

ASSEMBLY INSTRUCTIONS—Introduction

Fuselage

Objective:

At the conclusion of this section, vertical fin, rudder, stabilizers, elevators and dorsal fin will be installed on fuselage. Rudder, elevator and aileron control systems will be operative. Tail wheel, nose gear and main landing gear will be installed. Fuel tank and instrument panel installed. Fuselage covered, primed and painted. Wings and struts attached. Windshield installed and throttle assembly installed.

Tools required:

1/4", 3/16", 1/8" drill bits
Electric drill
Pop rivet gun
Protractor or angle gauge
Wrenches

Other materials: (not supplied in kits)

Masking tape
C-Clamps
Scraps of lumber (as per diagrams)

For covering instructions, refer to Section I, page 6:

How to cover the tail surfaces using 'Heat shrinkable material'

Preface to Section III

The fuselage assembly of the Challenger is nearly complete when shipped from the factory. Most bolts, nuts, washers etc. are in place. Be sure to carefully inspect all parts and assemblies for integrity before you start this section.

If you have the flaperons or the Special cockpit mod upgrades, install these at this time (see following instructions).

Section III fuselage parts and hardware inventory list - page 1

Check the relevant hardware pertaining to your specific order.

Parts on fuselage

()	4 STB-100	(Stabilizer struts with hardware attached)	(see A-1)
()	2 2S-001	(Front wing struts “ “)	(see A-2)
()	1 2S-002-R	(Right rear wing strut “ “)	(see A-2)
()	1 2S-002-L	(Left rear wing strut “ “)	(see A-2)
()	1 DF-100	(Dorsal fin with hardware attached)	(see A-3)
()	1 NG-100	(Nose gear assembly “ “)	(see A-4)
()	1 JS-200	(Set of Jury Struts - eight 1/2” tubes)	

A-1

8	UB-1S (Stainless U-brkt)
4	AN525-10R14 (Screw bolt)
4	AN393-19 (Clevis pin)
4	AN416-2 (Safety pin)

A-2

4	AN4-24A (Bolt)
4	AN365-428 (nyloc nuts)
8	S-84 (Black nylon saddles)
4	AN365-1032 (nyloc nuts)

A-3

4	UB-2 (Aluminum U-Brkt)
4	AN525-10R14 (Screw bolt)
4	AN365-1032 (nyloc nut)

A-4

2	1/4” x 28 Stainless steel threaded rod
4	NF-4 (Ball joint)
4	AN316-4 (Jam nut)
4	AN4-7 (Bolt)
4	AN960-416 (washer)
4	AN365-428 (nyloc nut)
2	3/4” Stainless hose clamp
2	1 1/4” Stainless hose clamp

B. Section III Hardware box.

() ()	3	#1246 (5” Tire with tube)	
() ()	2	#1250 (6” Tire with tube)	
() ()	3	#1057, #1179 (5” rim with bearings, bolts and locknuts)	
() ()	2	#1125 (6” rim with bearings, bolts and locknuts)	
() ()	1	LX-01 (lexan windshield) (not used with optional door kit)	
() ()	2	SC-a (seat cushion assembly, front and rear)	
() ()	2	2TP-002 (top former plate)	
() ()	2	FG-99 (rear boom brace gusset)	
() ()	1	IN-1 (instrument panel material (1/8” AC plywood) with template.	
	2	AN525-10R24 Screw bolts and 2 AN365-1032 nyloc nuts.	
() ()	1	EL-100 Elevator pushrod tube set (6 tubes, 4@ 1/2”, 2@5/8”) with hardware.	
	4	AN490-HT8P (threaded rod end)	4 AN4-7A (bolt)
	4	NF-4 (ball joint)	4 AN365-428 (nyloc nut)
	4	AN316 (Jam nut)	4 AN960-416 (washer)
	4	1/4” hardware washer	
() ()	1	AL-100 aileron pushrod tube set (2 tubes 1/2”) with hardware	
	2	AN490-HT8P (threaded rod end)	2 AN960-416 (washer)
	2	NF-4 (ball joint)	2 AN393-13 (clevis pin)
	2	AN316-4 (Jam nut)	2 AN416-2 (safety pin)
	2	AN4-7A (Bolt)	2 3246 (alum clevis fork)
	2	AN365-428 (nyloc nut)	2 1/4” hardware washer

Section III fuselage parts and hardware inventory list - page 2

Check the relevant hardware pertaining to your specific order.

- () () 1 PL-100 rudder pedal interconnect tube set (4@ 1/2" tubing, 2@ 5/8" tubing) w/ hdwr.
 4 AN393-13 4 AN416-2 (safety pins)
 4 3246 (alum. Clevis fork)
- () () 1 JS-200X jury strut hardware bag:
 16 ST-16L (stainless steel L shaped Bracket)
 16 ST-16F (stainless steel flat brkt.) 12 AN525-10R14 (screw bolt)
 2 AN525-10R16 (screw bolt) 14 AN365-1032 (nyloc nut)
 24 AD64ABS (3/16" alum. rivet, 1/4" long--L brkt. to wing spar)
 72 AD62ABS (3/16" alum. rivet, 1/8" short-- brkt. to 1/2" jury struts)
- () () 2 LG-2 (axle elements) with steel spacers and 5/8" thin nyloc (or with brake pkg.)
- () () 1 LG-100 (nose gear fork assembly) with axle, 2 alum. tube spacers, 1 each 7" Grade 8
 (bolt), 3/8"-24 (nyloc nut), AN3-14A (bolt), AN365-1032 (nyloc nut),
 AN960-10 (washer 3/16) and 2- 5/16" hardware washers
- () () 2 LG-1 (main gear legs)
- () () 1 LG-8 (tail wheel assembly)
- () () 1 ST-200 (Superflite covering material for fuselage- 6 pcs. Pre-cut)
- () () 2 Challenger decals (taped to instrument panel)
- () () 1 FTH-2L (front throttle interconnect - push/pull rod w/handle)

C: MISC. HARDWARE BAG:

- () () 1 TT-100 (trim tab set with 6-ST-16L,6-AN525-10R10 (screw bolt),6-AN365-1032 (nylon
 Nut),12-AN960-10 (washer),18- AD64ABS (3/16" alum. Rivets, long)
- () () 1 SM-SP mini-spares hardware bag
- () () 2 IG-1 (pair of black ignition wires with connectors)
- () () 2 GRIP (control stick grips with caps)
- () () 6 AD64ABS (3/16" alum. Rivets long) (rudder rivet bag)
- () () 25 AD42ABS (1/8" alum. Rivets, short) (windshield & top former rivet bag)
- () () 100 SSD42SSBS (1/8" stainless steel rivets, short)
- () () 1 A510-5 (ignition switch)
- () () 8 ft. safety wire for turnbuckles & prop bolts

D: SPAR & STRUT BRACKET BAG:

- () () 4 2" Rony (black alum. U-brkt (7075-T6), for wing spars)
- () () 4 1 5/8" Rony (black alum. U-brkt., for wing lift struts)
- () () 2 AN4-26A bolt (for 2" rony thru root tube)
- () () 4 AN4-26 bolt (for attaching spars to 2" rony brkts.)
- () () 4 AN4-24A bolt (for attaching 1 5/8" rony brkts. to longerons)
- () () 4 AN4-22 bolt (for attaching lift strut to 1 5/8" rony brkts.)
- () () 8 AN310-4 (1/4" castle nut)
- () () 6 AN365-428 (1/4" nyloc nut)
- () () 6 AN960-416 (1/4" washer)
- () () 6 AN416-2 (safety pin)
- () () 2 LSR (safety ring) (for castle nut on rear spars)

Section III fuselage parts and hardware inventory list - page 3

Check the relevant hardware pertaining to your specific order.

E. Gear cable and throttle bag:

- () () 2-- LG-3 landing gear cross cables
- () () 2-- LG-5 landing gear drag cable with AN43B-24A eyebolt and T2-FAT(tang) attached
- () () 2-- AN4-24A bolt, 6-- AN960-416 washer, and 2-- AN365-428 nyloc nut for attaching
drag cable to fuselage
- () () 1-- TH-200 throttle cable assembly with handle, lever and rear throttle cables
- () () 8-- AN742-D3 3/16" adel clamps for attaching throttle cables to fuselage
- () () 8-- AD64ABS 3/16" alum. Rivets, long for attaching adel clamps
- () () 2-- AN4-20A bolt with 2-- AN365-428 nyloc nut (gear leg to socket)
- () () 2-- AN4-17A bolt with 2-- AN365-428 nyloc nut (axle to gear leg)

F. Fuel system hardware bag:

- () () 6 Ft. 1/4" I.D. blue fuel line
- () () 1-- fuel filter
- () () 1-- X-type bungee cord
- () () 12-- metal hose clamps
- () () 1-- 3/8" plastic adel clamp
- () () 1-- AD64ABS 3/16" alum. Rivet, long for attaching plastic adel clamp
- () () 1-- fuel primer bulb
- () () 50-- AD42ABS 1/8" alum. Rivet, short
- () () 16-- SSD44SSBS 1/8" stainless steel rivet, long

G. Fuel Tank Box:

- () () 1-- 5 Gal. OR 1-- 10 Gal. Tank with pickup tube and vent
- () () 1-- TT-0-5 plywood tank tray bottom (for 5 gal. tanks only)
- () () 1-- TM-2-5 tank mount tube set (5 gal.)
- () () 1-- TM-2-10 tank mount tube set (10 gal.)
- () () 1-- TT-5 fuel tank tray set 4 pcs. (5 gal.)
- () () 1-- TT-2-10 fuel tank tray set 3 pcs. (10 gal.)

H. Shoulder Harness:

- () () 2-- SH-1 shoulder harness
- () () 2-- AN5-25A bolt
- () () 2-- AN365-524 nyloc nut
- () () 2-- AN970-5 lg. Area washers
- () () 1-- Instruction sheet

FLAPERON KIT PARTS INVENTORY

FACTORY INSTALLED SLIDE BRACKET:

<u>Qty.</u>	<u>Description</u>	<u>Qty.</u>	<u>Hardware Bag Description</u>
1--	Slide bracket-- installed	1--	AN4-7A bolt
1--	Pushrod outer sleeve (1P-- 11 7/8", 2P-- 28")	1--	AN365-428, 1/4" locknut
2--	Pushrod inner sleeve (1P-- 11 7/8", 2P-- 11 7/8")	3--	AN310-4, 1/2" castle nut
1--	Bellerank-- installed	7--	AN960-416, 1/4" washer
1--	Crank Assembly-- pre-assembled	1--	Ball Joint
	1-- AN4-25 bolt	1--	Threaded Rod end
	5-- thin plastic washers	1--	Clevis Fork
	2-- cotter pins	5--	Cotter pins
	1-- AN310- 4, 1/2" castle nut	8--	AD42ABS, rivet 1/4" alum.
	1-- AN365-428, 1/4" Nyloc	1--	#13 Clevis pin
		1--	5/16" zinc large area washer (ball joint)
		1--	instruction sheet

RETRO-FIT FLAPERON SLIDE BRACKET

14--	S. S. Large area washers
1--	Slide Bracket
2--	AN4-25 bolt
2--	AN960-416 washer
4--	AN310- 4 castle nut
4--	Cotter pin

FLAPERON INSTALLATION INSTRUCTIONS

If your Challenger is already built, you should remove the wings for easier access to the aileron bellcrank area. Remove the bolt and black plastic spacers that attaches the bellcranks to the fuselage root tube (you will have to cut a small hole in the fabric on either side of the fuselage just below the top former plates. This hole may be patched after the flaperon mechanism has been installed)

Assemble flaperon slide mechanism as shown in drawing "A". Be sure to put stainless steel washers where indicated, especially under bracket! This is very important; the stainless steel slide bracket must slide on the stainless steel washers, not on the aluminum root tube! Trim top fuselage former plates to provide necessary clearance.

Referring to drawing "B" drill square root tube at locations indicated using 1/4" drill bit and debur holes.

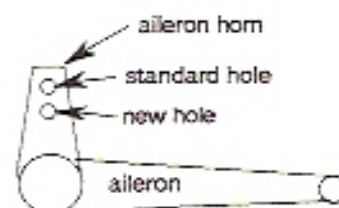
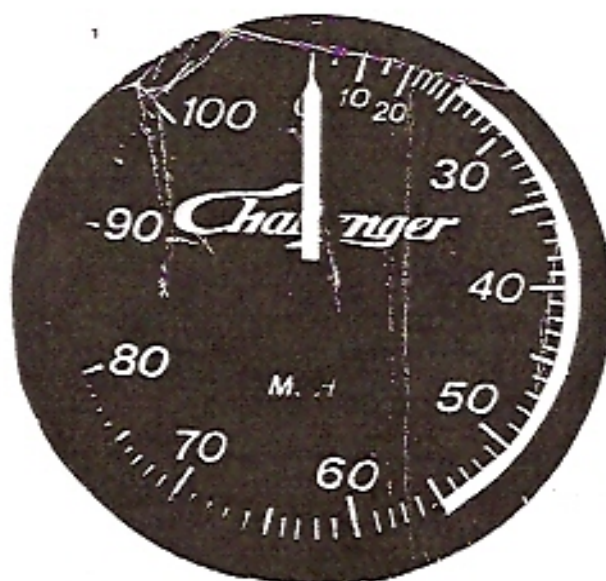
Install the crank assembly as shown in drawing "C" using washers provided to space parts away from square root tube to allow clearance between root tube and threaded brass swivel pin (two washers on eyebolt and three washers on bellcrank bolt works well). Install washers, castle nuts and cotter pins only tight enough to allow freedom of movement.

Assemble pushrod to length when slide is parallel with root tube as shown in drawing "C". Inner pushrods may or may not have to be shortened. Use stainless rivets provided.

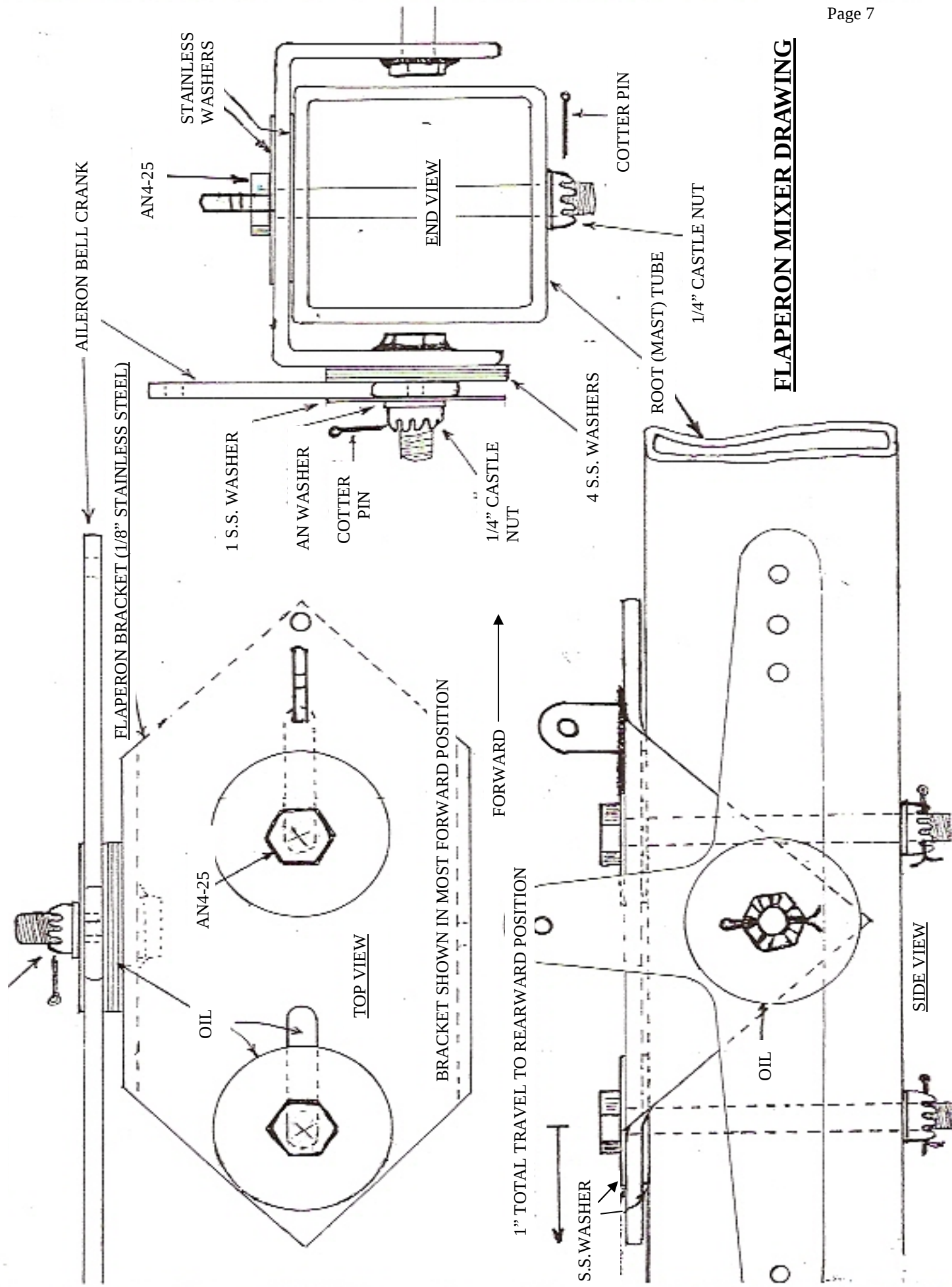
Oil mechanism wherever it slides, pivots or screws. Re-glue fabric and touchup paint as require.

Mark airspeed indicator as shown below. The maximum speed at which to use full down flaperons is 55 mph on the single place and the two place. Up (reflex) position can be used at any speed. If properly set up the flaperons should go up 10 deg. and down about 15 to 20 deg. You may have to readjust your aileron pushrods to get optimum results.

You can increase the amount of flaperon and aileron by drilling a new 1/4" hole in the aileron horn as in the sketch below. This new hole should be 3/4" below the factory drilled hole. Be sure you still have full aileron movement with the flaperons set in their full up and full down positions.



BELL CRANK & HARDWARE SHOWN ON ONE SIDE ONLY FOR CLARITY.

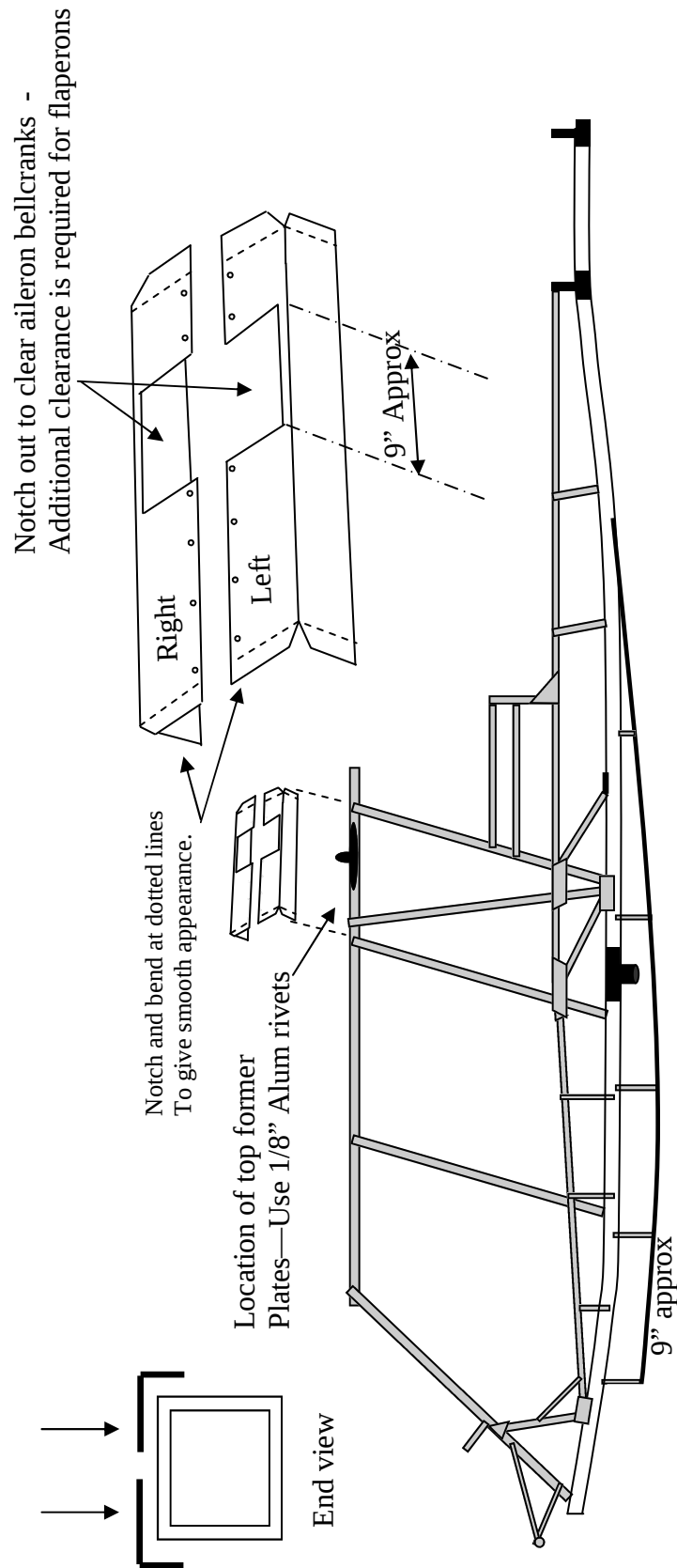


FLAPERON MIXER DRAWING

How to install the top former plates (TP002)

Step #1

Select the bent aluminum plates (TP-002) that are used for covering the top of the fuselage to act as formers for subsequent Dacron covering. Install plates as illustrated below using aluminum 1/8" rivets (in bag with windshield rivets). These plates provide a place to attach the fabric covering. Be sure to allow clearance for aileron bellcrank and flaperons mechanism movement.

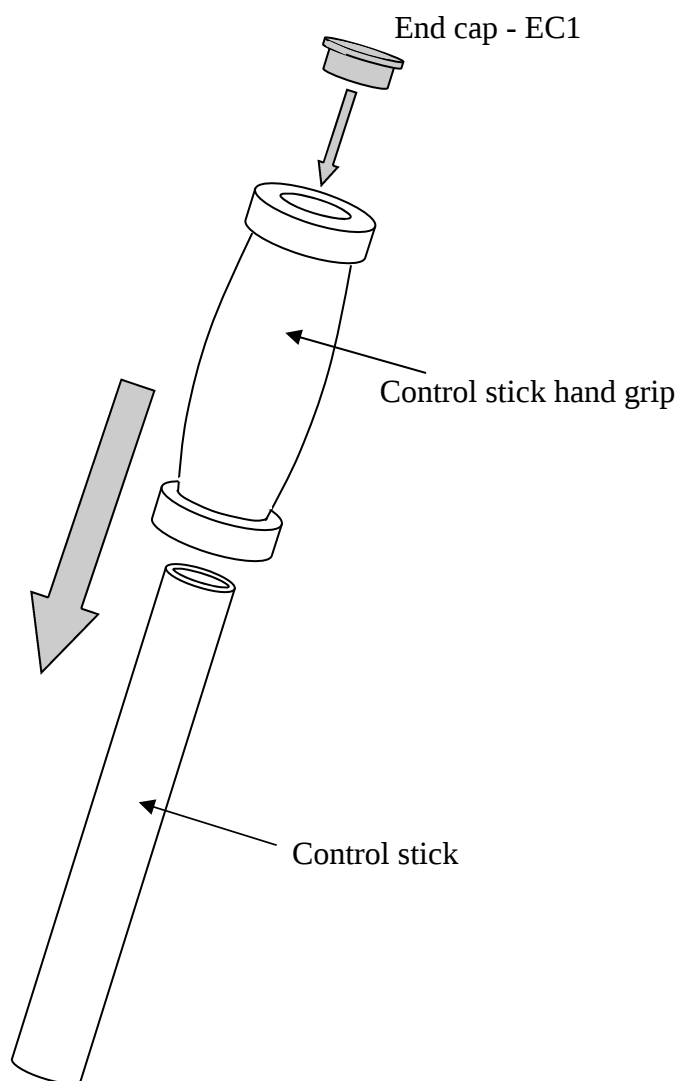


Installation of top former plates.
Some airframe parts omitted for clarity.

Control Stick hand grip

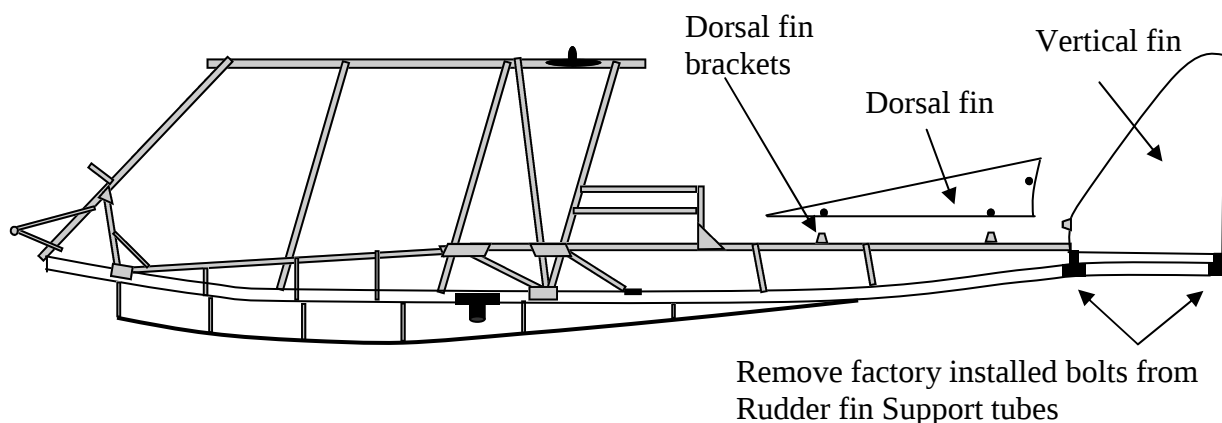
Step # 2

Install hand grip on control sticks (see below). Coating the inside of the grip with dish soap will help the grip slide over the tube. Insert end cap - EC1 into open end of control stick. You will need to gently tap this into position.



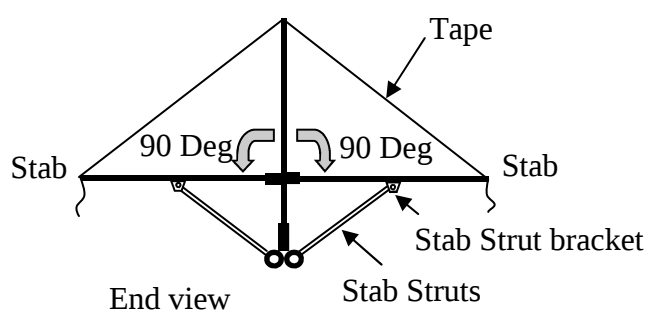
How to attach tail surfaces to fuselage.

Step 3



Remove factory installed bolts from vertical fin support tubes and insert rudder fin leading and trailing edge tubes into the vertical support tubes. Use the pre-drilled holes in the black support assembly as a pilot to drill 1/4" holes through the aluminum frame of the fin.. NOTE: Be sure the fin tubes are inserted completely into the support tubes. Re-install the factory bolt and eyebolt with associated nut. Tighten bolts making sure the 'flat' of the eyebolt is in a horizontal position. (This eyebolt is part of the lower rudder hinge assembly).

Step 4



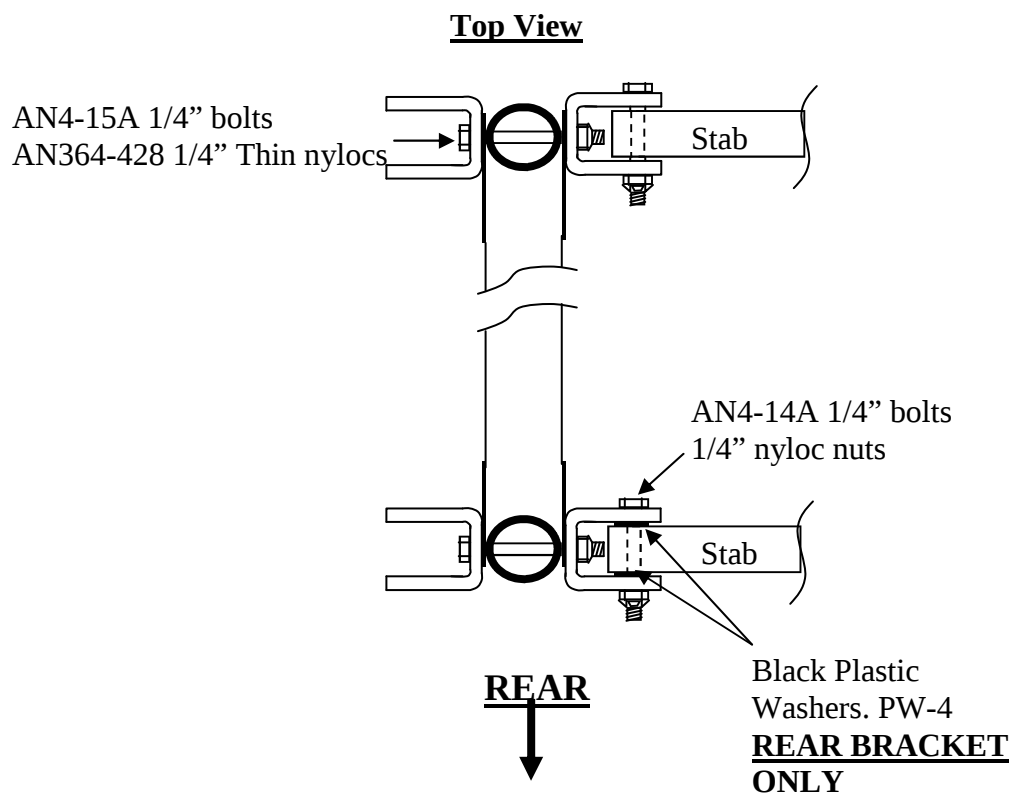
Use filament tape to hold the stabilizer surfaces squarely in place. Extend the stabilizer struts and brackets to find proper bracket location on leading and trailing edges of the stabilizers. Mark the bracket connect holes carefully in the center of the stabilizer frame tubes and drill for installation of rivets. Remove brackets from the struts one at a time, drill and rivet each bracket in place with long stainless rivets (SSD44).

How to attach tail surfaces to fuselage.

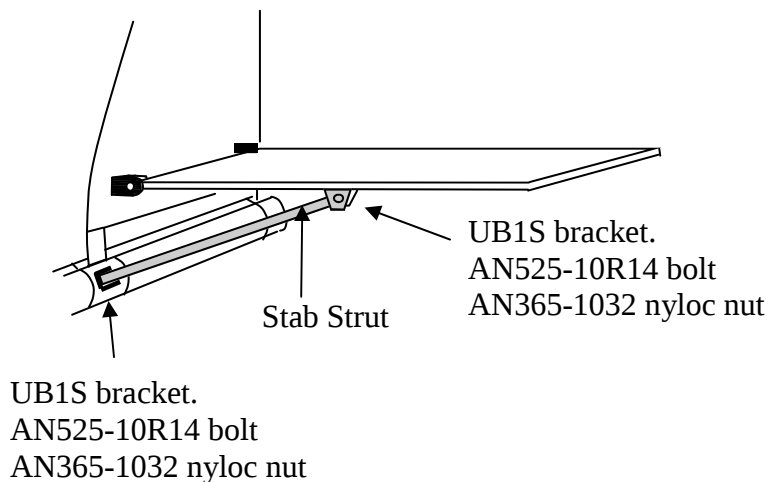
Step 5

Remove hardware from stabilizer attach brackets (on vertical fin) and insert the stabilizers. Replace bolts, nuts, pins and black plastic washers. Repeat for remaining stabilizer.

NOTE: The kit is supplied with 4 Black plastic washers - PW-4. These are installed on the trailing edge attach point hardware (rear bracket) only.

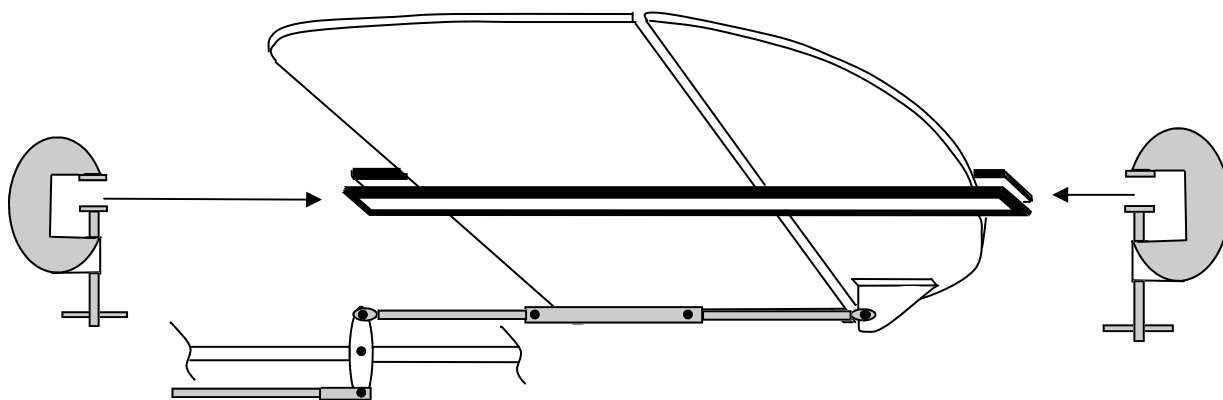


Step 6



How to attach Elevators and Elevator push rods

Step 7 Attach Elevators to Horizontal Stabilizers with hinge clevis pins. Hold the Elevator level with scrap lengths of wood and C-Clamps (as shown below).



Step 8

Assemble telescoping elevator push rods (do not rivet yet) and connect push rods between elevator control horn and stainless steel elevator bellcranks on fuselage (drill 3/16" holes to 1/4" where required).

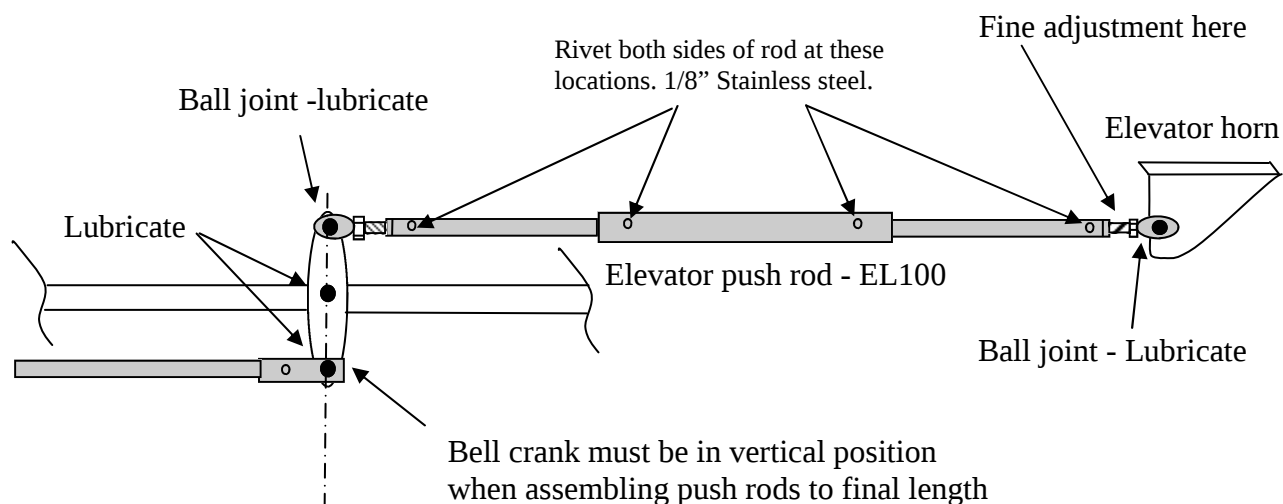
Be sure the elevator bell cranks are positioned in the Vertical position (as shown below). When proper length of the push rod is found, rivet in place with short stainless steel rivets (SSD-42). Make sure that the two smaller tubes telescope an equal amount into the outer sleeve.

Repeat this step for the remaining elevator push rod.

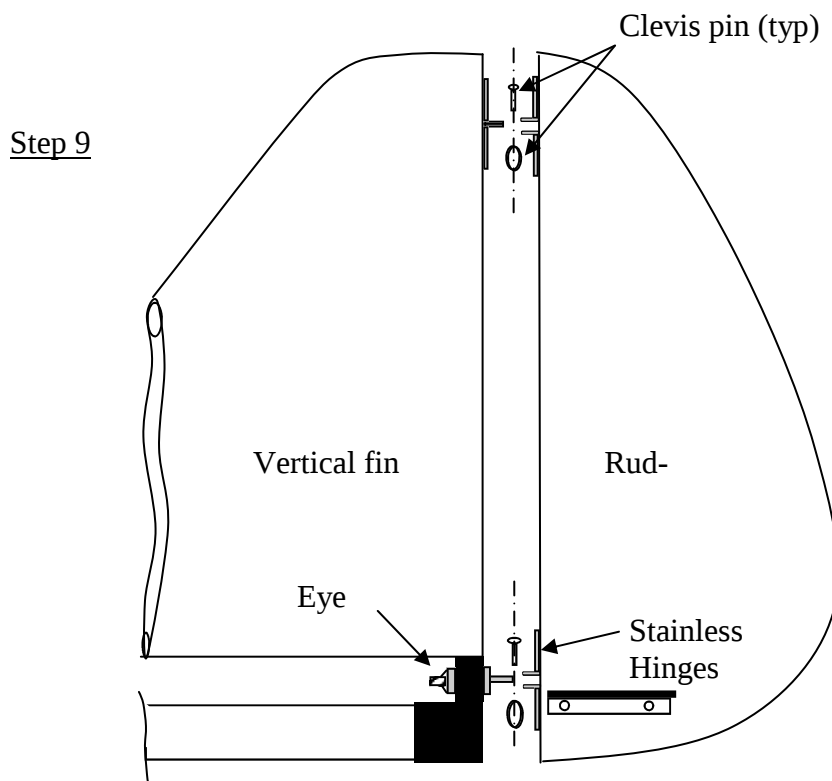
NOTE: The individual elevators must be aligned with each other during movements of the control stick.

Ensure the ball joints have **NO MORE** than 3 turns from bottoming out.

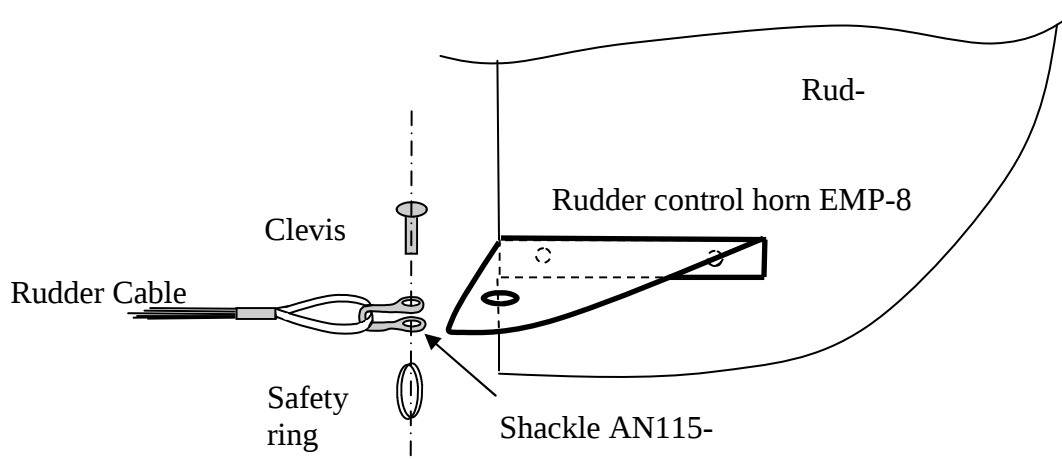
The horizontal stabs, elevators and pushrods may be removed and set aside until later.



How to connect the Rudder assembly



NOTE: Bottom hinge assy. cannot be

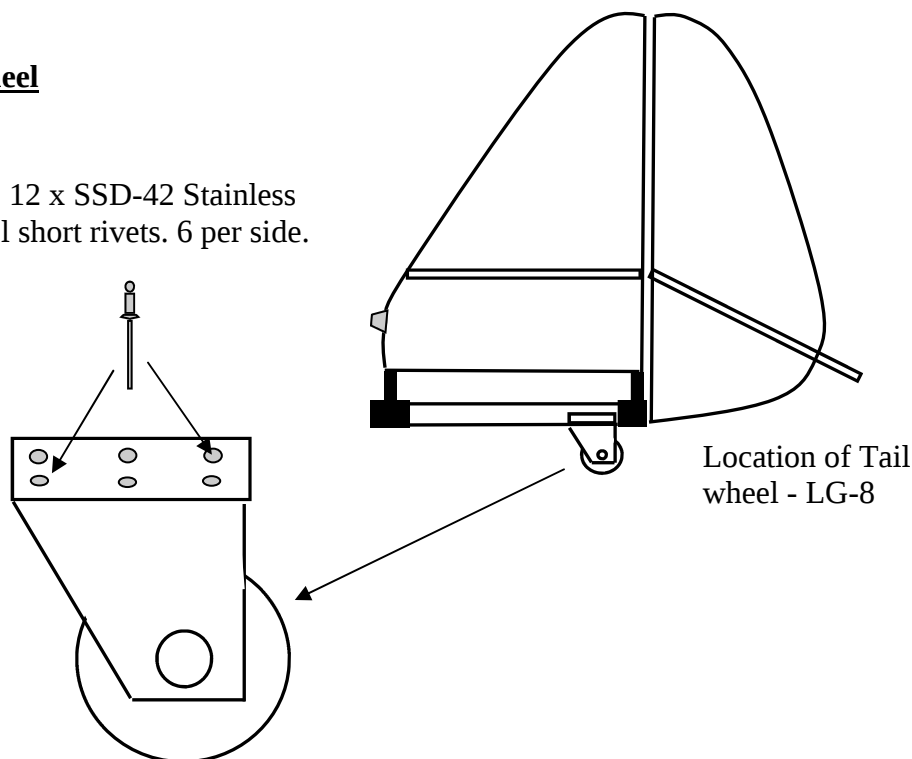


Connect the rudder to the vertical fin with the top hinge assembly completed in Section One. Carefully align the rudder with the vertical fin and locate the precise location the hinge brackets will be installed on the rudder (see above). Insert clevis pin and mark rivet holes in each hinge bracket. Rivet hinge brackets in place using 3/16" aluminum rivets.

How to assemble the landing gear

Step # 10 Tail wheel

Use 12 x SSD-42 Stainless steel short rivets. 6 per side.



Connect tail wheel assembly as shown above. Use SSD-42 Stainless steel short rivets. 6 per side.

Step # 11 Gear legs

Insert landing gear legs into their respective sockets on fuselage, attach bracing cables and drag cables as shown on page 16 & 18. Make sure that cross cables have equal tension and that eye bolts are parallel to each other before drilling. Drill hole in steel gear-leg socket about midway from frame to end of socket and parallel to fuselage longerons with 1/4" drill bit. Install 1/4" bolt (AN4-20A) 1/4" lock nut.

Step # 12 Axle assembly

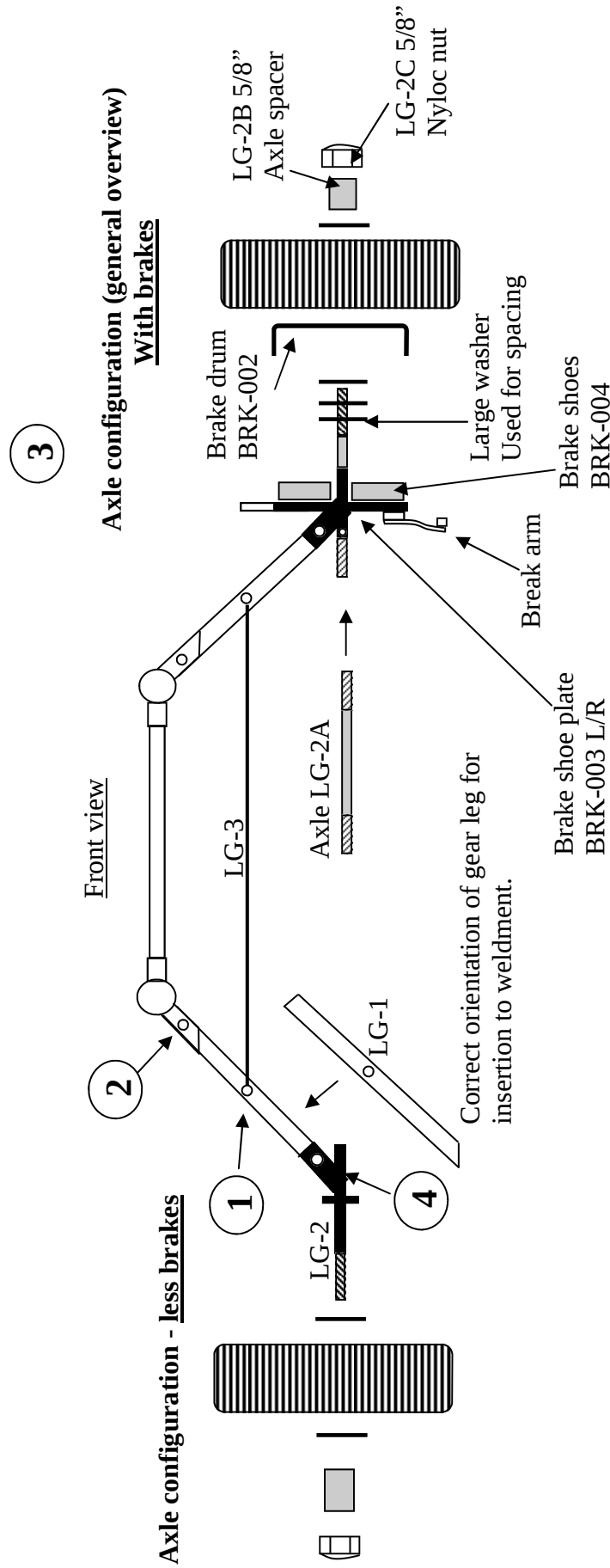
Insert axle assembly into gear strut tube, see page 16. Set the wheel with approximately 1 degree of tow-in by rotating the axle assembly. The toe-in is not real critical, but remember that zero toe-in is better than too much toe-in. Holding the assembly in position, drill a 1/4" hole through gear strut tube and axle assembly. Locate 1/4" hole as close to bottom of gear leg as possible and parallel to longerons. Install 1/4" bolt and lock nut.

Repeat assembly procedure for remaining leg and axle.

Step # 13 Nose Gear assembly

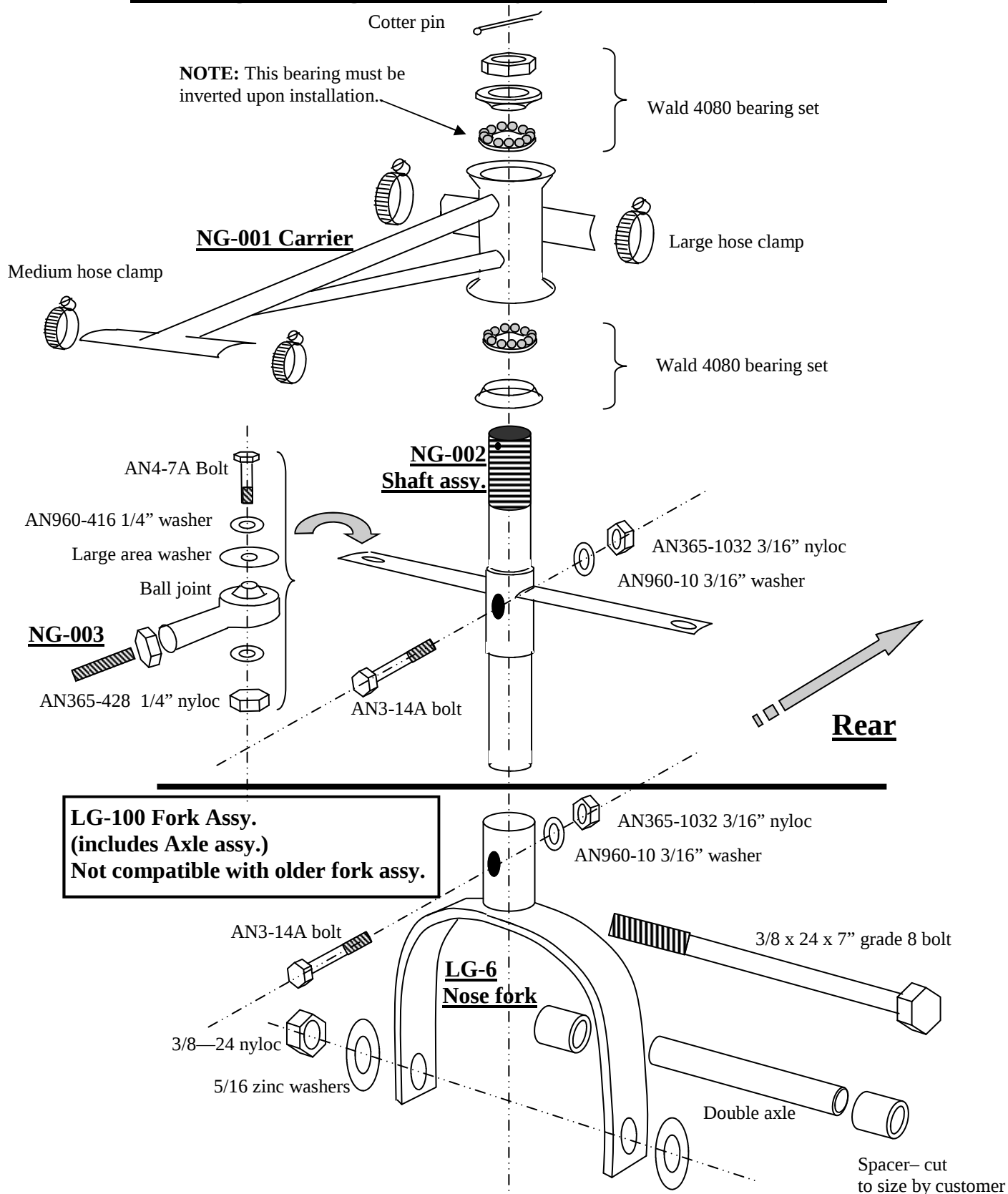
The nose gear assembly is shipped in place but with front of assembly not secured in final position. Lower front into position and secure with hose clamps. Tighten all hose clamps when satisfied with position. Connect steering pushrods and adjust for proper pedal angle. Adjust and SAFETY WIRE the rudder cable turnbuckles.

Main landing gear configuration



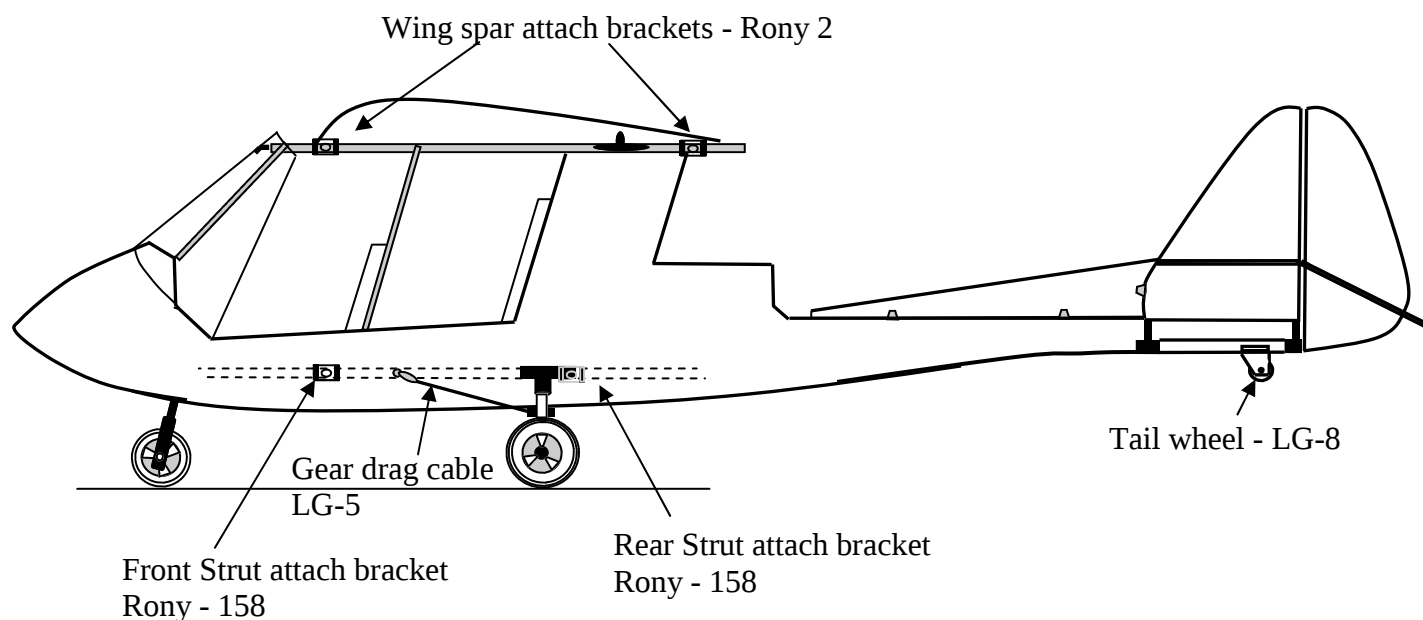
1. Attach gear cables (part # LG-3) before drilling any holes.
 2. Drill 1/4" hole & install bolt and lock nut (AN4-20A bolt & AN365-428 nyloc).
 3. Install axle configuration pertaining to your kit. If brakes are to be installed, refer to further instructions provided.
 4. Drill 1/4" hole after aligning wheel for **1 Degree** 'toe-in' and install (AN4-17A bolt and AN365-428 nyloc)
- Note: To obtain 1 degree toe in, merely tap (gently) the front of your wheel whilst on the axle and attached to the gear leg, until you see an approximate 1 degree angle inwards. Make sure the opposite wheel has the same angle before drilling the hole for the retaining bolt.

Challenger nose gear assembly detail - NG-100 (Less fork)

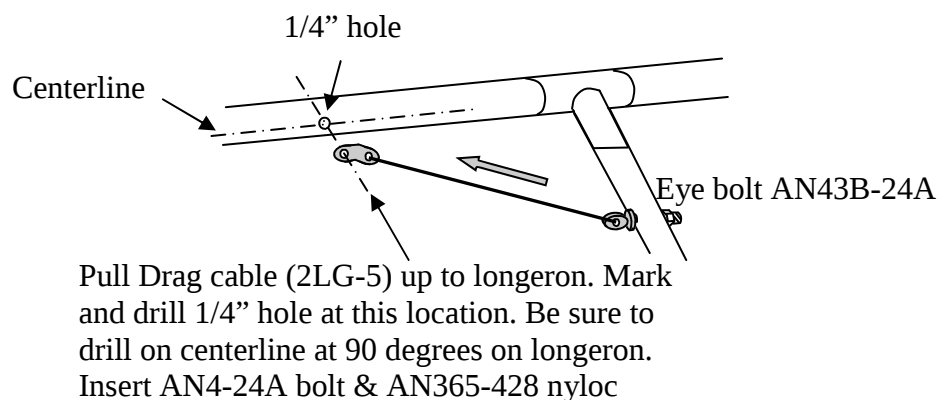


Challenger II sketch showing location of spar and strut brackets and installation of main landing gear and tail wheel.

Step # 14



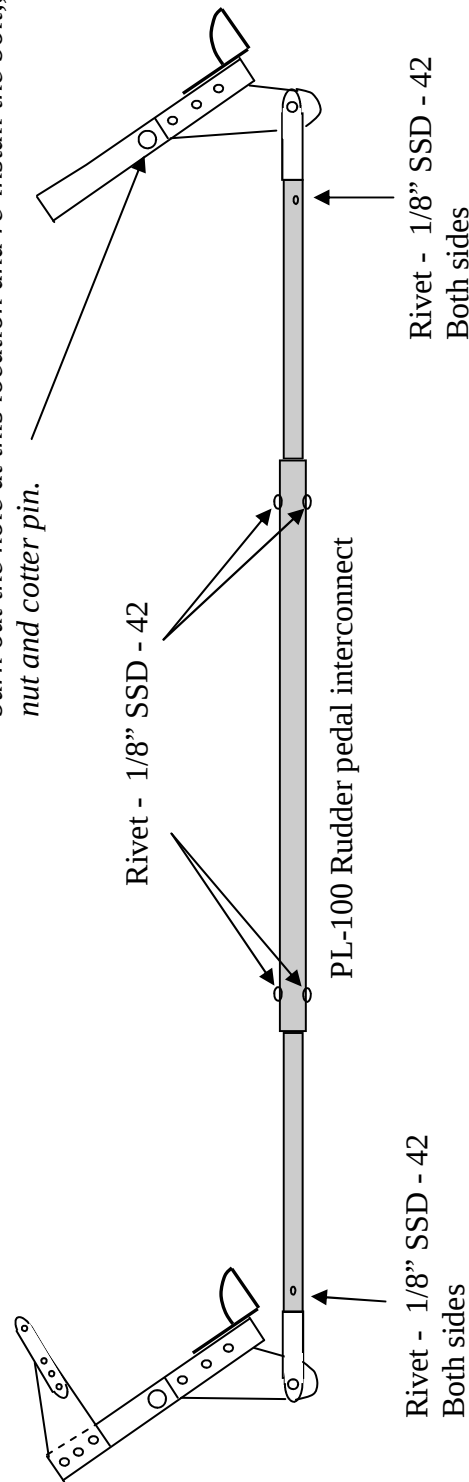
Step # 15



Rudder pedal interconnect pushrods

Step #16

Tip: Remove this bolt from the longeron before covering the fuselage. Once the fabric is on and painted, carefully cut or burn out the hole at this location and re-install the bolt,, castle nut and cotter pin.



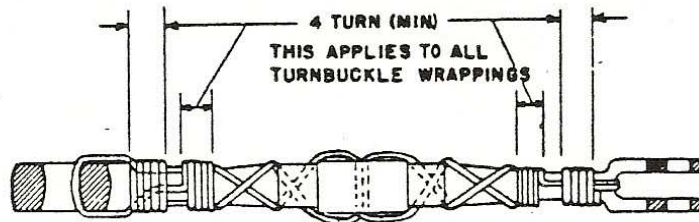
The rudder pedal interconnect pushrods are assembled and riveted in the same manner as the elevator pushrods. Be sure the front pedals are in a neutral position and then position the rear pedals to determine the proper length for the pushrods (as above). We find it best to sit in the rear cockpit and position the pedals to where they are most comfortable.

SAFETY METHODS FOR TURNBUCKLES

Page 21

Safety all turnbuckles with .040 diameter annealed safety wire using either the double or single wrap as described and illustrated. Do not reuse safety wire. Adjust the turnbuckle to the correct cable tension so that no more than three threads are exposed on either side of the turnbuckle barrel. Do not lubricate turnbuckles.

(A) DOUBLE WRAP (SPIRAL)



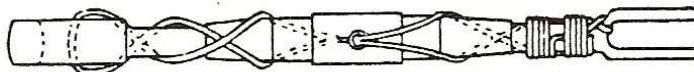
Of the methods using safety wire for safetying turnbuckles, the method described here is preferred, although either of the other methods described are satisfactory. The method of double wrap safetying is shown in figure (A). Use two separate lengths of the proper wire. Run one end of the wire through the hole in the barrel of the turnbuckle and bend the end of the wire towards opposite ends of the turnbuckle. Then pass the second length of the wire into the hole in the barrel and bend the ends along the barrel on the opposite side first. Spiral the two wires in opposite directions around the barrel to cross each other twice between the center hole and the ends. Then pass the wires at the end of the turnbuckle in opposite directions through the holes in the turnbuckle eyes or between the jaws of the turnbuckle fork as applicable, laying one wire along the barrel and wrapping the other at least four times around shank of the turnbuckle and binding the laid wires in place before cutting the wrapped wire off. Wrap the remaining length of safety wire at least four turns around the shank and cut it off. Repeat the procedure at the opposite end of the turnbuckle.

(B) DOUBLE WRAP



Another satisfactory double wrap method is similar to Method A, except that the spiraling of the wires is omitted as shown in figure (B).

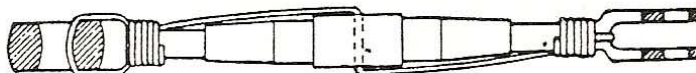
(C) SINGLE WRAP (SPIRAL)



The single wrap methods described and illustrated are acceptable but are not the equal of the double wrap methods.

Pass a single length of wire through the cable eye or fork at either end of the turnbuckle assembly. Spiral each of the wire ends in opposite directions around the first half of the turnbuckle so as to cross each other twice. Thread both wire ends through the hole in the middle of the barrel so that the third crossing of the wire ends is in the hole. Again, spiral the two wire ends in opposite directions around the remaining half of the turnbuckle, crossing them twice. Then, pass one wire end through the cable eye or fork in the manner described above, wrap both wire ends around the shank for at least four turns each, cutting off excess wire.

(D) SINGLE WRAP



Pass one length of wire through the center hole of the turnbuckle and bend the wire ends toward opposite ends of the turnbuckle. Then pass each wire end through the cable eye or fork and wrap each wire end around the shank for at least four times, cutting off excess wire. After safetying, no more than three threads of the turnbuckle terminal should be exposed.

How to install a 5 gallon fuel tank

Step # 17

Assemble the four fuel tank holder parts to form a box as in diagrams on page 22. Make sure that the fuel tank holder is squared up before final riveting. Drill two 1/4" holes in each side part as shown. These holes are for hooking bungee strap to hold tank down in holder.

Next, position tank mount tubes so that the rear one is approximately 16" from the back of the rear seat and rivet in place. Using the fuel tank holder as a guide, position the front tank mount tube and rivet in place. Next, rivet the fuel tank holder to the tank mounting tubes as shown, using AD-42 aluminum short rivets.

Hook up fuel line to tank outlet fitting, insert pickup tube in tank, connect filter, squeeze bulb and remaining clamps and hardware and install tank with bungee cords. Note direction of fuel flow arrows on squeeze bulb and filter.

How to install a 10 gallon fuel tank

.Step # 17a

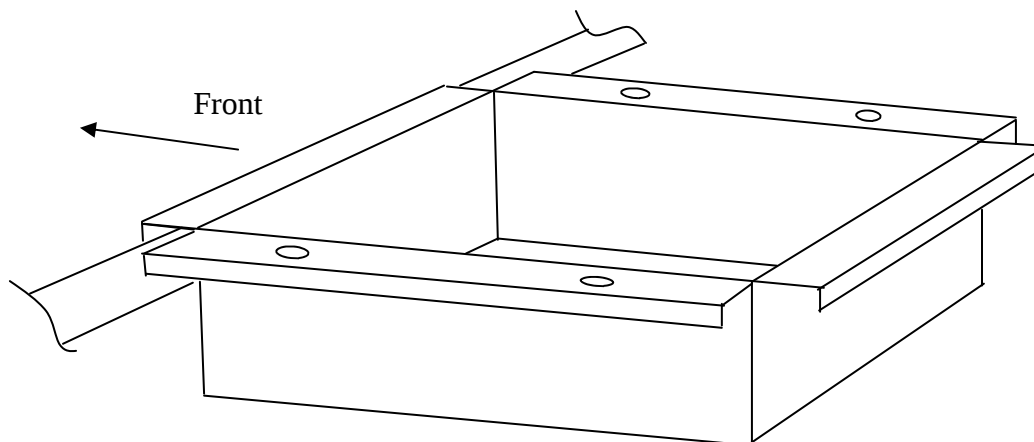
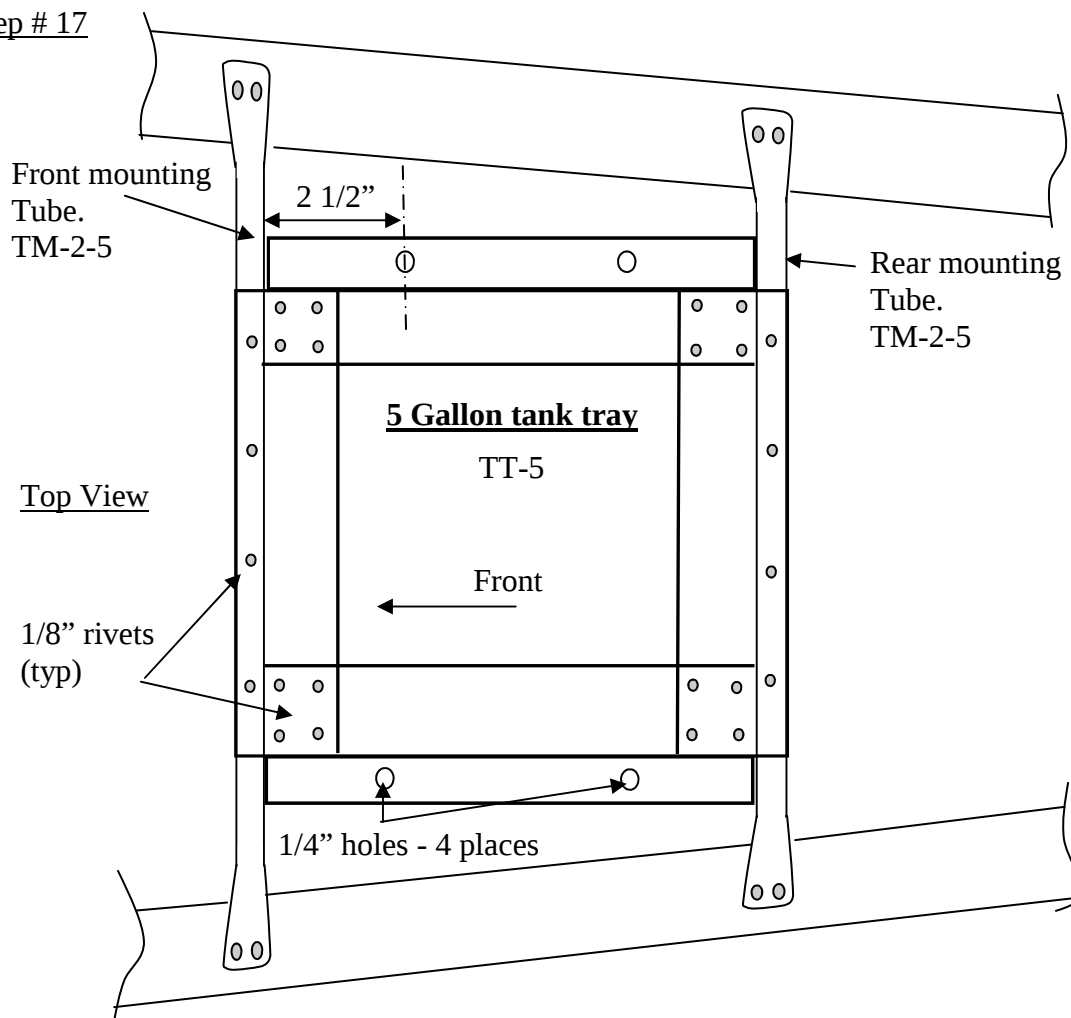
The 10 gal. fuel tank sits in the same general area as the 5 gal. but is positioned lower; resting on the two horizontal diagonal tubes between the main longerons. The tank sump hole in the tray bottom is positioned toward the front end of the triangular space made by the tubes. The rear lip of the tank tray attaches to FB-9 with 4 equally spaced long stainless rivets (SSD-44) and to the diagonal tubes under tray with short alum. rivets (AD-42). Install tank restraint tube in front of tank as shown in drawing page 24.

Note: If you are installing the '503' engine and the 10 gal tank and you weigh under 180lbs, you should move the tank forward as close to the rear seat back as possible

This will require an additional tube to attach the rear lip of the tray to instead of attaching to FB-9. You can use the tube which normally goes in front of the tank. The seat back cross tube will now serve as the front tank restraint tube.

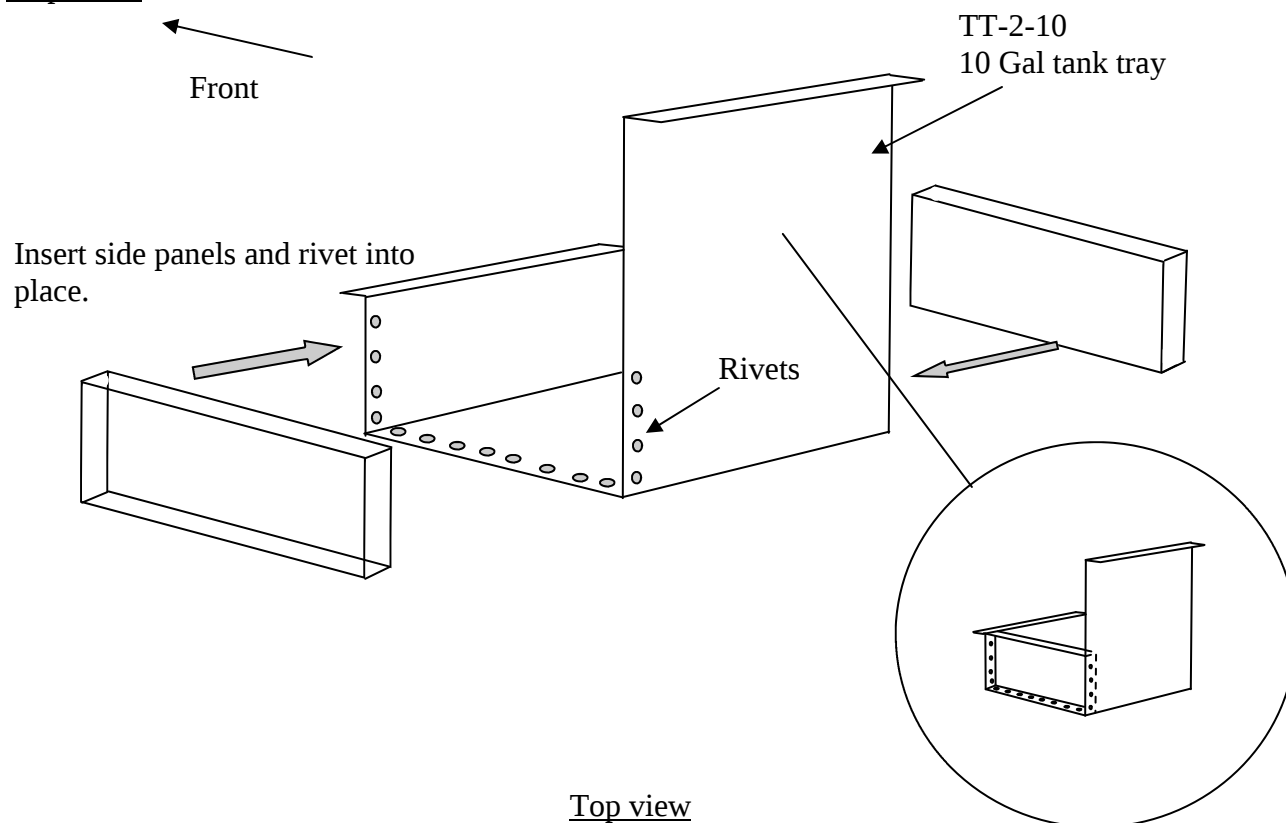
How to install fuel tank tray - 5 gallon configuration

Step # 17

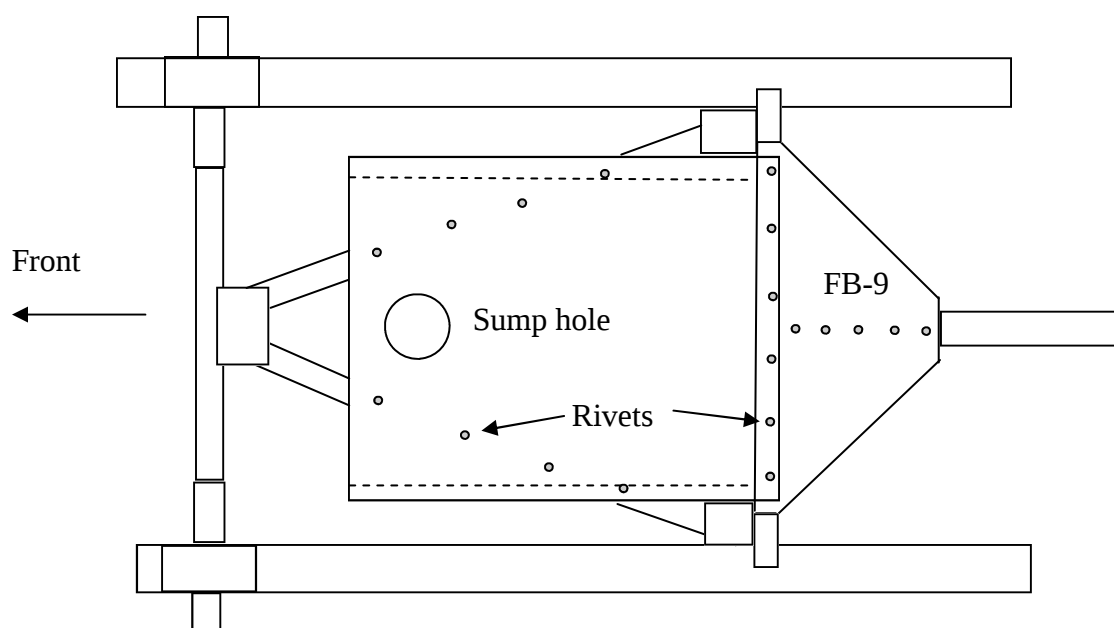


How to install fuel tank tray - 10 gallon configuration

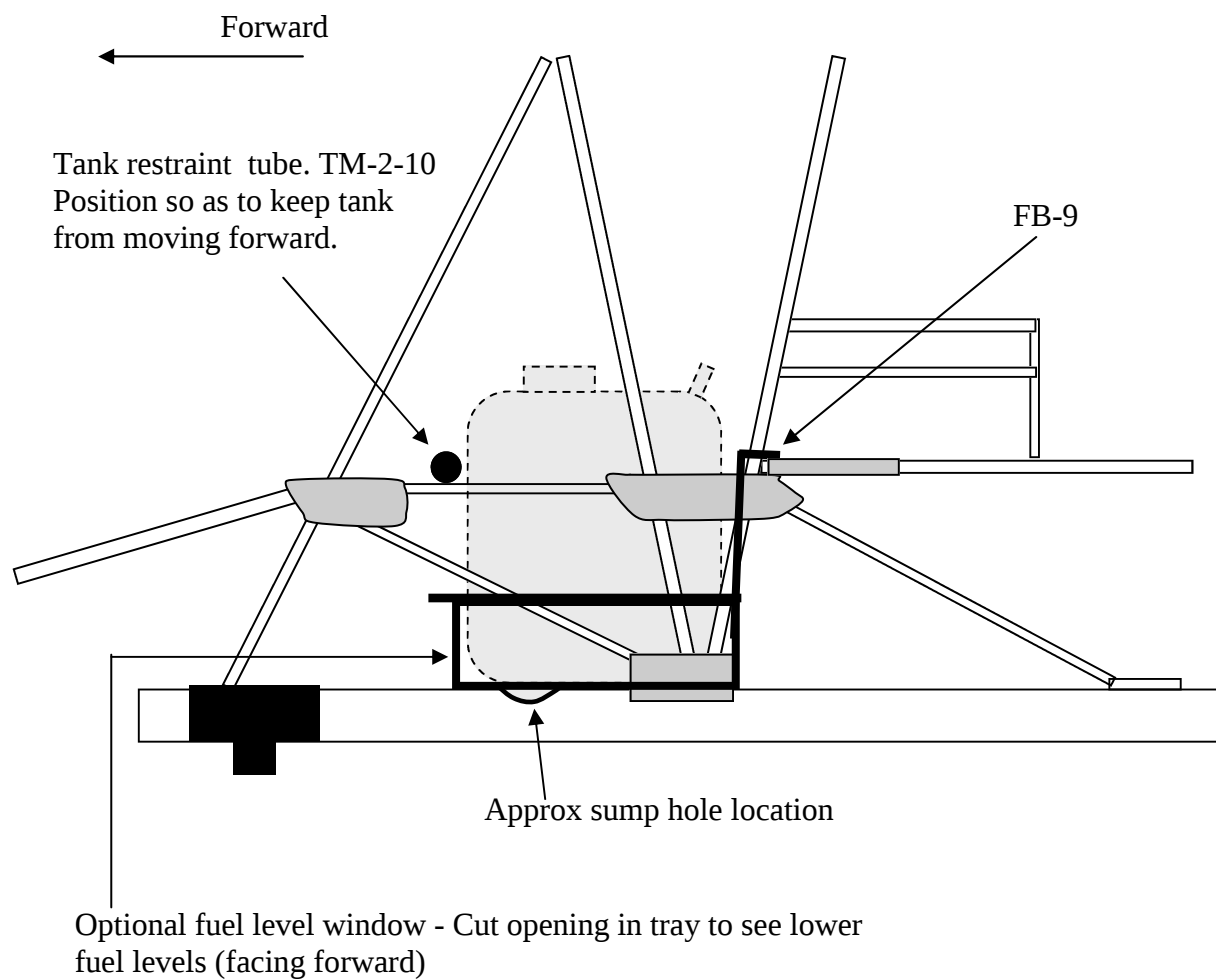
Step # 17a



Top view



Side view diagram, tray and tank installed - 10 Gallon config.



Wiring and electrical installation

Step # 18

There are many varied ways in which you are able to wire your electrical system for your Challenger. Because of this, we will supply the two black wires and terminals required for the ignition switch from the engine for Left and Right kill only, and leave the rest to you. Refer to the wiring diagram for reference.

The wiring loom can be made from 18 gauge wire obtainable from any good hardware store.

You will need the following if you are going to install instruments: (without an electrical starting system).

12– 15 feet (18 Ga.) wire to extend each engine probe installed (CHT/EGT)

12 - 15 feet (18 Ga.) wire for Tachometer (Grey from engine)

A roll of (18 Ga.) black wire and various terminals for grounding.

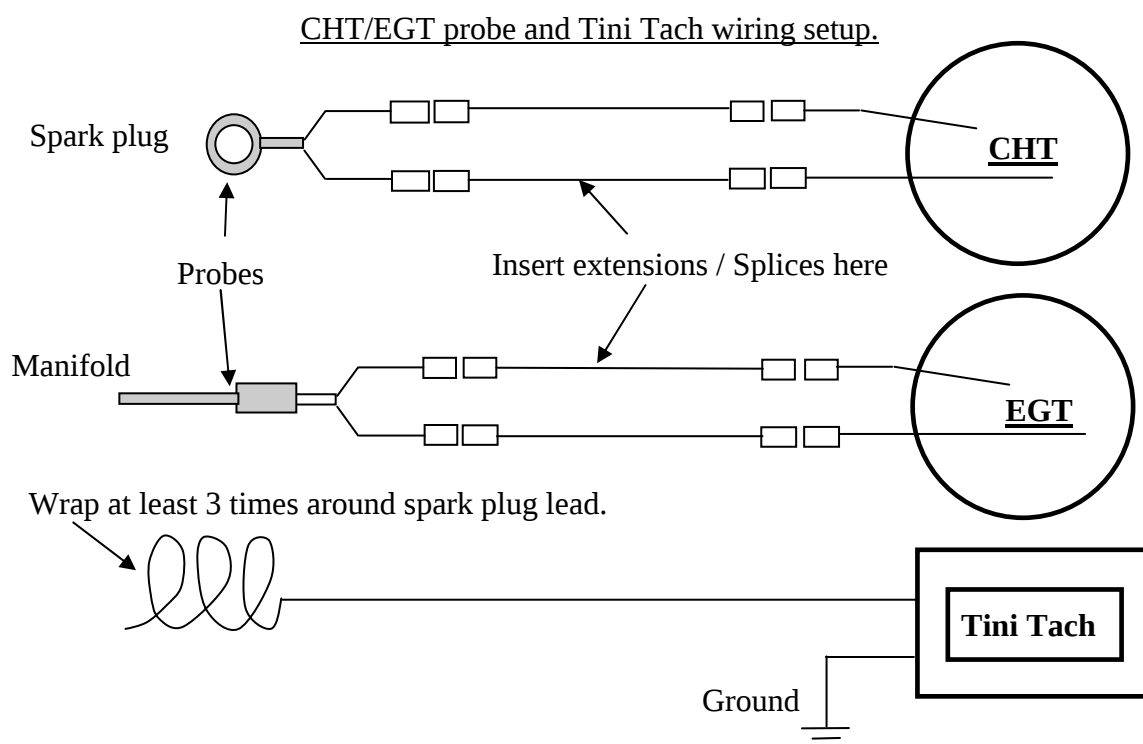
Connectors for the above wire

Tie-wraps to secure wiring to airframe

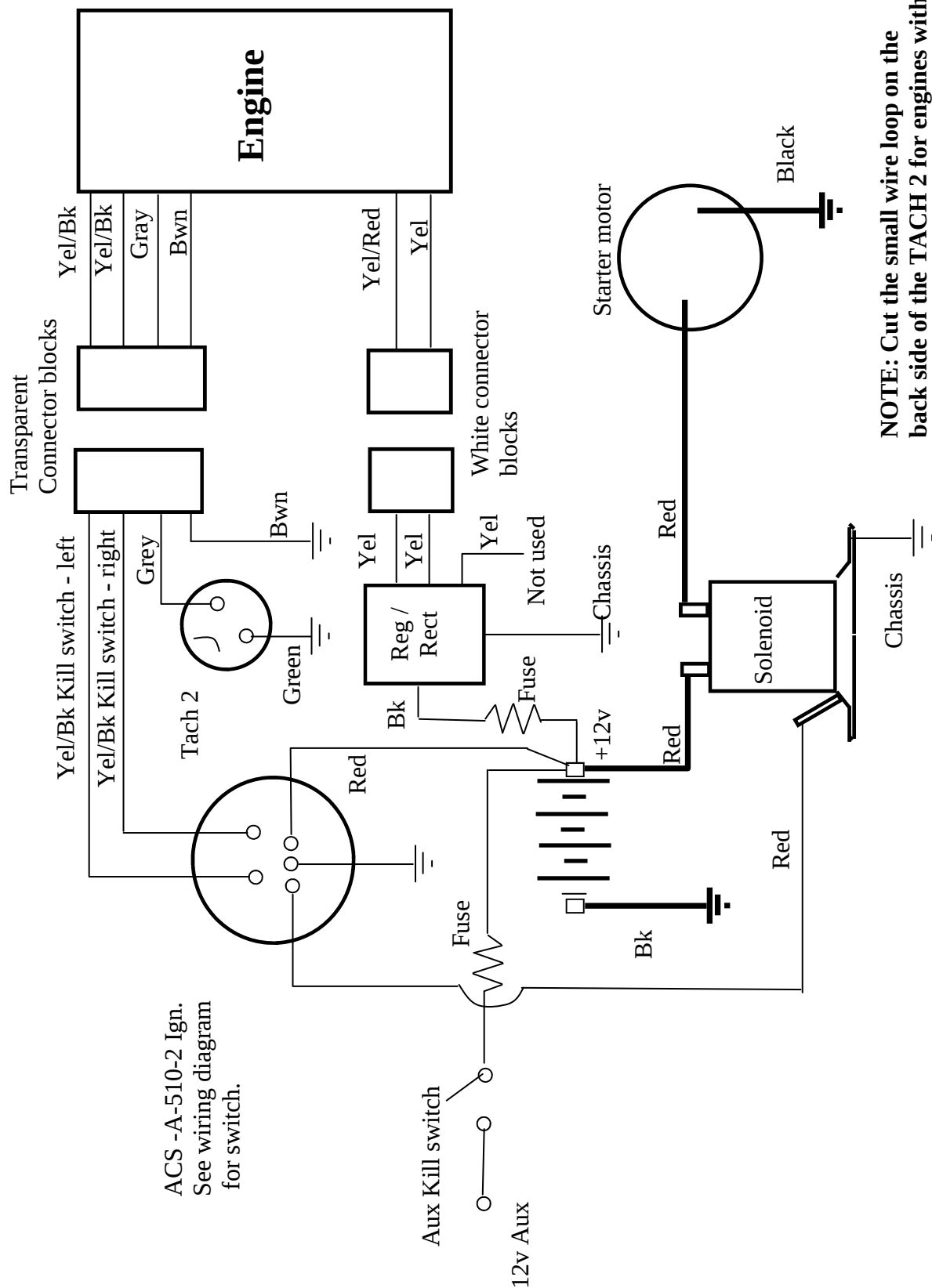
Wire cutting/crimping tool.

If you are going to install an electrical starting system, you will need to refer to the wiring diagram to determine what you require for your loom.

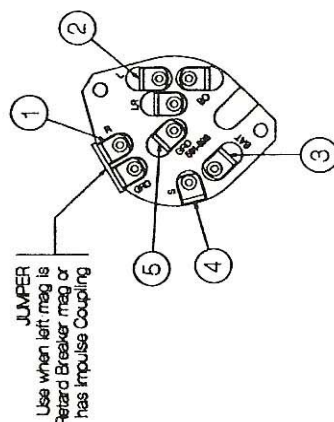
If you install a tachometer, run an extension from the Grey wire on the engine (approx 12- 15 feet). If you are running a DUCATI engine, you must cut the small red loop on the back of the Tachometer or you will not get a correct RPM reading.



Suggested wiring diagram for Rotax 447/503 Dual CDI, Dual carbs.



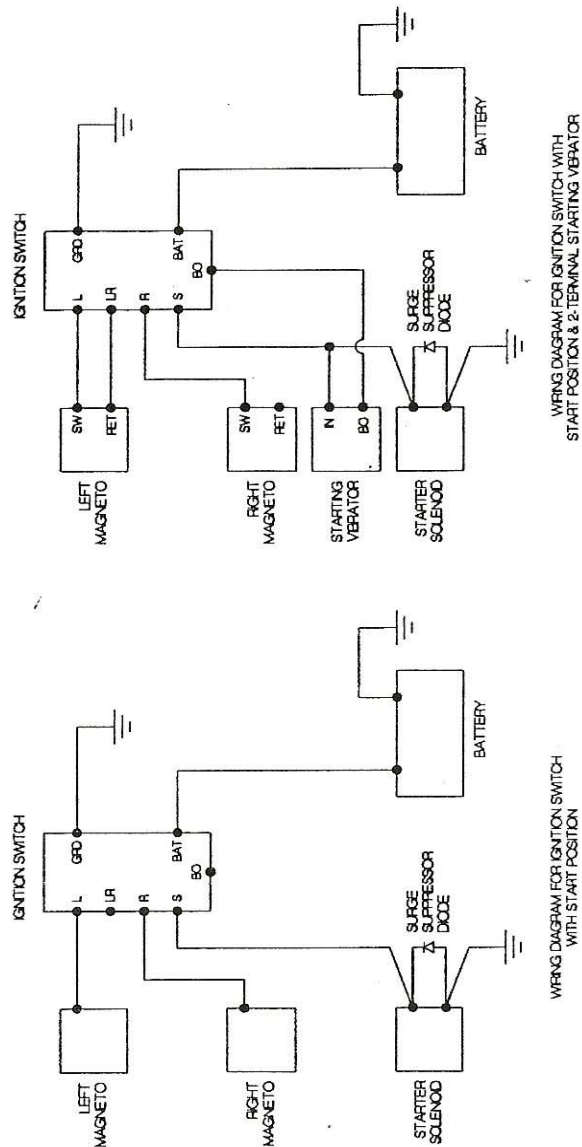
How to connect the ignition switch ACS A510-2



1. Connect wire from RIGHT MAG to terminal 1.
2. Connect wire from LEFT MAG to terminal 2.
3. Connect wire from POSITIVE terminal of power supply to terminal 3.
4. Connect wire from STARTER SOLENOID to terminal 4.
5. Connect wire from terminal 5 (center GND terminal) to nearest structural member.

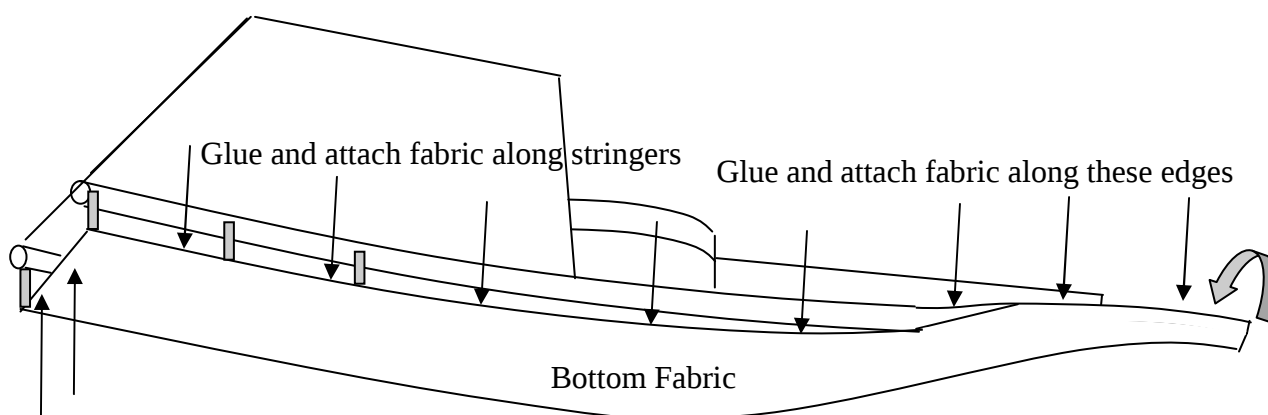
NOTES:
 A. Use JUMPER on terminal 1 when LEFT MAG has IMPULSE COUPLING.
 B. Use JUMPER on terminal 1 & use the 'LR' and 'BO' terminals for a 2-terminal starting vibrator when LEFT MAG is RETARD BREAKER MAGNETO.
 C. Use SHIELDED wire on all connections and ground shielding to nearest structural member.

ACS-510 Rev. C (5/10/01)



How to apply fuselage fabric

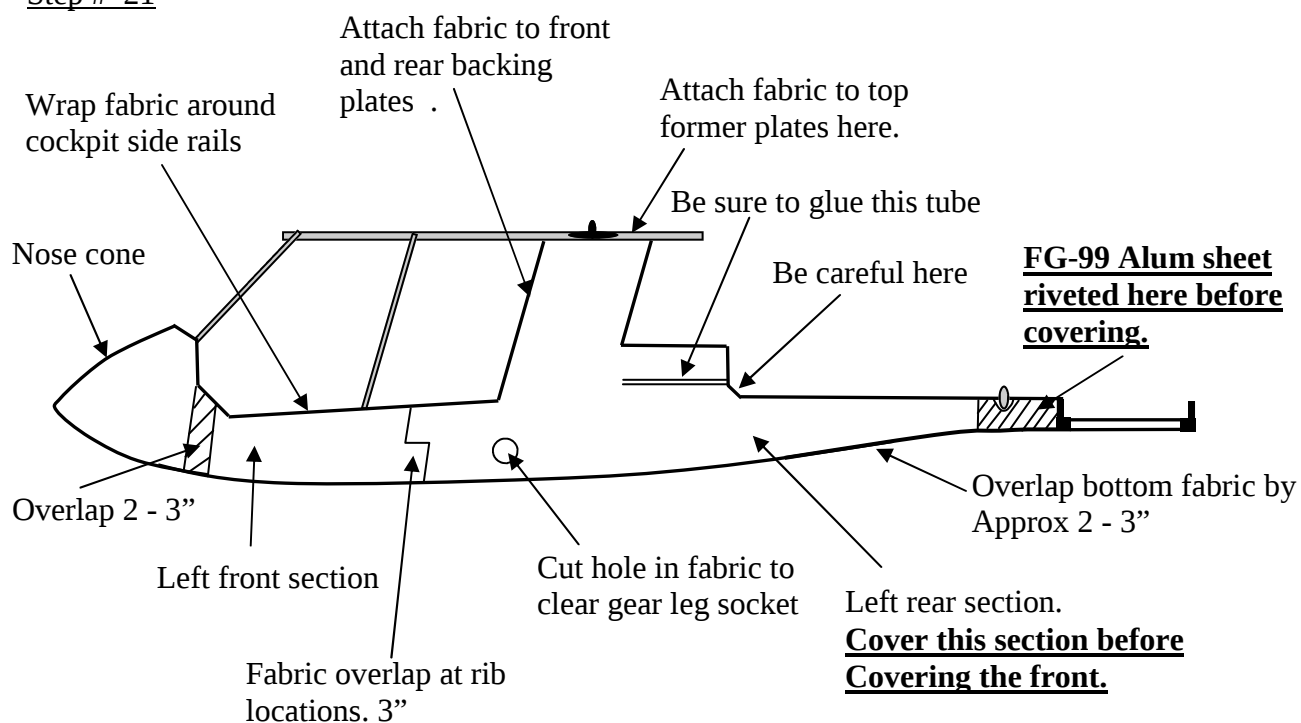
Step # 20



Use hot iron to heat shrink, as previously discussed in Section I.

NOTE: Care is to be exercised when heat shrinking. Too much shrinkage will cause the 1/2" x .035 stringer tubing to bend.

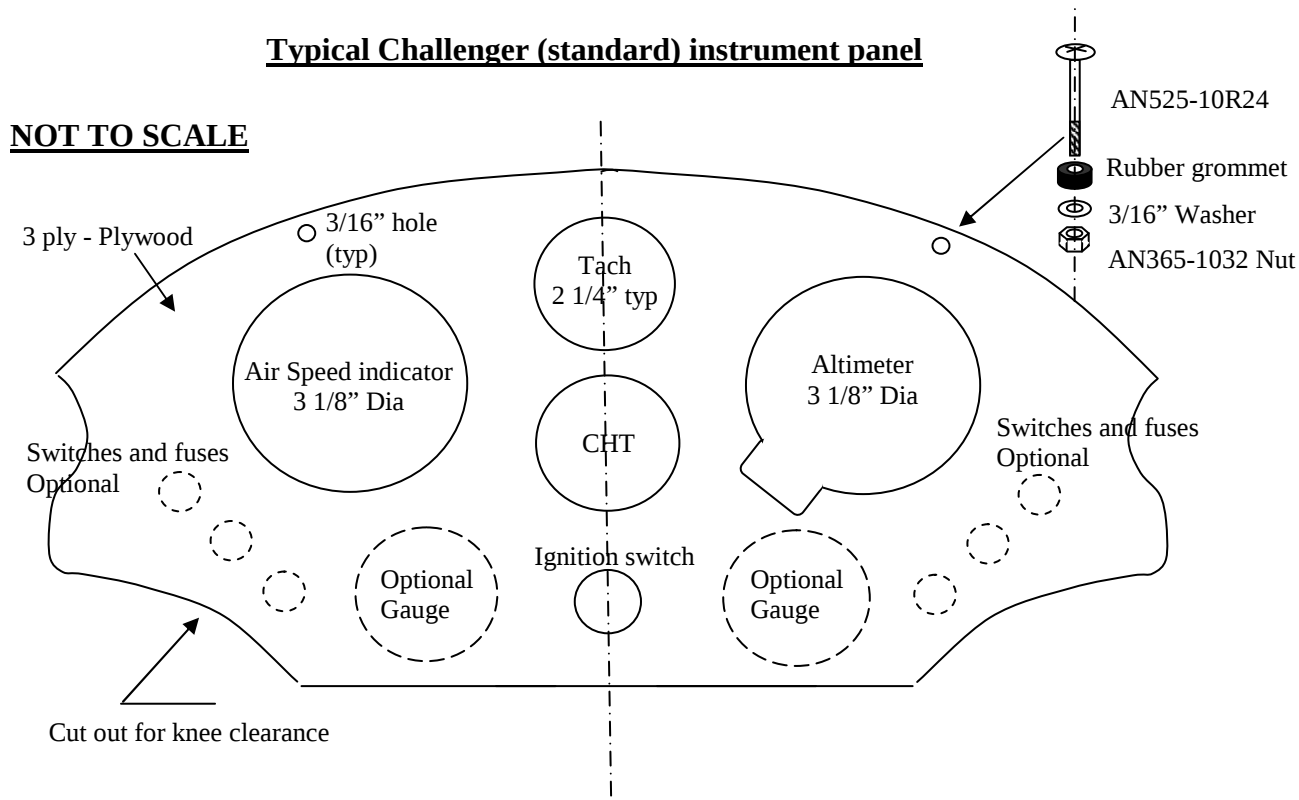
Step # 21



Paint and finish the fabric on the fuselage as described in Sect I of this manual.

How to install the instrument panel

Step # 19



Select the wooden instrument panel blank from the kit. The panel is supplied with a template copy of instrument layout and panel shape. Since it is not known what instruments you may choose to include in the panel, hole drilling and finishing is left up to you.

It is suggested that for holes necessary you use a drill press and proper hole saws to give exact fits for the instruments, gauges and keyed ignition switch.

The surface of the instrument panel should be sealed with paint, stain or varnish to protect it from the elements and give a nice finished appearance.

Attach to panel to the FWF on fuselage (curved tube) with the use of two AN525-10R24 bolts as shown.

NOTE: If instruments are mounted, panel should be shock mounted to protect instruments.

(Rubber grommets work well—not supplied with kit).

Compass:

It is advisable to mount the compass as far away from any electrical wiring as possible.

Electrical wires that have a current flowing through them, produce a small 'Electro Magnetic Field' that can influence a compass if placed close enough.

How to install the windshield

Step # 22

Standard Windshield.

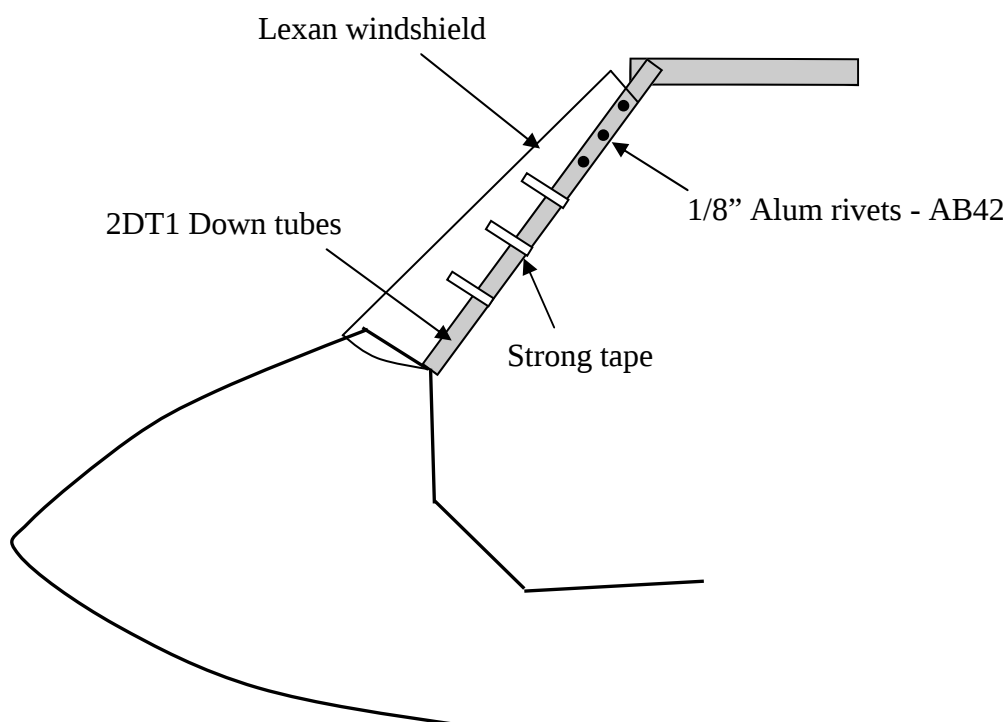
Select the pre-cut windshield from kit. Hold windshield in place and bend into position to check fit.

NOTE: This windshield blank is cut from Lexan plastic and may be bent into position without cracking.

Mark exact fit with marker and use tin snips to cut to exact size. Remove the protective paper and tape in place with a strong adhesive tape such as 'filament tape'. Drill 1/8" holes through lexan and down tubes and secure with 1/8" aluminum rivet (see drawing below). Remove tape after riveting.

Tape around the cockpit

To improve the finished appearance of the Challenger's cockpit area, it is suggested you apply chafing tape to trim the areas around the cockpit and windshield. This may also be done around the engine area. We have found that colored cloth duct tape works great. It is available in several colors and can normally be obtained at your local hardware store. The cloth reinforced type seems to adhere much better than the plastic type. Try to match your trim color or just use black.



How to mount the top frame of door assembly to facilitate installation of Wrap Around Windshield.

1. Clean all component parts with M.E.K. or equiv. Polish the tubes and remove lettering. At this time you can also de-burr any edging or tubing using an appropriate file.



2. The top door frame has one corner with a single 1/8" alum rivet only. Drill this out to facilitate the installation of the top frame to the root tube.



3. Slide it over the down tubes 1A (as shown right) then clamp it into the correct position. Ensure the front of the frame is 2 3/4" back from the front of the root tube. (see below).



Once you are satisfied with it's location, rivet the top frame in place using 1/8" SS rivets. Two on each cross piece into the root tube. Re-rivet the corner that was drilled out in step 2.

Further instructions for door installation are provided with the optional door kit.

How to install the 'Wrap around windshield'

Page 32

The 'Wrap around windshield' is actually part of the 2 place door kit, but can be installed without the complete door kit. Part of the installation is the same as in the door instructions except that the windshield must be positioned in such a manner that if the doors are installed later, they will line up properly with the already installed windshield and windshield frame.

This is rather difficult because the doors are pre-fabricated in factory Jigs and the windshield is customer installed to fit the pre-fabricated doors.

The best way around this problem is to install the wrap around windshield frames further rearward than normal so that when and if the doors are installed later, the windshield frames can be moved forward and the excess lexan cut off to match the doors.

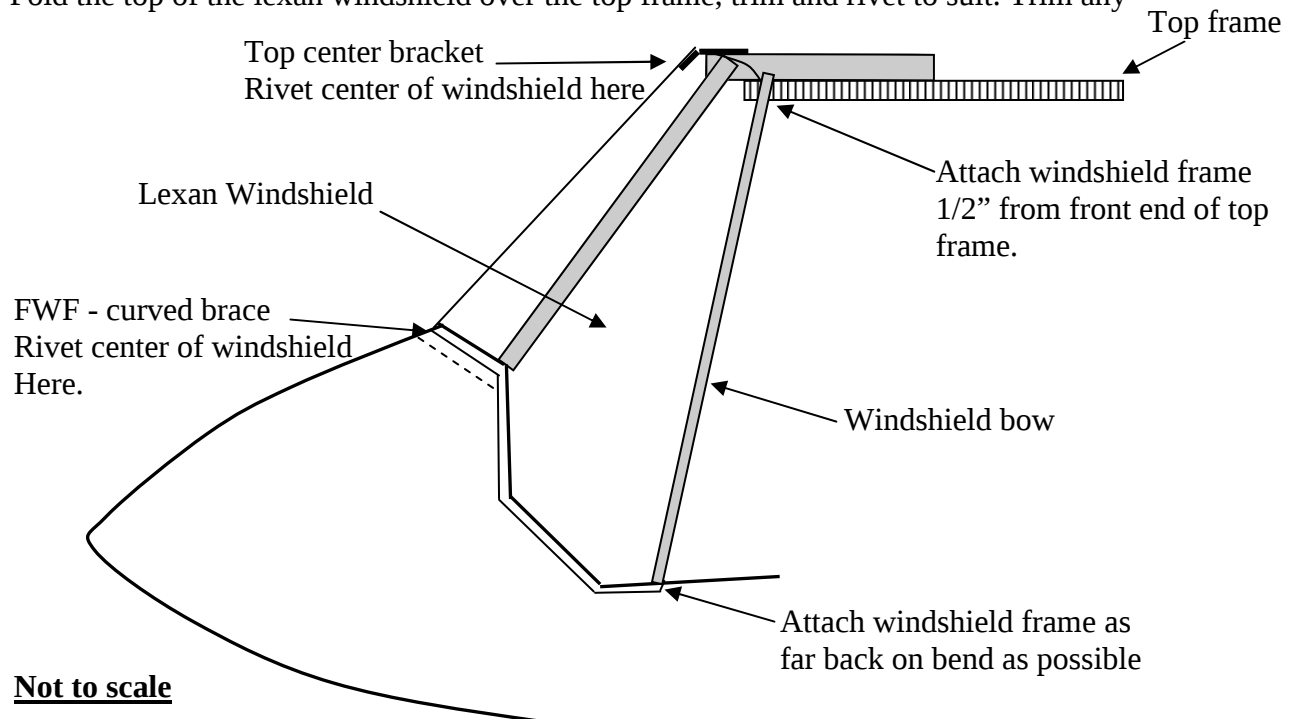
However. It is advisable to install the doors first. See door instructions.

Mount the top frame (as described on page 31).

Attach the top end of each windshield frame bow to top frame angle 1/2" from front end with one stainless steel rivet. Clamp bottom end of windshield frame bows in approximate position. (If doors have been built, simply line up windshield bows with the first down tube on door frame).

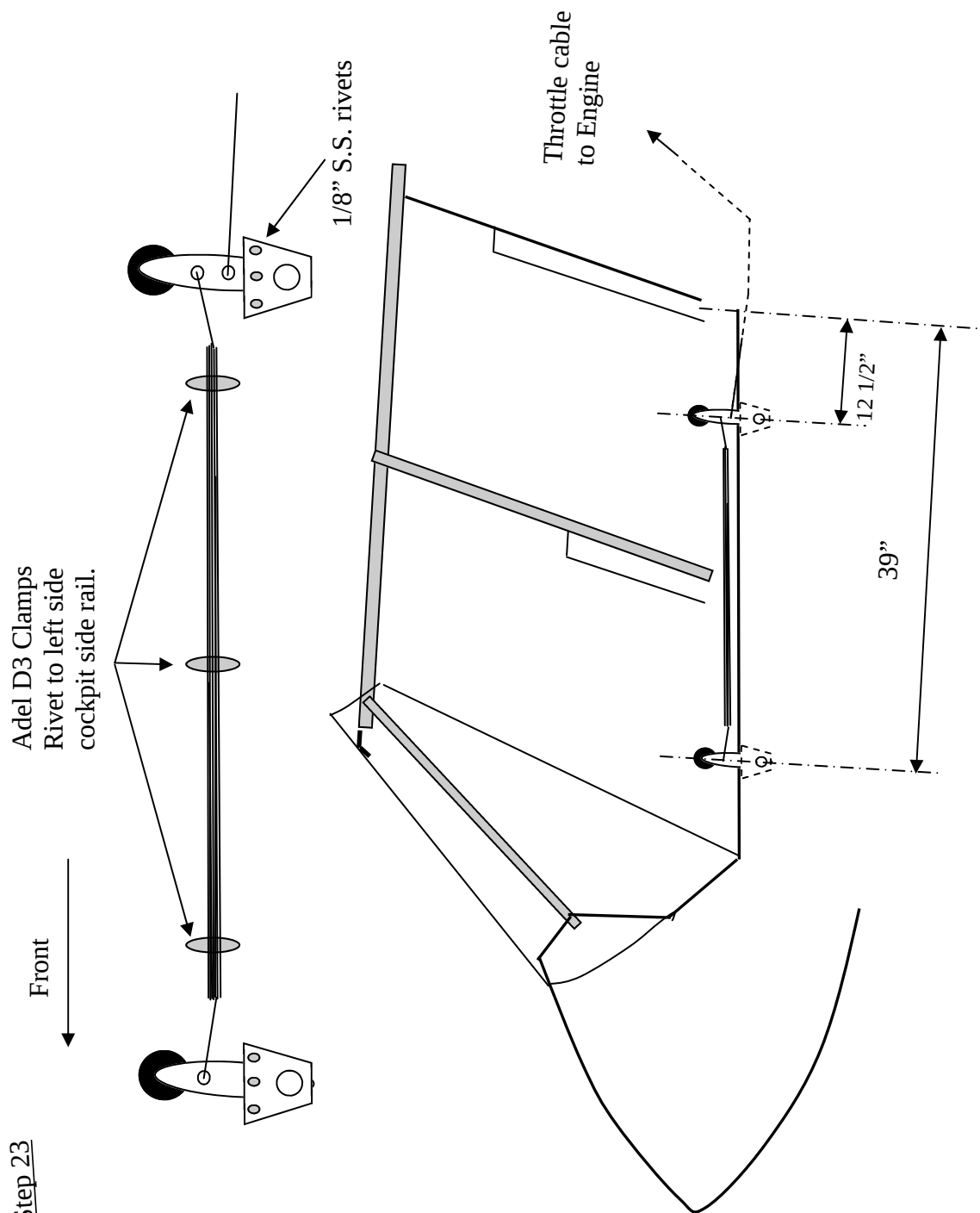
Center windshield on top center bracket and windshield former tube (FWF) and rivet to top center bracket and FWF. Wrap each side of windshield around and tape in place. Adjust windshield frame bow to match position of lexan and clamp in place. Windshield frame bow should be as far toward the rear as possible. When you are happy with the position, rivet the frame bow to the cockpit side rail with long stainless rivets and the perimeter of the lexan windshield with short aluminum rivets.

Fold the top of the lexan windshield over the top frame, trim and rivet to suit. Trim any

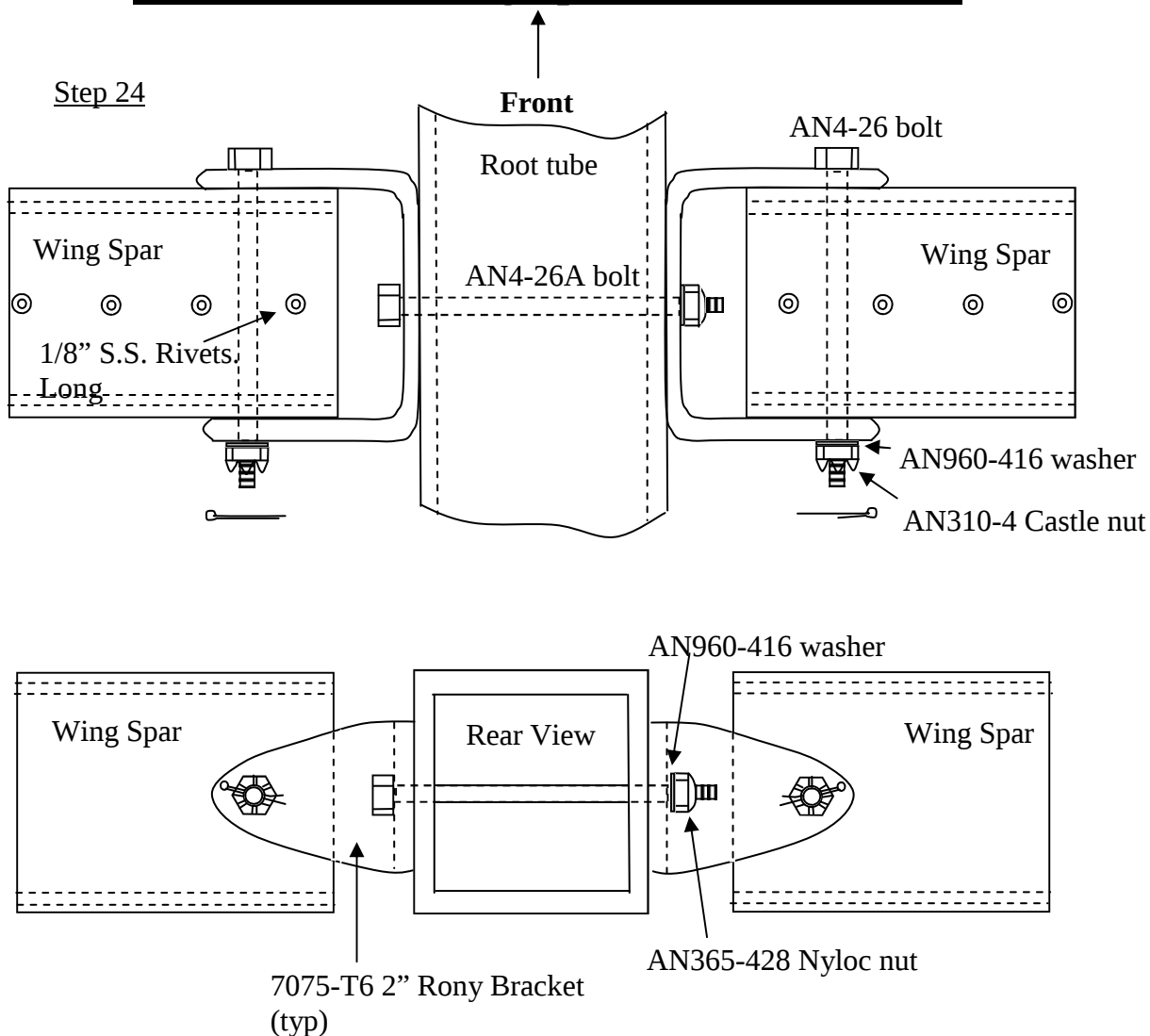


How to attach the throttle inter connect assy.

Step 23



How to attach Wing Spars to the root tube.



Step # 24

Install wing spar and strut attach brackets as per illustrations.

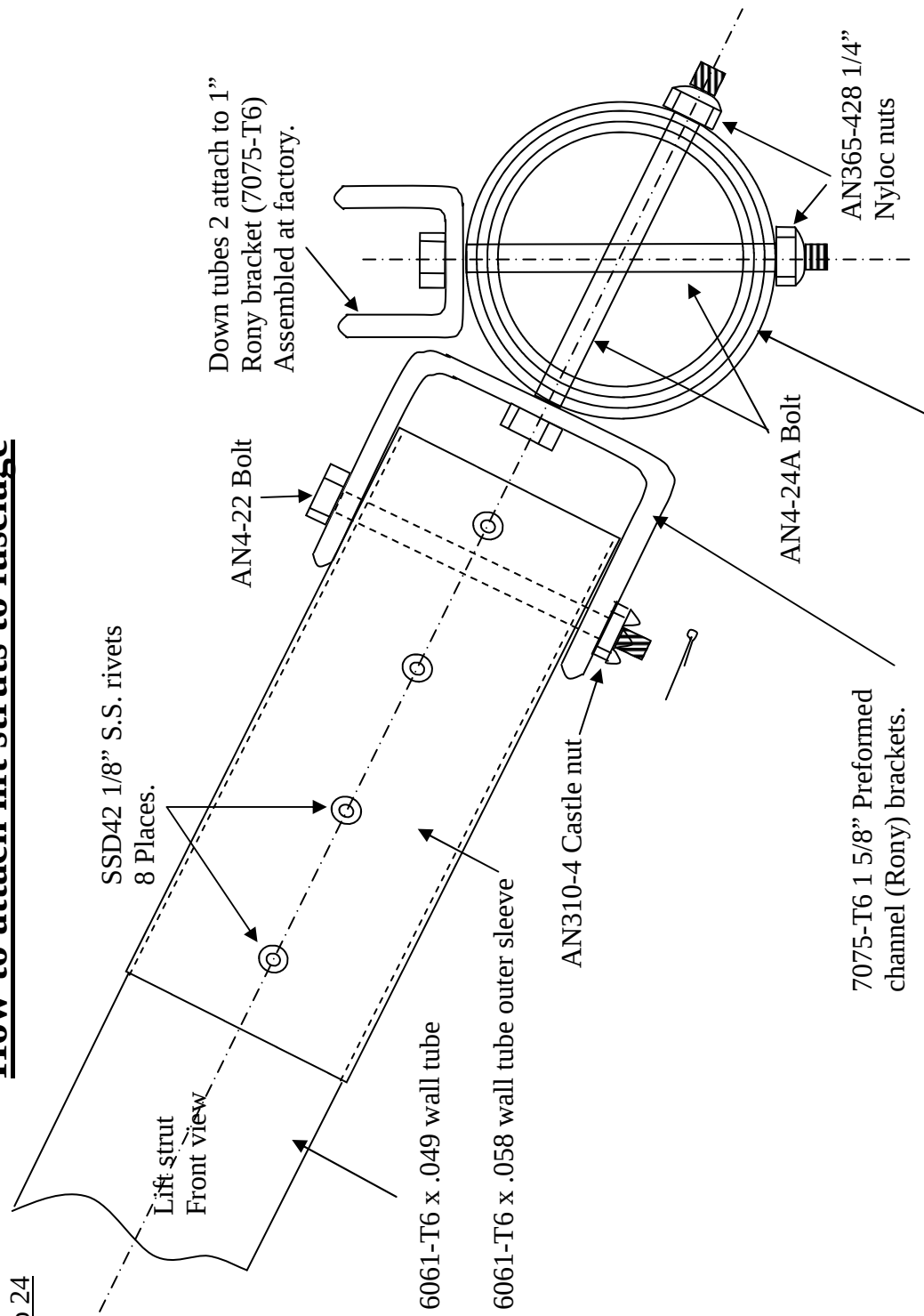
Do not over tighten bolts holding brackets to hollow tubes, but tighten only until snug.

Install wings into 2" Rony brackets (as shown above) and wing struts into 1-5/8" Rony brackets (as shown on page 35). These castle nuts need only be finger tight unless you do not intend to disassemble your Challenger after each days flying.

If your Challenger will be disassembled only once per year (for annual inspection), you can use nyloc nuts instead of castle nuts and tighten until snug.

How to attach lift struts to fuselage

Step 24



**ALL BOLTS MUST BE
INSTALLED EXACTLY AS SHOWN**

How to install Aileron push rods

Step # 25

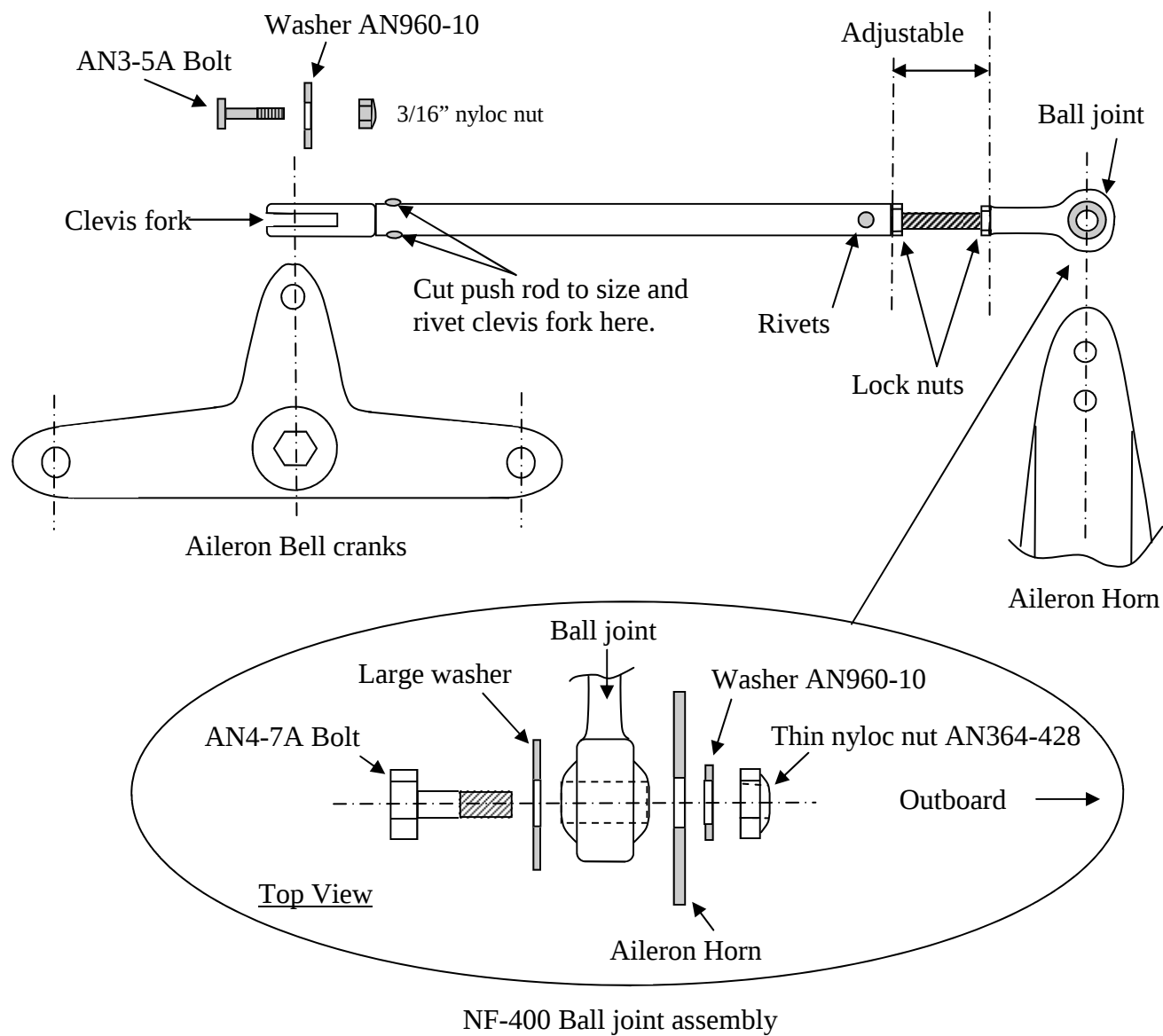
Assemble and install the aileron push rod assemblies as shown on page 37. Make sure that the control stick is centered side to side, the aileron bellcranks are neutral, the flaperons slide (if installed) is in it's middle setting and that the ailerons are level with the BOTTOM of the wing. Before cutting aileron pushrod to length, make sure that you have adjustment of the threaded rod end in both directions (bottom out threaded rod and then turn out 6 full turns). Once you are sure everything is in order, cut aileron push rod to length and rivet clevis fork as shown on page 37. and attach rod end to aileron horn.

The top factory drilled hole in the aileron horn is for calm weather flying. For more aileron throw, move ball joint to bottom hole. This will also give you more flaperons (if installed) But be sure that this does not interfere with full aileron travel with the flaperons in their full up or down position! And neither aileron should deflect more than 45 deg. Down. (too much down deflection may stall-out that aileron and 'roll' control may be adversely affected.

Locate the turnbuckles used to connect the aileron control cables to the control sticks in the cockpit. These turnbuckles have been installed at the factory and are used for tensioning of the aileron control cables. Adjust the turnbuckles so that the aileron bellcranks (on the 2" square root tube) are in their neutral position when the control sticks are centered left to right. Don't over tighten the turnbuckles as this will create friction in the system and lead to premature wear of the cables. Refer to page 20 and choose any of the approved methods shown to secure the turnbuckles with safety wire.

Aileron Push Rod detail

Step 25



How to install jury struts

Step # 26

Jury struts for two place aircraft wings are provided undrilled and not cut to length. The 48" tubes are for the middle jury struts and the 25" lengths are for the front and rear jury struts.

The finished lengths should be close to the following measurements.

Front jury strut = 21"

Middle jury strut = 44"

Rear jury strut = 25"

Diagonal (N) strut = 44 1/2"

The vertical jury struts should be installed half way out the wing spar between the wing root and the main strut attach bracket. Before drilling any holes, check the fit of all jury struts to see if this is the right location (tape jury struts and brackets in position until satisfied with location).

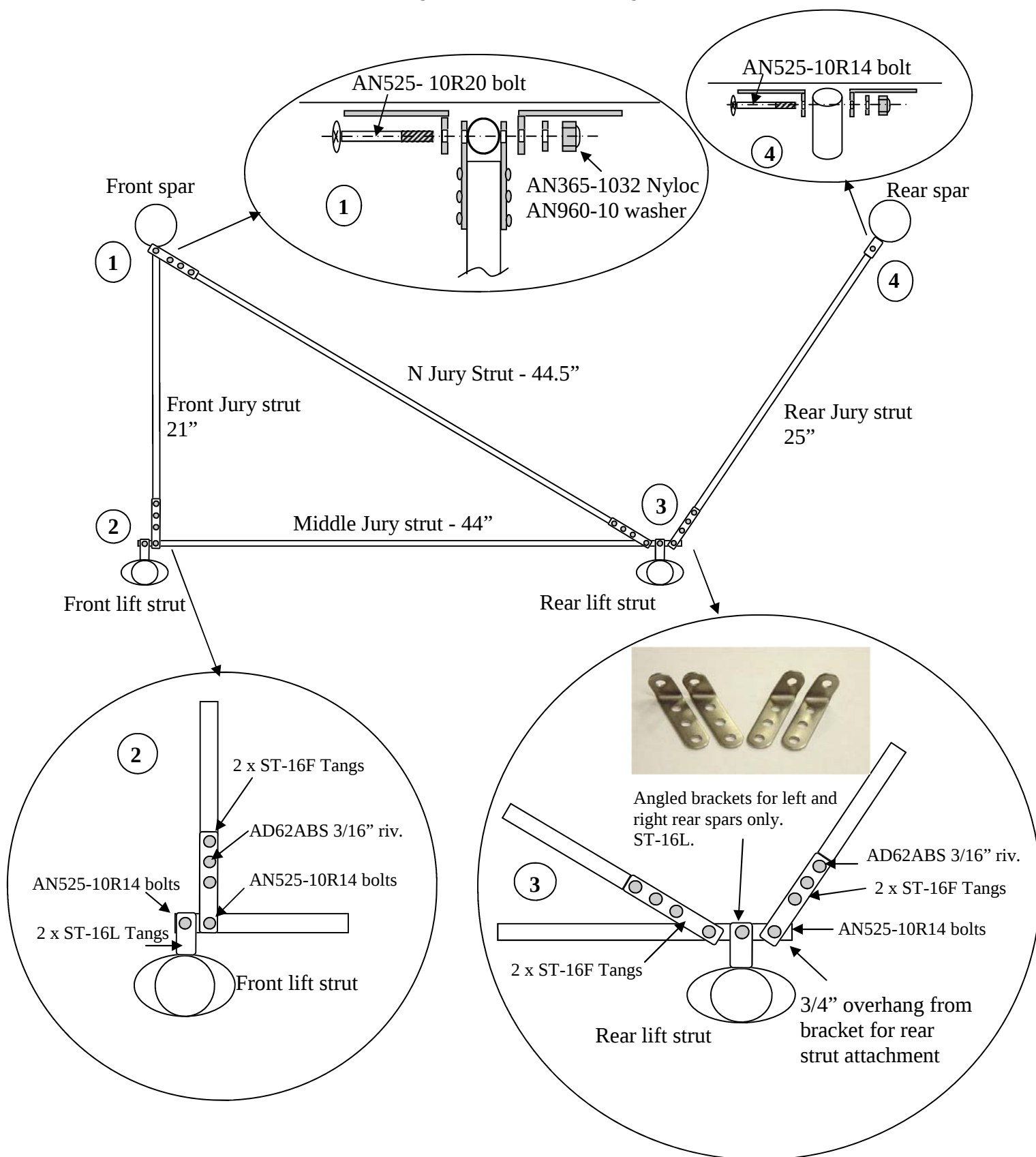
Note that the middle jury strut protrudes 3/4" past the stainless brackets to allow the rear jury strut to attach behind the brackets. See page 39.

When installing the brackets to the main struts, be sure that the bracket is centered on the round main lift struts. As the streamlined strut fairings cover the main lift struts, you will have to feel where the center of the main struts are as they are not visible.

Note that the brackets for rear lift struts are angled. Make sure you pair up the correct ones for Left and Right. The bolt that holds the cross tube is installed at a slight angle from the rear strut. (see photo, page 40, item 3)

After the jury struts have been installed, they may be removed for polishing or painting.

Jury strut assembly



Section IV

Engine Installation

For ROTAX 447 & 503 only.
(for Rotax 582, call QCU)

Check the relevant hardware pertaining to your specific order.

ENGINE PACKAGE

- () 1 Engine (with oil injection) Serial number:_____
- () Rotax 447 SDCI
- () Rotax 503 DCDI
- () Rotax 582 DCDI
- () 1 973 198 Rotax side mount muffler (447 & 503)
- () 1 973 197 Rotax side mount muffler (582)
- () 1 973 184 Rotax exhaust elbow (447, 503 & 582)
- () 1 878 937 Rotax manifold (447)
- () 1 878 937 Rotax manifold (503 & 582)
- () 1 bottle two cycle oil (packed in motor)
- () 1 Prop 60 x 44 (503)
- () 1 Prop 60 x 42 (447)
- () 7 938 795 Rotax exhaust springs
- () 1 SP2706 K&N air filter (447)
- () 1 SP2705 K&N air filter (503)
- () 1 SP2703 K&N air filter (582)
- () 1 CC-100 Choke cable single carburetor
- () 1 CC-102 Choke cable dual carburetor
- () 1 TACH-T tini tach (dash mount—sometimes in instrument package)
- () 1 HTD-100-R reduction drive (Rotax)

MUFFLER BRACKET AND HARDWARE BAG

- () 1 Muffler bracket (packed in motor box for Rotax 447 & 503 only)
- () 2 423 435 (8mm replacement head bolt)
- () 2 5/16" flat hardware washer
- () 4 Rubber grommets (2 x 9406 male - 2 x 8316 female)
- () 2 1/4" x 28 x 2" grade 8 bolts
- () 8 AN960-416 (1/4" washers)
- () 2 AN363-428 (1/4" high temp lock nut)
- () 4ft safety wire.

MOTOR MOUNT HARDWARE

- () 1 MP-447 Motor mount plate
- () 1 MP-503/582 Motor mount plate
- () 2 MM-1 (2" x 2"x 3/16" Alum. Motor mount angles)
- () 2 MM-2 (1 1/4" square alum. Motor mount spacers)
- () 2 AN5-52A bolts (engine mount)
- () 2 AN365-524 Nyloc nut
- () 2 AN960-516 washer
- () 8 AN4-16A bolt
- () 8 AN365-428 Nyloc nut
- () 8 AN960-416 Washer
- () 32 AN525-832R10 (screw bolt - for Lord mount)
- () 32 AN365-832 (5/32" Nylon nut - for Lord mount)
- () 8 150PL-30 rubber lord mounts
- () 4 1/4" Stainless steel large area washer.

How to drill out the M.M Angles and Plate

ONLY ONE MOTOR MOUNT ANGLE IS FACTORY DRILLED. MATCH DRILL THE UNDRILLED ANGLE USING THE DRILLED ANGLE AS A GUIDE

Step # 1

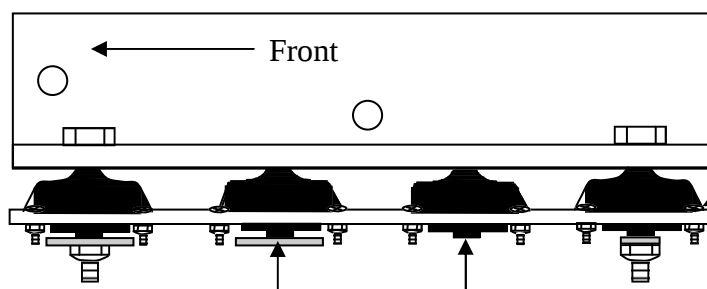
1. Clamp angles together with this end flush and all other edges flush.

2. Drill through 5/16" holes with 5/16" bit using factory drilled hole as a guide.

3. Rotate left angle 90 deg. to the left and rotate right angle 90. deg to the right

4. Clamp angles together with the SAME END flush and all other edges flush.

5. Drill through 1/4" holes with 1/4" bit using factory drilled hole as a guide.

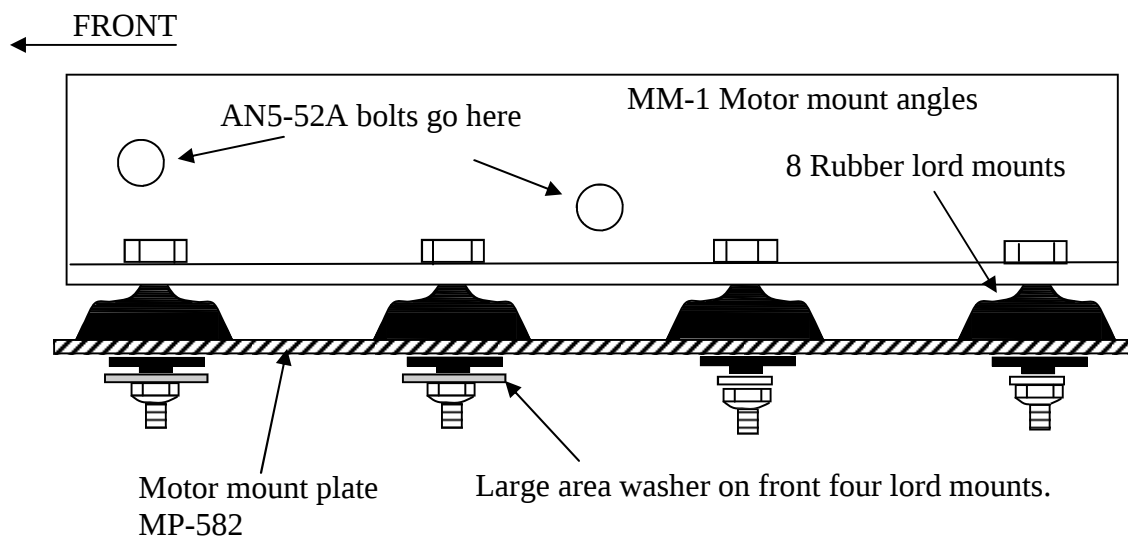


6. Drill holes on the motor mount plate using the lord mount holes as a guide with 5/32" drill bit. Install the 5/32" bolts and nyloc nuts See page 47.

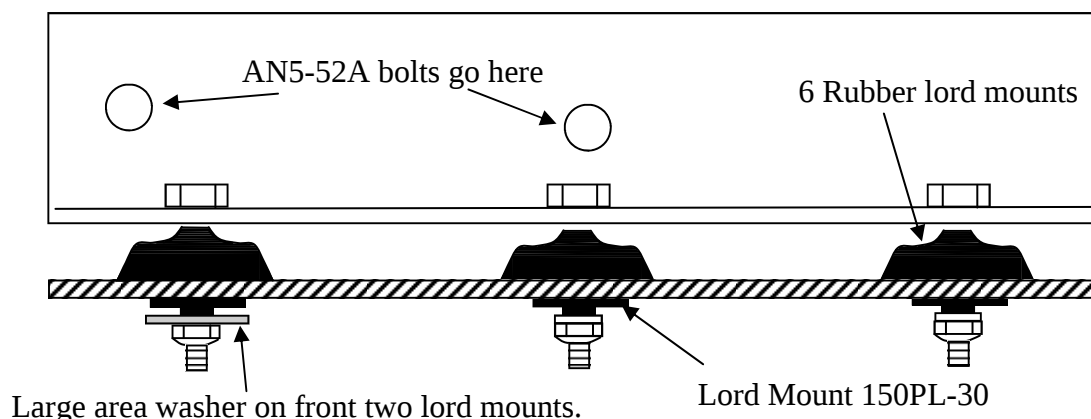
7. Drill remaining 1/4" holes through lord mount bushings with 1/4" drill bit. Be sure to install large area washers on the front 4 lord mounts

Motor mount angles viewed from left side - Rotax 503 configuration

Step # 2



Motor mount angles viewed from left side - Rotax 447 configuration



Attach the rubber Lord mounts to the engine mounting plate as shown on page 46. The Lord mounts are installed on TOP of the plate with the higher pointed end facing UP. The 5/32" holes will have to be drilled in the plate. Install the 8 (6 for Rotax 447) with the 32 x AN525-832R10 bolts and nuts provided.

Install the motor mount plate assembly on the engine with the Lord mounts on the top side. Secure with metric nuts and lock washers provided with engine (should be in the box with the carburetors). Be sure to use RED loc-tite on these nuts and **torque to 28ft lbs.**

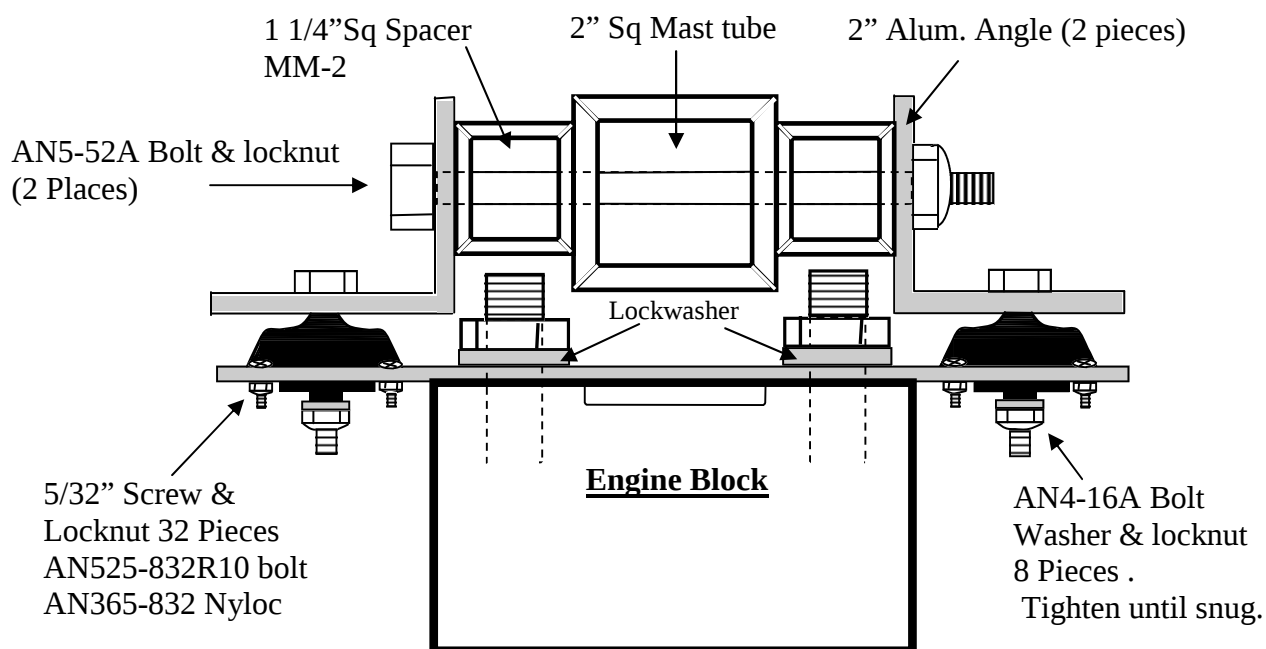
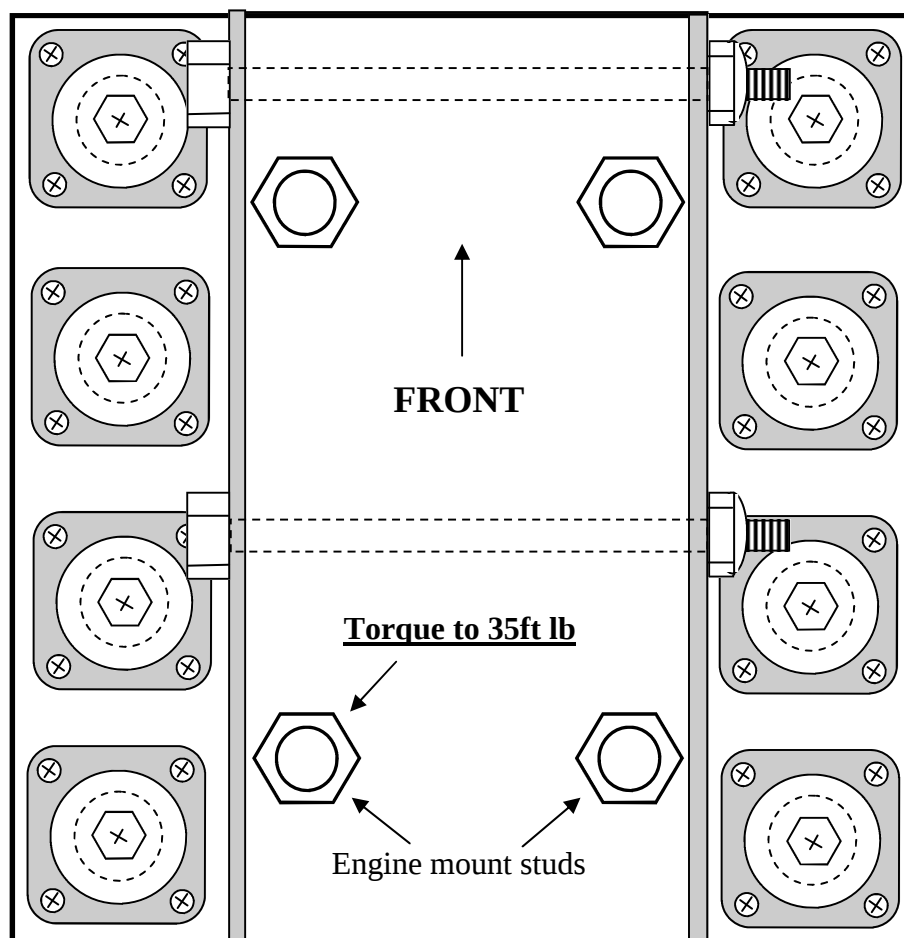
Install the motor mount angles to the top side of the Lord mount as shown above .

Install engine to fuselage root tube using 5/16" (AN5-52A) bolts, washers and Nyloc nuts. Do not over tighten nuts ! The 2" Square root tube should not be compressed more than 1/16"

Rotax Engine Motor mount detail

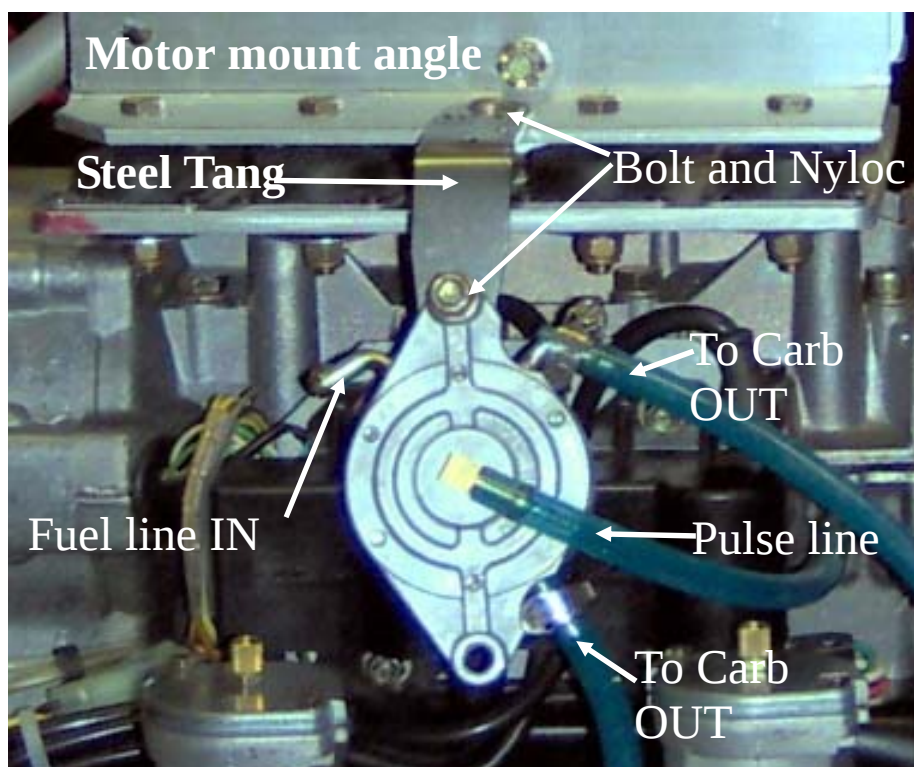
Step # 3

Top View



How to mount the fuel pump

Step # 4



Fashion a tang to mount the fuel pump to the Motor mount angle NOT the engine or engine plate. The preferred material is steel (or mild steel).

Ensure the pump is far enough away from the coils as not to hit them (or any other component) during engine operation but close as possible to the pressure nipple on the engine case with the shortest possible pressure (vacuum - pulse) line

All fuel line attachments must have a Stainless steel hose clamp.

Step # 5 Exhaust manifold

Install Exhaust manifold, muffler and muffler bracket per Rotax engine manual as shown on page 47. Do not torque 8mm bolts that attach muffler bracket to engine, but just tighten them until they are snug. Be sure male rubber washers are seated in muffler bracket tab hole. Do not overtighten 1/4" x 2" grade 8 bolts on muffler bracket clamp portion, as this may cause premature failure of these bolts (just tight enough that they don't rattle). Don't forget to safety wire the 8mm bolts. Hi-Temp anti-seize exhaust lubricant is recommended for the muffler to exhaust manifold ball joint. Be sure to safety wire the exhaust springs so they don't go through the propeller.

Step # 6 Carburetors

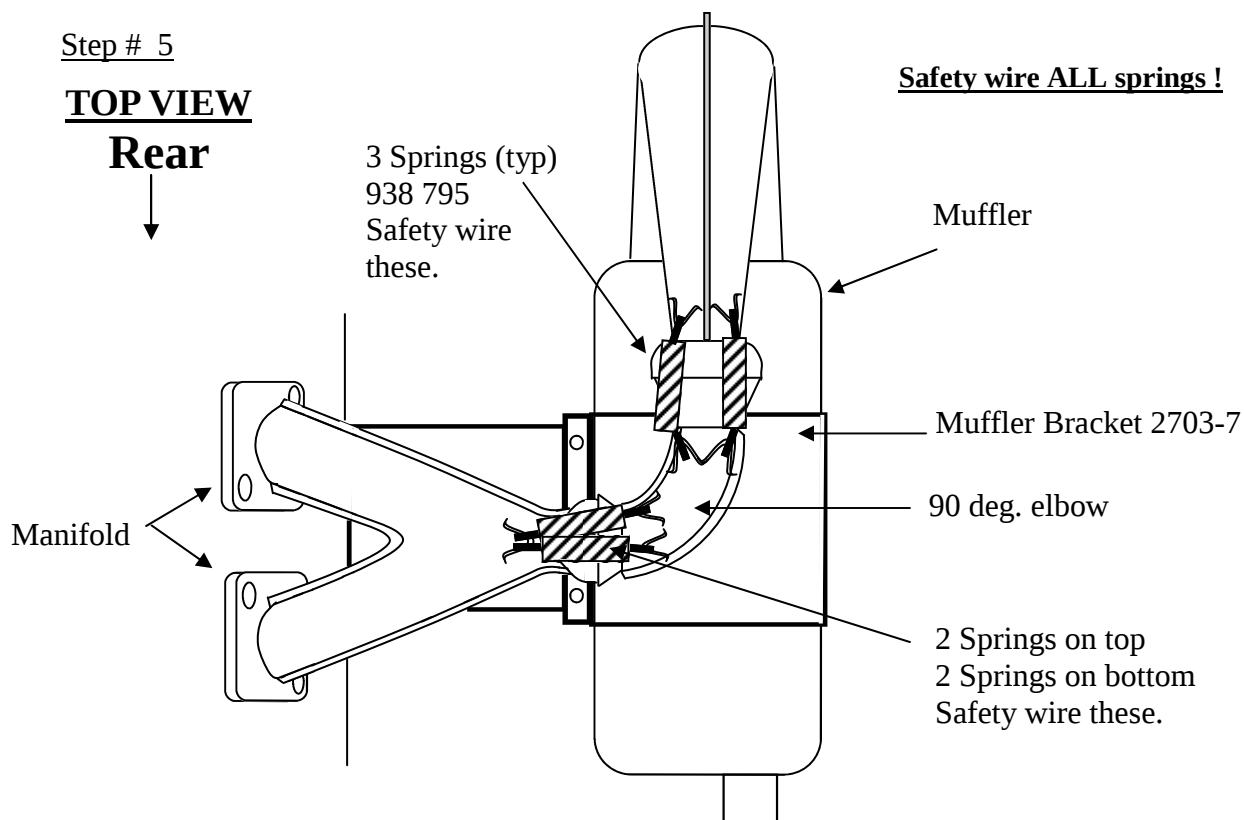
Install carburetors per Rotax Engine manual. The arrow on the rubber carb connectors points toward the engine. For best idle, we find that the main needle in the carb slide should be in it's leanest position (retaining clip in top slot on needle) and the small brass air bleed screw should be turned out about 2 turns from bottom. Install throttle cables and levers. Adjust cables so there is 1/8" play where cable housing enters top of carb. Cable adjusters on top of carb should be in a position to allow for adjustment up or down for differences in ambient temperature (on warm days the cable housing will lengthen slightly and may require adjustment to prevent too fast an idle).

3 Piece Rotax exhaust and Muffler bracket system

Step # 5

TOP VIEW

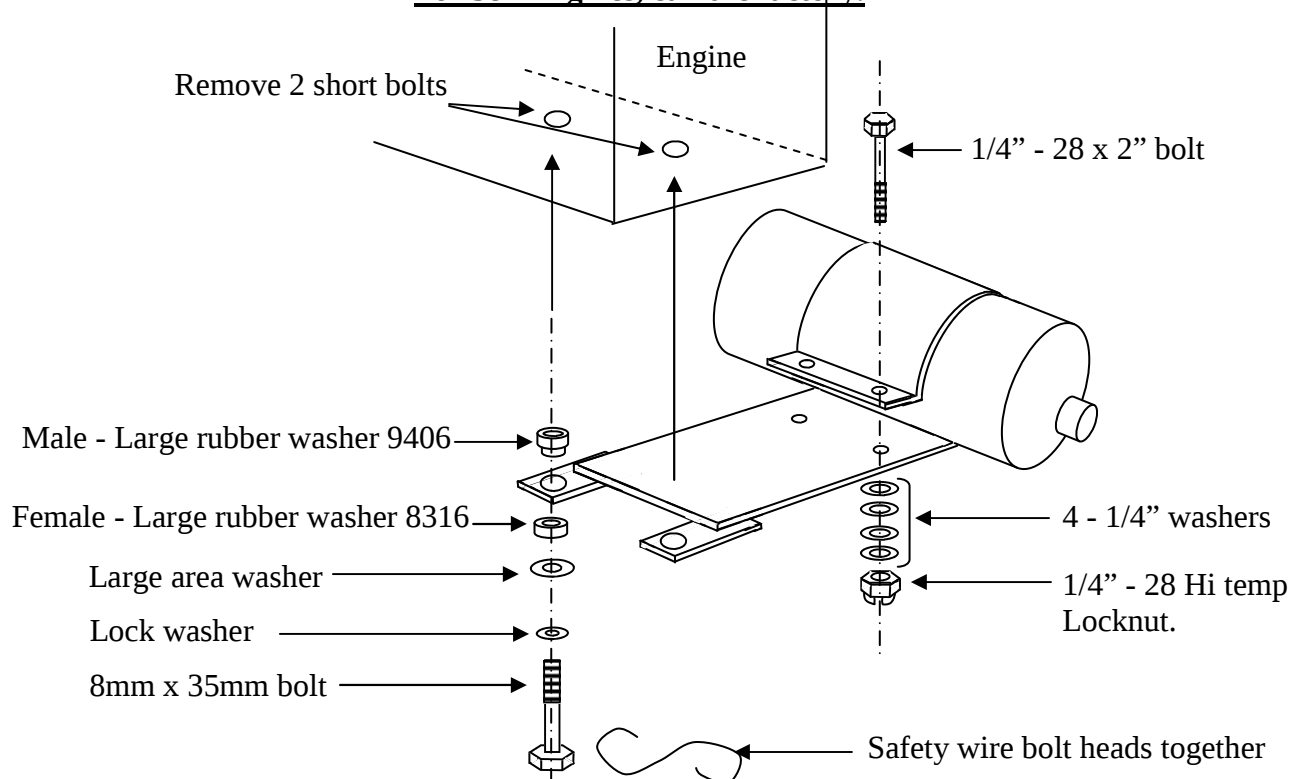
Rear



Safety wire ALL springs !

How to attach muffler for Rotax 447 & 503 engines

For 582 Engines, call the factory.



How to install the 2.6 : 1 Cog belt reduction drive Page 47

Step # 7

NOTE: In November of 1994, Quad City Ultralights changed the drive system from a 2.2 : 1 ratio with a 54" propeller to a 2.6 : 1 ratio with a 60" propeller. (60x44)

Belt reduction allows the Challenger to swing a bigger diameter propeller and is smoother than a gear drive. Care must be taken to install the reduction drive system properly to get the maximum life from the drive belt and the engine.

Begin by bolting the reduction tower to the output end of the engine with eight bolts provided (Hirth use 6 bolts). Make certain the mating surfaces are flat, smooth and free of burrs. Install mounting bolts with #271 Red Loc-tite and torque to 15ft lb. With QCU starter, see starter instructions.

Next, install the small drive pulley on the output shaft with the 1/2" x 20 bolt, thick washer and lock washer provided (use loc-tite on this bolt) and torque to 50ft lbs. (Be sure to lock Rotax engine by inserting a locking pin provided in Rotax tool kit into the vacuum nipple on the side of the engine).

Now install the adjuster bracket and large (driven) pulley to tower and snug up the large nut.

Pulley alignment

Check for proper pulley alignment between the drive pulley and driven pulley (large pulley) by Placing a straight edge on the face of both pulleys.

Belt tension

Tighten the adjuster bolt on the adjuster bracket until correct tension is achieved and snug up the large castle nut. Remember, when tightened, the shaft is forced straight and the belt becomes tighter. With the large nut snug, re-check tension. See diagram xxx for proper tensioning. When you are satisfied with the belt tension, torque the large castle nut on the casting side to **150 - 200ft lbs.** (hold the shaft from turning with a wrench on the square portion of shaft). Install 1/8" cotter pin, bend over and trim ends.

Back off the adjuster bolt, apply a small drop of loc-tite and screw down until bolt touches the top of the mount plate. Loc-tite the jam nuts and torque to about 15ft lbs.

Install the propeller hub with 6 allen bolts. Loc-tite and torque to 15ft lbs. Install the propeller per instruction manual. (Sect III).

Check belt tension and torque values every 50 hours of operation.

Belts should last 200 or more hours, but we recommend replacing after 100 hours of operation or every 12 months, whichever comes first. (200 hours or 2 years on GT-2 belts).

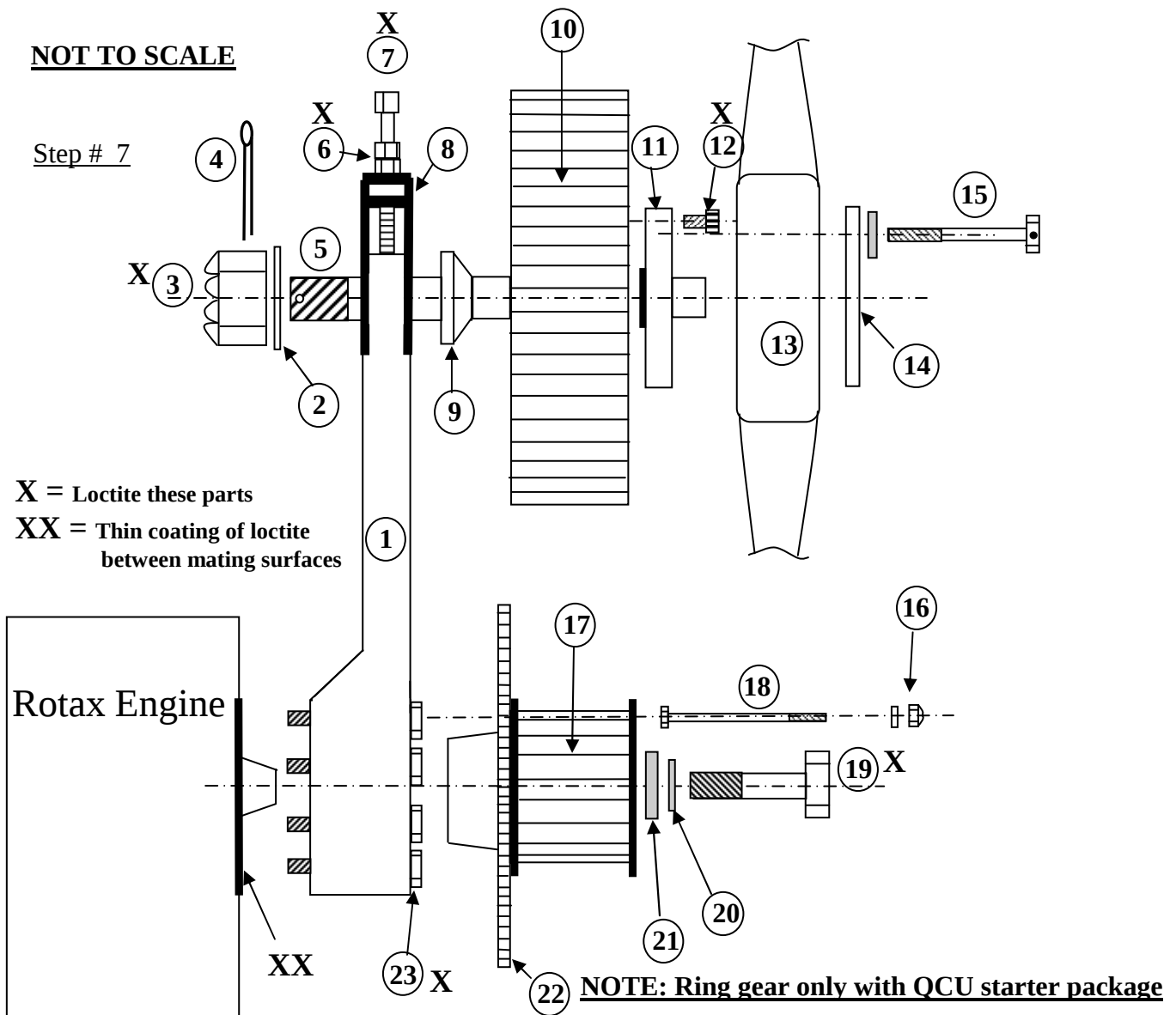
At 500 hours we recommend replacing the prop shaft bearings in the top pulley. These bearings are installed in the top pulley at the factory, but can easily be replaced with the use of an Arbor press.

Reduction drive detail

Page 48

NOT TO SCALE

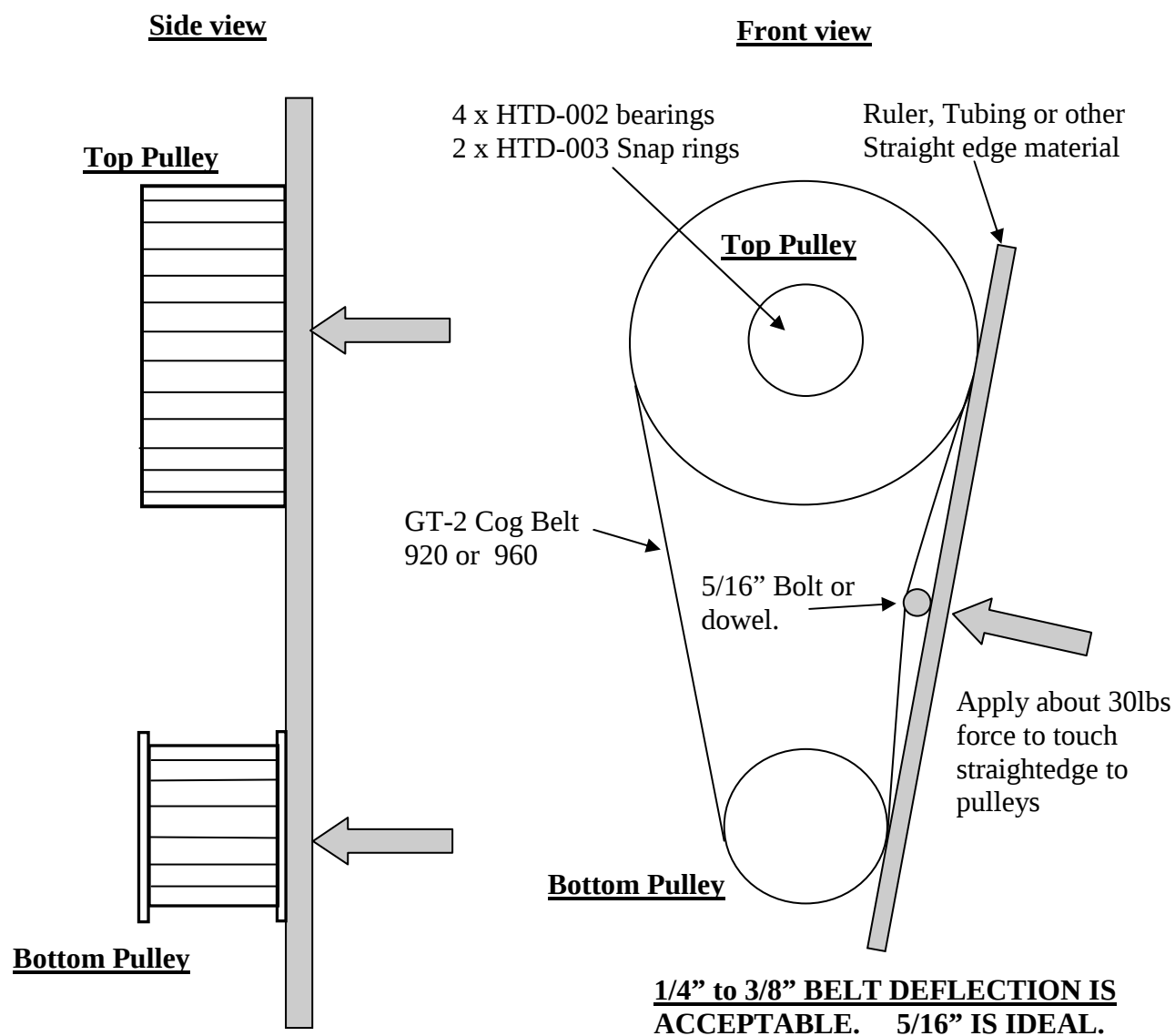
Step # 7



1. Reduction tower (spacer incorporated)
3. 1" Castle nut (Torque 125 - 175ft lb).
5. Pulley Shaft (4140 Chromalloy).
7. Adjuster bolt (3/8" grade 8).
9. Thrust washer (Stainless steel)
11. Propeller hub (6061-T6 Alum).
13. Propeller
15. Prop mounting bolts (& washers)
x 6 (drilled head). HTD-021
17. Bottom pulley
19. 1/2" bottom pulley bolt (1/2" x 2-1/2"
SAE fine grade - Torque to 50ft lb)
21. 1/2" Extra thick washer (stainless steel)
23. Re-drive mount bolts x 8. (8mm x 70mm torque
to 15ft lb Rotax - 10mm x 50mm Hirth torque to 20ft lb)
2. 1" AN960-1616 Washer
4. 1/8" cotter pin
6. Adjuster bracket jam nuts x 2 (3/8" zinc)
8. Adjuster bracket HTD-012 (s. steel).
10. Top Pulley (6061-T6511 Alum).
12. Hub mounting bolts x 6 (5/16" socket
Head. HTD-007 - Torque to 15ft lb
14. Propeller face plate - HTD-008
16. 6 x AN365-1032 nyloc nuts and washers
18. 6 x AN3-26A bolts with ring gear
(AN3-24A without starter package)
20. 1/2" lock washer
22. Ring gear - for Starter motor assy.

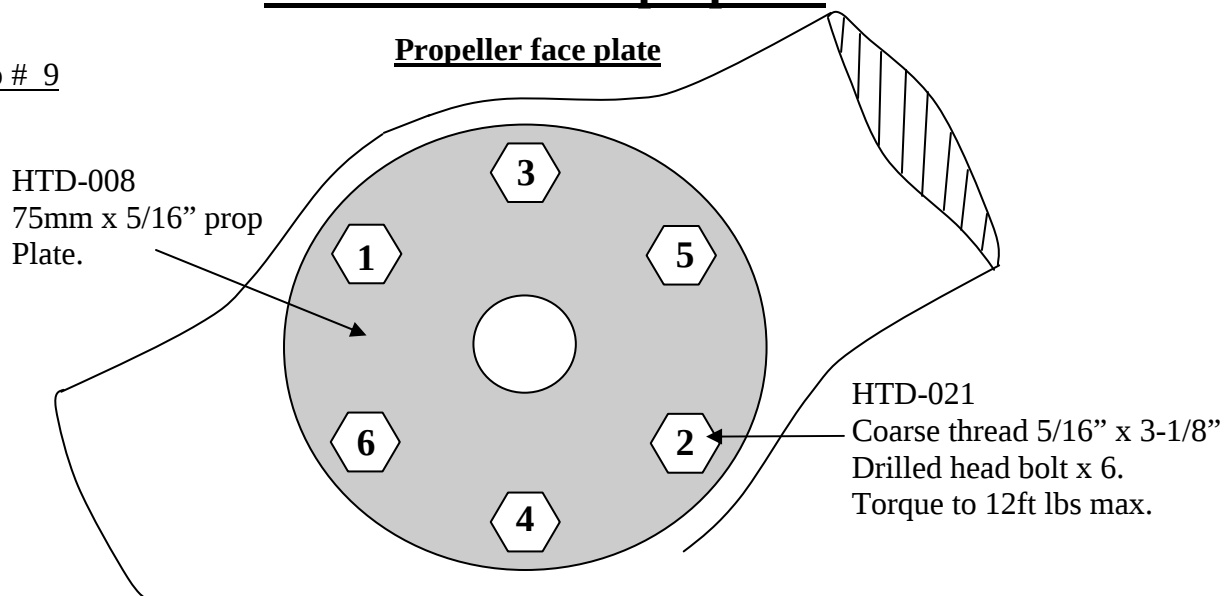
How to check belt tension and alignment for 2.6 : 1 Reduction drives

Step # 8



How to install the propeller

Step # 9

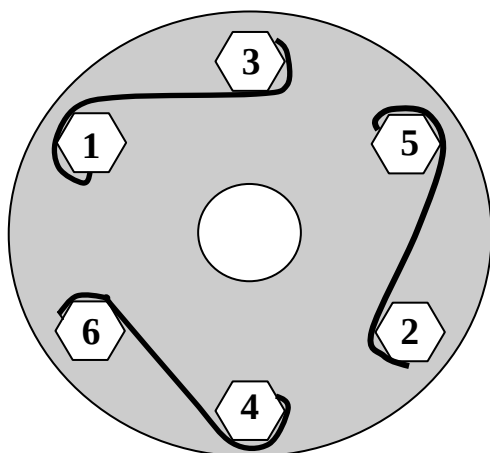


Install Propeller and prop plate with the 6 coarse thread 5/16 bolts (drilled head) provided. Be sure that the flat side of the prop is to the rear and the airfoil side of the prop is to the front. Do not over-tighten propeller bolts (12ft lbs. MAX). **Tighten in sequence indicated above.** Try to tighten prop bolts equally to prevent propeller from being pulled out of 'track'. Safety wire prop (reference below) with wire provided. Since prop bolts are 'safe tied', you need not use Loc-tite on threads.

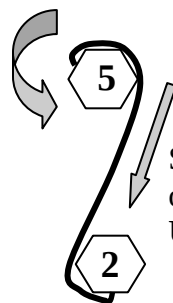
CAUTION:

Before running engine, see Rotax engine manual and proper break-in procedure.

Safety wire reference



Bolt loosens by unscrewing to the left



Safety wire keeps tension on the bolt to prevent Unscrewing.

Finishing up - Weight and balance

Step # 10

The following few pages contain information on the weight and balance of the Challenger aircraft. Some FAA inspectors want to see an actual weight and balance calculation on your plane before they will give you an airworthiness certificate. We have included a sample form on one of our planes and a blank one for you to use on your plane.

Remember - **If the nose wheel does not stay down** with the pilot sitting in the front seat with the engine NOT running, you are too tail heavy and must add ballast to the nose.

If you **weigh more than 250 lbs.**, you will probably be nose heavy unless you have the Rotax 503 with electric start system.

Generally speaking, the Challenger II will come out **Tail Heavy** if the following things are true.

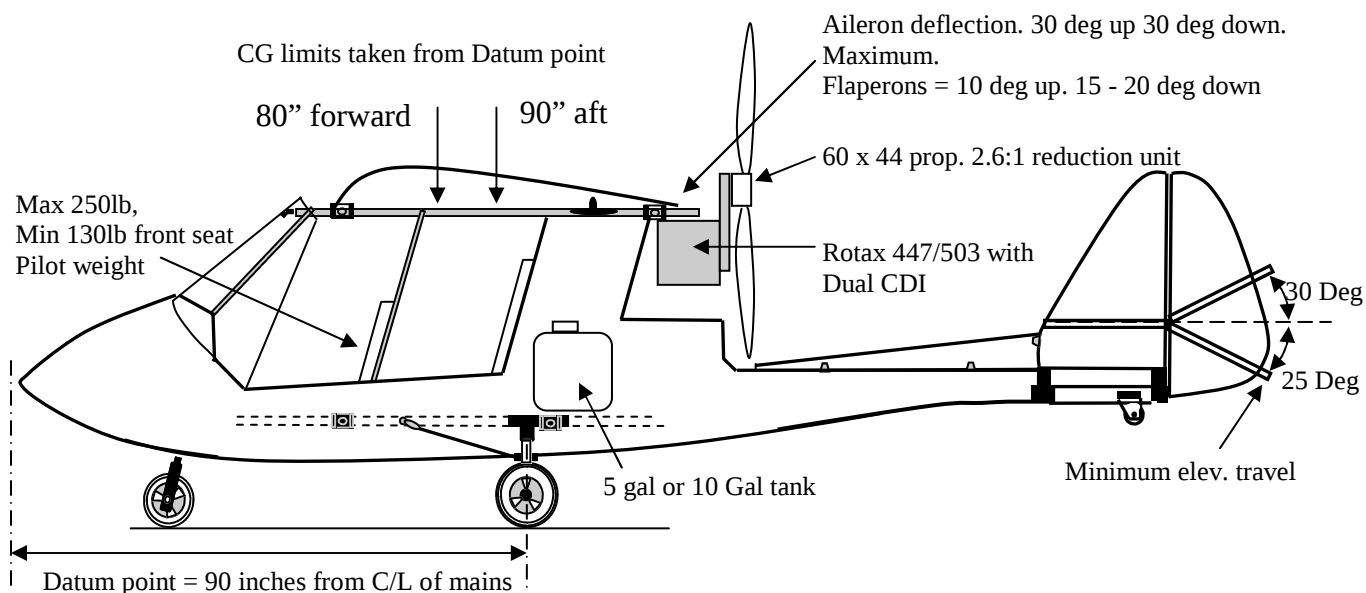
1. Pilot weighs less than 150lbs.
2. Too much paint is put on the tail surfaces
3. '503' engine, ten gallon tank and / or electric starter is installed.

If 1,2 & 3 are all true, you may need as much as 25lbs of ballast attached to the steel nose gear carrier assembly to balance the aircraft.

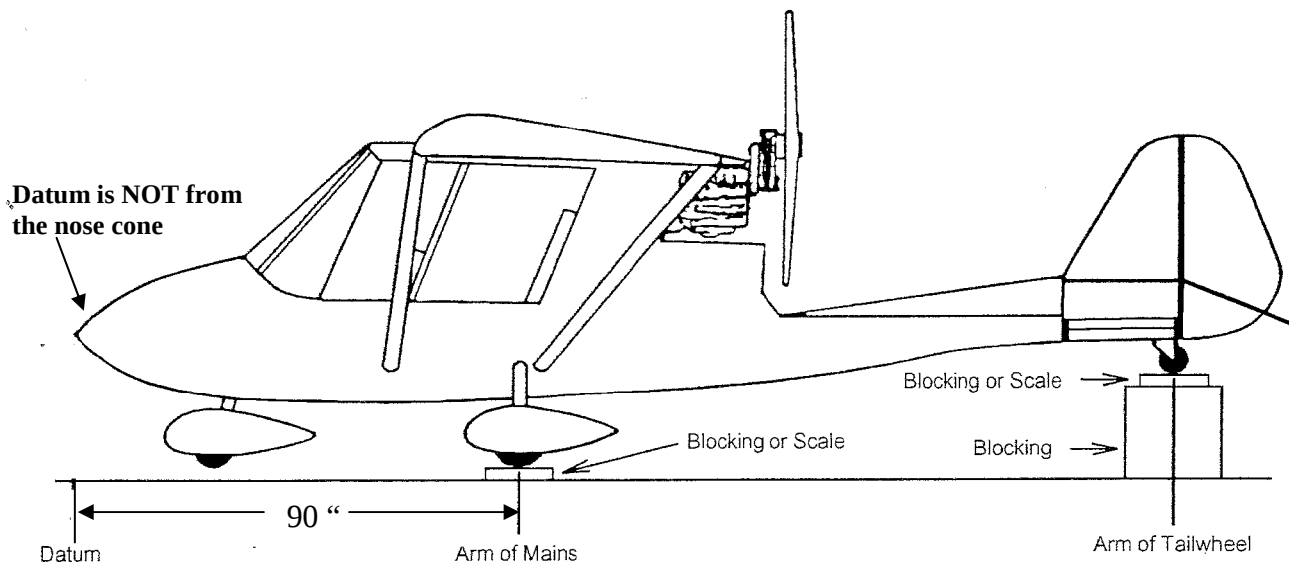
If you are slightly nose heavy, you will have to fly with the ailerons or flaperons in a more up (reflex) position. If you are slightly tail heavy, you will have to fly with the ailerons or flaperons in a more down (flap) position. Adjust your aileron pushrods accordingly. Elevator trim tabs may also be used (tab down for nose up trim).

IMPORTANT NOTE:

Before attempting to start the engine, taxi or fly your Challenger, refer to and read carefully the owners manual for set-up, pre-flight inspection, warnings and specific information vital to safe, proper operation are contained in that manual.



Weight & Balance - Challenger II - Two Place



Detailed Instructions

***DATUM:** A fixed point from which all measurements are taken.

***ARM:** Distance from the Datum to the center of mass of a specified object.

Example: The arm of the tail wheel would be the distance from the datum to the center bolt of the tailwheel. Prior to weighing, the aircraft should be thoroughly cleaned and serviced. Oil and Hydraulic systems should be full, fuel should be drained to an "un-useable" level, and all accessories should be in place. Weighing may be accomplished with either three scales, or one scale and two blocks the same height as the scale. Blocking should be prepared so that all weight measurements are taken in a level flying attitude.

Step 1: SETUP

Set up aircraft with blocking and scale(s) to a level flying attitude. With this setup, the nosewheel should not be in direct contact with the ground. See figure above.

Step 2: WEIGHING MAIN WHEELS

Obtain the weight of the left main wheel and record it on chart A of the Weight & Balance worksheet. If using only one scale, the right main should be resting on a block which is the same thickness as the scale, and the tailwheel should be resting on a similar block in addition to a larger block which represents a level flying attitude, as shown in the figure above. Repeat for the Right main wheel.

Step 3: WEIGHING TAIL WHEEL

Obtain the weight of the tailwheel and record it on chart A of the Weight & Balance worksheet. If using only one scale, the main wheels should now be supported with scale size blocks.

Step 4: CALCULATING THE ARM (Chart A)

Using the weight figures obtained in the previous steps, multiply the weight of each wheel by the corresponding arm listed to get the "Moment". Add the moments from left, right and tail wheels to get the "Total Moment". Carry this figure to the next line. Add the weight from left, right and tail wheels to obtain the empty weight. Divide the total moment by the empty weight, the result is the "Arm" for the empty airplane.

Step 5: CALCULATING GROSS WEIGHT AND CENTER OF BALANCE (Chart B)

Use the figures obtained in chart A to fill in the weight of the empty airplane, it's arm, and the moment on chart B. Fill in the front seat (pilot) weight and multiply it by the corresponding arm listed to get the front seat moment. Repeat for the rear seat using the passenger's weight. Fill in the number of gallons of fuel and multiply this number by 6 for fuel weight in pounds or fill in the number of liters and multiply by 1.585 for fuel weight in pounds (do not use both gallons and liters). Multiply the fuel weight by the fuel arm to get the moment. Add the weights for the total gross weight, and add the moments for the total moment. Carry these figures to the next line and divide the total moment by the total weight to get the Center of Gravity. Verify that the total gross weight is under the maximum allowable gross weight, and that the Center of Gravity is within the range recommended by the manufacturer.

Weight & Balance - Challenger II - Two Place

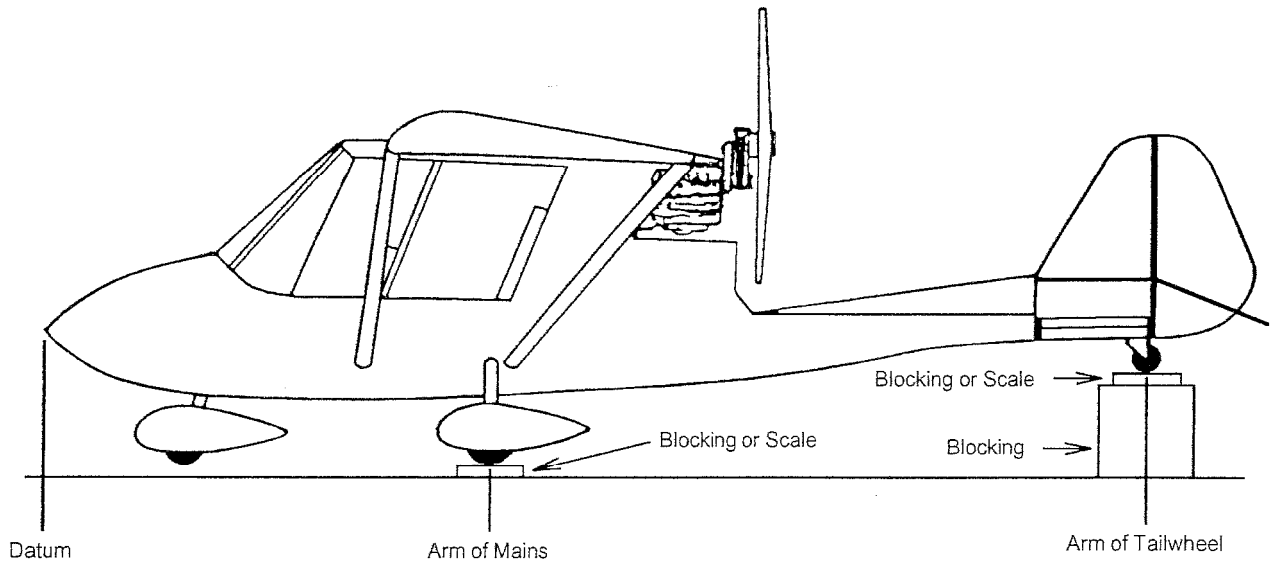


Chart A

Aircraft: N SAMPLE

	Weight		Arm		Moment
Left Wheel:	133 lbs.	x	90"	=	11970
Right Wheel:	133 lbs.	x	90"	=	11970
Tail Wheel:	44 lbs.	x	216"	=	9504
Total Empty Weight:	310 lbs.				
				Total Moment (inch/lbs):	33444
Total Moment (inch/lbs):	33444				
Total Empty Weight (lbs):	310	=	107.88	Arm (Empty airplane)	

*Notes: Empty weight does not include useable fuel. Aircraft must be weighed in a level flying attitude. Scale should be placed above blocking for tail wheel, or the weight of the blocking deducted from tailwheel weight if blocking is above scale.

Chart B

	Weight		Arm		Moment
Empty Airplane:	310 lbs.	x	107.88"	=	33444
Front Seat (Pilot):	170 lbs.	x	50"	=	8500
Rear Seat:	170 lbs.	x	77"	=	13090
Fuel in Gallons:	10 (x 6 = lbs.)				
or Fuel in Liters:	(x 1.585 = lbs.)				
Fuel in Weight:	60 lbs.	x	103"	=	6180

Total Gross Weight: 710 lbs.

Total Moment 61214

$\frac{\text{Total Moment}}{\text{Total Weight}} = \frac{61214}{710} = 86.22$ C.G.

Max. Allowable Gross Weight: 800 lbs.

Center of Balance Range, from: 80" to 90" from datum.

Weight & Balance - Challenger II - Two Place

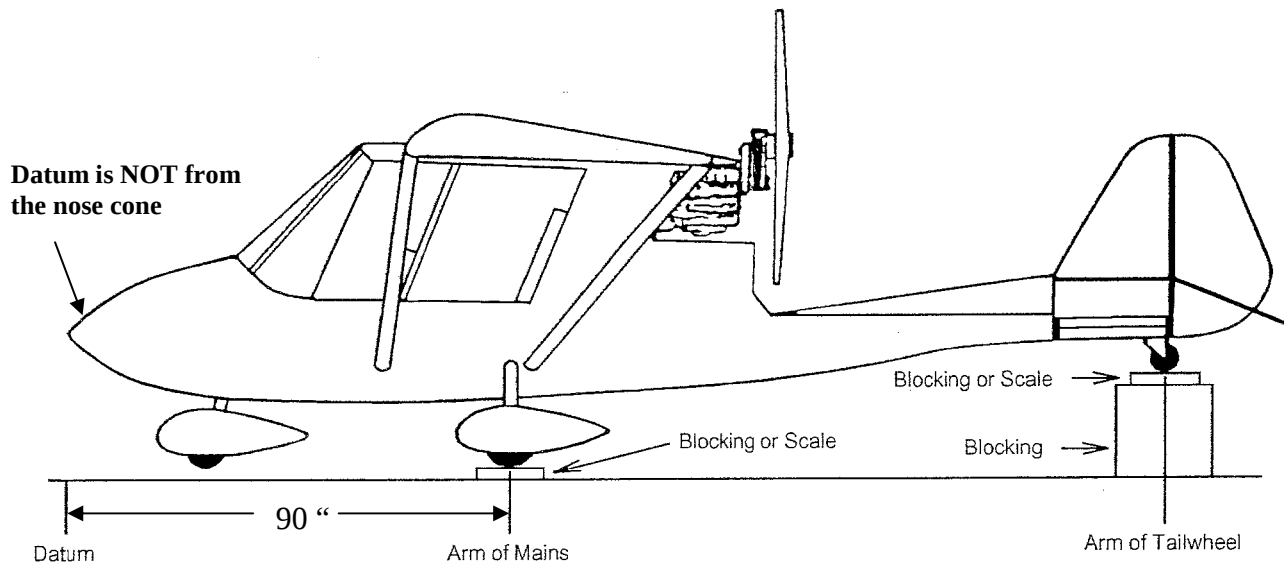


Chart A

Aircraft: N _____

	Weight		Arm		Moment
Left Wheel:	_____ lbs.	x	90 "	=	_____
Right Wheel:	_____ lbs.	x	90 "	=	_____
Tail Wheel:	_____ lbs.	x	216 "	=	_____
Total Empty Weight:	_____ lbs.		Total Moment (inch/lbs):		_____
Total Moment (inch/lbs): _____ = Arm (Empty airplane)					
Total Empty Weight (lbs): _____					

*Notes: Empty weight does not include useable fuel. Aircraft must be weighed in a level flying attitude. Scale should be placed above blocking for tail wheel, or the weight of the blocking deducted from tailwheel weight if blocking is above scale.

Chart B

	Weight		Arm		Moment
Empty Airplane:	_____ lbs.	x	_____ "	=	_____
Front Seat (Pilot):	_____ lbs.	x	50 "	=	_____
Rear Seat:	_____ lbs.	x	77 "	=	_____
Fuel in Gallons:	_____ (x 6 = lbs.)				
or Fuel in Liters:	_____ (x 1.585 = lbs.)				
Fuel in Weight:	_____ lbs.	x	103 "	=	_____
Total Gross Weight:	lbs.		Total Moment		
Total Moment / Total Weight = C.G.					

Max. Allowable Gross Weight: **800** lbs.

Center of Balance Range, from: **80" to 90"** from datum.

Quick reference page

Torque specs

ENGINE 447/503

<u>Bolt type</u>	<u>Bolt Size</u>	<u>in lbs.</u>	<u>ft lbs.</u>	<u>Loctite</u>
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MOTOR MOUNT HARDWARE

Crank case base nuts		335	28	242
All other bolts on MM hardware have no specific torque setting. Do not over tighten.				
1/16" compression MAXIMUM on the root tube for angle mount bolts - AN5-52A				

REDUCTION DRIVE

Prop Shaft drive nut	1"		150-200	none
Prop hub mounting bolts	5/16"	180	15	271
Prop mounting bolts	5/16"	180	15	none
Bottom pulley	1/2"	600	50	271
Re-drive mount bolts	8mm (Rotax)	180	15	271
Re-drive mount bolts	10mm (Hirth)	240	20	271

STARTER MOTOR HARWARE

Flat head, countersunk- socket cap screws	M8 x 1.25 x 80mm	156	15	271
Hex head bolts	2" x 3/8 x 16 grade 8	156	26	271

FOR ALL ENGINE SPECS, REFER TO ROTAX MANUAL SUPPLIED WITH ENGINE KIT.

FOR ROTAX ENGINE WARRANTY ISSUES, PLEASE CONTACT YOUR DESIGNATED WARRANTY CENTER. (REFER TO PAPER WORK SUPPLIED)

FOR ROTAX NON WARRANTY ISSUES, PLEASE CONTACT:

CALIFORNIA POWER SYSTEMS - 1 800 AIRWOLF

OR

LOCKWOOD AVIATION - 1 800 LA ROTAX