PHANTOM X-1 ASSEMBLY MANUAL

(X-1 & X-1E are almost identical in construction, see the Addendum for other X-1E instructions)

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TABLE OF FIGURES

For the purpose of this manual, all washers, nuts and pop-rivets will be given an abbreviated part number rather than their actual AN part number. They are as follows:

Part Number		Description
Washers		
W3		For 3/16 bolt
W3B		For 3/16 bolt, Large dia.
W3P		For 3/16 bolt, Plastic
W4		For ¼ bolt
W4B		For ¼ bolt, Large dia.
W4P		For ¼ bolt, Plastic
W5		For 5/16 bolt
W5B		For 5/16 bolt, Large dia.
W6		For 3/8 bolt
W8		For ½ bolt
W8L		For ½ bolt, Lock Washer
W8P		For ½ bolt, Plastic
W10		For 5/8 bolt
Nuts		
N3		10-32 Nylock
N3S		10-32 Nylock, Shear
N3W		10-32 Wing Nut
N4		¼-28 Nylock
N4A		¼-20 Plain
N4S		¼-28 Nylock, Shear
N4W		¼-28 Wing Nut
N5		5/16-24 Nylock
N6		3/8-24 Nylock
N8		½-20 Nylock, Shear
N10		5/8-18 Nylock, Shear
Pop Rivets		
PR1		1/8” Alum., 5/16 Reach, Alum. Break Stem
PR2		5/32” Alum., ¼ Steel Break Stem
PR2-C		5/32” Steel, Countersunk, Steel Break Stem
PR3-S		3/16” Alum., ¼ Reach, Alum. Break Stem
PR3-L		3/16” Alum., 5/8 Reach, Alum. Break Stem

Introduction

Phantom Aeronautics LLC, would like to take this opportunity to welcome you to the world of PHANTOM Airplanes. We wish you many enjoyable and safe hours of flying.

This manual has been written to provide you with the simplest manner of assembly. However, you MUST FOLLOW INSTRUCTIONS!! The following tips are invaluable and will help ensure satisfaction with the assembly and use of your PHANTOM.

1) **Read instructions thoroughly and study associated figures carefully prior to assembly.**

2) **Pre-fit Parts, Powder Coated Parts may require you to re-drill holes, you may use drill bits to run through holes to aid in alignment as well.**

3) **DO NOT melt any sail material until you reach the step in the manual instructing you to do so.**

4) **Use LOCTITE on all bolts not fastened with locknuts**

5) **Mount X-1E Windshield, Doors and Enclosure at the same time to ensure proper fit.**

6) **Call the factory before you install the wing sails. We will talk you through the instructions to insure your wing sails fit well.**

7) **You will have extra hardware, variations on bolt lengths have been provide incase material stack-ups cause a different length bolt to be utilized. As a guide make sure you have threads showing past the locknuts when they are tightened. If not change the bolt length.**

Again, a sincere welcome to PHANTOM flying and thank you for choosing Phantom.

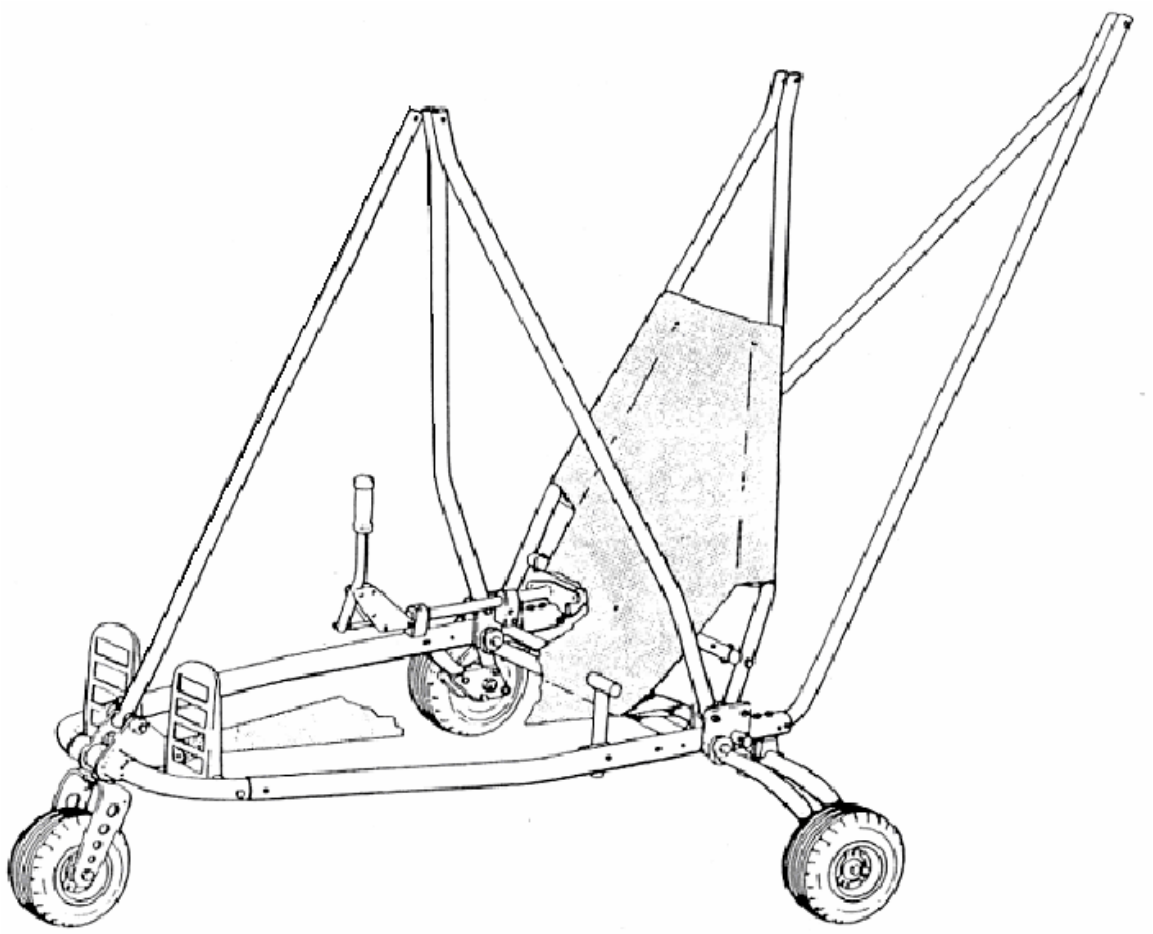


Figure 1 – Cage and Down Tubes

CHAPTER 1 – LOWER CAGE ASSEMBLY

Figures 2 thru 10 – Lower Cage Assembly

Install C13, C40, C41 and seat through C02 & C03. Install AN4-23A, W4, and N4 through C02 and C03 to hold C13 in place. Be aware that cage side bracket C40 is positioned inside right cage member to accept mounting of rear torque tube bearing. You may have a plane that uses all of the same cage side brackets. Install rear mounting bolt AN4-25A with W4 and N4, Left and right sides. Install bolt AN4-44A, (3) bungee retaining washers C07, (3) W4B, (2) Spacers C08, (1) W4 washer and (1) nut N4 in depicted sequence, left and right. This sequence is a guide and this may be pre-assembled. Your installation may be different to aid in fit-up of the bungee cords. Install C13 and tighten.

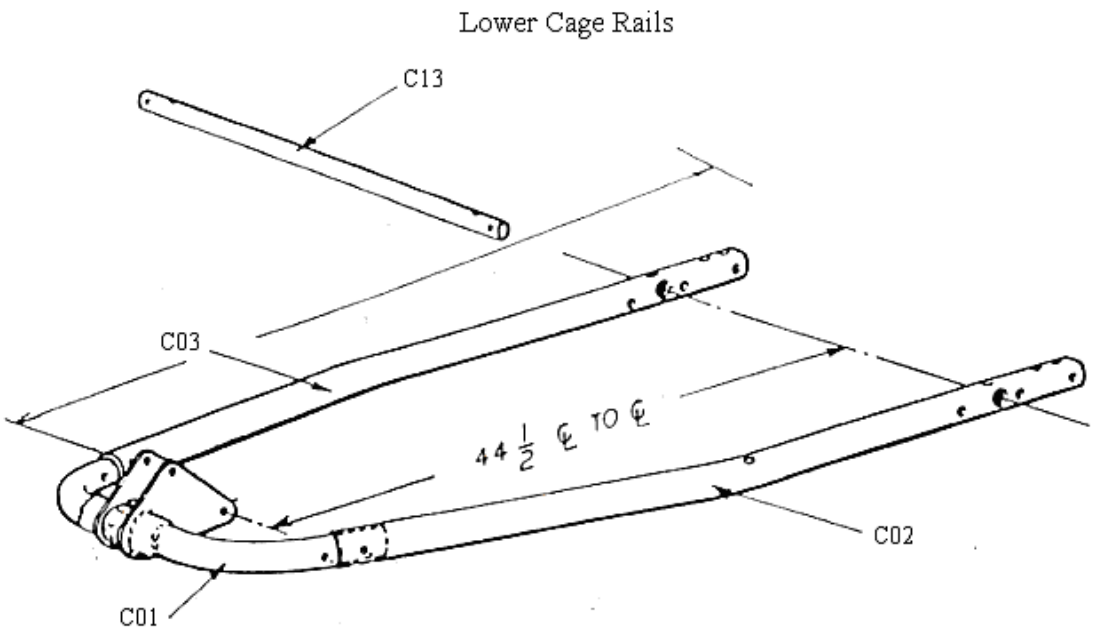


Figure 2 – Cage Rails

Figure 3 – Assembled Lower Cage

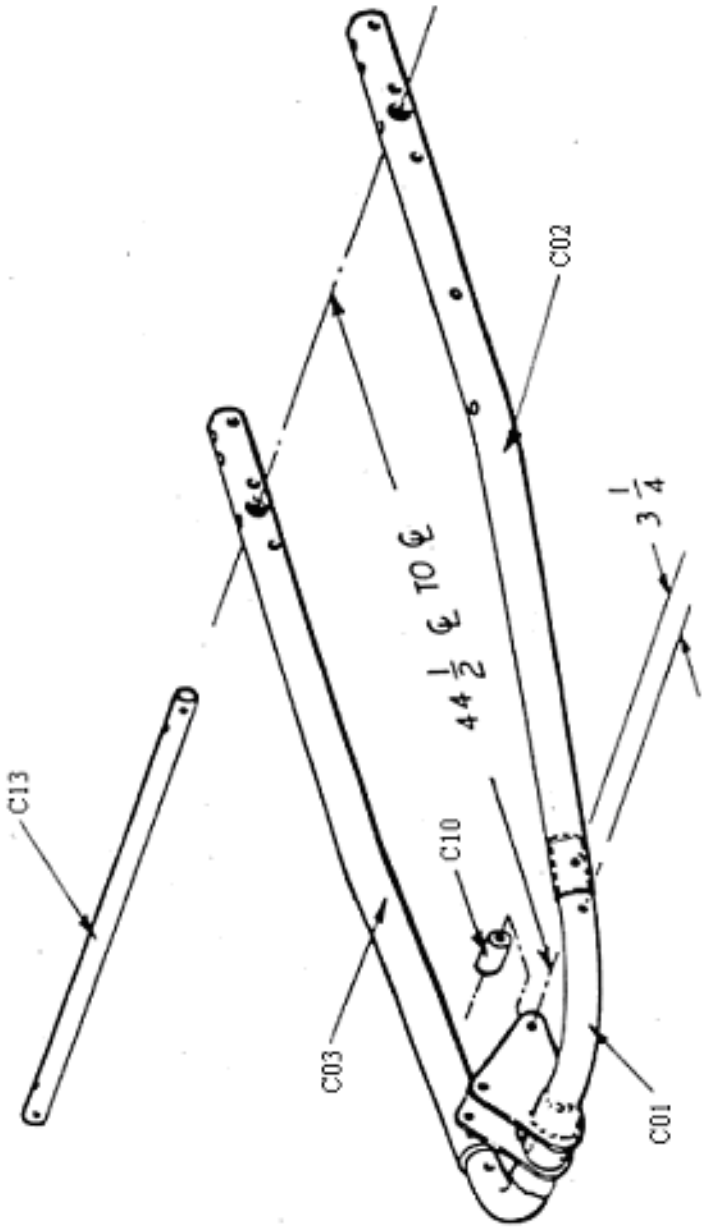


Figure 4 – Lower Cage Assembly

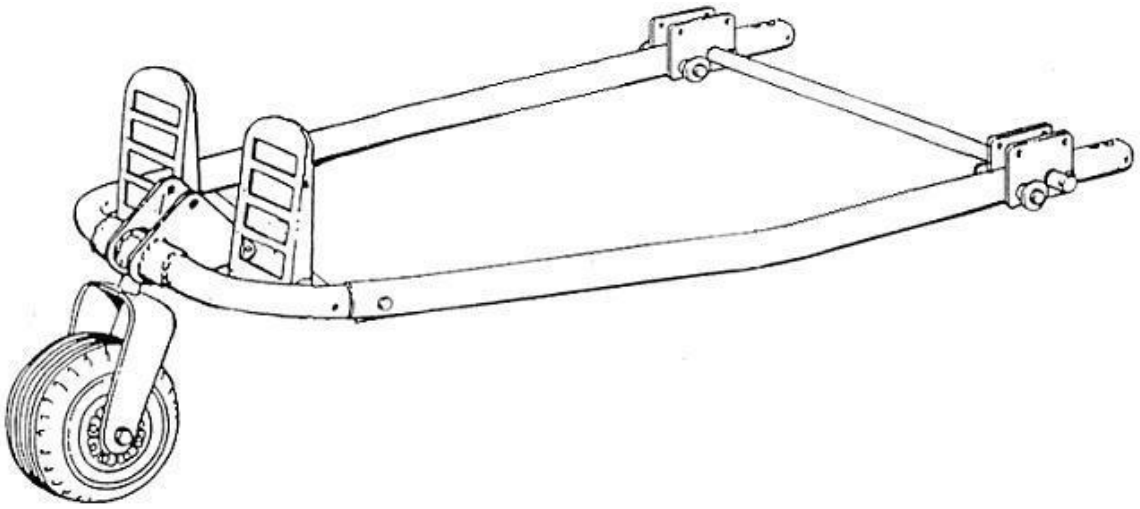


Figure 5 – Assembled Lower Cage

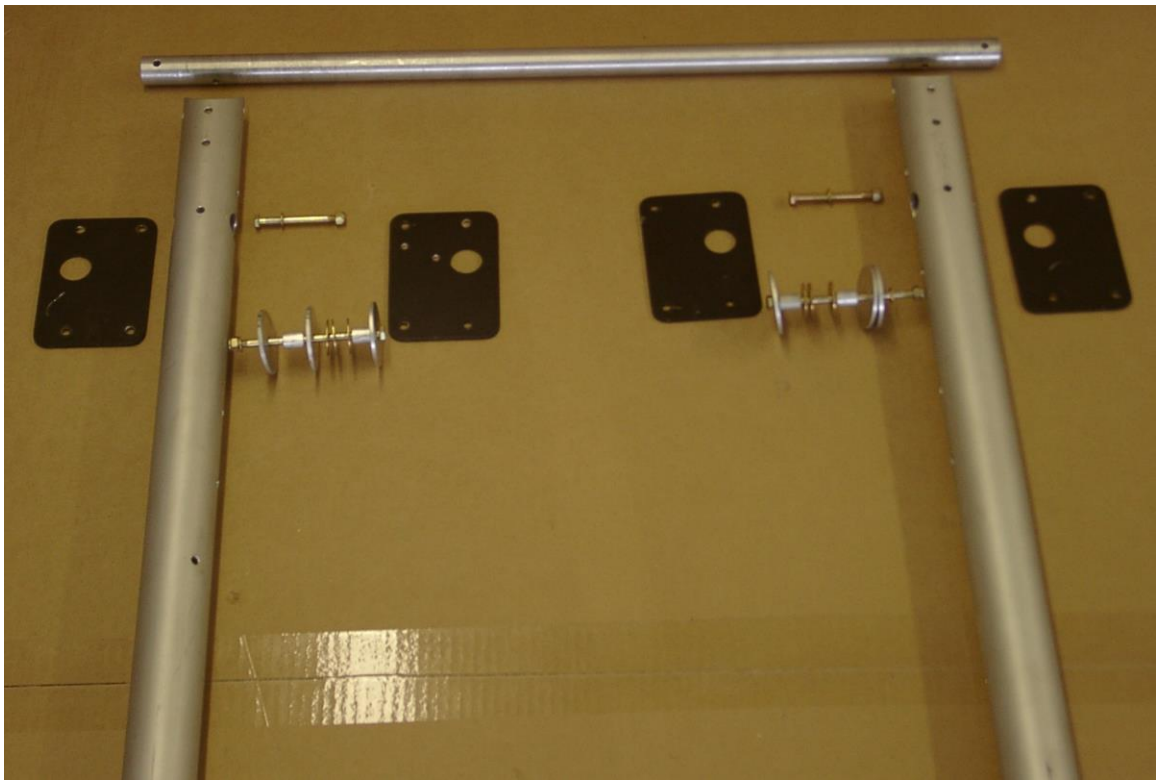


Figure 6 – Spreader Bar, Cage Rails and Hardware

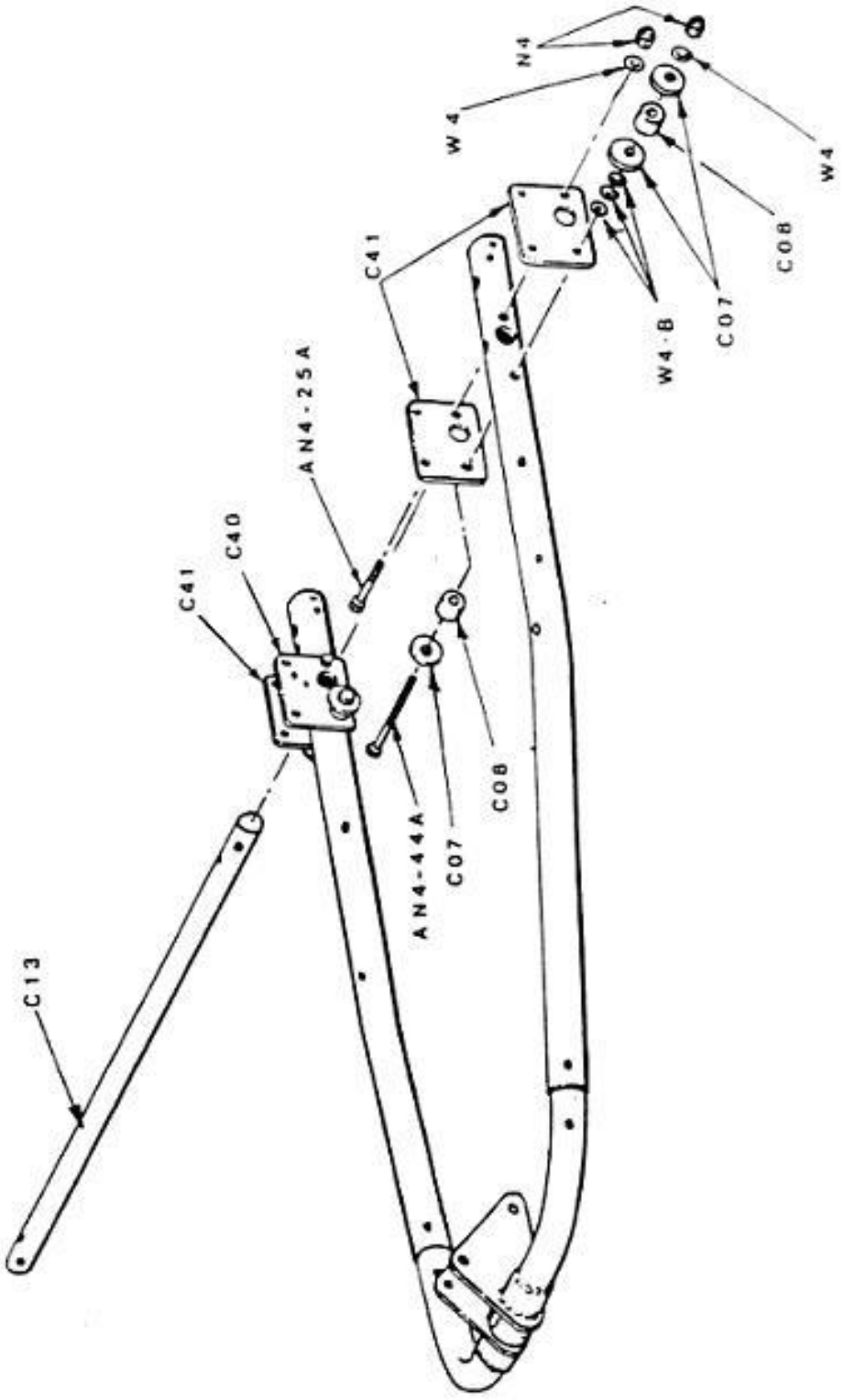


Figure 7 – Lower Cage Assembly

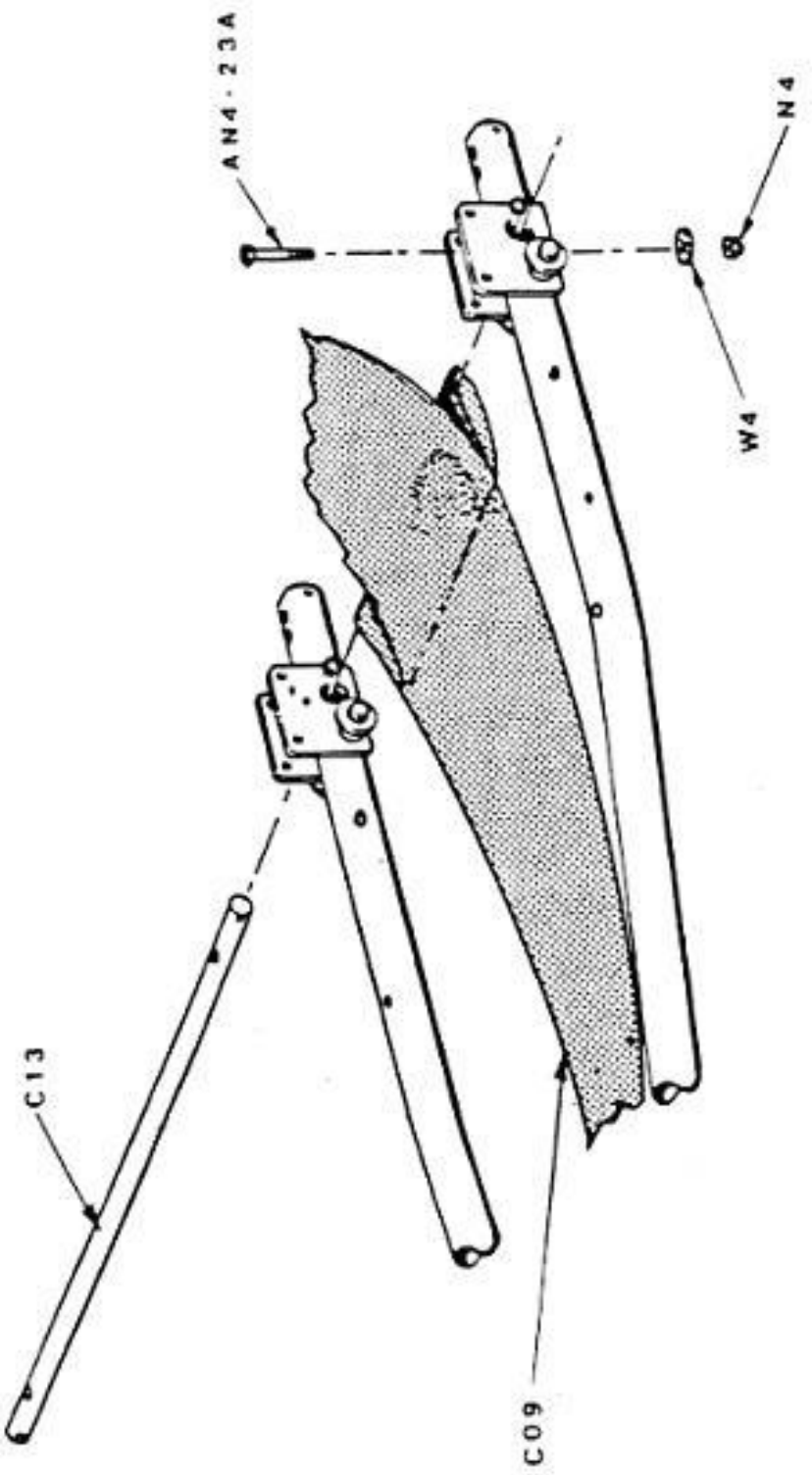


Figure 8 – Assembly with Seat

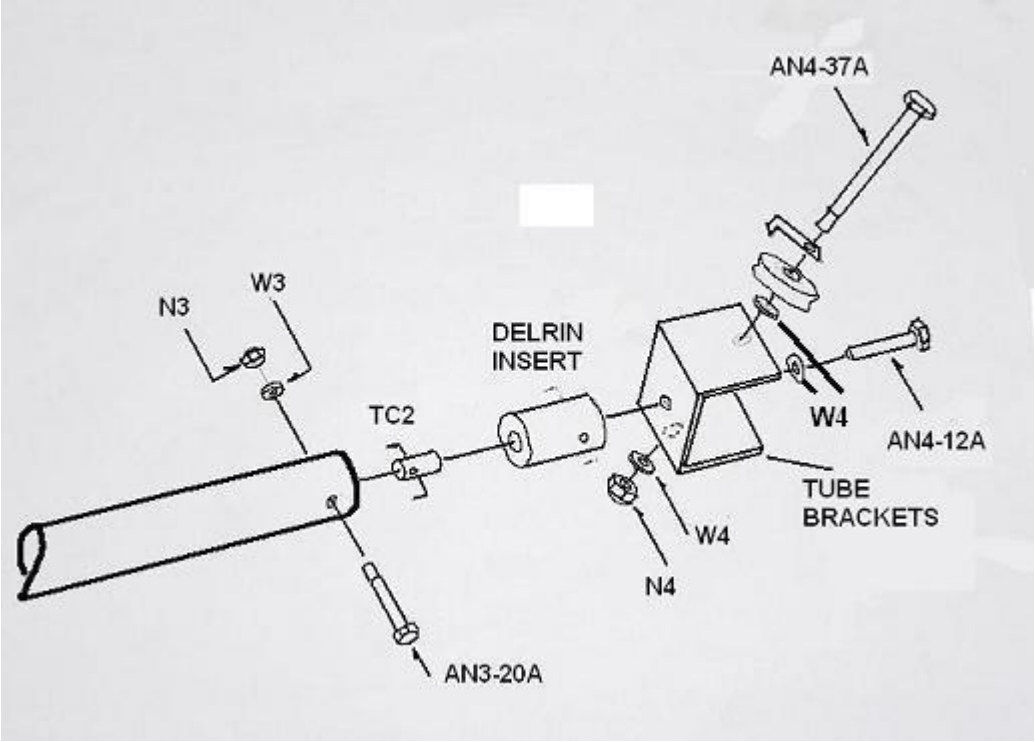


Figure 9 – Seat Bar Installation

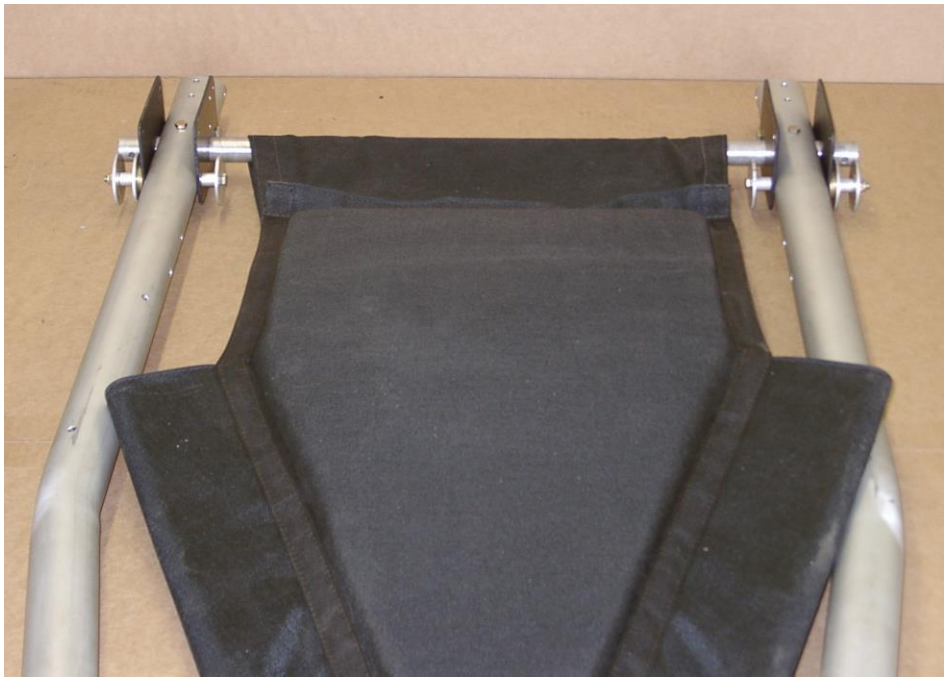


Figure 10 – Completed Assembly with Seat

Figures 11 & 12 – Rudder Pedal Assembly

Install left rudder pedal C11, Right rudder pedal C12, Seat C09 and insert seat bushing C10 as shown with bolt AN4-31A, (4) W4P and (1) N4s In depicted order. Lubricate and do not over tighten, must pivot. Make sure to install pedal extensions at this time using (1) AN3-5A, W4P and (1) N3 for each extension.

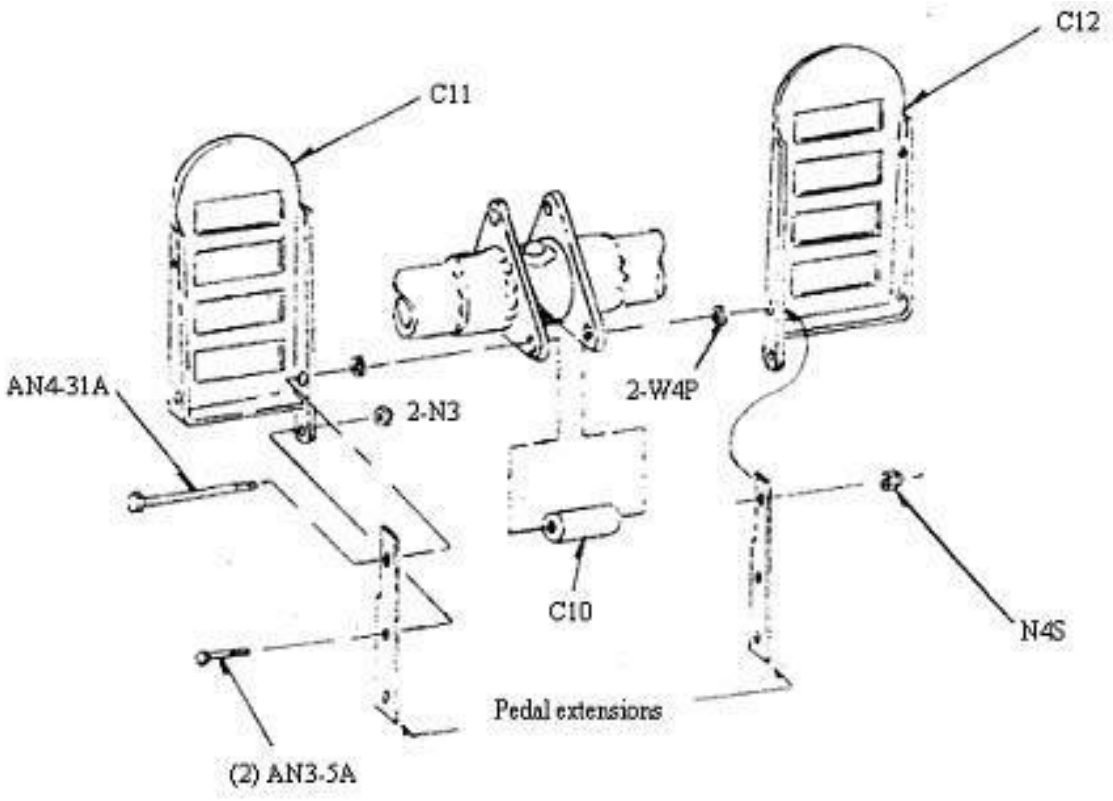


Figure 11 – Rudder Pedal Assembly

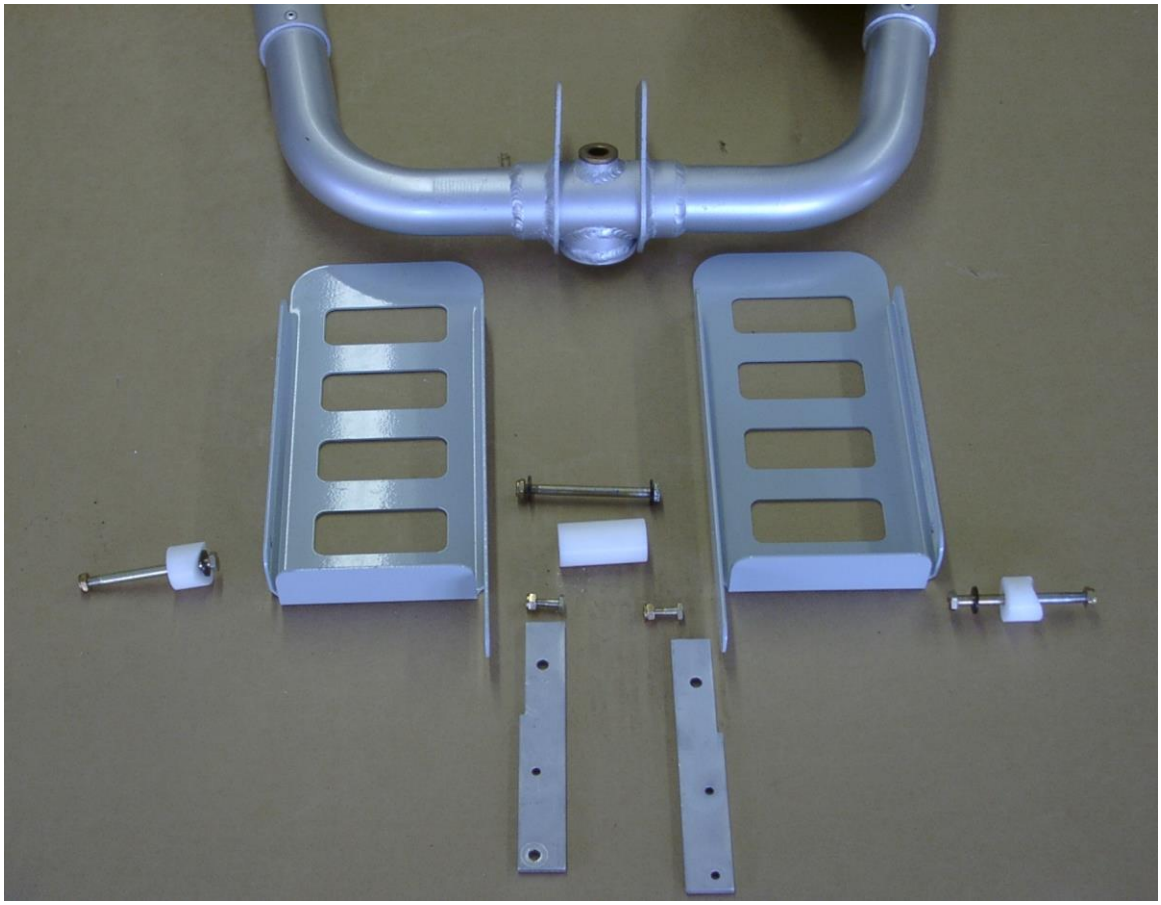


Figure 12 – Rudder Pedal Assembly with extensions

Figures 13 & 14 – Rudder Pedal Assembly

Install outside pivot bolt AN4-30A in left and right sides as shown with W4P, Spacer C05 and N4S. Trim C05 as necessary for clearance. Do not over tighten, must pivot freely.

***Note: C05 may require sanding to ensure proper movement in rudder pedals.**

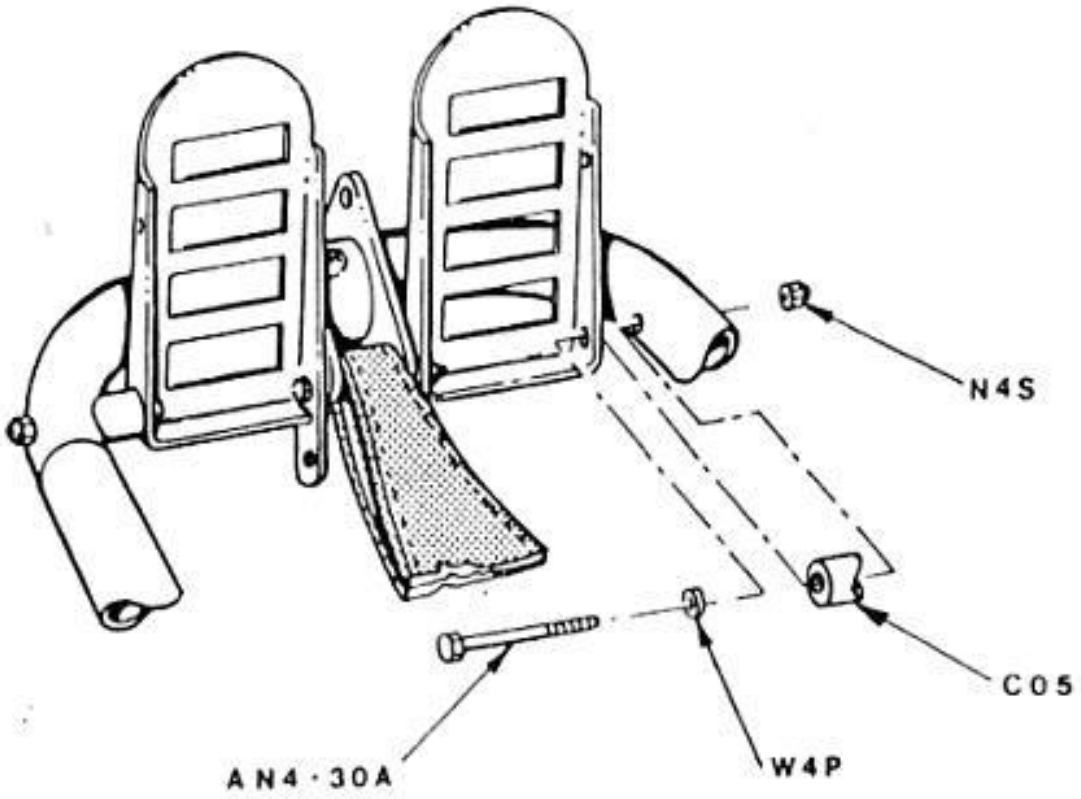


Figure 13 – Rudder Pedal Assembly

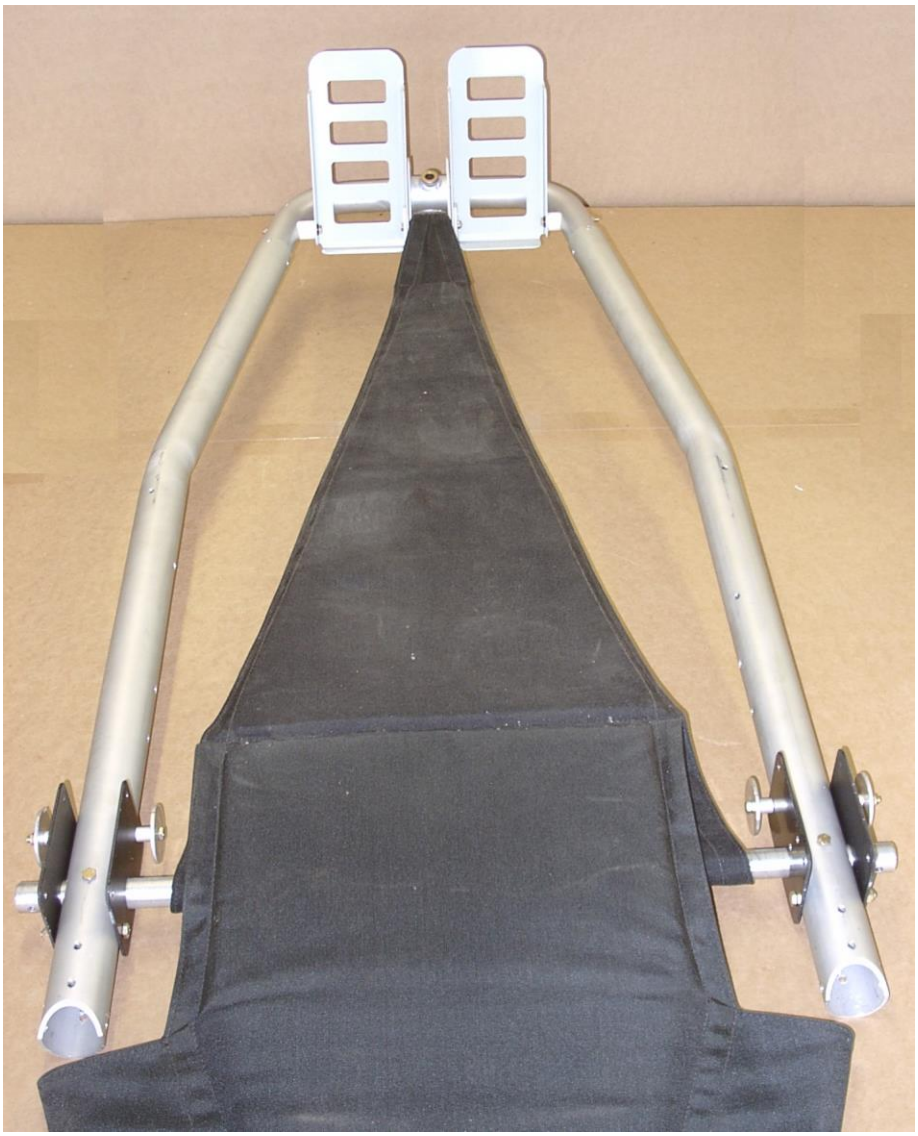


Figure 14 – Completed Lower Cage with Rudder Pedals

Figures 15 & 16 – Wheel and Brake Assembly

For Disc Brake Assembly and Adjustment see Disc Brake Assembly Manual.

Assemble each tire and wheel as shown. Partially inflate tube, which is usually shipped in tire, to insure against a pinched tube during assembly. Position wheel halves C23 and insert spacer C24 into wheels going on main gear only. Spacer will later be aligned by axle bolt. Bolt each wheel together with (3) C26 bolts and (3) N4A Nuts for plastic wheels. If using aluminum rims assemble as shown in Figure 16 using 3 AN5-34A, 3 W5, 3 N5 and 3 DS. If you are installing brakes on your aircraft install the brake drum at this time as shown in Figure 16 make sure to install DS 5/8" spacers in between the brake drum and rim. Inflate to 25-30 PSI

Note: 1) C24 is used only with plastic wheels.

2) DS not used if brakes are not to be installed

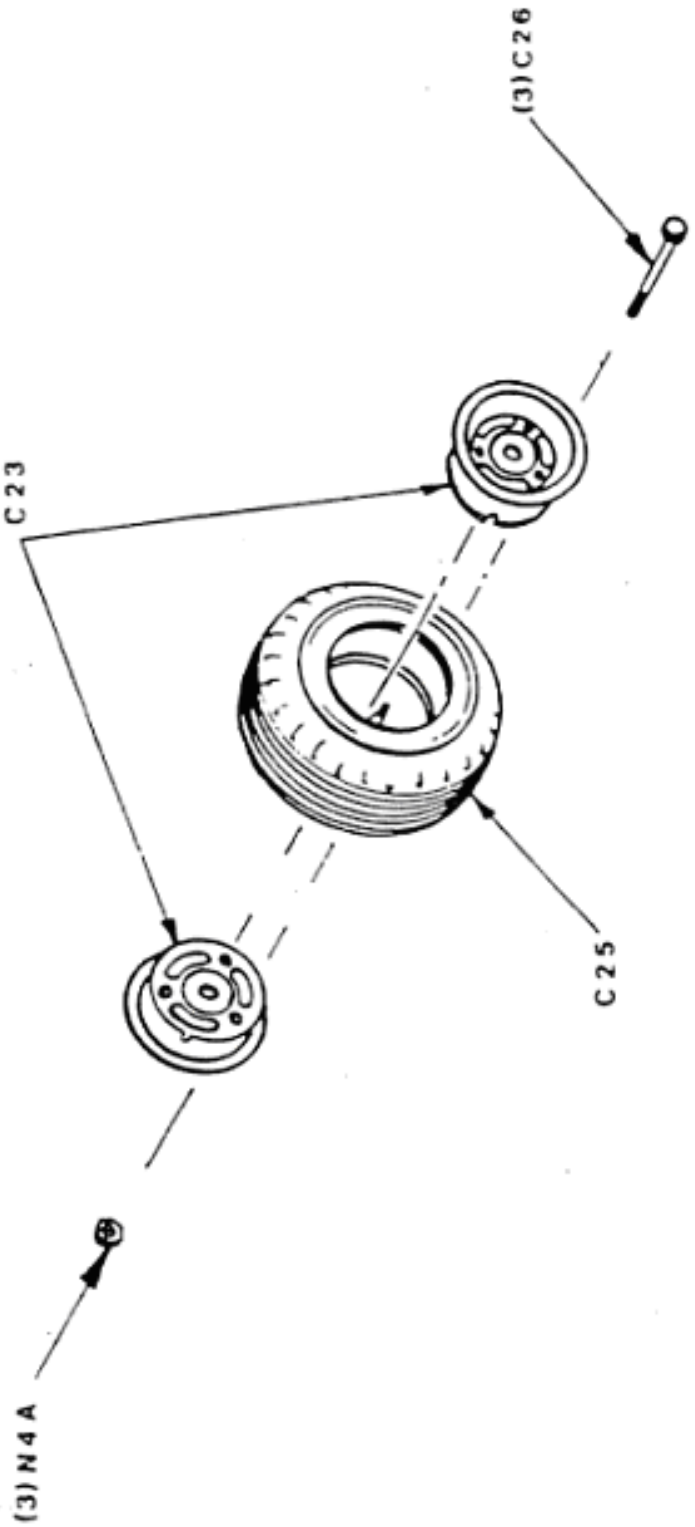


Figure 15 – Plastic Wheel Assembly

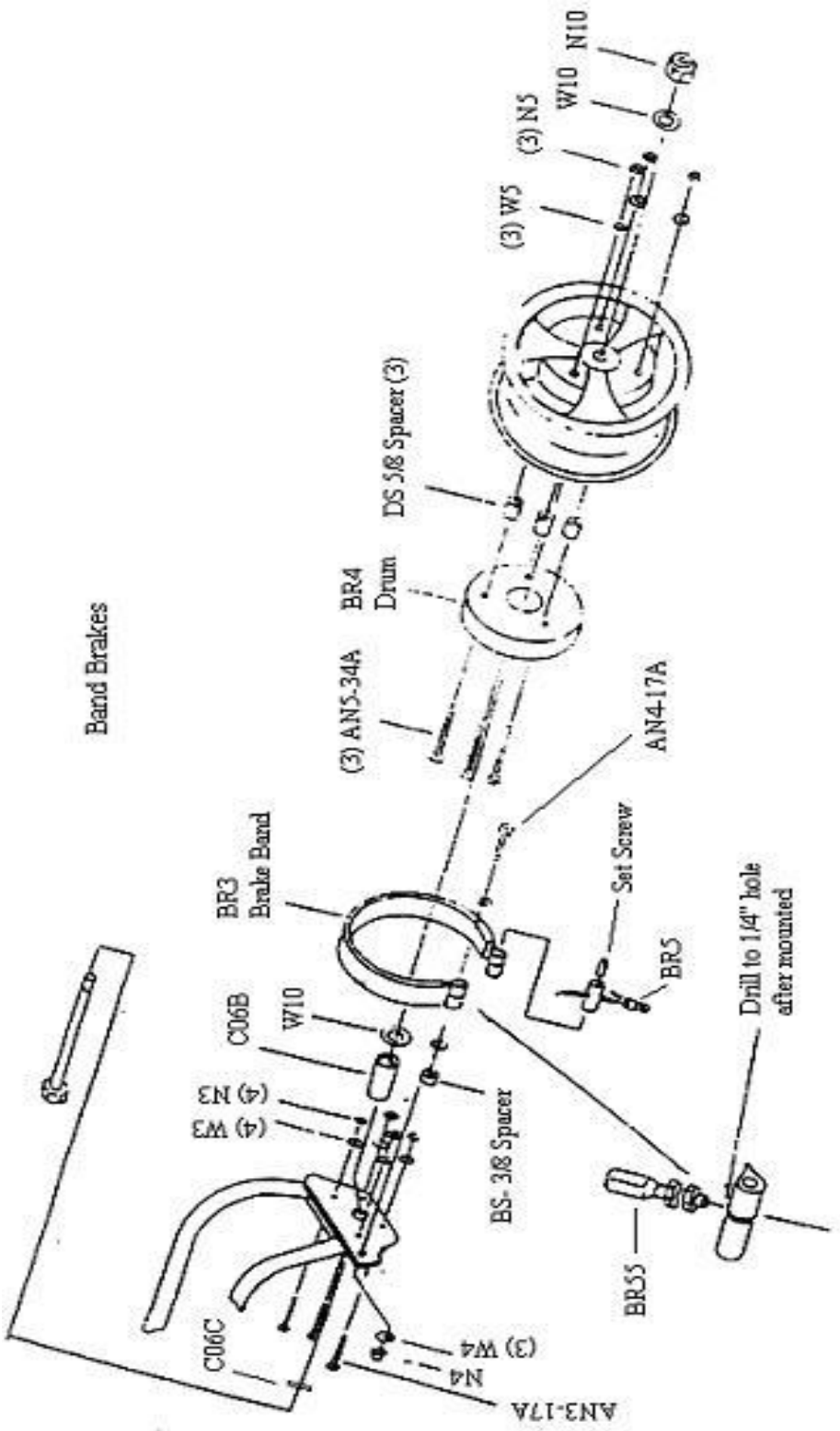


Figure 16 – Aluminum Wheel and Brake Assembly

Figure 17 & 18 – Bungees

Form (4) Bungee C14 into three loops as shown in Figure 17 and slide over forward landing gear tube C15 shown in Figure 18.

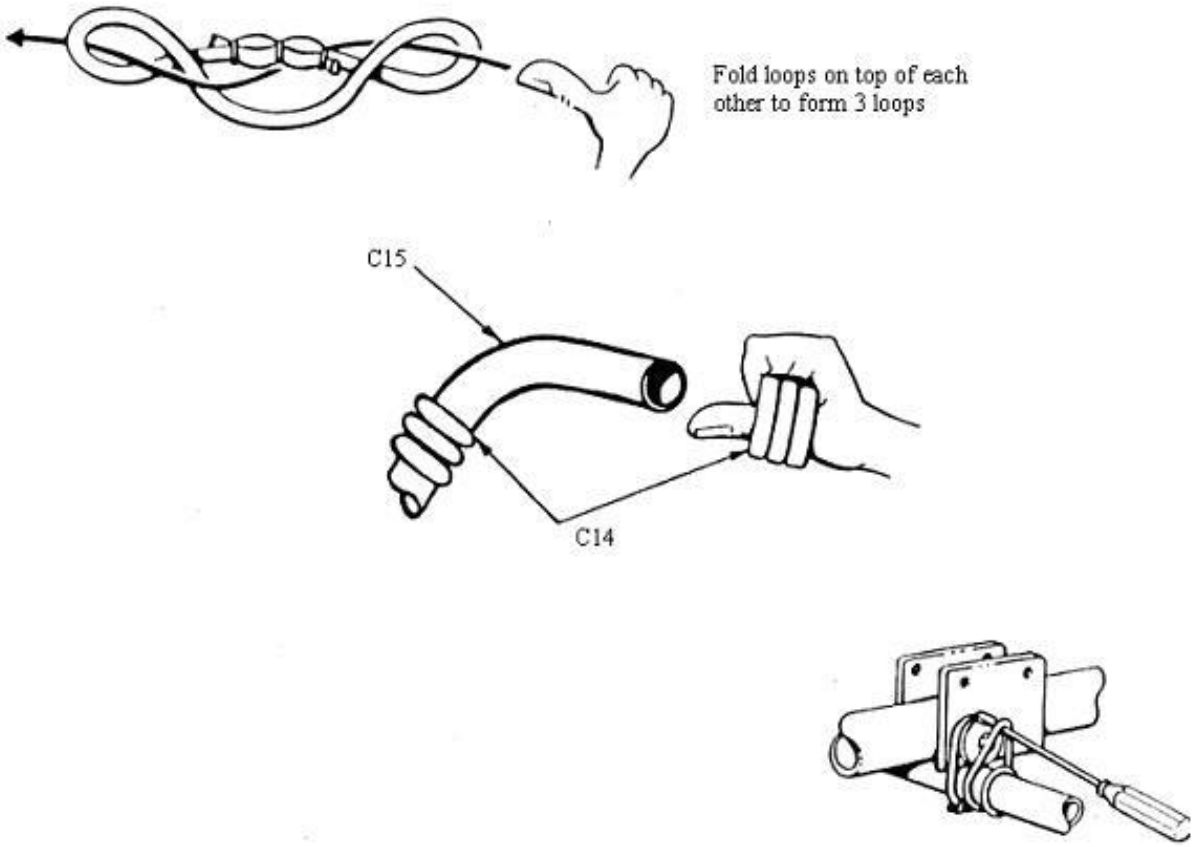


Figure 17 – Bungee Loops

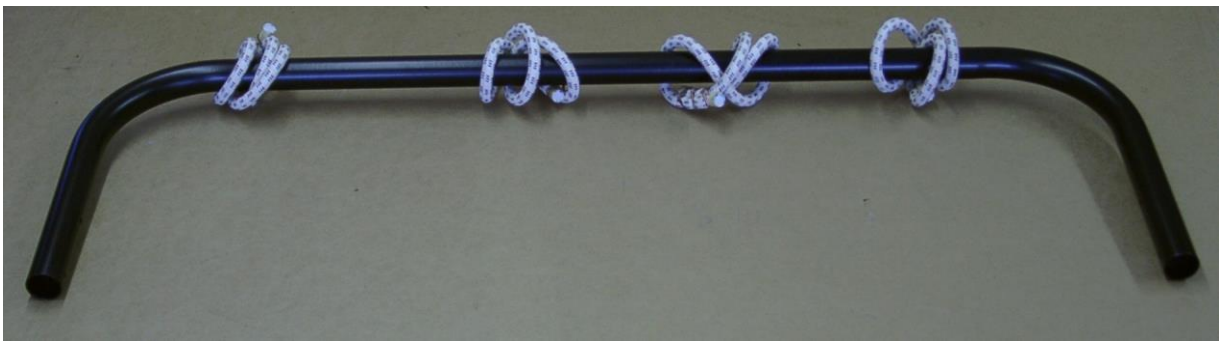


Figure 18 – Bungee Loops over C15

Figures 16 & 19 thru 21 - Landing Gear Assembly

Refer back to Figure 16 for drawings. Bolt (2) main gear gusset plates C17B to connect each side of forward landing gear tube C15C and rear landing gear tube C16C with (4) AN3-17A, W3 and N3. Be sure bungees are properly installed on forward landing gear tube C15C. Tighten securely. Insert axle bolt through C06C (washer), through inside gusset plate, through rear axle spacer C06, through assembled rim, through W10 and tighten with N10. Make sure the brake band is around the drum before installing axle bolt.

Note:

AN10-52A axle bolt is used with 4" plastic wheels only.

AN10-60A axle bolt is used with aluminum wheels 6" and no brakes

AN10-70A axle bolt is used with aluminum wheels 6" with brakes

AN10-80A axle bolt is used with aluminum wheels 5" with brakes

Figure 19 – Bungee Placement and Assembled Gear

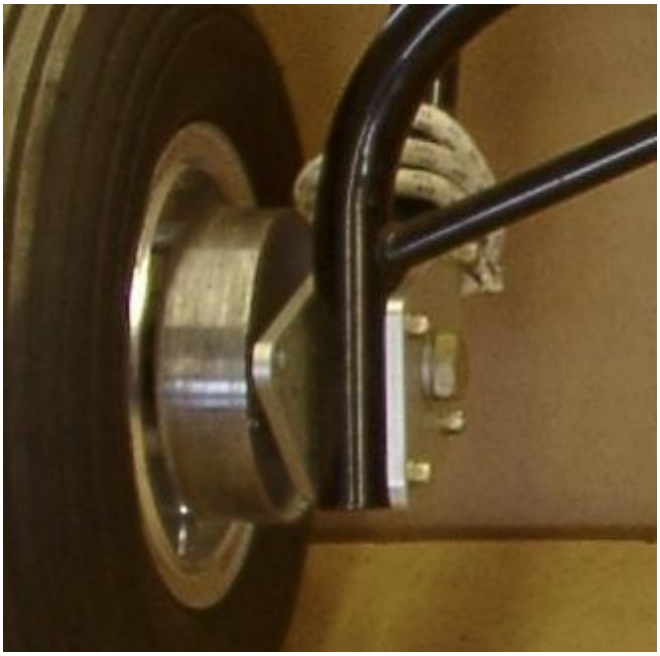


Figure 20 – Brake Placement (make sure to install brake band around drum)

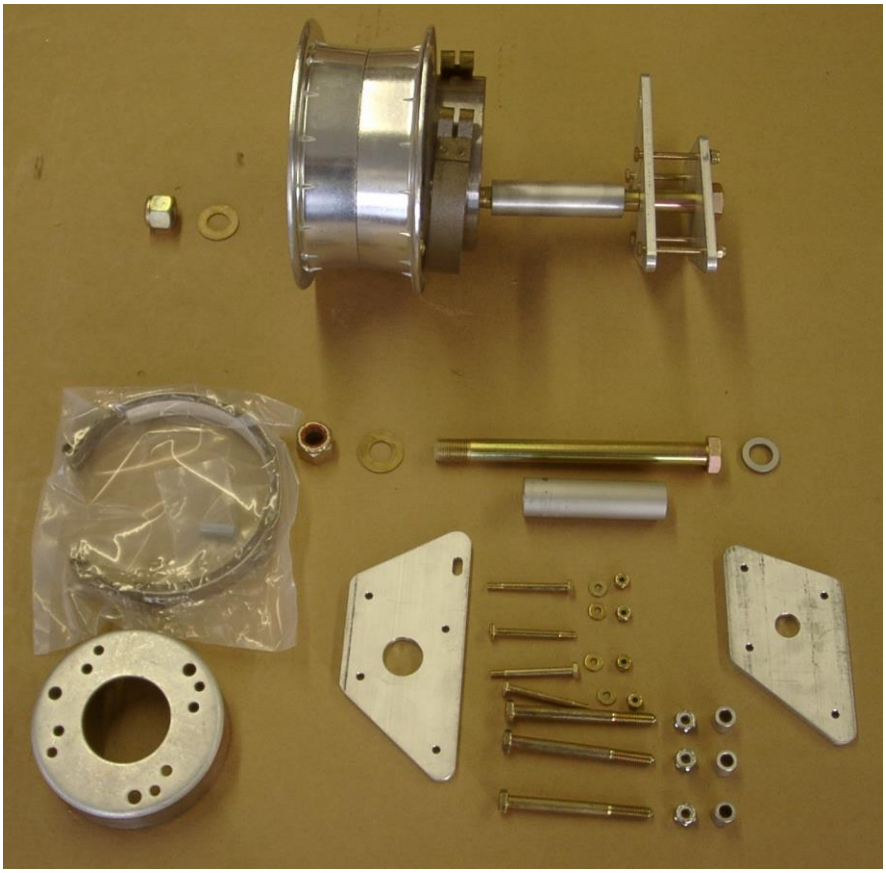


Figure 21 – Brake and Rim Hardware. (3 large bolts on rim, 4 small bolts on plates)

Figures 17, 22 and 23 – Landing Gear Installation on Lower Cage

Position assembled landing gear to rear of cage members as shown. Make sure (2) bungees are to the inside of cage and (2) bungees are outside. Install with AN4-44A bolts, delrin upper and lower landing gear mount C19, W4's and N4's as shown. Older planes may use a C18 and C19. New installations use C19 in place of C18. Be sure gear is centered when viewed from the rear and tighten evenly. Position and pull looped bungees over bungee retaining washers in each of the four places as shown in Figure 17. Bungee installation is best complete with 2 people and 2 screwdrivers. The first person should insert the screwdriver inside the bungee loops and place the tip on the outside washer. Pull up until the screwdriver slides in between the bungee spacer washers. (Be careful not to let the screwdriver slip) The second person should use the second screwdriver to slip the bungees the rest of the way over the washers while the first person is holding the tops of the loops above the washers. This is best done one loop at a time.

Figure 22 – Bungee Installation

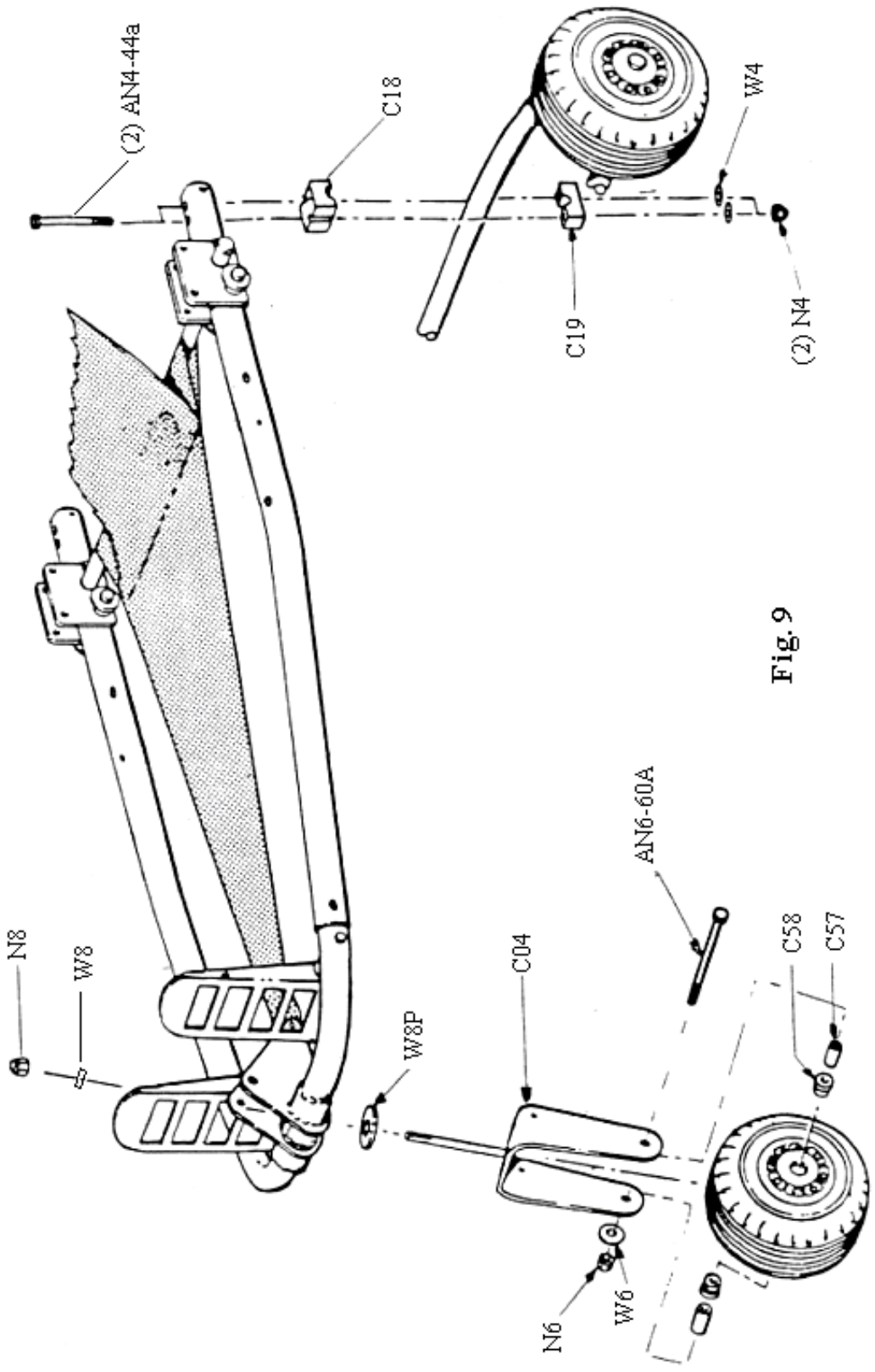


Figure 23 – Landing Gear Installation

Figures 23 & 24 – Front fork installation

Refer to Figure 23 for assembly. Install front wheel into fork as shown using bolt AN6-60A, (4) spacers C57, (2) front wheel bushings C58, Washers W6 as necessary and nut N6. Tighten nut to remove side play of wheel on axle but still allow wheel to spin freely. Insert assembly into front cage member C01 with W8P washer between front fork and the C01 cage member, W8 washer and retain with N8. Do not tighten at this time as unit must be removed during pod installation. If you purchased the 6" main gear tires you will be using C04E, the extended front fork and a 5" wheel. If you purchased the 6" main gear with tundra tires you will be using C04E, the extended front fork and a 6" wheel.

Figure 24 – Assembled Fork

CHAPTER 2 – UPPER CAGE ASSEMBLY

Figures 25 thru 28 – Down Tube and He-Man bar assembly

Install elliptical front down tube (C28A) as shown in Figure 27. Install he-man bars (C29A) as shown in Figure 27. C28 and C29 are old down tubes. He-Man bars may need to be loosened when installing main keel tube. Install bolt nearest to keel tube first. You may drill through holes with ¼" drill to aid in alignment.

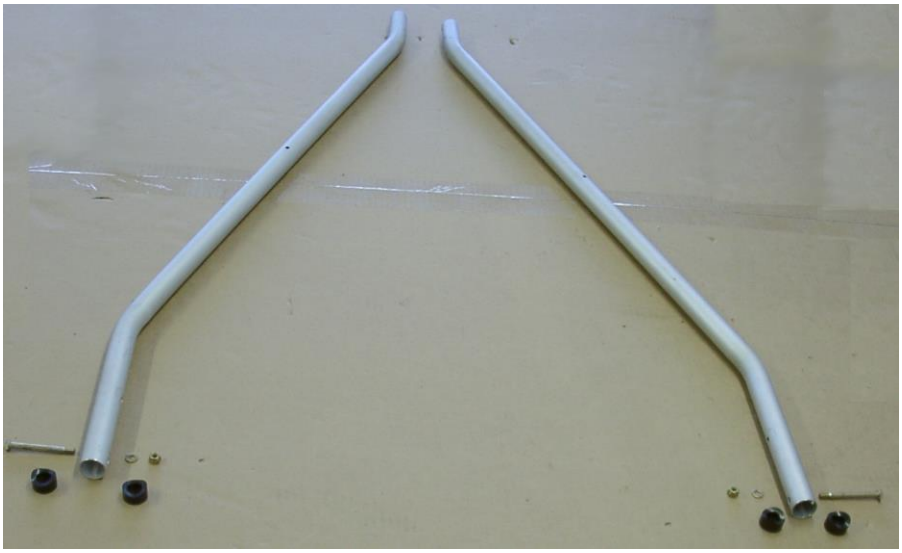


Figure 25 – He-Man Bars

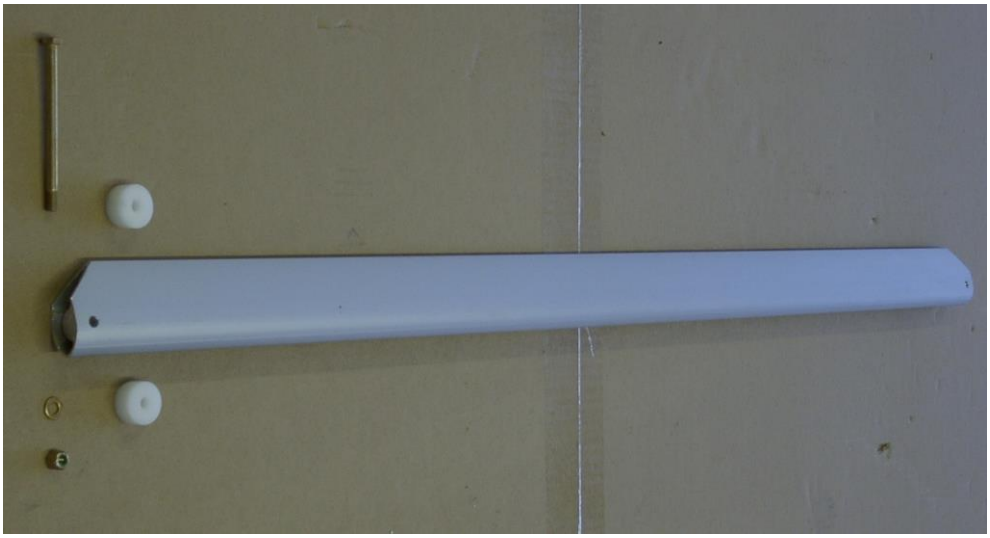


Figure 26 – Elliptical Front Down Tube

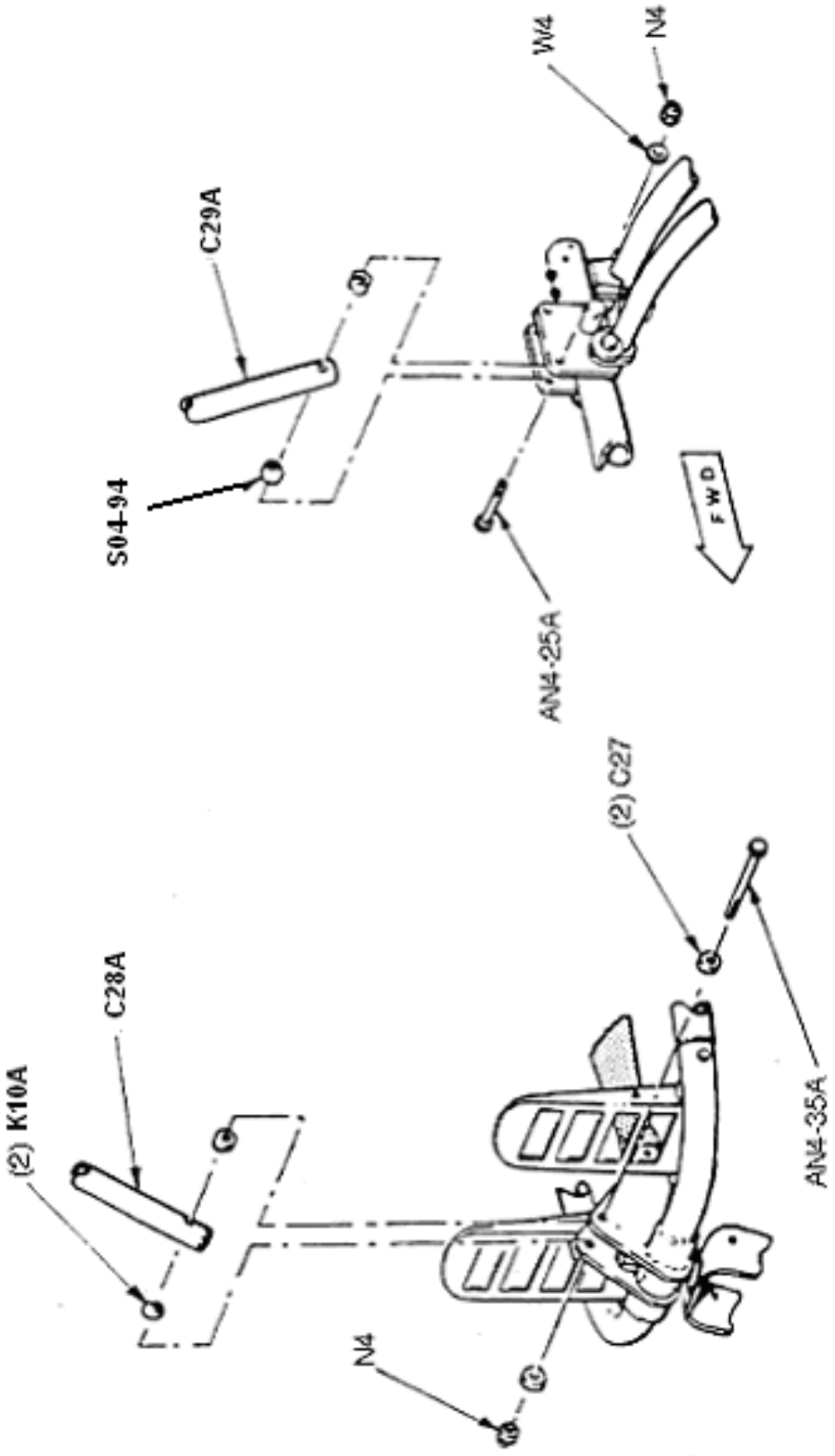


Figure 27 – Down Tube Assembly

Install (2) rear cage uprights C30 through sleeves provided in seat back and between cage side brackets with (2) S04-94 spacers each side as shown. Longer distance from bend is bottom. Retain with bolt AN4-25A, W4 and N4. Tighten.

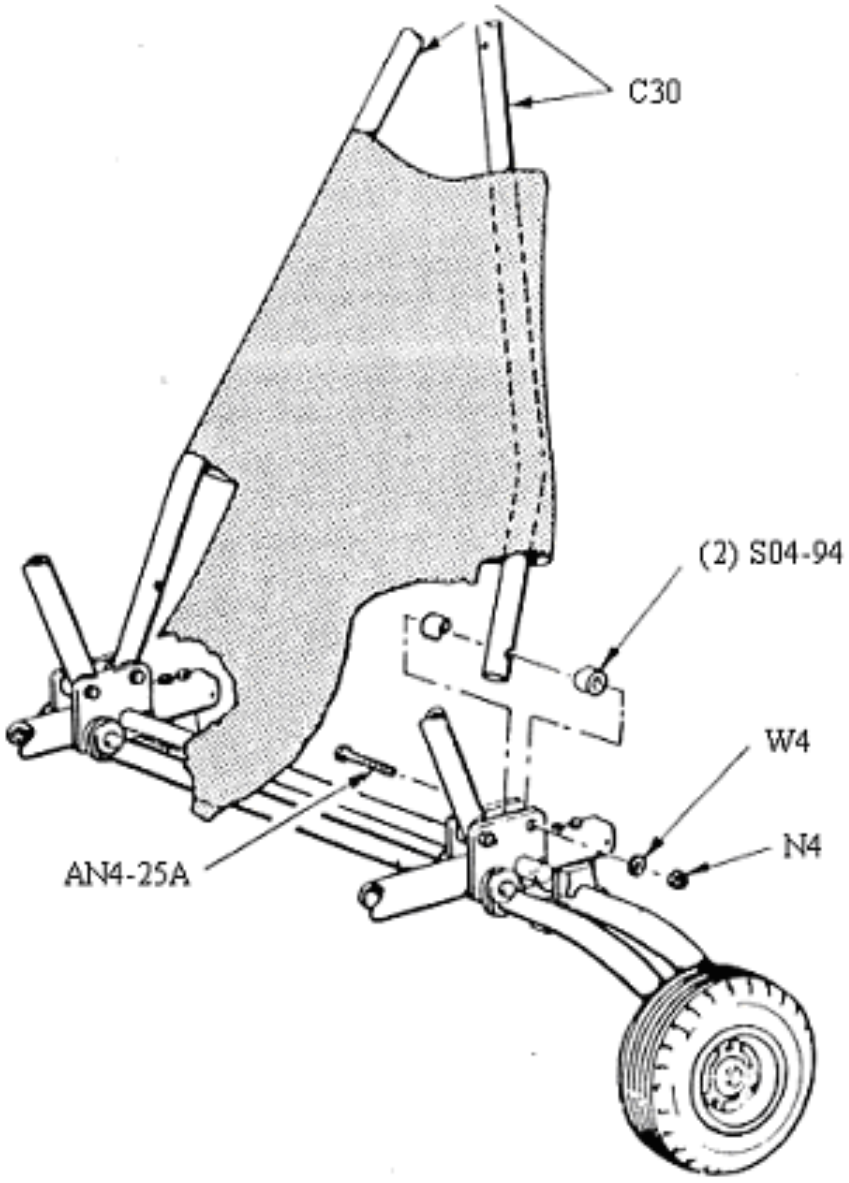


Figure 28 – Rear Down Tube Assembly

Figures 29 and 30 – Tail Struts

Trim each tail strut C31 as Shown in Figure 30 to clear pulley mounting bolt which is offset 15°. Once trimmed, tail struts become directional. Remove only what material is necessary for clearance. You may also install the C31's and then drill then re-drill the hole for the pulley mounting bolt. This will minimize the amount of material that is removed. Install into rear of left and right cage members as shown with AN4-23A, (2) S01-14, W4 and N4. Tighten.

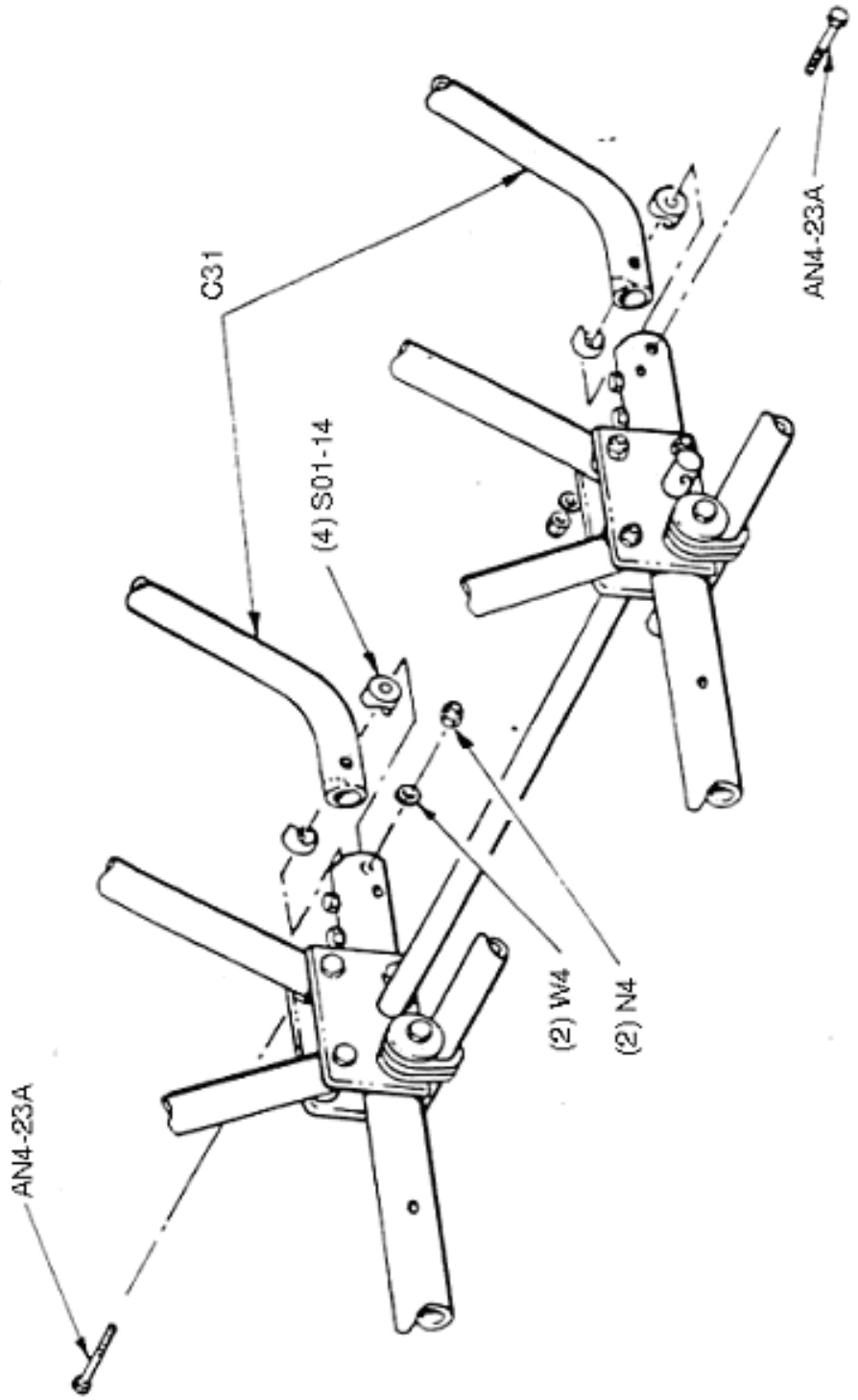


Figure 29 – Tail Strut Assembly

Figure 14

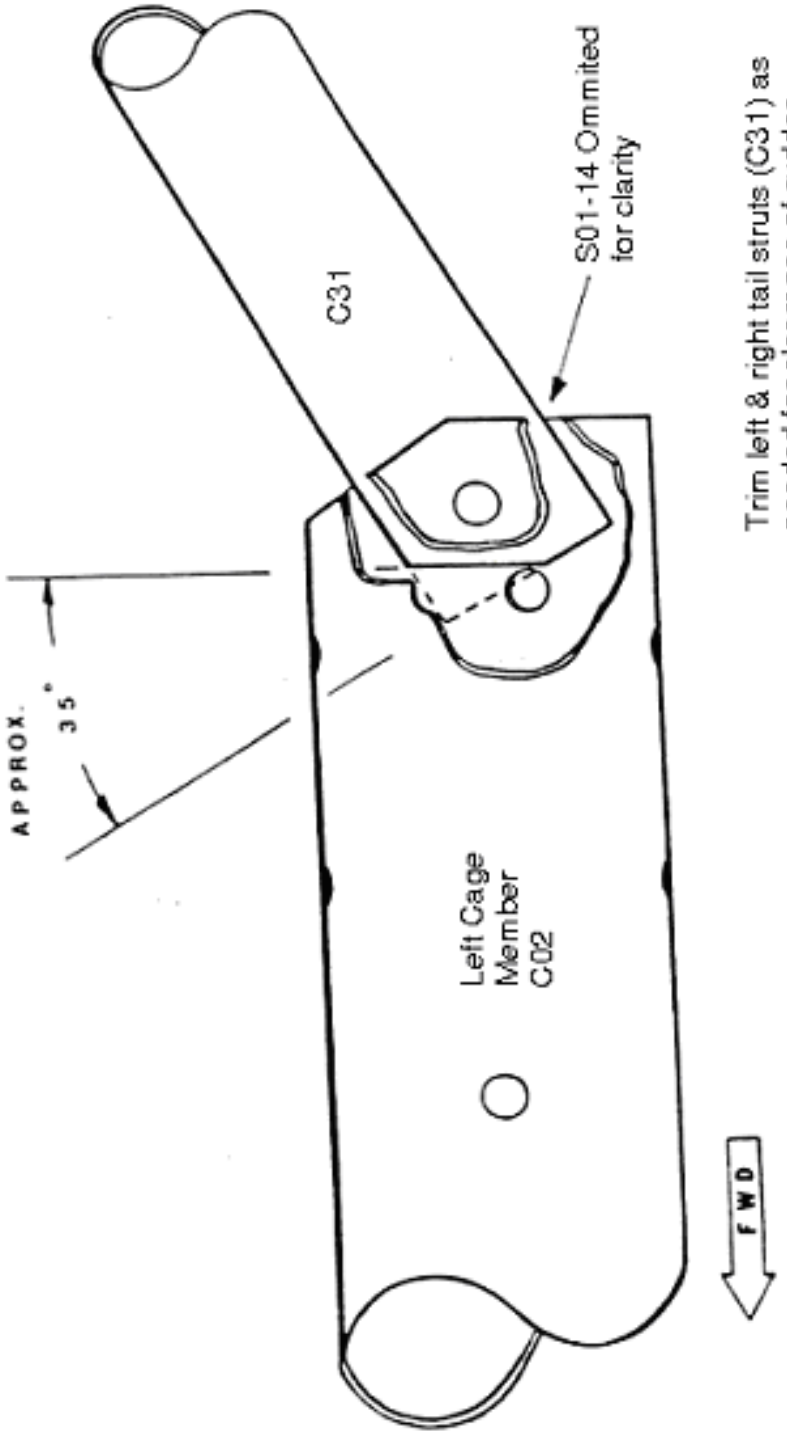


Figure 30 – Trim Information for C31

Figures 31 thru 33 - Control Stick Assembly

Locate C33 belcrank, C32 torque tube, AN3-13A retaining bolt and N3 nut. Note offset ¼" dia. Hole located 7 ¼" from end of C32 should be assembled to the top side as is belcrank mounting hole in rear. Assemble left and right gusset plates C34 to torque tube with (4) AN3-6A bolts, (4) S01-14 saddles, (4) W3 and (4) N3. Insert rear bolts first, the bolt head will be on the inside of the torque tube. This is to provide clearance for the elevator cable. It may take needle nose pliers to hold the bolt head while inserting from the inside of the tube. The holes can be ovaled using a drill bit to aid with insertion. Do not yet fully tighten. A narrow wrench will be needed for tightening. Make sure holes are deburred. Install (2) control stick stops C35 in their proper location with (2) AN3-20A Bolts, (2) W3 and (2) N3. Do not tighten. Install control stick insert into two pieces of the control stick and bolt into place. You may need to de-burr these items. Install control stick grip C37 onto control stick C36. A small amount of soapy water will help if it is not going on. Do not use oil, silicon or grease. Assemble control stick (note position) into gusset plates with AN4-21A, (2) S01-14 saddles, (2) W4P and N4. Tighten bolts, insure control stick will rotate properly. Install AN43-13A eyebolt into control stick bottom and secure with W4 and N4. If hole in eyebolt is 3/16" dia., drill out to ¼" at this time and deburr. Make sure hole in eyebolt is perpendicular to control stick. Check assembly.

Note: If brakes are included for your aircraft there will be a control stick with an insert that has a small diameter section to clamp the brake handle to.

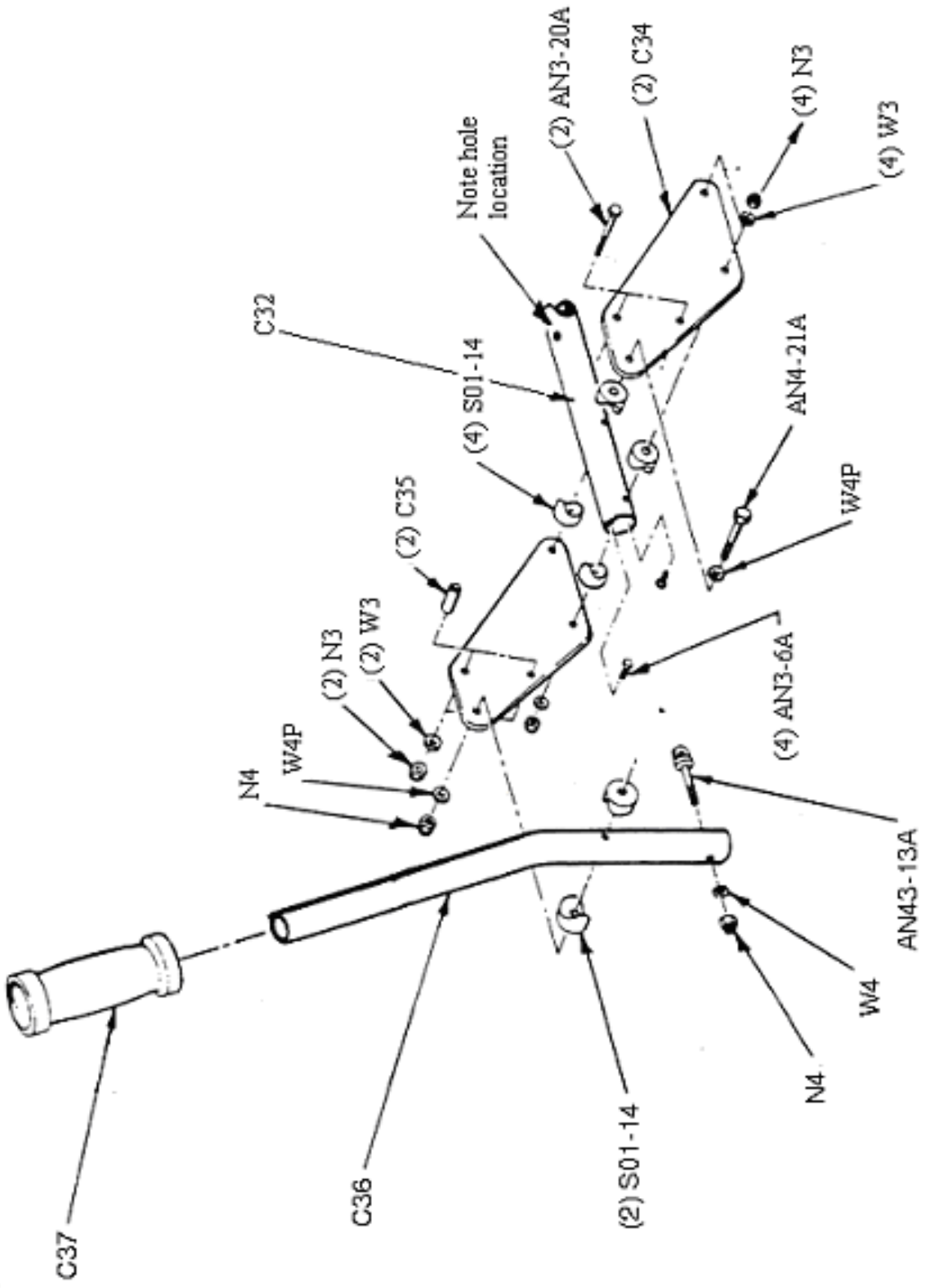


Figure 31 – Control Stick Assembly

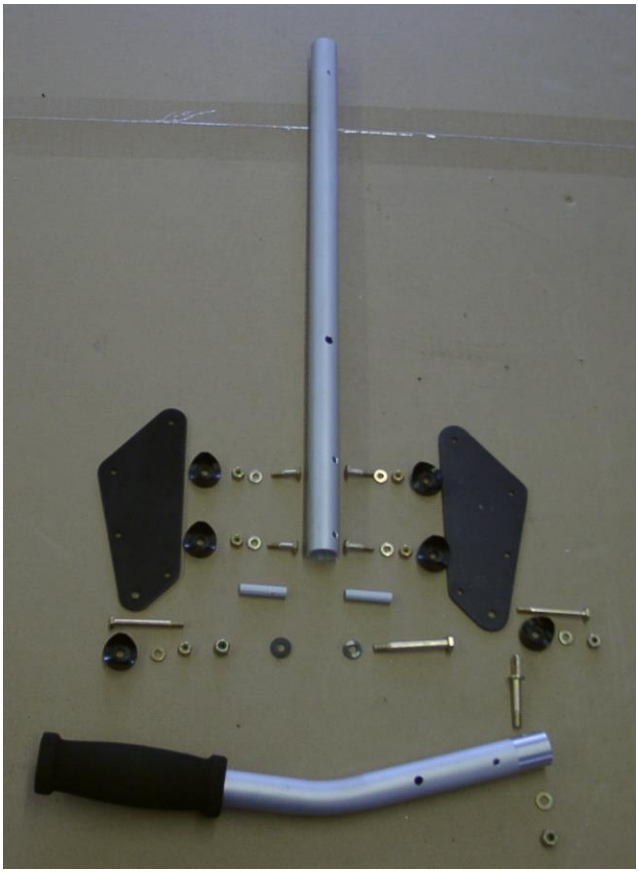


Figure 32 – Control Stick Hardware

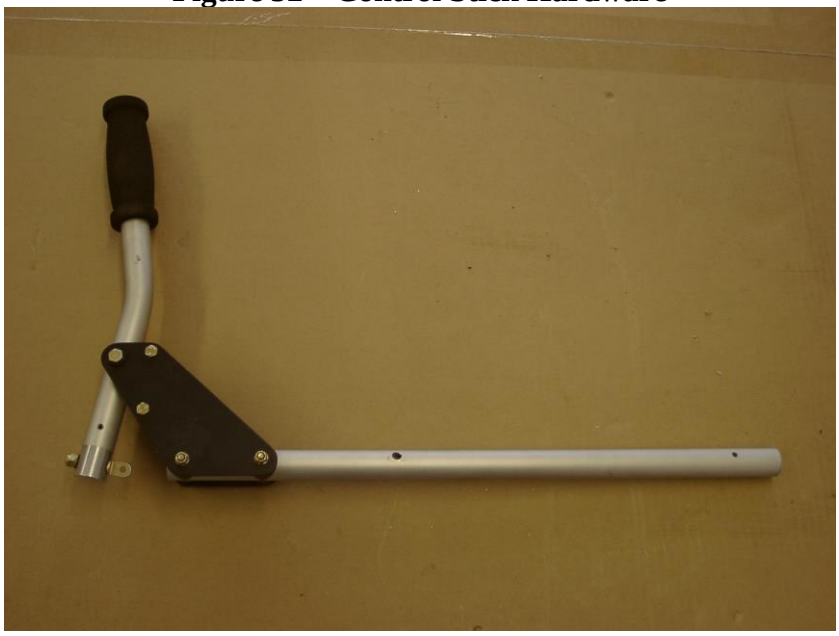


Figure 33 – Assemble Control Stick

Figures 34 thru 38 - Control Stick Installation on Cage and Teleflex Assembly

Install forward torque tube bearing C38 into the 30° offset hole in the right cage member with bolt AN4-35A, W4 and N4. Tighten. Install rear torque tube bearing C39 onto cage side bracket with (2) bolts AN3-20A, (2) W3 and (2) N3. Do not fully tighten these bolts at this time.

Slide torque tube assembly through front bearing C38 and through rear Bearing C39. Tighten bolts on rear bearing and check for freedom of movement, adjust as necessary. W3B washers may be used to space rear torque block away from the cage side plate. A reamer may be used on the ID of the torque tube holes to free up control stick movement. It should have a small amount of friction associated with it, it should not flop side to side by itself.

Refer to Figure 38 when installing Teleflex cable after the keel tube is mounted. Slide forward end of Teleflex cable C42 through aileron belcrank C33 in direction shown. ***Position cable housing so bolt AN4-12A locks Teleflex in recessed part of Teleflex housing (IMPORTANT).*** Install N4s to AN4-12a and tighten. Position belcrank onto torque tube and install AN3-13a bolt with N3. Tighten. Install Clevis C43 onto end of Teleflex cable with Loctite or similar. Tighten ¼-28 nut against clevis. Position eyebolt on control stick into clevis and install bolt AN4-6a and N4S. Tighten but allow AN4-6A bolt to pivot freely in no-load condition.

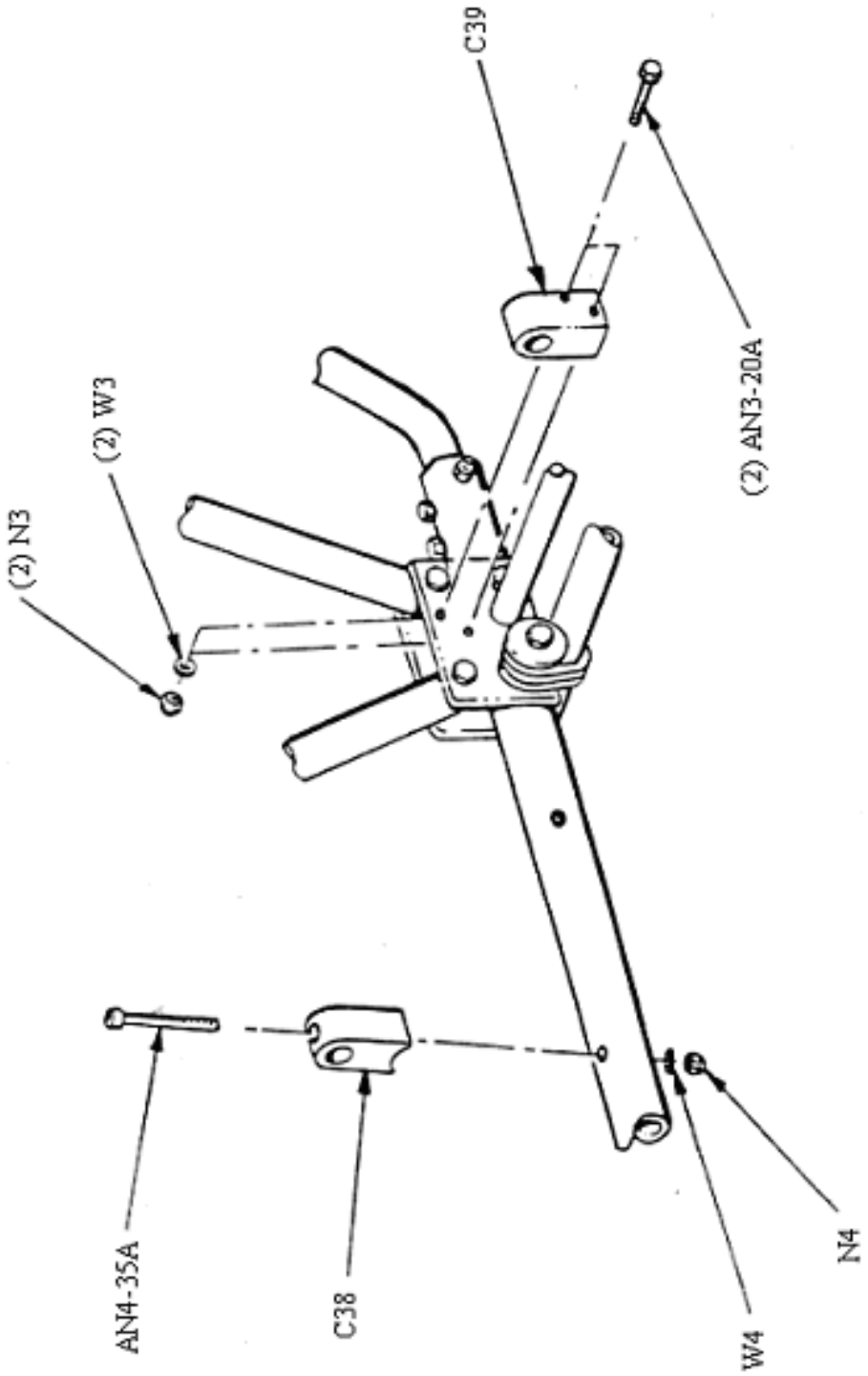


Figure 34 – Control Stick Delrin Support Blocks

Figure 35 – Installed Delrin Support Blocks

Figure 36 – Installed Control Stick (no brakes)

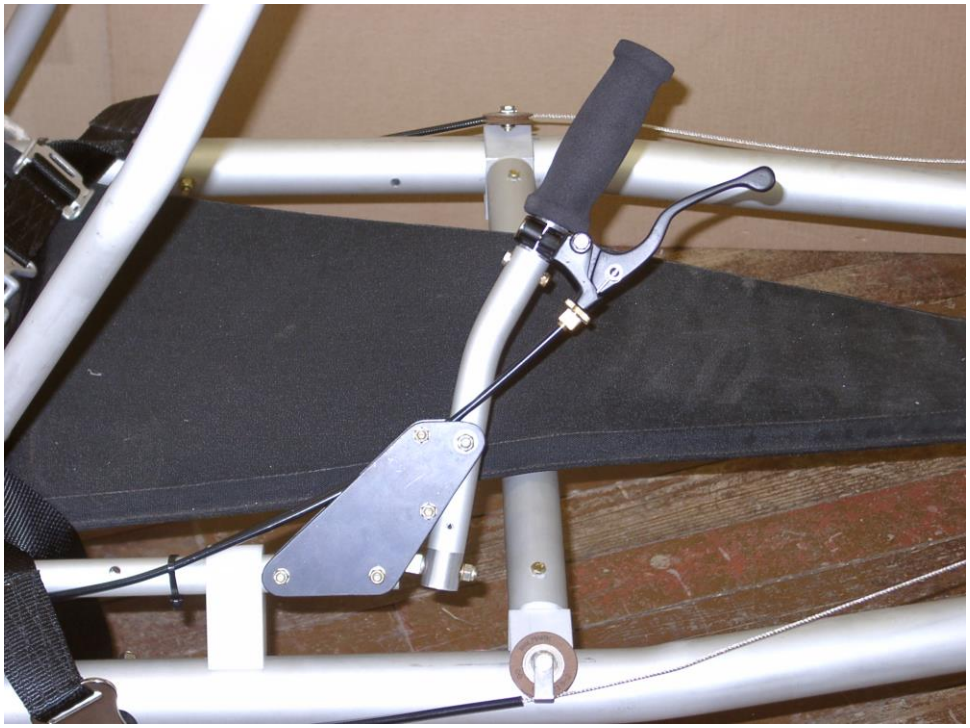


Figure 37 – Installed Control Stick (with brakes)

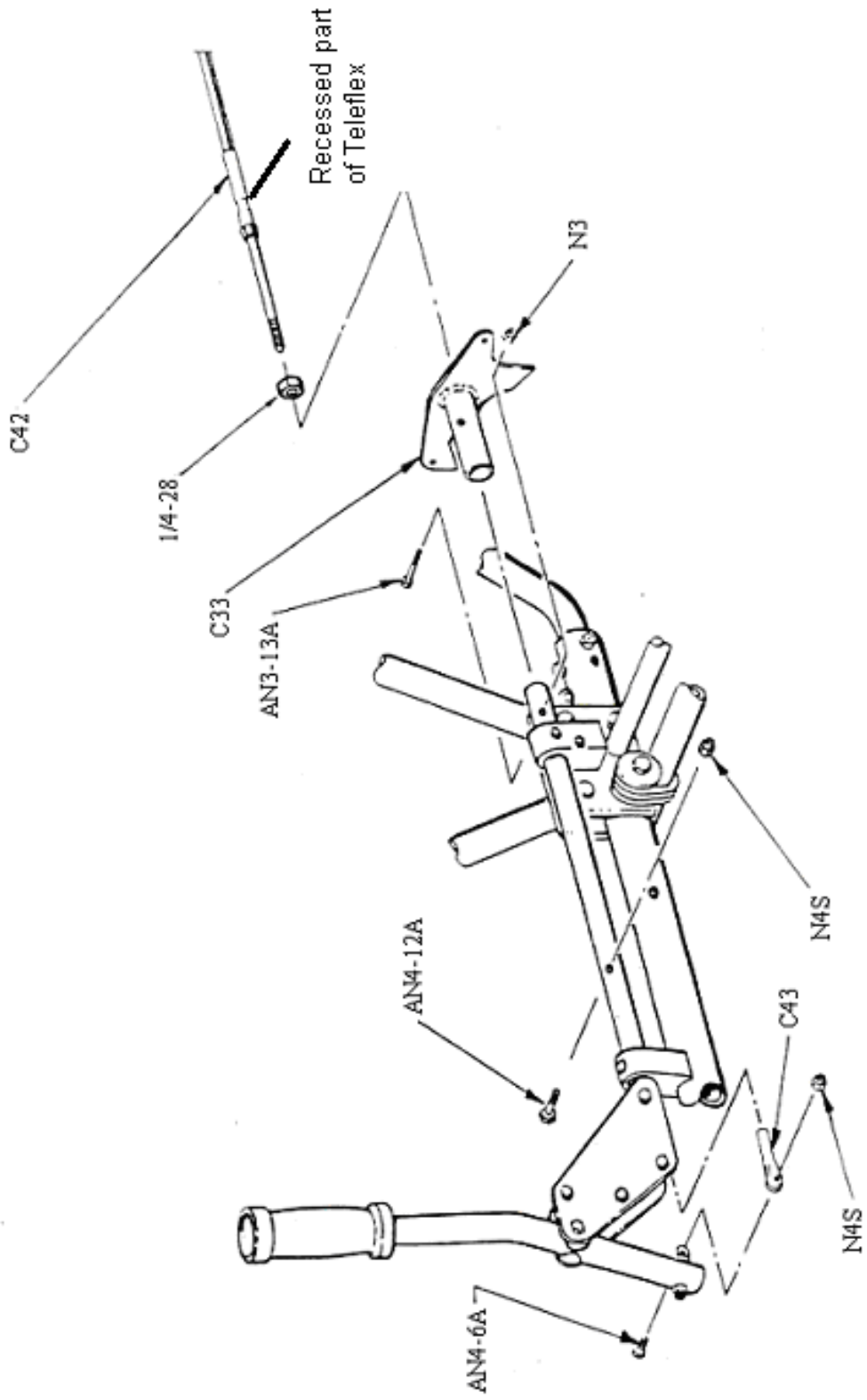


Figure 38 – Teleflex Assembly

CHAPTER 3 – KEEL TUBE ASSEMBLY

Figures 39 thru 42 – Keel Tube Assembly

These figures show the keel tube assembly. Some portion of the brackets and pulleys have been assembled at the factory to aid in shortening the build time.

The Motor Mount Keel extension has the brackets mounted. Refer to Figure 40 and slide the keel extension assembly into forward end of main keel. Align ¼" hole and install AN4-43A or AN4-44A bolt, W4 and N4. Tighten. The keel extension may come bolted to the main keel from the factory and may have an extra bolt holding it in place. The keel tube is extruded aluminum and is never perfectly round so spacers may sometimes be placed internally on the keel tube to insure it locks in place.

The only bracket not mounted to the main keel will be K09 tail strut mounting bracket. This bracket may need to be drilled and mounted after all other down tubes and main cage have been attached to the keel. When drilling and mounting the K09 bracket make sure that the keel tube is level to the cage rails. You may need to lift the tail to get the K09 bracket in the correct location.

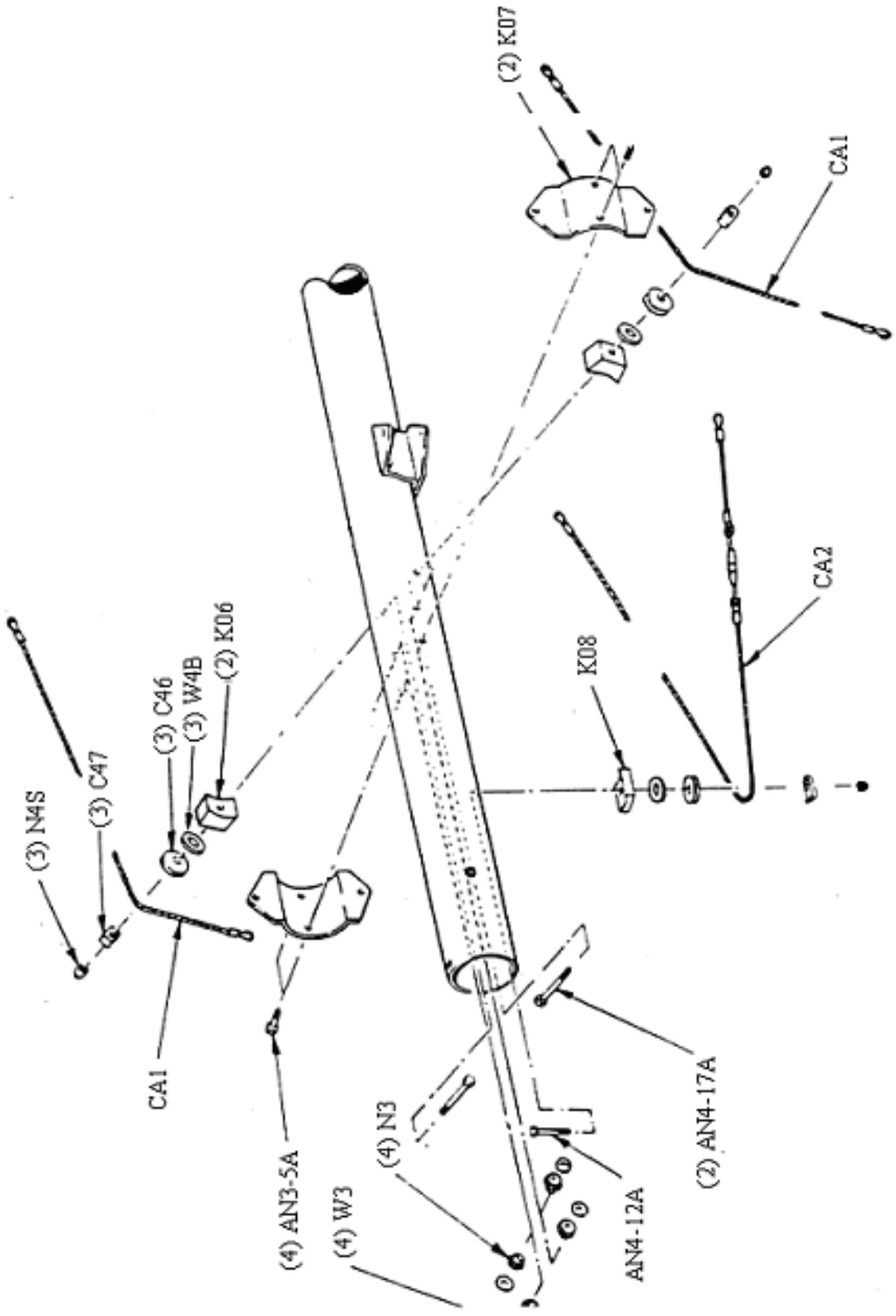


Figure 39 – Keel Tube Assembly

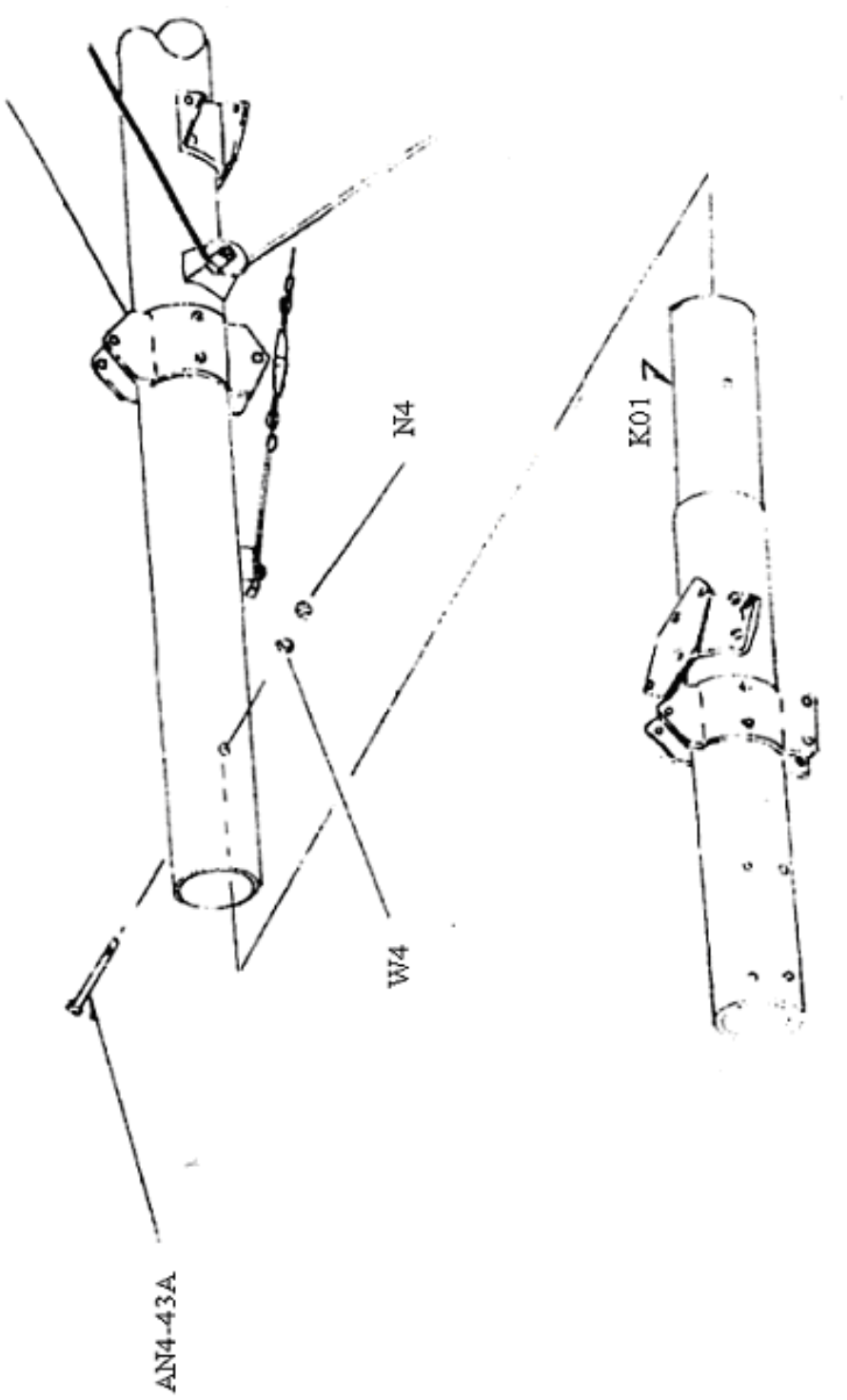


Figure 40 – Keel Extension

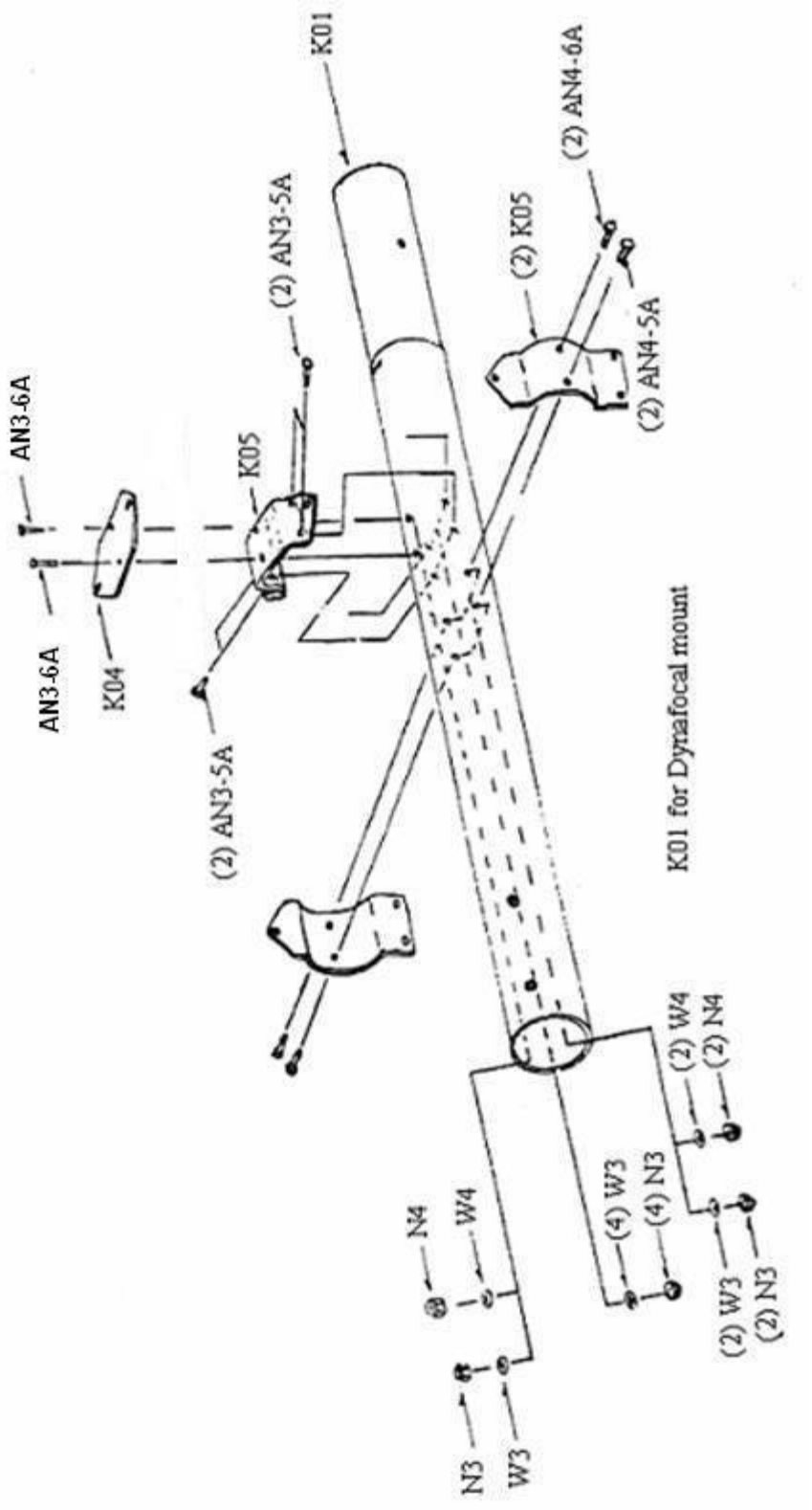


Figure 41 – Keel Tube Brackets

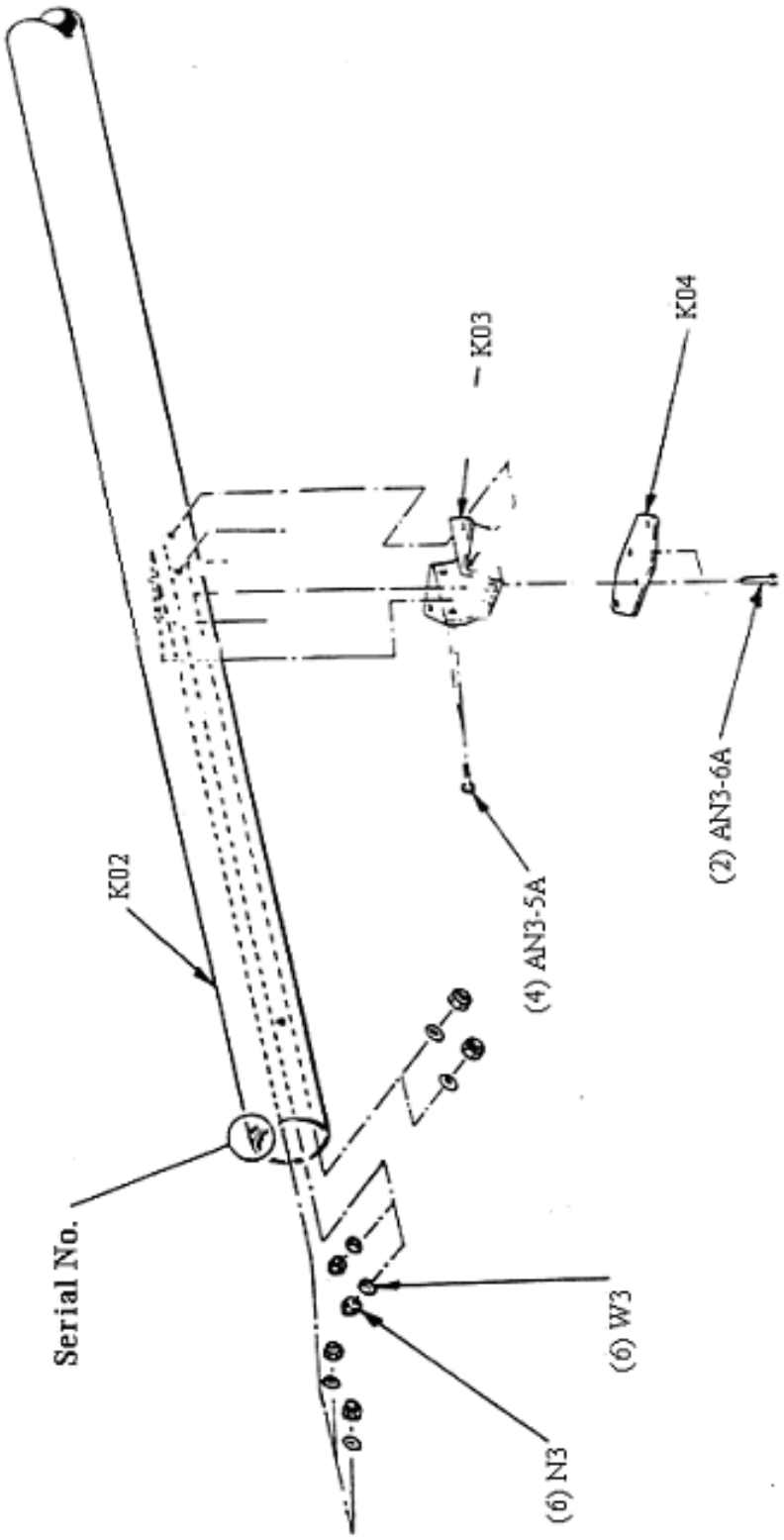


Figure 42 – Rear Spar Mounting Brackets

Figures 43 thru 47 - Keel Tube Mounting to Uprights (Down Tubes)

This portion of construction typically requires two people unless you can suspend the keel tube from a ceiling. With assistance, position assembled keel onto assembled cage. Installing down tubes and spacers may require clamps to spread the mounting plates apart or squeeze them together. Do not be afraid to use a screwdriver or other round tool to align the holes. You may also drill them out to get them to fit together well. Install rear cage seat uprights between rear brackets with (2) S01-14 saddles and push through AN4-32A bolt. Remember to attach seat belt as shown in Figure 45. Do the same with diagonal he-man bar uprights into the front bracket but use AN4-35A bolt (make sure bolt is inserted from left side). Move front cage upright (elliptical down tube) into position and push through AN4-32A bolt with (2) K10A spacers. Tighten bolt at rear bracket only. Slide tail strut bracket K09 over keel tube, the ears with more material on them should be used as attachment for the C31's. Assemble tail struts to bracket with AN4-31A bolt, (2) S01-14 saddles, W4 and N4S. Tighten. Now, with all cage members in position, drill out ¼" holes in K09 for (2) AN4-44A bolts, (2) W4, and (2) N4S. DO NOT over tighten and distort keel tube. Tighten bolts until snug against bracket. This may have been pre-drilled out at the factory.

Assemble kingpost front K11 and kingpost rear K12 to kingpost brackets K13 as depicted with bolts AN3-16A and AN4-17A in lower holes. Tighten as shown with (3) W4, (2) N4, W3, & N3. Attach front kingpost tube to keel brackets with bolt AN4-22A, (2) S01-14 saddles, W4 and N4. Attach rear of kingpost temporarily with bolt AN4-22, (2) S01-14, and W4. Do not tighten fully. King Post will need to be removed for wing cable and engine muffler mount installation.

*Note:

1. K10 replace with K10A if C28A is used
2. AN4-35A replace with new recoil hardware if electric starter is used change to AN4-32A
3. AN4-32A replace with shoulder hardware AN4-35A

Install seat belt C44 onto left and right cage members (left shown) with (2) AN4-26A or (2) AN5-26A or other appropriate length ¼" bolts, (2) S01-816, (2) W4 and (2) N4. Tighten.

Left side: lap belt positioned on outside of side rail.

Right side: lap belt remains on outside of side rail.

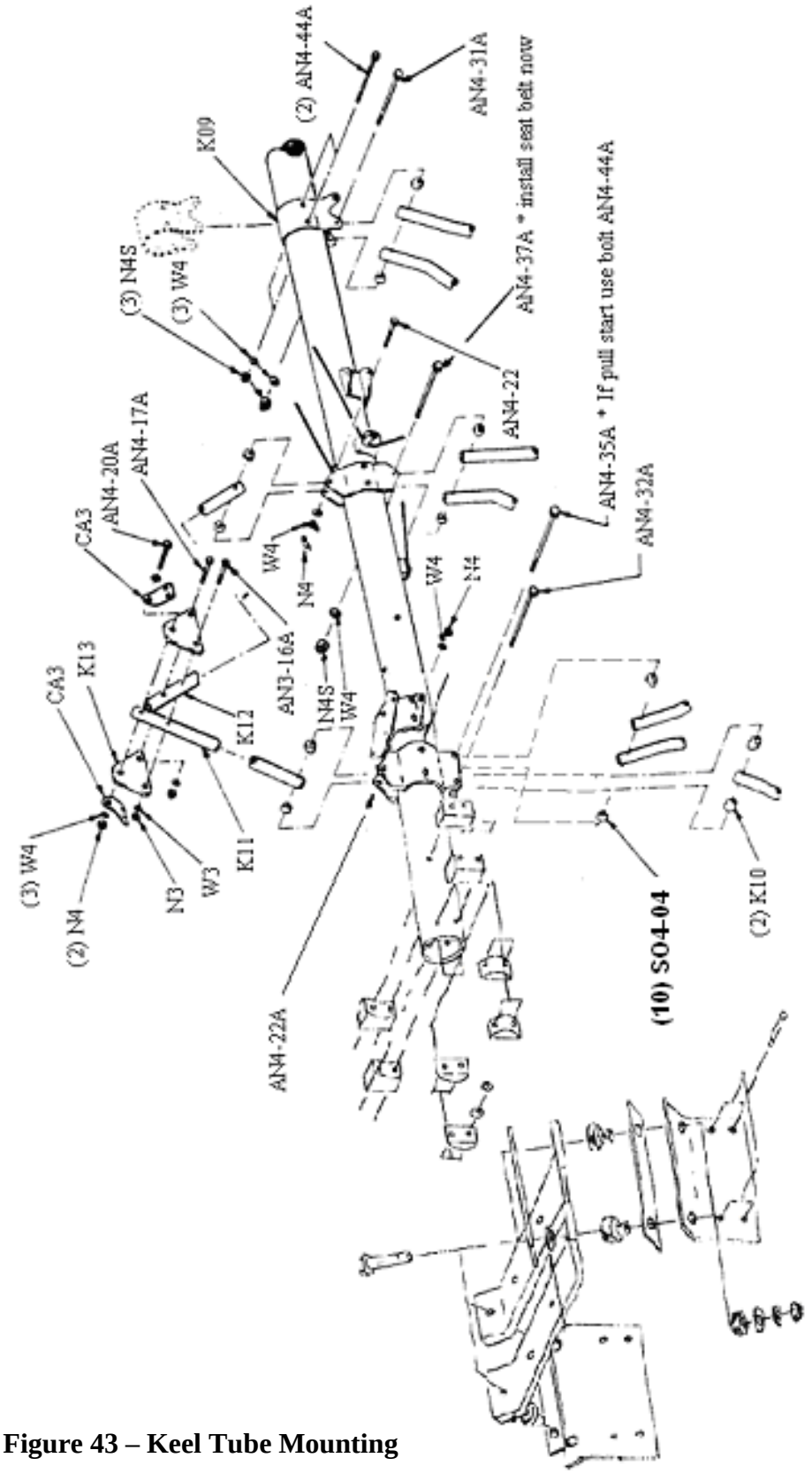


Figure 43 – Keel Tube Mounting

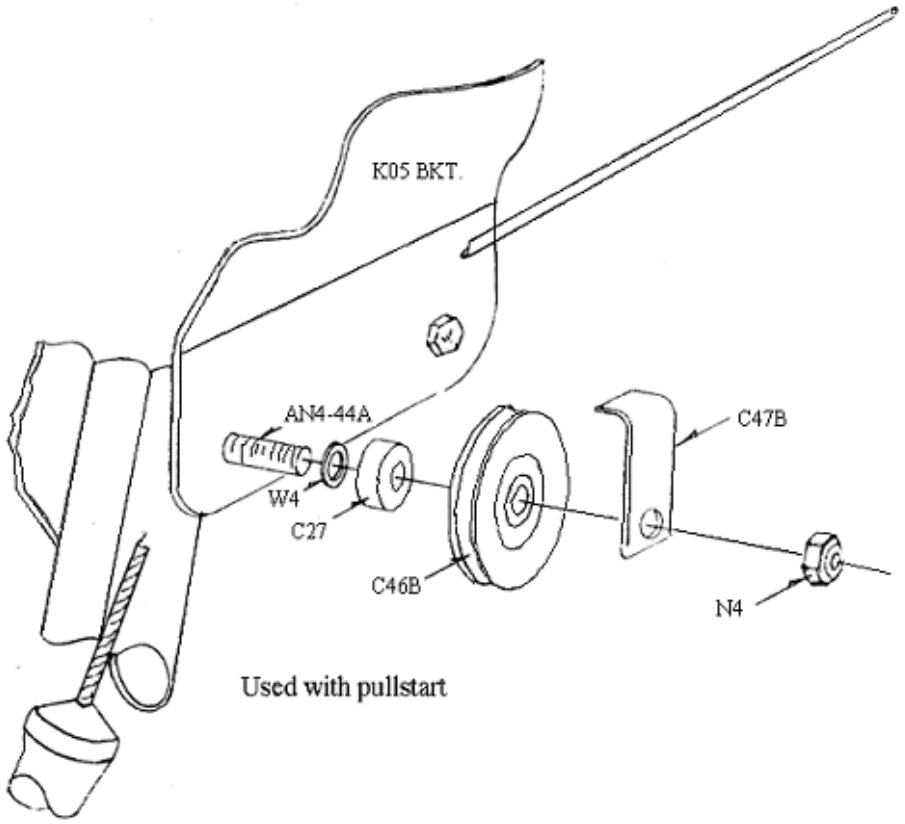


Figure 44 – Pull Start Pulley

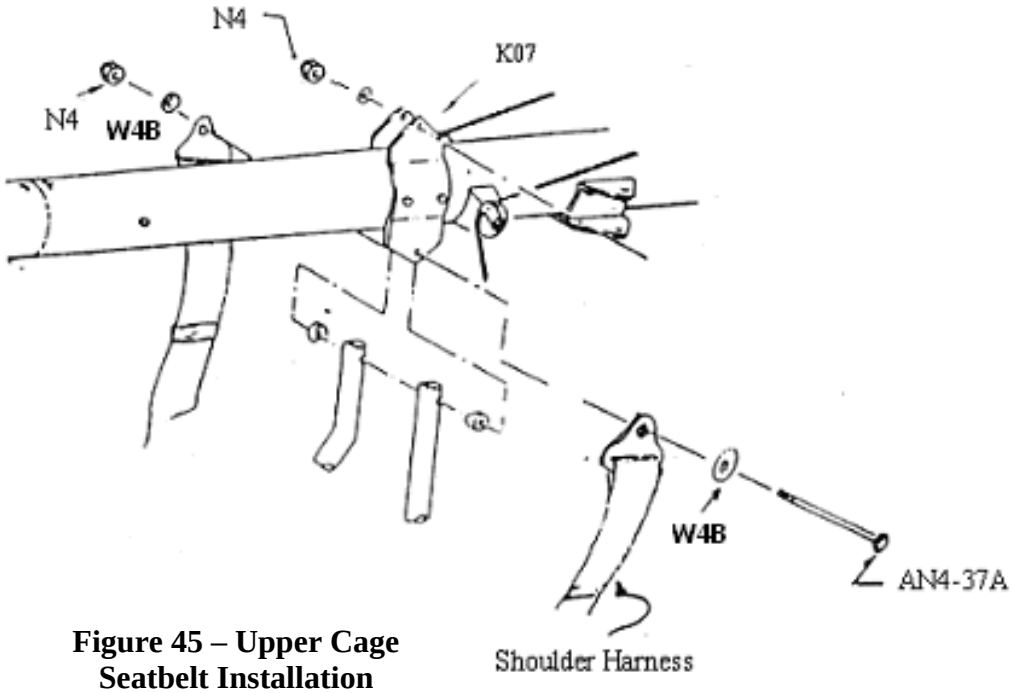


Figure 45 – Upper Cage Seatbelt Installation

Figure 46 – Seat Belt Installation

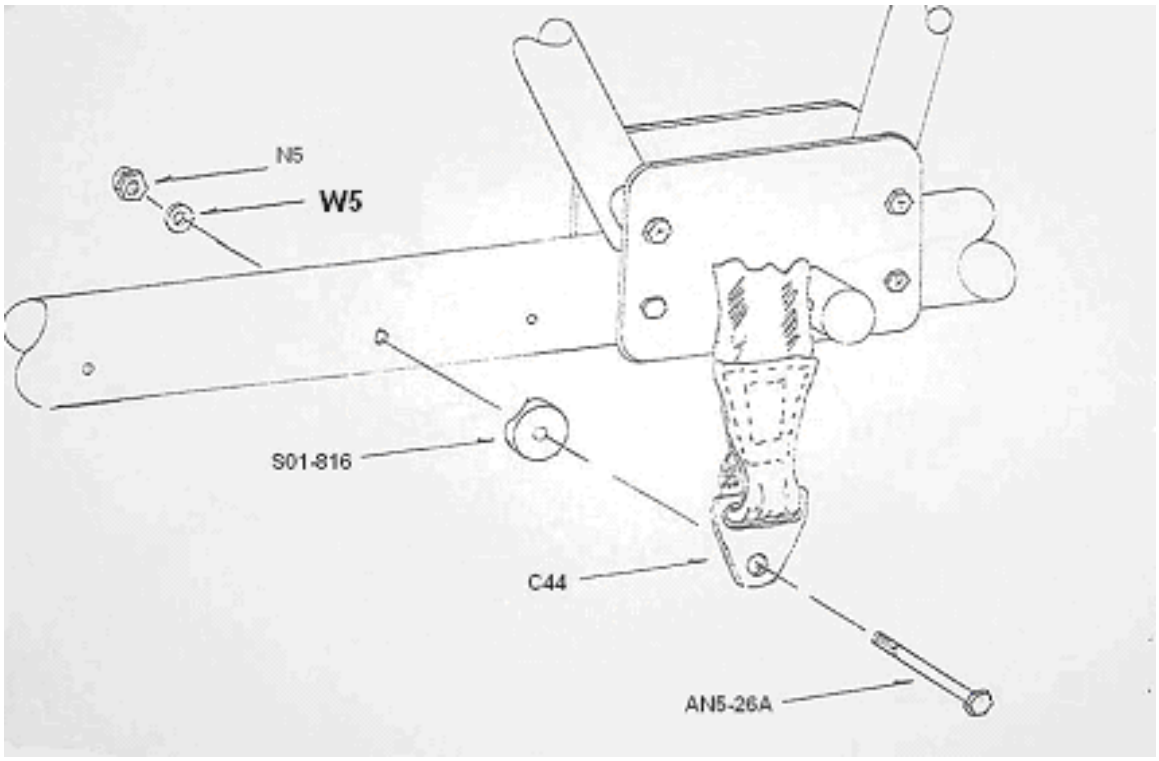


Figure 47 – Lower Cage Seatbelt Installation

Figures 48 thru 51 – Motor Mount Assembly

The motor mount shown is for Rotax and Hirth Engines. For the 4-Stroke 50HP Valley Engine refer to the specific manual developed for this engine.

The motor mount can now be assembled on the front of the keel tube as shown in Figures 48 and 49. The left side of the motor mount may have an extra bracket which is the fuel pump mounting bracket. On newer models the fuel pump is mounted to the motor mount side plate itself with pre-drilled holes. Refer to Figure 50 for this information. When installing fuel pump onto the fuel pump bracket the bolt heads will need to be ground down slightly to fit in between the EMD-2 cross plates.

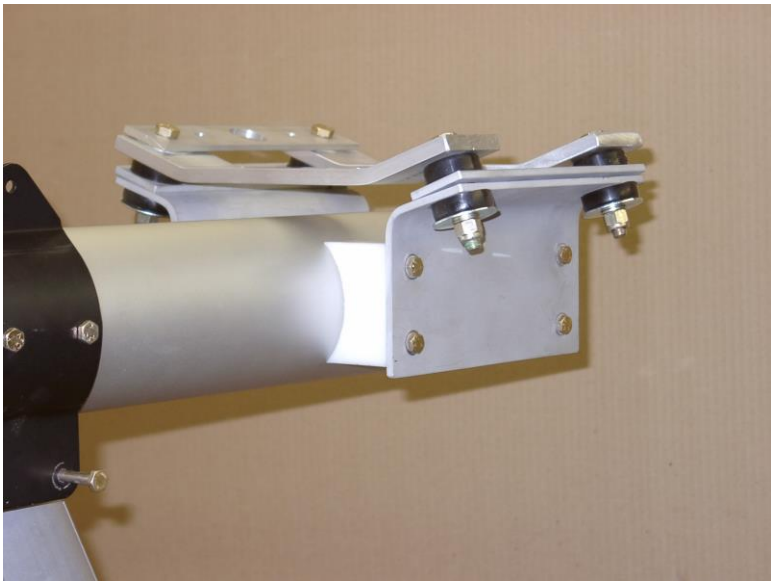


Figure 48 – Assembled Dynafocal Motor Mount

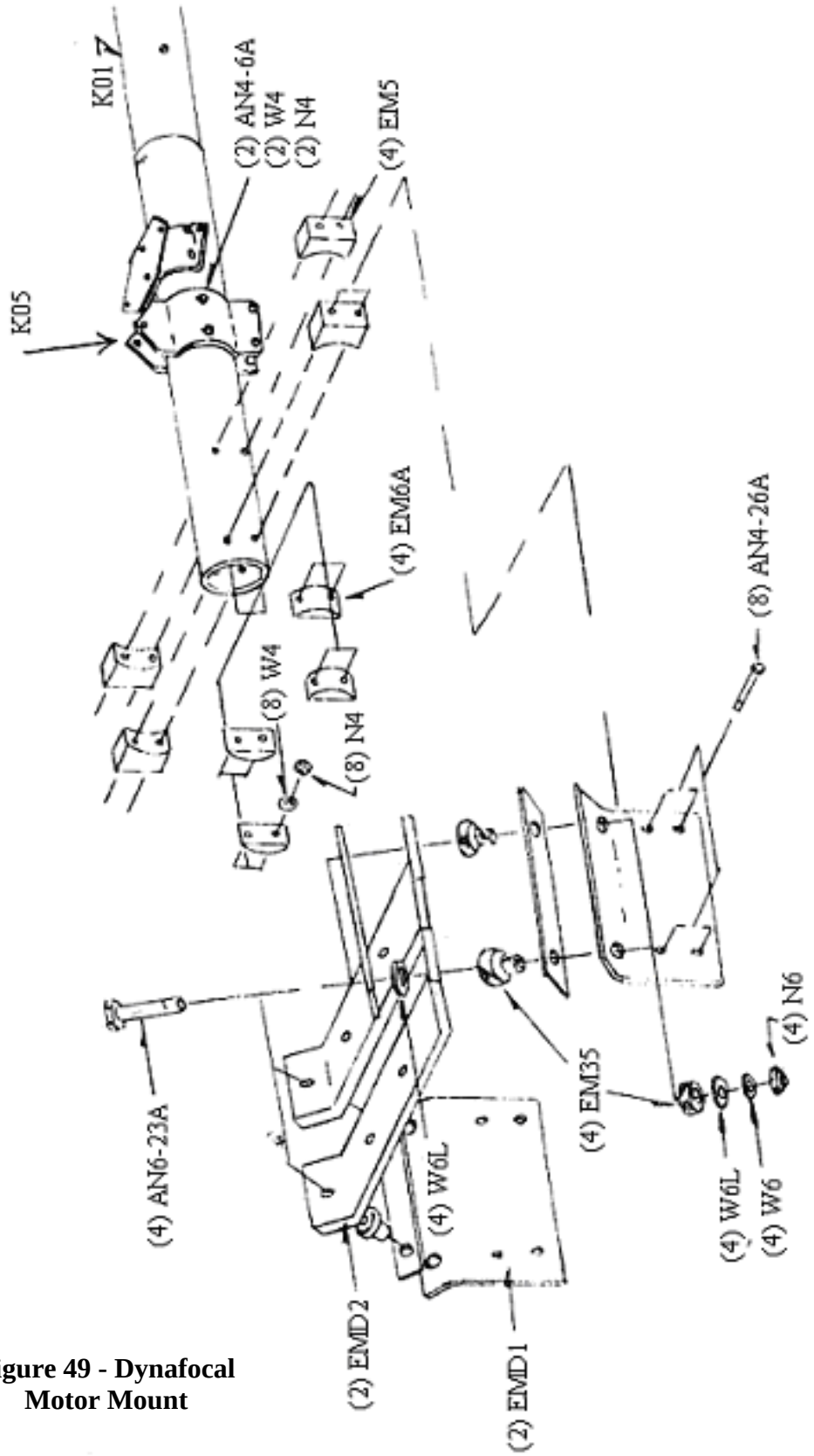


Figure 49 - Dynafocal Motor Mount

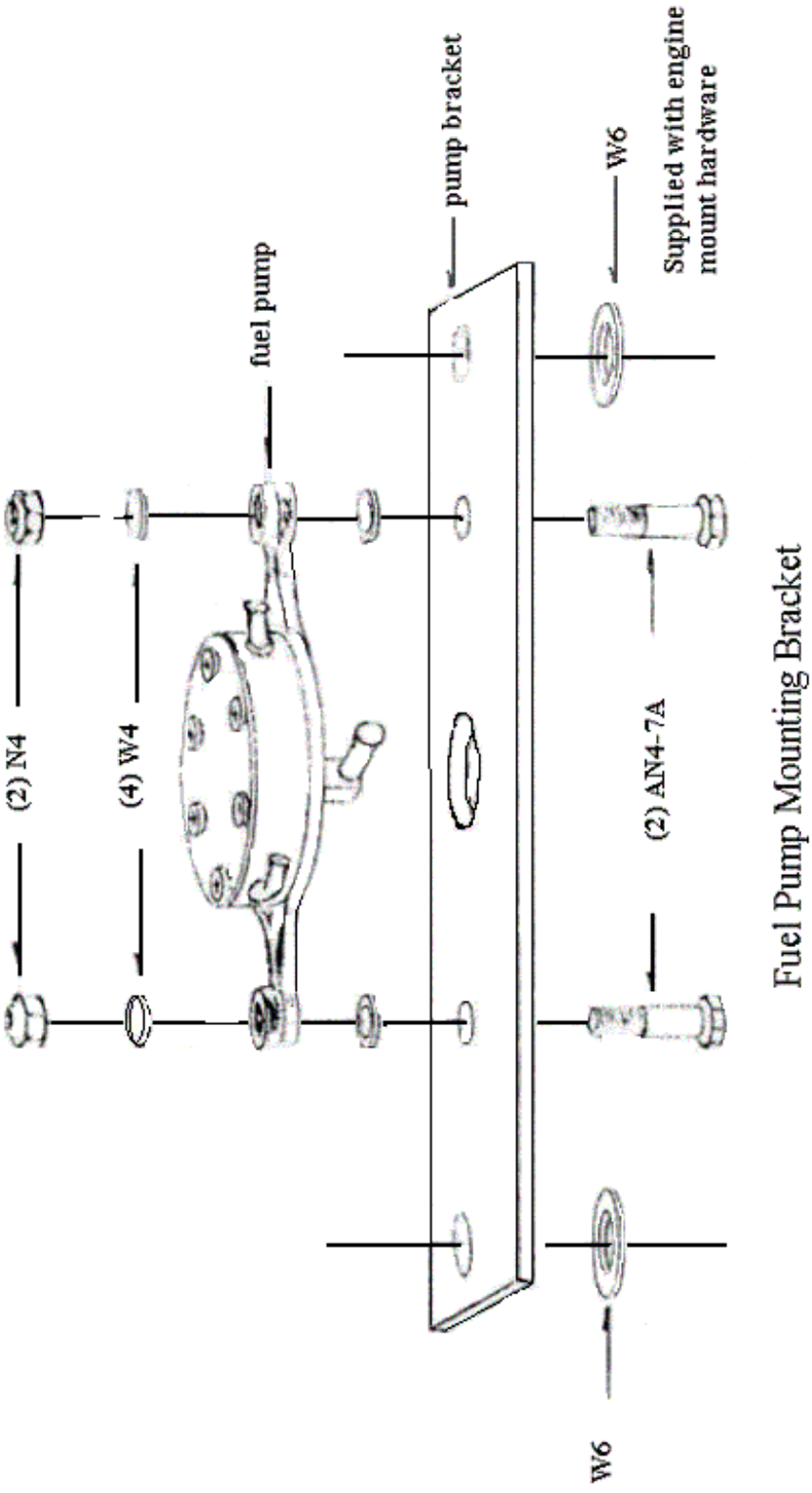


Figure 50 – Fuel Pump Mounting Option (or this Attaches to one side of the Motor Mount)

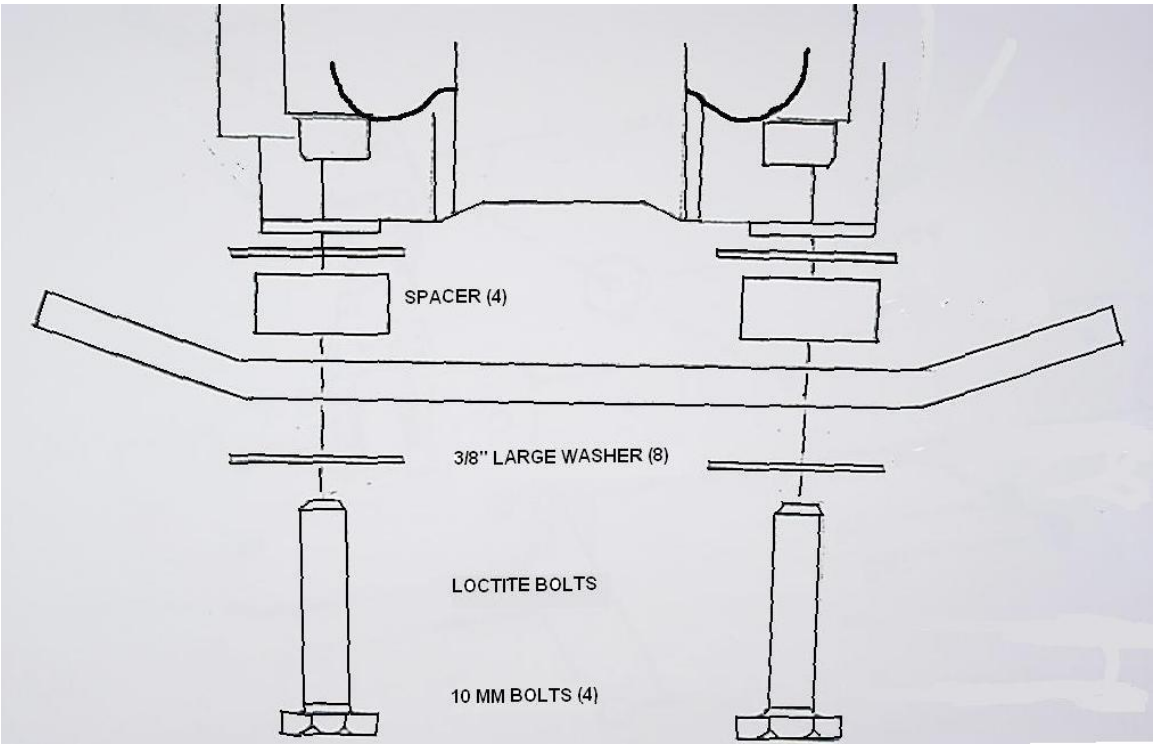


Figure 51 – Bolting of Motor to Motor Mount (3/8" spacers are not required but may be seen on older aircraft)

Figure 53– Throttle Handle Assembly

Assemble Throttle Handle as shown in Figure 53. Attach throttle handle to preassembled C45 throttle handle bracket. C45 will need to be mounted to the cage rail using AN4-33A and PR3-L (pop rivet) as shown in Figure 53. Adjust the throttle handle until it is sufficiently tight to hold the throttle cable in the proper position during flight vibrations.

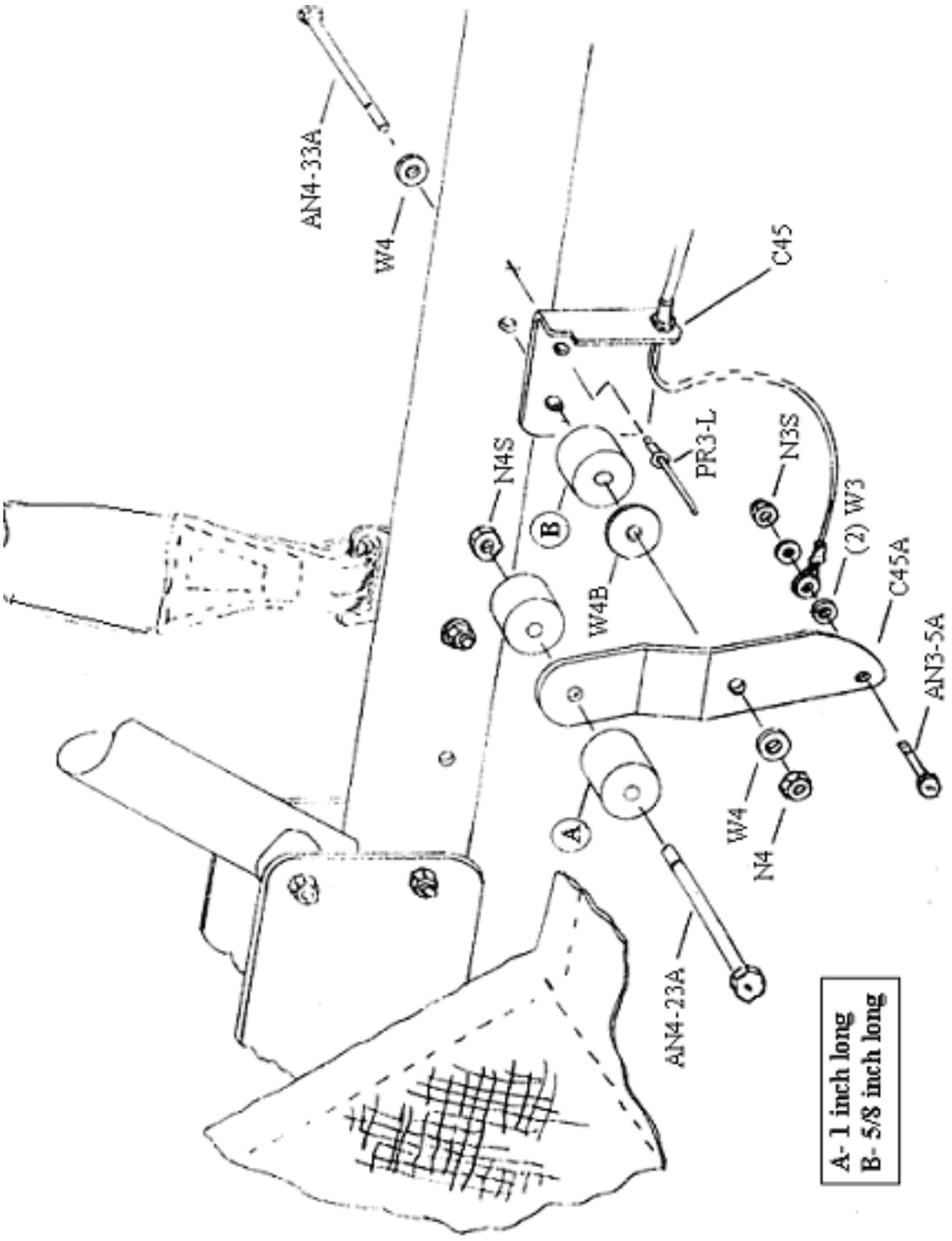


Figure 53 – Throttle Handle Assembly

Figures 54 thru 60 - Fuel Tank Installation

Note: If installing an enclosure on the aircraft the fuel tank will need to be removed for installation of the fiberglass bulkhead.

Instructions for the installation of your Roto-molded plastic gas tank

1. For additional security, it is recommended that you use "blue" Loctite on all five bolts that are screwed into the inserts of your tank. On older aircraft Fuel tank cross pieces will need to be drilled for your specific tank. Newer Aircraft are supplied with the cross pieces.

2. If you use the optional sight line (to visually measure the amount of fuel remaining in your tank). Drill two ½ inch holes and insert the rubber grommet in holes then the metal elbows. YOU MUST USE A SHOP VACUUM TO GET EXCESS SHAVINGS OUT OF TANK OTHERWISE; THEY WILL FIND THEIR WAY INTO YOUR FUEL FILTER. Make sure that you safety wire the sight hose and any fuel line onto the elbow fittings.

3. Locate and install (3) fuel tank fitting grommets C50 and (3) fuel tank fittings C51 into fuel tank C52. Moisten grommet C50 for lubrication when installing (yes, you can spit on them). A small amount of soap will also help. Do not use silicone, oil, or grease. With grommets installed, push fitting C51 through grommet C50 until flared end locks assembly. Use cable ties or safety wire to secure line on fitting top and bottom. Fuel line to bottom fitting is not installed at this time.

4. For customers who are retro-fitting our tanks to their Phantoms, you will have to drill new holes in your tank crosspiece bars in order to mount the tank. Make sure that you

leave enough space to the right to have aileron cables pass by without striking or rubbing against the tank.

5. For attachment of our tanks to other ultra lights, please call us to help you with your hardware and installation needs. We have designed for and found that roto-molded tanks can be used by many different ultra lights both pusher and tractor drive applications.

6. You will notice that the angled back, elongated neck, can accept either the supplied and vented fuel cap OR a filler hose can be clamped over the neck for filling from a different location.

Instructions for the installation of Aluminum gas tank

The tank is mounts to two cross bars that are attached to the C30 down tubes. There are tabs that will need to be drilled with ¼" holes for mounting. Position the tank with clamps for fit-up before drilling. Install brass fittings to fuel tank opening prior to installation. Use plumbers teflon tape for sealing around the threads. Fuel line should be attached to the fittings using plastic clamps or safety wired. The C53 upper tank bar has been pre-drilled with holes to match to tabs on the fuel tank. The lower C54 lower tank bar will need to be drilled to match the lower mounting tab. The hardware for the tank is pre-labeled, partially assembled and should be in the box with the tank or as a separate bag of parts with other fuel tank components.

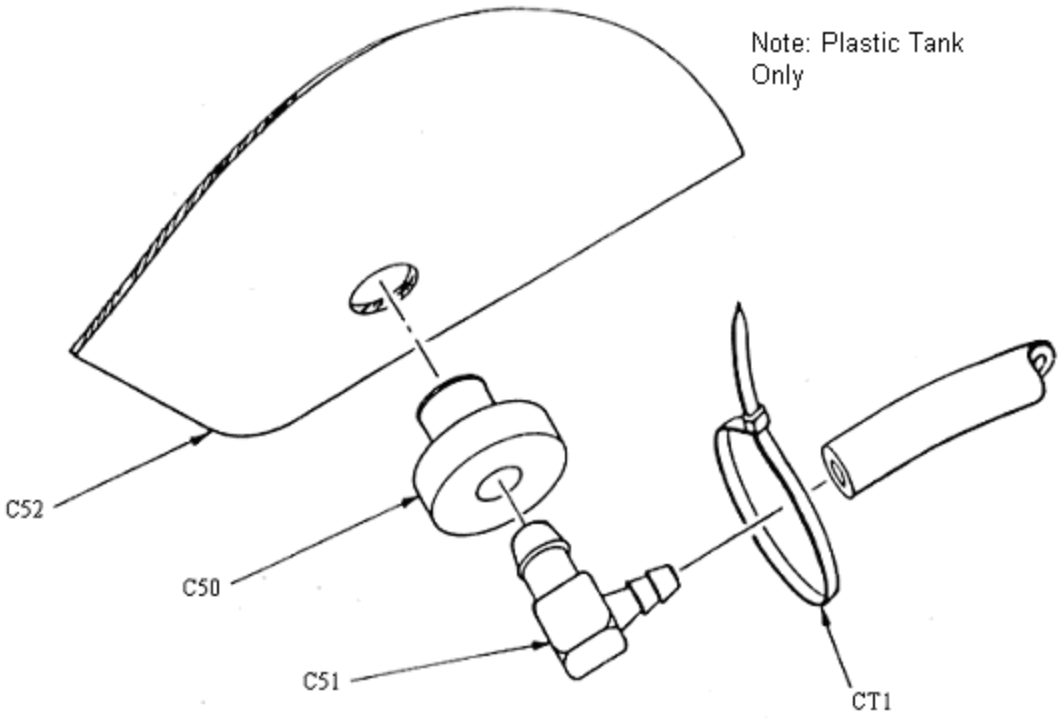


Figure 54 – Fuel Line Installation

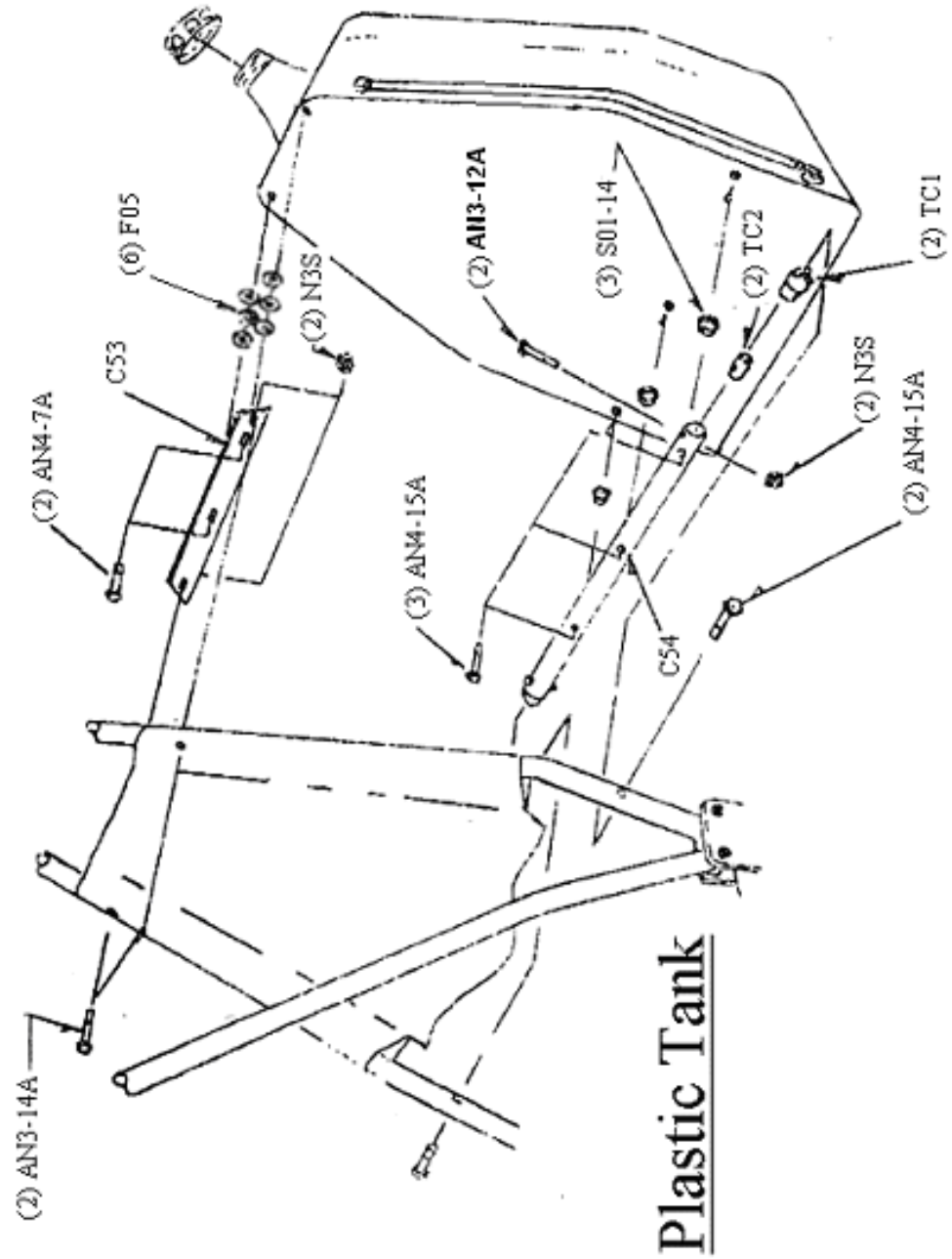


Figure 55 – Rotomold Plastic Tank

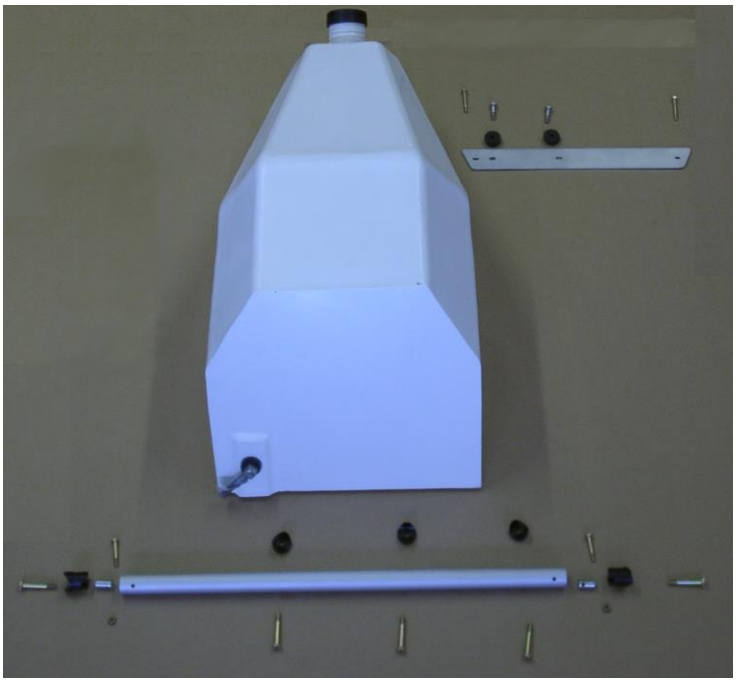


Figure 56 – Rotomold Plastic Tank

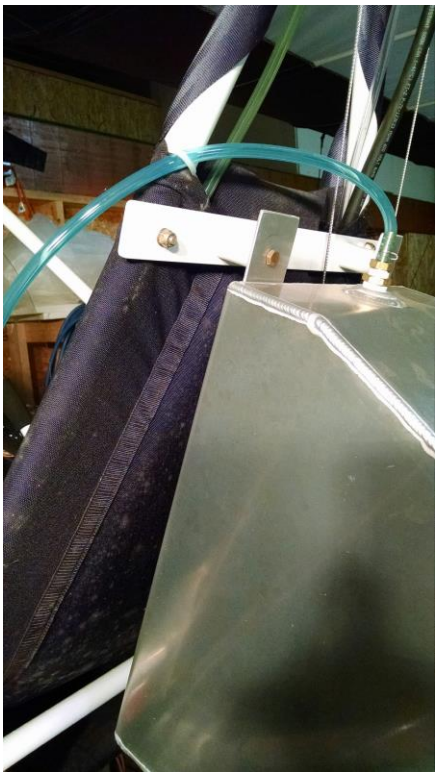


Figure 57 – Aluminum Tank

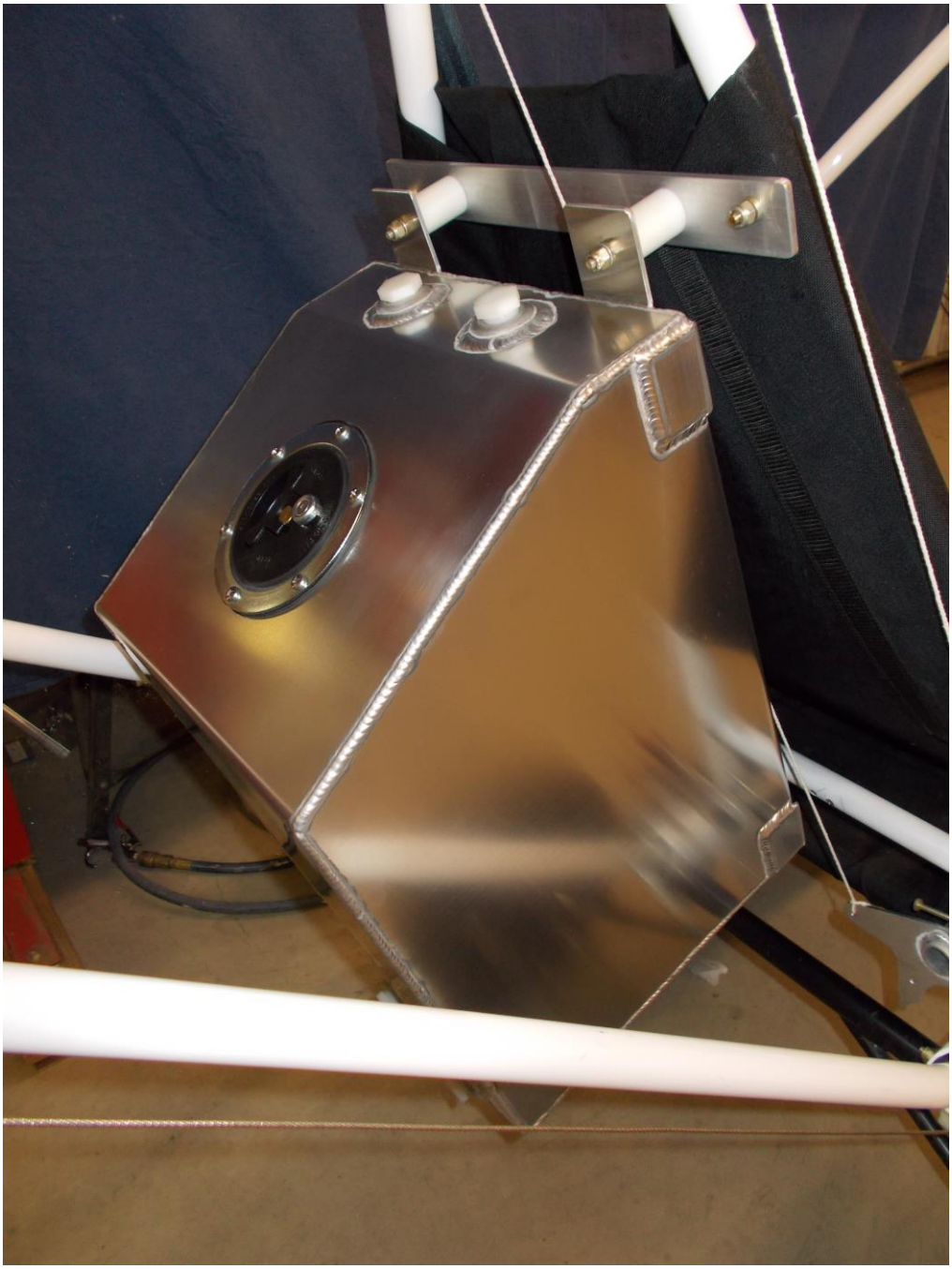


Figure 58 – Aluminum Tank Installation

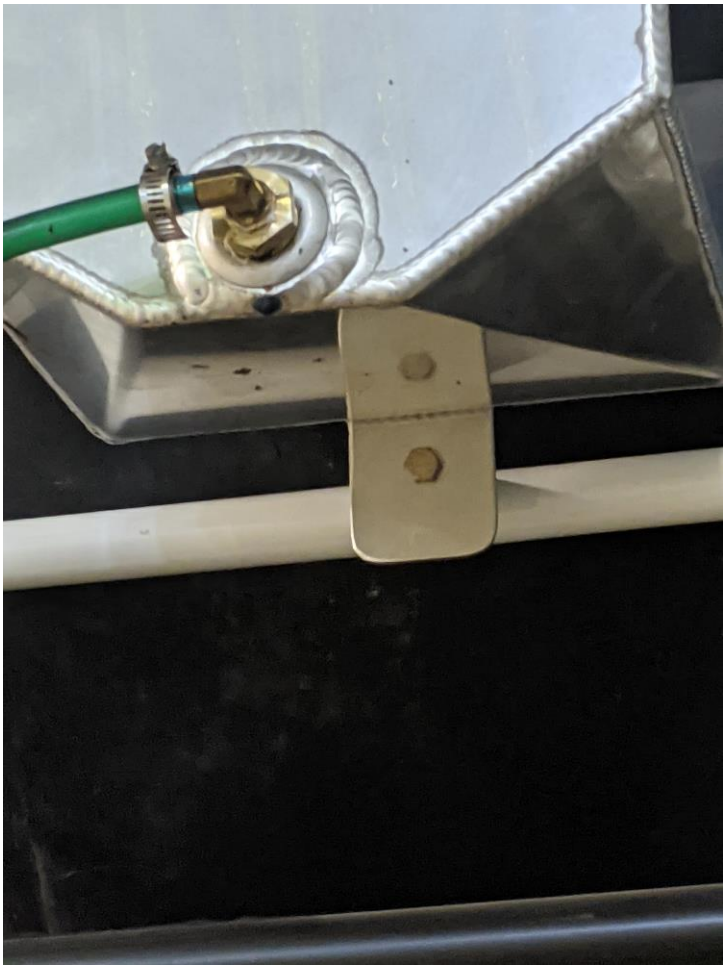


Figure 59 – Aluminum Tank Installation

Figure 60 – Attached Rotomold Plastic Tank

CHAPTER 4 –TAIL ASSEMBLY

Installation on Keel Tube (refer to this section after tail pieces have been assembled)

Install the upper and lower portion of the vertical stabilizer onto the keel tube. Bolt the rudder onto the vertical stabilizers. Do not tighten the hardware at this time. Insert the horizontal stabilizers into the keel tube. Bolt the elevators together inside the rear end of the keel tube and attach to the horizontal stabilizers. Attach tail wires. Do not tighten bolts completely until all wires have been installed. All wires should be tight when completely installed. If they are not first space the horizontal and vertical stabilizers further apart to take up the slack. This may require movement of the hinge bolts to opposite side of where you first install them. You may need to loosen the bolts at the root of the stabilizers a couple turns to allow them to slip in and out of the keel tube easier. You may twist the wire to shorten it and reattach. This method can also be used if the tail section does not initially sit level. Twist the cable no more than three times and twist them in the direction of the spiral that the cable is already wrapped in.

Figures 61 thru 65 - Horizontal Stabilizer

You are required to melt holes in the sail to insert bolts for final assembly. The tail structures are not completely bolted together until after the fabric is slid over them. Locate horizontal stabilizer leading edges S01, trailing edges S02, outboard spreaders S03 and inboard spreaders S04. Assemble tube connectors TC1 and insert TC2 into each end of S04 and aft end of each S01. Retain with (6) AN3-12A bolts and (6) N3S. Stabilizer frames are symmetrical until installed in sail, then become directional. VEL-CRO side of gap seal should be to the bottom side of stabilizer. Fit leading edge S01 into

each sail-half, followed by trailing edge S02 and then inboard spreader S04. Install eyebolt AN43-15A into aft end of leading edge. Use method depicted in Figure 63 to attach S04 with eyebolt AN43-15A in trailing edge and AN4-15A in leading edge. Make "assembly tool" as shown in Figure 64 from ¼-28 (grade 5 or better bolt. Be sure threads transition to taper smoothly. Using a hot knife (available at most sail boat supply houses) or a good pencil type soldering iron, melt holes in leading and trailing edges for outboard spreader. Refer to figure 65 for cutting sail at trailing edge take your time and BE ACCURATE!

Form a concave surface on one end of a 3/8" to ½" wooden dowel for outboard spreader installation tool. Slip outboard spreader S03 into stabilizer and work into position with fingers on each side of sail. Use an awl, Ice pick, etc. through leading edge to hold end of spreader. Use wooden dowel and mallet to tap aft end into place. Now, use assembly bolt to line up threads with hole. Remove installation bolt and awl. Install (8) stabilizer bracing cables CA4 with (4) AN4-15A bolts and (4) W4P (end with flat tang). Tighten. Insert assembled stabilizer halves into mounts in keel tube. Loosen AN4-15 in leading edge of inboard spreader if necessary. Position and tighten.

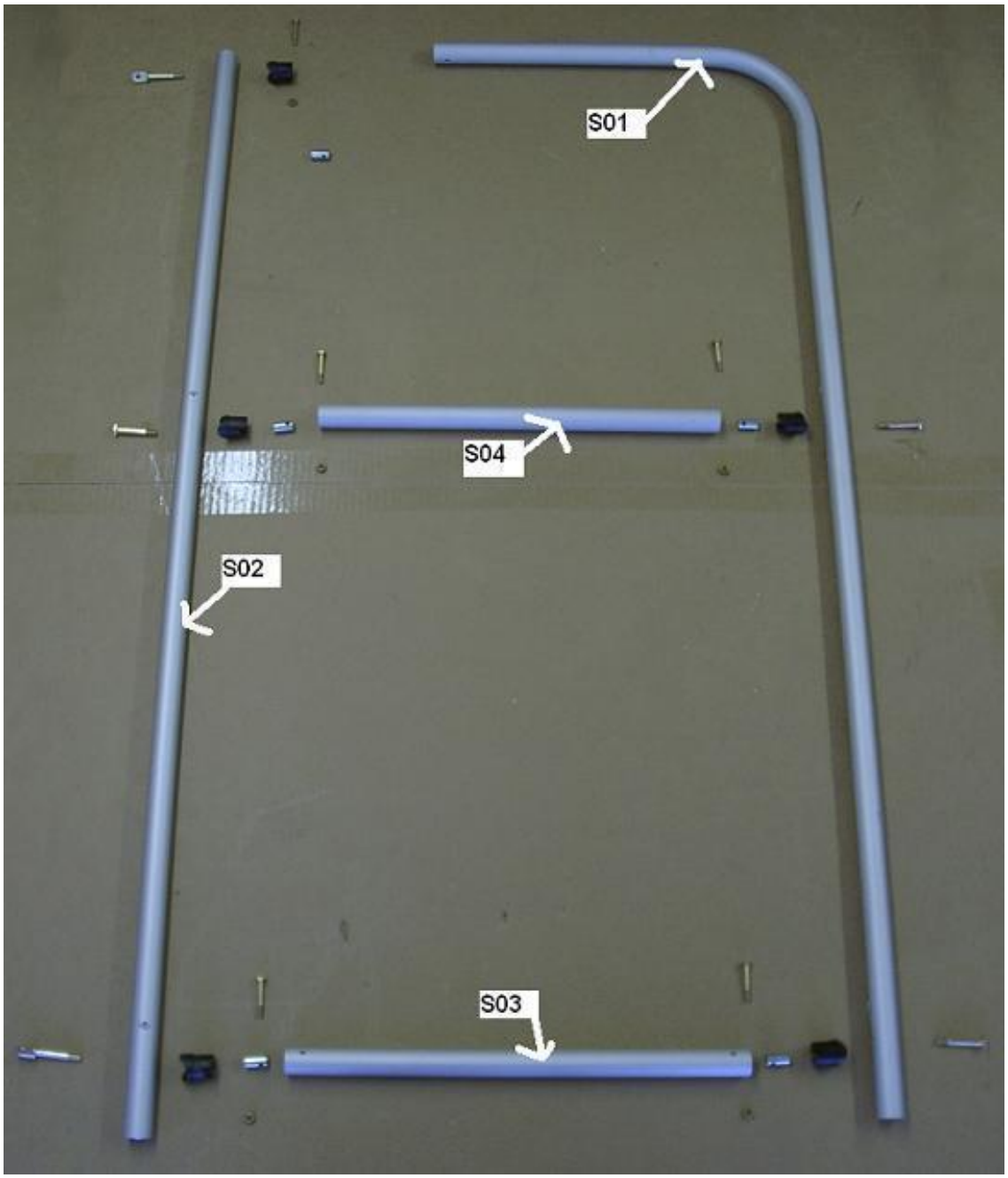


Figure 61 – Horizontal Stabilizer

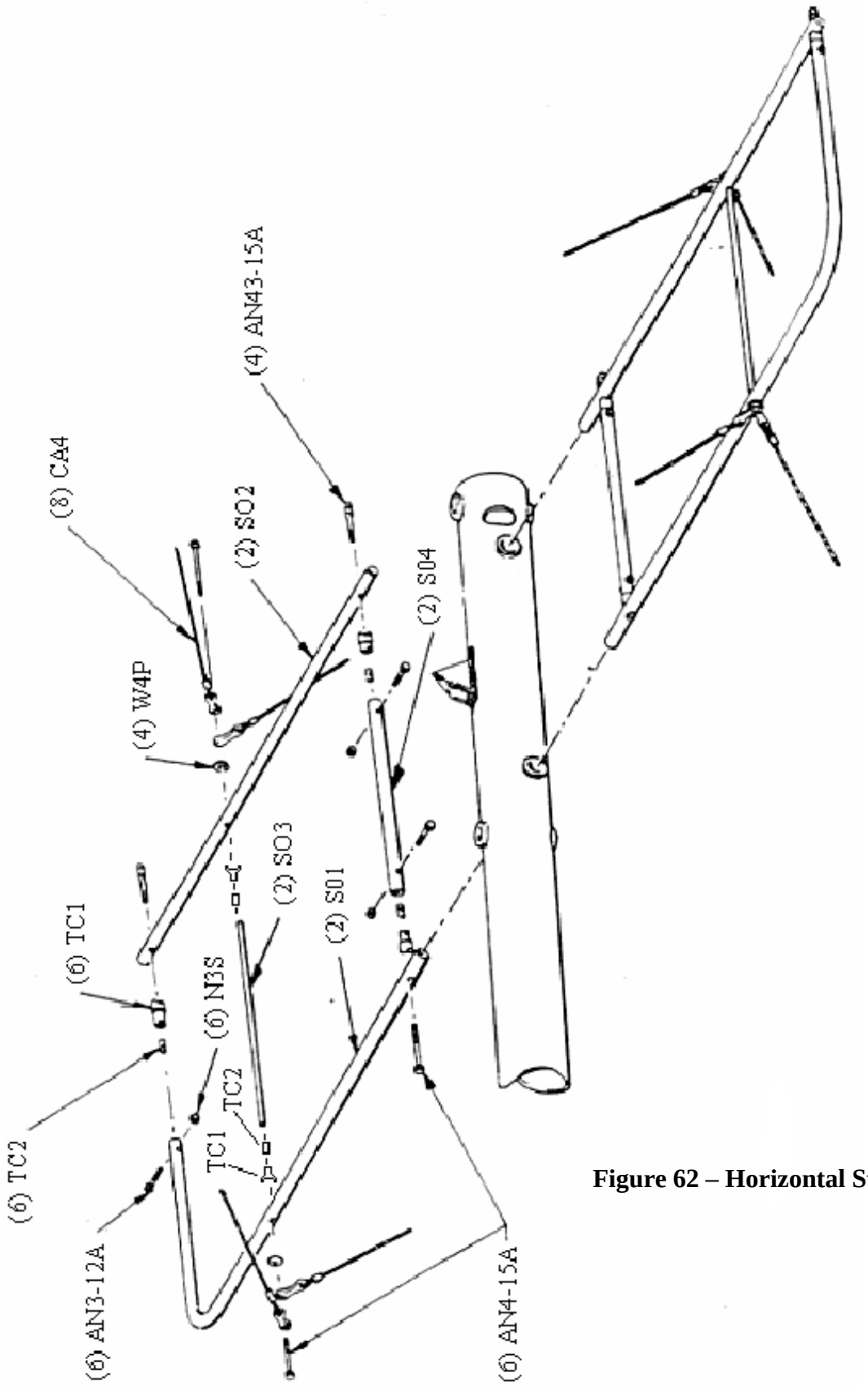
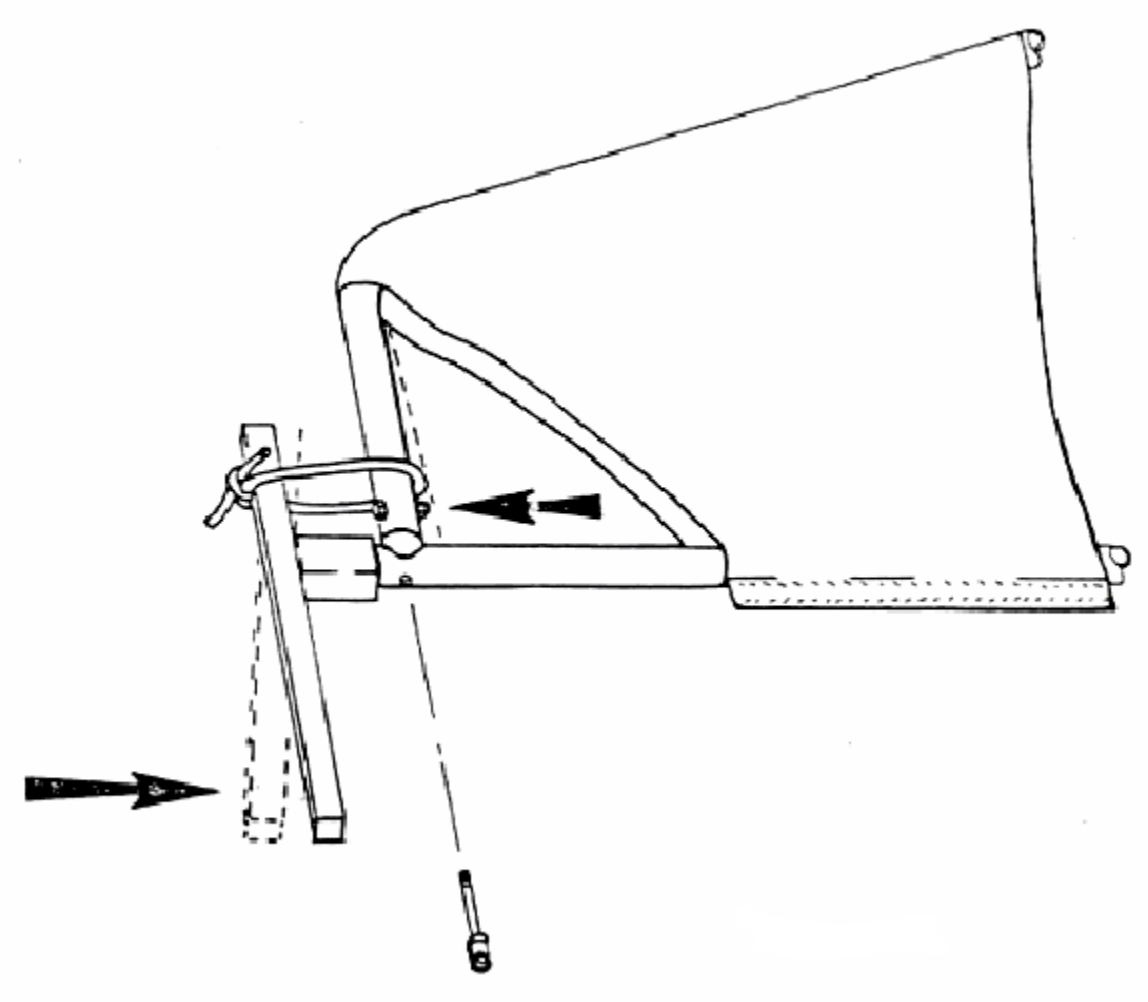


Figure 62 – Horizontal Stabilizer

Figure 63 – Tail Fabric Installation



Once the fabric is slid onto the tail a lever may be required to slide the outer tube into position to be bolted. A mallet with wooden stick may also be required. The ailerons have been made for you to speed up the building process.

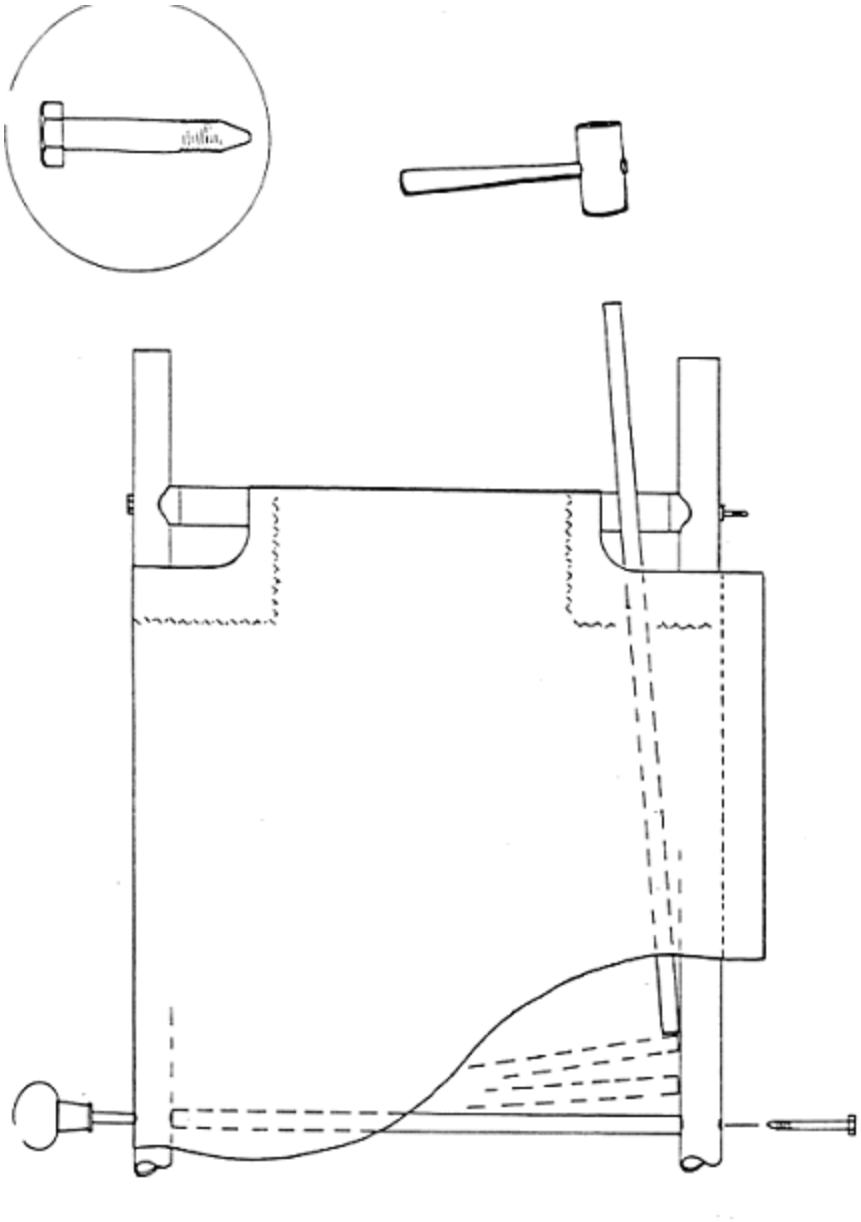


Figure 64 – Fabric Installation

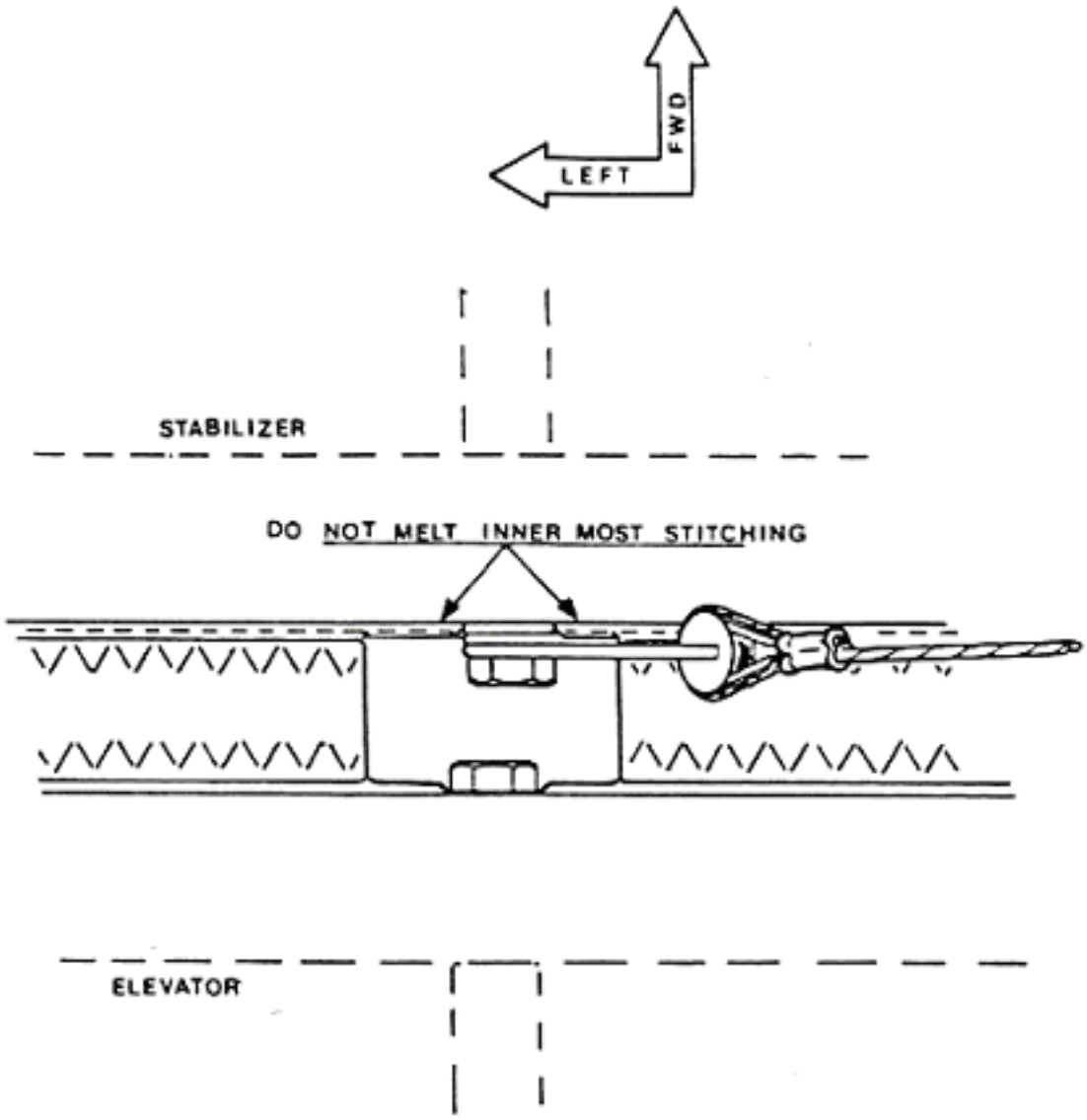


Figure 65 – Areas of Fabric to be melted or cut.

Figures 66 thru 68 - Vertical Stabilizer

Locate and install (6) TC1 and (6) TC2 into each end of (2) vertical stabilizer spreader tubes S09, aft end of upper vertical stabilizer leading edge S05 and aft end of lower vertical stabilizer leading edge S06 with (6) AN3-12A and (6) N3s. Assembled as depicted, using methods described in Figures 63, 64 and 65 with (3) AN43-15A eyebolts and (3) AN4-15a bolts. Tighten. Melt holes in each leading and trailing edge for cable bracing mounts. Using (4) AN3-14 bolts, place upper cables into position (ends with bent tangs) and insert bolts and just start (2) nuts N3, DO NOT TIGHTEN. Repeat procedure on bottom but tighten (2) nuts N3 securely. Tighten upper nuts.

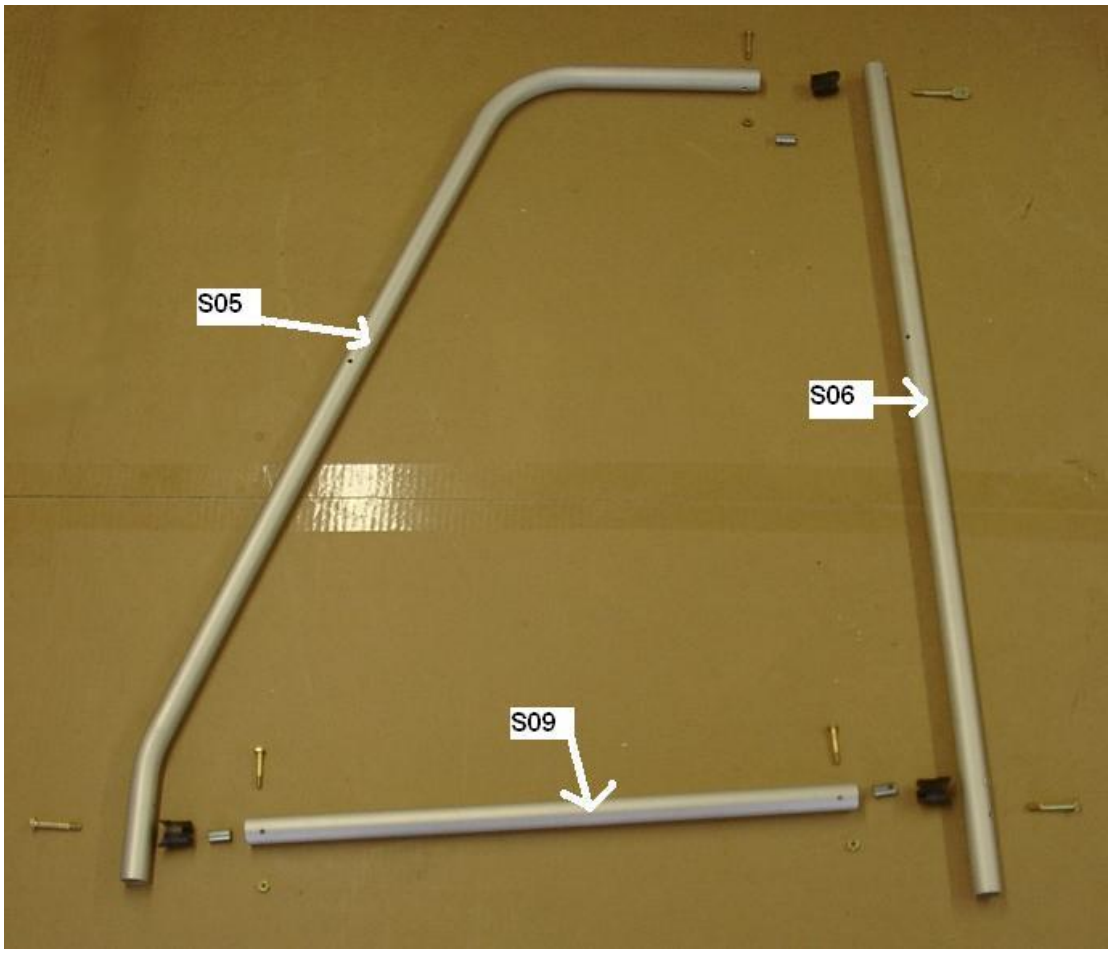


Figure 66 – Vertical Stabilizer (Upper)

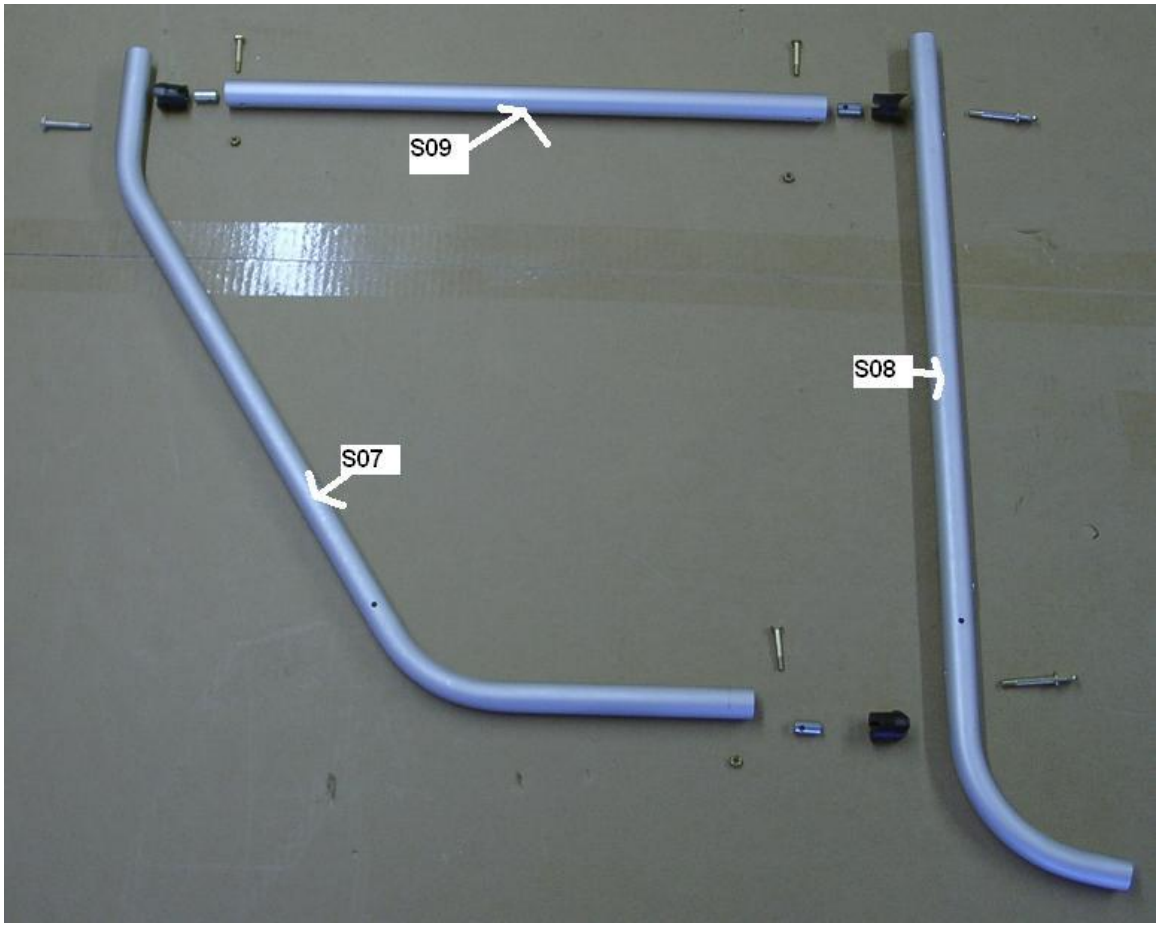


Figure 67 - Vertical Stabilizer (Lower)

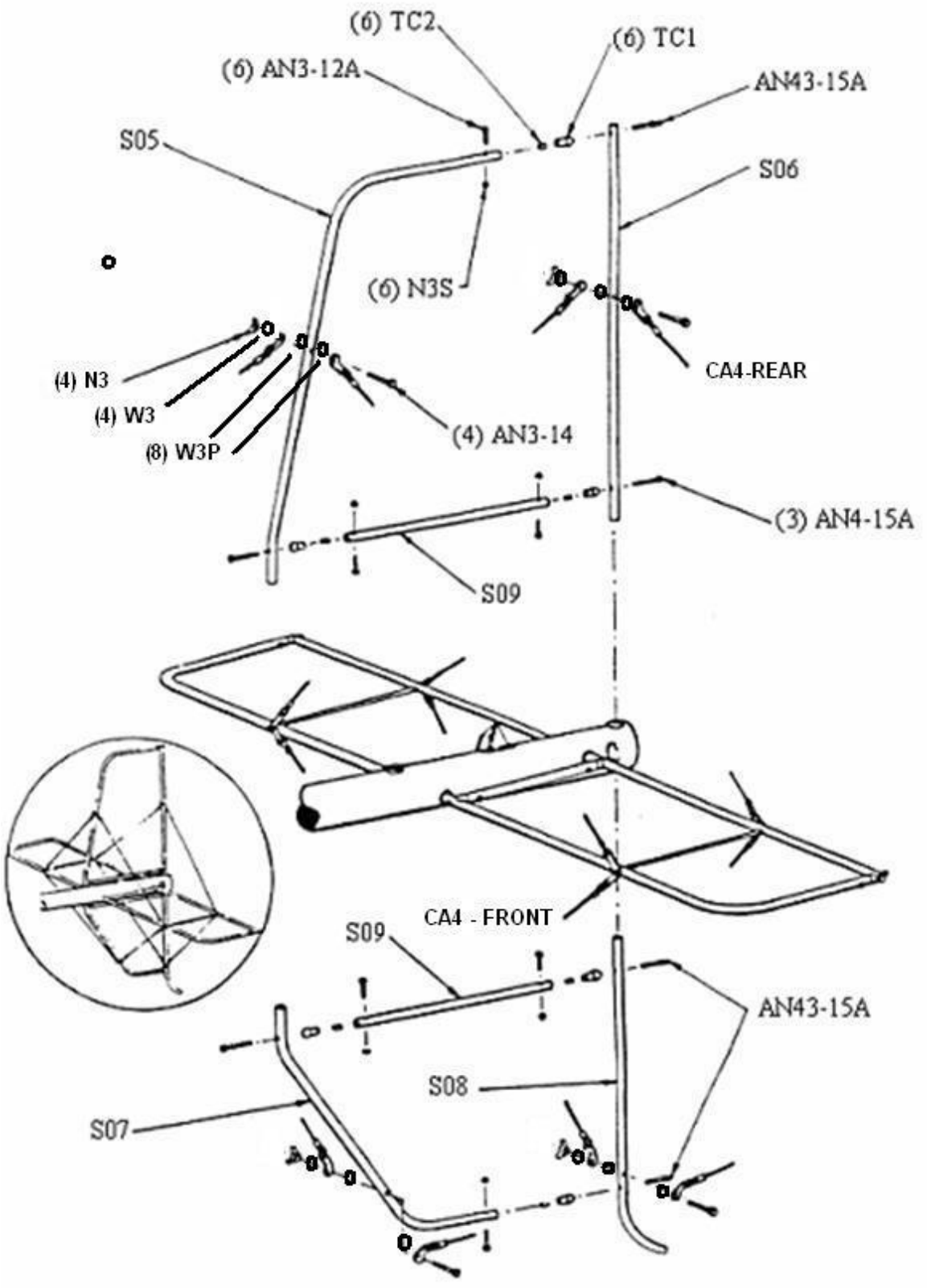


Figure 68 – Vertical Stabilizer

Figures 69 thru 70 - Elevator

Install (2) tube connectors TC1 and (2) inserts TC2 into each of right elevator trailing edge S11. Repeat in left Trailing edge S13. Use (3) AN3-12A bolts and (3) N3S to retain. Note: retaining bolt in right inboard fitting is common with forward mounting bolt of elevator belcrank S15. Install AN3-14A temporarily VEL-CRO side of gap seal should be to the top side of elevator. Position right leading edge S10 into right and left leading edge S12 into left side. Secure with (4) eyebolts AN43-15A. Melt holes in sail for mounting bolt for (2) spreader tubes S14. Install spreaders as depicted in Figure 69 and install (4) AN4-15A bolts. Tighten. Remove AN3-14A bolt temporarily installed in right inboard fitting. Position belcrank S15 and secure with (2) bolts AN3-14A, (2) W3, and (2) N3. Rear bolt may be reached with nut and washer taped to wrench or you may make a small slit from under side to allow access and patch with sail repair material. Position elevator halves through keel openings and join inside keel with (2) AN3-13A bolts, (2) W3 and (2) N3. (4) AN3-5A hinge bolts through eyebolts. (Make sure eyebolts are in proper position for freedom of hinge movement.) Place (4) W3P washers between eyebolts at each hinge point. Secure with (4) N3S. Tighten but allow to pivot freely.

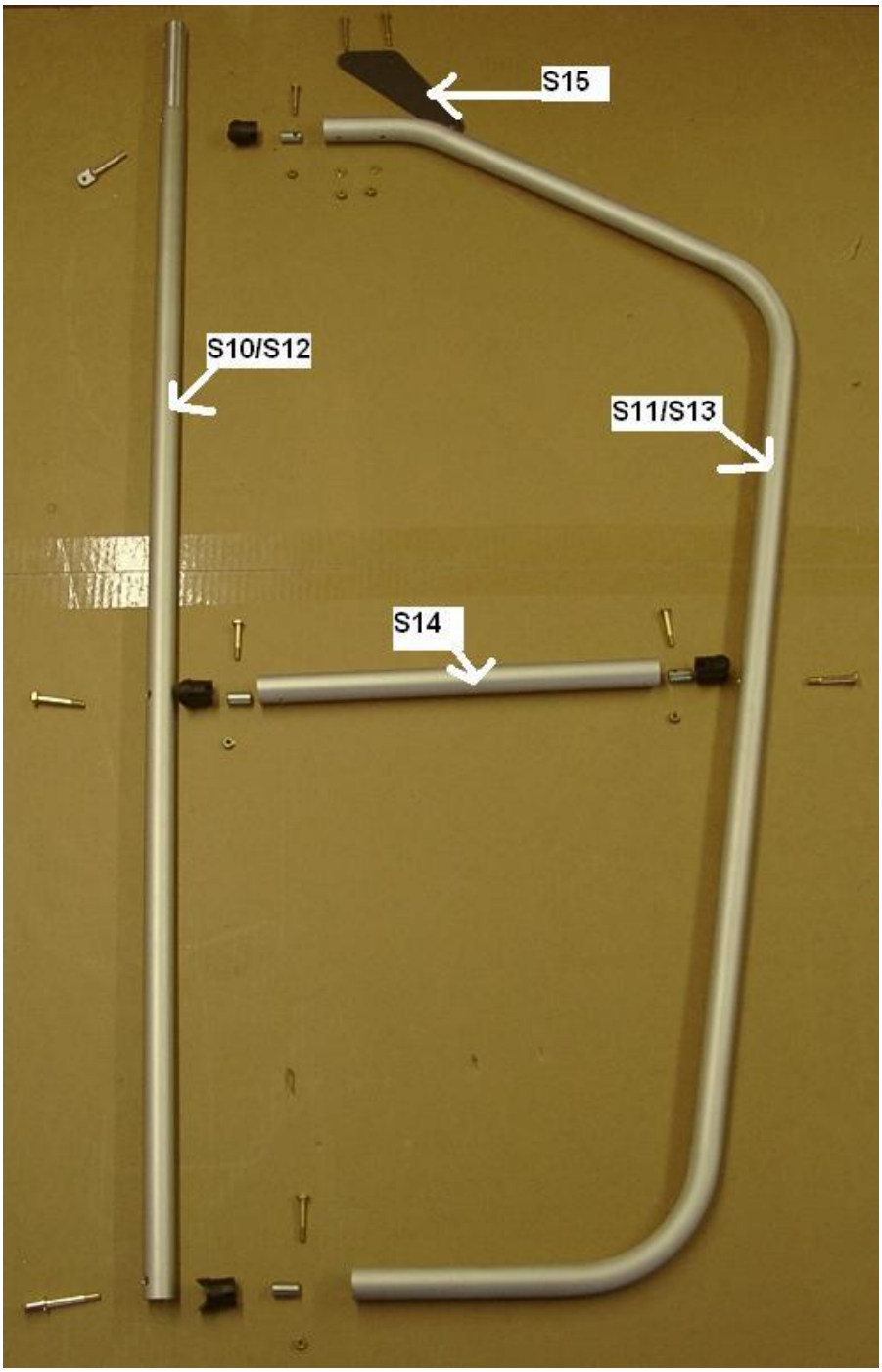


Figure 69 – Elevator

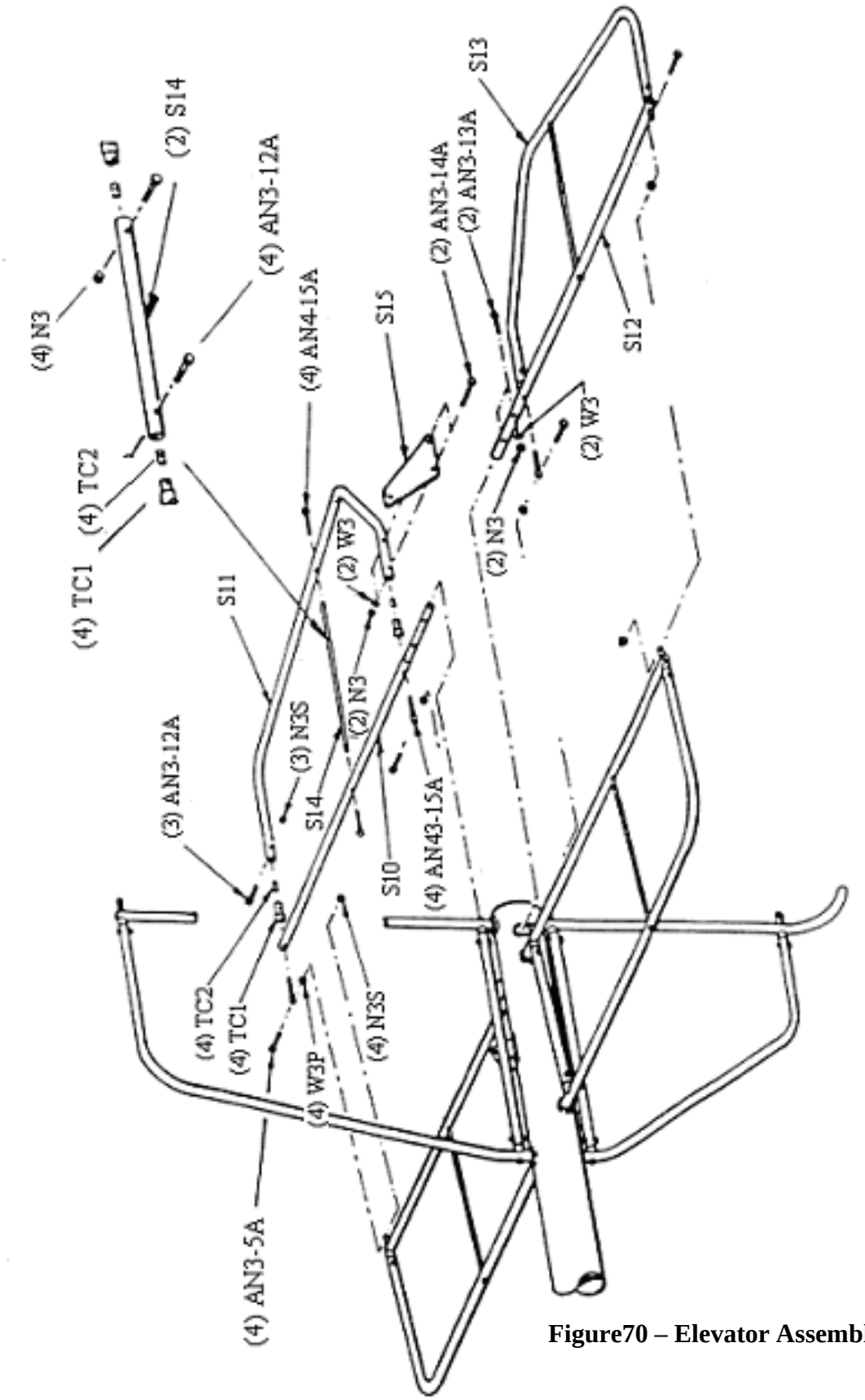


Figure70 – Elevator Assembly

Figure 71 thru 73 - Rudder

Install (2) TC1 and (2) TC2 into each end of spreader/belcrank mount S19. Use AN3-12A and N3S to secure aft end and temporarily mount forward fitting with AN3-15A. Position rudder trailing edge S17 into rudder sail. Be sure sail is positioned properly. Note: reinforcement in sail should line up with S19. Aft Mounting hole in trailing edge S17 is 21" from bottom edge. Place leading edge S16 into sail making sure forward mounting hole for S19 is 21" from bottom edge. Secure with (2) AN43-15A eyebolts. Refer to Figure 73 and cut access hole in sail for rudder belcrank.

Trim away gap seal as shown but be careful not to cut into inner most straight stitching. Stay about 1/16" away. Be careful! Trim gap seal at upper leading edge mounting bolt as shown in circled drawing. Melt holes in trailing edge. Install spreader S19 as with method shown in Figure 72. Secure with AN43-15A eyebolt and AN4-15A bolt. Install belcrank S20 through access hole as shown with (2) AN3-15A bolts, (2) S01-14 saddles, (2) W3 and (2) N3. Install upper spreader S18. Secure with (2) AN4-15A bolts. Position rudder onto assembled vertical stabilizer and install (3) AN3-5A hinge bolts, (3) W3P washers and (3) N3S. Tighten but allow to pivot freely.

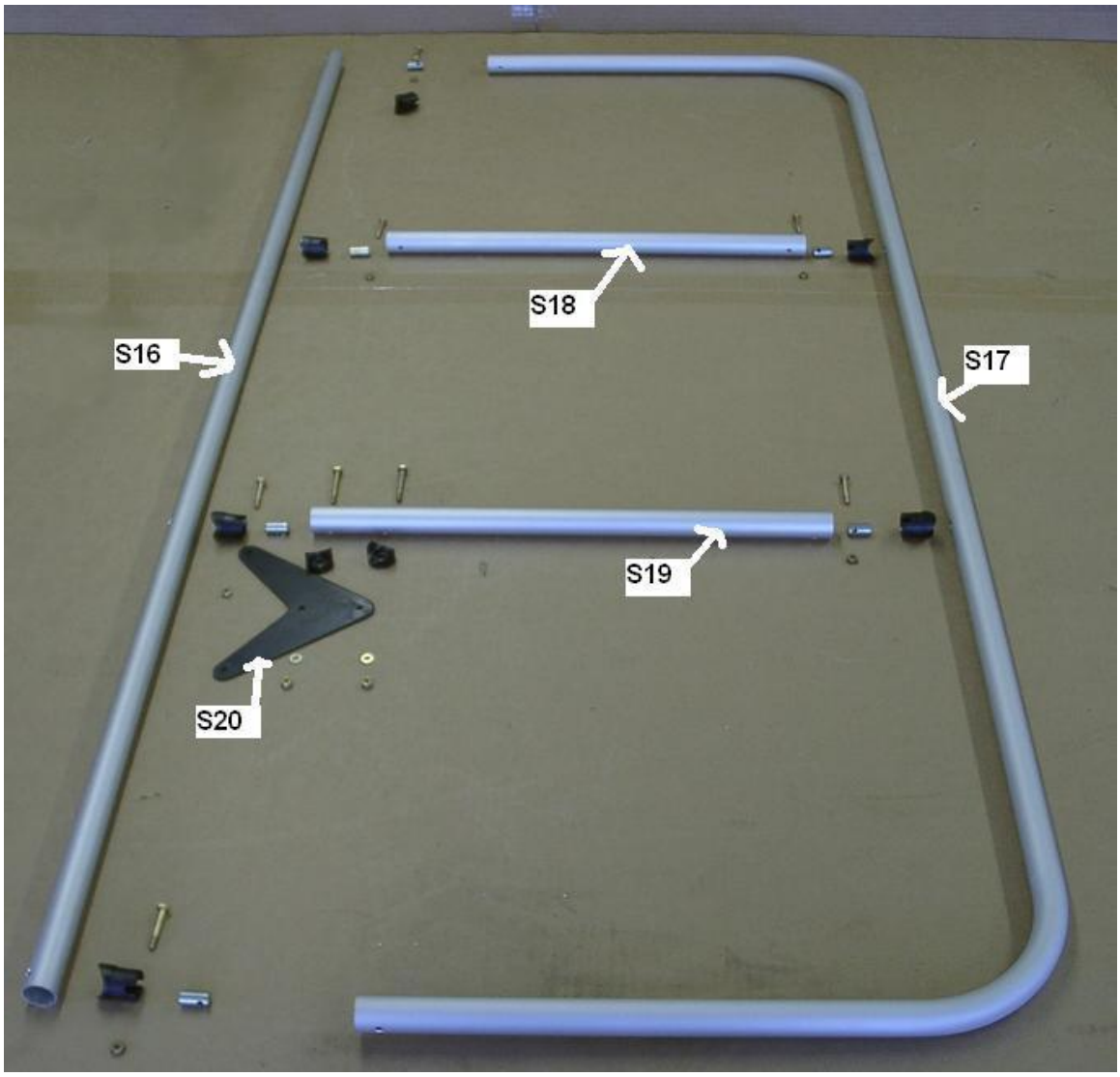


Figure 71 – Rudder

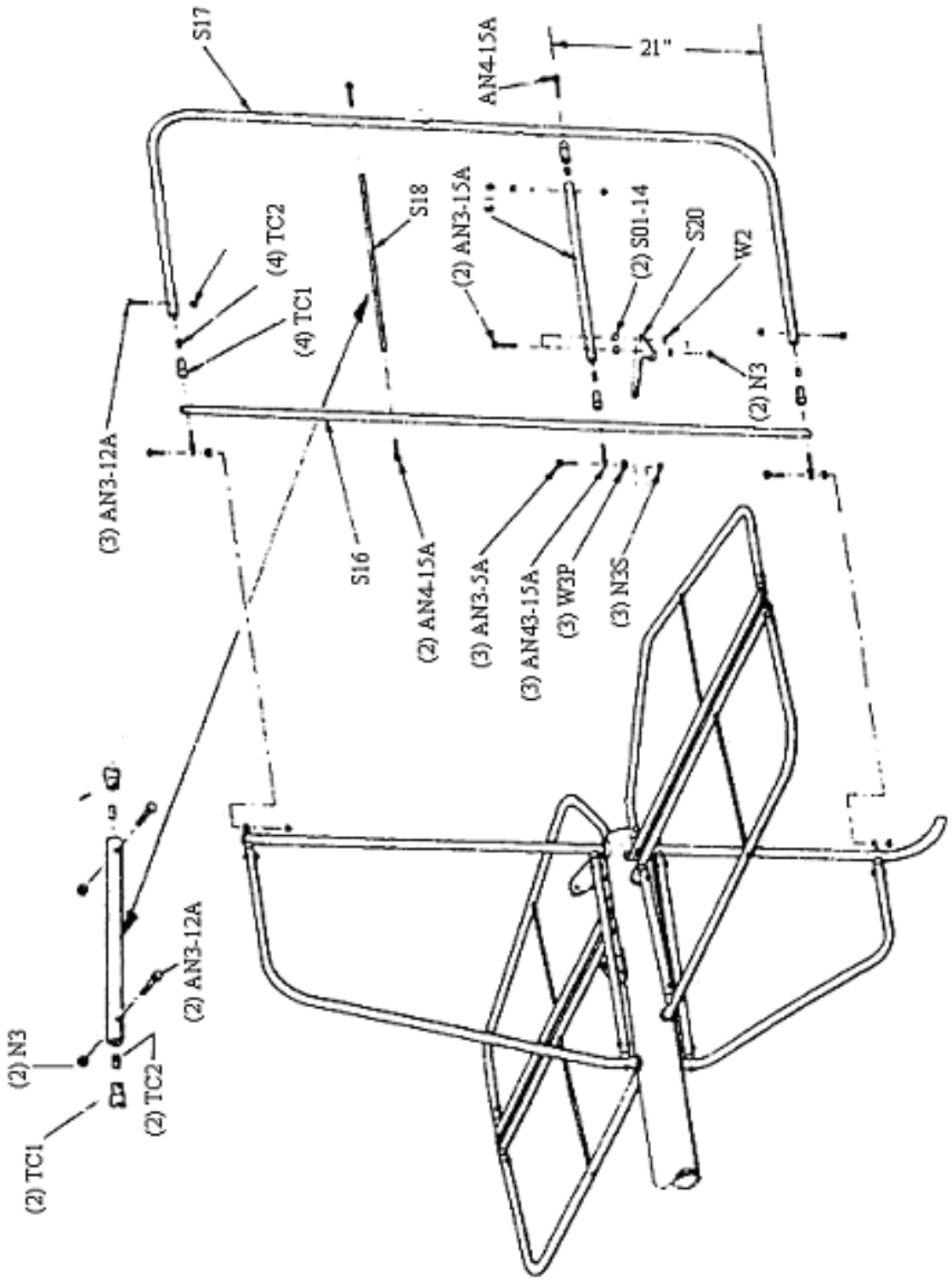


Figure 72 – Rudder

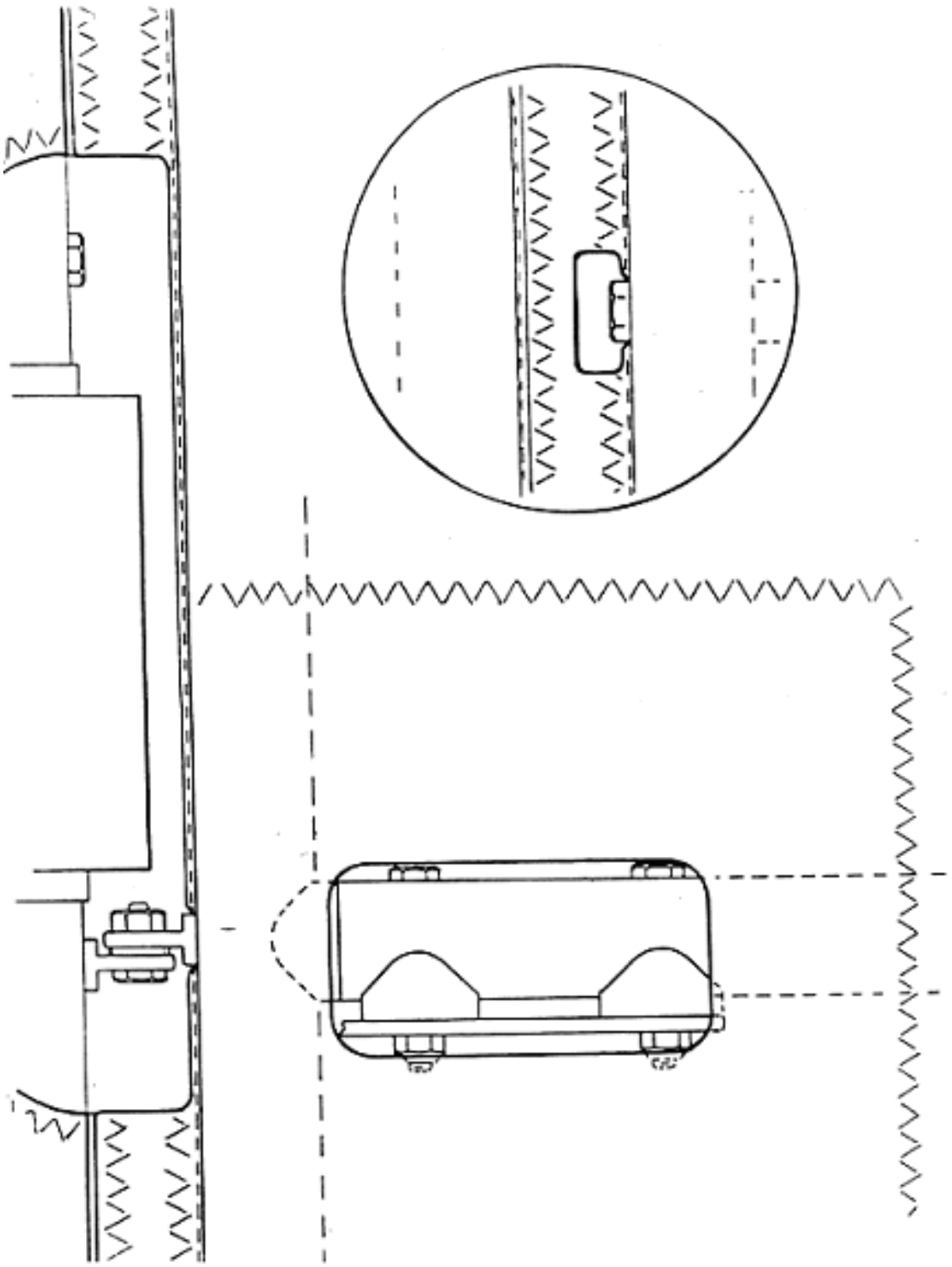


Figure 73 – Rudder Belcrank Hole

Figure 74 thru 76 - Rudder Cable

Install left and right forward rudder pulleys C46 and keepers C47 on side cage rails using appropriate length bolts and N4S. Washers may be used to space the pulley away from the cage. Prior to tightening, set rudder pedal cable and keeper to outboard side of pulley. The 24" piece of cable housing is positioned directly behind this pulley.

Install left and right aft rudder pulleys and keepers at the holes on end of cage rail 15° offset from horizontal. Use AN4-30A and (3) W4 for spacing, and N4S. Cable runs under pulley with retainer housing, so it does not touch forward or aft pulley. Secure cable housing with cable ties to insure housing does not interfere with pulleys

Install left and right pulleys and keepers onto tail strut bracket K09 with (2) AN4-7A and (2) N4S. Insert (2) Shackles AN115-21 into looped ends of cables and attach to rudder belcrank S20 with (2) AN3-5A and (2) N3S. Shackle and bolt should rotate freely on belcrank.

To attach cables to the rudder pedals insert (2) Shackles AN115-21 into looped ends of cables and attach to rudder pedals with (2) AN3-5A and (2) N3S. Shackle and bolt should rotate freely on rudder pedal.

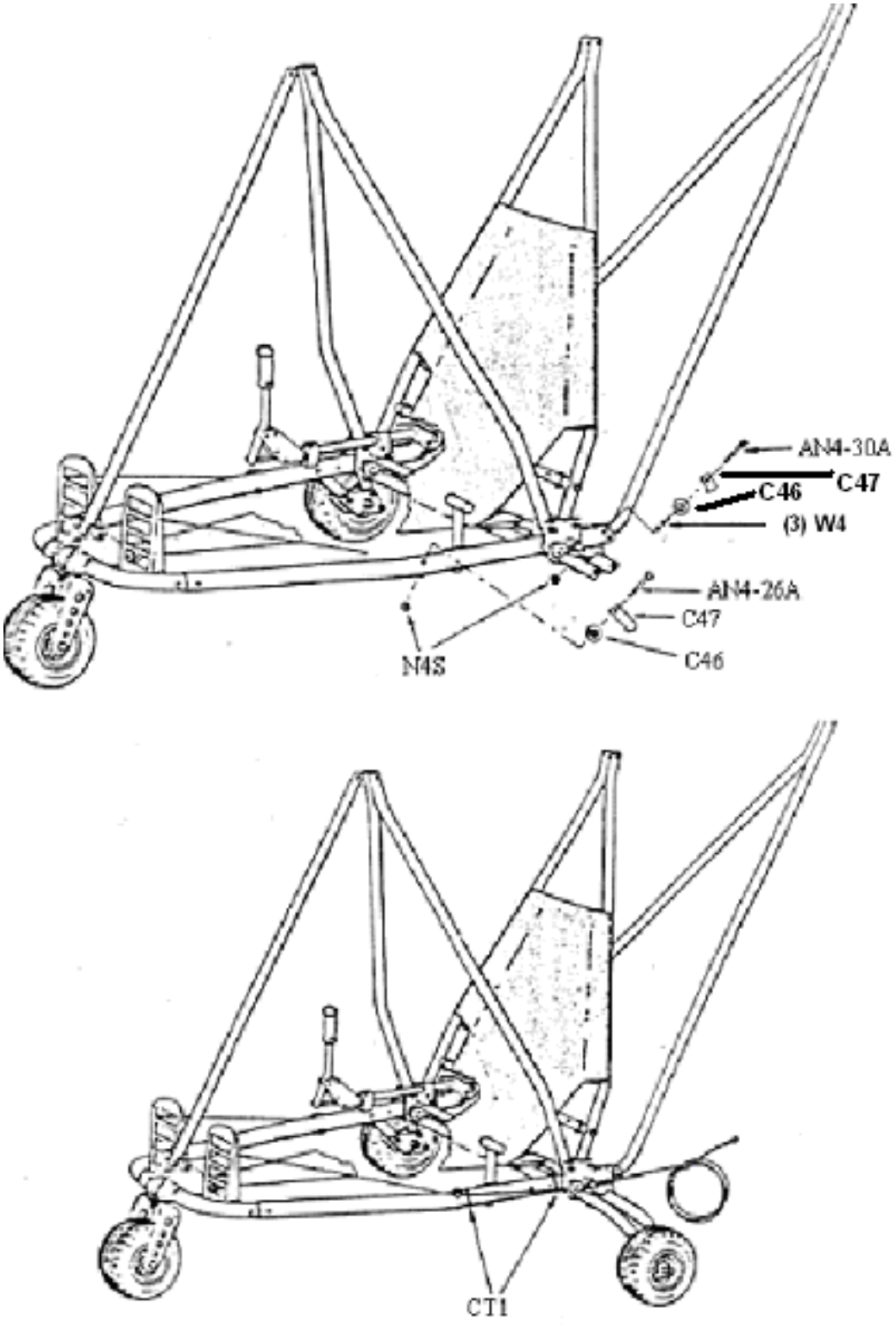


Figure 74 – Rudder Cable Placement

Figure 75 – Rudder Cable Placement

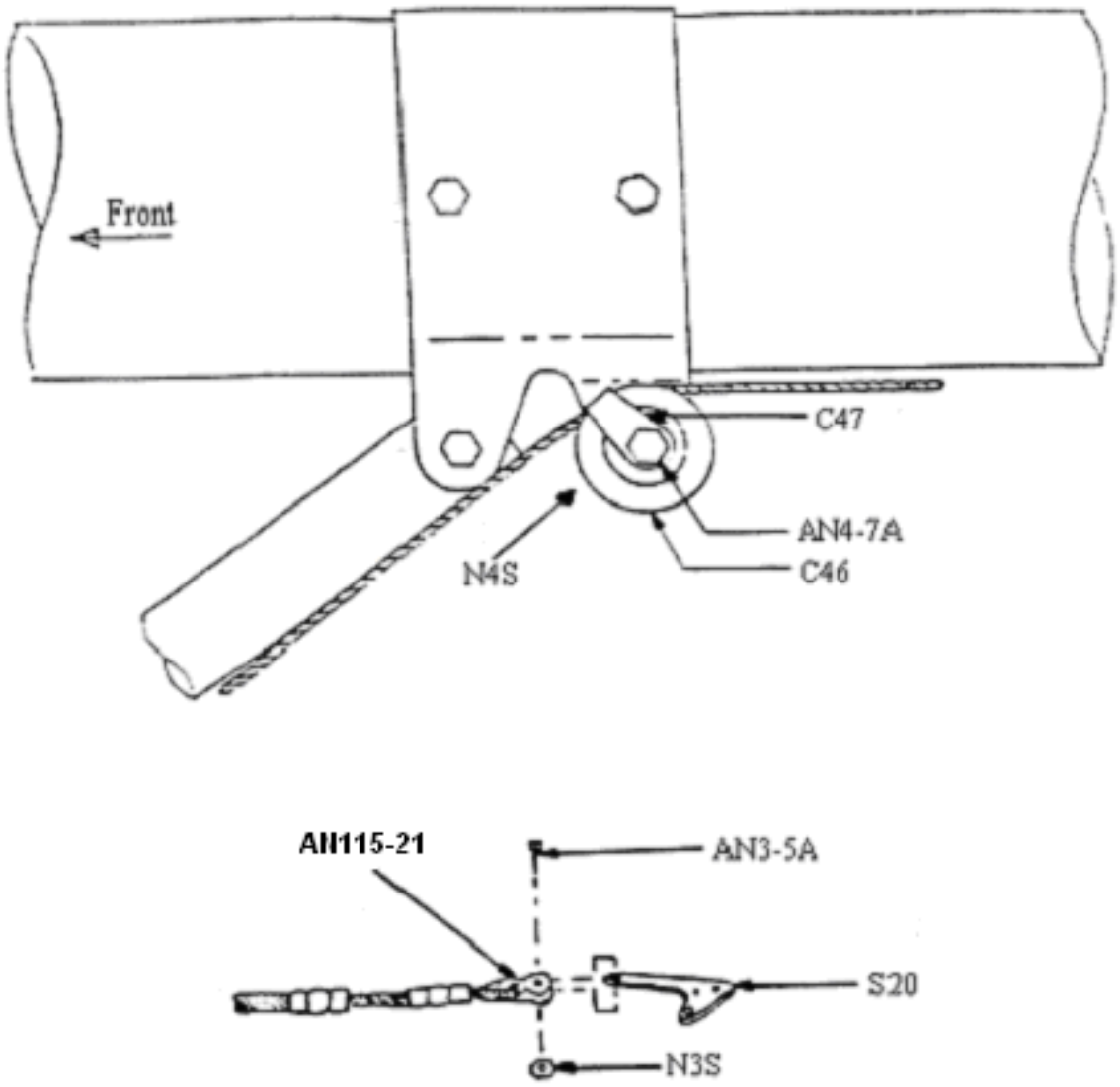


Figure 76 – Rudder Cable Placement

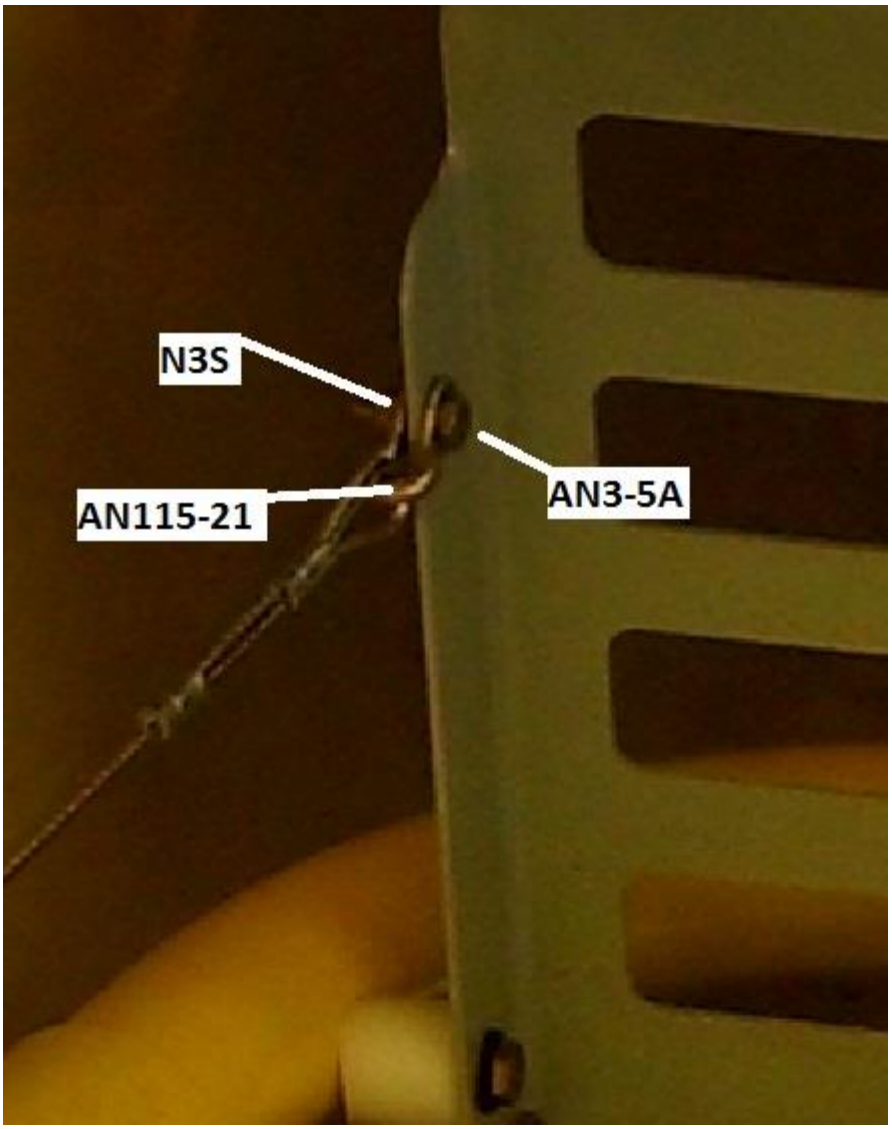


Figure 76A – Rudder Cable Attachment to Rudder Pedal

CHAPTER 5 – WINGS

Figures 77 thru 89 - Wings

Outboard sections of each spar are shipped inside the inboard sections. Lay out front spar W01, slide spar extension out and secure with roll pin W03. Lay out rear spar W02, extend tip, and secure with roll pin W04. Note that rear spar has a notched tip as opposed to front spar 1" holes. Rear spar also has two sets of paired holes. Layout diagonal wing wires CA5 in approximate position of attachment.

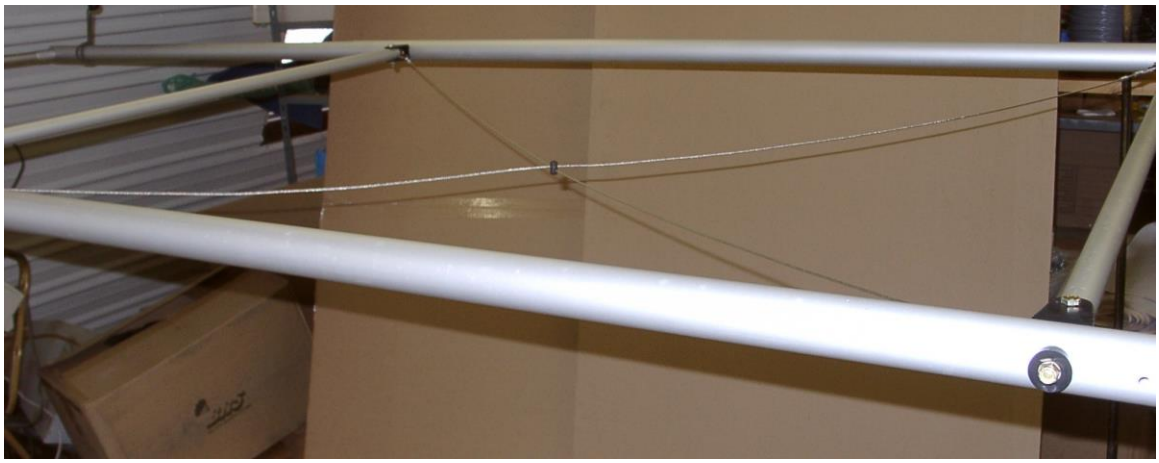


Figure 77 – Wing Structure Diagonal Wires

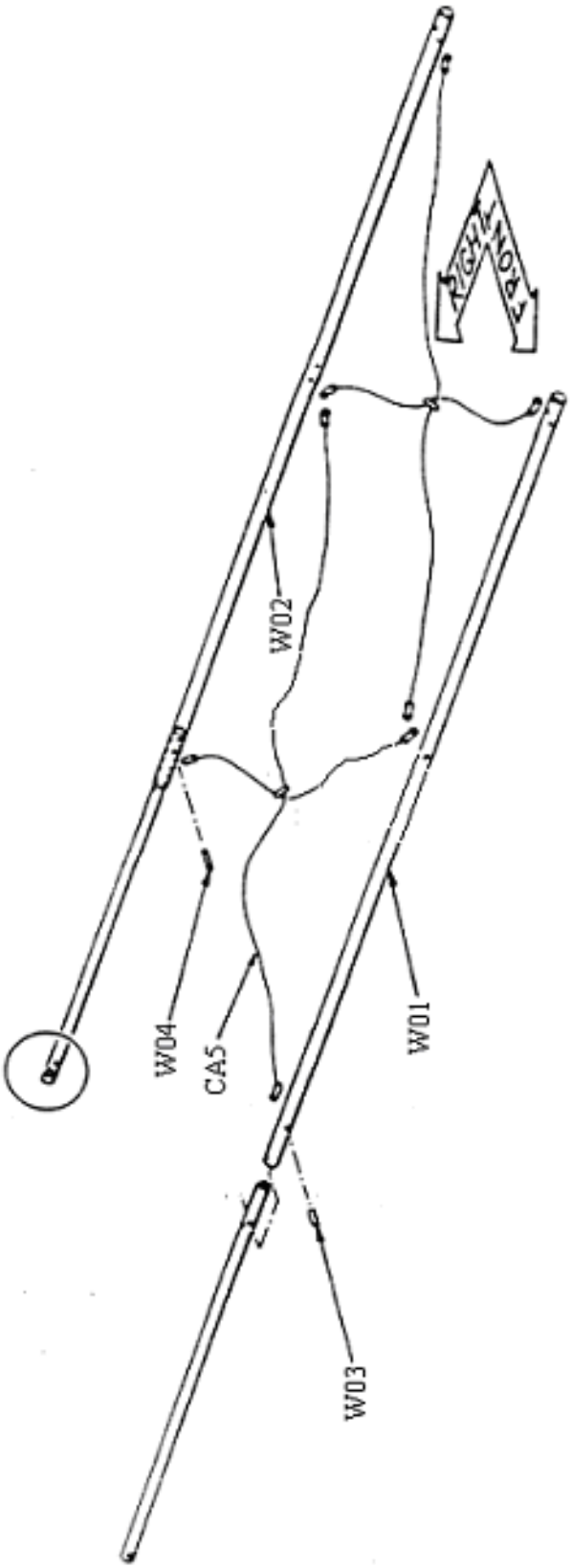


Figure 78 – Wing Structure

Refer to Figure 79. Fasten tang from diagonal wing wire CA5 and compression strut bracket W06 to the inside of the inboard end of the front spar W01 with bolt AN4-23A, washer W4, and nut N4. Tighten. Fasten tang from other diagonal wire of the same set and compression strut bracket W06 to the inside of the inboard end of the rear spar using eyebolt AN43-22A, saddle S01-84, and nut N4. Tighten securely. Be sure notch at outboard tip of rear spar is facing up. Also be sure that eyebolt is positioned vertically.

Along front spar, insert bolts AN4-26A through wing wire tangs, compression strut brackets W06, and front spar. Hold temporarily with nuts N4 finger tight. Saddle S01-84, flying wires and washer W4 will be added after sail is positioned. On the rear spar, insert bolts AN4-25A. Through diagonal wing wire tangs, compression strut brackets, rear spar, and hold with nut N4 finger tight. Again the rest of the hardware depicted will be added later. Of the paired holes on the rear spar, bolts are inserted in the outermost of each pair. Inner holes will later be used for the aileron hinge bolts.

Install Compression struts W05 on front spar use bolts AN4-15A and nuts N4. Insert bolts from bottom and tighten nuts until slight resistance is felt when pivoting strut back and forth. Do not full install the root compression strut at this time. A hole will need to be drilled in this strut after the wing is installed on the aircraft. Assemble both wings to this stage.

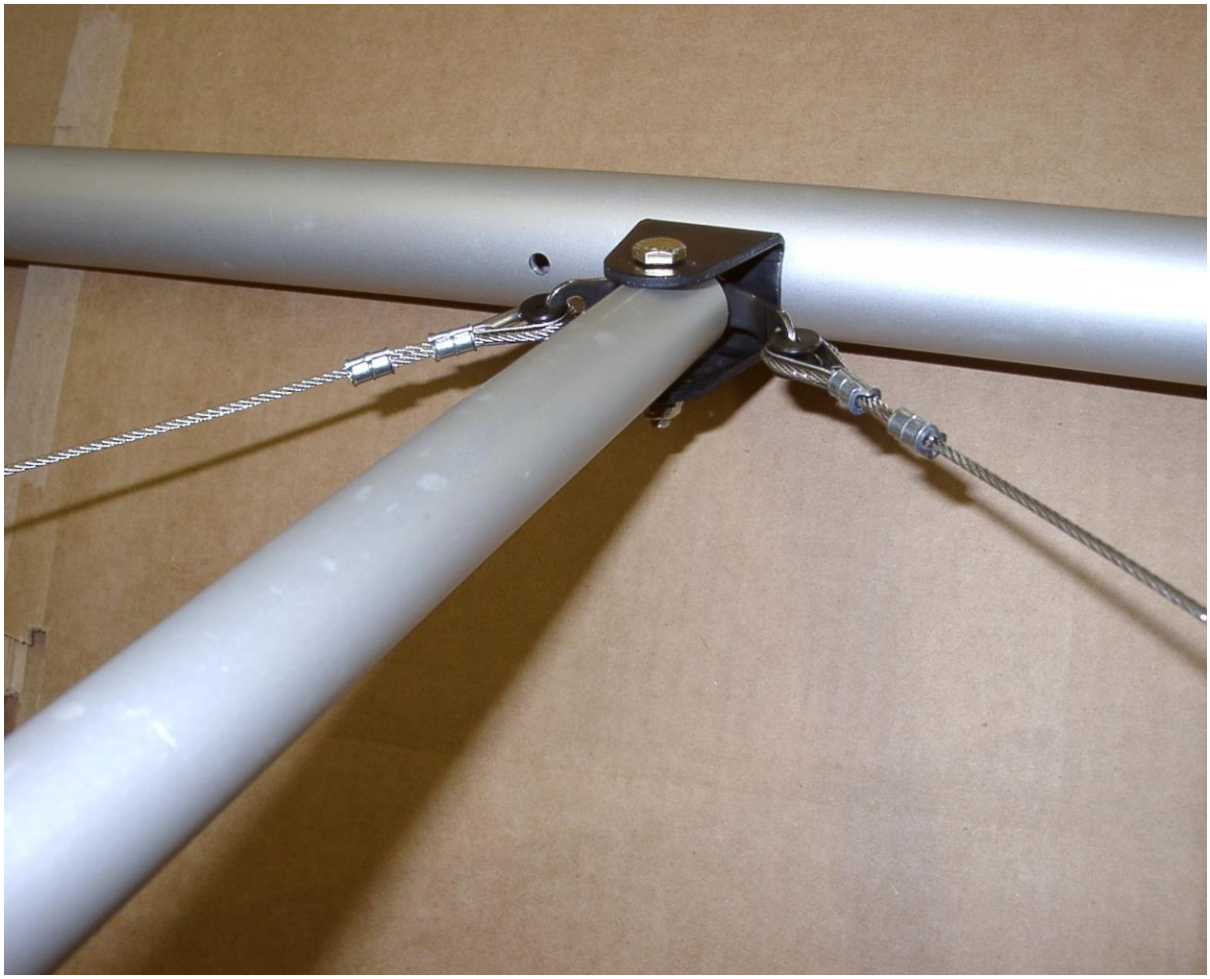


Figure 79 – CA5 Cable Attachment

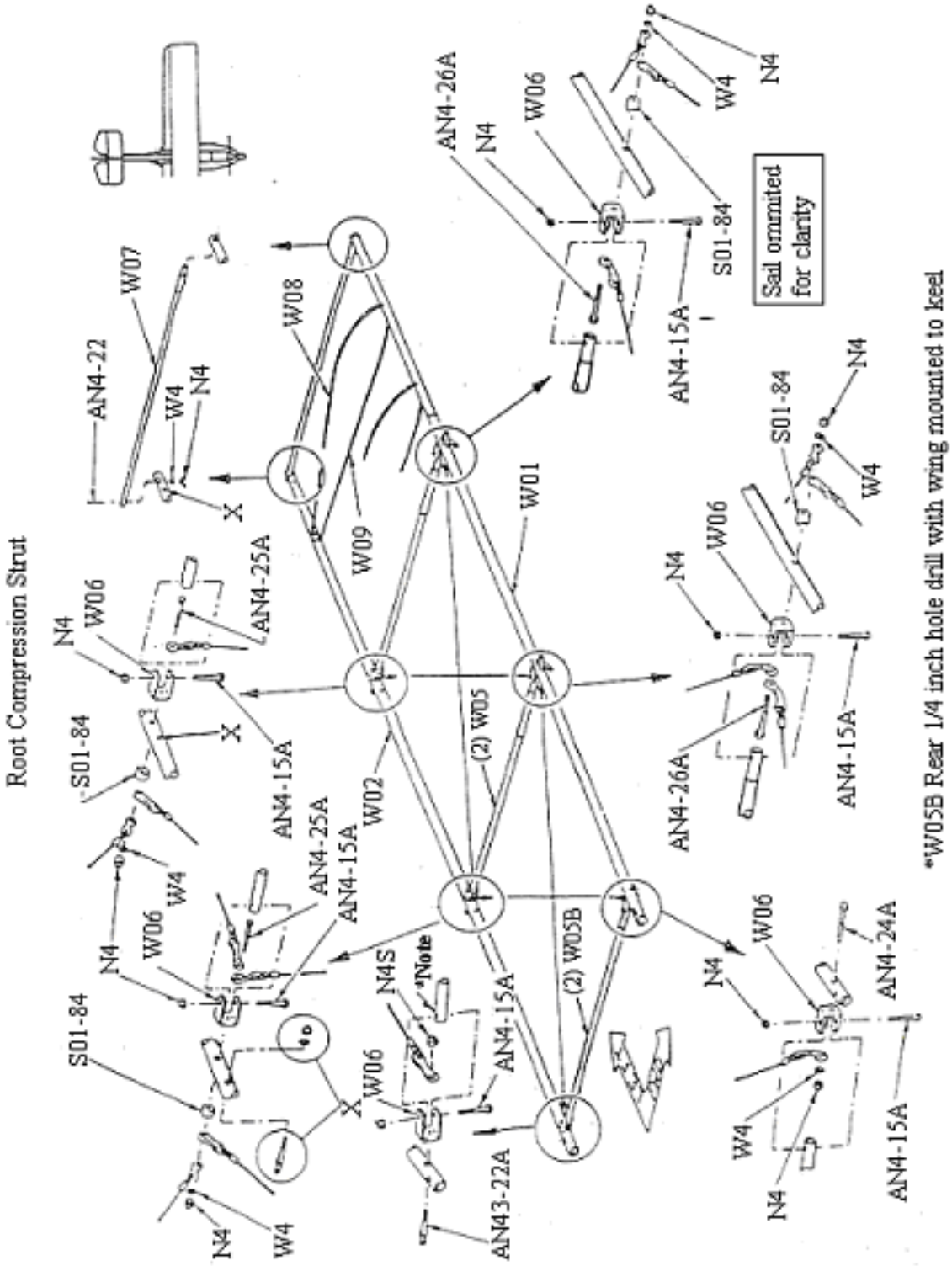


Figure 80 – Left Wing Layout

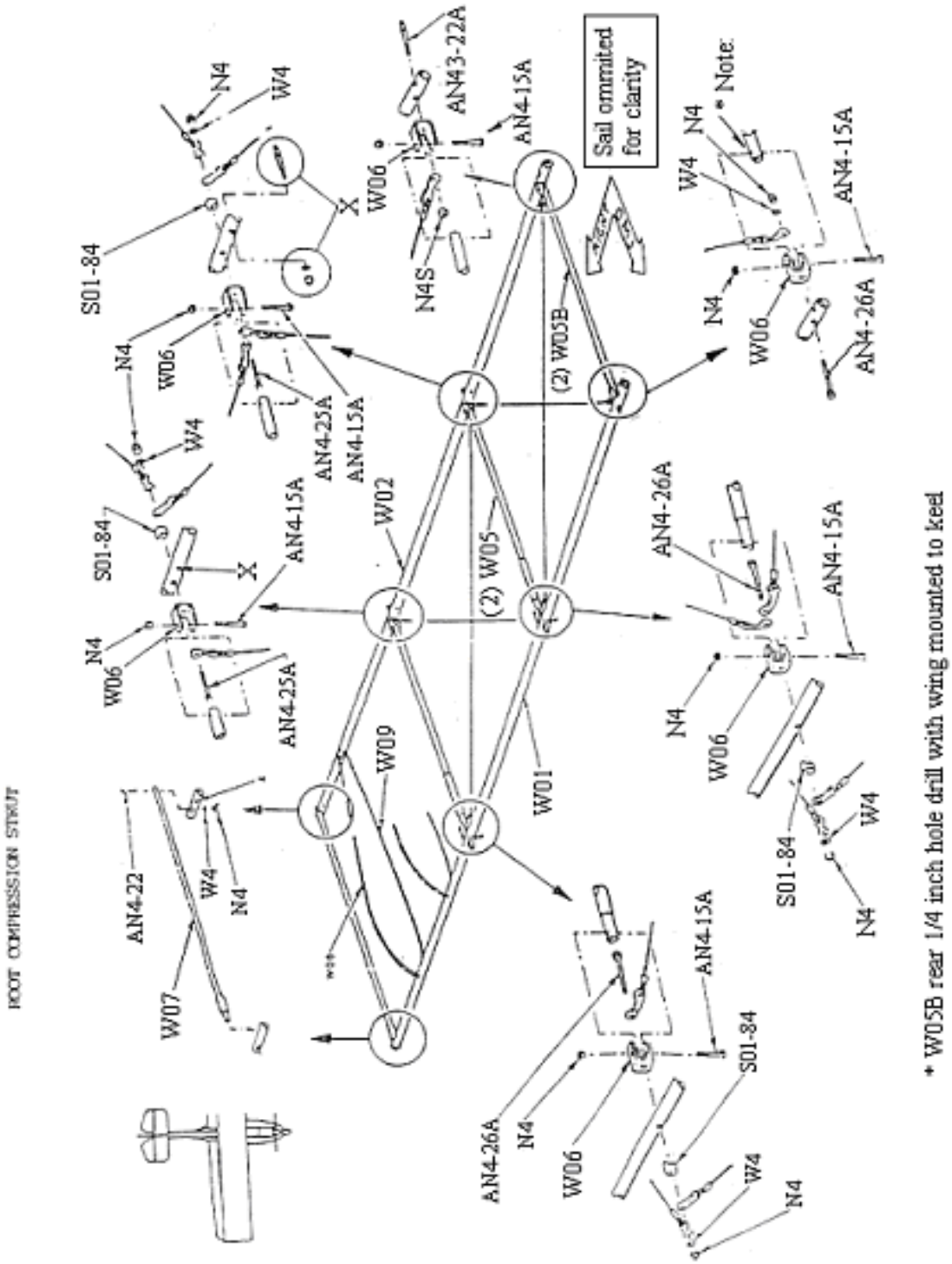


Figure 81 – Right Wing Layout

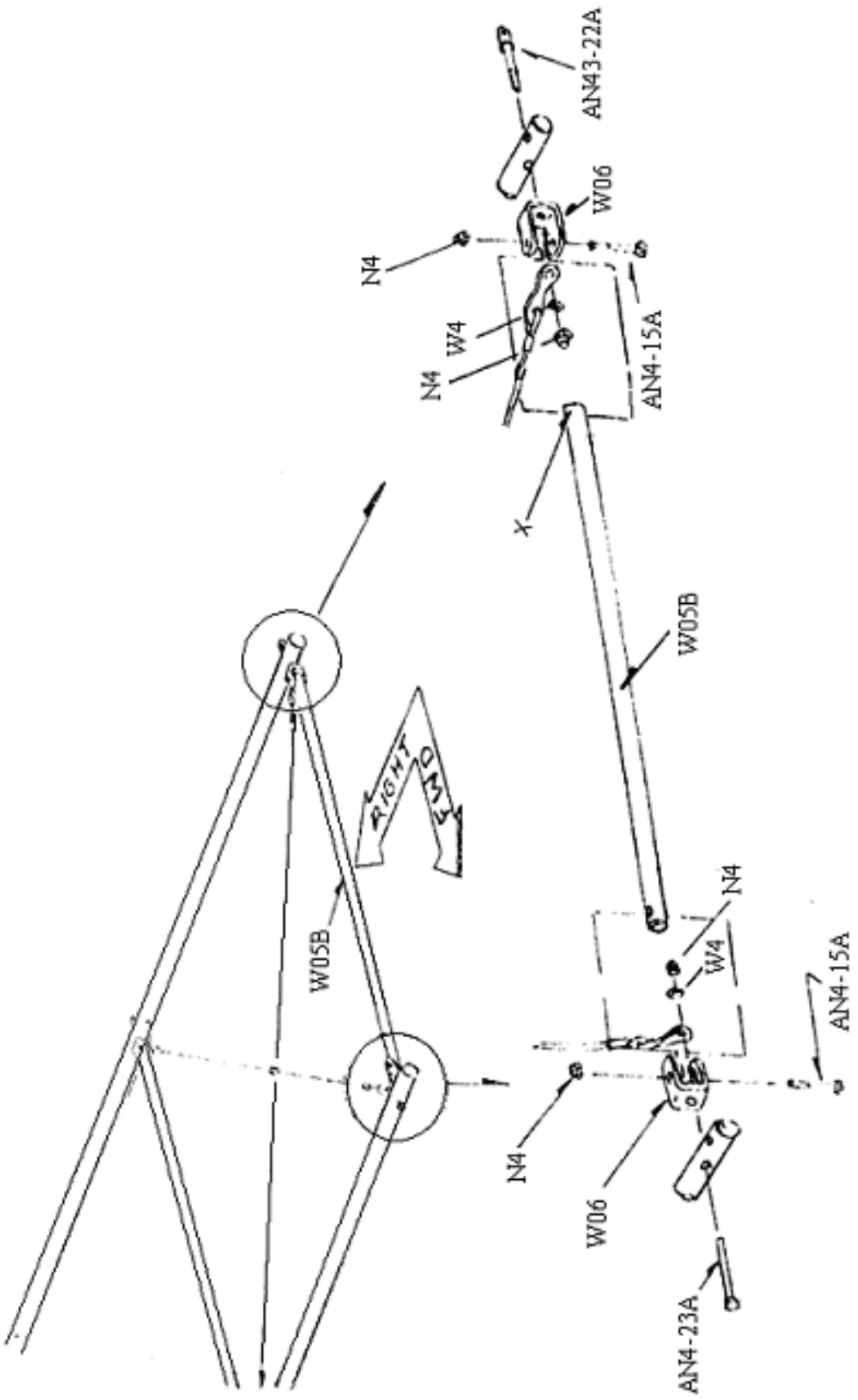


Figure 82 – Wing Layout

Figure 83 – Wingtip Layout

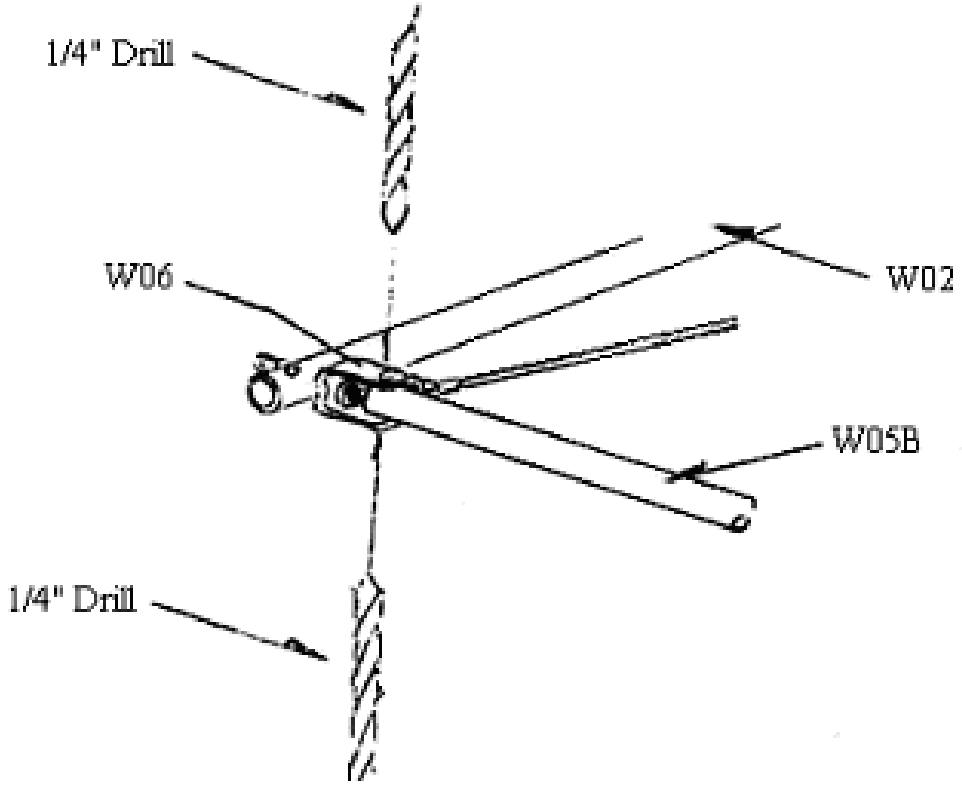


Figure 84 – Compression Tube (drill after attached to keel tube)

Figure 85 – Root Compression Strut (must be drilled as shown in Figure 80)

Drill after the Spars are attached to the keel Tube!!!

Connect front spar to keel tube front spar bracket with AN4-26A, (2) S84F, W4, and N4. Attach rear spar bracket with AN4-25, (2) S84R, W4, and N4. Follow same procedure with left wing and assemble to this point. Support the wing tips during installation. Once both wings are in place and attached at spar brackets, refer to Fig. 80, 81, 82, 84 and 85 to drill and attach inner compression strut.

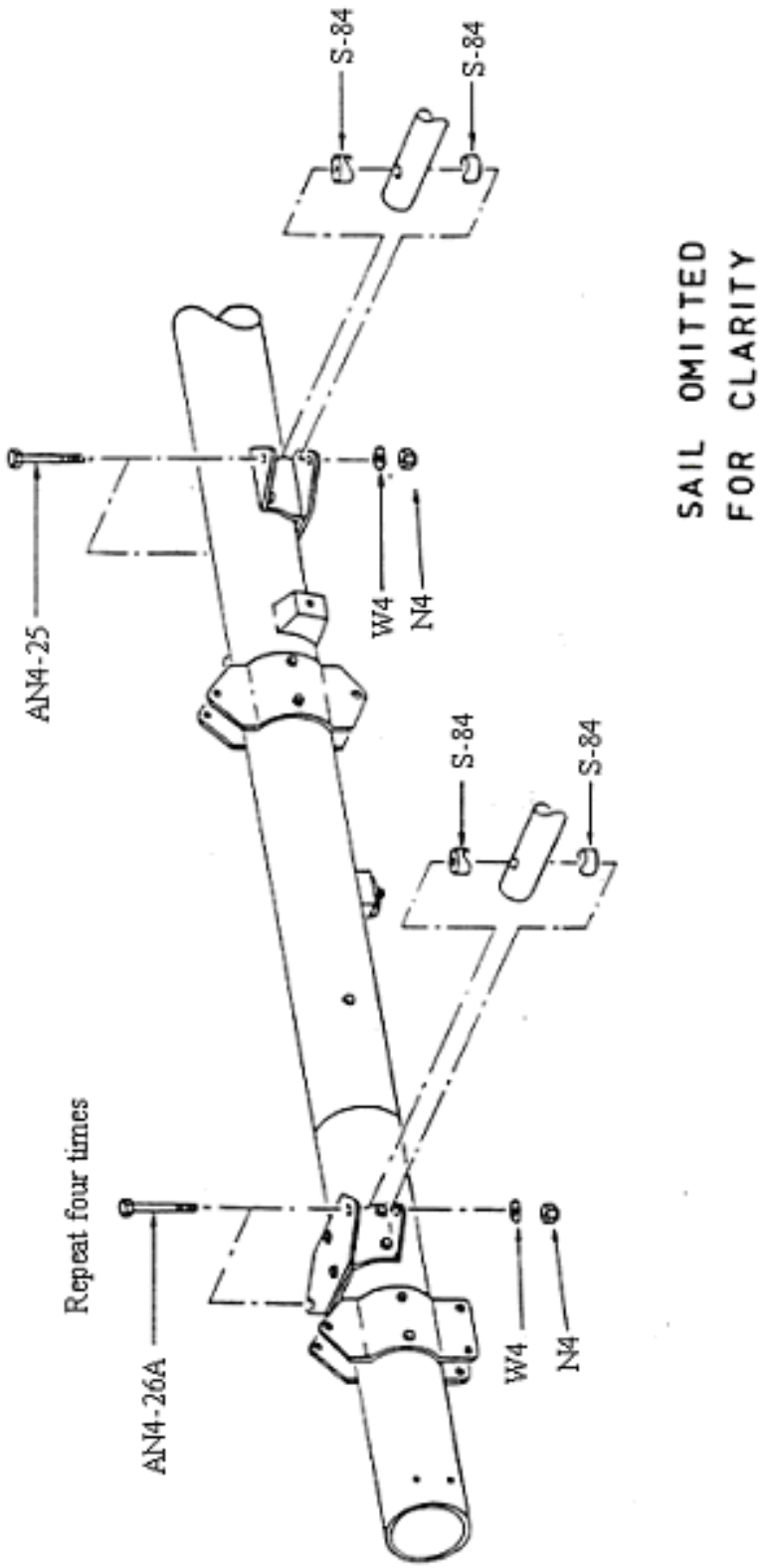


Figure 86 – Wing Spar Attachment to Keel

WING SAIL INSTALLATION

With wing structure installed on the aircraft slide the wing sails over the wing tube structure. There is a left and right wing sail. The rear edge Velcro should face down on each wing. Do not connect the wing sails together yet. Install wing tip compression tube rib. Referring back to figure 80 & 81, install tip rib W07 by sliding end with collar through 1" opening at front spar and catching end of rib in the slotted hole in rear spar. Once the rib has started into the front spar, rotate rib so that holes in rear are vertical and pull aft end of rib outward until it engages notched opening in rear spar. Work tip rib forward until collar seats against front spar. Secure aft end of rib with AN4-22, W4, N4. Install opposite tip rib in same manner.

Refer to Figure 87. Place wing stands just outboard of the outer compression struts. Open 2" x 4" VEL-CRO tabs found on lower surface along trailing edge of wing. There are eight per wing. At each tab position, both upper and lower wing surfaces have pockets sewn on the inside.

Connect left and right wing sails at the middle of the wing just above the keel tube. There are straps with locking mechanisms on them that will aid in cinching the wing fabric together. Pull these tight until the upper and lower Velcro at the center of the wing overlaps each other entirely. Lock Velcro together once it overlaps completely. Locking mechanisms on the straps when installed correctly will stay cinched together. If the strap slides back out and the wing coverings are loose the locking mechanism is not installed correctly. If it is installed incorrectly re-route the strap through the locking mechanism until the straps will stay cinched tight. ***Make sure to complete this before any wing ribs are installed. If you do not you will have loose fitting wing coverings.***

Upper ribs should be installed first before the lower ribs. Insert upper surface ribs W08 right side up starting at the keel. Work toward the wing tips alternating between left and right wings. This helps to keep sail from shifting, as it is important to keep span wise trailing edge VEL-CRO as close to the center of rear spar as possible. To install, push aft end of lower rib to one side and insert upper rib tip. Push tip to upper surface and catch pocket. Push rib all the way in and use rubber mallet to seat rear hook against front of rear spar.

Start lower surface ribs W09 upside down into wing, forcing flat tip down onto lower surface. This will allow tip to catch pocket opening and start rib into pocket. Push rib one-third of the way into pocket and rotate it 180° into an upright position, this is with front tip curving upward to meet front spar. Continue rib into pocket until hooked fitting at rear of rib snaps into place in front of rear spar. A rubber mallet may be necessary. Install all sixteen lower ribs in same manner. Take care not to apply to much downward pressure and tear rib pockets from wing sails.

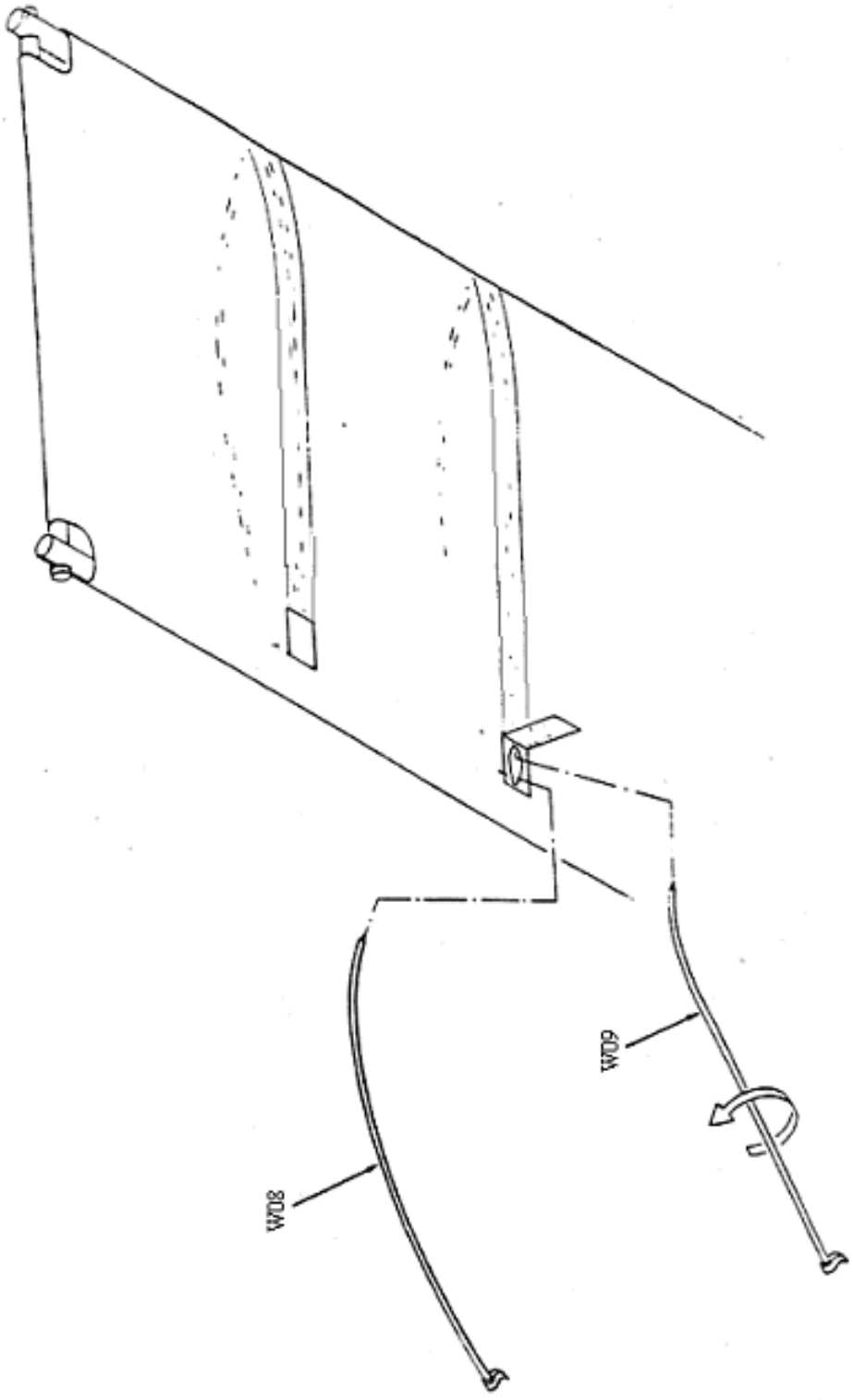


Figure 87 – Wing Rib Installation

Along leading edge of each wing, locate two AN4-26A bolts used to hold compression strut brackets. It may be helpful to refer back to Figures 80 and 81. The bolt locations should be obvious due to protrusions caused by the nuts. Melt the smallest hole necessary to allow bolt to come through fabric. A soldering iron works well for melting the sails.

Along trailing edge of each wing, locate two protruding nuts from the AN4-25A bolts. Again melt the smallest holes necessary to allow bolts to come through. Approximately two inches inboard of each bolt is a hole used for aileron systems. Melt these through fabric at this time. Also along trailing edge, it will be necessary to cut away VEL-CRO gap seal to allow clearance for eyebolts and saddles. Stay at least 1/16" from straight stitching.

When all necessary gap seal material has been removed, install (6) aileron hinge bolts AN43-20A with (6) W4 washers and (6) N4 nuts. Do not forget bolts next to tip ribs. Secure with W4 and N4. Turn eyebolts to vertical position.

Figure 88A – Melting Holes in Fabric for Bolts

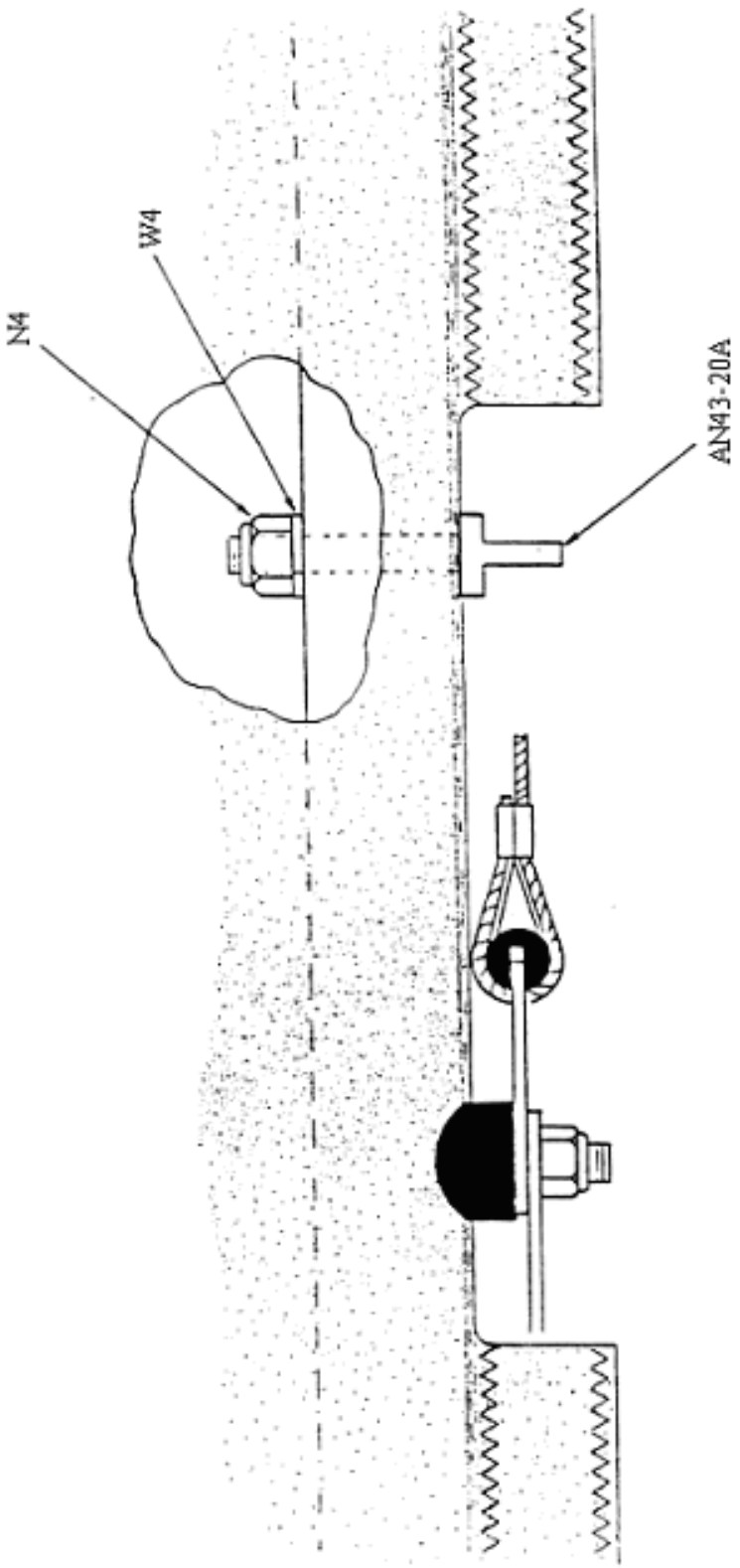


Figure 88 – Aileron Eyebolts

Extend upper wing cables CA3 to their respective positions and temporarily tape to sail near bolt attachment points. Layout lower cables CA6 – left front, CA7 – left rear, CA8 – right front, CA9 – right rear and tape near their respective attach points.

Refer to Figure 80. From inside wing, push AN4-26A bolt on front spar all the way out on leading edge and hold. Remove nut (if installed) and add saddle S01-84, lower wing cable tang, upper wing cable tang, washer W4, and nut N4. Finger tighten nut and allow bolt to settle back into spar. Complete all leading edge attachments in same manner and finger tighten.

On aft spars, push out bolts AN4-25A, remove nuts (if installed) and add saddles S01-84, lower cable tangs, upper cable tangs, washer W4 and nut N4. Once all cables have been attached, tighten all nuts on both leading and trailing edges.

At this point go to the engine installation manual and install exhaust mount to the front king post bracket and then return to this section (does not apply for Valley 50HP 4-Stroke engine installation). Lower king post by removing rear king post bolt. Attach upper wing cables to king post. This may require the wing tips to be lifted 1 foot or more above horizontal. Refer back to keel tube section if necessary. Raise king post and bolt back in place to the rear king post bracket. Securely tighten all king post bolts. Remove wing stands. Wings should now be supported by the upper wing wires. Attach lower left front cable tang CA6 and lower left rear cable tang CA7 to cage spreader bar C13 with bolt AN4-15, W4, and N4. Attach lower right cables in same manner. To accomplish, it may be necessary for two assistants to put slight downward pressure on both wing tips to provide enough slack to reach cage spreader bar.

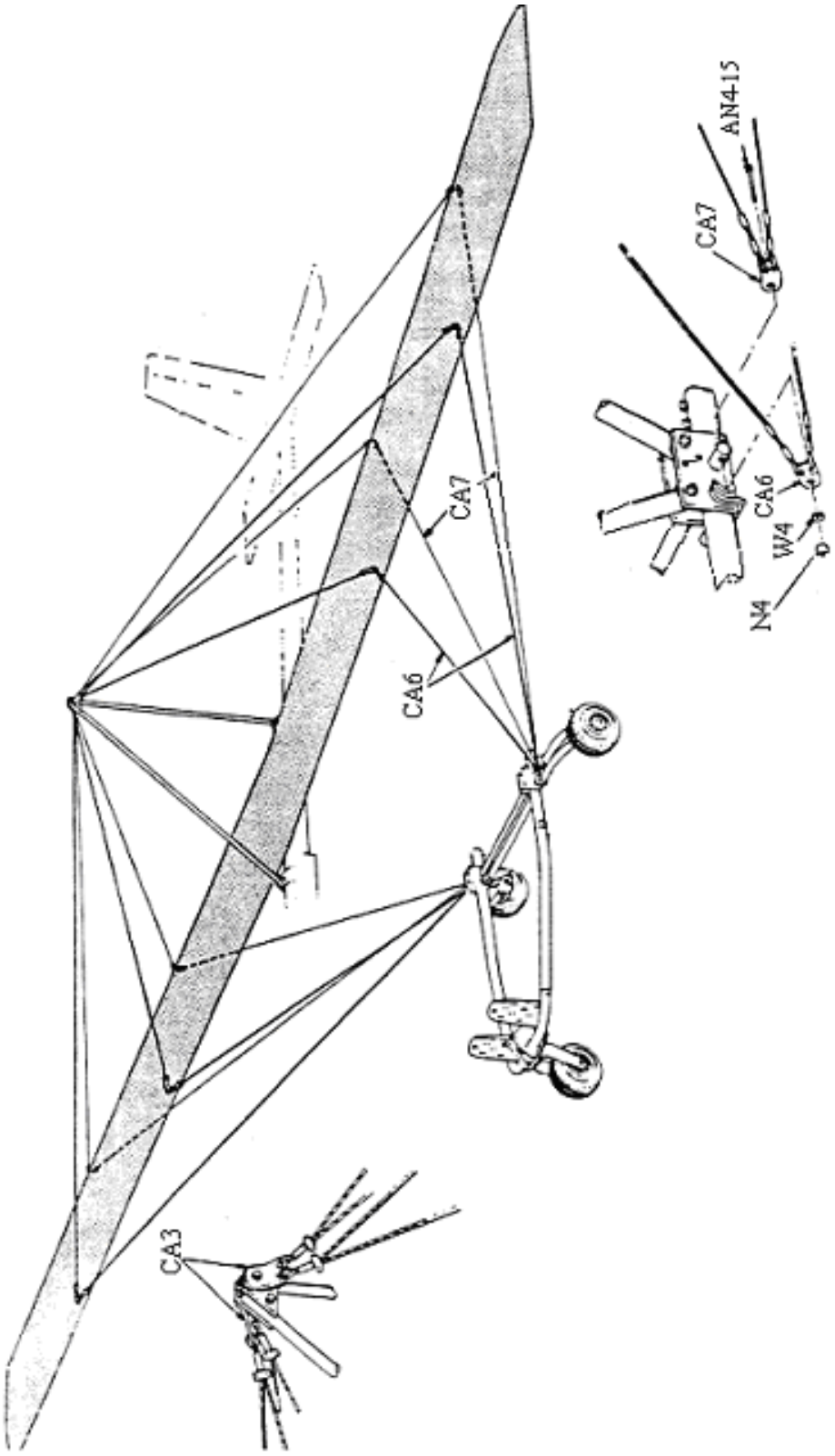


Figure 89 – Cable Layout and Attachment to Spreader Bar

Figures 90 thru 94 - Ailerons

Ailerons may already be assembled from the factory. Insert aileron extension AL2 into aileron leading edge AL1 and secure with (3) pop rivets PR2. Insert extension AL4 into aileron trailing edge AL3. Temporarily insert several spreader tubes AL5 into holes in AL3 and lay on flat surface. This will allow you to mark holes in AL4 so that it will be in line with AL3. Drill holes in AL4 with 5/32" bit and secure to AL3 with (3) pop rivets PR2.

Install aileron spreader tubes AL5 in aileron leading edge. Tubes are arranged to form an even taper with shortest one near wing tip. Insert spreader tubes into 5/16" holes in backside of leading edge and be sure it is butted up solidly against inside wall flush with 3/16" hole on front side. Install pop rivet PR3-L down inside of spreader tube. Complete leading edge. Install trailing edge assembly on spreader tubes and rivet. Again, be sure each spreader tube is fully seated against aileron wall before riveting.

Assemble tube connector TC1 and TC2 into front end of belcrank spreader tube AL6. Temporarily insert (1) AN3-15A bolt in the forward hole to secure connector. A nut is not needed for now. Do not install belcrank or saddles at this time. Place connector TC3 in aft end of tube and insert AL6 between aileron tubes.

Attach to spreader tube with AN3-13A and N3. Attach spreader tube AL6 to leading edge with eyebolt AN43-15A, and to trailing edge with bolt AN4-12A. Assemble both ailerons to this point.

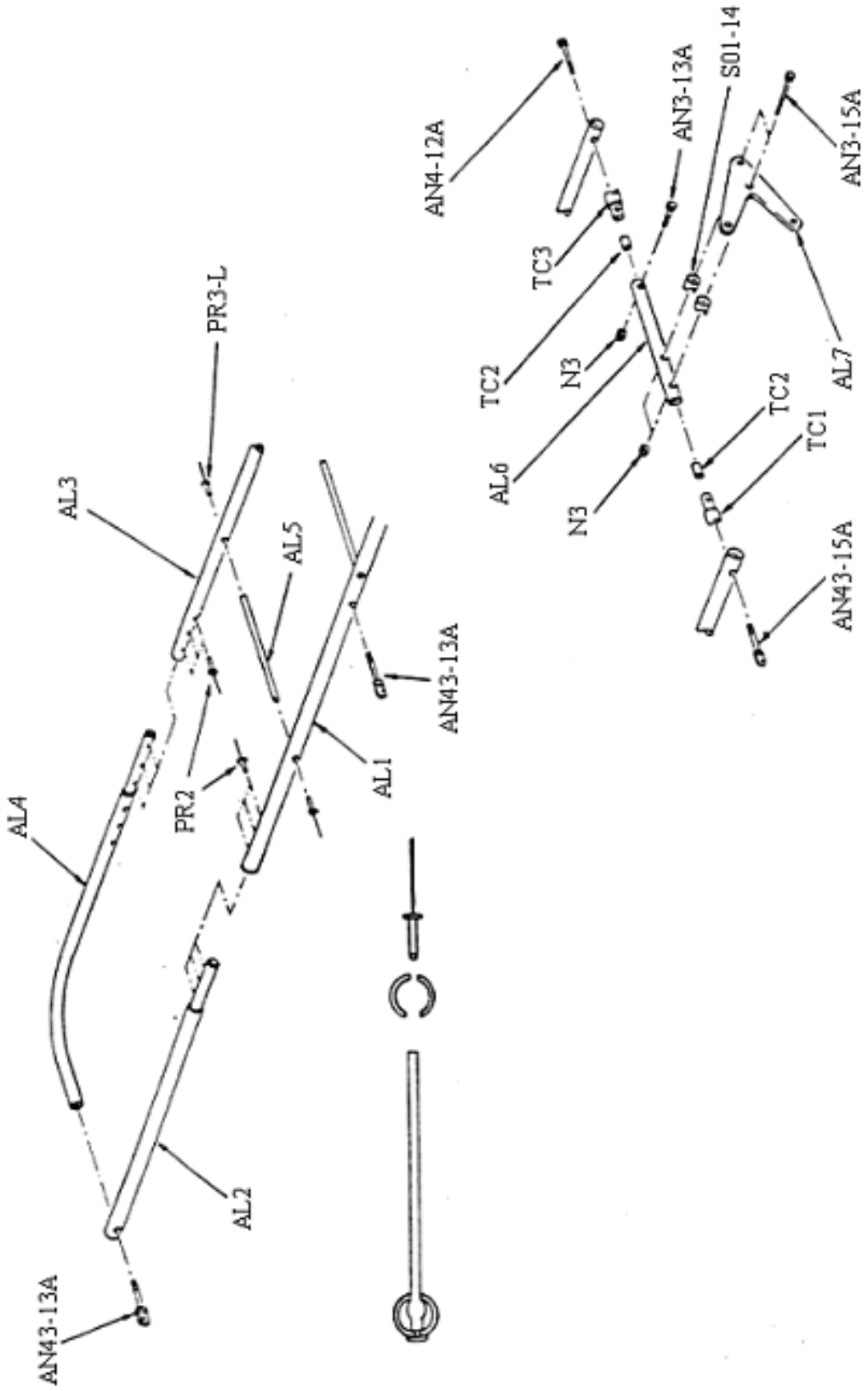


Figure 90 – Aileron Assembly

Flatten the spreader tube rivet heads on the aileron leading and trailing edges by lightly tapping with a ball peen hammer. The goal is a relatively smooth surface to facilitate sliding of the fabric cover. Next place piece of cellophane tape over each flattened rivet head. Spray leading and trailing edges with silicone spray available at auto and aviation parts houses. Slide the cover on as far as it will go with ease. Note that VEL-CRO side goes along leading edge. Put on a pair of rubber dishwashing gloves, and start working cover on from tip. Dacron shrinks when hot and dry and loosens when cold and wet. In warm weather, you might consider refrigerating covers until ready to assemble. Once cover is close enough, insert (5) cable ties CT3 into grommets in cover. Continue working fabric up entire length and tighten cable ties as slack develops. Continue process until VEL-CRO flap will seal.

Melt holes through cover and flap for belcrank bolts AN3-15A. Remove temporary bolt and cut front cable tie to allow access to inside. Attach belcrank AL7 with bolts AN3-15A, saddles S01-14 and nuts N3 as depicted in Figure 90. Tape nuts to box end wrench for access to inside. Replace cable tie. Cut off excess from all cable ties and seal VEL-CRO flap.

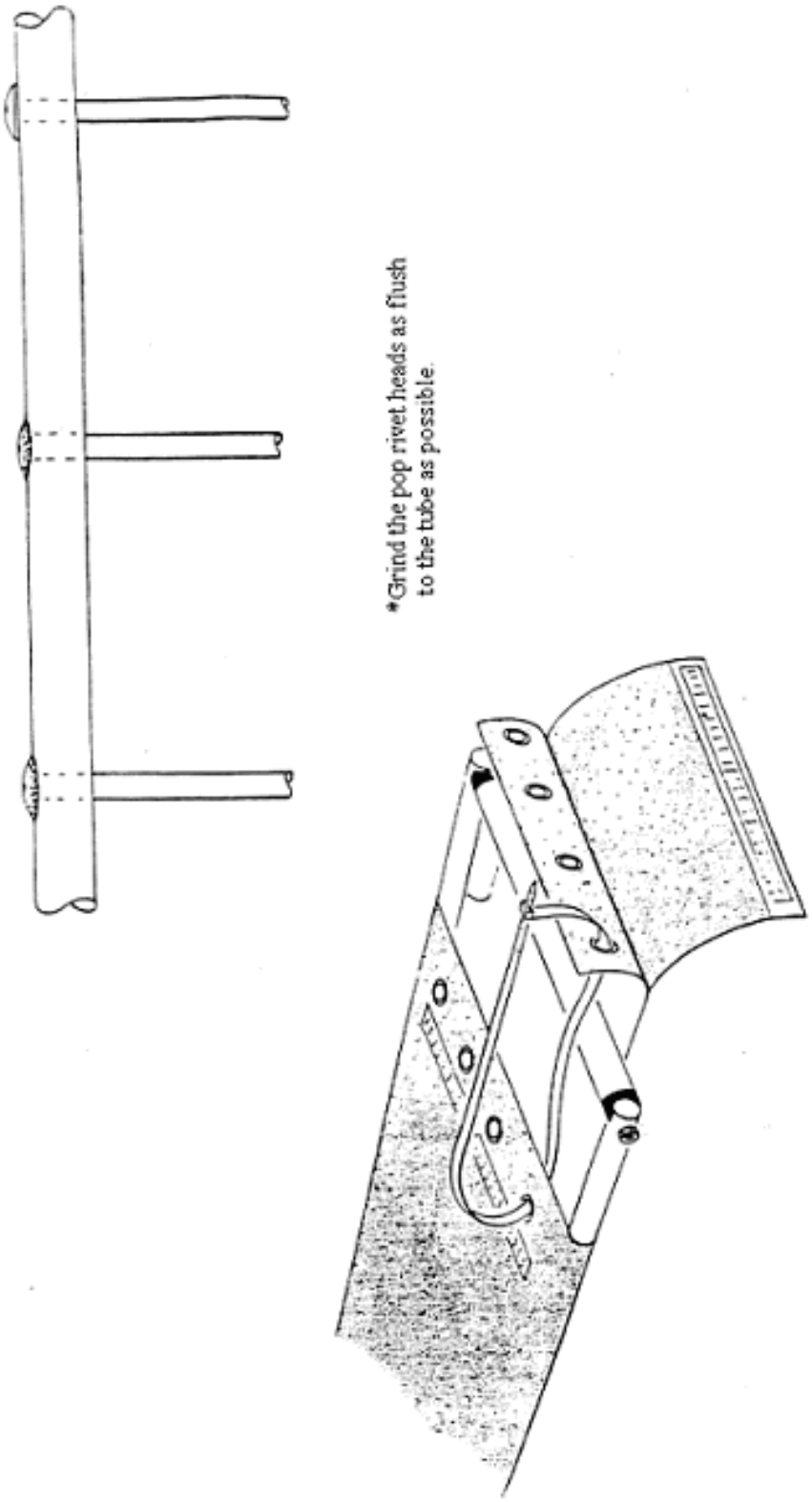


Figure 91 – Aileron Assembly, Laced Fabric

Melt appropriate holes in aileron leading edge and install (2) AN43-13A as depicted in Figure 90. Nut plates for these eyebolts are on backside of tube. Install AN43-13A at aileron tip. DO NOT OVERTIGHTEN AND DISTORT TUBING. Set eyebolts vertically.

Mount completed ailerons on aft spar after removing necessary gap seal to correspond with material removed from wing. Aileron eyebolts should be staggered toward wing tip. Attach each set of eyebolts with AN3-5A and N3S. Separate eyebolts with W3P washer. Tighten nuts to remove free play but allow bolts to rotate freely.

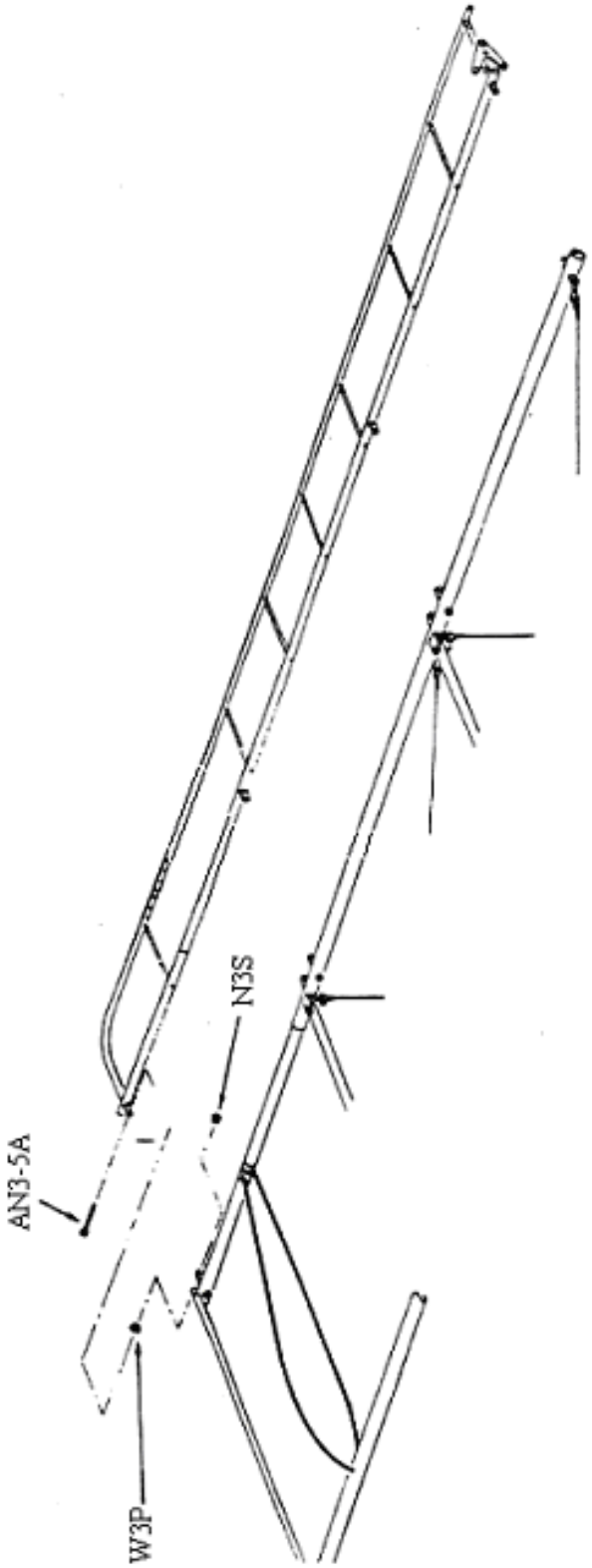


Figure 92 – Aileron Attachment to Wing

Refer to Figure 93. In order to rig aileron cables, holes will have to be melted in the upper and lower surfaces of the sail. On upper surface, melt one hole 2 ½" back and 1 ¾" over from right kingpost bracket. Melt hole only large enough to allow aileron cable through. On left side, melt a hole 6" back and 2 3/8" over from the left kingpost bracket.

On lower surface of sail, melt right hole 2 ¼" to right and ¼" back from the right cage bracket. Left hole should be 1 ¼" to left and ¾" rearward of left cage bracket. Again melt holes only large enough to allow cable loop through.

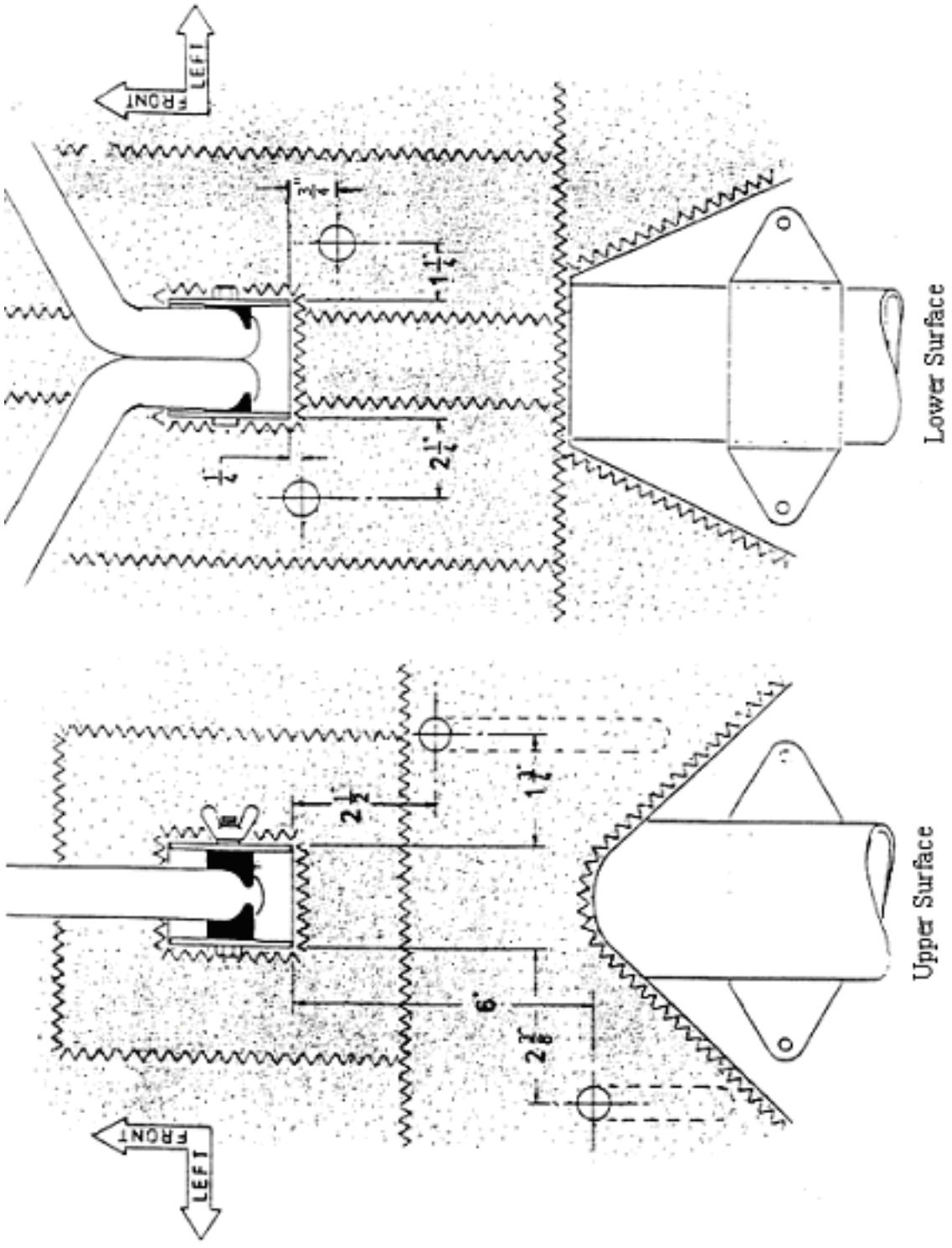


Figure 93 – Sail Holes for Aileron Cable

Refer to Figure 94. Insert shackles AN115-16 into looped end of all cables and attach to belcranks on ailerons and torque tube with bolts AN3-5A and nuts N3s. Allow shackles to rotate. Install idler cable CA2 to aileron belcrank bottom fittings. Now that ailerons are attached, move ailerons through their full range of travel and enlarge holes in sail to a point where cable contact with sail is eliminated. Using the turnbuckle in the idler cable, adjust tension in the aileron control system. The cables should be taut but ailerons should move freely. When adjustment is set, safety wire turnbuckle.

Extend Teleflex cable along right tail strut and secure with (4) cable ties CT1. Insert Teleflex into bracket bolted to rear of keel. Secure by clamping bracket between two large washers and nuts on Teleflex. Use Loc-tite and tighten securely. Thread clevis bolt C43 all the way down onto Teleflex using Loc-tite. Tighten ¼-28 nut against clevis. Attach clevis to elevator belcrank with bolt AN4-6A and nut N4S. Secure Teleflex cable to right side of keel tube using (3) Adel clamps DG6. Position clamps in straight line and drill 3/16" holes. Attach with (3) rivets PR3-S.

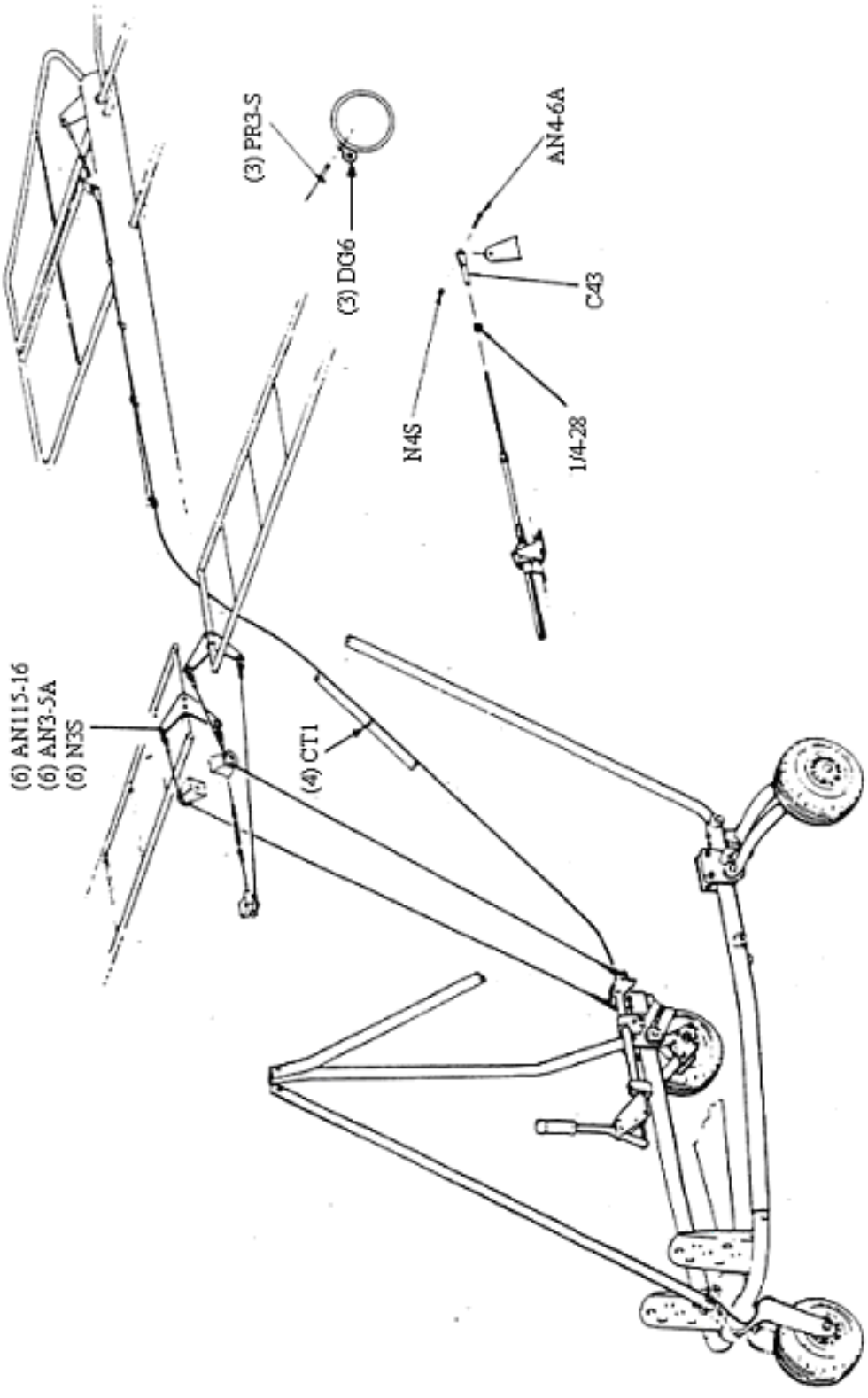


Figure 94 – Cable Rigging

CHAPTER 6 – POD ASSEMBLY

Figures 95 thru 99 - F01E Pod Assembly

Note: Holes for mounting the pod will already be drilled on the side of the pod; some of these directions will apply only to persons mounting the pod on an older Phantom. The new pod that you have received either with your kit or separately ordered is higher in the windshield area and longer by (6) inches in the rear side panel area. This change will give you more leg room and more wind screen area. A new dash has also been made to accommodate the extra length with two 45 degree panels on each side. This will keep the switches at finger tip length. If you have a short body structure the six inches showing in the drawing can be trimmed off if needed or trim less than six inches. This will not affect the dash mounting, but it will bring the base of the dash closer to your legs. The Delrin F08 will have to be shortened to fit between the fairing and side rail if this trim is made.

The measurements 12 inches and 9 7/8 inches are to be used in mounting the standard C28 front upright tube and only if the pod has been trimmed. These measurements re the distance from the dashboard edge of the pod to the C28 opening. The height from the floor of the pod to the bottom of the two cage side rails (C02-C03) will change the above measurements. It is recommended 1 inch clearance below the side rails to the floor surface. Throttle clearance to the floor and movement is important here. Please remember, Prop clearance (the distance from the tip of the blade to the pod surface 1 ½ to 2 inches is recommended. With all upright tubes mounted to the frame (this including both C31 tail strut tubes.) Remove both the C28A and C04 / C04E front fork,

then secure tail to the floor to keep keel (K02) level. Next locate pod over both side rails and support level from the floor surface. It would be helpful to make light grade cardboard template of the windshield and tape to the pod. This will help in clearing the windshield edges from the C29A diagonal upright tubes.

The edge of the pod at the rear of the side panels should be 1 3/8 to the center of the bolt that secures the bungee washers. (if the pod has not been trimmed) 2 ½ to 3 inches if you have trimmed the pod.

The F06 assembly is to be omitted if the C28A elliptic tube has been ordered. If you are using the C28 standard 1 1/8 aluminum round tube, the F06 bracket can be located to the C28 upright tube drilling two 3/16 holes in the tube, using the F06 bracket as a guide. Do not locate the F06 bracket until after the pod and C28 tube has been mounted.

NOTE: DISREGARD ALL ABOVE INSTRUCTIONS IF POD HAS BEEN DRILLED AT THE FACTORY

Cutting lines or pre-drilled holes have been marked on the Pod to show the portion of the Pod that needs to be removed for down tube clearance and rudder pedal clearance. These are shown in Figures 96 and 97. These are best trimmed out with a Dremel or other rotary tool. Start small, do not go right to the guidelines. Cut, test the fit and cut again, it is possible that the holes may be shifted left or right slightly.

Remove front down tube and front fork. Slide pod over the frame and bolt in place as shown in Figure 95. Re-install front down tube and front fork. Additional cutting may be required to properly fit the fork and allow full range of motion.

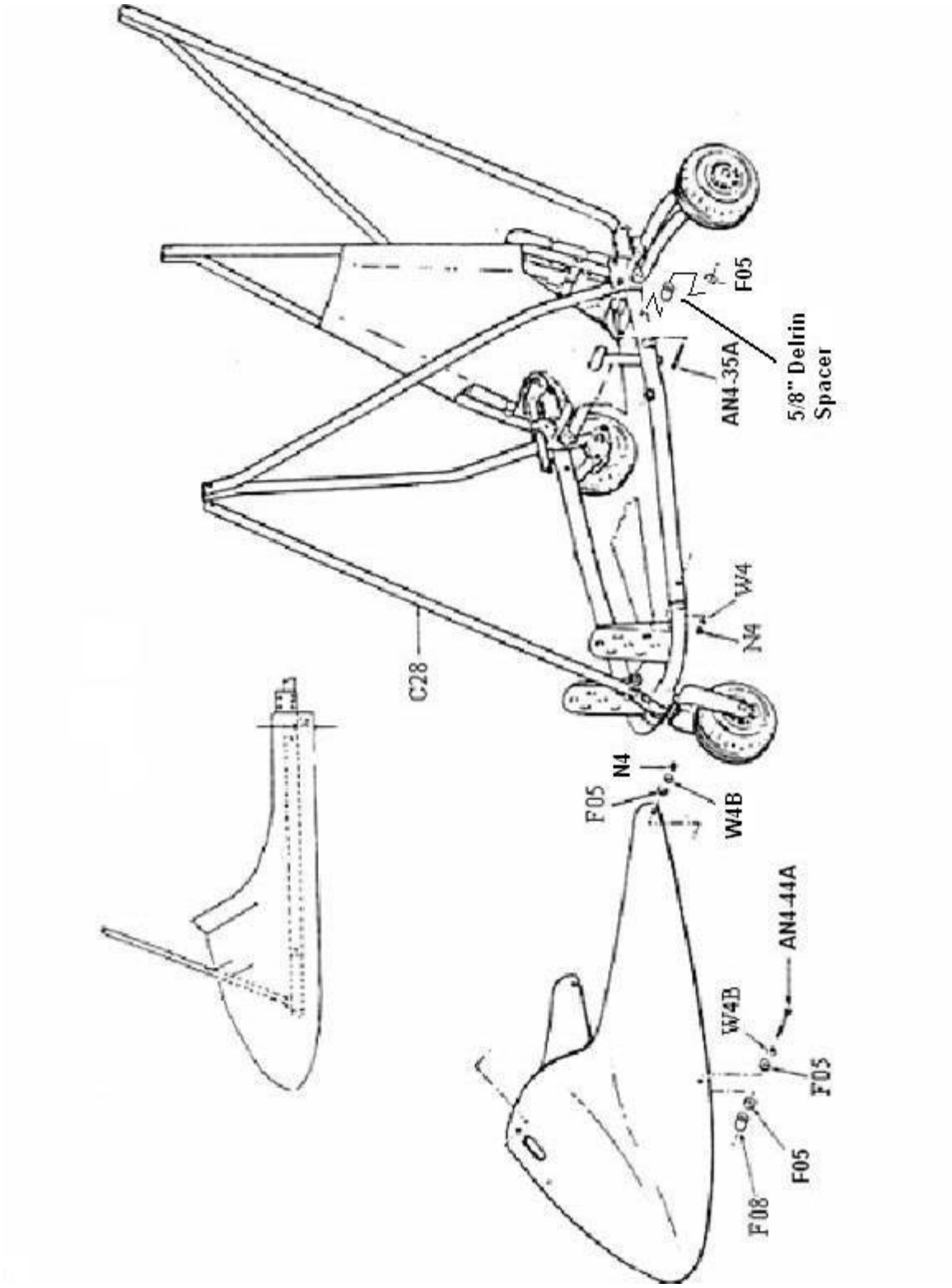


Figure 95 – F01E Pod Assembly

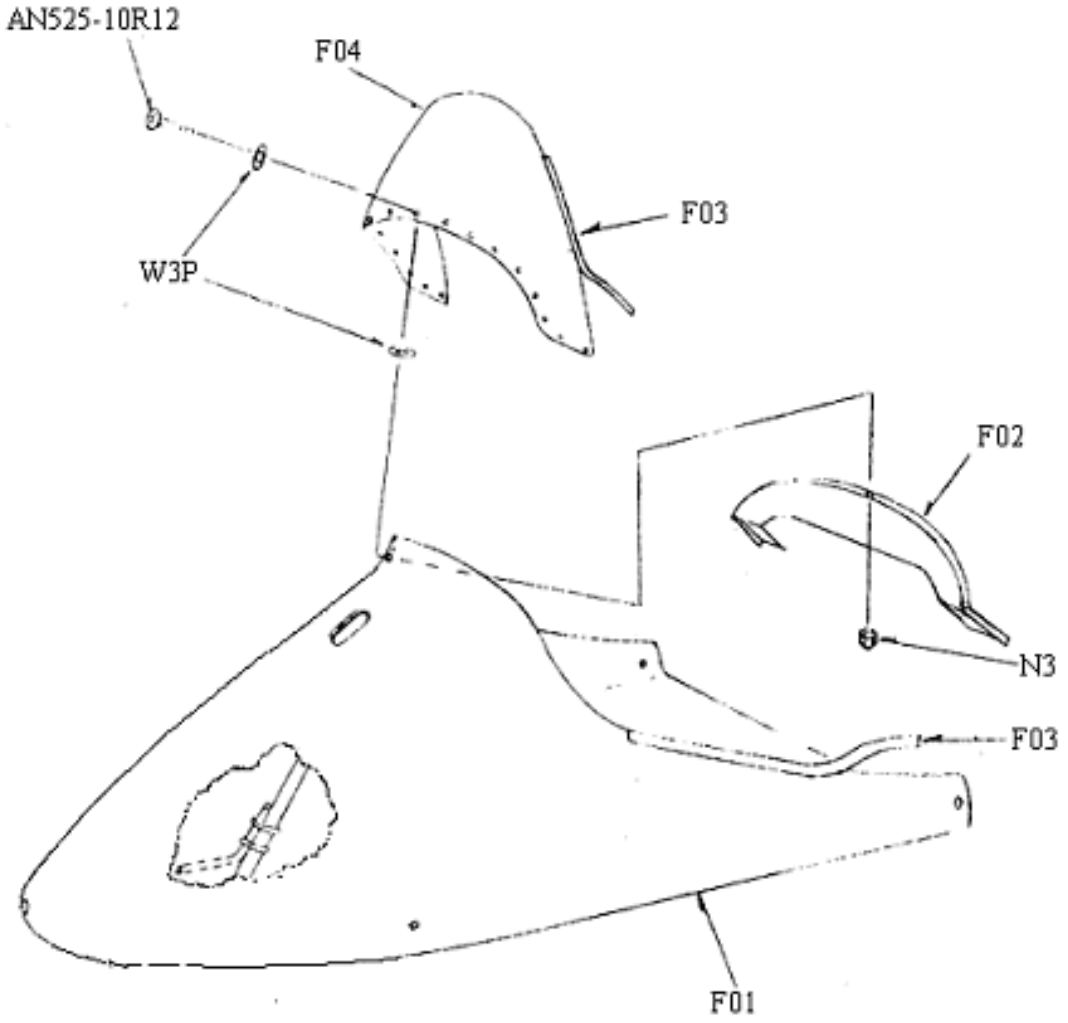
Figure 96 – Underbelly Cut Line

Figure 97 – Front Down Tube Opening

Figure 98 – Installed Pod

If you are using the X-1E kit, install the windshield at the same time the enclosure is fitted. It is best to install the windshield and wrap around dash panel at the same time. Two people will be required for this step. The dash panel needs to be drilled for instruments before it is mounted. Apply the optional fairing edge trim F03. This trim is optional and can be installed if you desire and like the look of the trim. Find midpoint of length of trim and start at top center of fairing, working out in both directions. Tap trim down onto edge with rubber mallet. Center windshield F04 on fairing. It may be helpful to clamp corners of windshield down, maintaining a 1" overlap of fairing, while drilling. Have an assistant center the instrument panel F02 on the inside of fairing. Starting at center line, drill through pre-drilled windshield holes, fairing, and flange of instrument

panel with 3/16” bit. Temporarily hold with screw AN525-10R12, (2) washers W3P and nut N3. Finger tighten. Continue until all holes are drilled. Remove windshield and



New Longer Pod

panel, and wipe away drill chips. Reassemble and tighten hardware.

Figure 99 – Pod Assembly for X-1

One the fork has been reinstalled the mount the spring assembly to the front fork and rudder pedals.

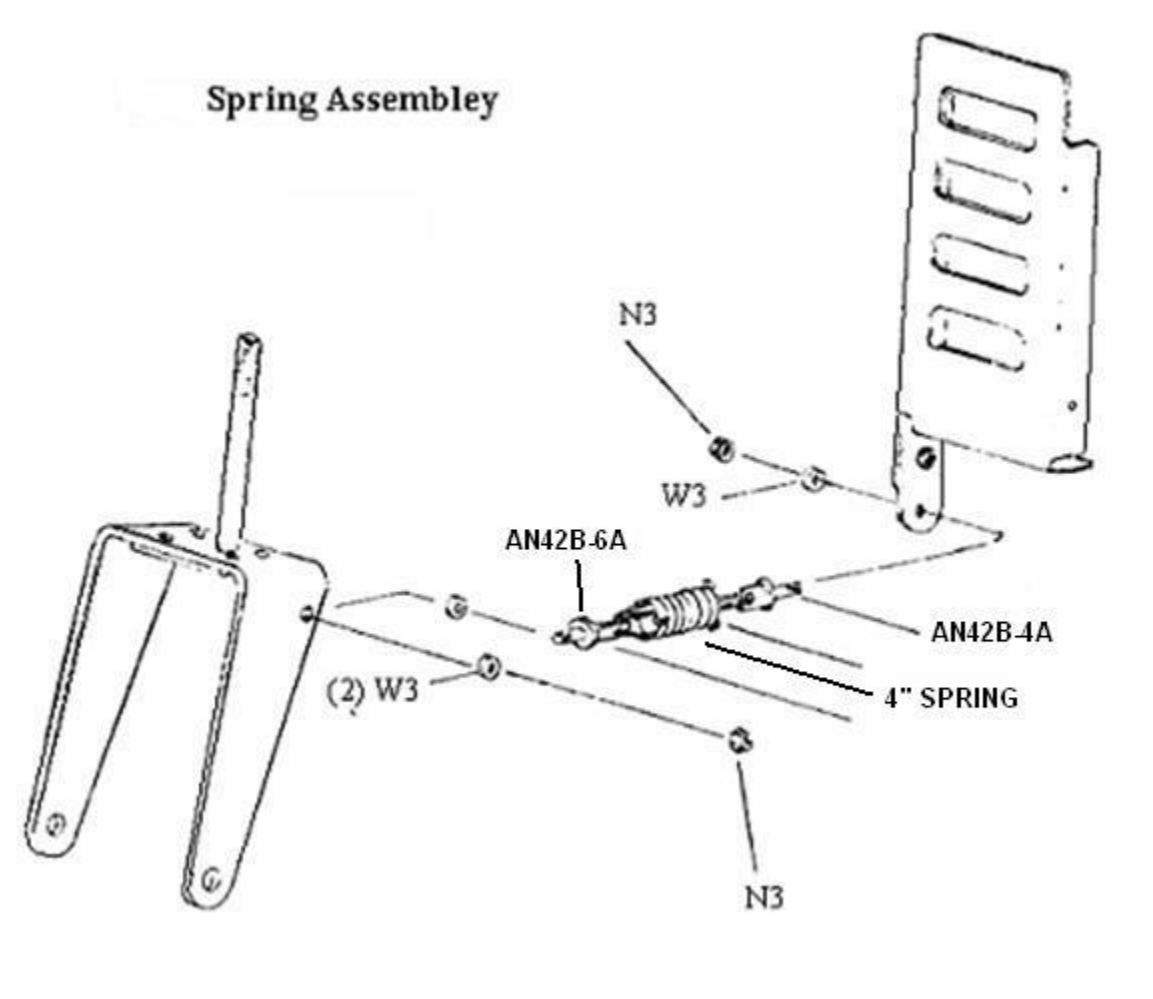


Figure 100 – Rudder Pedal Springs

Re-install front fork landing gear and attach rudder pedal springs after the pod is secure.

Figures 101 & 102 - Instruments and Engine Mounting

Detailed Engine Installation and Instrument Installation are shown in a separate Manual. The layout of the instrument panel is left to the individual customer. Instructions for instrument installation are typically included with the instruments. A 2 ¼" or 3 1/8" hole saw will be useful for installing the instruments. When drilling the instrument panel tape over the white gelcoat side of the instrument panel to prevent chipping. Make sure the panel is clamped down tight when using the hole saws.

Engine installation instructions are included from the engine manufacturer with the exception of mounting the engine to the dynafocal engine mount. Refer to Figure 51 for depiction of engine mounting to Dynafocal mount. (4) 10 mm bolts are used to secure the engine. Make sure to Loctite these bolts in place.

Other useful drawings are included below.

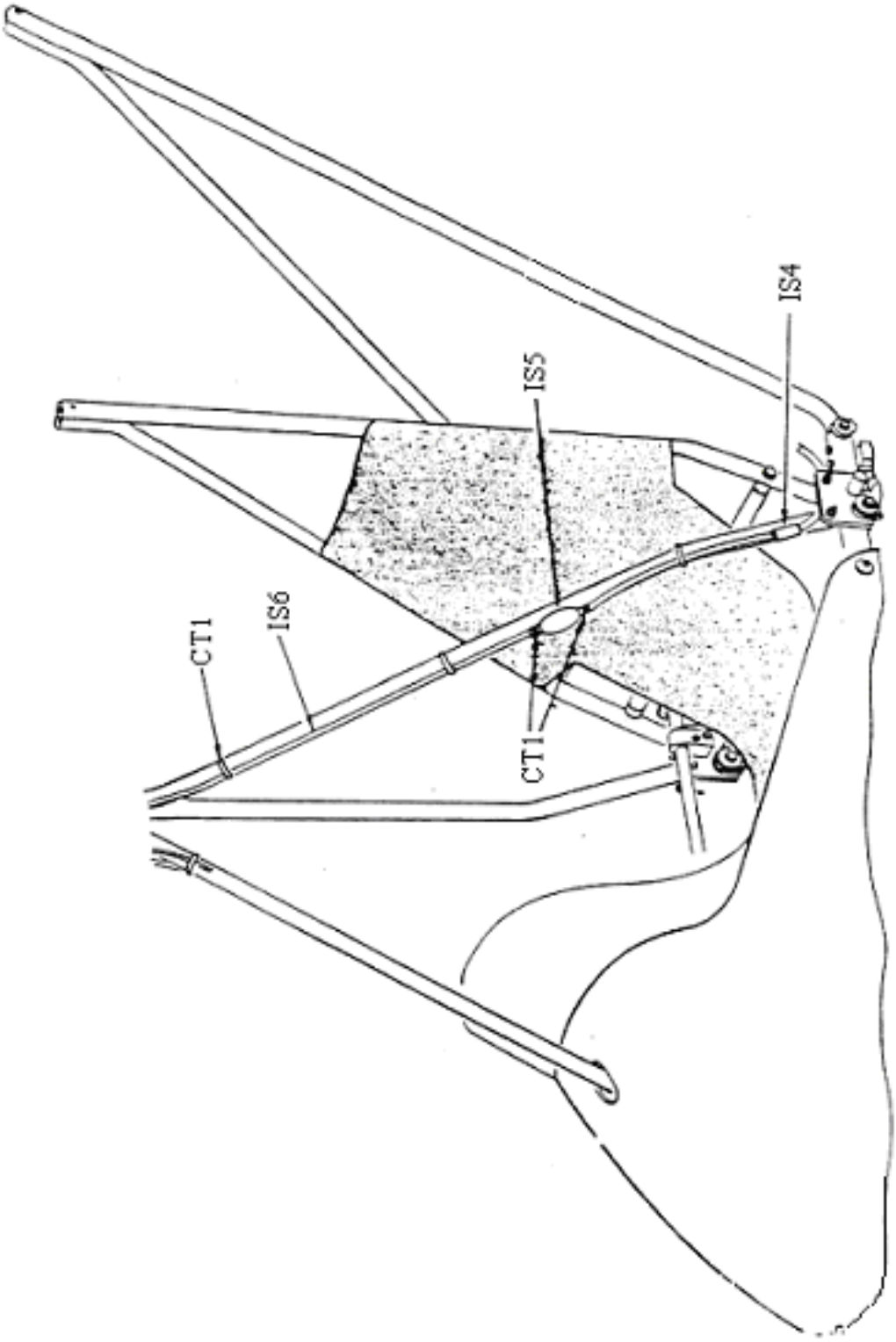


Figure 101 – Suggested Fuel Line Routing

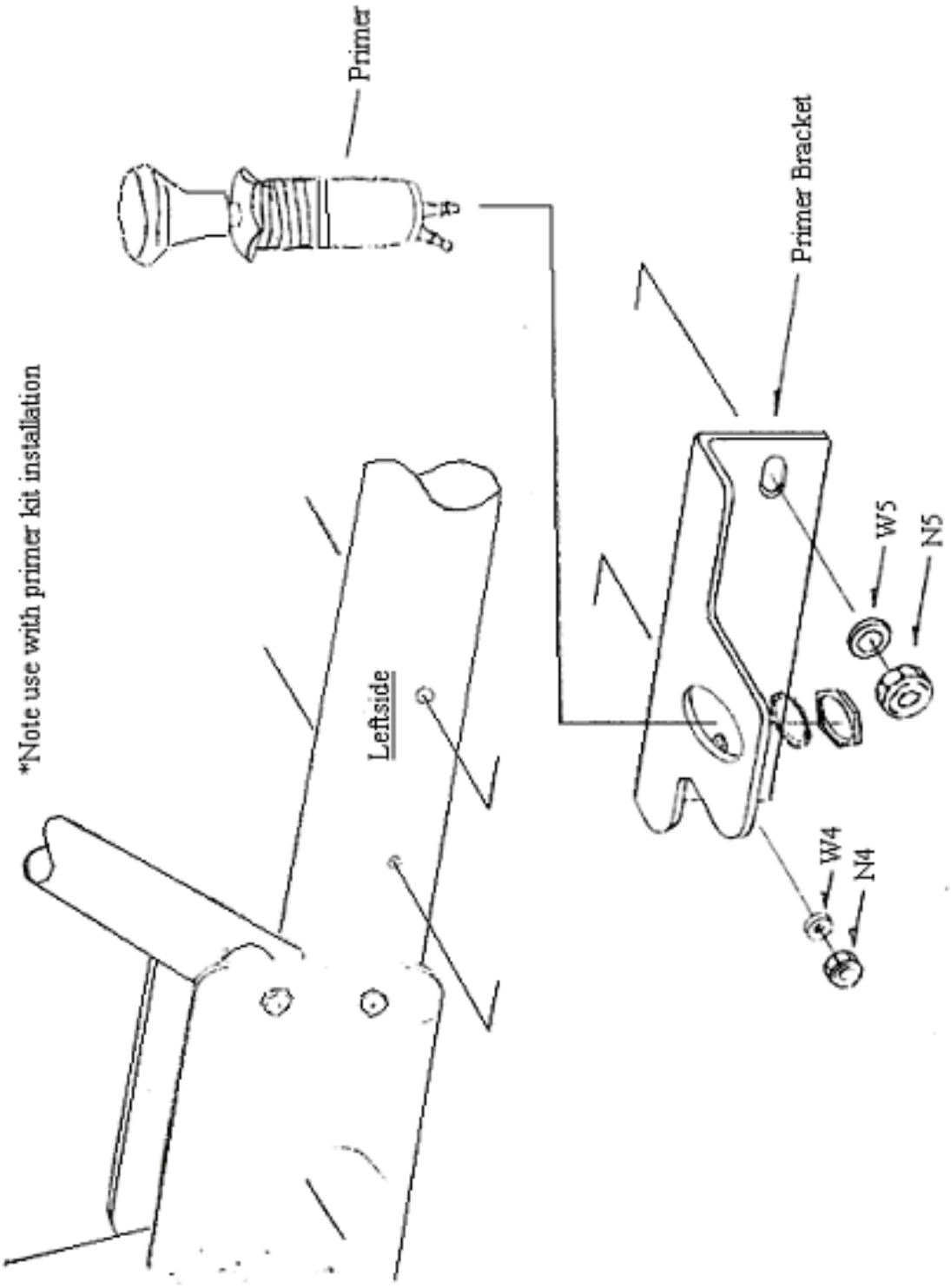


Figure 102 – Primer Bracket
(may also be clamped around one of the C29A down tubes)