

# KAL T



## ENFORCER ZR

ASSEMBLY INSTRUCTIONS



93A 10 3A

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## INTRODUCTION

Congratulations on your purchase of the Enforcer ZR. The ZR features more than a dozen design innovations that have been added to the original Enforcer, improving its hovering stability, aerobatic performance, precise control input and long term reliability.

The ZR's incredible hovering stability (thanks to its large 49.5" rotor disk, weighted pre-finished and balanced rotor blades, and dual flapping head) make it great for beginners' first hovering attempts.

With the cyclic throws turned up and 25 degrees of pitch travel, the ZR can really rip up the sky! Tumbles, loop flips, roll flips, switchless inverted—the ZR can take you as far as your imagination (and skill) can go.

Metal balls on the control inputs mean this .30 size machine's control system will stay tight and precise long after plastic balled machines are worn out.

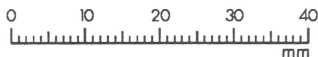
We have carefully developed and extensively test flown the ZR and are confident that it represents the highest quality and best-performing .30 size machine on the market.

However, no helicopter will perform up to its potential if it is not built correctly. In some cases, an improperly constructed heli can be dangerous.

Please carefully read each step in this instruction manual and make sure you understand in full the assembly process for that step before beginning assembly. During assembly, methodically examine each part and use the utmost in care when fitting pieces together and when tightening screws. For your convenience, each step has a box (☐) for you to check off as you complete that step.

The difference between a good ZR and a great ZR is one that is built with patience and care. If you have any questions concerning the Enforcer ZR, or any of Kalt's line of helicopters, please feel free to call our Horizon Service Center at (217) 355-9511.

**KALT**  
HELICOPTERS

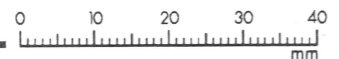


**ENFORCER ZR**



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## ADDITIONAL EQUIPMENT REQUIRED (NOT INCLUDED)

### R/C Helicopter System

- 5 channel minimum
- 5 servos
- 1000mAh (min.) battery

### Recommended JR Systems

JR System	Level
Max 5	Beginner
Max 6 Computer	Intermediate
X-347 Computer	Intermediate/Expert
X-388S Computer	Expert
PCM-10S Computer	Expert



### Recommended JR Servos (5 required)

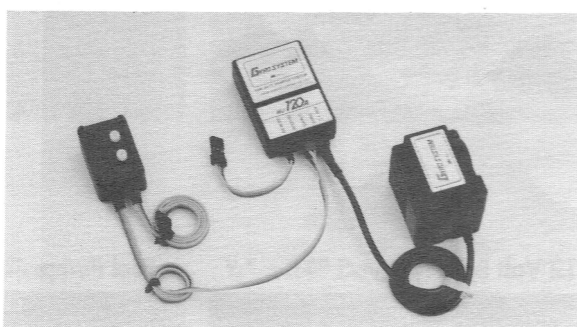
JR Servo	Level
507	Beginner
517 Ball Bearing	Intermediate
4131 Coreless, Dual Ball Bearing	Expert

### Rate Gyro

Used to dampen/stabilize the tail (yaw)

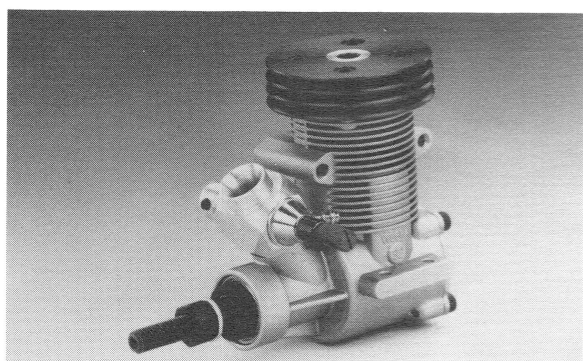
### Recommended JR Gyros

JR Gyro	Level
130 Ball Bearing, Single Rate	Beginner/Intermediate
120 Ball Bearing, Dual Rate	Intermediate/Expert



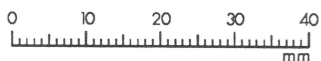
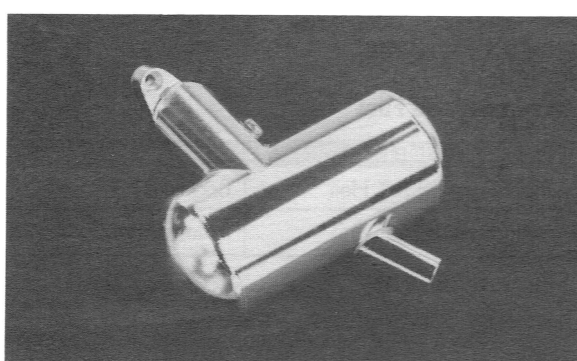
### Recommended R/C Helicopter Engine

Webra Engine	Level
Webra .32 Redhead	All



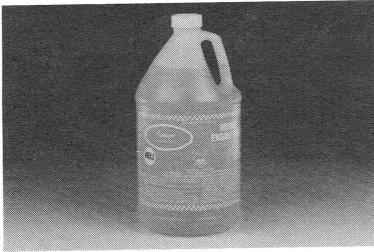
### Recommended R/C Helicopter Muffler

Kalt Muffler	Level
Kalt Enforcer Muffler (KIT31032)	All

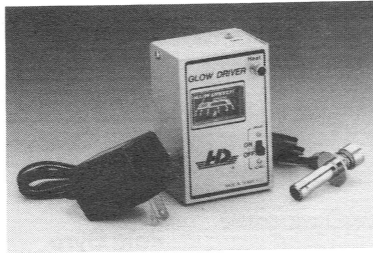


## FIELD EQUIPMENT REQUIRED (NOT INCLUDED)

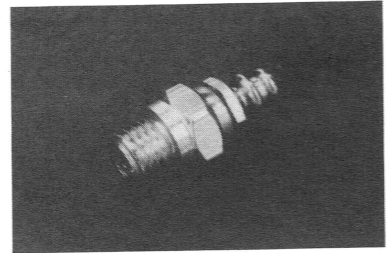
**Helicopter Fuel\***



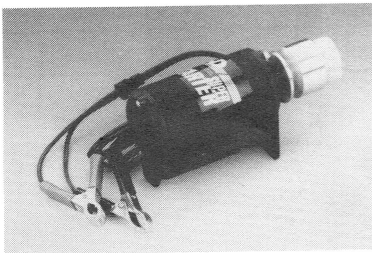
**Glow Driver**



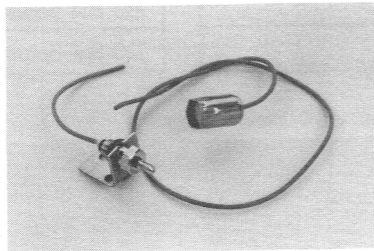
**Glow Plugs**



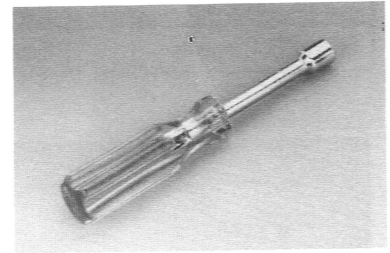
**12 Volt Electric Starter**



**Remote Plug Adaptor**



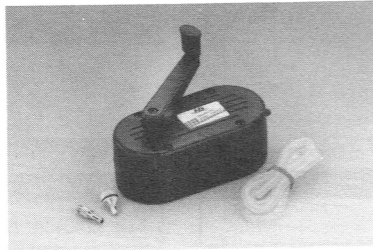
**Glow Plug Wrench**



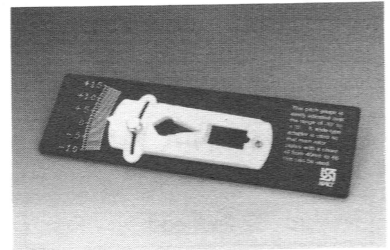
**12 Volt Battery**



**Fuel Pump**

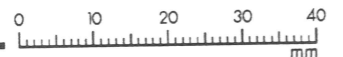


**Pitch Gauge**



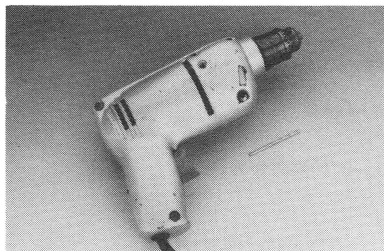
**\* Recommended Fuel**

Cool Power Heli Fuel	Level
Cool Power 12 1/2% Heli	Beginner
Cool Power 30% Heli	Intermediate/Expert

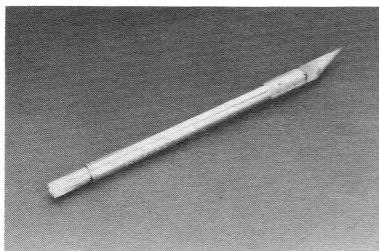


# RECOMMENDED TOOLS FOR ASSEMBLY (NOT INCLUDED)

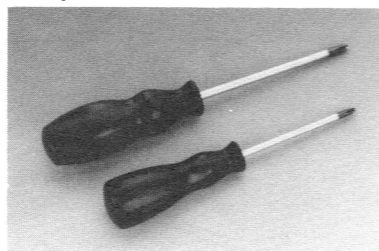
**Drill and Drill Bits**



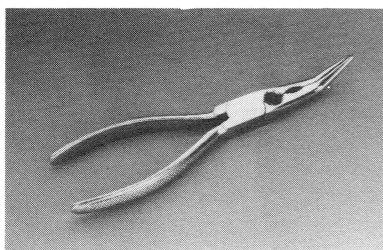
**Hobby Knife**



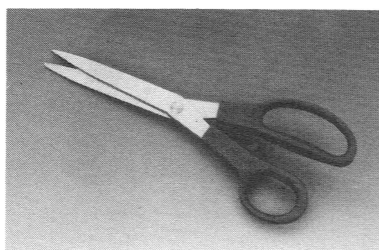
**Phillips Screwdrivers #1 and #2**



**Needle Nose Pliers**



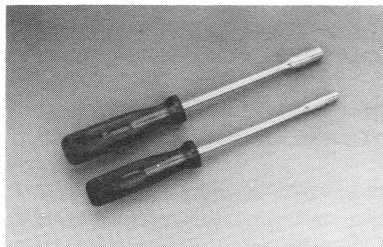
**Scissors**



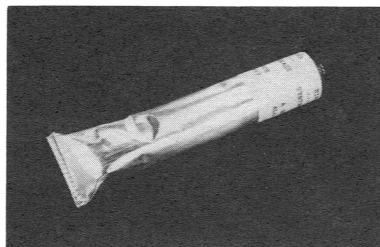
**Crescent Wrench**



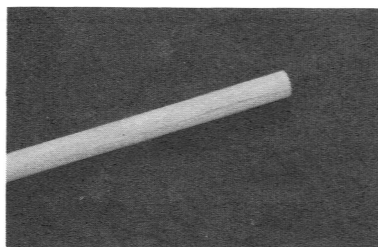
**5.5 and 10mm Nut Drivers**



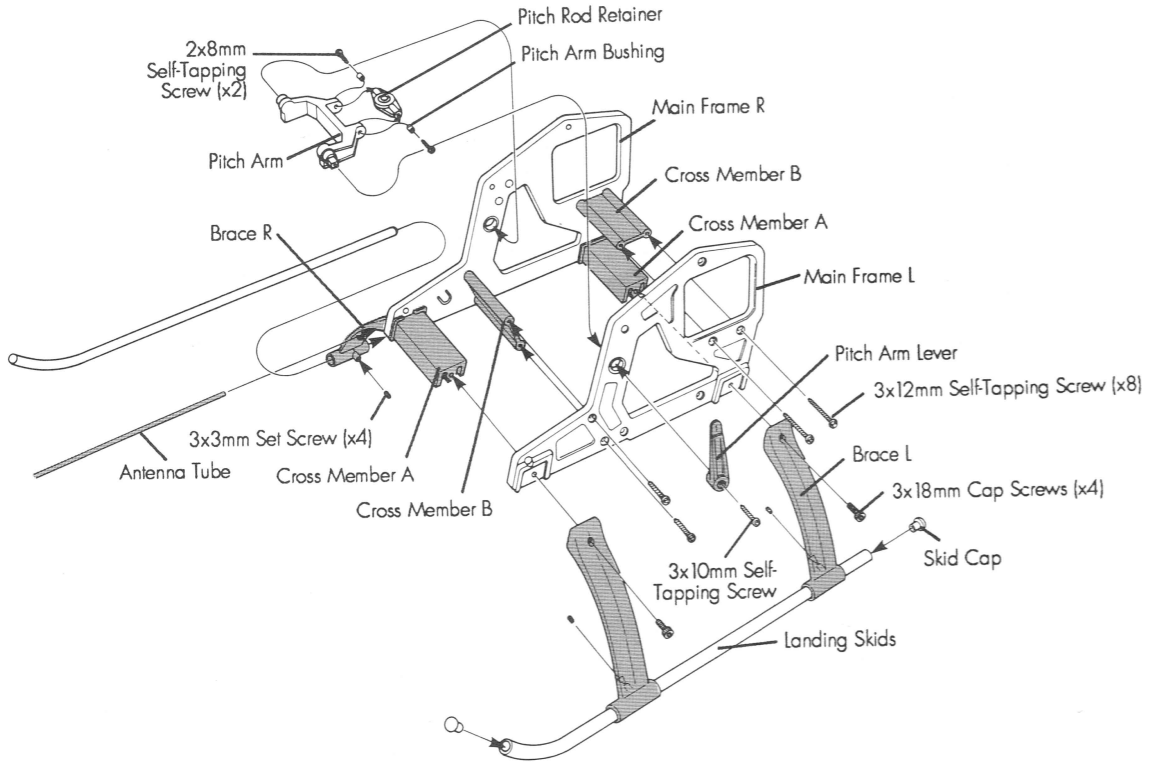
**Grease (moly or silicon)**



**1/4" x 24" Dowel Rod**



# MAIN FRAME ASSEMBLY



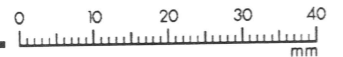
**Tools Needed**

- #1 Phillips Screwdriver
- 2.5mm L-Wrench
- 1.5mm L-Wrench

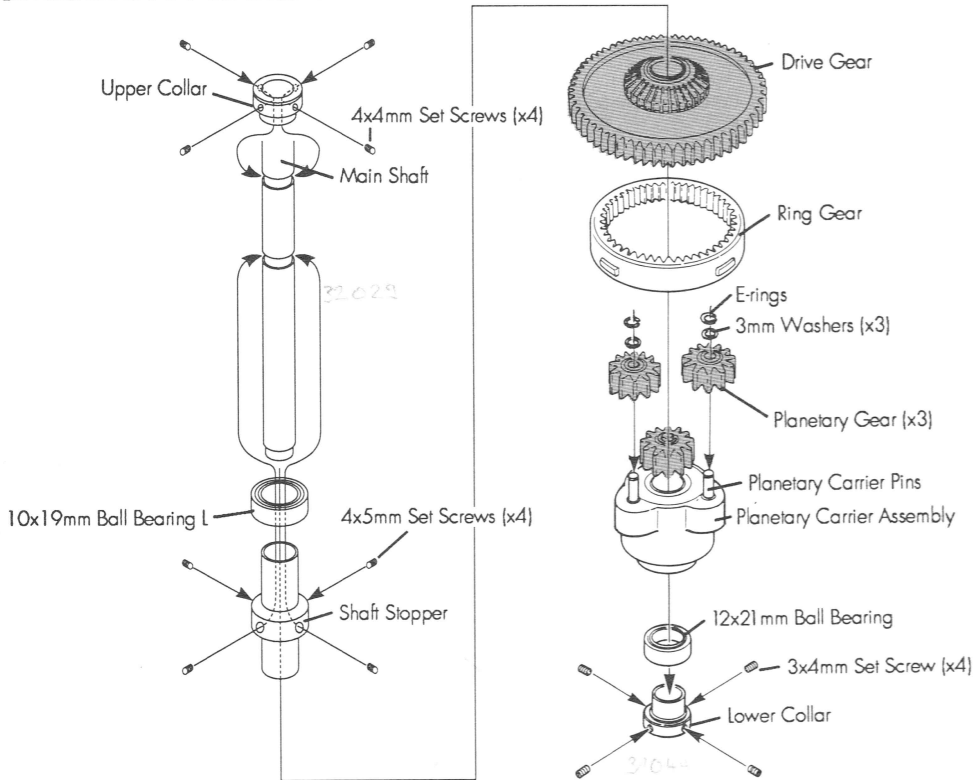
- 1. Locate the bag containing the main frame components and screw bag #2-1.
- 2. Assemble the pitch arm section, paying careful attention to the placement of the bushings that the 2x8mm self-tapping screws go through.
- 3. Install the pitch arm through the left main frame (marked L) and attach the pitch arm lever using a 3x10mm self-tapping screw. Note the relative position of the pitch lever to the pitch arm in the above drawing.
- 4. Using KaliTite thread lock, attach the right landing gear struts (Brace R) to cross members A with two 3x18mm cap screws through the right main frame.
- 5. Attach cross members B (both places) to the right main frame with 3x12mm self-tapping screws.
- 6. Attach the left side frame assembly to cross members A (using KaliTite) with two 3x18mm cap screws, attaching the left landing gear struts (brace L) in the process. **Note:** Be sure the pitch arm engages the hole in the right side frame and that it pivots freely.
- 7. Install the remaining four 3x12mm self-tapping screws in the left frame, securing cross members B.
- 8. Locate the bag containing the landing skids and slide them into the landing gear struts (brace L and R) from the front. When in position, secure with four 3x3mm set screws. Press the skid caps in place into each end of the landing skids. CA glue can be used to fasten the skid caps in place.
- 9. Loops are provided on the underside of the right landing gear struts (brace R) for an antenna tube to be mounted. An after-market base loaded (whip) antenna can also be used.

Screw Bag 2-1		Main Frame Assembly			
2	2x8mm Self-Tapping Screw	4	3x18mm Cap Screw	4	3x3mm Set Screw
1	3x10mm Self-Tapping Screw	8	3x12mm Self-Tapping Screw		

To order parts see page 58



# TRANSMISSION ASSEMBLY I



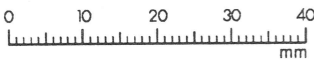
**Tools Needed**

- 1.5mm L-Wrench
- 2mm L-Wrench
- 2.5mm L-Wrench
- Grease

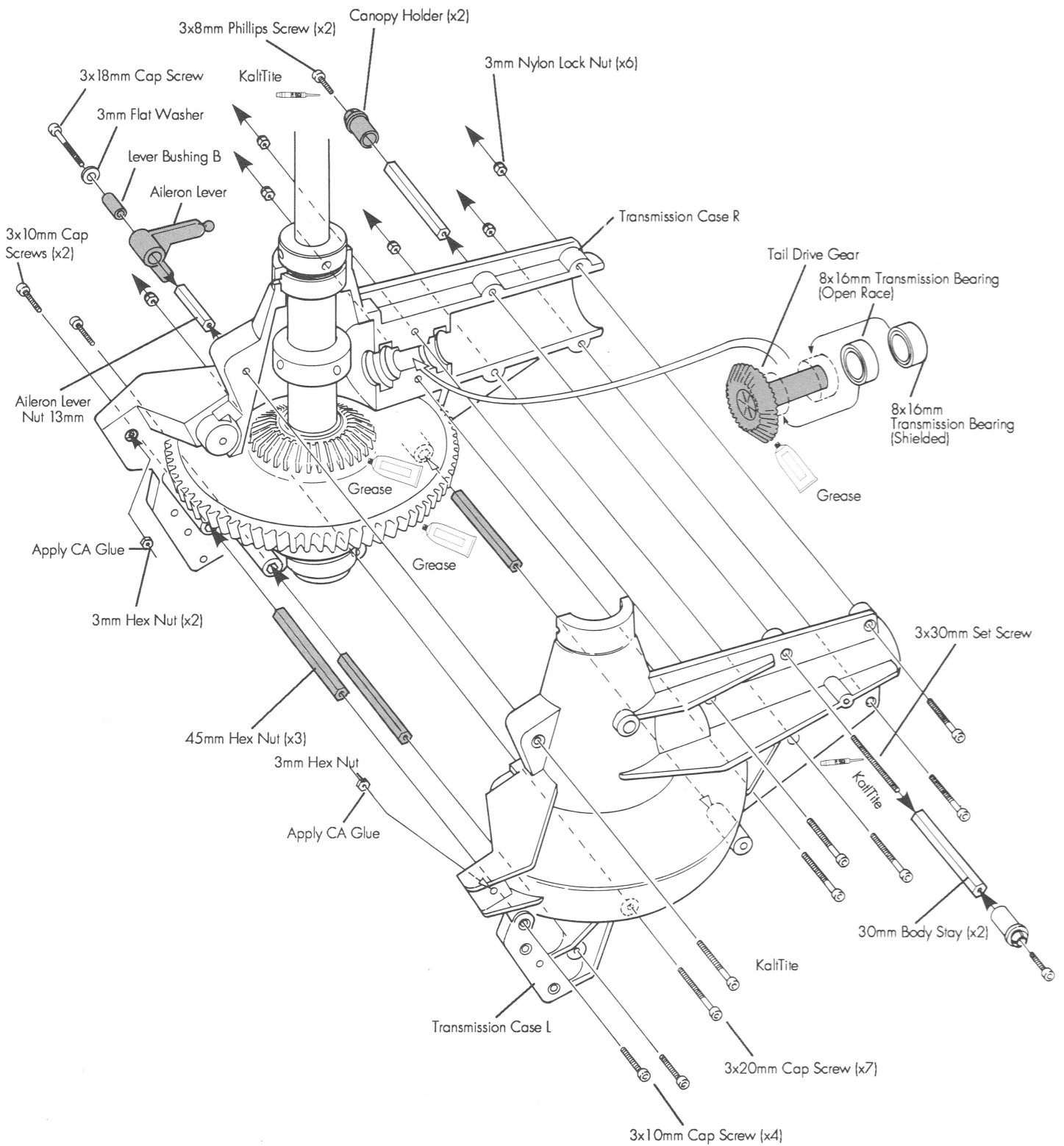
- ❑ 1. Locate the bag containing the transmission parts and screw bag #2-2.
- ❑ 2. Apply grease to each planetary carrier pin. Then install the three planetary gears onto the pins with the exposed bearing side upward. In screw bag 2-2, locate the three 3mm washers and three E-rings (E-clips). Put one washer on each carrier pin and fasten in place with the E-rings.
- ❑ 3. Locate the main shaft. The top of the main shaft can be identified by the material removed from (cut out of) the shaft and two 3mm tapped holes. From the bottom of the main shaft, slide an open rced

- ❑ 4. Install the upper shaft collar (narrower of the two) onto the top of the shaft with the recessed side downward using four 4x4mm set screws and KalTite. Secure the upper shaft collar while pressing downward against the bearing.
- ❑ 5. Slide the bottom of the main shaft through the top (bevel gear side) of the main gear (large white plastic) and then through the ring gear and into the planetary assembly that you just assembled in step #2, carefully making sure that the gears line up properly.
- ❑ 6. Install a 12x21 mm ball bearing onto the bottom of the main shaft, and then install the lower shaft collar. The recessed side should fit into the 12x21 mm ball bearing. Insert the four 3x4mm set screws using KalTite.

Screw Bag 2-2		Transmission Assembly			
3	3mm Flat Washer	4	4x5mm Set Screw	4	3x4mm Set Screw
3	Ering	4	4x4mm Set Screw		



# TRANSMISSION ASSEMBLY II








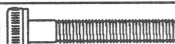




## TRANSMISSION ASSEMBLY II (CONTINUED)

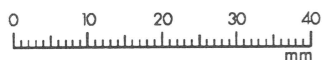
<p><b>Tools Needed</b></p> <p>2.5mm I-Wrench                  #2 Phillips Screwdriver                  5.5mm Nut Driver                  Grease</p>
---

- ❑ 1. Install the gear/main shaft assembly you just completed into the right half of the transmission case (marked R). Note that the tabs on the ring gear must engage the openings of the transmission case.
- ❑ 2. Locate the tail drive gear and the two 8x16mm ball bearings. Notice that one ball bearing has an open (non-shielded) race. First, install this non-shielded bearing onto the tail drive gear shaft. Then install the shielded 8x16mm ball bearing. Fit this assembly into the right transmission case per the diagram at left, paying close attention to where the bearings fit. Apply a moderate amount of grease to the tail drive gear.
- ❑ 3. Insert three 45mm long insert hex nuts (the longest threaded hex nuts in the bag) into the right transmission case (see diagram on preceeding page for proper location).
- ❑ 4. Carefully apply a small drop of thick CA glue to the black 3mm hex nuts and insert them into the front section of the right and left transmission cases. The CA glue will hold these nuts in place, making it easier to install the servo frame stays later in the assembly process.
- ❑ 5. Install the left half of the transmission case in the position shown and secure it using seven 3x20mm cap screws and six 3mm nylon lock nuts.
- ❑ 6. Install two 3x10mm cap screws with KaltTite into the two forward holes as shown. Repeat this process for the other side.
- ❑ 7. Apply KaltTite to the 3x30mm set screw and screw it 5mm into a 30mm body stay (25mm of thread should be still exposed). Insert the threaded rod through the upper second hole from the rear (see diagram) in the transmission cases and thread the

other 30mm body stay onto the threaded rod. Tightly secure it.

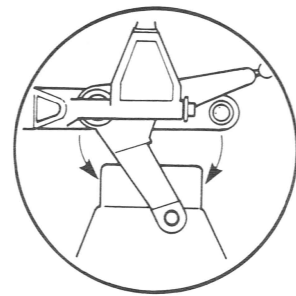
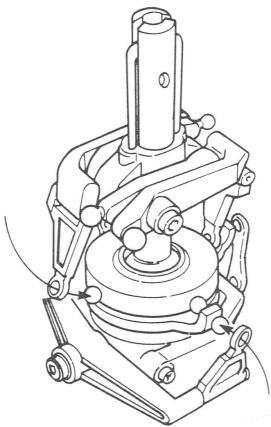
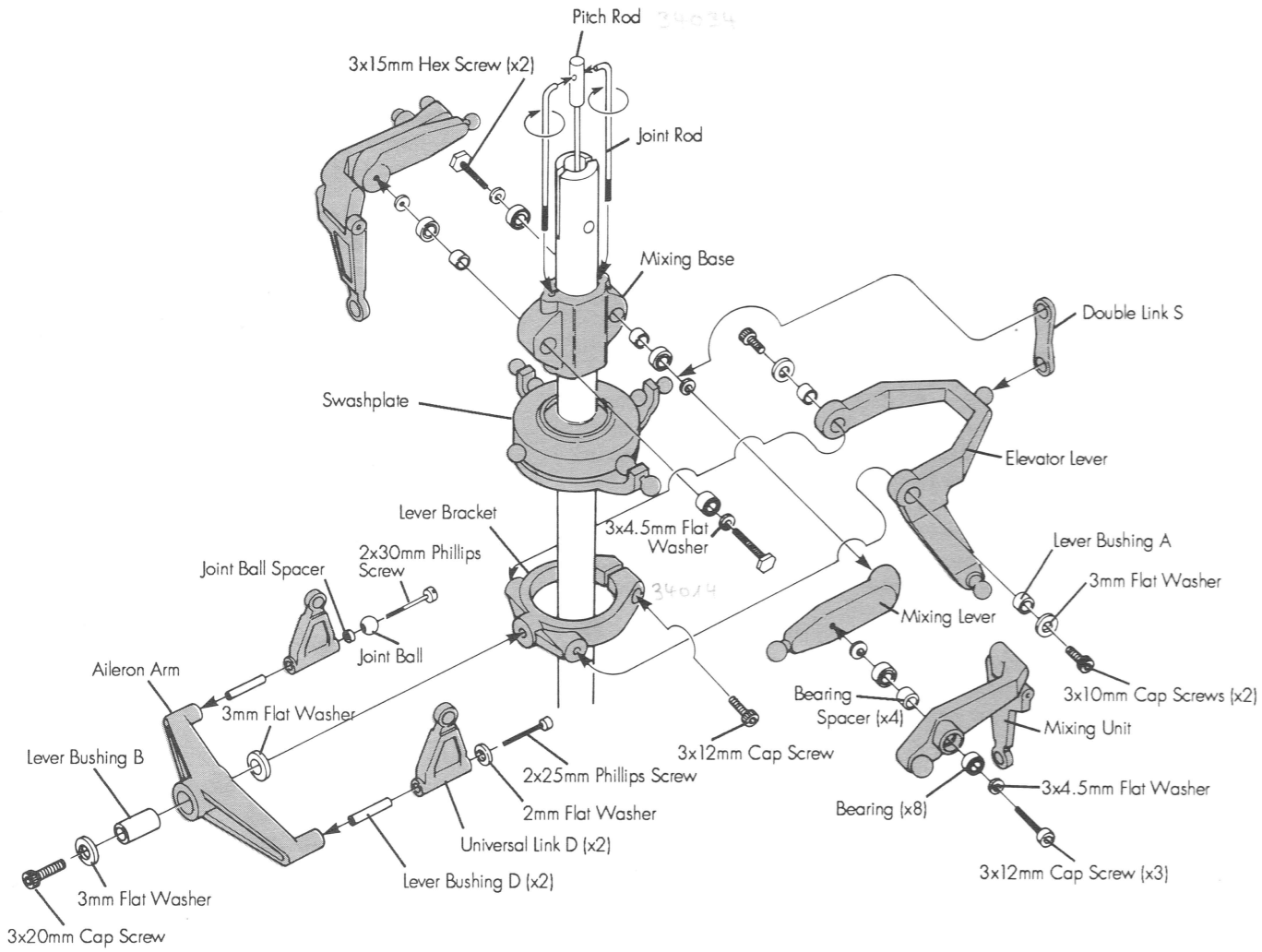
- ❑ 8. Install the canopy holders onto the end of the body stays and secure using 3x8mm Phillips head screws and KaltTite.
- ❑ 9. Place the 3mm washer on the remaining 3x18mm cap screw. Follow it with the lever bushing B. Next, insert the brass bushing into the aileron lever, paying close attention to the drawing to make sure you insert the screw and bushing into the proper side. Thread this assembly into the aileron lever arm and securely tighten using KaltTite.

Screw Bag 2-2		Transmission Assembly (Continued)						
2	3mm Hex Nut		4	3x10mm Cap Screw		1	3mm Flat Washer	
7	3x20mm Cap Screw		1	3x30mm Set Screw		1	3x18mm Cap Screw	
6	3mm Nylon Lock Nut		2	3x8mm Phillips Screw				





# CONTROL SYSTEM









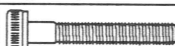




## CONTROL SYSTEM (CONTINUED)

### Tools Needed

2.5mm L-Wrench  
5.5mm Nut Driver  
#1 Phillips Screwdriver  
Grease

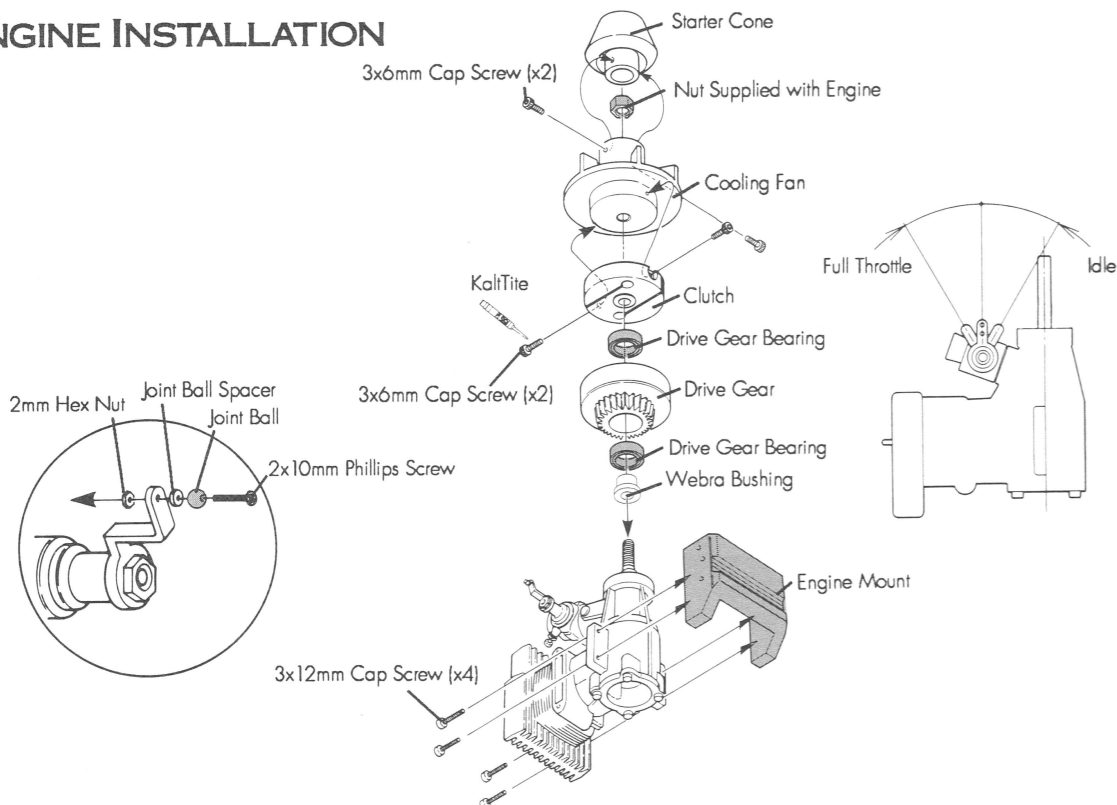
- ❑ 1. Locate the bag containing the molded control system parts and screw bag #2-3.
- ❑ 2. Carefully examine the mixing base. It is important to properly distinguish the top from the bottom of the mixing base. Notice the holes where the joint rod is installed. On one side of the mixing base, the threaded portion of the joint rods easily slide in. This is the top. On the opposite (bottom) side of the mixing base, the joint rod threaded end will not slide in.
- ❑ **Note:** It is very important that you install the joint rods into the top of the mixing base and thread them in until the end of the threaded rod is flush with the bottom of the mixing base. The joint rod ends then face each other to capture the pitch rod.
- ❑ 3. Install the thin wall bearing spacer (brass) followed by a bearing on each side into the mixing unit. Be sure the bearings are fully seated. Slide a 3x4.5mm washer (small) onto a 3x12mm cap screw and insert it into the bearings on the mixing unit (see diagram). Place another 3x4.5mm washer onto the other side of the mixing unit and screw into the mixing lever using a 2.5mm L-wrench (included). Tighten until all side play is eliminated, but the mixing level turns freely.
- ❑ Repeat this process for the opposite side.
- ❑ 4. Press the ball bearings (4) into the mixing base with thick wall brass spacers inserted between the bearings. The bearings must be seated flush with the mixing base. Slide a 3x4.5mm washer (small) onto a 3x15mm hex screw and insert through the bearings in the mixing base. Place another 3x4.5mm washer on the opposite side of the mixing base and screw into the mixing lever until all side play is eliminated but the mixing unit rotates freely.
- ❑ Repeat this process for the other side.
- ❑ 5. Slide the lever bushings D (2) into each side of the aileron arm. Slide the joint ball and joint ball spacer onto the 2x30mm Phillips screw (bevel on joint ball spacer must face the ball). Slide the universal link D onto the right lever bushing D and secure it using the 2x30mm Phillips screw with joint ball and spacer. Slide a 2mm flat washer onto the 2x25mm Phillips screw and secure the left universal link in place.
- ❑ 6. Slide the lever bracket down onto the top of the transmission case and secure using a 3x12mm cap screw. Rotating this lever bracket slightly will change the swash plate timing, which can be desirable for certain maneuvers. For now, align the lever bracket exactly square with the transmission.
- ❑ 7. Fit the elevator lever in place and fasten to the lever bracket using 3x10mm cap screws and 3mm flat washers through the short brass bushings (lever bushing A—2 places). Check that the elevator lever swings freely.
- ❑ 8. Slide the lever bushing B into the aileron arm and, using a 3x20mm cap screw and 3mm flat washers (one on each side), fasten the aileron arm to the lever bracket. Check that the aileron arm pivots freely.
- ❑ 9. Slide the swashplate onto the main shaft and snap the universal aileron links D (2) and the double link S onto their respective balls.
- ❑ 10. Liberally apply grease on the upper portion of the pitch rod and joint rods. Insert the pitch rod through the top of the main shaft, making sure the mixing levers are in the correct position.
- ❑ 11. Snap the mixing unit's ball cups onto the upper swashplate balls (2 places). Check that all the controls (aileron, elevator and collective) move freely. If any binding occurs, disassemble that section of the control system, find where the bind is taking place, correct it and reassemble. This is very important to ensure that you have a precise flying machine.

Screw Bag 2-3	Control System							
8	3x4.5mm Flat Washer		1	Joint Ball Spacer		2	3x10mm Cap Screw	
3	3x12mm Cap Screw		1	2x30mm Phillips Screw		4	3mm Flat Washer	
2	3x15mm Hex Screw		1	2mm Flat Washer		1	3x20mm Cap Screw	
1	Joint Ball		1	2x25mm Phillips Screw				



**ENFORCER** ZK

# ENGINE INSTALLATION



- Tools Needed**
- 2.5mm L-Wrench
  - 1.5mm L-Wrench
  - Hex Nut Driver (to fit your engine)

- ❑ 1. Locate the parts bag containing the engine mount, cooling fan shroud, cone starter, clutch, etc. and screw bag #2-4.
- ❑ 2. While several engines will fit, we will describe the installation of the Webra .32. The procedure for other engines (O.S., Enya, Super Tigre, etc.) is similar.
- ❑ 3. Remove the prop hub from your engine (if equipped), and install the appropriate bushing (the Webra bushing is shown) on the crankshaft.
- ❑ 4. Press the drive gear bearing (2) into each side of the drive gear. Then install the drive gear onto the clutch spacer gear side first.
- ❑ 5. Slide the one-piece clutch over the aluminum hub

on the cooling fan and secure using two 3x6mm cap screws and Kaltite. Thread the fan/clutch assembly onto the crankshaft, followed by the nut (supplied with engine). Securely tighten the nut using the appropriate size nut driver.

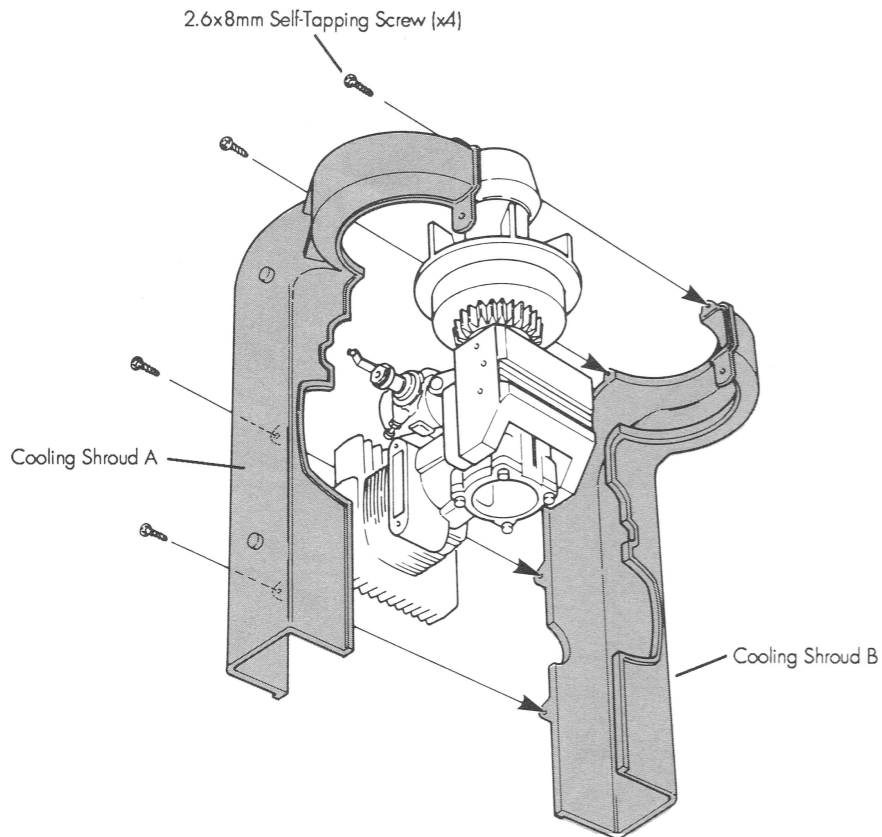
- ❑ 6. Insert the starter cone in the cooling fan. Rotate the cone until the holes on the cone line up with the cooling fan holes. Secure the cone in place with two 3x6mm cap screws.
- ❑ 7. Rotate the throttle lever on the carburetor to match the position shown in the above diagram.
- ❑ 8. Install the engine mount as shown using four 3x12mm cap screws and Kaltite.
- ❑ 9. Attach the ball joint and ball joint spacer to the throttle lever with a 2x10mm Phillips screw and secure with a 2mm hex nut and Kaltite. **Note:** On some throttle levers, it will be necessary to add an extension behind the ball for proper linkage alignment and to use a longer screw.

Screw Bag 2-4		Engine Installation						
4	3x6mm Cap Screw		1	Ball Joint		1	2x10mm Phillips Screw	
7	3x12mm Cap Screw		1	Ball Joint Spacer		1	2mm Hex Nut	

To order parts see page 58



## ATTACHING THE COOLING SHROUD

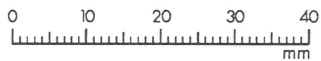


### Tools Needed

#2 Phillips Screwdriver

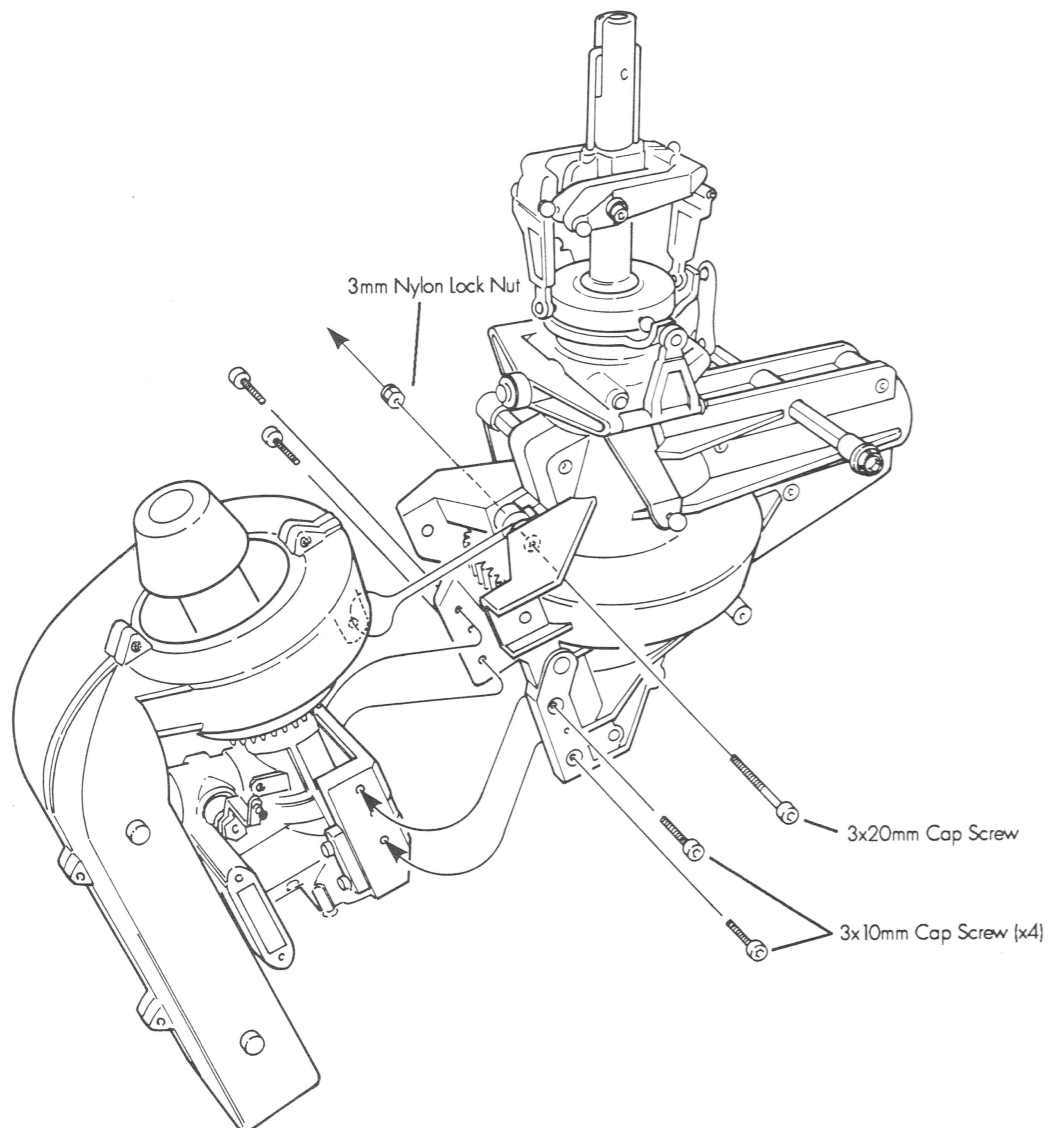
1. Using four 2.6x8mm self-tapping screws from screw bag #2-4, secure cooling shroud A to shroud B around the cooling fan and cylinder head of your engine. Depending on the muffler and engine used, you may have to trim the shroud for clearance. (The Webra .32 with Kalt muffler requires that you trim the exhaust area slightly.)

Screw Bag 2-4		Attaching the Cooling Shroud	
4	2.6x8mm Self-Tapping Screw		



**ENFORCER** ZR




## TRANSMISSION AND ENGINE INSTALLATION



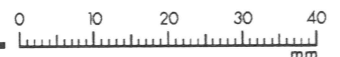
### Tools Needed

2.5mm L-Wrench

- 1. Locate screw bag #2-5.
- 2. Install the engine assembly to the transmission section using four 3x10mm cap screws and KalfTite. A 3x20mm cap screw passes through the upper frame and shroud and a 3mm nylon lock nut secures it in place. Be sure the gears smoothly mesh. If they do not, loosen the four 3x10mm cap screws and retighten until proper mesh is achieved (smooth with very little backlash).

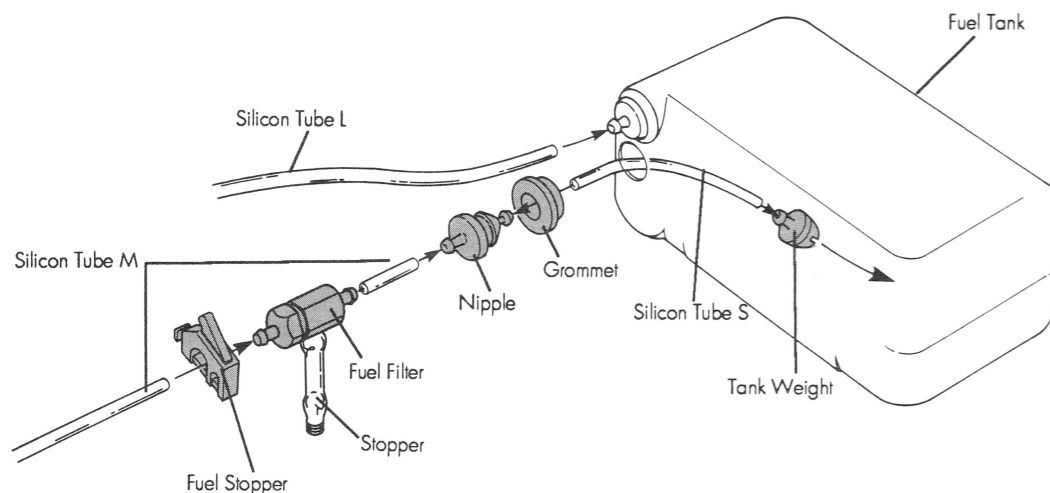
Screw Bag 2-5		Transmission and Engine Installation	
4	3x10mm Cap Screw	1	3x20mm Cap Screw
			
		1	3mm Nylon Lock Nut
			

To order parts see page 58



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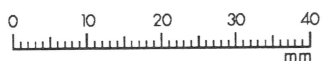
## FUEL TANK



### Tools Needed

Scissors

- 1. Locate the fuel tank and the bag containing the tank hardware.
- 2. Thoroughly clean out the tank using soap and water. Rinse and let fully dry.
- 3. Select the short silicon tube (S) and attach the tank weight (clunk) to one end. Pass the other end through a grommet and attach the end to a fuel nipple as shown on the diagram. This is the fuel pick-up assembly.
- 4. Install the long silicon tube (L) onto the other nipple. Then install the remaining black grommet in the top hole of the fuel tank. Insert the nipple with fuel line (L) attached into the grommet, making sure that it properly seats. This line will later attach to the muffler to pressurize the fuel tank.
- 5. Place the tank weight in the lower hole in the tank and feed the tubing in. Install the grommet. Then insert the nipple, making sure that it fully seats.
- 6. Cut two 1" lengths of tubing off the remaining silicon tube (M). Attach one piece of tubing to the lower nipple and fuel filter and one to the nipple on the side of the filter.
- Attach the remainder of silicon tube (M) to the open filler nipple and slide the fuel stopper over the tube.

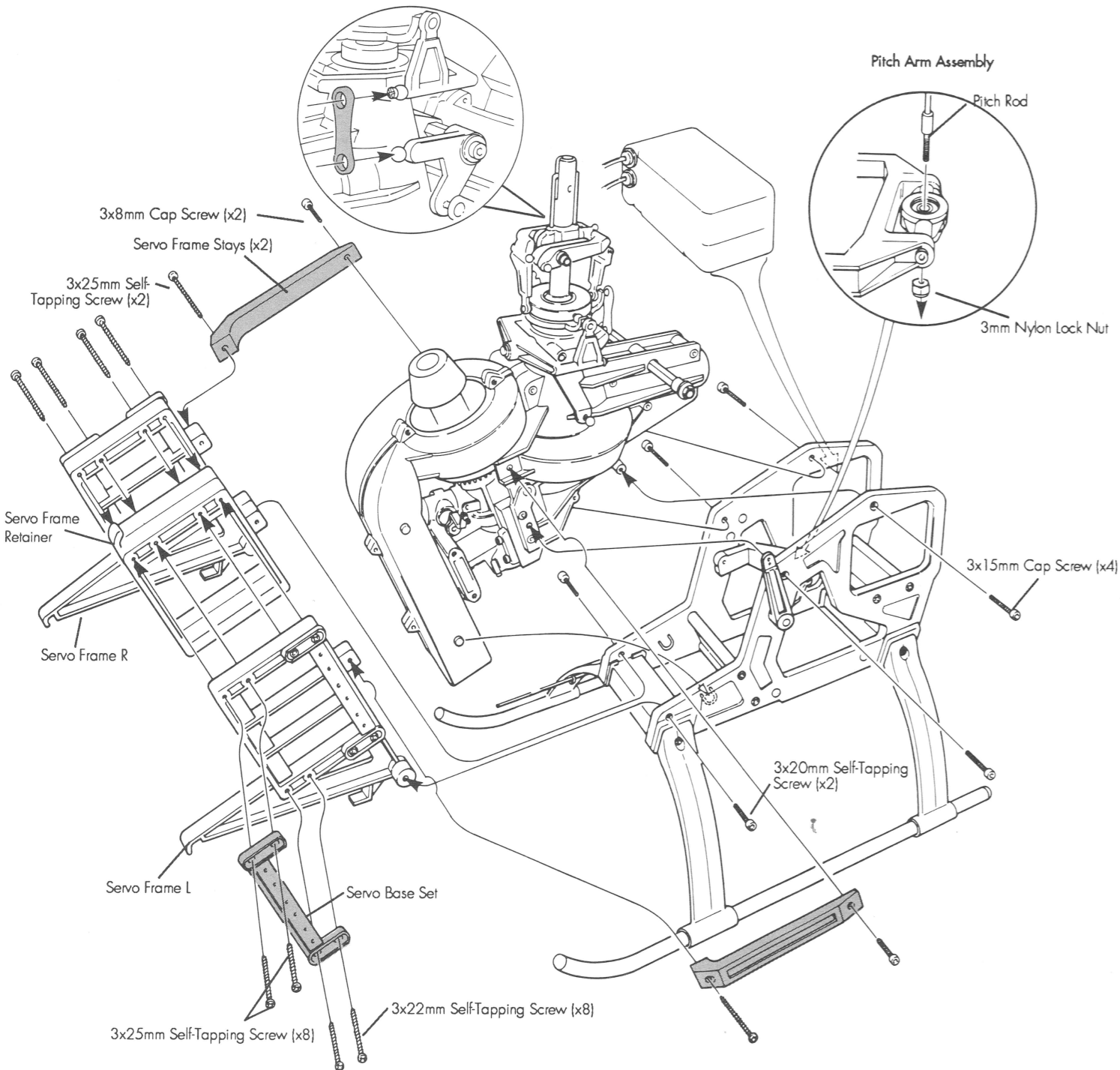


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# MAIN FRAMES AND TRANSMISSION

S-Link Installation

Pitch Arm Assembly









## MAIN FRAMES AND TRANSMISSION (CONTINUED)

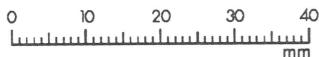
### Tools Needed

#2 Phillips Screwdriver  
2.5mm L-Wrench  
5.5mm Hex Wrench

- ❑ 1. Locate the bag containing the servo frames and screw bag #2-7.
- ❑ 2. Locate the right and left servo frames. These can be identified (right versus left) by noting the lower mounting hole that protrudes further in one direction. Loosely install the four servo bases onto the servo frames from the side that has the protruding lower mounting hole (see drawing). To do this, use eight 3x25mm self-tapping screws to secure the top of the servo frame set and eight 3x22mm self-tapping screws for the bottom. **Note:** Shorter 3x22mm screws are used on the bottom to provide clearance for the glow plug wrench.
- ❑ 3. Install the servo frame retainer between the left and right servo frames. Note the correct orientation on the drawing (the band hook faces upward and toward the front). Loosely screw the 16 self-tapping screws into the servo frame retainer (fully tighten later when the servos are installed).
- ❑ 4. Install the engine and transmission assembly into the side frames. This takes a little patience the first few times. The best procedure is to spread the main frames slightly and notice where the four 3x15mm cap screws are supposed to line up. Also notice the pegs on the lower far shroud fit into the shaped portion of the lower side frame. When in place, secure tightly with four 3x15mm cap screws.
- ❑ 5. Install the servo frame (from step #3) onto the main frames. Use two 3x20mm self-tapping screws. Now install the servo frame stays using two 3x8mm cap screws for the rear and two 3x25 self-tapping screws for the front.
- ❑ **Note:** The upper pegs on the cooling shroud fit between the pegs on the servo stay, holding the shroud in place.
- ❑ 6. Turn the engine over by rotating the starting cone between your fingers to check that the fan clears the shroud. If any contact is heard, reposition the fan shroud slightly by loosening the upper 3x20mm cap screw, adjust the shroud position, and then retighten the screw.
- ❑ 7. Turn the helicopter upside down and swing the pitch arm assembly over the pitch rod so that the threaded rod passes through the ball bearing. Place the 3mm nylon lock nut on the threaded rod and securely tighten while holding the main shaft.
- ❑ 8. Install the pre-assembled fuel tank into the side frame from the right side. It will take some squeezing, but the tank will fit properly. Attach the fuel line (line with filter) to the fuel inlet nipple of the carburetor. Later, attach the pressure line to the muffler nipple.
- ❑ 9. Connect the aileron lever to the aileron arm using the Slink.

**Congratulations!** Your main frame construction is complete! The rest of the assembly is easy, and you're well over half way finished.

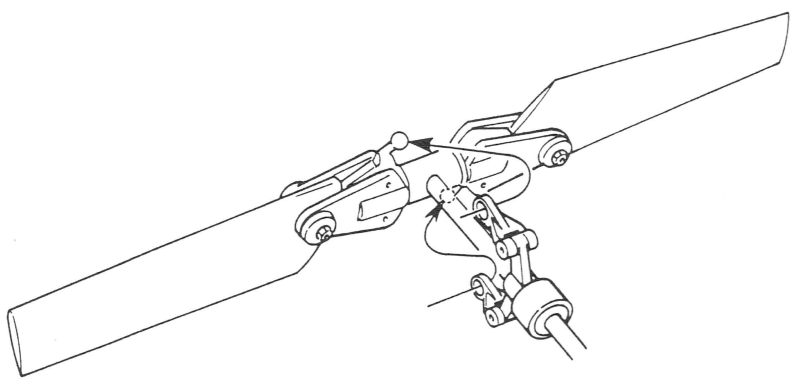
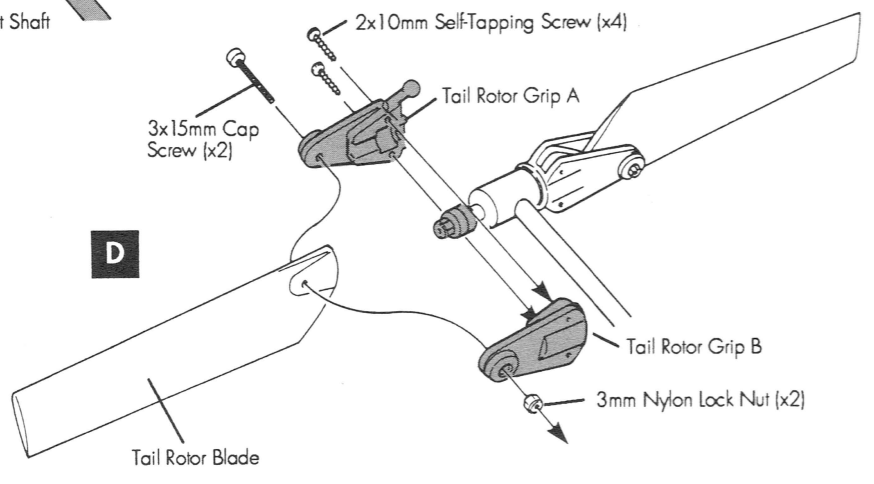
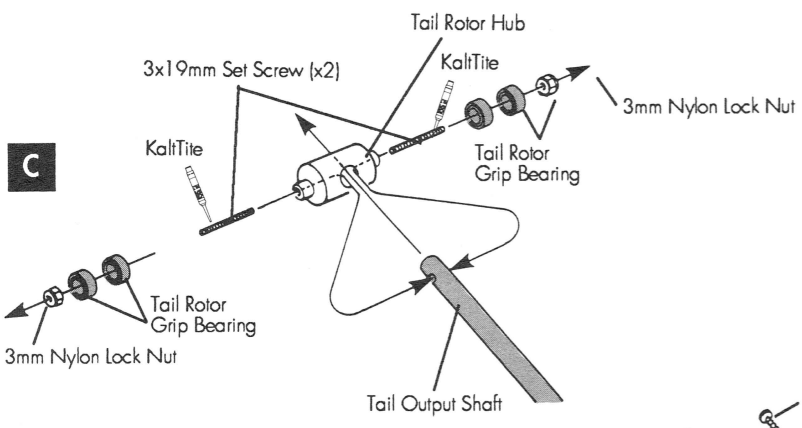
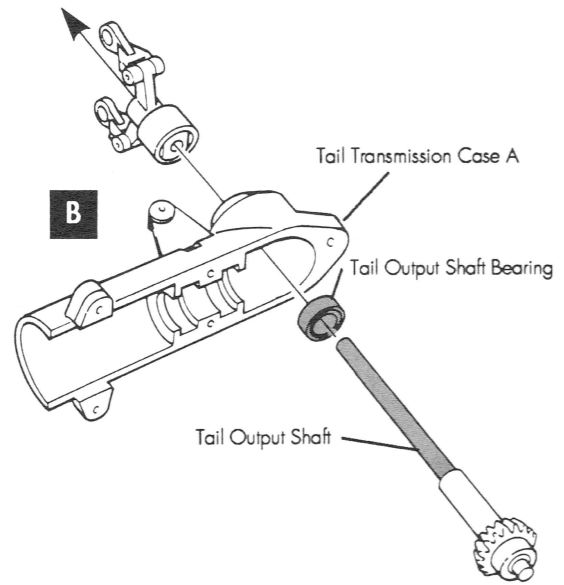
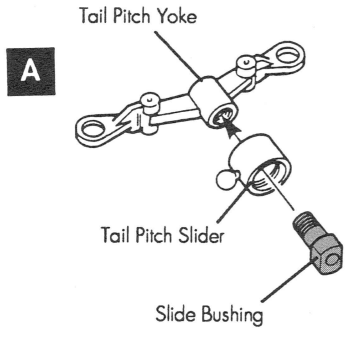
Screw Bag 2-7		Main Frames and Transmission						
10	3x25mm Self-Tapping Screw		4	3x15mm Cap Screw		2	3x8mm Cap Screw	
8	3x22mm Self-Tapping Screw		2	3x20mm Self-Tapping Screw		1	3mm Nylon Lock Nut	



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# TAIL SECTION







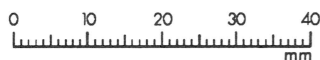
## TAIL SECTION (CONTINUED)

### Tools Needed

5.5mm Hex Nut Driver  
2.5mm L-Wrench  
1.5mm L-Wrench  
#1 Phillips Screwdriver  
#2 Phillips Screwdriver  
Crescent Wrench

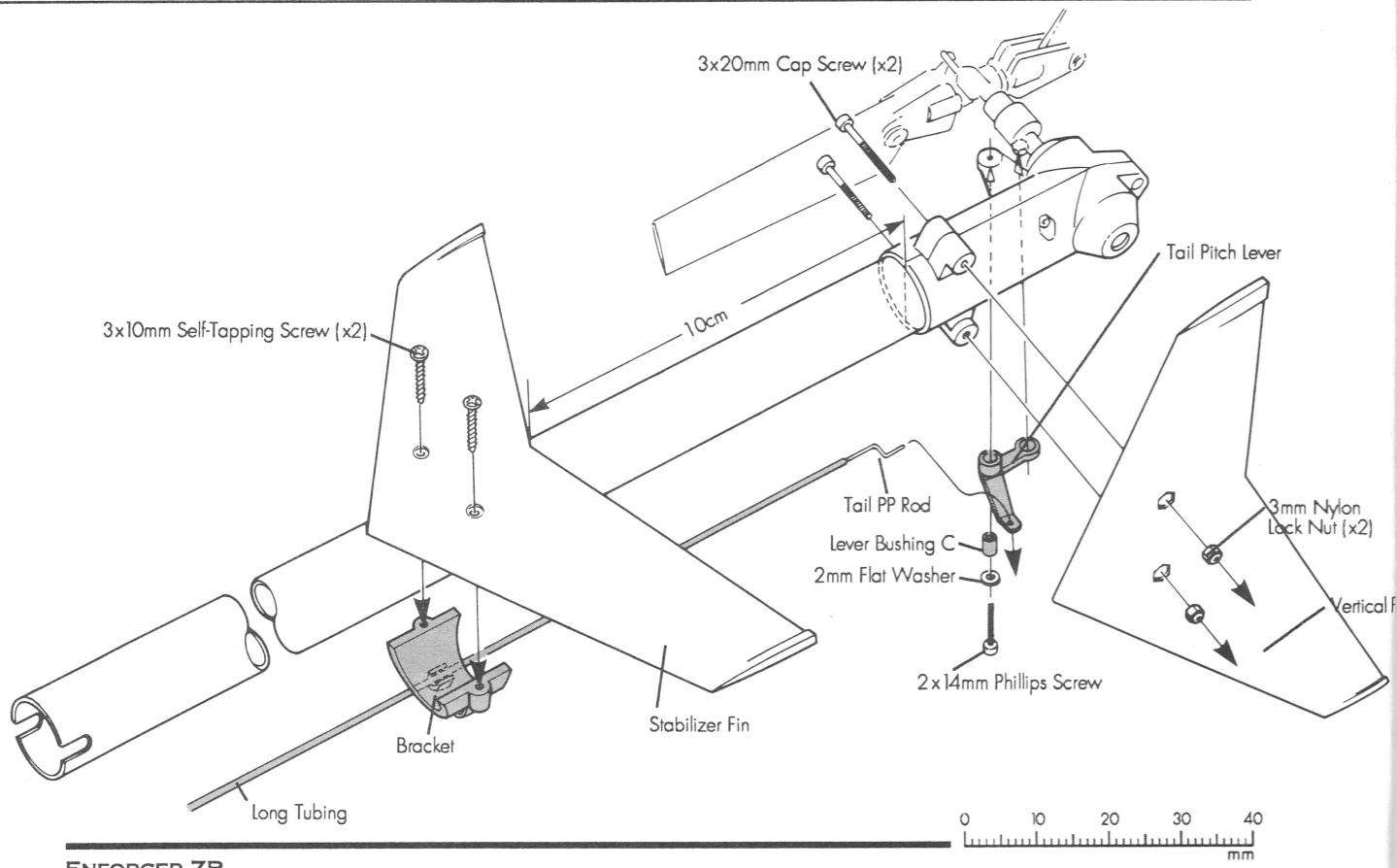
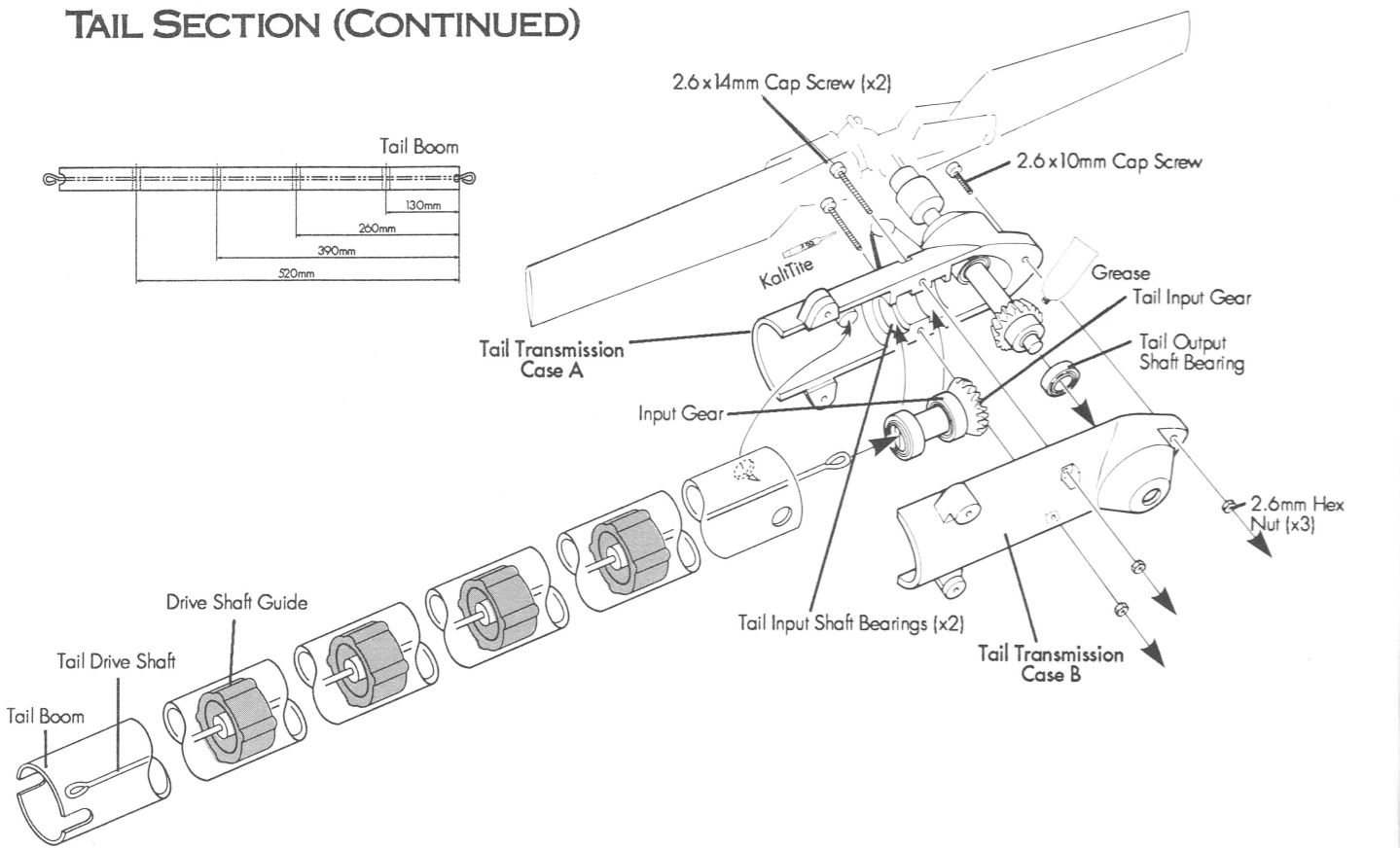
- 1. Locate the bag containing the tail rotor gear box parts and screw bag #2-8.
- 2. Insert the slide bushing (brass) through the tail pitch slider. Then thread it into the tail pitch yoke using a crescent wrench. Note that the threads on the slide bushing are left-hand threads. Tighten securely (see "A").
- Note:** The pitch yoke must be angled outward. The tail pitch slider must rotate freely on the slide bushing with no end play.
- 3. Press the tail output shaft ball bearing (5x10mm) into the right half of the tail transmission case A. Insert the tail output shaft into the tail output shaft ball bearing. Slide the tail pitch assembly from step #2 onto the tail output shaft (see "B").
- 4. Slide the tail rotor hub onto the tail output shaft. Align the holes in the hub with the hole in the output shaft. Apply KalTite to each 3x19mm set screw and install in each side of the tail rotor hub. Be sure each lock into the tail output shaft hole and securely tighten with a 1.5mm L-wrench (see "C").
- 5. Slide the tail rotor grip ball bearings onto each set screw and secure with 3mm lock nuts (both sides — see "C").
- 6. Install tail rotor grips A and B around the tail rotor grip bearings. Tail rotor grip A can be identified by a molded ball attached to the grip. Securely fasten the grips in place using four 2x10mm self-tapping Phillips screws.
- 7. Install the tail rotor blades in the direction shown using two 3x15mm cap screws and two 3mm nylon lock nuts. The tail rotor blades should be loosely fastened so they can pivot freely (See "D").
- 8. Snap the tail pitch yoke universal links onto the tail rotor grip balls (See "E").

Screw Bag 2-8		Tail Section	
2	3x19mm Set Screw 	4	2x10mm Self-Tapping Screw 
4	3mm Nylon Lock Nut 		2
			3x15mm Cap Screw 



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# TAIL SECTION (CONTINUED)











## TAIL SECTION (CONTINUED)

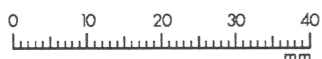
### Tools Needed

#1 Phillips Screwdriver  
#2 Phillips Screwdriver  
1/4" Dowel Rod  
Grease

See top diagram at left.

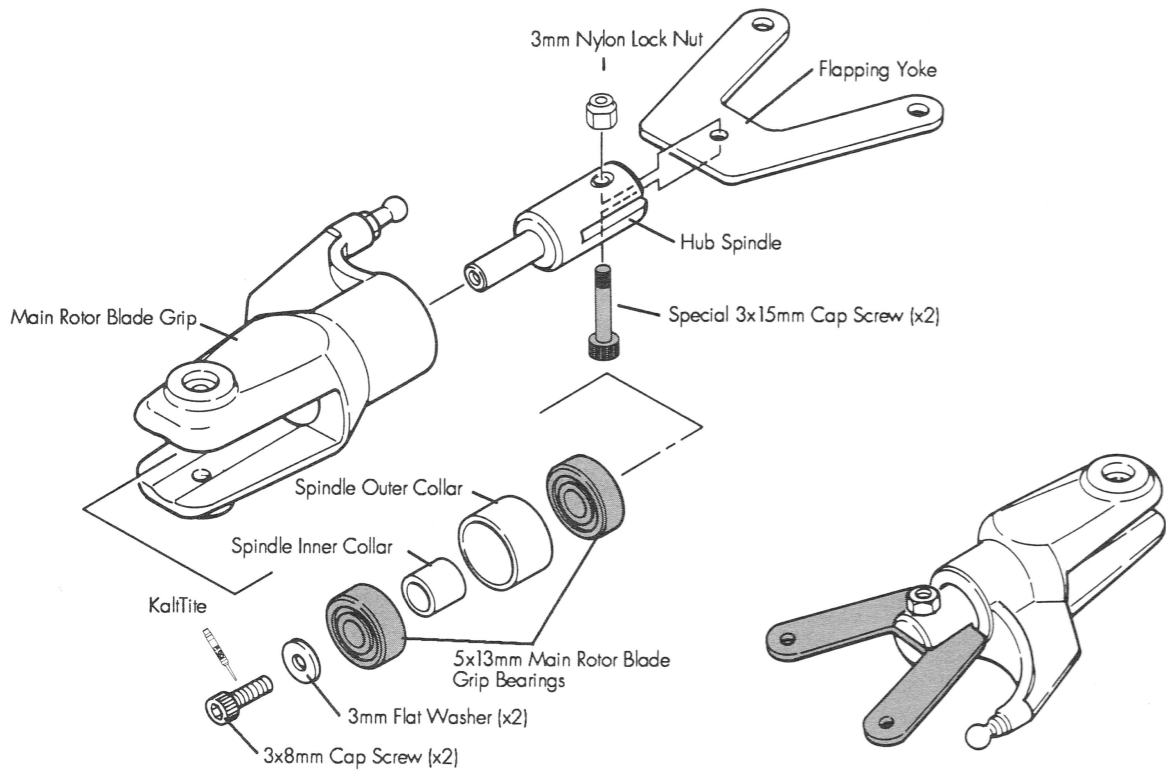
- ❑ 1. Locate the two tail input gear ball bearings (8x14mm). Notice that the balls are exposed on one bearing (open race) and the balls are not visible on the other (shielded). Slide the open raced ball bearing onto the tail input gear first, followed by the shielded ball bearing. Install this assembly into the tail transmission case A as shown, making sure the teeth line up correctly.
  - ❑ 2. Apply grease to the gears and spread the grease by rotating the tail rotor.
  - ❑ 3. Locate the bag containing the tail boom and the tail drive shaft with four drive shaft guides already attached.
  - ❑ 4. Apply grease to the tail rotor drive shaft. Using a 1/4" diameter dowel rod, make marks at 520mm (20.5"), 390mm (15.4"), 260mm (10.2"), and 130mm (5.1") from one end. This rod will be used to press the shaft guides into the tail boom and locate them at the correct position.
  - ❑ 5. Slide the tail drive shaft assembly into the back of the tail boom (end with two holes cut into it). Push the first drive shaft guide (520mm) into the tail boom, followed by the other three drive shaft guides (390mm, 260mm, and 130mm).
  - ❑ 6. Install the tail output gear ball bearing into the left tail transmission case B, making sure it's fully seated.
  - ❑ 7. Set the tail boom into the right transmission case A, making sure the peg molded into the case aligns with the hole in the boom. Engage the drive shaft into the input gear and install tail transmission case B. Secure in place with two 2.6x14mm cap crews, one 2.6x10mm cap screw, three 2.6mm hex nuts and Kaltite.
- See bottom diagram at left.
- ❑ 8. Using two 3x10mm self-tapping screws, install the horizontal stabilizer fin and bracket in place, approximately 10cm (2.5") in front of the tail transmission case.
  - ❑ 9. Install the tail PP rod (push-pull rod) and tube (long) through the stabilizer fin bracket and retainer on the transmission case with the Z-bend to the rear.
  - ❑ 10. Insert the Z-bend into the tail pitch lever from the top (see diagram). Next, secure the tail pitch lever with a 2x14mm Phillips screw (use caution when inserting this screw as the small screw can easily be stripped or broken), 2mm flat washer and lever bushing C. Snap the ball links of the tail pitch slider onto the tail pitch lever before tightening the 2x14mm Phillips screw.
  - ❑ 11. Install the vertical fin using two 3x20mm cap screws and two 3mm nylon lock nuts.

Screw Bag 2-8		Tail Section (Continued)						
2	2.6x14mm Cap Screw		2	3x10mm Self-Tapping Screw		2	3x20mm Cap Screw	
1	2.6x10mm Cap Screw		1	2x14mm Phillips Screw		2	3mm Nylon Lock Nut	
3	2.6mm Hex Nut		1	2mm Flat Washer				



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# MAIN ROTOR HEAD



**Tools Needed**  
 2.5mm L-Wrench  
 1.5mm L-Wrench  
 5.5mm Hex Wrench

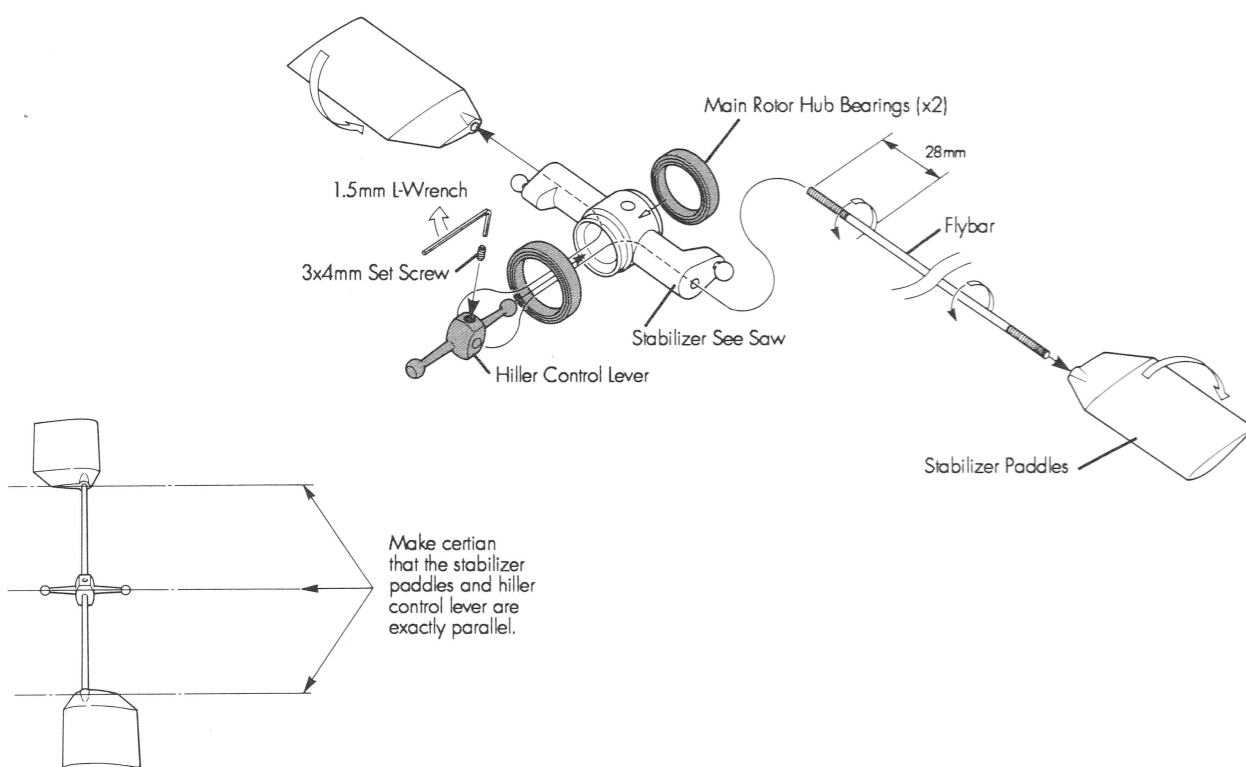
- 1. Locate the bag containing the rotor head parts and screw bag #2-9.
- 2. Using the special (shanked) 3x15mm cap screw and 3mm nylon lock nut, install the flapping yoke to the hub spindle (do not overtighten).
- Repeat for the opposite side.
- 3. Install the following parts into the forked side of a main rotor blade grip in this order: one 5x13mm main rotor blade grip ball bearing, one spindle inner collar (brass), one spindle outer collar (aluminum), and one 5x13mm main grip ball bearing.
- Repeat step #3 for other grip.
- 4. From the opposite side of the main rotor grip, install the hub spindle. Secure in place using a 3x8mm cap screw, 3mm flat washer and KaliTite. Be careful that no KaliTite gets in the bearings.
- Repeat this process for the other side.

Screw Bag 2-9		Main Rotor Head	
2	3x15mm Special Cap Screw	2	3x8mm Cap Screw
2	3mm Nylon Lock Nut	2	3mm Flat Washer

To order parts see page 58



## MAIN ROTOR HEAD (CONTINUED)



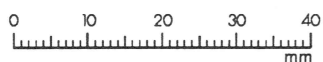
### Tools Needed

1.5mm L-Wrench

- ❑ 1. Place a mark (using magic marker) 28mm (1.1") from each end of the flybar.
- ❑ 2. Insert the hiller control lever into the stabilizer see saw. Then, slide the flybar through the end of the see saw making sure that it passes through the hole in the hiller control lever. Carefully enter the see saw assembly on the flybar making sure that the same amount of flybar extends on both sides of the see saw (this is very important).
- ❑ 3. With the see saw assembly perfectly centered on the flybar, secure it in place with a 3x4mm set screw and KaliTite through the control lever.
- ❑ 4. Screw the stabilizer paddles onto the flybar until they reach the 28mm marks you made in step #1.
- ❑ 5. Make sure that the flybar paddles and hiller control lever are exactly parallel. This is best accomplished by sighting down one paddle and making sure the hiller control lever and the other paddle are in alignment.
- ❑ 6. Install the main rotor hub ball bearings (15x20mm) onto each side of the stabilizer see saw.
- ❑ 7. To balance the flybar assembly, place the assembly, which should rest on the hub bearings, on the corner of a table with the stabilizer paddles hanging off each edge. The heavy paddle will fall lower than the light paddle. Add tape (decals can also be used) to the lighter paddle until the flybar balances level.

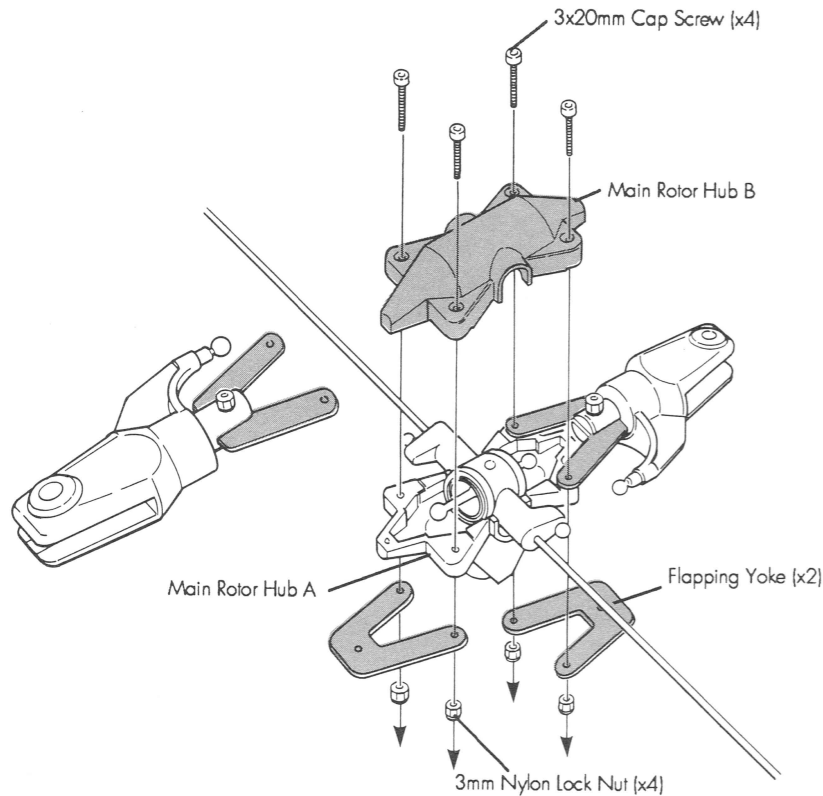
### Screw Bag 2-9 Main Rotor Head (Continued)

1 3x4mm Set Screw



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## MAIN ROTOR HEAD (CONTINUED)



### Tools Needed

2.5mm L-Wrench  
5.5mm Nut Driver

- 1. Lay the stabilizer see saw into the bearing tracks on the main rotor hub A.
- 2. Place the main rotor hub B onto rotor hub A and slide the hub spindle yoke assembly into each end of the main rotor hub as shown (3mm lock nut up).
- 3. Insert two 3x20 mm cap screws through the top of the main rotor hub B capturing the flapping yoke. Place a boom strike bumper (a flapping yoke that has been cut out) on the bottom side of main rotor hub A and retain with a 3mm nylon lock nut. Tighten securely.

- Repeat to assemble the opposite side.
- Note:** The head of the cap screws that pass through the hub spindle and flapping yoke should clear the boom strike bumpers by approximately  $\frac{1}{32}$ ". During a hard landing, the cap screw actually contacts the boom strike bumper, which prevents the blades from flexing downward and hitting the tail boom.

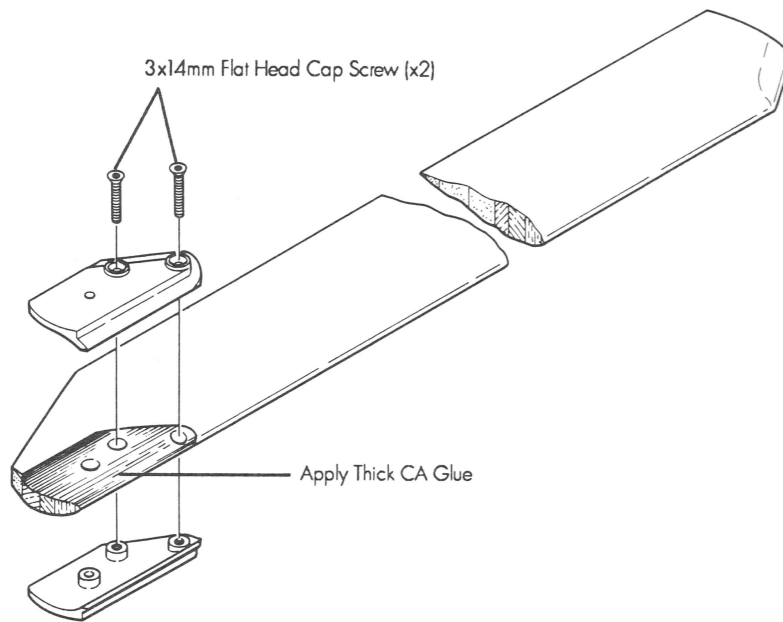
Screw Bag 2-9		Main Rotor Head (Continued)	
4	3x20mm Cap Screw		4
			

To order parts see page 58

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## MAIN ROTOR BLADES



### Tools Needed

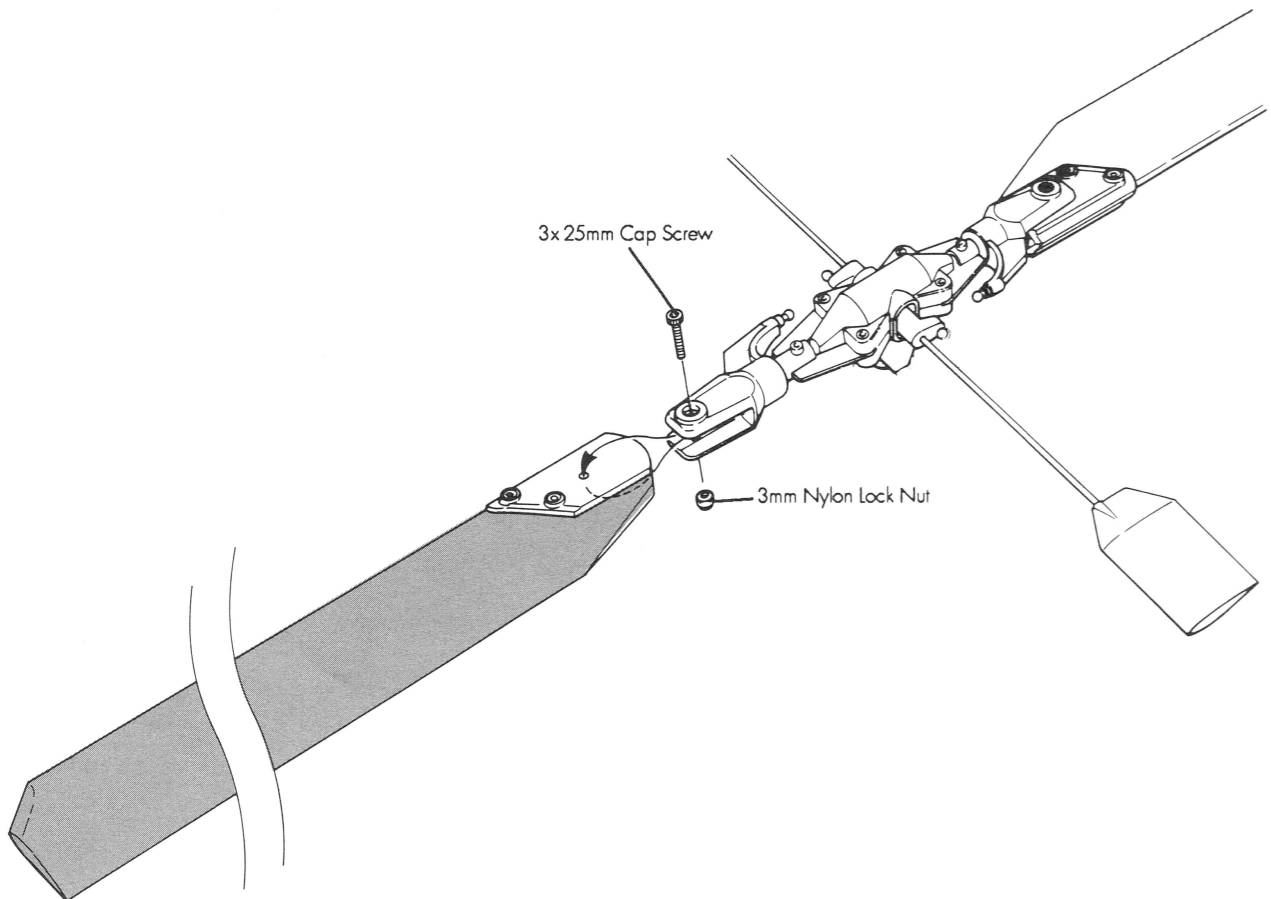
2mm L-Wrench  
Thick CA Glue  
Hobby Knife

- ❑ 1. Although the main rotor blades are factory finished and assembled, it is necessary to bond the blade reinforcements to the blade.
- ❑ 2. Using a sharp hobby knife, carefully cut through the blade covering around the root reinforcement. Unscrew the 3x14mm flat head cap screws and remove the root reinforcements.
- ❑ 3. Remove the blade covering material that is under the root reinforcements and discard.
- ❑ 4. Apply thick CA glue to this area and reinstall the root reinforcement and tighten the 3x14mm flat head screws.
- ❑ Repeat this process for the other blade and let dry at least 10 hours before using.





## MAIN ROTOR BLADES (CONTINUED)



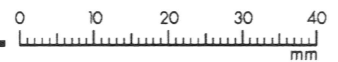
### Tools Needed

2.5mm L-Wrench

- 1. Using a 3x25mm cap screw and a 3mm nylon lock nut, fasten the blade in place. The blades should be tightened only moderately (do not overtighten) so that they can swing with a medium amount of force.

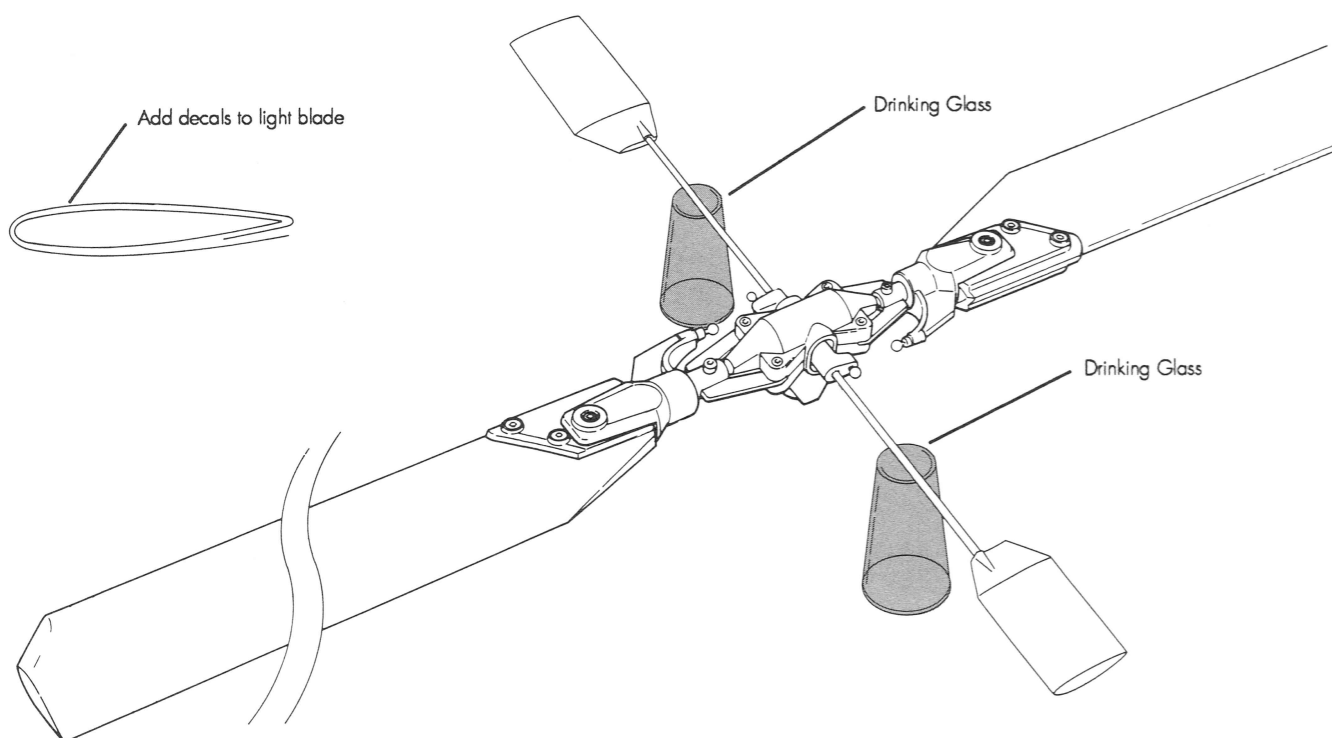
Screw Bag 2-9		Main Rotor Blades	
1	3x25mm Cap Screw	1	3mm Nylon Lock Nut

To order parts see page 58



ENFORCER ZR

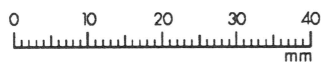
## BALANCING THE BLADES



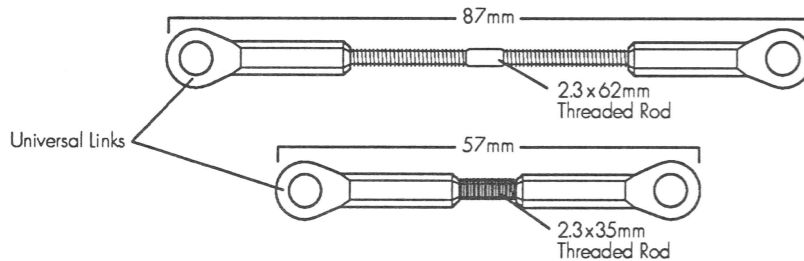
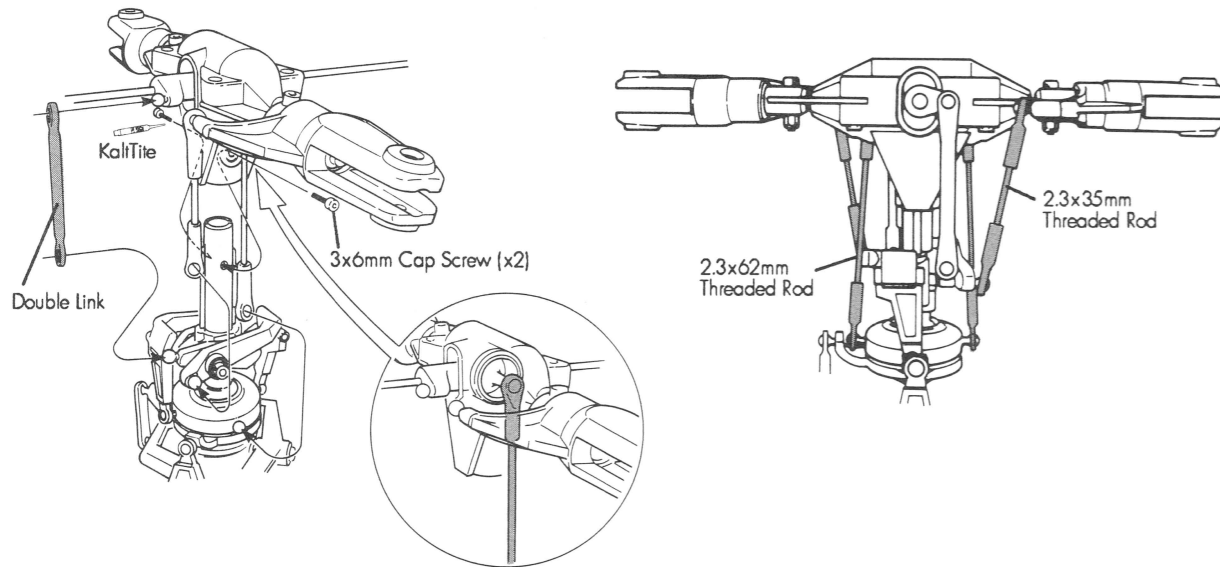
### Tools Needed

Two Drinking Glasses  
Hobby Knife

- ❑ 1. Suspend the rotor head with the flybar resting on two drinking glasses (see diagram). Be sure that the rotor blades are outstretched straight. The heavy blade will tip downward.
- ❑ 2. On the decal sheet you will find blade balancing decals. Cut out the decals and add to the tip of the light blade. Add or subtract decal material until the blades balance perfectly horizontal.



# ATTACHING THE ROTOR HEAD



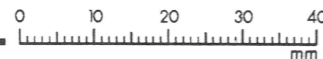
## Tools Needed

2.5mm L-Wrench

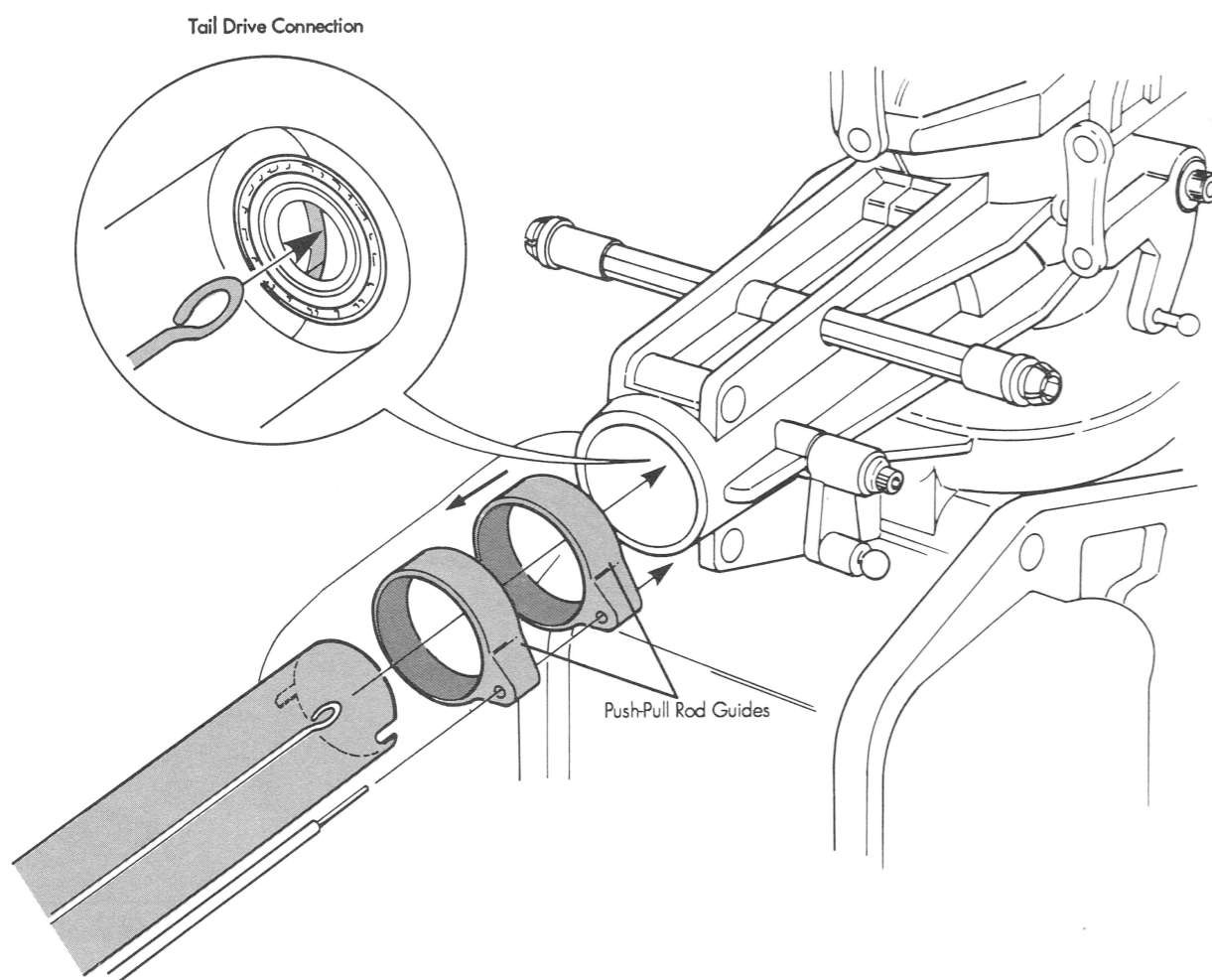
- 1. Locate the linkage bags (unmarked). Press the rotor head onto the main shaft, making sure the pitch joint rod slides into the recesses in the lower head block. Align the holes in the lower head block with the main shaft holes. Insert a 3x6mm cap screw with KaliTite into the lower head block hole and tighten. Install a 3x6mm cap screw with KaliTite in the opposite side and tighten.
- 2. Snap one end of a double link onto the end of the mixing lever and the other end to the stabilizer see saw (see diagram).
- Repeat this process for the other side.
- 3. Screw the universal links onto each end of two 2.3x62mm threaded rods and adjust both to 87mm in length (see above). These are the hiller control rods. Snap one side of the hiller control rod onto the hiller control lever inside the head and the other to a ball on the inside ring of the washplate.
- Repeat this for the other side.
- Note:** It may be necessary to slightly lengthen or shorten these hiller control rods to eliminate any load on the rods.
- 4. Screw the universal links onto each end of the two 2.3x35mm threaded rods and adjust to 57mm (see diagram). Install one end of each to the rotor blade grip balls and the opposite ends to the outside of the mixing unit.

Linkage Bag		Attaching the Rotor Head	
2	3x6mm Cap Screw		8
	Universal Link		

To order parts see page 58



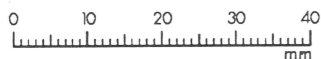
## TAIL BOOM INSTALLATION



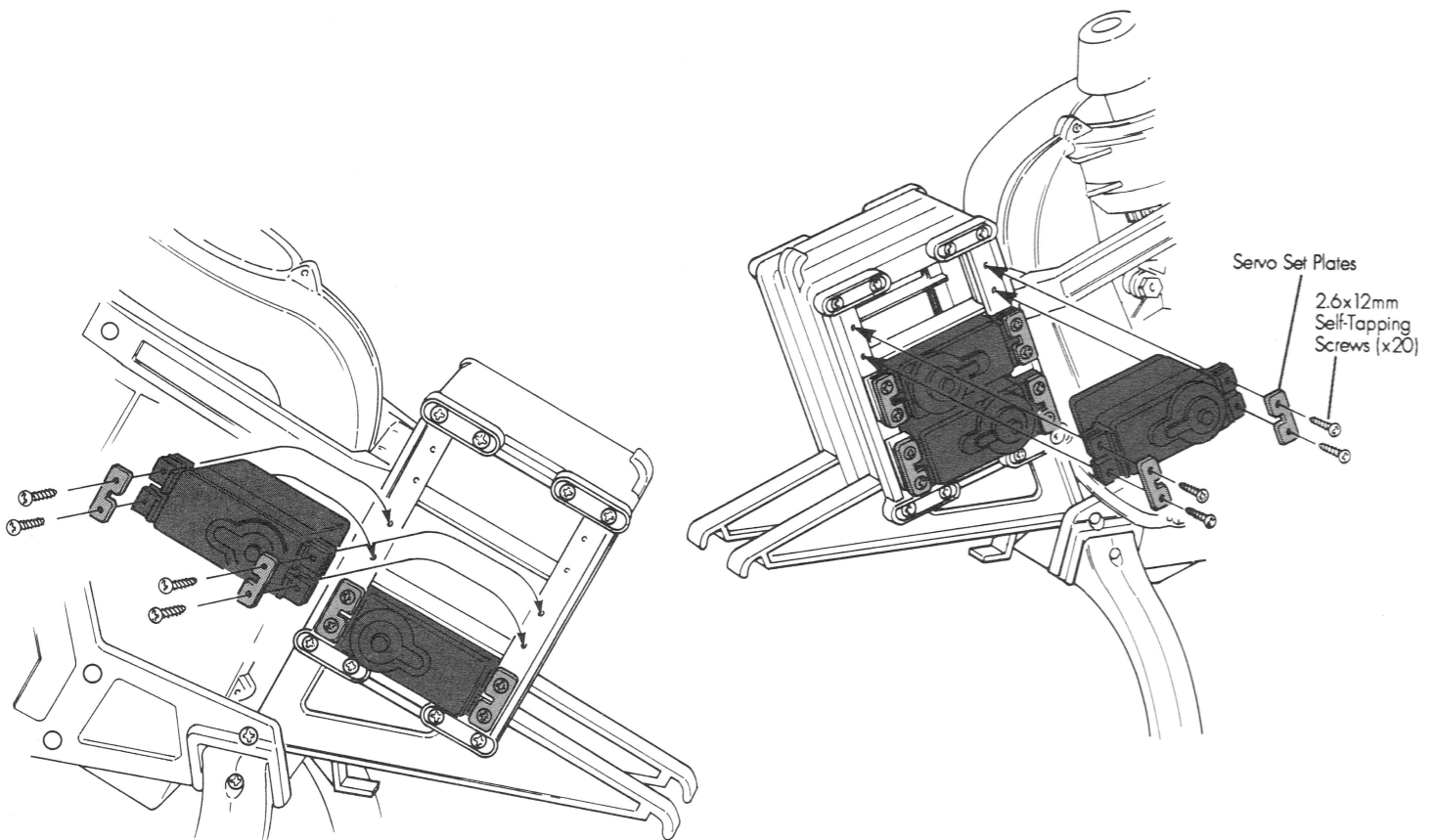
### Tools Needed

2.5mm L-Wrench

- ❑ 1. Loosen the three 3x20mm cap screws and rear body mount stays to allow the rear upper frame to be spread to accept the tail boom assembly.
- ❑ 2. Measure 54mm (2.12") from the notched end of the tail boom and make a pencil mark.
- ❑ 3. Slide the two tail push-pull rod guides (bag #1-2) onto the tail boom making sure the push-pull rod slides through the small hole in the guides. Push the rod guides rearward on the tail boom and out of the way. They will be positioned later.
- ❑ 4. Insert the tail boom into the main frames and slide up to the pencil mark 54mm from the end. Be sure the notches on the tail boom engage the pegs in the main frame. Also be sure the tail drive wire engages the tail drive gear.
- ❑ 5. Tighten the three 3x20mm cap screws and the body stays that secure the tail boom in place. Rotate the head counter clockwise from the top. It should turn freely and the tail rotor should also turn.
- ❑ 6. Slide the rear tail push-pull guide 250mm (9.8") back from the rear of the main frame and slide the front push-pull guide 50mm (1.95") from the main frame. Rotate the guides so that the tail rotor push-pull rod makes a straight line.



## RADIO INSTALLATION



### Tools Needed

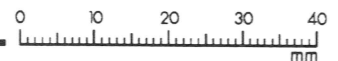
#2 Phillips Screwdriver

- ❑ 1. Using twenty 2.6x12mm self-tapping screws from bag #1-3 and servo set plates, install your servos using the grommets and eyelets provided with your radio system as shown. Pay careful attention to the position of the output shafts (front versus rear).
- ❑ **Note:** Depending on the depth of the servo being used, you may have to turn the servo bases over to provide clearance.
- ❑ 2. Route all the servo leads through the top right hole of the servo chassis.

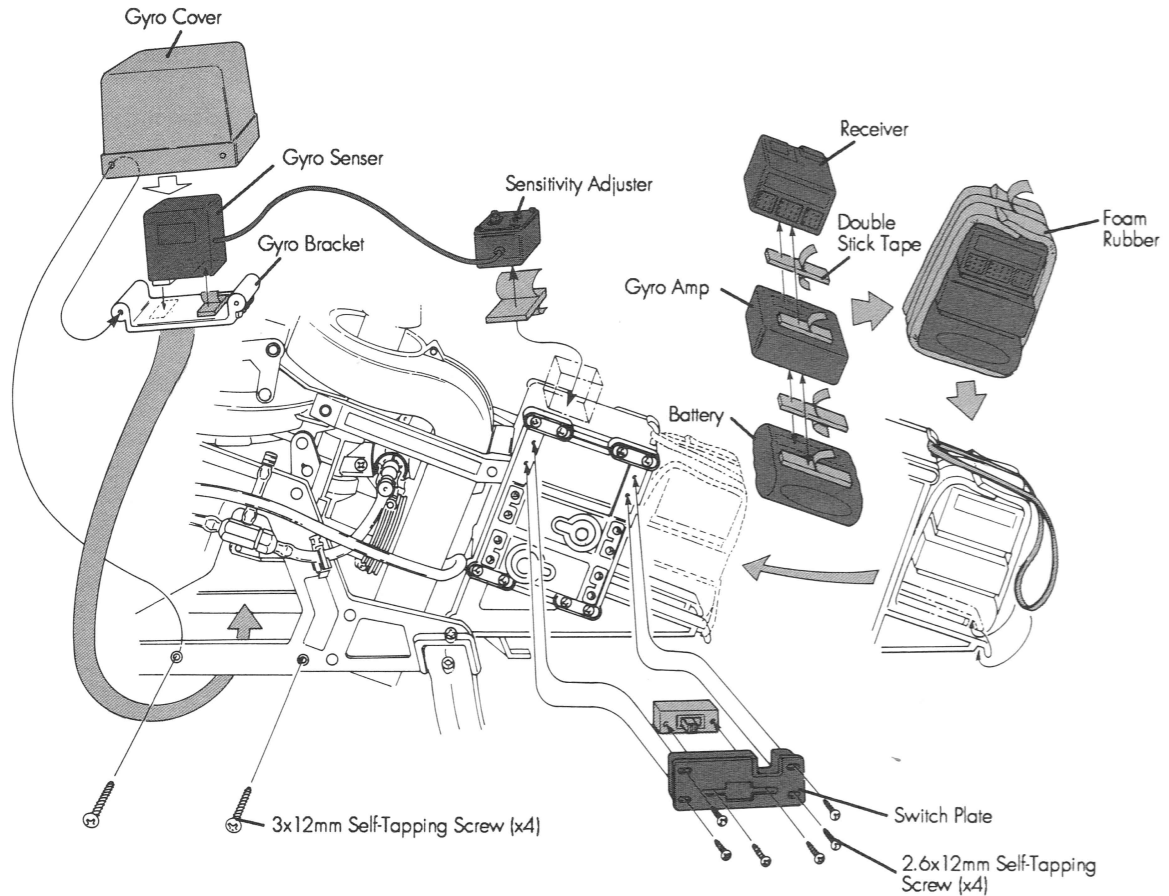
Screw Bag 1-3		Radio Installation	
20	2.6x12mm Self-Tapping Screw		

To order parts see page 58

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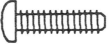

## RADIO INSTALLATION (CONTINUED)

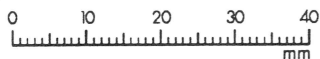


### Tools Needed

#1 Phillips Screwdriver

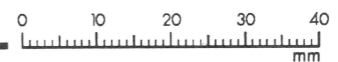
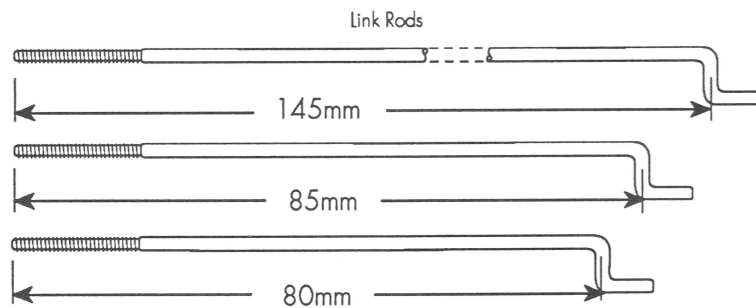
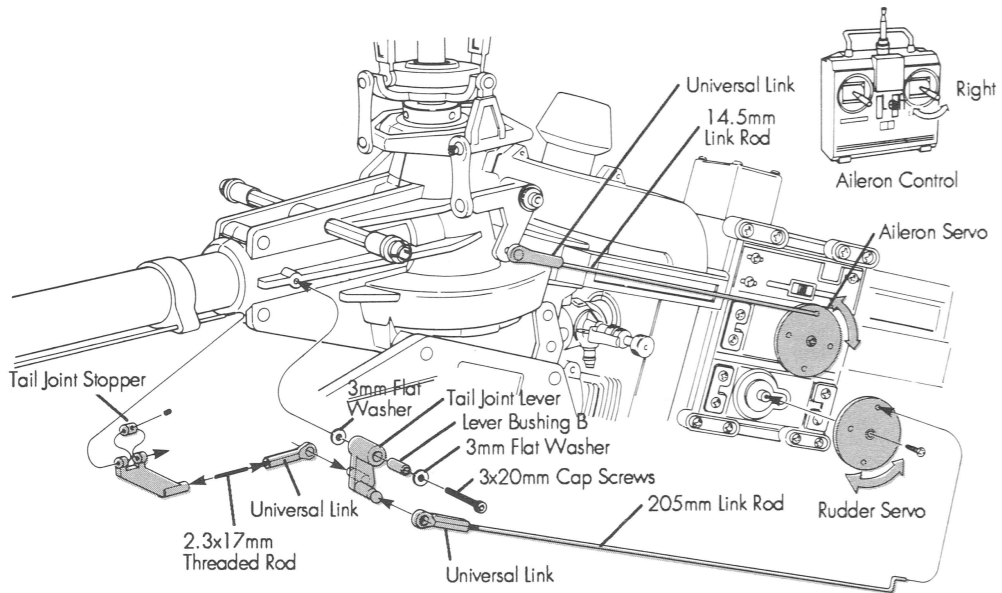
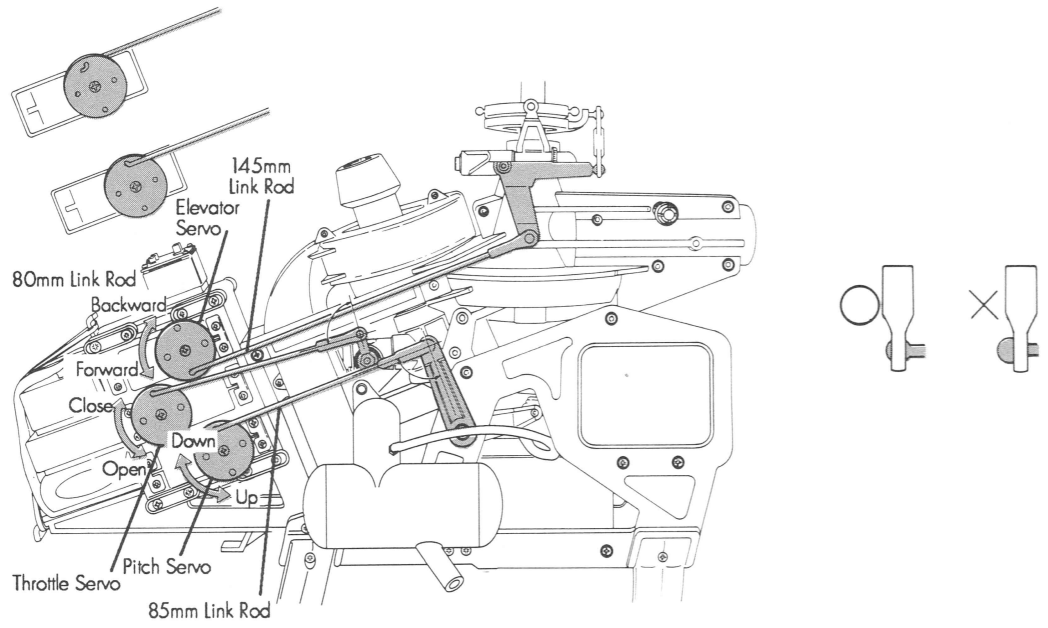
- ❑ 1. Using thick double sided tape, attach the gyro sensor to the gyro bracket. Two strips of tape located at each end is the preferred method since it effectively transfers rotational motion (yaw), but dampens high frequency vibrations.
- ❑ 2. Place the gyro cover over the gyro bracket and insert through the bottom of the main frames. Align the holes in the main frame, gyro cover and gyro bracket and secure using four 3x12mm self-tapping screws.
- ❑ 3. If your gyro is equipped with a sensitivity adjuster, mount it on top of the servo chassis using double sided tape.
- ❑ 4. Install your radio system's on/off switch to the switch plate using the hardware provided with your radio system. Gather all the servo leads together and be sure they rest in the slot in the switch plate. Install the switch plate using four 2.6x12mm self-tapping screws.
- ❑ 5. Using double sided tape, mount the battery pack (bottom), gyro amp (middle) and the receiver (top) to each other as shown above. Plug the servo leads, gyro and switch harness/battery into the appropriate positions on the receiver (consult the instruction manual included with your radio). Wrap this assembly in foam (included) and secure it to the servo frames with a rubber band.

Screw Bag 1-3		Radio Installation (Continued)			
4	3x12mm Self-Tapping Screw		4	2.6x12mm Self-Tapping Screw	



**ENFORCER** ZR

# LINKAGE SET-UP



## LINKAGE SET-UP (CONTINUED)

### Tools Needed

#2 Phillips Screwdriver

See top diagram at left







- 1. Turn your radio system (transmitter and receiver) on, center all the trims and move the collective stick to the middle position (left stick on transmitter mode 2). If you are using a JR brand radio, select the servo wheels currently on your servos and use the hole located furthest outward (10.5mm from the center). With Futaba systems, select the X-arm and use the hole 10.5mm out (the second hole out). Install the wheels or horns in the position shown in the drawing.
- 2. Locate bag #1-4
- 3. Depending on the height of the servos, it may be necessary to install the link rods from the opposite side of the servo wheel. The holes in the servo wheel may need to be enlarged with a #48 size drill bit (.076") to accommodate the linkage rods.
- 4. Screw a universal link onto the end of a 145mm link rod. Insert the Z bend, as shown, in the upper servo's output wheel. With the radio on and trims centered, adjust the length of the rod so that the swashplate is exactly level. This is the elevator control. When the right stick on the transmitter is pushed forward, the swashplate should tilt forward (front of swashplate down). If it doesn't, reverse the servo direction (refer to your radio instruction manual).
- 5. Screw a universal link onto the end of an 80mm link rod (throttle) and install the Z bend into the middle servo (left side) as shown. Adjust the rod length so that at half throttle on the carburetor, the control rod is 90° to the carb lever and 90° on the servo output wheel.
- Check that the servo is operating in the proper direction and change if necessary.
- 6. Screw a clevis onto the end of an 85mm link rod (pitch control) and install the Z bend into the lower

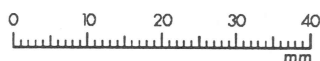
servo (left side) as shown. Be sure the transmitter's throttle stick position is exactly centered, and adjust the rod length so that at half throttle, the link is exactly 90° to the pitch level and to the servo wheel. When the throttle is moved to the high stick position, the pitch level should move forward.

- Change the servo direction if necessary.

See middle diagram at left

- 1. Screw a universal link on the 145mm link rod (aileron) and install. Adjust the length until the swashplate is exactly level with the transmitter aileron trim centered. Moving the aileron stick right should tilt the swash-plate right.
- Reverse the servo if necessary.
- 2. Install the tail joint lever using a 3x20mm cap screw, two 3mm flat washers and the lever bushing B in the order shown. Make sure the lever pivots freely.
- 3. Screw the 2.3x17mm threaded rod into the universal link. Screw the other end of the rod into the tail joint link. Screw in completely until the universal link seats on the tail joint link.
- 4. Install the tail joint link onto the tail push-pull rod with the tail joint stopper in place. The push-pull rod should extend 3mm past the tail joint link. Secure using a 3x3mm set screw and KaltTite. Now snap the universal link onto the back side of the tail joint lever. Be sure that the tail joint lever moves freely throughout its stroke. Reposition the rod guides as necessary to provide a straight line for the push-pull rod.
- 5. Screw a universal link onto a 205mm link rod (rudder) and install the Z bend in the bottom right servo wheel as shown. With the radio on and trims centered, make sure the rudder servo is perfectly centered. Adjust the rod length so that the tail joint lever is straight down. Moving the transmitter rudder stick to the right, the tail joint lever should move forward.
- Reverse the servo if necessary.

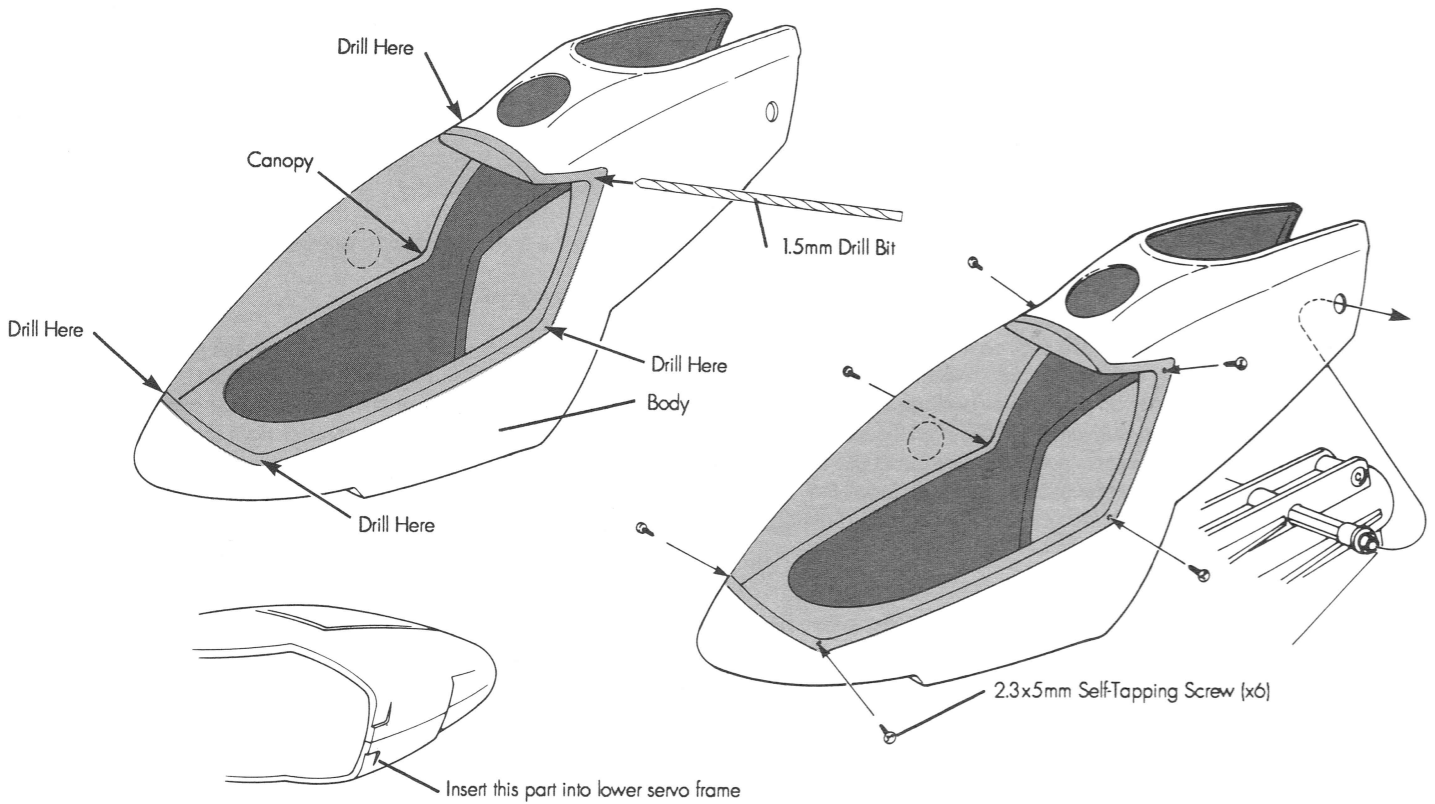
Screw Bag 1-4		Linkage Set Up						
1	3x20mm Cap Screw		1	2.3x17mm Threaded Rod		5	Universal Link	
2	3mm Flat Washer		1	3x3mm Set Screw		1	Clevis	



**ENFORCER** ZR



## BODY ASSEMBLY



### Tools Needed

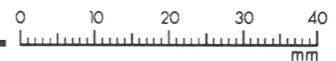
1.5mm Drill Bit  
Drill  
Scissors

- ❑ 1. Using scissors, trim the canopy to fit into the recessed portion of the body. Tape the canopy in place and drill six 1.5mm holes in the locations shown. Install six 2.3x5mm self-tapping screws from bag #1-7.
- ❑ 2. A small hole can be cut into the right side of the canopy to access the on/off switch, or you can pop the body off to get to the switch.

### Screw Bag 1-7 Body Assembly

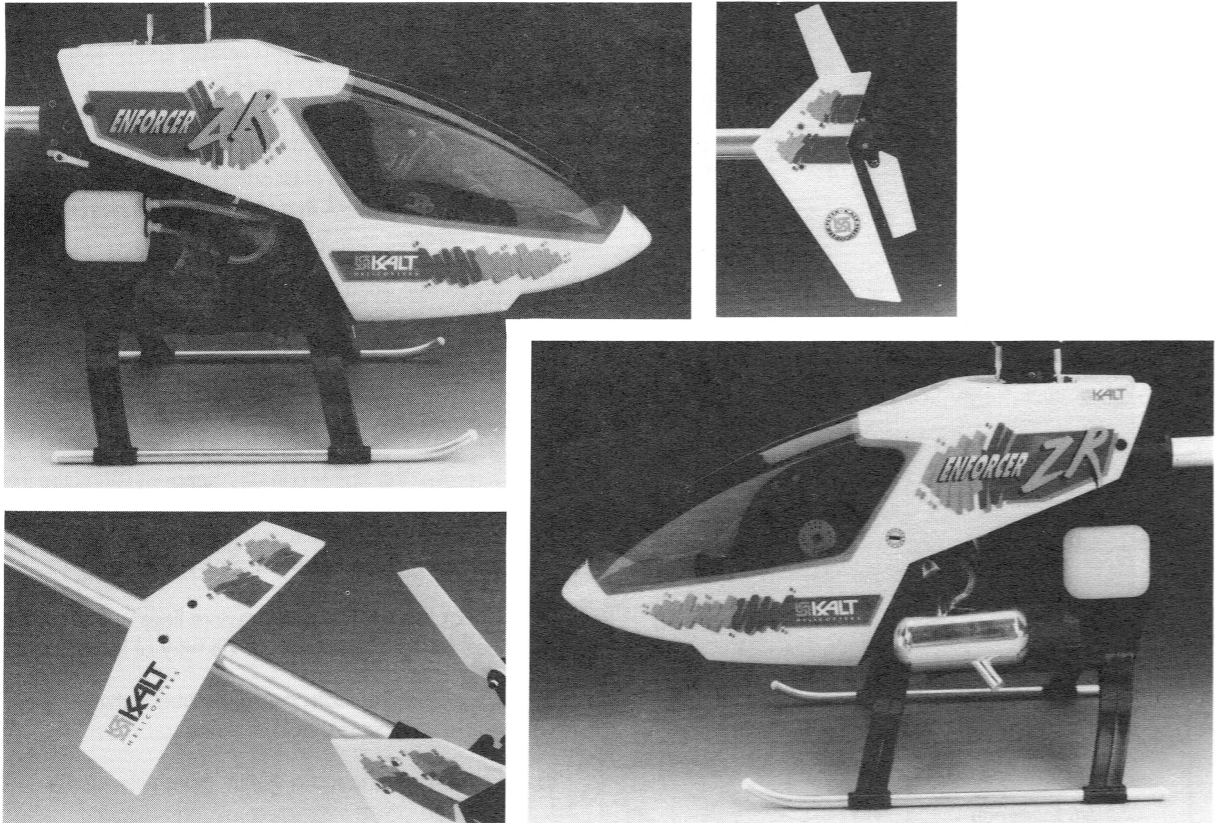
6	2.3x5mm Self-Tapping Screw			
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To order parts see page 58



ENFORCER ZR

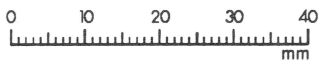
## BODY ASSEMBLY (CONTINUED)



### Tools Needed

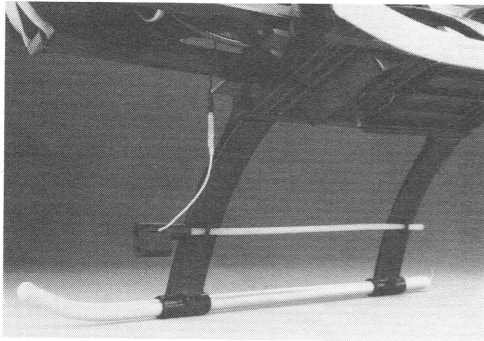
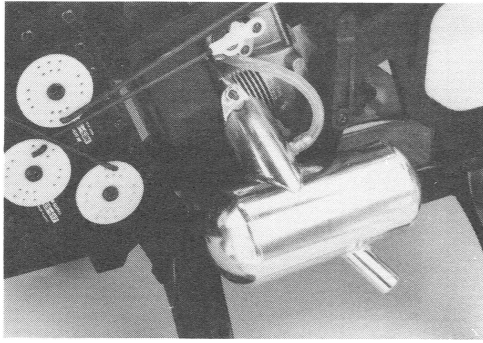
Scissors

- ❑ 1. Clean all body surfaces with rubbing alcohol and allow to dry.
- ❑ 2. Cut the decals from the decal sheet and apply as shown.
- ❑ **Hint:** *Spraying the body with soapy water prior to attaching the decals will allow you to position them easily. When the water dries, the decals will be stuck securely in place.*



**ENFORCER ZR**

## MUFFLER/ANTENNA INSTALLATION



### Tools Needed

2.5mm L-Wrench

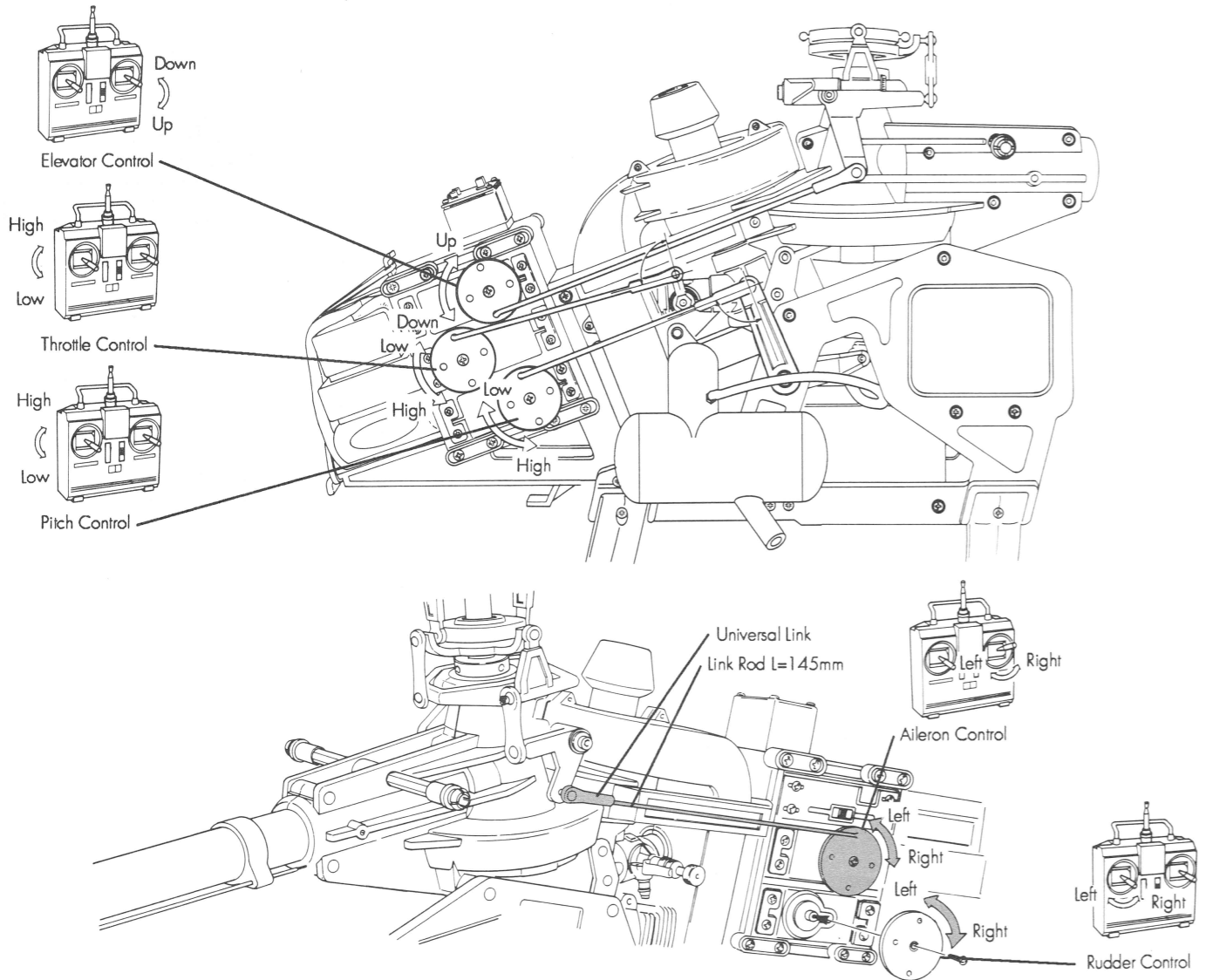
- ❑ 1. Many types of exhaust systems are available and some engines include mufflers. The exhaust system greatly affects the performance, power, tuning ability, smoothness in hover and overall handling characteristics of a helicopter engine. The recommended exhaust system is the Kalt 31032. It is super smooth in hover, is quiet, has non-critical hover RPM and gives excellent power and high-low transition. Even if your engine came with a muffler, replacing it with the Kalt 31032 is recommended.
- ❑ 2. Mount the muffler with the screws provided. It may be necessary to trim the cooling shroud slightly to provide clearance. Attach the pressure tubing to the muffler nipple.
- ❑ 3. A base loaded whip antenna is recommended to eliminate the excess length of antenna wire. Follow the instructions included with the antenna. Mount the antenna through the U-shaped retainers located under the right landing gear skids.

## POST ASSEMBLY CHECKLIST

**Congratulations!** You've successfully completed the assembly of the Enforcer ZR!

- ❑ Carefully go back over each assembly step in this manual and check that each step was completed in its entirety.
- ❑ Make sure each screw, bolt and nut is securely tightened.
- ❑ Check that all control linkages move freely with no binding. If the ball fit is too tight, lightly sand the steel ball links with 360 grit sandpaper.
- ❑ Turn over the starter cone by hand, making sure the fan clears the fan shroud. It may be necessary to loosen the top 3mm screw holding the shroud to adjust the shroud position, then retighten.
- ❑ Check that the fuel and pressure lines are properly hooked up and stay out of the way of the linkages.
- ❑ Check that the radio gear (receiver, battery, gyro amps) are securely held in place.
- ❑ Fully charge the radio system (transmitter and receiver).

## SET-UP AND FINAL ADJUSTMENTS



- 1. Turn on the radio system (transmitter and receiver) and center all the trims. Double check the servo direction.

### Mode 2

Right stick forward (elevator)	Swashplate tilts forward
Right stick right (aileron)	Swashplate tilts right
Left stick forward (throttle/pitch)	Throttle opens/pitch lever moves forward
Left stick left (rudder)	Tail joint lever moves rearward

- 2. Turn the gyro gain control to 100% on your gyro (see gyro instructions). If you are using a gyro with dual sensitivity, turn both positions to 100%. Rotate the nose of the helicopter to the right rapidly while observing the tail joint lever. When rotating the nose to the right, the tail joint lever should move rearward. If it moves forward, reverse the direction of the gyro (see gyro instructions on how to reverse). Now readjust the gyro to 50% gain. This will be your starting point for flying.
- 3. With the transmitter trims and the throttle stick centered, make sure the swashplate is exactly level, the pitch lever is 90° to the pitch rod, the throttle is at half open, and the tail joint lever is straight down. Readjust the link rods if necessary.

**ENFORCER** ZR

## CONTROL THROW ADJUSTMENT

### Aileron/Elevator

- ❑ 1. Make sure that the aileron and elevator link rods are in the proper holes in the output wheel (10.5mm from the center). With the transmitter adjusted to 100% travel on aileron and elevator, move the stick to its extremes. You should find that the swashplate moves freely and is within a few degrees of its mechanical travel limits. This is maximum throw and should not be exceeded. It is recommended that a travel between 70% to 100% be used.

If your radio is equipped with dual rates, the suggested rates are 100% for aerobatics (high rate) and 70% for hover (low rate) for both aileron and elevator. Because of the nature of the design of the dual flapping head, a very soft feel is achieved in hover so no exponential is used.

- ❑ 2. Recheck for proper control throw:

Right stick forward	Swashplate tilts forward
Right stick right	Swashplate tilts right

- ❑ 3. Check that the steel balls on the elevator and aileron control levers fit the universal links freely. Gently sand with 360 grit sandpaper until free. Check the rest of the balls on the head and swashplate and sand if necessary.

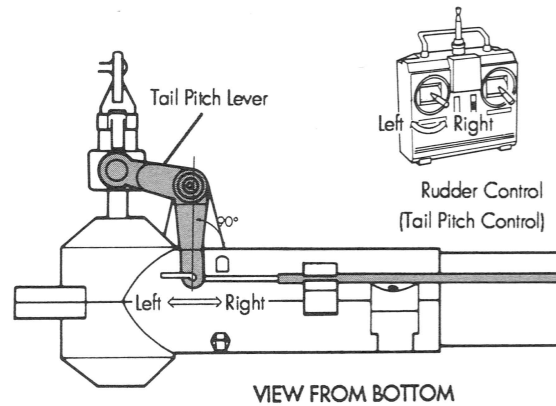
### Throttle

- ❑ 1. Pop the link off the throttle lever. Advance the throttle stick on the transmitter to full throttle. Now move the throttle lever to the full throttle position. Note where the ball on the throttle lever and the universal link on the throttle control link are in relationship to one another. Adjust the high throttle travel so that the universal link and the ball line up at full throttle.
- ❑ 2. Move the throttle trim lever full down (off) and move the throttle stick to the bottom of its stroke. Move the throttle lever to the idle position and adjust the low throttle travel so that the universal link and ball line up. Now snap the ball on the link and check the travel.

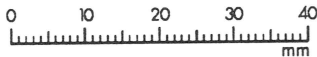
Mid-stick position	Throttle lever 90° to throttle link rod
Full stick position	Full throttle, Low stick position
Low trim	Kill engine
Low stick position, mid-trim	Idle

- ❑ **Note:** One way to check the opening and closing of the carburetor is to attach a fuel tubing to the fuel intake nipple and blow through it. When the throttle is fully open, more air will pass. When the throttle is closed, very little air will pass.
- ❑ **Note:** If you are using a transmitter that is not equipped with the throttle endpoint adjustments, it will be necessary to move the rod link closer to the center of the servo wheel to reduce the throw, or farther out to increase the throw.

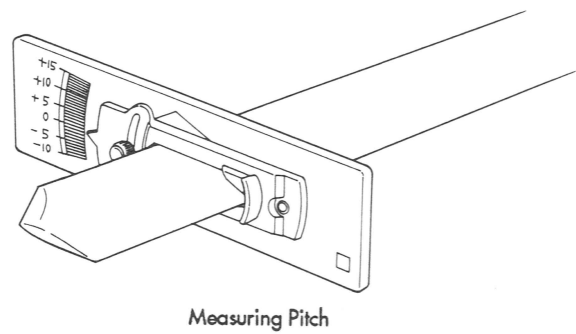
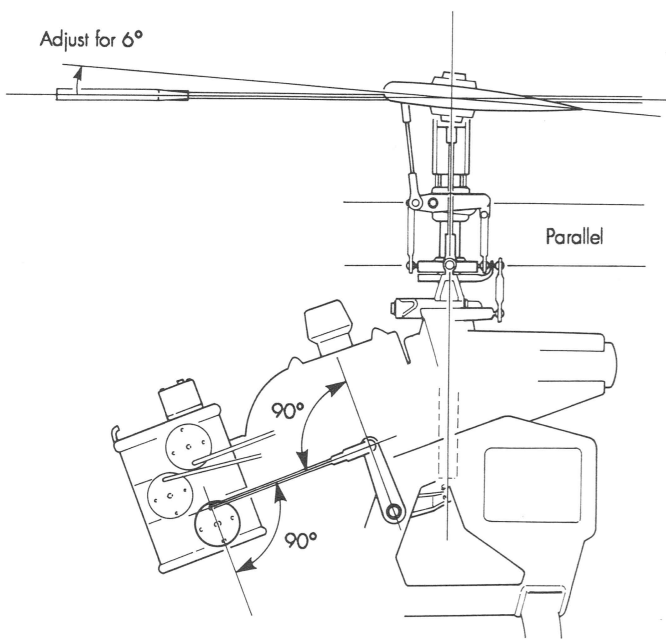
## TAIL ROTOR ADJUSTMENT (RUDDER)



- ❑ 1. Be sure that the rudder control link is in the proper hole in the servo wheel (10.5mm from center). Center the transmitter's rudder trim and turn the helicopter upside down.
- ❑ 2. The tail pitch lever should be exactly 90° to the rudder push-pull rod. If it is not, loosen the 3x3mm set screw in the tail joint stopper (opposite end of push-pull rod) and adjust until 90° is achieved. Tighten the 3x3mm set screw with KaliTite.
- ❑ 3. Check the direction of the rudder control. The left stick should move the tail pitch lever clockwise when viewed from the bottom. Adjust the rudder travel to 100%.
- ❑ 4. Be sure the gyro is adjusted to 50% gain and again check its direction.



## MAIN PITCH ADJUSTMENT



Measuring Pitch

### Tools Needed

Pitch Gauge

- ❑ 1. Install the pitch gauge onto a main rotor blade as shown. Adjust the pitch gauge to 6 degrees positive pitch and lock in place.
- ❑ 2. With the radio system on, move the throttle stick to the exact center position. Sight down the pitch gauge. With the flybar level, the top of the pitch gauge should line up exactly with the flybar. If it does not, adjust the rod going from the main rotor grip to the mixer until positive 6 degrees is achieved. This will be the hover position and the pitch rod link should be 90° to the servo, and 90° to the pitch lever. Adjust the opposite blade to exactly 6 degrees.

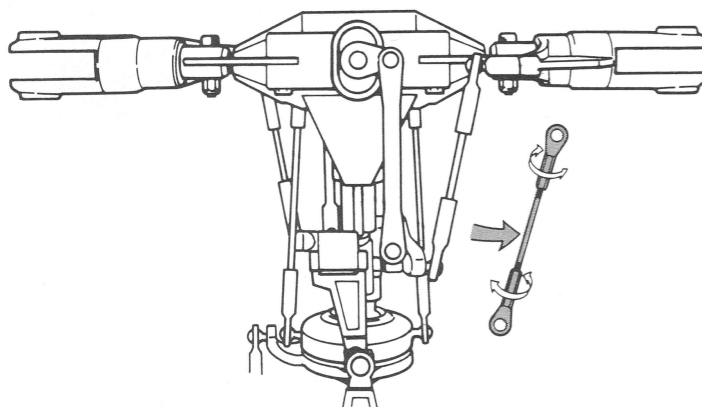
- ❑ 3. Now move the throttle stick to the high position. Preset the pitch gauge at positive 10 degrees and adjust the pitch high point until 10 degrees of pitch is achieved.

**Note:** The setting will be re-adjusted in flight to match the power of the engine.

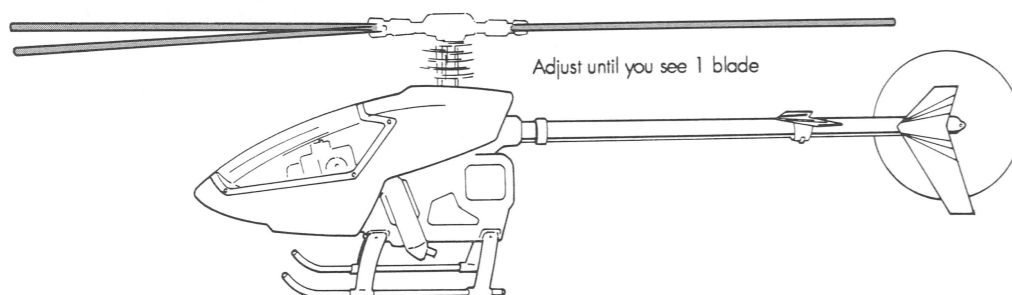
- ❑ 4. Move the throttle stick to the low position and preset the pitch gauge to negative 2 degrees. Adjust the low pitch trimmer until negative 2 degrees is achieved.

**Note:** This gives soft descents and can be adjusted later to suit individual tastes. Beginners may want to start at zero pitch for hovering.

## TRACKING THE MAIN ROTOR BLADES



If you can see 2 blades,  
adjustment is necessary

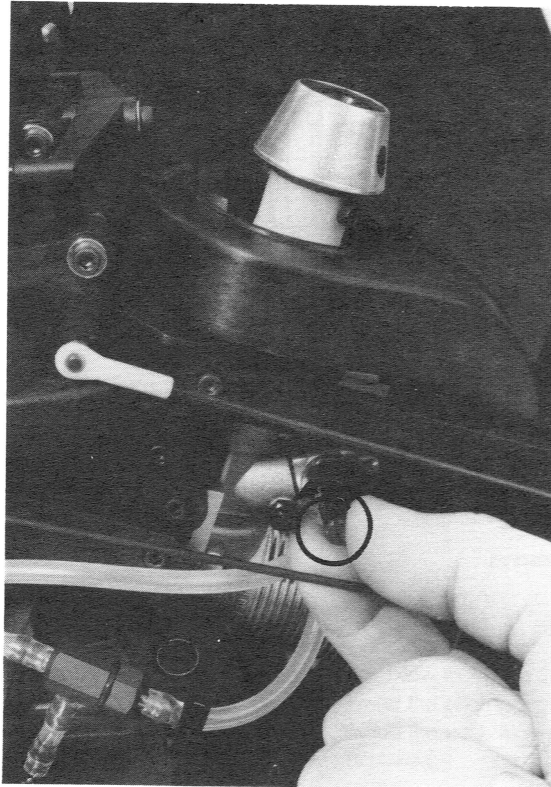


- ❑ 1. Place the helicopter on level ground at least 15 feet away and start the engine.
- ❑ 2. Gradually increase the main rotor RPM until the helicopter is producing nearly enough lift to lift off the ground.
- ❑ 3. Sight the tip of the main rotor blades to ensure the spinning blades resemble one blade. If not, adjust the 2.3x35mm threaded rod until the blades track in the same plane. This procedure requires the pilot to look at the blades in their rotation plane. **Be very, very careful!**





## ENGINE ADJUSTMENT



1. Read in full the instructions included with your engine. When using the Webra .32 Redhead, screw the high speed needle all the way in, then back it out  $1\frac{1}{4}$  turns to give a rich setting.
2. Install a glow plug in the engine (Enya #3 is recommended) and tighten.
3. Fill the fuel tank with high quality helicopter fuel (Cool Power 12 $\frac{1}{2}$  or 30% heli is recommended).
4. Attach a glow driver (a McDaniel remote is recommended).
5. Turn on your transmitter and receiver and move the throttle to low stick position and the throttle trim to the middle point.
6. Using a 12 volt starter, apply it to the starter cone and turn over the engine. It should fire within a few seconds.
7. Advance or reduce the trim lever as necessary to achieve a solid idle. Squeeze the fuel tubing at the carburetor, cutting off the fuel flow, and listen to the engine RPMs.
 

When the low speed needle is properly adjusted, the RPMs will pick up slightly (300-400 RPM). Then the motor will die.

If the motor dies with no RPM increase, richen (turn counterclockwise) the low speed needle.

If the motor takes more than 10 seconds for anything to happen, then the RPMs picks way up, turn the low speed needle clockwise (leaner).

**Note:** Run the Webra .32 Redhead  $1\frac{1}{4}$  turns out on the high end needle for two full tanks for break in. The proper needle setting is between  $\frac{3}{4}$  and a full turn out after break in.

## IN-FLIGHT ADJUSTMENTS

### Basic Set-Up (Normal Flight Mode)

1. Double check the pitch settings.

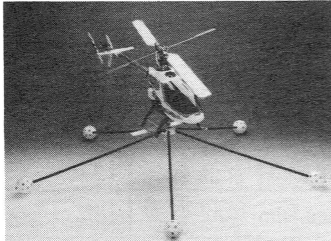
Basic pitch settings:

Full	+10 degrees
Hover (half stick)	+6 degrees
Low	-2 degrees

**Note:** These are the pitch settings recommended for set-up and beginning flying.

2. It's important to fully understand the instructions that are included with your radio. If you are using a JR computer radio, set the tail rotor compensation (revo mixing) at UP 40 DOWN 35.

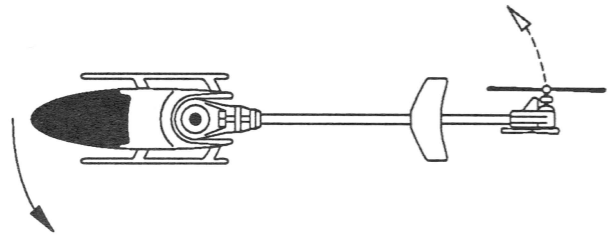
If you are using a non-computer radio, set the revo mixing at slightly below the mid-point.



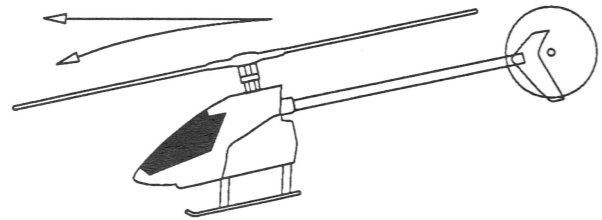
**Note:** If you are just learning, we suggest installing a RotoPod .30 sized training stand. We've tried several types of training aids, and have found the RotoPod offers the best protection of your machine at an inexpensive price. Plus, you can get the feel of your helicopter without leaving the ground. See your local hobby dealer for details.

**Important:** Even with a training stand, it is highly advisable to seek assistance from an experienced helicopter pilot to help trim and set up the helicopter. See your local hobby dealer for the names of heli flyers in your area.

3. Turn on the radio, start the engine, and face the helicopter into the wind.
4. Slowly advance the throttle until the helicopter becomes light on the skids. If the nose goes to the right, feed in left rudder trim (if the nose goes to the left, feed in right rudder trim) until the nose stays straight into the wind.



5. Gently lift the helicopter an inch by advancing the throttle stick and notice the direction the helicopter wants to tilt.



If it tilts forward	Feed in back elevator trim
If it tilts back	Feed in forward elevator trim
If it tilts right	Feed in left aileron trim
If it tilts left	Feed in right aileron trim

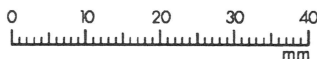
**Note:** An experienced pilot is extremely helpful here.

6. Next, increase the throttle until the helicopter is just about to lift off. Have someone else look at the throttle position. It should be exactly 50% (mid) of its travel. If the stick is low, decrease the hovering throttle adjustment on your transmitter. If it is high, increase the hovering throttle. Adjust until the helicopter just lifts off the ground at exactly 50% stick position.

**Note:** The above pitch range and set-up is recommended for beginner through intermediate pilots. Hovering maneuvers and basic flying around can be achieved with this set-up. If your transmitter is equipped with flight mode (Normal, Idle Up 1, Idle Up 2), this pitch and throttle cure is recommended for Normal mode.

### Aerobatic Set-Up

If you are an experienced heli pilot, or as your skill progresses, you will need a different set-up in order to perform more advanced aerobatic maneuvers, including rolls, loops, 540 stall turns, etc. Following is the procedure to set up your Enforcer ZR for more advanced aerobatics.



**ENFORCER ZR**

## IN-FLIGHT ADJUSTMENTS (CONTINUED)

### Pitch Set-Up

For more advanced aerobatics, a higher rotor speed is desired to give more cyclic and pitch responsiveness. An added bonus of this higher rotor speed is more control authority of the tail rotor. A rotor speed of approximately 1750–1900 rpm is recommended, and the following pitch setting is recommended to achieve this rpm when using a Webra .32 Heli Redhead engine. Other engines may require slightly less pitch based on their power output.

**Note:** The following pitch curve is achieved by transmitter adjustments using the same linkage set-up given in the instructions.

Full throttle	+8½ degrees
Half throttle	+4½ degrees
Full back stick	–5 degrees

**Note:** If your radio is equipped with different flight modes (i.e., Normal, Idle Up 1, Idle Up 2, Hold), you may choose to leave the Normal mode as the basic set-up (pitch and throttle curve) and use flight mode 1 for the aerobatic set-up. This is called a two-speed set-up and gives a slow rotor speed for hovering maneuvers (in-flight mode Normal), which results in a soft control feel. By switching to Flight Mode 1, you can achieve aerobatics with a higher rotor speed.

### Throttle Set-Up

The function of Idle Up is to maintain power when the throttle stick is reduced below hover. This is especially necessary during inverted portions of a maneuver (loops and rolls). For example, at the top of a loop, the throttle stick is reduced to near full back stick to achieve negative pitch. However, if the throttle had been reduced to idle, the rotor speed would be reduced quickly.

Idle Up should be adjusted to keep a percentage of the throttle in when the stick is reduced below the hover position. The proper way to adjust Idle Up is to do a maneuver (loop) and listen to the engine speed through the inverted section of the maneuver. If the engine speed reduces, add (raise) your Idle Up percentage. If the engine overspeeds, reduce the Idle Up percentage. When correctly adjusted, the rotor speed will remain constant throughout the maneuver.

**Note:** Many radios have more than one Idle Up (flight) because different maneuvers require different amounts of Idle Up (i.e., loop, inverted, roll, etc.).

### Tail Rotor Set-Up

In forward flight, less tail rotor compensation is needed due to the aerodynamic forces over the mechanics of the helicopter. In more advanced radios, like JR's X-347, X-388S and PCM-10S, a program is available that allows a different amount of tail rotor compensation in forward flight (Flight Mode 1 and 2) than in Normal mode.

The X-347 features an Up Stunt and Down Stunt revo mixing for the tail that is activated in Flight Mode 1 and 2. The recommended settings to start with are:

X-347, X-388S, PCM-10/10S

Up Stunt (U.S.)	R5%
Down Stunt (D.S.)	L10%

The X-388S incorporates a sophisticated stunt trim allowing the tail rotor trim to be offset in Flight Mode 1 and 2. The ZR requires approximately 8% of left rudder stunt trim (L8) for forward flight. Up Stunt and Down Stunt settings are:

X-388S

Up Stunt (U.S.)	R13%
Down Stunt (D.S.)	L10%
Rudder Stunt Trim	L8%

The PCM-10S has an even more sophisticated tail rotor compensation program. It uses stunt trim, a normal ATS revo mixing and a stunt revo mixing that allows you to store the zero and hover pitch points. Set the tail rudder stunt trim to Left 5.

**Important:** Adjust the linkages so that 0 trim offset is necessary in the trim offset program. This will affect the stunt trim values if 0 trim offset is not achieved.

+P reduces the tail rotor compensation from full pitch to zero pitch, while –P increases the tail rotor compensation below zero pitch. The approximate P settings are:

PCM-10/10S

+P	16%
–P	17%

**Note:** Be sure to store the hover and zero pitch positions.

## TAIL ROTOR ADJUSTMENTS SUMMARY

**Non-Computer Radios** — Slightly less than 50% of tail rotor compensation (up and down). Forward flight compensation not available. Use rudder trim lever in forward flight if needed.

### Computer Radios

#### X-347

Revo Mixing Up Normal	R40%
Revo Mixing Down Normal	R35%
Revo Mixing Up Stunt	R5%
Revo Mixing Down Stunt	L10%

#### X-388S

Revo Mixing Up Normal	R40%
Revo Mixing Down Normal	R35%
Revo Mixing Up Stunt	R13%
Revo Mixing Down Stunt	L10%
Rudder Stunt Trim	L5%

#### PCM-10/10S

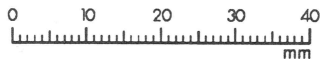
Direction	Right
Revo Mixing Up Normal	40%
Revo Mixing Down Normal	35%
Rudder Stunt Trim	L5%
+ P Mixing	16%
- P Mixing	17%

**Note:** Store zero pitch using a pitch gauge set to zero. Store hovering pitch with the stick at 50% (mid) position in Normal mode.

**Note:** All the above figures are approximate. Conditions including altitude, air density, engine power, etc. will effect the percentages somewhat, but the values given are a good place to start. Please read your radio manual and fully understand its functions before flying.

## CYCLIC AND RUDDER RATES

For aerobatics, you want a high cyclic rate (maximum response). If your radio is equipped with dual rate, set the aileron, elevator and rudder rates at 100% for aerobatics. (70% aileron and elevator rate and 80% rudder rate for hovering is recommended.)



**ENFORCER** ZR

## THROTTLE HOLD

Throttle hold is used for autorotations (descents without power). If your radio has a separate pitch curve for throttle hold, set the following pitch in hold:

Full Stick	+11 degrees
Mid-Stick	+4 degrees
Low Stick	-5 degrees

Set the throttle so that when the hold switch is activated, a reliable idle is achieved with the clutch disengaged.

At the back of this manual, you will find program data for JR's X-347, X-388S, and PCM-10/10S radios. Please note that your numbers may vary slightly due to conditions, but this is a good starting point. Also note the pitch readings are given in degrees rather than percentage values.

## STUNT TRIM

In forward flight, the trim positions necessary to maintain straight and level flight are different than those for hover. This is because the rotor disk and helicopter moving through the air create aerodynamics that vary from those present when the helicopter is stationary. More sophisticated radios feature a function called stunt trim that allows a different trim to be set in Flight Mode 1 and 2 (forward flight) versus Normal hover flight.

The Enforcer ZR is unique in that it has very little, if any, tendency to change elevator trim (pitch) in forward flight as opposed to in hover. Following are the suggested stunt trim values for the JR X-388S and the PCM-10/10S.

Aileron	L10
Elevator	0
Rudder	L5 (PCM-10/10S) L8 (X-388S)

## SETTING THE GYRO

In hover it is recommended that you set the gyro just below the point that the tail hunts. This is achieved by turning up the gyro gain a little at a time, hovering the machine, then turning it up more until the tail of the helicopter "hunts" from side to side. Then reduce the gain slightly just below the point at which hunting occurs. This will give the maximum amount of gyro authority.

For forward flight, less gyro is needed to prevent high speed hunting and to allow more tail authority. If you are using a dual sensing gyro, adjust the second position to about half that of hover and use this for forward flight.

**Note:** Read the instructions included with the gyro.

## SWITCHLESS INVERTED SET-UP

The Enforcer ZR features 25° of pitch travel, making it perfect for switchless inverted flying. In order to achieve this extended pitch throw, it is necessary to move the pitch control linkage farther out on the servo. Replace the servo wheel with a horn and select a hole that is 13 to 15mm out from the center. Adjust the linkage so that when the pitch servo is centered, the pitch level is centered in its stroke. Adjust the linkage to the blade grips until zero pitch is achieved at the mid-stick position.

### Flight Mode 1 Pitch

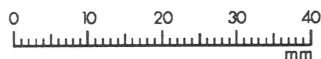
Full Stick Position	+8½ degrees
Mid-Stick Position	0 degrees
Low Stick Position	-8½ degrees

### Flight Mode 1 Throttle

Full Stick Position	100% Throttle
Mid-Stick Position	24% Throttle
Low Stick Position	100% Throttle

The PCM-10/10S tail rotor settings for switchless inverted are:

Stunt Trim	Left 5
+P (Stunt)	16
-P (Stunt)	16



**ENFORCER ZR**

## MAINTENANCE

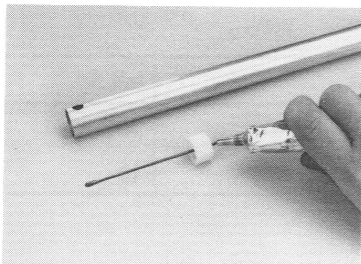
### Engine (after each flying day)



After the end of a day of flying, fully drain the fuel tank. Then, start the engine and let it idle until the fuel in the engine and fuel line is gone. Turn the motor over with the starter for several seconds, trying to start the motor again to finish getting the fuel out.

Next, remove the glow plug and put in several drops of after-run oil (Marvel's Mystery, 3 in 1, Prather, etc.). Re-insert the glow plug and turn over the engine with the starter for several seconds. This will prevent the steel part from corroding and will greatly increase the life of your engine.

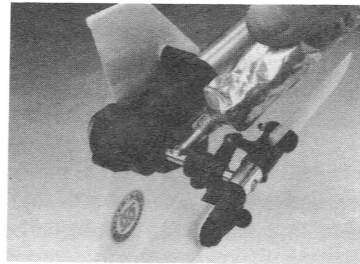
### Tail Rotor Drive Wire (every 4-5 hours)



The tail rotor drive wire rides in four bushings. It is necessary to grease the drive wire approximately every 4 to 5 hours of actual flight time. This is easily done by loosening the four screws in the main frame that holds the boom in place. Slide the tail boom out of the main frame rearward. Take the tail rotor gear box off the tail boom, then slide the drive wire rearward and grease. Slide the drive wire forward and grease. Reassemble. The approximate time to complete this is 30 to 40 minutes.

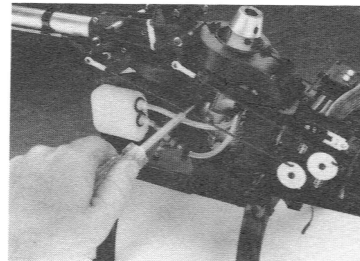
**Note:** If the tail drive wire becomes dry, a high pitched squeaking sound will occur, signaling that it is time for grease.

### Tail Drive Shaft (every 2 hours)



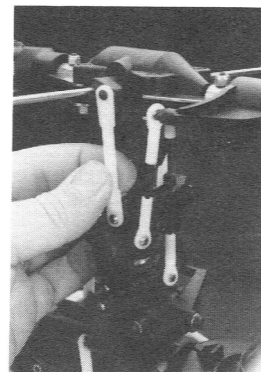
Apply grease to the tail drive shaft to allow the tail rotor pitch slider to operate smoothly. Move the tail pitch lever back and forth to spread the grease. The time to complete this task is approximately 2-3 minutes.

### Tighten All Screws, Nuts and Bolts (after each flying day)



A helicopter is subjected to high vibration levels. It is important to check that all screws, nuts and bolts are properly tightened after each day of flying. Be especially sure to check the mixing lever bolt, the control lever cap screws and the muffler cap screws. Time to complete is 15-20 minutes.

### Check Ball Link Wear (every 4 to 6 hours)



Check that all the universal links fit their respective balls freely but securely. If too tight, sand lightly with 360 sandpaper. If too loose, replace the plastic universal link. Time to complete is 10-15 minutes.

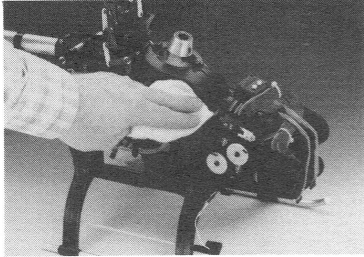
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## MAINTENANCE (CONTINUED)

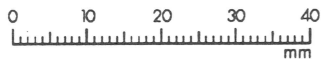
### **Batteries (before each flying day)**

The #1 cause of crashes (besides pilot error) is battery failure. Be sure your batteries are fully charged and limit your flight time to 3 or 4 flights between battery changes. If you want to fly more, purchase a reliable fast charger.

### **Clean and Neat (after each flying day)**



At the end of each flying day, wipe off your heli with a clean towel or rag. Inspect all the parts to make sure that nothing is loose or broken. Keep your Kalt Enforcer ZR neat, clean and in good working order, and it will reward you with many seasons of flying enjoyment.

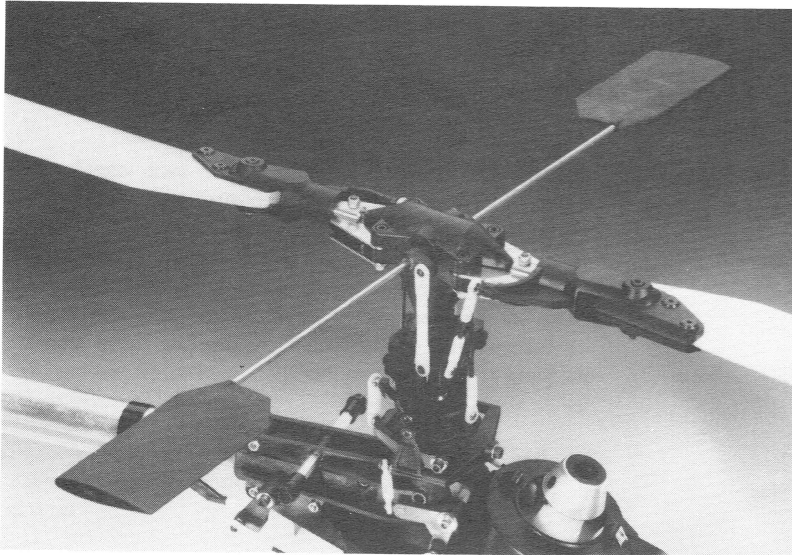
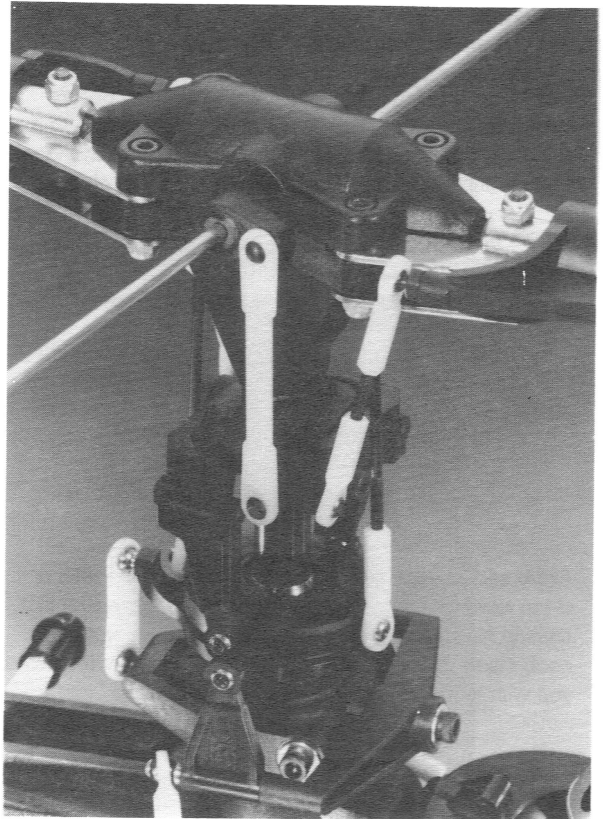


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**ENFORCER ZR**

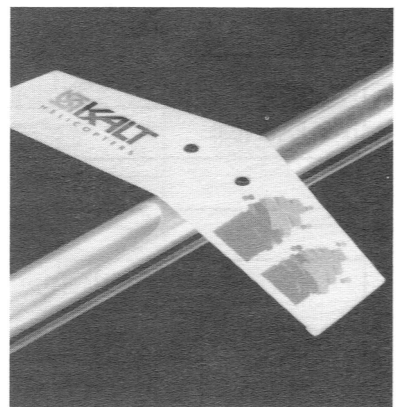
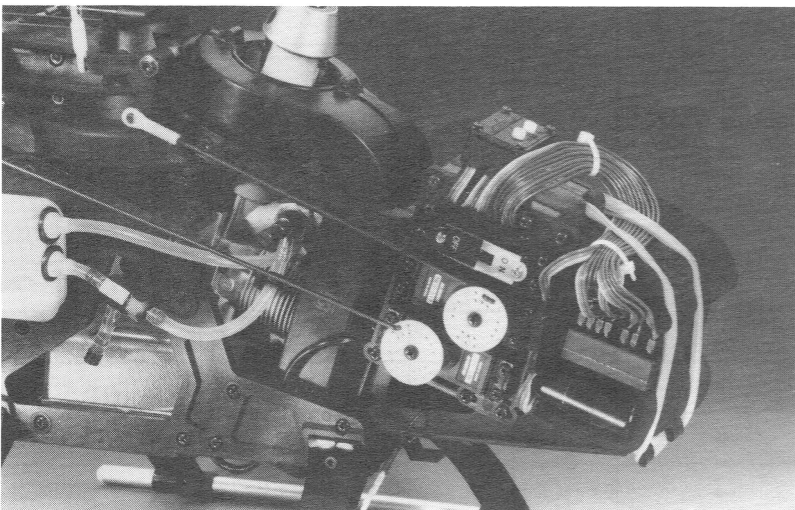
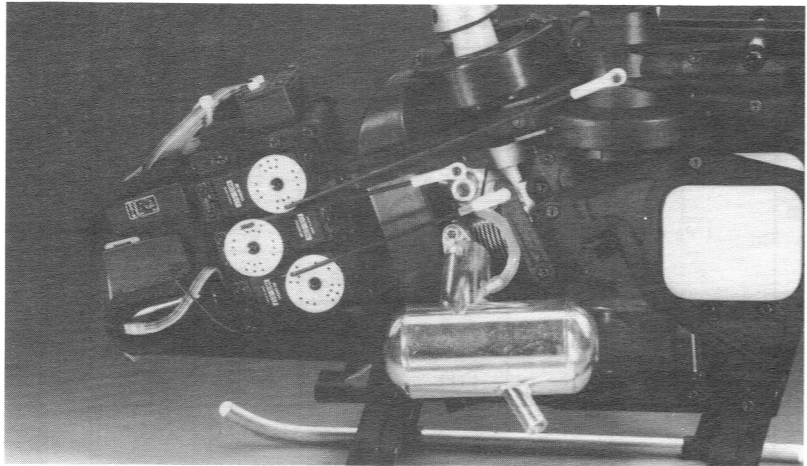
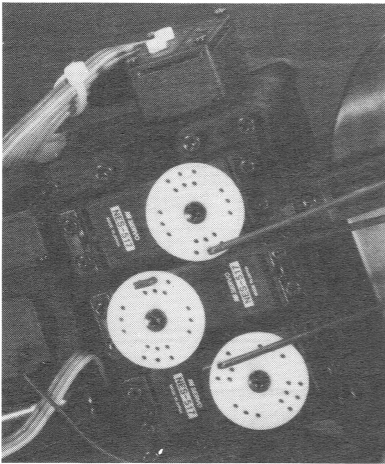
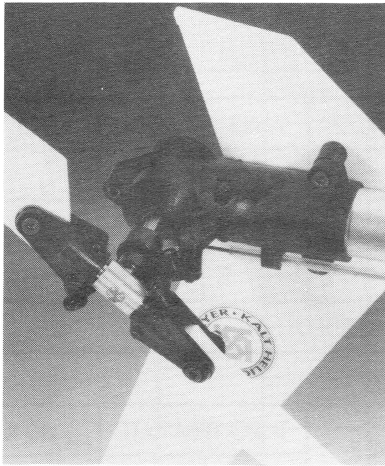


# THE COMPLETED ENFORCER ZR



ENFORCER ZR





# PCM-10/10S DATA SHEET (HELI)

MODEL NO. 1

MODEL NAME (81) ENFORCER ZR

MODULATION (85) S-PCM • Z-PCM • PPM  
(MATCH TO RECEIVER)

	THRO	AILE	ELEV	RUDD	GEAR	PITCH	AUX2	AUX3	AUX4	AUX5
REVERSE SW (11)	R N	R N	R N	R N	R N	R N	R N	R N	R N	R N
TRAVEL ADJUST (12)	MATCH THROTTLE STROKE	L 100 %	D 100 %	L 100 %	+ %	+ 100 %	+ %	+ %	+ %	+ %
		R 100 %	U 100 %	R 100 %	- %	- 135 %	- %	- %	- %	- %
SUB-TRIM (15)	ADJUST LINKAGE SO NO SUB-TRIM IS NEEDED									

			AILE	ELEV	RUDD
D/R EXP (13)	0	D/R	70%	70%	80%
		EXP	0%	0%	0%
		TYPE	NOR	NOR	NOR
	1	D/R	100%	100%	100%
		EXP	0%	0%	15%
		TYPE	NOR	NOR	NOR
	2	D/R	100%	100%	100%
		EXP	0%	0%	0%
		TYPE	NOR	NOR	NOR
AUTO (23)	ST-1	INH•ACT	0•1•2	0•1•2	0•1•2
	ST-2	INH•ACT	0•1•2	0•1•2	0•1•2
	HOLD	INH•ACT	0•1•2	0•1•2	0•1•2
STUNT TRIM (25)	INH•ACT		L10	0	L5
TRIM RATE (83)			100% 50%	100% 50%	100% 50%

TRIMER FUNC. (17)	THRO TRIM RATE		40 %
	PITCH TRIM	HI	INH•ACT
		LO	INH•ACT

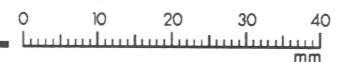
THROTTLE HOLD (16)	INH•ACT	POS	IDLE	
		AUTO CUT	INH•ACT	
			POS	

4→1 MIX (41)	R	10 %
	L	6 %
	MIX SW	INH•ACT

GYRO SENS [AUX3] (44)	INH•ACT	0	%
		1	%

			CHANNEL	TRIM	SW	OFFSET	+ GAIN	- GAIN	INCLUDE
PROGRAM MIX (51)-(55)	1	INH•ACT	→	OFF•ON			%	%	OFF•ON
	2	INH•ACT	→	OFF•ON			%	%	OFF•ON
	3	INH•ACT	→	OFF•ON			%	%	OFF•ON
	4	INH•ACT	→	OFF•ON			%	%	OFF•ON
	5	INH•ACT	→	OFF•ON			%	%	OFF•ON

ENFORCER ZR



			L	1	2	3	4	5	H
THRO CURVE (18) [TH.TRIM=SLOW] [HOV.T=CENTER]	N	IN	0			50			100
		OUT	0			APPROX 45			100
		HOV.SEL	—	HOV	HOV	HOV	HOV	HOV	—
	1	IN	0			50			100
		OUT	25			55			100
	2	IN	0			50			100
OUT		75			55			100	
PITCH CURVE (68) [HOV.P=CENTER] [P.TRIM=CENTER]	N	IN	0			50			100
		OUT	-2			+6			+10
		HOV.SEL	—	HOV	HOV	HOV	HOV	HOV	—
	1	IN	0			50			100
		OUT	-3°			+4½°			+8½°
	2	IN	0						100
		OUT	-5°			+4½°			+8½°
	HOLD	IN	0						100
		OUT	-5°			+4°			+11
INVT	IN	0						100	
	OUT								

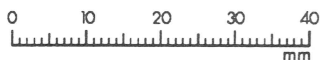
				RIGHT • LEFT	
ATS REVO-MIX (47)	POS	HOV	STORE MID STICK POS.		
		ZERO	STORE ZERO PITCH		
	NORM	UP	40 %		
		DN	35 %		
		-P	0 %		
	STNT	+P	16 %		
		-P	9 %		
	HOLD RUDD OFS.			INH	

ATS ACC-MIX (48)	VOL	0 %
	TIME	1

SWASH MIX (65)	TYPE	1s • 90° • 120°		
	EXP	INH•ACT		
	GAIN	AILE		%
		ELEV		%
RUDD			%	

INVERTED (61)	INH•ACT
---------------	---------

FAIL- SAFE (77)	Z	MODE	HOLD • 1.0s • 0.5s • 0.25s
		MEMORY	
	S	MEMORY	



# X-347 DATA SHEET (HELI)

MODEL NO. 1  
 MODEL NAME (81) ENFORCER ZR  
 MODULATION (85) S-PCM • Z-PCM • PPM  
 (MATCH TO RECEIVER)

			AILE	ELEV	RUDD
D/R	0	D/R	70%	70%	80%
		EXP	0%	0%	15%
EXP	1	D/R	100%	100%	100%
		EXP	0%	0%	15%

	THRO	AILE	ELEV	RUDD	GEAR	PITCH	AUX2
REVERSE SW	R N	R N	R N	R N	R N	R N	R N
SUB-TRIM	ADJUST LINKAGE SO NO SUB-TRIM IS NEEDED						
TRAVEL	MATCH THROTTLE STROKE	L 100 %	D 100 %	L 100 %	+ %	H 100 %	+ %
ADJUST		R 100 %	U 100 %	R 100 %	- %	L 100 %	- %

		L	1	2	3	H
THRO	N	0 %	INH	APPROX 45	INH	100 %
CURVE (TH:)	1	25 %	INH	55 %	INH	/
	2	75 %	INH	55 %	INH	
PITCH	N	-2°	INH	+6°	INH	+10°
CURVE (PT:)	1	-3°	INH	+4½°	INH	+8½°
	2	-5°	INH	+4½°	INH	+8½°
	H	-5°	INH	+4°	INH	+11°

THRO-HOLD (HOLD)	INH ACT	POS
		RELIABLE IDLE

INVERTED (INV.P)	INH ACT	OFFSET
		%

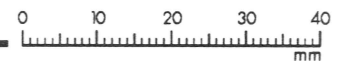
REVOLUTION MIX (RV)	NORMAL	UP (U.N.)	40 %
		DOWN (D.N.)	35 %
	STUNT	UP (U.N.)	R5
		DOWN (D.N.)	L10
ACC-MIX		NOT USED	%

	CHANNEL	+ POS	- POS	SW	OFFSET
PROGRAM MIX (MIX A)	→		NOT	USED	

FAIL-SAFE (FAL.S)	HOLD • 1.0 • 0.5 • 0.3
	MEMORY

AUX 2 INPUT	D/R • R HOLD
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ENFORCER ZR





## X-347 DATA SHEET (HELI)

MODEL NO. 1MODEL NAME (81) ENFORCER ZRMODULATION (85) S-PCM • Z-PCM • PPM  
(MATCH TO RECEIVER)

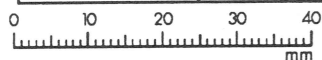
			AILE	ELEV	RUDD	AUTO D/R (POS.1)	ST-1	INH•ACT
D/R	0	D/R	70%	70%	80%		ST-2	INH•ACT
			EXP	0%	0%	15%	AUX 2 INPUT	
EXP	1	D/R	100%	100%	100%	D/R • R HOLD		
			EXP	0%	0%	15%		
STUNT TRIM	INH•ACT		L10	0	L8			

	THRO	AILE	ELEV	RUDD	GEAR	PITCH	AUX2	AUX3
REVERSE SW	R N	R N	R N	R N	R N	R N	R N	R N
SUB-TRIM	ADJUST LINKAGE SO NO SUB-TRIM IS NEEDED							
TRAVEL	MATCH THROTTLE STROKE	L 100 %	D 100 %	L 100 %	+ %	H 100 %	+ %	+ %
ADJUST		R 100 %	U 100 %	R 100 %	- %	L 100 %	- %	- %
FAIL- SAFE	S(TYPE)							
	Z(TYPE)	HOLD•1.0•0.5•0.3 <sup>3</sup>						

		L	1	2	3	H
THRO	N	0 %	INH	APPROX 45	INH	100 %
CURVE (TH:)	1	25 %	INH	55 %	INH	/
	2	75 %	INH	55 %	INH	
PITCH	N	-2°	INH	+6°	INH	+10°
CURVE (PI:)	1	-3°	INH	+4½°	INH	+8½°
	2	-5°	INH	+4½°	INH	+8½°
	H	-5°	INH	+4°	INH	+11°

THRO-HOLD (HOLD)	INH • ACT	POS	REVOLUTION MIX (RV)	NORMAL	UP (U.N.)	40 %
		RELIABLE IDLE			DOWN (D.N.)	35 %
INVERTED (INV.P)	INH • ACT	OFFSET	STUNT	UP (U.N.)	R5	
		%		DOWN (D.N.)	L10	
				HOLD RUDD OFFSET		NOT USED
ACC-MIX				NOT USED %		

		CHANNEL	+ POS	- POS	SW	OFFSET
PROGRAM MIX	MIX A	→		NOT	USED	
	MIX B	→		NOT	USED	

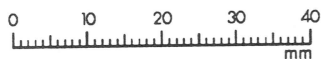


## PARTS LIST (BY STEP)

Part #	Description	Qty.	Part #	Description	Qty.
<b>Main Frame Assembly (Screw Bag 2-1)</b>			<b>Engine Installation/Attaching the Cooling Shroud (Screw Bag 2-4)</b>		
34023	Pitch Arm Set (Includes: 1-Pitch Arm, 2-Pitch Arm Bushings and 1-Pitch Arm Lever)	1	31014	Engine Mount	1
34025	Pitch Rod Retainer	1	31037	Metal Drive Gear	1
36005	Main Frame (1-Left Half and 1-Right Half)	1	31017	Drive Gear Bearing	2
36008	Landing Skid Set (Includes: 2-Landing Skids, 4-Skid Caps, 1-Left Brace and 1-Right Brace)	1	31033	Cooling Fan	1
36036	Cross Member A	2	31034	Clutch	1
36011	Cross Member B	2	31021	Clutch Bushing-O.S.	1
			31022	Clutch Bushing-Enya	1
			31028	Clutch Bushing-Webra	1
			31024	Cooling Shroud (Includes: 1-Left Half and 1-Right Half)	1
<b>Transmission Assembly (Screw Bag 2-2)</b>			<b>Fuel Tank</b>		
31008	Transmission Bearing Set	1	35001	Fuel Tank Assembly (Includes: 1-Fuel Tank, 2-Fuel Nipples, 1-Rubber Grommet, 1-Fuel Tank Weight and 1-Silicon Tube S (70mm))	1
31003	Planetary Gear	3	05000107	T-Type Fuel Filter	1
31039	Main Drive Gear (White)	1	05010156	Silicone Tubing (Includes: 1-Silicone Tube M (110mm), and 1-Silicone Tube L (240mm))	1
31005	Tail Drive Gear	1			
31006	Planetary Carrier Assembly	1	<b>Main Frames and Transmission (Screw Bag 2-7)</b>		
31009	Ring Gear	1	34010	Linkage Set A	1
31040	Transmission Case (1-Left Half and 1-Right Half)	1	36001	Servo Frame Set (Includes: 1-Servo Frame Left, 1-Servo Frame Right and 1-Servo Frame Retainer)	1
31012	Shaft Stopper	1	36004	Servo Base Set	4
31013	Spacer	1	36007	Servo Frame Stays	2
31015	Insert Nut	3	<b>Tail Section (Screw Bag 2-8)</b>		
32029	Main Shaft	1	31042	Tail Drive Shaft Assembly	1
34047	Aileron Lever	1	33002	Tail Gear Set	1
34019	Aileron Lever with Bushing B	1	33003	Tail Input Shaft Bearing	2
34020	Aileron Lever Nut	1	33004	Tail Output Shaft Bearing	2
36024	Body Stay	2	33005	Tail Transmission Case (Includes: 1-Tail Transmission Case A and 1-Tail Transmission Case B)	1
36025	Canopy Holder	2	33006	Tail Rotor Blade Grips (Includes: 2-Tail Rotor Blade Grip A and 2-Tail Rotor Blade Grip B)	1
31043	Main Shaft Stopper (Upper Collar)	1	33007	Tail Rotor Blade Grip Bearing	4
31044	Main Shaft Stopper (Lower Collar)	1	33008	Tail Pitch Yoke Set (Includes: 1-Tail Pitch Yoke, 1-Tail Pitch Yoke Bearing, and 1-Tail Pitch Lever with Bushing)	1
<b>Control System (Screw Bag 2-3)</b>			33009	Tail Pitch Slider	1
34002	Mixing Arm Base with Joint Rods (Includes: 1-Mixing Base and 2-Joint Rods)	1	33010	Slide Bushing	1
34041	Mixing Unit with Mixing Lever (Includes 2-Mixing Units and 2-Mixing Levers)	1	33013	Tail Rotor Hub	1
34003	Mixing Lever Set	2	33014	Tail Output Shaft	1
34007	Mixing Bearing Set	4			
34008	Bearing Spacer	4			
34042	Swashplate	1			
34010	Linkage Set A	1			
34046	Elevator Lever	1			
34015	Elevator Lever With Bushing A	2			
34016	Aileron Arm with Bushings (Includes: 1-Aileron Arm, 2-Lever Bushing D, 1-Lever Bushing B and 2-Universal Link D)	1			
34034	Pitch Rod	1			

Use prefix KLT when ordering parts.

Part #	Description	Qty.	Part #	Description	Qty.
<b>Tail Section (Screw Bag 2-8) (Continued)</b>			<b>Body Assembly (Screw Bag 1-7)</b>		
34048	Tail Push-Pull Rod Set (Includes: 1-Tail Push-Pull Rod and 1-Tail Push-Pull Rod Tube)	1	36016	Body Set with Canopy (Includes: 1-Body Set and 1-Canopy)	1
36013	Horizontal Stabilizer and Vertical Fin Set (Includes: 1-Horizontal Stabilizer, 1-Vertical Fin and 1-Mounting Bracket)	1	36017	Canopy Only	1
36037	Tail Boom	1	39008	Enforcer ZR Decal Sheet	1
39002	Tail Rotor Blades (Pair)	1	<b>Accessories</b>		
<b>Main Rotor Head (Screw Bag 2-9)</b>			39009	Assembly Instructions	1
32002	Main Rotor Hub (Includes: 1-Main Rotor Hub A and 1-Main Rotor Hub B)	1	39010	Exploded View	1
32003	Main Rotor Hub Bearing	2	00010016	KalTite Thread Locking Compound	1
32021	Main Rotor Blade Grip	2			
32005	Main Rotor Blade Grip Bearing	4			
32006	Flapping Yoke (2 Pack)	4			
32007	Hub Spindle	2			
32008	Hub Spindle Collar Set (Includes: 2-Inner Collars and 2-Outer Collars)	1			
32010	Hiller Control Lever	1			
32011	Stabilizer See Saw	1			
32030	Stabilizer Paddle (Flybar)	2			
32014	Stabilizer Bar (Flybar)	1			
<b>Main Rotor Blades (Screw Bag 2-9)</b>					
39007	Main Rotor Blades (Pair)	1			
<b>Attaching the Rotor Head (Screw Bag 1-6)</b>					
34010	Linkage Set A (Double Link L)	2			
<b>Tail Boom Installation</b>					
34032	Tail Push-Pull Rod Guide	2			
<b>Radio Installation (Screw Bag 1-3)</b>					
36012	Gyro Bracket with Gyro Cover (1 Each)	1			
36027	Switch Plate	1			
36028	Servo Set Plate	10			
	Rubber Band	1			
	Double Stick Tape	1			
	Foam Rubber	1			
<b>Linkage Set-Up (Screw Bag 1-4)</b>					
34029	Tail Joint Lever (Includes: 1-Tail Joint Lever and Bushing B, 1-Tail Joint Link and 1-Tail Joint Stopper)	1			



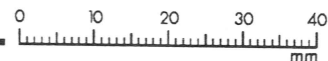
**ENFORCER ZR**



## SCREW LIST (BY STEP)

Part #	Description	Qty.	Part #	Description	Qty.	
11050318	<b>Main Frame Assembly (Screw Bag 2-1)</b>		11050368	<b>Main Frames and Transmission (Screw Bag 2-7)</b>		
	2x8mm Self-Tapping Screw	2		3x25mm Self-Tapping Screw	10	
	3x10mm Self-Tapping Screw	1		3x22mm Self-Tapping Screw	8	
	3x18mm Cap Screw	4		3x15mm Cap Screw	4	
	3x12mm Self-Tapping Screw	8		3x20mm Self-Tapping Screw	2	
	3x3mm Set Screw	4	3x8mm Cap Screw	2		
			3mm Nylon Lock Nut	1		
11050328	<b>Transmission Assembly I (Screw Bag 2-2)</b>		11050378	<b>Tail Section (Screw Bag 2-8)</b>		
	3mm Flat Washer	3		3x19mm Set Screw	2	
	E-Ring	3		3mm Nylon Lock Nut	4	
	4x5mm Set Screw	4		2x10mm Self-Tapping Screw	4	
	4x4mm Set Screw	4		3x15mm Cap Screw	2	
	3x4mm Set Screw	4	2.6x14mm Cap Screw	2		
11050328	<b>Transmission Assembly II (Screw Bag 2-2)</b>			2.6x10mm Cap Screw	1	
	3mm Hex Nut	2	2.6mm Hex Nut	3		
	3x20mm Cap Screw	7	3x10mm Self-Tapping Screw	2		
	3mm Nylon Lock Nut	6	2x14mm Phillips Screw	1		
	3x10mm Cap Screw	4	2mm Flat Washer	1		
	3x30mm Set Screw	1	3x20mm Cap Screw	2		
	3x8mm Phillips Screw	2	3mm Nylon Lock Nut	2		
	3mm Flat Washer	1	11050388	<b>Main Rotor Head (Screw Bag 2-9)</b>		
	3x18mm Cap Screw	1		3x15mm Special Cap Screw	2	
	11050338	<b>Control System (Screw Bag 2-3)</b>		3mm Nylon Lock Nut	2	
3x4.5mm Flat Washer		8		3x8mm Cap Screw	2	
3x12mm Cap Screw		3		3mm Flat Washer	2	
3x15mm Hex Screw		2		3x4mm Set Screw	1	
Joint Ball		1		3x20mm Cap Screw	4	
Joint Ball Spacer		1		3mm Nylon Lock Nut	4	
2x30mm Phillips Screw		1		11050388	<b>Main Rotor Blades (Screw Bag 2-9)</b>	
2mm Flat Washer		1			3x25mm Cap Screw	1
2x25mm Phillips Screw		1	3mm Nylon Lock Nut		1	
3x10mm Cap Screw		2	<b>Attaching the Rotor Head (Linkage Bag)</b>			
3mm Flat Washer	4	3x6mm Cap Screw	2			
3x20mm Cap Screw	1	Universal Link	8			
11050348	<b>Engine Installation (Screw Bag 2-4)</b>		11050398		<b>Radio Installation (Screw Bag 1-3)</b>	
	3x6mm Cap Screw	4			2.6x12mm Self-Tapping Screw	20
	3x12mm Cap Screw	7			3x12mm Self-Tapping Screw	4
	Ball Joint	1	2.6x12mm Self-Tapping Screw		4	
	Ball Joint Spacer	1	11050408	<b>Linkage Set-Up (Screw Bag 1-4)</b>		
	2x10mm Phillips Screw	1		3x20mm Cap Screw	1	
2mm Hex Nut	1	3mm Flat Washer		2		
11050348	<b>Attaching the Cooling Shroud (Screw Bag 2-4)</b>			2.3x17mm Threaded Rod	1	
	2.6x8mm Self-Tapping Screw	4		3x3mm Set Screw	1	
11050358	<b>Transmission and Engine Installation (Screw Bag 2-5)</b>			Universal Link	5	
	3x10mm Cap Screw	4		Clevis	1	
	3x20mm Cap Screw	1	11050428	<b>Body Assembly (Screw Bag 1-7)</b>		
	3mm Nylon Lock Nut	1		2.3x5mm Self-Tapping Screw	6	

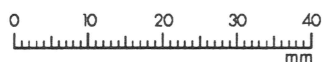
Use prefix KLT when ordering parts.



ENFORCER ZR

## PARTS LIST (NUMERICALLY)

Part #	Description	Qty.	Part #	Description	Qty.
00010016	KalTite Thread Locking Compound	1	33006	Tail Rotor Blade Grips (Includes: 2-Tail Rotor Blade Grip A and 2-Tail Rotor Blade Grip B)	1
05000107	T-Type Fuel Filter	1	33007	Tail Rotor Blade Grip Bearing	4
05010156	Silicone Tubing (Includes: 1-Silicone Tube M (110mm), and 1-Silicone Tube L (240mm))	1	33008	Tail Pitch Yoke Set (Includes: 1-Tail Pitch Yoke, 1-Tail Pitch Yoke Bearing, and 1-Tail Pitch Lever with Bushing)	1
31003	Planetary Gear	3	33009	Tail Pitch Slider	1
31005	Tail Drive Gear	1	33010	Slide Bushing	1
31006	Planetary Carrier Assembly	1	33013	Tail Rotor Hub	1
31008	Transmission Bearing Set	1	33014	Tail Output Shaft	1
31009	Ring Gear	1	34002	Mixing Arm Base with Joint Rods (Includes: 1-Mixing Base and 2-Joint Rods)	1
31012	Shaft Stopper	1	34003	Mixing Lever Set	2
31013	Spacer	1	34007	Mixing Bearing Set	4
31014	Engine Mount	1	34008	Bearing Spacer	4
31015	Insert Nut	3	34010	Linkage Set A	1
31017	Drive Gear Bearing	2	34010	Linkage Set A (Double Link I)	2
31021	Clutch Bushing—O.S.	1	34015	Elevator Lever With Bushing A	2
31022	Clutch Bushing—Enya	1	34016	Aileron Arm with Bushings (Includes: 1-Aileron Arm, 2-Lever Bushing D, 1-Lever Bushing B and 2-Universal Link D)	1
31024	Cooling Shroud (Includes: 1-Left Half and 1-Right Half)	1	34019	Aileron Lever with Bushing B	1
31028	Clutch Bushing—Webra	1	34020	Aileron Lever Nut	1
31033	Cooling Fan	1	34023	Pitch Rod Set (Includes: 1-Pitch Arm, 2-Pitch Arm Bushings and 1-Pitch Arm Lever)	1
31034	Clutch	1	34025	Pitch Rod Retainer	1
31037	Metal Drive Gear	1	34029	Tail Joint Lever (Includes: 1-Tail Joint Lever and Bushing B, 1-Tail Joint Link and 1-Tail Joint Stopper)	1
31039	Main Drive Gear (White)	1	34032	Tail Push-Pull Rod Guide	2
31040	Transmission Case (1-Left Half and 1-Right Half)	1	34034	Pitch Rod (2 Pack)	1
31042	Tail Drive Shaft Assembly	1	34041	Mixing Unit with mixing lever (Includes 2-Mixing Units and 2-Mixing Levers)	1
31043	Main Shaft Stopper (Upper Collar)	1	34042	Swashplate	1
31044	Main Shaft Stopper (Lower Collar)	1	34046	Elevator Lever	1
32002	Main Rotor Hub (Includes: 1-Main Rotor Hub A and 1-Main Rotor Hub B)	1	34047	Aileron Lever	1
32003	Main Rotor Hub Bearing	2	34048	Tail Push-Pull Rod Set (Includes: 1-Tail Push-Pull Rod and 1-Tail Push-Pull Rod Tube)	1
32005	Main Rotor Blade Grip Bearing	4	35001	Fuel Tank Assembly (Includes: 1-Fuel Tank, 2-Fuel Nipples, 1-Rubber Grommet, 1-Fuel Tank Weight and 1-Silicon Tube S (70mm))	1
32006	Flapping Yoke (2 Pack)	4	36001	Servo Frame Set (Includes: 1-Servo Frame Left, 1-Servo Frame Right and 1-Servo Frame Retainer)	1
32007	Hub Spindle	2	36004	Servo Base Set	4
32008	Hub Spindle Collar Set (Includes: 2-Inner Collars and 2-Outer Collars)	1	36005	Main Frame (1-Left Half and 1-Right Half)	1
32010	Hiller Control Lever	1			
32011	Stabilizer See Saw	1			
32014	Stabilizer Bar (Flybar)	1			
32021	Main Rotor Blade Grip	2			
32029	Main Shaft	1			
32030	Stabilizer Paddle (Flybar)	2			
33002	Tail Gear Set	1			
33003	Tail Input Shaft Bearing	2			
33004	Tail Output Shaft Bearing	2			
33005	Tail Transmission Case (Includes: 1-Tail Transmission Case A and 1-Tail Transmission Case B)	1			

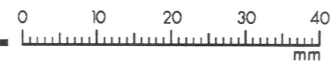


## PARTS LIST (NUMERICALLY) (CONTINUED)

Part #	Description	Qty.
36007	Servo Frame Bracket	2
36008	Landing Skid Set (Includes: 2-Landing Skids, 4-Skid Caps, 1-Left Brace and 1-Right Brace)	1
36011	Cross Member B	2
36012	Gyro Bracket with Gyro Cover (1 Each)	1
36013	Horizontal Stabilizer and Vertical Fin Set (Includes: 1-Horizontal Stabilizer, 1-Vertical Fin and 1-Mounting Bracket)	1
36016	Body Set with Canopy (Includes: 1-Body Set and 1-Canopy)	1
36017	Canopy Only	1
36024	Body Stay	2
36025	Canopy Holder	2
36027	Switch Plate	1
36028	Servo Set Plate	10
36036	Cross Member A	2
36037	Tail Boom	1
	Rubber Band	1
	Double Stick Tape	1
	Foam Rubber	1
39002	Tail Rotor Blades (Pair)	1
39007	Main Rotor Blades (Pair)	1
39008	Enforcer ZR Decal Sheet	1
39009	Assembly Instructions	1
39010	Exploded View	1

Use prefix KLT when ordering parts.

ENFORCER ZR





Modular design  
for easy maintenance

•  
Fully equipped  
with 36 precision  
ball bearings

•  
Pre-finished,  
weighted and balanced  
rotor blades

•  
Metal balls  
on all linkages

•  
Large 49.5" rotor span  
for improved flight performance

•  
25° of total pitch travel

•  
**Specifications**

Main Rotor Disk 49.5"

Tail Rotor Diameter 8.0"

Length 42.5"

Approximate Weight 6 lbs.

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**KALT**  
HELICOPTERS

#KLT39009