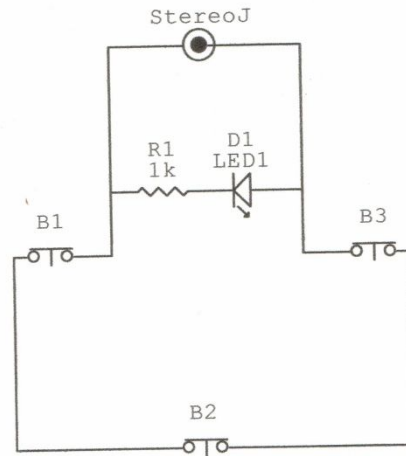




Econo-Probe Wiring



Econo-Probe Schematic

In the schematic above, B1, B2 and B3 are the “switches” internal to the Econo-Probe. These are the devices that sense a “touch”. These switches are normally closed such that the circuit through the probe is a dead short.

When a touch occurs, one of more of the switches opens and current from the sensing circuit (DRO, CNC controller, etc.) flows through R1 and D1. This allows D1 to light. This is strictly for the convenience of the operator. R1 and D1 can be removed from the circuit and the probe will still function with a DRO, CNC controller, etc.

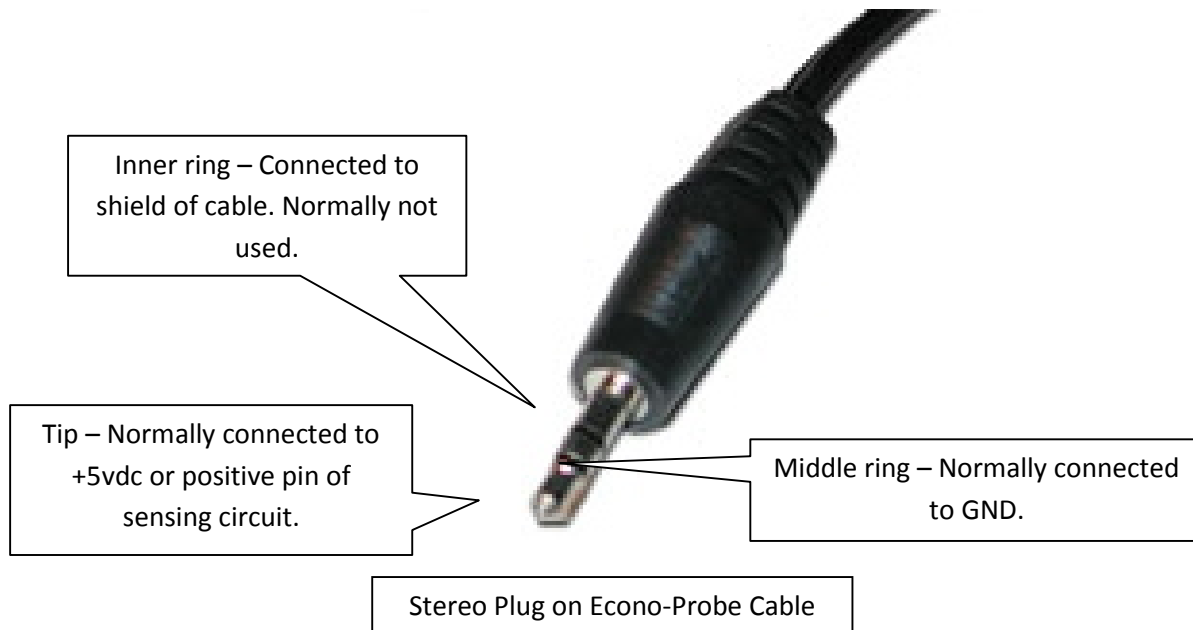
If D1 fails to light on a touch, it is likely that the Econo-Probe is hooked up with the polarity of the connections reversed (see next page for more information). If D1 fails to light on a touch, the first test in diagnosing the problem is to reverse the connections between the Econo-Probe and the device.

Some devices (DRO, CNC controller, etc.) have probe sensing circuits that are so sensitive that the presence of R1 and D1 will allow enough current to flow that the device cannot recognize a touch. If this is the case, you may open the probe (remove only the top cover, the portion with the spindle shaft) and either remove R1 and D1, or merely clip one leg of the LED D1.

DO NOT CUT ANY OF THE CABLE WIRES. YOU WILL RENDER THE ECONO-PROBE INOPERATIVE.

DO NOT REMOVE THE BOTTOM COVER OF THE ECONO-PROBE. DOING SO WILL DAMAGE THE INTERNAL CIRCUITRY OF THE ECONO-PROBE. The bottom cover is the end from which the probe tip protrudes. This cover has been sealed with medium strength Lock-Tite to prevent accidental removal. However, the Lock-Tite will release given sufficient twisting pressure if internal repairs are needed.

Continued on next page.



The stereo plug on the cable is provided for convenience only. If you have a breakout board with screw or solder terminals, you may cut off the stereo plug and strip back the sheath and internal wires. Leave enough wire on the stereo plug so that you can strip the wires and determine which color wire goes to the tip and which goes to the middle ring. We obtain cables from several sources and the color coding is not always the same between various cable manufacturers.

Because the Econo-Probe has no high frequency circuits and is normally very insensitive to outside electrical interference, the wire braid shield of the stereo cable is normally not used. If you choose to use it, connect the shield at the *CONTROLLER END ONLY*. **DO NOT CONNECT THE SHIELD TO ANY PORTION OF THE ECONO-PROBE BODY!!**

The Econo-Probe is a **NORMALLY CLOSED** (dead short) device. It is in the dead short condition whenever a touch IS NOT OCCURRING. If you have a device that requires opposite sensing (normally open, becoming a dead short on a touch) you must devise outside circuitry which will reverse the signals between the Econo-Probe and your device.

The Econo-Probe can safely be used with voltages between 3vdc and 24vdc. AC current in those voltage ranges will also work, but D1 (the LED) will be dim or may not function at all.

If you wish to use the Econo-Probe as a standalone device (not connected to a DRO, CNC controller, etc) you may provide a power source of 3vdc to 24vdc connected between the tip and the middle ring of the stereo plug. The positive pin of the power source must be connected to the tip of the stereo plug. **IF AN EXTERNAL POWER SOURCE IS USED, A 1kohm RESISTOR MUST BE CONNECTED IN SERIES BETWEEN THE POWER SOURCE AND THE ECONO-PROBE.** Failure to install a resistor may damage the Econo-Probe and/or the power source.

Aligning the Econo-Probe

The Econo-Probe is NOT aligned at the factory. The reason for this is that irregularities (spindle run-out, etc.) in the machine on which the Econo-Probe is mounted would require realignment. This factor also requires that in order to maintain the highest accuracy, the Econo-Probe be aligned to every machine on which it is used.

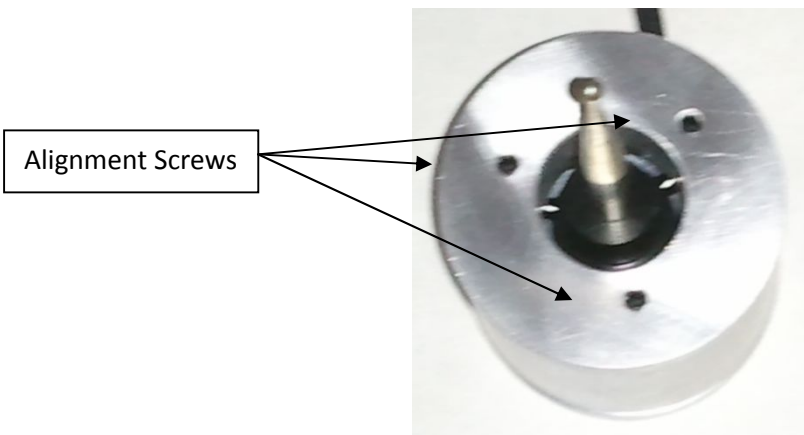
It is also advisable that the Econo-Probe be installed in the same position, relative to the rotation of the machine spindle, each time it is used. This is easily accomplished by making an indelible mark on the machine spindle and the Econo-Probe and assure that these marks are aligned whenever the Econo-Probe is installed.

Because many machines have very little mis-alignment, you may find that using the Econo-Probe in several machines results in "close enough" results. If the spindle run out difference between two machines is 0.002" you may decide to "split the difference" and allow a 0.001" error on each machine. This is entirely a matter of personal preference as well as the tolerances you need to hold.

Whenever a probe is disassembled, be sure to mark one spindle on the contactor body and one set of "balls" so that the contactor can be reinserted in the original position.

Whenever a probe is realigned (new probe tip, contactor, etc.) back off the alignment screws so that you start at a "zero" position. If you attempt to re-align without backing off the screws, cumulative alignment may exceed the range of "stretch" of the adhesive securing the PCB.

There are three adjustment screws contained in the bottom cap (the end from which the probe tip protrudes) which are used to align the Econo-Probe.



These alignment screws can be adjusted using a 1/16th inch Allen wrench.

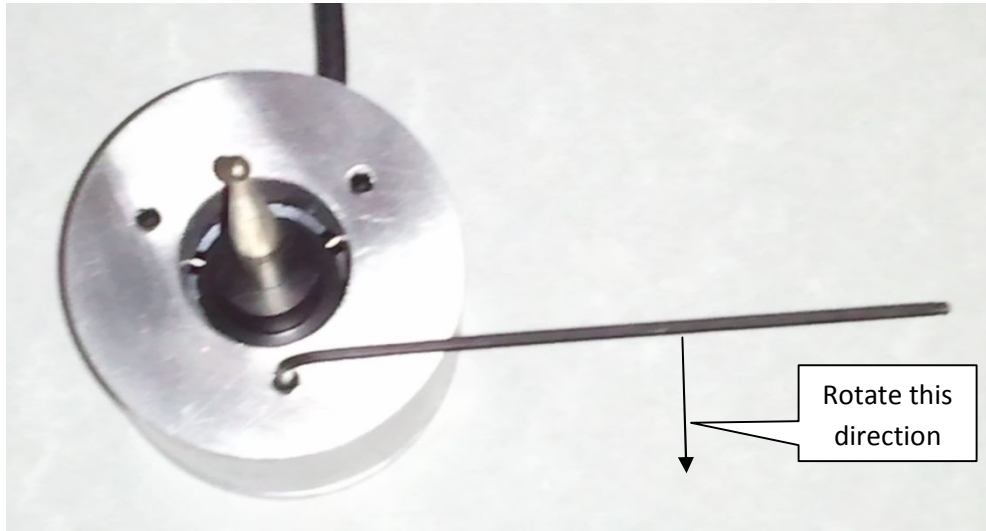
Continued on next page.

During shipping and handling it is possible for the contactor (the black object seen through the large opening in the picture to the left) to become "dislodged". As you look at the picture to the left, note that the contactor has 3 "arms" protruding from it. These arms must be in line with the 3 alignment screws.

If the arms are not in alignment with the screws, grasp the tip and press the tip/contactor assembly into the body of the Econo-Probe (press against the force of the spring). Press the tip/contactor assembly about 1/8" into the body of the Econo-Probe.

Rotate the tip/contactor assembly so that the arms are aligned with the alignment screws. Gently release the tip/contactor assembly, allowing it to "seat" against the internal contact assembly.

Now gently move the tip in a circle about 1/8" in all directions for a total of about 3 rotations. The Econo-Probe is now ready for the balance of the alignment procedure.



Referencing the picture above, we will “pre-load” each adjustment screw by inserting the Allen wrench into the adjustment screws and rotating each screw 1/8th turn CLOCKWISE.

THROUGHOUT THIS PROCEDURE IT IS CRITICAL THAT NO ADJUSTMENT SCREW BE ROTATED MORE THAN 1-1/2 TURN CLOCKWISE FROM ITS INITIAL POSITION. THIS INCLUDES THE PRE-LOAD ROTATION DONE ABOVE. IN OTHER WORDS, YOU MUST NOT ROTATE ANY SCREW MORE THAN 1-3/8 OF A TURN FROM THE PRE-LOAD POSITION. The adjustment plate(internal to the Econo-Probe) is held in position by flexible adhesive. By rotating any adjustment screw more than one turn clockwise from its initial position you run the risk of damaging this adhesive. Such damage would require a complete disassembly of the Econo-Probe for repairs.



In order to make the balance of this procedure easier, mark, on the outside housing, the position of each adjustment screw (see photo above). Use whatever type marking you want, including a scribe if you wish the marks to be permanent for future alignments. It may also be helpful to number the adjustment screws for easier reference through the balance of the procedure.



Mount the Econo-Probe in your machine and setup an indicator as shown above. It is critical to achieving accurate alignment that the indicator be held firmly in place. Place the point of the indicator as close to the center of the spherical tip as possible (in other words, “along the equator”). Have a note pad handy.

Rotate the Econo-Probe and make a notation of the reading on the indicator at the location of each adjustment screw. Also make a notation as to which location places the probe tip “furthest” from you. The adjustment screw at this location will be the first screw you adjust.

After noting all the readings, position the tip at the adjustment screw that positions the tip furthest from you. Make a note of the indicator reading. Now rotate the probe 180 degrees and make a note of the indicator reading. Now rotate the probe back (180 degrees) to the original position. Using the Allen wrench, rotate this adjustment screw clockwise until the indicator dial moves one half the distance between the two readings.

(Whenever the terms clockwise or counter-clockwise are used in this document, please use the same directions as were used when pre-loading the adjustment screws.)

Rotate the probe 180 degrees and verify that the reading at these two locations are the same. (Variations in readings as the probe is rotated are ignored at this point. We are only interested in aligning the probe at these two points at this moment.)

Now repeat the procedure of taking a reading at each of the alignment screws. Again note which location positions the probe tip furthest away from you. Repeat the procedure above for this location, insuring that the indicator readings are equal at the two points 180 degrees from one another.

Repeat this procedure for the last adjustment screw. The direction of movement for this screw may be either clockwise or counter-clockwise. If it is counter-clockwise, remember that moving the adjustment screw more than $1/8^{\text{th}}$ turn at

this point will move it past the initial position (before preloading) and further movement in the counter-clockwise direction will have no effect. Should this occur, pre-load this screw 1/4th turn and repeat the alignment procedure.

After completing the alignment at the three adjustment screw positions you may need to “fine tune” the alignment by taking readings at various rotation points and making minor adjustments to the appropriate adjustment screws.

Remember to keep track of how much each adjustment screw is rotated from its initial position (prior to pre-loading). If you are unable to obtain satisfactory alignment without exceeding one turn in the clockwise direction on any adjustment screw, please contact us at info@wildhorse-innovations.com for assistance.

NOTE: In theory, the 1-1/2 turn limitation can be “stretched” to as much as 2 turns. However, exceeding the 1-1/2 turn limit causes the flexible adhesive used on the adjustment plate to be stressed beyond its safe working limits. If the flexible adhesive is stressed beyond its limits, it may fail, rendering the Econo-Probe useless until it is repaired. Field repairs are possible, but it is recommended that any Econo-Probe damaged in this manner be returned to the factory for rebuilding.