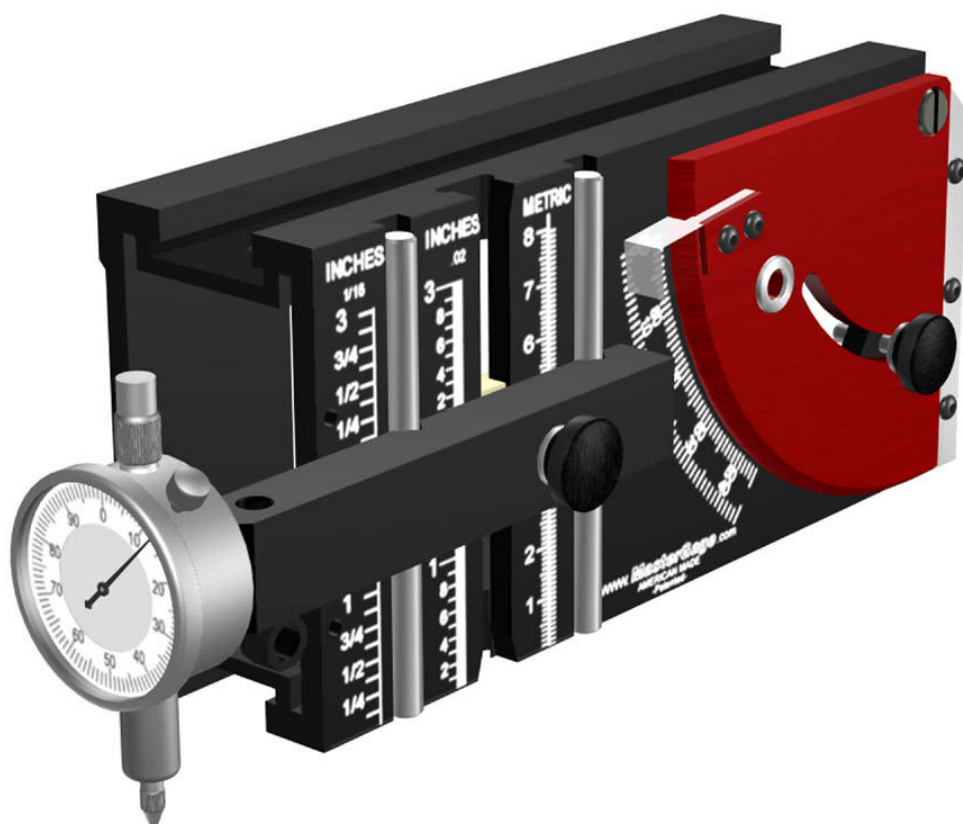


MasterGage/Professional Owner's Manual



“Master Your Machinery”™

**Getting control of all of your woodworking machinery with the
powerful features of the *MasterGage/Professional***

Preface

Machinery illustrated in this Manual is generic. There is a vast range of woodworking machinery available, both domestic, imported - new and old. It is impossible to show all makes and models of these machines along with their adjustment features. Consult your machines Owners Manual for methods of adjustment, etc. If you do not have a Manual, consult the manufacturers dealer.

Legal Notices

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Patents

The *MasterGage/Professional* and all other *MasterGage* products are protected by one or more of the following United States Patents:

5,491,906

6,665,946

6,766,584

6,901,672

5,826,346

6,594,913

D,574,862

7,245,199

Plus other patents pending.

No rights are extended to any entity to reproduce these patented features at any time or place.

Product Improvement

We at *MasterGage Corporation* are constantly striving to improve our products. We reserve the right to change specifications, modify products and/or prices at any time and without notice.

SAFETY INSTRUCTIONS

ALWAYS TURN OFF AND UNPLUG the tool/machinery **BEFORE** using the *MasterGage/Professional System* on any power tool/machinery

Welcome to *MasterGage*

Dear Valued Customer:

I'd like to welcome you into our family of valued customers. **MasterGage** is a manufacturer of high quality, precision tooling for those who demand the very best tools.

All **MasterGage** products are innovative and original. To illustrate this point, I have been awarded **eight** United States Patents in the development of the **MasterGage** system. The tools that I present to you are the result of my 45+ years as a practicing mechanical engineer involved in many industries developing precision tools and mechanisms. As a woodworker, I found aligning, tuning and trouble shooting my woodworking machines to be unnecessarily difficult to do. I also found, setting up the machines up for various cuts and operations, very time consuming and exasperating. This frustration let me to develop the **MasterGage** system.

The **MasterGage/Professional** is a powerful tool, as this Manual will show, it will allow you to calibrate, tune up and set up any piece of woodworking machinery found in the wood shop. With the **MasterGage/Professional** you have control over any machine you presently own - or any you plan to acquire in the future. Easily portable, you can use the *Professional* on any machine, in the production shop, in the field or in the home shop. No need to rely on any machine scales, since you are always reading the laser precision scales on the **MasterGage/Professional** or the super accurate Dial Indicator. You will also get automatic conversions of any dimension from one system to another, whether it is in fractions, decimals inches, millimeters, centimeters or degrees of angles. Now you are in control of all of your equipment and projects.

This Manual guides you through most of the woodworking equipment alignment, calibration tune-up and troubleshooting. Keep in mind that alignment and calibration is **NOT A ONE TIME EVENT**. You must check your machinery regularly. All machine misalignment is invisible and dangerous. Once all your equipment is aligned and tuned, the **MasterGage/Professional** *really shines* when it comes to setup and re-setup of projects on your machinery. Machine setup that took hours will now only take minutes. This allows you to get right to the fun/business of woodworking **fast**.

For even more versatility and usefulness, I've designed many optional *Accessories* that allow you to "customize" the **MasterGage/Professional** to your particular needs, insuring you will never outgrow this *System*. As you grow in your measurement and calibration needs, you will always find a **MasterGage** *Accessory* to fit your requirements.

Craftsmen involved in any of the following disciplines will find our tools invaluable.

- | | |
|----------------------|---------------------------|
| 1. Woodworkers | 7. Machinists |
| 2. Model makers | 8. Tool makers |
| 3. Pattern makers | 9. Sheet metal workers |
| 4. Finish carpenters | 10. Boat builders |
| 5. Furniture makers | 11. Serious hobbyists |
| 6. Cabinet makers | 12. And many, many others |

Thank you for your business.

Paul Reilly
President, Founder and Inventor

MasterGage.com

Your *MasterGage/Professional* Package

This package contains the following:

1. The ***MasterGage/Professional*** unit
2. The ***MasterGage/Professional*** Manual
3. A precision Dial Indicator, .001 [1/1000 inch] with 1/4 inch travel (Page A11)
4. A 1.0 inch and 2.0 inch stainless steel dial indicator extension – extends the reach of the Dial Indicator (Page A11)
5. A 0.300" diameter hardened stainless steel flat Dial Indicator tip – Hardened to Rockwell 52. Perfect for adjusting and replacing knives on jointers, planers plus adjusting router bit heights (Page A11).
6. Dial Indicator Adapter Assembly – allows you to position the Dial Indicator in different directions for maximum versatility (Page A10).
7. Two Memory Links plus hardware. "Instant Recall" One Memory Link for the Protractor and another for the Level Arm height gauge (Page A6 and A7)
8. A ¼ inch diameter stainless steel precision Index Pin for use on the "Instant Recall" feature on both the Protractor for angles and Level Arm for heights (Pages A6 and A7). The Index Pin also doubles as a Depth Gauge Rod for measuring dado mortise slots, blind drilled holes depths, etc (Pages A8 and A8.1).
9. Hex wrench to recalibrating the Protractor and cursor (Page K1).
10. A Precision Dowel Rod stainless steel precision, ½ inch diameter x 4 inches long. Perfect for calibrating and setting up drill presses, routers, horizontal mortisers and lathes (Pages E1 and E2).
11. A Magnetic Miter Slot Cradle Bar – Attaches to the bottom [and top] of the *Professional*. The Cradle Bar lets you align the saw blade and rip fence easily (Page A9)
12. Magnetic Miter Slot Cradle Bar hex wrench for securing it in position (Page A9).
13. A rugged, double walled carrying case, lined with custom cut foam that nests and protects your *Professional* system. As an added feature, the bottom foam is removable – to let you store your ***MasterPlate*** safely under the foam, on the bottom surface of the case. All your valuable tools are housed together in one safe place.
14. A roll of transparent tape for working surface protection. (Page K1)
15. An enclosed stamped self addressed Post Card, asking you to supply us with a name. We will engrave the name into a solid brass name plate, ready for mounting onto the ***MasterGage/Professional***– free of charge.
A nice way to personalize your *Professional*.
16. A 30 day Money Back Guarantee plus a One Year Guarantee on all materials and workmanship – including the dial indicator
MasterGage.com

MasterGage/Professional System

SECTION **TABLE OF CONTENTS**

A Getting acquainted with your *MasterGage/Professional*

1. ***MasterGage/Professional*** Features (Page A1)
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3. Measuring and Reference Surfaces Defined (Pages A3, A3.1 and A3.2)
4. Description of the Four Measuring Scales (Page A4)
5. Fraction – Decimal – Millimeter Conversion Chart
6. Protractor “***Instant Recall***” feature (Page A6)
7. Height Gauge “***Instant Recall***” feature (Page A7)
8. Using the Depth Gauge Rod (Pages A8 and A8.1)
9. Mounting the ***MasterGage/Professional*** to the Miter Slot Cradle Bar (Page A9)
10. Attaching the Dial Indicator (Page A10)
11. Using the Dial Indicator (Page A11)

B TABLE SAW + ADD-ON SLIDING TABLE KIT + SLIDING TABLE PANEL SAW

C RADIAL ARM SAW + CHOP SAW + SLIDING COMPOUND SAW

D ROUTER + ROUTER TABLE + SHAPER + CNC ROUTERS & MILLS

E DRILL PRESS

F BAND SAW

G JOINTER

H PLANER

I DISK SANDERS + DRUM SANDERS + WIDE BELT SANDERS

J HORIZONTAL MORTISER + DOWELER

K Protractor Calibration and Maintenance

L Useful Tips and Techniques

M Frequently Asked Questions - FAQ

N Accessories

O Ordering information

P ONE YEAR GUARANTEE

SECTION A

MasterGage/Professional

FEATURES

***MasterGage/Professional* Features**

Your ***MasterGage/Professional*** is packed with exciting patented features that are built to last! The body of the *Professional* is fabricated from rugged aircraft quality extruded aluminum. All sides are ground flat, square and parallel to each other to within 0.001 inches [as a reference, the human hair is 0.002 inch]. Once ground, the body is then machined to exacting tolerances [to +/- 0.0002 inches] on computer controlled [CNC] machinery, the surface is then plated with a protective black anodized finish that also presents a superb, black non-glare surface for easy reading of the height scales and protractor markings.

The *Professional* is then precisely and permanently laser etched with scales in inches, millimeters and degrees. This allows the *Professional* to be used on any equipment worldwide - regardless of the measurement standards used.

The *Professional* has a new Patented feature called "*Instant Recall™*" that allows you to recapture any height or angle precisely. By aligning the location hole in the Memory Link™ to the precision hole of either the Protractor or Level Arm you can recall the angle or height with remarkable accuracy and speed. There is capacity for three Memory Links on both the Protractor and the Level Arm height gage.

The *Professional* body has extruded "T" slots in both the top and bottom surfaces, allowing you to insert special magnets. These magnet accessories are powerful rare earth [neodymium boron] magnets, imbedded in a special "T" configuration that slips into the "T" slots. A valuable Accessory that ensures rock solid rigidity, while making critical measurements.

The Protractor is high quality aluminum, with protective red anodized plating, marked with a hairline cursor for easy reading of the laser-etched angles. The actual red hairline is only 0.003 inch (.076 mm) from the laser angular markings, thus eliminating any parallax difficulties. The angular markings are in ½ degree increments. A ¼ degree can easily be read. The Protractor has a stainless steel working edge called a "Knife Edge". This 1/16 inch (1.524 mm) thick piece of steel allows easy angular measurement, since it easily fits between the carbon tips on the saw blade. By doing so, the knife-edge fits flat against the body of the saw blade giving you an exact angular reading. The Protractor can measure both acute angles [less than 90 degrees] and obtuse angles [greater than 90 degrees]. Illustrations on Pages A3.1 and A3.2) show these features. Both linear and angular measurements can be performed in any X, Y or Z axis.

The Level Arm (Page A4) is made of ½" x ¾" x 3 3/8 inch aircraft quality aluminum, hard anodized for durability [hardness equal to sapphire]. The arm is spring loaded so that it automatically levels itself for precise measuring. It never goes out of alignment. The Level Arm is self cleaning, it glides through sawdust with ease and never clogs up.

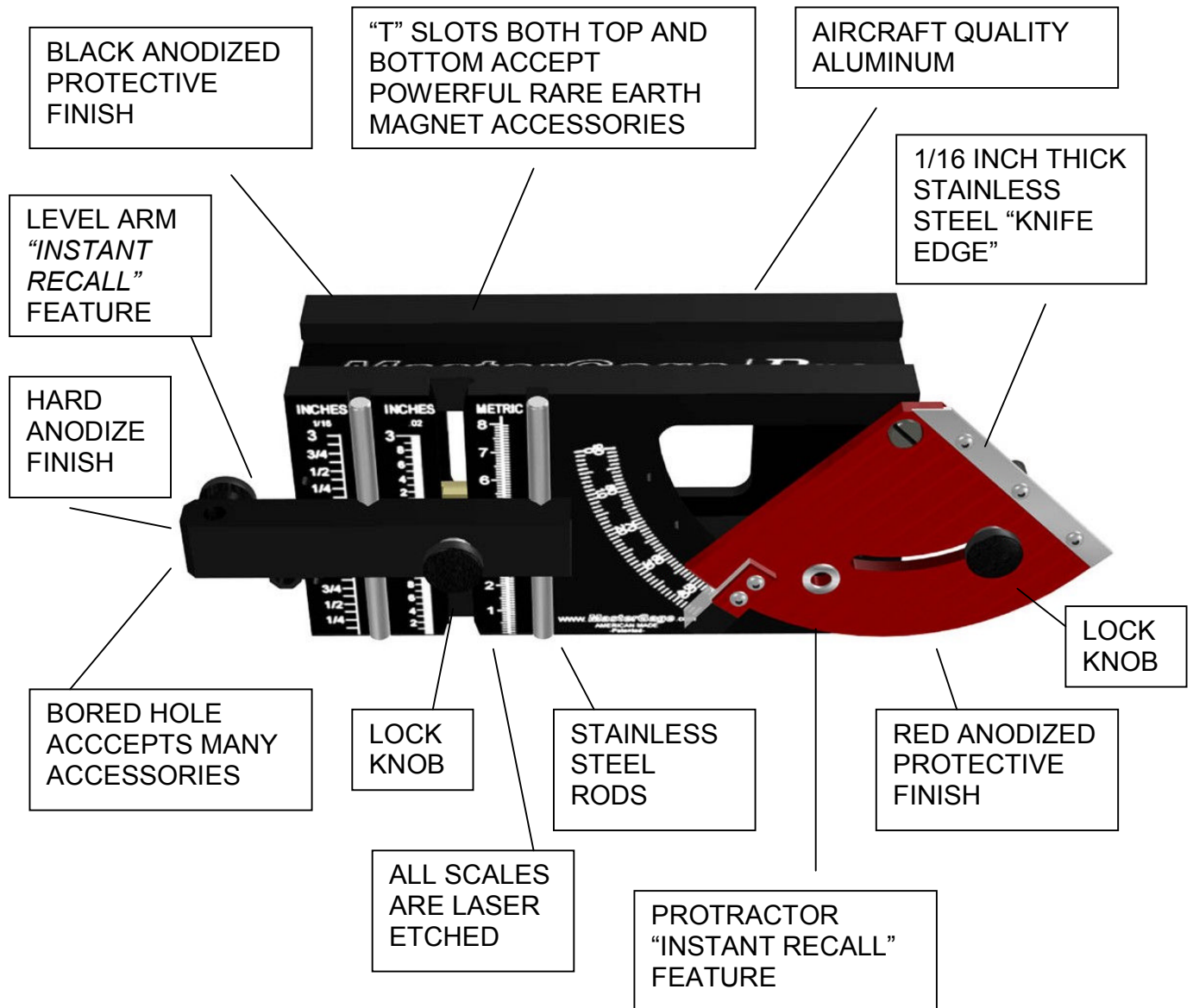
All parts are so precisely made and interchangeable, a part made last year will fit a *Professional* made today, next year and years to come! If a part is lost or damaged, it can be quickly replaced by our factory and fit your *Professional*.

We have made a great effort to present you with a truly remarkable tooling system that will serve you and yours for generations to come.

A2

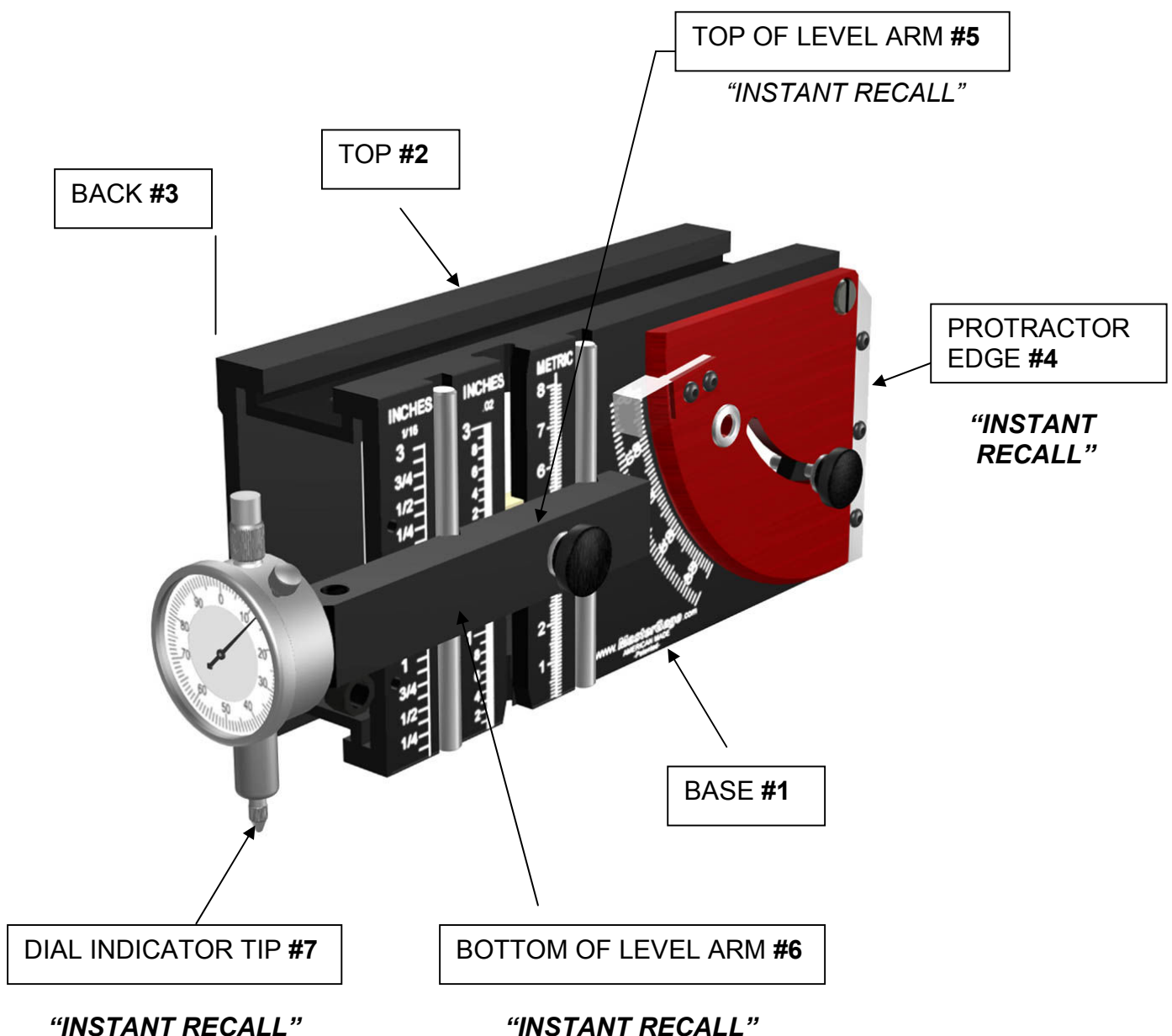
A2

ILLUSTRATED FEATURES



MEASURING AND REFERENCE SURFACES DEFINED

YOU CAN MEASURE AND CALIBRATE FROM ANY ONE OF **SEVEN** REFERENCE SURFACES SHOWN BELOW. ALSO ILLUSTRATED ARE THE SURFACES THAT GIVE YOU USE OF THE “*INSTANT RECALL*” FEATURE

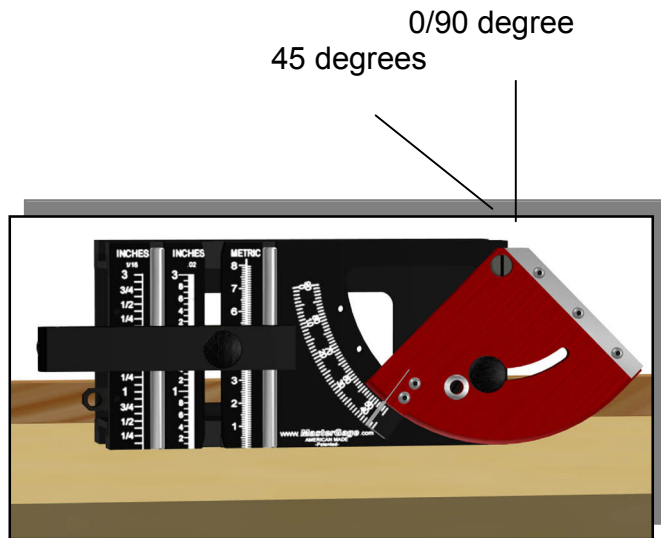


A3.1

A3.1

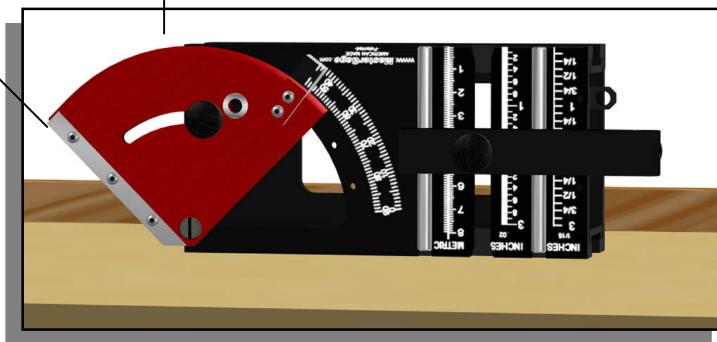
PROTRACTOR MEASURING/REFERENCE SURFACES DEFINED

POSITIONED ON BASE SURFACE – Ability to measure acute angles [less than 90 degrees] in the **VERTICAL** plane



RESTING ON THE BASE

0/90 degrees
135 degrees



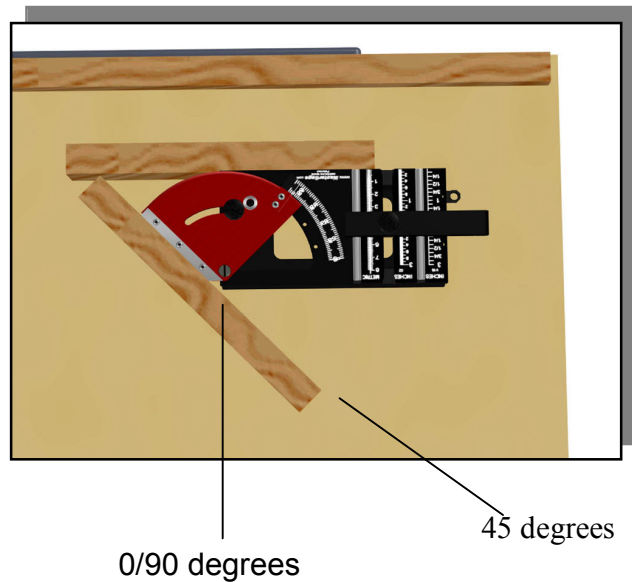
RESTING ON THE TOP

POSITIONED ON TOP SURFACE- Ability to measure obtuse angles [greater than 90 degrees] in the **VERTICAL** plane

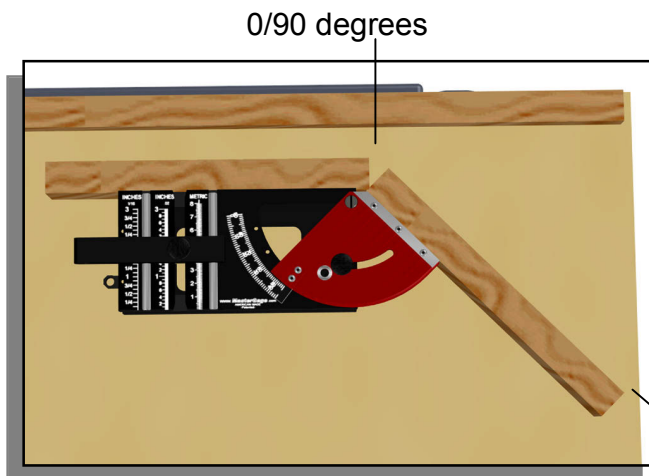
This position is best for measuring blade angle – the full length of the “Knife Edge” is in contact with the saw blade - giving you the most accurate angular readings.

PROTRACTOR MEASURING/REFERENCE SURFACES DEFINED

POSITIONED ON
BACK SURFACE –
Ability to measure
acute angles [less
than 90 degrees] in
HORIZONTAL plane



RESTING ON BACK SURFACE



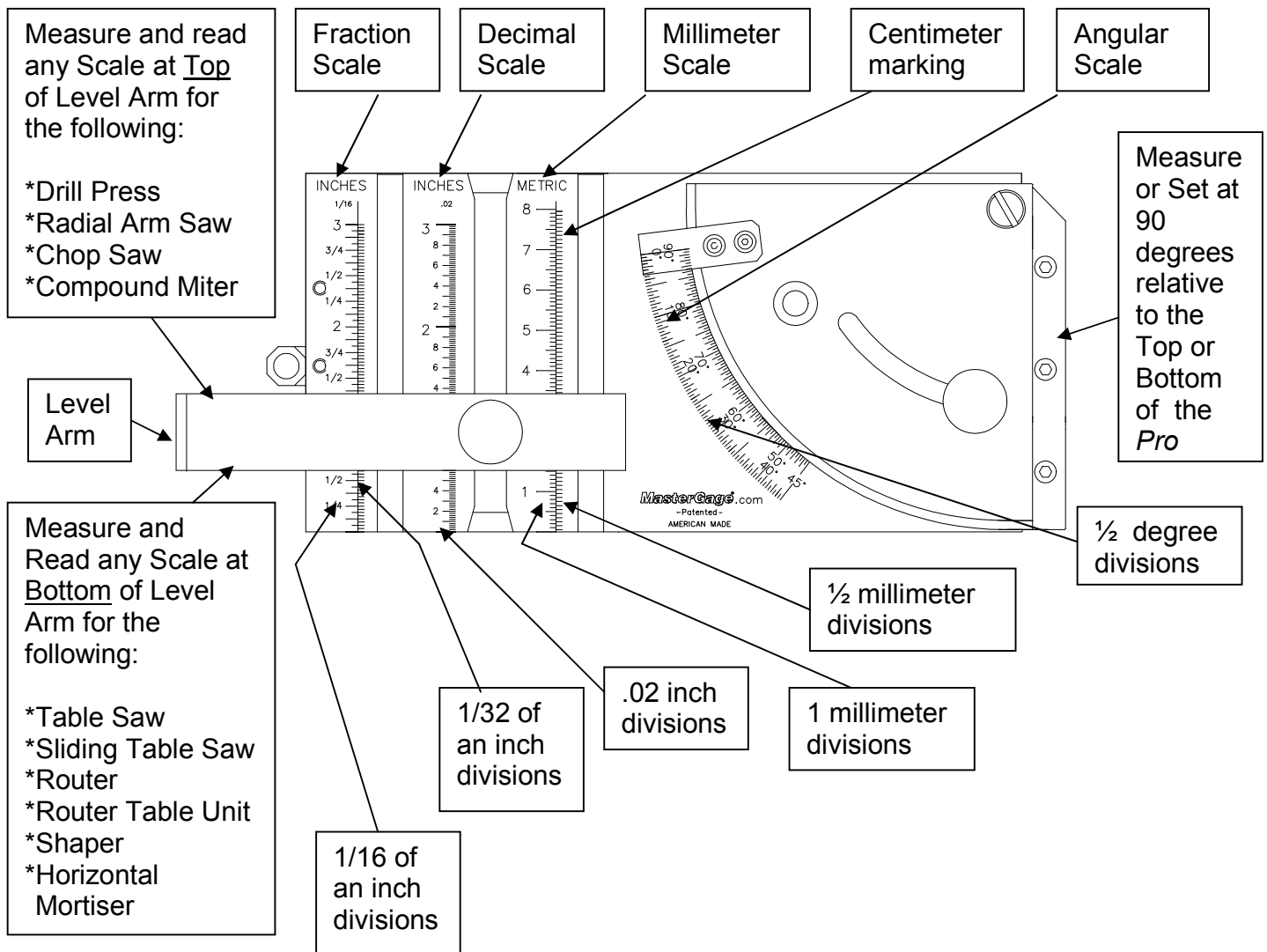
POSITIONED ON
BACK SURFACE -
Ability to measure
obtuse angles [greater
than 90 degrees] in
HORIZONTAL plane

RESTING ON BACK SURFACE

A4

A4

Description of the Four Measuring Scales



All scales on the **MasterGage/Professional** are precision laser etched into anti-glare black surface. Notice that both the Fractional and Millimeter scales are specially designed, with each having a vertical line separating the coarse readings on the left from the fine readings on the right of the vertical line.

Another innovative feature.- with the fractional, decimal and millimeter scales side by side -you can automatically translate and/or compare one scale reading to another scale.

Example: 1. 23 millimeters = .91 inches

2. $\frac{3}{4}$ of an inch = 19 millimeters

The Level Arm is spring activated and automatically aligns itself level to all scales, and never needs calibration. Readings can be taken from the top or bottom surface of the Level Arm — depending on the machine you are working with.

All measurements can be read in either the vertical or horizontal position.

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CONVERSION CHART

Convenient conversions of fractions, decimals and millimeters

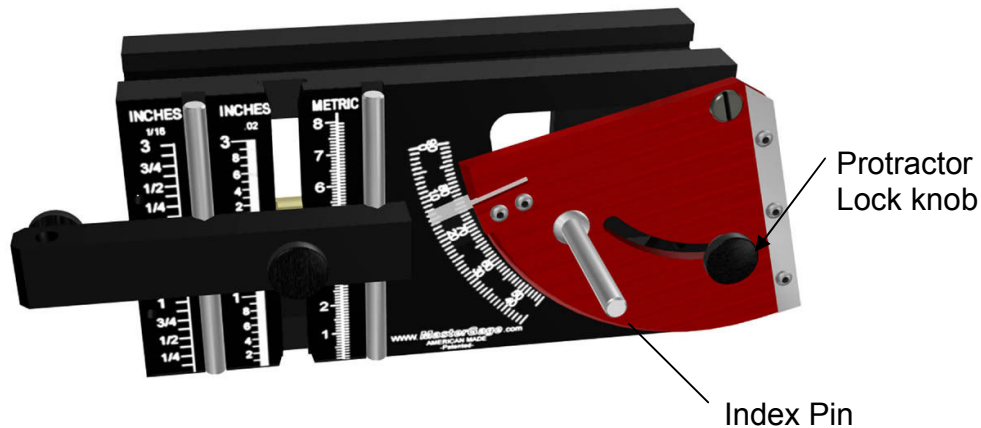
Fractional Inches – Decimal Inches - Millimeters					
Fraction of Inch	Decimal of Inch	Decimal of Millimeters	Fraction of Inch	Decimal of Inch	Decimal of Millimeters
1/64	.016	0.397	(NO FRACTION)	0.512	13.000
1/32	.031	0.793	33/64	0.516	13.097
(NO FRACTION)	.039	1.000	17/32	0.531	13.494
3/64	.047	1.190	35/64	0.547	13.891
1/16	.063	1.588	(NO FRACTION)	0.551	14.000
5/64	.078	1.984	9/16	0.563	14.288
(NO FRACTION)	.079	2.000	37/64	0.578	14.684
3/32	.094	2.381	(NO FRACTION)	0.591	15.000
7/64	.109	2.778	19/32	0.594	15.081
(NO FRACTION)	.118	3.000	39/64	0.609	15.478
1/8	.125	3.175	5/8	0.625	15.875
9/64	.141	3.572	(NO FRACTION)	0.630	16.000
5/32	.156	3.969	41/64	0.641	16.272
(NO FRACTION)	.158	4.000	21/32	0.656	16.669
11/64	.172	4.366	(NO FRACTION)	0.669	17.000
3/16	.188	4.763	43/64	0.672	17.066
(NO FRACTION)	.197	5.000	11/16	0.688	17.463
13/64	.203	5.159	45/64	0.703	17.859
7/32	.219	5.556	(NO FRACTION)	0.709	18.000
15/64	.234	5.953	23/32	0.719	18.256
(NO FRACTION)	.236	6.000	47/64	0.734	18.653
1/4	.250	6.350	(NO FRACTION)	0.748	19.000
17/64	.266	6.747	3/4	0.750	19.050
(NO FRACTION)	.276	7.000	49/64	0.766	19.447
9/32	.281	7.144	25/32	0.781	19.843
19/64	.297	7.541	(NO FRACTION)	0.787	20.000
5/16	.313	7.938	51/64	0.797	20.240
(NO FRACTION)	.315	8.000	13/16	0.813	20.638
21/64	.328	8.334	(NO FRACTION)	0.827	21.000
11/32	.344	8.731	53/64	0.828	21.034
(NO FRACTION)	.354	9.000	27/32	0.844	21.431
23/64	.359	9.128	55/64	0.859	21.828
3/8	.375	9.525	(NO FRACTION)	0.866	22.000
25/64	.391	9.922	7/8	0.875	22.225
(NO FRACTION)	.393	10.000	57/64	0.891	22.622
13/32	.406	10.319	(NO FRACTION)	0.905	23.000
27/64	.422	10.716	29/32	0.906	23.019
(NO FRACTION)	.433	11.000	59/64	0.922	23.416
7/16	.438	11.113	15/16	0.938	23.813
29/64	.453	11.509	(NO FRACTION)	0.945	24.000
15/32	.469	11.906	61/64	0.953	24.209
(NO FRACTION)	.472	12.000	31/32	0.969	24.606
31/64	.484	12.303	(NO FRACTION)	0.984	25.000
1/2	.500	12.700	63/64	0.984	25.003
			1 inch	1.000	25.400

For dimensions greater than 1.000 inch [25.400 mm]

Example: 1 9/32 inches is 1.000 inch + .281 inches [9/32] = 1.281 inches

1 9/32 in millimeters is 25.400 mm [1.000 inch] + 7.143 mm [9/32] = 32.543 mm

PROTRACTOR “INSTANT RECALL” FEATURE



USING THE PROTRACTOR “INSTANT RECALL” FEATURE:

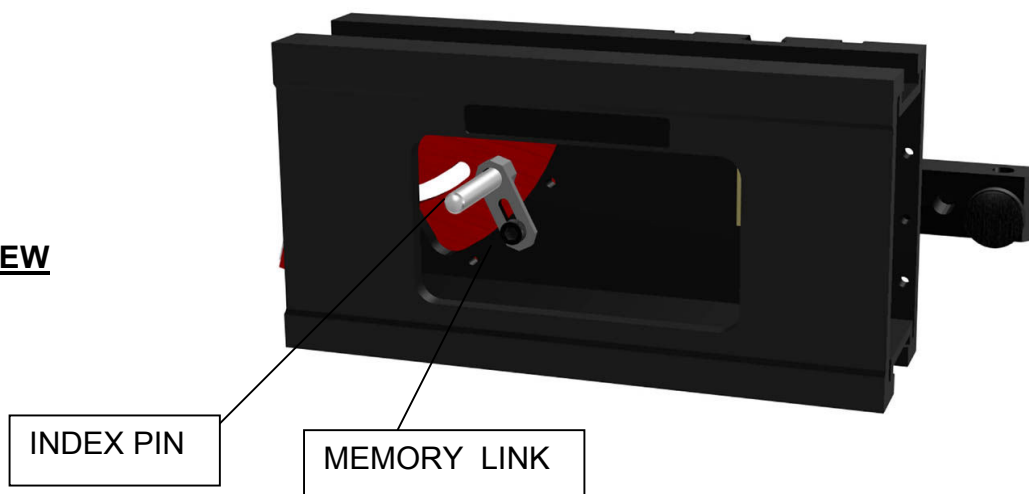
1. Determine the angle needed to recall and lock the Protractor knob.
2. Pass the Locating Pin through the Protractor bushing – align the Memory Link so that the Locating Pin will pass through the Memory Link precision hole.
3. Once this is done, tighten the Memory Link screw, remove the Precision Pin and proceed to use the Protractor as normal.

TO PERFORM THE “INSTANT RECALL” ON DESIRED ANGLE[S]

1. Align the Protractor locating bushing hole to the Memory Link hole and pass the locating pin through the Protractor and Memory Link.
2. Lock the Protractor knob and retract the locating pin.

YOU HAVE NOW “INSTANTLY RECALLED” THE DESIRED ANGLE!

REAR VIEW



A7

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HEIGHT GAUGE “INSTANT RECALL” FEATURE

Your customized
brass nameplate
location

LEVEL ARM

MEMORY LINK

INDEX PIN

PROCEDURE:

1. LOCK LEVEL ARM
AT DESIRED HEIGHT
2. PASS LOCATING PIN
THROUGH MEMORY LINK
INTO HOLE IN LEVEL ARM
3. LOCK MEMORY LINK SCREW
AND REMOVE LOCATING PIN

YOU CAN NOW “INSTANTLY RECALL”
THAT HEIGHT - AT ANY TIME!

“INSTANT RECALL” can
be used with or without the
Dial Indicator mounted.

LEVEL ARM

MasterGage.com

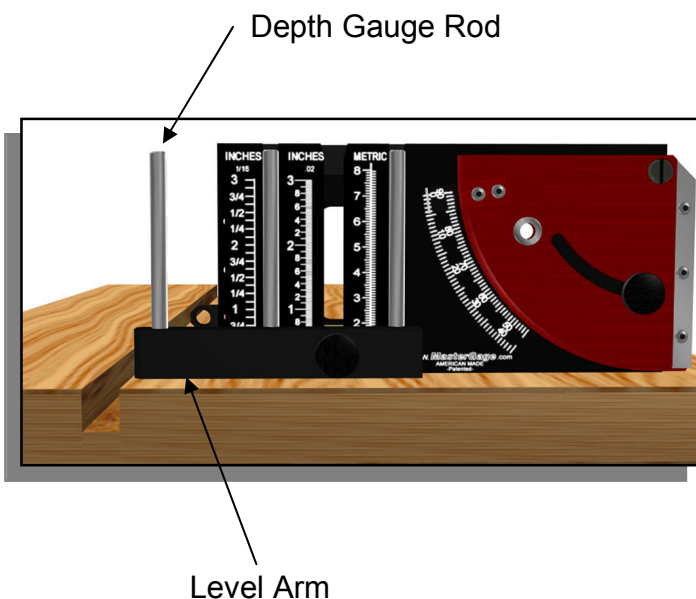
Using the Depth Gauge Rod

The 1/4 inch diameter x 4-inch long rod serves two purposes. The **FIRST** is as an Index Pin for use in the “*Instant Recall*” feature. The **SECOND** as a Depth Gauge Rod.

The following illustrations show how the Depth Gauge Rod adds additional capabilities to your **MasterGage/Professional**. Keep in mind that this feature can be used in all X, Y and Z. axis. A typical use in the Z axis would be checking/setting the infeed/outfeed offset on a Split Fence for a Shaper or Router Table system.



The following three illustrations show how the Depth Gauge Rod can be used to determine dado depth, mortise depth or a blind-drilled hole. It then becomes easy to measure and cut the required tenon or mating part.



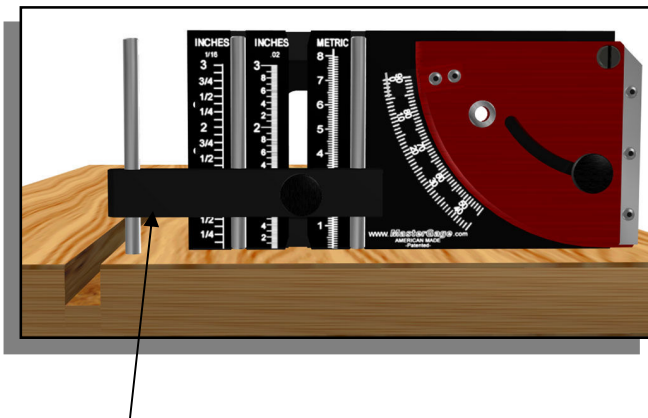
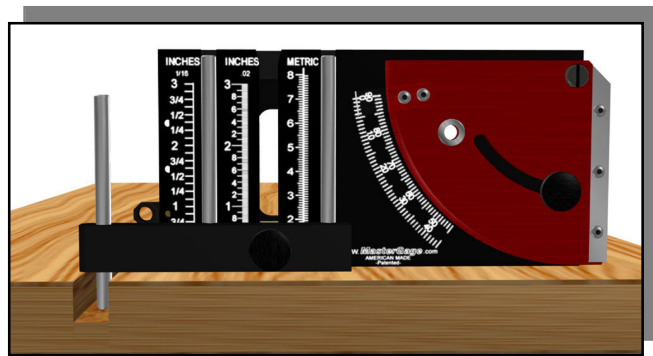
Move the Level Arm down against the wood [zero position] and tighten the Lock Screw. Insert the Depth Gauge Rod leaving the Lock Screw loose.

Using the Depth Gauge Rod

The $\frac{1}{4}$ inch diameter x 4 inch long rod serves two purposes. The **FIRST** is as an Index Pin for use in the "Instant Recall" feature. The **SECOND** as a Depth Gauge Rod.

Move the Depth Gauge Rod over the groove/slot/hole and allow it to bottom out.

Tighten the Lock Screw.



Reposition the *Professional* to a flat surface. Raise the Level Arm and bottom out the Depth Gauge Rod on the flat surface. Then simply read the selected scale under the Level Arm for the groove/slot/hole depth.

Read scale[s] for groove/slot/hole depth dimension

A9**A9**

USING THE *MAGNETIC MITER SLOT CRADLE BAR* ON THE *MasterGage/Professional*

The patented, *Magnetic Miter Slot Cradle Bar* attaches to either the top or bottom “T” slot, anywhere along the full length of the *MasterGage/Professional*. Two powerful rare earth magnets are embedded into one side of the Cradle Bar. The body of the Cradle Bar is fabricated from Delrin, a special polymer selected for its low friction properties. This innovative design achieves the following:

The magnets cling to only one wall of the steel tablesaw miter slot.. Using this innovative method, all tolerances, adjustments and misalignments are eliminated, giving you dead-on accuracy, **guaranteeing absolute precision**

- The magnets cling to the miter slot wall with just the right amount of holding power, while gliding smoothly along the full length of the miter slot.
- The magnetic feature allows the *Magnetic Miter Slot Cradle Bar* to be used on any steel miter slot width. This eliminates any concern for miter slot width variations.

This unique round “T” nut locks the *Cradle Bar* anywhere along the length of the top or bottom “T” slots of the *MasterGage/Professional*

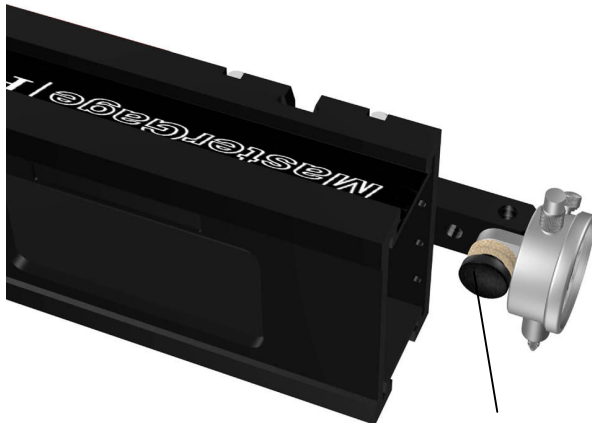
Embedded rare earth magnets



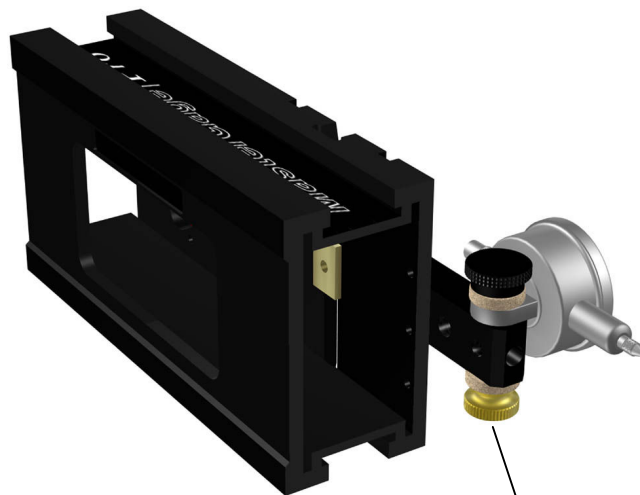
A10

A10

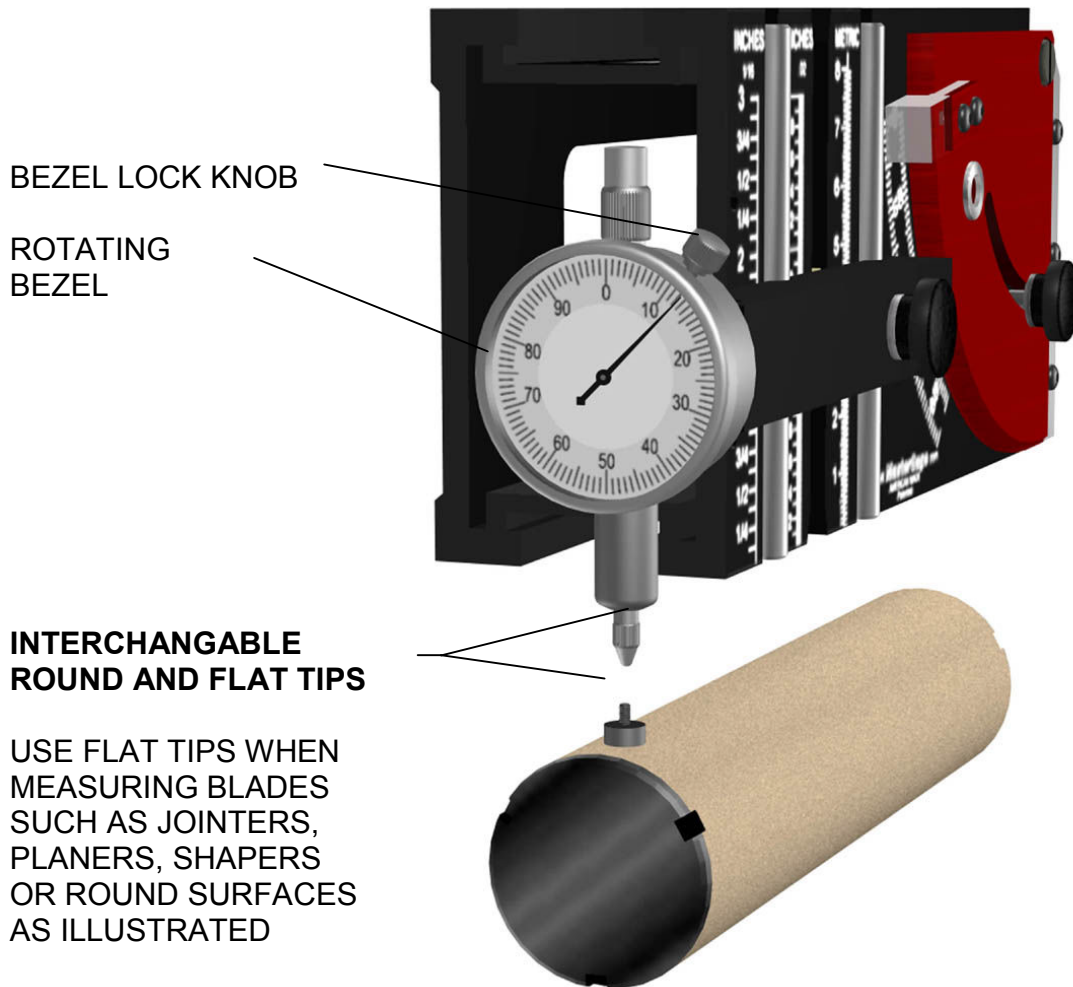
ATTACHING THE DIAL INDICATOR



ATTACH DIAL INDICATOR WITH
THE STEM IN EITHER DOWN POSITION
[SHOWN] OR UP POSITION WITH THIS
LOCK KNOB



ATTACH DIAL INDICATOR IN
THE HORIZONTAL POSITION
[SHOWN] USING THE DIAL
INDICATOR ADAPTER
HARDWARE AS ILLUSTRATED



USE FLAT TIPS WHEN
MEASURING BLADES
SUCH AS JOINTERS,
PLANERS, SHAPERS
OR ROUND SURFACES
AS ILLUSTRATED

1.0 AND 2.0 INCH
EXTENSIONS ARE ALSO SUPPLIED

DIAL INDICATOR INFORMATION

THE DIAL INDICATOR IS VERY EASY TO USE

- THE DIAL INDICATOR HAS A TRAVEL RANGE OF .25 INCHES [1/4 INCH]
- THE BLACK NUMBERS ON THE DIA REPRESENT .010 [TEN THOUSANDTHS OF AN INCH]
- EACH BLACK GRADUATION ON THE DIAL REPRESENTS .001 INCH [ONE THOUSANDTHS OF AN INCH]
- EACH TIME THE INDICATOR ARM ROTATES 360 DEGREES [.100 INCH TRAVEL] THE SMALL DIAL MOVES TO A NUMBER ON THE SMALL DIAL.
- EXAMPLE: WHEN THE LARGE INDICATOR ARM ROTATES TWO TIMES, THE SMALL DIAL ARM WILL INDICATE 2, WHICH IS .100 TIMES 2 OR .2 INCHES.

PROCEDURE FOR USING THE DIAL INDICATOR

- MOVE THE DIAL INDICATOR SO THAT THE TIP OF THE INDICATOR IS TOUCHING THE DESIRED SURFACE.
- ALLOW THE TIP TO DEFLECT THE DIAL INDICATOR ARM SLIGHTLY. THIS IS CALLED "PRELOADING" THE DIAL INDICATOR
- LOOSEN THE BEZEL LOCK SCREW AND ROTATE THE BEZEL SO THAT THE "0" ON THE DIAL LINES UP WITH THE INDICATOR ARM - LOCK THE BEZEL KNOB.
- YOU ARE NOW CALIBRATED TO MEASURE FROM THE DESIRED SURFACE.

A NOTE ABOUT TOLERANCES

A common question customers ask is: "What kind of accuracy should I expect from my woodworking machinery? How close should I measure, 1, 5, 10, 15 thousandths of an inch? (A reference, a human hair measures 0.002 inches - this page is 0.004 to 0.005 inches thick.)

The answer is as follows. Machines come in all sizes and quality levels. Many are built with stout cast iron bodies and components, others with sheet metal and plastic. Obviously, one can expect the cast iron fabrication to hold tight tolerances and for longer periods than a sheet metal fabricated machine. The general answer is to align and calibrate as close as possible, without making it a 3 day project. Then monitor the dimensions over time. Obviously, the cast iron machine will stand more abuse over time, and still keep the tolerances versus the sheet metal unit.

Here is a **general** overview of machinery available today.

Table top models: designed for high portability and minimum storage space
typical customer – home owners & trim carpenters
weight range – 25 to 75 pounds
construction: sheet metal, castings and plastic
expected accuracy: 0.010 to 0.015 inches

Contractor models: designed for mobility at home and to the job site
typical customer – home owners & job site carpenters
weight range – 50 to 200 pounds
construction: sheet metal and some castings
expected accuracy: 0.005 to 0.010 inches

Stationary machinery: designed for high production and are seldom moved
typical customer – cabinet shops, mill work houses, etc.
weight range – 500 to 5,000 pounds
construction: very heavy castings and machined parts
expected accuracy: 0.001 to 0.002 inches

Also asked is: "How often should I monitor my machinery for alignment and calibration?"

I would suggest setting up a written schedule for every machine alignment check. The schedule would depend upon machine usage. Is your shop on a 8 hour/5 day or 16 hour/6 day work week? How many different people use the equipment, etc. My feeling is to consider your shop like an airplane. Before you "take off" on your business day, all machines should be checked for running condition and accuracy. After all, your business and livelihood rely on these machines.

SECTION B

**TABLESAW
+
ADD-ON SLIDING TABLE KIT
+
SLIDING TABLE PANEL SAW**

B1

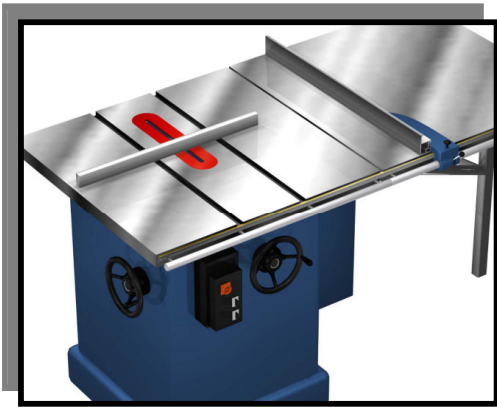
B1

TABLE SAW

- OVERVIEW OF TABLESAW ALIGNMENT –

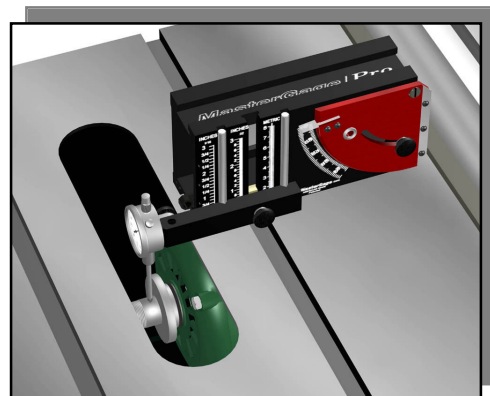
Here are a few facts that become very obvious, once explained. A standard tablesaw has a miter slot machined into the table saw. Obviously it is a fixed reference feature that cannot be changed or adjusted. The manufacturers have built in adjustments into: **A/** saw blade trunnion **B/** the rip fence assembly and **C/** the miter gauge assembly. They all need to be adjusted and aligned **relative to the machined miter slot**.

Adjusting the saw blade parallel to the miter slot. In the Contractors [motor outside of frame] type saw, the trunnion is adjustable. On the Cabinet saw, [saw is totally enclosed] the table top can be loosened for adjustability.



Using an accurate straight edge steel rule, check the flatness of the table top. TIP: Sprinkle talcum powder on the table top and carefully drag the straight edge across the table top surface. This is much like a concrete mason dragging his top leveler across the fresh cement to get it flat. This method will give you a visual indication of the high and low spots of the table top. When finished simply rub the talcum powder into the table top. The talcum powder will not harm the metal surface.

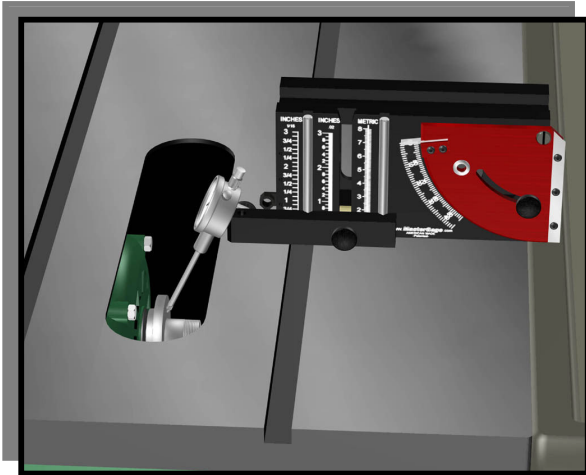
Use 2.0 inch dial indicator extension with 1/4 inch dial indicator flat tip. Contact arbor shaft on smooth surface [not threads]. Rotate arbor by hand. Readings should be in the 0.001 inch range.



B2

B2

TABLE SAW



Wipe face flange clean and run fingers across flange to insure there are no burrs. If there are – carefully remove them with a file.

TIP: Rotate the saw motor assembly 45 degrees so that the face of the face flange is directly 90 degrees to the Dial Indicator stem for the most accurate readings. Rotate the flange by hand and read the run out. It should be within 0.001 inches

Using the round tip on the dial indicator, make contact with the saw blade near the top of blade. Rock the blade gently side to side to check bearing wear. Check with the saw manufacturer for bearing wear allowances.

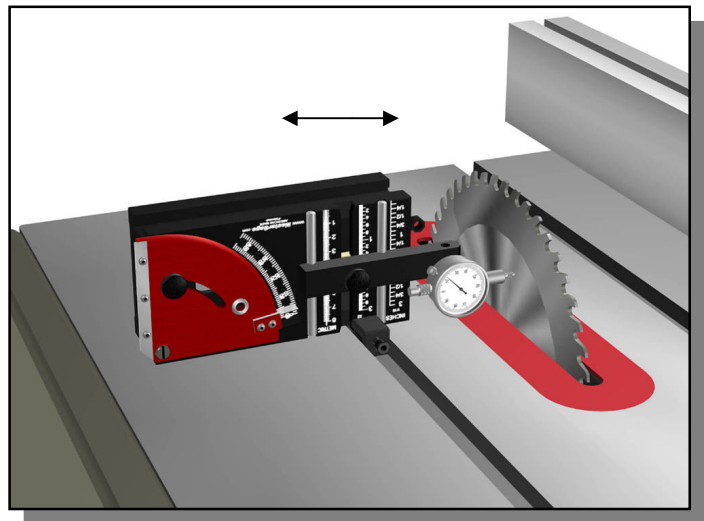
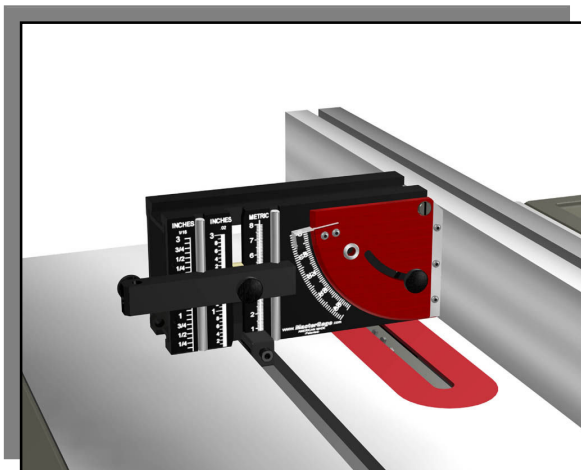
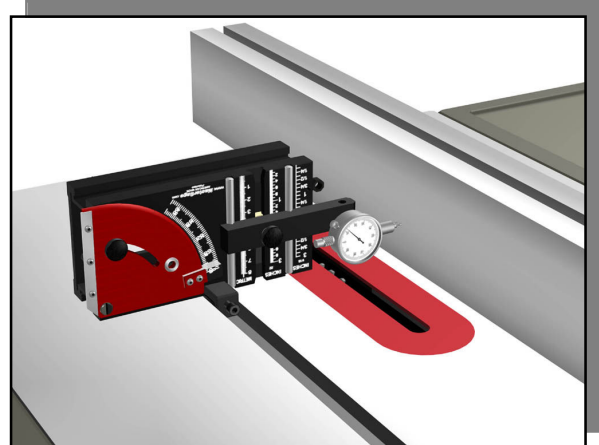


TABLE SAW

Fence alignment: Attach the Miter Slot Cradle Bar to the **MasterGage/Pro**. Traverse the length of the fence and adjust parallel to the miter slot. Check for any fence warpage.

HINT: Adjust the fence so that the fence is .004 to .006 further away from the back of the fully extended blade, relative to the front of the blade.



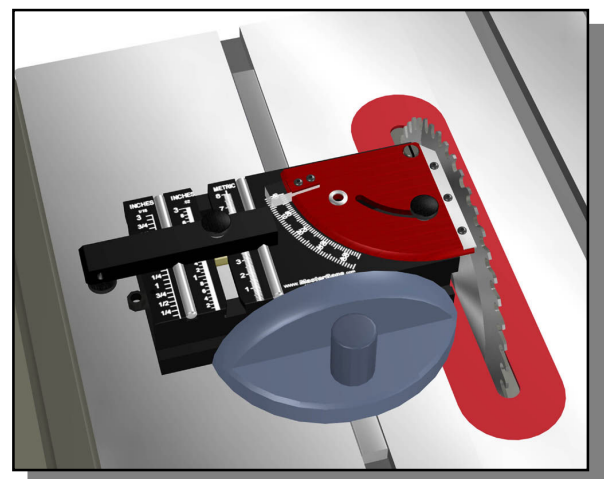
Square the rip fence with the **MasterGage/Pro** protractor. Some European systems have fences that tilt to any desired angle. These fences can be easily set to any angle with the **MasterGage/Pro** Protractor.

TIP: Use the Protractor “*INSTANT RECALL*” feature

Square the miter gauge to the saw blade using the **MasterGage/Pro** Protractor.

TIP: Use the **MasterPlate** for this calibration. It will give you a precision flat surface to accurately establish squareness and set any desired angle very accurately.

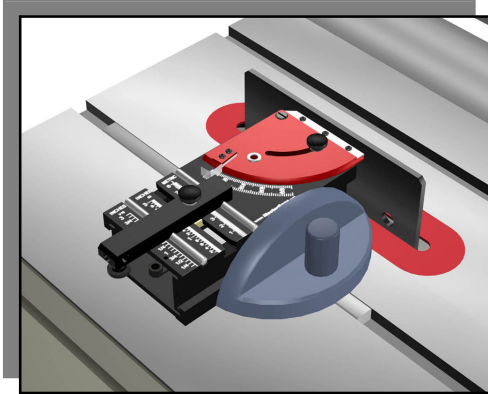
TIP: Use the Protractor “*INSTANT RECALL*” feature.



B4

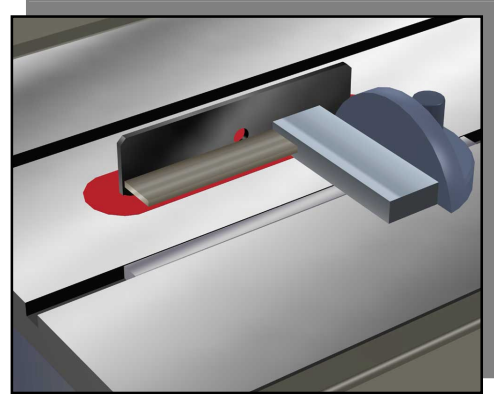
B4

TABLE SAW

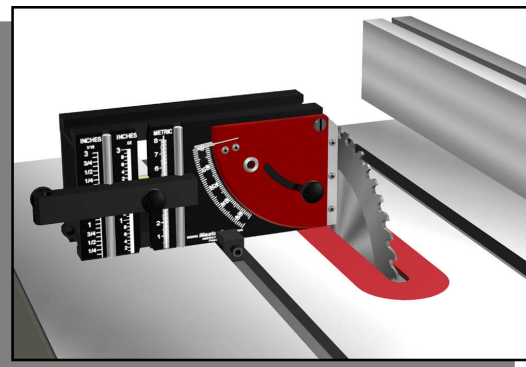


OPTION 1: Use the **MasterPlate** to square the miter gauge

TIP: Use the Protractor “*INSTANT RECALL*” feature to recall any miter angle accurately



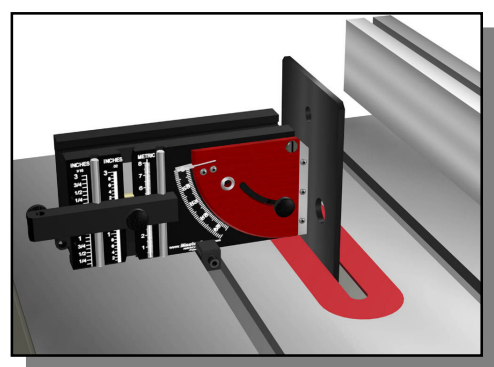
OPTION 2: Use a machinist square to adjust the miter gauge 90° to the **MasterPlate**



Square saw blade to table top – set table saw blade tilt pointer to zero. Notice that the “Knife Edge” is thin enough to fit between the carbide teeth.

TIP: Set any bevel angle required to within ¼ degree

TIP: Use the Protractor “*INSTANT RECALL*” feature to recall any bevel angle accurately



OPTION: Use the **MasterPlate** to establish squareness to table top.

TIP: **MasterPlate** is perfect for setting any bevel angle extremely accurately. Also great for using the “*INSTANT RECALL*” feature.

B5

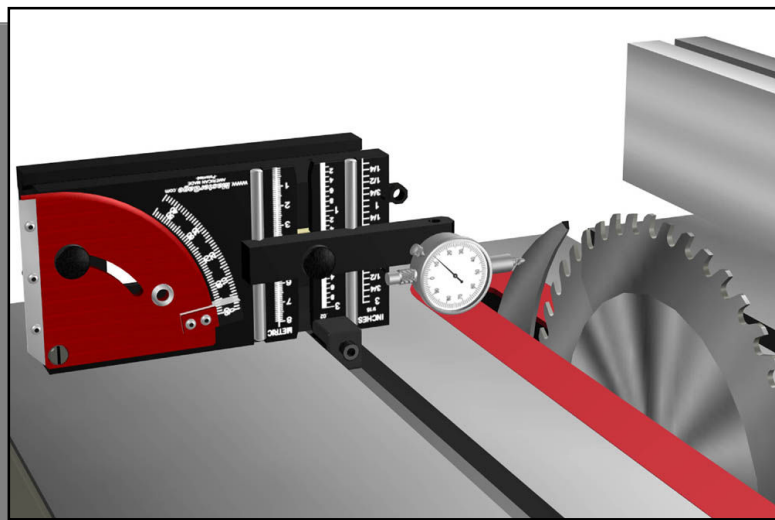
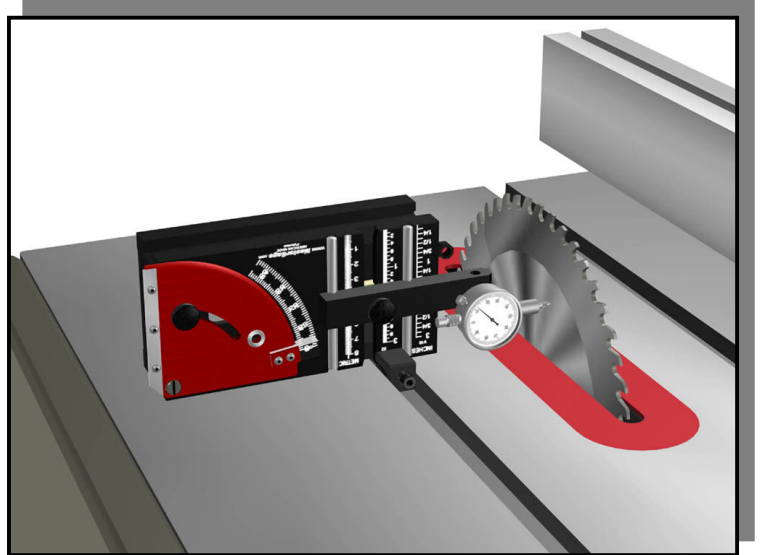
B5

TABLE SAW

With the Miter Slot Cradle Bar attached to the **MasterGage/Pro**, perform the following steps.

1. Mark a carbide tooth on the blade, in the forward position (toward you) 2. Measure the distance with the **Pro** and the dial indicator. 3. Rotate the blade forward. 4. Repeat step #2. This will give you distance variation from blade to miter slot. Adjust the saw blade parallel to the miter slot.

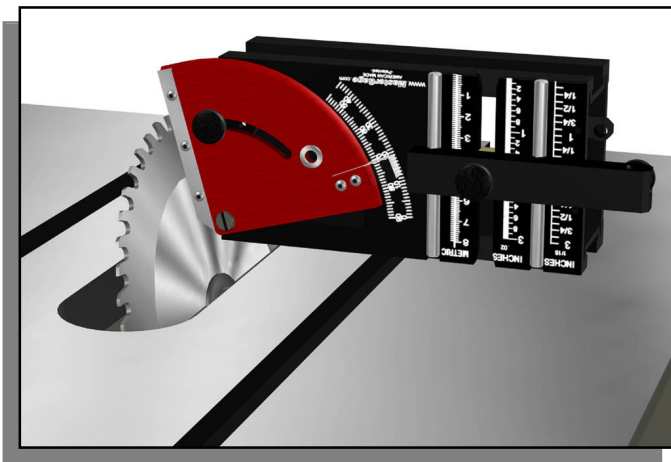
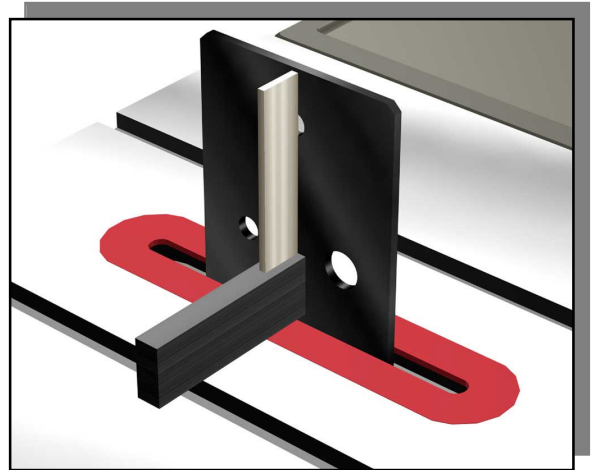
TIP: The **MasterPlate** is ideal to accomplish this task - giving you a full 10 inches of flat surface of measurement.



Align the splitter unit both parallel and center to the saw blade

TABLE SAW

OPTION: Use a machinists square with the **MasterPlate** to establish 90 degrees between the **MasterPlate** and the table top



The **MasterGage/Pro** is designed to measure angles greater than 90 degrees. This allows you to measure directly against the saw blade for the full 3 ½ inches of the protractor “Knife Edge”. This method gives you more surface to measure to and more accuracy. The **Pro** can measure both left tilting and right tilting blade angles.

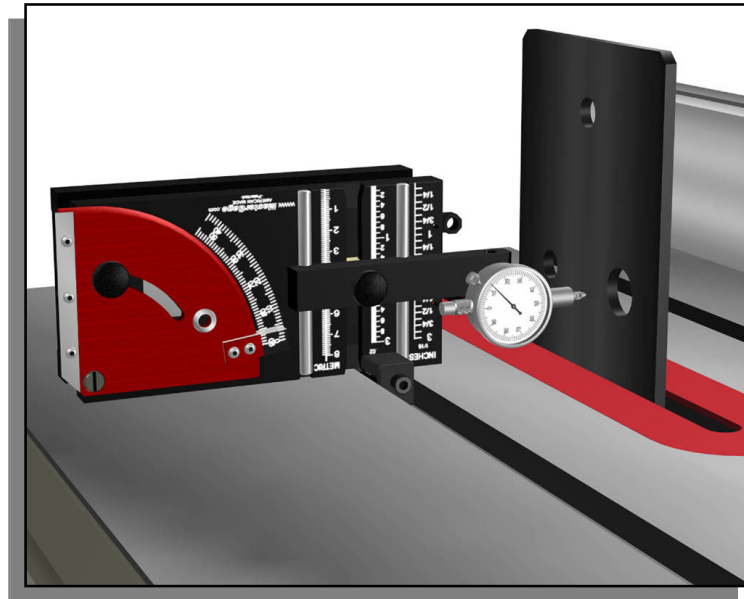
TIP: Use the Protractor “**INSTANT RECALL**” feature to recall any bevel angle

TIP: Measure/set the angle from the back [obtuse] part of the saw blade as shown. This gives you the maximum contact area for the Knife edge against the blade.

B7

B7

TABLE SAW



If your saw is equipped with a scoring blade, we suggest the following procedure:

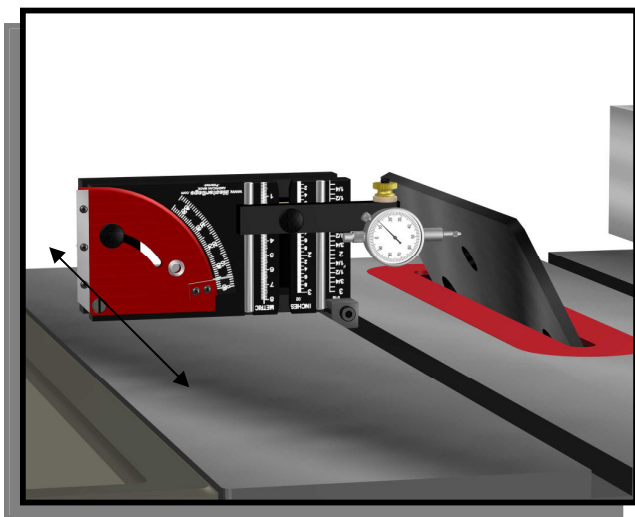
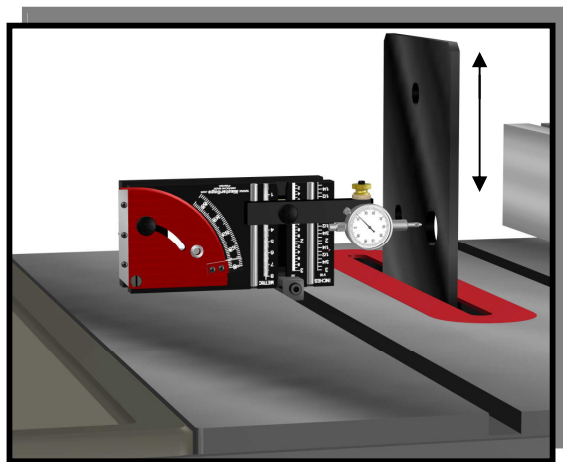
1. Mount the **MasterPlate** to the scoring blade arbor. You may find that the **MasterPlate** may have to be rotated slightly to clear the table opening. This may be due to the fact that the scoring blade is located lower and behind the insert plate opening..
2. Using the **MasterGage/Pro** with the Miter Slot Cradle Bar, you can now set the scoring blade parallel to the miter slot and the saw blade.

TABLE SAW

CHECKING THE SAW BLADE MECHANISM FOR TRACKING ACCURACY

Once the tablesaw has been aligned, it is important to verify that both the vertical motion and tilting motion mechanisms track accurately. Below are illustrations on verifying these motions. The SawStop Owner's Manual specifically describes the following two required adjustments in detail. The *MasterGage/Professional* and *MasterPlate* make these procedures a breeze.

After the **MasterPlate** is aligned 90 degrees perpendicular to the table top, perform the following. With the dial indicator stem registered against the **MasterPlate**, move the saw blade mechanism to the maximum up and maximum down position. This will tell you if the mechanism is tracking true through the full vertical range motion.



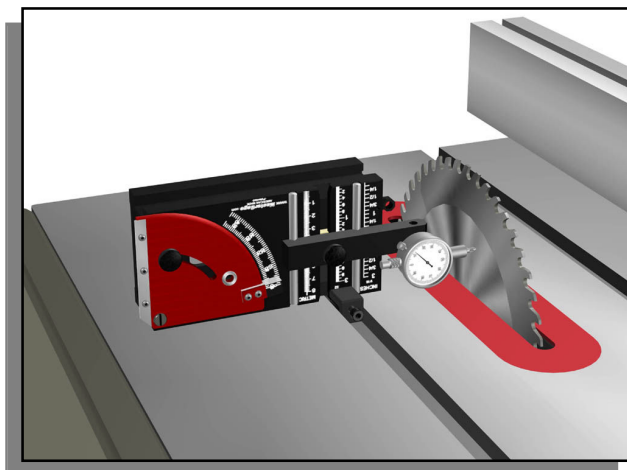
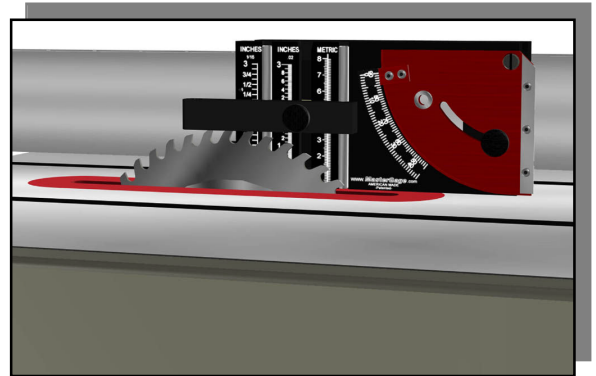
Once the **MasterPlate** is aligned parallel to the miter slot, the following procedure should be performed to verify the accuracy of the blade tilt mechanism as it travels from 90 degrees to 45 degrees. (This applies to both right and left tilting blades.) Once you have aligned the saw blade [**MasterPlate**] parallel to the miter slot. Proceed to measure the distance from the miter slot to the saw blade (**MasterPlate**), approximately every 15 degrees, from 0 to 45 degrees. The measurements should read the same as the **MasterPlate** in its 90 degree position. This should be within 0.002 to 0.004 inches. This exercise will verify that the tilting mechanism is tracking true, through the full tilt cycle of 90 to 45 degrees.

TABLE SAW

SET ANY HEIGHT:

1. Set the Level Arm at the desired height [do not lock the locking knob].
2. Raise the blade until it almost touches the Level Arm.
3. Carefully rotate the blade toward the back of the saw [this keeps the cutting edge of the tooth from damaging the Level Arm]. Allow the tooth to glance the Level Arm to establish height desired.

TIP: Use the Height Gauge *"INSTANT RECALL"* feature to recall any height required



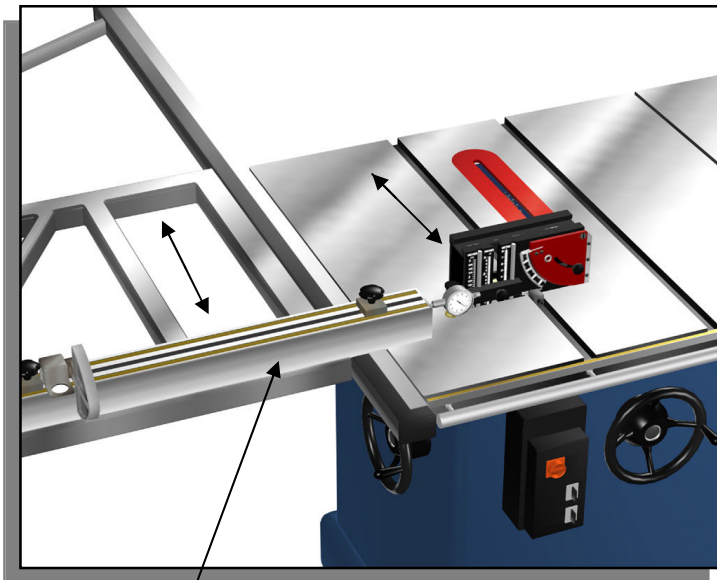
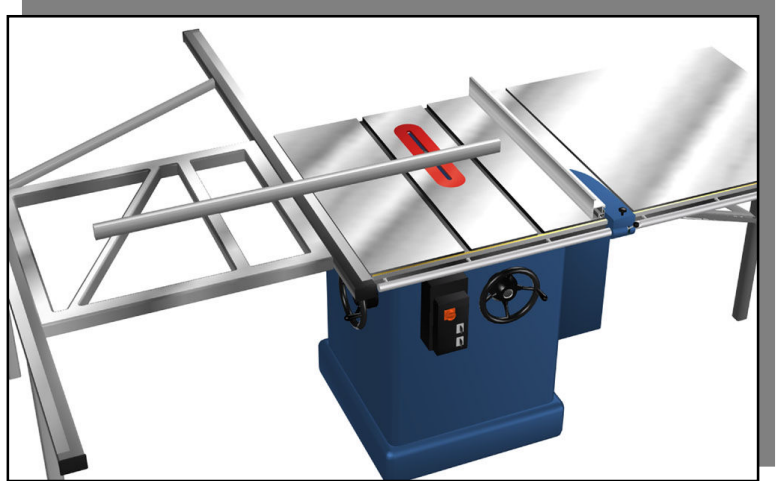
After all of the elements of your tablesaw are aligned and calibrated, install your saw blade. Rotate the blade by hand and check the saw blade run out. Now you know with confidence that you can check out the accuracy on all your saw blades.

B10

B10

ADD-ON SLIDING TABLE KIT

Adjust the sliding table parallel to the saw table top using an accurate straight edge. The sliding table should be slightly higher than the tablesaw surface. Fold a crisp dollar bill once [approx .010 inches thick] and use it as a feeler gauge and adjust the sliding table so that it is approximately .010 inches higher than the tablesaw surface, along its total travel distance.



Cross Cut Fence

Align all elements of the tablesaw with the **MasterGage/Professional** as shown in the tablesaw section

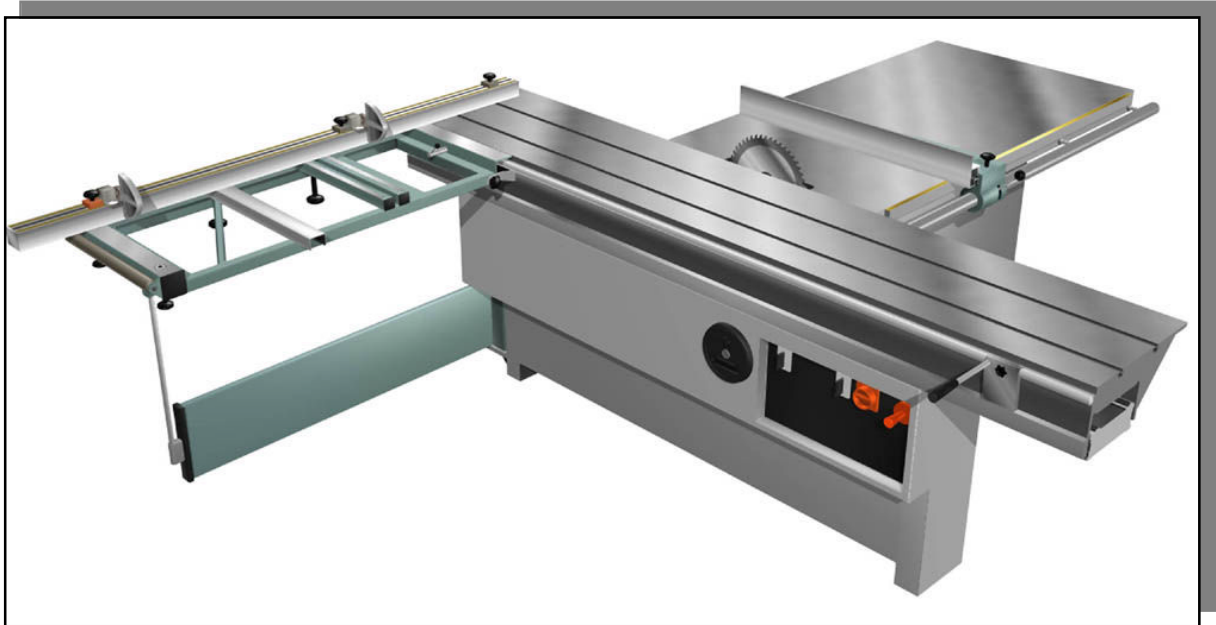
Once completed, position the *Pro* as shown. Bring the Cross Cut Fence in contact with the Dial Indicator tip. Move the *Professional* and Fence together along the length of the miter slot. Adjust the sliding table to bring it parallel to the miter slot. Now you will be assured of clean 90 degree cuts using either the miter gauge or sliding table.

The **MasterGage/Professional** can also set up and align special equipment such as the Incra fence system and the Saw Train fence system very easily.

- The Incra fence system is a registered trademark of the Taylor Design Company.
- The Saw Train fence system is the registered trademark of JOINTECH

MasterGage.com

SLIDING TABLE PANEL SAW



A little background on the sliding table saws. They were originally developed by European saw manufacturers for the 32 mm system for construction of cabinets and case goods. The 32 mm system requires precision machining of sheet goods such as MDF (medium density fiberboard) and melamine for the fabrication of case goods.

Many of the *MasterGage/Professional* calibration techniques used on the tablesaw can be performed on the sliding table saw. See the Tablesaw section for the following procedures.

- | | |
|--|--|
| 1. Checking arbor shaft run out – page B1 | 5. Checking bearing wear – page B1 |
| 2. Checking face flange run out – page B1 | 6. Squaring blade to table top – page B3 |
| 3. Saw blade/ <i>MasterPlate</i> squareness to table top – page B3 | 7. Setting blade angle – page B5 |
| 4. Checking saw blade run out – page B7 | 9. Setting saw blade height - page B7 |
| | 10. Squaring fence to table top –page B2 |

Generally, there is no miter slot in the main table of the sliding table saw, as in standard tablesaws. Thus, different alignment and calibration techniques are required.

NOTE: We recommend that alignment of the sliding table itself to the main table be performed by manufacturer/dealer qualified technicians only.

SLIDING TABLE PANEL SAW

Sliding Table Panel Saws are designed to cut large sheet goods such as 4 ft x 8 ft (1,219 mm x 2,438 mm) materials. The sliding table is used for both cross cuts and ripping operations. Calibrating the cross cut fence square to the saw blade is critical. We call this calibration technique the "Five Sided Cut". The illustrations below, numbered 1, 2, 3, 4 and 5 demonstrate this method.

Use a piece of MDF or Melamine – approximately 48 x 48 inches (1,219 x 1,219 mm) preferably ½ inch (13 mm) thick, mark one edge "A" for orientation. Perform the following steps.

Step 1 - Make a full clean cut (dust cut) along side "A".

Step 2 – Rotate the stock counterclockwise (to the left) so side "A" is against the cross cut fence and make a clean cut, full length.

Step 3 – Repeat Step 2

Step 4 - Repeat Step 3

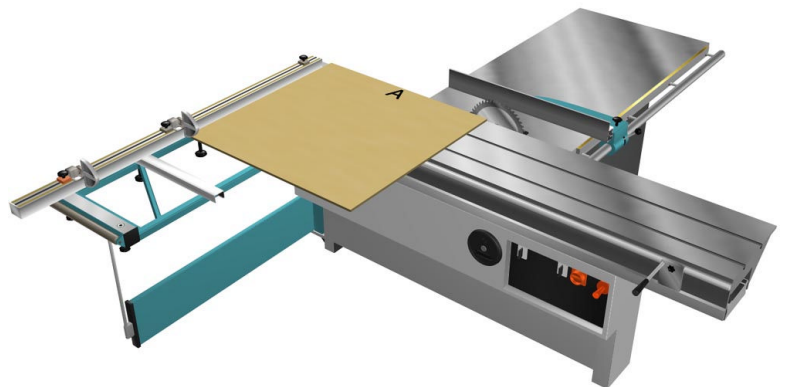
Step 5 - The panel is once again back with side "A" facing the saw blade. Make a cut approximately ½ inch (12,7 mm) wide.

Step 6 - Measure the width at both ends of the strip. Subtract the difference and divide by four. This will give you the amount of adjustment to make in the cross cut fence to bring it into square. You may have to repeat this procedure the first time you perform this test.

Once your saw is aligned, this procedure becomes a quick way to verify your saws squareness.

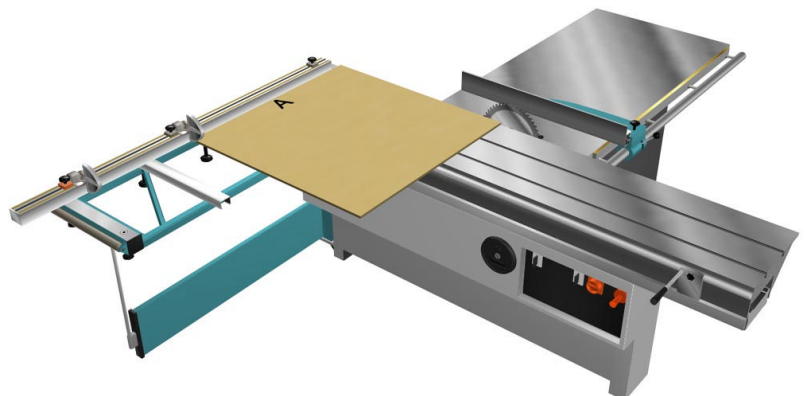
STEP 1

Make a clean full cut along edge "A"



STEP 2

Rotate stock counterclockwise, with edge "A" against cross cut fence and make a clean cut, full length



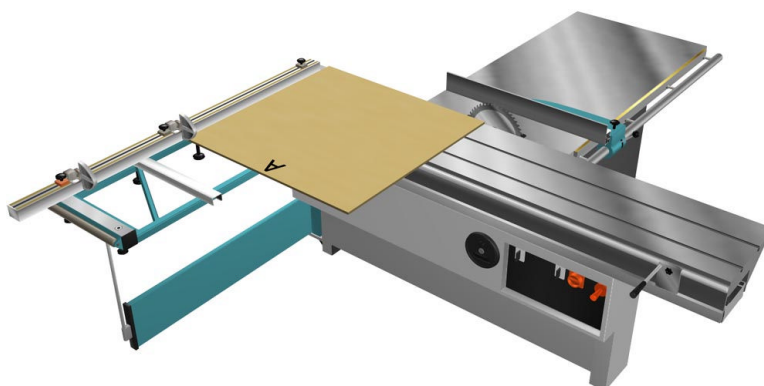
B13

B13

SLIDING TABLE PANEL SAW

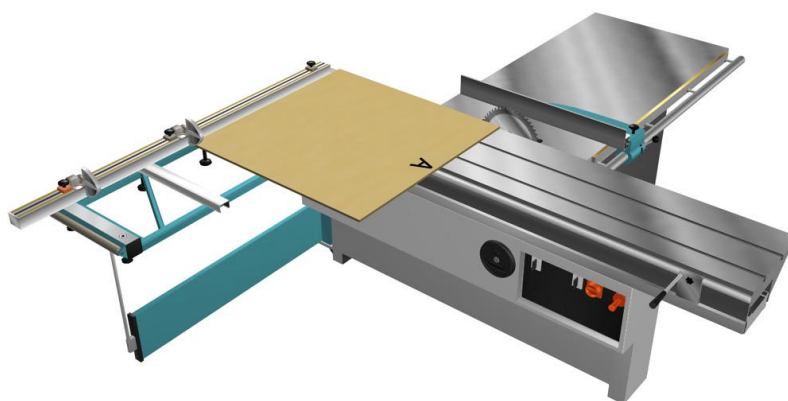
STEP 3

Repeat Step #2



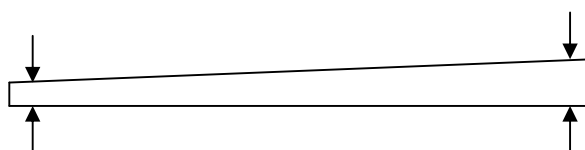
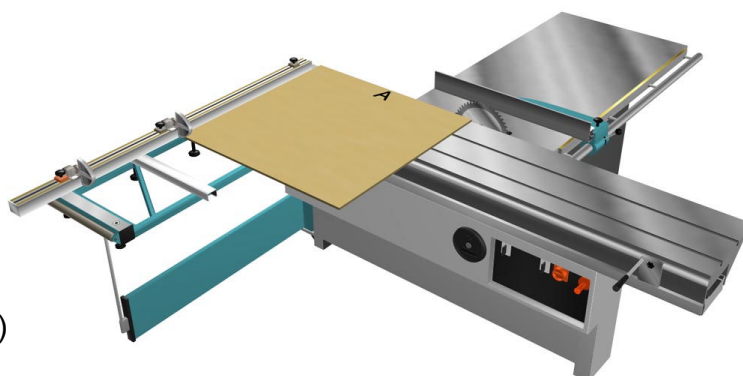
STEP 4

Repeat Step #2



STEP 5

With edge "A" back to original position, make a cut approximately $\frac{1}{2}$ inch (13 mm)



STEP 6 Lastly, measure the width of each end of cut strip, subtract the difference and divide by 4. This is the required adjustment needed on the cross cut fence to bring it in square

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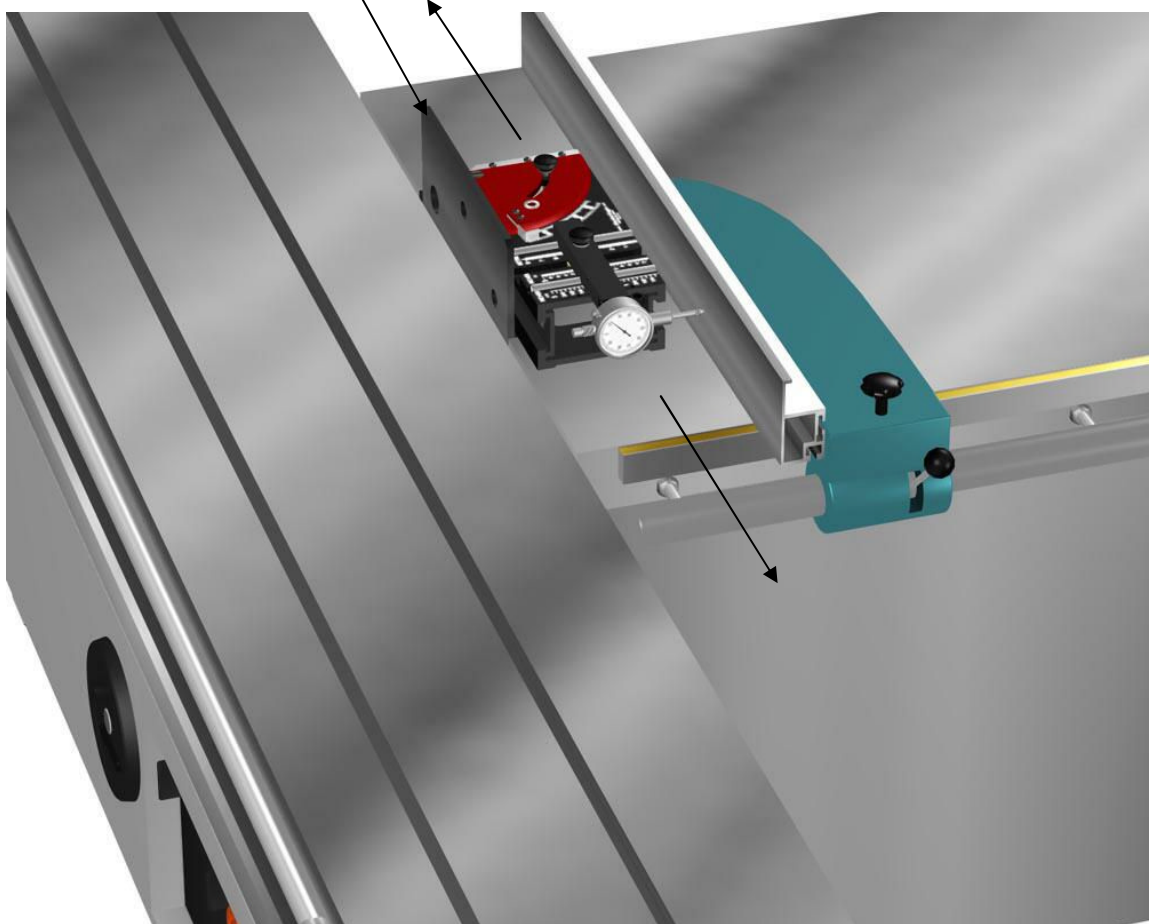
SLIDING TABLE PANEL SAW

Rip Fence Alignment

The rip fence alignment is achieved with the *MasterGage/Professional* and the *MasterPlate*. We offer a special *Euro-MasterPlate* with 30mm mounting holes and clearance holes for the anti-rotation pins found on most European sliding table saws. It is the same price as the standard *MasterPlate*.

First, replace the saw blade with the *Euro-MasterPlate*. Position the *Professional*, with its back on the tabletop and the top against the *Euro-MasterPlate*, with the dial indicator indexed against the rip fence. Simply slide the *Professional* fore and aft to set rip fence parallel or to toe out dimension desired.

Euro- MasterPlate



GUIDELINES FOR CARBIDE SAW BLADES

Courtesy of Forrest Manufacturing Company

Wear eye protection, use the saw blade safety guard and splitter and use sharp saw blades.

KICK BACK – Pinching of wood between the blade and rip fence – SOLUTION: Align fence and saw blade [*MasterPlate*] with the *MasterGage/Professional* as shown on pages B2 and B4.

SAWDUST THROWN TOWARD OPERATOR – Often comes from the fence being too loose or too tight. This crowds the wood against the rear side of the teeth, forcing a cut on the UP rotation on the left or right side of the blade. SOLUTION: Adjust the fence as shown on page B2.

BURNING OF WOOD – [especially hard wood] SOLUTION #1 – Raise the saw blade 1-2 inches above the surface of the wood and feed faster. This method produces 300 – 500 degree cooler cuts, and stops scorching. Most effective on hardwoods such as cherry and hard maple. On soft woods, the blade may be kept low [1/4 inch above the wood] and should not experience scorching. SOLUTION #2 – When ripping, too many teeth on blade causes slow feed and excessive side friction. The blade rubbing at 100 MPH rim speed heats and scorches the wood surface – keep the wood moving. Suggest 24 to 40 teeth for ripping. 60 to 80 teeth for cross cutting. SOLUTION #3 Wood getting caught on raised throat plate. Level entire throat plate surface to table top.

SPLINTERING – Ripping on table saws – slower feed speed or use more teeth on blade or use reduced face hook on blade. Inspect for possible high sides or tips on carbide tips. Also try lowering blade. Cross cut – splintering on bottom edge and final vertical surface. Lower the blade and feed more slowly. Also, use a blade with more teeth and/or higher Alternate Top Bevels [ATB], instead of a square tooth or Triple Chip Grind [TCG-square and chamfered style]. Radial arm saws and chop saws – High Alternate Top Bevel [ATB] blades give much better control of bottom splintering than a square top or TCG Triple Chip Grind blades.

SAW LIFE – Use an inexpensive saw blade for rough ripping chores on flake board and Formicas, these materials dull blades faster than soft or hard woods. Save your best blades for finish cuts. Raise the blade higher [table saw] and feed faster to minimize the arc of contact. This decreases heat and abrasion and the number of rotations required to cut the piece. This is especially true on ripping plywood and particleboard.

NOTE: For best results, use the correct saw blade designed for that particular saw, such as a tablesaw, chop saw, etc..

We are pleased that Forrest Manufacturing, maker of the legendary Forrest saw blades recommends *MasterGage* products, and is a distributor for the *SuperBar* and *MasterPlate*.

SECTION C

RADIAL ARM SAW

+

CHOP SAW

+

SLIDING COMPOUND MITER SAW

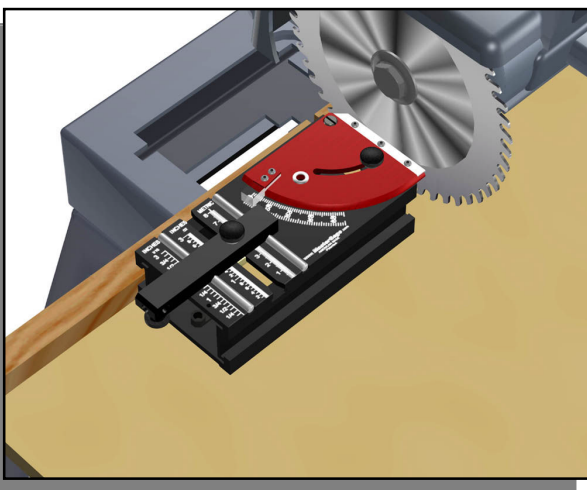
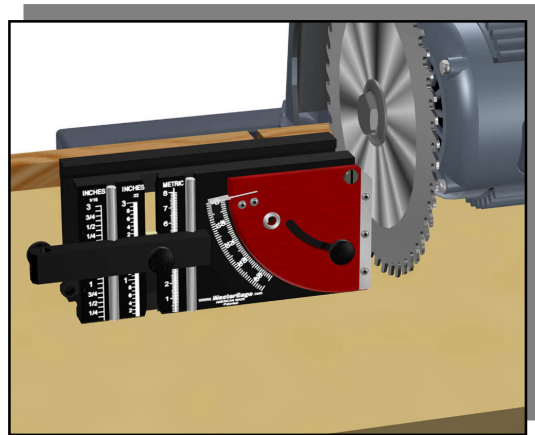
RADIAL ARM SAW *PLUS* CHOP SAW *PLUS* SLIDING COMPOUND MITER SAW

All pictures and illustrations are showing the **MasterGage/Pro** with the Radial Arm Saw. These techniques and methods are also applicable to Chop Saws and Sliding Compound Miter Saws.

Square saw blade to table top
Set any bevel angle desired to within $\frac{1}{4}$ degree accuracy.

HINT: Use the Protractor "*INSTANT RECALL*" feature to return to any desired bevel angle

HINT: Use the **MasterPlate** for more accurate alignment



Square saw blade to fence
Set any miter angle desired to within $\frac{1}{4}$ degree accuracy

HINT: Use the Protractor "*INSTANT RECALL*" feature to return to any desired miter angle

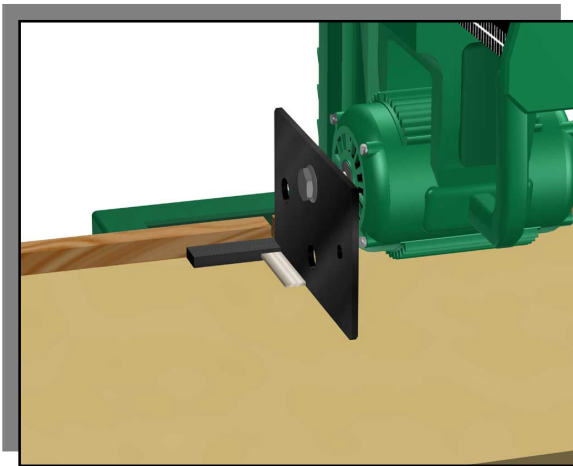
HINT: Use the **MasterPlate** for more accurate alignment

C2

C2

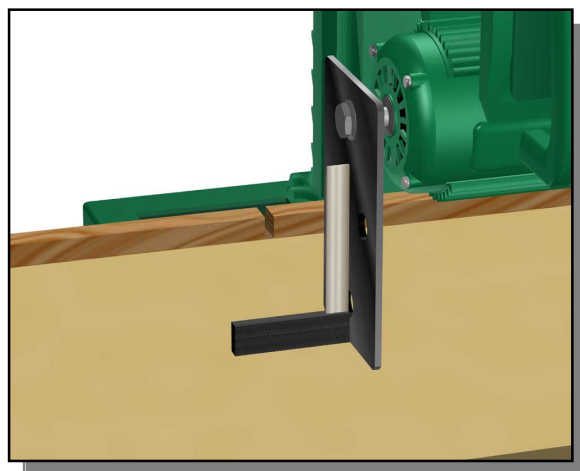
RADIAL ARM SAW PLUS CHOP SAW PLUS SLIDING COMPOUND MITER SAW

All pictures and illustrations are showing the **MasterGage/Pro** with the Radial Arm Saw. These techniques and methods are also applicable to Chop Saws and Sliding Compound Miter Saws.



OPTION: Set **MasterPlate square** to fence using machinist square

OPTION: Set **MasterPlate square** to table top, using machinist square

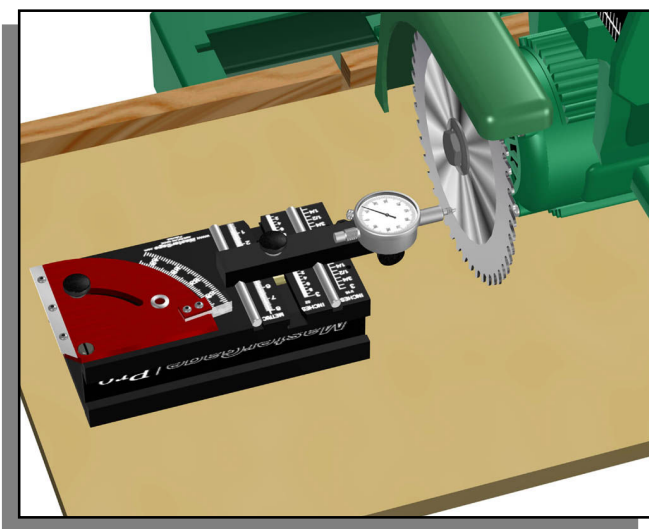
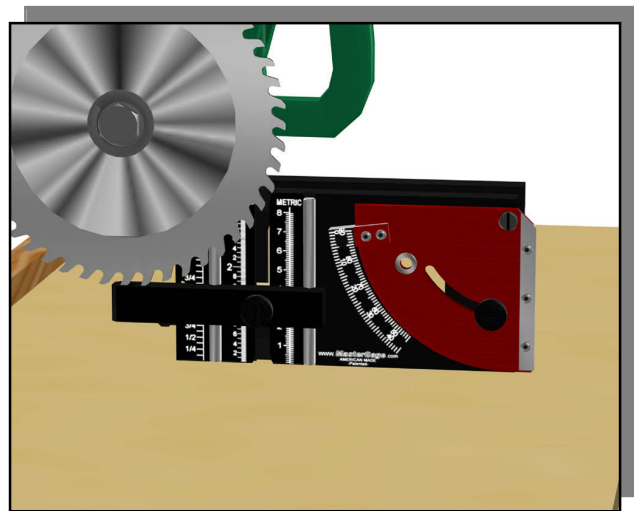


RADIAL ARM SAW *PLUS* CHOP SAW *PLUS* SLIDING COMPOUND MITER SAW

All pictures and illustrations are showing the **MasterGage/Pro** with the Radial Arm Saw. These techniques and methods are also applicable to Chop Saws and Sliding Compound Miter Saws.

Measure/set blade height easily

TIP: Use the Height Gauge
“*INSTANT RECALL*”
feature to return to any
desired height



Check saw blade run out

SECTION D

ROUTER

+

ROUTER TABLE

+

SHAPER

+

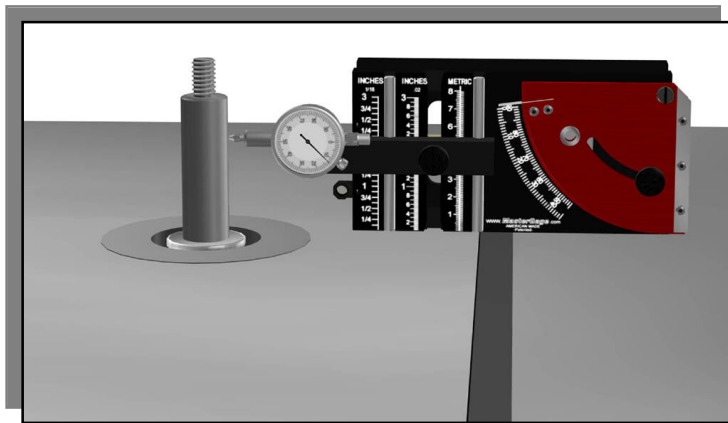
CNC ROUTERS & MILLS

D1

D1

ROUTER PLUS ROUTER TABLE PLUS SHAPER

All pictures and illustrations are showing the **MasterGage/Pro** with the Shaper. These techniques and methods are also applicable to the Router [hand held] and the Router Table systems.

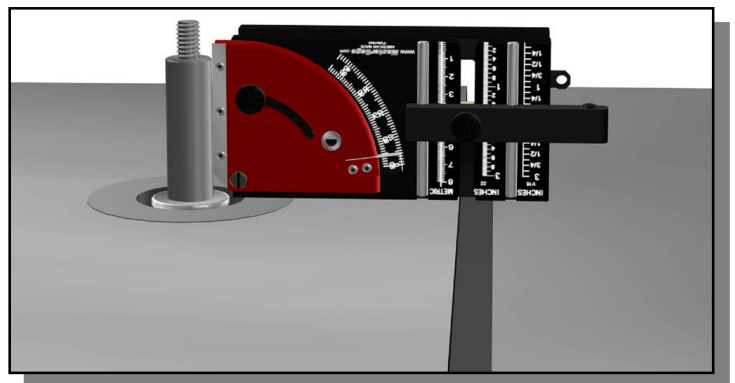


Checking spindle run out by rotating spindle by hand.

ROUTERS: Use the ½ inch diameter x 4 long Precision Rod for this operation

Use flat dial indicator tip for this operation

Square spindle to table top

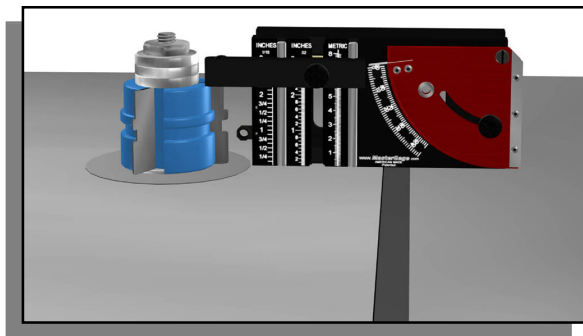
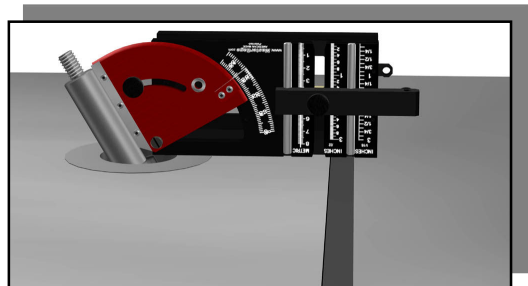


ROUTER PLUS ROUTER TABLE PLUS SHAPER

All pictures and illustrations are showing the **MasterGage/Pro** with the Shaper. These techniques and methods are also applicable to the portable Router and the Router table systems.

Measure/set any angle from 90 degrees to 45 degrees to within 0 degrees, 15 minutes

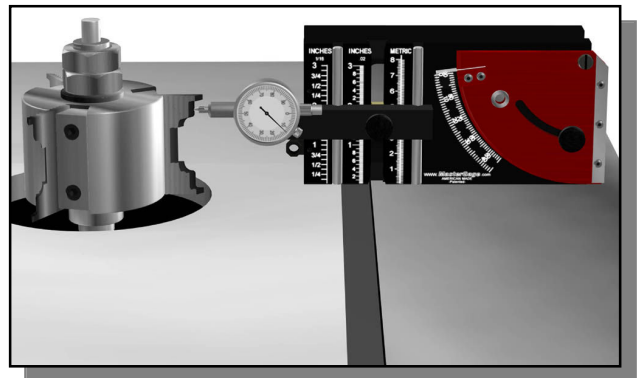
TIP: Use the Protractor "*INSTANT RECALL*" feature to recall any desired angle accurately



Measure/set height of cutter
Great for cope & stick or rail & stile work where you want to go from one cutter profile to another with **NO** setup down time.

TIP: Use the Height Gauge "*INSTANT RECALL*" feature for setting different cutter heights and return to desired height instantly.

The **Pro** is perfect for checking replaceable blades. You will be able to check each cutter at each contour feature of the blade to verify that all blades are perfect relative to each other. This will insure that there are no "cheater" blades or surfaces. You can now be sure that your sharpening service is giving you what you want!



SECTION E

DRILL PRESS

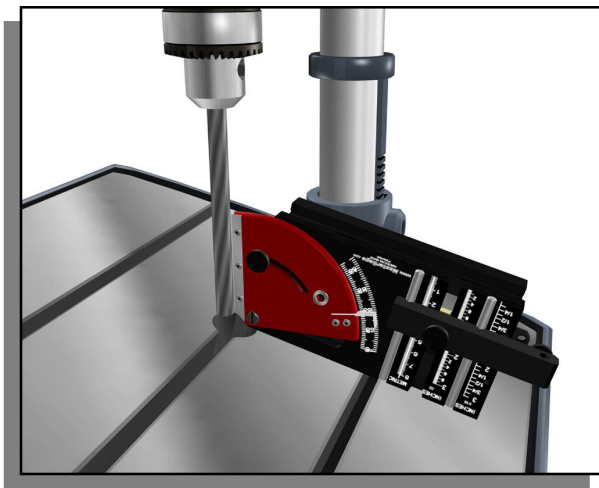
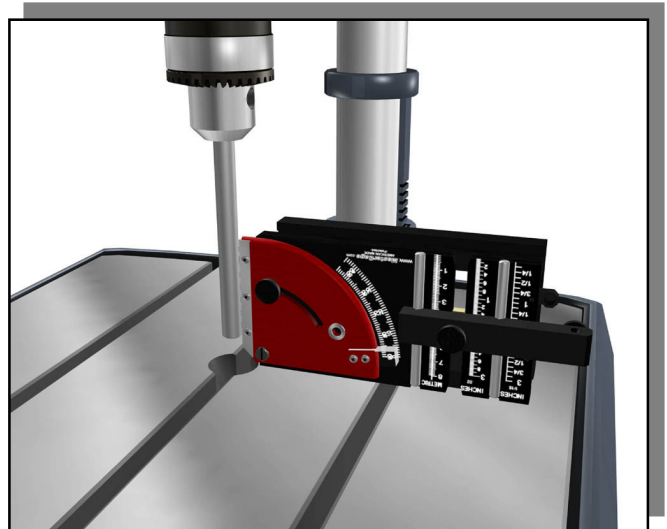
E1

E1

DRILL PRESS

Square table to spindle. Set any table tilt angle precisely

TIP: Utilize the ½ inch diameter x 4.0 Precision Rod that offers a polished smooth and straight surface to get accurate results.



Set any table angle desired from 0 to 45 degrees to an accuracy of ¼ degree! Also verify any existing table tilt angle.

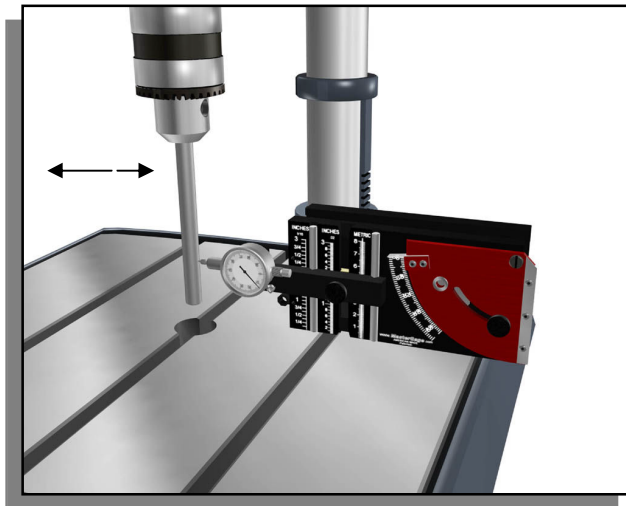
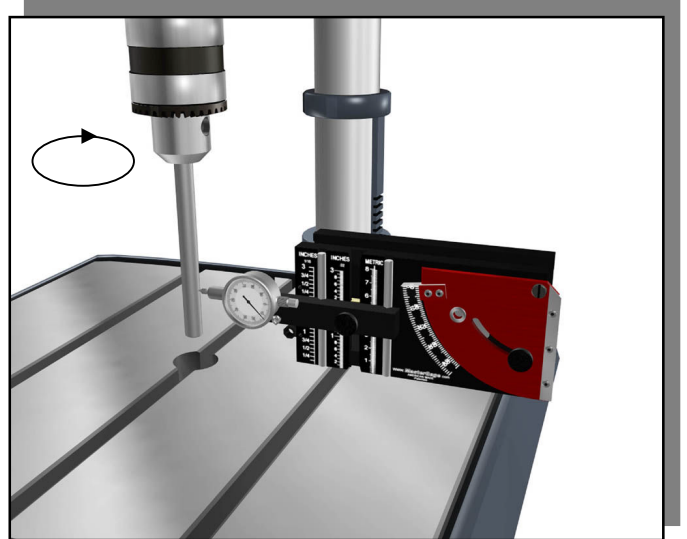
TIP: Use the Protractor "*INSTANT RECALL*" feature to return to any desired angle

E2

E2

DRILL PRESS

Check drill chuck run out by rotating the chuck by hand and reading the dial indicator at the tip of the $\frac{1}{2}$ inch diameter x 4 inch Precision Rod.

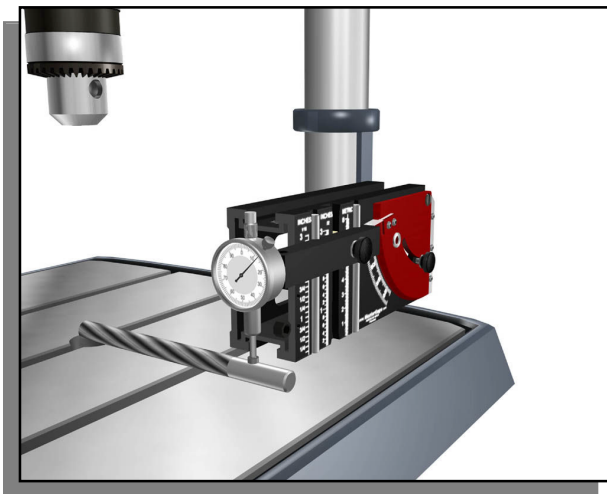
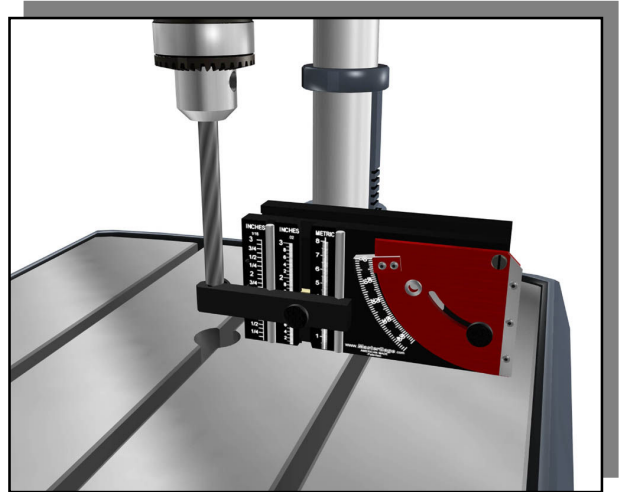


Check spindle bearing run out by moving the tip of the Precision Rod side to side and reading the dial indicator.

DRILL PRESS

Measure/set any drill bit height accurately. Establish depth of drilled hole quickly.

TIP: Use the Height Gauge *"INSTANT RECALL"* feature to return to any desired height



Check and measure drill bit diameter very accurately with the dial indicator and flat dial indicator tip. Always measure the smooth ends of the bit – not the flutes

SECTION F

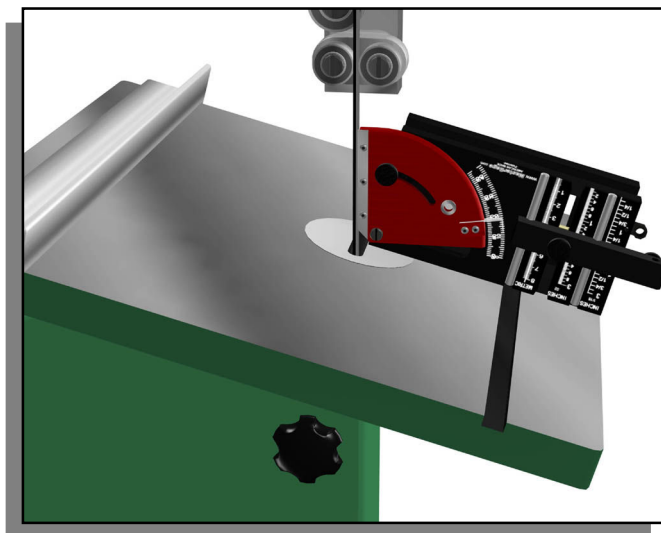
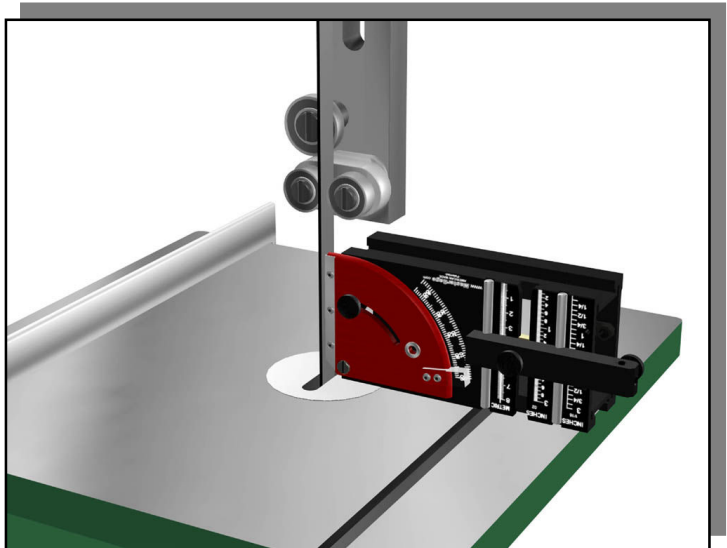
BANDSAW

F1

F1

BANDSAW

Square table to saw blade.



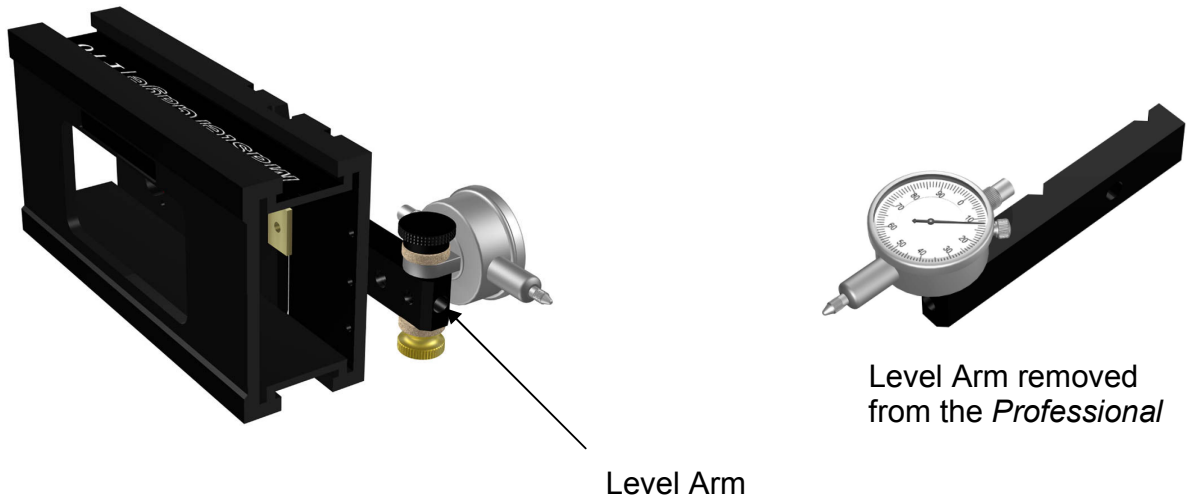
Set any angle desired from 0° to 45°, to an accuracy of 0°, 15 minutes [1/4 degree]. Also, verify any existing table tilt angle.

TIP: Use the Protractor “*INSTANT RECALL*” feature

F2

F2

BANDSAW



ADDITIONAL USES ON THE BANDSAW

CHECKING THE WHEELS FOR CONCENTRICITY [ROUNDNESS]:

1. Remove the Level Arm with the dial indicator attached.
2. Mount the dial indicator in the horizontal position [stem in line with the Level Arm].
3. Mount [clamp] the Level Arm with dial indicator so that the tip of the dial indicator is facing - and in contact with the face of the wheel [top or bottom].
4. Mark the wheel at the start point and rotate the wheel by hand one complete turn back to the mark and note the reading variation.

CHECKING THE WHEELS FOR RUN OUT, OR SIDE MOTION

1. Duplicate notes 1 & 2 above.
2. Mount [clamp] the Level arm with dial indicator so that tip of the dial indicator is in contact with the side surface of the wheel [top or bottom].
3. Duplicate note 4 above.

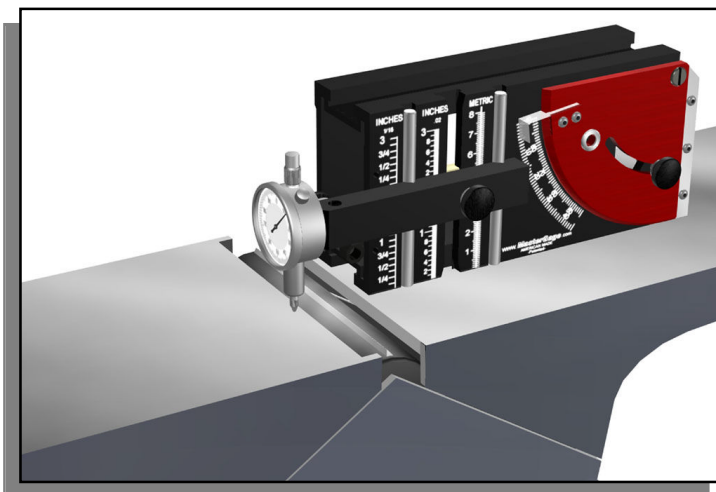
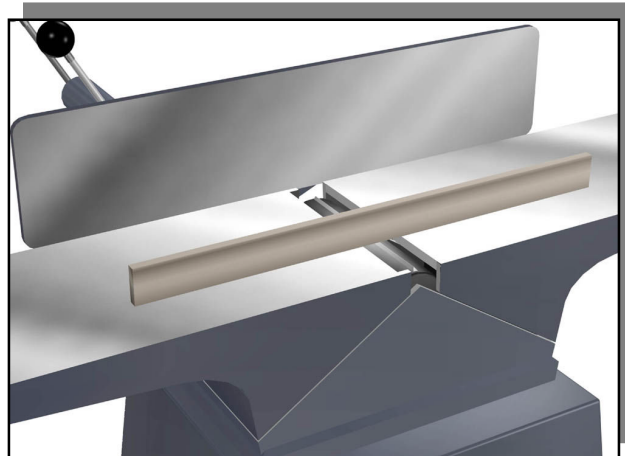
SECTION G

JOINTER

JOINTER

Perform the following procedures in tuning you jointer.

1. Using an accurate straight edge steel rule, check the flatness of both the Infeed and the Outfeed Tables. TIP: Sprinkle talc powder on the tables and drag the straight edge across the surface carefully. Much like concrete a mason dragging his top leveler across the cement to get it flat. This will give you a visual indication of where the hills and valleys are on the beds. This method can also be used on the tablesaw.
2. Bring the Infeed Table up to the height, which should be equal to the height of the Outfeed Table. Place the straight edge across both the Infeed and Outfeed Tables. They should be absolutely parallel with each other. If not, make the appropriate adjustments.



Outfeed Table

VERIFYING INFEED/OUTFEED TABLE PARALLELISM: With the **Pro** sitting on the Outfeed Table and the Dial Indicator zeroed out on the Infeed Table, sweep the tip back and forth on the Infeed Table. Verify that the Infeed Table is parallel to the Outfeed Table. Adjust to bring it in parallel

G2

G2

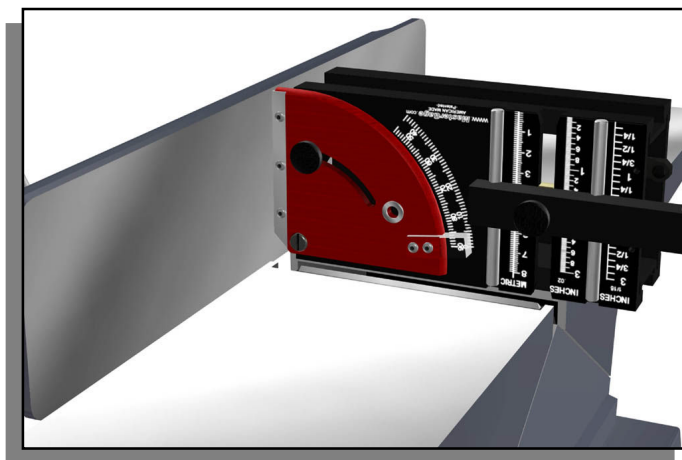
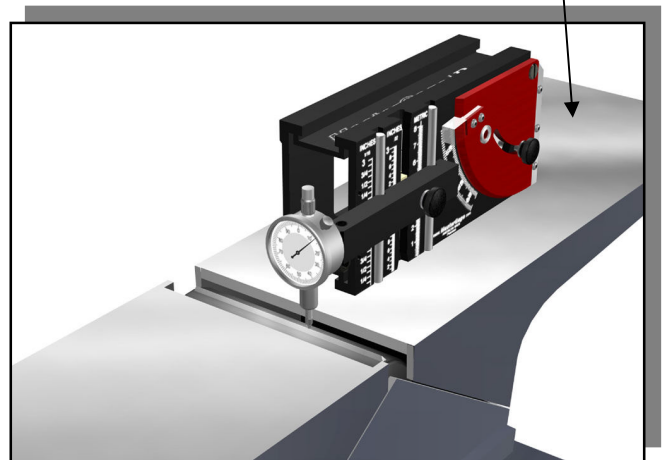
JOINTER

PROCEDURE FOR CHECKING AND ADJUSTING THE EXISTING BLADES – OR INSTALLING NEW BLADES.

1. Install the dial indicator flat tip.
2. Position the **Professional** on the outfeed table and “zero out” the dial indicator on the outfeed table surface. [This establishes the maximum height of the blade]
3. Using the **Professional**, rotate the cutter until the blade is at Top Dead Center [TDC]. Secure the cutter head at that position. [tape will do it nicely]
4. Check and set the blade to zero on the dial indicator.
5. Go to the next blade and repeat steps 2, 3 and 4 for each blade

TIP: Replace one blade at a time.
Do not remove all blades at once

OUTFEED TABLE



Square fence to table or set the fence to any angle required.

TIP: Use the Protractor
“INSTANT RECALL”
feature

SECTION H

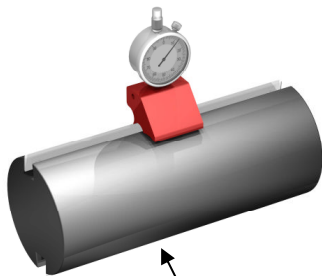
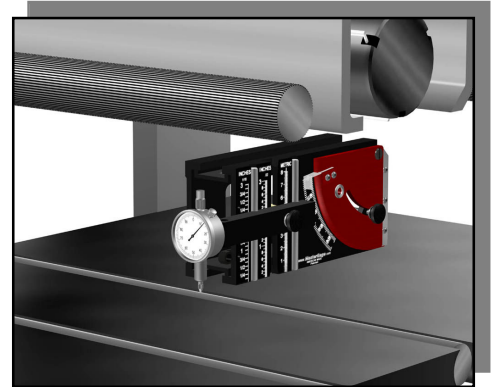
PLANER

H1

H1

PLANER

Check/set bed rollers to correct height and parallel to the table top. Use the flat Dial Indicator tip



We now offer a precision PLANER BLADE SETTING JIG for accurately setting planer blades relative to the cutter head to within .001 inches [1/1000 inches]. Contact us for details, or check our website at: www.mastergauge.com

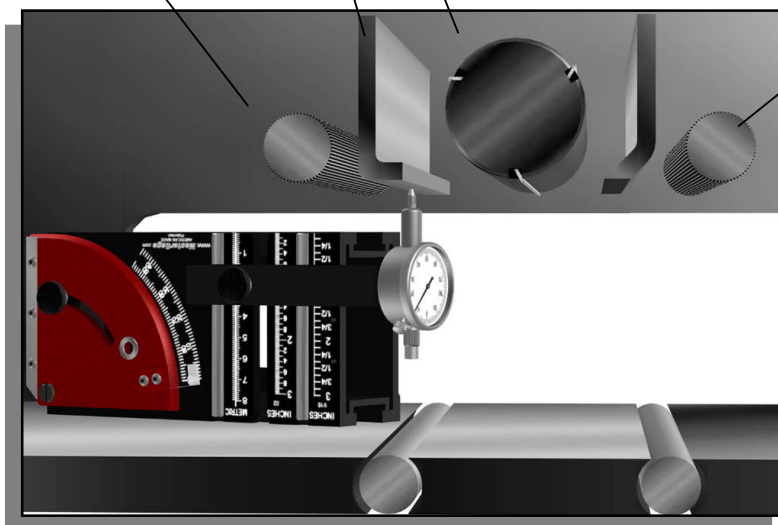
INFEED ROLLER

CUTTER HEAD

CHIP BREAKER

PRESSURE BAR

OUTFEED ROLLER



Rotate the **MasterGage/Pro** so that the Dial Indicator is facing up and check all the labeled elements on the illustration for correct height and parallelism to base table

PLANER

GENERAL NOTE: The planer is a complex machine with many components, both moving and stationary, that work in conjunction with each other. All of these components must be aligned and calibrated accurately to get the desirable results you expect. As the word “planer” implies, all of these components must be parallel with each other. **NOTE: ALL ADJUSTMENTS MUST BE MADE WITH THE POWER PLUG REMOVED FROM THE ELECTRICAL SOURCE.**

PLANER COMPONENTS DEFINED

BED ROLLERS – Most planers have two bed rollers mounted in the base table. One is located in the front of the cutter head, the other mounted in the back, behind the cutter head. The rollers are generally made of rubber or urethane. Their role is to reduce the friction as boards are pushed through the planer. They are spring loaded and non powered, and are raised slightly above the base table. Approximately 0.005 inches [5/1000 inches] for pre-finished stock and about 0.015 inches [15/1000 inches] for rough stock. It is important to maintain these heights completely across the full length of the BED ROLLERS.

INFEED ROLLER – This roller is generally a powered steel serrated steel roller mounted above the base table, forward of the cutter head. It is serrated so that it can grip the incoming board and move it forward through to the cutter. Tension on this roller should be stiff enough so that it leaves slight depression lines across the board. This ensures that the INFEED ROLLER will advance the board through to the cutter head smoothly. The cutter knives will remove these slight pressure lines as the board completes its passage through the planer.

CHIP BREAKER – It is a solid metal stationary piece and is located forward of the INFEED ROLLER and before the CUTTER HEAD. The CHIP BREAKER keeps the board from tilting at an upward angle and hitting the spinning cutter head prematurely. Both the INFEED ROLLER and the CHIP BREAKER must be adjusted even with the bottom of the CUTTER HEAD KNIVES at the cutter knives lowest point [arc]. If the INFEED ROLLER AND CHIP BREAKER are too high, the board will vibrate and have a rippled surface.

CUTTER HEAD & KNIVES – The CUTTER HEAD is a long cylindrical steel roller that holds 2, 3 or 4 long cutter blades [knives]. The CUTTER HEAD must be parallel across its full length to the base table to approximately 0.001 to 0.003 inches. The cutter blades in turn must be parallel to the cutter head. Again to approximately 0.001 to 0.003 inches. As you can see, the accumulated parallelism tolerances will reflect on the finished product – your finished planed wood. Be aware that the CUTTER HEAD bearings must be in good condition. If you can feel movement when you try to lift the cutter head with at each end or if you hear a clunk noise when the planer is turned on, it is a sign of bad bearings.

PLANER

PLANER COMPONENTS DEFINED (continued)

PRESSURE BAR – It is located forward of the CUTTER HEAD and is generally made of a solid metal stationary piece. The role of the PRESSURE BAR is to keep pressure on the board and hold the timber down on the table to decrease vibration, thereby giving the spring loaded OUTFEED ROLLER some extra help. It also keeps the board from tilting upward after being cut by the cutter head knives. If the PRESSURE BAR is adjusted too high, it does not hold the board down and the board can bounce and be gouged by the CUTTER HEAD. If it is too low, it will rub on the new surface or even hinder the board from exiting the planer. The PRESSURE BAR should be the same height as the as the CHIP BREAKER and the bottom arc of the CUTTER HEAD KNIVES. If it is too low, it will stop the board passing through. If it is too high, the board will vibrate and have a cupped cut effect.

OUTFEED ROLLER – This roller is smooth, so as not to mar the machined board surface. It is designed to keep downward pressure on the finished board surface and guide it as the board exits the planer. The OUTFEED ROLLER must also be parallel and at the same height as the INFEED ROLLER, the CHIP BREAKER, the CUTTER HEAD KNIVES, and the PRESSURE BAR.

FINAL NOTE – All of these measurements can be made with the *MasterGage/Professional* as illustrated. The one measurement that cannot be made with the *Professional* is setting the planer blades to the CUTTER HEAD. We have a special tool for that purpose called the *Planer Blade Setting Gauge*. This precision tool is designed specifically for this purpose. Please contact us for more information regarding this tool.

PLANER

TROUBLESHOOTING PLANER PROBLEMS

PROBLEM: The board is tapered across its width after passing through the planer

SOLUTION: 1. Check the bed rollers for parallelism to the table
2. Check for the cutter head and knives for parallelism to the base table

PROBLEM: The finished board has a washboard [cupped] effect on surface.

SOLUTION: 1. Sharpen the knives. If the knives are not sharp they tend to act as a blunt surface against the board, burnishing the surface and not cutting as required.

PROBLEM: The finished board has a glazed or burned surface.

SOLUTION: 1. The planer knives are dull and need to be resharpened

PROBLEM: There are ridges on the finished board.

SOLUTION: 1. One or more of the planer knives have a chip and need to be resharpened.

PROBLEM: The finished board has a rough and irregular surface.

SOLUTION: 1. The pressure bar is not holding the board to the table.

PROBLEM: The board stops or hesitates as it is being passed through the planer

SOLUTION: 1. Either the pressure bar and/or the chip breaker is set too low relative to the cutter head knife arc
2. The table is offering too much friction, wash the table top surface

PROBLEM: The board turns diagonal while progressing through the planer.

SOLUTION: 1. The feed roller is applying uneven pressure along its length.

PLANER

TROUBLESHOOTING PLANER PROBLEMS

- Continued -

PROBLEM: The planed surfaces are chipped

SOLUTION: 1. The planed material waste is being forced back into the planed surface. Check the vacuum exhaust system for clogged material. The material waste is not being evacuated adequately.
2. The chip breaker is set too low and is affecting the board surface.

PROBLEM: One or both ends of the board has snipe. Snipe is when a slightly deeper cut appears in the leading or/and trailing areas of the board.

SOLUTION: 1. The pressure bar or chip breaker is not set correctly
2. The pressure bar spring tension may be too light
3. Put a scrap piece of wood of the same thickness in front of and/or behind the board being passed through the planer.
4. Place two long narrow pieces of scrap along each side of the board to be planed. These narrow pieces are to be the same thickness as the primary board
5. Create a base extension so that the board is completely level upon exit of the planer.

PROBLEM: Vertical cut lines across the width of the board

SOLUTION: 1. Check the serrated infeed roller for both depth [height] and proper spring tension

PROBLEM: Wave marks on the timber.

SOLUTION: One or more of the knives are improperly set.

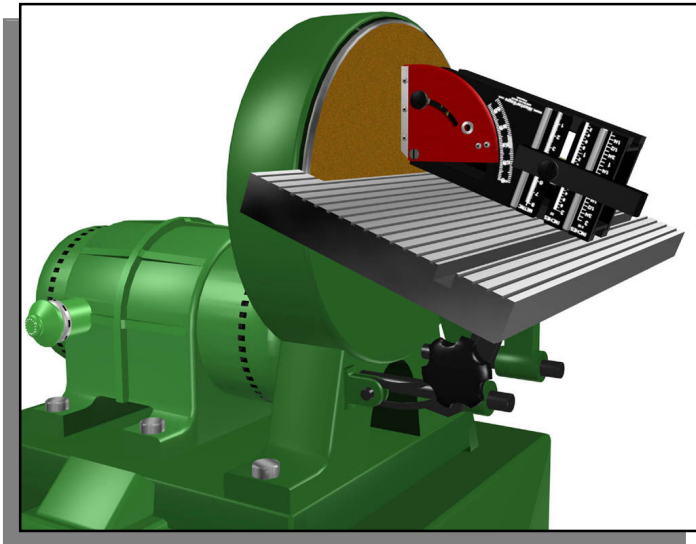
SECTION I

DISK SANDER

+

DRUM SANDER

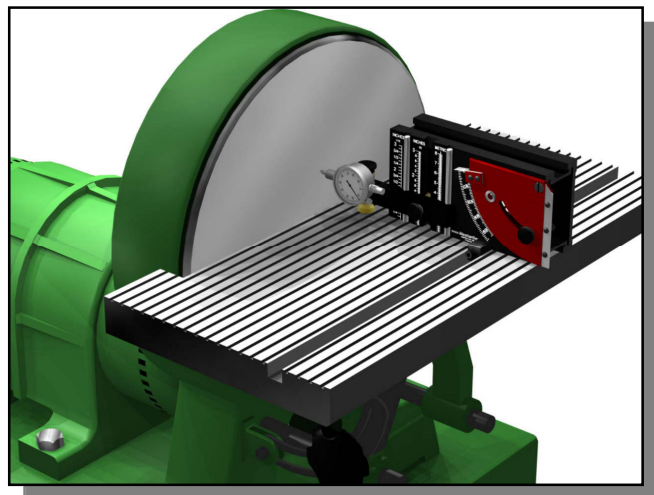
DISC SANDER



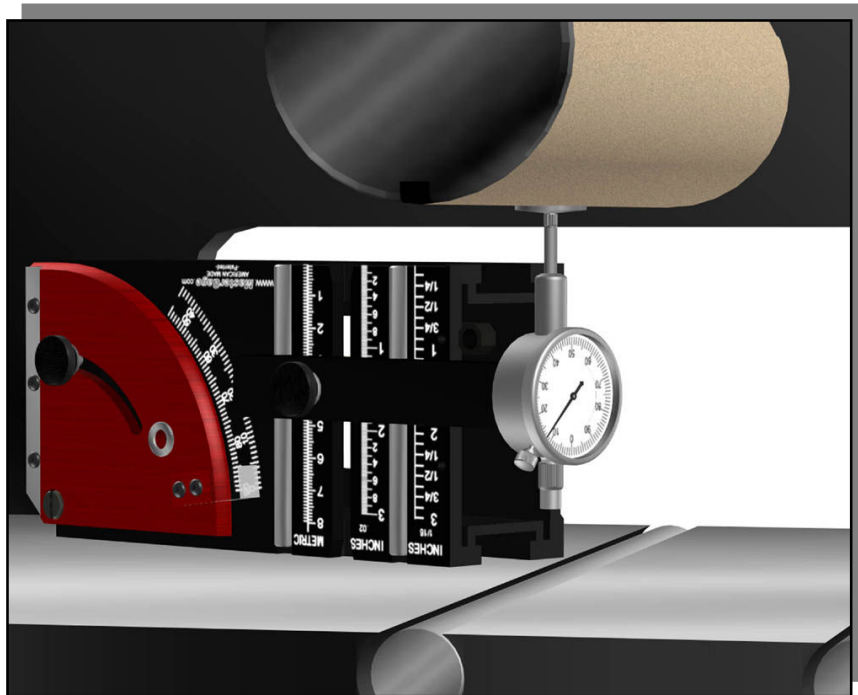
Set any angle required accurately.

TIP: Use the Protractor
"INSTANT RECALL" feature

Checking and adjusting the
sanding disk face plate
parallel to the miter slot.



DRUM SANDER



Check and set roller[s] parallel to base table top.

Also check and set bottom feed rollers for parallelism and required height

Use a ½ inch diameter [or larger] flat dial indicator tip

SECTION J

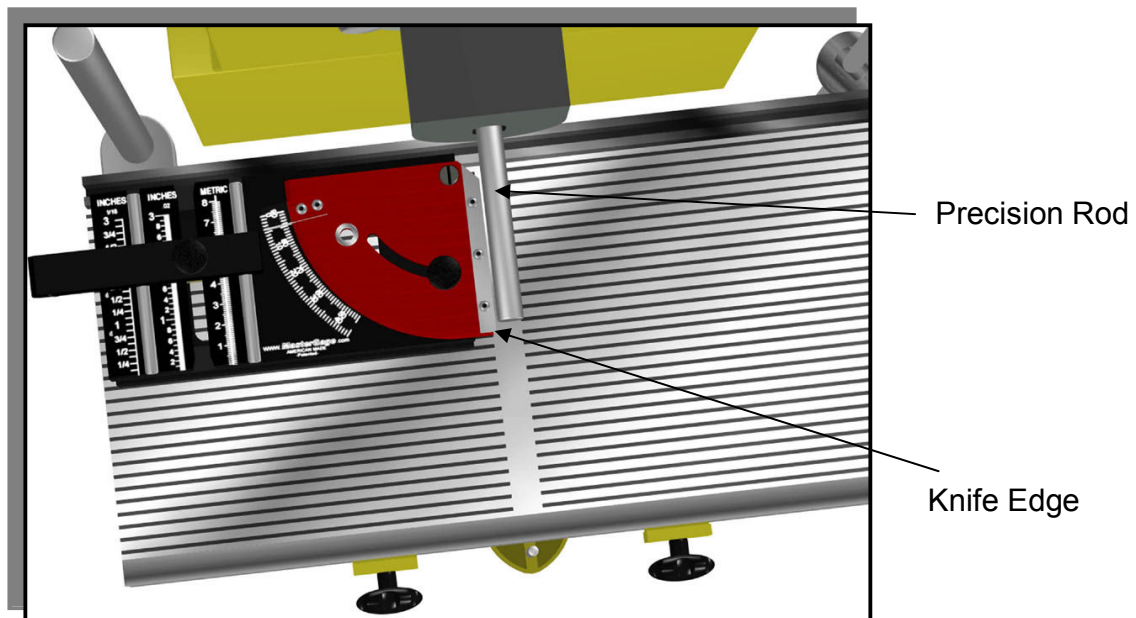
HORIZONTAL MORTISER

+

DOWELER

HORIZONTAL MORTISER + DOWELER

Horizontal Mortisers present a special challenge. Many of the tables are independent of the cutter head. They are separate tables that can move vertically, horizontally and back and forth. [X, Y and Z]. As such it becomes difficult to align the table to the mortise cutter. With the **MasterGage/Professional** it is easy and very fast to align the mortise table in X, Y and Z axis to the mortise cutter.

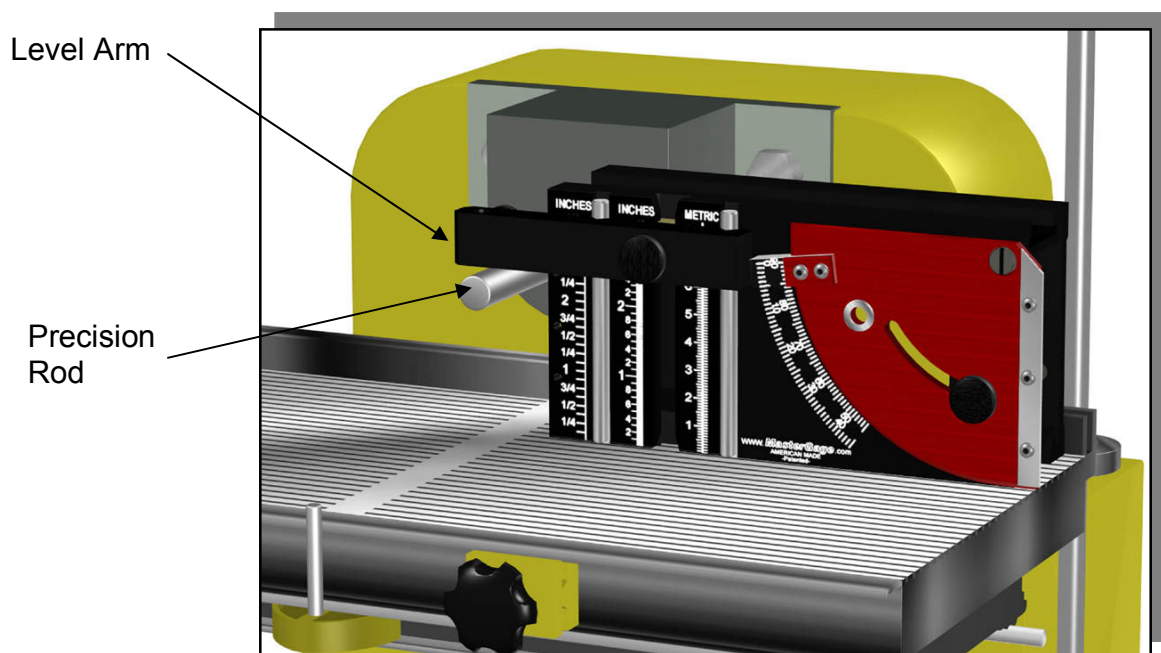


Square the Mortise table to the cutter head using the knife edge of the **MasterGage/Professional**

HINT: Use the ½ inch x 4 inch Precision Rod for alignment. Its smooth, super straight surface is far more accurate than using a cutter.

HORIZONTAL MORTISER + DOWELER

Horizontal Mortisers present a special challenge. Many of the tables are independent of the cutter head. They are separate tables that can move vertically, horizontally and back and forth. [X, Y and Z]. As such it becomes difficult to align the table to the mortise cutter. With the **MasterGage/Professional** it is easy and very fast to align the mortise table in X, Y and Z axis to the mortise cutter

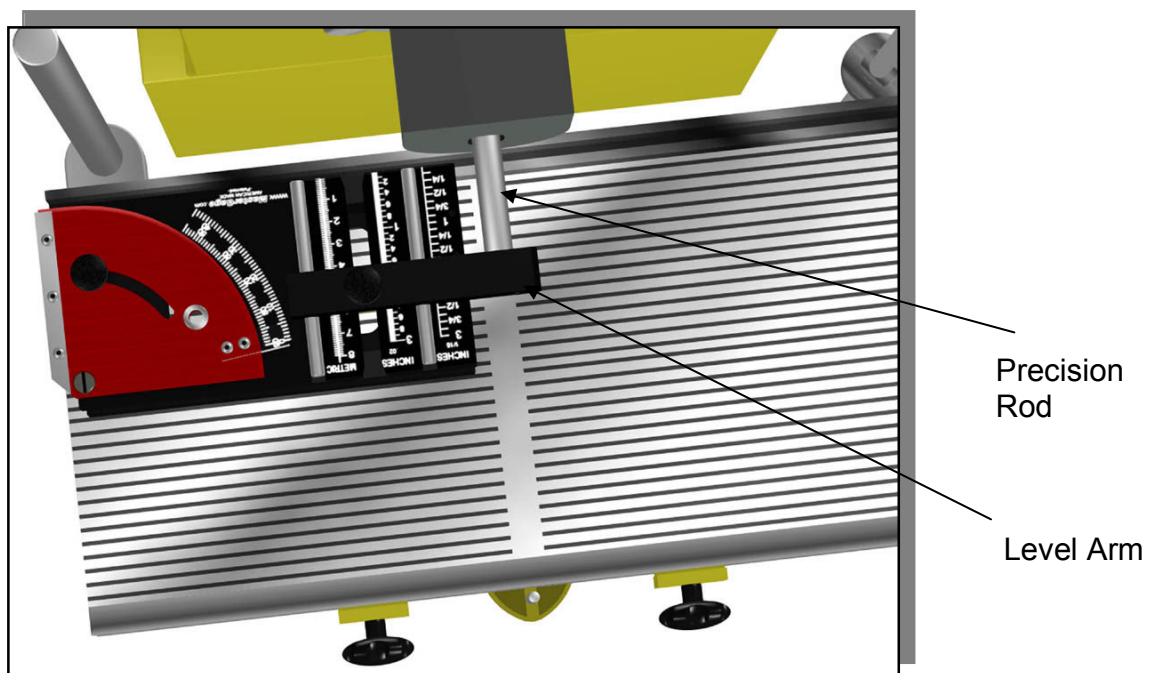


Setting the cutter height

HINT: When using the Precision Rod, simply subtract $\frac{1}{4}$ inch to find the center of the mortise required.

HORIZONTAL MORTISER + DOWELER

Horizontal Mortisers present a special challenge. Many of the tables are independent of the cutter head. They are separate tables that can move vertically, horizontally and back and forth. [X, Y and Z]. As such it becomes difficult to align the table to the mortise cutter. With the **MasterGage/Professional** it is easy and very fast to align the mortise table in X, Y and Z axis to the mortise cutter

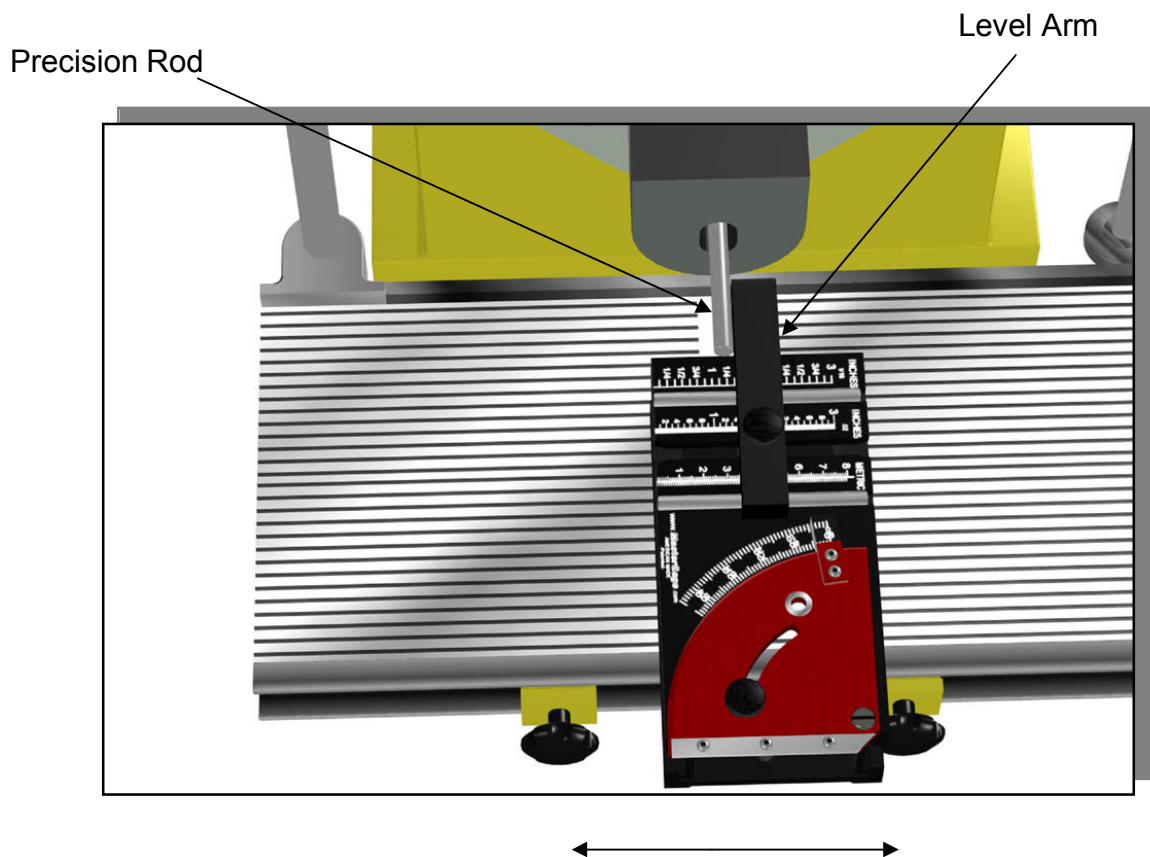


Set the cutter depth required and lock table stops.

HINT: Use the actual mortise cutter bit for this set up. Set the Mortise/Doweler table travel for the depth cut.

HORIZONTAL MORTISER + DOWELER

Horizontal Mortisers present a particular challenge since many of the tables are independent of the cutter head. Usually on separate tables that can move vertically, horizontally and back and forth. [X, Y and Z]. As such it becomes difficult to align the table to the cutter head and mortise cutter for a correct mortise cut on the wooden part. The **MasterGage/Professional** handles this problem easily.



Set the distance required for the mortise length and lock table stops.

HINT: Use the actual mortise cutter bit for this set up. Set the Mortise/Doweler table travel for the mortised slot width.

SECTION K

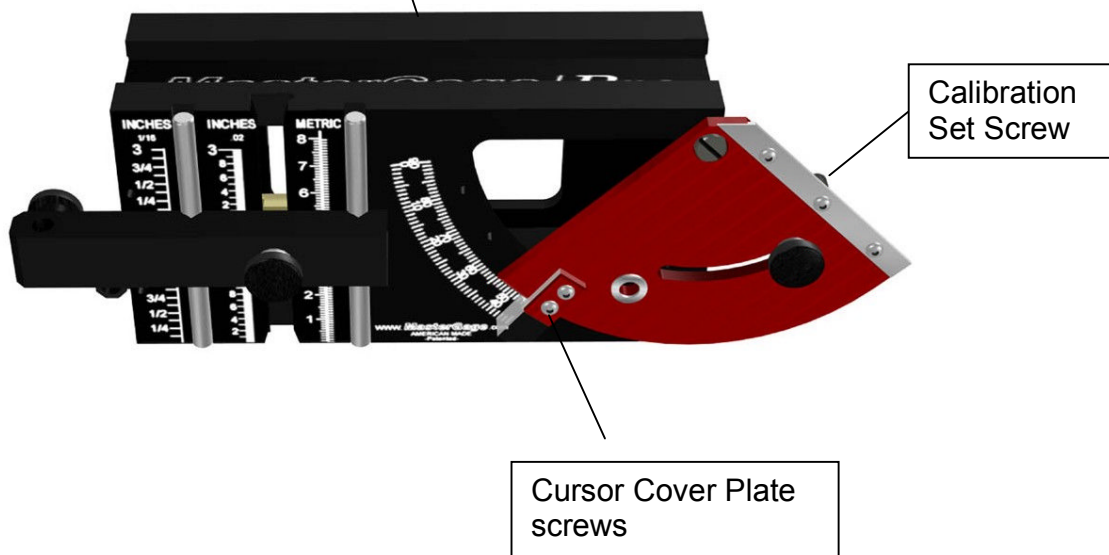
PROTRACTOR CALIBRATION

PROTRACTOR CALIBRATION

Your **MasterGage/Professional** protractor comes to you fully calibrated. If it ever needs recalibration, simply perform the following procedure, which takes less than a minute.

1. Using an accurate machinist square, set the protractor to 90 degrees.
Rotate the Calibration Set Screw until the Protractor aligns to the square.
2. Next, loosen the screws holding the Cursor Cover Plate and align the red cursor indicator line to 0/90 degree line and tighten the screws – Calibration Completed.

Applying Magic Mending Tape or Scotch Tape [not Masking Tape] to the working surfaces adds great protection and can be easily replaced when worn. The .002 inch thick tape allows the *Professional* to glide over machine surfaces with ease.



MAINTENANCE:

Lubrication – simply wipe the vertical stainless steel rods clean with your fingers.
The oil from your fingers will provide all the lubrication needed.

SECTION L

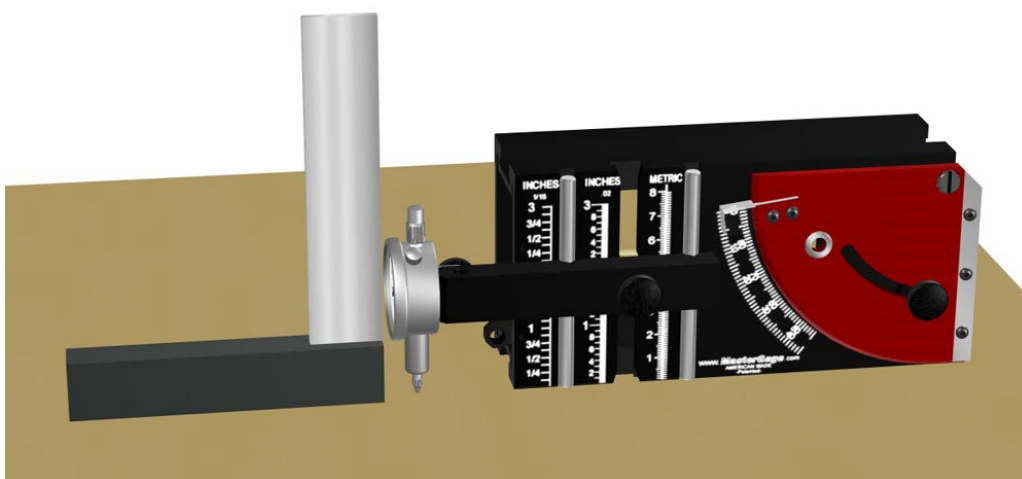
USEFUL TIPS AND TECHNIQUES

USEFUL TIPS AND TECHNIQUES

This Manual was designed to be a “working” Manual. With the open spaces on the printed pages and the blank left page, we encourage you write any information you need, such as the following:

- Record settings required for each of your machines
- Sketch/doodle any thoughts you have for a particular adjustment
- Make a chart for an inspection schedule for that machine
- Make notes for any particular set up or calibration procedures
- Any other information you want to record

When using the dial indicator on the *MasterGage/Professional*. Verify the dial indicator is perpendicular to the table surface by checking it with a machinists square as shown below.



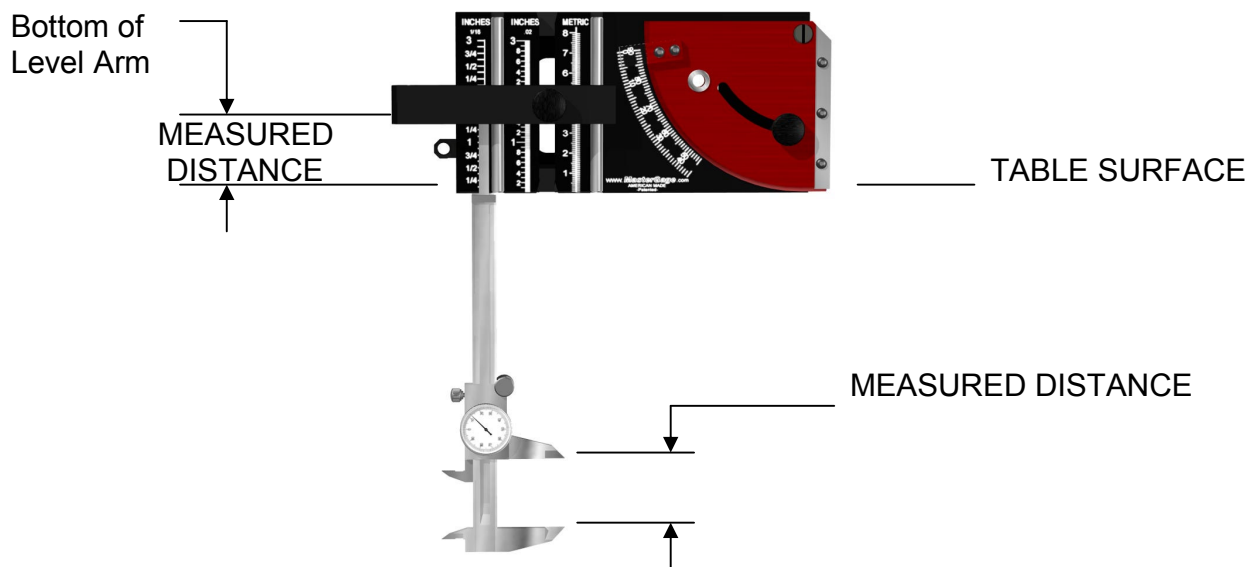
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Check with the *MasterGage.com* website for updates to this Manual. The edition of your Manual is shown on the lower right of the front page with the month and year of printing. You can download the latest version from the website. The edition will be visible on the lower front page also. You will have to enlarge the front page on your monitor to see this information.

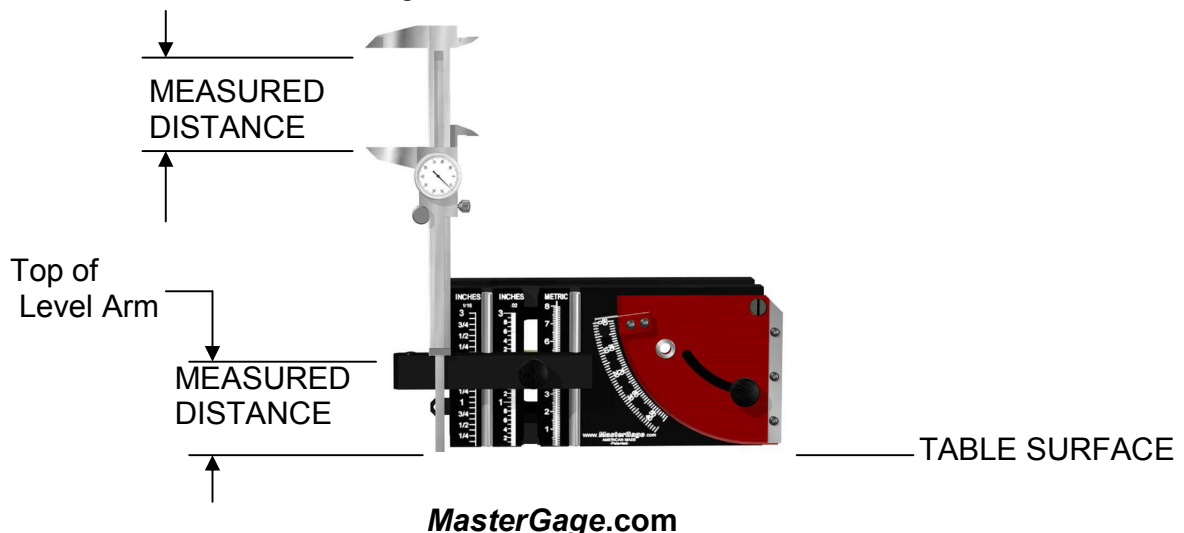
We encourage you to contact us with any tips you may have discovered using your *Professional* Call Toll Free: 888/893-8300 or e-mail at: sales@mastergage.com

USEFUL TIPS AND TECHNIQUES

Very precise settings can be attained using dial calipers with the *MasterGage/Professional*. This illustration shows how you can set any height to within one thousandth of an inch (.001 inches/.025mm). This technique is great for measuring/setting the height of a cutting tool that comes up from BELOW and registers against the BOTTOM of the Level Arm. For example, measuring/setting router bit heights, table saw blade heights, etc.



Another variation of this method is shown below. Measuring/setting cutting tools coming from ABOVE and registering against the TOP of the Level Arm. For example, measuring/setting the height of drill bits when used on a drill press. Also, radial arm saws, chop saws, compound miter saws, where the blade is coming down from above.



USEFUL TIPS AND TECHNIQUES

Using the MasterGage/Professional as a “Story Stick” for machine set up.

Most of us know of the Story Stick concept. One example is where the cabinetmaker uses two sticks, one a vertical and the other a horizontal stick to layout a wall where a cabinet is to be placed. He lays the sticks against the wall and marks them for locations of existing plumbing, electrical locations, along with window locations, etc. Instead of making a drawing of the wall, with the dimensions of these items, he simply marks the story sticks where they are located. Once that is done, he brings the story sticks back to the shop to assist him in designing and building the cabinet for that particular wall. This concept can be used for furniture building also.

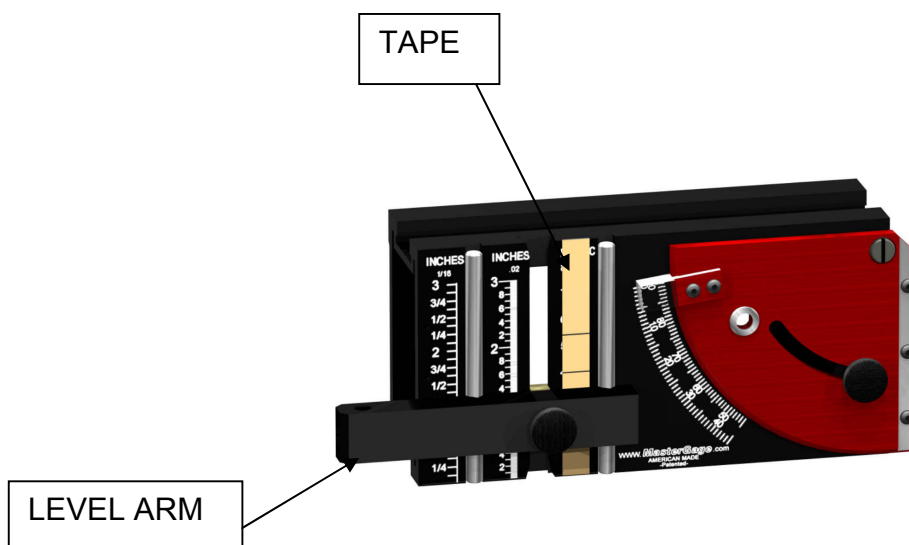
We have a bit of the same concept with the technique shown below. When you have several set ups on any machine, we suggest the following method.

First, remove the Level Arm and tape over one of the three scales you do not normally use. Then replace the Level Arm.

As an example, say you are making doors and are constantly exchanging cope and stick cutters on your shaper or router table system. Simply mark the tape on each cutter height needed. Perhaps a red color for a cope cutter and a black for the stick cutter.

Another example would be various drill bit heights for a project. Not only can you mark the tape to show the height needed, you can also make a note on the tape for the size of the drill bit used.

Once you finish with the project at hand, simply peel off the tape. Give this technique a try, the variations are endless.

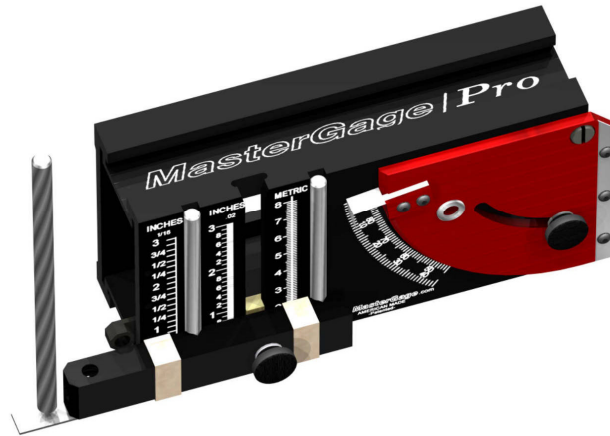


USEFUL TIPS AND TECHNIQUES

MEASURING/SETTING HEIGHTS OR DEPTHS LESS THAN $\frac{3}{4}$ INCH.

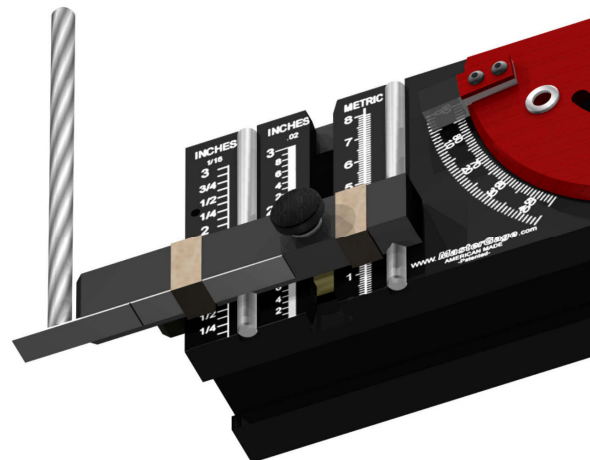
Because the height of the Level Arm is $\frac{3}{4}$ inches, it limits measuring anything from $\frac{3}{4}$ " to .000.

To overcome this restriction, simply tape a stick, or better yet, a 6 inch steel scale to the bottom of the Level Arm. This will allow you to measure from $\frac{3}{4}$ inches to close to .000.



Before taping the scale onto the Level Arm, select the height you require, between .000 and $\frac{3}{4}$ inches. Once done, tape the scale to the bottom of the Level Arm.

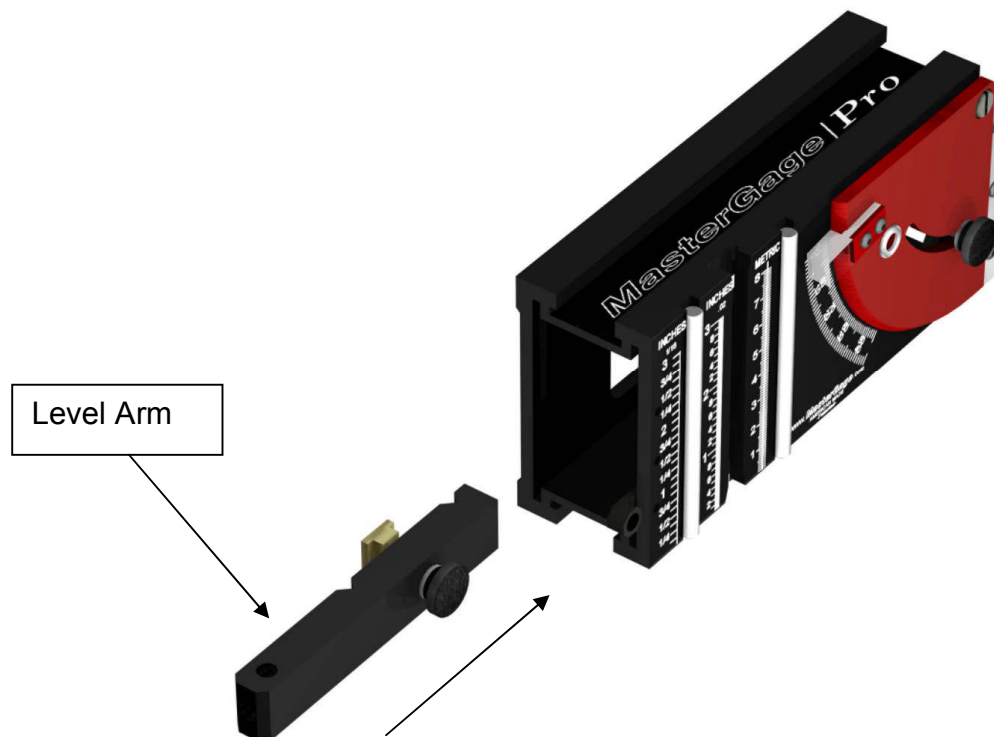
Note that the top of the steel scale [or other taped item] is actually the bottom surface of the Level Arm, which in turn, is the height that you selected.



L5

L5

USEFUL TIPS AND TECHNIQUES



PROVIDING MORE ROOM IN YOUR SHIPPING CONTAINER OR CARRYING CASE

With the **MasterGage/Professional** plus the manual plus the **MasterPlate** in the container/Carrying Case, it gets pretty crowded. The solution is to simply slide the Level Arm off of **the MasterGage/Professional** body and slip it into the center cavity of the body extrusion, then place the unit into the container/Carrying Case. This will give you an extra $\frac{3}{4}$ inches of height in the container/Carrying Case, making it easier to close the lid.

USEFUL TIPS AND TECHNIQUES

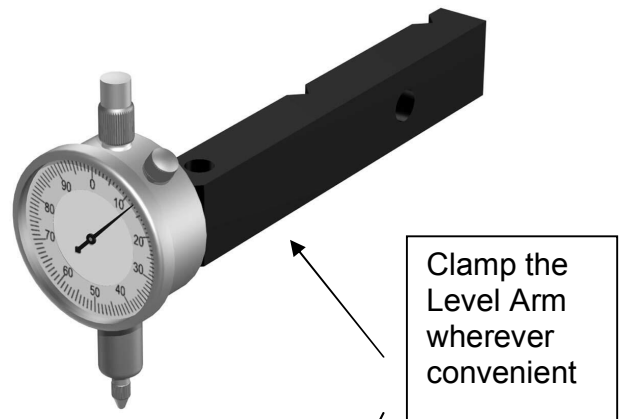
Setting your saw for bevel and miter angles for multiple sided boxes can be challenging. An excellent source for setting angles from 4 to 24 sides is shown on the following website. www.betterwoodworking.com/compound_miter.com [Note] there is an underline character between “compound and miter”, example: compound_miter. Hint: To change decimal minutes into degrees (example: 19.7°) Multiply .7° x 60 minutes = 42 minutes. The 19.7° now becomes 19°42 minutes.

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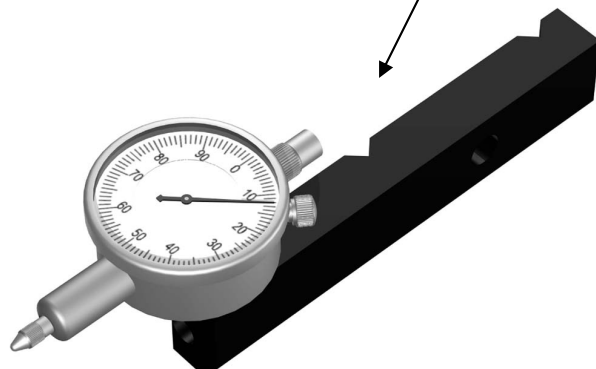
Getting the maximum use of your dial indicator

By removing the Level Arm with the dial indicator attached gives you a lot of capabilities for checking your machinery precision. The small package allows you to use the dial indicator in restricted places, such as beneath the tablesaw tabletop to check the flange run out. Simply clamp the assembly to any structure to give you precise readings.

With the dial indicator facing downward



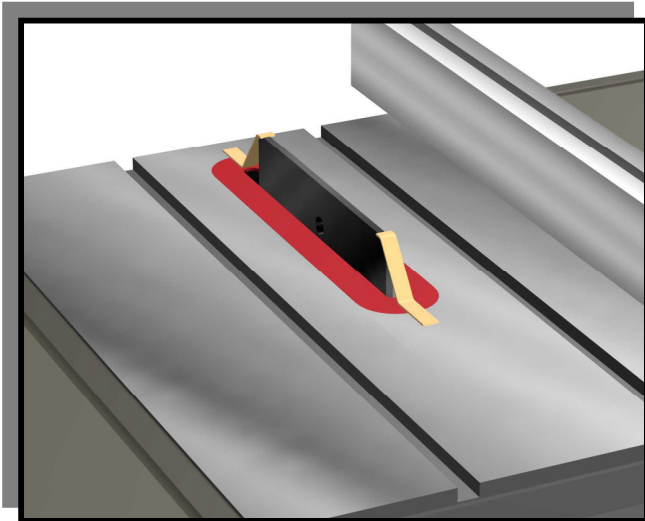
With the dial indicator facing forward



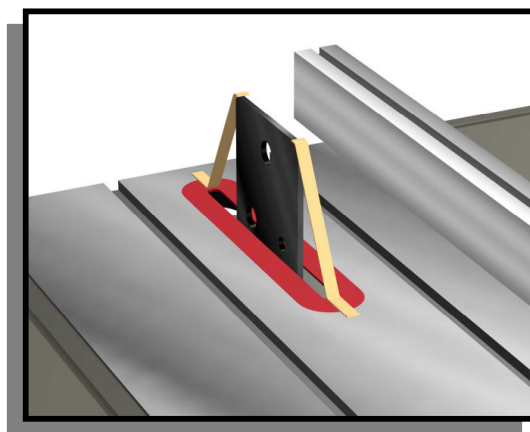
L7

L7

USEFUL TIPS AND TECHNIQUES



To keep the **MasterPlate** from rotating on the arbor shaft, tape the ends or edges as shown, before using the **MasterGage/Professional**. This technique will allow you to take accurate readings without worrying about the **MasterPlate** rotating.



With the **MasterPlate** in the vertical position, it becomes more difficult to keep in position. The above illustration shows how to keep the **MasterPlate** stable, with tape.

SECTION M

FREQUENTLY ASKED QUESTIONS – “FAQ”

FREQUENTLY ASKED QUESTIONS – “FAQ”

QUESTION: What kind of accuracy should I expect on my woodworking machinery? How close should I measure, 1, 2, 3, 4 thousandths of an inch?

ANSWER: Machines come in all sizes and quality levels. Many are built with stout cast iron bodies and components, others with sheet metal. Obviously, one can expect the cast iron fabrication to hold tight tolerances and for longer periods, than a sheet metal fabricated machine. The general answer is to align and calibrate as close as possible, without making it a 3 day project. Then monitor the dimensions over time. Naturally the cast iron machine will stand more abuse over time, and still keep the tolerances, versus the sheet metal unit.

QUESTION: How often should I monitor my machinery for alignment and calibration?

ANSWER: I would suggest setting up a written schedule for every machine alignment check. The schedule would depend upon machine usage. Is your shop on a 8 hour/5 day or 16 hour/6 day work week? How many different people use the equipment, etc. My feeling is to consider your shop like an airplane. Before you “take off” on your business day, like the plane, all machines are checked for running condition and accuracy. After all, your business relies on the accuracy and output of these machines. They are your bread and butter.

SECTION N

ACCESSORIES

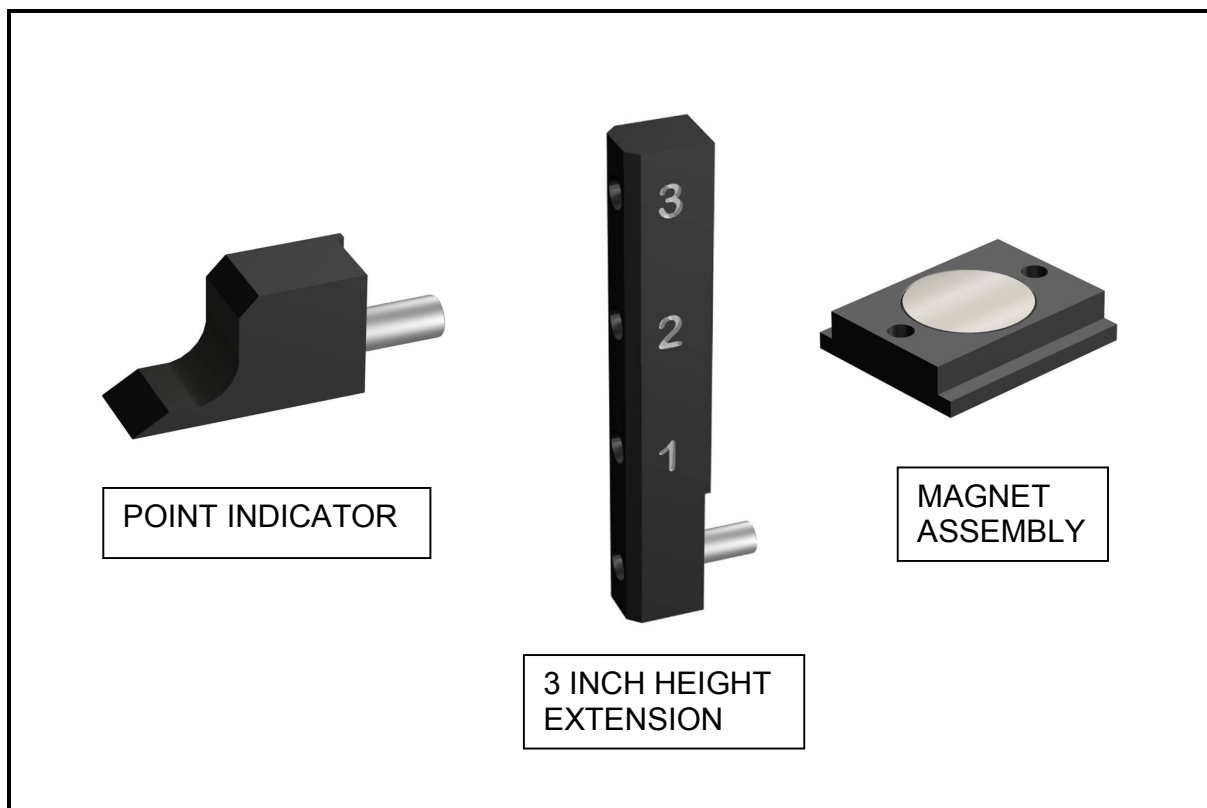
ACCESSORIES

Our list of Tooling Accessories for the **MasterGage/Professional** and **MasterGage/Classic** is constantly growing and expanding.

All pictures and information on existing and new Accessories are posted on our web site, making it easy for you to keep up with the latest developments.

Shown below are just a few of the many Accessories that can enhance your **MasterGage/Professional**.

Be sure to bookmark www.mastergage.com



SECTION O

ORDERING INFORMATION

ORDERING INFORMATION

You may order any **MasterGage** product by any of the following methods - 24 hours a day, 7 days a week,
Payment to be in US dollars

- PHONE or FAX: -TOLL FREE 888/893-8300



- WEB SITE: - PRINT OUT THE ORDER FORM FROM OUR WEB SITE www.mastergage.com AND FAX OR MAIL THE ORDER



- MAIL YOUR ORDER TO:

MasterGage Corporation
1534 N. Moorpark Road
Thousand Oaks, California 91360 USA



SECTION P

ONE YEAR GUARANTEE

ONE YEAR GUARANTEE

MasterGage Corporation extends a One Year Guarantee on all **MasterGage** products, including our Dial Indicators. This Guarantee covers materials and workmanship only and will not apply to damages arising from neglect, accidental or intentional damage or misuse of the product. This Guarantee is not transferable.

Repairs or replacement under this warranty shall be made by **MasterGage Corporation**, at no charge to the original customer. **MasterGage** will pay the return shipping costs.

We have registered your name in our data base as the owner of this **MasterGage/Professional**

REFUND POLICY

If this **MasterGage/Professional** is not satisfactory for any reason, return it **within 30 days of purchase**, postage paid. We will refund you the full purchase price, plus your shipping costs. We require a "Proof of Purchase", so please be sure to include a copy of your purchase receipt.