies with engine choice.



LEARNING TO FLY THE WOODHOPPER

Read this entire manual before attempting to fly your Woodhopper.

CAUTION

Always wear a helmet and eye protection.
Do not taxi or fly without fastening your seatbelt!!

PROPELLER

Regardless of the starting system on your WOODHOPPER, the propeller must be treated with great caution. The blades move at over 600 miles per hour and should be regarded in the same respect as whirling knives!

1. Never allow anyone to stand in front, or in line sideways when the engine is running, if a failure occurs, it will be either straight to the side or slightly forward and to the side. A crank-shaft failure could release the prop as a flying meat grinder. For these reasons, don't ever rev the engine full power near spectators, and don't ever start the engine at full throttle.
2. Inspect the prop, flange and bolts everytime you start the engine. Don't run a badly nicked or split prop. Small nicks in the leading edges hurt performance and should be repaired with epoxy and sanded smooth. A cracked or split prop should be replaced. Try to avoid takeoffs on gravel or wet ground.
3. Always turn ignition off and pull the spark plug wire when the plane is parked.

DUAL INSTRUCTION

If you are already a pilot you should find the transition easy. If you have never flown before, it is best to take some dual instruction in the lightest and slowest plane you can get into for dual. A glider such as the Schweitzer 2-33 is good. You should learn stall recognition and recovery and maneuvering to ground references at least. Take-off, landing and control co-ordination in normal planes are of little value as applied to the WOODHOPPER.

Pick a dry, reasonably smooth area at least 1200 feet long and 200 feet wide. The first sessions should be in **ZERO** wind.

PRE-FLIGHT

Starting at the engine, check the prop condition, prop bolts, engine mount bolts, fuselage boom, and front wires for cracks or looseness. Check carburetor, throttle linkage, wiring, fuel line, crankcase pressure line, exhaust system, and muffler.

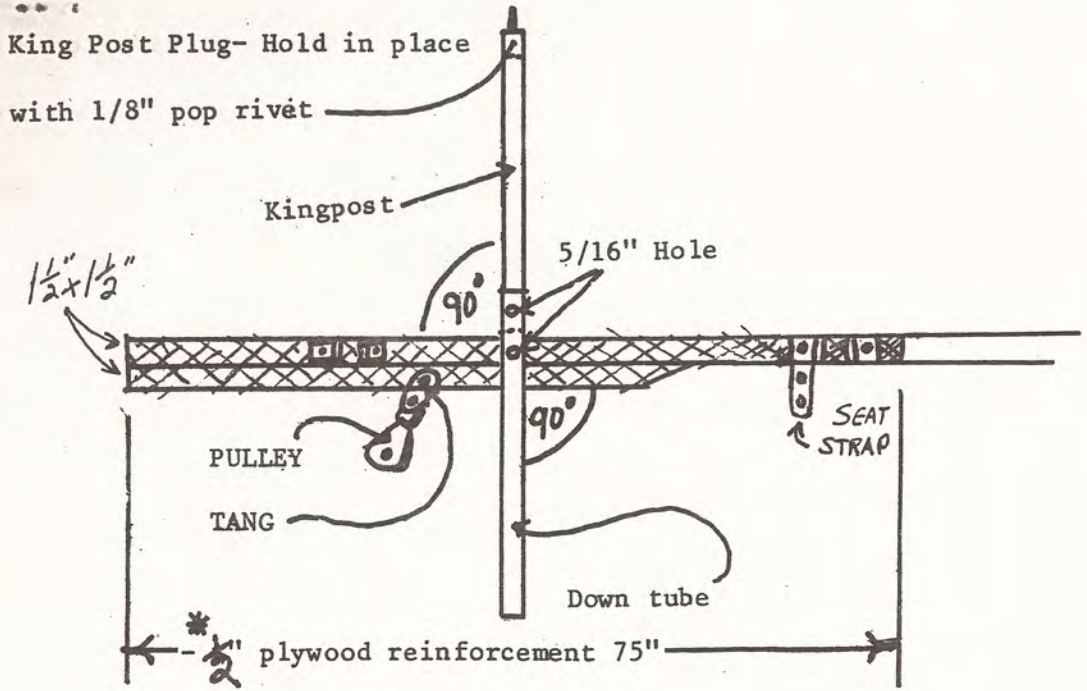
Next, moving to the wing, check the pins and safety clips on the root of the leading edges. Going down the right wing, check to see that all bolts are tight and the leading edge wing wires are properly secured. Check right wing tip. Moving to the trailing edge, check wing wires and king post. Move back toward fuselage checking brackets and bolts to see there are no cracks, looseness or damage and that everything is secured. Check all turnbuckles, pins, safety clips, wires and bolts.

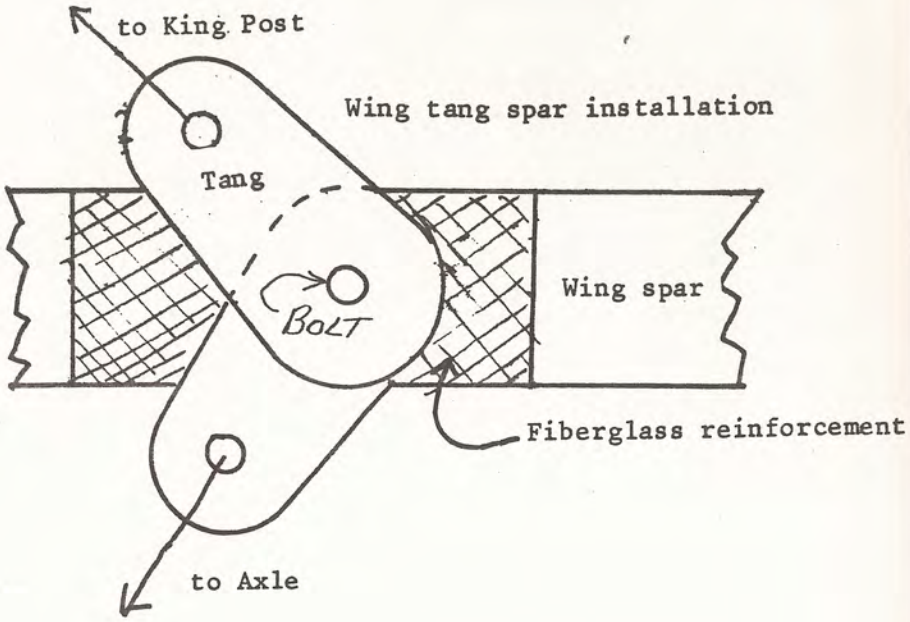
Check fuselage boom back under elevator. Check forward and rear elevator bolts, right elevator leading edge and tip. Check right elevator hinges, elevator cables, secure, straight, and undamaged. Check elevator trailing edge, then look under the elevator center. Check elevator horn and wires, rudder hinges, control horn, and elevator hinges. Check rudder fabric, gusset plates, and bolts. Check left elevator, trailing edge, left elevator brace cables, left elevator leading edge.

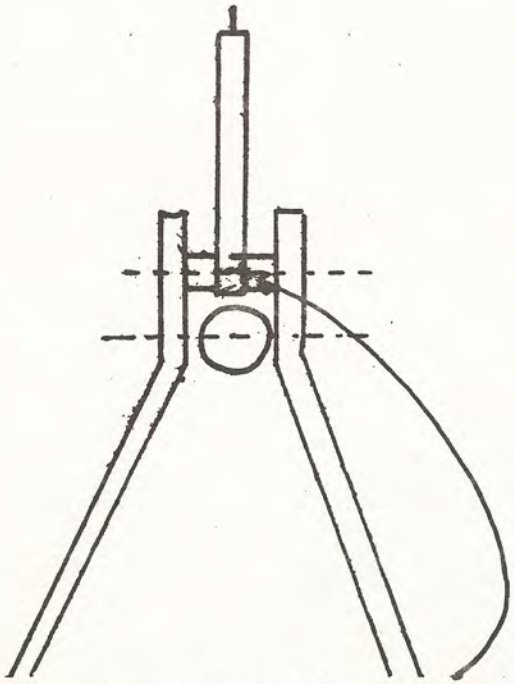
Starting at left trailing edge root, walk out and round left wing checking all the same details as right wing.

Now check seat, main wheels, all left wires, seat back, fuel tank, ignition off and throttle closed. Walk to right side and check all wires there, check freedom of controls. Check airspeed indicator and mount.

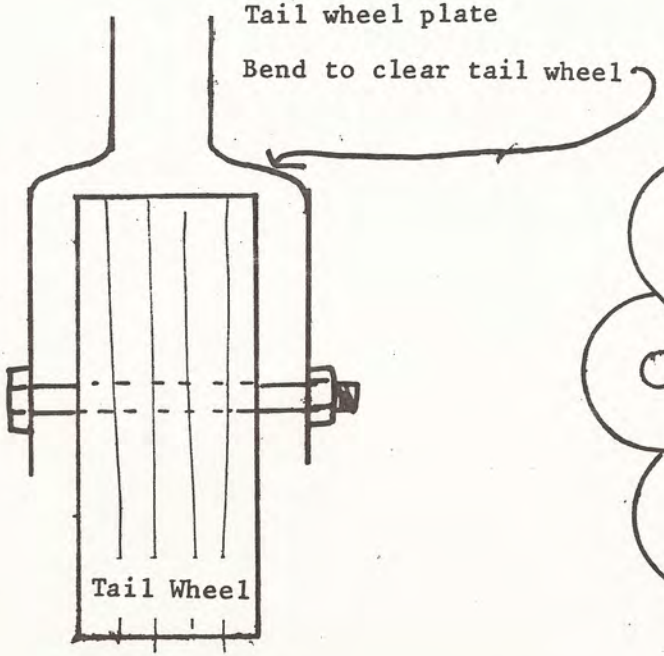
This is intended to be a guide only. The object is to look for cracks, looseness, damaged safety wires or clips; anything which may give trouble in flight. It is also a good idea to do a quick visual check after starting the engine and getting in, too. Whatever pre-flight procedure you use, do it the same every time so you won't forget anything.



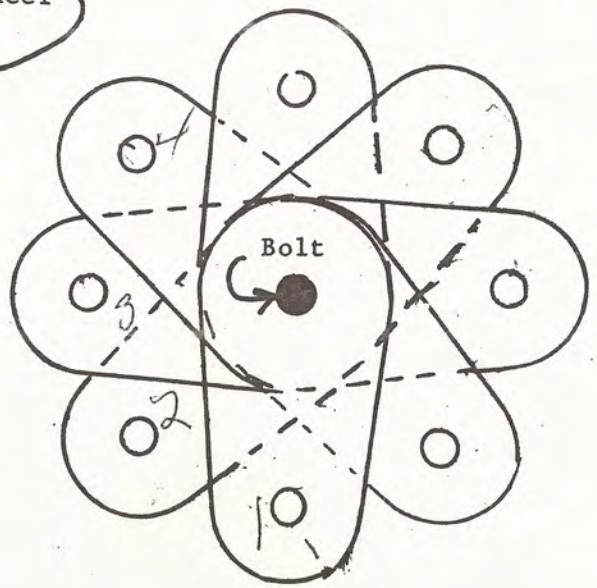


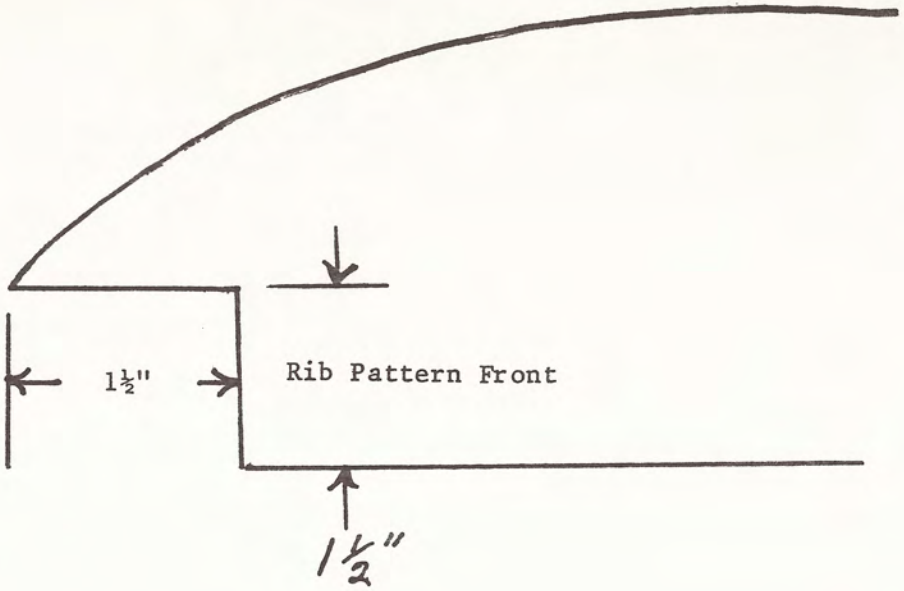


Kingpost spacer for optional fuselage

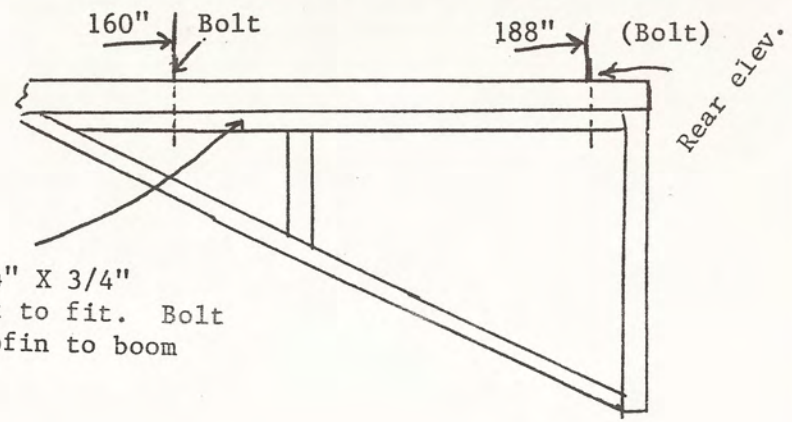


Top View of Kingpost,
Tangs slip over bolt

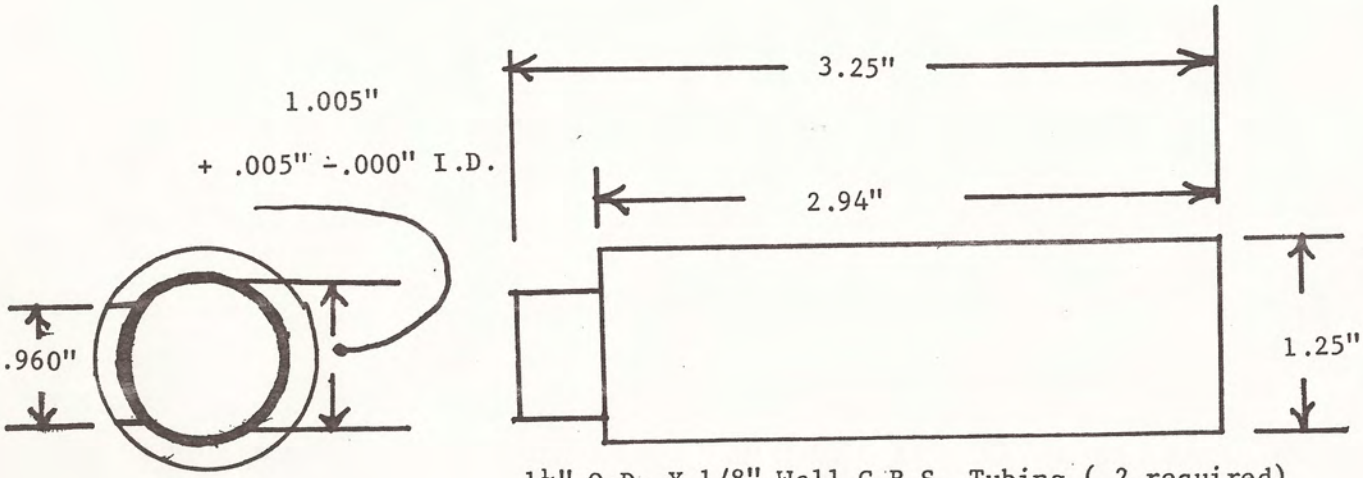




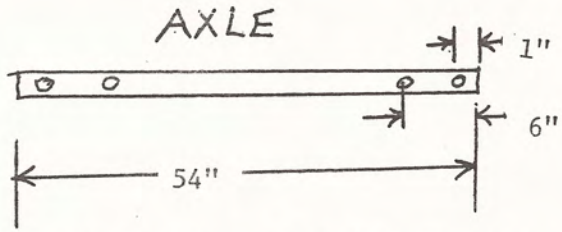
Subfin Inst. on optional 2 1/2" boom



Wheel Bushing for Tuff Wheels



1¼" O.D. X 1/8" Wall C.R.S. Tubing (2 required)



Mat. 1" Dia. solid 6061-T6 Alum

Bore Wheel to 1.270" + .010" -.000"

STARTING

Never start or take-off in your WOODHOPPER with less than a full tank of fuel. Always be certain that you have added oil to your gasoline. Several good 50:1 ratio oils give good results. Don't use regular car oil, it fouls the plug and generally give less reliability and less power. You should also drain the tank between sessions.

Tie the plane down or have experienced people hold it back. Tell them to prepare for a sudden pull of considerable force so they won't be surprised.

Pull the spark plug wire (if not already off) and pump the primer bulb to fill the fuel line.

Get everyone clear of the prop area. Re-connect spark plug wire. Turn ignition on, set about 1/3 throttle. It should start in less than 4 or 5 flips. If it doesn't, take the plug out and clean it. (Note: A hot engine is harder to start).

If starting by hand proping, step back and to the side in the same motion as you flip the prop over. The prop should be set so one blade is slightly short of vertical as compression starts. After the engine starts, walk to the side at least to the wing leading edge brace before ducking under the wing. In fact, it is a good habit to give the prop a wide berth even when stopped!

Now the plane is tied down or held and engine is running. Put on the helmet and strap yourself in.

TAKE-OFFS

All tail dragger type airplanes are directionally unstable on the ground. The WOODHOPPER is no exception. The only really bad (nearly uncontrollable) situation is a high speed taxi with the tail up, then a sudden reduction of power while holding the tail up. The rudder is not effective enough under these conditions and there are no differential brakes to save the situation. . .a ground loop is almost sure.

If the right procedure is followed, however, take-offs are relatively easy. Simply taxi about a bit with the tail down to get the feel of it. Keep airspeed below 10 mph. **Do Not** lift tail until ready to make a **complete** take-off run. Once ready for actual take-off, full power, full forward stick, and steer with the rudder. Feeding the throttle slowly is not particularly helpful. The tail will come up quickly; directional control is good under full power. Acceleration is very quick; pull back and lift off at 25 MPH **indicated.** Best rate of climb varies with pilot and plane but generally 25-35 is best. Keep both mains on the ground until liftoff, one wing high while still on one main wheel and the tail will almost guarantee a ground loop. **Note:** The wind should be less than 3 MPH while you learn. Always take-off directly into the wind. Never attempt to take-off in a crosswind.

LANDINGS

Approach speed is 25-30. Long final approaches help greatly, but any thermal activity drastically affects the glide slope. **Hold-it-off** wheel landings are extremely difficult as it ballons very easily with any reserve speed above stall. Hold it off until it stalls just as the tail wheel touches and the mains are about 4"-6" up.

With this technique it will roll out straight and short.

Take-offs and landings are predictable and not too difficult. . .that is, when properly executed. These procedures have worked best during the test flying.

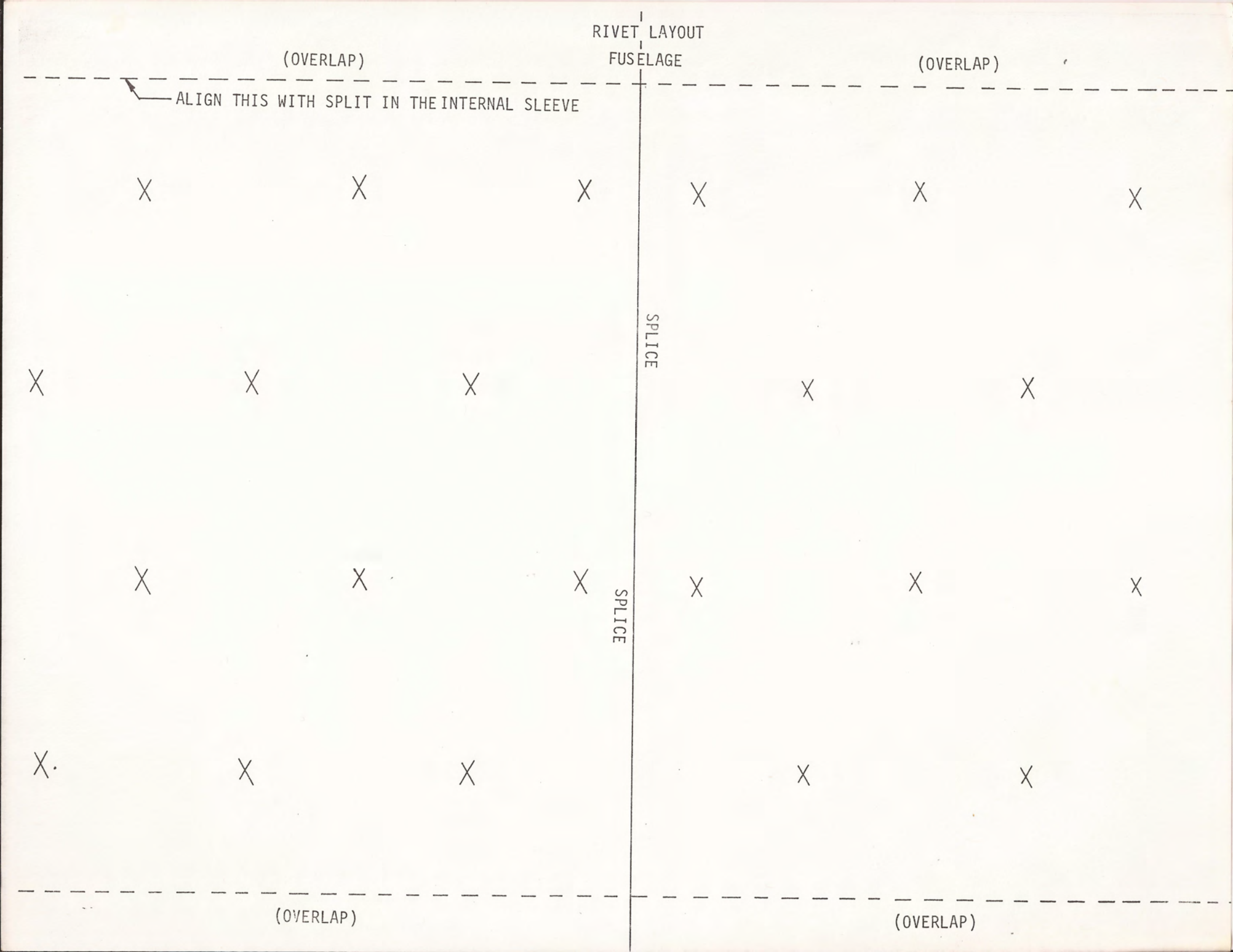
Always land directly into the wind. NEVER attempt a crosswind landing.

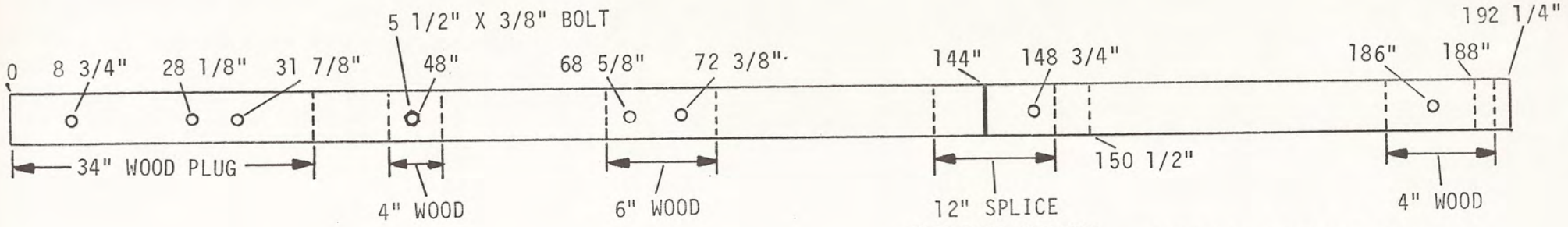
AIRSPEED CONTROL

Airspeed is controlled with **pitch** (elevator). The throttle is a **power** control only. If the plane is flying too fast, nose up to slow down. If you are too slow, nose down to increase speed. If you don't want to gain altitude at a given airspeed, reduce power. If you want to climb, add power and adjust pitch to control speed. If you try to climb without adequate power, the plane will slow down and stall.

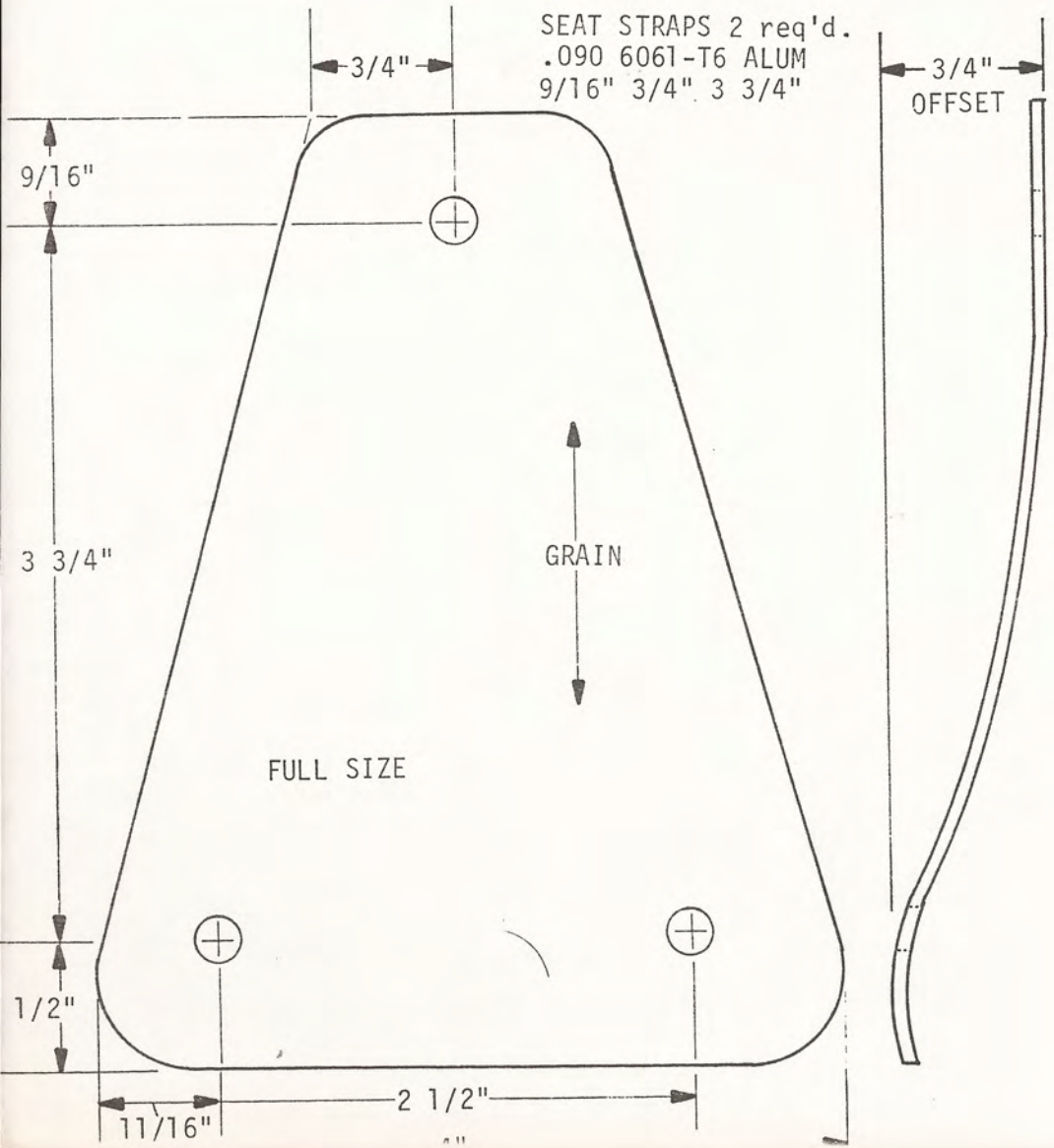
Optimum rate of climb runs around 26-27 MPH as does the best glide speed. This varies somewhat with various loads, different aircraft and different airspeed indicators.

In the interest of safety and the occasionally inconclusive airspeed readings these indicators give, it is best to fly by attitude when in doubt. On your first extended hop, note the position of the engine relative to the horizon, climbing, level flight, and power off (gliding).

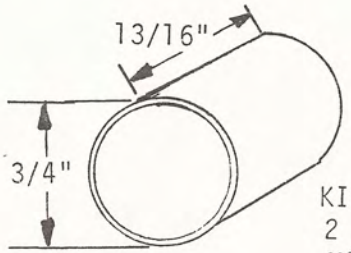

RIVET LAYOUT
FUSELAGE
(OVERLAP)
(OVERLAP)
ALIGN THIS WITH SPLIT IN THE INTERNAL SLEEVE
SPLICE
SPLICE
(OVERLAP)
(OVERLAP)



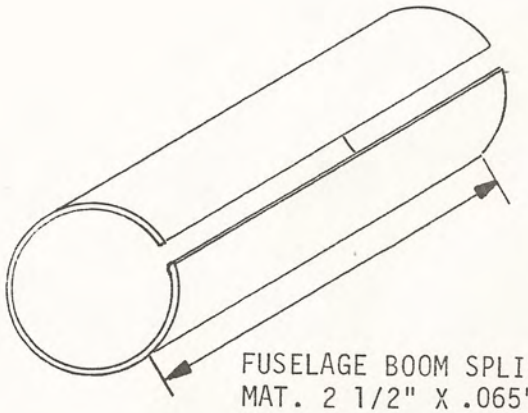
OPTIONAL FUSELAGE BOOM
.065" 6061-T6 ALUM.



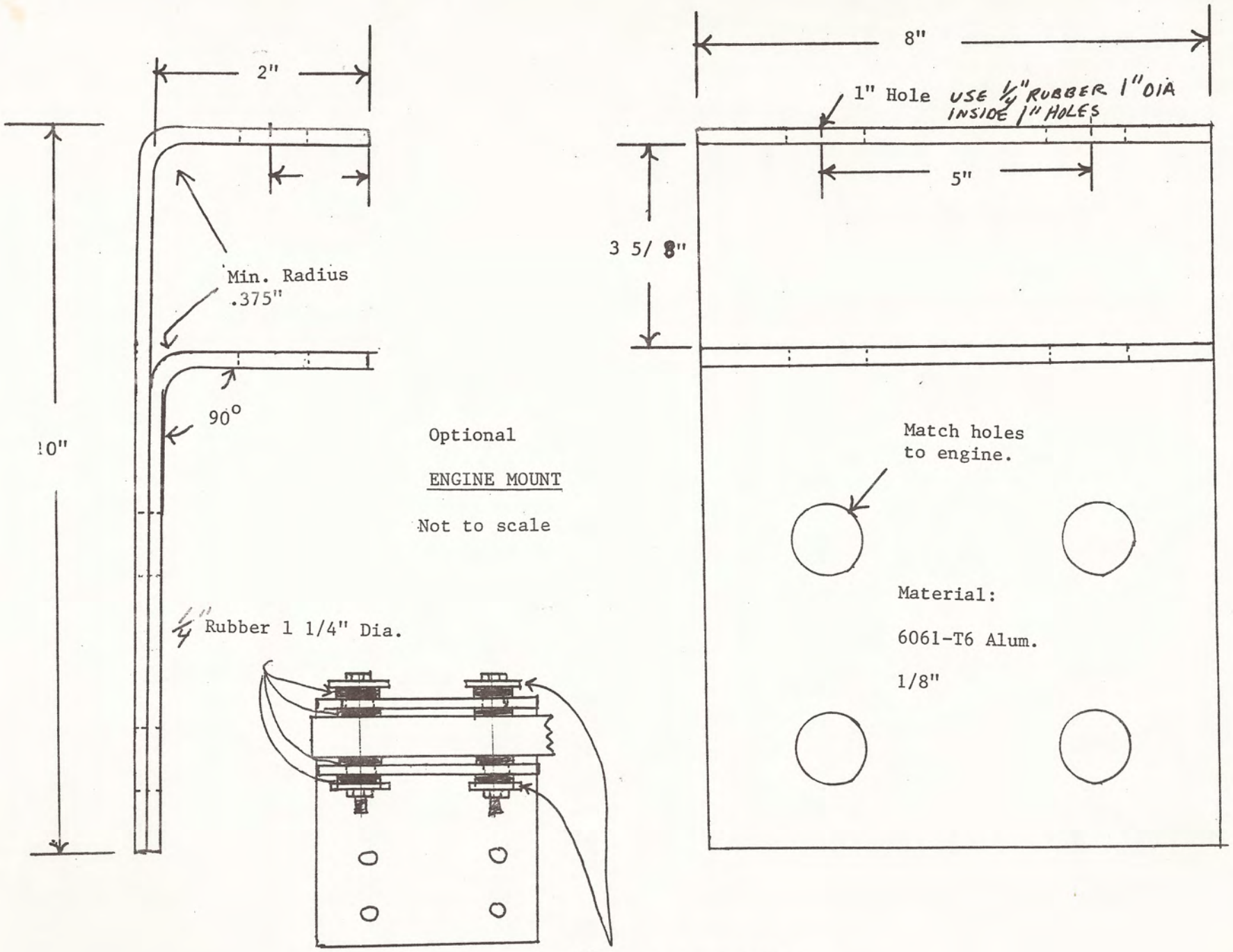
OPTION WILL REQUIRE 1" LONGER
FUSELAGE BOOM BOLTS



KING POST SPACER
2 req'd.
MAT. 3/4" X .035"
6061-T6 TUBE



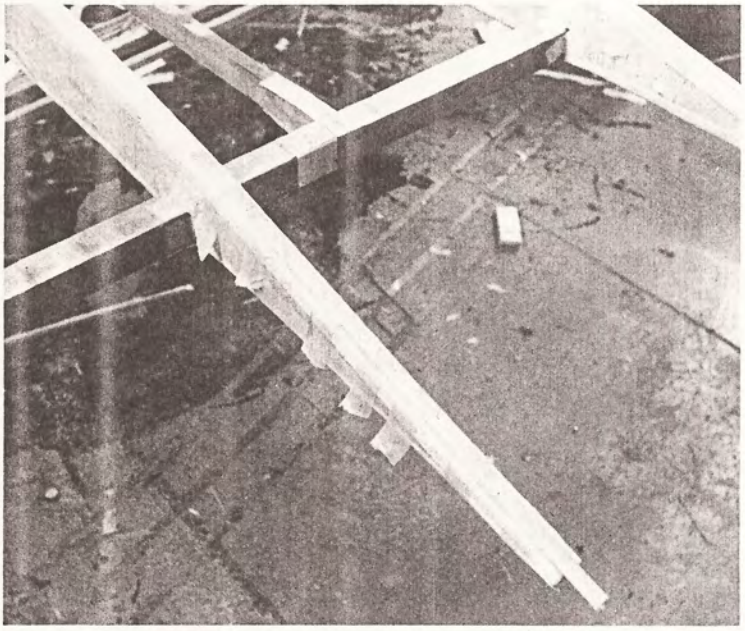
FUSELAGE BOOM SPLICE
MAT. 2 1/2" X .065"
6061-T6 ALUM TUBE

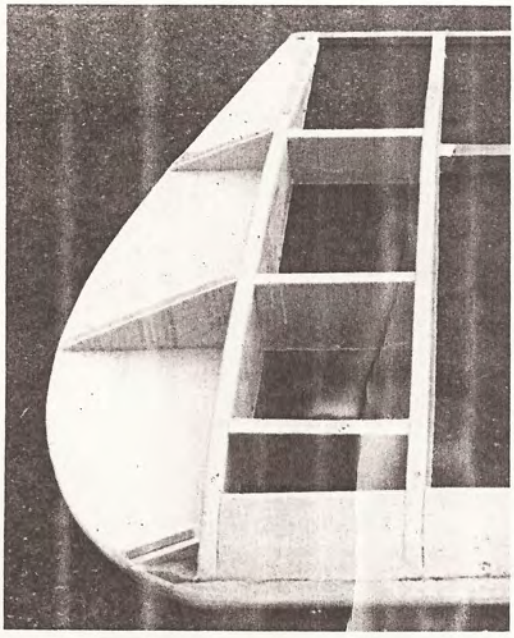


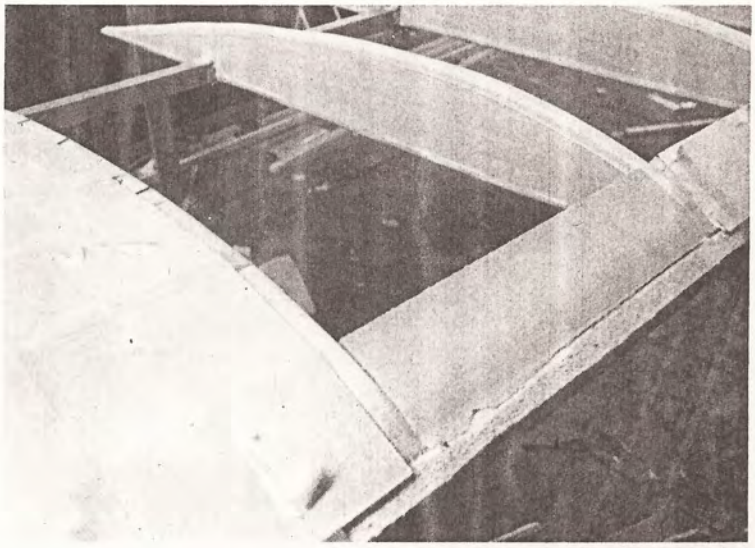
Optional

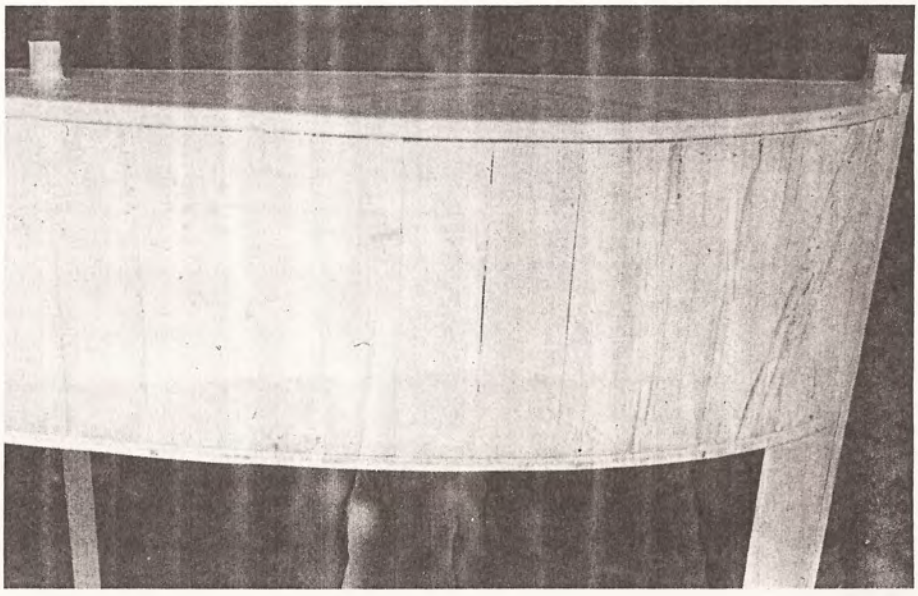
ENGINE MOUNT

Not to scale









NOTE: Foam Planking on Top and Bottom.

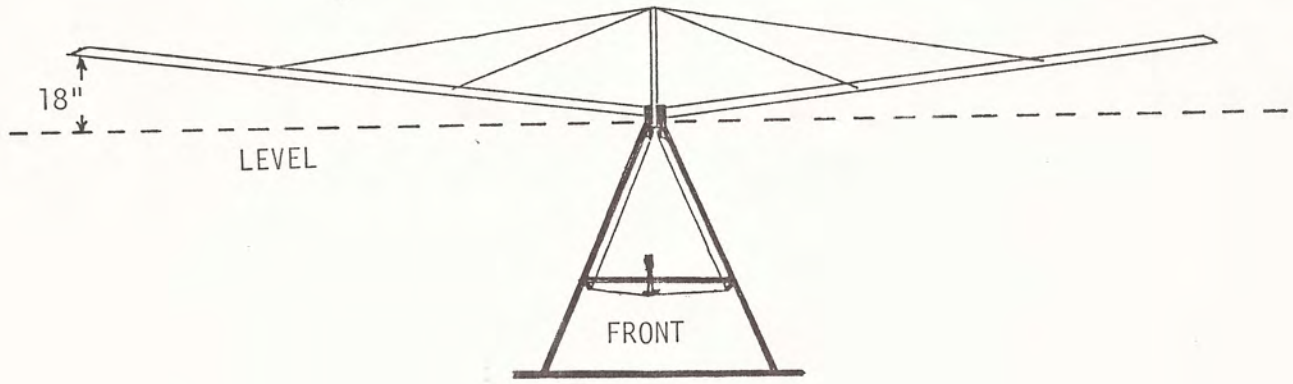
WING RIGGING

Block up fuselage at tail and level boom.
Install wings, block up at tips and level wings. From the level position add 18" to each tip. This will set the proper dihedral.

Now rig top wires C-3, L & R; C-2, L & R; C-1, L & R.

Making sure wing does not twist (use level)

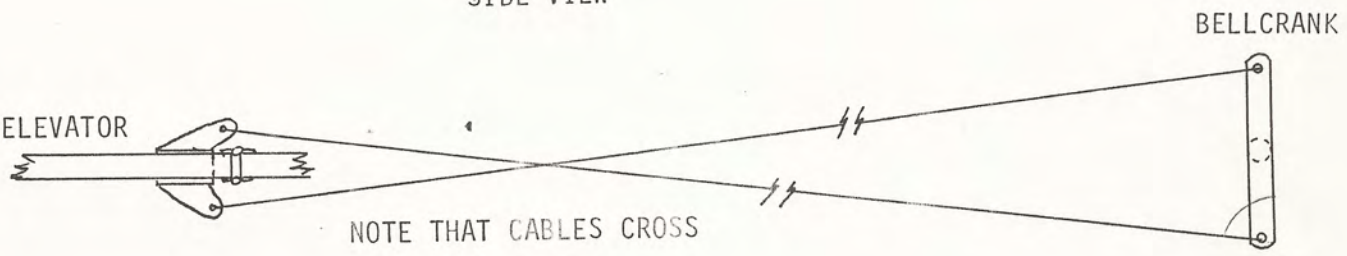
Now rig bottom wires DD-1, L & R; E2, L & R; D3, L & R; D4, L & R; (Note DD1 uses double wires.)

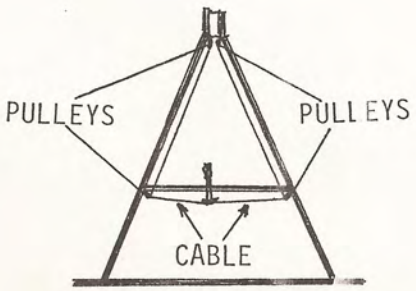


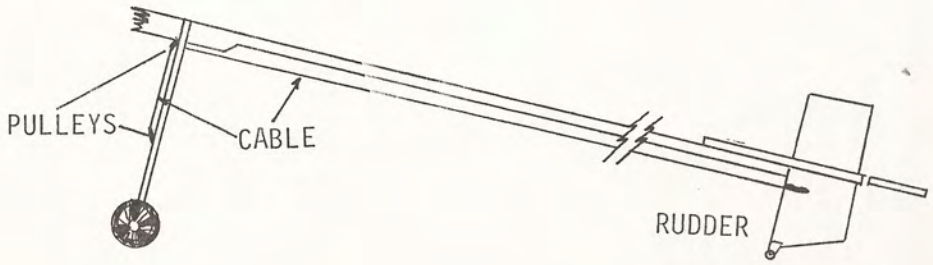
CONTROL SYSTEM RIGGING

Install control system and cables. Route cables as shown.

CONTROL SYSTEM
SIDE VIEW







RUDDER

Make 1

Cut leading edge, trailing edge top and bottom and reinforcements. See material list and blue prints for dimensions.

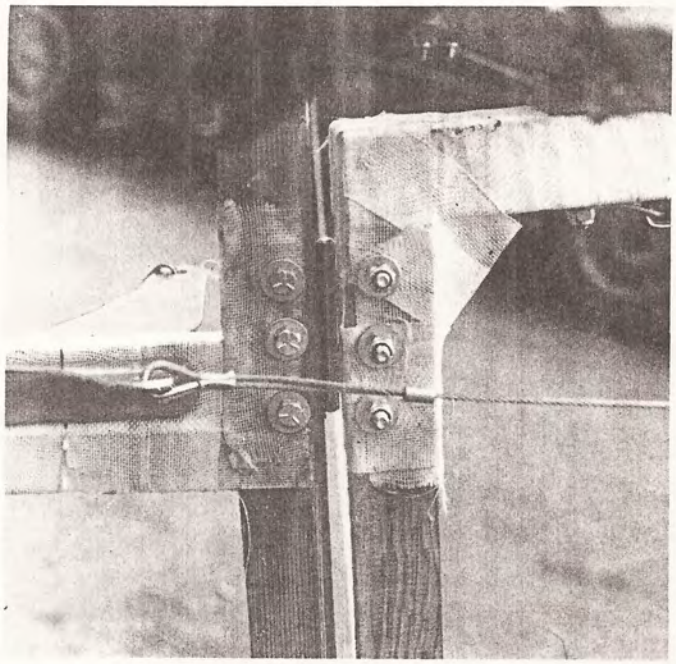
Lay frame on flat surface and assemble with fiberglass tape and white glue. (See pictures)

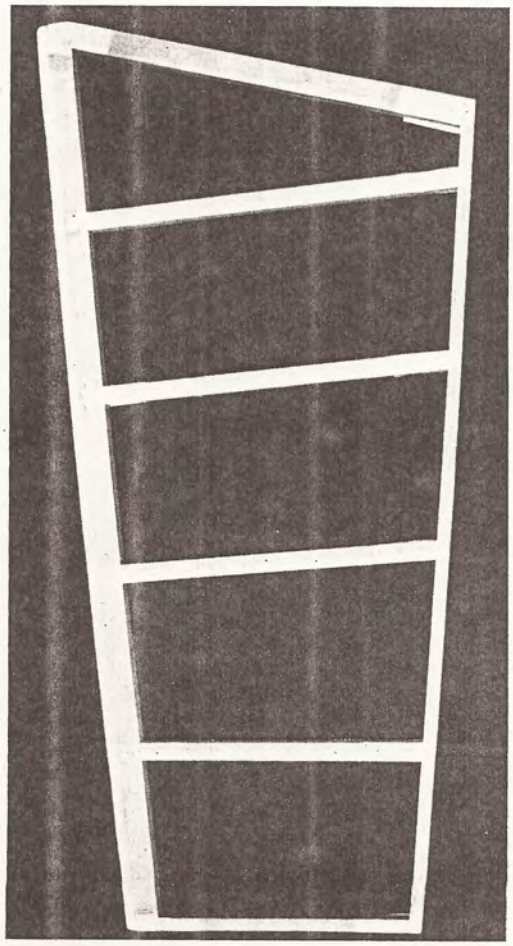
Cut and install ribs, fasten with fiberglass tape and white glue. Foam ribs do not use capstrips. Sand all parts smooth.

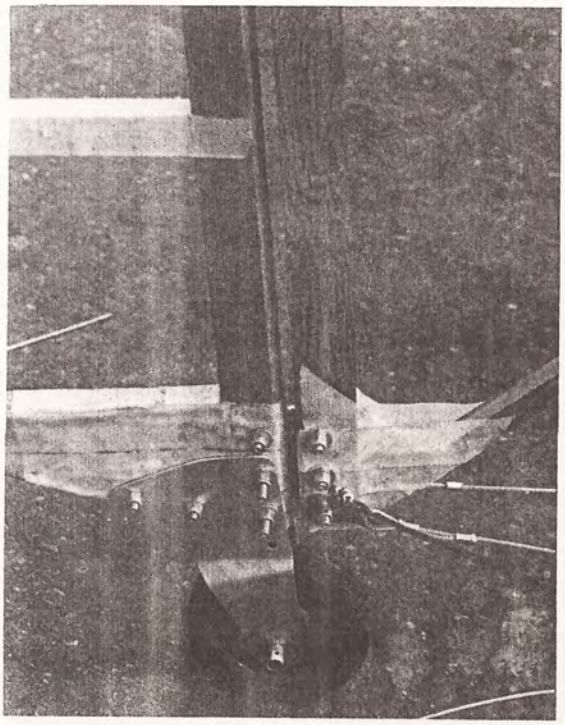
Give 3 coats of white glue thinned 75-25. Sand between coats.

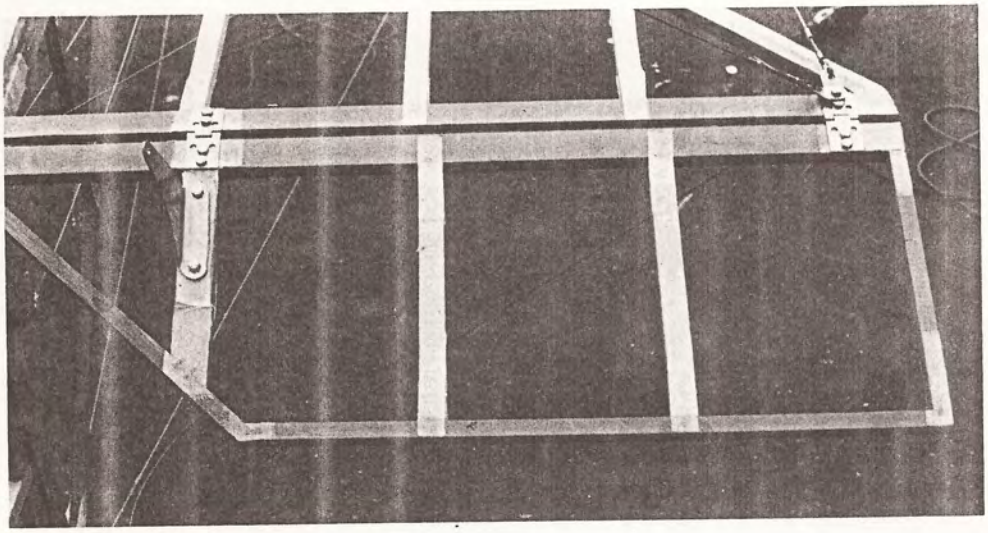
Cover rudder with dacron using white glue thinned to bond fabric to all parts.

Drill and install all hardware. Use 1-5/8" long bolts on control horns and tail wheel plate.









ELEVATOR

Make 1

Cut leading edge, spars, trailing edge.

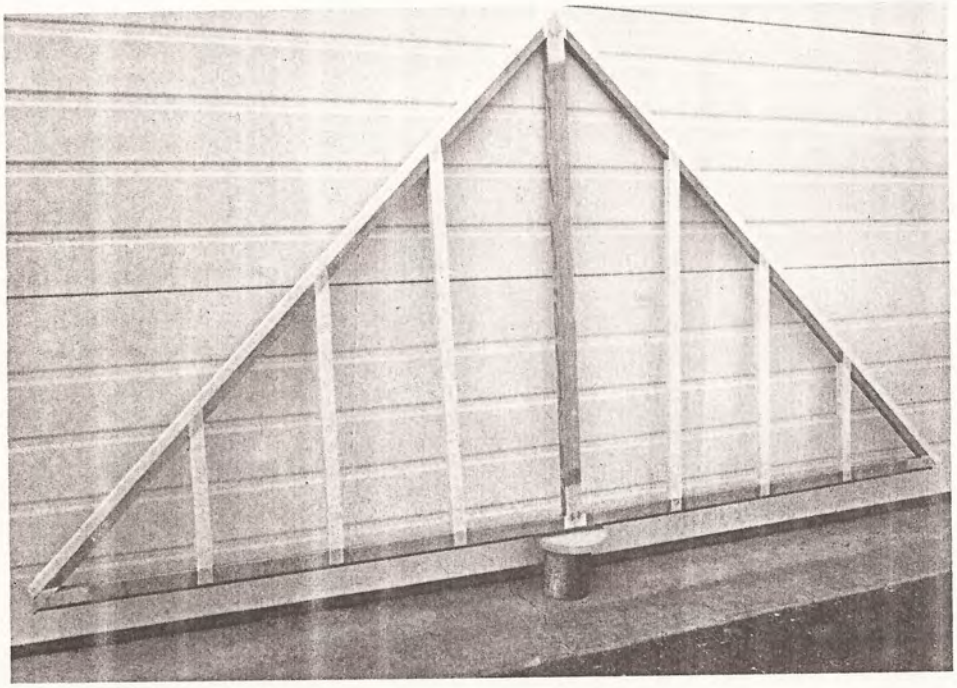
Lay out frame on flat surface and assemble with fiberglass tape and white glue.

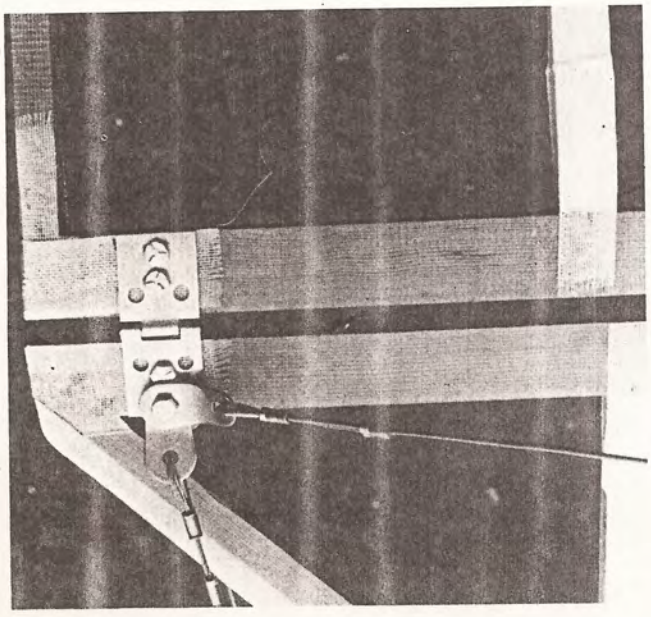
Cut ribs and install as per rudder.

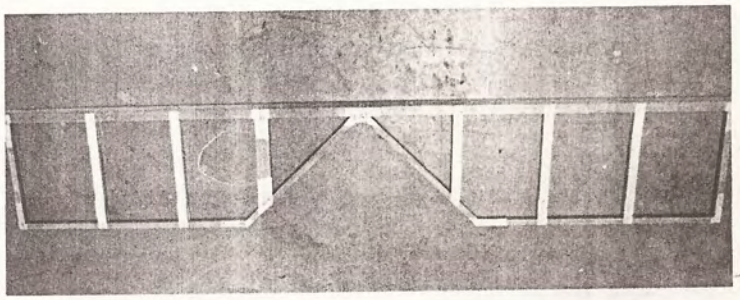
Sand smooth and coat with 3 coats of white glue thinned 75-25. Sand between coats.

Cover elevator same as rudder.

Install all hardware and use 1-5/8" bolts.







MATERIALS

1 piece 20' x 12" x 2" Nominal (11½" x 1½" actual)

Douglas Fir is a fine material for use on aircraft. Although it is a shade heavier and stiffer than spruce, it is both cheaper and stronger -- and you can get it. You use the same criteria in picking out the right pieces as you do the spruce; **"Vertical Grain"** about 8 to 14 grains per inch and grain runout not exceeding 1" in 15.

Cap strips 1/2" x 1/8" x 60' - Douglas Fir

Fibergalss strip material 100 yd. 2", 75 yd. 1" Tap 484-7607 7½ oz. material selvage edge.

7 sheets extruded 1" styrofoam (polystyrene)

White glue, Elmer's or Safe T Poxy, 5 gallons; Buterate dope, 5 gallons; Thinner, 5 gallons.

3/32" cable (7 strand wrap in a cluster of seven) (7/7) 3/32" cable 450'
1/16" 10 ft. throttle cable and housing 1/4" 1/8" ID, 10'

1 1/8" x 1/8" wall 6061 T6 tubing - 26 ft.

1" solid bar stock 6061 T6. 54" long for axle
Fabric 3.0 dacron 100% dress lining (50 yds.)

(6) hardware store hinges
2" x 2" (2 ea.) - 3 1/2 x 1 1/2 (4 ea.)
Pulleys - 4, Race Lite (Brand Name)

16" bicycle motor cross tuff wheels (2)
Tail wheel 5.0" OD, 1/2" ID centered hub at a hardware store

Control stick grip and throttle lever at your local bicycle shop

(Seat) Plywood back and bottom covered with foam rubber 3" then covered with material of your choice, vinyl, etc.

1 piece extruded angle 13" x 2" x 2" x 1/8" 6061-T6 (Wing brackets)

Cockpit hardware and tail wheel brackets 25" x 35" x 1/8" 6061-T6 Aluminum plate

(Tangs) Cable - 80

Thimbles - 80, Nicos - 150

Turn Buckles - 2

Gas tank (Clorox Bleach bottle)

Control horn matt. 12" x 12" x .090 6061-T6

RUDDER

L.E. 1 1/2" x 3/4"
T.E. 3/4" x 3/4"
Top 3/4" x 3/4"
Bottom 1 1/2" x 3/4"
Center Bruce 1 1/2" x 3/4"

Foam L.E. 1" x 3/4" Rounded 24" Long
Foam Ribs 1" x 3/4"
Hinge 3" x 2" (2 ea.)

HORIZONTAL STABILIZER

L.E. 3/4" x 3/4"
T.E. 3/4" x 3/4"
Spar 1 1/2" x 3/4" Bevel to hinge
Center spar 1 1/2" x 3/4"

Foam L.E. 1" x 3/4" Rounded
Foam Ribs 1" x 3/4"
Center Spar 1 1/2" x 3/4"

ELEVATOR

L.E. 1 1/2" x 3/4" (Bevel hinge)
T.E. 3/4" x 3/4"
Control horn brace 1 1/2" x 3/4"

Foam Ribs 1" x 3/4"
Hinge 3 1/2" x 1 1/2" (4 ea.)

WINGS

Spars 1 1/2" x 1 1/2" (4 ea.)
Comp strut 1 1/2" x 3/4" (4 ea.)
Cap strips 17" x 1/2" x 1/16"

Foam Ribs 1"
Foam Planking 1"
Foam L.E. 1" x 1 1/2" rounded

FUSELAGE

Boom 1 1/2" x 1 1/2"
Plywood 1/8" aircraft quality (for front boom)

SUBFIN

L.E. 3/4" x 3/4"
Brace 3/4" x 3/4"
T.E. 1 1/2" x 3/4"

WOODHOPPER SUPPLEMENTAL SHEET

MATERIALS:

- Cap strips 1/2" X 1/16" X 60' Douglas fir.
  If you cannot get 1/2" get 1" X 1/16" X 30' and split in half.

- (7) sheets extruded 1" Styrofoam (polystyrene) 4' X 8'.

- Pulleys - (4) "Race Lite", (Brand name) Sheave diameter 1/2" to 3/4".

- Bushings for 16" bicycle motocross Tuff wheels. (See Drawing.)
  Bore Tuff wheel to 1.270" + .010" - .000".

- Tail Wheel Axle - Use a 3" X 1/2" diameter bolt.

- Cable Tangs (80) 1/4" Stainless Steel Tang (To-FT)

- NICO Press sleeves are 3/32"

- Turn Buckles (2) AN 155-165

- Rudder Hinges 3" X 2" (2ea) Elevator hinge 3 1/2" X 1 1/2" (4ea)

- Throttle cable housing 1/8" I.D. X 1/4" O.D. Plastic

- 3/32" 7/7 Stainless steel cable (Aircraft quality)

HORIZONTAL STABILIZER: "Materials"

- L.E. 3/4" X 3/4"

- Horizontal Stabilizer Spar - 1 1/2" X 3/4", Bevel to hinge, (see page 1 of 6 Blueprints).

- Center Rib - 1 1/2" X 3/4"

- Foam L.E. - 1" X 3/4" Rounded.

- Foam Ribs - 1" X 3/4"

- Drill holes in center spar at installation on fuselage!

ELEVATOR: "Materials"

- Elevator L.E. - 1 1/2" X 3/4" (bevel hinge).

- T.E. and T.E. tips 3/4" X 3/4"

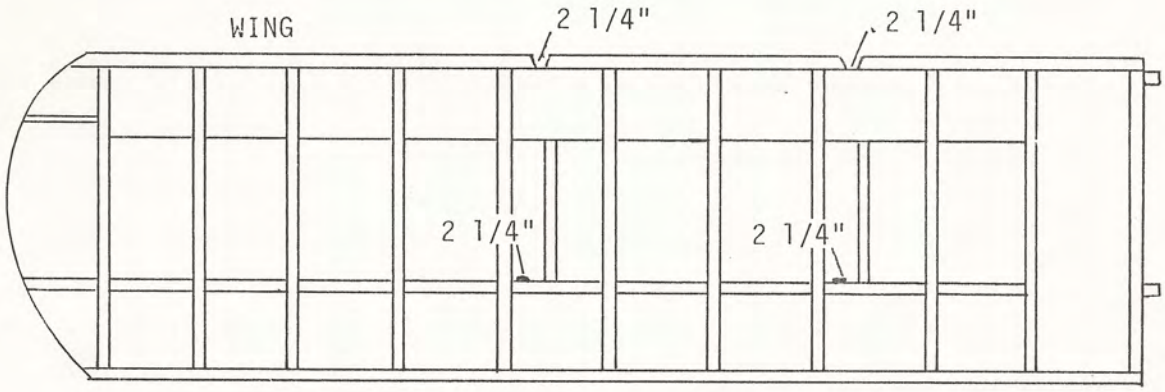
- Control horn brace - 1 1/2" X 3/4", (Note: Bolt upper control horn and control horn to control horn brace and elevator L.E.)

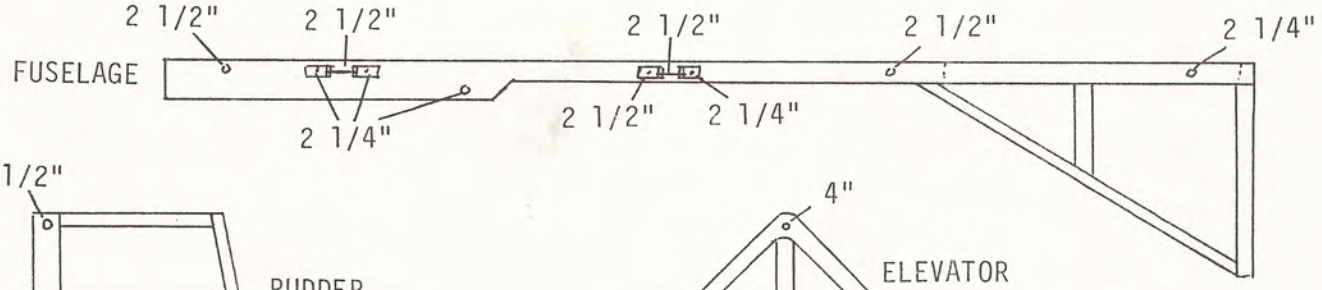
- Foam Ribs - 1' X 3/4".

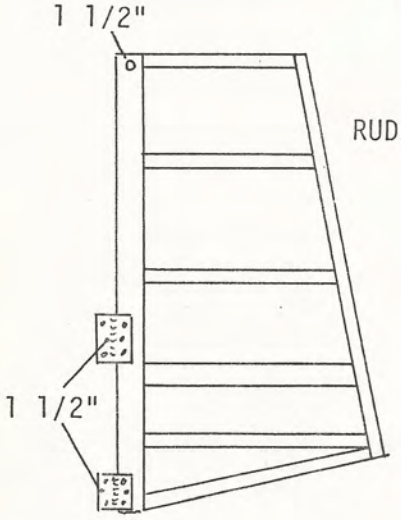
- Hinge 3 1/2" X 1 1/2" (4 ea)

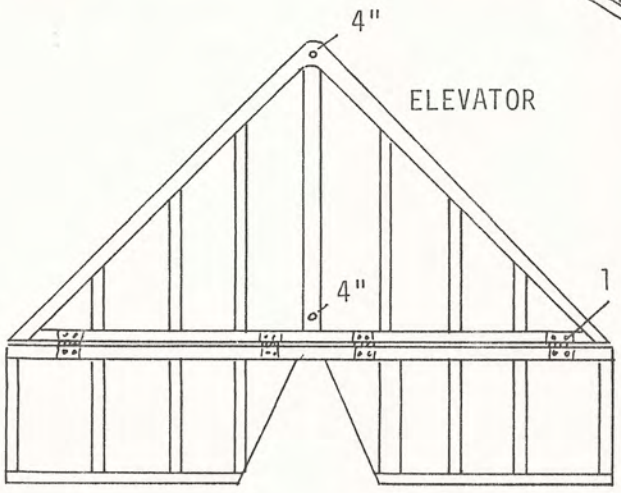
ALL BOLTS AIRCRAFT QUALITY

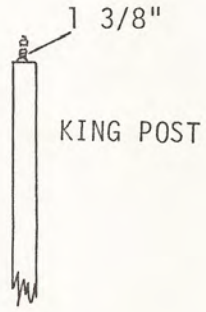
1/4"dia. EXCEPT WHERE INDICATED

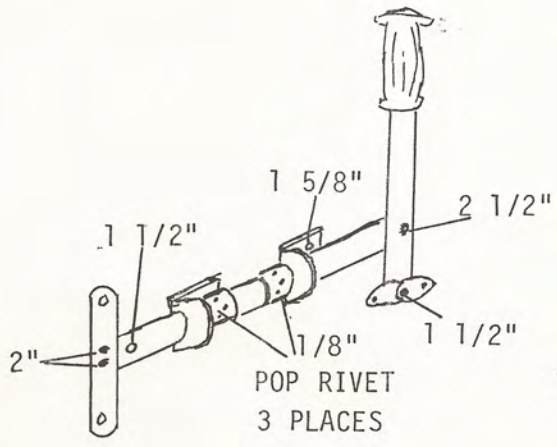


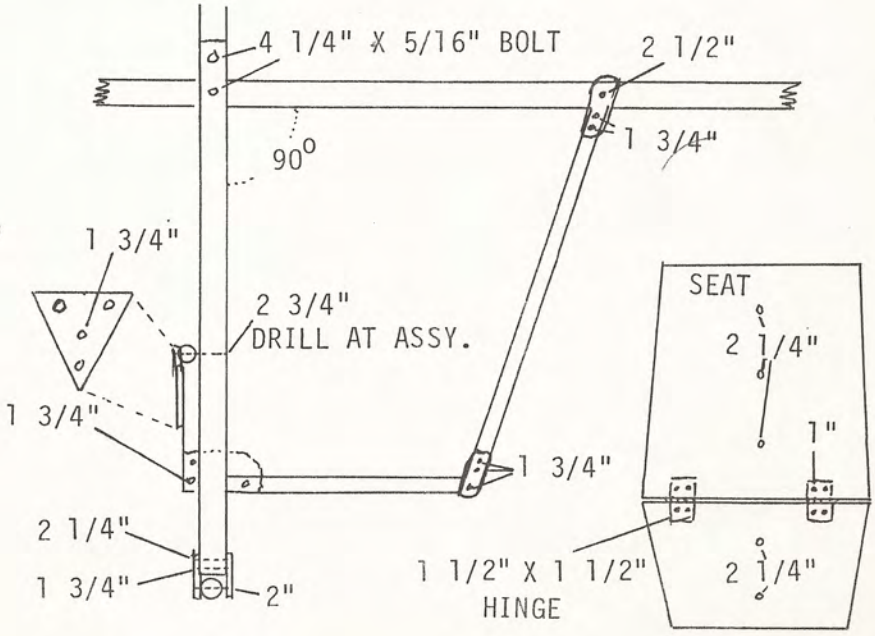












WOODHOPPER SUPPLEMENTAL SHEET

BLUE PRINTS:

RUDDER BLUEPRINTS:

Should read:

- L.E. 1 1/2" X 3/4" Foam L.E. 1" X 3/4" - sand round.
- Bottom - 1/2" X 3/4"
- Center Brace 1 1/2" X 3/4"
- Control horn bolts to center brace.

WING CONSTRUCTION:

- 17" cap strips are glued to the last 17" of ribs top and bottom after 1" fiberglass is glued on.
- Install foam leading edge (Top only!) Planking
- Install foam planking between first and second rib top and bottom.
- Capstrips are also glued to triangle shaped wing tip braces.

ELEVATOR CONSTRUCTION:

- No capstrips needed!

WING RIGGING:

- (Double Strand) means double wires on D1 left and right
- See wing construction for approximate lengths.
- See blueprints for details (Page 1 of 6).

CROSS-TUBE: Page 5 of 6

- DO NOT DRILL A HOLE AT 13 3/4"! Center triangle gusset on cross tube and drill holes to match triangle gusset holes.

(Pages 4 & 5 of 6)

- All holes drilled 17/64" except, where down tubes attach to fuselage boom, two holes at top of down tubes, and the hole at the bottom of kingpost. They should be drilled 5/16".
- Aileron Bellcrank Standoff--DISREGARD!! NOT NEEDED ON WOODHOPPER!
- Offset seat straps - for optional 2 1/2" fuselage.

RIBS PATTERN:

- Pattern should be flat on bottom.

BOLTS:

- All bolts that go through 1/2" plywood reinforcement on front of fuselage boom, add 1" to lengths shown. (See bolt page.)

NUTS:
- Use aircraft quality elastic lock nuts 1/4"

WINGS:

- Blueprint should read T.E. 1" X 5/8".

WING TIPS: Foam

FUSELAGE: Materials

- Plywood reinforcement, 1/2" aircraft quality (for front boom).
  Note: 5/16" hole where down tubes bolt to fuselage.
* Extend plywood reinforcement to 75" (See supplemental drawing.)

SUBFIN:

- Blueprint should read; T.E. 1 1/2" X 3/4" X 26".

OPTIONAL FUSELAGE BOOM:

- .065" wall 6061-T6 Aluminum - 2 1/2" diameter.

TRIANGLE GUSSET:

- Mounts to cross tube front and rear.

CONTROL HORN:

- (3 ea) two for rudder, one for lower Elevator control horn.

BREAKDOWN AND TRANSPORTATION:

- For breakdown and transportation - disconnect wing wires at kingpost and axle. Wings will fold down. Take bolts out of spar brackets to disconnect wings.

BALANCE TEST

- When built according to plans, your completed Woodhopper should balance on the main landing gear when the down tubes are vertical and the fuselage boom is level. This test is to be performed without a pilot on board.

SEAT MATERIAL 1/4' Plywood

- Fiberglass
  Wrap 2 layers of fiberglass where holes are drilled. First coat wood with glue then wrap with fiberglass. Work glue through glass with fingers.

"ENGINE SOURCE"

Cuyuna Development Co.
PO Box 116
Crosby, MN 56441

Advanced Engine Design
4709 Highland Road
Pontiac, MI 48054

Arizona Air Sports - Reduction Drive Components
1441 South Rita Lane
Tempe, AZ 85281

Zenoah (242 cc-Model G-25-B)
24144 Sumac Dr.
Golden, CO 80401

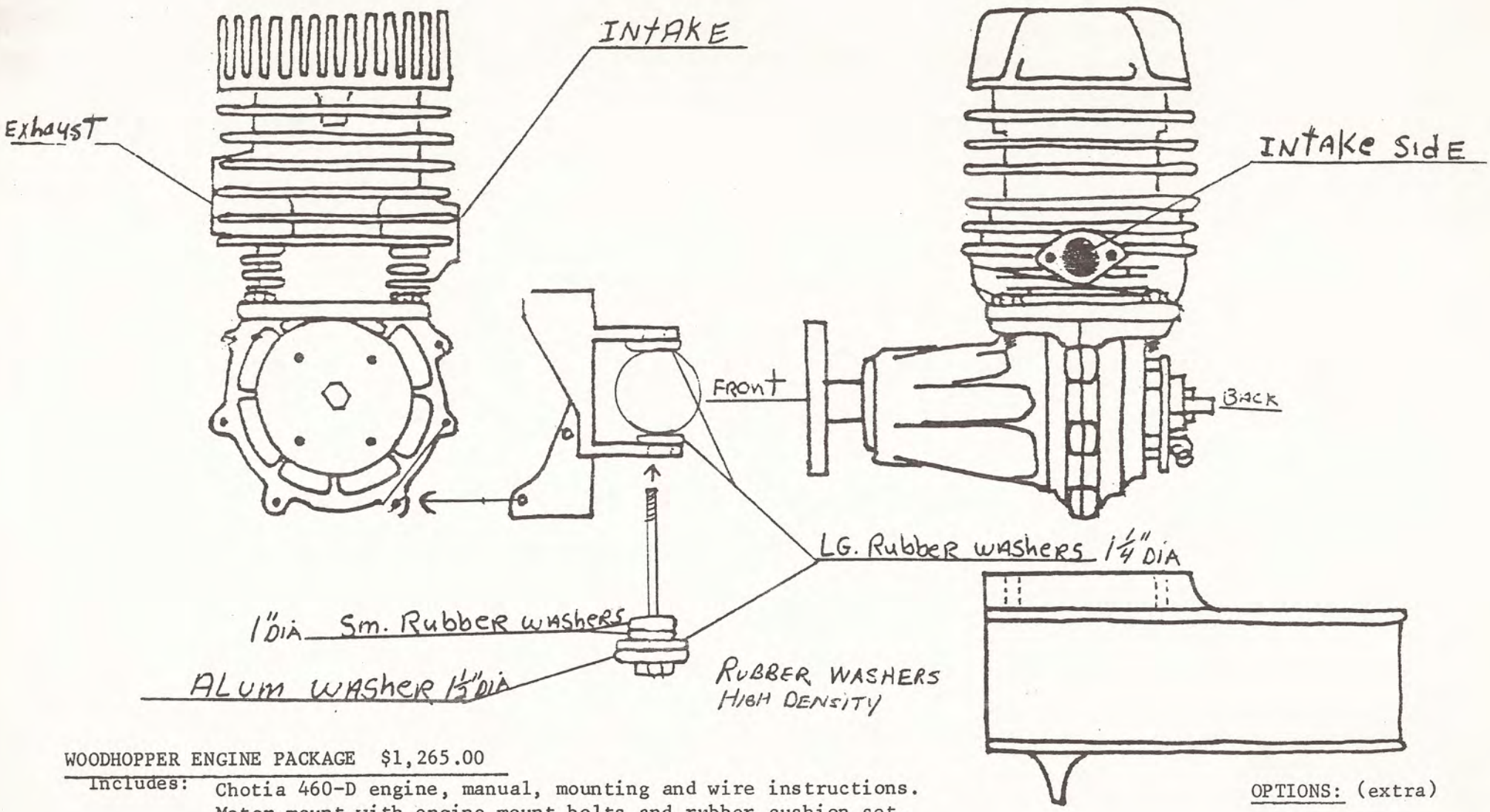
Yamaha
(Contact nearest Yamaha Motorcycle Dealer.)

"PROPS SOURCE"

Black Hawk Propellers
2020 South Susan St. #N
Santa Ana, CA 92704

Engineering Duplicating
403 Avenida Teresa
San Clemente, CA 92672

Glider Rider Magazine (Parts Classified)
PO Box 6009
3710 Calhoun Ave.
Chattanooga, TN 37401



WOODHOPPER ENGINE PACKAGE $1,265.00

Includes: Chotia 460-D engine, manual, mounting and wire instructions.
Motor mount with engine mount bolts and rubber cushion set.
2- coils 2-spark plugs 2-spark plug wires
1-Mikuni carburetor, fuel pump, air filter and fuel filter.
Throttle cable, housing and lever.
Ignition box with wireing harness and ignition switch. (uses 4 "D" size batteries.)
Propeller with propeller face plate and propeller bolts.

OPTIONS: (extra)

Muffler
Recoil Starter

ENGINES

Obviously, the Chotia 460-C with its light weight, high torque, low RPM and dual-ignition is the best engine for the job since it was designed for this job. Yet, the Chotia 460-C isn't exactly the cheapest engine available which will fly the WOODHOPPER.

For direct drive, at least 240 cc will be required. A good prop to start with might be 36" in diameter, 14" pitch. Bigger engines are okay as long as the weight is under 55 pounds. Smaller engines, down to 100 cc, are useable if they use a speed reduction system to allow at least a 42" diameter propeller.

A Chrysler 820 would probably do the job with a 4:1 reduction and 45" - 49" prop diameter and approximately 20" - 24" pitch. Whatever engine package is used, it must be totally isolated from the airframe with rubber to prevent airframe fatigue and cracks.

If power is too low, take-offs will be touchy and more susceptible to ground loops. No matter how much power you install, be sure to observe the 45 maximum speed.

Be sure to carefully inspect all engine installations and the airframe regularly and thoroughly for cracks, wear, or looseness. Engines love to shake things apart.

WEEDHOPPER OF UTAH, INC.
PHONE: 801-621-3941

SEAT CROSS TUBE: (missing)

- 1 1/8" X 1/8" X 18" 6061-T6
  Instruction: Drill hole at center, (9"), and a hole at 1/2" from each end. See seat picture, (fuselage construction.)

SOURCES FOR OBTAINING PARTS

LEAF
331 South 14th Street
Colorado Springs, CO 80904

Aircraft Spruce and Specialty Co.
201 W. Truslow Ave.
Box 424
Fullerton, CA 92632

Wag. Aero Inc.
PO Box 181 1216 North Road
Lyons, Wisconsin 53148

"Swage-It Tool size #2
S & F Tool Co.
PO Box 1546
Costa Mesa, CA 92626

Wick Aircraft
410 Pine Street
Hiland, IL 62249

Information on Dope, Fabric and Wood techniques:

Experimental Aircraft Association
11311 W. Forest Home Ave.
Franklin, Wisconsin 53132

Mail: EAA
Box 229
Hales Corners, Wisconsin 53130
(414) 425-4860

3/32" cable may be purchased from
Weedhopper of Utah, for .40¢ per ft.
Address: PO Box 2253
Ogden, Utah 84404

Hall Brothers (Airspeed Indicator)
Box 771
Morgan, Utah 84050

Race Lite South Coast, Inc. (Pulley's)
16516 Broadway
Maple Heights, OH 44137