

## LIABILITY WAIVER

THIS PROPELLER HAS NOT BEEN TESTED FOR AIRWORTHINESS.

AIRWORTHINESS IS TO BE DETERMINED BY THE OEM MANUFACTURER.

WE DO NOT ACCEPT RESPONSIBILITY FOR PROPERTY DAMAGE, INJURY OR DEATH RELATING TO THE USE OF THIS PRODUCT, AS THE ASSEMBLY, MOUNTING AND USE OF THIS PRODUCT ARE BEYOND OUR CONTROL.

## GSC SYSTEMS (INTERNATIONAL) LTD. ASSEMBLY INSTRUCTIONS FOR TECH SERIES PROPELLERS

### WARNING!

**Before assembly and use of this propeller please read all assembly and operating instructions completely and carefully. Failure to read all instructions and failure to adhere to all operating instructions may result in improper assembly and improper operation. This in turn may cause premature damage or even complete damage to this propeller.**

First, before we begin, please take note that all propeller blades which have been shipped from our factory have already been balanced. DO NOT ALTER THESE BLADES IN ANY WAY OR FORM! Such a simple thing as putting paint on the tips may cause improper balance therefore causing some form of vibration. Also there is a misconception out there that individual propeller blades can be just placed on a weigh scale and weighed; this is totally WRONG! Individual propeller blades must be balanced according to their C of G weight, not to their mass weight. One proper balance method to balance individual blades is to use a T-scale set up, so in the future, if you think you have a balance problem, please use this method.

- 1) To begin, inspect all blades and make sure there has been no damage in shipment. Also check for slag which may have formed around the root end of the blades in the moulding process. If there is any it will be very thin and can be easily removed.
- 2) Next, inspect the aluminum hub, remove any chips, burrs etc. from the inside of this hub. If any are found remove them in a careful manner.
- 3) After you are satisfied with the inspection of the blades and hub, place one half of the hub on a large flat working area. Insert blade roots into the hub half, of course while doing this you are placing the blades in the hub with the airflow of each blade going in the same direction.
- 4) Now locate the other half of the hub and place it over the propeller roots. NOTE: You must put the two hub HALVES together as a matched set. There are numbers stamped on one end of each hub, match these numbers up. When putting the hubs together you may have to move the propeller blades up and down slightly to allow the retaining ring in the hub to slip into the root end of the blade.
- 5) With the hub HALVES now together, locate the 2 1/2" bolts and the 1/4" washers. Start assembly of the bolts by first placing a washer on each bolt and then inserting the bolt into the holes in the hub which are on the outside of each hub arm. There will be two bolts required for each root end blade that you have. After the bolts have been inserted place another washer on the threaded end of the bolt. Now a 1/4" lock nut can be put on but DO NOT TIGHTEN all the way, the blades must be free to move so that blade adjustment can be made.

**IF YOU HAVE A FIXED PITCH PROPELLER PROCEED TO STEP 8**

- 6) Blade pitch angle may now be set on your work bench. To do this there are a few different ways in which this can be done. One of the best ways is to use our GSC protractor, if you do not have one you can make a template out of a thin gauge material with a predescribed angle already cut out in the template, or use some sort of tool which will measure an angle. To determine what pitch you should start at, you may already know from the factory at what pitch they have recommended. If you do not have that information refer to our enclosed charts showing some common starting pitches which should give you a very close starting pitch enabling you to use this as a starting reference. Remember these charts show starting pitches only, different equipment applications plus various different atmospheric locations, will greatly alter the proper required PITCH that may be needed.

After you've decided on what angle you want, remember angle and pitch are two different things, start by rotating each blade to the same relative position. Angles are normally set at the 75% radius station. To find the proper 75% distance from centre for each diameter of propeller you can look on the bottom of the pitch/angle chart. Also before setting the angles you should raise the hub off the surface of the table this will allow the blades to clear the working surface when they are rotated to the desired angle. Usually a 1" spacer is sufficient, but make sure that the hub is sitting firmly on the spacer and not allowed to wobble.

Now rotate the blade to the desired angle using what method you have decided on. You will notice that when using a straight edge measuring device that you find there is a curve in what looked like the flat side of the propeller. The best thing to do is even the spaces out between the leading edge and trailing edge in regards to the straight edge that you are using. As you are adjusting each blade tighten the bolts just enough so as to stop the blade from rotating while you are adjusting the other blades. Over tightening will not allow you to adjust the other blades. When you have adjusted all blades you now can tighten the bolts a little more securely so that the blades will not be jarred while mounting propeller, but do not over tighten.

If you want to set the angle on the propeller when it is on the plane do as above but leave the root end attach bolts loose so that blade rotation can be made while it is mounted on the propeller flange. In this manner of setting the pitch, remember you must have all blades set at the same relative position before operation of the propeller is to be started.

**ONE OF THE MOST IMPORTANT POINTS TO REMEMBER BEFORE START UP OF A GROUND ADJUSTABLE PROPELLER IS TO HAVE ALL THE BLADES SET AT THE SAME RELATIVE ANGLE SO AS NOT TO CREATE ANY UNNECESSARY VIBRATION.**

- 7) **AT ANY TIME THAT YOU ARE ADJUSTING OR WORKING ON YOUR PROPELLER MAKE SURE THAT ALL POSSIBLE IGNITION SWITCHES ARE OFF!**

Now before you can assemble the propeller to the propeller flange, install the six 8 mm torque studs into the reduction drive. Remember to use loctite on the stud threads.

- 8) With the studs now secured, place the propeller assembly on the propeller flange. If you have a fixed pitch propeller you will have to rotate the blades slightly so that the 1/4" hole in the root end of the blade aligns with the 1/4" hole in the hub. For ground adjustable propellers, this hole should already be aligned. Next, install six 1/4" AN aircraft grade bolts through the hub and into the propeller flange or through the propeller flange whichever flange you may have. (These bolts are not supplied). Also make sure you use safety wire in a drilled headed bolt or propeller locking tabs.

IT IS VERY IMPORTANT TO TIGHTEN THE BOLTS IN THE FOLLOWING PROCEDURE AND TO THE FOLLOWING **TORQUE** SPECIFICATION

### IMPORTANT TORQUE SPECIFICATION REQUIREMENTS

Torque all bolts to 75 in./lbs. and never to exceed 100 in./lbs. It is important to bring each bolt up to the proper torque specification several times. DO NOT bring one bolt up to torque and then go on to the next one and so on. This is especially important during initial mounting of the propeller. Also when tightening the specified bolts, tighten them in a crossing pattern.

8-1) Tighten bolts which pass through the centre of the blade roots first.

8-2) Tighten the remaining propeller mounting bolts next.

8-3) Finally tighten the bolts at the end of each hub arm. Remember to tighten them to the specified torque only. If OVER TIGHTENING occurs possible damage to the root end of the blade may result.

- 9) Now that you have your propeller mounted one more very important step, and one that seems to be neglected, has to be done. This is to check the TRACKING of your propeller blades. What this means is that all the blades should be running along the same reference line. When tracking is out some form of vibration may occur. In some cases when a vibration is encountered this vibration is blamed on the blades being out of balance when this is not the case.

Tracking can be checked in the following way, you must first set up some sort of reference point pertaining to the propeller blades at the tip end. It may be a block of wood on the floor for a tractor configuration or part of the frame in a pusher or air boat application. One good way to check tracking is to secure a piece of paper to the floor or frame. But whatever it is, it must not move while you are doing this procedure, and this is also the case with the unit you are working on.

Once you have a reference point in place, you can now check each individual blade with regards to this reference point. The distance from your reference point can now be measured with a measuring tape. If you are using a piece of paper, you can lay a pencil along the leading edge of each blade and make a mark on the paper. But be sure to hold the pencil in the exact same way and manner on each individual blade that you are doing.

The most that your tracking should be out is 1/8 of an inch, any more than this may cause some form of vibration.

- 10) In case your tracking is out, do not panic it most likely can be fixed very easily. One reason tracking can be out is that you have not set up the angles correctly, you may have to recheck them. Another reason tracking can be out is in the way the hub has secured itself to the prop flange. Loosen the propeller adapting bolts and retighten them, then check again. If it is still out locate a blade that is out of line, and then loosen the bolts that are securing the hub. Retighten the bolts on one side of the hub then go to the next side and tighten the other half and then check to see if your blade has moved in the right direction. In the event that none of the above works you may have to use shims between the hub and the adaptor flange. But this is very unlikely and usually occurs only after a propeller strike. Also it is a good idea to check tracking frequently.
- 11) Now that you are satisfied that the tracking is correct and all bolts are torqued and secured properly, you now can run the propeller up. During the initial run up check and see if your engine is operating in the proper R.P.M. range which the manufacture has recommended. If for example the engine is operating at too high of a R.P.M. you may have, too fine of a pitch set up in the blade and it must be readjusted. Likewise if you do not have enough R.P.M. you may have too much pitch set up in the blade and it too will have to be readjusted. Remember on a static ground test for aircraft you should adjust R.P.M. around 150 to 200 R.P.M. lower than what is wanted in the air.

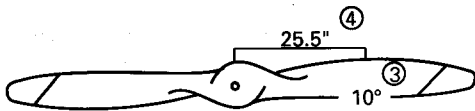
The following is a helpful hint if you have to readjust your propeller. So that you do not have to take the propeller completely off, make some scribe marks on the root end of the blade in line with where the two hub halves join. Then use these scribe marks as reference points when rotating the blades.

### RECOMMENDED RPM/ PROPELLER COMBINATIONS

	GND MAX	CLIMB FULL LOAD & THROTTLE	MAX RPM
377/447	6350	6500	6800
503	6200	6350	6800
532	6200	6600	6800
582	6200	6600	6800
912	5300	5500	5800

Dual carb engine the max RPM is 6800

This chart is used to help set the pitch on a GSC ground adjustable two or three blade propeller when first installing it on your plane. If you have a 68" diameter propeller and want to set the pitch to 28", then go to the intersection of these two references (1 & 2). The pitch should be set at 10° (3). This is measured 25.5" (4) from the center of the hub. The setting at full power on the ground should give 6200 RPM on a Rotax 532. If it is different, then the pitch on the propeller must be changed (increased or decreased) to get the recommended 6200 RPM.



### ADJUSTING THE GSC PROPELLER DIAMETER (INCHES)

	29 TO 32	33 TO 36	37 TO 40	41 TO 44	45 TO 48	49 TO 52	53 TO 56	57 TO 60	61 TO 64	65 TO 68 <sup>①</sup>	69 TO 72
10	7.5	6.75	6	5.5	5	4.75	4.25	4	3.75	3.5	3.25
12	9	8	7.25	6.5	6	5.5	5.25	4.75	4.5	4.25	4
14	10.5	9.5	8.5	7.75	7	6.5	6	5.5	5.25	5	4.75
16	12	10.75	9.75	8.75	8	7.5	7	6.5	6	5.75	5.25
18	13.25	12	10.75	9.75	9	8.25	7.75	7.25	6.75	6.5	6
20	15	13.25	12	11	10	9.25	8.5	8	7.5	7	6.75
22	16.25	14.5	13.25	12	11	10.25	9.5	8.75	8.25	7.75	7.25
24	17.75	15.75	14.25	13	12	11	10.25	9.75	9	8.5	8
P	19	17	15.5	14	13	12	11.25	10.5	9.75	9.25	8.75
I	20.5	18.25	16.5	15	14	12.75	12	11.25	10.5	10 <sup>③</sup>	9.5
T	21.75	19.5	17.5	16.25	14.75	13.75	12.75	12	11.25	10.5	10
C	23	20.75	18.75	17.25	15.75	14.5	13.5	12.75	12	11.25	10.75
H	24.25	21.75	19.75	18.25	16.75	15.5	14.5	13.5	12.75	12	11.25
36	25.5	23	21	19.25	17.75	16.25	15.25	14.25	13.5	12.75	12
I	26.75	24.25	22	20.25	18.5	17.25	16	15	14	13.25	12.5
N	28	25.25	23	21	19.5	18	16.75	15.75	14.75	14	13.25
40	29	26.25	24	22	20.5	19	17.75	16.5	15.5	14.75	14
I	30.25	27.5	25	23	21.25	19.75	18.5	17.25	16.25	15.25	14.5
N		28.5	26	24	22.25	20.5	19.25	18	17	16	15.25
C		29.5	27	24.75	23	21.5	20	18.75	17.75	16.75	15.75
H		30.5	28	25.75	23.75	22.25	20.75	19.5	18.25	17.25	16.25
E			29	26.25	24.75	23	21.5	20.25	19	18	17
S				27.5	25.5	23.75	22.25	21	19.75	18.75	17.75
54				28.25	26.25	24.5	23	21.5	20.5	19.25	18.25
56				29.25	27.25	25.25	23.75	22.25	21	20	19
58				30	28	26	24.5	23	21.75	20.5	19.5
60				31	28.75	26.75	25.25	23.75	22.25	21.25	20
62					29.58	27.5	25.75	24.25	23	21.75	20.75
64					30.25	28.25	26.5	25	23.75	22.5	21.25
66						29	27.25	25.75	24.25	23	21.75
68											

### DISTANCE FROM CENTER (INCHES)

### RECOMMENDED ROTAX ENGINE PROP COMBINATION LIST

Notes: Gear Box Tractors are all left hand, all Pushers are right hand.  
Belt Redrive Pushers are all left hand, all Tractors are right hand.

#### 2 - BLADE PROPELLERS

ENGINE TYPE	REDUCTION 2.00 : 1 DIA/PITCH INCHES	REDUCTION 2.24 : 1 DIA/PITCH INCHES	REDUCTION 2.58 : 1 DIA/PITCH INCHES	REDUCTION 3.00 : 1 DIA/PITCH INCHES
277	44 X 34 46 X 32 48 X 30 50 X 28 52 X 26	46 X 36 48 X 34 50 X 32 52 X 30 54 X 28	56 X 32 58 X 30 60 X 28 62 X 26	64 X 32 66 X 30 68 X 28 70 X 26
377	48 X 34 50 X 32 52 X 30 54 X 28 56 X 26	52 X 34 54 X 32 56 X 30 58 X 28 60 X 26	58 X 36 60 X 34 62 X 32 64 X 30 66 X 28	64 X 38 66 X 36 68 X 34 70 X 32 72 X 30
447	48 X 36 50 X 34 52 X 32 54 X 30 56 X 28 58 X 26	52 X 38 54 X 36 58 X 32 60 X 30 62 X 28	58 X 40 60 X 38 62 X 36	66 X 40 70 X 36 72 X 34
503	48 X 40 50 X 38 52 X 36 54 X 34 56 X 32 58 X 30	54 X 38 56 X 36 58 X 34 60 X 32 62 X 30 64 X 28	60 X 42 62 X 38 64 X 36 66 X 33 68 X 31	66 X 44 68 X 42 70 X 40 72 X 38

#### 3 - BLADE PROPELLERS

ENGINE TYPE	REDUCTION 2.00 : 1 DIA/PITCH INCHES	REDUCTION 2.24 : 1 DIA/PITCH INCHES	REDUCTION 2.58 : 1 DIA/PITCH INCHES	REDUCTION 3.00 : 1 DIA/PITCH INCHES
277	44 X 24	42 X 30 44 X 28 46 X 26 48 X 24	44 X 34 46 X 32 48 X 30 50 X 28 52 X 26 54 X 24	48 X 38 50 X 36 52 X 34 54 X 32 56 X 30 58 X 28 60 X 26
377	42 X 30 44 X 28 46 X 26 48 X 24	42 X 34 44 X 32 46 X 30 48 X 28 50 X 26 52 X 24	44 X 40 46 X 38 48 X 36 50 X 34 52 X 32 54 X 30 56 X 28	54 X 38 56 X 36 58 X 34 60 X 32 62 X 30 64 X 28 66 X 26
447	42 X 32 44 X 30 46 X 28	44 X 36 46 X 34 48 X 32	48 X 40 50 X 38 52 X 36	56 X 40 58 X 38 60 X 36
503	42 X 36 44 X 34 46 X 32 48 X 30 50 X 28 52 X 26 54 X 24	44 X 40 46 X 38 48 X 36 50 X 34 52 X 32 54 X 30 56 X 28	50 X 42 52 X 40 54 X 38 56 X 36 58 X 34 60 X 32 62 X 30 64 X 28	56 X 44 58 X 42 60 X 40 62 X 38 64 X 36 66 X 34 68 X 32

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ENGINE TYPE	REDUCTION 2.00 : 1 DIA/PITCH INCHES	REDUCTION 2.24 : 1 DIA/PITCH INCHES	REDUCTION 2.58 : 1 DIA/PITCH INCHES	REDUCTION 3.00 : 1 DIA/PITCH INCHES
503/2V	SAME AS 503 - TURNS AT HIGHER RPM			
532 and 582	54 x 40 56 x 38 58 x 36 60 x 34 64 x 30 66 x 28	60 x 40 62 x 38 64 x 36 68 x 32 70 x 30	64 x 42 66 x 40 68 x 38 72 x 34	68 x 46 70 x 44 72 x 42

#### 3 - BLADE PROPELLERS

ENGINE TYPE	REDUCTION 2.00 : 1 DIA/PITCH INCHES	REDUCTION 2.24 : 1 DIA/PITCH INCHES	REDUCTION 2.58 : 1 DIA/PITCH INCHES	REDUCTION 3.00 : 1 DIA/PITCH INCHES
503/2V	SAME AS 503 - TURNS AT HIGHER RPM			
532 and 582	44 x 40 46 x 38 48 x 36 50 x 34 52 x 32 54 x 30 56 x 28	50 x 40 52 x 38 54 x 36 56 x 34 58 x 32 60 x 30	52 x 48 54 x 46 56 x 44 58 x 42 60 x 40 62 x 36 64 x 34 66 x 32 68 x 30 60 x 38 (GYRO)	62 x 42 64 x 40 66 x 38 68 x 36 70 x 34 72 x 32