Not so

BasicTraining

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Tiger Tuner Tales.

Teaching New Tigers Old Tricks

Variety is the spice of life. So is pepper. And just like pepper, if you get too much "variety", you'll get burned. The same thing happens when you brag to MHTjef about how nice the weather has been here and how crappy it's been for him, ... nanner nanner naaa-ner, ... and how much flying you're going to get the coming weekend and BLAM! The rain gods decide to teach you a lesson and turn every available fly day for two months into a soggy excursion into heartbreak. Since we Californians are used to nice, clear dry days, this "variety" we're currently measuring with a yard stick is getting really old. Yet, I struggled to prevail against incredible odds, fighting through the howling rain, because I know that you depend on me for the vital and late-breaking information that you need to plan your next helicopter purchase...

I have no idea where I was going with this, but I can honestly say that wherever it was, it was going to be good. So skipping straight to the point, very few R/C helicopters offer as much "variety" in flight as the Audacity Models Tiger 50.

Pocket Protector time.

As die-hard readers of MHT, you know that this is the second installment of the Tiger 50 review. The focus of this article is tuning the Tiger to perform exactly how you wish it to ... within reason. First, a few mind-numbing statistics, so that you can go around spouting esoteric yet exceptionally boring information to impress your friends, lovers, fellow chess club members, pet poodles, etc.

The Tiger 50 with 600 mm blades has a disc area of 15.28 ft2 (1.42 m2). Given the 7 lbs 12 oz (124 oz or 3.52 kg) weight of a wet Tiger, we get a disc loading of 8.12 oz/ft2 (2.48 kg/m2), which compares favorably with other aerobatic models in its class. Like our fixed wing brethren's wing loading, disc loading really comes into play with aerobatics and autorotations, since the lighter the disc loading, the more nimble the disc in flight and the less energy expended during the last stages of an autorotation. On the other hand, lighter disc loadings tend to be dodgier, especially at higher head speeds. As in all things in life, there are tradeoffs, and the Tiger comes in at the lower range of disc loading, which promises reasonable aerobatic flight without being too twitchy. (Now, before any glider pilots freak out about how well a helicopter should glide with that kind of loading, disk loading and wing loading are similar for theoretical explanations only. The actual wing loading of a heli would be calculated using the area of the blades only, which of course would equate to the wing loading of a '69 Dodge Fury)

The Tiger's ready to roar *("Ready to Roar" ... Ash ... ouch! ED)*you through some aerobatic maneuvers. Note the absence of the horizontal tail and the shorter flybar with thin KSJ paddles.

" The focus of this article is tuning the Tiger to perform exactly how you wish it to ... within reason."

Tail authority is excellent considering the long tail boom and the stock 85mm blades spinning at a 5.2:1 ratio, which is great for pirouetting flips of tumbling death. To help the piro, flipping and backwards flight characteristics a bit more, I removed the horizontal fin. This is easily accomplished on the Tiger because the horizontal fin is not an integral part of the boom support bracket. And when you consider that the horizontal fin has an area of over 13.5 in2, getting rid of it certainly helps zip that long tail through the air. I also intend to skeletize that honkin' 14.25 in2 vertical fin, but I haven't gotten around to it yet.

Speaking of other things I haven't done yet, besides save for retirement, I think replacing the metal tail-rotor push-rod with a carbon fiber rod would be a great mod. This should help lighten the tail-heavy Tiger even more. The tail servo is already mounted at the rear of the frame, so fitting a CF rod should be fairly simple. However, because of the required length of the rod, I'd probably keep and modify one of the metal rod's guides for the CF rod simply to avoid any oscillations that might occur in flight.

The long tail also offers the tantalizing potential of slinging longer main blades. In fact, there's almost two inches of clearance between the tail rotor and the main rotor, so it's not outside of the realm of possibility to try 650mm blades on the Tiger. But be careful. That's pushing the clearance envelope.

And this just in... Remember that long explanation in the last article about getting the prop drive/fan hub mated just right? Well, forget all of that. The Audacity folks now include a longer hub in the kit to fit engines without using the prop drive! You have to give John and his crew credit for making kit improvements and getting them out in a timely manner. This attention to "getting it right" has made the Tiger 50 an excellent example of a kit that goes together easily and does not require a bunch of "grind down this screw, shave that plastic piece" modifications.

Flyin' Tiger on a low pass. Very solid flyer. Tried to get some inverted photos, but it's too hard to fly and shoot pictures at the same time...

Back to the point ... whatever it was..

I started this article off talking about variety, and there are few other R/C helicopters that offer so many areas for flight adjustment. This starts with the swash plate, which has a travel of 23 degrees, even though I settled firmly on 20 degrees (+10 -10). However, the cyclic adjustment is accomplished through the lengths of the swash arms themselves, in that one set is shorter than the other. This allows you to run a longer throws on the Hiller side than the Bell side, or vice versa! The kit also comes with extenders that allow you to lengthen the short arms to match the longer arms, thus giving equal throws on Hiller and bell systems. Of course, since most of you have read my outstanding article on Hiller and Bell systems, you're already ahead of me and thinking that by having a shorter Bell input, the bell side has less input and thus the disk will not be as quick to react to a command; something that a beginner or anyone interested in extra stability would want. And you also realize that by equalizing the inputs from the swash, you'll increase the disc's quickness, without slowing the Hiller's response. Ah... you've learned well grasshopper...

The next area for adjustment is the washout arms themselves, which have two output points, similar to other helis on the market. This is another area where you can tune down the Tiger by using the inner holes on the arms, or tune it up by using the outer holes. In using the inner holes, one lowers the output to the Hiller paddles making them pitch less during a given command and thus not moving the flybar disc as rapidly, which slows the flight characteristics. By increasing the throw to the outer points, a given cyclic command results in more pitch in the paddles which gives a quicker response, moving the flybar disc out of the way allowing the main disk to move more quickly.

The see-saw modification gives significantly more deflection angle than the unmodified see-saw. You will also see the double holes of the upgraded see-saw.

Photo of a completed mod to the see-saw. Arrow shows area of relief.

The final area of adjustment is on the seesaw itself, where there are two mounting holes for the mixing arms. By mounting the arms in the outer holes on the seesaw, the flybar ratio becomes a 1:1 ratio. This means that the flybar has more authority and thus lends more stability. However, this also amplifies the effect of twitchy or light paddles, especially in forward flight, which can result in porpoising and/or pitchy control in forward flight. By moving the arms to the inside holes, the flybar ratio drops to .7:1, which takes away some of the authority of the flybar (Hiller) system, smoothing out the forward flight issues.

One other area I should mention is the use of different length flybars. A longer flybar has more leverage than a short one, and thus can create a faster responding disc. By switching to a shorter flybar, one creates a bit more stability and avoids some of the hysteresis effects that a longer 3mm flybar can induce. The Tiger's stock flybar is pretty long and goes completely through the stock paddles. However, when you add 3D paddles, which screw on to the ends, the extra length is very obvious. I decided to switch to the shorter 3mm Raptor flybar. I like the shorter 3mm flybar because of less bar flexing, even though theoretically there is a slight roll rate penalty. Frankly, I didn't notice much of a roll rate change between the two different flybars. Changing flybar lengths is not a "built in adjustment" per se, but it is something that I used to tune my Tiger. And besides, I just love to type.

I also love to tinker. One aerobatic modification I made to the seesaw is a standard mod on most of these types of heads. It involves carving a small amount of the seesaw area out in order to allow the seesaw a greater degree of movement. This allows the flybar greater movement and thus the main disk is allowed greater movement. This mod alone subtracted about .5 sec on the Tiger's roll rate. Finally, I added 80 durometer dampers to the head to stiffen it up a bit. And yes, I will avoid another opportunity for a joke at this time...

By combining all of these adjustments, one can tune the Tiger 50 to fly just about any way you want. I began flight-testing the Tiger with Thunder Tiger 600mm CF blades and 1800 rpm head speed. Here's a quick chart of the adjustments and the resulting flight characteristics they pro-

duced:

The thing that really jumped out at me during my flight tests was that I couldn't get the Tiger to be pitchy in forward flight no matter how light and sharp my paddles were, or how much authority I gave the flybar. This helicopter is very stable. The flip side of this... and yes, the pun is intended... is that the cyclic rates are not extremely fast, but are still more than adequate for aggressive 3D flight, or in my case, aggressive 3D crashes. In reality, the 9252 servos I used are not exceptionally quick, so the collective response suffered slightly. If you are going to do tick-tocks or other maneuvers that require lightning quick collective, be sure to buy fast and accurate servos for this CCPM system. That will enable you to turn the Tiger inside out with no problem

If you own the RealFlight simulator, you can get a rough feel for the Tiger 50 by flying the Foiler 3D heli. The stock software Foiler 3D has very similar flight characteristics and responses. Because the Foiler simulates a larger helicopter, there are slight differences in flight patterns. However, more than the others in the stock configuration, the Foiler performs very similarly to the Tiger 50.

Or, better yet, you can fly the RealThing by purchasing a Tiger 50 from your local hobby dudes, or you can order directly from the crew at Audacity Models. In any event, take the plunge and add some variety to your hanger and your club's flight line. I think you will be thoroughly satisfied with the Tiger 50's performance, ease of construction, excellent engineering and features, and cost of parts. And if you're not satisfied with it, send it to me. The way I fly, I'll probably need the parts.

Order of experimentation:
- *Swash throw*
- *Wash-out arms*
- *See-saw arms*
- *Paddles*

Flight results

1
- *Short (Bell) throw, longer Hiller throw*
- *Inner hole output*
- *Outside hole mounting (1:1 flybar ratio)*
- *Stock, weighted*

Exceptionally stable hover and flight characteristics. Very slow cyclic rates. (3.5 sec+ roll rates)

2
- *Equal Bell and Hiller throws (extenders added)*
- *Outer hole output*

Outside hole mounting (1:1 flybar ratio)
- *Stock, un-weighted*

Still, very stable in hover and forward flight. Cyclic response still fairly slow. (3 sec roll rate)

3
- *Equal Bell and Hiller throws*
- *Outer hole output*
- *Outside hole mounting (1:1 flybar ratio)*
- *3D paddles, 20 g, rounded edge*

Hover and forward flight stable; no signs of pitchiness. Cyclic slightly faster (2.75 sec. roll rates)

4
- *Equal Bell and Hiller throws*
- *Outer hole output*
- *Inside hole mounting (.7:1 flybar ratio)*
- *3D paddles, 15g, sharp edge, short flybar*

Still hovers very well and no poor forward flight characteristics! Cyclic more responsive (2.25 sec roll rates)

Tiger 50, another view: by MHTjef

OK, after the weather finally broke into spring here, I got some time to aggravate some air with the editorial Tiger. Ash and I agreed to compare notes and report back to y'all and to that end here's my take on the Tiger. I only have about 2 gallons through it so far.

I had a bearing failure on one tailrotor grip in the air which locked up one blade. I was able to auto the machine down without damage. Thinking I had the "goods" on Audacity, I copped a Dan Rather 'tude and called John Beech to grill him on this problem and was told that there was only one other instance of tailgrip beaing failure reported. I felt as dumb as Dan!

The tail on the review machine vibrated from the first flight, so the bearing must have been bad from the start. A bad bearing is not Genesis' fault, so with a reboot

of confidence, I swapped out the stock tail hub assembly with one off another machine (a Venture 50) so I could keep flying until new parts came in. New bearings solved the problem.

Perhaps the weakest part of this machine is an area at the back of the frames just above the tank. Weak does not mean that they crack when crashed or anything, just that they flex during hard maneuvers. I noticed this while doing rapid tic-tocs and pump maneuvers that try to wrench the rotorhead from the frames. A bit of flex reveals itself as a "soft" cyclic feel that goes away after the violence stops. Its nothing

that bogs the motor, chew gears away or screws-up the gyro authority, so this may not be a real problem for those who aren't set on destroying their machines ...Heh ...Heh!

And then I ran out of fuel while close to the ground, ... inverted, ... (I know, I know ... it was just stupidity. Stupidity finds me sometimes). I managed to get the machine over, almost, before the thud came. The only damage was a cracked mixer link, both skid struts and a minor feathering spindle bend, *BUT* the frames held up solid! So that's really the test I guess. Unless of course, one of those "trunk monkeys" pounds on something else.

I straightened the spindle and swapped the gear off our Venture 50. Then I tied up the mixer break with Kevlar cord CA'd into place and went back out to thrash. All was well. Getting parts is a mail order thing around here and I wanted to keep flying before the weather puked on me again.

Another thing you'll need to be made aware of is that if you intend to fit up a OS 50Hyper, you will need to trim that bit of the cooling shroud that touches the topmost part of the head. A minor bit.

Now the good point about this heli ... the way it flies. Ash seems to like a RappyFlippy motions *(which is why he's crashing all the time-ED)* and I like a wee-bit more sedate machine. Either way this thing flies a very true straight line with no tendencies to tuck or "porpoise". It flys more like my Millie 70, except for the smaller disk. It also is very durable, but the best for my wants, is that the head doesn't allow the blades to woof at high rotor speeds. How do I know this? Because I flew deep into the danger zone a few times as the mighty Hyper started to break-in and the disk unloaded. The fan does not yet come with that small magnet detent and being a basically lazy individual, I didn't drill one and fit up a governor. That made for some interesting moments. I now have the OS singing a tune and the blades at the right pitch angles for two part harmony.

Good servos in the Tiger are a must! I started with some HiTech HS-5625MGS digital servos thinking that they are representative of the "attainable" for most flyers, but the CCPM was suffering bady from terminal interactions. I think these are too slow and sloppy for eCCPM. I then opted for three JR 8311s left over from the 9303 review and everything came together ... amazingly! It is now has rock-like quality. Lesson: CCPM *requires* good servos for full enjoyment. These servos are probably why I found the soft spot in the frames as they are capable of sustaining pumping maneuvers that become a downright blur. I gotta wonder what kept it all together!

Ash's mod of the see-saw works very well. I flew the machine with and without and I like it better with the extra flybar movement *(motion that also helps when you're inverted and the engine quits, doh)*. I went a bit further and hogged out the slot in the alloy center hub as well. This will get you very close to RappyFlippy, if you like that sort of thing.

I flew 60cm Maverick, Thunder Tiger and BBT carbon blades, but did not try the kit woodies *(I just can't fly woodies anymore!)*. They all worked well with the BBTs being the lightest and therefore the most active. I got the BBTs from Steve Piteros at *rchelis.com* at a super good price. ...he had a boatload of 'em! Next up will be the my trusty V2 VBlades that have lived a very long and courageous life. This machine autos as well as any modern 50 and I even mustered up the courage to do the inverted auto that I have been practicing on G3 all winter long. And that brings up another point. As this machine is super "economical", most of the moves I was practicing *all winter* on RealFlight G3 were tried with great success, no fear, and inside the first gallon of fuel. Most impressive *(WHO? You or the heli - ED)*.

The rotor head has a 5mm spndle which I suppose is small by modern standards, however the rotorhead borrows heavily from what most other heli makers are currently offering. With that said I found that a trip through the *RCHelisPlus.com* K&S catalog revealed many nice upgrades that will work on this heli ... like the 6mm spindle shaft (part # K&S396). That package is a direct fit including all the bearings and spacers, so I imagine that the standard 5mm version JR V50 shaft will work too *(You will lose the stiff yellow dampeners with this swap)*. So if you bend a spindle and you cannot get a Tiger replacement fast enough, try a Venture part. I'll bet that there are even more parts interchangable between the two different machines which could make parts availability very good.

With two gallons of fuel through it I find that I like it a lot. It has all the qualities that I 'm looking for in a thrash and practice machine: Great areobatic ability *with* smooth, pitch free fast level flight lines. Big fuel tank! Adoption of the successful rotorhead features of the other brands. Cheap replacement parts and rugged good looks!

Time and hours should prove more things out, but the Tiger works well enough that I bought another so I can spend this summer keeping the 90s away from the dangers of my deepening pursuit of 3D flight ... or until I get Benario-like at aerobatic autos. Genesis should aim this at the intermediate 3D flyer. It fills that niche very well.

Here's how mine is set up:

- Yellow dampeners
- White paddles, first hole
- High activity mixer modes
- Short flybar
- OS50 Hyper (no gov, but Ballistic!)
- Zimmerman 50 muffler
- JR 8311 on col/cyc w/ 9303 Tx
- JR 500T & 8700 on tail
- Morgan 30% HeliFuel
- Cut down carbon Vigor boom - to save some rear weight
- Mr Carbon Sceadu Fin

- 6volt NiCd regulated onboard battery
- CG aft of mainshaft about .250 in
- Raptor 50 tail blades
- Mr Carbon boom braces
- Zero Sub Trim!

Finally, because I know John is going to read this at some point, and he may be open to some input ... I'm going to risk asking that a couple of features be considered for the V2 version.

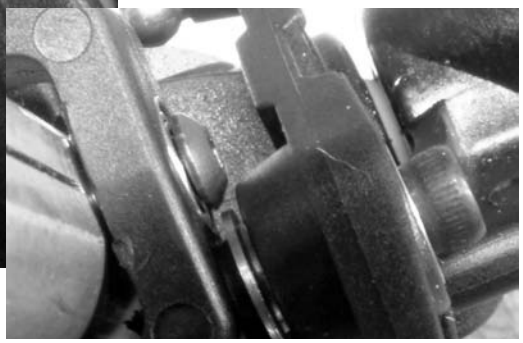
- A gear based constant drive tail
- A brace just above the tank
- A 6mm spindle w/yellow dampeners
- Carbon main and tail blades option
- A way to get parts quicker

(ForAshley's sake ... y'no)

Tiger Tips and Tricks:

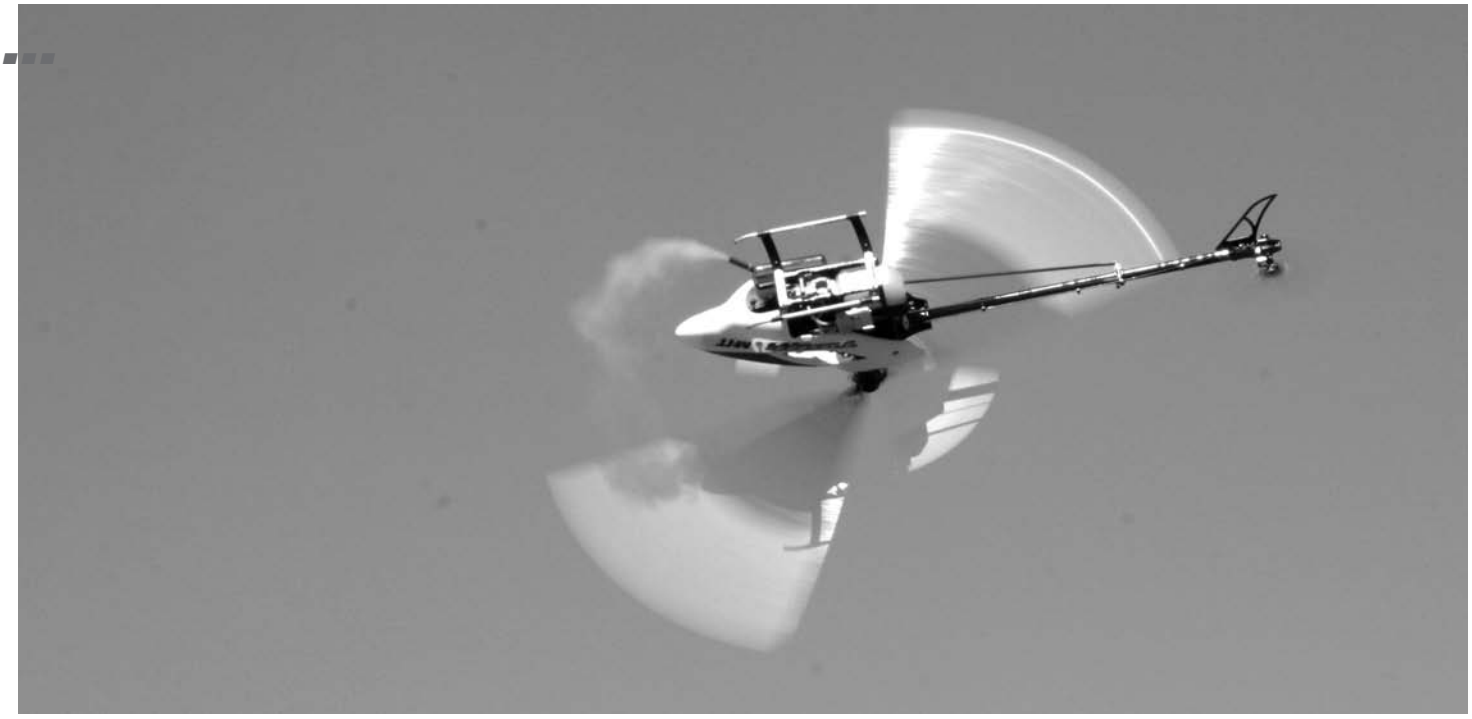
There is always more you can do ...

This is more irritating that critical but this seesaw bolt contacts the mixer arm when the arm is in the hole closest to the pivot.

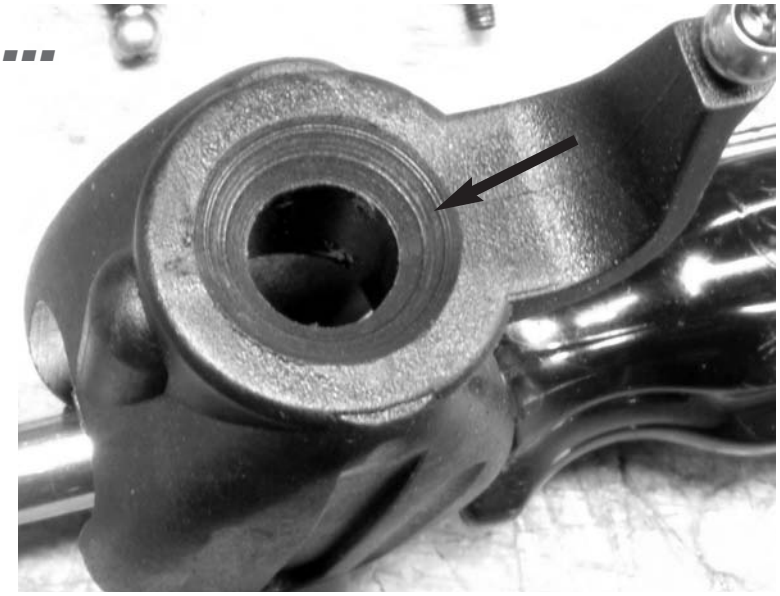


Here is the solution the seesaw bolt hitting the mixer arm ... a pan head replacement from the Ace Hardware Store.

Forward facing muffler keeps machine cleaner but does not affect performance. and also helps out the CG placement. Skeletonized vertical fin is from Mr Carbon and was borrowed from the Sceadu EVO. Tiger has very good tail power due to 5.2:1 ratio. For comparison: Venture 50 is 5.18:1, Sceadu Evo 50, 4.65:1 and Raptor 50, 4.56:1. The MHT Tiger came in at 8.0 lbs with 1/2 tank of fuel and header tank.



Nice axial rolls. The secret to balanced cyclic on the Tiger is to set up the elevator servo-arm at 23mm from servo center, as there is a small differential action in the mechanicals. The collective and roll servos should be at 22mm from servo center. Check Issue #42 (or *www.mht.net)* on how to make your own servo arms to do this, or any CCPM setup, a snap! Balanced controls make for happier pilots. JR 8311 servos are very quick and strong. I accidently jambed two 8311s up until they were toasty hot and smelly ... they are flying the heli in this pic .. . reliably!



I opened up the main blade grip with a countersink to allow more room for the yellow dampeners to squeeze around and clear the grips when the head gets "active". Otherwise, the grips have been working great with absolutely no plastic "creep" affecting the vital bearing fit.

Always a fun thing to play with different paddles. You'll get both sets and two lengths of flybar. Hours of fun!