

THE FLYING MACHINE NEWS

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A GOLD LEADER CLUB

December 2009

The Newsletter of the Rocky Mountain Flying Machine

AMA Charter Club #2229



Presidents Message

This is truly the time of the year to be thankful. Thankful for the success of RMFM, for the great private field we have to fly at and all of the improvements to our

facility that have already taken place and are planned for this spring, for all the great weather we have to fly in, for the great members we have and their willingness to share their knowledge of the hobby and their friendliness and camaraderie. Thanks to all the spouses and their understanding of this sometimes addicting hobby in which we are engaged.

I will be turning over my leadership to a new very qualified group to take us in the right direction for the future. I have enjoyed the experience and hope I have added some positive leadership to the Rocky Mountain Flying Machine. I enjoy flying with all of you and hope that will continue in the future. Thanks to all of the members that contributed to the field improvements, and a special thanks to each board member for helping the club through some challenging opportunities this last year. And we can't forget our newsletter editor, Mark Johnston, for getting the newsletter published each month.

This year our annual club party/business meeting will be held on Sunday, December 27th at the home of Cheryl and Jim Swart. I hope to see as many of you there as possible. The club is furnishing the meat items and we ask everyone to bring their favorite dish. Don't forget about the spouse gift exchange. Every couple should bring a gift and will draw a number to pick a gift brought by someone else. It is a lot of fun. Please remember the gifts are for our spouses and please keep the cost around or under \$10.

Thanks again,
Ken Morris
President
Rocky Mountain Flying Machine



V.P. David Haygood
Hello Members,

First thing I want to say is, Merry Christmas and a Happy New Year to all. I have enjoyed serving as V.P. of RMFM. I look forward to next year even being better. January's

meeting will start out with some Safety changes that the AMA has made. Then move on to all the gifts we received like Planes; and maybe a motor or some good field accessories! That should take most of the time we have allotted for the program segment. Remember the give-away and prize for the meeting. See you all there. V.P. David Haygood.

Secretary's notes

By Jerry Jones

As the year draws to a close it seems the club has accomplished quite a bit, Twice we had to do the road and field maintenance due to heavy rain. Getting the Geotex down on the main runway was quite a chore, but worked out great in the end. Should be able to finish the rest early in the Spring, and possibly get two circles done for control line guys. We also got a plaque put up for Bob's runway. I want to thank Ken for all the help he has given the club and especially me in my first year, we will miss his guidance.


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November Fun Fly

I was running out of ideas for the last fun fly of the year, so I asked Mark for a suggestion. He suggested doing a countdown of Roops. Perfect, a countdown to the end. I called it

“Roop De Roop or Winding Down.” A Roop by the way, is a roll followed immediately by a loop. A little coordination required, but not too difficult. So, for the last fun fly this year, we took off, did three Roops in a row, turned around and did a touch and go followed by two more Roops in a row. We then turned around again and did another touch and go and then one Roop. And then we landed. Fastest time was the winner.

Of the six guys at the field, only three of us flew the event. Mark Johnston finished first with a time of 1:07 minutes using his little electric 3D plane. Nicely done Mark. Dave Haygood came in second with a time of 2:45 using a large slow flying Senior Tele-master. Good job Dave. Yours truly flew a slow stick and busted the prop and bent the shaft on the first touch and go. Ouch!

I want to thank all of you who attended the fun fly's this year. It was a pleasure flying with you. I tried to challenge your flying skills without being too difficult with a little random luck thrown in just for fun. I hope you all had as much fun as I did. The final standings will be announced at the annual Christmas party. Unfortunately, I won't be able to attend as I will be out of town at a family get together. The complete final standings will be posted in the next newsletter.

Merry Christmas to All,
Vic Newton



SAFETY CORNER

Hi' Folks,
it's me – the safety dude!

It took me some time to decide what to write about this time and –to be honest-

I didn't find a breathtaking topic.

So let me throw out a few ideas about safety on our model airfield.

Why is safety so important out there? The answer is: If someone gets hurt or even killed during spare time activities it always is extreme tragic. I will try to make it more clearly. If troops are killed or wounded in military activities – of course it is tragic as well but at least to a certain degree it is an expected result of their activities. War is a dangerous business and because of that most

life insurances don't cover it.

Back to our field. As we perform our flights including engine start up and everything we want to enjoy it to the maximum degree possible. We want relaxation, perhaps a little bit of positive self induced stress to make us feel great if it is over, we want success and sometimes a little bit of admiration from the others. With one word: we want fun! Don't know how you feel after you had a good time out there. But I feel great when driving home. If in such moments my wife asks me whether she may buy that nice piece of jewelry she saw downtown last weekend I have a hard time to say NO! (But my wife doesn't know that, so don't tell her ;-)

The other way around: if we crash a model we feel bad. If someone get's hurt or even worse it always is a tragedy because this is the precise opposite of what we want. We wanted fun and leave the field in an ambulance or in a coffin.

Because of that safety out there is so important. Throughout this year I mentioned a few points worth for your consideration. For example standing in front of a running engine or not securing a model properly before starting the engine or flipping the prop with naked hands. I well know that it is hard to give up habit patterns if nothing has happened over years. But just because of that it is not safe! Think about it!

I wish all of us a

Merry Christmas

and a

Happy and safe New Year

Rudi Stein

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Conversations With Friends

“Well, I guess that about does it, fellas,” I said. “Your Boxer wings and stabs are perfectly aligned now.” After the minor debacle of last time, Jed and Juan made sure that all construction steps were completed before we tried to attach the wings and stabs. They were in my workshop, and we used my

table and tools to align and attach the wings and stabs. Following the steps in the manual, and checking each step twice, produced two airplanes which were straight. Now all they had to do was finish the construction, which consists of building and attaching the rudder, sub-fin and vertical stabilizer, and attaching the top and bottom sheeting. They had a bit more to go, but progress was being made!

“Gee, thanks again for your help, Richard,” effused Jed. “With what you’ve showed us, we shouldn’t have too many problems getting the fin on straight!”

“Yeah, muchas gracias, Richard!” echoed Juan. “My enthusiasm is higher now, and we should be finishin’ these birds real quick. C’m on, Jed, let’s get outta Richard’s hair!”

“Right! See you later, Richard!”

With that, the boys departed, and I returned to my building tasks. That evening, the phone rang. It was (surprise!) Juan.

“Hi, Richard. Uh, Jed ‘n I were readin’ the manual, like you said, tryin’ to get an idea of what’s comin’ next, and we got to the part about installing the radio and servos, ‘n, like, buildin’ the pushrods. It looks like a lotta work, so we were thinkin’, like, it’d be easier to just go ahead ‘n install NyRods. Waddaya think?”

“I don’t think NyRods are a good idea. If the manual calls for pushrods, there’s a good reason for it. Look, I’ve got a couple of setups here in my shop that I use at club meetings when this topic comes up. Why don’t you, Jed and Kris come over tomorrow evening? I’ll get out the setups and we can talk about control linkages.”

“OK, Richard. I’ll get hold of Jed ‘n Kris and we’ll see you tomorrow evening.”

I went out to the workshop and got out the two setups you readers can see in Photos 1 and 2 around here someplace. Photo 1 shows a ‘fuselage’ with a ‘rudder’. One servo is used in a pull-pull setup (the outer one), and another servo is used with either a NyRod or a solid pushrod setup. Each setup is demonstrated separately to show how they work. The NyRod setup is particularly bad in that I didn’t put in any support, so when I hold the rudder (simulating flight pressure) it flexes wildly! I then ‘support’ it and show how much better it works. The pushrod works pretty well, but I bent it so that it, too, would flex somewhat under load. Finally, the pull-pull setup works wonderfully (natch!).

Photo 2 shows a single pushrod setup, with a servo at one end and a ‘Y’ at the other end, connected to a set of pointers and protractors to measure deflections. The ‘control surface’ end can be supported with a brass tube inserted through a ‘rudder post’. The servo can be repositioned to accommodate different length servo

arms. The connectors at the control surface end can also be raised and lowered to simulate different length ‘control arms’. I first show how an unsupported pushrod can flex from side to side, thereby imparting unwanted control surface movements. After the brass tube is inserted, the side to side flex is greatly reduced. The remainder of the demonstration investigates the phenomenon of ‘tweak’, whereby one side of the ‘Y’ moves more than the other, thereby imparting once again unwanted control surface movement.

“Cool!” exclaimed Kris, as he, Jed and Juan examined the ‘fuselage’. “Looks like pull-pull is the only way to go.”

“But it sure looks like a lotta work to set it up, not to mention the adjusting ya gotta do”, admonished Jed.

“Hey, Richard, if we install pushrods ‘n keep ‘em straight, wouldn’t that be the best way?” asked Juan.

I laughed. “Well, as my economist friend keeps saying, ‘it all depends’. I think you can see why NyRods aren’t very good for control linkages in pattern ships—in addition to their inherent flex problems, they tend to stretch and contract with temperature, leading to (at least) undesired trim changes during and between flights.

“Pull-pull setups are usually made with either Kevlar cord or plastic coated wire. Adjustment is actually quite easy, as each wire has an adjustable clevis on the control surface end. The initial installation is accomplished by centering the servo arm and attaching equal length leads from it to the control surface connectors. Then, using the adjustable clevis, alignment and tensioning is done.”

“How much tension should we use, Richard?” queried Juan.

“If your geometry is perfect, you’ll only need enough to make the leads taut,” I replied, “but if, as is usually the case, your geometry is a little less than perfect, a little more is preferable. There shouldn’t be very much slack in any case, however. We’ll cover the case of too much slack a little later.”

“OK, Richard, what’s ‘perfect geometry?’” asked Kris.

“The idea is ‘equal arm lengths, equal motion’ at each end. The servo arm is centered, perpendicular to the axis of the control surface. The control arm is also perpendicular to that axis, and the attachment points are exactly over the hinge line. Here, lemme sketch it for you.” (You readers look at Figure 1.)

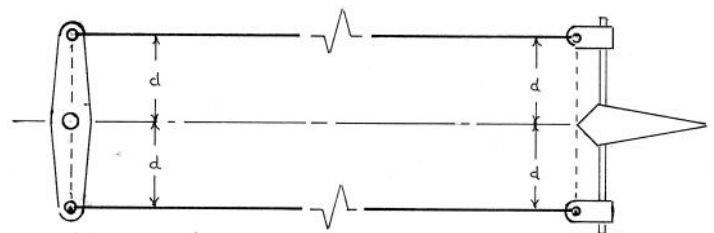


Figure 1 - “Perfect Geometry”

“What happens if the geometry ain’t perfect?” questioned Juan. “What can we do about it? How serious is it? Mebbe Jed’s right—this is too much work!”

“The usual problem is that the brackets on the control arm aren’t centered on the hinge line—they’re usually too far back. This causes slack in the cables when the servo arm is rotated, thereby

leading to control surface oscillation at neutral—you can see this sometimes in a pull-pull rudder setup. The rudder ‘dances’ at neutral. Not good. The fix is rather easy, though—take a servo wheel and drill new holes at the same offset angle that the control bracket presents at the hinge line. In other words, if the control arm/bracket bends back, make the servo arm do the same, in the same direction.”

“Ah, I get it,” mused Kris. “Keep the parallelograms the same—don’t make trapezoids out of ‘em.”

“Right,” I answered. “Here’s a sketch of this solution.” (Readers, look at Figure 2.)

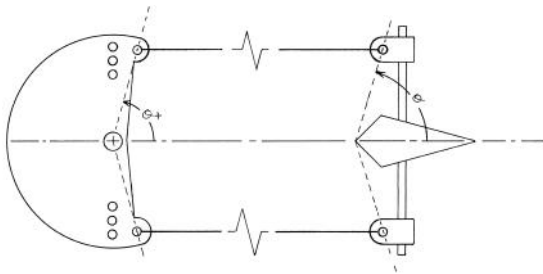


Figure 2 - Parallelograms

“Now, let’s look at pushrods. As Juan suggested, a straight pushrod to each control surface looks easy and should do the trick, right? Sometimes, that IS a good way, IF you have the room and can stand the increased weight and support problems. A long servo arm, with a ball joint on both the top and bottom (check with your hobby store’s heli department for such hardware), will allow two push rods to be used for the elevator in your Boxer, for instance. But things are pretty tight in that fuselage! That’s one reason why the manual advises you to build a pushrod like this one, here.” (Readers, look again at Photo 2.) “At the ‘business end’ of the push rod, these pointers and protractors represent an ‘elevator’ control surface. The pointers will show the deflection of each ‘elevator’ half as the push rod transfers the servo rotation to the control surface.” I moved the servo arm from side to side, demonstrating how the setup worked.

“This post in the middle here represents a ‘rudder post’. Note that I’ve drilled some holes through it. We’ll get to that in a minute. First, though, look what happens when I flex the rod.” (As you’ve guessed, the ‘control surfaces’ moved. More unwanted movement!) “Now let’s put this piece of brass tubing through the ‘rudder post’ and into the push rod, for support. Now watch what

happens when I (try to) flex the rod.” (This time, the movement was quite diminished.) “When you install a push rod, support it in the rear to minimize undesired motion. Also, as you’ll see, you’ll need more supports, too, but again, we’ll get to that.”

“Gee, Richard, this setup looks awfully complicated just to show us that,” said Jed. Why didja bother? We coulda figured that out for ourselves, I bet.”

“I built this to illustrate another problem associated with this kind of installation—‘tweak’. The setup is this: 1" long servo arm, 1" long control arm, a fairly long pushrod supported only at the rear. Because each ‘elevator’ control surface is attached to the pushrod via this ‘Y’ setup, when I move the servo arm, both control surfaces move, ostensibly the same amount. Ah, but there’s the rub—the surfaces DON’T move the same amount! Observe—I’ll demonstrate.” (I had the boys observe the pointers on each control surface. When I moved the servo arm to obtain a +10° movement on one control surface (the one on the servo side), the other control surface moved about +1/4° more! Similarly, for a +20° movement, the other moved +1/2° more. You readers, look at Photo 3 to see this ‘tweak’.) “Now observe what happens in the opposite direction.” (This time, I moved the servo arm to obtain a -10° movement—the other side moved about -1/4° less! And, as you might surmise, at a -20° movement, the discrepancy was about -1/2°! We then repositioned the servo to accommodate different length arms, and also changed the length of the control arms at the ‘elevator’ end, to determine the ‘tweak’ at different settings. The results are presented in Table 1. Note: The protractors were as big as I could find, and the ‘tweak’ is small, so the results are only a good approximation—but the ‘tweak’ is there, and it’s noticeable! By the way, ‘tweak’ was coined by Dean Pappas. It’s a very descriptive term, I think.)

See Below

Table 1 - ‘Tweak’ movement for various servo/control arm lengths

“From what you’ve shown us, Richard,” said Kris, “it appears that there’s a problem with the ‘commonly accepted way of doing things’—this ‘tweak’, as you’ve called it. As I see it, the problem is very complicated—‘tweak’ makes the control surfaces move apart in one direction and together in the other direction. What can we do about it?”

“Good question, Kris,” I replied. “The motion is caused by the push rod moving off the center line, due to the rotation of the

SERVO/CONTROL	-30°	-25°	-20°	-15°	-10°	0	10°	15°	20°	25°	30°
1/2" / 1"		-1/2	-1/4		~0	0	~0		+1/4	+1/2	
3/4" / 1"	-3/4(-)		-1/2(-)		~0	0	~0		+1/4(+)		+3/4(-)
1" / 1"	-3/4		-1/2		-1/4	0	+1/4		+1/2		+3/4
1-1/4" / 1"	-1/4(-)		~0		~0	0	~0		+1/4(-)		+1/2(-)
1/2" / 1-1/2"				-1/4	~0	0	~0	+1/4			
3/4" / 1-1/2"		-1/2(-)	-1/4		~0	0	~0		+1/4	+1/2(-)	
1" / 1-1/2"	-3/4(+)	-1/2	-1/4		~0	0	~0		+1/4(+)	+1/2	+1(-)
1-1/4" / 1-1/2"	-1/2		-1/4		~0	0	~0		+1/4(-)		+3/4(-)

servo arm. Suppose we support the push rod, additionally, near the servo end, thereby inducing a more linear movement.”

“Yeah, but this will cause a lotta stress on that servo!” interjected Juan.

“True,” I replied. “So, consider this—mount the servo ‘sideways’; that is, with the servo arm vertical. Now, with an additional support near the servo end of the pushrod that permits vertical but not horizontal movement, I think your problems would be minimized. Whadda ya think?!”

“Hey! I think you’re right ON! That’s IT!” exuded Kris.

Jed and Juan were a little harder to convince, but Kris was up to the task, and eventually all of us fell silent.

“Another informative session, Richard,” expostulated Jed, after a bit. “Thanks for sharing this information with us. Now we can REALLY finish up our Boxers RIGHT! C’mon, guys, time to go home!”

Well, Jed was right—it was a somewhat arduous session, but useful. Now, all I have to do is compute the angles on the pull-pull elevator setup on this Python I’m building and install it!

Stay focused...



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**HELP KEEP OUR FIELD CLEAN. WE HAVE A TRASH CAN, BUT
SOMETIMES WE HAVE MORE THAN IT CAN HOLD.
PLEASE TAKE YOUR REFUSE HOME. THANK YOU!!!**

The Rocky Mountain Flying Machine
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