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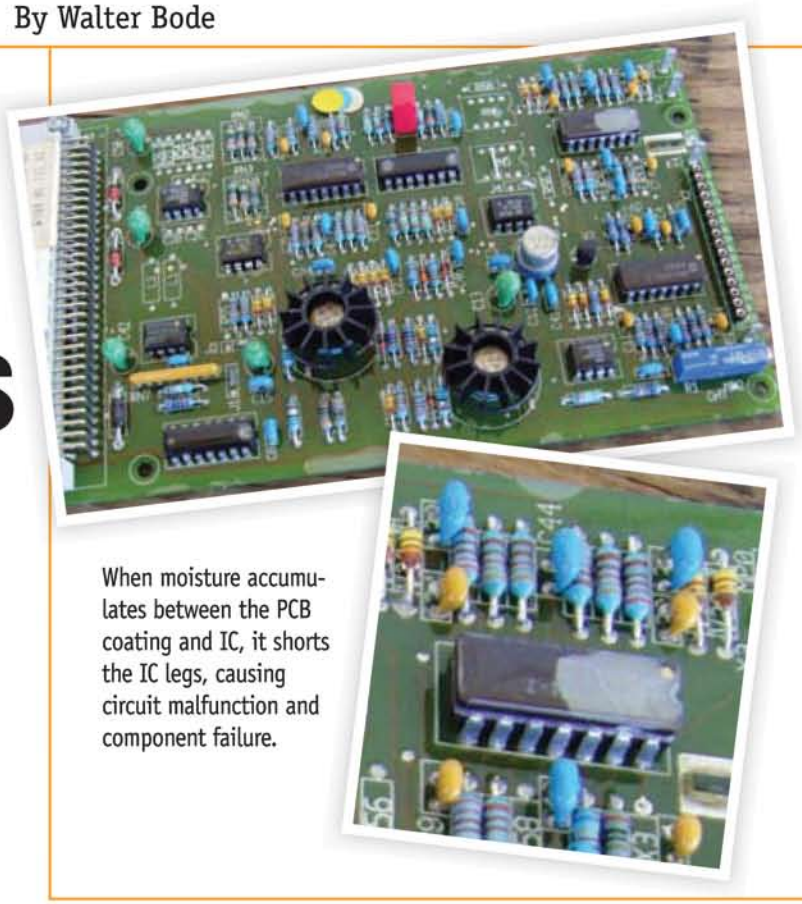
By Walter Bode

Water and Electronics DON'T MIX

Prevent unnecessary crane downtime with these simple fixes



When moisture accumulates between the PCB coating and IC, it shorts the IC legs, causing circuit malfunction and component failure.

Imagine this scenario: A crane sits beside a five-lane Los Angeles freeway with a load suspended directly above the middle lane. No boom operation is possible and everyone is frantic, including the crane owner and operator and city officials. Police have blocked the freeway for fear of the load falling, and traffic is backed up almost a mile. What a nightmare... and unfortunately a very real situation one of our clients encountered a few years ago.

One of the most frustrating, credibility-destroying events for a crane owner is a crane stopped mid-lift on a big job. Specializing in crane electronic control and overload systems has meant that Bode Technical Services has seen its fair share of emergencies like this. Fortunately the situation in Los Angeles was an easy fix and the crane was quickly up and moving again. The bad news is that the problem was due to a far too common, but preventable, maintenance issue—water damage to sensitive crane electronics.

Outlined here are some of the most common and easily prevented water-related electronic problems. These are simple fixes that could save you thousands of dollars in repair costs.

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Condensation Effect

Much like the beads of water on an ice-cold drink on a hot summer day, condensation can occur in your crane's electronics when air comes in contact with a cold surface. This is common in cooler climates where cranes are garaged in warm buildings during the night. Electronics are typically housed in metal enclosures designed to provide protection from minor impacts and the elements. However, when these enclosures fail to seal correctly (detailed later) significant moisture build-up can occur. In most cases this results from a day-night cycle where significant temperature differences are present.

For example, a crane is stored inside at night and warm air slowly leaks into an enclosure. In the morning the crane drives out for a job, the metal parts of the enclosure quickly cool, and the warm air cannot escape fast enough. Moisture forms on the cool metal parts inside of the enclosure where all the sensitive electronics are located. This cycle repeats every morning and soon the moisture accumulates into small droplets and eventually larger puddles inside the enclosure. This can create a whole array of erratic electronic behavior.

Our recommendation: Check your enclosures. Are lids solid or do they rattle loosely? Are strain reliefs sealing or is there a visible gap? Are there telltale rust or water spots near enclosures? Remember the condensation effect does not occur in fully sealed enclosures. Consider utilizing a one-way moisture relief valve.

Power Washing

Most crane control electronics are rated water protection class IP65. This is defined as low-pressure water jets from any direction. Many crane owners take great pride in their machines and regularly power wash them. Though this leaves the crane clean and looking great for the next job, it can also lead to significant water damage. Power washing is so effective because of its high pressure—pressure that is above the safe IP65 rating. Washing with a garden hose is a good example of IP65-compliant low pressure. Think of the effect power washing the deck in your back yard has versus hosing it down. Much like the power-washed wood, the pressure on enclosure seals can be extreme.

Our recommendation: Avoid electronic components when power washing your crane.

Lid/Gasket Seal

Improper lid installation and dirt on gaskets is one of the most common reasons for water in enclosures, especially in junction boxes and cable reels. Contrary to what may be intuitive, it is not good to bolt an enclosure lid down as hard as possible. We have seen countless gaskets fail after being "cranked down" tightly. Gaskets tend to lose their sealing effect under three main conditions:

- Loose bolts on the lid
- Damage or dirt on gasket
- Lid cranked down too tightly and/or unevenly

Our recommendation: Before sealing enclosures, run your finger along the gasket and remove any debris. Check for cuts in the gasket. When sealing, bolts should be tightened so as to distribute the load evenly across the gasket by using a staggered cross-tightening pattern. Hand-tighten enclosures.

Corrosion in the length sensor cable reels causes slip ring failure and electrical short circuits. A one-way water release valve is an easy fix.

Open Windows and Spilled Drinks

Moisture ingress through the cabin causes the console front foil to lift and water to build up under the display glass.

Damage to the console in the cab is one of the most expensive electronic repairs to make because damaged consoles often can't be fixed and need to be replaced. An open cab window can allow significant water from a strong overnight snow or rain to enter the cab and cause serious damage to the crane electronic controls inside. Similarly, a spilled drink can be equally as destructive.

Our recommendation: Close the cab window at night and never place drinks on the console.

A build-up of sand paste and heavy corrosion occurred due to moisture ingress through the strain relief, connectors, and poor seal on the cover.

Strain Reliefs

Electronic wiring provides direct access into enclosures. Strain reliefs provide water protection at these entry points. Every strain relief has a very specific range of cable outer diameter for which it is effective. Check your strain reliefs. There should be no visible gap between the strain relief grommet and the cable. If you tug on the cable lightly the grommet should hold the cable tightly. However, grommets should not be so tight that they squash out the end. If you replace a cable the strain relief should also be replaced. Never reuse strain reliefs.

Our recommendation: Check for proper grommet sizing on wire and never reuse strain reliefs.

Needless and costly crane damage and downtime are issues no one wants to deal with. Having an awareness of potential water damage, and staying on top of your crane's preventive maintenance schedule, will help you enjoy many years of trouble-free crane use.

Our clients entrust us with the care of their property and their people...to ensure the safety of their jobsite, and the welfare of their business. We take great pride in that responsibility and work diligently to earn this level of trust.

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