

# *Original Instructions*

*for Magna-Matic*

*Static Balancing Instruments:*

**MAG-1000**

**MAG-1000G**

**MAG-1000GC**



**MADE IN THE USA**

# THANK YOU,

We sincerely appreciate your decision in choosing Magna-Matic precision balancing instruments for your blades or other rotary parts. Rest assured that if you have a question or problem you will have complete customer support for all of our products.

## MAG-1000 Series Balancing Instrument Specifications

	MAG-1000	MAG-1000G	MAG-1000GC
Width	3.25" (8.25 cm)	3.25" (8.25 cm)	3.25" (8.25 cm)
Height	12.25" (31.11 cm)	12.25" (31.11 cm)	12.25" (31.11 cm)
Depth	5.5" (13.97 cm)	5.5" (13.97 cm)	5.5" (13.97 cm)
Magnet Force	120 lb pull (54.4 kg)	120 lb pull (54.4 kg)	120 lb pull (54.4 kg)
Weight	45 oz (1275 gm)	45 oz (1275 gm)	45 oz (1275 gm)
Bearing	7 ball	8 ball	8 ball
Spindle	Steel	Steel	Carbide
Cone Range	0.3125" to 1.49" 0.7937 to 3.78 cm	0.3125" to 1.49" 0.7937 to 3.78 cm	0.3125" to 1.49" 0.7937 to 3.78 cm
Accuracy (no load)	0.021 oz-in 15 g·mm (± 5 g·mm)	0.007 oz-in 5 g·mm (± 2 g·mm)	0.007 oz-in 5 g·mm (± 2 g·mm)
Accuracy (load 2050g blade)	0.04 oz-in 31 g·mm (± 5 g·mm)	0.022 oz-in 16 g·mm (± 2 g·mm)	0.022 oz-in 16 g·mm (± 2 g·mm)

# SAFETY INFORMATION



## CAUTION

**LAWN MOWER BLADES HAVE SHARP EDGES - ALWAYS WEAR PROTECTIVE GLOVES AND SAFETY GLASSES!**



## WARNING

**ENSURE BLADE OR ROTARY PART HAS FULL CONTACT WITH THE MAGNET TO PREVENT A BLADE FROM FALLING OFF THE BALANCER!**

### Magnetic Chuck Safety Information

Magna-Matic magnets have a pull force in excess of 120 lbs (using a 0.25" thick test plate 3.5" x 3.5").

Magna-Matic balancers use a magnet to hold the lawn mower blade. Blades or rotary parts made of non-magnetic materials will not be held by the magnet.

Magnetic pull force is drastically reduced if surface dirt, rust, or paint is between the blade and the balancer's magnet.

Blades that do not have a clean, flat, steel surface and at least 3" in diameter around the center hole shall not be mounted on the balancer. These blades may not be held securely by the magnet and may fall.

SAFETY ICON	DEFINITION
	Read all included manuals and bulletins included with this equipment.
	Always wear protective gloves when operating this equipment.  Gloves are required.
	Always wear protective eye wear when operating this equipment.  Eye protection required.

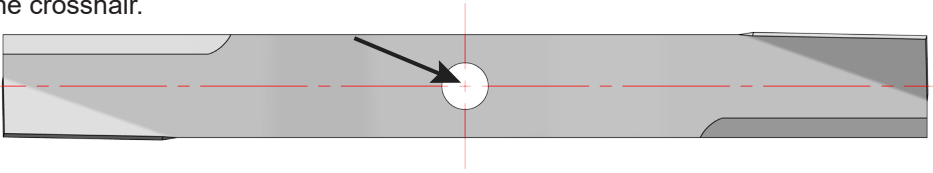
# UNBALANCE EDUCATION

## What is Unbalance?

Too much unbalance causes damaging vibration when the blade is at its operating speed. The following diagrams and information will provide the basics of understanding unbalance so that you may better service your lawn mower blades.

### ROTATION CENTER *versus* MASS CENTER

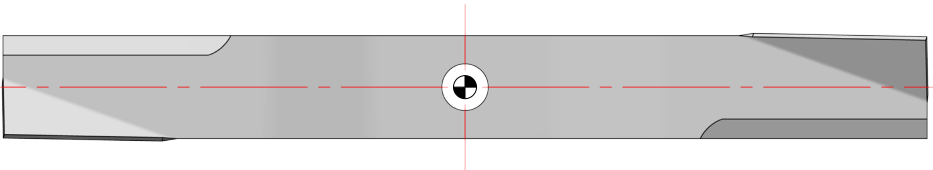
**ROTATION CENTER** (center of rotation) is the lawn mower blade's center of rotary motion. The rotation center is shown in the image below at the center of the crosshair.



**MASS CENTER** (center of mass) is the middle point where all the weight of the blade is concentrated. It represents the unique point in a body that describes its response to external forces and torques. Steel is not evenly distributed, machining and sharpening are not 100% consistent, therefore the mass center and rotation center are rarely in the same place. The universal symbol for a “mass center location” is a circle with two filled opposing quarters, as shown to the left.

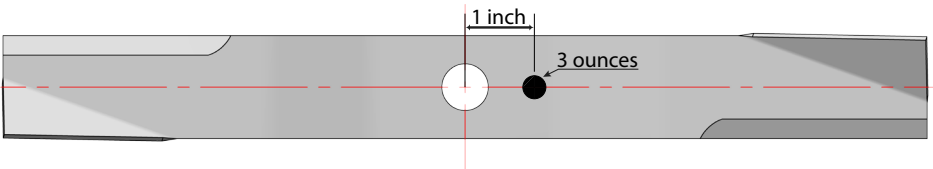


If the mass center and the rotation center are in the same place (as shown below) the blade below is statically in-balance.



### Unbalance Units of Measure

If a blade has an unbalance moment of 3 oz·in it means that there are three ounces of weight one inch away from the rotation center. For example “ounce inch” is a measure of torque just like “foot pounds” or (lb·ft), when using a torque wrench. When unbalance is calculated the unit of measure is “ounce inch” (displayed mathematically as **oz·in**). In the metric system it is “gram millimeter” (displayed mathematically as **g·mm**).

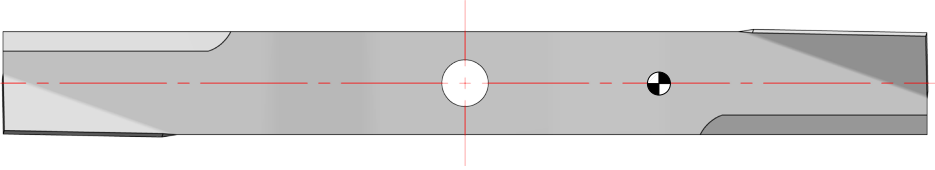


# UNBALANCE EDUCATION

## What is Horizontal Unbalance?

This blade is a larger view of a horizontal unbalance condition.

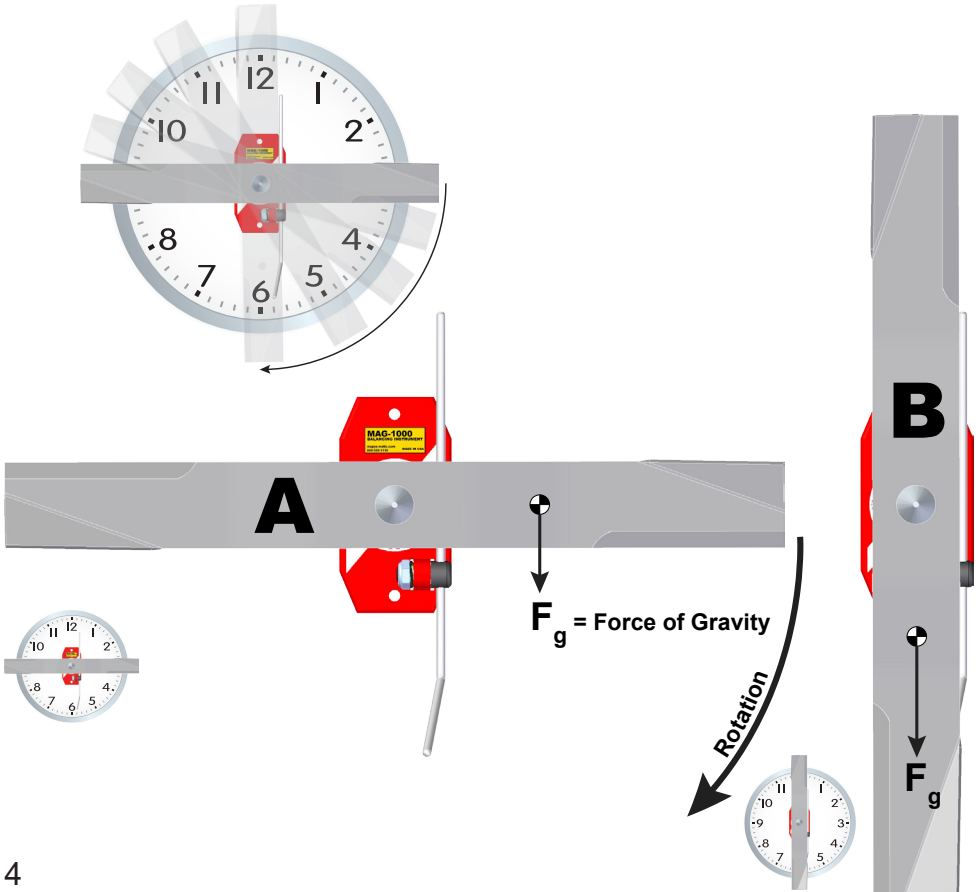
*This is most often caused by inconsistent wear and sharpening.*



The above blade shows the mass center symbol to the right of the rotation center. Image “**A**” shows this blade on the MAG-1000 in the horizontal position with the mass center to the right of the rotation center. This condition will cause the right-side (heavy side) to rotate clockwise and come to rest as shown in image “**B**.” The mass center could be to the left of the rotation center which would cause it to rotate counter-clockwise.

**A** = Start position (horizontal) (3 o'clock and 9 o'clock)

**B** = Rest position (vertical) (12 o'clock and 6 o'clock)

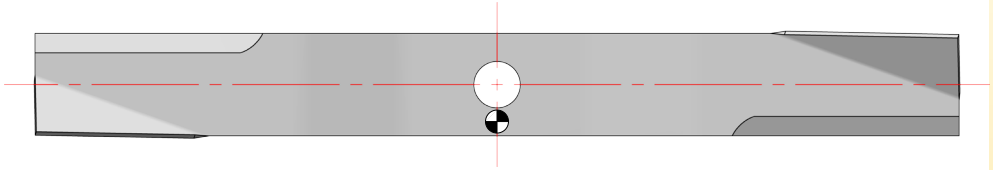


# UNBALANCE EDUCATION

## What is Vertical Unbalance?

This blade is a larger view of a vertical unbalance condition.

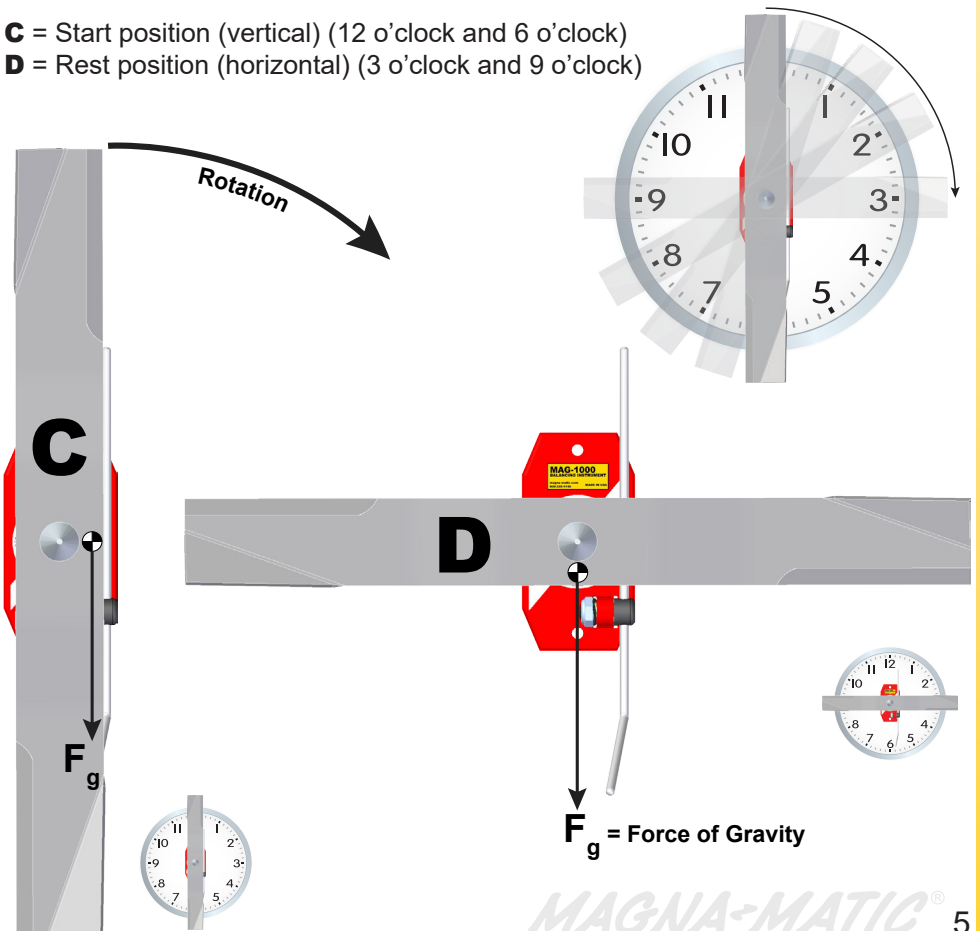
*This is most often caused when the mounting hole is not stamped in the center of the blade.*



The above blade shows the mass center symbol below of the rotation center. Image “C” shows the blade on the MAG-1000 in the vertical position with the mass center to the right of the rotation center. This condition will cause the right-side (heavy side) to rotate clockwise and come to rest as shown in image “D.” The mass center could be to the left of the rotation center which would cause it to rotate counter-clockwise.

**C** = Start position (vertical) (12 o'clock and 6 o'clock)

**D** = Rest position (horizontal) (3 o'clock and 9 o'clock)



# Mounting the Balancer

## Mounting Options:

1. On a wall or a vertical surface (1/4" screws, not supplied)
2. On the 10400-05 Balancer Arm Stand (1/4" bolts supplied with stand)
3. On the MAG-10400 Service Center Stand (1/4" bolts supplied with stand)

## Mounting Conditions:

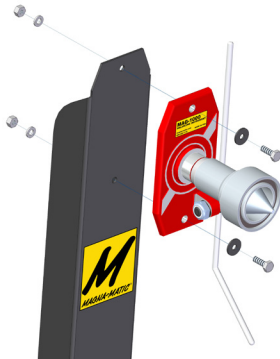
1. All mounting options must be vertical  $\pm 5^\circ$
2. Ensure there is enough clearance around the balancer to allow the blade to freely rotate without interference.
3. Keep the balancer mounting location away from forced air movement (fans, wind, open doors, windows, etc.)



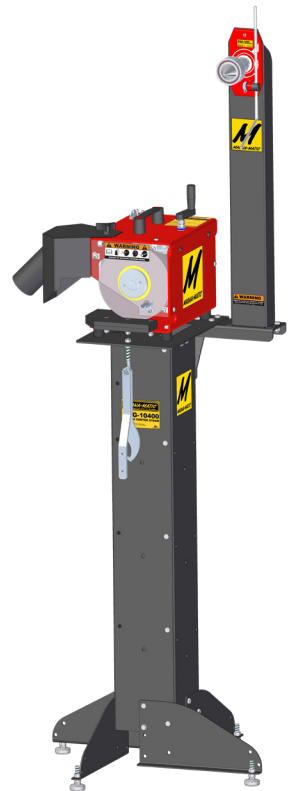
MAG-1000 mounted to a wall.



MAG-1000 mounted to 10400-05 Arm Stand.



Mounting diagram for the 10400-05 and MAG-10400



MAG-1000 mounted to the MAG-10400 stand shown with MAG-9000 Sharpener.

# Inspect the Balancer

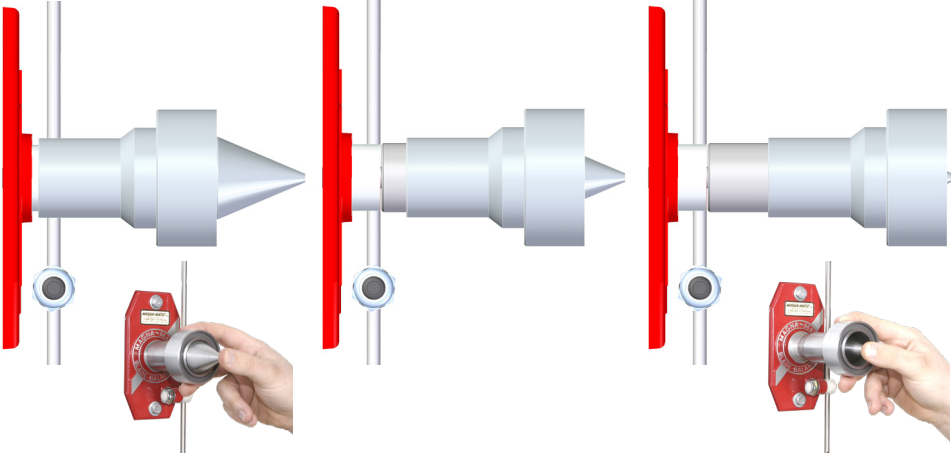
## BALANCER SLIDE INSPECTION

The magnet sleeve should slide smoothly over the cone. Manual hand-force is necessary to move the magnet.

**WIPE OFF PRESERVATIVE OIL FROM MAGNET.**



The slide will have substantially more resistance when the balancer is below 55° F. Above 60° F the slide will have less resistance. Slide resistance will decrease over the life of the balancer due to wear. Never strike the balancer with a hammer. Never force the slide with more than hand strength.



# CAUTION

**DO NOT SPIN THE BALANCER WITH OR WITHOUT A BLADE MOUNTED.**

**IT IS UNSAFE TO SPIN THE BALANCER**

## BALANCER ROTATION INSPECTION

Rotate the balancer (one revolution) to assure the bearings are free to rotate.

Do not spin the balancer at high speed it is an unsafe practice.

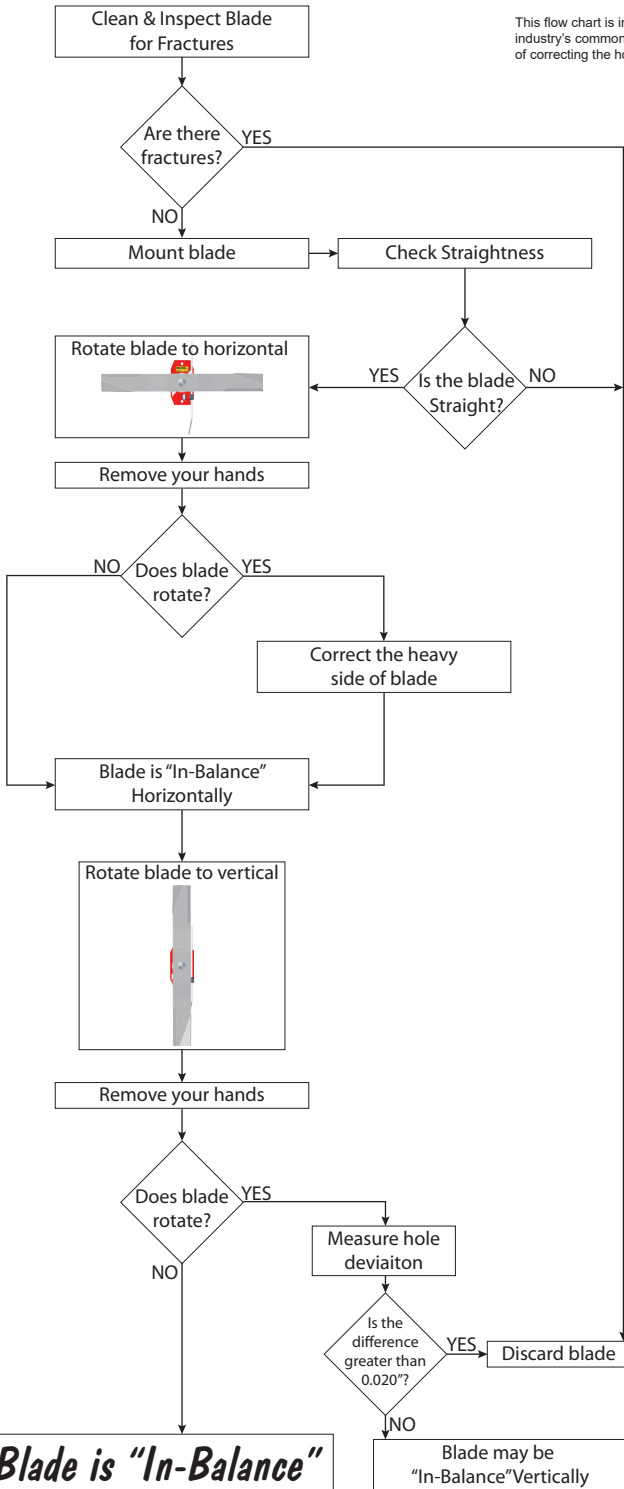
Do not spin a blade or rotary part on the balancer. The blade may come loose from the magnet. This is an unsafe practice that may result in injury.



**NOTE: Always wear protective gloves when handling lawn mower blades - gloves were not worn in photos to show maximum detail of hand positions. The wall has been removed from the picture to improve the view.**

# Blade Balancing Process Flow Chart

This flow chart is in accordance with the industry's common blade balancing practice of correcting the horizontal axis.





# STEP 1

## Mount the Blade or Rotary Part on the Balancer

### BLADE PREPARATION AND INSPECTION

1. Clean the blade of all dirt and vegetable material.
2. Visually inspect the blade for fractures or material failure.

Use a hand wire brush or the MAG-12008 lawn mower blade cleaning machine to clean the blade. This will greatly improve the magnetic “holding force” of the balancer and the accuracy of the reading.

If the blade or rotary part has fractures or material failure it should be **DISCARDED**.



## WARNING

DO NOT WELD LAWN MOWER BLADES



## CAUTION

LAWN MOWER BLADES HAVE SHARP EDGES - ALWAYS WEAR PROTECTIVE GLOVES AND SAFETY GLASSES!



1. Hold the blade with two hands and locate the center hole of the lawn mower blade on the cone.
2. With your index fingers, pull the magnetic chuck towards the blade.
3. The blade is now securely located on the cone and held by the magnet.
4. Slowly let go and make sure the blade is held firmly by the magnet before completely removing your hands.



**NOTE:** Always wear protective gloves when handling lawn mower blades - gloves were not worn in photos to show maximum detail of hand positions. The wall has been removed from the picture to improve the view.

# STEP 2

## Check Blade Straightness

1. Rotate the blade on the balancer to the vertical position.
2. Position the gauge rod in close proximity to (or touching) the underside of the blade near the tip.
3. Take note of the distance between the gauge rod tip and the blade.
4. Rotate the blade 180°.
5. Compare the two distances.

### General Straightness Tolerance Guide:

14" - 20" long blades can allow up to 1/4" difference

21" - 28" long blades can allow up to 3/8" difference

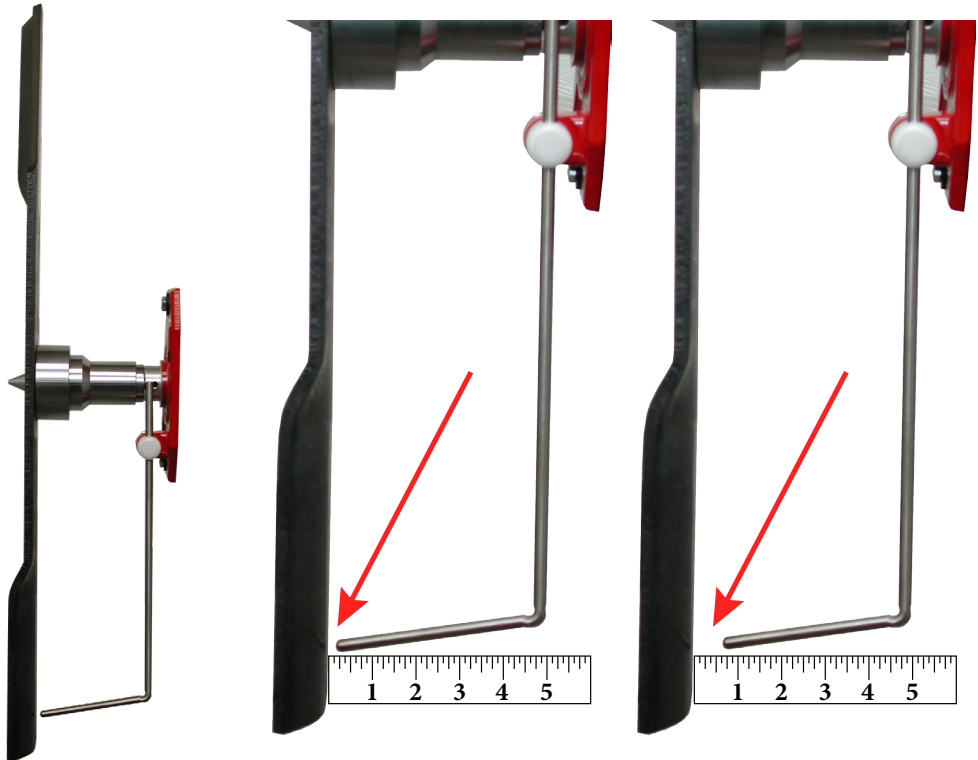
See your mower blade manufacturer's tolerance requirements to determine if the blade should be discarded. **Never attempt to straighten a lawn mower blade; you may create fractures that could cause the blade to break apart during use and be propelled by the mower.**



# WARNING

DO NOT ATTEMPT TO STRAIGHTEN LAWN MOWER BLADES.

DISCARD BENT BLADES



# STEP 3

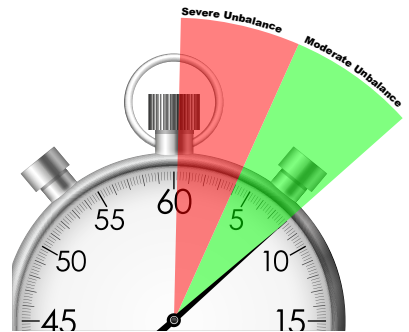
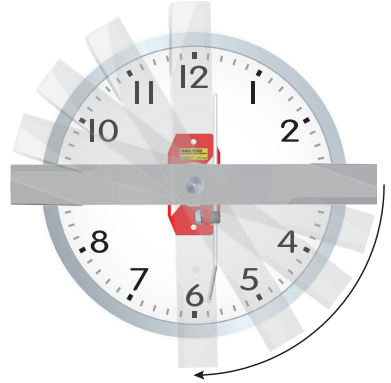
## Horizontal Unbalance Indication & Correction

1. With the blade mounted on the MAG-1000, rotate it to the horizontal position.
2. Remove your hands, let gravity act, and observe the blade.
3. A horizontal unbalance condition will cause the heavy end of the blade to rotate clockwise or counter-clockwise towards 6 o'clock.
4. The acceleration of the heavy end is an indication of how severe the horizontal unbalance condition is.
5. To correct a horizontal unbalance condition material should be ground from the cutting edge of the heavy side (use a MAG-8000 or MAG-9000.)
6. The above process may need to be repeated several times to correct the horizontal unbalance condition.

### UNDERSTANDING BLADE ACCELERATION ON THE MAG-1000

A lighter blade (1-2 lbs) requires less time to show its unbalance condition than a heavy blade (3-4 lbs). The bullet points below are measurements of time the blade takes to make a quarter turn from the horizontal position (3 to 6 o'clock). In this case there is no benefit to wait for the blade to come to rest.

- **Severe unbalance condition moves FAST - 0.1 to 3 seconds**
- **Minor unbalance condition moves SLOW - 4 to 8 seconds**



# STEP 4

## Vertical Unbalance Indication & Determination

1. With the blade mounted on the MAG-1000, rotate it to the vertical position.
2. Remove your hands, let gravity act, and observe the blade.
3. A vertical unbalance condition will cause the heavy end of the blade to rotate clockwise or counter-clockwise towards 6 o'clock.
4. The blade will come to rest in the horizontal position.
5. To confirm a vertical unbalance condition, measure the mounting hole to see if it is in center. See page 12 for measurement instruction.

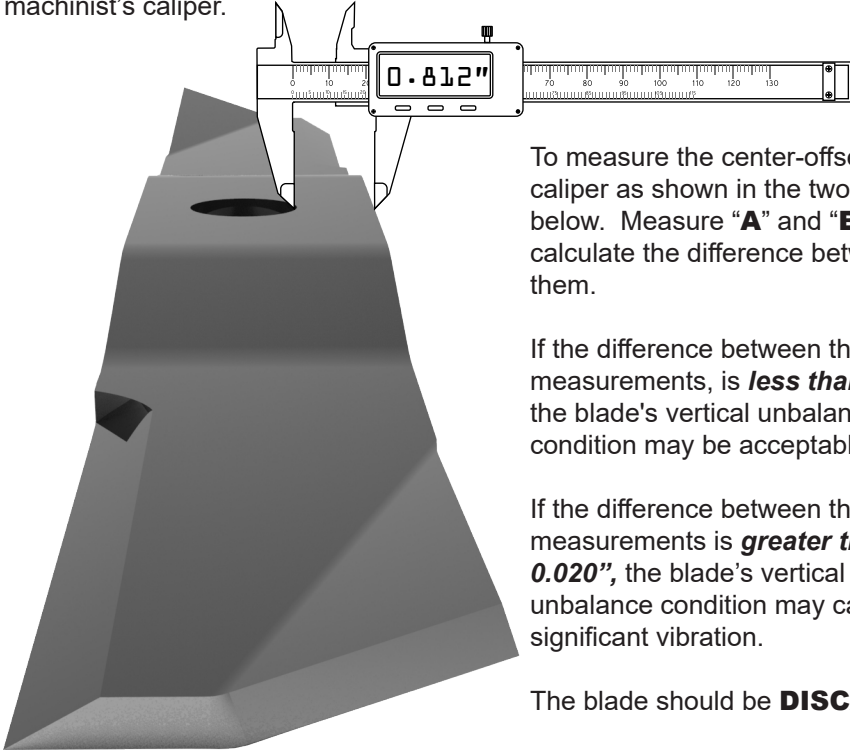
There is no safe correction process for a vertical unbalance condition in a lawn mower blade.

# STEP 4 continued

## Blade Hole Center-Offset Measurement

How to measure the center-offset of the mounting hole after a vertical unbalance condition has been determined.

It must be clearly understood that the center-offset measurement is a reasonable check to remove undesirable blades from use. It does not correct a vertical unbalance condition. The easiest tool to measure the center-offset is a machinist's caliper.

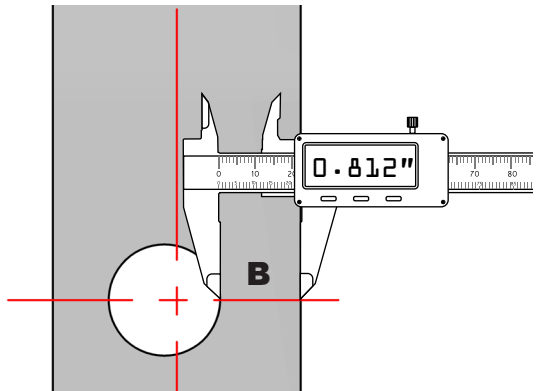
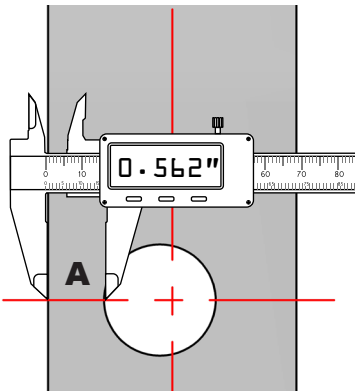


To measure the center-offset use the caliper as shown in the two images below. Measure "**A**" and "**B**" then calculate the difference between them.

If the difference between the two measurements, is **less than 0.020"** the blade's vertical unbalance condition may be acceptable for use.

If the difference between the two measurements is **greater than 0.020"**, the blade's vertical unbalance condition may cause significant vibration.

The blade should be **DISCARDED**.



# STEP 5

## Remove the Blade or Rotary Part from the Balancer



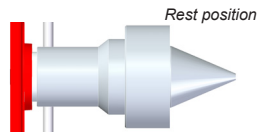
# CAUTION

LAWN MOWER BLADES HAVE SHARP EDGES - ALWAYS WEAR PROTECTIVE GLOVES AND SAFETY GLASSES!

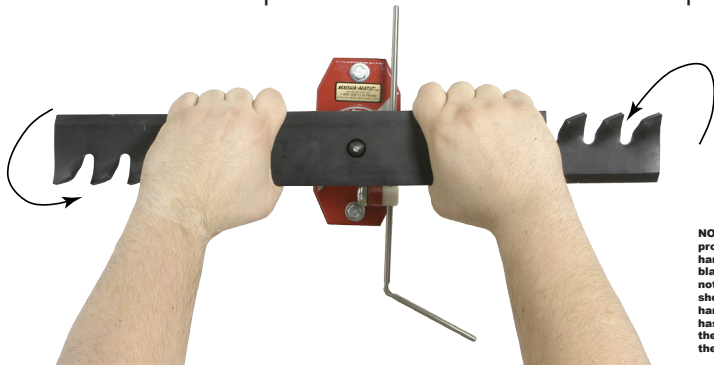


The safe way to remove a blade from the balancer without damage to the balancer, or injury to the operator is to twist the blade.

See the image below showing the twisting motion. Use the blade as a lever to remove it from the balancer's magnetic chuck. This will release the blade from the magnetic pull with the least amount of force.



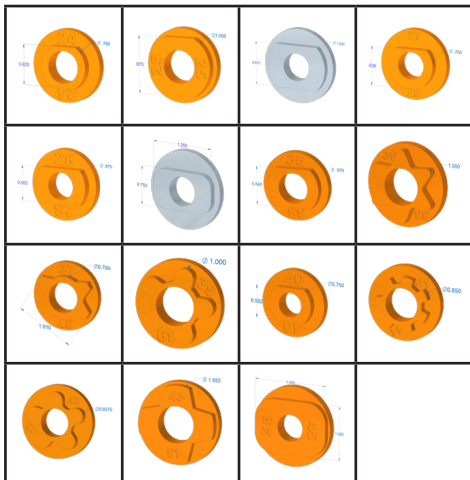
After the blade has been removed from the balancer remember to push the magnetic chuck back to the rest position so the slide is covered and protected.



**NOTE:** Always wear protective gloves when handling lawn mower blades - gloves were not worn in photos to show maximum detail of hand positions. The wall has been removed from the picture to improve the view.

### Lawn Mower Blade Mounting Hole Adapters

These blade hole adapters allow accurate centering of odd shaped blade mounting holes in OEM and aftermarket blades. Often aftermarket blade manufacturers create odd shaped holes or rectangular holes to fit special shaped OEM spindles. Without these adapters it is impossible to balance these blades. The adapters are designed and made in the USA by Magna-Matic for use with Magna-Matic blade balancing instruments. Purchase adapters at: [www.magna-matic-direct.com](http://www.magna-matic-direct.com)



Part #	Description
1000-24	Double "D" 5/8"x3/4" dia WHEELHORSE
1000-25	Double "D" 7/8"x1" dia MURRAY
1000-26	Double "D" 7/8"x1-1/4" dia CRAFTSMAN
1000-27	Single "D" 0.635"x3/4" dia HOMOKO
1000-28	Double "D" 9/16"x7/8" dia JACOBSON
1000-29	Double "D" 3/4"x1-1/4" dia YAZOO
1000-35	Double "D" 0.645"x0.900" dia WALKER
1000-36	Six Point Star 1.010" dia MTD & CUB CADET
1000-37	Four Point Star "bow tie" MTD
1000-39	Five Point Star 1" dia HUSQVARNA
1000-40	Double "D" 0.562x0.750" dia TROYBUILT
1000-41	Gear Look 0.85" dia JOHN DEERE
1000-42	Five Point Star .9375" dia HUSQVARNA & CRAFTSMAN
1000-43	Four Point Star 1.055" dia Raven America Mowers
1000-45	Double "D" Gravley
1000-38	FULL SET OF 15 ADAPTERS

# Balancer Care

All Magna-Matic balancers are precise, highly accurate instruments made to indicate the unbalance condition of rotary blades, hub products, impellers, and other rotary parts. Additionally, it gauges the flatness/straightness between the cutting edges of lawn mower blades.

Run-out gauges can be attached to the gauge rod to get run-out readings when balancing circular saws or other discs.

## DO

- DO keep balancer clean, by wiping external surfaces with light oil
- DO store balancer in cool dry environment
- DO push the magnetic chuck back to cover the greased slide
- DO apply a light oil to the magnet rings, they are un-plated
- DO cover the balancer with a sock or cloth when not in use
- DO remove any metal chips from the magnet front and rear

## DO NOT

- DO NOT strike the balancer with a hammer
- DO NOT drop or misuse the balancer
- DO NOT remove the bearings
- DO NOT disassemble the balancer
- DO NOT remove the grease from the slide
- DO NOT spin the balancer

Magna-Matic balancing instruments are repairable and re-buildable. If you believe your balancer is not indicating unbalance correctly see page 15 and complete the calibration test.

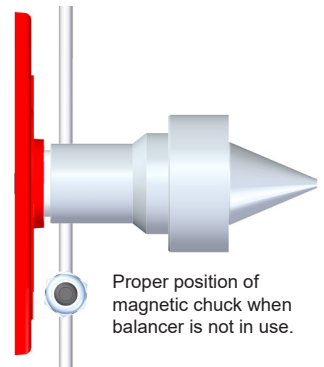
Keeping the balancer clean and free of metal chips or dust is the most important thing you can do to keep your balancer accurate and reliable. Always push the magnetic chuck back so that the grease slide is covered. If the magnet is left in the forward position metal dust and dirt will collect on the slide. This will dry out the grease and cause undue wear to the slide. If the tolerance in the slide is compromised, so is the balancers accuracy. The metal dust and dirt can also create an interference with the slide, preventing its movement.

### *Seasonal Storage Suggestions*

During the winter season (in colder climates) when the balancer is not in use, we advise storing it in a temperature controlled building. You may loosen the set screw in the aluminum base bracket and store just the balancer body.

### *Humid Climate Storage Suggestions*

If your workshop is in a very humid climate, we strongly advise the application of light machine oil to the external surfaces of the balancer to help prevent corrosion.



# Calibration Test

## Pre-conditions of the calibration test.

1. The balancer must be clean, check for metal chips on the face and rear of the magnet. If balancer is new wipe off preservative oil.(see page 14)
2. It must be correctly mounted (see page 6)
3. Ensure that no other external forces influence the movement of the balancer (fans, wind, open doors, windows, etc.)

## Begin the calibration test.

1. Make a mark on the magnet ring of the balancer (use dry erase marker or pencil).
2. Rotate the mark to 1 o'clock, let go of the balancer without imparting any motion.
3. Observe if the balancer rotates on its own.
4. Repeat 2 & 3 for every position of the clock face 2 o'clock and so on.
5. If the mark did not move at any position = TEST PASS
6. If the mark moved on its own = TEST FAIL



If the balancer fails this test it should be sent to Magna-Matic for re-calibration.

Re-calibration is done at no charge\* for the life of your Magna-Matic balancer (\*shipping charges apply.) We offer this free service to help ensure the accuracy of our products in the field.

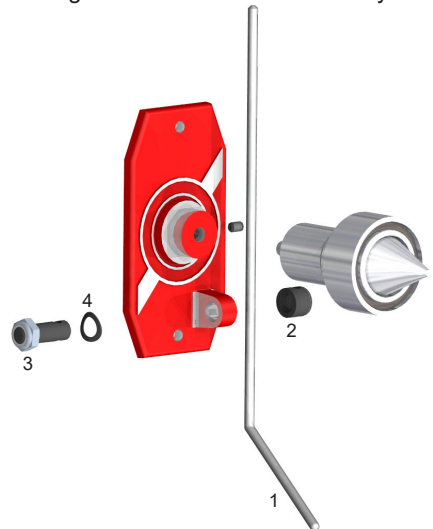
## RECONDITIONING SERVICE

All Magna-Matic balancers dating from the 1950's to present can be repaired and reconditioned. It is possible to repair a balancer if it has been damaged. Send the balancer to us for a reconditioning evaluation and quote. Or call us 800.328.1110 or 920.564.2366 with any questions. When you send a balancer to Magna-Matic be sure to include your contact information inside the box.

### SHIP TO:

Balancer Reconditioning  
Magna-Matic Corporation  
W4599 County Road IW  
Waldo WI 53093 USA

Key #	Part #	Description
1	1000-03	Gauge Rod
2	1000-04	Gauge Rod Bushing
3	1000-05	Gauge Rod Stud
4	1000-06	Wave Washer



# WARRANTY

MAGNA-MATIC CORPORATION (the "Manufacturer") warrants Manufacturer's products (the "Products") will be free from defects in manufacture by Manufacturer (the "Warranty"). The Warranty will be effective and valid for a period of one (1) or two (2) years, as indicated on the Warranty certificate or Manufacturer's website (<http://www.magna-matic.com>), beginning on the date in which Manufacturer ships the Product (the "Warranty Period") from manufacturer's facility directly to Manufacturer's distributor or customer/end user (the "Customer"). The Warranty shall obligate Manufacturer to repair or replace (in Manufacturer's discretion) defective Products as provided below. Manufacturer shall maintain records, including Manufacturing Process Instructions, for all Products for a period equal to the Warranty Period. Upon the expiration of the Warranty Period, Manufacturer will have no further obligation to Customer with respect to a Product that is non-conforming and/or defective for any other reason.

To take advantage of the Warranty, Customer must take the following three steps: (1) Customer must promptly notify Manufacturer after Customer becomes aware that it has a defective Product, which in all events must be within thirty (30) days of Customer's discovery of the defect and within the Warranty Period; and (2) Customer must provide detailed digital pictures and/or must return the defective Product to Manufacturer immediately thereafter and/or make the Product available to Manufacturer for inspection (at Manufacturer's request/discretion), and in no event more than thirty (30) days after any notification provided in (1) above; and (3) Customer must insure the defective Product until Manufacturer receives and accepts it. After Customer has taken the above steps, Manufacturer will evaluate the Product to determine if Customer's warranty claim is valid and to determine what, if any, remedy is available to Customer. Customer must return or make available all defective Products with complete documentation associated with the defective Product.

The Warranty shall be invalidated if: (1) damage to the Product is the result of misuse or abuse by Customer or any end user of the Product; or (2) if the Product has been modified by Customer or any end user of the Product; or (3) if any defects in the Products are caused as a result of Manufacturer following Customer's specifications in manufacture that contain any problems, faults, errors, miscalculations, or discrepancies in the specifications. If Manufacturer decides to repair or replace the defective Product, Manufacturer will ship the repaired or replaced Product (both, a "Repaired Product") F.O.B. the shipping point and all of the provisions in this Warranty pertaining to the Products will apply to the Repaired Product, including but not limited to, the risk of loss provisions set forth above. Notwithstanding the prior sentence, the Warranty Period for a Repaired Product will not be restarted, but instead will expire at the same time as though the Repaired Product was never a defective Product but rather the Product at all times.

THE WARRANTY PROVIDED HEREUNDER IS THE ONLY WARRANTY MANUFACTURER PROVIDES TO CUSTOMER, AND SHALL BE IN THE PLACE OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE OR NONINFRINGEMENT, OR ANY OTHER OBLIGATION ON MANUFACTURER'S PART. NO ORAL OR WRITTEN STATEMENTS MADE BY MANUFACTURER, EXCEPT THOSE MADE IN THIS WARRANTY SHALL BE CONSIDERED A WARRANTY OR CONSIDERED TO HAVE ANY LEGAL EFFECT. ADDITIONALLY, NO SAMPLES, MODELS, OR PROTOTYPES MANUFACTURER PROVIDES TO CUSTOMER SHALL BE CONSIDERED A WARRANTY OR CONSIDERED TO HAVE ANY LEGAL EFFECT.

CUSTOMER'S EXCLUSIVE REMEDIES FOR MANUFACTURER'S BREACH OF WARRANTY SHALL BE ONE OF THE FOLLOWING: (A) THE REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT; OR (B) THE REFUND OF THE PRICE CUSTOMER PAID FOR THE DEFECTIVE PRODUCT. THE REMEDIES SET FORTH ABOVE SHALL BE DETERMINED IN MANUFACTURER'S SOLE DISCRETION. ANY SHIPPING COSTS ASSOCIATED WITH VALID WARRANTY PRODUCTS THAT MANUFACTURER AND CUSTOMER HAVE MUTUALLY AGREED UPON SHALL BE PAID BY MANUFACTURER.

UNDER NO CIRCUMSTANCES WILL MANUFACTURER BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE SALE, MANUFACTURE, OR USE OF THE PRODUCT, WHETHER BASED UPON BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT, OR ANY OTHER LEGAL THEORY. MANUFACTURER'S LIABILITY IN CONNECTION WITH THE SALE OR USE OF THE PRODUCT WILL NOT EXCEED THE PRICE OF THE PRODUCT UNDER ANY CIRCUMSTANCES. BY WAY OF EXAMPLE, IF A SINGLE PRODUCT CAUSES ANY DAMAGES, MANUFACTURER'S LIABILITY WILL NOT EXCEED THE PRICE OF THAT SINGLE PRODUCT. DAMAGES REFERRED TO IN THIS PROVISION INCLUDE, BUT ARE NOT LIMITED TO, LOSS OF PROFITS, REVENUE, OR USE OF THE PRODUCT; THE COST OF CAPITAL, SUBSTITUTE PRODUCTS, REPLACEMENT PRODUCTS, OR DOWNTIME; ANY CLAIMS OF THIRD PARTIES, INCLUDING, BUT NOT LIMITED TO, CUSTOMER'S CUSTOMERS OR OTHER USERS; DEATH; PERSONAL INJURY; AND INJURY TO PROPERTY.

## CE DECLARATION OF CONFORMITY

### Manufacturer Declaration

According to EC Machinery Directive 2006/42/EC, Annex II A

We, MAGNA-MATIC W4599 County Road IW Waldo, WI 53093, herewith declare, that the following machine complies with the appropriate basic safety and health requirements of the EC Directive based on its design and type, as brought into circulation by us. In case of alteration of the machine, not agreed upon by us, this declaration will lose its validity.

Machine: MAG 12008, MAG 8000, MAG 9000

Applicable EC Directives:

EC Machinery Directive 2006/42/EC  
EC Low - Voltage Directive 2006/95/EC



Applicable Harmonized Standards: BSENISO 12100:2010

BSEN 61029-1:2009+A11:2010  
BSEN 61029-2-4:2011

Printed Name: Gerd F. Bauer II

Title: Vice President

Date: 1 January 2015



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