

# **GTP** **COMPETITOR BULLETIN #1**

Hope all you new "Competitor" owners have noted Competitor's recent contest results:

## U.S. NATIONALS. - August 1982

2nd Place Expert  
3rd Place Expert

## East Coast Helicopter Championship - August 1982

1st Place Expert

## Schluter Cup, Kansas City - August 1982

1st Place Expert

## Canadian Nationals - July 1982

1st Place Expert  
3rd Place Expert

Competitor is gaining an excellent reputation especially with the top fliers. It is reported to be:

"Several times easier than the H-----y to fly", "much smoother than any other heli I've ever flown!", "head is powerful but smooth - I can do aerobatics with Competitor that I could never do before", "the machine is so much better than me, I will be able to continue to grow into it as long as I can forsee", "The Competitor has no surprises - it tracks my commands at all times", "A natural step up from my "Cricket" - I found the transition easy".

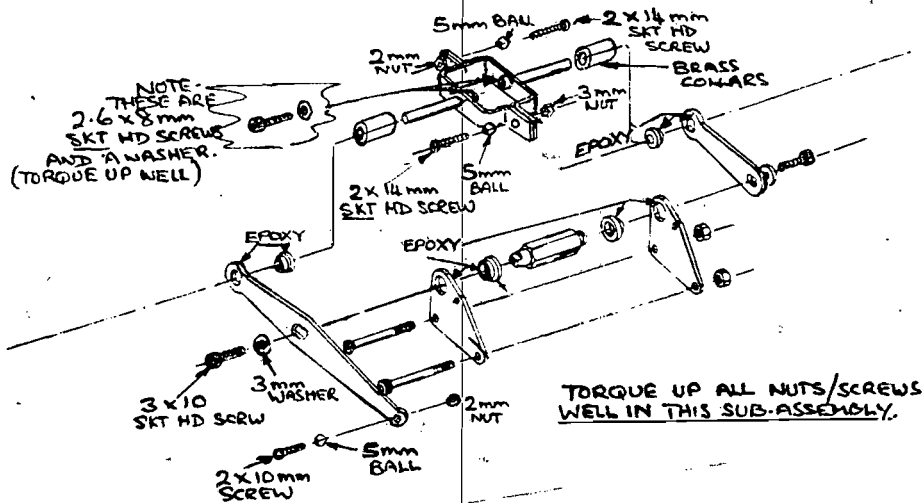
These are some of the good reports coming in from all over the USA. Now to the problems and, we hope, the fixes.

### CONTROL INSTABILITY

Several builders have complained of a lack of rigidity in the controls to the swashplate. This surprised us considerably because the Competitor's control system in cyclic and collective is the most rigid on the market today. We finally established some of the reasons for the difference in our machines and the ones some of our customers have built. The collective pitch unit shown in the sketch must be a totally rigid structure - that is, when the collective/throttle servo moves both arms of the collective pitch unit must move in unison. Some builders said their's didn't and we tracked this down to some early Competitors which were fitted with the smooth cross shaft. The 3mm socket head screws were bottoming out in the holes in the cross shaft so that the steel side arms were not rigidly attached to the shaft or to each other. Problem - when the collective pitch servo moved one side arm the other one didn't move in unison so the swashplate did funny things in roll as well as collective pitch - result: Competitor didn't fly worth a d\_n.

Solution - add an extra washer under the screw heads and torque them down so that the structure shown in the sketch is RIGID, then your cyclic and collective control will

also be RIGID. (Also read "Control Instability - Again" below.)



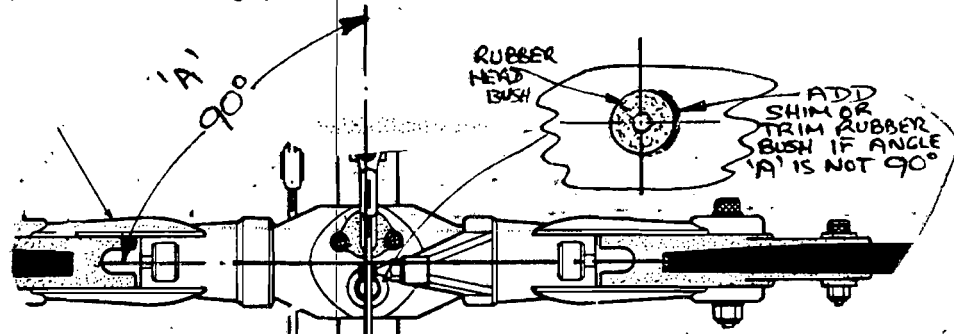
### CONTROL ARM BALL SCREW LOOSENING

One report indicated that one of the steel ball screws at the end of the main blade arm loosened in flight. Oh boy, the 'funny' things that this can cause. Please refit these using a strong 'Loctite' (even "red") and not the silicone we recommend in the instructions - sorry about that!

Same goes for the 2mm screws holding the steel balls onto the swashplate. Make 'em permanent. Apparently the silicone idea doesn't always work.

### SHAKING OR OUT-OF-TRACK

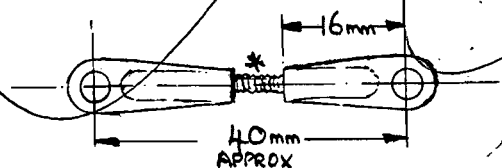
Although we have a strict checking system for parts of Competitor a few rotor head hubs and/or machined yokes have slipped through with the rubber damping hole not truly central in one part or the other. Then the trouble starts 'cos your static tracking can be out and at the very least you'll get the 'shakes'. Check by turning the main rotor blades slowly and measure the height of each blade from the tail boom (or other fixed datum point). If one blade tracks higher than the other then take the damping bits and pieces apart and shim the rubber bush in the big hole to one side or the other until the yoke sits at right angles to the shaft (see sketch). This should fix any vibration or blade dynamic tracking problems.



By the way, make sure that your damping rubber piece is 'squished' up well and the head is nearly fully rigid if you want the best aerobatic performance out of your Competitor. A sloppy head means a softer control but then your helicopter won't roll quite as well (and rolling is one of Competitor's best maneuvers).

## HEAD BALL LINKS FRACTURING

There have been reports of the ball links between the main rotor blade arms and the mixing levers on the seesaw giving way in flight. Even if yours have not, please don't fly anymore but change them for four of the "Rocket City" heavy duty ball links but remove the aluminum ball from the "Rocket City" link first) - or call us and we'll send them to you at no charge. If you have a newer kit, the new ball links will already be included. Cut to size and fit as shown in the sketch below.



\* MAKE SURE ROD IS CENTERED IN LINKS.

## RADIO NOISE

Some flyers say that Competitor can cause radio noise because of its black anodizing (because it's anodized - not because it's black!). Try roughing up places where the anodized parts meet if you're having problems. However, this could only be a problem if your radio is really sensitive.

## CONTROL INSTABILITY (AGAIN)

This one should have been #1A. Anyway, there are two bronze bushes in which the collective shaft pivots up top there just ahead of the starting cone. Well - they should be epoxied into the aluminum plates and we didn't tell you to do this in our instructions. Those of you old timers knew what to do but maybe some of you forgot. So please take the mechanism apart, clean it well and then epoxy (with 30 minute or stronger epoxy) the bushes into the aluminum side plates. Now see how firm everything becomes. Oh, yes, also epoxy the bronze bushes at the rear ends of the steel collective pitch side arms.

## TIGHT GEAR MESH

Yes, we changed the main steel drive gear size at the last minute on Competitor and, as a result, the mesh between your main gear and the steel engine drive pinion may be a little too tight. If so, open up the four main frame screw holes which hold the top two bearing blocks of the starting shaft and reset the whole thing. Don't forget the notepaper trick to set the mesh of the gears. You know, run a piece of notepaper between the gears before you tighten up the screws. Then take out the paper!

## BENDING OF RADIUS ARM STAY

The radius arm stay (the vertical plate on which the swashplate 'grounding' rod is fitted) is made of aluminum. In some cases of aerobatic flight combined with a stiff swashplate this stay has twisted or bent and the swashplate will then move off datum. We are now making these stays of a thicker steel material which will fix the problem. We will have these new steel stays in about 3 weeks and we will be glad to send you one if you ask us. Meanwhile, keep an eye on the stay fitted to your machine.

## COOLING PROBLEMS

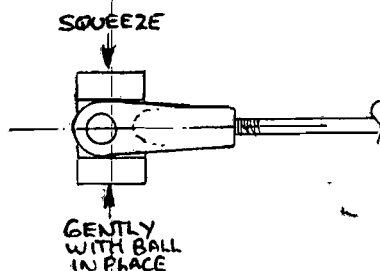
There have been a couple of comments regarding cooling problems with Competitor. In each case we've traced it to the builder not keeping the fan housing top surface as near to the fan as possible (without touching it, of course). This clearance should be no more than  $1/32''$ . Also, if you are flying in hot ambient temperature, you should open up the circular hole where the air comes in at the top of the fan housing by about 8" all around (eg.  $1/8''$  radius increase or  $1/4''$  diameter increase).

### TAIL WAGGING

If your tail boom is resonating (wagging up and down) at certain engine speeds and you'd like to stop it - add a couple of stiffening struts as shown below. Or send us \$3 and we'll send you a set post paid.

### TIGHT BALL JOINTS

The white nylon ball links in the earlier kits can be tight on the balls. You can relieve this tightness by squeezing sideways with a pair of flat pliers as shown. Don't make them too loose!



### FRONT TAIL GEAR DRIVE

There have been some cases reported of the front tail drive steel gear meshing incorrectly with the plastic main gear helical track. There must be a little play here, of course, so if yours is tight then open up the holes in the main plate through which the two 3 x 35mm socket head screws are fitted to hold the steel gear shaft and bearings in place. Then you will be able to adjust the play between the steel and plastic gears to be just free - not too much though. If you have too much you'll be constantly stripping the plastic gear track. By the way, this tail drive track is many times wider than other similar sized aerobatic R/C helicopters and, when meshed properly, will have a very low failure rate.

### CONTROL RATIOS

The control ratios of Competitor have been very carefully worked out. That is, the movement of the paddles and the main blades must be a certain value for a movement of the swashplate. To get this correct movement of main blades relative to swashplate you must be sure to fit one 2mm nut between each of the two 5mm balls and the swashplate. These are the ones fitted to the shorter stubs of the top swashplate section. The longer stubs and balls are fitted to the washout control arms. If you would like even more "Bell" to speed thing up then add another nut. Anyway, make sure you have fitted at least one nut.

### MAIN BLADE DIAMETER

The blades supplied in your Competitor kit could make up to a 62" diameter rotor system. It is intended that you shorten the blades to suit your own requirements. As a guide, 53" to 55" diameter is good for a 0.60 powered machine, 51" to 53" diameter

for the "OS 0.50 FSR", and 47" to 49" diameter for the Shorty 40 version using a 0.40 - 0.45 engine.

This bulletin is going into every new kit to forewarn all new owners and for you present owners we hope that it may solve any problems you may have had with Competitor. Anything else? - why not call us? Robert is our Competitor expert so ask for him. There's no doubt in our minds that Competitor is not just a step up from existing machines - it's a great big leap forward. So if yours is not performing superbly, try the above or call us. Your Competitor is potentially a great helicopter - if yours is not it may be our fault in not providing the proper instruction level for you or maybe you goofed up on something. Either way, we'll work with you to get it right.

Let's hear from you - feedback is what we need.

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# GMP COMPETITOR

## BULLETIN #2

### INTRODUCTION

Since Bulletin #1 the popularity of our "Competitor" helicopters has increased dramatically and our sales are booming now.

We have made a number of improvements as the result of feedback from owners. We are most grateful for this feedback which enables us to improve our product and give you more pleasure. We also sell more "Competitors" because, after all, recommendation from one flyer to another is one of the strongest methods of increasing sales. In turn, increasing sales means that we can spread our operating costs better and further improve our after sales service from the factory, and the hobby stores and technical representatives in the field. So keep the suggestions coming. Now to discuss some changes in the models available for 1983.

### MAJOR CHANGES IN THE 'COMPETITOR' HELICOPTER RANGE - UP-DATES AND ACCESSORIES

As of June 15, 1983, the models available are as follows:

#### "Competitor Professional"

The following features have been added to the new, improved "Competitor Pro":

- 1) 6 additional precision ball bearings (it now has 38) - standard
- 2) Tail struts - standard
- 3) Cockpit interior - standard
- 4) Heavy duty ball links throughout - standard

All these features are readily retrofitted into any of the earlier models and update kits are available from your hobby store or direct from us if you are 'out-of-range' of a hobby store as follows:

#### Up-Date Bearing Kit - Part #584

This contains the six new precision ball bearings and the new replacement plates and levers. Four of these bearings fit into the collective mechanism to make it even smoother and more 'solid'. The other two fit up on top of the rotor hub and form a new seesaw pivot. This kit retails at \$32.50.

#### Tail Strut Kit - Part #582

This kit contains:

- 2 Aluminum tail struts
- 1 Tail boom clip
- Necessary nuts and bolts

It retails at \$4.60.

### Cabin Interior - Part #617

This is an attractive interior floor and console which is made of black, crinkle finish ABS plastic, 1/16" thick. It fits inside the canopy to form a deck or floor and hides all the items which are spread along the present plywood floor. Looks neat and is available at \$4.95.

### New Ball Links

Early "Competitor" kits included white nylon ball links. Unfortunately this link seemed to remain permanently stiff. The new link is heavy duty and made of a different plastic. It is considerably more expensive but we are now including 30 of these in all the new kits. They are available in packages of 10 for \$7.50 (part #580L).

The "Competitor Professional" equals or exceeds the features, quality and performance of any aerobatic helicopter in the world including the top-of-the-line "Blackhead" Kalt which sells for \$489.95 and the Schluter "Superior" which, it is reported, will retail around \$500. The price for the basic "Competitor Pro", including all the above new features, is \$399.95 and autorotation is available as an option for \$59.95. If purchased together the model retails for \$449.95.

### CUSTOM COMPETITOR (Previously "Shorty 40")

The "Shorty 40" has enjoyed a popularity with beginners which surprised us. Many modelers are learning to fly with this model. However, we experienced a selling disadvantage in describing the helicopter as a "Shorty 40" since, as all owners will know, it is in fact identical to the "Pro" except for a few constructional differences. It is, undoubtedly, a true 0.60 powered helicopter which can also be flown well with a good 0.40 engine.

So now, instead of supplying our "Shorty 40" with a shorter tail boom, it has now been re-named "Competitor Custom" and is, in all respects, a very versatile 0.40 to 0.60 powered full sized aerobatic helicopter. It possesses nearly all of the fine features of the "Pro". In fact, it has 32 ball bearings (10 more than the "Heli-Boy"), and there have also been some design improvements so that autorotation can be added for the same cost as for the "PRO" model. With the first "Shorty 40's" there was a need to change one of the main shaft bearings when you added autorotation. We have made a design change so that you now can add autorotation without changing any of the main bearings of the helicopter. At \$349.95 this helicopter is the best bargain on the market today since not only is collective pitch standard but also "Bell/Hiller" mixing which some of the other 0.60 powered helicopters on the market do not provide in their 'standard' model. It also has a full complement of precision bearings. Autorotation can be added at any time with a kit which lists at \$59.95. "Competitor Custom" complete with autorotation sells for \$399.95.

Those of you that already own the "Shorty 40" - don't worry. We will continue to provide all the parts needed to keep your helicopter in the air although, when you order a tail boom you will now receive the longer one so that you have a choice of

using it "as is" or cutting it down to the length of the one which you have been using on your helicopter. By the way, if you have just bought one of the new "Customs" and wish to use a 0.40, 0.45 or 0.50 engine you may like to shorten the tail boom and main blades a bit in order to give a more "racy" performance. A "Competitor Custom", fitted with a 0.50 engine, shorter tail boom and shorter main blades, results in a fast aerobatic machine with sparkling performance.

One last point regarding "Competitors". Those of you who read Bulletin #1 learned that the early "Competitors" had a number of items which needed revision. These included the radius arm stay. This was originally made of aluminum and some flyers had failures due to it bending. The new radius arm stay is made of steel so this problem has now been eliminated.

In the earlier kits we asked you to slot some of the holes in the main frame in order to get a better clearance with the drive gears. This problem has been 'fixed' in all our new kits. The 'problems' encountered with the stiff white ball links are eliminated by the inclusion of the new heavy duty black ones described earlier. So you see, we have already made a number of design improvements in the "Competitor", all of which are available to you as an up-date, should you so desire.

### NEW INSTRUCTION MANUAL

Perhaps the most dramatic improvement which we have made was to re-write the whole instruction manual. As many of you who have built the "Competitor" must know, the original instruction manual was mostly descriptive with very few diagrams since it was written with the expert builder in mind. The popularity of the "Competitor" to the less experienced builder caught us by surprise and we were faced with either having the finest helicopter on the market with poor instructions or to undertake the task of completely rewriting the instructions. We obviously decided to rewrite the manual, which was completed in May, 1983. From reports we have received, we now have the best RC helicopter instruction manual as well as the finest helicopter. For those of you who 'suffered' through building to the old instruction manual (which had a blue cover) we would like to make you the offer of sending you the new manual (with a white and orange cover), which we normally sell for \$10.00, for a nominal \$4.50 to cover our handling and mailing costs.

By the way, the control set-up section in this new manual is quite unique. There is a complete diagram of all the control rods and linkages but, more than this, each rod is described by its end to end measurement and an additional measurement which defines the length between the ball centers of the ball links fitted to each rod. A sample page of the new manual is shown in this bulletin. Feed-back from our customers tells us that if a helicopter is set-up exactly to these instructions it will fly right "off the board" every time. Sorry for those of you who struggled through the earlier manual but we hope you'll feel good for future builders and avail yourself of our offer if you would like to have one of these new books for your own records and use.

### REAR FUSELAGE COVERS

Another piece of general news is that we have finally produced the rear fuselage covers for the "Competitor". The only problem we had originally was to produce a shape which we felt improved the look and the performance of the helicopter, rather than just put sides on just as a gimmick. The new rear fuselage covers are not only



functional and very easy to install, but they also further improve the flight performance of the "Competitor". One other important point is that they provide an 'improved' side profile of the helicopter in the sky which is much easier to sort out at distance or when you're in trouble! As you know, with the metal frame helicopters this has always been a problem. These new fuselage sides are shown in the photographs in this bulletin. We hope you agree that they enhance the appearance of the "Competitor". They will be retailing for \$29.95 through your local hobby store but for those of you who are registered owners we will send you one set of these sides for \$20, post paid. This is a one time offer and further supplies must be obtained through your local hobby store.

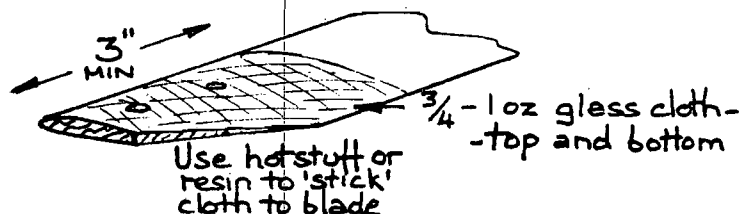
## TECHNICAL HINTS

Now to the technical hints which have been discovered by ourselves and/or "Competitor" owners over the past nine months.

### 1) MAIN ROTOR BLADES



Because of the outstanding control power of the "Competitor", the main rotor blades should be fiberglassed around the root (see sketch). We strongly recommend that you do this for your "Competitor"; in fact we believe this is an essential step to increasing the safety margins of any RC model helicopter.



### 2) OSCILLATIONS



If you are getting a rapid oscillation in pitch or roll you may find that you tightened up the rubber damper in your rotor head too much. The tightness of the damping rubber should be such that there is approximately a 3" teeter at the tip of each rotor blade. By the way, we have also found that there can sometimes be a problem if the damper rubber is not well lubricated. It should be able to move freely in its hole in the rotor head and not 'stick' in any manner. So, if you haven't done it before, take out the rubber damper and lubricate it with a vegetable oil or grease, such as castor oil or margarine, and you will find a much smoother performance results.

### 3) TAIL ROTOR SLIPPAGE

There have been a very few owners who have experienced a slippage of the tail rotor drive of the "Competitor". In every case we have found this is because they tightened the set screws with the allen key, using their fingers only. In the case of the front coupling, especially, the allen key can only be inserted with the long end towards the coupling. Therefore it is necessary to use a pair of pliers to grasp the short end of the key in order to tighten it properly. Please make sure that you have used blue Loctite and tightened all screws at both couplers (front and rear) before flying your helicopter.

### 4) QUICKER RESPONSE

More  
Response

Despite the very fast and powerful control response of the "Competitor", there are still some "young" pilots who want the response to be even quicker. If you want a quicker response from your "Competitor" please add two nuts under the 5mm ball which connects the Bell/Hiller mixing rods fitted between the swashplate and the mixing arms of the rotor head. This will increase the amount of "Bell" and improve the quickness of response. Please remember that "Bell" control (or direct blade input) will give you quickness and "Hiller" (which is controlled by the other single rod) will give you control power.

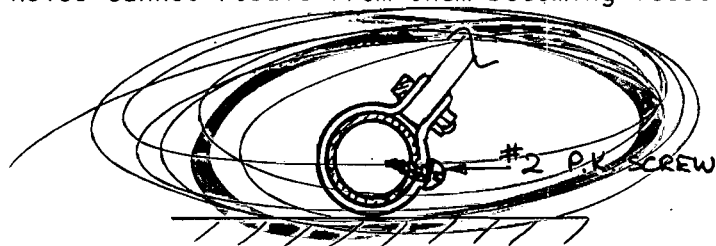
5) RADIO SWITCH INSTALLATION

We have found that the radio switches and charging plate are most conveniently mounted on a plastic sheet at the rear of the canopy. We include a template and a sketch in this bulletin for you to see how we do this on our own choppers. Haven't yet figured out the best place for them if you have the new side panels, though. Let's have your ideas.

6) RADIO NOISE

"Competitor" has been extremely good from a "radio noise" point of view but there have been a few owners who have experienced radio noise. Assuming that the radio receiver itself is not prone to noise (or, in other words, is not too sensitive or is de-tuned), then the following points should be checked:

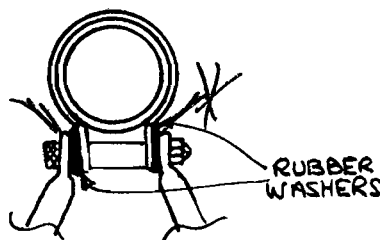
- a) The landing gear must have tight gear clips. But, to make sure that this situation is maintained, drill a small hole on the inside of each landing gear clip and inserting a P.K. or sheet metal screw through the clip into the landing gear skid. By doing this you will not only tighten up the skid/clip relationship but you will also effectively 'ground' the skids so that radio noise cannot result from them becoming loose (see sketch).



ground  
for Radio Noise

- b) Another potential source of radio noise is the rear fan shroud bracket. If this is loose on the aluminum rod which goes across the fuselage radio noise can result. So use plenty of Silicone here or else dispense with the clip and use Silicone only to attach the cooling fan shroud to the aluminum rod.

- c) The boom struts should be grounded on at least one end in order that they will not cause radio noise. By the way, the use of a thin rubber washer (half a servo mounting grommet) mounted under each of the four 3mm socket head screws will help to avoid strut fatigue and cracking (see sketch).

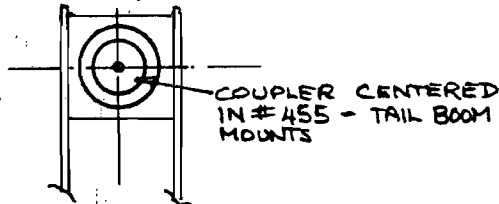
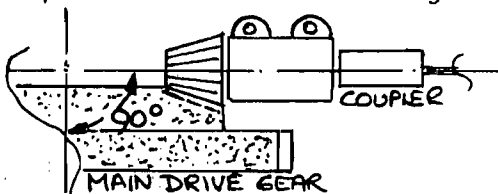


7) TAIL DRIVE GEAR TRACK STRIPPING

There have been some owners who have stripped the tail drive gear track of the main plastic drive gear too frequently. In every case we have found this was due to the bevel steel gear not being mounted at a 90 degree angle to the bevel gear drive track of the main black drive gear. If you are having this problem please readjust all three elements of engine unit, main shaft, and tail drive gear assembly until the bevel gear engages the black main drive gear at 90 degrees and also snugly, into the gear track. The amount of backlash between these gears should be virtually zero but of course this backlash between the engine drive gear and the black plastic gear should be set to just have a very little play at the tightest point.

8) TAIL DRIVE WIRE BREAKAGES

There have been a few reports of tail wires breaking. In every case we have found this has been due to the tail drive coupler at the front end not being centered in the tail drive tube. Please be sure that it is not only set correctly into the plastic track of the main gear but that it is also centered in the plastic tail tube holding brackets (see sketch).



9) GYRO INSTALLATION

We enclose for your information a diagram of the bracket which we use to hold the gyros in our helicopters. It is mounted on the front of the vertical plywood servo tray with #4 x 1/2" wood screws.

Well, that's all of the hints and tips for now. We will finish up with a suggestion on set-up angles for normal and inverted flight. Please don't hesitate to give us a call if you intend to try inverted flight and are having problems. Our suggested settings are as follows:

	LOW PITCH (LOW TRIM)	CENTER LIFT-OFF PITCH	HIGH PITCH (HIGH TRIM)
NORMAL FLIGHT	-2°	4°	7 - 8°
INVERTED FLIGHT	3°	-2 1/2°	-5 1/2°

**GMP**

**GORHAM MODEL PRODUCTS**

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WWW.I07.ORG/COMPETTOR

**CONTROLS INSTALLATION AND SET-UP - see Figure 14**

We will install and hook-up every control arrangement and servo separately. The push rod lengths will be given - then the overall length with ball links or clevises (measured from center to center of the balls or clevis pins) will be given in parenthesis like this: 2x110mm (120mm). The control rods from servos to controls may vary in length because of variations in individual servo sizes and may need to be varied from the suggested dimensions given. Cut equal amounts from each end of the control rod and deburr the ends thoroughly or your ball link or clevis may not be secured properly onto the rod ends.

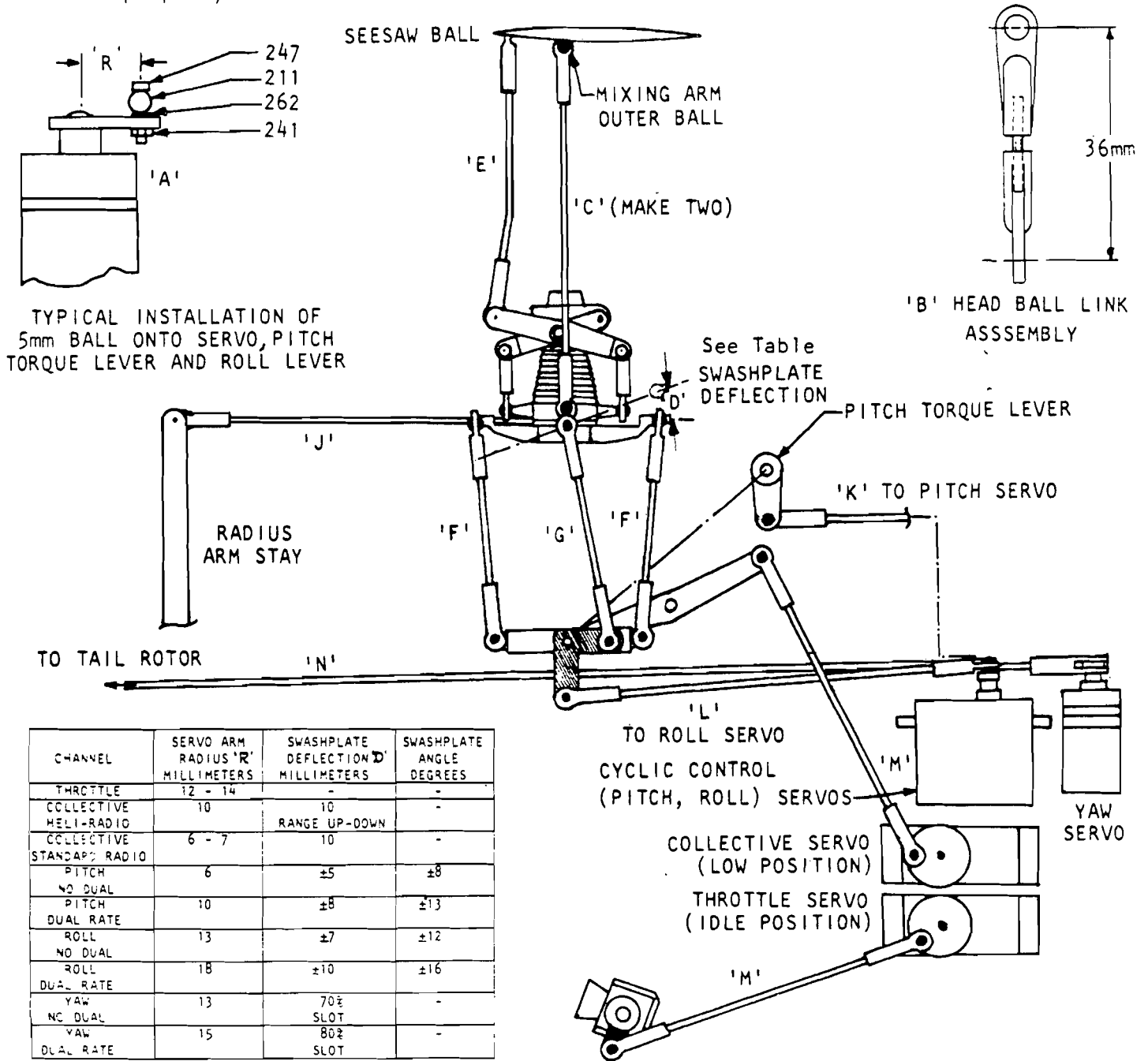
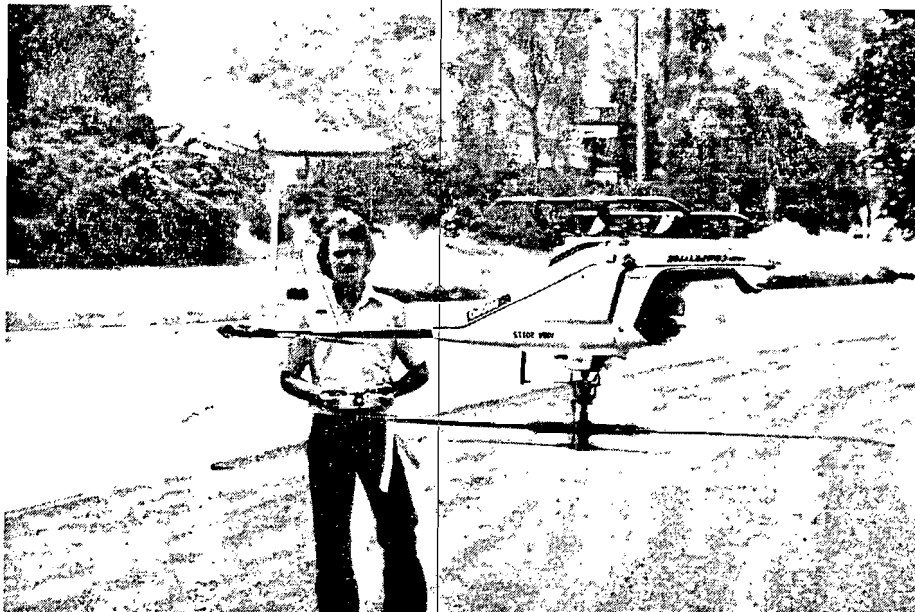
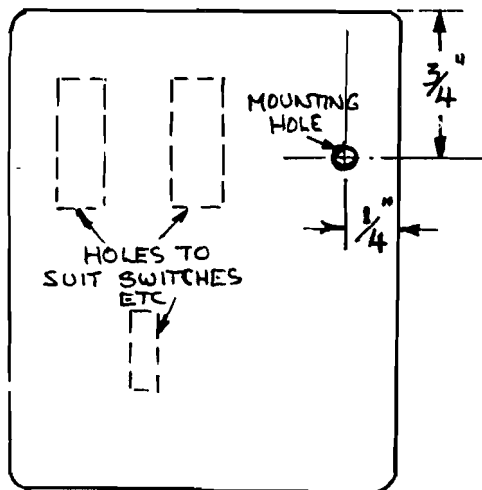


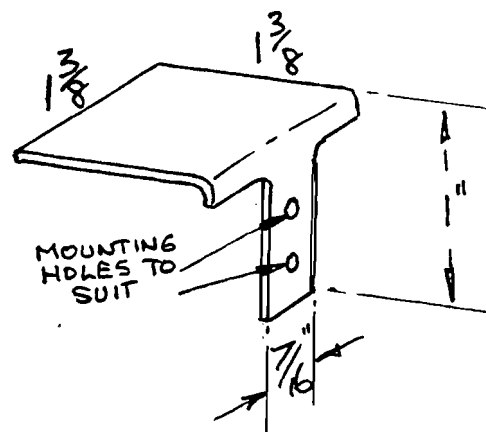
Figure 14  
CONTROL RODS INSTALLATION



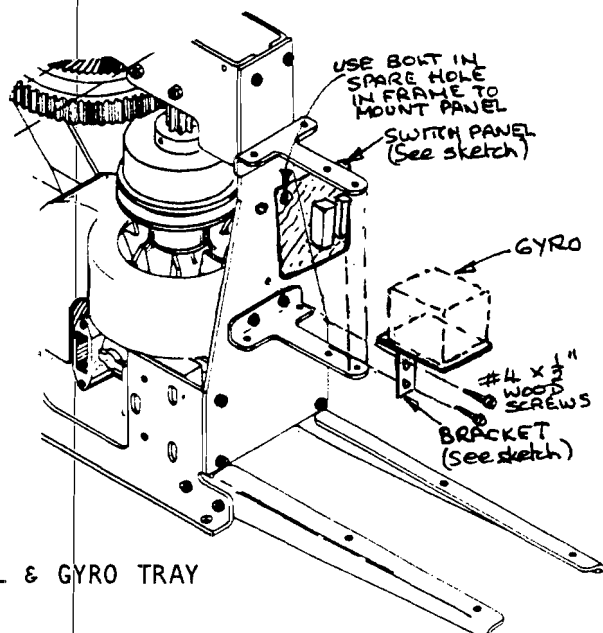
THE NEW COMPETITOR SIDE PANELS IN FULL OPERATION



RADIO SWITCH PANEL



GYRO MOUNTING TRAY



MOUNTING OF RADIO PANEL & GYRO TRAY

# COMPETITOR



# GMP BULLETIN

GMP's Competitor "Pro" has the finest "championship" performance in the industry. GMP's Competitor "Pro" (flown by Curtis Youngblood) took first place in the 2nd World RC Helicopter Championships, held in Switzerland for 1987-8 and the 1986 and 1987 AMA National Championships. One of the major factors in its extraordinary success is that particular emphasis has been placed on the control system in order to provide a very "tight" control. Because of the very careful blending of response damping and control power, the Competitor offers you the best machine for winning national and international competitions.

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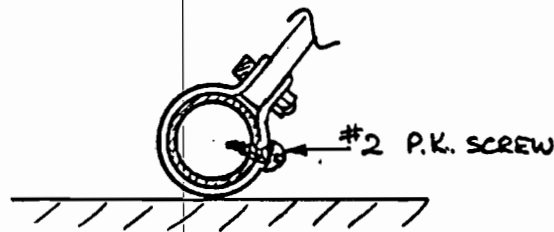
### 3) RADIO SWITCH INSTALLATION

We have found that the radio switches and charging plate are most conveniently mounted on a plastic sheet at the rear of the canopy. We include a template and a sketch in this bulletin for you to see how we do this on our own choppers. Haven't yet figured out the best place for them if you have the new side panels, though. Let's have your ideas.

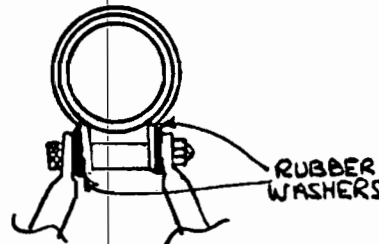
4) RADIO NOISE

"Competitor" has been extremely good from a "radio noise" point of view but there have been a few owners who have experienced radio noise. Assuming that the radio receiver itself is not prone to noise (or, in other words, is not too sensitive or is de-tuned), then the following points should be checked:

- a) The landing gear must have tight gear clips. But, to make sure that this situation is maintained, drill a small hole on the inside of each landing gear clip and inserting a P.K. or sheet metal screw through the clip into the landing gear skid. By doing this you will not only tighten up the skid/clip relationship but you will also effectively 'ground' the skids so that radio noise cannot result from them becoming loose (see sketch).



- b) The boom struts should be grounded on at least one end in order that they will not cause radio noise. By the way, the use of a thin rubber washer (half a servo mounting grommet) mounted under each of the four 3mm socket head screws will help to avoid strut fatigue and cracking (see sketch).

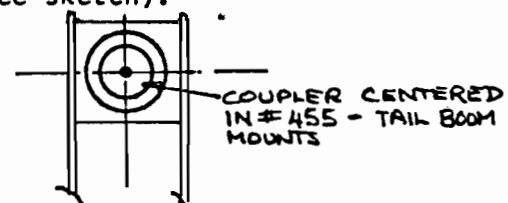
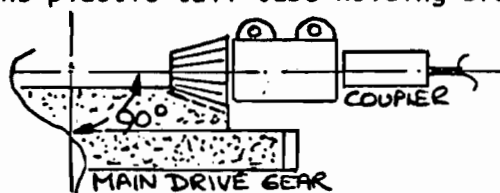


5) TAIL DRIVE GEAR TRACK STRIPPING

There have been some owners who have stripped the tail drive gear track of the main plastic drive gear too frequently. In every case we have found this was due to the bevel steel gear not being mounted at a 90 degree angle to the bevel gear drive track of the main black drive gear. If you are having this problem please readjust all three elements of engine unit, main shaft, and tail drive gear assembly until the bevel gear engages the black main drive gear at 90 degrees and also snugly, into the gear track. The amount of backlash between these gears should be virtually zero but of course this backlash between the engine drive gear and the black plastic gear should be set to just have a very little play at the tightest point.

6) TAIL DRIVE WIRE BREAKAGES


There have been a few reports of tail wires breaking. In every case we have found this has been due to the tail drive coupler at the front end not being centered in the tail drive tube. Please be sure that it is not only set correctly into the plastic track of the main gear but that it is also centered in the plastic tail tube holding brackets (see sketch).



## 7) GYRO INSTALLATION

We enclose for your information a diagram of the bracket which we use to hold the gyros in our helicopters. It is mounted on the front of the vertical plywood servo tray with #4 x 1/2" wood screws.

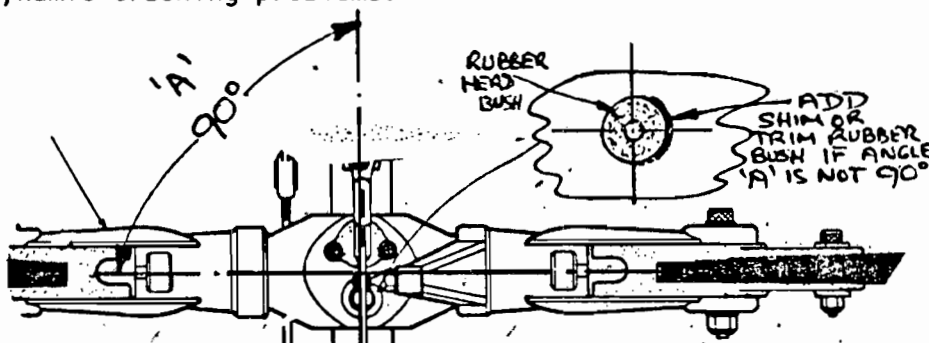
Well, that's all of the hints and tips for now. We will finish up with a suggestion on set-up angles for normal and inverted flight. Please don't hesitate to give us a call if you intend to try inverted flight and are having problems. Our suggested settings are as follows:



	LOW PITCH (LOW TRIM)	CENTER LIFT-OFF PITCH	HIGH PITCH (HIGH TRIM)
NORMAL FLIGHT	-2°	4°	7 - 8°
INVERTED FLIGHT	3°	-2 1/2°	-5 1/2°

## SHAKING OR OUT-OF-TRACK

Although we have a strict checking system for parts of Competitor a few rotor head hubs and/or machined yokes have slipped through with the rubber damping hole not truly central in one part or the other. Then the trouble starts 'cos your static tracking can be out and at the very least you'll get the 'shakes'. Check by turning the main rotor blades slowly and measure the height of each blade from the tail boom (or other fixed datum point). If one blade tracks higher than the other then take the damping bits and pieces apart and shim the rubber bush in the big hole to one side or the other until the yoke sits at right angles to the shaft (see sketch). This should fix any vibration or blade dynamic tracking problems.

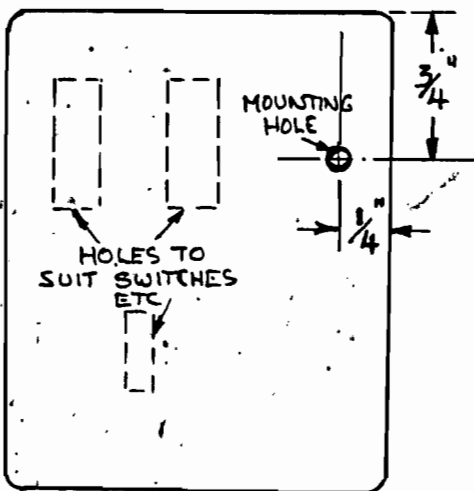


By the way, make sure that your damping rubber piece is 'squished' up well and the head is nearly fully rigid if you want the best aerobatic performance out of your Competitor. A sloppy head means a softer control but then your helicopter won't roll quite as well (and rolling is one of Competitor's best maneuvers).

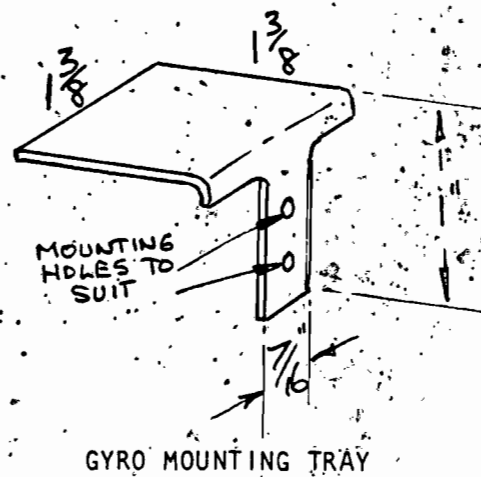




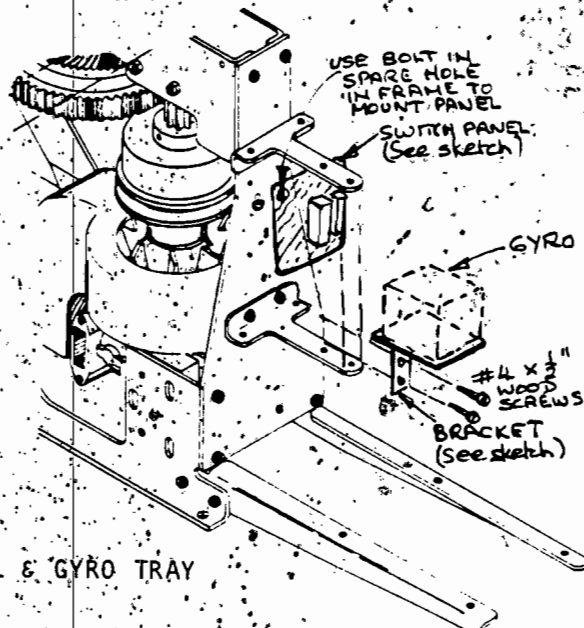
THE NEW COMPETITOR SIDE PANELS IN FULL OPERATION



RADIO SWITCH PANEL



GYRO MOUNTING TRAY



MOUNTING OF RADIO PANEL & GYRO TRAY