Warnings

WARNING!

THE RADIO CONTROLLED MODEL HELICOPTER BUILT FROM THIS KIT IS NOT A TOY, AND IS NOT MEANT FOR CHILDREN. IT IS A FLYING MACHINE CAPABLE OF CAUSING PROPERTY DAMAGE AND SERIOUS BODILY HARM TO THE OPERATOR AND SPECTATORS IF NOT BUILT AND OPERATED CORRECTLY AND RESPONSIBLY. ROTATING COMPONENTS, ESPECIALLY THE MAIN ROTOR BLADES, ARE AN EVER-PRESENT DANGER.

WARNING!

Helicopters, by their nature, are not positively stable. Even if assembled and adjusted properly, helicopters will not hold a particular flight position without constant control inputs from the pilot, and will not automatically recover from an unwanted flight attitude without pilot intervention.

WARNING!

It is your exclusive responsibility to correctly and responsibly build, maintain and operate this helicopter. Lite Machines has spent considerable time making this product reliable and easy to build, but only the operator can ensure that it is safe. Because the safe operation of this helicopter is beyond the control of the manufacturer and distributor, the owner/operator assumes all risk of use.

WARNING!

THIS PRODUCT CONTAINS CHEMICALS WHICH ARE KNOWN BY THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS AND/OR OTHER REPRODUCTIVE HARM. Many common materials, such as metals, plastics, glues, fuels, lubricants and coatings contain chemicals in varying amounts and concentrations which will cause harm if introduced into the human body. Lite Machines strives to produce safe and reliable products, and is interested in the well-being of every user of its products. For more information on chemicals contained in Lite Machines' products, please contact Lite Machines Corporation. For further information on toxic or dangerous chemicals, please refer to California's health and safety codes sections 25249.5-13.

Acknowledgments

We thank all of those people who helped make Lite Machines Corporation possible. We especially thank Mom and Dad. Without their help and constant encouragement we could not have done this.

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PATENT NOTICE

Most aspects of Lite Machines helicopters including, but not limited to, the main rotor, main rotor blades, tail rotor, tail rotor blades, *Arlton Subrotor*™ stabilizer, *Arlton Gyro*™ stabilizer, swashplate, fuselage structure and configuration, radio installation configuration, landing gear and drive train are either patented (U.S. 5305968, 5597138, 5609312, 5628620, 5749540, 5879131, 5836545, 5906476, 6053146, 6142419; Australia 681287, 686883; Europe 0605656, 95918276.7-2312, 95932305.6-2312, 96928019.7; France 0605656; Germany 69221307.4; U.K. 0605656), patent pending or patent applied-for in the United States and in other countries. For information concerning patents and licensing, please contact Lite Machines Corporation.

Revision VP8.2 1001

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Introduction

The Lite Machines *Corona*™ electric helicopter is an economical introductory helicopter for those modelers intrigued by helicopters and helicopter flight, but unable to justify the significant investment in time and money required for traditional helicopter models. The *Corona* can withstand tip-overs and minor crashes with little or no damage. Many flight skills such as hovering, low speed maneuvering, forward and backward flight and pirouettes can be mastered without busting the family budget with a larger, more complex machine.

The *Corona* utilizes advanced aerodynamics that enable it to fly on roughly the same power consumed by a 100 watt light bulb. In comparison, .30 to .60 size model helicopters use one to two horsepower – 10 to 20 times more.

The fixed-pitch main rotor of the *Corona* helicopter combines *Subrotor*™ technology and free-flapping, foldable rotor blades in a rugged, high lift rotor system with fewer than half the number of parts found in collective-pitch helicopters. Main rotor lift is controlled by changing the rotational speed of the main rotor rather than varying the pitch of the individual rotor blades (as with “collective-pitch” type main rotor systems).

Fixed-pitch main rotors are substantially simpler than collective-pitch systems and are ideal for beginners. Collective-pitch main rotors allow for advanced aerobatics and engine-off autorotation maneuvers that are typically flown by more experienced pilots.

Designed on modern computer-aided design (CAD) systems and computer-aided manufacturing (CAM) systems, the structure of the *Corona* helicopter incorporates eight types of engineering plastics, four aluminum alloys, several high strength steels, aircraft plywood and multiple protective surface coatings.

Although beginners can successfully build and fly their *Corona*, the process can be significantly easier with the help of an experienced modeler and instructor pilot. Lite Machines recommends that all beginners join the Academy of Model Aeronautics (AMA). The AMA is a non-profit organization that provides services for modelers. The AMA can help you locate a model aircraft club in your area with an instructor pilot (also check with your local hobby shop). Membership benefits include a monthly magazine and liability insurance. Many flying clubs require an AMA modeler’s license to operate a model on their flying field. For information on the AMA call , or write:

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
Ph: (765) 287-1256

Consumer Warranty

IMPORTANT! Before building this *Corona* helicopter kit, read and fully understand the following warranty, and review the entire Construction Manual and Operator's Guide. By building and/or flying this helicopter you indicate your acceptance of the following warranty terms and conditions, and further agree to build and operate this helicopter in a safe and responsible manner.

If you find any term or condition of the warranty unacceptable, or if you feel that this helicopter is just not suited to you, you may return it to your place of purchase in **NEW** and **UNUSED** condition within thirty (30) days of the date of purchase for a refund of the purchase price less shipping and handling. Partially assembled kits, and kits with opened parts packs or missing parts cannot be returned for a refund. Items such as radios, engines and accessories are warranted separately by their respective manufacturers and are not warranted by Lite Machines.

Warranty:

1. Lite Machines Corporation warrants to the first consumer Purchaser that the *Corona* helicopter substantially conforms to its published description when used as intended as a hobby product, and will be free from defects in materials and workmanship for a period of 90 days after the date of purchase. Lite Machines will repair or replace (at its option) any defective part, and supply any missing part at no charge to the Purchaser within this period. Lite Machines makes no other warranty, express or implied. This warranty does not apply to glow plugs, or parts damaged by improper assembly, modification, abnormal service or handling, crashes, abuse, neglect, incorrect wiring, overvoltage or overloading of electric/electronic components.
2. To take advantage of this warranty the Purchaser must provide proof of purchase, receive a return authorization (RA) number from Lite Machines, and ship any defective part at Purchaser's expense to Lite Machines for repair or replacement. Shipments of warranted parts back to Purchaser will be made by common carrier standard service. Over-night, expedited or priority service requested by Purchaser will be at Purchaser's expense.
3. It is the responsibility of the Purchaser to properly assemble, maintain, and operate this helicopter in accordance with manufacture's instructions, AMA (Academy of Model Aeronautics) safety codes, local laws and ordinances, and **COMMON SENSE**. It is also the responsibility of the Purchaser to **ALWAYS WEAR APPROPRIATE EYE AND HEARING PROTECTION** when operating this helicopter, and never to operate this helicopter in any way which might endanger persons or property including the Purchaser. The Purchaser is advised to carry appropriate liability insurance such as that commonly provided to modelers by the Academy of Model Aeronautics.
4. **THIS WARRANTY SPECIFICALLY EXCLUDES THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.** The selection of this helicopter for a particular application or use (beyond hobby/entertainment) is the sole responsibility of the Purchaser. Any advice supplied by any representative of Lite Machines pertaining to any particular application is given freely as an opinion and is not meant to bind Lite Machines or

in any other way modify this warranty. Since Lite Machines has no control over the assembly or use of this product, and since operation of a helicopter is affected by various conditions such as engine power, local elevation and air temperature, Lite Machines cannot guarantee specific performance figures.

5. Notwithstanding the paragraph above, this warranty is in addition to whatever implied warranties may be granted to the Purchaser by law. To the extent permitted by law, all implied warranties, including the warranties of merchantability and fitness for a particular purpose, are limited to a period of one (1) year from the date of purchase. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply.

6. This warranty shall be the sole and exclusive remedy available to the Purchaser. Correction of defects, in the manner and for the period of time specified above, shall constitute complete fulfillment of all liabilities and responsibilities of Lite Machines to the Purchaser, and shall constitute full satisfaction of all claims, whether based on contract, negligence, strict liability or otherwise. Lite Machines shall not be liable for any costs or expenses incurred in the replacement of any defective or non-conforming parts, and **IN NO EVENT SHALL LITE MACHINES BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR ANY DAMAGES DUE TO THE USE OR INABILITY TO USE THIS PRODUCT**. Lite Machines shall not be liable, or in any way responsible, for any damages related to modifications, repairs, attempted repairs, or crashes. **IN NO EVENT SHALL LITE MACHINES' OBLIGATIONS TO THE PURCHASER EXCEED THE ORIGINAL PURCHASE PRICE PAID BY THE PURCHASER TO LITE MACHINES**.

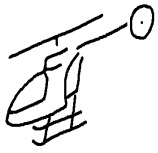
7. Some states do not allow exclusion of incidental or consequential damages, so the above exclusion may not apply. This warranty gives the Purchaser specific legal rights. The Purchaser may also have other rights which vary from state to state.

8. This warranty shall be governed by the laws of the State of Indiana, USA, and any action related to this warranty shall be brought within the jurisdiction and boundaries of the state of Indiana, county of Tippecanoe.

9. No modification or amendment to this warranty will be effective unless reduced to writing and signed by an authorized representative of Lite Machines Corporation.

If you do not understand any aspect of this warranty please contact Lite Machines for clarification. **IF YOU DO NOT AGREE WITH ANY ASPECT OF THIS WARRANTY, RETURN YOUR UNASSEMBLED HELICOPTER TO YOUR PLACE OF PURCHASE FOR A REFUND.**

Lite Machines believes that information contained within its published materials is accurate as of the date of publication and is not responsible for inadvertent errors or omissions. Lite Machines reserves the right to make changes and improvements in its products without notice.



Model Helicopter Safety

This section contains important safety information regarding proper handling of model-engine fuel and operation of the Lite Machines *Corona* helicopter.

Flight Safety

1. **ALWAYS WEAR APPROPRIATE EYE PROTECTION WHEN OPERATING YOUR MODEL.** Fuel droplets, loose parts, and airborne debris ejected from your model could cause serious injury or blindness. Select comfortable, well-fitting eyewear with high-impact resistance such as shop glasses. Prescription glasses made of glass are dangerous because they could shatter if struck sharply.
2. **NEVER STAND OR PLACE YOUR EYES OR FACE IN-LINE WITH ROTATING MAIN ROTOR OR TAIL ROTOR BLADES**. Loose parts or debris thrown outward from rotating rotors could cause injury or blindness.
3. **NEVER, EVER FLY NEAR OR OVER PEOPLE**. Always keep your model at a safe distance from yourself and spectators.
4. Use only those electric motors designed specifically for your Lite Machines helicopter. Use of more powerful motors is potentially dangerous and voids all warranties.
5. Never allow main rotor speed to exceed 2000 RPM (as by operating with blade pitch set too low, or using a high powered engine with high nitro fuel). Rotor parts could separate from the rotor head and cause serious injury or property damage. Very high speeds can also damage the engine.
6. Fly only at approved flying fields or in open areas away from people and property. Do not fly in residential areas.
7. Before turning on your radio, ensure that your radio frequency is not already in use. Flying clubs have organized frequency sharing procedures.
8. Range check your radio prior to the first flight of each day. If your range check is lower than normal, do not fly.
9. Prior to the first flight of each day, check all mechanics for smooth, unobstructed operation. Before the main rotors reach flying speed, gently move all flight controls and confirm proper function. Do not fly if anything is out of the ordinary.
10. Check for hidden damage after crashing, and replace any damaged components.
11. Beginners should have the main rotors tracked, and model adjusted for flight by an experienced modeler.

Electric Power Safety

1. Electric power systems can be very dangerous. High electric currents can heat wires, cause sparks and lead to fires and personal injury. **DO NOT TO TOUCH EXPOSED ELECTRIC COMPONENTS, AND NEVER FLY AT A SITE LOCATED NEAR FLAMMABLE MATERIALS.**
2. Electric motors are almost silent, and the main rotor and tail rotor blades of an electric helicopter can start tuning unexpectedly causing serious injury. **MAKE SURE THE TRANSMITTER IS SWITCHED ON BEFORE CONNECTING THE SPEED CONTROLLER AND BATTERY ON AN ELECTRIC HELICOPTER. ALWAYS DISCONNECT THE BATTERY FROM THE SPEED CONTROLLER WHEN CARRYING AN ELECTRIC HELICOPTER.**
3. **ALWAYS DISCONNECT THE MOTOR POWER CABLES WHEN ADJUSTING THE RADIO SYSTEM ON A HELICOPTER SO THE MAIN ROTOR BLADES CANNOT START TURNING. TO AVOID A SHORT CIRCUIT, BE CAREFUL NOT TO TOUCH THE ENDS OF THE POWER CABLES TOGETHER.**
4. Electric power systems, electronic components and batteries contain chemicals such as lead and antimony which are known by the state of California to cause cancer and birth defects.

General Safety

1. Periodically check tightness off all bolts, nuts, set screws and pins. Loose parts could be ejected from your model causing injury or causing the model to crash.
2. Replace broken or worn components with original parts only. To prevent recurring problems it is important to locate and understand the cause of failure (including pilot error).
3. Never modify any part of the main rotor, tail rotor system or drive train. Modifications could lead to part failure.
4. Always replace the main and tail rotor blades in sets if damaged.
5. Do not store your model in direct sunlight. Prolonged exposure to ultraviolet light can weaken some types of plastics.
6. When flying in very cold conditions be aware that metals and plastics (even flexible ones) can become brittle and break or shatter.
7. Keep your model, radio and field equipment clean and in good repair. While cleaning and maintaining your model you can often find and fix potential problems (such as loose or damaged parts) before they occur.
8. Do not use solvents to clean or degrease rotor blades. Solvents can attack the plastic and cause the blades to fail unexpectedly resulting in serious injury.

Requirements

This section lists the equipment, tools and materials needed to assemble and operate the Lite Machines *Corona*™ helicopter. Note that a specialized helicopter radio is not required. Although helicopter radios may be used, they are usually more expensive than airplane radios and will not appreciably improve the flying qualities of the *Corona* helicopter.

Federal law requires that radio controlled model aircraft use specific radio frequencies. Check with your hobby dealer or local club to find a radio frequency within the appropriate band that is not popular with other fliers in your area (since two aircraft cannot fly on the same frequency simultaneously), and is not subject to local interference (some phone pagers may cause interference).

Radio

1. Standard four (4) channel airplane-style transmitter (Hitec *Laser 4HM*, Futaba *Attack*, Airtronics *Vanguard*, JR *F400*)
2. Four channel micro receiver (Hitec *555*, *JR 610*)
3. Three (3) micro servos with mounting hardware (Hitec *HS-81*, Futaba *3101*, Airtronics *94501*, JR *341*)
4. Two (2) six-inch servo extension wires
5. Lite Machines *Fusion 35* motor speed controller
6. Electronic gyro stabilizer (Hitec *Gy-130*, Futaba *450*, JR *400, CSM 180)*
7. 2-piece Dean's antenna (This short whip-style antenna replaces the long wire antenna on the radio receiver. Long antennas used on airplanes get tangled in the rotor blades of the *Corona* helicopter.)

Motor and Battery

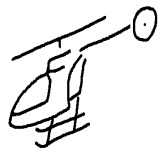
1. *Electro-Fusion 7* motor and seven-cell 2400 mAh NiCad battery pack (preferred), or *Electro-Fusion 6* motor and six-cell 2400 mAh NiCad battery.
2. Lite Machines connector for battery and controller connections.

Battery Charger

1. Fast charger for 6-7 cell NiCad battery packs (Dynamite *Mega Peak* charger or similar works on both 120 volts AC and 12 volts DC, FMA *SuperNova 25* works on 12 volts DC and has computer screen that shows charging parameters.)

Building Supplies

1. Lite Lock Thin cyanoacrylate (CA) glue, 20 g. (Fast setting thin CA glue is used for quickly joining wood parts and sometimes finger tips. Do not use regular Super Glue purchased at a grocery store.)
2. Lite Lock Thick cyanoacrylate (CA) glue, 20g. (Slow setting thick CA glue can fill small gaps and form fillets, and allows time to reposition parts after gluing.)
3. Lite Lock CA accelerator (Accelerator hardens CA glues instantly.)
4. Lite Lock Anerobic Thread-Lock for securing bolts and set screws (Use only anaerobic thread locking compounds made for metal screws. Do not use *Loctite* "red" formula because it is almost permanent and makes setscrew removal and adjustment difficult.)
5. Lite Lube Grease, ¼ oz
6. Lite Lube Heavy Oil with needle oiling tube, 14 ml
7. Masking tape
8. X-Acto knife with #11 blades
9. Needle-nose pliers
10. Standard pliers
11. Soldering iron and solder (borrow these from a friend if you don't have them)
12. Pencil
13. English ruler (Queen Elizabeth)
14. Scissors
15. Electric drill and drill bits
16. Hammer (A hammer is required to gently tap pins into some plastic parts. It is also useful when things go hopelessly wrong and instant gratification is desired.)
17. Small phillips screwdrivers (for installing radio components, jeweler's style works best)
18. Paint for wood parts (Dope or acrylic laquer recommended)
19. ½" camel hair paint brush (if necessary for applying dope)
20. Building surface (a 4 foot by 3 foot flat, uncluttered work surface is sufficient)



General Building Guidelines

Assembling a model helicopter can be a lot of fun. As you build your Lite Machines *Corona* helicopter you will observe the function of each part and subassembly, and develop a feel for mechanical systems in general. It is important to build your own *Corona* so that you know how to maintain and repair it. For more technical information on how helicopters work, refer to the *How Helicopters Work* section of the Operator's Guide.

Most parts of the *Corona* are designed to assemble in only one way, so assembly is easy. In some cases, however, parts can be assembled upside-down or backwards. As much as possible, the instructions will warn you about incorrect assembly, so read each assembly instruction entirely and study the drawings before performing each assembly step. When you have completed a step, mark the check-off box to keep track of your progress.

Review the entire *Corona* Construction Manual and Operator's Guide before starting assembly. The beginning of this Construction Manual contains a list of required tools and materials. Follow all building steps carefully, and make no modifications or "improvements". Modifications can reduce performance or lead to part failure. Remember, proper assembly and safe operation of your *Corona* helicopter are your responsibilities

Friction and Binding

For the best flight performance, it is important that all mechanical linkages move very freely. The servos in the *Corona* actuate several interconnected pushrods, control arms and ball-links to control the main rotor and tail rotor. Even small amounts of friction or binding in the linkages can affect flight performance. Friction and binding often cause problems that are difficult to diagnose, especially for beginners.

Fig. 4-1 shows a simplified linkage system with a servo and several interconnected linkages. Tight ball-links, rubbing pushrods, dragging control arms and jammed parts are all sources of friction and binding. Even if each link produces only a small amount of friction, the total friction produced by a long chain of links can be substantial. This friction can stall the servo, or cause it to perform erratically. Friction and binding can also prevent small servo movements from reaching the main rotor or tail rotor where they are needed for precise control when hovering.

In addition to link friction, molding "flash" (the thin plastic ridge produced by the mold seam-line) sometimes interferes with the operation of moving plastic parts. Molding flash must be removed with sandpaper or a hobby knife.

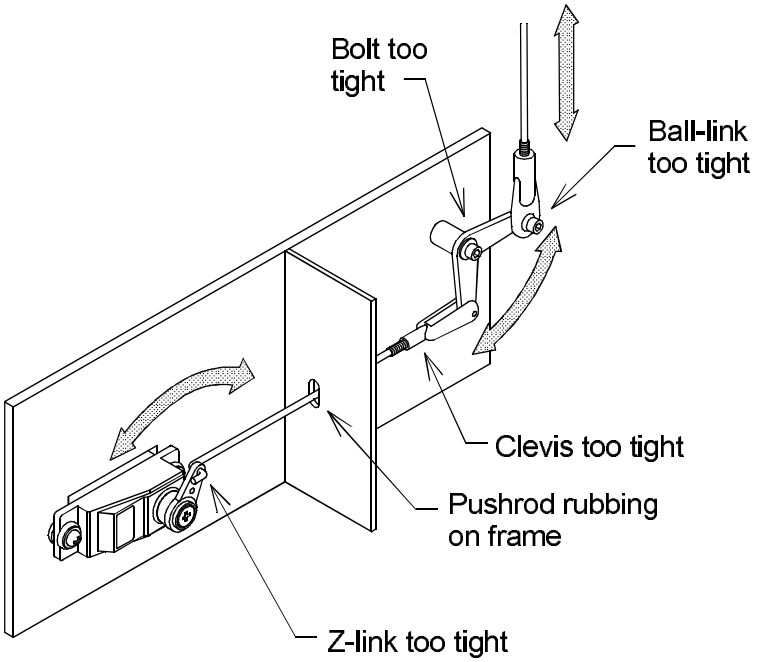


Figure 4-1.

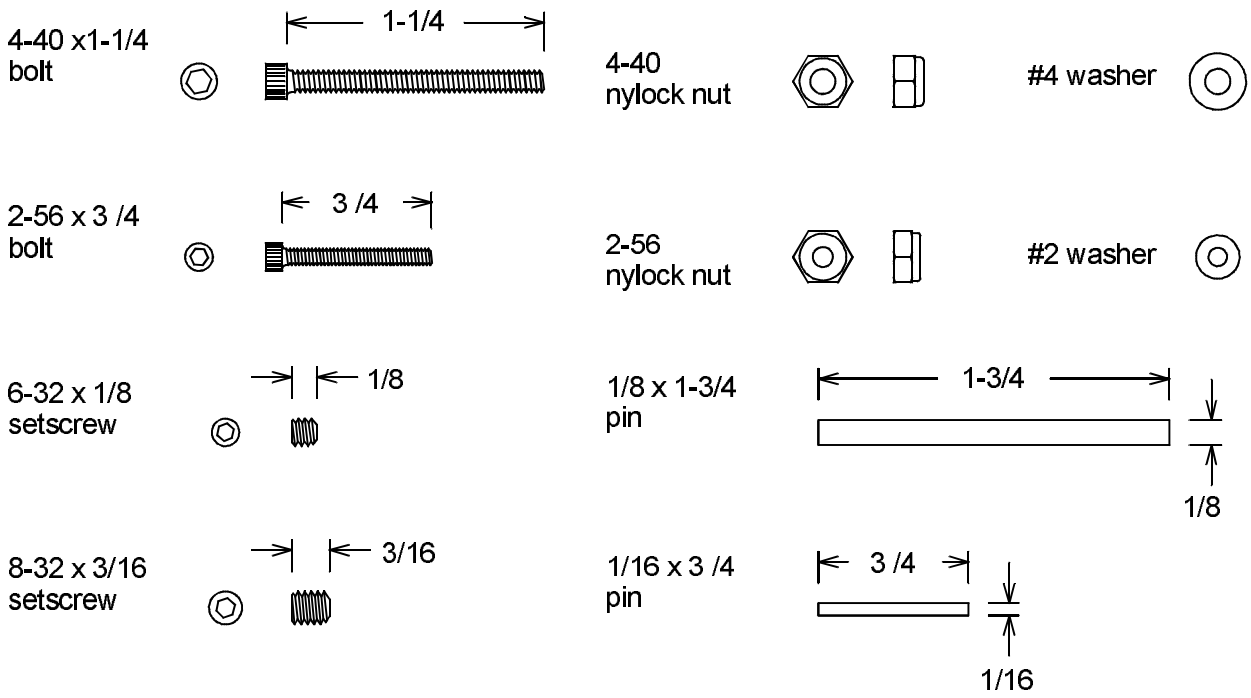
As you assemble moving parts and linkages, make sure that each assembly operates smoothly and without binding. If parts do not operate smoothly, locate the problem and correct it before proceeding to the next assembly step. It is much easier to solve friction and binding problems as you build the *Corona* than after it is entirely assembled.

Balance of Rotating Assemblies

Proper balance of rotating assemblies (like the main rotor and tail rotor) is as important as minimizing linkage friction. Out-of-balance components cause vibration that wastes engine power and can lead to bearing and radio problems. Carefully balance all rotating assemblies as described in the instructions.

Fastener Identification

The English system of identifying bolts and screws involves three basic descriptive numbers: bolt size, number of threads per inch, and bolt length. For example, a 4-40 x ½" bolt is a number 4 bolt with 40 threads per inch that is ½ inch long. The same identification system applies to setscrews. Fig. 4-2 shows several examples of nuts, bolts, washers and setscrews at full size. Notice that bolt length does not include the bolt head, while setscrew length refers to the entire setscrew.



Note: All parts shown full size

Figure 4-2.

Nuts of a certain size and thread fit bolts with the same size and thread. For example, 4-40 nuts are used only with 4-40 bolts. All nuts used on the *Corona* have a small nylon insert to keep them tight against vibration. These nuts are called nylock nuts. Fig. 4-2 shows both 4-40 and 2-56 nylock nuts.

Several different washer sizes are used on the *Corona*. For instance, standard number 2 washers are used with 2-56 bolts and nuts, and standard number 4 washers are used with 4-40 bolts and nuts. Some assemblies require special washers. These washers are labeled in the drawings. For instance, oversized number 4 washers are usually used against wood surfaces. See Fig. 4-2 for full size drawings of standard and oversize washers.

Many hardened-and-ground steel dowel pins are used in the *Corona*. Pins are described in terms of their diameter and length. For example, a 1/16" x ½" pin is 1/16 inch in diameter and ½ inch long. Fig. 4-2 shows several examples of pins.

Apology:

To those who are familiar with and prefer the metric system which uses grams, kilograms, meters and decimal numbers, we apologize for the English system which uses ounces, pounds, feet and fractional numbers. While the metric system is superior in many respects for engineering purposes, most commonly available components in the United States are designed with English units, so the *Corona* helicopter uses English units.

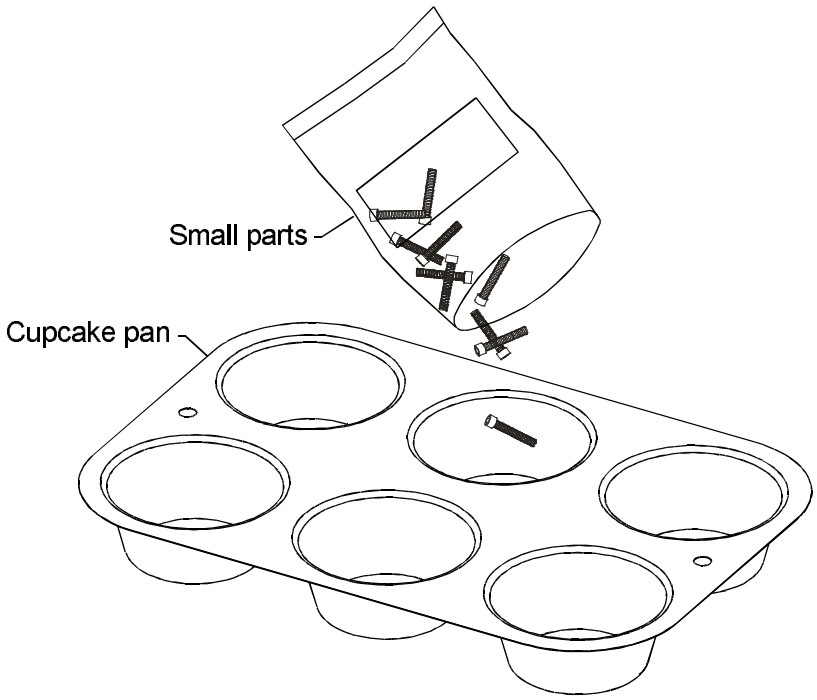
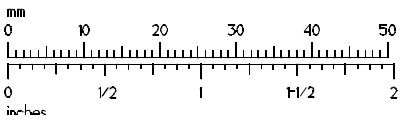


Figure 4-3.

To organize your building, pour the contents of each small-parts bag into a separete cup or into a cupcake pan as shown in Fig. 4-3.



Crutch

The crutch is the primary structure or backbone of the *Corona* helicopter. All major mechanical assemblies and radio components are fastened to the crutch. It is the only part of the *Corona* that requires painting, and it is built first to allow time for the paint to dry before attaching other assemblies.

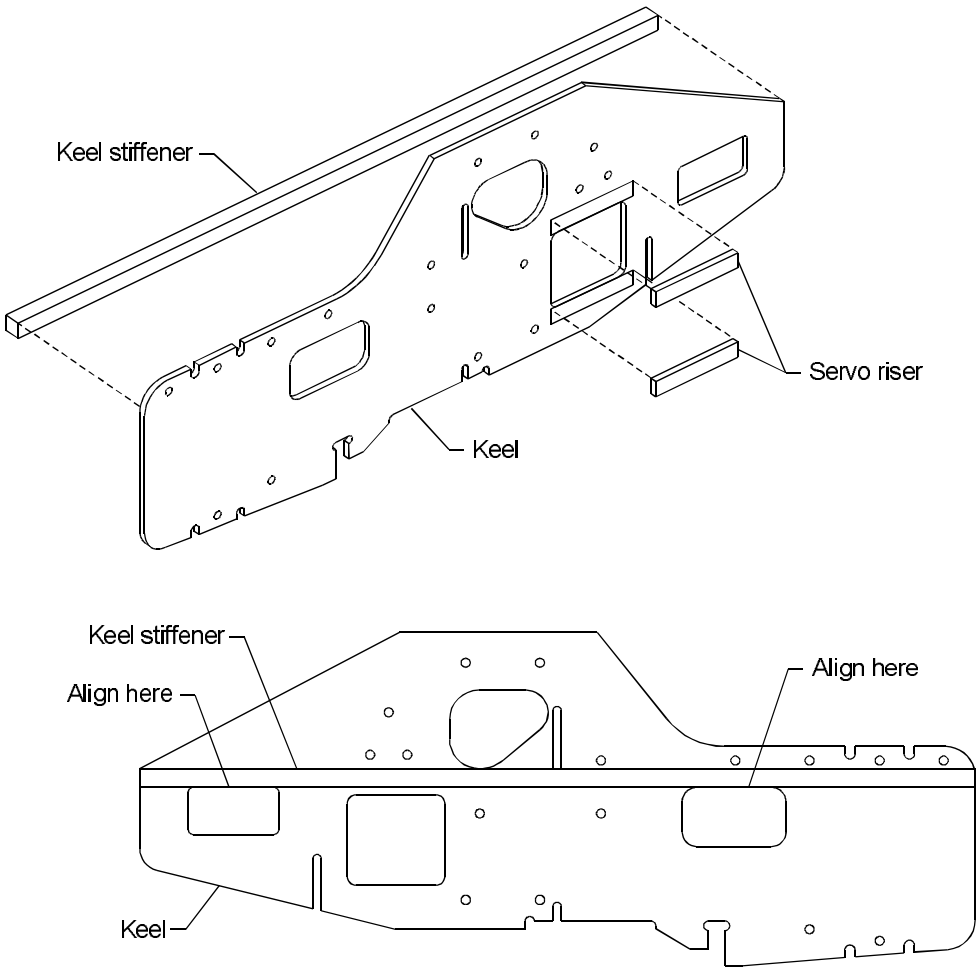


Figure 5-1.

❑ 1. Clear off a 4ft x 3ft (1.2m x 1m) area on a table or bench to use as a building area. Cover your building area with 10 to 15 sheets of newspaper to protect the surface from glue drips and knife cuts. Collect the building supplies listed in the front of this manual and locate the *Tools Bag* supplied in the kit. Keep building supplies and tools nearby as you are building.

❑ 2. Remove all wood parts from their packaging and sand lightly with medium (220 grit) sandpaper (supplied in the *Tools Bag*). Remove any sanding dust with a cloth or several pieces of masking tape (wrap the tape sticky-side-out around two fingers and roll over the wood surfaces).

❑ 3. Glue the keel stiffener to the keel with thick CA glue and align the stiffener with the holes in the keel (see Fig. 5-1). Hold the stiffener in position until the glue sets.

Note: CA glue produces fumes that will sting your eyes and cause them to water like when cutting an onion. Work in a well ventilated area and avoid holding your head above the glue joint.

❑ 4. Install rubber grommets into the mounting arms of each of your servos as shown in Fig. 5-3.

Note: The *Corona* is designed to fit Hitec HS-81 micro servos. For smaller servos such as the *JR 341* and *Airtronics 94501*, the lower servo doubler must be moved upward slightly (about 1/16" or 1.5mm) as shown in the bottom half of Fig. 5-2. Be carful not to space the doublers too far apart or the servo mounting screws will split the wood on the edges of the servo bays.

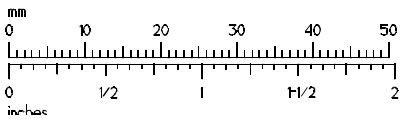
❑ 5. Lightly glue the servo riser to the keel with thin CA glue. Insert a servo into the forward servo bay to check the fit (make sure that rubber mounting grommets are installed in the servo mounting flanges). If your servo will not go easily into the rear servo bay, rotate it 45 degrees before installing it in the bay. Once you are satisfied that the risers are positioned properly, glue them to the keel with thin CA until the wood is saturated.

Note: To apply thin (instant) CA glue, hold two close-fitting parts together in the exact position desired, and soak the joint with glue. The parts will be bonded almost instantly and cannot be repositioned. The parts may also stick to your fingers. If this happens, don't panic. Gently pry your fingers from the parts. The oil in your skin will eventually cause the glue to peel off (finger-nail polish remover can also soften CA glue).

❑ 6. Check the fit of one servo in the rear servo bay. If your servo is shorter than the servo bay, adjust the length of the bay opening with plywood left over from the keel.

Note: In the following steps you will mark and drill pilot holes for the servo mounting screws. The sides of the servo cases should not touch the sides of the servo bays. If they do, vibration may damage the servos over time. Also allow at least 1/8" (3mm) gap between the servos so that they do not vibrate against each other.

❑ 7. Insert all three servos into the servo bays as shown in Fig. 5-2. Make sure to provide adequate clearance between the roll and pitch servos so the servo arms do not hit each other.



❑ 8. Poke a sharp pencil through the rubber grommet on each servo mounting arm, and mark the position of each servo mounting screw on the keel.

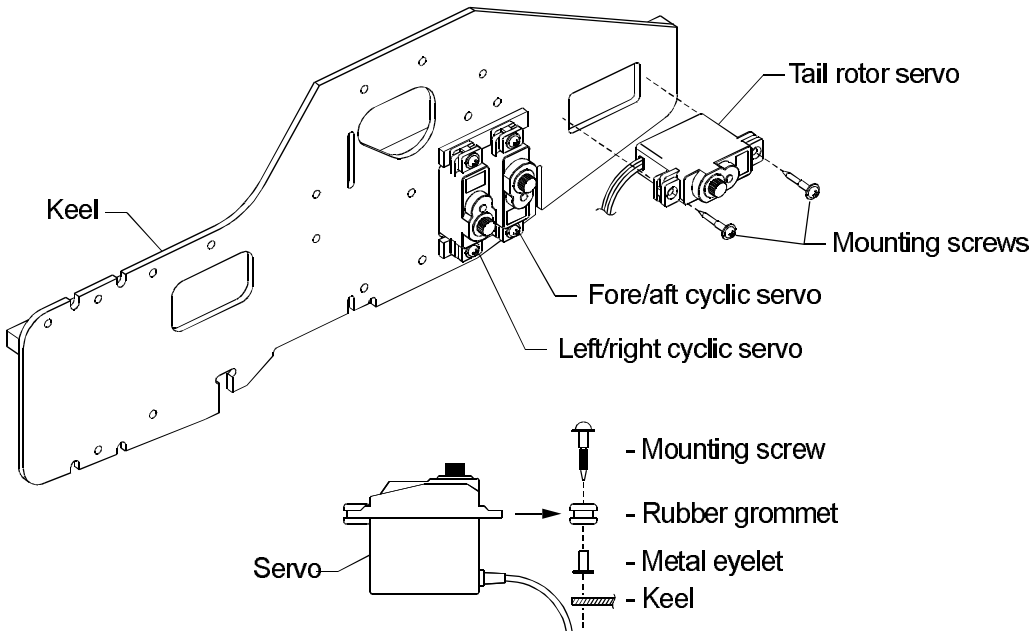


Figure 5-3.

❑ 9. Drill all the screw holes marked in the previous step with a small drill bit (about .050" or 1.3mm diameter). Mount the servos to the keel as shown in Fig. 5-3 and install all servo mounting screws. If any screws split the wood, remove the servo and apply a drop of thin CA to the split area to repair the hole. Re-drill the repaired hole if necessary.

❑ 10. After you are satisfied that all servos are correctly mounted, remove them from the keel.

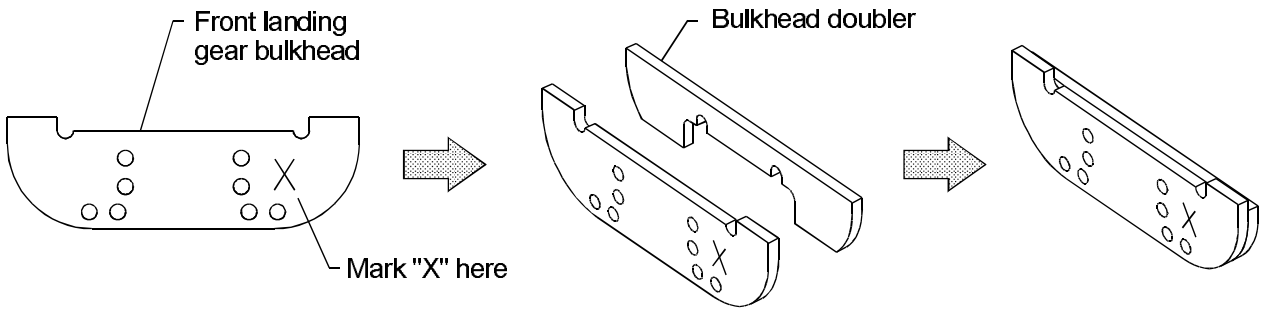


Figure 5-4.

❑ 11. Lightly mark an "**X**" on thefront landing gear bulkhead as shown in Fig. 5-4.

❑ 12. Glue the front landing gear doubler to the **BACK SIDE** of the front landing gear bulkhead with thick (slow setting) CA glue. Make sure the doubler is on the **BACK SIDE**.

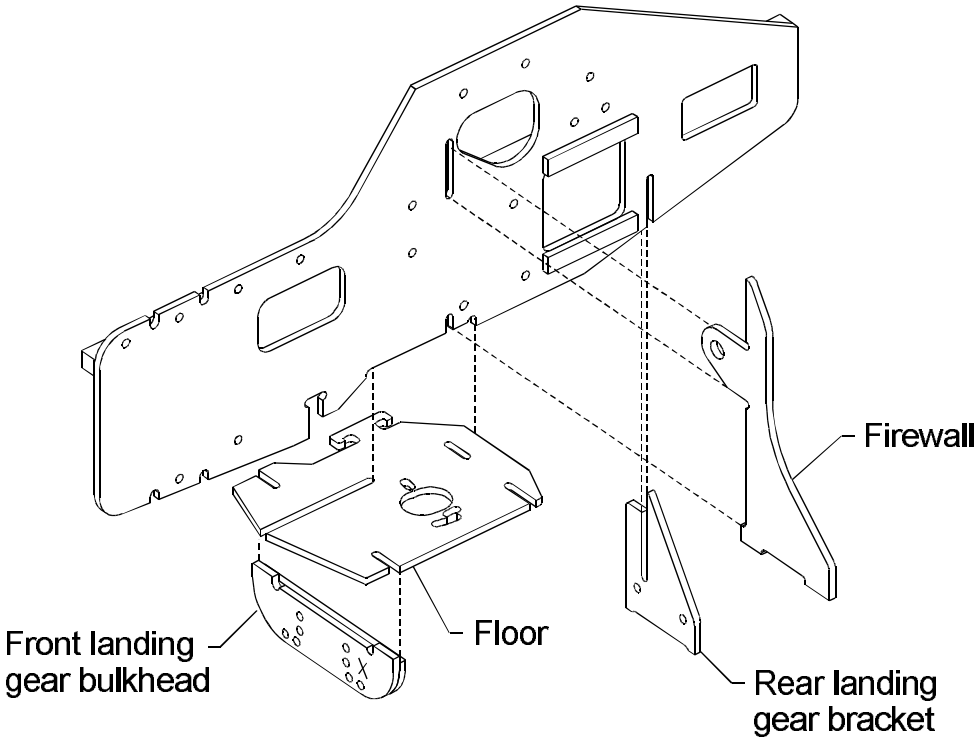


Figure 5-5.

Note:

In the following steps you will assemble the remaining parts of the crutch and glue them permanently together. To insure that all pieces are properly assembled and aligned, do not glue anything else until instructed to do so.

❑ 13. Attach, but do not glue, the firewall, floor, and front landing gear bulkhead to the keel as shown in Fig. 5-5. Make sure the "**X**" on the bulkhead faces forward.

❑ 14. Slide the rear landing gear bracket into the slot at the rear end of the keel until the upper end of the bracket hits the keel stiffener.

❑ 15. Visually check the alignment and fit of all pieces. The firewall and floor should be at right angles (90 degrees) to each other and to the keel. Look at the parts from above, below, behind and each side before proceeding.

❑ 16. When convinced that all parts are properly aligned, tack-glue everything together with a single drop of thick CA on each joint (use CA accelerator to harden the CA drops instantly).

❑ 17. Check the alignment again. If any part has shifted or is improperly aligned, gently break the appropriate glue joint and reposition the part.

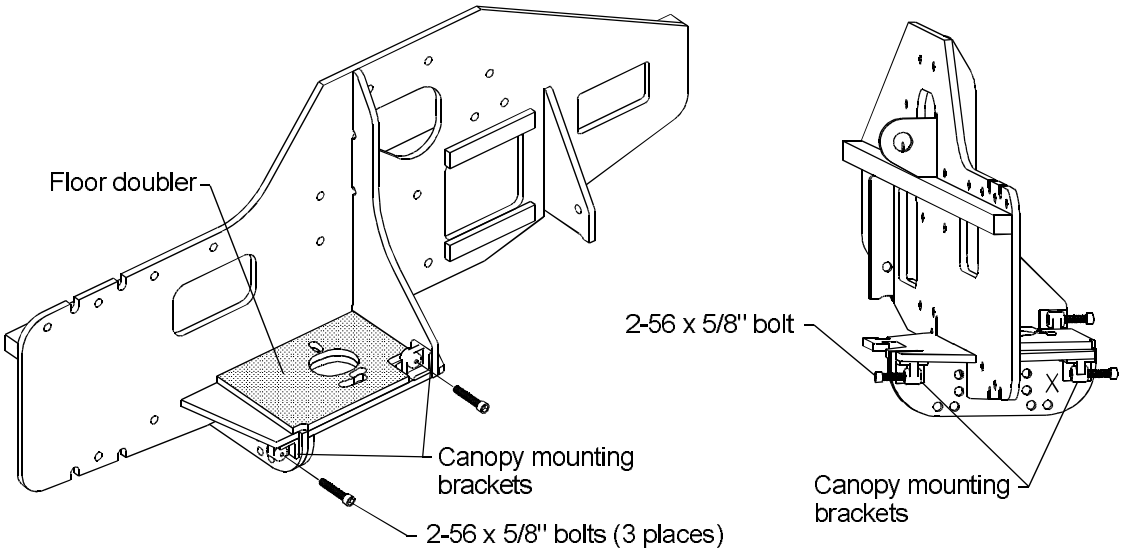


Figure 5-6.

- ❑ 18. Cover the entire surface of the floor doubler with thick CA glue, and glue it to the **TOP** of the floor as shown in Fig. 5-6.
- ❑ 19. Roughen the mounting surfaces of three (3) canopy mounting brackets with coarse (120 grit) sandpaper. Permanently glue the brackets with thick CA at the intersections of the floor, firewall and front landing gear bulkhead as shown in Fig. 5-7. The outer edges of the brackets should be flush with the outer edges of the floor
- ❑ 20. Screw a 2-56 x ½" bolt (no washers) into each mounting bracket leaving about 3/8" (10mm) exposed.

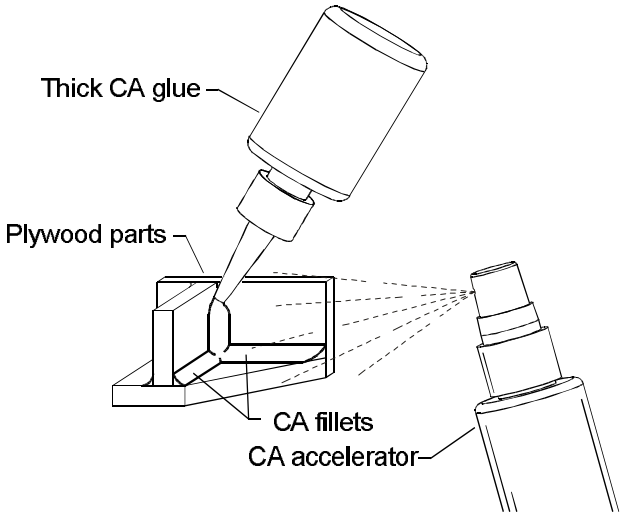


Figure 5-7.

Note:

THE STRENGTH OF THE CRUTCH DEPENDS UPON THE STRENGTH OF THE FINAL GLUE JOINTS WHICH ARE KNOWN AS "CA FILLETS". As shown in Fig. 5-7, CA fillets are made with thick CA glue and form an angle between two parts. For maximum strength, CA fillets should be 1/16" to 1/8" (2-3mm) wide.

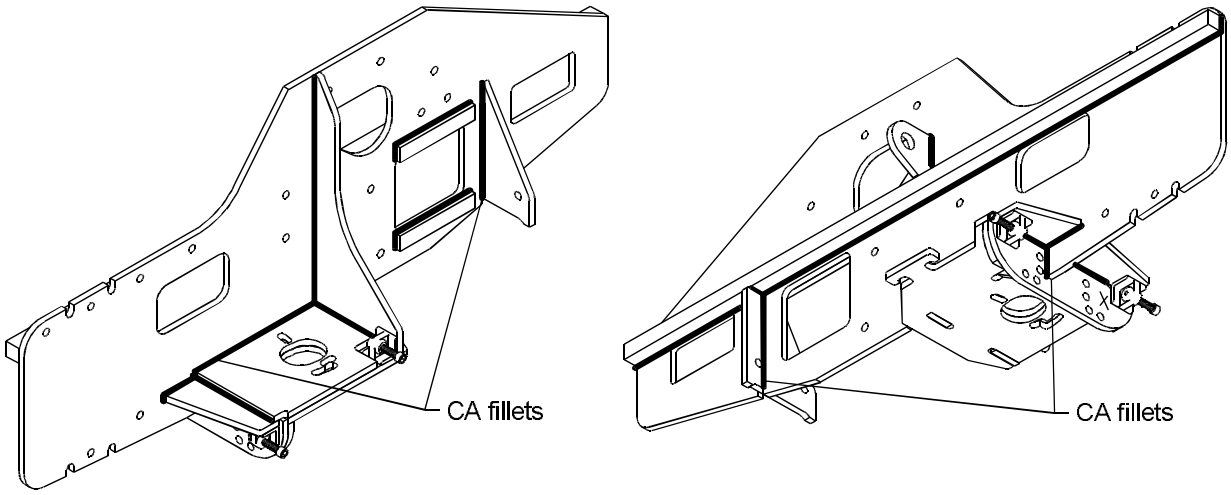


Figure 5-8.

❑ 21. Reinforce all joints on the crutch one at a time with CA fillets. Apply thin CA to soak the joint, then apply thick CA to form the fillet. Spray CA accelerator at the fillet from a distance of about 6" (150mm), to harden the fillet in a few seconds. Avoid using too much accelerator because it will bubble the glue and weaken the joints. **USE CA ACCELERATOR ONLY IN A WELL VENTILATED AREA.**

Hint:

Be careful not make the fillets behind the firewall too large or they will interfere later with the main rotor bearing blocks.

❑ 22. Cover the canopy mounting brackets with masking tape, and paint the entire crutch to seal the wood and give it color. Model airplane dope is highly recommended because it soaks into the wood and is very hard.

Hint:

If applying dope with a brush, apply one coat to all surfaces of the crutch and allow to dry for a few hours. If using a spray can, apply three coats to all surfaces allowing 30 minutes between coats. Sand lightly with fine (320 grit) sandpaper after the first coat to remove wood fuzz.

Warning!

DO NOT PAINT INDOORS, AND DO NOT BRING PARTS INDOORS TO DRY. THE VAPORS ARE HARMFUL AND LINGER FOR HOURS. LET PAINT DRY OUTDOORS OVERNIGHT.

Canopy

The canopy is a streamlined shell that protects the radio control system from dirt and debris. On most model helicopters like the *Corona* the canopy extends back to the main rotor shaft, but not all the way back to the tail rotor as shown in Fig. 6-1. This is commonly referred to as a pod-and-boom configuration (the pod being the canopy, the boom being the tube which supports the tail rotor). The canopy on the Corona helicopter is easily repairable, but should be discarded and replaced when it starts looking ragged after prolonged use and many crashes.

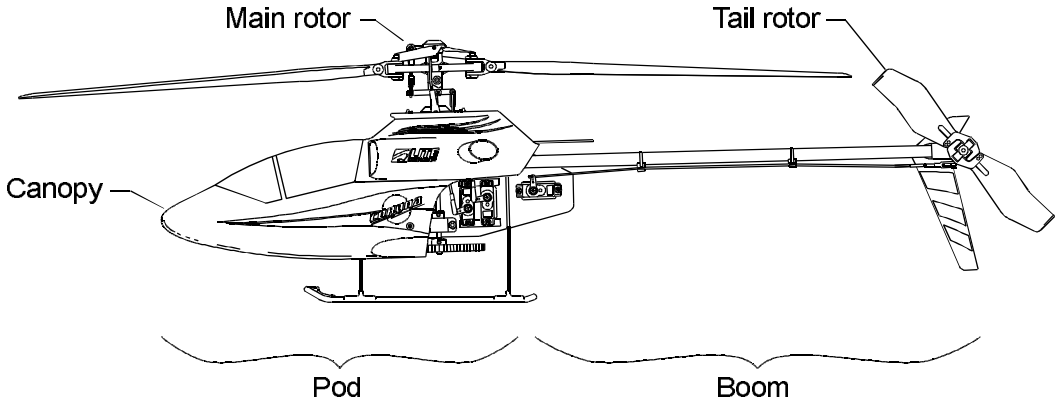


Figure 6-1.

Hint:

The following steps require trimming excess plastic from the canopy halves with a scissors. Be careful not to cut with the tips of the scissor blades because they will crack the canopy plastic. For best results cut with the middle of the blades as shown in Fig. 6-2.

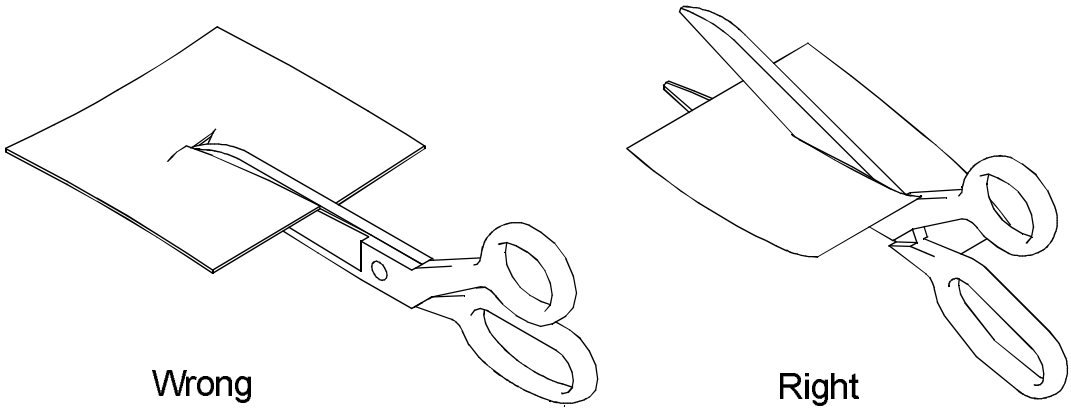


Figure 6-2.

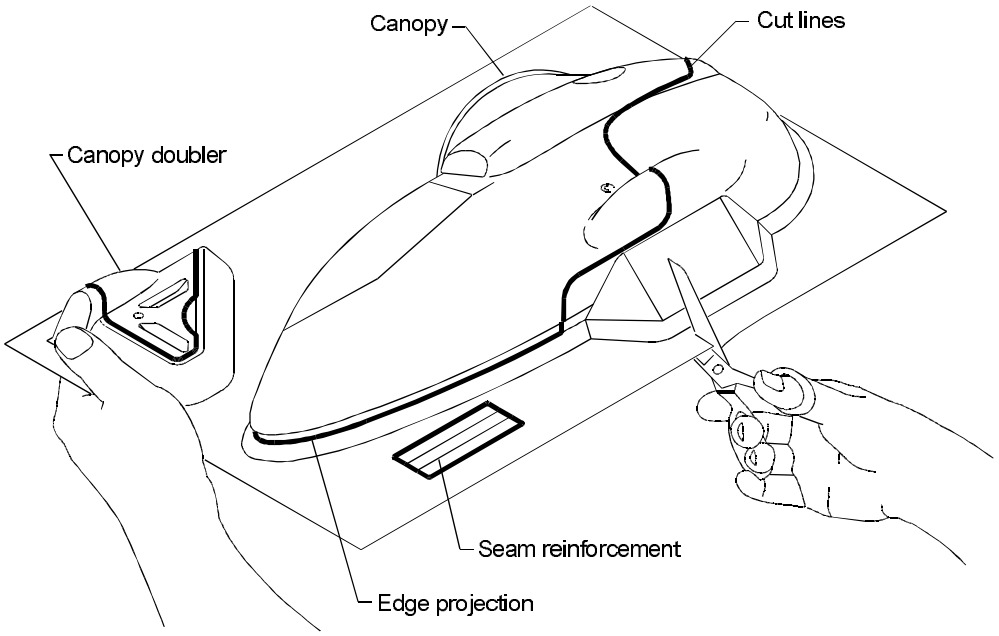


Figure 6-4.

❑ 1. Roughly cut the two canopy halves, canopy doublers and seam reinforcement strips from their carrier sheet with scissors as shown in Fig. 6-4. Be careful to leave the ¼" (6mm) edge projection on both halves (this is used to hold the canopy together). Note that the right-side canopy doubler is not used in the *Corona* helicopter.

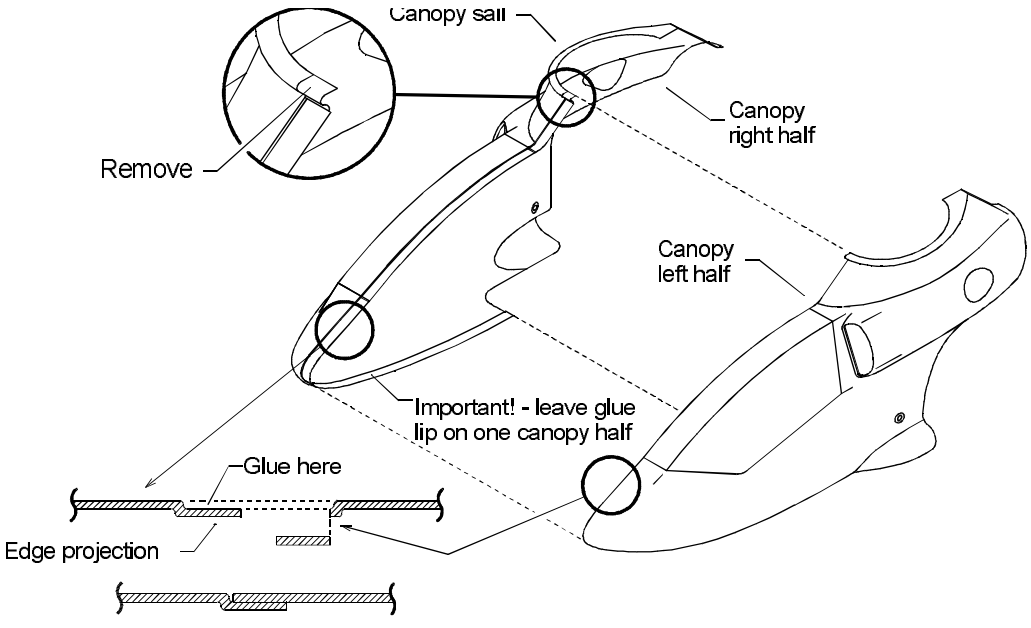


Figure 6-3.

❑ 2. Cut the ¼" (6mm) edge off the left half of the canopy, and sand the edge with coarse (120 grit) sandpaper until the edge is flat as shown in Fig. 6-3.

Note:

DO NOT REMOVE THE ¼" (6mm) EDGE ON THE RIGHT HALF OF THE CANOPY. THE RIGHT-SIDE EDGE FITS INSIDE THE LEFT HALF OF THE CANOPY AND ACTS AS A SEAM WHEN JOINING THE CANOPY HALVES.

❑ 3. Trim all canopy parts carefully with a scissors.

❑ 4. Trim a small portion of the edge away from the top right half of the canopy as shown in the enlarged view of Fig. 6-5.

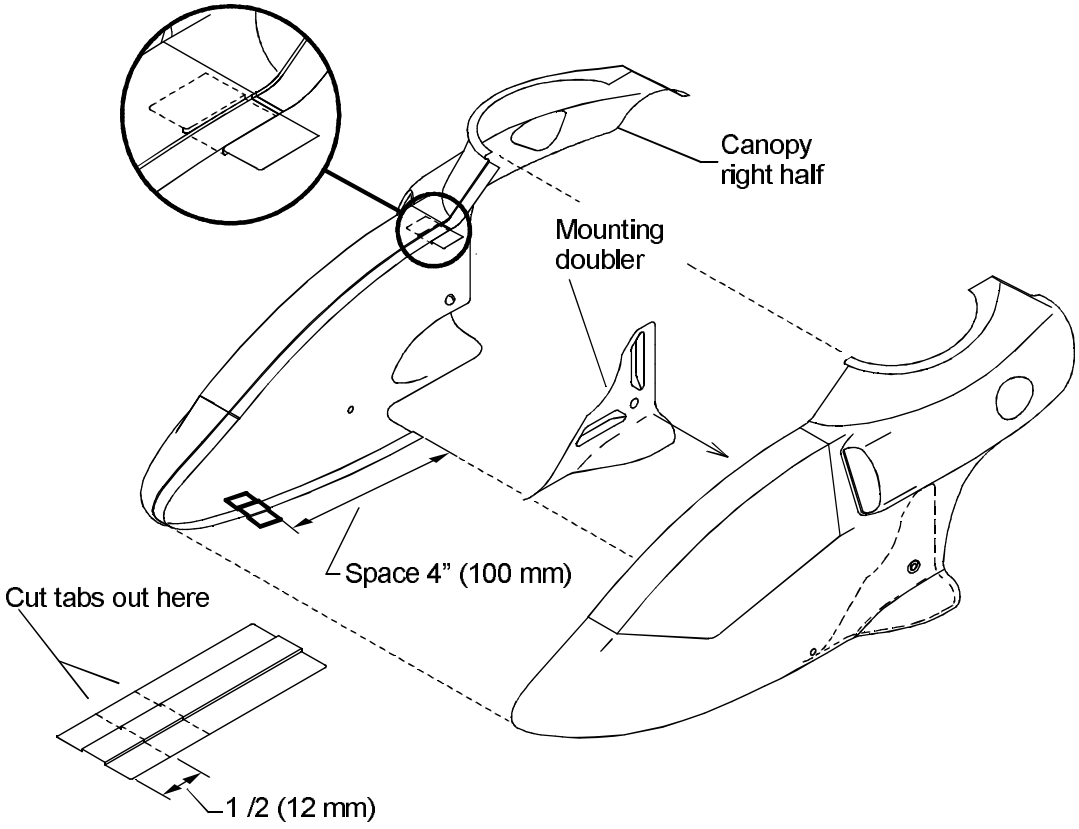


Figure 6-5.

❑ 5. Trial fit the left doubler to the inside of the left half of the canopy as shown in Fig. 6-5. Note that the circular indent on the doubler should fit exactly over the circular bump on the inside of the canopy. Trace around the doubler with a pencil.

❑ 6. Lightly sand the left doubler and canopy inside the pencil marks with coarse (120 grit) sandpaper to prepare the surfaces for gluing.

❑ 7. Sand the edge projection on the right half of the canopy, and the inside edge of the left half of the canopy with coarse sandpaper to prepare the surfaces for gluing.

❑ 8. Sand the areas that will lie under the seam reinforcements to prepare the surfaces for gluing.

❑ 9. Hold the canopy left doubler in position, and apply thin CA glue around the edges. Capillary action will pull the glue under the doubler and lock it in place. Hold the doubler and canopy together for about ten seconds while the glue sets.

Hint:

Avoid getting glue on your fingers since the glue will leave permanent fingerprints on the canopy.

Note:

Use only plastic-compatible CA glue to assemble the canopy. If you are unsure about the compatibility of a particular glue, test it on a piece of scrap plastic. Do not use glue that softens or cracks the plastic.

❑ 10. Cut two ½" (12mm) pieces of the seam reinforcement strip, and sand the back of each with coarse sandpaper to prepare the surfaces for gluing. Note how the seam reinforcements sit on the inside of the canopy over the top of the seam as shown in Fig. 6-5. Glue the reinforcements to the inside of the left half of the canopy as shown.

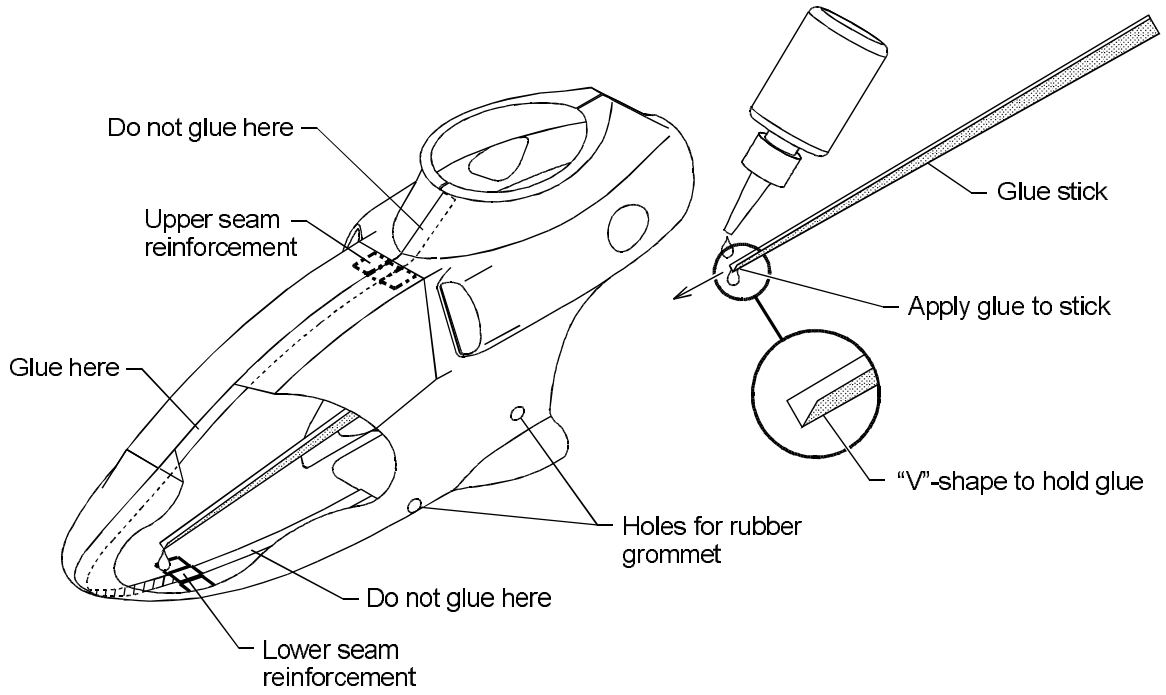


Figure 6-6.

❑ 11. Assemble the canopy with several pieces of masking tape as shown in Fig. 6-6. Carefully check the alignment of the window outlines and the fit at the nose. If the canopy does not align properly, trim the edges with sandpaper and repeat this step.

❑ 12. Hold the canopy at arm's length and visually check that it is not twisted or distorted. If it is twisted, repeat the previous step.

❑ 13. Cut a 12" (30cm) strip of scrap canopy plastic for use as a glue dropper as shown in Fig.6-6.

Note: The canopy on the *Corona* is designed to flex open to reduce the possibility of cracking. **DO NOT GLUE THE SEAM TOGETHER BEHIND THE UPPER AND LOWER SEAM REINFORCEMENTS.**

❑ 14. Apply a drop of thin CA glue to the end of the glue dropper. Reach down inside the canopy and touch the glue drop to the canopy seam and the seam reinforcements. Capillary action will drawn the glue into the seam and lock the canopy together. Apply glue to the entire seam area in front of the seam reinforcement as shown in Fig. 6-.

Note: The canopy seam must fit tightly together for the glue to flow properly. Be careful not to apply glue near a piece of tape because the glue will seep under the tape and mar the canopy surface.

❑ 15. Allow the glue to set for about 15 minutes then remove any remaining tape. Roll a piece of coarse sandpaper around your finger, and sand all exposed edges smooth.

❑ 16. Carefully drill three 1/4" (6mm) holes for the canopy mounting grommets with a sharp hobby knife (two on the left side and one on the right side). Finish the holes with a piece of coarse sandpaper rolled into a tube.

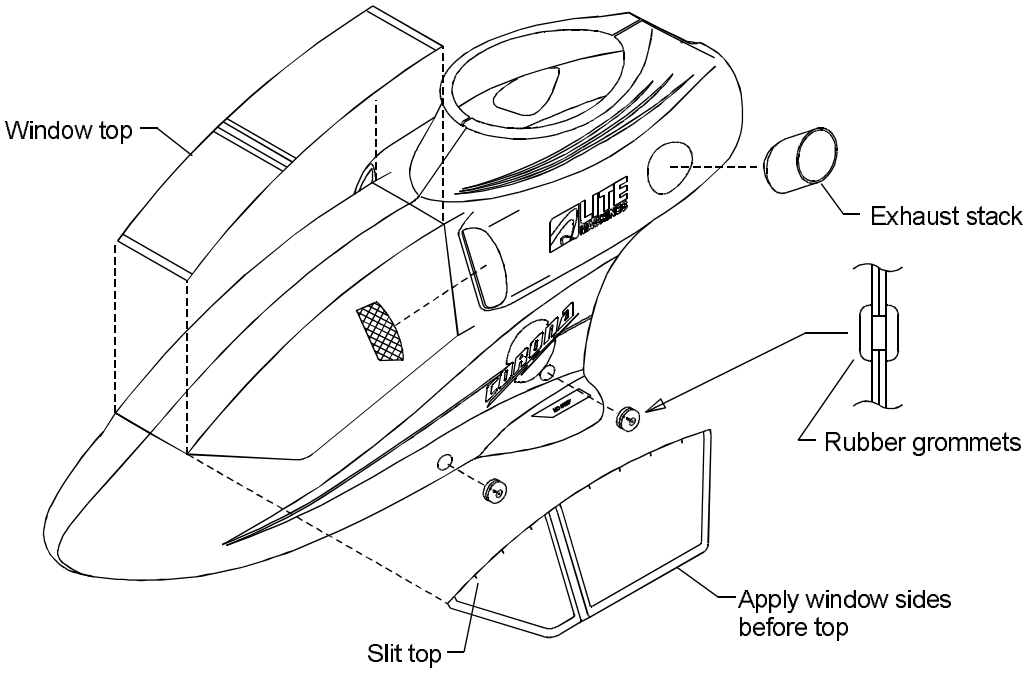


Figure 6-7.

Hint:

The *Corona* canopy is designed to be decorated with decals, not paint. If you choose to paint your canopy, test the paint on a piece of scrap plastic first. Also, don't spend too much time with fancy paint schemes since you will probably smash your canopy several times learning to fly. Your second canopy will last much longer.

- ❑ 17. Clean the canopy with spray window cleaner to remove any oil and dirt before applying decals.
- ❑ 18. Cut out the side and top window decals from the canopy decal sheet with a scissors as shown in Fig. 6-7. Make sure to cut the small slits on the top of the side windows.

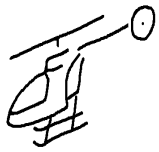
Hint:

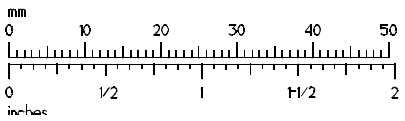
The easiest way to apply decals is to first remove a small ¼" (6mm) section of the paper backing and stick the edge of the decal to the canopy. If the decal is not properly aligned, peel it off and reposition it. Do not remove the remaining paper backing until the decal is in the proper place.

- ❑ 19. Apply the side window decals, and fold the slitted portions over the top of the canopy.
- ❑ 20. Apply the top window decal.
- ❑ 21. Apply stripe decals as you did the window decals. Follow the color scheme shown in Fig. 6-7, or design your own.
- ❑ 22. Install three rubber grommets in the holes in the canopy. The grommets will be used later to mount the canopy to the crutch.
- ❑ 23. Sand the turbine exhaust pockets on the canopy and the bottom of the plastic turbine exhausts with coarse sandpaper. Glue the turbine exhausts to the canopy with thick CA glue.

Note:

Several optional canopy decal sets are available. You may wish to consider a different decal set for your next canopy.





Battery

The *Corona* helicopter is designed to operate with *Electro-Fusion* brushed motors and either six or seven-cell sub-C NiCad battery packs. *Electro-Fusion 7* motors work best with seven-cell packs. *Electro-Fusion 6* motors work best with six-cell packs.

The *Corona* helicopter generally performs best with an *Electro-Fusion 7* motor and a seven-cell pack because they produce more motor power, and the added weight of a seven-cell pack increases main rotor speed in hover. If you decide to use only six-cell battery packs, use an *Electro-Fusion 6* motor to improve flight times.

If you purchased your battery pack from Lite Machines, it includes a high-current Lite Machines connector. Do not use low-current "Tamiya-style" connectors on your *Corona* helicopter because the connector will reduce flight performance and burn out.

This section describes how to change battery connectors and charge a new battery for the first time. For more information on batteries and battery charging, refer to the *Electric Motors* section of your Lite Machines Operator's Guide.

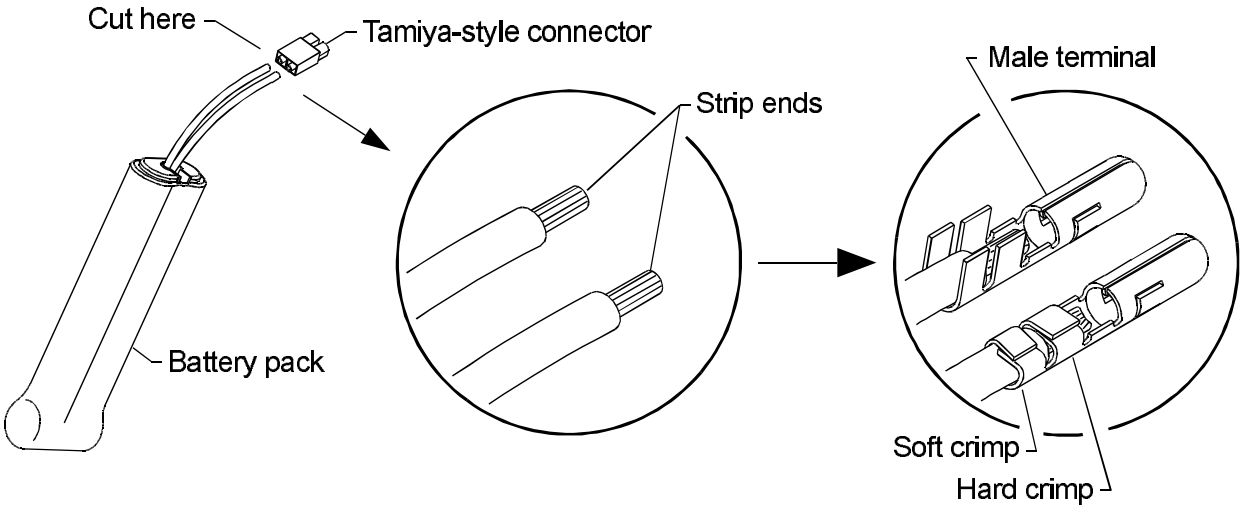


Figure 7-1.

❑ 1. If your battery has a low-current Tamiya-style connector, remove it and strip 1/4" (6mm) of insulation off the ends of the wires as shown in Fig. 7-1.

Note:

Batteries have male terminals as shown in Fig. 7-1, and motor speed controllers have female terminals. **DO NOT INSTALL FEMALE TERMINALS ON YOUR BATTERY.**

❑ 2. Crimp a Lite Machines connector male terminal on each wire with a pliers. Make sure one set of terminal fingers holds the wire insulator (to act as a strain relief), and one set is crimped firmly around the copper wire. Solder the terminals to the wires for the best electrical connection.

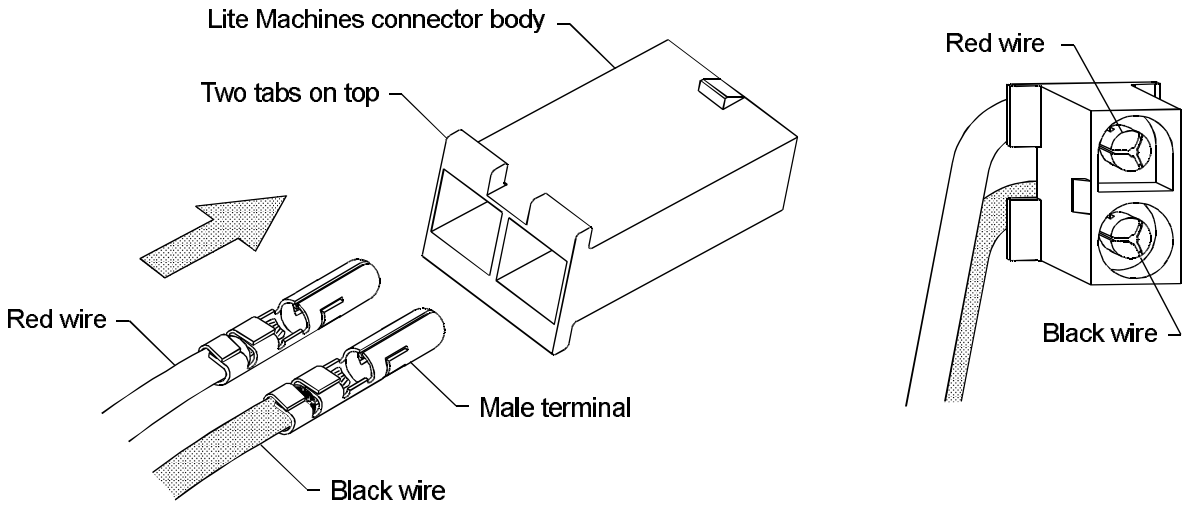


Figure 7-2.

❑ 3. Push the connector terminals into a Lite Machines connector body as shown in Fig. 7-2. **NOTE THAT THE BLACK-WIRE TERMINAL GOES INTO THE CIRCULAR BODY OPENING, AND THE RED WIRE TERMINAL GOES INTO THE BULLET-SHAPED OPENING.**

Warning!

IF THE TERMINALS ARE REVERSED IN THE CONNECTOR BODY YOU WILL PERMANENTLY DAMAGE YOUR BATTERY AND YOUR MOTOR SPEED CONTROLLER DURING CHARGING AND OPERATION. THIS DAMAGE IS NOT COVERED UNDER WARRANTY.

❑ 4. For the best battery life, it is best to "condition" new battery packs before use. To condition a new pack, charge it slowly over night at a current of 1/10 of the rated battery capacity. For instance, charge a new 2400 mAh battery pack at about 240 mA for ten hours before flying it on your helicopter or fast-charging it at a high current (3-5 amp) setting.

Note:

If your battery charger has only a Tamiya-style connector, use a Lite Machines/Tamiya adapter to convert the Tamiya-style plug to a Lite Machines plug.

Main Rotor

The main rotor produces the aerodynamic force that lifts your *Corona* helicopter into the air. In flight, the two long main rotor blades act like a large propeller or fan to push air downward. Unlike a propeller, the main rotor is designed to move through the air sideways, and incorporates pushrods and linkages to control the pitch of the blades.

Most model helicopter main rotors have a flybar at 90 degrees to the main rotor blades that increases stability and controllability of the main rotor. The *Corona* main rotor incorporates an *Arlton Subrotor* stabilizer that not only increases stability and controllability, but also the efficiency and lifting potential of the main rotor. Many unique features of the *Corona* main rotor (including the main rotor blades, *Arlton Subrotor* stabilizer, blade grips, etc.) are patented.

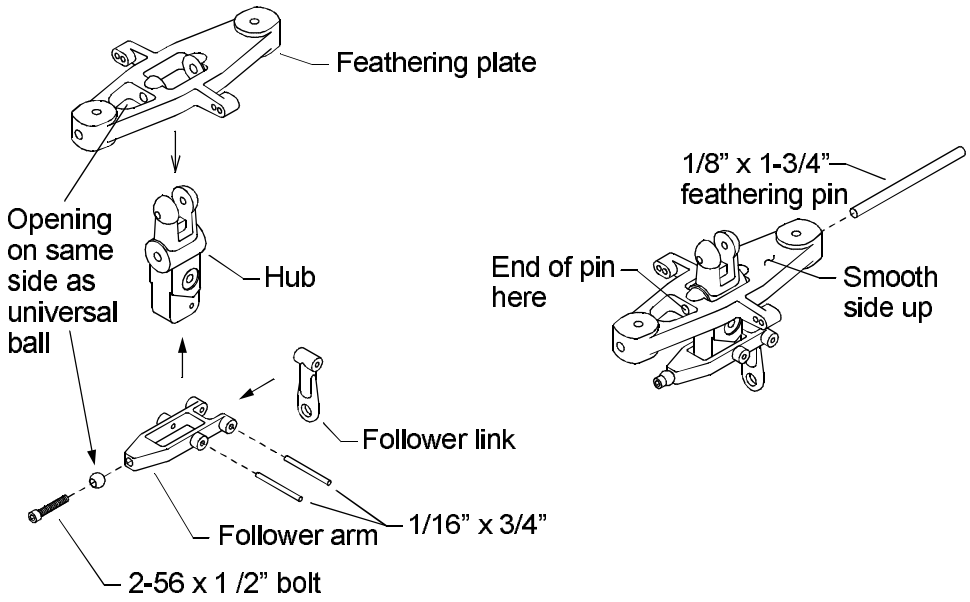


Figure 8-1.

Hint:

When installing a steel pin into a plastic part, hold the plastic part against a hard, solid surface (such as a concrete floor or patio) and tap on the pin with a hammer. Do not hold the part against your dining room table or kitchen counter top. The hard plastic and the end of the pin can damage the table or counter top and cause you long-term grief with the rest of your family.

- ❑ 1. Attach a metal universal ball to the follower arm as shown in Fig. 8-1. Tighten the bolt only until the ball is held in place (tightening further may strip the plastic threads).
- ❑ 2. Attach the follower link to the follower arm, and the follower arm to the hub as shown with 1/16" (1.6mm) steel pins. The pins should extend completely through the plastic parts and equally out each side. The follower arm and link should move very freely.

- ❑ 3. Slide the rotor hub through the center of the feathering plate. The indentations on the feathering plate should face down (the smooth side faces up). **MAKE SURE THE PUSHROD THROUGH-HOLE IN THE FEATHERING PLATE IS ON THE SAME SIDE AS THE UNIVERSAL BALL ON THE FOLLOWER ARM.**

- ❑ 4. Insert the 1/8" steel feathering pin into the feathering plate. Use a long 4-40 bolt and hammer to gently tap the pin through the hub until it is flush with the inside edge of the pushrod through-hole in the feathering plate. The feathering plate should rotate about the feathering pin very freely.

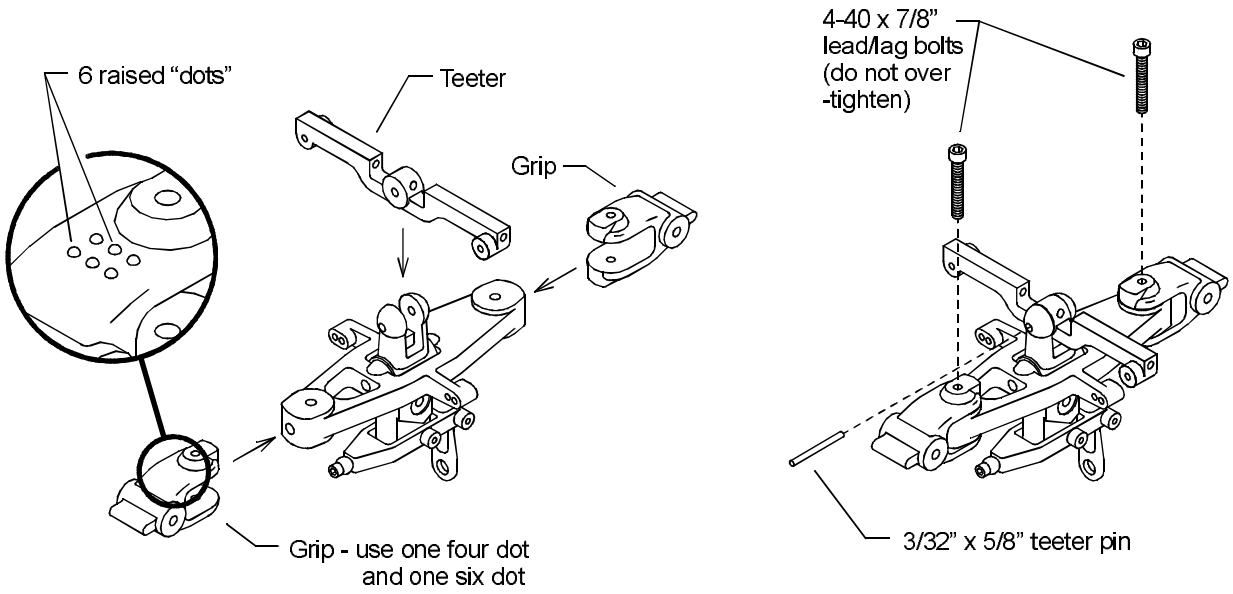


Figure 8-2.

Note:

The *Corona* helicopter has interchangeable blade grips to adjust main rotor blade pitch. Raised dots on the surface of each blade grip indicate the angle of the grip in degrees. For example, blade grips with four dots, called "four-grips" add four degrees to the blade's natural pitch angle. It does not matter if the raised dots face upward or downward on the main rotor. Refer to the Operator's Guide for information on selecting blade grips for the best flight performance.

❑ 5. Attach one six-grip (six raised dots) and one four-grip (four raised dots) to the feathering plate with 7/8" (22mm) lead/lag bolts as shown in Fig. 8-2. These are called lead/lag bolts because the rotor blades swing forward and backward (or lead and lag) on these bolts in flight. Do not over-tighten the bolts. They will be adjusted later after attaching the rotor blades.

❑ 6. Attach the teeter to the forks to the hub with a 3/32" (2.4mm) steel pin. The teeter should move very freely.

Important!

Both the feathering plate and teeter must move very freely. If either binds or drags even slightly your *Corona* helicopter will not be stable in flight!

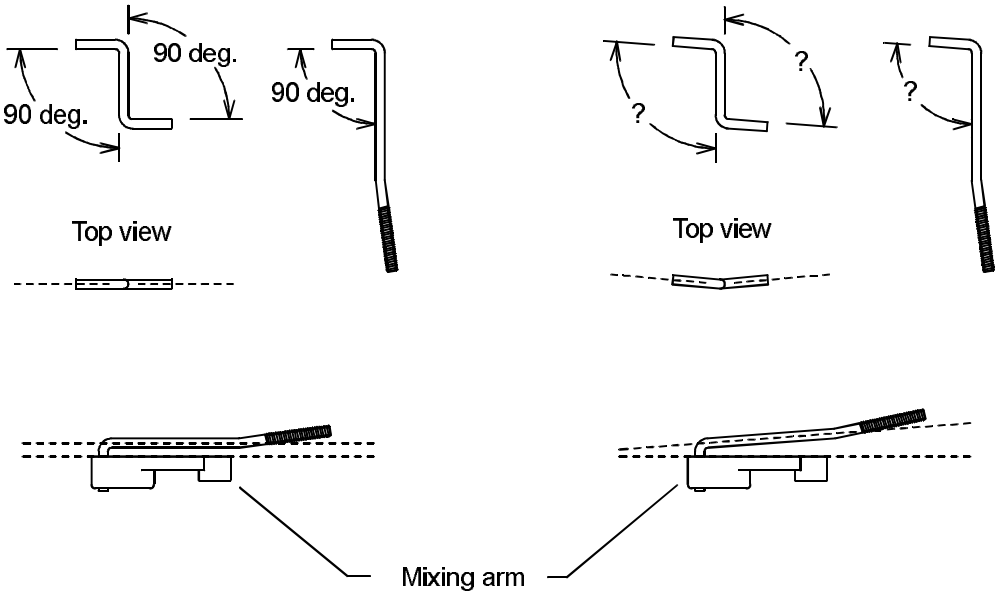


Figure 8-3.

❑ 7. The right-angle bends in the Z-links and mixing-arm/swashplate pushrods must measure exactly 90 degrees. Compare your Z-links links and mixing-arm/swashplate pushrods to Fig. 8-3 and bend them slightly with a pliers if necessary.

❑ 8. Screw a plastic ball-link onto the end of each mixing-arm/swashplate pushrod and adjust to the length shown in Fig. 8-4.

❑ 9. Mount the mixing arms, Z-links, and pushrods to the teeter with bolts and washers as shown. Note that the mixing arms and feathering plate arms each have two Z-link holes. Place the Z-links in the outer holes away from the center of the rotor head.

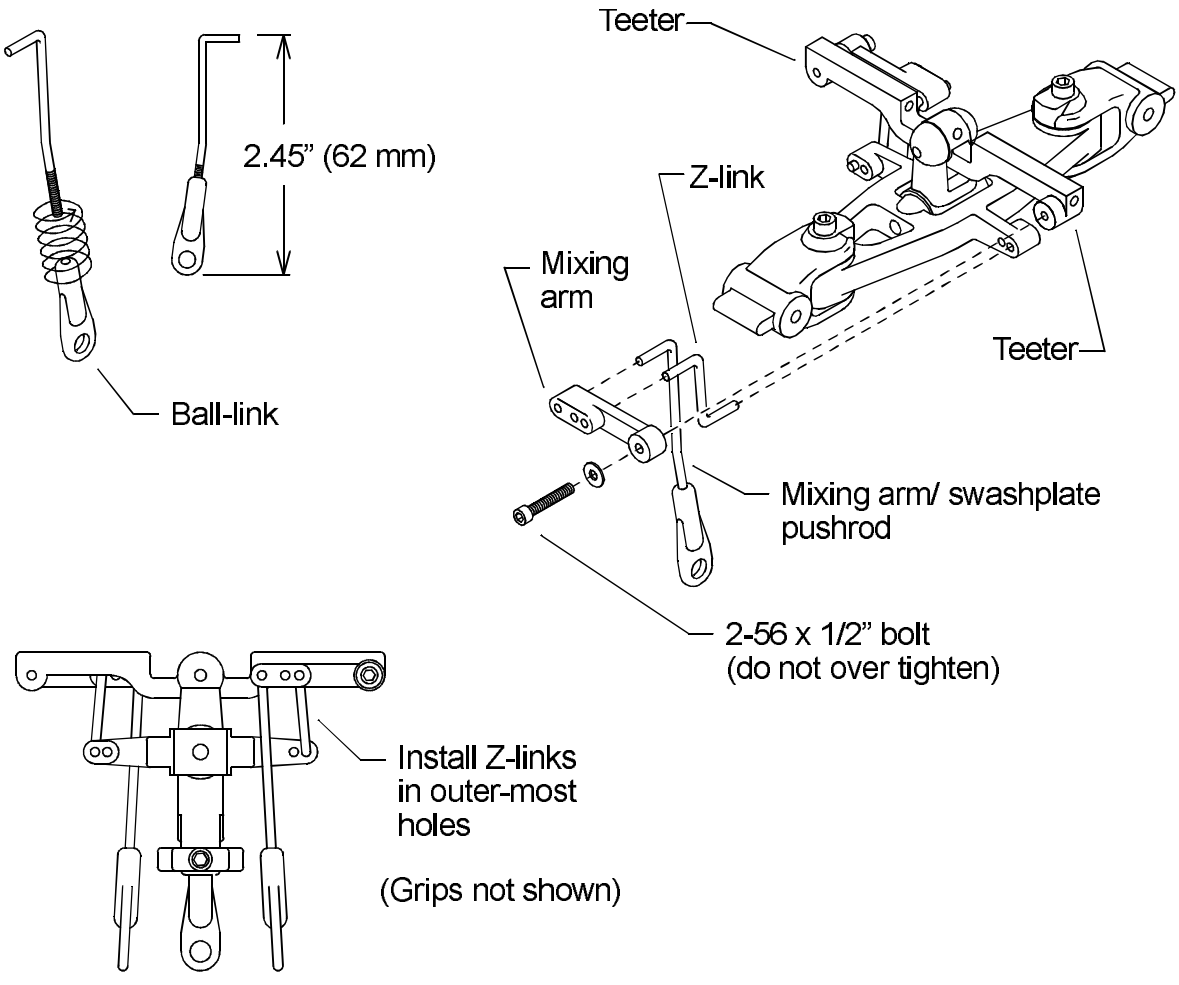


Figure 8-4.

Note:

The two Z-link positions produce different flight characteristics. The outer position produces normal control response, while the inner position is more powerful but less stable. You can move the Z-links to the inner position later if you want to experiment, but do not install a Z-link from an outer hole to an inner hole. This will bind the rotor head.

❑ 10. Adjust the mixing arm bolts so the mixing arms rotate freely against the teeter. Slowly tighten the bolts until the mixing arms start to bind, then unscrew them about 1/4 turn until the mixing arms once again move freely.

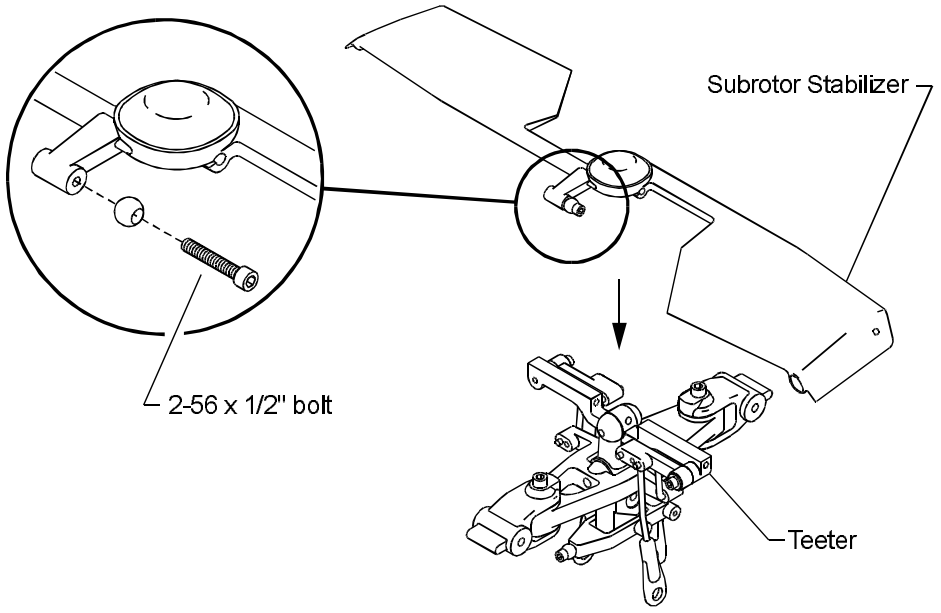


Figure 8-5.

❑ 11. Attach a metal universal ball to the *Subrotor* stabilizer as shown in Fig. 8-5. Tighten the bolt only until the ball is held in place (tightening the bolt further may split the plastic or strip the threads).

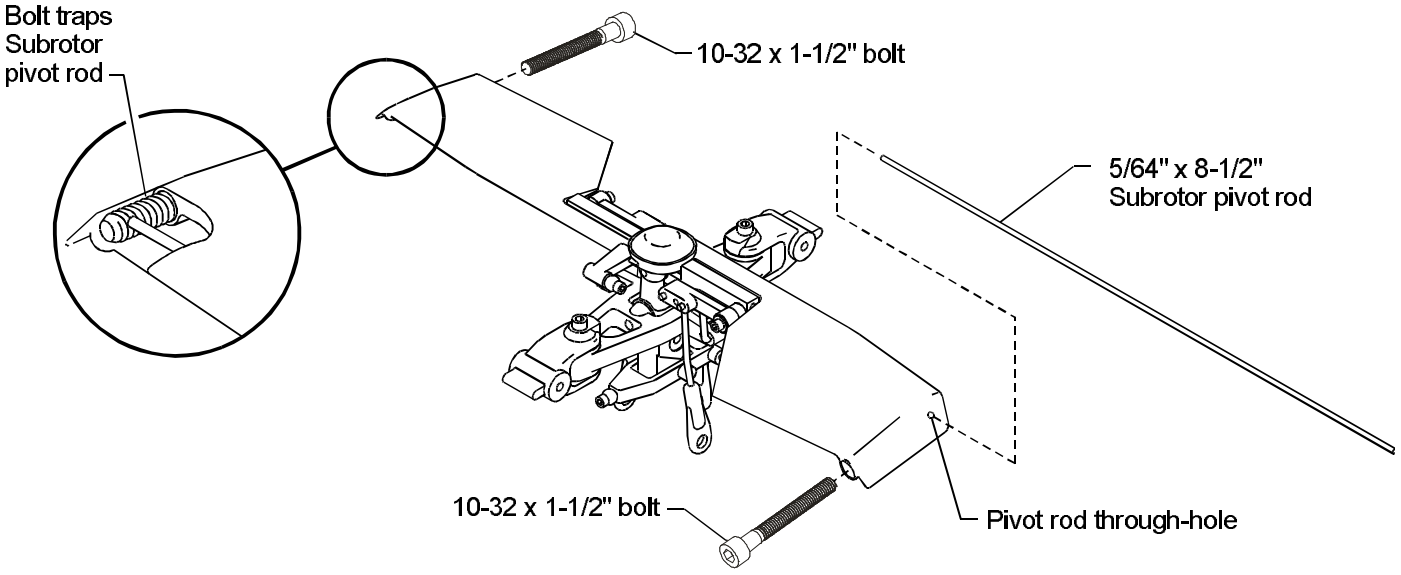


Figure 8-6.

❑ 12. Screw a 10-32 x 1-1/2" bolt into **ONE** *Subrotor* blade as shown in Fig. 8-6. Tighten the bolt until the pivot rod through-hole is completely blocked.

- ❑ 13. Mount the *Subrotor* stabilizer to the teeter with the universal ball on the same side as the big hole in the feathering plate. Push the 8-1/2" (216mm) *Subrotor* pivot rod into one *Subrotor* blade, through the teeter and into the opposite blade.
- ❑ 14. If the pivot rod does not pass through the teeter easily, remove the *Subrotor* stabilizer and enlarge the pivot rod hole in the middle portion of the teeter. To do this, push the rod through the middle portion of the teeter several times so the sharp edges on the end of the rod scrape out the hole. Repeat the previous step.
- ❑ 15. Screw a 10-32 x 1-1/2" bolt into the end of the open *Subrotor* blade as shown in Fig. -6. Tighten the bolt until the pivot rod through-hole is completely blocked.

Warning!

The large bolts in the *Subrotor* stabilzer are meant to trap the pivot rod inside the *Subrotor* blades. **IF THE BOLTS ARE NOT INSTALLED CORRECTLY, THE PIVOT ROD COULD BE THROWN OUT WHEN THE MAIN ROTOR IS TURNING, AND CAUSE SERIOUS INJURY!**

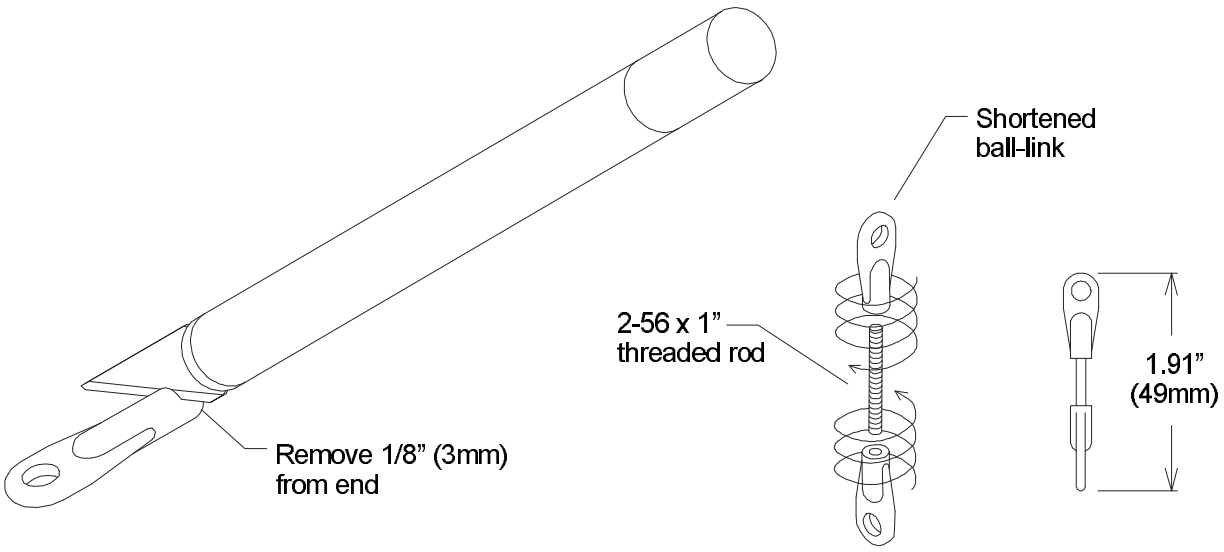


Figure 8-7.

- ❑ 16. Trim 1/8" (3mm) off of the ends of two plastic ball-links with a hobby knife. Screw the two ball-links onto a 1" threaded rod to form the *Subrotor* pushrod, and adjust the length as shown in Fig. 8-7.

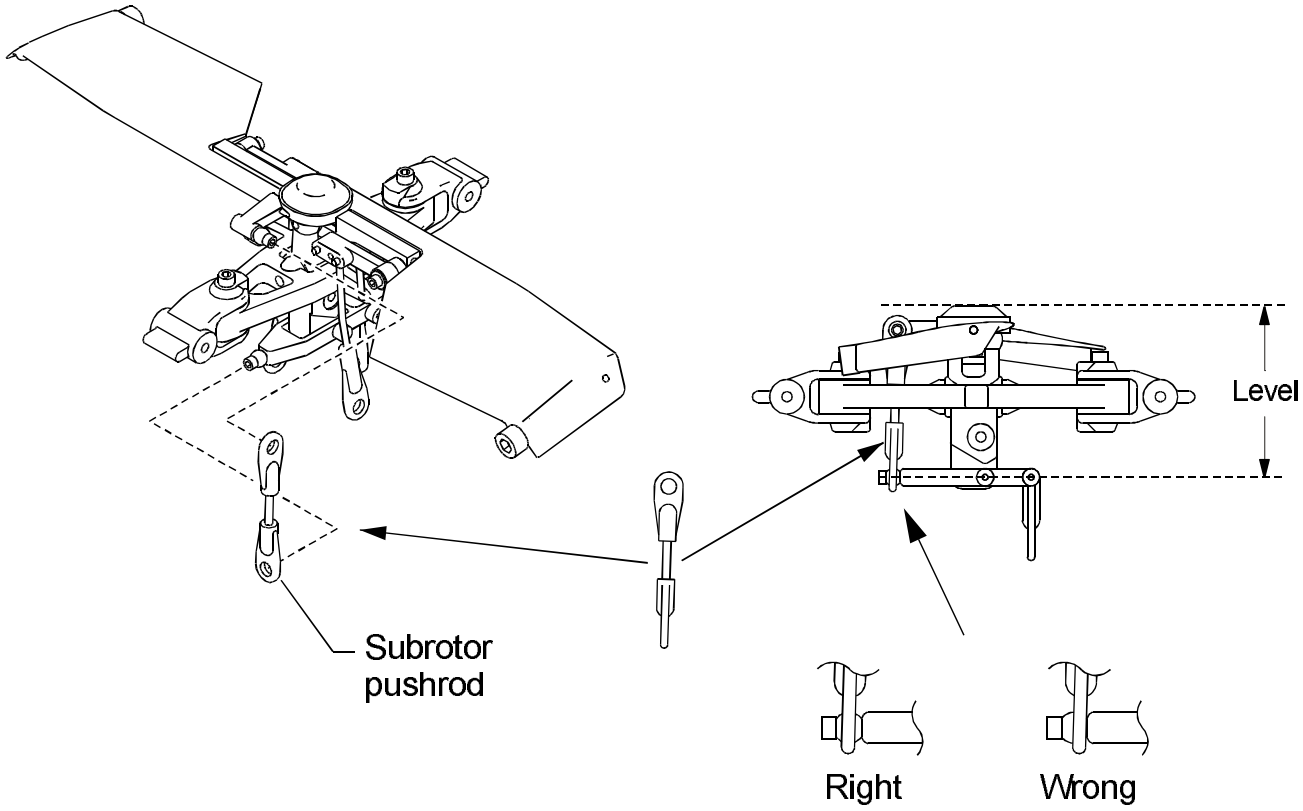


Figure 8-8.

- ❑ 17. Snap the *Subrotor* pushrod onto the follower link and *Subrotor* universal balls, and adjust the length of the pushrod until the *Subrotor* stabilizer and follower link are level as shown in the side view of Fig. 8-8.
- ❑ 18. Locate tall ball bearings. Although these bearings are oiled during manufacture, the original oil is thin and may evaporate over time. As a precaution, place the bearings on a paper towel and apply oil to the bearing seals. In a few minutes you will see oil seep through the bearings and wet the paper towel.
- ❑ 19. Push a 5x11x4mm bearing firmly into each bearing block (see Fig. 8-10) until fully seated. It is sometimes easiest to place the bearing on a hard surface and push the bearing block down over the bearing.

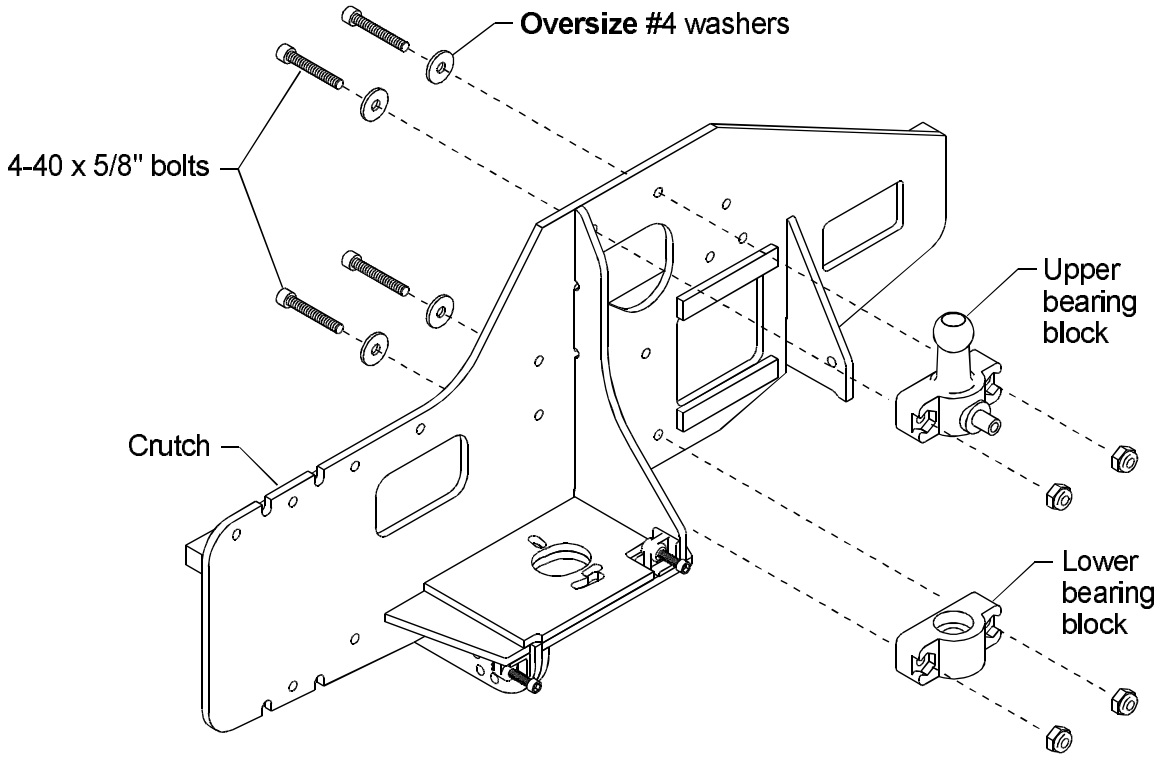


Figure 8-9.

❑ 20. Attach the upper and lower bearing blocks to the crutch with 5/8" (16mm) bolts, **OVERSIZE** washers (3/8" or 9.5mm outside diameter), and nylock nuts as illustrated in Fig. 8-9.

Note:

In the following steps you will temporarily mount the main shaft to the crutch in order to balance the *Subrotor* stabilizer and main rotor blades. A poorly balanced rotor will shake badly in flight and consume engine power. Follow the balancing instructions carefully to avoid problems. In later steps you will position the main shaft more accurately and tighten the bolts and setscrews.

❑ 21. Temporarily assemble the main shaft, bearing blocks, bearings, bearing collars and crown gear as illustrated in Fig. 8-10. Make sure the small deep notch is at the top of the shaft, and the long flat is at the bottom. Leave about 1-1/4" (32mm) of the shaft above the top of the upper bearing block.

Note:

The main rotor shaft on your *Corona* is made from high-strength spring steel and is designed to flex during crashes. By their nature, spring steel shafts usually are slightly twisted or bowed. Do not be alarmed if your shaft is not perfectly straight. Slight bends do not affect flight performance as long as you balance the main rotor blades while they are mounted to the shaft.

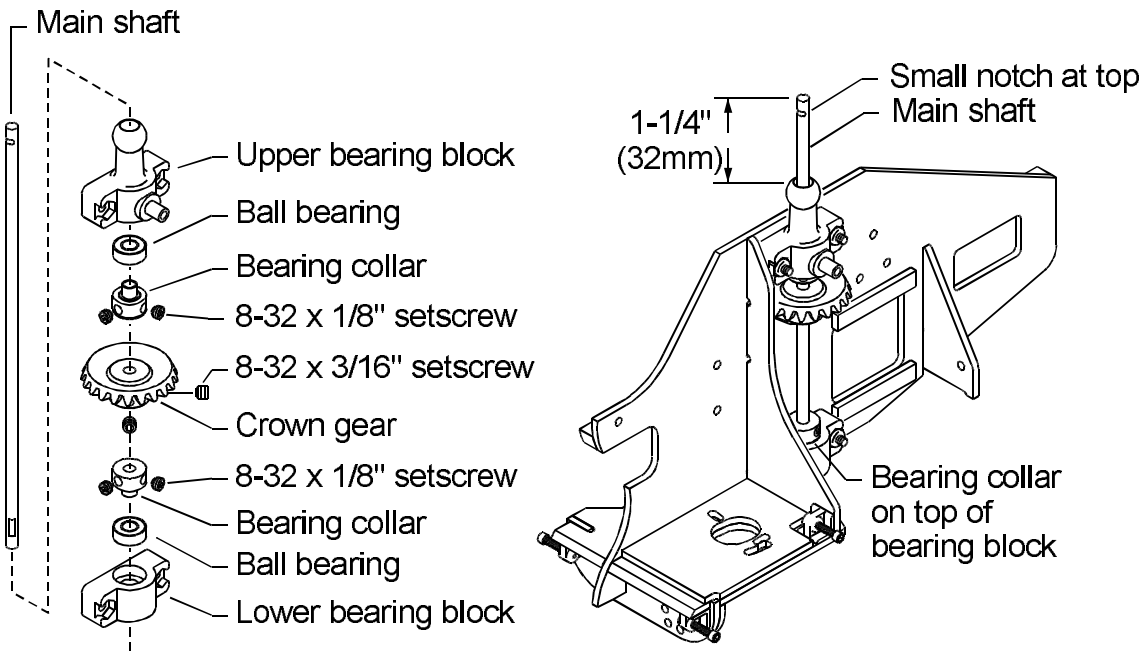


Figure 8-10.

❑ 22. Lightly tighten the setscrews in the upper bearing collar. Pull the main shaft up against the upper bearing, and push the lower bearing collar down against the lower bearing, then lightly tighten the setscrews in the lower bearing collar.

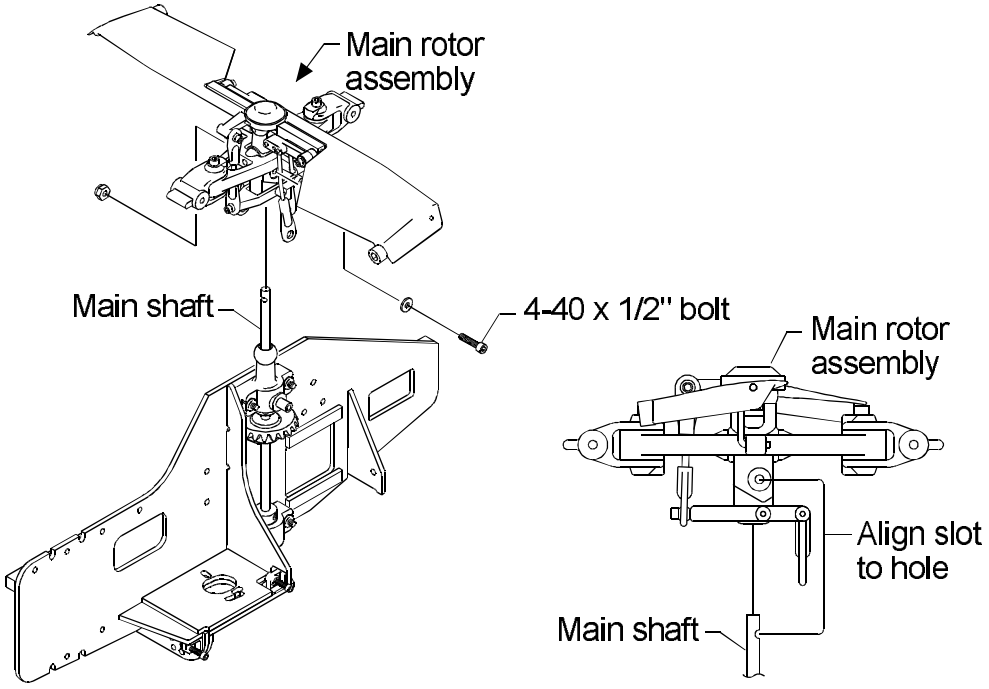


Figure 8-11.

- ❑ 23. Mount the main rotor assembly to the main shaft with a ½" (12.7mm) hub bolt, washer and nylock nut as shown in Fig. 8-11. If the shaft is too tight in the main rotor hub, ream the shaft hole in the hub with a 5/32" (4mm) drill bit to remove interior molding flash.
- ❑ 24. Wash the surface of the *Subrotor* blades with spray glass cleaner to remove any oil or grease (such as finger prints) so that balancing tape will stick.
- ❑ 25. Wrap a piece of masking tape around the two mixing arm pushrods to keep them from flopping around, and support the crutch with books as in Fig. 8-12 so the main rotor overhangs the edge of the table and can rotate without hitting anything. The heavy blade of the *Subrotor* stabilizer will swing downward.
- ❑ 26. Wrap a 1-1/2" x 2" (40mm x 50mm) patch of black stick-on plastic trim material lightly around the leading edge of the high (light) blade as shown in Fig. 8-12. Snip off one end of the patch until the *Subrotor* stabilizer rests horizontally. This means that both blades are the same weight. Tap the tip of one blade and wait for it to stop swinging to check that it is actually balanced. When balanced, press the trim patch firmly in place.

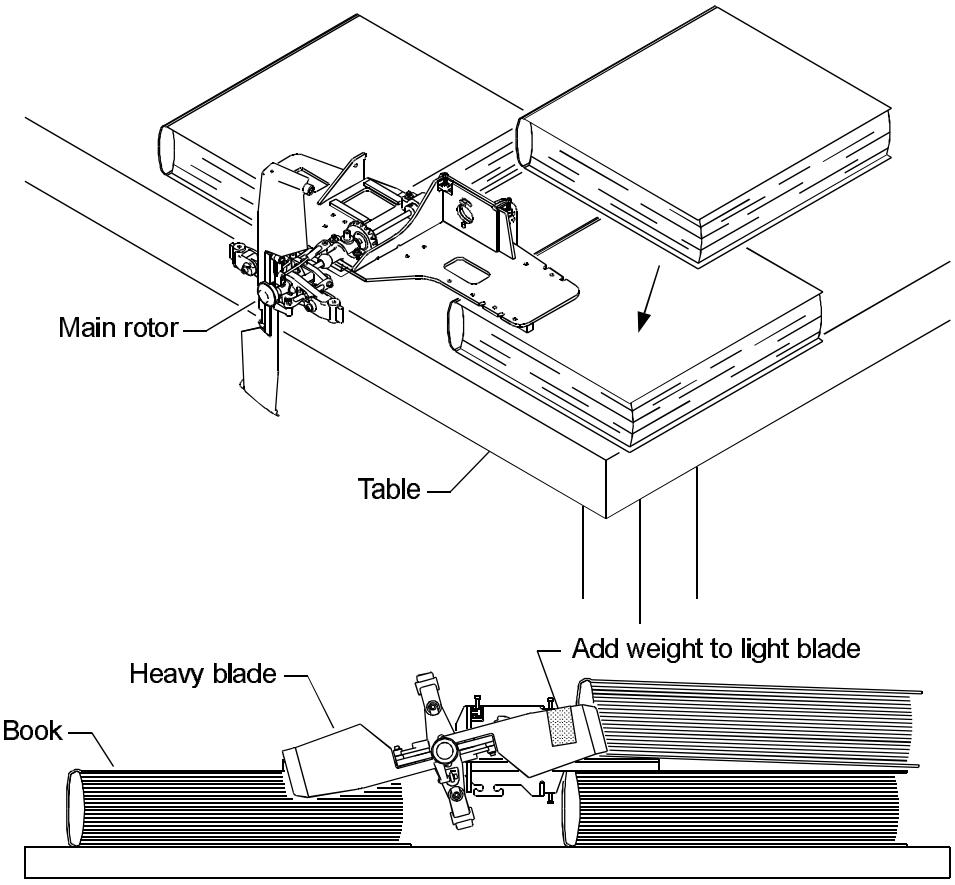


Figure 8-12.

Note:

DO NOT USE THE THICK FOAM VIBRATION ISOLATION TAPE TO BALANCE THE ROTOR BLADES because this will radically increase blade drag in flight. Use only thin plastic trim tape.

- ❑ 27. Read and then remove the warning stickers from the main rotor blade. If they do not peel off easily, soak them in water for 15 minutes and rub them off.
- ❑ 28. Carefully remove the molding "flash" from the leading edge and tip of each rotor blade with medium (220 grit) sandpaper ("flash" is the thin plastic ridge on plastic parts produced by the mold seam-line). Take care to remove only the flash, and do not change the shape of the blade. Clean the surface of the blades with spray glass cleaner to remove oil and grease.
- ❑ 29. If your *Corona* has black or dark blades, apply a 1" (25mm) stripe of brightly colored (white, yellow or orange) stick-on trim material around each blade near the tip. The bright stripe makes the blades more visible when rotating at high speed.

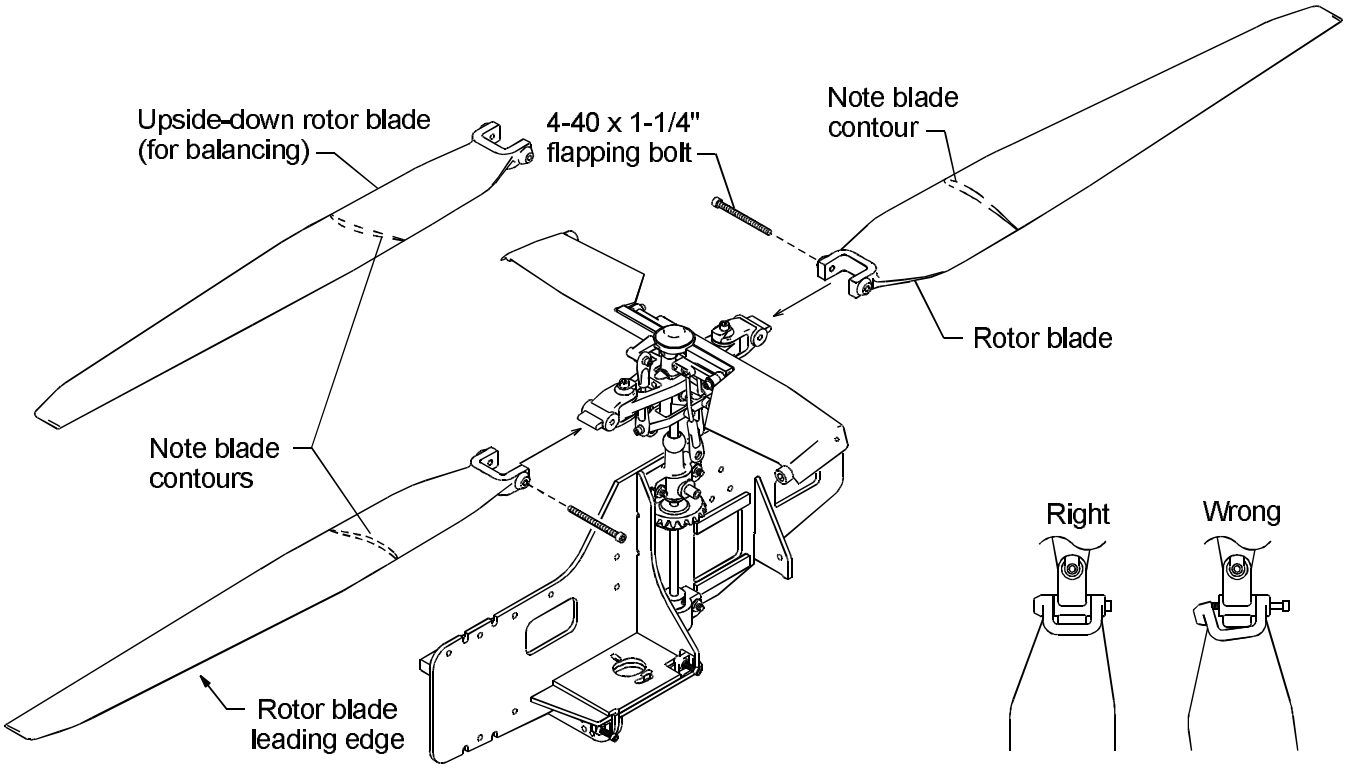


Figure 8-13.

- ❑ 30. As illustrated by Fig. 8-13, bolt the rotor blades to the blade grips on the main rotor assembly with 1-1/4" (32mm) flapping bolts. These are called flapping bolts because the rotor blades flap upward and downward on these bolts in flight. **ATTACH ONE BLADE RIGHTSIDE-UP AND ONE UPSIDE-DOWN**. Balancing the rotor is easier when one blade is mounted upside-down. You will reverse the upside-down blade after balancing the rotor.
- ❑ 31. Tighten the lead/lag and flapping bolts so the blades stand straight out from the main rotor shaft. To increase balance sensitivity, angle the blades up slightly as shown in Fig. 8-14.
- ❑ 32. Wrap a piece of white stick-on trim material around the leading edge of the lighter blade and balance the rotor blades as you did the *Subrotor* stabilizer.
- ❑ 33. Now that the blades are balanced, remove the upside-down blade and bolt it on rightside-up (with the cupped surface facing the crutch). Make sure the flapping bolt passes completely through both sides of the rotor blade root as shown in Fig. 8-13.

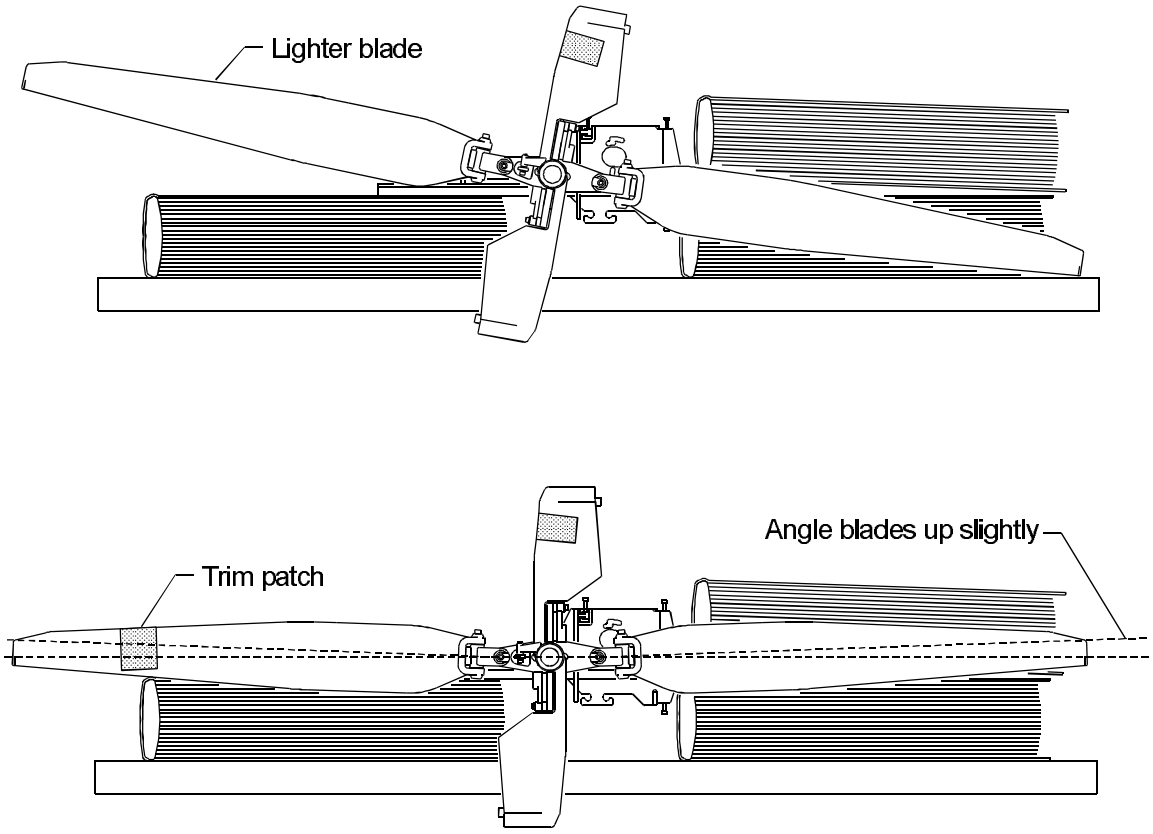


Figure 8-14.

- ❑ 34. Now loosen the lead/lag and flapping bolts slightly so that the blades are free to swing forward and backward, and flap up and down in flight. A light drag force on the lead/lag bolt will not hurt flight performance, and helps keep the blades from flopping around at low rotor speeds.

Note:

IF THE BLADES DO NOT FLAP UP AND DOWN ABSOLUTELY FREELY, YOUR HELICOPTER WILL BE UNSTABLE AND DIFFICULT TO CONTROL.

- ❑ 35. With the tip of a hobby knife, lightly mark a small “X” on the blade and blade grip on the same side of the rotor hub as the *Subrotor* pushrod. With these marks you can remove and replace the main rotor blades without rebalancing them.
- ❑ 36. Remove the masking tape from around the mixing arm pushrods, and put away the books that supported the crutch. Remove the balanced rotor head from the main shaft, and store it somewhere out of the way.

Tail Boom

The tail boom on the *Corona* helicopter is an aluminum tube that extends rearward from the body, and terminates in the tail rotor assembly. A wire drive shaft runs down the length of the tail boom, and transmits power from the main rotor shaft to the tail rotor. The tail rotor incorporates specially designed, high efficiency swept rotor blades (patented) which greatly reduce the mechanical complexity and power consumption of the tail rotor.

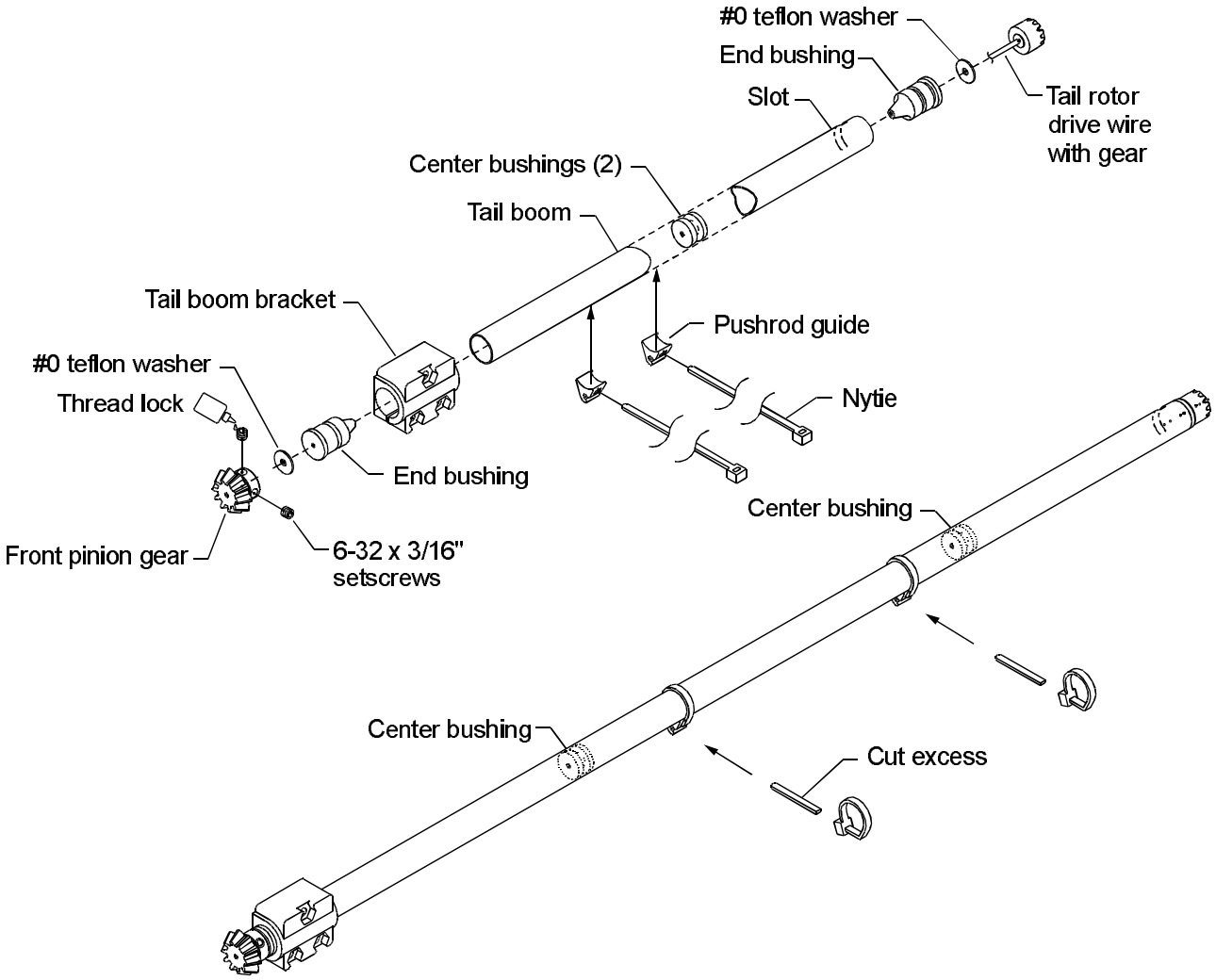


Figure 9-1.

❑ 1. Fill the center holes of all plastic tail boom bushings with oil. Push one center-bushing about 6” (150mm) down each end of the tail boom with a pencil (refer to Fig. 9-1). Note that the center bushings are tapered and will go into the tail boom in only one direction. Cap each end of the tail boom with an end-bushing.

❑ 2. Slide the tail boom mounting bracket onto the front of the boom as shown in Fig. 9-1 with the double bolt holes positioned below the boom.

❑ 3. Slide a small (#1) teflon washer onto the drive wire, and insert the wire into the rear bushing (located at the notched end of the boom), through the center bushings and out the front bushing.

Hint:

The hole in a #1 washer is smaller than the hole in a #2 washer. If a #2 bolt will not pass through a washer, it is probably a #1 washer.

❑ 4. Clean the end of the drive wire at the front end of the tail boom with a tissue to remove any oil. Slip a small (#1) teflon washer over the wire, and mount the front pinion gear to the wire with two setscrews and threadlock. The drive wire should rotate freely inside the bushings.

Hint:

To reduce the possibility of gear slippage, you may file a flat into the drive wire under one of the front pinion gear setscrews.

❑ 5. Attach two pushrod guides to the tail boom with short nyties (nylon cable ties) as shown. The exact orientation will be set later when the tail rotor pushrod is attached. After pulling the nyties tight with a pliers, cut the excess off with a knife or scissors.

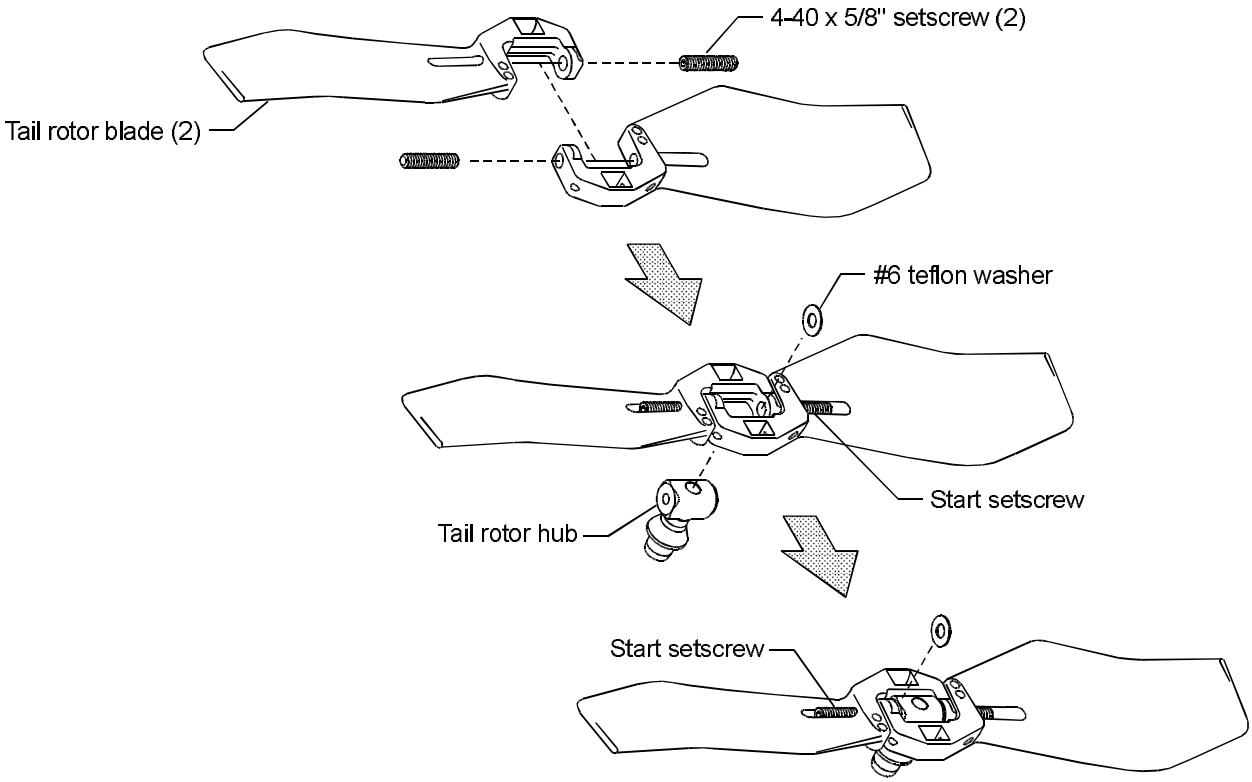


Figure 9-2.

- ❑ 6. Slide a 5/8" (19mm) setscrew into the root of each tail rotor blade and interlock the blades as shown in Fig. 9-2.
- ❑ 7. Slide the interlocked blades over the end of the tail rotor hub, insert teflon washers, and screw the setscrews about 1/8" (3mm) into the hub. Make sure the blades are correctly oriented on the hub and can pivot freely.

Warning!

IF YOUR TAIL ROTOR HUB IS MADE OF METAL (NOT PLASTIC), YOU MUST USE THREADLOCK TO PREVENT THE TAIL ROTOR SETSCREWS FROM FALLING OUT IN FLIGHT.

- ❑ 8. Lubricate the teflon washers with Lite Lube heavy oil.

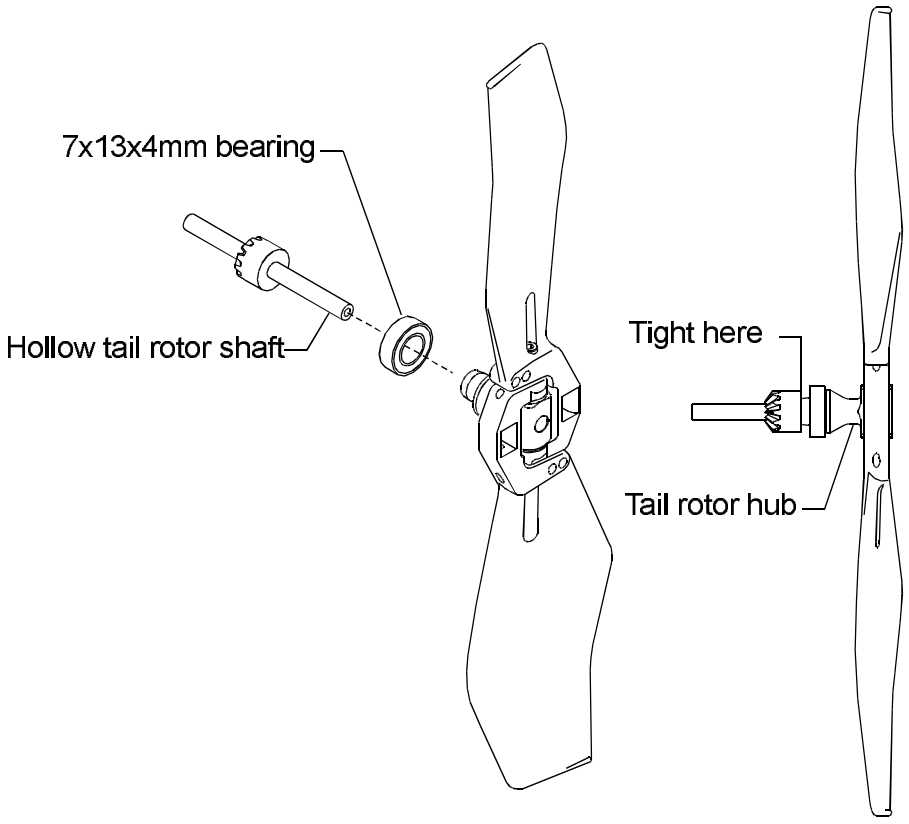


Figure 9-3.

- ❑ 9. Locate one 7x13x4mm and one 5x11x4mm ball bearing, and apply oil as you did before for the main rotor (if you have not already done so).
- ❑ 10. Referring to Fig. 9-3, assemble the tail rotor hub, 7x13x4mm bearing and tail rotor shaft so the end of the hub presses tightly against the back of the plastic bevel gear. Tighten the tail rotor blade setscrews to hold the hub to the shaft (they will be very tight).

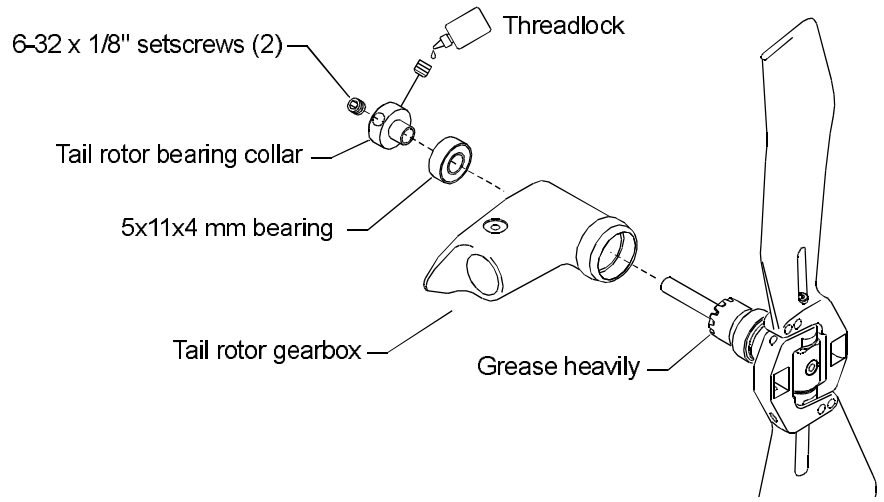


Figure 9-4.

❑ 11. Press a 5x11x4mm bearing and bearing collar into the tail rotor gearbox as shown in Fig. 9-4. Liberally apply *Lite Lube* grease to the shaft gear, and insert the shaft into the gearbox. **MAKE SURE BOTH BEARINGS ARE COMPLETELY SEATED**.

Note:

Petroleum-based greases and oils (like automotive motor oil) cause certain plastics to crack or become brittle. Do not use petroleum-based oil or grease on the tail rotor gears because it will damage the plastic gearbox over time and cause it to crack.

❑ 12. While squeeze the hub and bearing collar together, secure the bearing collar to the shaft with two 1/8" (3mm) setscrews and threadlock (this insures that the tail rotor shaft and gear are correctly positioned inside the gearbox). Make sure no threadlock gets on the tail rotor shaft inside the bearing collar or the shaft will be difficult to disassemble later.

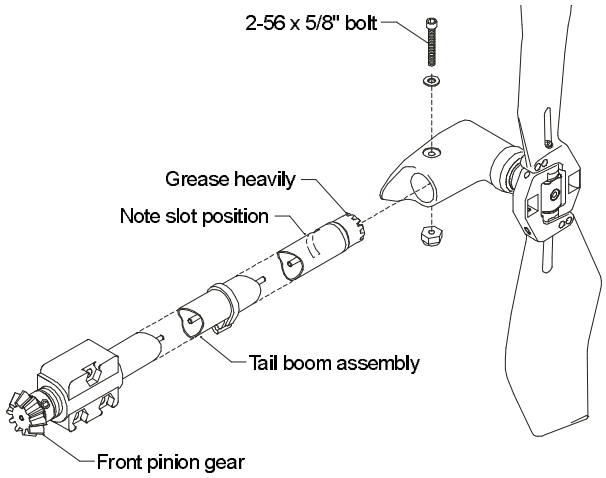
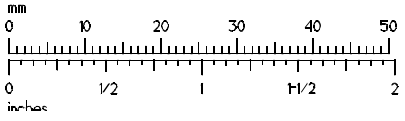


Figure 9-5.



- ❑ 13. LIberally apply *Lite Lube* grease to the bevel gear on the tail boom (remember, don't use petroleum-based grease), and insert the tail boom into the gearbox as far as it will go as shown in Fig. 9-5.
- ❑ 14. Rotate the tail boom until the tail boom slot is aligned with the gearbox bolt hole. Install a 5/8" (16mm) gearbox bolt, washer and nylock nut, but do not tighten the bolt.
- ❑ 15. Turn the pinion gear at the front of the tail boom by hand to check the gear mesh. The bevel gears should bind and turn roughly (this is normal). Simultaneously rotate and pull the tail boom out of the gearbox very slightly to open the spacing between the bevel gears until the gear mesh just starts to feel smooth.
- ❑ 16. Tighten the gearbox bolt and lock the gearbox to the tail boom. When tight, the gearbox nut should dent the tail boom and keep the gearbox from rotating.
- ❑ 17. Make sure the gears rotate smoothly. If not, loosen the gearbox bolt and adjust the gear mesh.

Note:

The gear mesh should not be too loose or too tight. Tight gears absorb engine power, and loose gears wear out quickly.

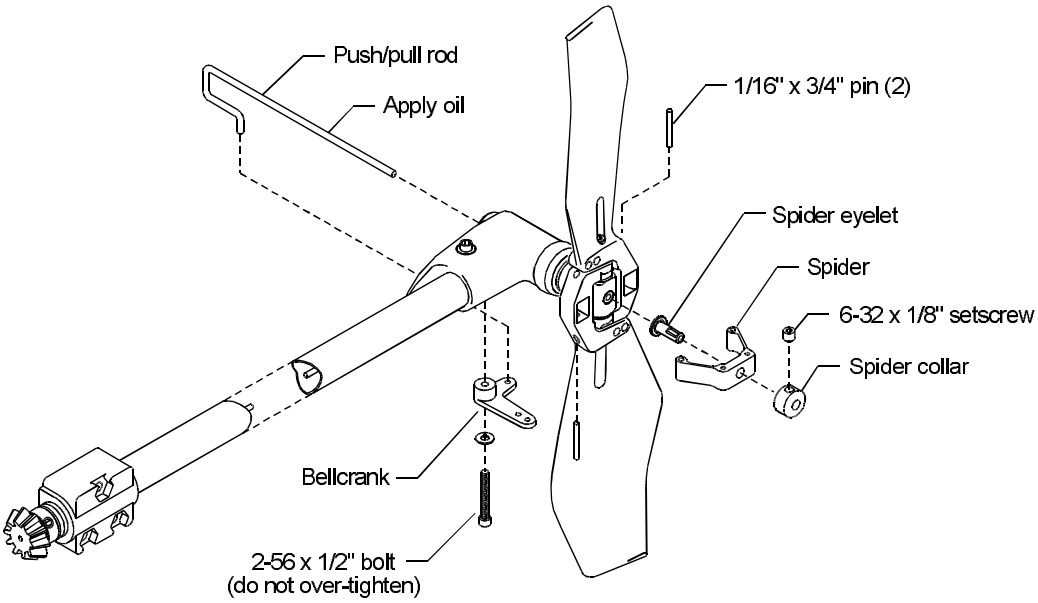


Figure 9-6.

- ❑ 18. Oil the push/pull rod, and assemble the tail rotor bellcrank, push/pull rod and gearbox as shown in Fig. 9-6. Bolt the bellcrank to the bottom of the gearbox with a ½" (13mm) bolt, washer and threadlock (use only thick CA or threadlock labeled as "plastic-safe"). Tighten the bolt all the way, then back it off ½ turn or until the bellcrank pivots freely. Make sure the push/pull rod moves freely within the tail rotor shaft when the bellcrank is moved.

❑ 19. Slide the tail rotor spider and eyelet onto the pushpull rod, and connect the spider and tail rotor blades with steel pins.

❑ 20. Slide the spider collar over the eyelet and secure the eyelet to the push/pull rod with a setscrew and thread lock. Note that the collar setscrew goes through the hole in the eyelet and presses against the push/pull rod. Make sure the spider rotates freely inside the eyelet and collar.

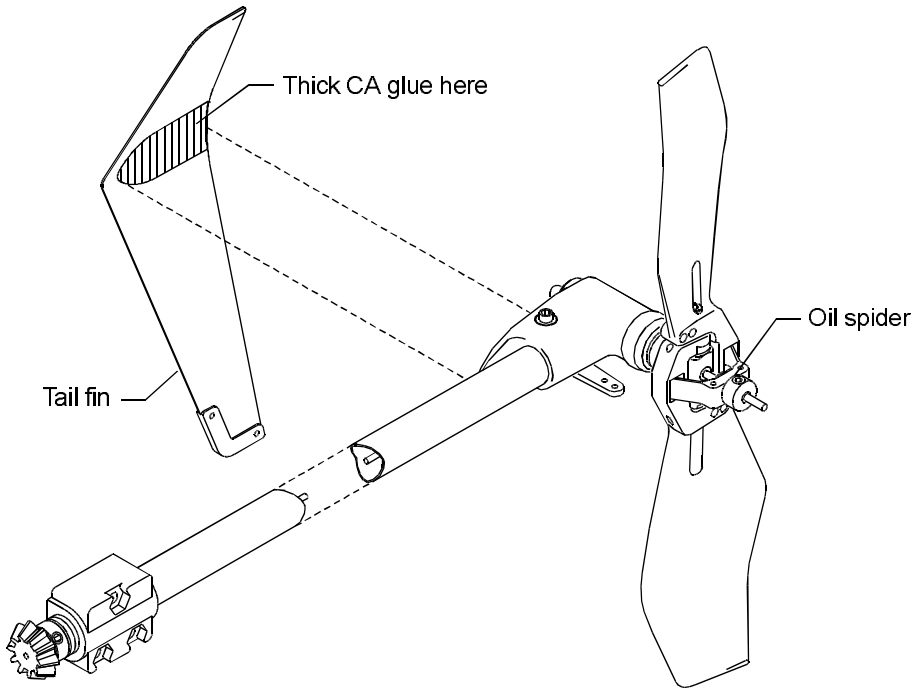


Figure 9-7.

❑ 21. Referring to Fig. 9-7, lubricate the spider with *Lite Lube* heavy oil.

❑ 22. Thoroughly sand the flat side of the gearbox and the corresponding area of the plastic tail fin with coarse (120 grit) sandpaper to completely remove the glossy surface. Apply **THICK** CA to the fin and gearbox, and hold the fin in position against the gearbox for about ten seconds or until the glue sets.

Note:

CA accelerator can cause certain plastics to crack or become brittle. Do not use CA accelerator on or near the gearbox or tail fin. Also, do not use thin CA on the tail fin. It will not fill the gap between the fin and gearbox, and the fin will break off easily.

Swashplate

The swashplate is essentially a large ball bearing surrounding the main rotor shaft below the main rotor. Pilot control commands tilt the lower portion of the swashplate. The upper portion rotates with the main rotor and transmits the pilot commands to the rotating rotor blades. Since the swashplate pitches the main rotor blades up and down in a cycle as they rotate, controls associated with the swashplate are commonly called “cyclic” (pronounced “sigh-click”) controls. The swashplate on the *Corona* helicopter is uniquely simple in design, has double the number of ball bearings found in many other swashplates, and can easily be adjusted for wear.

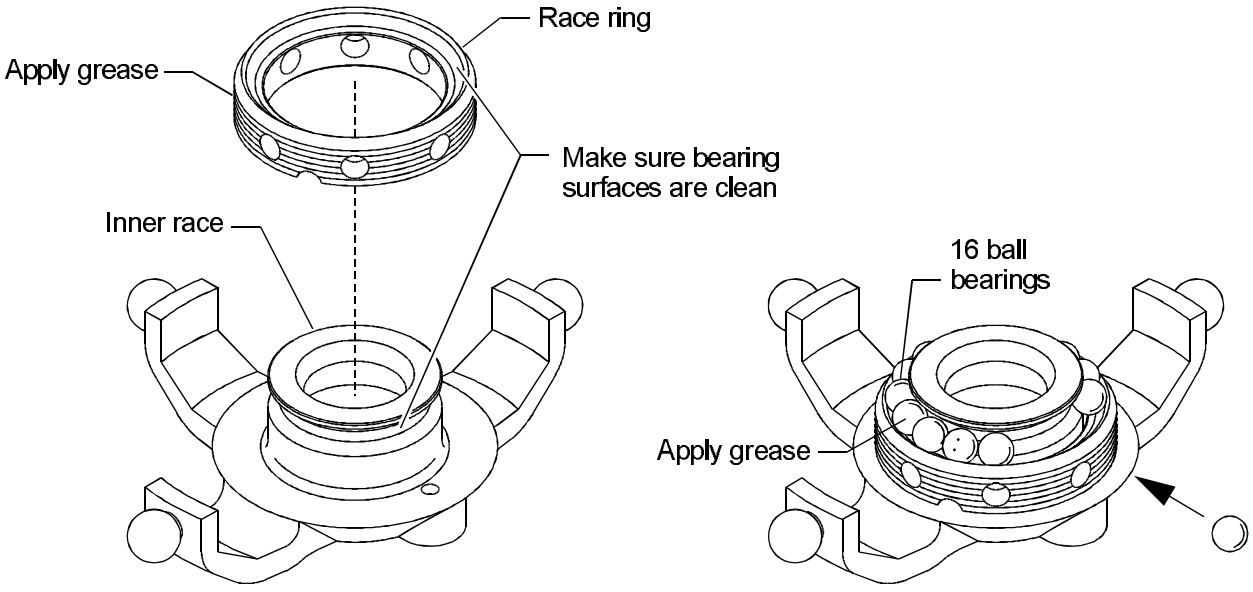


Figure 10-1.

- ❑ 1. Lightly lubricate the exterior threads of the race ring with *Lite Lube* grease to prevent the threads from sticking in later steps.
- ❑ 2. Slip the race ring over the inner race with the notched end facing down as shown in Fig. 10-1. Insert sixteen (16) steel ball bearings into the track formed by the inner race and race ring. The final balls may require a little force to snap into place.
- ❑ 3. Apply enough *Lite Lube* grease to the ball bearings to fill the space between the balls.

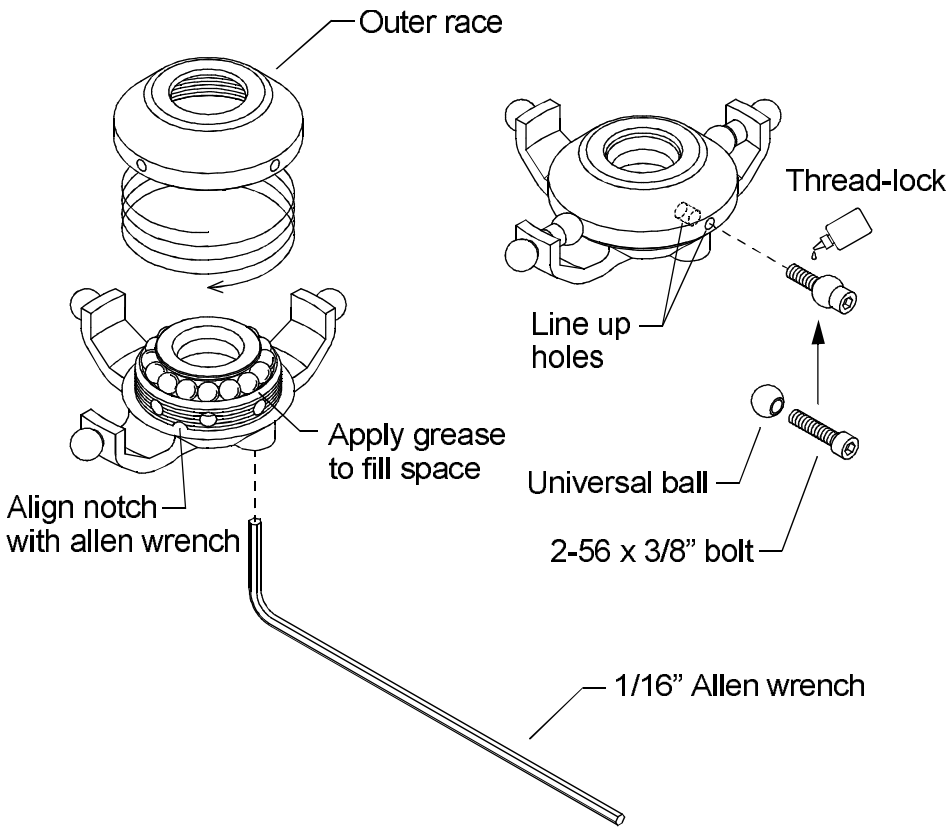


Figure 10-2.

- ❑ 4. Insert a 1/16" hex wrench in the hole in the plastic surrounding the inner race as illustrated by Fig. 10-2. Rotate the race ring until the notch lines up with the end of the wrench . The wrench will prevent the race ring from rotating while you screw on the outer race.

- ❑ 5. Make sure that the inside of the outer race is clean. Screw the outer race clockwise (when viewed from above) onto the race ring until snug. Be careful not to tilt the swashplate assembly while screwing on the outer race. If a ball bearing falls out of the race ring during assembly, it can permanently jam the swashplate.

- ❑ 6. Remove the hex wrench and rotate the outer race and race ring together as a unit. At this point the outer race and race ring are probably screwed together too tightly to allow smooth rotation. Lock the inner race again with the hex wrench, and slowly unscrew the outer race (counter-clockwise) until one of the holes in the outer race lines up with one of the holes in the race ring. This should take less than 1/8th of a turn.

- ❑ 7. Lock the outer race and race ring together with a metal universal ball and a 3/8" (9.5mm) bolt as shown in Fig. 10-2. The bolt should extend through the outer race and into a locking hole in the race ring. Do not accidentally tighten the bolt against the threads on the outside of the race ring. If you do, the race ring will distort and the swashplate will not work properly.

- ❑ 8. Remove the hex wrench again and spin the swashplate. It should spin very smoothly, but have little or no vertical play. If the races bind or turn roughly, unscrew the races to the next set of locking holes. If the swashplate still does not move freely, disassemble and check for dirt in the grease, and repeat the last two steps.
- ❑ 9. Once the swashplate spins smoothly, screw two more bolts and universal balls into the swashplate with threadlock on the bolt threads.
- ❑ 10. Remove the first bolt, apply threadlock to the threads and screw it back into the swashplate. Tighten all bolts (but be careful not to strip the threads).

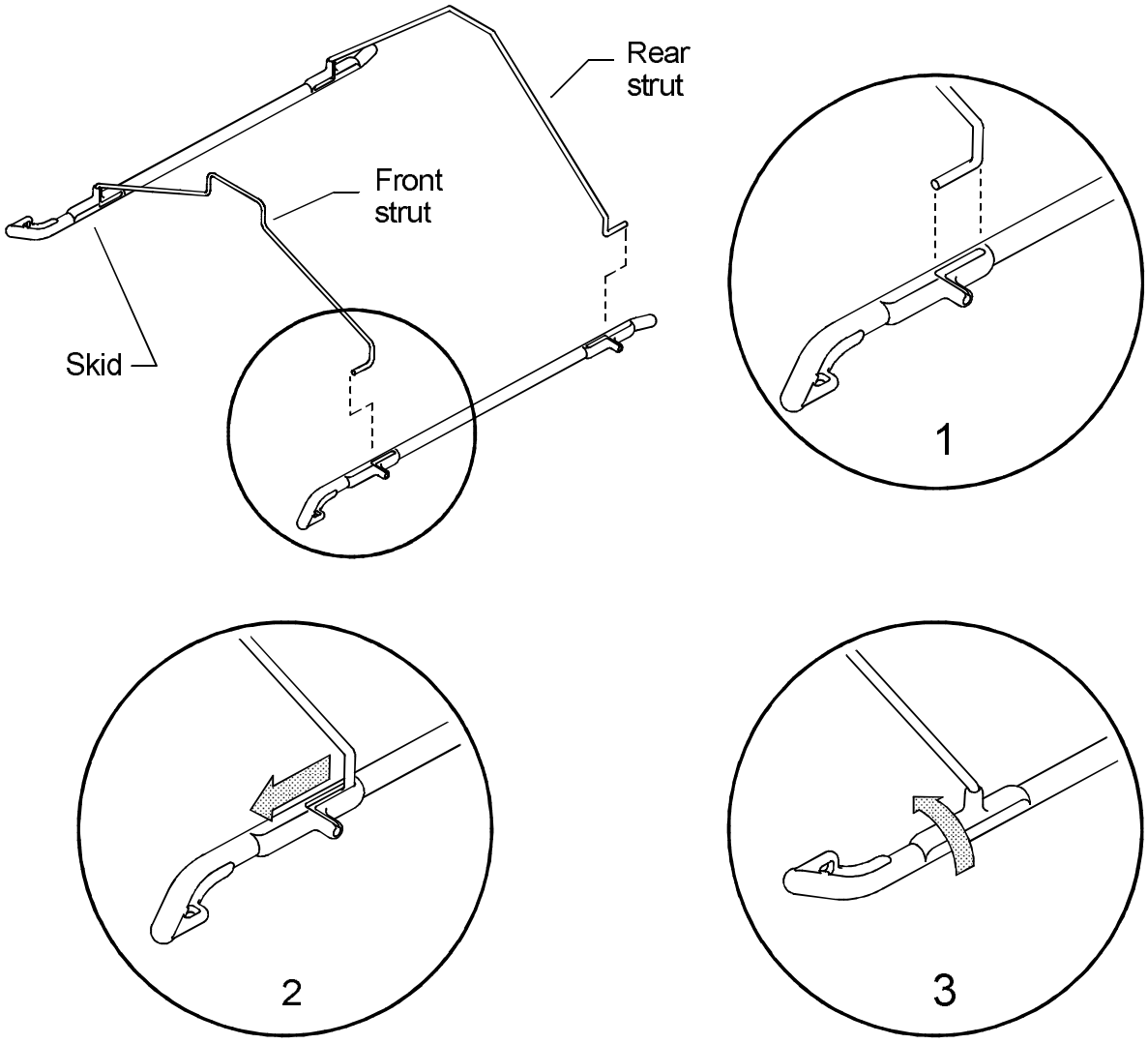


Figure 10-3.

- ❑ 11. Attach the plastic landing gear skids to the wire landing gear struts as shown in Fig. 10-3. Note that the front and rear struts are not the same.

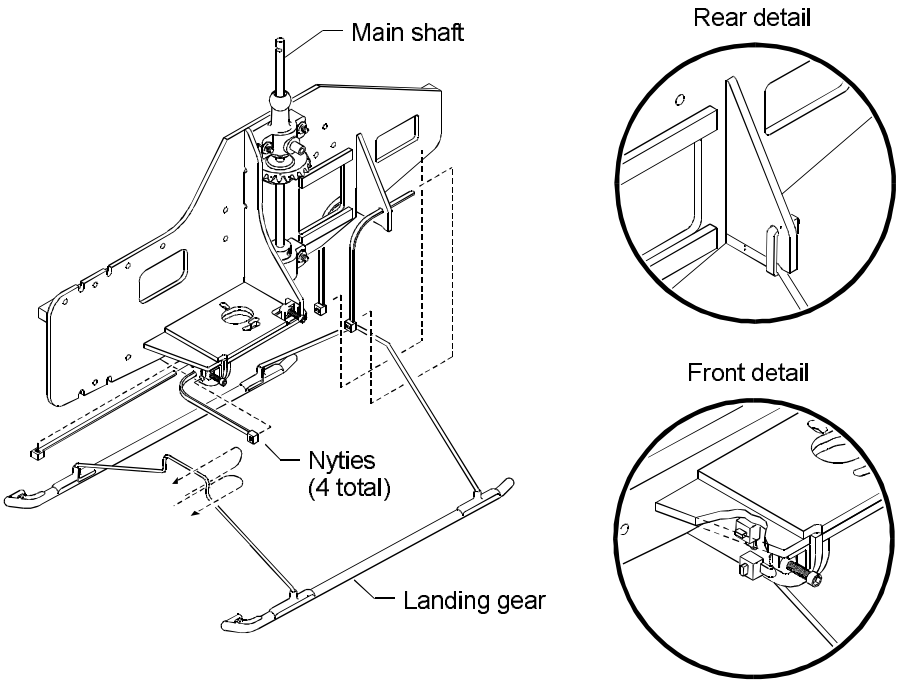


Figure 10-4.

❑ 12. Attach the landing gear to the crutch with short nylon cable ties (nyties) as shown. in Fig. 10-4. Pull the nyties tight with a pair of pliers, and clip the ends.

Warning! **BE CAREFUL NOT TO POKE YOURSELF WITH THE TOP OF THE MAIN SHAFT.**

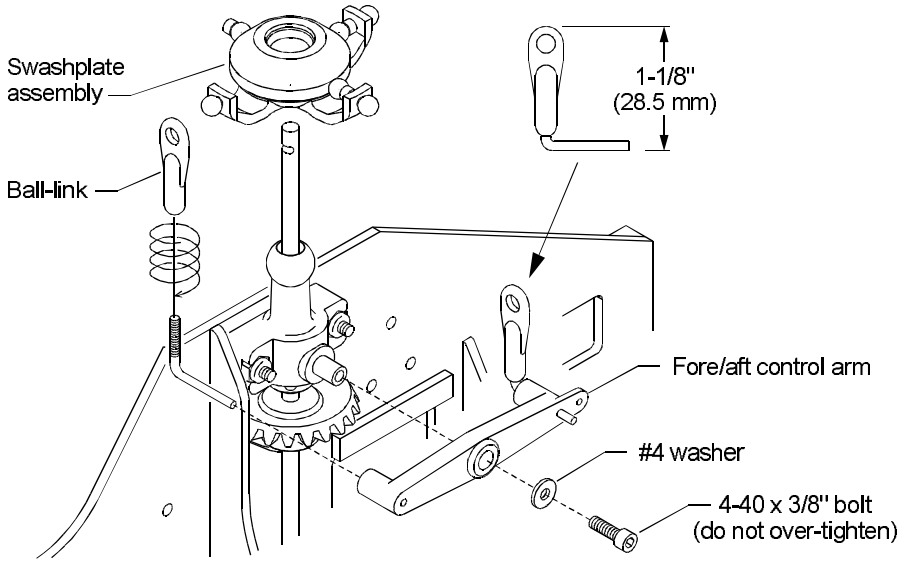


Figure 10-5.

- ❑ 13. Attach the fore/aft control arm to the upper bearing block (which is mounted to the crutch) as shown in Fig. 10-5. To avoid stripping the bolt hole, push the bolt into the hole while turning it, and do not over-tighten it. The control arm should move freely.
- ❑ 14. Attach plastic ball-links to two L-links, and adjust to the length shown. Insert the free end of each L-link into the control arm as shown.
- ❑ 15. Place the swashplate on top of the upper bearing block with the middle swashplate arm above fore/aft control arm. Snap the ball-links onto the two other arms of the swashplate as shown.
- ❑ 16. Adjust the lenth of the L-links until the swashplate rests against the universal ball and tilts freely in any direction. If the swashplate is too high, unsnap the L-links and screw each ball-joint down ½ turn. If the swashplate is too tight against the universal ball, unscrew each ball-joint ½ turn. Repeat the process until the swashplate feels right. Note that both L-links must be the same length to prevent the swashplate from binding.

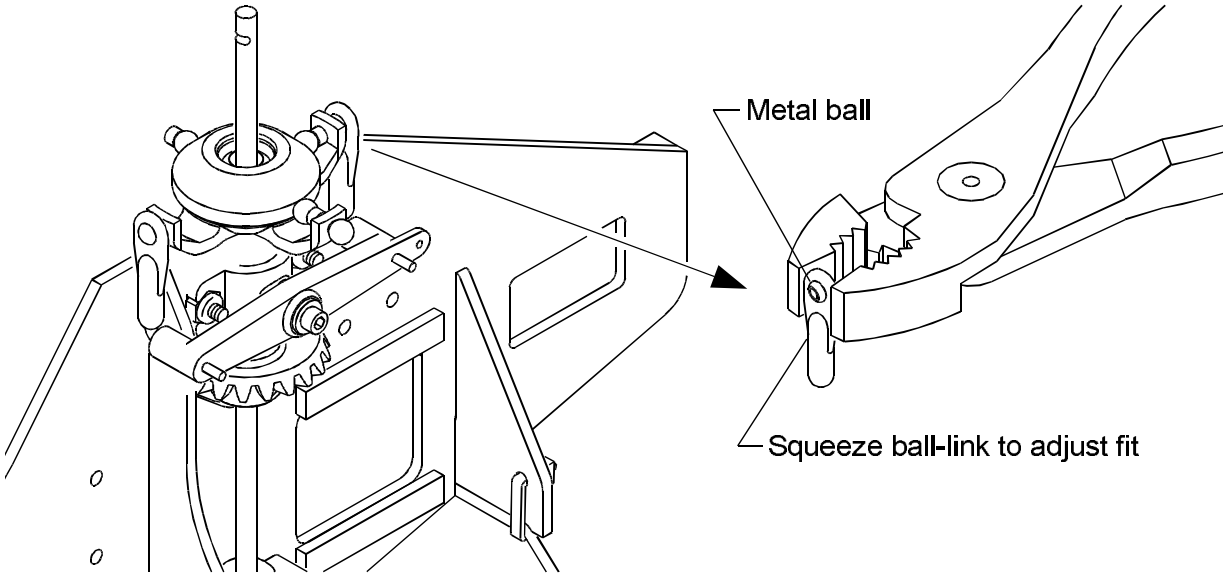
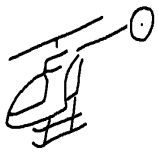


Figure 10-6.

- ❑ 17. The plastic balls on the swashplate arms vary slightly in size. If the ball-joints are too tight, the swashplate may not operate smoothly. To get an idea of the proper fit, snap a ball-link onto a metal universal ball and move the link around. To loosen a tight ball-link, remove the link from the swashplatre and snap it onto a metal ball. Gently squeeze the link with a pair of pliers as shown in Fig. 10-6 to deform the plastic slightly.



Final Assembly

In this section you will assemble something resembling a helicopter. Carefully follow all instructions concerning gear mesh and alignment to insure a smooth running power transmission. Make sure your radio batteries are charged - you will need to use the radio in the next section.

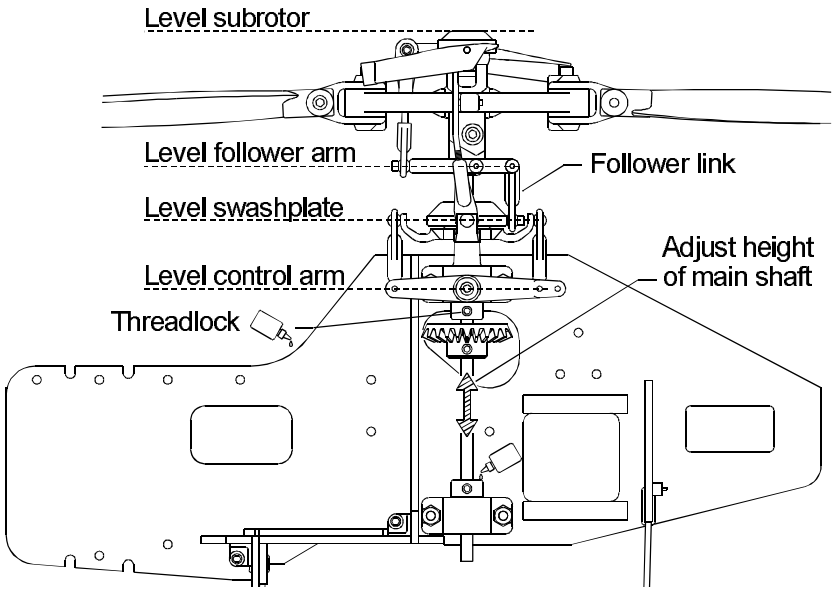


Figure 11-1.

- ❑ 1. Mount the rotor head to the main shaft as shown in Fig. 11-1 (review Fig. 8-11 if necessary). Snap the follower link to the middle swashplate universal ball.
- ❑ 2. Loosen the setscrews in the main-shaft bearing collars (review Fig. 8-10 if necessary) and move the shaft up or down until the *Subrotor* stabilizer and follower arm are level with the swashplate and fore/aft control arm as shown in Fig. 11-1.

Note:

Certain important setscrews, such as in the main-shaft bearing collars and main gear, need to be very tight. **WHEN INSTRUCTED IN BOLD TYPE TO MAKE A SETSCREW VERY TIGHT, INSERT THE SHORT END OF A HEX WRENCH INTO THE SETSCREW, AND TIGHTEN THE SETSCREW WITH THE LONG END FOR EXTRA LEVERAGE.**

- ❑ 3. When the shaft is correctly positioned, push the bearing collars firmly against the upper and lower bearings so the shaft cannot move vertically, and secure the collar setscrews with threadlock. **MAKE SURE THE SETSCREWS ARE VERY TIGHT.**

❑ 4. Snap the mixing arm pushrods onto the two remaining swashplate universal balls. Adjust the length of the pushrods if necessary to prevent the rotor head from binding (final adjustments will be made later while flying).

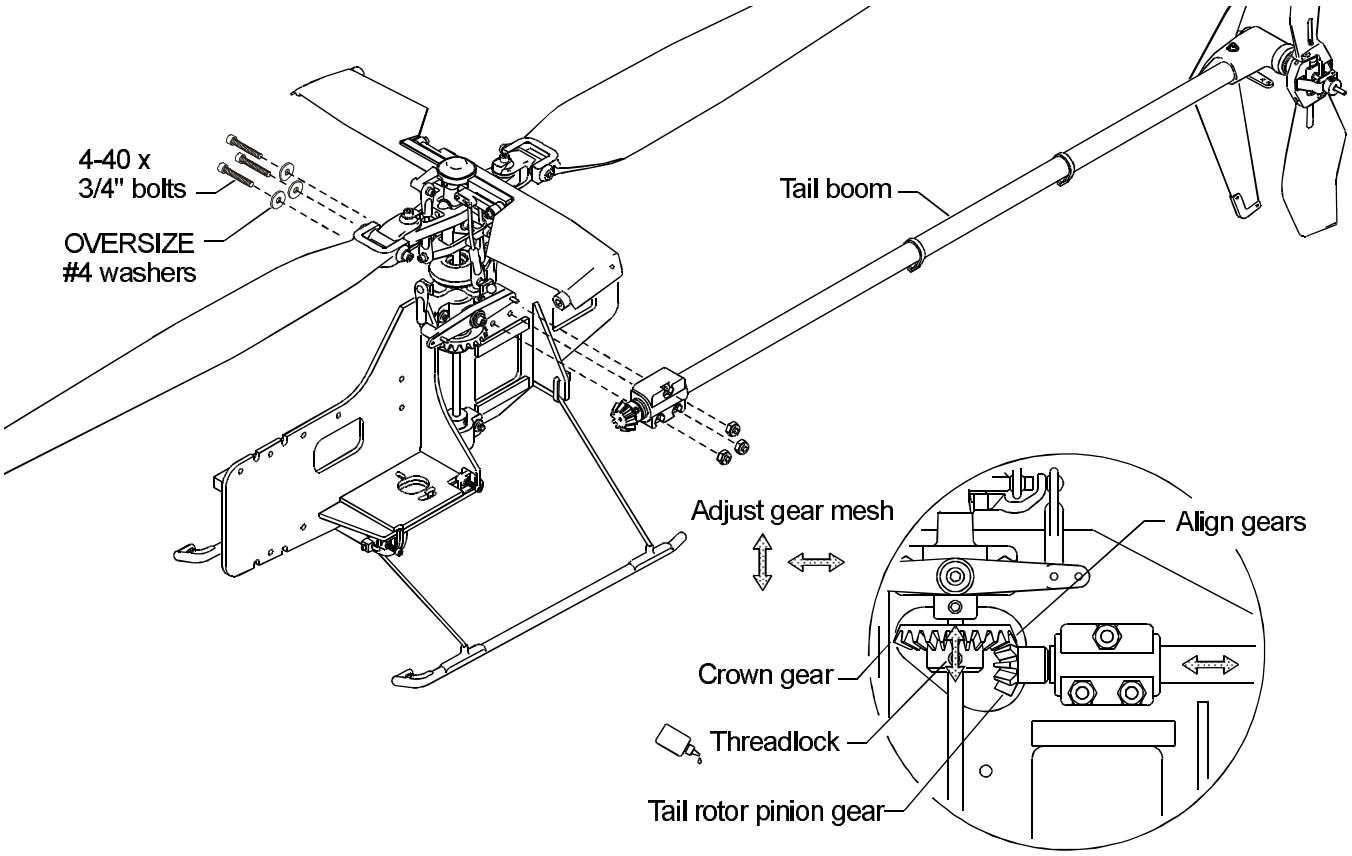


Figure 11-3.

❑ 5. Loosely bolt the tail boom assembly to the crutch using three 3/4" (19mm) bolts and **OVERSIZE** washers (3/8" or 9.5mm outside diameter) as shown in Fig. 11-3. Move the crown gear on the main shaft to clear the tail rotor pinion gear if necessary.

❑ 6. Position the tail tube horizontally so that the pinion gear teeth line up with the crown gear teeth, rotate the tail tube until the tail fin is vertical (and the tail rotor shaft is horizontal), and tighten the three mounting bolts.

❑ 7. To set the crown-gear/pinion-gear mesh, push the crown gear down onto the pinion gear until the gears bind. Raise the crown gear slightly and tighten one crown gear setscrew. Rotate the main rotor to check the mesh, and repeat the process until the gears run smoothly. Once positioned properly, lock the crown gear to the shaft using threadlock on the setscrews. **MAKE SURE THE CROWN GEAR SETSCREWS ARE VERY TIGHT**.

❑ 8. Temporarily mount the main gear on the lower end of the main shaft with two 3/16" (4.8mm) setscrews as shown in Fig. 11-4. Make sure one of the setscrews rest on the flat in the shaft.

❑ 9. Attach the motor pinion gear to your *Electro-Fusion* motor with a 1/8" (3.2mm) setscrew and threadlock as shown in Fig. 11-4. Be careful not to overtighten the setscrew or you will strip the threads in the pinion gear.

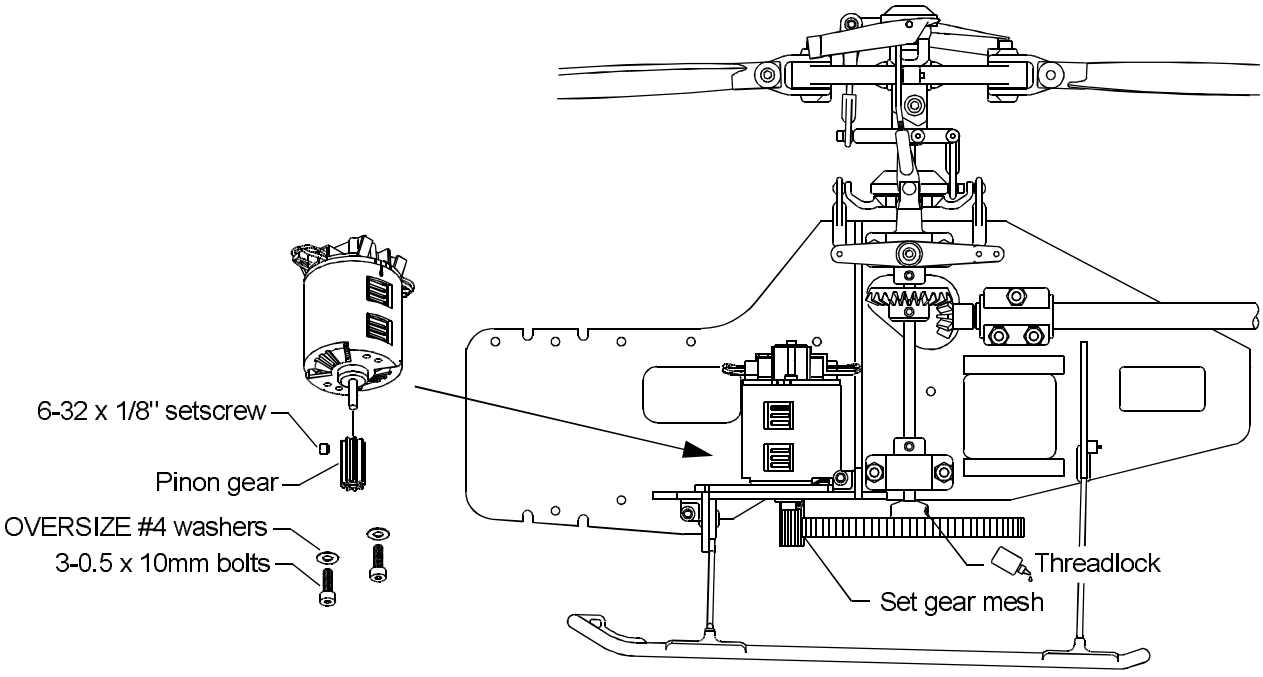


Figure 11-4.

❑ 10. Mount your *Electro-Fusion* motor to the crutch with 10mm bolts (3mm metric thread) and **OVERSIZE** washers with the positive (+) motor terminal on the left.

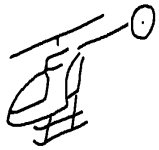
❑ 11. To set proper gear mesh, push the gears together until they bind, then unmesh them until they no longer bind but are still fully engaged. Tighten the motor mounting screws.

Hint:

Another way to set gear mesh is to place a strip of newspaper between the gears, force the gears together, and tighten the motor mounting screws. When the newspaper is removed, the gear mesh should be close to perfect.

❑ 12. Adjust the vertical position of the main gear to run on the motor pinion gear as shown in Fig. 11-4. Once positioned properly, lock the main gear to the shaft using threadlock on the setscrews. **MAKE SURE THE MAIN GEAR SETSCREWS ARE VERY TIGHT.**

❑ 13. Lighlty oil the teeth of the main spur gear and tail rotor crown gear with Lite Lube heavy oil.



Radio Installation

In this section you will install the radio control system. Make sure the radio transmitter and your flight pack battery are charged before starting.

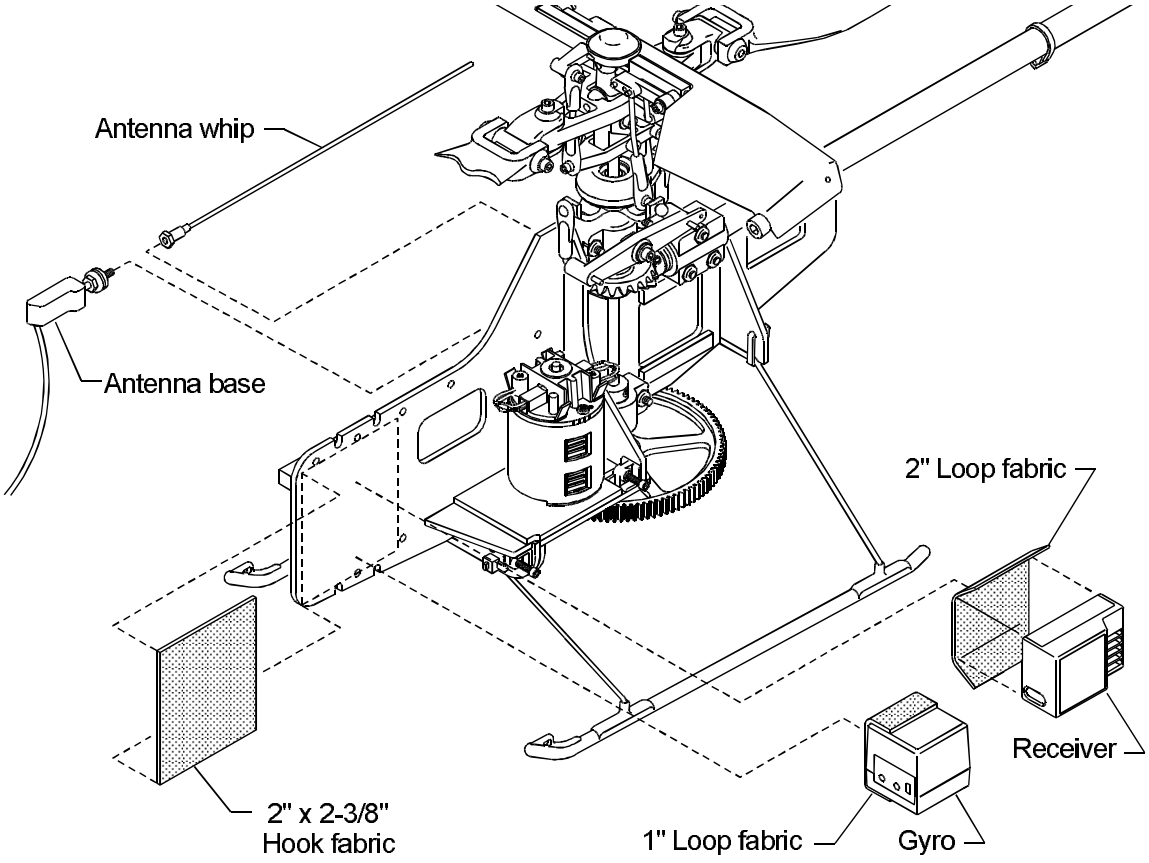


Figure 12-1.

- ❑ 1. Install a *Dean's* two-piece whip antenna to the radio receiver following the manufacturer's instructions. This involves shortening the standard airplane-style wire antenna and soldering on a connector.
- ❑ 2. Press the rubber grommet supplied with the whip antenna into the antenna mount on the crutch, and mount the whip antenna in the grommet. Make sure that the whip portion and base portion of the antenna make good electrical contact to avoid radio interference problems.
- ❑ 3. Cut a 2" x 2-3/8" (51mm x 60mm) piece of **HOOK** fabric as shown in Fig. 12-1, and apply it to the keel. Use only the **HOOK** part of the fabric (not the loop part), and do not cover any holes in the keel.

❑ 4. Wrap the back and two sides of your radio receiver with **LOOP** fabric (not hook fabric), and mount it to the keel as shown. The fabric must fold onto the sides of the receiver, or it will peel off in time.

❑ 5. Wrap three sides of your gyro with 1" (25mm) **LOOP** fabric, and mount it to the keel with the gyro adjustment screw(s) exposed.

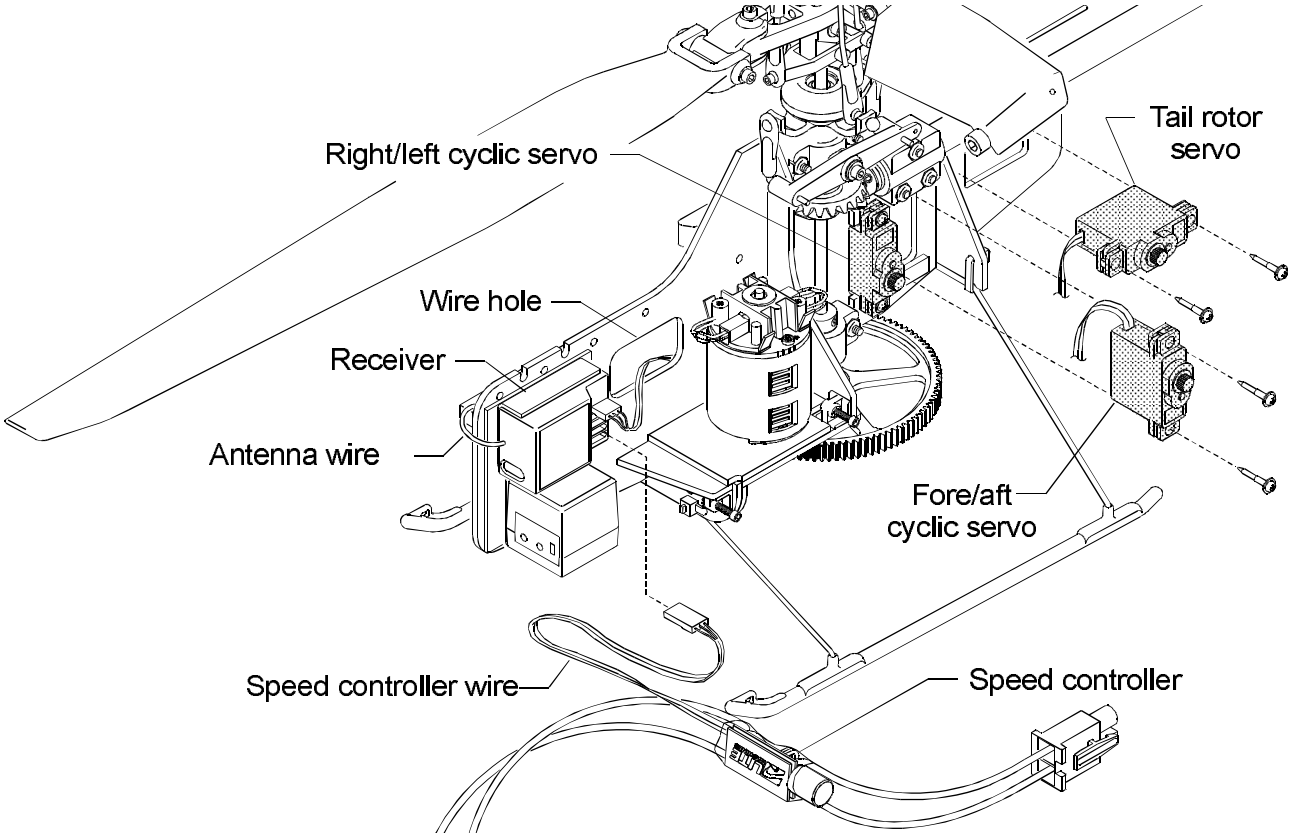


Figure 12-2.

❑ 6. Mount three servos to the crutch as shown in Fig. 12-2. Make sure the servos are properly oriented. The left/right cyclic servo wires should point down, the fore/aft cyclic servo wires should point up, and the tail rotor servo wires should point forward (review Fig. 5-3 and Fig. 12-7 if necessary).

Note:

The following instructions refer to wiring a Hitec Laser 4 radio control system. If you have a different radio system, make sure your wires are connected correctly.

❑ 7. Attach a 6" (150mm) servo extension wire to the right/left cyclic servo. Run the wire through the wiring hole in the keel, and plug it into receiver slot 1.

❑ 8. Attach a 6" (150mm) servo extension wire to the fore/aft cyclic servo. Run the wire through the hole in the keel, and plug it into receiver slot 2.

❑ 9. Plug the *Fusion 35* motor speed controller wire into receiver slot 3.

Warning!

DO NOT CONNECT THE SPEED CONTROLLER POWER CABLES TO THE MOTOR AT THIS TIME.

Warning!

DO NOT USE A SPEED CONTROLLER ON YOUR CORONA HELICOPTER UNLESS IT IS SPECIFICALLY DESIGNED FOR THE CORONA HELICOPTER. Speed controllers other than the *Fusion 35* are potentially dangerous because they may lack important safety and operating features.

❑ 10. Run the tail rotor servo wire through the hole in the keel and plug it into into the gyro servo wire. Plug the gyro receiver wire into receiver slot 4.

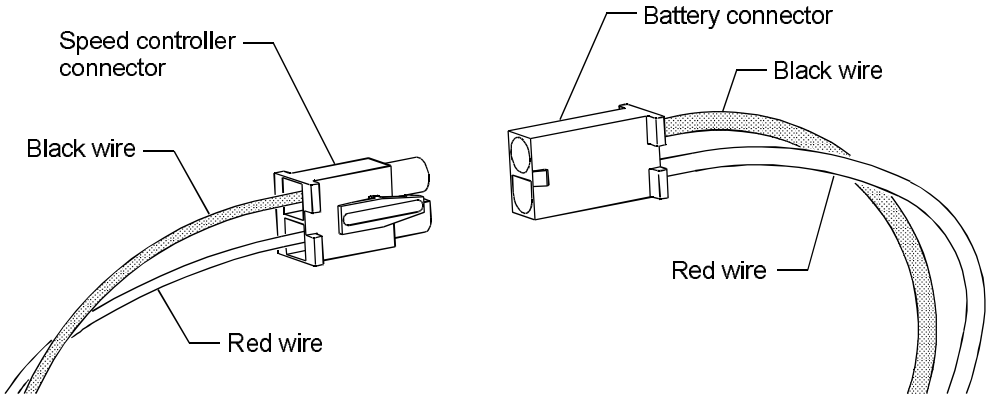


Figure 12-3.

❑ 11. Turn on your transmitter.

❑ 12. Before plugging the speed controller into your flight battery refer to Fig. 12-3. Make sure that the red battery wire will connect to the red controller wire, and the black battery wire will connect to the black controller wire.

Warning!

DO NOT CONNECT THE SPEED CONTROLLER TO THE BATTERY IF THE CONNECTOR TERMINALS ARE REVERSED (RED AND BLACK WIRES CROSSED) BECAUSE YOU WILL PERMANENTLY DAMAGE YOUR SPEED CONTROLLER. THIS DAMAGE IS NOT COVERED UNDER WARRANTY.

❑ 13. When the connections are right, connect the speed controller to the flight battery.

Note:

Always turn your transmitter **ON** first and **OFF** last to insure that the receiver has a radio signal.

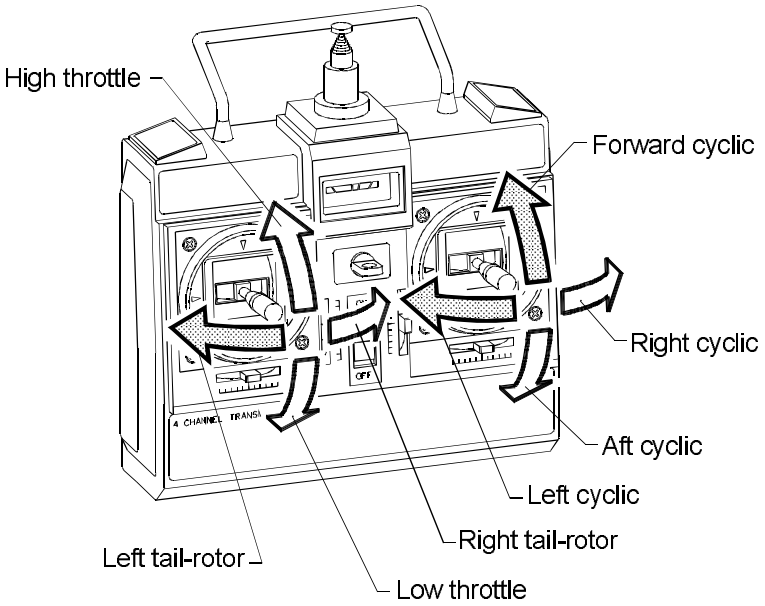


Figure 12-4.

❑ 14. Refering to Fig. 12-4 and 12-5, check that each control on the transmitter moves the correct servo in the correct direction. If any servo rotates in the wrong direction, flip the servo-reversing switch on the transmitter corresponding to that servo.

Note:

Double check the rotation direction of each servo. It is impossible to fly a helicopter with the controls reversed.

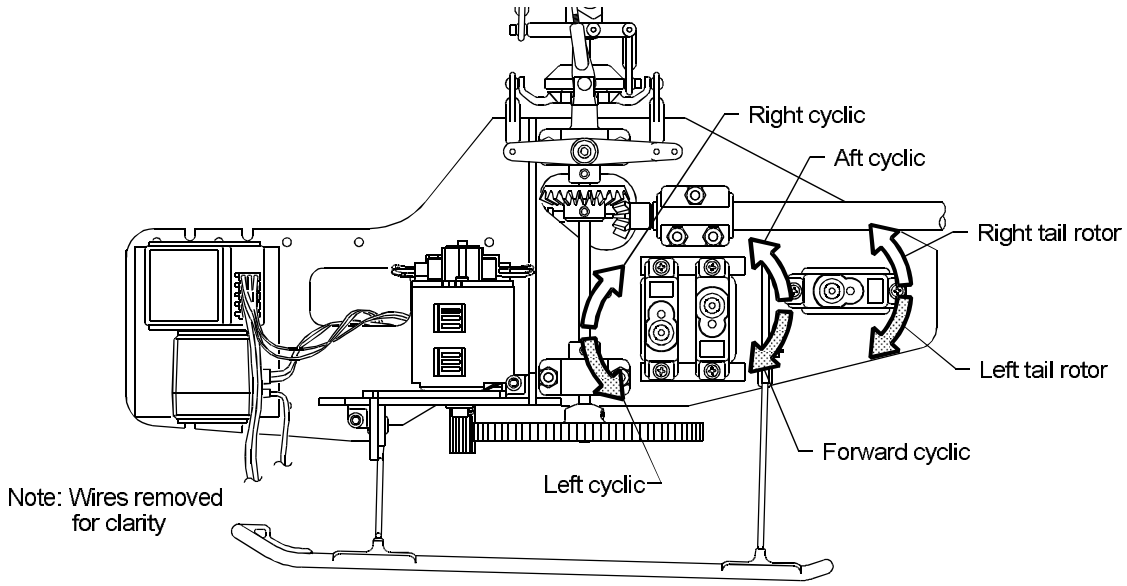


Figure 12-5.

- ❑ 15. The small tabs or levers immediately below and beside the transmitter sticks control the neutral point of the servos. Move each trim levers to make sure the servos respond.
- ❑ 16. Unplug the flight battery, and turn the transmitter off.

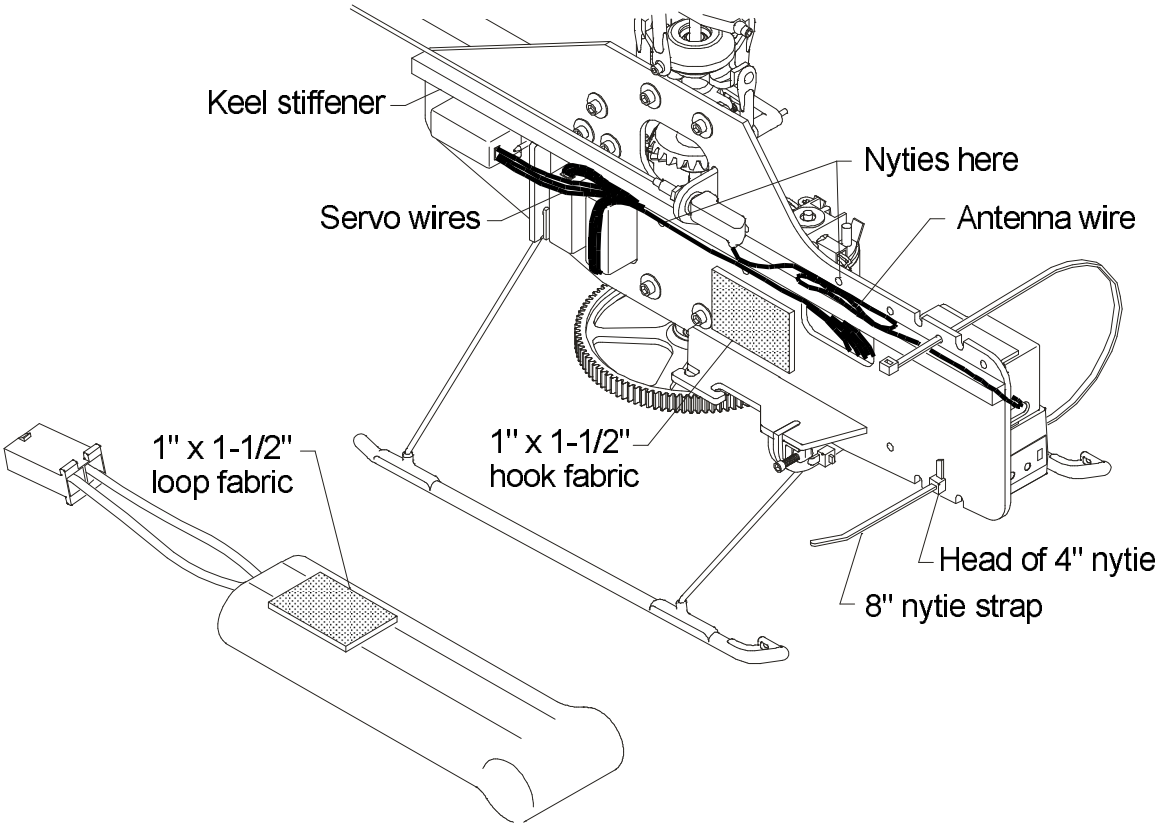


Figure 12-6.

- ❑ 17. Run the servo wires along the bottom of the keel stiffener as shown in Fig. 12-6, and lightly tie all wires to the keel with nylon cable ties (nyties).
- ❑ 18. Run the antenna wire along the top of the keel stiffener, and plug it into the reveiver antenna wire.

Warning!

DO NOT ROUTE THE ANTENNA WIRE NEXT TO THE SERVO WIRES BECAUSE THE ANTENNA WILL PICK UP RADIO INTERFERENCE FROM THE SERVOS.

- ❑ 19. Lightly loop an 8” (200mm) nytie around the receiver and gyro to act as a safety strap. Use a 4” (100mm) nytie to lock the strap in place. Do not overtighten the strap because unwanted vibration will be transmitted to the reciever and gyro.
- ❑ 20. Cut a 1½” (38mm) section of 1” (25mm) hook and loop fabric, and stick the **LOOP** part to the flight battery. Stick the **HOOK** part to the keel with thick CA glue (the glue helps to keep the fabric from pulling off when the battery is removed).

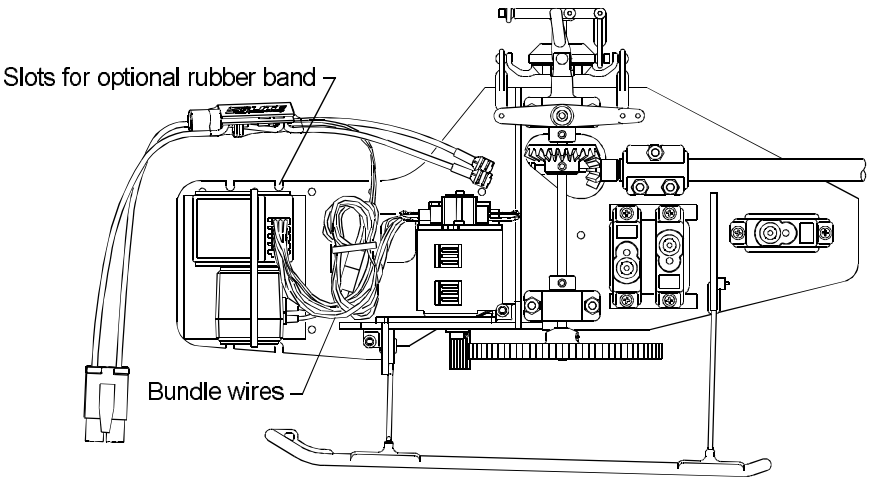


Figure 12-7.

❑ 21. Neatly coil all servo and controller wires together beside the receiver (and away from the motor), and lightly bundle the wires with cable ties.

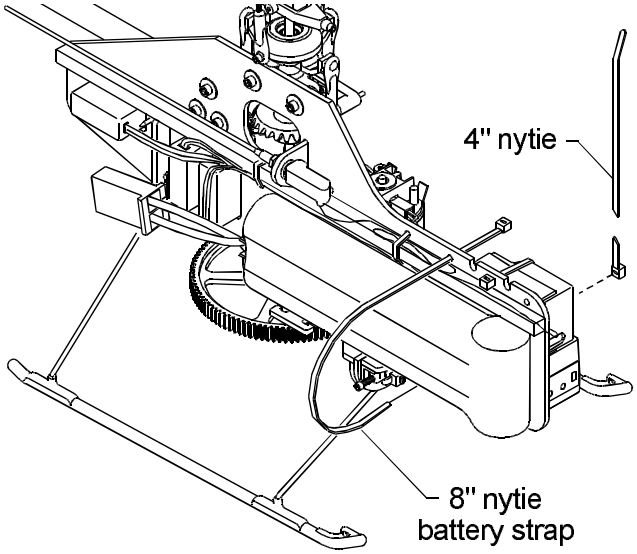
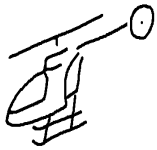


Figure 12-8.

❑ 22. Mount the flight battery as shown in Fig. 12-8. Loosely wrap an 8” (200mm) nylon tie through the keel and around the battery to act as a front safety strap. The strap should be lose enough so you can easily remove the battery.

Note:

The crutch floor includes a tab for an optional rear battery strap. If you want a second battery strap, anchor one end of a rubber band at the top of the keel with a nytie, and loop the other end around the tab.



Pushrods and Radio Adjustment

In this section you will install and adjust the servo pushrods and check control throws. Your first flights will be more successful if your *Corona* helicopter is adjusted correctly, so follow each step closely.

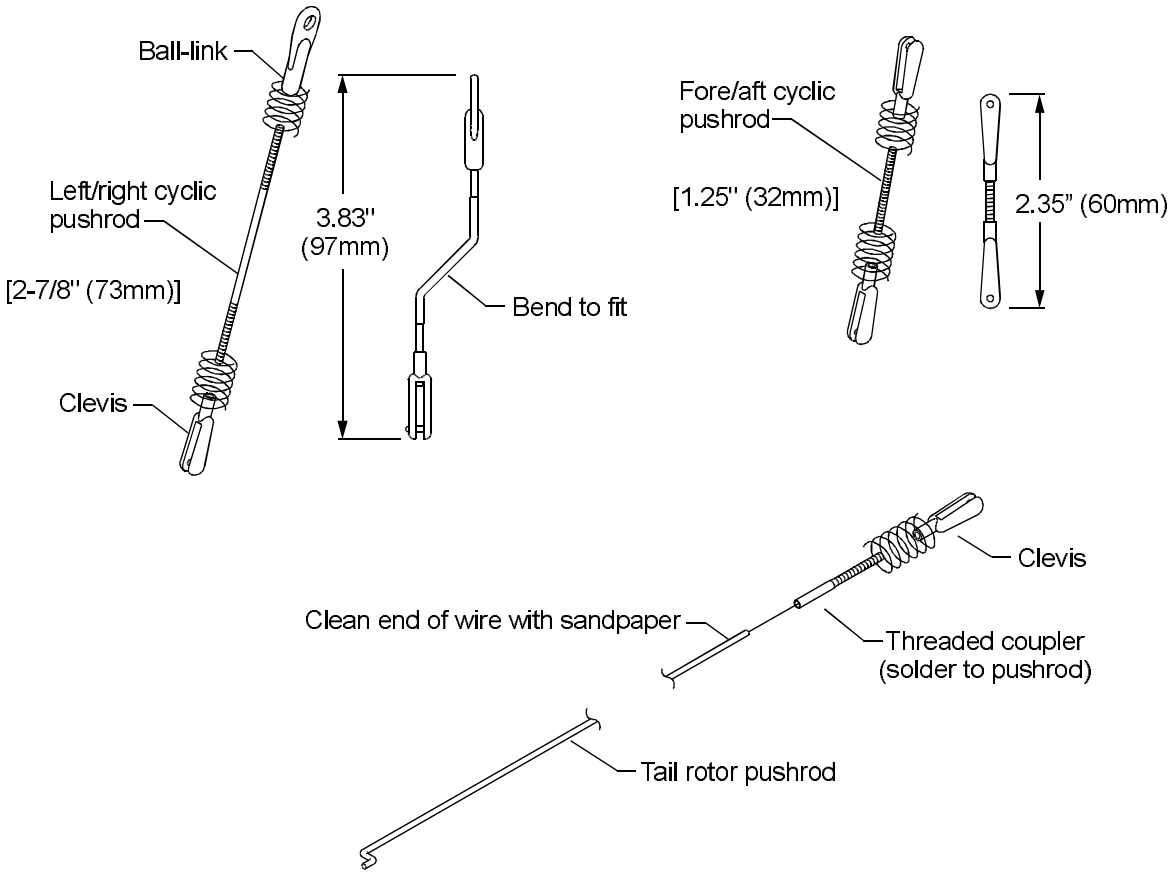


Figure 13-1.

- ❑ 1. Bend the left/right cyclic pushrod as shown in Fig. 13-1, and assemble all pushrods. Note that the left/right cyclic pushrod has a ball-link on one end and a clevis on the other.
- ❑ 2. Solder the brass threaded coupler to the end of the tail rotor pushrod wire. For a strong solder joint, clean the last 3/8" (10mm) of the wire with coarse (120 grit) sandpaper, and coat the wire with soldering flux. Stuff a 1/4" (6mm) length of solder into the hole in the threaded coupler and hold the coupler with a pair of pliers.
- ❑ 3. Insert the wire into the coupler and heat the coupler with a soldering iron. When the solder melts, push the wire all the way into the coupler and continue heating for five to ten seconds. Shave off any solder drips with a hobby knife (be careful not to cut yourself).

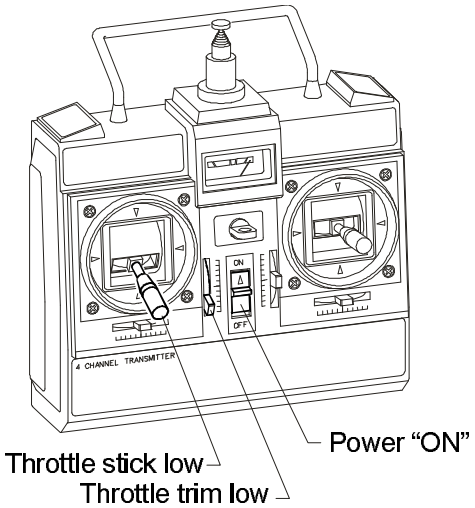


Figure 13-3.

- ❑ 4. Turn on the transmitter and connect the speed controller to the flight battery.
- ❑ 5. Move the transmitter throttle stick and throttle trim lever to full low, and all other trims to neutral as shown in Fig. 13-3. Leave the transmitter on while installing the pushrods.

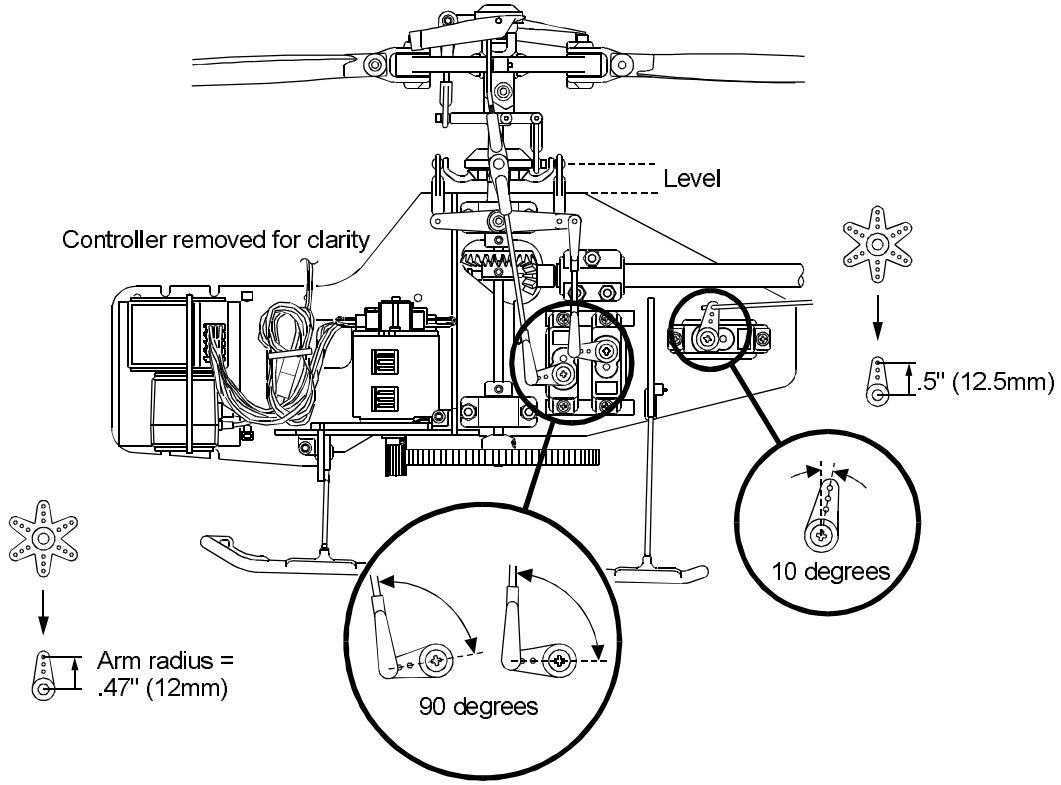


Figure 13-2.

Note:

Each servo on the *Corona* uses a arm with a particular arm radius (the distance from the arm center to one of the arm holes) in order to produce a certain amount of pushrod travel. A large arm radius produces more pushrod travel than a small radius. For each servo, select an arm with holes as close as possible to the specified radius. If you do not have an arm with holes at the required radius, drill a new hole in an arm you already have.

❑ 6. Find two servo arms with holes at a radius of about .47" (12mm), and mount them to the two cyclic servos at the angles shown in Fig. 13-2. Trim off all unused servo arms from multi-arm servo wheels.

Note:

The angle between a pushrod and a servo arm (measured when the servos are centered) affects pushrod motion. A pushrod that is 90 degrees to a servo arm will travel the same distance in both control directions. A pushrod at an angle other than 90 degrees will travel more in one direction than the other. This effect is called "differential throw". Differential throw is useful on controls that need to move more in one direction than in the other (such as the tail rotor).

❑ 7. Install the fore/aft cyclic pushrod on the .47" (12mm) hole position as shown in Fig. 13-2. Make sure the plastic clevises on the pushrod snap shut and lock.

❑ 8. Install the left/right cyclic pushrod on the .47" (12mm) hole position. Make sure the plastic clevise on the pushrod snaps shut and locks.

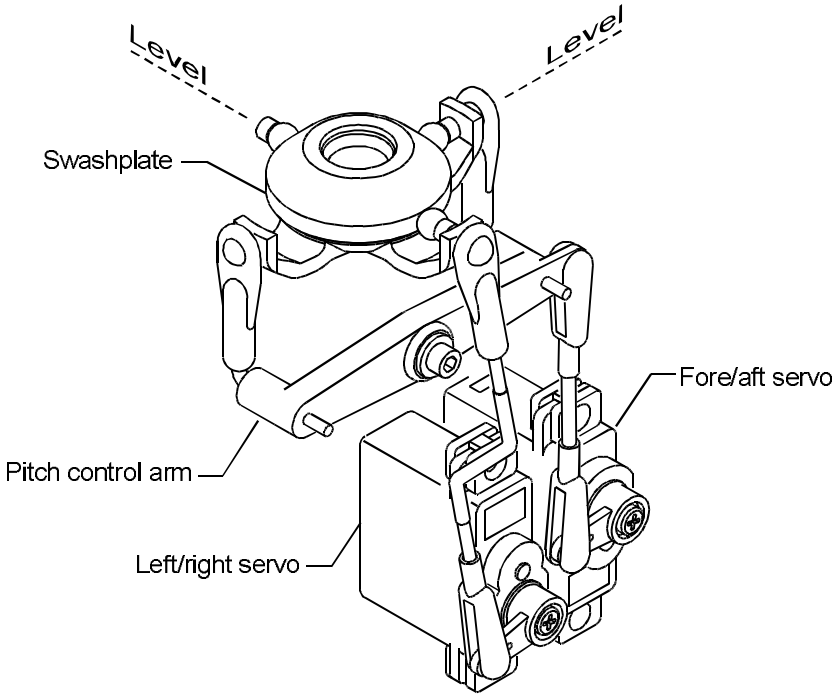


Figure 13-4.

❑ 9. With the transmitter sticks and trims centered, adjust the length of the cyclic pushrods so that the swashplate is level with the crutch and 90 degrees to the main shaft when viewed from the front and side as shown in Fig. 13-4.

Note:

The *Corona* sits nose-low because the front anding gear struts are of slightly shorter than the rear struts. Make sure you level the swashplate to the top of the **CRUTCH**, and not to your work surface.

❑ 10. The rotor head on the *Corona* can be adjusted to reduce unwanted “slop” (mechanical play). Move the cyclic (right) stick on the transmitter slowly, and observe the motion of the mixing arms on the rotor head. If the servos move slightly while the mixing arms do not, some linkage slop exists. Lengthen each mixing arm pushrod ½ turn to load the linkages **LIGHTLY** against the swashplate, and check for slop again.

Note:

Do not lengthen the pushrods too far. Too much pushrod force will bind the swashplate causing premature wear.

❑ 11. Check the motion of the swashplate. As you move the cyclic (right) stick on the transmitter forward and backward, the swashplate should tilt forward and backward. Left/right stick motion should tilt the swashplate to the left and right. If either control is reversed, flip the corresponding servo reversing switch on the transmitter.

❑ 12. Slowly move the cyclic stick and trim levers on the transmitter from neutral to full deflection in every direction (including each 45 degree direction) and make sure the cyclic servos are not over-driving the swashplate. If the swashplate reaches its mechanical limit before the servos stop moving, the servo motors will stall (you will hear the servos humming). This stalling may burn out the servo electronics if left uncorrected. Reduce the servo throw by adjusting the ATV dials on the transmitter (on Hitec radios) or reduce the servo arm radius by moving the pushrod inward one hole.

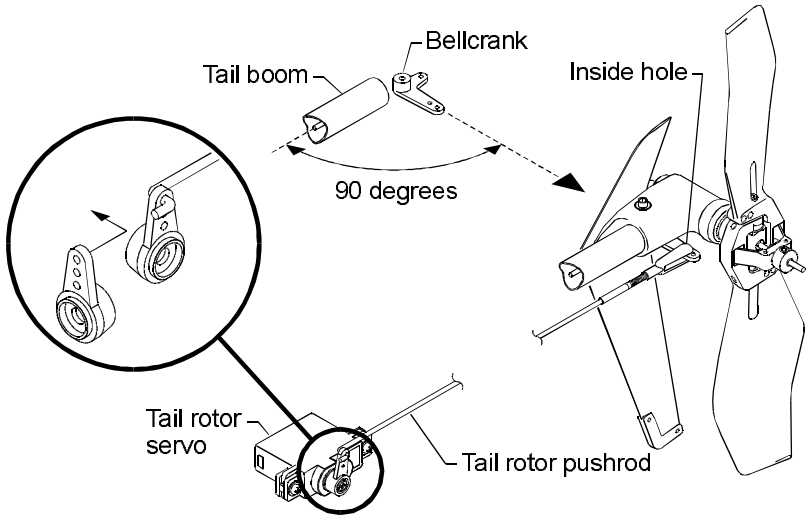


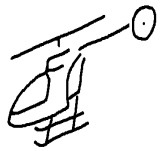
Figure 13-5.

- ❑ 13. Connect the tail rotor pushrod to the innermost hole of the tail rotor bellcrank (for the greatest control throw) as shown in Fig. 13-5. Snap the pushrod into the guides in the middle of the tail boom.
- ❑ 14. Select a servo arm with a hole radius of .5" (12.5mm) for the tail rotor servo, and trim off all but one arm. Slip the arm over the end of the tail rotor pushrod.
- ❑ 15. To evenly balance tail rotor control power in right and left turns, more negative blade pitch is required than positive blade pitch. For the proper differential throw, mount the servo arm to the tail rotor servo at about 10 degrees from vertical as shown in Fig. 13-2 (the angle doesn't have to be exact).
- ❑ 16. Adjust the clevis on the tail rotor pushrod until the long arm of the tail rotor bellcrank is square (makes a 90 degree angle) with the tail boom as shown in Fig. 13-5.
- ❑ 17. Check the maximum control movements (with trim) in each direction as you did for the swashplate. You want as much tail rotor control throw as possible (even if the pushrod bends slightly) because the gyro will reduce this control throw in flight.

Note:

If, after flying your helicopter, you want more tail rotor control, you may use a longer servo arm or drill drill one more hole in the bellcrank 1/16" (1.6mm) further toward the center bolt hole.

- ❑ 18. Move the tail rotor control stick on the transmitter, and watch the tail rotor pushrod. Right and left stick motion should move the pushrod forward and backward respectively. If the tail rotor control is backward, flip the appropriate servo reversing switch on the transmitter.
- ❑ 19. All controls are now connected. Check each control one last time to insure that everything moves freely, and nothing binds or jams. If you suspect a control is binding, disconnect the control and check the pushrod and servo separately. If the servo moves much more quickly when disconnected, or if the pushrod is hard to move with your fingers, something is binding. Check for (and fix) tight pivot bolts, tight ball-links, etc..
- ❑ 20. Secure all servo arm screws, and turn off the receiver and transmitter.



Final Check

In this section you will check your *Corona* helicopter to insure that it is assembled properly. If you discover a problem, fix it.

- ❑ 1. Tilt the *Arlton Subrotor* stabilizer (on the main rotor) 20 degrees in each direction with your finger tips. The stabilizer must pivot **VERY FREELY** about the teeter pin or your *Corona* will be unstable in flight.
- ❑ 2. Make sure that the main rotor blades flap up and down **VERY FREELY** about 10 degrees or your *Corona* will be unstable in flight. Also check that the lead/lag hinge drags just enough to keep the blades from flopping forward and backward.
- ❑ 3. Check all electrical connections between the receiver and servos.
- ❑ 4. Make sure the motor mounting bolts are tight.
- ❑ 5. Slide the canopy over the crutch and the canopy mounting bolts (oiling the mounting bolt helps).
- ❑ 6. To remove the canopy, slowly pull outward on the canopy behind the canopy mounting grommets until the grommets slip over the heads of the canopy mounting bolts. You do not need to remove the bolts to remove the canopy. If the grommets do not slip over the bolt heads easily, screw the bolts in a little further or oil the bolt heads.

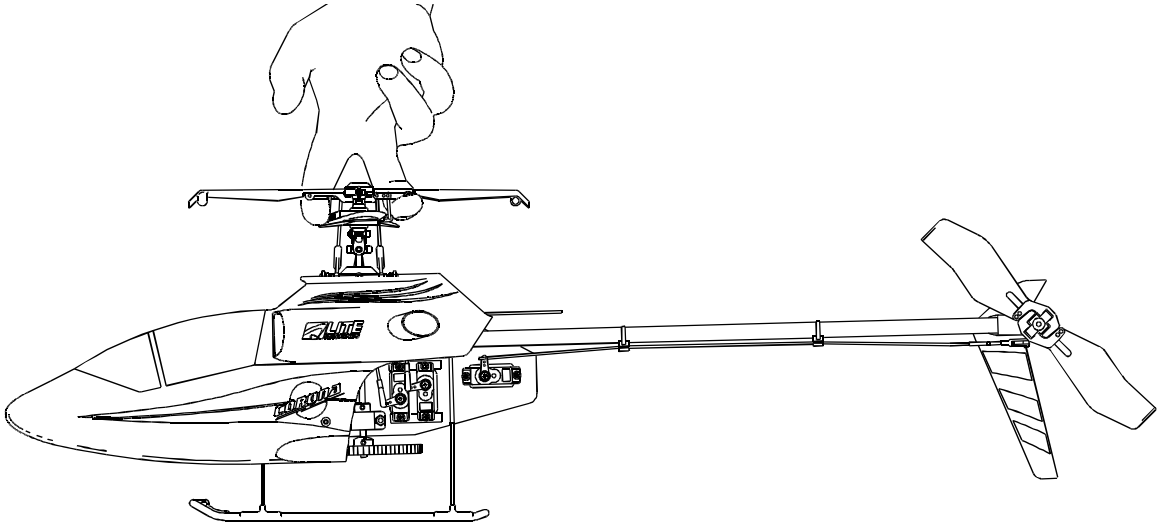


Figure 14-1.

- ❑ 7. To check for proper center-of-gravity, rotate the main rotor until the blades are perpendicular to the tail boom and pick up your *Corona* by the *Subrotor* stabilizer as shown in Fig. 14-1. With the battery installed, the fuselage should hang level (with the tail boom parallel to the ground) or slightly nose-low. If the tail hangs low, your helicopter could become unstable in forward flight. In this case move your battery forward.

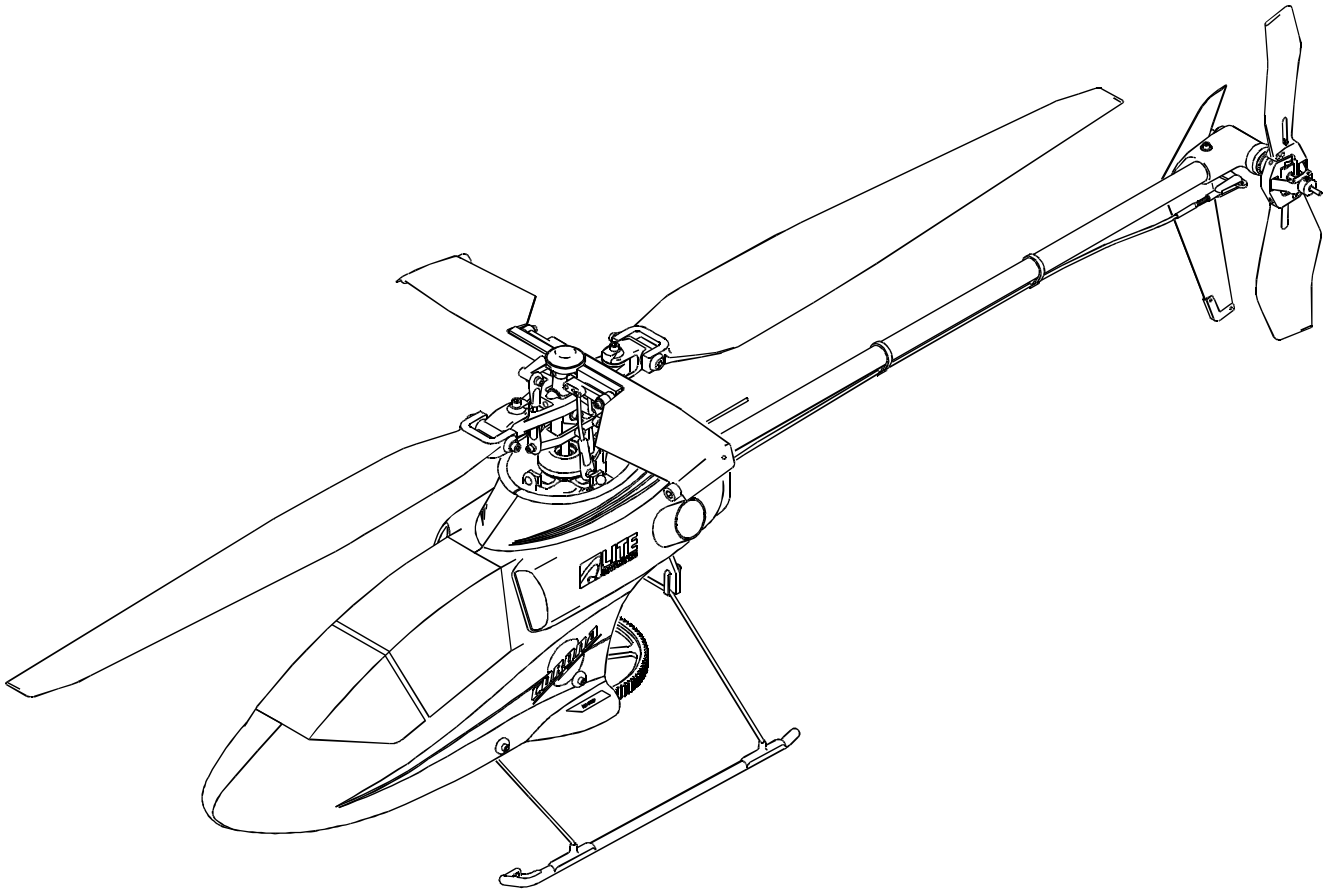
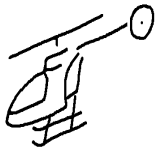


Figure 14-2.

- ❑ 8. Print your name, phone number and address on a piece of tape, and stick it to the crutch under the battery so that it can be easily seen in case you ever lose your *Corona*.
- ❑ 9. Your *Corona* is done! Take lots of pictures - this is as clean and shiny as it will ever be. Show it to your friends and family, and convince them to buy one.

Hint:

DO NOT THROW AWAY THIS CONSTRUCTION MANUAL. You will refer to it when maintaining and repairing your *Corona*.



Specifications, Model 120

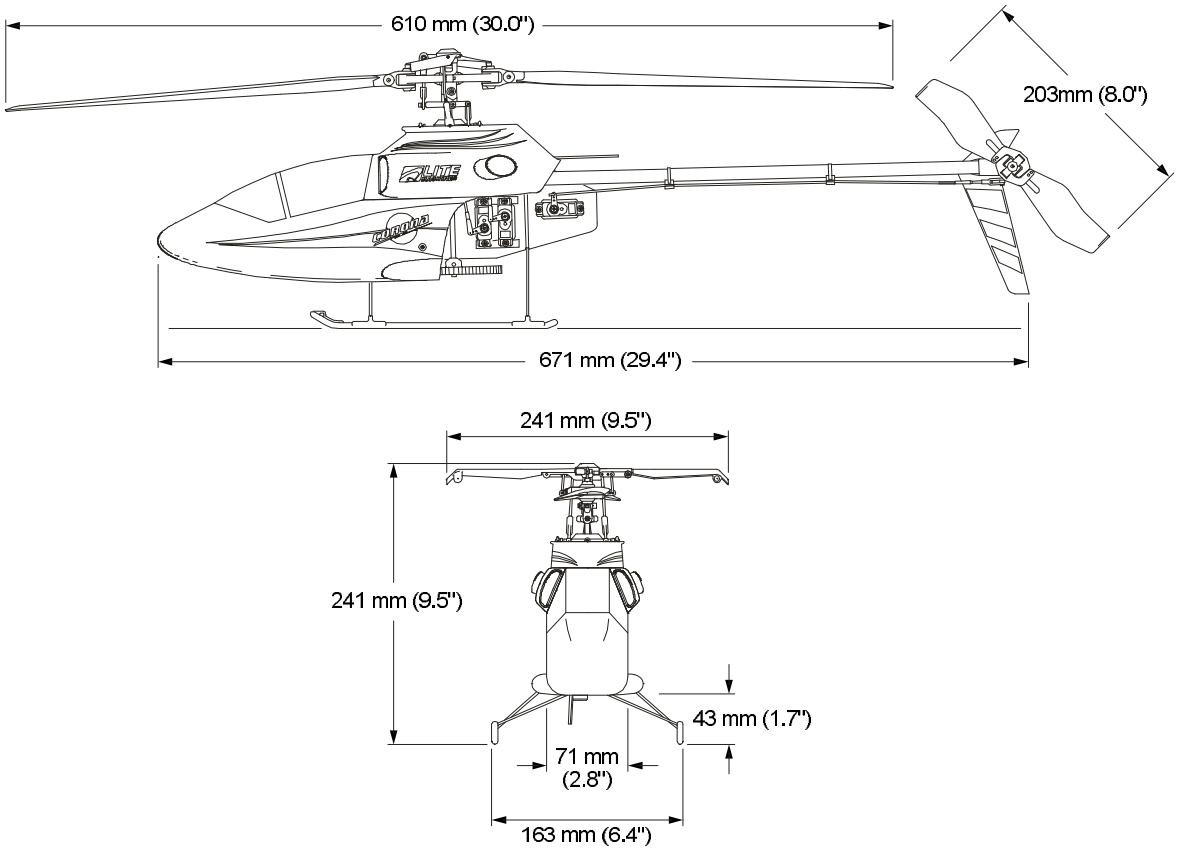


Figure 15-1.

General

- Weight with 7-cell battery: Approximately 44 oz (1250 gm)
- Maximum gross weight: Highly dependent upon motor, battery and flight conditions
- Operating temperature range: 40°F to 85°F (5°C to 30°C)

Main Rotor

- Main rotor blade type: Semi-flexible, twisted, tapered, undercambered, three airfoil sections
- Main rotor blade suspension: Dual flapping with no mechanical damping (DF), foldable at flapping axis

- Main rotor diameter: 30 in (762 mm)
- *Subrotor* stabilizer diameter: 9.5 in (241 mm)
- Main rotor blade area: 38.8 in^2 (250 cm^2)
- *Subrotor* stabilizer blade area: 10.4 in^2 (67 cm^2)
- Useful blade area: 49.2 in^2 (317 cm^2)
- Disk loading: 0.6 lb/ft^2 (2.9 kg/m^2)
- Blade loading: 8.0 lb/ft^2 (39 kg/m^2)
- Power loading: 13.7 lb/hp (8.3 kg/kW)
- Continuous main rotor speed: 1900 rpm
- Max. (never-exceed) rotor speed: 2000 rpm
- Figure of merit: 0.5 to 0.6 (requires estimate of actual power and maximum gross weight at sea level)

Tail Rotor

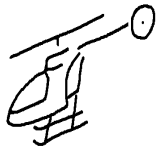
- Tail rotor blade type: Dynamically Over-Balanced (DOB), twisted, tapered, undercambered
- Tail rotor diameter: 8 in (203 mm)
- Tail rotor blade area: 8 in^2 (52 cm^2)
- Continuous tail rotor speed: 3990 rpm
- Maximum tail rotor speed: 4200 rpm

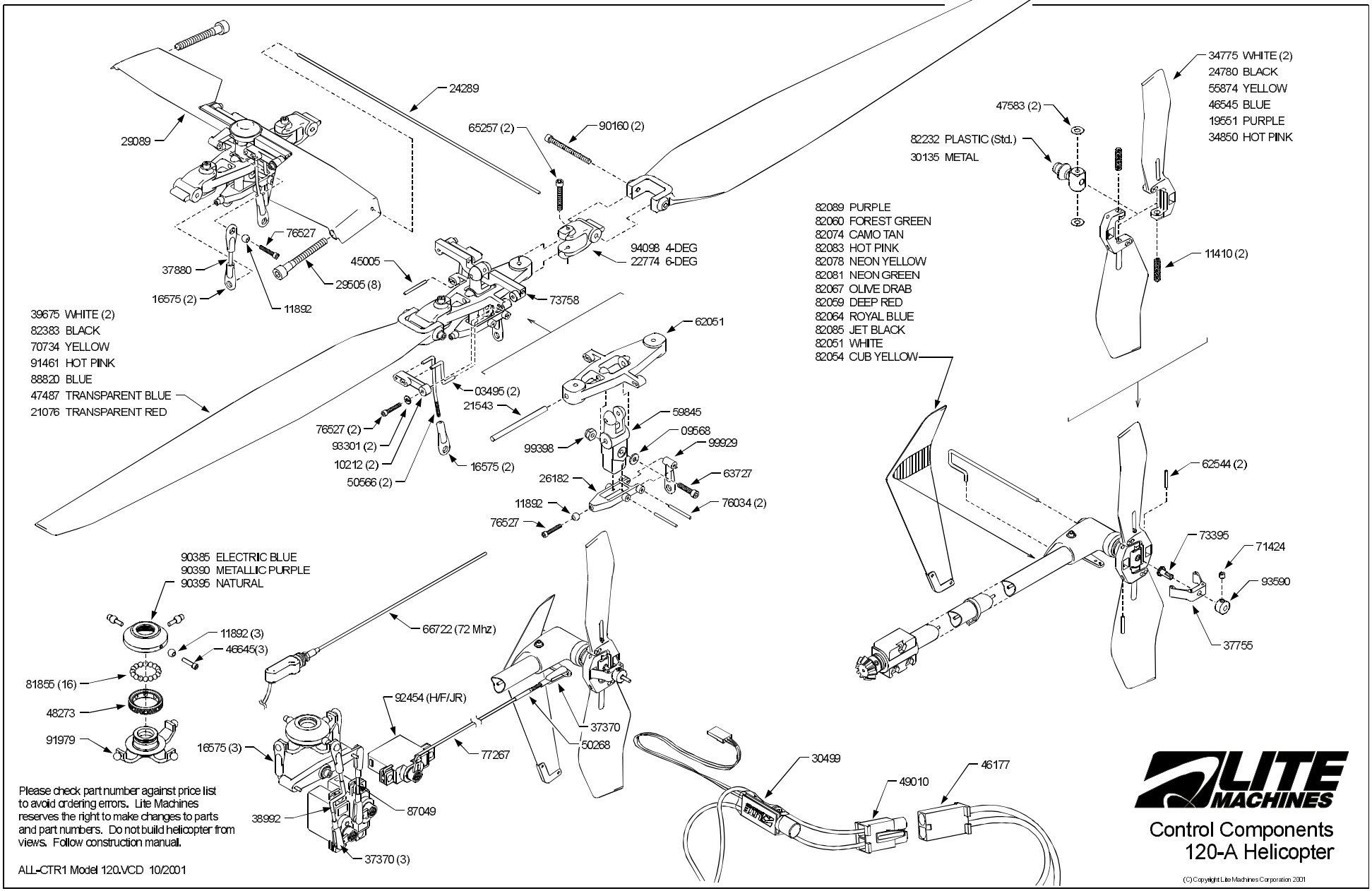
Motor/Transmission

- Motor: *Electro-Fusion 7* with 7-cell NiCad
- Max. rated engine power: approx. 0.2 hp (150 W)
- Max. rated transmission power: approx. 0.2 hp (150 W)
- Max. motor rpm: 22,700
- Engine/main rotor gear ratio: 1 : 11.3
- Tail rotor/main rotor gear ratio: 1 : 2.1

Note:

The foregoing specifications are provided for interest only, and are not meant to be a basis for considering the Lite Machines *Model 120* helicopter for any particular application.




24289
29089
65257 (2)
90160 (2)
76527
37880
16575 (2)
11892
45005
29505 (8)
94098 4-DEG
22774 6-DEG
73758
39675 WHITE (2)
82383 BLACK
70734 YELLOW
91461 HOT PINK
88820 BLUE
47487 TRANSPARENT BLUE
21076 TRANSPARENT RED
62051
03495 (2)
21543
76527 (2)
93301 (2)
10212 (2)
50566 (2)
16575 (2)
59845
09568
99398
99929
63727
26182
11892
76034 (2)
76527
34775 WHITE (2)
24780 BLACK
55874 YELLOW
46545 BLUE
19551 PURPLE
34850 HOT PINK
47583 (2)
82232 PLASTIC (Std.)
30135 METAL
11410 (2)
82089 PURPLE
82060 FOREST GREEN
82074 CAMO TAN
82083 HOT PINK
82078 NEON YELLOW
82081 NEON GREEN
82067 OLIVE DRAB
82059 DEEP RED
82064 ROYAL BLUE
82085 JET BLACK
82051 WHITE
82054 CUB YELLOW
62544 (2)
73395
71424
93590
37755
90385 ELECTRIC BLUE
90390 METALLIC PURPLE
90395 NATURAL
11892 (3)
46645(3)
81855 (16)
48273
91979
66722 (72 Mhz)
92454 (H/F/JR)
16575 (3)
77267
37370
50268
38992
87049
37370 (3)
30499
49010
46177
Please check part number against price list to avoid ordering errors. Lite Machines reserves the right to make changes to parts and part numbers. Do not build helicopter from views. Follow construction manual.
ALL-CTR1 Model 120.VCD 10/2001
LITE MACHINES
Control Components
120-A Helicopter
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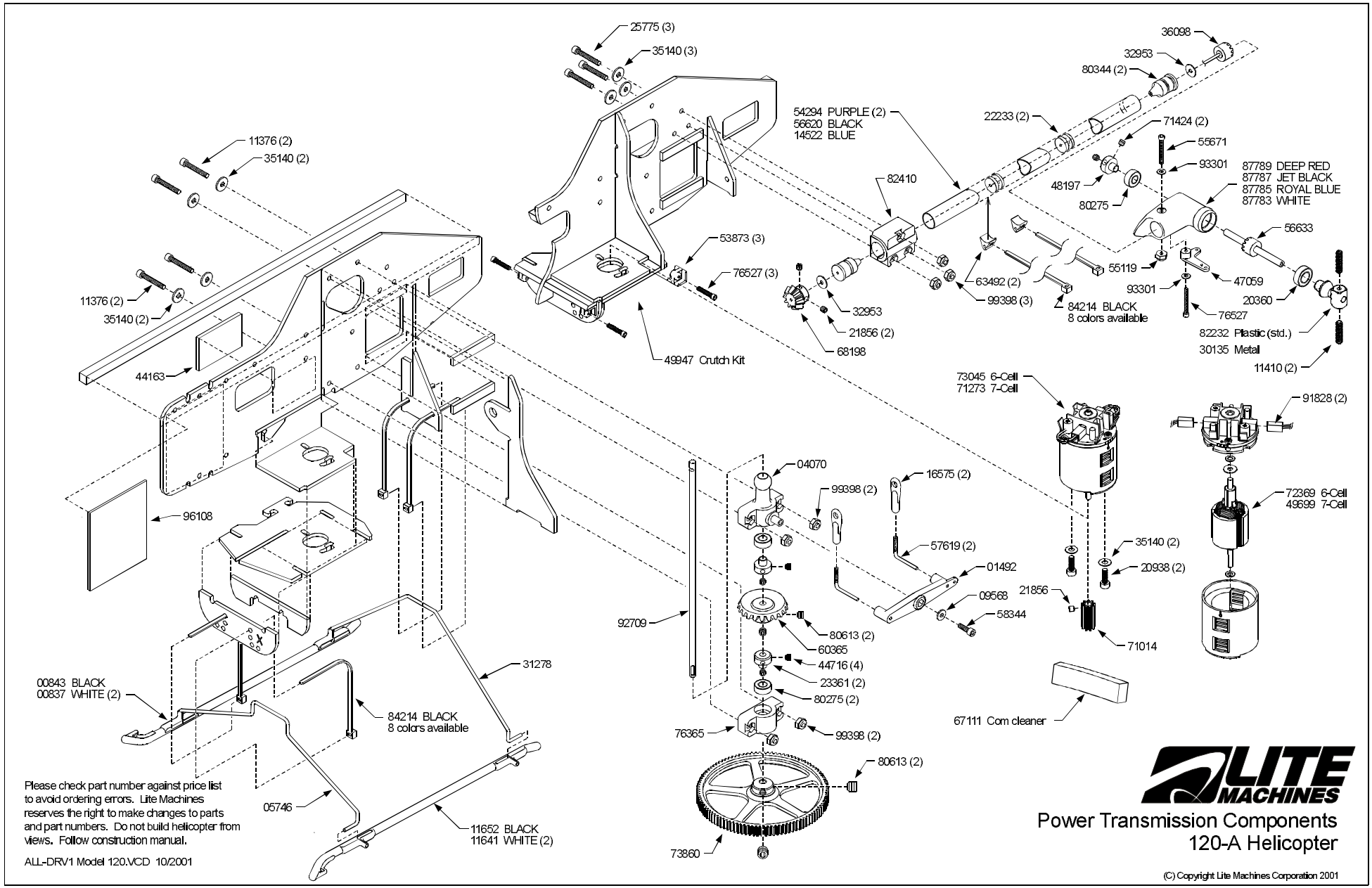
25775 (3)
35140 (3)
36098
32953
80344 (2)
54294 PURPLE (2)
56620 BLACK
14522 BLUE
22233 (2)
71424 (2)
55671
93301
87789 DEEP RED
87787 JET BLACK
87785 ROYAL BLUE
87783 WHITE
48197
80275
82410
11376 (2)
35140 (2)
53873 (3)
76527 (3)
56633
55119
47059
20360
63492 (2)
99398 (3)
84214 BLACK
8 colors available
32953
21856 (2)
68198
49947 Crutch Kit
82232 Plastic (std.)
30135 Metal
11410 (2)
73045 6-Cell
71273 7-Cell
91828 (2)
72369 6-Cell
49699 7-Cell
44163
96108
04070
99398 (2)
16575 (2)
57619 (2)
01492
09568
58344
35140 (2)
20938 (2)
21856
71014
92709
80613 (2)
60365
44716 (4)
23361 (2)
80275 (2)
76365
99398 (2)
80613 (2)
73860
67111 Com cleaner
31278
00843 BLACK
00837 WHITE (2)
84214 BLACK
8 colors available
05746
11652 BLACK
11641 WHITE (2)
Please check part number against price list to avoid ordering errors. Lite Machines reserves the right to make changes to parts and part numbers. Do not build helicopter from views. Follow construction manual.
ALL-DRV1 Model 120.VCD 10/2001
LITE MACHINES
Power Transmission Components
120-A Helicopter
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Price List, October 2001