

## **Transcripts of videos in module “Leveling Equipment”**

### Slide 2

For this level circuit we are going to be using a digital and an optical engineer’s level. The digital system utilizes a bar code rod shown here, which on the back side also has a self reading graduation that you can use the optical system with.

We are going to begin this level circuit with a backsight to reference mark number nine which is our origin. I’m going to focus in on the digital rod using the optical part of the engineer’s level and then interrogate the digital system to give me a reading. I’m going to interrogate it twice to get two values. The first read is 4.660 feet, and the second read is also 4.660 feet. I’m going to add this backsight to the elevation of the reference mark to obtain the first height of instrument for the level.

### Slide 8

We are now going to run a two peg collimation test to determine any collimation error that our engineer’s level may have. The engineer’s level that we are using is a digital level that also has an optical system. We will be running the two peg test first on the optical system and then on the digital system.

We have set up our two peg test by driving two rebar pegs into the ground; one over here and one located down there. We will set our instrument up near to the first peg and take a rod reading from the instrument. We will then take a rod reading from this same instrument set up to the second peg over there. After that reading we will move the instrument to be near the second peg and then we will take a rod reading from that location to the second peg and then we will also take a long reading to the first peg. We will be measuring distances between the instrument for each shot to the pegs. We want to set it up so that the instrument for the long shots is no longer than 110 feet.

## Slide 9

We are now getting ready to take our first shot to our first peg. As I said before we are using a digital engineer's level that's equipped with an optical system. Because it is common to have to rely on the optical system for various readings when running gaging station levels we need to run our two peg test on both systems. I will first be making manual reads of the self reading rod using the optical system and then I will ask my rod man to turn the rod around, and I will take a digital reading using the digital system of the level. I will also be needing the distances between this instrument and the various pegs and I will be getting that by using the stadia from the digital system. You could also use the stadia hairs on an optical level or you can stretch a measuring tape between the two points to obtain those distances.

I'm now going to make my first rod reading on the first peg from the first instrument set up. This will be reading number one, R1. And I'm first going to make an optical measurement from the self reading side of the rod. That measurement is 4.631. I'm now going to ask my rod man to turn the rod around and I'm going to use the digital system to get a measurement. That measurement is also 4.631. I'm going to do a quick check; 4.631. My first distance, D1, is 16.8 feet. We have moved the rod over to the second peg so we can now get our second reading from instrument height number one; reading number two, R2. As before I'm going to use the optical system to get a manual read of the self reading rod. My read 4.924. I'm now going to ask my rod man to turn the rod around so I can use the digital system. That reading is 4.925. I'll do a quick check. 4.925, and my distance, D2, is 93.2 feet.

## Slide 10

I've now moved the instrument to the second instrument location near to the second peg. I'm now going to make a reading of the second peg, rod reading number 3, R3. I'm going to take an optical read, which is 4.880. I'm going to ask my rod man to turn the rod around so I can use the digital

system. And the first digital reading is 4.879. I'll do a quick check. 4.879 for reading number 3, R3, and my distance, D3, is 22.9 feet.

We are now ready to take our final readings of the two peg test. This will be reading number 4, R4. My optical read is 4.589. I'm now going to ask my rod man to turn the rod around so I can use the digital system. My first reading is 4.589. I'll do a quick check. 4.589, that's reading 4, R4, and my distance for number 4, D4, is 87.1 feet.

Slide 11

We have now completed our two peg collimation test of our engineer's level. The collimation error for the optical system of our engineer's level is -0.0014 feet per 100 feet, and our collimation error for the digital system of our engineer's level is -0.0028 feet per 100 feet. These collimation errors are both less than or equal to the absolute value of 0.003 feet per 100 feet; and therefore, our engineer's level is within acceptable tolerances.