FLUKE®

Network hub failure

Application Note

Power Quality **Case Study**

Measuring tools: Fluke 434 Power Quality Analyzer

Features: Scope, V-A-HZ, Monitor, Trend, Events, ground

Problem Description:

Ever fixed something and still not solved the problem? Sometimes multiple deficiencies can all cause the same symptoms.

In this case, an industrial facility was having communication problems with a network hub. During the initial survey data gathering phase, they documented equipment failures and port problems all the way back to the hub equipment installation.

After the service company exhausted all hardware and software options, they called in a consultant to find out whether it was a power quality problem. Using his handheld Fluke 434 three-phase Power Quality Analyzer, the consultant found more than expected.

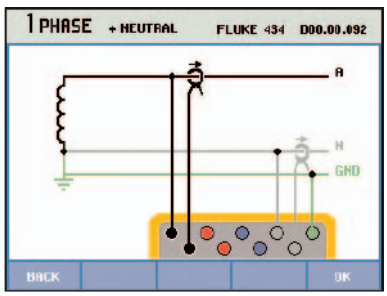

Fig. 1 View configuration screen

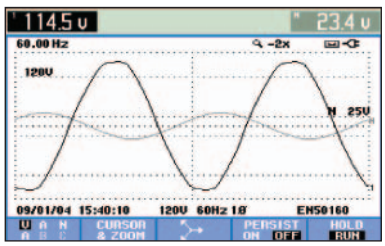

Fig. 2 High neutral waveform

Measurements:

After connecting his Fluke 434 to the branch circuit supplying the hub equipment, he checked the View Config screen (Fig. 1) diagram to verify proper connections. From there, he pushed the Scope button and saw an abnormally high neutral waveform. (Fig. 2) He checked the numeric values at the top of the screen and saw that neutral voltage was in fact incredibly high, at 23 volts, indicating a possible neutral-ground issue. He saved that screen for customer documentation.

Just to be sure, he switched to the V-A-Hz screen (Fig. 3) and checked the voltage level again. He got the same results. Following standard power quality practices, he began looking for a grounding problem at the branch circuit, since that was the next step in the wiring path.

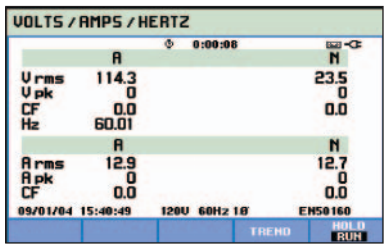

Fig. 3 Voltage level check

He traced the branch circuit to the isolated ground receptacle but couldn't find a grounding conductor. That was a little too isolated! Not having a grounding conductor caused an open ground condition. That was not only a problem for the electronic equipment, but also a safety hazard to personnel and equipment. As a temporary fix, he recommended replacing the isolated ground receptacle with a legal, standard receptacle. The standard receptacle would allow the client to use conduit as the standard equipment grounding providing proper grounding for the branch circuit.

During his examination of the branch circuit, the consultant also discovered that the circuit was supplied from a general-purpose electrical panel. Since he knew the hub would require higher quality power than average equipment, he thought he should go ahead and check the panel for any kinds of sags or swells.

He pressed the Monitor button (Fig. 4) and set the recording time for 24 hours. After the first 15 minutes, he pushed the trend button while continuing to record in the background. (Fig. 5) Shortly into the cycle he saw a dip in the line.

To learn more, he pushed the event table button, checked the numeric values, and saw distinct voltage sags on the branch circuit. (Fig. 6)

The panel was clearly carrying too much load, most likely from one or more of the facility's large motors. That meant the hub was seeing high voltage from the grounding problem and low voltage from the sags, both of which were causing the hub to go down.

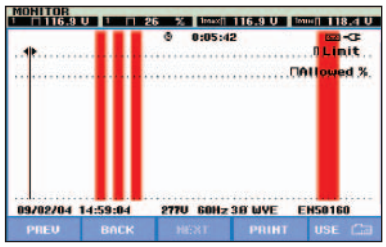

Fig. 4 Set recording time

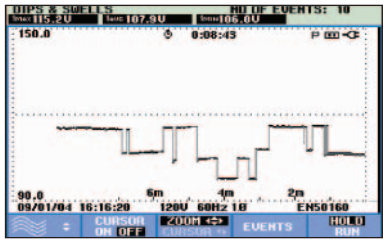

Fig. 5 Dip swells

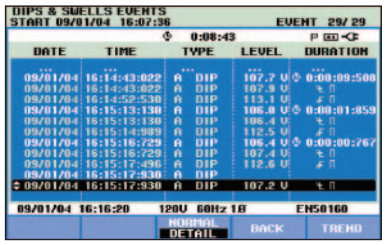

Fig. 6 Dip swells

Conclusion:

Due to the cost and time required to install a new receptacle on the branch circuit, the facility decided to add a UPS in front of the power supply to the hub. Since the remaining equipment on that line wasn't disrupted by the sags, no further actions were required. The consultant downloaded a report of the benchmark power quality measurements he'd made and gave it to the facility, who agreed to set up a regular preventive maintenance schedule.

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