These are some tips to make the Tiger 50 better!

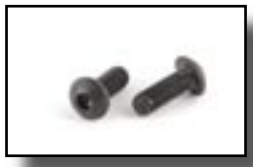
ADDENDUM v2.3

1. In the manual I say don't glue the servo bosses - oops! Use plastic type CA glue to secure them. We use black-color CA called IC-2000, which is a rubber-reinforced Tire Glue from Bob Smith Industries.

AUD1012 Servo Boss

2. Want to make your Tiger flip and tumble faster, i.e. for more aggressive 3D flight? The Pantera 50 seesaw has two extra mounting holes - it's part number AUD0048-2. Review the diagram on page 50 to see where it's installed. Make sure you use two AUD3505 button head screws to prevent the seesaw arms binding. If you're learning to hover, or enjoy upright flight with F3C-style flight routines (like loops and rolls), use the outer hole position (as with the original seesaw) and the inner hole to tumble and roll in place (and basically make the Tiger less stable). But be careful because a boom strike is possible when you're too agressive (which is why we offer stiffer PDR0071 dampers).

AUD0048-2 Seesaw



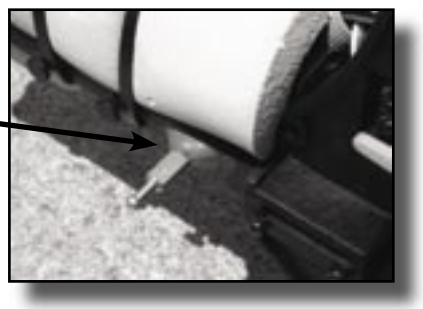
AUD3505 M3x8 Buttonhead Screw

3. We forgot to mention in the manual what to do with two little black spacers (4mm dia x 2.8mm), the F3C swashball extensions. Install them under the short balls on the upper ring of the swashplate per the Pro Tip in section 4.1 - these are for sport aerobatic use. For 3D, buy the PDR0069 3D Swashball Kit because it's more of the same (but 4.25mm instead of 2.8mm high). Novices shouldn't install any extensions! Swashball extensions like the F3C and the PDR0069 option are another tool in the arsenal of the pilot seeking to extend the performance envelope via tuning.

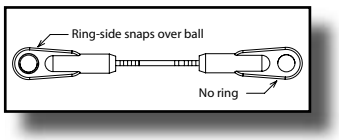
F3C Swashball extension

PDR0069 3D Swashball Kit Seesaw

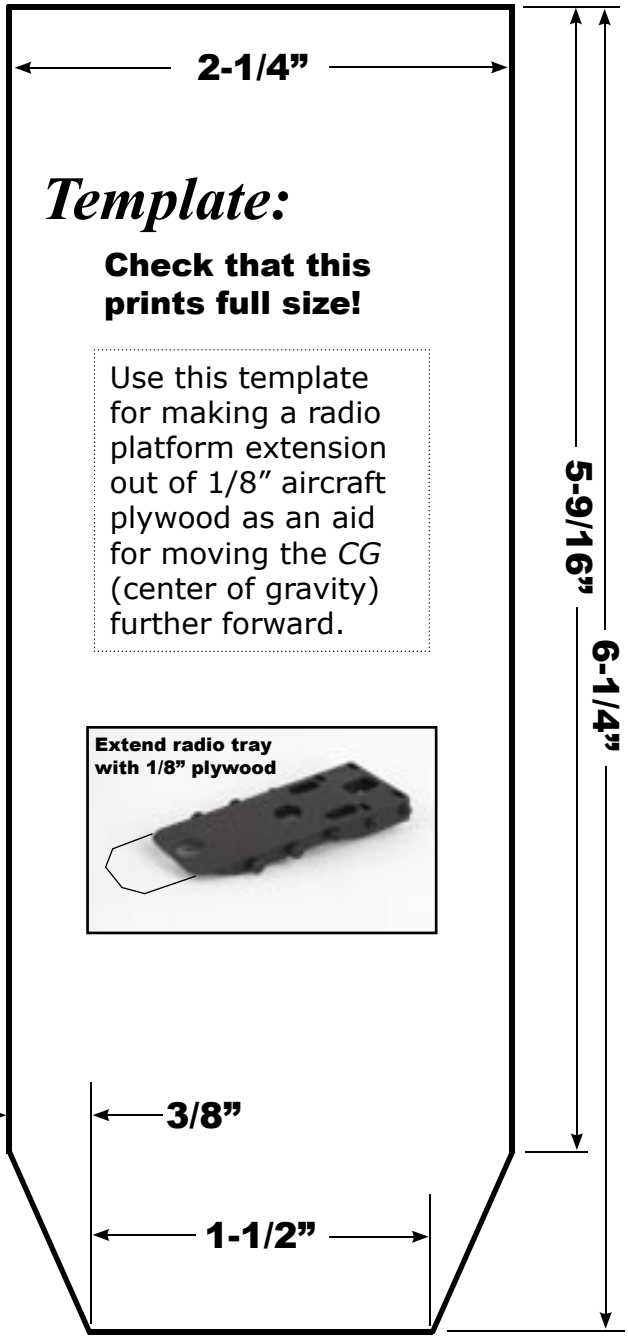
4. We've taken to using epoxy and micro ballons (or JB Weld) to add a reinforcing fillet to the bosses which hold the canopy posts on the radio platform and frames. They seem to break pretty easy so this saves a few bucks!



5. Turns out there is no HD molded on the ball links. Instead, look closely for a lightly molded ring around the lip on one side of the links. This ring-side is slightly larger than the other. Install the link by snapping the ring-side down over the ball.



6. 3D pilots (who often fly backward maneuvers) usually prefer a slightly tail heavy setup. But for learning to hover, you want the CG (center of gravity) more forward. We offer AUD0030-2 (longer Pantera 50 part), but an inexpensive alternative is to make a plywood platform-extension from 1/8" aircraft plywood. Screw it on and zip-tie the battery as far forward as you can thus, shifting the CG furhter forward.



7. Servo arms are an important part of setting up your Tiger. There's a mistake in the manual on pages 26, 27, and 31 where we suggest using 20 mm long servo arms for the three swashplate servos. In fact, the forwardmost servo should operate through a 23 mm long servo arm instead of a 20 mm servo arm. The reason is AUD0027 Elevator Arm reduces throw by 15% to clear the start shaft. Mechanically compensate by using a servo arm that's 15% longer than the arms used on the two aft servos. Hence, a 23mm long servo arm is pefect if you use 20 mm arms for those because 20 mm x 15% = 3 mm, or 20 mm x 1.15 = 23 mm thereby resolving the issue quite elegantly. We're partial to the HD servo arms by Du-Bro: #670 for Futaba, #671 for JR, #672 for Hitec, and #856 for Airtronic brand servos. Also, instead of a 12.5 mm servo arm for the tail rotor servo we're using a longer arm (15-18 mm) instead.

8. Under hard use, thread locker securing the pinion gear of the AUD0526 Clutch Bell Assembly to the AUD3077 10x19x7 bearing may work its way loose. If you're hearing a ringing sound (kind of like a bell) the pinion may have worked its way loose. The fix is to clean the old thread locker off with acetone and re-assemble with thick CA or JB Weld. The real trick to making it bulletproof though is to use thick CA or JB Weld on it while it's new! Remove the front landing gear bolts and drop the engine. Some have reported they're placing a pair of needle-nose pliers on top of the clutch bell and giving it a tap with a hammer to pop it loose, but because some have also damaged the frames where it holds the bearing, we think it's best to just split the frame! We get away with just removing the frame bolts forward of the Tail Drive Pinion Assembly and flex the frames open (make sure you remove the M3x12mm that's inside the curve of the fan shroud too). In fact, you may not even have to remove servos because there's usually enough slack in the wiring. Next, clean the thread locker off with acetone or laquer thinner (the thread locker dissolves very easily) and use either thick CA or JB Weld to re-bond the pinion into the bearing (instead of thread locker as detailed in step 1.1). However, as with thread locker, be especially careful not to get CA into the bearing because it'll lock it up tighter than a tick on a hound dog . . . you've been warned!

9. Disassemble the thrust bearings located inside the main rotor blade grips and grease them. This will maximize service life. We have used many types of grease and don't think which kind matters in the least regardless of whether it's wheel bearing grease, white lithium grease, or whatever you have on hand! This is an easy job, but please refer to the drawing for proper thrust bearing re-assembly as detailed in the manual's exploded views (refer to 11.3 Main Rotor Head & Seesaw). There's really only one thing that might bite you on the rear. There are two grooved washers in each thrust bearing pack, and getting them backwards will make blade tracking inconsistent since these washers differ slightly in the ID. Just make sure the grooved washer with the larger ID is installed on the hub-side while the one with the smaller ID is installed toward the nut-side. Finally, while you're at it, put just a smear of grease on the dampers (where the spindle shaft rides) so that they don't bind.

10. There's a mistake in the manual affecting steps 3.3 and 3.5 because these bolts are reversed. The correct bolts to mount the engine to the engine mount (as detailed in step 3.3) are the 3x12 mm shown in step 3.5. The longer 3x15 mm bolts (from step 3.3) should instead be used in step 3.5 for securing the engine mount (with aluminum cap washers) to the side frames.

11. Turns out the note about not using thread locker on the crankshaft nut (step 3.3) isn't the last word. We now think it's best to use blue thread locker to secure the nut. Also, if you dial-indicate the AUD0037 Clutch Hub (to minimize vibration), then PDR0090 Equalizing Nut (used in the wings of Boeing jets) is the Cat's Meow to keep the runout from changing as you tighten the engine nut because its ball-and-socket design prevents it from pulling the hub off center!

PDR0090 Equalizing Nut

12. Complaints of the tail boom working loose have two usual sources - using a screwdriver-handle type Allen to tighten the four M3x38 mm aft frame bolts vs. an L-shaped or T-handle Allen-wrench (to really tighten the suckers), or forgetting to tighten the M3x4 set screws located on each side frame (as detailed in step 5.7). Here are a couple of tips; first, simply using some strips of electrical tape on the boom before plugging it in, works great. A better method exists if the frames haven't been assembled yet (or you're willing to disassemble them). Use a sanding block to remove some material (just a few thousanths) so the frames will pinch the tail boom more tightly by lightly sanding on the aft part of the side frame (the one without the round alignment keys sticking out). Also, some like to substitute M3x10 Allen Head bolts for the M3x4 safety set screws (these secure the tail boom after you've flown a time or two and set the belt tension) so you can use a 2.5 mm Allen, which doesn't round out as easily! Also, because it's not unusual for these safety set screws to actually punch through the boom (which certainly keeps it from working loose), we first fly the heli a time or two (because the belt stretches a little) and then we secure these safety set screws!

13. On 9.0 Set Up Tips, there's a mistake as the two aft servos are reversed. The starboard (right) aft servo should actually be plugged into channel 1 and the port (left) aft servo should instead be plugged into channel 6. The same issue pops up with with different brands of equipment as per step 9.3 where channel numbers are refered to as Aux 1, ELEV, and AILE - please refer to your radio equipment's manual for specifics.

14. AH-xxxx and PRO-xxxx part numbers are superceded by AUD-xxxx and PDR-xxxx - the numbers don't change.

15. We've been fortunate that some of the best 3D pilots in the world have chosen to use a Tiger 50 as a "beater" for practicing the presentation of their 3D routines. As a direct consequence (because they fly their Tiger 50 harder than mere mortals) their ideas may lead to inprovements for the rest of us. The tip that follows is really neat and is both easy and effective.

This mod involves AUD0010 Tail Pitch Control Lever, and requires an X-Acto with a #11 blade, a drill, the appropriate drill bit and 3 mm tap, as well as PDR-0079 3D Guide Pins. These can increase the service life of the tail pitch control lever under grueling abuse imposed by aggressive 3D pilots.

PDR0079 3D Guide Pins

Step 1 - Remove AUD0010 Tail Pitch Control Lever from the Tail Gear Case Assembly by using a drift to drive out the tail lever bushing - a makeshift drift can be an Allen driver.
Step 2 - Use the X-Acto to slice off the two plastic nubs which fit the grooves to drive AUD0014 Tail Slide Ring.
Step 3 - Drill and tap for 3 mm. This is easy because there is a round molded recess directly opposite (on each side) from where the pins were. Just be careful to center the drill bit beforehand and go for it. If you screw up, it's not the end of the World, a replacement AUD0010 is inexpensive.
Step 4 - Use a drop of plastic CA glue as a thread locker and an Allen driver, screw in the PDR0079 3D Guide Pins.
Step 5 - That's it! Reinstall the Tail Pitch Control Lever.

Special thanks to: Henry Caldwell for coming up with the idea, Marcus Kim for letting his Tiger 50 be the guinea pig, Eric Reinhart for the tools to accomplish this, and most especially Lee O'Dell for generously donating the guide pins off his Freya for the experiment. The idea was prototyped at Blacksheep, SC over the 2005 Independence Day Holiday and a mere 5 weeks later we had approved the drawings, manufactured the guide pins and were shipping! This little modification can really help maintain precision longer!

16. Assembling the AUD2003 Ball Link Ends to the AUD1521 Tail Rotor Pushrod becomes a lot easier if you first use a 5/64 drill bit (.078") and drill out the slightly undersized holes before threading them onto the pushrod.

17. We've had reports of blades occasionally going out of track and have learned it's related to excessive play in one of the Seesaw Arms. Check for excess play before flying your model because the resulting flutter can easily be strong enough to lead to a Spindle Shaft bending. Fortunately, the shaft is a sacrificial part and hence, is cheap and easy to replace. The cause is usually either the screw securing the Seesaw Arm on the shaft has backed out slightly, or there's a ganging of tolerances which has resulted in a loose fit on one of the arms. Checking for either condition is actually pretty easy. First, grasp the Seesaw Arm between your thumb and forefinger and give it a side-to-side wiggle. Next, rotate the head around and check the other Seesaw Arm the same way. If you've experienced blades going out of track, then dollars to donuts there's more play in one Seesaw Arm vs. the other!

You may be asking yourself, "What's ganging of tolerances?" Simply this . . . it's surely no surprise that two bearings with the same part number can actually vary slightly in size, right? I.e. measure them using instruments of sufficient precision and you'll almost always discover that one can be slightly thinner than the other. Similarly, the ID and the OD can vary slightly as well. The same holds true for the shaft - such that it might be slightly longer than others in the same parts bin. Ditto with the seesaw arm itself, but nonetheless, these differences are within the +/- tolerances of the design. Then during assembly; thinner bearings, maybe a seesaw arm with a thinner ring gap, or perhaps a longer shaft, when assembled result in slightly too much play in one of the seesaw arms. It doesn't happen often but occasionally parts (each in proper tolerance) when combined may result in an assembly that's out of tolerance - in this case too loose!

First, just try tightening the bolt. Be careful though since this bolt threads into the plastic seesaw. Fortunately, if it's stripped, all's not lost since plastic-type CA used as thread locker will have you back in business because you can pretty much restore the threads using it. If the damage is too bad, happily, seesaws are inexpensive so it's not that big a deal.

If it's not loose, then back the bolt out and look to see if the shaft itself (the one the bearings ride on) isn't just a hair too long (you'll see it sticking out past the inner race of the outer bearing of the seesaw arm - it's pretty easy to discern). If this is the case, then file a few thousanths (or however much is needed to make for a perfect fit) off the end of the shaft.

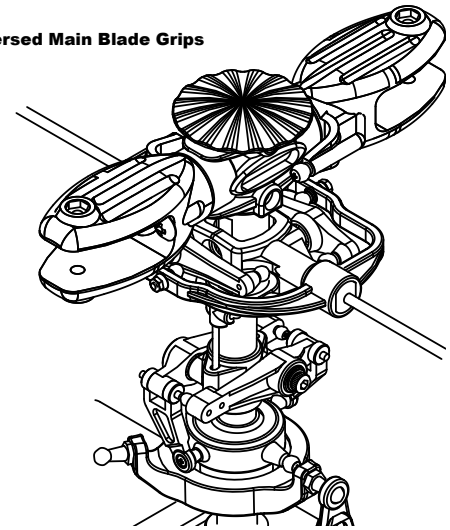
That's how you remove the extra play and the process is called "blue printing". Top pilots blue print every assembly of a machine. Most of us aren't top pilots, but blue printing an assembly is a simple, easy, and free modification. Best of all, it may result in a tangibly better handling helicopter plus it's fun to do - after all, it's called modeling for a reason! While you're at it, check the mixing arms for excess play and blue print them to perfection also!

18. A member of the Audacious Crew came up with an idea for making the Tiger 50 fly better and it really works! This **Positive Delta Modification** makes for a real improvement in the flying chracteristics of the Tiger 50 . . . and it doesn't cost a thin dime! Basicaly we now recommend flipping the main rotor blade grips over (exactly like on the Pantera 50) so that the main rotor blades are controlled from the leading edge vs. from the trailing edge (resulting in positive delta vs. negative delta). The ensuing aerodynamic forces work to provide more precise collective and cyclic control and best of all, it's both easy to accomplish . . . and free!

The goal is to invert, or mirror image, everything north of the Swashplate. These include the Mixing Base/Mixing Arms, the Seesaw/Seesaw Arms, and the Control Lever Assembly as well as the Main Blade Grips. It's easy, here's how . . .

Step 1 - DISASSEMBLY - use ball link pliers and remove the links (to include the Washout Link) leading from the Swashplate up to the Main Blade Grips. Then remove a Flybar Paddle, loosen the set screws on the Control Lever Assembly, and slide the Flybar out as well. Take the Seesaw Arms off the Seesaw followed by the two screws holding the Seesaw onto the aluminum Center Hub Assembly to remove the Seesaw itself. Next, remove the Jesus Bolt and lift the Head Assembly off the Main Shaft. Finally, lift the Washout Base/Mixing Arms off the Main Shaft.

Reversed Main Blade Grips



Step 2 - MODIFICATION - For the full collective pitch range (-11/+11 degrees) you must cut about 1/8" from the bottom of the Washout Base (or just buy AUD0004-2 which is the 3D-style washout base for the Pantera 50 which does the job and fits perfectly). Anyway, I use a Dremel tool with a cutoff disk but because the inner liner of the Washout Base is made of steel it's helpful to occasionally dip the Mixing Base in a bowl of water to keep the steel sleeve from getting too hot and melting the plastic. Alternatively, get someone to hold a wet sponge above the Washout Base and dribble water on the job for cooling (as you cut it). Also, use the Dremel and cutoff disk to trim enough (about 1/8") off the rotor blade bolts to keep them from gouging your palm when you use your hand as a rotor blade brake - you've been warned!

Step 3 - RE-ASSEMBLY - Refer to the drawing. First replace the Seesaw - remember to invert it. Reinstall the Seesaw Arms, then slip the Control Lever Assembly in place and ease the Flybar through it and the Seesaw. This has been done correctly when the Set Screws which secure the Flybar are tightened from the bottom vs. from the top. Now replace the second Flybar Paddle and re-align everything. Then, re-install the Mixing Arms onto the Washout Base and slip this over the Main Shaft - but ensure the side which you cut off faces upwards and the Washout Arms are reversed. Snap the Washout Links onto the long balls on the upper star of the Swashplate. Next, re-install the head assembly and the Jesus Bolt - and please remember to tighten it securely. Trust me when I say it's a sick feeling to watch the rotor disk go sailing off pretty as you please while the Tiger 50 imitates a costly Lawn Dart - and don't ask me how I know, but you've been warned - sob! Now remove one of the M4 Nylon Lock Nuts from the Spindle Shaft and slide the grips apart enough to permit you to rotate them 180 degrees (flip them over in other words) and re-tighten the M4 Nylon Lock Nut. Finally, re-install the linkage rods.

Step 4 - PROGRAMMING - Next, let's reverse the pitch direction - do this in the Swashplate Menu of the transmitter. It's where you have values for Elevator, Aileron, and Pitch. All you do is reverse the value for Pitch. For example, if the value is +55, change it to -55 . . . or from -60 to +60 and the Swashplate will now move down for positive pitch instead of moving upward - and vice versa! You're done!

This is the new "official" way we recommend assembly of the main blade grip control. The only downside to this little modification is the set screws securing the flybar are reached from below and similarly, the bolts securing the main rotor blades install from the bottom as well - a small price to pay!

19. Installing the 3D paddles is simplicity itself, but you must ensure they are properly installed. Make sure none of the threads on the flybar are exposed, i.e. that they're fully covered by the body of the paddles (or the flybar can break where the threads start). Just make a mark 1" from the end of the flybar, then screw the paddles on until the inside edge of the paddle meets the mark. Also, some 3D-pilots like to experiment and try to improve the flight characteristics when using these paddles - it's easy. First, slice 1/8" off the leading edge. Next, using a sanding block, simply re-profile the edge back to an aerodynamic shape. Finally, check to ensure they still weigh the same - that's it!

20. The inevitable will occur. Yes, despite your best efforts (perhaps even due to your best efforts), the time will come when your Tiger 50 meets *terra firma* at a rapid rate and what results is a smokin' hole in the ground! Inevitably this greatly amuses the peanut gallery (while you'll be shaking your head in dismay). If (when the momentous occasion occurs), the damage includes the AUD0013 Tail Pitch Plate (this piece supports the two AUD0012 Tail Pitch Links and threads onto the AUD1005 Tail Slide Ring Sleeve), then remember this - the assembly doesn't use the usual right-hand threads . . . it uses **left-hand threads** - you've been warned!

10.7 ADDENDUM

21. I've been asked a few times about lubing bearings and other points of friction on the Tiger 50. First, remember the goal of lubrication is to reduce friction and the resulting accelerated wear due to the rubbing together of parts. We do this with lubricant. This, naturally enough, raises the question of what to use? Personally, I don't care for WD-40 for this application (though it's better than nothing also), and 3-in-1 oil (or any light sewing machine oil) is decent but attracts dirt, which is bad! I like synthetic high tech lube like Tri-Flow with Teflon and I use it everywhere except on the bearings where we recommend using a lithium based bearing grease.

Speaking of whichh, how often do we grease bearings? it depends where they're located. For example, we recommend greasing the bearings in the tail rotor blade grips periodically - I do it every time I open a new case of fuel (4-gallon cases) because it's easy to remember to do it then. By the way, the best tool for the job is a tool like PDR0082 Bearing Greaser. While you're at it, disassemble and grease the bearings in the main rotor blade grips at the same time as when you do the tail rotor brip bearings. Lubricating main shaft bearings is another issue altogether because the frame halves secure these in place. Thus, I don't grease them unless I'm splitting the side frames anyway - then I definitely take the opportunity to re-grease them! We also recommend greasing the thrust bearings every time the spindle shaft is replaced, or after every case of fuel - presuming I have't had the head/grips apart due to a crash repair!

Next, using Tri-Flow (or the like) lube on a daily basis where the tail slide ring sleeve rides on the tail output shaft. While I'm at it, I also put a couple of drops right where the swashplate rides on the main shaft. Ditto for the washout base also. I also put a few drops at the dampers (through which the spindle shaft passes) because it works hard during flight and this lubrication keeps it supple.

Anyway, that's how I do it . . . and it's not just for my Tiger, but for all my helicopters! By the way, one reason I lube so frequently is because I also happen to be meticulous about keeping my helicopters clean. To make this job easier, I spray them down with denatured alcohol (once I get back to the workshop). Next, I use a jet of high pressure air (from my air compressor) to blast things nice and clean! Finally, I touch up by wiping with a diaper (these work great for rags) whilst checking for anything wearing or broken (which may have escaped my attention at the field). Since it seems to me I may very well be washing away some lube along with any oil and dirt on the model, I figure the best thing to do is just re-lube these points before the start of flying each day.

22. We forgot to mention in 8.2 that the 4 large (about 1" diameter) black plastic washers are actually shims for the main rotor blades. The main rotor blade grips are designed to fit properly when you add the washers to the blade roots. The shim washers are designed to be fit with one on each side of each main rotor blade (they're only 1 mm thick). They're something a tight fit, but you can use thin CA glue to attach the plastic washers permanently to the plastic blade roots - this way they're not so hard to install! Finally, in the manual we recommend you remove the blade covering material from under the plastic root halves and use thick CA glue to permanently attach them to the wood of the blades. You can also use epoxy instead. Just trace around the plastic to mark the covering material before separating the halves, trim the covering away, glue, then reassemble. If you don't the blades may fail . . . and then you're screwed!

23. We've had some issues with the threads in the body of the AUD0001 Hex Start Adapter not being fully cut. Before final assembly using thread locker, make sure the threads are actually cleanly cut by first running the set screw all the way into the body until you see it penetrate into the center (which is how it secures the adapter to the flat of the start shaft). If the threads aren't clean, then just run a tap through it to finish cleaning them up. Finally, remember to use plenty of thread locker so the hex start adapter doesn't come loose . . . which as we all know, Murphy's Law dictates will always happens at the field while you're showing off your new pride and joy to the peanut gallery! This brings us to "which" of the thread lockers to use, blue, green , or red? Blue is used for most screws, while green is designed for wicking into an already assembled part. Red is the one you'll need heat to remove and is generally considered the strongest of the three. The strength of the connection between the start adapter and the start shaft is dependent on the screw sitting square on the flat spot of the shaft, so in turn, it's critical that this screw not back out (or the adapter will spin itself loose of the shaft). Hence, more experienced modelers often prefer red for this job despite knowing it'll be something of a pain in the rear to get loose later.

24. We've had a few reports of the tail rotor grip bearings failing - with the result being that a grip and blade go flying off to land who knows where. There's been no consistent pattern to these failures, i.e. following crashes, or because users drag the tail rotor blades through the grass and frankly, we're baffled, but figure better to make you aware of it. One user reported the tail "felt funny" so he landed, popped the links off the tail rotor grips to check, and by rotating each grip discovered the bearings were rough in one of the grips. So he lubed them with Tri-Flow, went on to fly and soon thereafter, lost a grip (fortunately no damage other than to his pride). If a bearing is rough IT MUST BE REPLACED. Periodically check them for smooth operation! Also, it's easy to overload tail grips bearings by fitting longer tail blades (though you don't need them because the Tiger's 5.25:1 tail gears are already faster than every 50-class heli on the market except the Pantera 50). An alternative is to switch to the Pantera 50's thrust bearing set up instead - it's part number AUD0043K and has everything you'll need.

This addendum is how I'd have written the manual had I known then what I know now!

- John Beech, GM (and janitor)

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