



Radio Frequency Interference on Commtest VBx Series Data Collectors from Improperly Grounded Equipment

Study Information

In April of 2010, I took over the responsibilities of vibration data collection and analysis at a salt evaporation plant in upper New York. The site has a history of having a robust condition based monitoring program using infrared, ultrasonic, motor current analysis, and vibration technologies. For vibration, the site uses Commtest equipment and software. Their data collector was a VB7.

On my first day of route data collection, I came upon a variable speed pump. I attached the transducer to the motor and attempted to enter the machine speed using the keypad. When I pressed a key, the digit would be entered between 2 and 4 times onto the screen. I cleared the speed on the screen and tried again. The same thing happened. I attempted a third time with the same results. Knowing I could set the speed in the Ascent software, I took the data using the default speed. When I analyzed the data, I would set the speed using the run speed peak as a reference.

In March of 2011, an email was distributed within my group concerning other analyst having the same issue. We were informed that a software patch was being developed that would correct the problem. Knowing others were having the same problem, I decided to investigate further into the cause of the issue.

I attempted to take data with the VB7 on a pump that I knew would produce the symptom. I attached the transducer and tried to enter the speed. I had the same results as before. This made me think the cable was picking up stray radio frequencies and causing interference in the collector. I took the transducer off the motor and attempted to enter the speed. I still had the same issue. I walked away about 10 feet (3.3 meters) from the pump motor and tried to enter the speed. I had no problems. This piece of information led me to believe there was some sort of radio interference coming from the variable frequency drive.

My first idea was to consider the ground for the motor, as insufficient grounding can cause bearing defects by arcing across the bearing surfaces. I had not seen any vibration signatures of bearing fluting; however, I asked the site maintenance planner to have an electrician attach an auxiliary ground to the motor. When the electrician received the work request they told me this could not cause the issue. The electrician then installed the auxiliary ground.



Figure 1: Motor using auxiliary ground.

After the electrician installed the ground, I attempted to take measurements again on the motor. I entered the digits for the speed with no issues whatsoever. I moved the transducer around the motor in order to see if there was a place where I could cause the digit error. I could not replicate the problem. This solved my data collector problem.

I told the electrician the ground fixed my data collector issue. He thought for a moment and said there must be a ground issue with the motor they need to repair. They would attempt to repair the ground during the next outage.

While running the same route the next month, I noticed another pump causing the same problem. This pump had not been causing problems before. I told the planner about the pump the same day and also told the electrician. I was told they would inspect both of the motors during the next outage.

The first motor was inspected. Two bolts mounting the motor junction box to the motor were found in the bottom of the box. Two other bolts were found to be extremely loose. The bolts were reinstalled and tightened.

The second motor was inspected. The bolt holding the ground cable was too small for the bolt hole. The nut holding the ground cable was pulled inside the bolt hole to a point where the lug on the ground cable did not touch the housing. The motor was being grounded by the hex points of the nut.

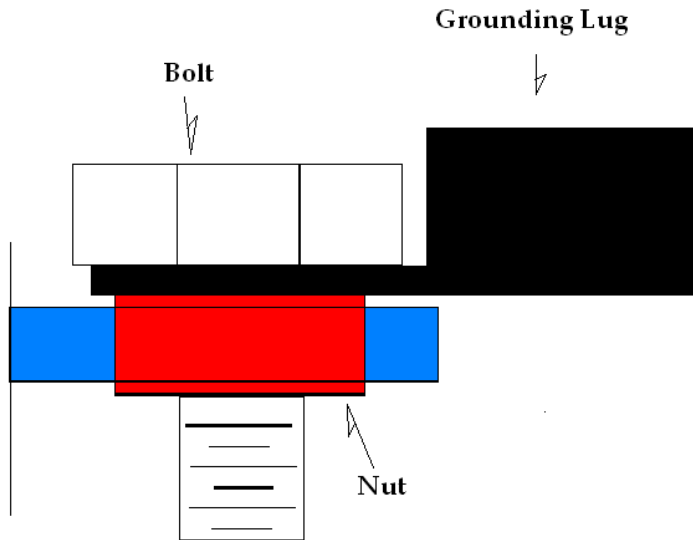


Figure 2: Illustration of Grounding Lug on Second Motor.

Both of these motors, while operating normally, were improperly grounded. This lack of ground was not causing an immediate problem. However, this deficiency may cause two significant problems.

The most important issue is one of safety. The electrician who inspected the motors said these were traps waiting to catch someone. The environment in the evaporative plant is wet. Water and electricity are a fatal combination. Under the right conditions, someone working in the area could have been electrocuted. The ground is the last resort to divert electricity from passing through a person if a component in the motor short circuits.

The second issue that could have been caused is bearing fluting. This is caused by the rotor arcing across the bearing components from stray electrical fields. Bearings that are fluted may operate for a period but should be considered to be a failed bearing.

At this site, we now have a procedure if the VB7 data collector does not accept key presses correctly. We report the situation immediately to the planner. The planner writes a work request to have an auxiliary ground placed on the motor. This request is expedited as it could represent a major safety issue. The motor ground is then inspected at the next outage.

Conclusion

If a Commtest VBx data collector produces multiple key strokes while taking measurements on a motor, have the ground on the motor checked as soon as possible. This may at least save a piece of equipment and could possibly save a life.