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Operating Instructions for the EST- KN100

Introduction - Congratulations on your purchase of an Edge On Up edge sharpness testing (EST) instrument. We can say without hesitation that this instrument will not only deliver precise final sharpness data but will also unlock information that will vastly improve your understanding of the sharpening and honing process. But we're still not done – The SE90 and KN100 are both linked to the **BESS®** (Brubacher Edge Sharpness Scale). The **BESS®** is the world's first universal *quantifiable* scale for the determination of edge sharpness.

More on the BESS® - The **BESS®** is based on a common double edge razor (DE razor) blade. The kind your Dad (or Granddad) used to load into his safety razor and the same kind that is making a huge

comeback today. The lower end of the scale (0) is based on the sharpened edge of the DE blade. The high end of the scale (2000) is based on an unsharpened DE blade blank. You can make an unsharpened blank by simply snapping a DE blade in half lengthwise. Once you snap a DE blade in half you will be holding a representation of both ends of the **BESS®** scale in your palm.

Why a DE razor blade? You know why already! We all have used the phrase “razor sharp”. The phrase (and the reality if your face or finger has ever gotten crosswise with a razor blade) has meaning to us. We know that DE razor blades are really, really sharp, the sharpest objects that most of us ever come into contact with. So on the **BESS®** a DE razor represents “0” grams (or near ‘0”) of added pressure required to slice through the test media. Even though the unsharpened DE blank is only .004 thousandths of an inch thick, it takes approximately 2,000 grams (4.5 lbs.!) of pressure to sever the test media.

So there you have the **BESS®**, 0 to 2,000 grams of pressure and in case you’re wondering – a cutting instrument that measures 2,000 on the **BESS®** is a very dull instrument indeed, an edge, if you want to call it an edge, very much akin to that of an ordinary butter knife.

But just as important, the **BESS®** is what allows users to exchange accurate sharpness information

worldwide. For example: Let's assume a user located in South Florida and another in Finland. Let's also assume that there was some magical way that both could test the same knife at nearly the same time. If they both used **Bess•U** approved instruments and test media they would both, within the accuracy constraints specified by the test instrument, come up with the same measurement number!

So who is BESS•U? BESS•U stands for BESS Universal. They can be found at www.bessu.org. Bess•U, amongst other duties, is the organization that regulates use of **BESS®** trademarks, instruments and test media. Bess•U exists to protect users so that they know that sharpness data that is written, seen or heard and that carries the **BESS®** trademark can be relied on as accurate. Instrumentation and test media must be certified by Bess•U before it can carry the **BESS®** trademark and logo. Edge On Up is licensed by Bess•U and all EST instrumentation and test media is **BESS®** certified.

Safety First! Handling and working with sharp edges and particularly sharp edges mounted in vises pose a real cut hazard. Kevlar safety gloves are readily and inexpensively available at Amazon.com and other outlets. Heavy long sleeves are a good safety choice as well. Use caution and good, sound judgment while working with sharp edges and this instrument.

Typical Examples Of Bess Measurements

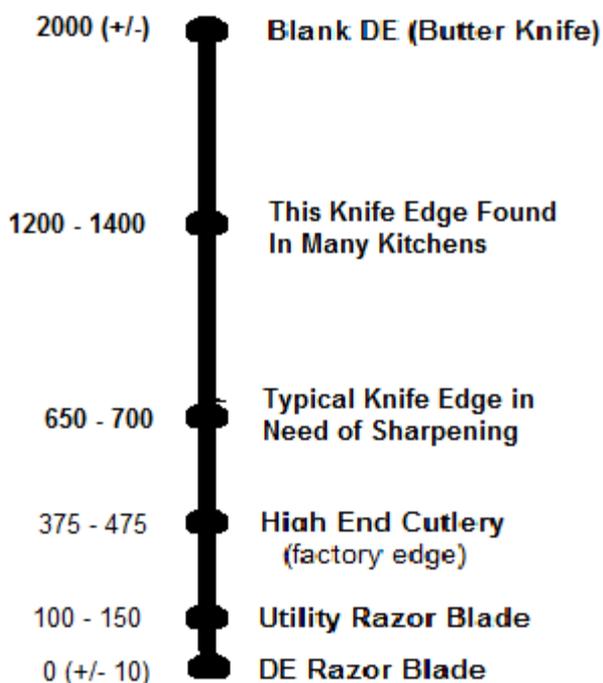
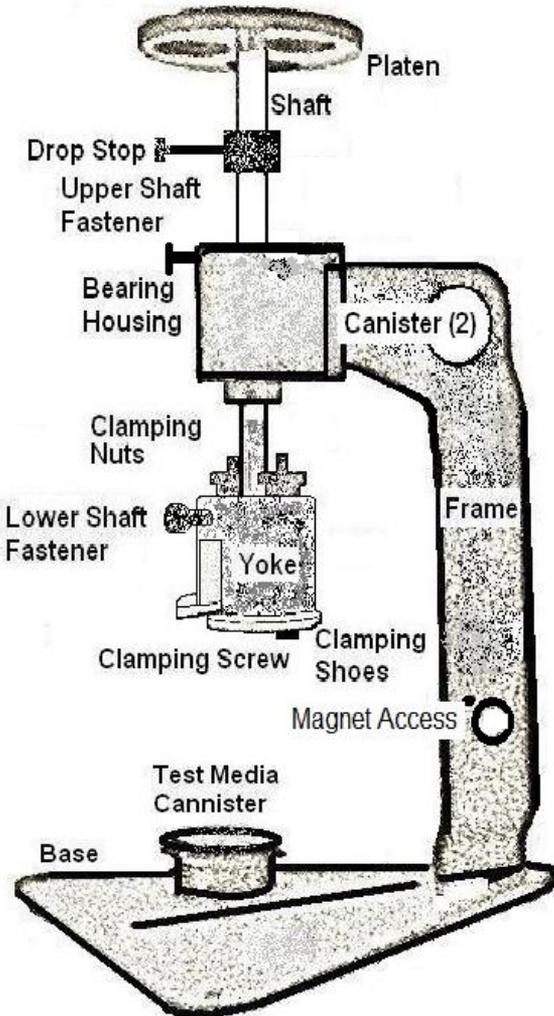


Figure 1 - EST Instrument



Please! Read the following in its entirety then return to the point where you would like to begin.

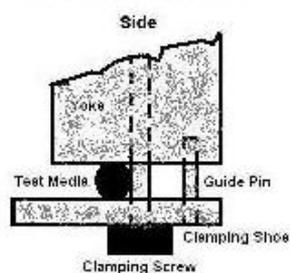
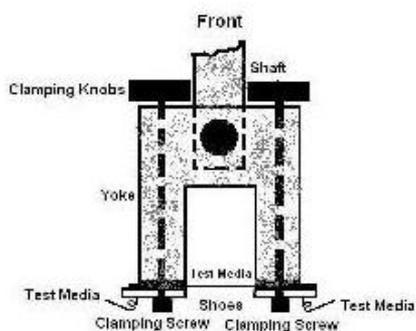
So Let's Get Started! – The EST instrument system is very robust. This means you can do a lot of things not quite right and yet still receive a very reliable answer. No cords, no batteries and no electronic components to “drift” or fail.

EST instruments utilize one of the most stable forces in the physical world as a motive source, gravity. In the instrumentation world, the most reliable designs are simple designs. EST instruments are guaranteed to produce repeatable measurement results better than .5% of scale (+/- 10 grams of pressure).

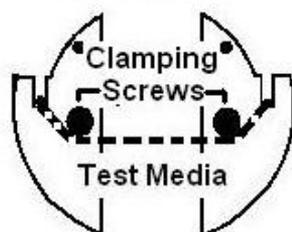
For you, this means your EST instrument has taken a scale from 0 (sharpest) to 2000 (dullest) and parsed it into 200 progressive levels of sharpness. This degree of accuracy and resolution far exceeds the typical requirement for final knife sharpness data but can be very useful when judging the efficacy of any particular stage of the sharpening process.

It is up to you to apply measurement data correctly so that it becomes useful information. This means that you should have a good working knowledge of the mechanics of edge sharpening/honing or, at least, be ready to learn.

Figure 2 - Test Media Loading



**Test media Path
Across Shoes**



Test Media Canister

A small spool inside the test media canister contains the actual test media. The canister is designed so that test media may be dispensed via a port in the canister by simply pulling on the test media. You need not ever open the canister and you certainly should not remove the media spool from its sealed environment. The canister may be located in the base, or top frame from either side. If the canister is not as tight as you like it place a single or partial wrap of scotch tape around the base of the canister and then insert it into the hole provided. **Do not** over do on this step or the spool will wedge inside the canister.

Loading the Yoke

(Figure 2) Like most processes there is more than one way to skin a cat and test media loading is no different. The following is one way that we like because it is fast, sure and preserves test media.

Place your finger under the yoke and push the yoke and shaft up and near the top of its travel. Secure in place by gently tightening the upper finger screw located on the front side of the bearing housing. Loosen the two clamping knobs (only a turn or two is sufficient).

Place the test media canister in the lower base holder and turn the canister so that the test media exits the canister to your right. If the canister doesn't fit snugly in the holder wrap a half round of scotch tape around the lower portion of the canister and try it again. **Don't make it to tight** or the canister will pinch the spool inside. The object here is simply to secure the canister in its mounting hole securely enough that test media may be pulled up and out of the canister without displacing the canister itself.

Pull out an amount of test media (about 5 inches for the SE90 and 6 for the KN100), straight up, until the end of the media is about a half-inch shy of the top of the bearing housing. Now, while maintaining slight upward tension on the test media, hook the shoe slot on the left with the media and then run the media down and around as indicated in Figure (2).

The theory here is to allow the test media canister to serve as an anchor point while you thread the test media over and through the clamping shoes. This method also insures that you do not over tension the test media because if you pull (tension) the test media too much, more test media will simply be released from the canister.

While still maintaining slight tension tighten the left clamping knob and then the right. That's it! When the measurement is completed you should have used no more than two inches of test media. Even less may be used as you tailor the process to your own style.

Once you master the process, you will be loading test media in five seconds or less utilizing the above described technique.

Another technique is to simply allow the test media canister to "dangle" mid-air from either side of the Yoke. The weight of the canister will anchor the test media but you must make certain that the canister rests on the EST base during the actual measurement or the weight of the canister hanging from the shoes will influence the measurement result.

Do not over tension the test media! We are simply removing the slack from the test media so that there is no droop across the Yoke gap prior to the actual measurement and that is all.

If you would like to take an additional measurement, remove the cutting edge and vise to a safe distance, raise the Yoke and secure with top fastener, loosen both clamping nuts, remove the severed end of test media from the right clamping shoe and begin the process again.

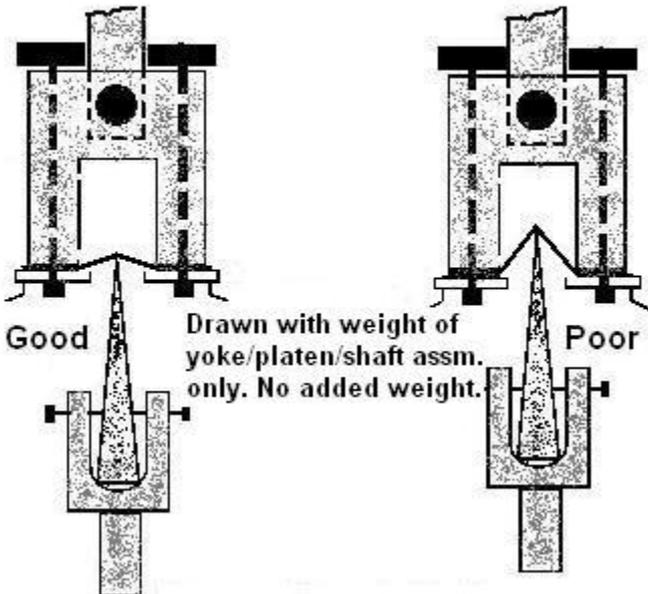
No matter what technique you settle on for loading test media (ours or yours) make sure you accomplish these three things;

1. You have placed both extents of the media between clamping shoes and yoke and against the clamping screws. *Placing the media against the clamping screws puts the test media in-line*

with the shaft thereby balancing the loading characteristics of the instrument.

2. You have removed the slack from the test media across the yoke gap (jaws).
3. You have finger tightened *securely* the clamping nuts at both ends of the test media.

Good & Poor Test Media Tensioning



About DE Razor Blades

Measurement of DE razors serves really only one purpose – to demonstrate to you the continued accuracy and precision of your EST product.

From a technical standpoint your measurements are relative to the scale sharpness of the DE blade and not to “0” on the BESS®. In practice, any differences between the scale reading of a DE blade and “0” on the BESS® will be slight and therefore usually insignificant to the result.

DE razors produced by the major manufacturers are a very reproducible product. You will find little difference (at least in initial sharpness) between different batches from a single manufacturer and little difference in the product produced by the various manufacturers. *We nor BESS•U claim, however, to have tested all manufacturers product.* At 72° F (22°C) the pressure range (ΔD) for all tested DE razor blades is only 20 grams of pressure (less than 3/4 ounce). In fact, for roughly 80% of DE blades, that range is only 10 grams.

In part, the BESS•U standard for "0 value" (DE razor blades) for combined instrumentation and test media is as follows;

"An instrument and test media combination whereby application of 50 grams of pressure +/-10grams will

cause the test media to sever." Therefore the mass of all Edge On Up piston apparatus (platen, shaft, yoke assembly) fall within this standard. The weight of the SE90 piston assembly is registered at 49 grams +/- 2 grams. The weight of the KN100 piston assembly is registered at 55 grams +/- 3 grams.

The KN100 piston assembly, by virtue of its design weight alone, is designed to sever the test media 80% of the time with no added weight. Should the operator wish to quickly test the accuracy of the instrument this provides a very quick means of doing so and since this unit is designed for knives the additional 5-6 grams of weight is insignificant to the result.

The SE90 piston weight sits on the very cusp in terms of mass. At 72° F this means that roughly 50% of the time (with the average DE razor blade) the test media will be severed by the SE90 piston weight alone. This design difference exists because the SE90 is designed for straight edge razor use where, in theory, only the very bottom of the scale will be utilized and only five grams of pressure (typical weight difference between KN100 and SE90 piston assemblies) gains significance.

Loading the DE Vise (double edge razor blades)

As previously noted the DE razor blade is the backbone of the **BESS®**. For this reason Edge On Up has included with your instrument a vise designed specifically to help measure DE razor sharpness. The DE vise is 5/16" diameter Delrin with a very narrow slot and clamping screw at one end. Only DE razor blades should be used in the DE vise.

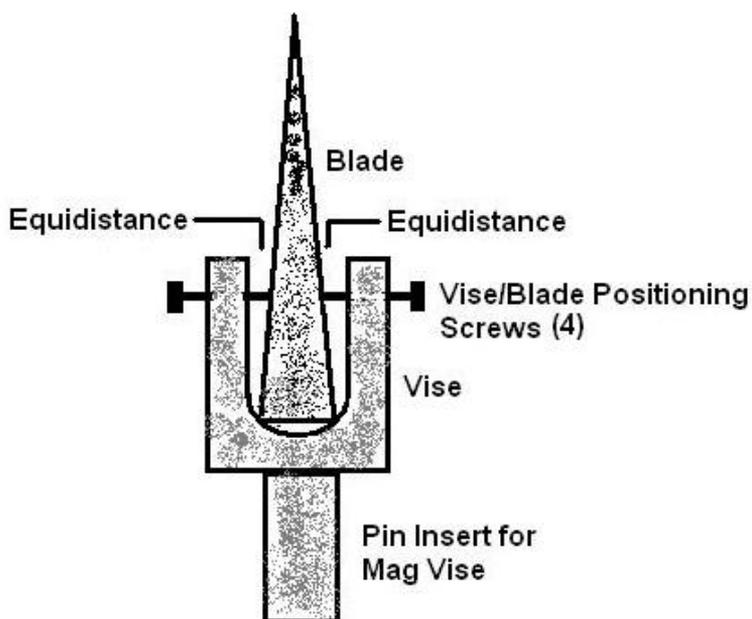
First locate the magnetic vise holder base and place "stick" the vise holder to the EST metal base at a point that is convenient for you. You don't have to worry about positioning the vise in a proper measurement position just yet. We'll do that later once the razor blade is positioned in the vise correctly. Insert the DE vise into the matching 5/16" diameter hole in the magnetic base. Now you are ready to mount the razor blade.

It is difficult to measure a whole razor blade because the weight of the measuring apparatus has a tendency to bend the super thin blade to the side before the test media severs. This distortion of the blade will affect the measurement result. Therefore you need to break the blade in half lengthwise. This is best done while the blade is still in it's individual wrapper (to protect your fingers from cuts). Once you feel the blade snap you now have two test blades. Center and insert the broken edge of one half blade in the vise and tighten down

with the vise thumb screw. Allow about 50% of the half blade to extend up and above the vise jaws.

And oh yes, do we really need to remind you about what happens when a razor sharp edge comes into forceful contact with human flesh? Please use **CAUTION!** and safe practices. When an exposed sharp edge is mounted firmly in a vise fixture it only takes one inadvertent movement with your hand or other body part to produce a severe cut. Please take care and wear protective gloves and long heavy sleeves when working with an EST instrument.

Figure 3 - Vise Blade Positioning



Loading the Vise (Knives & Straight Razors)

(Figure 3) For simplicities sake the balance of our instructions will be written as if we were preparing to measure a knife edge however the instructions for straight razors are, unless noted otherwise, the same.

Insert the black aluminum vise provided with your EST unit into the magnetic base vise holder and then locate “stick” the vise holder onto the EST metal base in any location that is comfortable and easily accessible for you.

Most knives can be gripped roughly in the center of the blade length but in all cases and with respect to the length and heft of the knife, care should be exercised to make certain that the blade is secured in a manner to avoid “tipping” once the knife and vise is mounted into the magnetic vise holder. This means that not only should the knife be balanced in the vise but that also the vise finger screws should be gripping the knife securely. You don’t want to end up with a sharp edge or knife point coming to rest in your lap in the middle of a measurement process.

An additional 5/16inch diameter magnet is provided with KN100 units in order to help stabilize long and/or heavy knives. This magnet may be inserted through the frame or “stuck” above or below the knife blade on the frame to provide better leverage and support.

Please use **CAUTION!** and safe practices when an exposed sharpened edge is mounted firmly in a vise fixture. It only takes one inadvertent movement with your hand, forearm or elbow to produce a severe cut. Please take care and wear protective gloves and long heavy sleeves when working with an EST instrument.

It is important that the edge to be measured is held in the vise in as close to a vertical position as practical. Your eye will tell you when the blade is vertical and that is close enough. Very thin cutting edges (such as a DE razor blade) can present a problem if they start to bend one direction or the other during the measurement process. Making certain the edge is vertical before and during the measurement process is important.

The vise provided for knives will accommodate blades thickness up to .187 (3/16) inch thick. The vise provided for straight edges will accommodate straight edge spine widths up to .281 (9/32) or most 5/8, 6/8, and 7/8 blades. Many larger and smaller size straight edges may be gripped by the vise at the shank (portion of razor between the scales and heel of razor) segment of the straight edge. If the razor shank is not "square" with the blade then adjust the vise grip on the shank so that the *blade* is vertical.

In all cases the vise incorporates a radius at it's lower extent. The radius at the lower extent of the vise serves to centrally locate the spine of the blade in the vise, automatically. Opposing set screws serve then to set

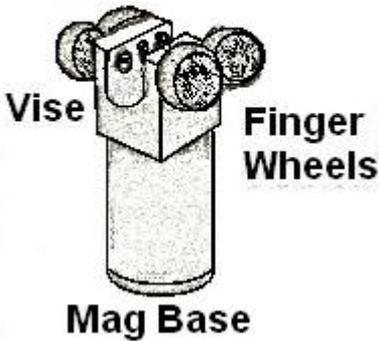
and secure the upper portion of the blade into a vertical position (make certain these screws are tight, securely holding the blade in the vise). You may use a four screw pattern (directly opposing screws) or a three screw pattern with two on one side and the third centered on the opposite side of the vise. Once the blade sides are equidistant from each side of the vise the blade is vertical. Equidistance is achieved once the gap between each side of the blade and the inner vise jaws is equivalent. Once again, for our purposes your eye will be a good enough gauge when judging equidistance.

Simply use a combination of loosening thumb screws on one side and tightening on the other side to achieve a vertical orientation. Once the vise has been adjusted properly for a particular cutting instrument and additional sharpening, honing, stropping is required you need only loosen the thumb screws on one side, slide or lift the blade from the vise, perform the needed task, reinsert the blade and retighten the loosened screw(s). Straight sided knives may be lifted from the vise. Wedge shaped blades and straight edges can be slid horizontally from and back into the vise. A finger screw is provided should you wish to lock the vise into the mag base.

Should you wish to experiment with different styles and materials of vise adjustment fasters, the vise adjustment holes are threaded for 8/32 screws.

The Magnetic Base Vise Holder

**Figure 4 - Mag
Base w/Vise**



The (Mag Base) (Figure 04) allows infinite edge positioning on both x and y axis. The narrow slot in the base of the EST delineates the center line of the EST instrument and the half-moon inscribed in the EST base approximates the center of the perpendicular axis when the Mag Base is positioned inside its confines. Always try to center, as closely as practical, the blade edge with the center of the yoke gap. The mag base allows you to make small alignment adjustments as required. Slightly off center measurements could affect the measurement result in a small way. Lifting the mag

base should be unnecessary once the mag base is mounted on the EST base. Just push it, near the bottom, or pull it in the direction you want it to go.

You can measure 3" long sections of a *well sharpened* blade (trying to measure "off vise" with dull knives could tip the mag base) with a single vise grip by simply repositioning the vise along the centerline. The mag base also allows the handle of the blade to be pointed toward you or away from you by simply rotating either mag base or vise (this assumes the handle of the knife doesn't contact the EST frame).

If the point or haft sectors of long and/or heavy knives are to be measured then additional support (auxiliary 5/16 magnet) for the Mag Vise may have to be utilized in order to keep the Mag Base from tipping and/or the vise securing screws from slipping.

The mag base includes a finger screw. When tightened the finger screw will prevent the vise from turning inside the mag base.

Caution! The EST's mag base is designed so that multiple points of measurement may be made from a single vise grip position on the knife. However, knife tipping issues may occur in combination with the following three factors;

- (1) Amount of linear offset from vise to yoke
- (2) Weight and length of blade and handle
- (3) Amount of weight added to EST platen. In general, dull knives can only be measured at a point with the yoke directly inline (above) the vise.

The Drop Stop – The drop stop prevents the yoke from contacting the edge of the knife after the test media severs. It needs to be set high enough that the media can be severed but low enough to prevent yoke contact with the knife edge. Detailed information regarding setting of the drop stop may be found under the section entitled "Taking a knife measurement".

What may affect the accuracy of the EST?

- **Temperature and humidity** - Bess® certified test media has been engineered to be nearly immune to humidity and temperature changes. We did say “nearly”. Over a span of 20° F you might see an insignificant (.5%) drift in measurement reading with cooler temperature measurements reading slightly higher (more pressure/weight) than warmer. If your measurements are being conducted in a climate controlled environment, temperature and humidity should not be a factor. If you will be conducting measurements in a non-environmentally controlled area you might see 10 grams (points) of drift at the lower end of the scale and 20 grams in the middle.

Note: In general, we don't care a great deal about what happens at the upper end of the Bess® scale when dealing with knives and

straight razors. If the cutting instrument edge measures 1000 points then it most certainly should be sharpened.

- **Edge not centered in yoke gap** – If it's a 1/16th of an inch off center (noticeable with the eye) there may be a small amount of variance. If it's a 3/16th inch off center (clearly noticeable with the eye) then there is liable to be a significant error. Your eye will put you within a 1/32nd inch easily so don't sweat it, just pay attention.
- **Edge not vertical** – Two or three degrees is no problem. Five degrees (noticeable) a small variance. Fifteen degrees (clearly noticeable) may produce a major error of 40 or 50 grams (points) depending on the sharpness of the edge being tested.
- **Test media slack before measurement** – The test media will “bow” during nearly every measurement process (even DE razor blades). The idea is not to allow excessive bowing which can affect the measurement result. A little loose is not a problem a lot loose is. Simply and gently pull the slack out of the test media before tightening the final clamping knob.
- **The knife blade edge is not parallel with the plane of the EST base** – If the knife edge is not perfectly level with the base it should not be an issue. Just position it as close to level as practical.
- **The test media does not cross the knife edge at a 90° (right) angle** – Reasonable angle errors

(15 - 20°) seem to have little effect on the measurement result. Sometimes, due to an imbalance in the loading of the yoke assembly, the yoke and platen will begin to slowly rotate as weight is added to the platen. If the yoke begins to rotate past 15° as you add weight, use the thumb screw attached to the drop stop or the lower shaft fastener as a lever to straighten or prevent the yoke from turning further. Don't impede the downward movement of the piston but rather use one finger or a thumb to push straight or block the rotating movement of the yoke.

- **Test media “slips” during measurement process** – This is a major no-no. Slippage is normally noticeable because the platen and yoke assembly, during the measurement process, will perceptively drop but the test media has not been severed. When and if this occurs during a measurement process (even if the test media “catches” securely again) start over. Pull the affected area of test media (a couple of inches) through the yoke and reload the yoke with fresh test media. So what has happened here? Usually the clamping nuts were simply not tightened securely enough for the load placed on the platen. As a result the test media will have been thermally altered by friction thereby altering its shear characteristics.

To Weigh or not to Weigh?

The EST instrument determines sharpness by measuring the amount of additional weight (pressure) required to sever a test media. Of course the yoke/platen assembly itself embodies a certain amount of mass (about 50 grams) but this weight has been calibrated so that it approaches the mass necessary to sever the test media when measuring a DE razor blade.

Once weight has been added and the test media is severed a physical record is automatically preserved. That record is the combined weight of the container (the container placed on the platen to contain the added weight) and the amount of mass (weight) it contains. If one possessed a knife whose edge was “just right” with regard to sharpness then you might measure that knife and then preserve the result in its container and subsequently always sharpening to that level. One might have several different containers each holding a different amount of weight representative of the desired sharpness level for different cutting instruments.

For **straight razors** the process is simplified by the fact that these shaving instruments will rarely require more than 150 grams of added weight once honed to a minimally acceptable level. This means we can use graduated weights, count, and then add up the total

mass. The small balls provided with SE90 units weigh 2 grams each and the large balls 10 grams each. A container is provided with the SE90 and that container (lid not included) weighs 8 grams. Straight razor users should separate the lid from the container body if it is to be used during the measurement process.

For KN100 owners in particular, it is Edge On Up's opinion that you should invest in an inexpensive electronic kitchen scale (assuming you don't already own one) if you want to realize the full value of your EST instrument. The scale should have a "grams" mode (almost all do). Most kitchen scales will weigh total mass well in excess of the 2000 gram level required by the BESS®. Electronic scales that weigh in tenths of grams are not required nor recommended. They often do not extend to the 2000 gram level; however, if that is what you have on hand it will work at some level. Edge On Up has tested several scales in the \$15-\$22.00 range and have found all to be quite satisfactory. They are readily available in both brick and mortar stores and on Amazon.com. Try to pick a model that the base of the EST instrument will rest on securely (most will) in order to afford yourself greater flexibility (more on that later).

Assuming you have an electronic kitchen gram scale in hand there are two methods for extrapolating data from a measurement event;

Method 1 – Put the scale read out in “grams” mode. After a measuring event is complete “zero the scale” then place the container with weights on the scale and note the result. Straight forward enough.

Method 2 - Put the scale read out in “grams” mode. Load the EST with test media, position the blade/knife to be measured properly on the EST instrument base then place the EST instrument with blade/knife on the scale platform. Lower the yoke/platen/test media assembly onto the blade edge carefully. Now “zero the scale”. Place the weight container on the platen and begin adding weight until the test media severs. **Leave the weight and the container in place on the platen!** The net measurement result can now be read on the scale display. This procedure can be modified as suits you as long as the last two set-up procedures you follow are “zero the scale” and then add weight.

Additional Weight (KN100 Only)

You will need to supplement the weight provided with your KN100 in order to accommodate most knife measurements. Weight is weight so there are many possibilities available for you. You just need to use a weight media that is dense and that will flow smoothly into the weight receptacle. At Edge On Up the preferred weight media is #8 or #9 shot. You can purchase it readily on-line , or in sporting goods stores Shot is dense and flows very smoothly with little impact into the container.

CAUTION! Ingesting lead or breathing lead dust can be hazardous to your health and particularly to children's health. If there are children in your house play it safe for their sake. Copper plated lead shot is readily available at many locations including Amazon.com.

Water works well. BBs are readily available (any Wal-mart) and inexpensive. Clean and dry fine sand will work. Any of the above will get you started just fine but if you will be taking a lot of measurements we recommend you invest in shot. 1000 grams (2.25 lbs.) is the minimum for any weight medium and 5 lbs. is ideal. Copper plated shot is available at Amazon.com in 10lb. bags

Weight Containers – As in you can't have too many. The little clear plastic 9 oz. cups with sloped sides you

find at every grocery store work great. They hold 1500 grams of shot easily and weigh about 9 grams each. If you are using water or sand you will like need larger containers. You may also use heavier (perhaps 200-300 grams in weight) containers when measuring knives. Heavier containers allow you to use less added eight but limit your data on the low end of the scale.

Taking a Knife Measurement

Caution! Never load test media, set drop stops etc. while the razor or knife edge is in the measuring position. Placing the vise/ edge in the measurement position is the *last* thing you do before taking the actual measurement and removing the vise/edge from the EST base is the *first* thing you do after the measurement is concluded. Please! Save yourself from a nasty laceration and follow this advice religiously.

OK so we know how to load the yoke with test media, how to position the knife in the vise, the vise in the mag holder, and then the mag holder on the centerline of the EST base with (for starters anyhow) the vise directly under the yoke (to avoid tipping of the blade).

Now stop! Is your **Drop Stop** bushing set properly? You may not care if you know the edge is dull (you won't hurt the edge or yoke) or if the blade to be tested is short enough that the yoke will come to rest on the vise as opposed to the knife edge. In any case make

certain the drop stop isn't set so low as to prevent the test media from severing.

The surest way to set the drop stop properly is to move the vise mounted blade under the yoke *before* the test media is loaded. Lower the yoke until the knife edge extends roughly half way up into the yoke gap. Now lock the yoke in this position with the upper fastener and remove the knife and vise. Slide the drop stop down until it contacts the top of the bearing housing and lock in place with the set screw. Now you are ready to load test media and take a measurement.

Move the knife/ vise/mag base into position. With one finger supporting the yoke from the bottom, loosen the upper fastener locking the shaft in place (just a full turn) at the bearing housing then lower the test media gently onto the edge until the blade edge supports the weight of the yoke/platen assembly fully. Remove your finger, place a suitable weight receptacle on the platen and begin pouring weight slowly into the weight container until the test media severs. If you used Method 2 for weighing, simply read the result now on the scale display. If you are using Method 1 then weigh the container and contents.

Note: . Weights over 1000 grams can degrade the holding ability of your clamping shoes over time. In no case add more than 2000 grams of weight to your EST instrument.

Taking a DE Razor Blade Measurement

First! If the EST instrument has not been used for some time spin the platen/yoke assembly shaft clockwise and then counter clockwise a few times (grasp shaft between thumb and index finger and roll back and forth). We do this because after sitting for some time the bearings can take on a “set” affecting the final result by 10 or 20 grams. While 10 or 20 grams is not significant when measuring most knives it is for DE razor blades and straight razors. Once this step is complete and if you are going to continue taking additional measurements you do not need to repeat this procedure.

Caution! Never load test media, set drop stops etc. while the razor or knife edge is in the measuring position. Placing the vise/ edge in the measurement position is the **last** thing you do before taking the actual measurement and removing the vise/edge from the EST base is the **first** thing you do after the measurement is concluded. Please! Save yourself from a nasty laceration and follow this device religiously.

So OK, your brand new and unused DE razor had been broken in half and now centered and clamped in the special DE razor vise. Center the vise and mag base directly under the yoke already loaded with test media. Support the yoke with one finger, loosen the finger screw holding the yoke shaft a full turn then gently,

very gently, allow the yoke to settle until the test media lies at right angles across the razor edge. Remove your hand. At 72° F (22° C) and the KN100 there is a 80% probability that the test media has already severed. With the SE90 the probability is 50%. In either case less than 10 grams additional weight should cause the test media to sever. If it does not then there is a problem either with the DE razor blade (unlikely if it was just removed from it's original package) or your test procedure

Assuming everything went swimmingly on your first or subsequent attempts try this experiment. Take an ordinary business card and using a sort of sliding down the blade motion make four or five 1/4" deep cuts making sure you pass over the point on the blade to be tested with each pass. Now conduct another measurement sequence. You should see that you have dulled the blade by about 20 - 40 grams. In fact your EST instrument will demonstrate that just the act of testing the razor blade a fair number of times will dull it!

Note: If you haven't encountered this phenomenon already you will as you gain experience with the EST. Sometimes you will add an amount of weight, stop, and the media will remain unsevered. You simply reach up to scratch your head and the piston goes *kachunk!!* severing the test media. This simply means that when you stopped adding weight the test media was on the "hairy edge". That's simply test instrument speak for being on the brink of something happening. Vibration,

air currents whatever then shoved the instrument over this hairy edge. Anecdotally speaking our experience tells us that if the kachunk occurs within a few seconds we were within perhaps 5-10 grams of severing the media and if the kachunk occurred twenty seconds later we were within 10-20 grams of severing the media. If you take a lot of measurements, particularly with straight edges or razor blades, you will experience many *kachunks!*

So why are we measuring razor blades?

In large part measuring the sharpness of razor blades is just showing off for the EST instrument. It does demonstrate both accuracy and repeatability however so that you, the user, gain confidence in the precision of the device. You will, from time to time, run into situations where you doubt the data provided by the device. Assuming the measuring procedure and set-up was conducted properly the device is pretty much error free. If there were a set of circumstances that would produce a significant variance (other than the procedural ones we have already discussed) we would tell you about it. After a year of testing we simply have *never* experienced an unexplained and significant error. We don't ask you to take our word for it however. That's one reason why we measure DE razor blades. If we get the correct answer on something as fine as the edge of a razor blade then the much broader requirements for a hunting or cutlery piece are a snap.

You can also use/measure single edge utility blades and use them as a test standard as well. They measure about 100-150 on the BESS®. In the lab we also use good quality cutlery and field knives as standards. Our Buck® hunting knife standard has a factory edge and has never cut anything other than test media. It measures around 410 on the BESS®.

If you decide to create your own set of standards make certain that your blades are protected from both abrasion and corrosion. Even stainless steel blades have an iron content that will oxidize. That oxidation will reflect itself on your test results as a duller (higher BESS® reading) knife. We recommend that you buy a batch of wrapped utility blades for test standard work. Just get out a new one (same for your DE blades) each time you want to test. Once unwrapped, utility blades can oxidize and dull fairly quickly. Test standard blades are only useful in demonstrations to your friends and for building your confidence in and learning about the EST instrument. After a few months your confidence in your EST instrument and the BESS® will be in place and you will be measuring razor blades less and less frequently.

Clamping Shoe Maintenance – If you don't take a lot of 1000 gram+ measurements your clamping shoes will last a long time. The clamping shoes are grooved so they grip better and as the grooves wear you will find yourself using more and more force on the clamping

knobs to hold the test media during a measurement. Once you get tired of fighting it you can turn the shoes over since we have grooved them on both sides for this purpose. Remove the yoke from the shaft. Remove the clamping knobs and then the clamping screws from the yoke. Unscrew the clamping screws from the shoes. You'll have to turn them over and then swap sides when reinstalled. When the second side wears out you can either try roughing up the surface of the shoes with coarse sandpaper or just order a new set from Edge On Up.

Note: Do not allow anything that resembles oil, wax or grease near the clamping shoes or yoke base! If you do you'll regret it because it is very difficult to clean effectively.

Tips and Tricks with the EST

If all you were ever going to do was measure the initial or final sharpness of an edge then we wouldn't have much to talk about here. If you want to unlock the full potential of an EST instrument as a learning and discovery device then please read on.

As we mentioned earlier, in order to fully utilize the potential of your new instrument you need to understand or be willing to learn the mechanics of edge sharpening/honing. Your first knife sharpening/test attempt might go something like this:

You make an initial measurement (or measurements) and discover that the blade is 640 (needs to be sharpened). Using the sharpening technique/method of choice you grind, grind, grind and then retest. It's still 640. Obviously your EST instrument has decided to go on vacation. Right? Wrong! Your blade sharpening angle was too shallow and you've simply been grinding on the side, not the edge, of the blade. This can occur even if your sharpening angle was off only by 1°. Now, isn't it nice that you now have an instrument that lets you know that you have been wasting your time and need to make some corrections in your sharpening methodology? Read on.

Uniformity of sharpness – You can test the entire blade if you would like to insure that the blade is uniformly sharp. It is extremely unlikely, at least initially, that it will be. Expect to see 50 or even 150 gram variations but please! Don't shoot the messenger! Use this information to improve the uniformity of your sharpening technique but don't kill yourself trying to get your entire knife edge to +/- 10 grams. 50 grams is really pretty good.

Sharpening different blades for different jobs – Not every blade should be sharpened to its sharpest level. It depends on what task the blade is designed for and how it will be used. Field dressing an elk and thin slicing cucumbers require two different knives and two different sharpness levels. You can use your EST instrument to fine tune each blade for its intended task. You may even want to sharpen different portions of some blades to different sharpness levels.

What grits produce what results? Now you can quantify what sharpening implements produce what kind of results and how efficient they are at producing those results. You may discover that your expensive 8000 grit stone isn't getting your knife any sharper than your 1200 grit stone or you may discover that you can skip the 1200 grit and go straight to the 8000. The possible iterations here are almost boundless. How about micro grit papers versus ceramic stones? Knock yourself out!

What blade geometries (sharpening angles) produce what sharpness levels? Ever wonder the difference (if there is a difference) between 15° and 22° with regard to sharpness? Now you can find out for yourself.

Burr and wire edges.- Here's one we could write a book on but first let's clear the air with regard to terminology. Here's how we look at it and this is not to say that we are right and someone else is wrong with regard to what a burr is and what a wire edge is.

To us a burr edge is one composed of, primarily, fragments and splinters of metal. A wire edge is a semi homogenous and mostly continuous super thin roll of steel that has been "squeezed" out of the blade edge by the sharpening/honing process. Burr edges are normally and readily removed by the use of finer grit sharpening tools. Wire edges are more difficult to remove in their entirety because the flexible wire edge is constantly being rolled from one side of the edge to the other. Wire edges almost always lay to one side of the blade or the other after sharpening. If you last sharpened the right side of the blade, the wire edge will be rolled to the left and vice versa. Many expert knife sharpeners work hard at removing this edge because they know a wire edge is very fragile and subject to folding back on itself. Other individuals cultivate this wire edge because it is, in fact, a very sharp edge. So what's the point here? This is just background. We'll make our point in the next, strops and steels, section.

Strops and steels – In Edge On Up parlance strops and steels are for straightening edges, not actually sharpening them in a metal removal sense of the term. We have actually had little experience with steels and have relied mostly on various stropping materials. Yes, if you spray your strop with diamond abrasive spray you may have converted it into a metal removing abrasive surface but we will leave to your judgment the wisdom and logic of doing so. So now **here's a first for you** - Your EST instrument will detect and measure the degree of wire edge present on an edge. Here's how it is done:

At or near the final stages of sharpening/honing go straight from the abrasive sharpening surface and then to the EST instrument. Take a measurement and note the result. Now strop the blade several times on each side (you can use your jeans if you like). Denim surfaces work quite well as do any number of other materials and techniques. If you own a leather strop or stropping block, use it. Now back to your EST for a measurement. If there is a wire edge present you will see a decided difference between first and second measurements (perhaps 450 initially and stropped 275. This differential can be less or more dependent on the height of the wire edge. Did five or six swipes per side on your jeans remove that much metal? No, of course not! You simply used the edge pressure exerted against the denim to straighten out the wire edge so that its sharpest element could directly impinge on, in this case, the test media.

Now pat yourself on the back. You are among the first to actually measure the degree of wire edge on a cutting edge. The more wire edge the greater the differential between initial and stropped results. The edge was rolled to the side in the first measurement and then straightened in the second.

Now let's continue the experiment with wire edges. Our last measurement, after stropping was 275. Leave the knife in the vise *exactly* in the same position for six or eight hours. When you return take a measurement. The new measurement will now be closer to your initial measurement after sharpening (450). Yes, the stropped edge rolled back near its previous, pre-stropped position. This effect, which we attribute (yet to be proven scientifically however) to metal memory, begins immediately after stropping and progresses with time until the metal has returned to its preprogrammed state.

This effect is apparent in all metal edges including straight razors. Its why you strop your razor immediately before shaving (and sometimes during) and not when you cleaned your razor after the previous days use.

A little more on wire edge removal – We often see in blogs and knife forums a familiar question; “*How do I know when the wire edge has been removed?*” Of course, until now, there has been no definitive answer for this question. Now there is.

We know that wire edge removal usually requires numerous very light pressure passes with a very fine abrasive surface (others advocate dragging the edge across a felt surface in hopes of causing the wire edge to separate from the blade. *Not sure about that one however.*). We also know now how to detect a wire edge so it follows then that when there is no measurement difference between a dressed (very lightly and finely honed) edge and the same edge stropped that no wire edge continues to exist. In practice this limited differential result ("0" differential) is difficult, if not impossible, to achieve. Our experience tells us that when the differential measurement is inside 50 or 60 points on the BESS® you have achieved your practical goal. This is evidenced by the following experiment:

Assume the initial measurement was 300 and the stropped result was 260. Great, we are inside our goal of a 50-60 point differential. Now let the knife rest for a couple of hours in exactly the same position on your EST instrument. Now retest. It will most likely be within 10 or 15 points of your final reading indicating that the vast majority of the wire edge has been removed and that little or no metal memory remains.

Please remember! A wire edge will most likely be your sharpest edge. Full or partial removal of the wire edge will result in a significantly duller but much more durable edge.

What can cause seemingly unexplained minor variations in readings?

Other than the few procedural items discussed earlier it will be the vagaries of metal blades themselves. On even the most professionally sharpened edges microscopic nicks, shards and folds exist. The contact area of the radius of the test media on edges only molecules thick is miniscule to say the least. Shifting that contact area only a few thousandths of an inch could place the test media in a slightly different measurement zone. These potential variations should be inconsequential to your goals. If you want to really see how precise an EST instrument can be when measuring knife blades, go through a sharpening sequence on a good ceramic blade. Ceramic blades do not create burrs or wire edges and because the off fall of the sharpening process is a fine dust the sharpened edges are very homogenous. This is one reason why Edge On Up and the BESS® use DE razor blades as a standard. As far as steel blades go they are the most uniformly manufactured edge commonly available.

A Little Bit About BESS® Certified Test Media

It is inevitable that comparisons will be drawn between BESS® certified test media and other monofilament fibers designed for different applications. These include monofilament thread, fibers, sutures, fishing line and leaders. Monofilament is made from Nylon, polyethylene, polypropylene, polyolefin etc. Edge On Up has tested most of these fibers and found them to be, largely, unsuitable for our purposes. None perform, in concert with the BESS®. Some may resemble the BESS® on the bottom end of the scale but miss badly in the middle or top and vice versa. None have the repeatability or precision of BESS® certified test media. However, should you find yourself in a bind (out of test media) and simply want to know if one edge is sharper than another then ordinary fishing line (we suggest fishing line because it is readily available but if you have polyethylene thread etc. on hand then use it) can suffice if your precision requirements are broad. You can use 4, 6, or 8 lb. line because it makes little difference in this case. It simply needs to be able to fit inside the small slots in the clamping shoe. Once started down this path, stick with one spool and one size line by one manufacturer (even different spools (batches) of the same size line and manufacturer can yield significantly different results). Remember, you are not trying to make comparisons with the BESS®, you are simply trying to compare one edge to another.

Ordinary sewing thread string and other stranded fibers. Don't waste your time. They will barely work at any level.

Never report, publicly, EST sharpness testing results if those results were not obtained using BESS® certified test media and instrumentation.

Licensing and Use of Trademarks

Your purchase of an EST Instrument manufactured by Edge On Up and continued use of BESS® certified test media in your EST instrument entitles you to free use of the trademarked term (word) BESS® for non-commercial, non-profit purposes in both the spoken and written word unless notified, in writing, to the contrary by Edge On Up and/or BESS•U .

Intellectual Property – Most aspects of the design and operation of the EST instrument and use of test media are covered under patent application #14481255 entitled Edge Sharpness Tester filed with the US Patent office.

Thank you for purchasing an EST instrument!

We have only one parting thought for you. As you begin to open doors which were previously closed you will discover many things. At first, you may not always understand the results you are seeing but that is only because this is the first time you've ever been able to measure them. You no longer have to rely on conjecture and anecdotal wisdoms when sharpening your cutting and shaving instruments. You now own an instrument that will simply present you with the facts.

At Edge On Up we are constantly reminded of the adage told of an inexperienced private pilot who flew into a fog bank and then sensed he was in a steep climb when his instruments told him he was in a dive. The outcome in this adage isn't pretty. As you learn to trust your EST instrument your knowledge base will grow. You probably won't live any longer but you *will* produce sharper and more durable edges.

Please visit our web site at www.edgeonup.com for further information or email us at edgeonup@gmail.com . We guarantee you will get a speedy response. You may receive your reply from our edgeonup.com email (it's our way of filtering spam) Once again – Thank you for becoming one of our customers!