

Application Note

#10

Let There be Light - The Sequel



In the previous application note, “Let there be Light,” it was stated that half the work of the CV400 fiber optic tachometer system is done by the cable. This paper will address the other half, or at least the part that you have control over which is the sensitivity adjustment. The sensitivity adjustment is a calibrated 10 turn potentiometer. This potentiometer adjusts the sensitivity of the photo cell that is receiving the reflected light from the cable system. After the sensitivity adjustment “sets up” the photo cell, the rest of the CV400 product line electronics strictly shapes the output pulse (and counts them in the case of the CV435). For the purpose of illustration, the CV435 will be used in this paper to explain the proper settings of the sensitivity adjustment.

In the previous paper it was an oversight not to mention that when first setting up the system, the sensitivity control should be set to five (5.00). This sets the sensitivity of the photo cell to the middle of its detection range. It’s not too sensitive and it’s not insensitive. It should trigger on a very reasonable reflection of light. You should try to set up your cable/tip and reflecting surface for a reasonable reflection in this position. If that is not achievable – that’s the reason the sensitivity control is adjustable and not a fixed point.

For the purpose of explanation, Figure 1 provides the scale of opportunity for reflection from both extremes.

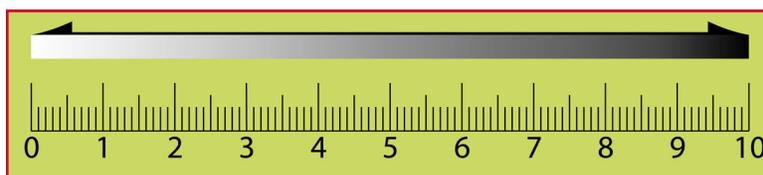


Figure 1. Reflection Opportunity

While Figure 1 shows reflection opportunity as a double ended arrow and an approximation of the 10 turn Sensitivity adjustment of the CV400 Product line. It has a fixed range that comes close to both ends of the double ended arrow in Figure 1. The question is, “How Close?” The answer to that question is, “Very Close.” So what we need to know to clarify that statement is, “What are the reasonable extremes?” The reasonable extremes in the case of the CV400 product line are two conditions and they are under the constraints of the light going down the fiber optic cable shown in Figure 2.



Figure 2. Fiber Light

The first condition, shown in Figure 3 on the next page, is the extreme where the cable is connected to the CV400 series product, the light is turned on and the cable is pointed at a light absorbing surface. In other words, the only reflected light that may possibly come back into the photo sensor is a small percentage from the system itself. To get a “reflection” at this extreme, you must make the electronics the most sensitive it can possibly be. You can check this by pointing the cable system at a non-reflective surface and adjusting the sensitivity control. A properly operating CV400 system should indicate a reflection all the time between 9.50 and 10.00 on the sensitivity dial. It is important to note that most CV400 systems (cable and electronics) are typically set between 9.80 and 10.00 when in perfect condition.



Figure 3. No Reflection

The second extreme condition, shown in Figure 4, is the extreme where all the light that is going out the fiber optic cable system is coming right back into the photo cell. The object here is to find the location where the electronics will reject the obvious light reflection, or make the electronics as insensitive as possible, and yet able to detect the condition. To do this, check remove the leg of the “Y” cable that is connected to the photo sensor (the lower connection of the two). Point the long leg of the “Y” cable directly at the photo sensor. Adjust the sensitivity control to a position between 9.50

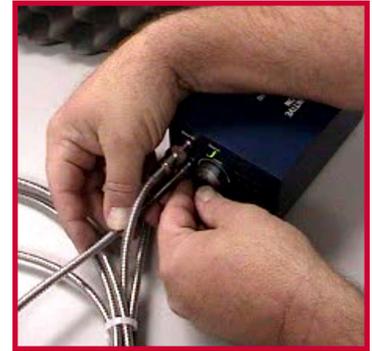
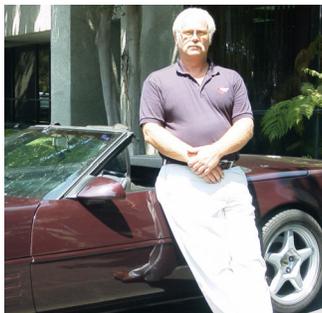


Figure 4. Constant

and 10.00. At some point in this range you will get a reflection indication, which is good. Again, CV400 systems in perfect condition will have this condition set somewhere between 0.00 and 0.20, but a setting as high as 0.50 is acceptable. Because of the unique condition at this setting, you may have to wave the tip back and forth over the photo sensor to verify the proper setting.

While a perfect operating system will give you an adjustment range of 9.6 turns, a unit is functioning normally with a tunable range of 9 turns, half a turn at both extremes.

By
Pete Neild
pneild@cognitivevision.com



9625 Black Mountain Rd, Ste 306
San Diego, CA 92126-4584 USA
Tel: 1.858.578.3778
Fax: 1.858.578.2778
instruments@cognitivevision.com
www.cognitivevision.com