



## Operating Instructions for the **EST- ME110**

**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 ME110 is 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.

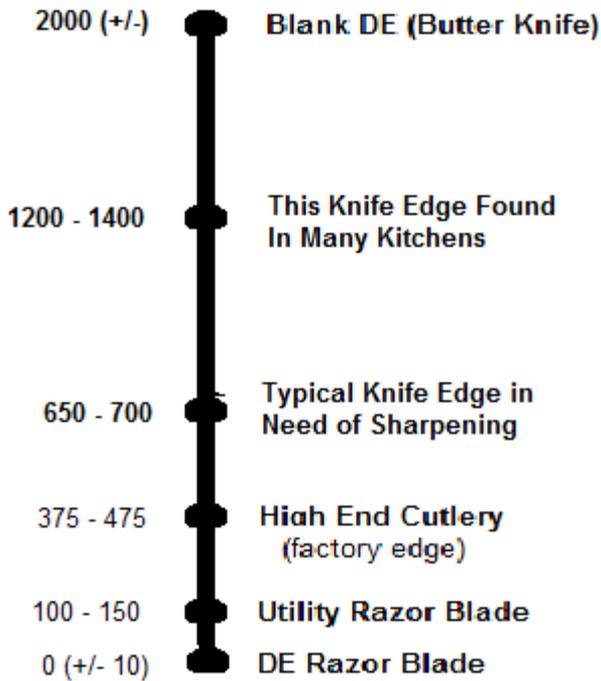
But just as important, the **BESS®** is what allows users to exchange accurate sharpness information worldwide. For example: Let’s assume a user located in South Florida and another in Finland. Let’s also

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](http://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



# EST-ME110



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

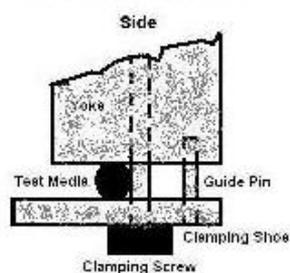
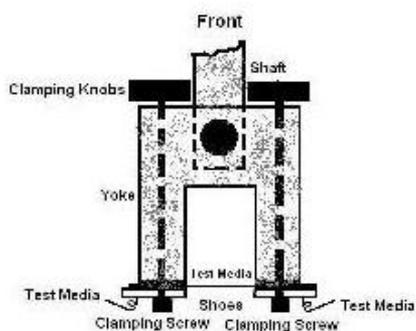
**So Let's Get Started!** – The EST instrument system is very robust. This means you can do a lot of things not quite right and yet still receive a very reliable answer. No cords, no batteries and no electronic components to “drift” or fail.

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).

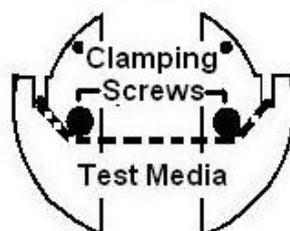
For you, this means your EST instrument has taken a scale from 0 (sharpest) to 2000 (dullest) and parsed it into 200 progressive levels of sharpness. This degree of accuracy and resolution far exceeds the typical requirement for final knife sharpness data but can be very useful when judging the efficacy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

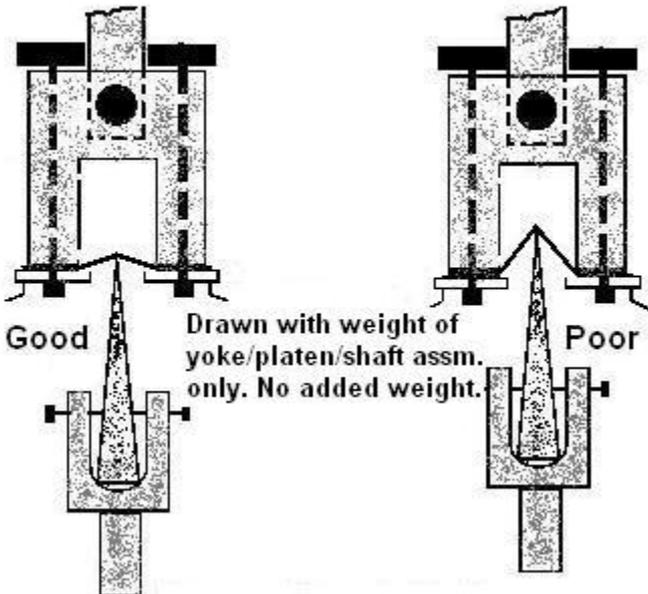
No matter what technique you settle on for loading test media (ours or yours) make sure you accomplish these three things;

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



## Loading the Vise

There are only two rules here. Make certain the object edge to be measured is loaded as close to vertical as possible and then center the edge in the yoke gap. Do not over-tighten the vise! The ME110 vise is designed for light duty applications only.

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.

The vise provided will accommodate blades thickness up to .375 inch thick and has a magnetic base. **Make certain that very long or odd job objects are given additional support so that the vise does not tip!**

The magnetic base vise 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. . 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 or by adjusting the "H" shaft.. 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 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.

**Caution!** The ME110 is designed so that multiple points of measurement may be made from a single vise grip position on the knife by adjusting the "H" shaft.. However, blade 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.

## **Tall Edges**

You can measure edges as tall as 7.5 inches with your ME110 when the provided extension is utilized. Simply take the cap screw out - screw in the extension and then replace the cap screw.

## **OFF AXIS Measurements**

The ME110 may be configured to make off-axis measurements. Simply loosen the V shaft retaining screw and rotate the adjustment block to the desired setting and the H shaft for alignment. The extension piece provided may be used in this configuration as well. It is wise to provide additional ballast at the base (pictured 6000 grams of BB's) in this configuration to avoid tipping when weight is added to the measurement platen.

In our off-axis picture a very long and thin industrial cutter knife is being set-up for measurement. Most of the blade extends down through the bench vise and only a suitable portion extends above the vise jaws.

ME110 in Off Axis Transverse  
Mode w/ extension



## **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 most sharpened edges. 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 1/16<sup>th</sup> of an inch off center (noticeable with the eye) there may be a small amount of variance. If it's a 3/16<sup>th</sup> 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 the ME110, it is Edge On Up’s opinion that you should invest in an inexpensive electronic gram 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 inexpensive 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.

Assuming you have an electronic 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**

While sharp edges are generally considered to be those under 500 on the BESS you may need to supplement the 500 gram weight provided with your ME110 in order to accommodate more "industrial" style 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 lead shot. You can purchase it readily on-line , in sporting goods stores (Cabelas etc.) or at your local gun club shooting range (reclaimed shot is just fine). Shot is dense and flows very smoothly with little impact into the container. Water works well. BBs are readily available (any Walmart) and inexpensive.

**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 Measurement**

**Caution!** Never load test media etc. while the 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

vises/edges from the EST base is the **first** thing you do after the measurement is concluded. Please! Save yourself from a nasty laceration and follow our advice.

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).

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.

**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!*

**Remember that proper measuring protocol calls for adding weight continuously until the test media severs.**

**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.

## **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 have 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.

## **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](http://www.edgeonup.com) for further information or email us at [edgeonup@gmail.com](mailto: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!