

CRAVE

The Total Source for Crane Buyers, Sellers, Owners and Operators **HOT LINE**®

Service on **DEMAND**

Taxi Cranes:
Always in the
Thick of It



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A Mechanic's **MANTRA**

Insulate, wrap, crimp,
and tape to prevent
electrical problems

It was a Friday afternoon and our technicians were wrapping up for the weekend when we received an urgent call from one of the world's largest oil companies. They had a major crane problem at a refinery and needed our most experienced technician "right away." In fact, the situation was so urgent that they were fueling their corporate jet and wanted to pick up our tech in a little over an hour.

One of the refinery's cranes had lifted a filter out of a smoke stack for replacement, a routine maintenance procedure that usually takes about an hour. All combustibles had been temporarily rerouted to other sections of the refinery for this process. However, as soon as the filter was off and a couple of feet

These cranes are in the shop at Jcrane's facility in Covington, Ohio, for annual winter maintenance. Jcrane's taxi-crane fleet consists of boom trucks, hydraulic truck cranes, and ATs. Read more about this company in the Product Focus, page 14. Other images were provided by Bode Technical Services and do not represent Jcrane machines.

above the tower, the crane boom froze. No further boom operation was possible.

You can imagine the panic at the refinery, as the temporary rerouting of fuel lines was only possible for a short time. After some intense troubleshooting our technician found that an improperly crimped relay wire was the cause of the boom lockup. The crimped wire only had minor contact with the terminal. We can only guess that each time the relay switched it created a spike in amperage, got really hot for a second, and over thousands of cycles eventually burned through the thin copper strand. It turned out to be an easy fix once diagnosed, but was costly for the refinery in terms of lost production and mental stress.

Here are three of the most common wire related problems that our technicians are called to repair. With a little foresight, it's often possible to avoid these problems. We

hope that these simple fixes will help save you unnecessary expense, lost time, and headaches.

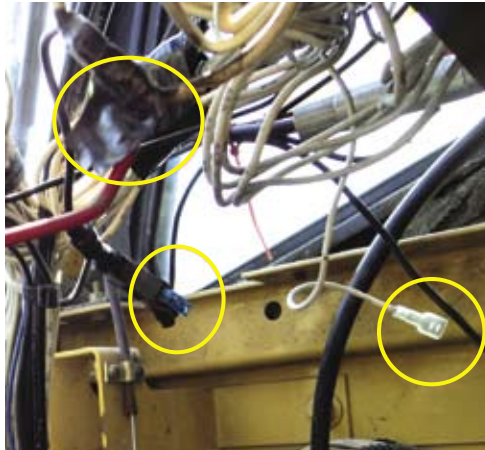
Powered wires

Another less dramatic but more common scenario occurs when a company mechanic makes a temporary fix that later causes different problems. This occurs because mechanics are always under a great deal of pressure to get a crane back up and running quickly. In this situation, the mechanic discovers the faulty component, often a third wrap, proximity, or other type of switch and decides that bypassing the malfunctioning switch is the fastest way to get the crane operational again. To do so, the mechanic may pull out the connecting wires, and just to be safe, also pulls the fuse or unplugs some cables, to bypass the system. The crane becomes operational again and though the operator needs to pay a little

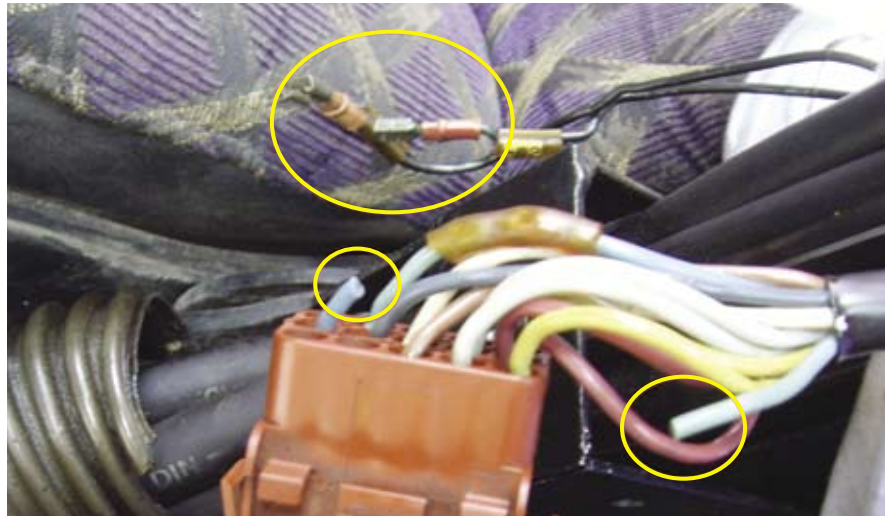
Walter Bode has more than 30 years of industry experience spanning two continents and is currently the president of Bode Technical Services Inc., a Denver, Colo.-based firm specializing in the diagnosis, repair, and refurbishment of crane electronic control systems on Terex, Demag, Grove, Liebherr, and Krupp models worldwide. Go to www.bodetechnicalservices.com or contact Walter Bode directly at walter@bodetechnical.com.



Electrical tape has been used as insulation, but it's useless when applied this way and may as well not even be there! Instead, shrink tube or a different connector should be used.



Electrical tape is a poor choice for insulation. Notice the blue fuse has no insulation and is completely exposed. When the white wire and connector (on the right) were removed from a terminal, it was left hanging loose, without insulation.



(Top) Notice wires pulled from connectors and left hanging. (Middle) A cable has been cut and left exposed. In both cases, the wires should be insulated.

more attention due to the bypassed system, all is generally well.

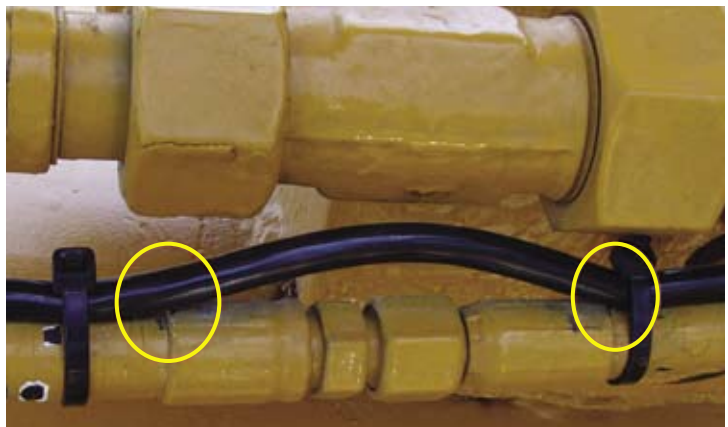
Several weeks later someone else discovers a missing fuse or unplugged cable, which is promptly replaced. Little does this individual know that the fuse now sends power to that disconnected and previously unpowered wire. As the now live and not-insulated wire starts moving around it eventually touches the crane, grounding it. The result is usually intermittent shorts-outs.

No one can figure out what is going on—when the crane is stationary everything works fine, when it is operating it has constant problems. Often we hear, “It doesn’t happen until the crane is warmed up,” though we usually find it has nothing to do with the crane warming up and everything to do with the crane movement causing the loose wire to become grounded on the metal around it. The mechanic, the operator, the owner, and everyone involved is frustrated by the situation. Nevertheless the crane keeps going out on jobs because there does not appear to be a solution for this problem. Over time the problems gets worse and worse until one day there is a complete failure. At this point, usually an electronic circuit board has become overloaded due to the constant shorting-out of the wire. Unfortunately these boards can easily cost \$10,000 or more. Even worse, a new board will not last long if the short is not fixed!

Our recommendation: If you are having intermittent errors, think back to past repairs. Try to remember if something was bypassed or rewired. Think beyond just the most recent repair. Take some time and



Someone installed a new pressure transducer and ran the cable along a high pressure hydraulic tube. This should be heat shielded.



Although flexible hydraulic hoses usually don’t get too hot, the metal connectors do. Here the cable is touching the sharp metal edge of the connector on a flexible hydraulic hose.



An exposed connection is sitting right on the metal ground. A small amount of rain pooling on the deck would cause it to short circuit.

inspect your crane, especially if you are not the original owner. If you find loosely hanging wires insulate them with a crimp or shrink tube.

Electrical tape is perhaps the cheapest, easiest, and most-effective short term measure for mechanics performing electrical work. If you disconnect a wire from any terminal or component, tape off the wire and terminal right away. If you are going to leave the wire for more than a couple of days be sure to put shrink tube on it or crimp it off. We guarantee if you make this a common practice you will save countless hours doing troubleshooting and probably thousands of dollars in repairs.

Cable insulation

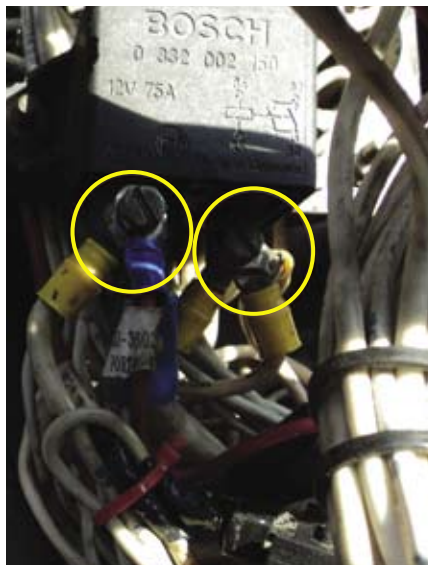
Our technicians often see electrical wiring routed beside or along hydraulic tubes and hydraulic hoses. Though this is an efficient way to route the wire across a crane,



Our technician found this junction box completely open. In fact it looks like it was open when the crane was repainted (yellow) probably a long time ago.



The plastic cover for the wiring on this valve broke off (probably due to age), leaving the electrical contacts completely exposed. Regular visual inspections are recommended to discover this type of maintenance item.



This relay is completely overloaded. It was found to be a convenient +12V power source for a radio and fan in the operator's cab. Do not use any +12V power source you find for powering electronics.

and it certainly looks neat, it must be done selectively. Often this wiring is installed while the crane is off a job when the hydraulic lines are cool. However when the crane is operational certain tubes, especially high pressure lines from the boom lift cylinder, become very hot. If wires are routed along these hydraulic tubes the insulation can quickly blister and crack. The resulting damaged wires can become so brittle that normal crane vibrations can break them. These tiny

breaks are virtually impossible to find, so avoidance is the best practice.

Our recommendation: If electrical wires are routed near the engine, exhaust pipes, or hydraulic lines, a Teflon spiral wrap or some sort of heat shielding conduit should be used.

Wire gauge

When damaged sections of wire need to be replaced it is very important to consider the electrical current flow with respect to the gauge of the wire. This is especially important going to and from fuses, valves, gauges, and sensors. Remember that many of these wires carry high amperage currents. If the gauge of the new wire is lower than the wire it replaced it can result in overheating, cable burns, and cracked wires. Make sure that the connection between the old and new wire is strong and that it is properly insulated. We have had customers whose mechanics have spent days trying to find a problem with the electronics, only to discover that a spliced wire pigtail from a repair made years before has come undone.

Our recommendation: The resulting problems might not show up until years later, but they can be avoided by using the same or slightly larger gauge of wire when making repairs. A strong electrical connection and good insulation are worth the extra time needed to do the job properly.

Prevention is simple. Mechanics who take the time to insulate, wrap, crimp, and tape wherever possible, will go a long way toward avoiding future crane downtime. ■