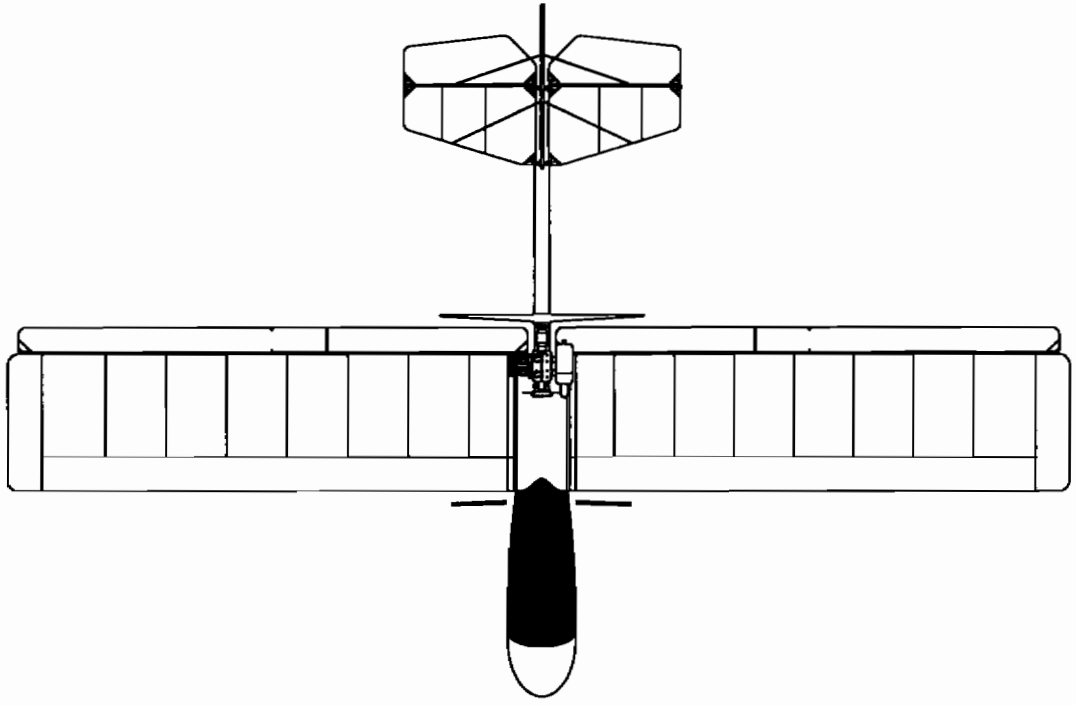
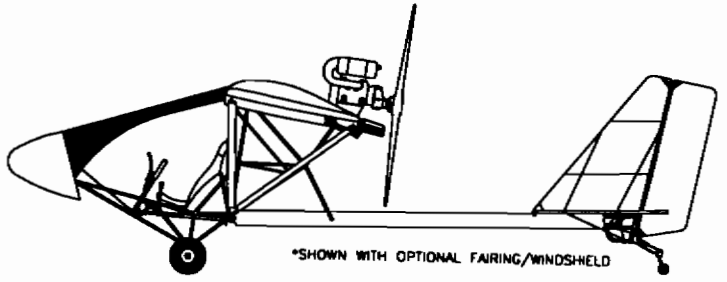
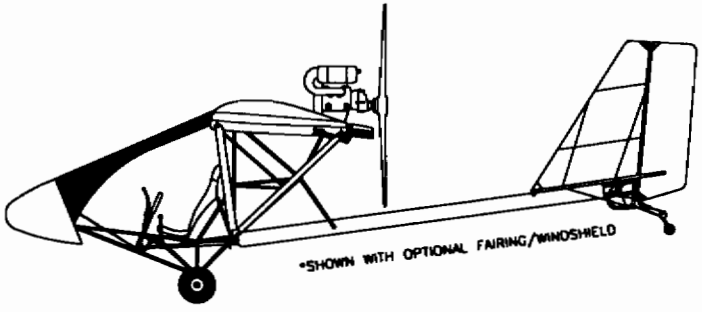
RANS S-17 STINGER





*SHOWN WITH OPTIONAL FAIRING/WINDSHIELD



*SHOWN WITH OPTIONAL FAIRING/WINDSHIELD

RANS
4600 Highway 183 Alternate
Hays, KS 67601
(785) 625-6346

DESIGNED BY:
RANDY SCHLITTER

RANS, Inc.

4600 Highway 183 Alternate
Hays, KS 67601

Technical Support
(785)625-0069

Parts Department
(785)625-6346

When calling Technical Support or the Parts Department please have the following ready:

- Aircraft Model
- Serial Number
- Engine Model
- Parts Number Needed (Parts Department Only)
- Your Aircraft Assembly Manual

Note: Please make your questions precise and to the point so that we may assist as many customers as possible.

UNPACKING KIT and PREPARING FOR ASSEMBLY

TAKE INVENTORY: You must complete an inventory within 60 days of receiving your kit. We check and re-check and are 99.9% certain that if we say we shipped it, we did. The first task in building your kit is to inventory the parts using the packing list provided. It's your job to keep all parts organized and accounted for. We can not provide missing parts cost free after 60 days. Use the supplied pack list to verify that everything that we packed is in the box. The fast way to inventory, is to use the Priority Number that appears on the Part Number labels, these will match the pack list in numeric order. Go through the list item by item. If anything is not there that should be, please contact our parts department immediately. ***HINT:*** *Use sections of plywood from the packing crate to fabricate a part inventory board. As each part is inventoried and checked off on the pack list, staple the bag to the board, grouping like items together. This allows for quick identification and part selection during assembly. Plywood can also be attached to shop wall.* See **Figure 0-0.**

INSTRUCTION MANUALS

The Stinger is assembled by reference to three manuals: *text*, *parts* and *figure*. Instructions in the text manual refer to exploded views in the parts manual. The parts manual identifies all kit components and illustrates assembly and installation. For clarification, the text often refers to detail views found in the figure manual.

Where drawings are sufficient, little or no text is provided. Have all three manuals open to the appropriate pages during assembly. *For fast, easy assembly, carefully study all manuals prior to starting.*

RECOMMENDED TOOLS and MATERIALS

Not all tools and materials listed below are essential for assembly, but all are helpful. The builder is cautioned to use appropriate tools, materials and methods during assembly.

pliers
riveter
center punch
wrench and socket set
utility knife
clamps
side cutter
file
tube cutter
hole saw
rubber mallet

needle-nose pliers
safety wire pliers
wire stripper
screwdriver set
tape measure
carpenter's level
sand paper
ball peen hammer
hack saw
safety glasses
duckbill vise grip

power drill
hot knife
soldering iron
power screwdriver
disk sander
band saw
drill press
heat gun
dust mask
fly cutter
hole saw

masking tape
lithium grease
contact cement
acetone
Loc-tite
WD-40
Dremel tool
Cleco pins

IMPORTANT ASSEMBLY NOTES

Dacron skins soil easily; wash hands, tools, work surfaces and floor as needed during assembly.

Many components are pilot-drilled and require further drilling prior to assembly or installation.

Some components may require sanding, filing or grinding to remove powder coating from holes, bushings, sockets or other surfaces prior to installation of hardware or final assembly.

Unless directed otherwise in manuals, use a #40 bit when drilling for 3/32" rivets, a #30 bit when drilling for ⅛" rivets and a #11 bit when drilling for 3/16" rivets and bolts.

Clecos are pins which hold components in position when drilling and riveting. Available in #40 (silver), #30 (copper) and #11 (gold), they are placed in holes with special pliers. While not required, Clecos are very convenient assembly aids and their use is highly recommended.

Aluminum is soft; when drilling, use sharp bits, high speed and moderate pressure. Drill larger holes in steps to avoid drifting.

Dress holes and edges by carefully deburring; ½" drill bit works well as deburring tool on most holes. Radius and smooth corners with sand paper, a grinder or file.

When drilling or trimming, maintain adequate distances between holes and edges.

When installing bolts, turnbuckles and rod ends, be certain threads are sufficiently engaged. Install washers where needed. Discard damaged hardware.

The Stinger kit contains aluminum and stainless steel rivets of various sizes; be certain to use the proper rivet for the job at hand. Be certain rivet holes are free of burrs, parts to be joined are in contact and rivet heads are fast against surfaces when pulled.

Denting or scraping aluminum or steel can result in corrosion and stress risers. Damaged components should be replaced; if marred, powder coated or painted finishes should be retouched with suitable paint.

Though designed to assemble quickly, some steps of the Stinger's construction take more time to complete than others. *Be patient and careful. Apply proper shop techniques.*

TECHNICAL SUPPORT

RANS, Inc. has taken care to provide clear, comprehensive and straightforward instructions for assembly, maintenance and operation by reference to manuals alone. In the event a question arises for which no answer seems apparent, feel free to contact RANS, Inc. headquarters.

Physical and mailing address:.....RANS, Inc.; 4600 Highway 183 Alternate; Hays, KS 67601
Voice:.....785-625-6346
Fax:.....785-625-2795
E-mail:.....rans@media-net.net
Internet site:.....www.rans.com
Technical Support:.....785-625-0069
Parts Department:.....785-625-6346

When calling for technical assistance, have the aircraft model and serial numbers, engine model number and assembly manuals at hand.

Questions about propeller care and adjustment and about engine break-in, operation and maintenance should be directed to respective manufacturer's or supplier's technical support personnel. Refer to manufacturer's or supplier's literature for instructions and contact information.

RIVETS CROSS REFERENCE LIST

DIA.	RANS	POP RIVET				CHERRY Q			
	NO.	NO.	SHER.	TNSL.	GRIP	NO.	SHER.	TNSL.	GRIP
3/32 (#41)	40APR1/8	AD32ABS	85	135	.031-.125	--	--	--	--
3/32 (#41)	40APR1/4	AD34ABS	85	135	.126-.250	--	--	--	--
3/32 (#41)	40APR3/8	AD36ABS	85	135	.251-.375	--	--	--	--
1/8 (#30)	30APR1/16	--	--	--	--	AAPQ-41	225	250	.0-.062
1/8 (#30)	30APR1/8	AD42ABS	155	235	.063-.125	AAPQ-42	225	250	.063-.125
1/8 (#30)	30APR1/4	AD44ABS	155	235	.188-.250	AAPQ-44	225	250	.126-.250
1/8 (#30)	30APR3/8	AD46ABS	155	235	.313-.375	AAPQ-46	225	250	.251-.375
1/8 (#30)	30SSPR1/16	--	--	--	--	CCPQ-41	700	600	0-.062
1/8 (#30)	30SSPR1/8	SSD42SSBS	550	700	.031-.125	CCPQ-42	700	600	.063-.125
1/8 (#30)	30SSPR1/4	SSD44SSBS	550	700	.188-.250	CCPQ-45	700	600	.188-.312
1/8 (#30)	30SSPR3/8	SSD46SSBS	550	700	.251-.375	CCPQ-46	700	600	.251-.375
3/16 (#11)	12APR1/8	AD62ABS	315	500	.063-.125	AAPQ-62	500	450	.062-.125
3/16 (#11)	12APR1/4	AD64ABS	315	500	.126-.250	AAPQ-64	500	450	.126-.250
3/16 (#11)	12APR3/8	--	--	--	--	AAPQ-66	500	450	.251-.375
3/16 (#11)	12APR1/2	AD68ABS	315	500	.375-.500	AAPQ-68	500	450	.376-.500
3/16 (#11)	12SSPR1/8	--	--	--	--	CCPQ-62	1650	1300	.062-.125
3/16 (#11)	12SSPR1/4	SSD64SSBS	1000	1375	.126-.250	CCPQ-64	1650	1300	.126-.250
3/16 (#11)	12SSPR3/8	SSD66SSBS	1000	1375	.251-.375	CCPQ-66	1650	1300	.251-.375
3/16 (#11)	--	--	--	--	--	SSPQ-68	1050	825	.376-.50
3/16 (#11)	--	--	--	--	--	SSPQ-610	1050	825	.501-.625
1/8"	--	--	--	--	--	CCPQ-44	700	600	.126-.250
						AVEX RIVET			
1/8 (#30)	--	--	--	--	--	1691-0410	165	230	.031-.187

EF-39G

AN3 - AN8 AIRFRAME BOLTS

AN3-AN8 CADMIUM-PLATED STEEL BOLTS (DRILLED AND UNDRILLED)

A non-corrosion-resistant steel machine bolt which conforms to Specification MIL-B-6812. Cadmium-plated to Specification QQ-P-416.

Available with or without single hole through shank and/or single hole through head. Examples of part members for a cadmium plated steel bolt having a diameter of 1/4" and nominal length of 1".

AN4-6	For drilled shank
AN4-6A	Designates undrilled shank
AN4H-6	Drilled head, drilled shank
AN4H-6A	Drilled head, undrilled shank

NUT AND COTTER PIN SIZES

AN NUMBER — DIAMETER	PLAIN NUT AN NUMBER	CASTLE NUT AN NUMBER	COTTER PIN MS NUMBER
AN3 . . . . . 3/16	AN315-3R	AN310-3	MS24665-132
AN4 . . . . . ¼	AN315-4R	AN310-4	MS24665-132
AN5 . . . . . 5/16	AN315-5R	AN310-5	MS24665-132
AN6 . . . . . 3/8	AN315-6R	AN310-6	MS24665-283
AN7 . . . . . 7/16	AN315-7R	AN310-7	MS24665-283
AN8 . . . . . ½	AN315-8R	AN310-8	MS24665-283

HOW TO DETERMINE GRIP For Steel and Aluminum Aircraft Bolts

(Subtract Fractions Shown Below From Length of Bolt)

AN 3 to AN 8	AN NUMBER, Diameter, and Threads per Inch	AN3 10 -32	AN4 1/4 - 28	AN5 5/16 - 24	AN6 3/8 - 24	AN7 7/16 - 20	AN8 ½ -20
	Grip = Length Less	13/32	15/32 *	17/32	41/64	21/32	25/32

*Formula does not apply for AN4-3. Grip for AN4-3 is 1/16.

DASH NUMBER -- NOMINAL LENGTH

-3 . . . 3/8	-6 . . . 3/4	-11 . . . 1 1/8	-14 . . . 1 ½	-17 . . . 1 7/8	-22 . . . 2 1/4	-25 . . . 2 5/8
-4 . . . ½	-7 . . . 7/8	-12 . . . 1 ¼	-15 . . . 1 5/8	-20 . . . 2	-23 . . . 2 3/8	-26 . . . 2 3/4
-5 . . . 5/8	-10 . . . 1	-13 . . . 1 3/8	-16 . . . 1 3/4	-21 . . . 2 1/8	-24 . . . 2 ½	-27 . . . 2 7/8
						-30 . . . 3

PART IDENTIFICATION

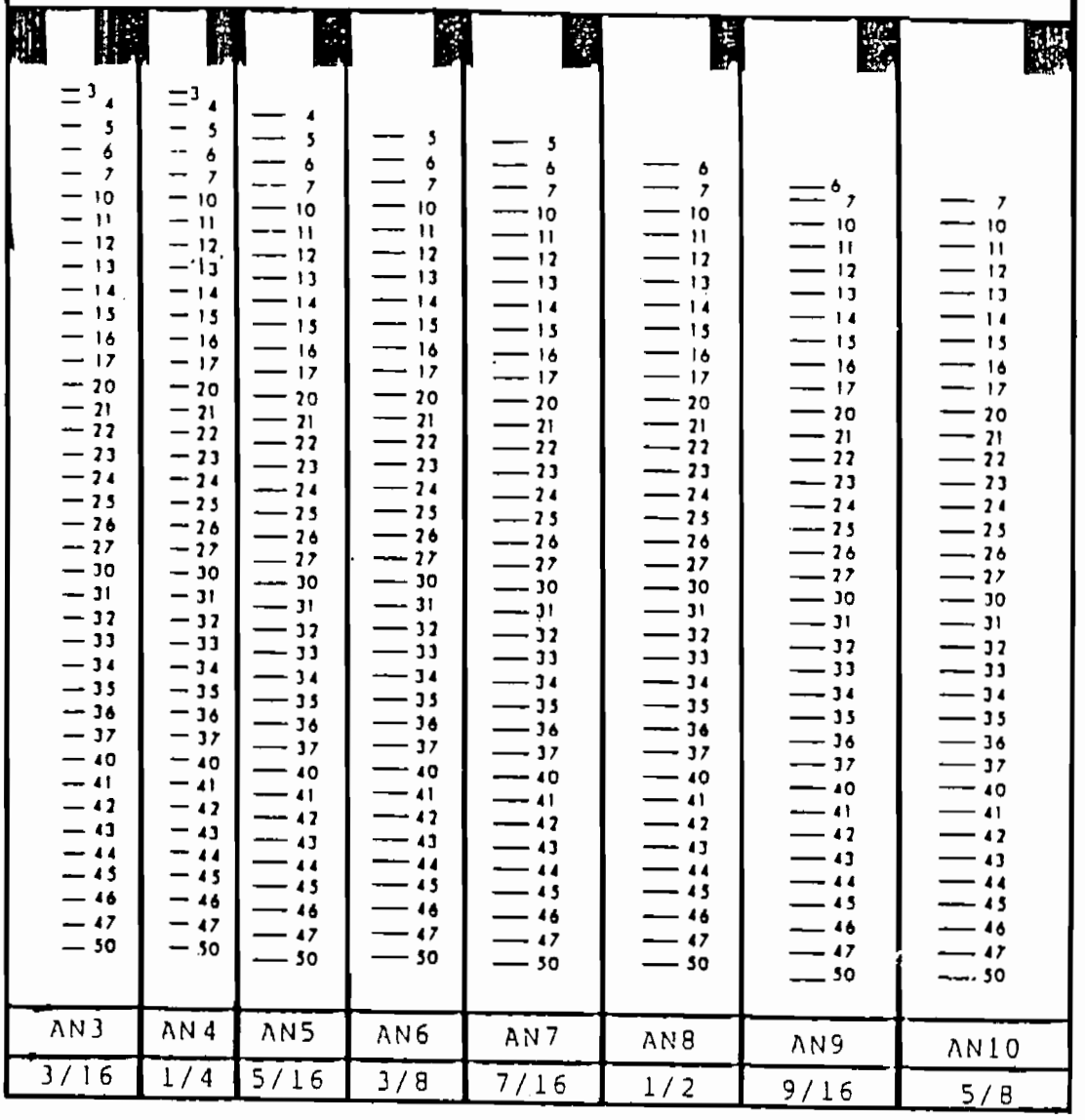
Use the above chart to determine lengths of bolts. Diameters are as follows:

AN3 = 3/16" AN4 = 1/4" AN5 = 5/16" AN6 = 3/8"

Use the parts manual for other part identification. The drawings depict a fairly accurate likeness of the real thing. Other parts are labeled by part number. Again, reference the parts manual to confirm part identity.

EF-84

AN BOLT GAUGE



CLECO SIZES AND QUANTITY

For S-17 Stinger:

Quantity	Size
5	No. 30 Copper (1/8)
10	No. 11 Gold (3/16)

EF-116

KEEL to FUSELAGE CAGE ASSEMBLY

Refer to **Fuselage Cage, Keel Installation**, **Control Stick System**, **Aileron Push-Pull System** and **Engine Mount** parts pages. *HINT: Place fuselage upright, on sturdy benches, crates or saw horses, in roughly keel-level attitude; this provides comfortable access to most locations during assembly.*

1. Locate keel to mounting brackets atop fuselage, with the pre-drilled ¼" hole to the AFT hole in each fuselage mounting bracket. See **Figure 1-1**. Drill brackets and keel to ¼" and deburr. Fabricate and install shims between keel and mounting brackets as necessary. *HINT: Trim and radius shims to match mounting bracket profile.* Bolt keel to fuselage.

2. Bevel central hole of control stick tee to accommodate bearing flange. The bearing flange must be flush into the tee. Place bearing flange assembly in bevel and rivet. Drill pilot hole on top and bottom of keel to ¼" and install assembled tee and associated hardware. Tighten so tee turns freely with no play or wobble on the ¼" bolt. Install turnbuckles to tee. Assemble upper aileron pulleys and associated hardware; install to uppermost bolt hole on the sides of the keel, 23 ¾" from the front.

3. Drill forward pilot hole on keel to ¼" and three aft pilot holes to 5/16"; install engine mount angles, spar attach brackets and associated hardware. Locate magneto switch plate and primer bracket to left side of keel, transfer-drill #30 and #11 respectively and rivet to keel.

RUDDER CONTROL SYSTEM ASSEMBLY and INSTALLATION

Refer to **Rudder Control System**, **Rudder Pedal Return System, Rudder Assembly** and **Tail Wheel Assembly** parts pages.

4. Drill #11 holes ½" from top of each rudder pedal and install rudder pedal brace. Install rudder pedal pivots to sides of pedals by locating middle rivet hole of pivot five inches from top of pedal, transfer-drilling #30 and riveting. Drill #11 hole on one side of pedal, 7 ½" from top and install cable stop and washers. See **Figure 1-4**.

5. Fabricate rudder torque tube from 23 ¼" segment of 1" x .058" aluminum tubing. Slide torque tube into bushings at forward end of fuselage; sand or grind inner surface of bushings if necessary to accommodate torque tube. When centered, drill #30 and rivet torque tube to bushings. Slide pedals and pivot stops onto respective sides of torque tube; locate pivot stops against pivots, transfer #30 and rivet stops to torque tube. Locate bushings so the rudder pedal pivots are square to the torque tube and no gaps between bushings. **NOTE:** When installing nose pod/windshield, position collar to have 3/4 E.D., see **Figure 1-4A**.

6. Bolt ends of return cable to pedals, place cable into pulley assembly and bolt to tabs at control stick FWD pillow block. See parts drawing and **Figure 1-4**. The rudder return and rudder cables will be tensioned by using multi-hole tangs in a later step. Bend tangs to angle toward pulley. **NOTE:** Rudder cables may touch inside frame. This is acceptable as long as deflection angle is less than 3 degrees. Place tape on inside of frame tube to prevent damage to the paint and cable. See **Figure 1-4A**.

7. Trim cable keepers per **Figure 1-7**. Install pulley attach brackets, rudder pulleys and cable keepers to fuselage tabs; only finger-tighten at this time. Install small cotter pins through holes of cable keepers; cotter pins will retain rudder cable, but must not encumber pulley. Install rudder cable guides to fuselage tabs and rudder pulleys to boom extension tabs.

8. Rudder cables may be installed once tail wheel and vertical tail have been installed. Cables go under the bolt through the boom. Cables should be free of slack; tension is adjusted through multi-hole tangs on the return pulley bracket and multi-hole tangs at the rudder horns on rudder. Pedal tilt can be

adjusted by selecting holes on the 3-hole tang at the rudder pedals. **IMPORTANT:** Loc-tite rudder cable to pedal after adjusting. Do not over tighten as to restrict tangs rotation. **NOTE:** Use 3/16" thick washers to shim rudder cables in or out from the center line at attach point on rudder pedals.

CONTROL STICK SYSTEM ASSEMBLY and INSTALLATION

Refer to **Control Stick System** parts page.

9. Bolt control stick pulley to the tabs on the torque tube.

10. Slip forward pillow block onto forward end of torque tube; sand surface of tube and insure that pillow block turns freely. Install glides to control stick torque tube; drill #40 obliquely and secure with large cotter pins. If fwd glide is difficult to install, control stick torque tube may be out of round. Try using a mallet and block of wood to tap into a more round shape. Press 1" cap into front end of ⅝" Push-Pull Tube travel slot and rivet. See **Figure 1-10**. Place torque tube on fuselage and Cleco forward pillow block to tabs. Locate end of torque tube 1" forward of forward edge of pillow block. Center aft pillow block on square mounting tube and transfer #11 bolt hole on right side through square tube. Since diagonal crossing tube prevents drilling left hole from above, remove forward pillow block from fuselage, align it with previously drilled #11 hole on bottom of square tube and transfer remaining hole from below.

11. Cleco torque tube to fuselage once again. Locate aluminum stops against aft pillow block, drill #30 and rivet (⅛" stainless steel pop rivet) to torque tube. Check for ease of rotation on the torque tube. The intention is to have as friction free movement of the controls as possible. This will require perfect alignment of the (2) pillow blocks. To obtain lowest friction possible it may be required to bevel (by grinding) the bottom mount plates on the pillow blocks. Do not over tighten the pillow block mounting bolts, as that may cause binding also.

12. Aft end of ⅝" push-pull tube is identified by #11 hole 11/16" from end; install elevator push-pull tube connect brackets and associated hardware. Drill hole at forward end of push-pull tube to ¼", slide ⅝" push-pull tube into torque tube, slide pulley mount onto fwd end of the ⅝" push-pull tube and install eye bolt. **IMPORTANT NOTE:** Place pulley mount so pulleys will be on fwd side of eye bolt. Be sure to place a thick washer under head of eye bolt. See **Figure 1-12**.

13. Bolt control stick socket to torque tube. Control stick should be cut to 17" in length and extend out of socket 14". Install grip and end cap to control stick and install control stick to control stick socket. Transfer ¼" hole in socket to control stick and install eye bolt. Bolt link tube to eye bolts on control stick and push-pull tube with radius edge down.

14. Install the pulleys to the pulley mounts using the ¼" bolt. The pulleys must ride on top of the two ⅝" steel tubes welded to the side of the torque tube. Use ¼" washer as required to shim the pulleys into position.

15. Check the installation for proper function by moving the control stick fore and aft. It should glide back and forth smoothly with resistance. If there is a lot of friction, check for free space between the pulley and steel tube. Also check the glides, the ⅝" aluminum push pull tube slides in for clearance. There should be no binding, the tube should glide freely through the gray plastic glides. Check all nuts and bolts for tightness before flying. Bolt linkage tube to eye bolts.

16. Bolt control stick assembly into cage. Check motion, should move freely side to side, adjust bolt tightness to effect movement. Oil pillow blocks through small holes at top.

17. Install aileron pulleys and keepers to the frame tabs located just above the control stick pulley. Do not over tighten the bolts. Pulleys should spin, but keepers should not.

TAIL BOOM ASSEMBLY and INSTALLATION

18. Drill pilot hole at forward end of boom to ¼". Grind ends of tail boom spreader to fit within boom; spreader should fit snugly without deforming boom. *HINT: Use disk sander to radius ends of spreader.*

19. Install tail boom to fuselage. **IMPORTANT:** Inspect tail boom for anti-crush bushing, must be in place. Torque ¼" bolt thru boom to 10 ft/lbs.

20. Drill #11 along bottom centerline of tail boom at ⅜", 2 ⅜" and 22" from aft end of tail boom; deburr. *HINT: To locate bottom centerline, check that fuselage is in wings-level attitude by placing carpenter's level across fuselage at seat location, ninety degrees to aircraft's centerline. Once leveled, place a segment of small-diameter aluminum tubing within boom, allowing it to rock freely; mark point at end of boom which tube seeks as it comes to rest. Place angle iron or similar tool against boom to project resting point forward and mark centerline. See* ***Figure 1-20.***

21. Install nut plate to forward most hole on the inside of boom. *HINT: To locate rivets, insert 3/16" bolt through hole from inside and engage nut plate. Hold nut plate to boom and transfer-drill holes for rivet location. Deburr, locate nut plate inside boom and install rivets from outside.*

22. Slide tail boom extension into boom and bolt along bottom centerline. Check installation by sighting along boom; extension's post should be vertical. Once satisfied, note location of extension's ⅝" tubes at end of boom; as in previous step, project these points forward and locate remaining bolt holes along boom, ⅜" and 2 ⅜" from end. Drill #11 squarely through ⅝" tubes; deburr and install bolts.

ELEVATOR YOKE and PUSH-PULL TUBE INSTALLATION

Refer to **Control Stick System** and **Elevator Assembly** parts pages.

23. Slide the long push-pull tube into tail boom; install *underneath* tail boom spreader. Install forward end of the push-pull tube to connect brackets at aft end of ⅝" push-pull tube. Locate elevator yoke within tail boom extension so tine with red mark is *right* of centerline. Bolt yoke to aft end of the push-pull tube; install male rod ends to tines, engaging at least six turns. Remove Clecos from pillow blocks and bolt torque tube securely to fuselage.

AILERON CABLE INSTALLATION

Refer to **Control Stick System** parts pages.

24. Lug at midpoint of aileron cable seats in notch in control stick pulley's rim; secure with safety wire, per **Figure 1-24**. Cable extends upward to lower aileron pulleys, back to upper aileron pulleys on keel, thence to turnbuckles on control stick tee. Secure cable to turnbuckles with Clevis pins.

25. With control stick centered (neutral aileron position), adjust turnbuckles to center control stick tee and tension ends of cable equally. Install cotter pins to lower aileron pulley cable keepers. Cable should travel smoothly and easily, free of either slack or excessive tension. Safety wire turnbuckles and secure turnbuckle loc-nuts. **NOTE:** Test flights may show control stick not centered. Adjust push-pull tubes as required or re-center cable system. **GENERAL CAUTION:** All rod ends must screw into the push-pull tubes or elevator yoke by a minimum of six turns.

INSTRUMENT PANEL INSTALLATION

Refer to **Instrument Panel** and **Keel Installation** parts pages.

26. Assemble side panels to the inside on instrument panel using the #6 pan head screws. Line up the panel cover with bent end to the bottom of the panel. Drill and cleco to center of bottom with cover on outside of panel. Set assembly on fuselage centered fore and aft between tabs. Drill #30 and cleco to fuselage. Bend panel cover to conform around side panels, drill and cleco, then rivet as per parts drawing. Remove screws and install gauges to instrument panel. Install rubber grommets and pitot tube to instrument panel cover. Cut segments from ¼" fuel line and install between pitot tube and air speed indicator. Re-install panel with screws.

27. Install ignition switches to switch plate on keel; orient switches with "off" position forward. **NOTE:** Actual switch position will be on or off; ignition system grounds current to airframe to kill engine.

SEAT and RESTRAINT INSTALLATION

Refer to **Seat and Restraint Installation** parts pages.

28. Place 3/16" bolts through seat pan and install seat attach angles. The bolts are installed to the inside hole on the angle and seat pan. Rivet the outer holes with the long 3/16" stainless steel rivets. Install cushion and cover. Bolt flute tube to seat as shown in **Figure 1-28.** Place seat on fuselage, between any pair of adjustment bushings; install quick pins to secure. Bolt through bushing on frame and flute tubes to secure tilt. Bolt lap belts to tabs on gear leg sockets. Drill pre-located #11 hole in keel to ¼"; install shoulder belts and associated hardware.

CENTER COVER INSTALLATION

Refer to **Wing Frame and Covering** and **Keel Installation** parts pages. Center cover rib and associated attach brackets are most easily installed prior to installing wings to keel; center cover should be installed after installing wings.

29. Place center cover rib on keels centerline and locate forward brackets alongside, flush with forward edge of keel. Transfer-drill #30 and rivet brackets to keel. Adjust rib fore or aft as necessary for best fit to bracket's rivet holes; transfer-drill #30 and rivet rib to forward brackets. Locate aft attach brackets atop keel, alongside rib, and adjust fore or aft as necessary for best fit of rivet holes to rib; transfer-drill #30 and rivet rib to aft brackets. Trim rib, leaving 1 ⅝" extending beyond aft bracket. Locate aft bracket as shown. See **Figure 1-29.**

30. Once wings are attached to keel, locate center cover to airframe. Locate covers rivet holes along centerline of rib, adjusting fore or aft so openings in leading edge provide access to spar attach hardware. Once you are satisfied with the fit, transfer-drill #30 through underside of keel and wing and secure with pan head screws. Transfer-drill #30 along centerline of cover and rivet cover to rib. **Note: If installing Optional Fairing Nose Pod/Windshield Assembly, do not rivet the third hole from the front. Use for attaching jigging tube.**

THROTTLE LEVER INSTALLATION

Refer to **Throttle Lever Installation** parts pages.

31. Install throttle knob to lever; secure by drilling #30 and installing roll pin. Bolt throttle lever friction block to fuselage tab and slide lever through block and fuselage bushings; slip throttle lever stop rings onto lever *between* bushings. Locate throttle cable attach tab flush with end of lever and aligned with handle; transfer #11 through lever, deburr and install bolt. Slide lever back so attach tab is fast against right bushing, locate stops against respective bushings, drill #30 and rivet stops to lever. Tension on throttle lever is adjusted through screw in friction block.

If preferred, throttle lever may be installed to right side of fuselage; see **Figure 1-31**.

GEAR LEG INSTALLATION

Refer to **Main Gear Leg and Wheel Installation** parts pages. *HINT: Place the fuselage upright, on sturdy benches or saw horses.*

1. Insert gear leg into fuselage's gear leg socket; properly installed gear should insert 10-1/4" into gear leg socket. Check for equal side to side extension. **HINT:** A piece of masking tape on the gear leg will mark the insertion depth. Should gear leg resist insertion, remove powder coating from socket or leg as necessary with emery type sandpaper. Orient leg within socket so brake mounting tabs are parallel with tail boom.

2. With the gear legs properly set, use the pre-drilled hole in the fuselage socket as a drill guide. Drill #11 from each side to mark gear leg (**DO NOT** drill through). Remove gear leg & finish drilling from each side in a drill press. Drill out gear leg hole with "D" bit. *HINT: Use drill press for greater ease and accuracy.*

3. Drill out holes in socket to ¼". Deburr all holes and remove shavings. Apply grease to gear leg and bolt in socket.

BRAKE ASSEMBLY

Refer to **Brake System Assembly** parts pages.

4. Radius edges of the cam bolt, per **Figure 2-4**. Lightly lubricate the cam bolt's shank and slide it into the bushing in the assembly plate. Note the orientation of the assembly plate and cam bolt; install the cam arm, lock washer and brake nut. Note that there is a left and a right cam arm as well as a left and a right assembly plate; assemble accordingly. *Orient the cam arm on the cam bolt exactly as shown in the parts drawing.* Tighten the nut and check for freedom of movement of the cam arm and bolt. If the arm and bolt do not rotate freely, verify that the cam arm has been tightened against the shoulder of the cam bolt and not against the bushing in the assembly plate. If the arm tightens against the bushing, remove the arm and bolt and lightly file the length of the bushing, see **Figure 2-4**. ***NOTE:*** *Removing too much of the bushing's length will result in excessive play.*

5. Install the brake pads to the assembly plate. The lower end of the pad mount flange will sit against the flat surface of the cam. Install the springs to the holes along the inside of the brake pads. If after assembly a more positive pad return is desired, a second set of holes may be drilled outboard of the existing set for more spring tension.

WHEEL ASSEMBLY and INSTALLATION

Refer to **Main Gear Leg and Wheel Installation** parts pages.

6. Install the rubber O-rings to the machined grooves on each side of the seal plate. *Do not use silicone on the O-rings to form a seal.* Insert the valve stem into the outer rim; a ¼" Allen wrench works well to push the valve stem through. Since the valve stem is permanent, a small amount of silicone sealer may be used around the sealing neck to preclude leakage.

7. Using the longer socket head cap screws, bolt the brake drum to the wheel hub through the hub's three threaded holes. Note the orientation of the hub in **Figure 2-7**; the brake drum mounts to the side of the hub with the longer, tapered bearing housing. Install the hub/brake drum assembly to the inside wheel rim; the heads of the shorter socket head cap screws fit into holes in the hub. Install the washers and nuts on the longer cap screws and tighten the hub/brake drum assembly to the wheel assembly, per **Figure 2-7**. Before inflating, check that the wheel is bolted securely. Stand the tire upright, press downward to spread the bead and create an air lock and inflate to 25 psi. ***NOTE:*** *Optional Tundra Tires are inflated to 9 psi (That's right, ONLY 9 psi!)*

8. Hone axle down and slide the brake assembly onto the gear leg axle, followed by two shims. Slide the wheel assembly onto the axle so that the brake pads extend into the drum. Install another shim and thread the nut onto the axle until approximately three threads are left prior to bottoming. Note that there is a left and a right hand assembly; install accordingly.

9. Rotate and position the brake assembly so that the cam arm is pointing aft and is parallel to the brake mount tabs on gear leg. Temporarily hold the assembly plate tight against the two tabs on the gear leg and bottom the wheel assembly against the shims and axle socket. In this position, the brake pads should be flush with or have no more than 1/16" extending beyond the drum edge. *Add or delete shims as necessary until this is achieved.* It is not unusual for the drum to be slightly out of true; a section of the drum will be flush with the brake pad while another section extends beyond it. If this is the case, determine the widest section and grind or file it until the drum is true. See **Figure 2-9**.

10. Pull the cam arm up until the brake pads are spread tightly against the inside of the drum. Using a piece of safety wire or similar material, tie the cam arm to the cable stop to hold the brake pads firmly inside the drum. Transfer-drill #11 through the pre-drilled holes in the gear leg tabs, into the assembly plate. Remove the safety wire and release the pads. Remove the wheel assembly and bolt the assembly plate to the gear leg tabs. Replace the wheel assembly and check for pad/drum placement as previously explained. Add or delete shims accordingly. If more than three shims are needed, it is acceptable to fabricate a spacer bushing to the correct length; use ¾" x .058" aluminum raw stock to fabricate these bushings. The wheel/brake drum assembly should spin freely around the brake pads.

BRAKE LEVER and CABLE INSTALLATION

Refer to **Brake System Assembly** parts pages.

11. The brake lever top hole will need to be drilled out to ⅜". Drill through the brake lever with a 5/16" bit starting from the side with the hole. Drill completely through the handle. Finish drill the handle to ⅜". This will allow insertion of the bushing and wire attach rod. See **Figure 2-9.** Bolt the brake lever into place in the brake lever bracket and install the assembly to the control stick. One cable ferrule/nut assembly comes with the brake lever bracket; the other one comes separately. Brake lever assembly location can be adjusted to suit the pilot.

12. Fabricate two ¼" long bushings from the ⅜" x .058 tubing in the raw stock kit. Install the bushings to the top hole of the brake lever to center the wires and allow the attach rod to pivot freely. Assemble with park brake tab pivoting on wire attach rod and center in lever. Drill two #40 holes in the wire attach rod as shown in **Figure 2-9**; install the attach rod to the bushings in the top hole of the brake lever.

13. Insert brake wire through hand brake mechanism and secure with wire stop/screws. **NOTE: Bend wire over in half loop to prevent slippage, the wire nuts alone will not retain the wire.** With cable housing in place around brake cable, route cable from control stick, down gear leg and through ferrule end cap on brake assembly plate. Avoid sharp bends; the straightest and shortest route offers the best braking performance. With the housing in place, safety wire the housing into the ferrules. Loop the wire around the housing and the ferrule nut and pull in the center to hold the housing securely in the ferrule. Attach the brake cable to the cam arm with the wire swivel/screw stop. Test system for proper operation.

TAILWHEEL INSTALLATION

Refer to **Tailwheel Assembly** parts pages.

14. Install tailwheel to fork. Add shims to fork's horizontal axle as needed to position tailwheel directly underneath fork's vertical axle; install cotter pin.

15. Lightly grease vertical axle; slide swivel stub onto vertical axle. Place steer horn onto vertical axle; trim vertical axle as needed to be flush with top of horn. ***NOTE:*** *Lightly sand the inside bore of the Swivel Stub as needed to allow the vertical axle to swivel freely.* Align steer horn parallel with horizontal axle and drill #11 through horn and vertical axle; secure with 3/16" bolt. Install end cap to vertical axle; remove cap's tabs as required to accommodate bolt through horn and vertical axle. Install swivel stub to tail spring; grind tail spring as necessary to fit. Radius the angle on the Tailboom Extension, where the Tail Spring contacts, as shown in **Figure 2-10**. Install tail spring to tailboom extension.

16. During final assembly, join rudder cables to rudder horns and tailwheel horn with associated hardware. Disassemble return springs to install hummer tang. Tension tailwheel linkage appropriately; add or delete links as needed. Crimp "S" hooks as necessary to preclude chain slipping off during operation. Check alignment and test steering action.

17. Keep tailwheel fork adequately lubricated by applying grease gun to fitting on aft side of swivel stub and working fork side-to-side. After initial flights, check tailwheel hardware for security. Include tailwheel components in routine pre-flight inspection.

MUFFLER, ENGINE and PROPELLER INSTALLATION

Refer to **Engine**, **Engine Mount** and **Muffler Mount** parts pages.

1. Assemble the barry mounts, mount plates and associated hardware to the mount angles; fuel pump installs to ST-16 tangs on right mount angle. The engine mount plate, that attaches to the engine, has the center holes located offset from the centerline. Bolt these to the engine, as per **Figure 3-1**. Tighten all the bolts and inspect the mount.

2. **For the 447 ONLY:**
To mount the muffler:
Drill a 5/16" hole in the location shown in **Figure 3-2**. Locate this hole by finding the center line between bolts B and C. Project 90° off this center line, the distance over from the line of bolt D. Remove cooling shroud and remove nut from stud under hole A and swap with stand-off at location D. Re-torque all head bolts to value called out in Rotax manual.

3. The muffler mount and muffler are easier to install if done on the bench, prior to lifting the engine into place. The exhaust manifold will almost always leak at the point it attaches to the engine. It seems the seals alone are not enough, so we recommend applying a good gasket seal such as Permatex Ultra Copper high temp sealer. Apply very thin layer to each side of the gaskets before installing. The muffler's ball joints are held together with small springs that attach to hooks welded to the muffler. Try to install these with even tension. They should not be stretched more than fifty percent of their length. The tension can be adjusted by bending the hooks up or down. After the springs are installed, run a loop of safety wire through the spring; this will save the spring from going through the prop should the spring ever break. Also, to prevent spring breakage from vibration, we recommend applying a bead of silicon caulking along the length of the spring.

4. Place three 7/16" thick washers over each mount hole where the engine studs will insert; use super glue to hold the washers in place. Place the engine onto the mount and secure with washers and nuts.

5. Install prop spacer, propeller, prop plate and associated hardware; refer to propeller manufacturer's instructions for recommended torque value. **NOTE: Drill prop bolt heads with a #40 bit, for safety wire holes.**

CARBURETOR and THROTTLE CABLE INSTALLATION

Refer to **Engine** and **Throttle Lever Installation** parts pages.

6. Slip the black rubber intake manifold over the engine intake. The smaller opening is the carb side of the rubber manifold. Slip on the carburetor and install the clamps. Position the carburetor vertical to the cylinders. See the engine manufacturer's manual for details.

7. To hook up the throttle cable you need to unscrew the carb's top plate. Take care not to let the spring inside jettison the plate onto the floor. Remove the spring and cap and place aside. Look closely at the slider. See the white plastic fitting on the bottom? Underneath this should be the cer-clip that holds the fuel metering pin. Be sure when re-assembling the cer-clip is under the white plastic. Close examination will reveal where the cable terminates, but before hooking up the throttle cable first slip the little rubber boot over the end. See **Figure 3-7**. During re-assembly note where the throttle exists the cap is not on center. Position the cap so the cable is directly over its slider position.

8. Pull on the free end of the cable to seat the housing into the fitting on top of the carb plate. Then route the cable to the throttle lever. Double-check to see if everything is curving gently, no sharp turns. Check to see if the housing is into the carb's top plate fitting. Mark the housing at a point where it will enter the throttle cable housing stop, just aft of the throttle. Then pull the housing away from the carburetor so the cable's free end will be inside, past your cut-off mark. Cut off the excess housing and push out the cable. Check closely the housing where you've cut it; a clean cut is a must! The metal coil inside the housing can rub the cable and cause it to break. An unclean cut of throttle cable housing can also result in sticking of the lever due to the added friction. Install the housing to the stop and secure with safety wire. Install the forward end of the cable to the throttle lever horn, securing it with the wire swivel/screw stop.

9. If installing dual carburetors, install throttle splitter for simultaneous control to both carburetors.

VERTICAL STABILIZER FRAME ASSEMBLY

Refer to **Vertical Stabilizer Assembly** parts pages.

1. Fabricate four 5" doublers from 7/8" x .058 raw stock. Mark a line completely around each doubler at its mid-point. DO NOT use pencil; the graphite in the lead may corrode the aluminum. Insert one of the marked doublers into the vertical stabilizer leading edge and one into the vertical stabilizer spar. The remaining two doublers are for the horizontal stabilizers. Slide each doubler until the marked line shows in the cable attach point hole. Drill #40 and rivet 1 1/4" below the cable attach point hole. Using a #11 bit and the holes as a guide, drill into the doubler from each side at the cable attach point.

2. Install end caps to top of spar and bottom of leading edge; drill #40 1/8" from ends of tubes and rivet. Rivet 3/16" thick washers to holes along aft side of leading edge, forward side of spar and top of spreader tube; these serve to retain internal braces. Install insert nut into upper end of leading edge. *HINT: Screw insert nut onto ¼" bolt; use bolt to hold insert nut in place while securing to leading edge with 3/16" bolt. Once insert nut is installed, remove ¼" bolt.* Install compression tube fitting to leading edge. Drill out hole near top of spar and in stainless steel hinge to ¼". Bolt hinge, spar and leading edge together.

3. Drill #11 and Cleco forward gussets to bolt hole near bottom of leading edge; drill #11 and Cleco aft gussets to bolt hole near bottom of spar. Locate spreader tube to gussets; forward hole in spreader tube aligns with aft hole in forward gussets and aft hole in spreader tube aligns with forward hole in aft gussets. *Ends of spreader tube must be trimmed to proper angles.* Once trimmed, Cleco spreader tube in place. Drill #30 and rivet forward and aft gussets to leading edge and spar, respectively, and to spreader tube.

4. Fabricate braces from ½" x .035" aluminum tubing. Upper brace installs to washer on spar and upper washer on leading edge; vertical brace installs to washer on spreader tube and leading edge/upper brace joint; lower brace installs to lower washer on leading edge and spreader tube/vertical brace joint. Cut braces to approximate lengths, test and trim as required. Ends which install to joints must be wedge-shaped; ends which install to washers must be angled and reamed to fit onto washers. *HINT: Use deburring tool to reduce wall thickness.* Braces should fit snugly, snapping into place, but not bowing stabilizer. See **Figure 4-3**.

5. Cut out and trim ribs. *HINT: Leave small amount of excess when cutting ribs from plastic stock; apply ribs to belt sander, open side down, to remove excess evenly along chord. Rotary grinding bit works well to notch aft end. Use deburring tool or sanding block to smooth.* Edges of finished ribs should be free of burrs which might snag fabric. Trim, radius and sand aft ends of ribs to blend with spar. Slot lower rib accommodate braces. Lower rib locates approximately 14 ¾" from spreader tube and upper rib approximately 28" from spreader tube; drill and rivet. Install braces. See **Figure 4-3**.

HORIZONTAL STABILIZER FRAME ASSEMBLY

Refer to **Horizontal Stabilizer Assembly** parts pages.

6. Left and right horizontal stabilizer assembly is similar to above. Install doublers, end caps, 3/16" thick washers, insert nuts and compression tube fittings. Drill as required and bolt hinges, leading edge, spar and spreader tube together. Fabricate braces. Cut out, trim and install ribs. *Airfoil is inverted; ribs must be installed with greatest camber underneath.* Install braces.

RUDDER FRAME ASSEMBLY

Refer to **Rudder Assembly** parts pages. *Spar and trailing edge are unbolted prior to skinning; braces are installed after skinning.*

7. Drill hinge bolt holes to ¼". Install nut plate. *HINT: Insert ¼" bolt through spar and engage plate slightly; use bolt to hold plate while drilling rivet holes.* Install end cap, 3/16" thick washers, insert nut and compression tube fitting.

8. Temporarily bolt hinges, trailing edge and spar together.

9. Locate horns' forward bolt hole ⅜" from bottom of spar; drill #11. Install horns to trailing edge and spar.

10. Fabricate braces. One end of each brace must be notched per **Figure 4-9**. Notches allow braces to be installed to spar's washers after skinning.

ELEVATOR FRAME ASSEMBLY

Refer to **Elevator Assembly** parts pages.

11. Left and right elevator assembly is similar to above. Install end caps, washers, insert nuts, compression tube fittings and nut plates. Drill as required and bolt hinges, spar, horn and trailing edge together. Fabricate brace, notching one end.

SKINNING STABILIZERS

Refer to **Horizontal Stabilizer Assembly** and **Vertical Stabilizer Assembly** parts pages. *Skin is easily soiled. Clean stabilizer frames, removing labels, pen and pencil marks. Thoroughly clean hands, work surfaces and tools.*

12. Slip skin onto stabilizer frame.

13. Cut two lacing wires to appropriate length. Bend tips of wires to prevent snagging and insert wires into pocket along sides of stabilizer. Once fully inserted, trim wires or bend back ends. With wires lying along bottom, pierce pocket at three-inch intervals, immediately *above* wire. Offset holes on one side of stabilizer 1 ½" from holes on other side. *HINT: Use soldering iron to pierce skin cleanly.* See **Figure 4-12**.

14. Install lacing rope. *HINT: Melt tip of rope to create rigid tip for easier threading.* Begin at either end of pocket. Lace rope through first hole, around spreader tube and through hole on *other* side of stabilizer; bring rope around spreader tube again, to next hole on *initial* side of stabilizer. Continue thusly until stabilizer is completely laced. Wires distribute load along bottom of pocket, allowing skin to be drawn taut. See **Figure 4-12**.

15. Once laced through all holes, cinch rope to remove slack, drawing skin tightly across stabilizer frame. When skin is drum-tight, secure with square knots at both ends of rope; trim excess rope. Wrap flap around spreader tube and mate Velcro strips.

SKINNING RUDDER and ELEVATORS

Refer to **Rudder Assembly** and **Elevator Assembly** parts pages. *Skin fits very tightly and is most easily installed with assistance.*

16. Separate trailing edge and spar; remove braces.

17. Slip trailing edge into position within skin.

18. Insert spar into skin and engage with appropriate lever. *HINT: Heavy steel tube or hardwood dowel 30" to 36" long and ¾" to ⅞" in diameter works well as lever.* Tap with mallet while applying leverage to move spar into position. See **Figure 4-17**. Rotate spar as required to avoid driving washers and nut plate against trailing edge during installation.

19. With spar in position, install remaining hardware.

20. Fabricate tool for installing braces. *HINT: Tool is available from RANS; contact Parts Department.* Place brace on tool *with notched end facing away*. Fit brace onto trailing edge's washer first, then push onto spar's washer. Tap end of tool with mallet to ensure that brace snaps into position. Remove tool and tap spar and trailing edge with mallet to ensure braces are seated. See **Figure 4-19**.

Tail surfaces should be true and free of bowing; skin should be smooth and taut.

STABILIZER INSTALLATION

Refer to **Vertical Stabilizer Assembly** and **Horizontal Stabilizer Assembly** parts pages. Tail boom must be assembled and installed to fuselage prior to tail installation.

21. Install boom straps to vertical stabilizer forward gussets. Fabricate anti-crush bushing from ¼" x .020 aluminum tubing to install between forward gussets. Install horizontal stabilizer attach brackets to middle incidence adjustment hole of forward gussets; bolt which retains brackets passes through anti-crush bushing. Install remaining horizontal stabilizer attach brackets to aft vertical stabilizer gussets.

22. Plug the vertical stabilizer onto the tail boom extension. The stabilizer should parallel to boom in both top and side view. Bottom spreader tube should be parallel to boom. Drill and bolt vertical stabilizer to extension, and rivet fwd straps to boom. Double check for proper alignment before drilling.

23. Install horizontal stabilizers to attach brackets on vertical stabilizer. Horizontal stabilizers' incidence angle is adjusted by repositioning forward attach bracket among bolt holes in vertical stabilizer's forward gusset.

24. Install tail cables to stabilizers. Lower forward cables bolt to nut plate on bottom centerline of tail boom; lower aft cables bolt to tabs on tail boom extension. Bend multi-hole tangs as necessary to install properly at respective locations. Tension is adjusted by relocating bolts through tangs; cables should produce deep tone when strummed.

RUDDER and ELEVATOR INSTALLATION

Refer to **Rudder Assembly**, **Elevator Assembly** and **Tailwheel Assembly** parts pages.

25. Install rudder and elevators to respective stabilizers; control surfaces must pivot smoothly and easily on hinges. During final assembly, bolt elevator horns to male rod ends on yoke; adjust rod ends as required to ensure elevators deflect at same angle. Bolt rudder cables, rudder horns and tailwheel return springs together; locate rudder cable tangs atop horns, return springs below horns. Bend forward end of return springs as necessary to install against horns.

26. Provided in your kit is the Stinger tail decal to be applied to the rudders upper aft corner, once clear coat has been applied. **Note:** Decals are in LH/RH pairs, when viewing them on the sheet, left is left and right is right.

WING FRAME ASSEMBLY

Refer to **Wing Frame and Covering** and **Aileron Push-Pull Tube System** parts pages. *HINT: For ease of assembly, place spars on saw horses. Ensure that spars will not roll off; clamps secured to ends of horses make convenient stops.*

1. Locate nut plates over flap and aileron hinge bolt holes on the forward side of the trailing edge spar. *HINT: Insert a 3/16" bolt through holes and engage plates; use the bolt to hold plates while drilling.* Drill #40, deburr and rivet plates to the spar.

2. Install compression tubes, drag tubes, associated parts and hardware to the spars. Slip the doubler onto second compression tube from the tip prior to installing. Install the bell crank gusset flange-down and align the hole in the doubler to the bolt hole in the compression tube. Install jury strut tangs facing wing root with the long legs down, see parts drawing. From below, drill out the hole in the doubler, compression tube and gusset to ¼"; pin with a bolt. Locate #30 hole on gusset 1-13/16" forward of the bolt hole; drill and rivet the gusset to the doubler/compression tube. Install rivets to the outboard compression tube brackets. See **Figure 5-2**.

3. Install the wing tip bow. The bow must be compressed fore-aft so its ends slide into the spars, fitting snugly against the walls. Align the hole in each end of the bow with the outboard hole in each spar and secure with a rivet. Ensure the bow's centerline is aligned with the spars' centerlines, transfer the adjacent #11 hole in each spar to the bow and secure with a rivet. *HINT: mark the bow's centerline so it can be sighted through holes in the spars.*

4. Install the tip rib to the spars. Ends of the rib must be trimmed to fit properly against the spars. Ensure that the rib is installed properly by comparing it to the root rib: place the root rib against the outboard compression tube and carefully trim the tip rib to match its profile. See **Figure 5-4**. Drill #30 and rivet the tip rib to the spars. Locate rib supports between the tip rib and compression tube, ensuring that rivet holes fall along the centerlines of both rib and tube; drill #30 and rivet. Remove the root rib when finished.

FUEL TANK ASSEMBLY
SINGLE and DUAL

Refer to **Fuel Tank Assembly and Installation, Fuel System, Fuel Tank Mount-Optional Dual Wing Tank, & Fuel System-Optional Dual Wing Tank** under Fuel System in parts manual.

5. Drill two ½"-diameter holes in the fuel tank(s), per **Figure 5-5**; center the holes ⅝" from bottom. Deburr and install o-rings and withdrawal fittings. *HINT: Use wire from a coat hanger. Place the wire through a fitting hole and the filler neck, place the fitting and o-ring onto the wire and bend the wire's end to retain the fitting and o-ring. Pull the fitting through the filler neck, into the tank, pull the threaded end of fitting through the hole and grasp; remove the wire.* Install washers, apply Loc-tite and install the nut. Use a ¼" hex wrench to hold the withdrawal fitting while tightening the nut. Apply Loc-tite to the ninety-degree fitting and screw it onto the withdrawal fitting until snug; *do not over-tighten.* Take care to remove *all* debris from the tank interior; failure to do so may inhibit fuel flow.

6. To check the completed tank(s) for leaks, install a segment of fuel line between the fittings, per **Figure 5-5**. Fill the tank or tanks with water and inspect carefully for leaks. Drain tank(s) and let dry.

7. Remove the rubber gasket and plastic baffle from the fuel cap. *HINT: Gently pry the gasket and baffle with a screwdriver.* Drill a ¼" hole in the center of the fuel cap; install the conduit adjuster, Loc-tite and nut. With side cutters or a file, remove the attach nipples from the plastic baffle; drill a ¼" hole in the center of the baffle and install it to the fuel cap, over the conduit adjuster stem. Drill a ¼" hole in the center of the rubber gasket and install it to the cap; note proper orientation of the gasket. Drill the large wood washer #30. See **Figure 5-7**.

8. Install the retainer sleeve to the bead chain; install the chain to the wood washer. Install the washer to the fuel cap and the ¼" shear nut to the conduit adjuster stem; tighten. Install the end coupling to the chain. Drill the middle of the plastic retainer #30, locate the small brass washer to one side, the end coupling to the other side and rivet.

9. Modify the vent tube per **Figure 5-7** and install it to the conduit adjuster. Install the fuel cap to the tank and tighten. When preparing for flight, rotate the vent tube to face forward and tighten the conduit adjuster to secure.

FUEL TANK INSTALLATION SINGLE and DUAL

Refer to **Fuel Tank Assembly and Installation, Fuel System, Fuel Tank Mount-Optional Dual Wing Tank, & Fuel System-Optional Dual Wing Tank** under Fuel System in parts manual.

10. To locate the bracket for the forward end of the outer tank support, mark the centerline along the aft side of the leading edge spar, from the bracket of the inboard compression tube to 17" outboard. Set the tank on the wing with its forward side against the leading edge spar and its inboard side against the inboard compression tube. Locate the bracket on the spar centerline, ⅛" from the outboard side of fuel tank; drill #11 and rivet it to the spar. Locate the outer tank support between the spar and drag brace; trim the aft end of the support diagonally to accommodate the drag brace. Drill #11 and rivet the support to the bracket at the spar. Drill two #30 holes along the centerline of the U-bracket and rivet the U-bracket to the brace. Drill the aft end of the support #11 and bolt it to the bracket. See **Figure 5-10**. Repeat as a mirror assembly for second tank!

11. Bolt the wing tank mount brackets to the fuel tank. Place the tank onto the wing and locate rivet holes of the brackets along the centerline of the compression tube and tank support. Drill #30 and rivet the brackets to the compression tube and tank support. Once the tank installation is complete, remove the bolts from the tank, apply Loc-tite and re-install them. Install several feet of fuel line to the withdrawal fittings. Repeat for second tank!

ROOT RIB INSTALLATION

Refer to **Root Rib Tensioning System** parts pages.

12. Place the root rib onto the spars. Locate the L-brackets to the spars and align them with the root rib, per **Figure 5-12**. Drill #11 and bolt the L-brackets to the spars. Place ¼" bolts through the brackets and rib; finger-tighten the nuts. Drilling #28, transfer the pilot holes along the top and bottom of the rib to the underlying square tube. Remove root rib to shake out any drill shavings inside the square tubes, then install.

FLAP and AILERON ASSEMBLY and SKINNING

Refer to **Fixed Flap Assembly**, **Aileron Assembly** and **Aileron and Flap Tension Rib** parts pages.

13. Install the end cap to the spar; drill #40 and rivet. Drill out bolt holes in the spar, tension rib and end tube (outboard end of flap, inboard end of aileron) to #11; locate nut plates to bolt holes on the tension rib and aft side of the spar; drill #40 and rivet. See **Figure 5-13.**

14. Cut a notch in the leading edge of the skin to open the pocket; *do not cut into stitching. HINT: Use a clean fine-tip hot knife; this cuts fabric neatly, melting threads to prevent fraying.* Insert the aluminum strip into the pocket and work it along until the strip's ends protrude equally from the pocket. *HINT: radius the corners of the strip to avoid snagging fabric during insertion.* See **Figure 5-14.**

15. Pull the skin onto the frame. The skin fits very snugly; avoid twisting it while tugging. Be certain the skin is installed with Velcro strip along the forward centerline of the spar. *HINT: Grasp the skin's pocket with a duckbill vise grip; alternate sides, tugging the skin along one side of the frame, then the other.* For extra tight covers, try dusting the frame with talcum powder. Once the skin is pulled sufficiently far, insert bolts through the end tube and install the tension rib in the extended position. Locate the pocket to the tension rib, drill #30 and install five rivets per side. Retract the tension rib by turning the screws until the rib meets the end tube; the skin should be taut. Wrap the aluminum strip's ends around the spar, drill two #40 holes in the strip, along the forward centerline; trim away excess, if necessary. Rivet the strip to the spar. See **Figure 5-15.**

16. Remove Velcro at hinge locations; penetrate the skin at hinge bolt holes and the horn attach angle bolt holes. *HINT: Use a soldering iron or fine-tip hot knife.* Install the horn attach angle ninety degrees to the spar. Install the aileron clip and associated bushing. See **Figure 5-16.**

17. Bolt hinges to the spar.

Once completed, the flaps and ailerons may be ironed to remove remaining wrinkles. *HINT: Use a household clothing iron set to a medium temperature. Do not exceed 350 degrees and keep iron moving briskly over the skin. When properly ironed, Dacron fabric relaxes, but draws up as it cools, becoming drum-tight.*

BELL CRANK ASSEMBLY and INSTALLATION

Refer to **Wing Frame and Covering** and **Aileron Push-Pull Tube System** parts pages. *Assemble both left and right bell cranks; this requires a bevel on different sides of the bell cranks.*

18. Drill out the ¾" hole in the bell crank to ⅞". Bevel the hole sufficiently to accommodate the bearing flange; the flange must be flush with the bell crank for proper riveting. Place the flange in the bevel and transfer every other hole to the bell crank; deburr. Install the bearings and remaining flange; rivet. See **Figure 5-18.**

19. Bolt the bell crank over the bell crank gusset; the long arm of the bell crank must be outboard. Install rod ends to the bell crank. See **Figure 5-18.**

AILERON PUSH-PULL TUBE ASSEMBLY and INSTALLATION

Refer to **Wing Frame and Covering** and **Aileron Push-Pull Tube System** parts pages.

20. Locate the aileron push-pull tube guide to the second compression tube from the root. Drill #30 and rivet through the guide's lower set of holes on the right wing; through the upper set of holes on the left wing. See **Figure 5-20.**

21. Locate the push-pull tube end fittings to the aileron push-pull tubes; transfer #30 holes to the fittings and rivet. Slide the longer push-pull tube through the guide and thread it onto the rod end closest to the bell crank bearing. Engage half of the rod end's threads, thereby allowing adequate margins for rigging. The shorter push-pull tube installs between the remaining rod end and the aileron after the wing is skinned.

FLAP and AILERON INSTALLATION

Refer to **Fixed Flap Assembly**, **Aileron Assembly** and **Wing Frame and Covering** parts pages.

22. Bolt the flap and aileron to the wing's trailing edge spar. To provide clearance between control surfaces, aileron hinge tabs bolt against the outboard sides of wing hinge tabs; flap hinge tabs bolt against the inboard sides of wing hinge tabs. Install cotter pins through castle nuts and bolts; ailerons must pivot smoothly and easily on hinges.

23. Trim the flap horns per **Figure 5-23.** *HINT: Use a band saw to trim; smooth trimmed surfaces with sandpaper.* Install horns to horn attach angles.

AILERON and FLAP RIGGING

Refer to **Aileron Push-Pull Tube System** parts pages. Control stick system and wings must be installed to fuselage prior to rigging.

24. Install male rod ends to control stick tee. Secure control stick firmly in neutral aileron position. Check that control stick tee atop keel also is in neutral position. Tee's forward bolt hole should lie on keel centerline; adjust turnbuckles joining aileron cable to tee as required. Screw push-pull tubes emerging from wing roots onto male rod ends; engage at least ten threads.

25. Install male rod end to aileron control horn. Slide bellcrank/aileron push-pull tube into push-pull tube exit in wing skin; screw push-pull tube onto bellcrank's male rod end, engaging half of rod end's threads. Screw aft end of push-pull tube onto male rod end on aileron control horn, engaging at least ten threads.

26. Use a straight edge to assess the rigging; a scrap of board about five feet long will do. Hold the board against the bottom of the wing's leading and trailing edge spars; if the aileron is properly rigged, the board will graze the bottom of the aileron's trailing edge. Adjust the rod end to raise or lower the aileron, as required, and recheck. See **Figure 7-9.**

27. Slide the forward end of the flap mount into the flap mount exit and install it to the adjacent compression tube; bolt the trailing end to the flap horn. Check both flaps for symmetry. The flaps may be rigged at the same angle as the ailerons; this is the cleanest rigging position and will provide the highest level flight speed. Setting the flaps lower will provide greater lift, resulting is shorter takeoff rolls, higher climb rates and lower level flight speeds.

WING SKINNING

Refer to **Wing Frame and Covering** and **Rib Tensioning System** parts pages. *The skin is easily soiled. Clean stabilizer frames, removing labels, pen and pencil marks. Thoroughly clean hands, work surfaces and tools. The skin fits very tightly and is most easily installed with assistance.*

28. Install rib tips to the forward ends of the top ribs and both ends of the bottom ribs. Round off the upper aft end of the contour fittings and install to the aft ends of the top ribs. See **Figure 5-28.** Dimple the ribs near their ends to retain the tips and fittings.

29. Apply weatherproofing tape or similar material to the bolt heads and wing tip bow/spar junctures to prevent chaffing and facilitate skin installation. See **Figure 5-29.** Inspect the wing frame before skinning, checking that all hardware is properly installed and all labels, pen and pencil marks have been

removed. Check installation of jury strut attach tabs. Tabs should be turned so the tab points toward the root and snugged down ninety degrees to spar.

30. With frame upside down on sawhorses, pull the skin onto the frame; be certain that inspection zippers are on the bottom of the wing and the Velcro strip is along the aft centerline of the trailing edge spar. *HINT: Place the skin atop the wing frame, bottom side up, with its root at the wing tip bow. Slip the skin onto the bow and pull it back along the wing frame.* If the skin resists, check along the spars and lift the skin over impeding hardware and components. Continue checking that the Velcro strip remains on the aft centerline of the spar. The Velcro strip seals the gap between the wing and control surfaces; see **Figure 5-29.**

31. Work the skin along the top and bottom of the wing until it overlies the tension rib; the tension rib should be in the fully extended position. Locate the reinforced edge of the skin to the inboard edge of the tension rib; secure the skin by driving screws through the reinforcement and into the pre-drilled holes along the top of the tension rib. Turn the wing over and secure the skin along the bottom of the tension rib. See **Figure 5-31**. *HINT: Use a power screwdriver or variable-speed power drill with screwdriver bit; be certain the reinforced edge of the skin is flush with the inboard edge of the tension rib.*

32. Once screws are installed, retract the tension rib by ratcheting its bolts. The tension rib must be brought within ½" of the L-brackets; see **Figure 5-31**.

33. Slit the bottom of the wing to install ribs. Locate each slit along the centerline of the rib pocket, 1" forward of the Velcro strip, per **Figure 5-33**. *HINT: Use a fine-tip hot knife.*

34. Insert top ribs through the slits and into the pockets inside the skin; ribs must be driven far enough to allow their contour fittings to fit over the forward side of the trailing edge spar. *HINT: Once pushed as far as possible by hand, use a mallet and length of scrap wood to tap the top ribs into position.* Insert bottom ribs to the remaining pockets; before inserting, remove the markings which indicate the forward ends of the ribs. *HINT: Use acetone to remove markings. To facilitate insertion, fabricate an insertion tool from scrap wood; engage the rib tip within the notch and push the rib into position. See **Figure 5-34.*** When properly installed, the aft tips of bottom ribs lie against the bottom of the trailing edge spar, occupying the slit in the wing skin. Once ribs are installed, the wing skin should be taut, with no more than minor wrinkles remaining. Minor wrinkles may work out in time, usually after a few days of varied temperatures.

35. Slit the skin where the strut attach plates, jury strut tangs and fuel filler neck protrude. The skin will tend to pop into place, relieving tension; trim the skin around these components as needed. Open inspection zippers and slit the underlying skin. *If using a hot knife, take care not to touch zippers with the blade.* Slot the skin for aileron push-pull tube and fixed flap mount exits; see **Figure 5-35**.

Once completed, the wings may be ironed to further remove wrinkles. *HINT: Use a household clothing iron set to medium temperature. Do not exceed 350 degrees and keep the iron moving briskly over the skin.* When properly ironed, Dacron fabric initially relaxes, then draws up as it cools, becoming drum-tight. *Excessive heating will discolor and loosen the skin.*

FUEL SYSTEM INSTALLATION
SINGLE and DUAL

Refer to **Fuel Tank Assembly and Installation, Fuel System, Fuel Tank Mount-Optional Dual Wing Tank, & Fuel System-Optional Dual Wing Tank** under Fuel System in parts manual. The fuel system is installed most easily after installation of the engine.

1. Install withdrawal fittings, sump drain valve and fuel shut-off valve to mixer block.

2. Run the fuel lines from the wing-mounted fuel tank, along the diagonal tube on the right side of the fuselage, to the mixer block, which may be located near the bottom of the diagonal, immediately aft of the seat. This arrangement places the fuel shut-off valve, as well as the sump drain valve at its base, within reach of the pilot and provides the pressure necessary for proper fuel flow. Install the mixer block to the fuselage with the associated hardware and fuel lines, for dual tanks refer to **Figure 6-2A**. Install a segment of fuel line from the sump drain valve to the bottom of the fuselage; secure the end of this drain line to the fuselage with a zip tie. See **Figure 6-2**.

3. Install fuel pump to tangs on engine's right mount angle. Route fuel line from shut-off valve, back up fuselage diagonal, to fuel pump; cut fuel line into segments as required to install fuel filter and primer line tee fitting. Secure fuel lines and associated components to fuselage with coil wrap and zip ties.

4. Install primer pump to primer bracket on left side of keel; install primer line between tee fitting and primer pump and between primer pump and carburetor. Install lines between fuel pump and engine, per **Figure 6-4**; refer to engine manufacturer's instructions.

5. If installing fuel system for optional dual carburetors, install additional tee and segment of primer line between primer pump and carburetors, per **Figure 6-5**.

Check all lines and components of fuel system for security and proper operation prior to fueling, engine start and flight.

LIFT STRUT INSTALLATION

Refer to **Airfoil Lift Struts** parts pages. Before installing struts, the wings must be assembled, keel and tail boom must be installed and the fuselage should be resting on the gear.

1. Each strut is inspected twice before shipment. However, the builder is encouraged to inspect the struts himself for any anomalies; the surface should look and feel smooth. Deeply grooved struts should be returned to the factory for replacement. The struts are resilient and resist denting; however, damage can occur during shipping. If dents are present, they usually are large enough to require rejection of the strut.

Minor nicks and scratches should be sanded out with 250, 350 and finally 400 grit wet or dry sandpaper. Sanding out such defects is an effective way of restoring the strut to a safe status. When sanded, the anodized finish is removed; painting the struts then should be considered. Any nicks or scratches that require more than light sanding are cause for rejection.

Anodized struts are resistant to corrosion. In normal service, these struts should require nothing beyond routine pre-flight and condition inspections.

Because of normal variations in the extruded aluminum struts, it may be necessary to shim the strut connectors, thus eliminating any gap between the connector and interior wall of the strut. *If a gap exits, it should not be eliminated by tightening the bolts.* Refer to **Figure 7-1**.

2. Bolt the wings to the keel, supporting the tips with ladders or similar supports the approximate height of the spar attach brackets. *HINT: Enlist the aid of an assistant.* Locate bolt holes along the struts' chord with the template in **Figure 7-2**.

3. Locate both forward lift struts (109 5/8" long). Locate and drill a 3/16" hole 5/8" in from each end, per **Figure 7-2**. Drill a 1/4" hole for the jury strut 54 3/4" from the upper end. See **Figure 7-3** for the hole locations. Use the template **Figure 7-2** to locate the holes along the chord. Install the lift strut connectors to each end of the strut. Install the gusset plates per **Figure 7-3**. Secure the gusset plates to the forward lift strut with 3/16" stainless steel pop rivets.

4. Cut, profile and drill the aft lift struts (109 5/8" long) on one end *only*. This becomes the upper end; profile as in **Figure 7-4**. *Do not drill or profile lower end until washout is set.*

5. Drill the holes in the LS-ACU-2 connectors to 5/16". File a clearance into these connectors as needed to fit into the strut at the angle indicated in **Figure 7-4**.

6. Bolt the connectors into the upper ends of the aft lift struts. Bolt the struts to the wings and check for clearance. The connectors must fit to the strut attach plates without binding.

7. Pin the struts to the fuselage's strut attach brackets. This automatically sets the dihedral. **NOTE: Radius bottom end of connector to create clearance at attach point.**

8. Mark a line of several inches at the aft strut's lower end showing chordwise location for the hole. Place the aft strut's lower end between the gussets. The wash out will be set by twisting the wing; the aft strut will be clamped and drilled at the gusset once the wash out is set. The gusset will act as a drill guide.

9. Make a rigging level by taping a two-foot carpenter's level to a 50" X 2" X 3/4" board. Block the aircraft's wheels to prevent rolling. Place the level under the spars, at the root of one of the wings and raise the tail so it reads level. See **Figure 7-9**.

10. Fabricate a 6" X 2" shim from ¼" plywood and nail or screw it to one end of the straight edge. Place the rigging device just outboard of one wing's strut with the ¼" shim under the trailing edge spar. See **Figure 7-9**. Move the aft spar up or down as required to obtain a level reading. This sets the wash out; secure this setting with a vice grip or C clamp. Check for accuracy before drilling. Mark the fitting where the lower end of the strut is. Use the gusset fitting to line up on the mark and the chordwise marks to drill the bolt hole. Drill 5/16", then assemble. Be certain to place the anti-crush bushing on the inside of the aft strut lower fitting.

11. Go directly to the other wing and set the washout as above, but *do not level the wing again.* If done correctly, the aircraft will have no tendency to drop a wing during stalls or drift from a heading. If it is discovered that the wings are not set properly, correcting the situation is a simple matter of installing and drilling a new aft lift strut connector.

JURY STRUT INSTALLATION

Refer to **Airfoil Lift Struts** parts pages. Lift struts must be installed to the wing and fuselage before jury strut installation.

12. Locate a ¼" hole through the aft lift strut 56 ⅜" from the strut's upper end for the jury strut eyebolt.; use the template to locate chordwise on the strut. See **Figure 7-12**. Install a ¼" eyebolt at this location and to the ¼" hole in the forward lift strut; orient the eyebolts so as to be edge-on to the slipstream.

13. Install the tangs to the jury struts. To do so, insert a tang to each end, leaving ½" from the end of strut to the center of tang's hole (insert so the three closely-spaced holes are concealed within the jury strut). Test-fit the jury strut to the lift struts' eyebolts and wings' jury strut attach tangs; adjust the depth of the tangs as necessary. Once satisfied with the fit, superimpose another tang to locate and transfer-drill #11 through the jury strut and tang. Secure with rivet. Install completed jury struts per **Figure 7-13.**

OPTIONAL FAIRING NOSE POD/WINDSHIELD ASSEMBLY

Refer to **Optional Fairing Nose Pod/Windshield Assembly** parts pages.

1. Trim and sand nose pod to line molded near edge. Drill #30 holes in all marked locations.

2. Drill three ¼" holes into the nose pod as per **Figure 8-2** for the arch tube and pitot. Drill top center on the marks provided a #30 hole. Lay the arch on a flat surface and measure from each flattened end to locate and mark the top center of the tube. Place the arch tube into the nose pod with the top center of tube lined up on the #30 top hole on the pod. Tape the tube in place with the top centered over the hole and the flattened parts of the tube centered on the ¼" holes. Drill through the top with a #30 bit and cleco. Make sure the arch tube is tight against the pod and drill to mark the ¼" holes into the flattened ends of the tubes. Do not drill through, only drill enough to mark (drilling through will elongate the holes in the fiberglass pod). Remove arch tube and drill through the flattened ends with a ¼" drill. Place the arch tube back into the pod clecoing the top and pinning the bottom ¼" holes with bolts. Drill the remaining #30 hole using the marks molded into the pod. Be sure the arch tube is centered over the holes as you drill. See **Figure 8-2**.

3. Remove 1" caps and 3/16" bolt retaining outer collar from the end of the rudder pedal mount tube and install I-nut and T-C-4 into ends of tube. See **Figure 8-3**.

4. Mark and drill top arch tube as per **Figure 8-4**. Rivet on the gussets, use gussets to locate and drill the next two holes into tab. Rivet. Top arch top will install to windshield side tube in a later step, set arch tube aside.

5. Locate and drill ¼" diameter holes into the flattened ends of each windshield side tube. See **Figure 8-5**. Bolt windshield tube keel connect bracket to the keel using the pre-drilled hole approximately ½" ahead of fuselage cage attach point. Slip over each end of the keel connect bracket at 90 degree fitting.

6. Place the 90 degree elbow fittings inside each end of keel connect bracket. Use masking tape to hold in place until ready to drill and rivet.

7. Bolt nose pod, windshield side tube and nose pod arch tube to the rudder pedal mount tube The arch tube is placed 1'st against the rudder mount tube, then the side tube. See **Figure 8-7**. Rivet on the gussets, use gussets to locate and drill the next two holes into tab. Rivet. Top arch top will install to windshield side tube in a later step, set arch tube aside.

8. Nose pod should be rotated until the top edge of the pod flows straight into the center rib. See **Figure 8-8**. To establish nose pod position, cleco in place with jigging tube, to third hole in center cover, cut ends at 45 degrees to allow use of cleco. See **Figure 8-8**.

9. Slip side tubes and side connector tubes together onto 90 degree elbow fitting. Place windshield side connector tubes with the longer leg to the top, see **Figure 8-9**.

10. Place top arch tube assembly onto the side tubes with 90 degree gussets facing forward. Move the arch until it is touching against the straight edge and make sure the arch is approximately 54 ¾" from the rudder pedal mount tube. The important aspect here: the distance on each side should be near equal, the arch should touch the straight edge. See **Figure 8-10**.

11. Position the arch tube centered over the #30 holes and drill into tube #30. Drill only thru tube on side against the pod. Cleco to hold tube in place.

12. The windshield Lexan comes pre-cut to shape, but will need fitted, trimmed and drilled. Follow these guidelines when working with Lexan.
    A. Leave protective wrap on until ready to fly.
    B. When cutting, use tin snips or score with a knife and shave off edges. File all edges smooth.
    C. De-burr all holes, use a slightly larger hole over, find size of hardware used. Example: Drill final holes for ⅛" rivets with #28 bit size.
    D. Acetone, MEK, lacquer thinner and many other solvents will destroy lexan. Avoid fuel spills also. Crazing and cracking will result!

13. Place the windshield on the frame work with the front edge under the nose pod. You may have to loosen the ¼" bolts, retaining the side of the arch tubes. Lexan does not fit between the arch tube and the pod. It may touch up against the tube. See **Figure 8-13**.

14. Center lexan on frame work and clamp in place. Check fit and adjust as required. Layout, drill and cleco the lexan to the frame work. Trim as required. See **Figure 8-14**.

15. Remove and drill all ⅛" rivet holes to #28 and deburr. With windshield laid flat, drill bearing strip that will support the lexan and the nose pod. Trim front edge of strip to the shape of the lexan. See **Figure 8-15**.

16. Paint outside nose pod to match the aircraft. Paint or "flock" inside if desired.

17. Final install nose pod, use loc-tite to secure ¼" bolts at rudder mount tube.

18. Apply a small bead of acrylic or silicon caulk to the upper under side of the nose pod where the windshield will contact. This will cushion the lexan from the fiberglass.

19. Put windshield in place before caulking sets, use clecos to quickly install.

20. Rivet windshield to frame and pod.

21. Cut block of PVC to shape as shown in **Figure 8-21**. Use template to shape curve.

22. Place pitot mount with pitot on nose pod inside, drill #30 holes on each side of ¼" hole for self tapping screws and secure. See parts page.

23. Place decals on nose pod as shown in **Figure 8-23**.

24. The fairing removes in minutes via the 3 attach bolts, this gives you the option of flying with or without the fairing. If you desire to switch back and forth, drill two ¼" diameter holes in the instrument panel as shown in **Figure 8-24**. Use these holes to support the pitot tube when flying without the fairing. Orientate the pitot tube 5° nose down to cage top longeron.

When removing the fairing for open air flight, unplug the pitot tube from the nose pod and insert thru the holes on the left hand side of the panel. Loop hose to inside of cage to avoid tangles with rudder pedals.

25. Locate document pouch on the bottom of pod with opening end forward. Once on center and square, drill and bolt with small screws.

S-17 OPTIONAL ELEVATOR TRIM TAB

Refer to **Optional Elevator Trim Tab** parts pages.

NOTE: *Trim system cable/housing should be zip-tied within fuselage prior to covering.*

1. Cut trim cable housing to approximate length, leaving generous margin for error. Straighten about three feet of cable and bevel one end smooth. Pull housing straight and carefully feed cable into housing; leave plenty of cable extending beyond both ends of housing. *If housing is not straight while inserting cable, cable's leading end may damage housing's nylon lining, jamming system.*

2. Install cable/housing into boom tube; secure with zip ties to avoid interference with controls. Cable exits right hand side of boom at tail.

3. Drill the elevator spar to accommodate the 3/16" rivet; locate so cable/housing may exit fuselage and pass through tube clamps without significant bending, per **Figure 8-25**. Assemble tube clamps to spreader tube and spar, per parts drawing. Locate, drill and rivet cable housing stop bracket to underside of elevator trailing edge spar, per parts drawing. ***NOTE:*** *clamp and bracket must align at right angle to elevator trailing edge, per* ***Figure 8-25.*** Assemble conduit adjustor assembly to stop bracket; trim excess threads, leaving approximately ¼" of threads exposed beyond nut. Apply Loc-tite during assembly.

4. Trim housing to final length. Install cable/housing to clamps, through ferrule cap and ferrule of conduit adjuster; tighten. Safety-wire housing to assembly. See **Figure 8-26.**

5. Install forward end of cable to wire swivel/screw stop on trim lever, per parts drawing.

6. Assemble trim tab, per **Figure 8-27.** Be certain tab is not twisted when drilling and riveting.

7. Attach hinges to tab, per **Figure 8-28.** Center the tab on elevator trailing edge, locate innermost holes of tab hinges on centerline of trailing edge and drill #11. Remove hinges from tab and rivet to elevator; drill remaining holes and rivet. Install tab to elevator. Refer to parts drawing.

8. Drill hole for tab horn swivel to ¼". Test fit wire swivel/screw stop; file until it turns freely. Locate and rivet horn on underside of tab, directly in line with tube clamp and stop bracket on elevator. Refer to **Figure 8-29** and parts drawing. Install wire swivel to horn and thread cable through swivel, eliminating any slack.

9. Bolt lever to outside of fuselage cage to the bushing just ahead of the throttle. See **Figure 8-30**.

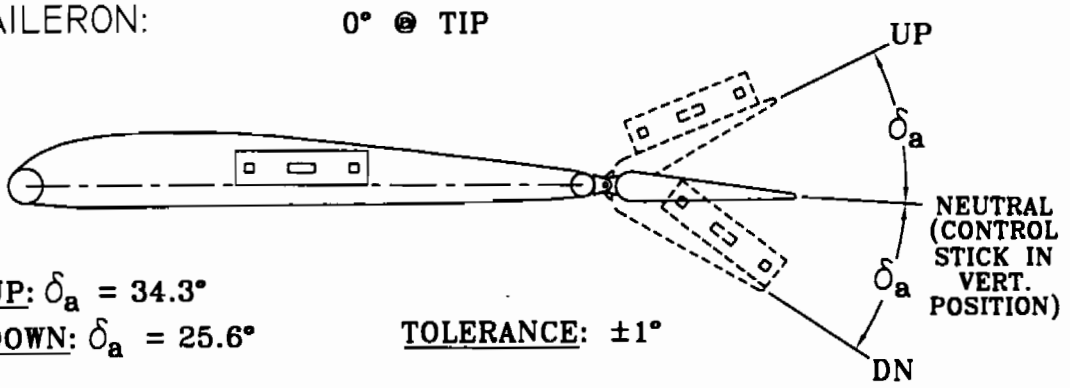
10. Install the trim wire to the tab and lever using the swivel nuts provided. Adjust the tab so it is straight with the elevator when the lever is 90 degrees to the frames top tube. This will allow equal movement of the tab in either direction; if after flying you need more trim in one direction over the other, adjust lever position as required. **NOTE:** If you are not able to use the trim tab to allow hands off flight at any speed, the horizontal stabilizer position may need to be adjusted. For example, if the entire nose up trim is applied and the plane still nose dives when hands off, the horizontal stabilizer will need to have more negative incidence. *LOWER the leading edge of the stabilizer to adjust the aircraft's trim speed.*

CHECKING RIGGING and SYMMETRY

Use the chart below to verify throws and alignment prior to operation.

With exception of the Engine thrust offset, rudder displacement and landing gear toe-out, all other rigging or symmetries can be measured using a smart level, available at most hardware or industrial supply stores for around $150.00. Another method, is to use a warp drive prop protractor. The following procedures use the smart level.

AILERON: **0° @ TIP**

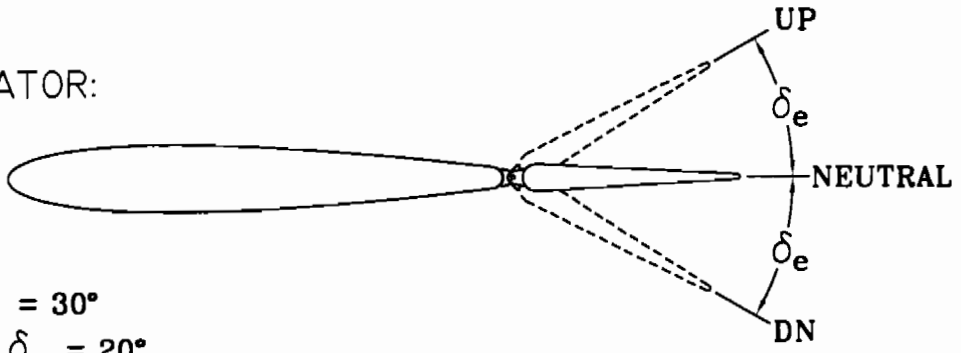


UP: δ_a = 34.3°
DOWN: δ_a = 25.6°

TOLERANCE: ±1°

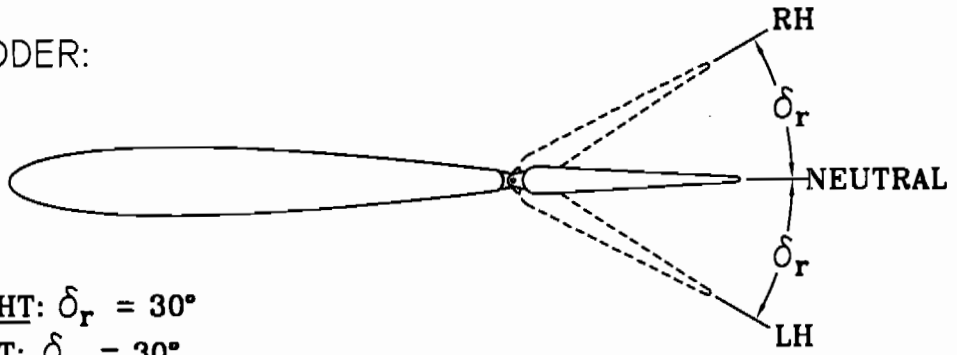
PLACE SMART LEVEL ON TIP BOW, MID CHORD AND ZERO.
PLACE ON TOP SURFACE OF AILERON IN BOTH POSITIONS
FULL TRAVEL. FOLLOW THIS PROCEDURE FOR THE ELEVATOR AS WELL.

ELEVATOR:



UP: δ_e = 30°
DOWN: δ_e = 20°

RUDDER:



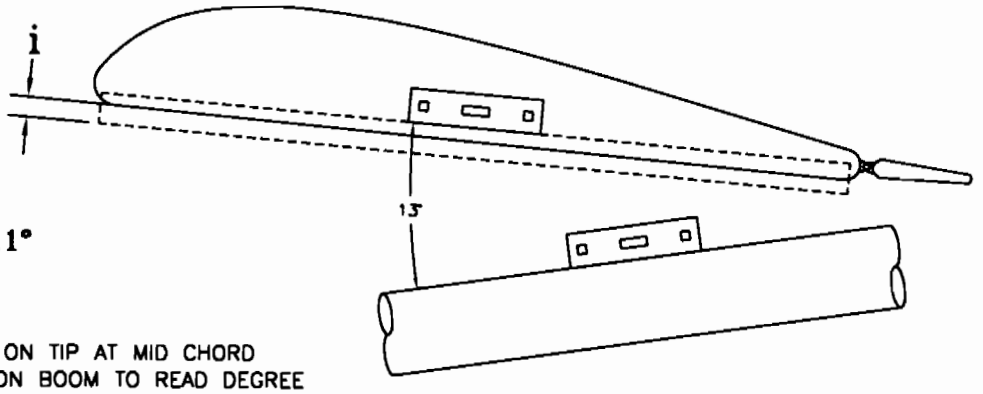
RIGHT: δ_r = 30°
LEFT: δ_r = 30°

CHECK FOR CONTACT AGAINST ELEVATOR. ADJUST TO AVOID CONTACT

MD3832

WING INCIDENCE:

i: = 13°

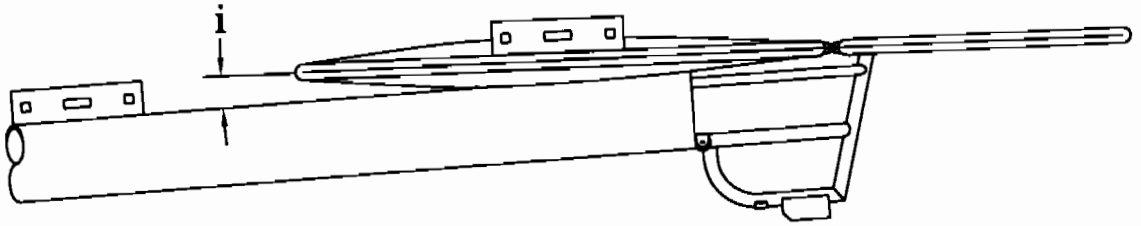


TOLERANCE: ±1°

PLACE SMART LEVEL ON TIP AT MID CHORD AND ZERO. PLACE ON BOOM TO READ DEGREE OF INCIDENCE RELATIVE TO BOOM. FOLLOW THIS PROCEDURE FOR THE TAIL INCIDENCE AS WELL.

TAIL INCIDENCE:

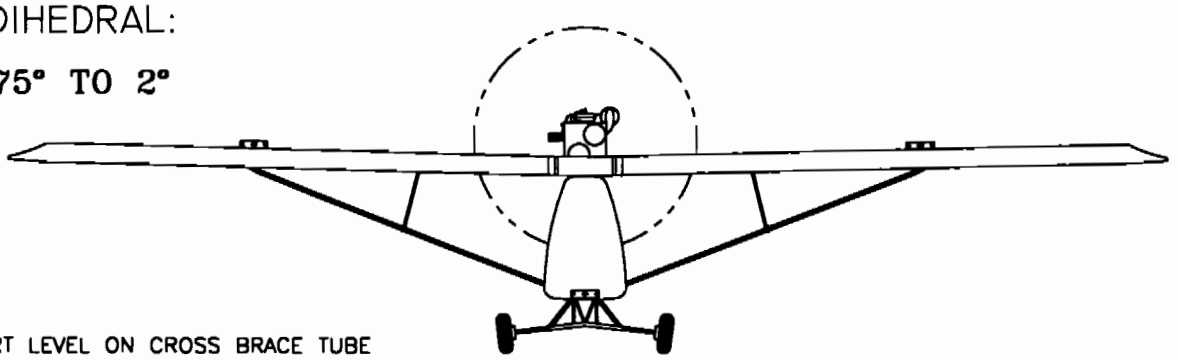
i: = 2°



MAY INCREASE FOR 447. FOR 503 ADJUST TO LEVEL FLIGHT AT CRUISE SPEED.

WING DIHEDRAL:

d: = 1.75° TO 2°



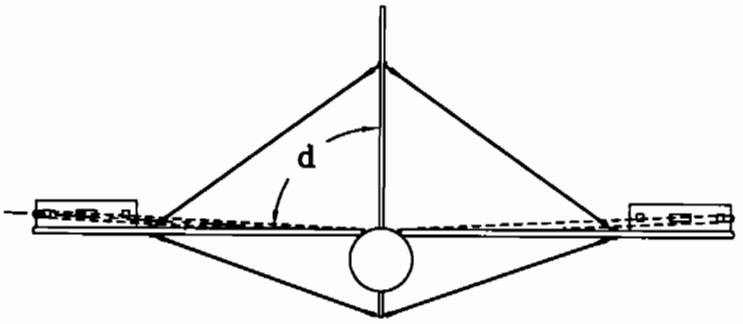
PLACE SMART LEVEL ON CROSS BRACE TUBE DIRECTLY IN FRONT OF SEAT AND ZERO. PLACE ON WING CENTERED BETWEEN RIBS AT STRUTS.

MD3832

TAIL DIHEDRAL:

d: = 0° TO 2.5°

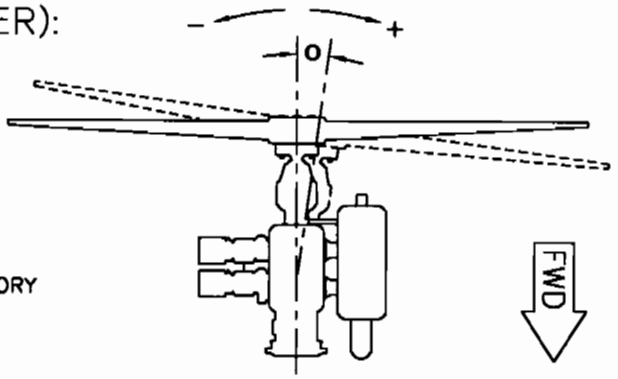
ZERO ON ONE SIDE, THEN PLACE ON THE OTHER SIDE.



ENGINE (PUSHER):

o: = 0°

NO ADJUSTMENT MEANS. PROVIDED. SET BY FACTORY



WING WASH-OUT:

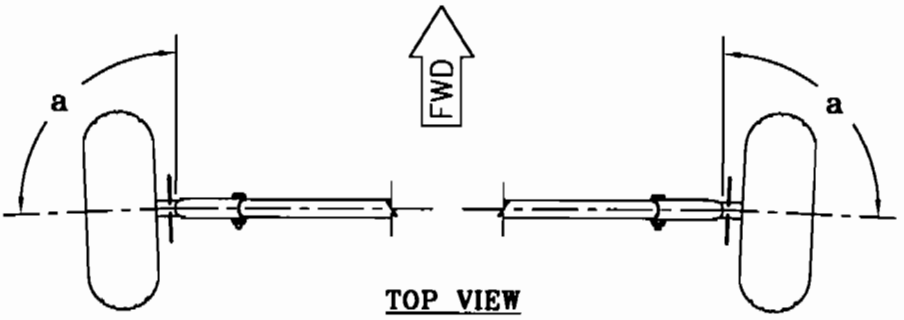
w: = 1.3° TO 1.5°

ZERO AT BOTTOM OF KEEL. PLACE LEVEL ON TOP MID WING TIP TUBE.

MEASURED AT ROOT

LANDING GEAR TOE-OUT:

a: = 90°



TOP VIEW

MD3832

NO ADJUSTMENT MEANS. PROVIDED. SET BY FACTORY

EAA General Safety Check List

For all types of Aircraft, Ultra lights and Experimental.

Execute this checklist before first flight; thirty minutes here may be worth the rest of your life.

PROPELLER	Yes	No
1. Blades		
Laminations not separated?	☐	☐
Breaks scratches, nicks tipping?	☐	☐
Loose rivets in tipping?	☐	☐
Drain holes in tip clear?	☐	☐
2. Hub		
Any cracks or corrosion?	☐	☐
Hub properly seated and safetied?	☐	☐
3. Control Mechanism		
Oil leaks?	☐	☐
Worn bearings?	☐	☐
Secure?	☐	☐
4. Attachment		
All bolt & nut threads undamaged?	☐	☐
All bolts & nuts secured & safetied?	☐	☐
5. Spinner		
Cracks?	☐	☐
Is spinner chafing into prop?	☐	☐
ENGINE & ENGINE COMPARTMENT		
1. Fuel System		
All lines of approved type?	☐	☐
All strainers clean?	☐	☐
All lines secured against vibration?	☐	☐
Gascolator bowl at low point in system when aircraft is in normal ground position?	☐	☐
Fuel drains operative?	☐	☐
All connections properly tightened?	☐	☐
2. Oil System		
All lines of approved type?	☐	☐
All lines secured against vibration?	☐	☐
Oil tank has no cracks or leaks?	☐	☐
Tank properly secured & safetied?	☐	☐
All plugs & strainers cleaned & safetied?	☐	☐
3. Ignition-Electrical System		
All wiring proper type and gauge?	☐	☐
All fastenings secured & safetied?	☐	☐
Magnetos properly grounded?	☐	☐
Spark plugs cleaned & undamaged?	☐	☐
Spark plugs properly torqued?	☐	☐
Engine grounded to airframe?	☐	☐
Starter/generator secured?	☐	☐
4. Exhaust Manifold		
Secured and safetied?	☐	☐
All gaskets in good condition?	☐	☐
All stacks in good condition-no cracks or rusted-out areas?	☐	☐
Carb heat and cabin heat muffs removed and manifold inspected?	☐	☐

	Yes	No
5. Controls		
All secured and safetied?	☐	☐
No excessive play in any linkages?	☐	☐
No interference between any control and the structure throughout the full operating range?	☐	☐
Carb heater gate open & close fully?	☐	☐
6. Mount		
Secured and safetied?	☐	☐
All joints inspected for cracks?	☐	☐
Any bends in mount tubes?	☐	☐
Bushings in good condition?	☐	☐
7. Cowlings		
Secured and/or safetied?	☐	☐
All latches or fastenings working properly?	☐	☐
Any cracks properly checked or reinforced?	☐	☐
Cowlings clean?	☐	☐
8. Power Plant in General		
All necessary safeties, palnuts, locknuts, etc. in place?	☐	☐
No fuel or oil leaks?	☐	☐
All accessories secured & safetied?	☐	☐
FUSELAGE-HULL		
1. Structure		
All welds sound?	☐	☐
All tubing straight and uncracked?	☐	☐
No rust or corrosion?	☐	☐
All attach fittings sound, no cracks, elongation of holes or worn threads?	☐	☐
All rivets properly installed?	☐	☐
Inspection openings for all vital areas?	☐	☐
Fuselage properly drained, that is, no built-in moisture traps?	☐	☐
Firewall of proper fireproof material?	☐	☐
2. Cover		
Properly attached?	☐	☐
No tears, distortions, or abrasions?	☐	☐
Any breaks or ruptures properly repaired?	☐	☐
3. Control System		
Properly secured and safetied?	☐	☐
Controls stops provided & adjusted?	☐	☐
All fittings of proper thread & size?	☐	☐
FUSELAGE-HULL		
All pulleys of proper diameter for bends, proper size for cable, and guarded?	☐	☐
All cable of proper size (1/8" min) and condition?	☐	☐
Any parts in system subject to rotation for any reason properly secured and safetied?	☐	☐
Return springs on rudder pedals?	☐	☐
No interference between any control part (cable, tube or linkage) and any other part of the structure throughout full control movement?	☐	☐
Adequate room for full control throw when aircraft is occupied?	☐	☐
Controls arranged to minimize danger of blocking by foreign objects?	☐	☐
Grip properly secured to control stick or wheel?	☐	☐

	Yes	No
4. Electrical System		
All grommets, particularly in firewall, snug fitting and in good condition?	☐	☐
All wires of proper gauge, insulated, and secured?	☐	☐
Wires do not rest on abrasive surfaces?	☐	☐
Battery installation of sufficient strength?	☐	☐
Battery properly ventilated and drained?	☐	☐
No corrosion at or around battery or its vents?	☐	☐
Fuses of adequate amperage?	☐	☐
5. Fuel System-Tanks		
Drains properly located to discharge clear of aircraft?	☐	☐
All outlets properly screened?	☐	☐
Breather inlets clear?	☐	☐
Fuel shut-off valve installed?	☐	☐
Fuel shut-off valve easily reached by pilot?	☐	☐
All fuel lines of proper approved type?	☐	☐
All fuel lines secured against vibration?	☐	☐
Is tank located so that sufficient head is available in maximum climb with minimum fuel? Placard if necessary?	☐	☐
Has tank sufficient expansion area?	☐	☐
Any tank overflow discharge clear of hazardous areas on aircraft?	☐	☐
Is tank support sufficient to meet strength requirements?	☐	☐
Does tank clear surrounding structure?	☐	☐
Do tank supports minimize strain and chafing?	☐	☐

To insure its safe construction and operation, and to further emphasize the vital necessity for thorough consideration of every item which goes into your airplane, the following working check-list should be used, and it is suggested that it be made a part of the aircraft records.

EXITS

1. Can aircraft be cleared rapidly in case of emergency?	☐	☐
Are special precautions available during test period, such as jettison able doors or canopy?	☐	☐
If parachute is to worn, does it clear all controls?	☐	☐
Baggage Compartment		
1. Are walls and floors of sufficient strength to withstand flight loads?	☐	☐
Can anything escape from baggage compartment by accident?	☐	☐
Cabin-Cockpit		
1. Instruments		
Are all instruments functioning and accurate?	☐	☐
Are all instruments marked, max pressures, temperatures, speeds?	☐	☐
Are all vital instruments easily visible to pilot?	☐	☐
2. Flight-Engine Controls		
Are all engine controls marked or easily identifiable?	☐	☐
Are all engine controls smooth in operation, without excessive resistance, and easily available to pilot?	☐	☐
Are all flight controls arranged so that jamming by dropped gloves, etc. is impossible?	☐	☐
3. Fuel Systems		
Are all gas valves easily reached by pilot?	☐	☐
Are all gas valves marked ON, OFF, LEFT, RIGHT?	☐	☐
Are all gas valves in such a position that accidental operation is impossible or guarded in such a way that accidental operation is impossible?	☐	☐

	Yes	No
4. Seats		
Are seats of sufficient strength for maximum flight loads contemplated?	☐	☐
Does seat "flex" enough at any time to interfere with flight controls?	☐	☐
5. Safety Belts and Shoulder Harness		
Is installation and attachments of sufficient strength to meet 9G forward load minimum?	☐	☐
Does attachment connect directly to primary structure?	☐	☐
Are belts and harness in top condition?	☐	☐
Is belt of correct size, that is, no long over-tongue?	☐	☐
Is a separate belt and shoulder harness supplied for each occupant?	☐	☐
6. Heating-Ventilation		
Is cabin or cockpit in negative pressure area and liable to suck in exhaust fumes?	☐	☐
Is any provision made for ventilating cabin other than normal leakage?	☐	☐
7. Windshield-Windows		
Are windshield and windows of recognized aeronautical materials?	☐	☐
Is windshield braced against positive or negative pressures in flight, either by design or extra bracing?	☐	☐
WING-TAIL SURFACES		
1. Fixed Surfaces		
Are all interior fastenings secured and/or safetied?	☐	☐
Is interior properly weatherproofed?	☐	☐
Have any mice been inside lately?	☐	☐
2. Movable Surfaces		
Are stops provided, either at wing or somewhere else in the control system?	☐	☐
Are all hinges and brackets sound?	☐	☐
Are all hinge pins secured and safetied?	☐	☐
Is there any excessive play in hinges?	☐	☐
Is there any excessive play in control cables or tubes?	☐	☐
3. External Bracing		
Is the interior of all struts weather protected?	☐	☐
Are all adjustable fittings locked, secured, and safetied?	☐	☐
Are struts undamaged by bends or dents?	☐	☐
Are all wires serviceable with proper end fittings?	☐	☐
4. Attach Fittings		
Are bolts of proper size installed?	☐	☐
Are all bolts secured and safetied?	☐	☐
Have all bolts been examined for wear?	☐	☐
5. Flight Control Mechanism		
All cables and tubes unbroken or unbent & with proper end fittings?	☐	☐
All control attachments secured and safetied?	☐	☐
All pulleys free from interference and guarded?	☐	☐
All torque tubes and bell cranks in good condition?	☐	☐
No interference with fuselage or wing structure throughout full control travel?	☐	☐
6. Fuel Tanks **(See Fuselage Section Also)**		
Are drains supplied at low point in tank when aircraft is in normal ground position?	☐	☐
Fuel overflow drains clear of aircraft - no tendency for overflow to soak into aircraft structure?	☐	☐

7. LANDING GEAR	Yes	No
Properly lubricated?	☐	☐
Proper oleo inflation?	☐	☐
Shock cords or springs in good condition?	☐	☐
All attach fittings uncracked and sound?	☐	☐
All bolt holes not elongated?	☐	☐
All attach bolts secured and safetied?	☐	☐
Brake lines in good condition?	☐	☐
Brakes operating properly?	☐	☐
Correct hydraulic fluid in lines?	☐	☐
Wheels uncracked?	☐	☐
Tires unworn & properly inflated?	☐	☐
Excessive side play in wheel bearings?	☐	☐

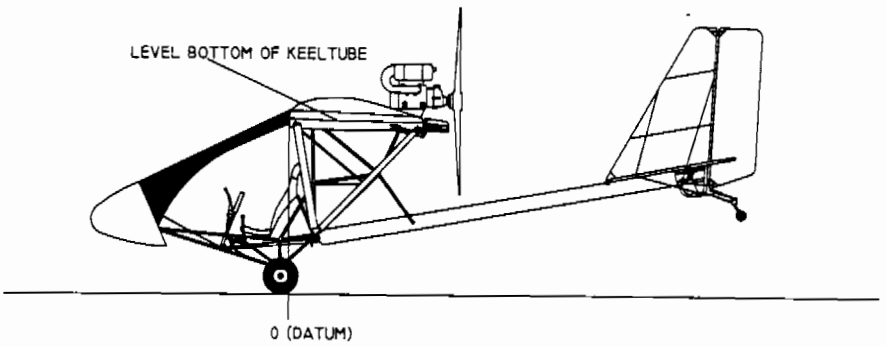
GENERAL

ALL BOLTS WHEREVER POSSIBLE, HEAD UP AND FORWARD.

All exterior fastenings visible from cockpit or cabin should have safetied end toward pilot, wherever possible.

A complete walkaround inspection of the aircraft should be accomplished to check that every bolt visible on the exterior is secured and safetied. That there is no visible structural damage. That all inspection panels and covers are in place and attached. That all parts of the aircraft are in proper alignment.

DON'T FORGET TO PUT IN ENOUGH GAS PRIOR TO THAT FIRST FLIGHT - GROUND RUNNING AND TAXI TESTS CAN USE UP A LOT MORE THAN YOU THINK!



MD3702

N	
DATE WEIGHED	
ENGINE TYPE	
EMPTY WEIGHT	

RANS S-17 STINGER
WEIGHT AND BALANCE

ACCEPTABLE C.G. 13.5" TO 18.7" FROM DATUM 0.
DATUM = LEADING EDGE OF WING (FRONT SPAR)
AIRCRAFT IN LEVEL ATTITUDE.

TO PROPERLY DETERMINE THE CENTER OF GRAVITY THE TAIL MUST BE ELEVATED UNTIL THE BOTTOM OF THE KEEL IS LEVEL TO SIMULATE LEVEL FLIGHT.

#	ITEM	WEIGHT	ARM	MOMENT
1	PILOT	180	-10.6"	-1908
2	MAIN GEAR LEFT	136	-1.65"	-224
3	MAIN GEAR RIGHT	136	-1.65"	-224
4	WING TANK	25	14.7"	367
5	TAIL	74	155.9"	11537
6				
	TOTAL=	551	TOTAL=	9548

$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.} \qquad \frac{9548}{551} = 17.3$$

CG = 17.3 " AFT OF DATUM

ACCEPTABLE C.G. 13.5" TO 18.7" FROM DATUM 0.

#	ITEM	WEIGHT	ARM	MOMENT
1	PILOT		-10.6"	
2	MAIN GEAR LEFT		-1.65"	
3	MAIN GEAR RIGHT		-1.65"	
4	WING TANK		14.7"	
5	TAIL		155.9"	
6				
	TOTAL=		TOTAL=	

$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.}$$

CG= " AFT OF DATUM

ACCEPTABLE C.G. 13.5" TO 18.7" FROM DATUM 0.

FINAL INSPECTION

Make a comprehensive check of the aircraft after final assembly. Check that hardware is tightened appropriately; rivets are properly installed; cotter pins, quick pins and safety wire are installed where required; steel and aluminum components have not been compromised by dents, scratches, nicks or corrosion; skins are smooth and intact; cables are free of kinks and tensioned appropriately; airframe components are true; pilot seat and restraint are installed securely.

Check that ailerons, elevator and rudder respond properly to control inputs; hinges and associated hardware are properly installed; all surfaces are properly rigged; all control cables, push-pull tubes, bellcranks, horns and associated components are secure and operating properly.

Check wheels and tires for security and freedom of movement; brake system components and associated hardware for security and proper operation; tailwheel, springs, chains and associated hardware for proper tension, security and freedom of movement.

Check engine, propeller, muffler, mounts and associated components for proper installation, hardware and security; throttle for security and smooth travel; fuel lines, components and connections for leaks and proper flow.

Weigh the finished aircraft properly; determine the location of the center of gravity when loaded for flight. Be certain the center of gravity is within acceptable limits prior to taxi and takeoff; refer to the ***weight and balance data sheet*** *in the operations section of the parts manual.*

Refer to the engine manufacturer's literature for proper engine break-in procedure, operating instructions and maintenance information.

CHECKING MAXIMUM STATIC RPM

Prior to the first flight, determine the engine's maximum static RPM; this is the speed it develops when stationary and fully throttled. An acceptable maximum static RPM indicates that the engine is operating at or near full potential and should not over-speed during the first flight.

Run the engine with the throttle fully open; be certain the tail is tied down and the main gear is chocked. For the two-stroke Rotax 447 and 503, acceptable maximum static RPM is usually about 6000 to 6200. A number of factors influence this, including the number of propeller blades, their length and pitch. Ideal maximum static RPM would render an *in-flight* RPM just below red line with the throttle fully open at sea level on a standard day.

A high maximum static RPM may indicate that the propeller is pitched too finely (the blades take too small a bite of air). This prevents the propeller from performing most efficiently and may allow the engine speed to exceed red line in flight. If the blades are adjustable, increase pitch; refer to the manufacturer's instructions. If the blades are fixed, contact the manufacturer.

A low maximum static RPM may indicate that the propeller is pitched too coarsely (the blades take too large a bite). This prevents the propeller from performing most efficiently and induces an excessive load on the engine, as well. If the blades are adjustable, decrease pitch; if fixed, contact the manufacturer. If finer pitch does not raise maximum engine speed to an acceptable RPM, another problem may be indicated.

WARNING: Attempting flight with improper propeller pitch may have severe consequences. Conduct flights only with sufficient power output!

Knowing the ideal maximum static RPM allows you to check the health of the engine during a full-throttle run-up prior to takeoff. Once you've become familiar with the in-flight performance of the engine and have adjusted the propeller appropriately, you'll know better what the tachometer should indicate during run-up.

PRE-FLIGHT CHECKLISTS and SAFETY

This section includes much information on the Stinger's operation, limitations and performance; however, the nature of kit-built aircraft makes it impossible to publish checklists and procedures applicable to *all* examples of a particular model. This is because the builder, as manufacturer of the aircraft, has the freedom to assemble, equip and modify his machine as he wishes. The result is a fleet of aircraft that share the same name and designation, but vary somewhat in operation and performance.

The builder should consider carefully all aspects of the engine, airframe and equipment when developing checklists and procedures for operating his plane. For example, he might begin the preflight inspection by seating himself and checking that the magnetos are off; this would ensure the engine cannot start if the propeller were moved. He also might reach behind the seat and drain fuel from the sump, allowing any water trapped in the system to escape. He then might begin walking around the machine in a logical, straightforward manner, checking the presence, security and condition of hardware and components.

With the walk-around completed, he might seat himself again and consider the checks necessary for a safe and mechanically sound engine start. This will depend largely on the specifics of the engine, fuel, ignition and electrical systems he has installed. Again, a straightforward, logically-flowing checklist should be developed to address the particulars of his machine.

The same care should go into development of a pre-takeoff checklist. Of particular importance is a proper engine run-up to check the health of the power plant. An essential checklist item often given short shrift is that of free and correct movement of control surfaces; this is particularly important for aircraft that fold or disassemble.

Considerable forethought should be given to potential emergencies. What steps should be taken to deal with balked landings or engine failures? Consideration of contingencies now is likely to mean faster, more appropriate reaction to urgent or emergency situations, should they arise.

Since each Stinger is unique, each builder should expect unique performance. The prudent builder will determine carefully the weight and c. g. location of his plane before its first flight. He'll familiarize himself with its handling characteristics early on, cautiously exploring its capabilities and limitations while heeding the designer's words of advice. The U. S. Government, the Experimental Aircraft Association and other publishers offer a wealth of information on flight preparation and testing. As a first step, the builder should refer to the FAA's AC-90-89A, *Amateur-Built Aircraft and Ultralight Flight Testing Handbook*.

By applying suitable checklists and procedures to his plane and operating it within reasonable limits, the builder helps ensure his safety as well as the reliability and longevity of his airframe, power plant and components.

FLIGHT HANDLING CONSIDERATIONS

The Stinger's handling is characteristic of pushers with high thrust lines.

Because of its configuration, the Stinger tends to pitch down initially when power is applied. This presents no problem for pilots who are aware of it and most readily develop a habit of adding slight back-pressure when applying power. The tendency is noticed more readily at low airspeeds. During approach to landing, avoid high descent rates; this usually results from flying too slowly. If a low, slow approach results in a high sink rate,

application of power is required for proper recovery; in such a case, the low altitude may not allow for a proper recovery.

The other side of the pitch down tendency is the pitch up. This occurs at any airspeed when sudden reduction of power is made. Again, the only phase of flight during which this is critical is landing. The proper action is to add the right amount of forward pressure.

Fly the approach at adequate speeds and you will avoid any problems associated with the thrust line. *Suggestion: Hold some power during the approach and landing, flying the plane onto the surface and throttling full back upon touchdown.*

As you fly the Stinger, its handling will become second nature. Just remember to explain its handling to your buddy before turning him loose with it, especially if he has not flown a pusher. As pushers go, the Stinger is average in these thrust-line-related properties; as you will see, they are very easy to live with and hard to design out completely without making some major trade-offs.

FLYING THE STINGER

The Stinger is lightweight and has low wing loading; initial flights should be undertaken in calm conditions.

Conduct a thorough pre-flight inspection of the aircraft. Check all aircraft components for proper installation and security. Be certain to check control surfaces for proper response to inputs; this is especially important if the aircraft has been folded for storage or trailering. Check fuel tank and system for proper fuel/oil mixture, adequate quantity, unrestricted flow and security.

Prior to attempting flight, taxi the Stinger about to test main gear, brake and tail wheel action; make adjustments as necessary. Acquaint yourself with its docile tail wheel handling and the necessary control inputs.

Check that gross weight and c. g. location, once the aircraft is boarded and fueled, fall within acceptable limits; refer to the ***weight and balance data sheet*** *in the operations section of the parts manual. Add ballast forward of the center of gravity as necessary.*

Adjust seat as necessary to provide full access to and complete control of stick, rudder, throttle, brake and magneto switches. Once seated, latch shoulder and lap belts; adjust as necessary. A helmet and goggles are strongly recommended.

Once pre-flight checks are complete, align the aircraft for takeoff, release the brake lever and apply full throttle, holding the stick neutral or slightly back. Stinger performance is typified by short takeoff rolls and brisk climbs. Due to the lack of customary ques, maintaining the Stinger in a given attitude may take a little practice.

Because the Stinger dissipates energy quickly, landings usually are made with power. Reduce power to establish a reasonable descent rate and carry some into the round-out. If necessary, add power to check descent. Once level just above the surface, retard the throttle gently, applying back pressure to reduce speed; when the mains touch, retard to idle and maintain back pressure on the stick.

ALL AEROBATIC MANEUVERS ARE PROHIBITED

FINE TUNING RIGGING

The Stinger's initial flight should reveal any need for rigging adjustment. Equipped with Rotax 447 or 503 engines, the Stinger may exhibit a mild right-turning tendency, especially while climbing; this is normal, the result of the propeller's thrust, slipstream and torque.

Uncharacteristically strong tendencies to roll or yaw may indicate that an aileron or flap is rigged at a different angle than that on the opposite wing. With the control stick fixed in the neutral position (vertical), the ailerons should be deflected at the same angle; while both flaps must rigged at the same angle, they need not be rigged exactly as the ailerons. Refer to **Aileron and Flap Rigging**. The ailerons on the S-17 are light and responsive. The feel can be tailored to your liking, for heavier feel move the push pull tube closer to the hinge. See **Figure 9-2.**

Yawing or rolling also may be induced by stabilizers that are out-of-true; standing directly behind the tail, sight along the Stinger's tail boom to check the tail surfaces. Rigging can be affected through the tail cables, which are adjusted by relocating the bolts to other holes in their tangs.

Pitching tendencies are influenced by the horizontal stabilizer's angle of incidence. This is adjusted by bolting the leading edge among another of the five bolt holes in the vertical stabilizer's forward gusset.

If desired, simple trim tabs can be installed to the trailing edges of the rudder or an elevator to moderate control pressures.

An effective trim tab is a 10" or 12" segment of ¼" tube. Flatten each end and rivet to the control surface on opposite side of desired correction. See **Figure 9-1.**

AIRFRAME MAINTENANCE

The Stinger's Dacron fabric will last several years of normal use, if the plane is protected from direct sunlight and weather while not in use. Ultraviolet is the most common cause of Dacron aging; signs of this include faded colors, brittleness, fraying and fragility. Clear-coating will extend the useful life of Dacron considerably; however, clear-coated or not, the best preservative is covered storage.

Clean Dacron fabric with mild soap and water. On clear coated surface, use Brilliance *, and on tough dirt use 409 spray cleaner. The aluminum tubing needs little more than a damp cloth or mild soap cleaners; followed this with a dry cloth to prevent spotting.

If you conduct flight operations near salt water, thorough fresh-water washing is a must and should be done immediately after the last flight of the day. Saltwater can cause serious corrosion of key structural elements. Internal rinsing of spars, struts and fuselage members with fresh water is required if the plane has been excessively wetted or submerged. During cleaning of any type, inspect the craft for signs of corrosion as well as any other anomalies.

The Stinger's aluminum and steel components are designed to last for many years; however, abuse through hard landings and high-speed flight in rough air could fatigue key structural elements. When inspecting the airframe, look for cracks; bent, dented or corroded tubing; elongated bolt holes; flecking of anodization (which may indicate overloading and bending) and any signs of misalignment or distortion. Consult your dealer or RANS, Inc. if your inspection reveals airframe damage beyond your ability to repair.

* Brilliance is available thru your RANS, Inc. parts department.

ENCLOSED TRAILERS

The distance, terrain, weather and type of trailer will determine how much disassembly is necessary to transport the Stinger. With an enclosed trailer, remove the wings and hang them on the wall of an enclosed trailer. Folding the tail is necessary only if the trailer width proves too narrow.

OPEN TRAILERS

When towing long distances on an open trailer, remove the tail surfaces from the tail boom; highway speeds and gusts can induce damaging loads. Ensure that all components are stowed securely.

If you must tow tail-first with the tail group installed, lock the rudder and elevator surfaces in neutral positions; with the aircraft trailered in this attitude, driving speed should be limited to 35 mph and should not be attempted at all if winds are more than moderate. This method is acceptable for hauling a few miles, but is not suited for long hauls.

CORROSION and WASHING YOUR PLANE

Using the garden hose to wash the outside of your plane may seem like a great idea, however this is a practice avoided at the factory. We simply never let the plane get to the point it needs hosing. Instead, the exterior of the plane is cleaned using a product called Brilliance. This mild cleaner works great on all surfaces including the Lexan. For the oil or exhaust stains, we use 409 or Fantastic. These clean very effectively without apparent damage to the paint.

If your plane is open air like an Airaile or Stinger and you do use a hose to wash it down, you may be causing a future corrosion problem. In the case of any open cockpit plane with the tail sitting low, it is possible for water to collect inside the elevator push pull tube. This will rust away the elevator yoke and corrode the push pull tube also.

Even leaving the plane in the rain can allow moisture to collect in the elevator yoke. Please avoid the practice of spraying water into the cockpit area of your plane, open cockpit or not, this is a practice that will lead to corrosion problems and part replacement.

If you suspect your aircraft of corrosion problems, inspect all areas where water may collect, such as the elevator yoke area.