



PRECISION MAGNETIC BALANCER™

INSTRUCTIONS

Thank you for purchasing the Top Flite **PRECISION MAGNETIC BALANCER**. We think you'll agree that this ingenious design, which uses powerful magnets to support the balancer shaft, is the simplest, easiest-to-use and most friction-free balancer available. The compact, rugged case halves press together to provide a convenient carrying case for the balancer parts.

Originally designed by Mark McCormack

IMPORTANT: Please read through this booklet in its entirety before attempting to assemble or use the balancer.



- Use the Top Flite **PRECISION MAGNETIC BALANCER** to balance all spinning components of your models (propellers, spinners, rotors, and even wheels!). Accurately balancing these components will provide noticeably smoother, quieter operation and will help extend the life of your models, radio gear and engines.
- This balancer is capable of suspending objects up to a maximum weight of approximately 5.5 ounces (156 grams). For example, this permits balancing up to a 24x16 wood propeller. Your balancer may have slightly greater or less capacity, depending on the strength of the magnets which varies slightly.
- This booklet also explains how you can use your Top Flite **PRECISION MAGNETIC BALANCER** as a **wind speed indicator!**

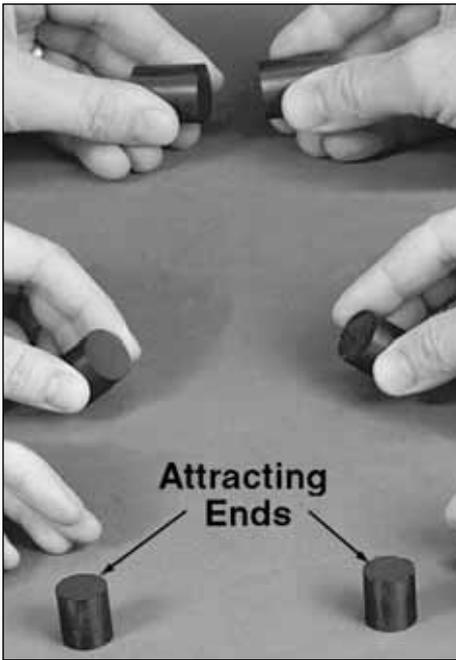
CAUTION - STRONG MAGNETS:

1. When removing the magnets from the carton and when handling the magnets, use care to prevent them from snapping against each other. The ceramic magnet material is brittle and a hard impact can result in chipping or breaking.
2. If not handled properly, the powerful magnets in this balancer may cause temporary or permanent damage to TV SCREENS, COMPUTER MONITORS, VIDEO TAPES, AUDIO TAPES, FLOPPY DISKS, TAPE STORAGE MEDIA, etc. To avoid damage, keep the magnets *at least 24 inches (600mm)* away from components that are sensitive to magnetic fields.

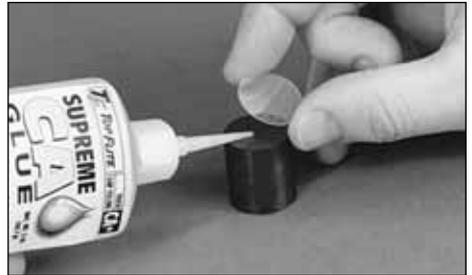
ASSEMBLY

#1 is quick and easy and is described in the following steps. Method #2 results in a more scratch-resistant and friction-free surface, but it requires more work. The choice is yours which method to use.

□ 2. Remove all oil and foreign particles from the exposed magnet ends by wiping with a tissue dampened with rubbing alcohol.

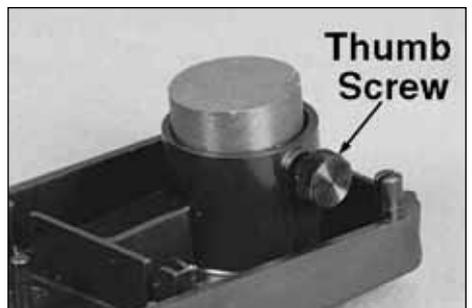


□ 1. Carefully remove the magnets from the carton (see CAUTIONS on page 1). Note how the magnets have a strong attraction for one another. Note also how they repel one another if one of the magnets is turned end-for-end. When installed in the magnet tubes, the magnets must be positioned so they attract, not repel. Place the magnets on your workbench **with the attracting ends pointing up**. Separate the magnets at least 12", so they won't accidentally snap together.



□ 3. Glue one of the **clear plastic disks** to each of the exposed magnet ends by applying one drop of thick or medium CA glue to the magnet. Center the clear disk over the magnet and press the disk down firmly until the CA has spread evenly between the magnet and the disk. Epoxy may be used instead of CA, if you prefer. Wipe off all excess glue before it cures, wiping downward to avoid getting any glue on the face of the disk. The disk will protect the magnets and provide a smoother bearing surface for the balancer shaft.

NOTE: To make the balancer as friction-free as possible, it is very important to provide smooth magnet faces on which the balancer shaft ends will spin. There are two ways of doing this: **1)** Glue the supplied clear plastic disks to the magnet faces; or, **2)** Polish the magnet faces to a smooth and high gloss finish using #400 and #600-grit wet-or-dry sandpaper, followed by a rubbing/polishing compound. Method



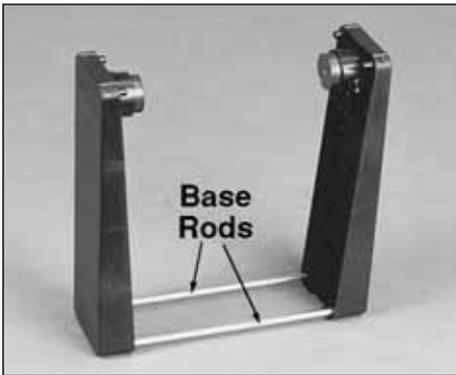
□ 4. After the adhesive cures, place the magnets into the magnet holder

tubes in the plastic **balancer cases**. When installed in the magnet tubes, the magnets must be positioned so they **attract**, not repel. Secure each of the magnets in the magnet tubes with a **thumb screw**. Do not over-tighten the screws, as this can deform the plastic and put the magnets out of alignment. Slight screw pressure is all that is required. **NOTE:** The 6-32 threads will self-tap into the plastic, but you may cut threads with a 6-32 tap, making the thumb screw easier to adjust with your fingertips.

shaft between the two magnets. *The balancer shaft will touch one magnet and the other end will be suspended in the magnetic field.* For the **lowest possible friction**, adjust the magnets by loosening the thumb screws and sliding the magnets in or out until the gap is very small (approximately 1/32" [0.8mm]) at the shaft end. Secure the magnets in this position with the thumb screws. **NOTE:** The smaller gap provides lower friction and greater load-carrying capability.

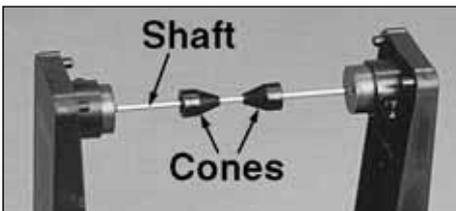
HOW TO USE YOUR TOP FLITE PRECISION MAGNETIC BALANCER

The general principle of balancing is to determine the "heavy side" of an object and then to either remove material from the heavy side, or add weight to the light side (see safety precautions below). Because the Top Flite PRECISION MAGNETIC BALANCER is so nearly frictionless, you'll wait a long time for a propeller to stop swinging; therefore, you should help the object to nearly stop by applying light friction to the balancer shaft with your finger. An object is perfectly balanced if it can be stopped and will remain stationary in *any* position.



□ 5. Push and twist the two long **base rods** into the sockets in one of the case halves. Assemble the **second case half** to the other ends of the base rods. Press firmly to seat the rods. Stand the assembly up as shown.

CAUTION: Do not allow the balancer rod ends to snap hard against the magnets, as this will damage the rod ends or the plastic discs.



□ 6. Slide the balancing **cones** onto the balancer **shaft**. Place the balancer



How to balance SMALL AND MEDIUM SIZE PROPELLERS: Slide the cones onto the balancer shaft with the tapered ends facing each other, trapping the propeller between the cones. The object

is to hold the item to be balanced perpendicular and concentric to the center line of the balancing shaft. Always position the item to be balanced near the **midpoint** of the balancing shaft for best results. Determine which are the heavy and light blades of the propeller.

BALANCING

Below are several commonly accepted methods for balancing.

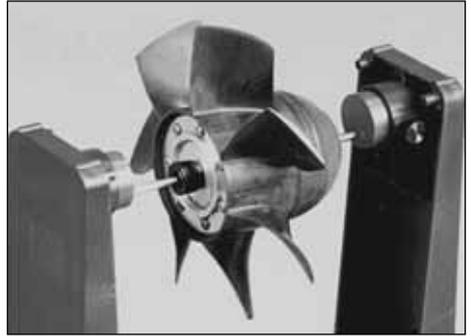
Method 1: Lightly sand the back side of the heavier blade with fine sandpaper. Recheck often to avoid removing too much material.

Method 2: Apply a drop of medium CA to the back side of the light blade and use a piece of waxed paper or a plastic bag over your finger to smooth the CA into a thin film. Cure the CA with a light spray of accelerator. Re-check the balance. Apply more CA in thin layers until the propeller is balanced. **NOTE:** Before adding glue to a prop, make sure it is absolutely clean and free of any oil residue.

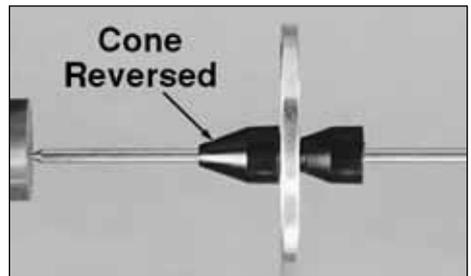
Method 3: Balance by sanding material from the very end of the heavy blade. This will avoid changing the airfoil shape and avoid the possibility of weakening the blade. **NOTE:** Do not attempt to remove material by carving with a knife, as this can leave cuts where cracks can begin to form.

A prop is truly balanced if it can be stopped and will remain stationary in **any** position. If the prop comes to rest in a level position, but is still obviously out of balance (hole slightly off-center), you may need to add weight to the lighter side of the hub (see method 2). **Do not remove material from the hub.** This could weaken the prop, making it unsafe.

CAUTION: Never remove material in a way that will cause weak spots or structural failure in the propeller.

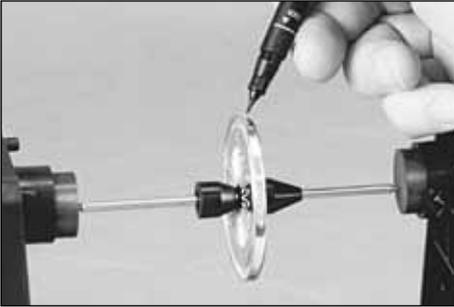


How to balance HEAVY OBJECTS: The capacity of the balancer can be significantly increased by loosening the thumb screw of one magnet. This will allow both magnets to remain in contact with the shaft. Allow one magnet to “float” by leaving the thumb screw loose. The **friction** between the shaft and the magnets increases in this mode, but balancing accuracy will **not** be significantly affected with heavy objects. Also, keep in mind that large propellers do not have to make a full revolution to enable balancing.



How to balance THIN OBJECTS (such as spinner backplates), or a propeller with a LARGE HOLE: For this application, the tapered ends of the cones would probably touch each other before centering the object on the shaft, so you'll have to turn one of the cones around (both cones facing the same direction). This configuration

does not hold the object as securely, so check the cones frequently to make sure they are tight against the object while balancing.



BALANCING SUGGESTIONS: To balance a spinner, balance the backplate first. Mark the light side (up), then remove material from the heavy side by drilling several shallow holes in the backplate. **Don't drill through the backplate and don't drill where it will weaken the structure.** Repeat by trial and error, until the backplate balances perfectly. If the spinner cone has a front hole, you can now join the backplate and the cone on the balancer, to determine the balance of the cone. To balance the cone, carefully remove material from the inside of the cone with a piece of medium-grit sandpaper, being careful not to remove so much material in one place that it would weaken the cone. **NOTE:** Spinners that do not have a hole in the front of the cone do not lend themselves to balancing, so in this case just balance the backplate.



How to balance CAR WHEELS: Most car wheels can be balanced with this

balancer using the method described above and doing so will make a big difference in the smoothness and handling of your car. Certain car wheels which have large diameter holes (such as 1/10 scale on-road rear wheels) will also require the use of an inexpensive adapter, such as the DuraTrax® #DTXC9581 BBS Wheel Adapter (available from your hobby dealer), which reduces the center hole to a size that this balancer can accommodate. Another way to balance rear on-road wheels is to mount them to an extra *left diff side* from your model.

When balancing car wheels, safety is of utmost importance.

Do not attempt to balance car wheels by sticking pins into the rubber, as these can come loose. Also, a spinning wheel with any protruding metal can be very hazardous to a person holding the car. Self-adhesive lead tape works great for balancing wheels. Check with your hobby dealer or a golf supply store for this type of tape. Consult with your local hobby dealer and track owner for methods that are acceptable in your area.

TIPS FOR ULTRA-PRECISION BALANCING:

If you need to balance small objects with high precision, such as boat propellers, you can follow this procedure to increase the precision of your balancer:

1. Examine the balancer shaft ends with a magnifying glass. The shaft ends should be concentric with the shaft centerline and should not be blunt or scratched. If a careful inspection of the shaft ends reveals any imperfections, you may carefully true up the points with

a knife-sharpening stone, then polish the points with 600-grit sandpaper followed by rubbing compound. The smoother the points, the less friction. However, don't sharpen the points too much. Leave a very small polished radius at the tip.

2. Before using the balancer, spread a very thin film of **oil** on the magnet ends.

3. Check the balancer shaft for straightness by rolling it slowly on a piece of clean, dust-free plate glass. If the shaft is bent, you'll be able to see light under the shaft as you roll it on the glass. If the shaft has any significant bend, it will not balance accurately. Straighten the shaft by carefully bending it. You can check the trueness of the shaft by placing it on the balancer without the cones.

4. Balance each individual balancer cone, one at a time.

5. Your balancer is now ready to be used for high precision work.

PROPER CARE OF YOUR BALANCER



• Place all components into the case halves in the positions shown in the photo. Press on the **ends** of the rods (not in the middle) when storing, to prevent bending. We recommend storing one base rod in each case half, for minimum case distortion.

• If the balancer parts become exposed to water, dry them thoroughly. Do not close the balancer case halves together with metal parts inside if there is moisture in the case, as this can result in corrosion of the metal parts.

• Do not drop the magnets, or allow the magnets to snap together. **NOTE:** If you should happen to break a magnet, you may glue the magnet pieces back together with epoxy or CA glue, with very little reduction in magnet strength.

• Handle the balancer **shaft** with care. It is made of soft steel (for high magnetic attraction) which will bend easily if handled roughly. When pushing the shaft into the storage slots in the case, push down near both ends of the shaft, rather than at the middle. Also, when removing the shaft from the case, pull up near the ends. Don't let the shaft snap hard against the magnets, as this will blunt and deform the shaft ends.

• When disassembling the balancer, gently twist the base rods as you pull them out.

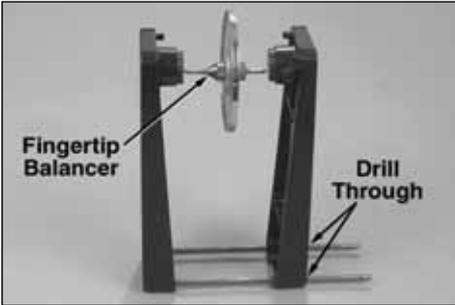
• Always open the case halves by popping both ends open with a coin. Don't try to force the halves open from one end only.

• Do not subject the balancer to high temperatures, above 120°F (49°C), such as on the dashboard of a closed automobile on a hot, sunny day, as high temperatures may deform the plastic and permanently reduce the strength of the magnets.

• If you need more friction or "holding power" between the shaft and the cones (for balancing heavy objects), try cleaning the shaft with rubbing alcohol or solvent. If you still need additional

friction, try roughening the plated surface of the shaft with 320-grit sandpaper.

MODIFICATION



In the years since its introduction, users have informed us of various useful modifications they have discovered. One particularly useful one is to drill out the Base Rod holes in one of the balancer cases with a 3/16" drill bit, allowing the two halves of the case to be positioned closer together. Doing this makes it possible to suspend a Great Planes Fingertip Prop Balancer (GPMQ5000), which has a threaded shaft that will hold some items more securely.

HOW TO USE YOUR BALANCER AS A WIND SPEED INDICATOR (ANEMOMETER)

A unique feature of the Precision Magnetic Balancer is its ability to read the wind speed. Because of its nearly friction-free design, it can determine the wind speed to within 2 mph. All you need is a photocell tachometer and a balanced **Top Flite 11 x 8 Power Point prop**. Any tachometer will work to read the wind speed, but the **Hobbico Digital Mini Tach** is ideal. You can temporarily mount it on the balancer which will allow you to set the unit down and read the wind speed without having to hold any of the components.

PROCEDURE

Mount the **11 x 8 Power Point** prop on the balancer shaft and place the shaft between the magnets. Adjust the magnets if necessary until the shaft is touching only one magnet. For stronger winds, adjust the Magnets so they touch both ends of the shaft.



Place the balancer unit on a flat surface (or hold it) in free flowing air so the **back** of the prop is **facing** the direction the wind is **coming** from. Turn on the tach and read the wind speed. The wind speed with the 11 x 8 Power Point prop will be the RPM divided by 100. The Hobbico Digital Mini Tach reads RPM in thousands so the wind speed will be in tens. For example, a reading of 0.5 on the tach is 5 mph. A reading of 18.8 on the tach is 188 mph (in which case you should not fly) and so on.



To temporarily mount the Hobbico Digital Mini Tach on the balancer, use a piece of

2" length of self-adhesive Velcro® near the middle of one balancer case half. Position another piece of Velcro® on the Hobbico Digital mini-tach so that the sensor faces the propeller blade.

NOTE: The **Top Flite 11 x 8 Power Point** prop is the best prop we have found that will give an accurate wind speed reading without having to use a calculator. Other props will work but you will have to use the following formula to determine the wind speed. The accuracy may also be affected due to the different efficiencies of prop designs and pitches, but the results will be reasonably close for approximating the wind speed.

$$\text{Wind Speed (in MPH)} = \text{RPM} \times \text{Pitch of the prop(in inches)} \times .00114$$

PARTS LIST

| <u>PART #</u> | <u>UNITS</u> | <u>DESC.</u> |
|----------------|--------------|----------------|
| NYLON92 | 2 | Case Half |
| WIRES80 | 1 | Balancer Shaft |
| METAL058 | 2 | Magnet |
| WIRES81 | 2 | Base Rod |
| SCRW102 | 2 | Thumb Screw |
| NYLON97 | 2 | Cone |
| PSDC001 | 2 | Clear Disk |

Visit our website for prices and ordering information:

www.top-flite.com/manuals/index.html

We accept Visa and MasterCard.

Note: Parts and prices subject to change without notice.



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