The OMNI Transmitter

INSTRUMENTATION | ELECTRICAL | CONTROLS

FEBRUARY 2020 NEWSLETTER

instrumentation | calibration | loop check | startup | commissioning | electrical installation | control panel design & fabrication | project management

Inside This Issue...

Filling In the Design Details:

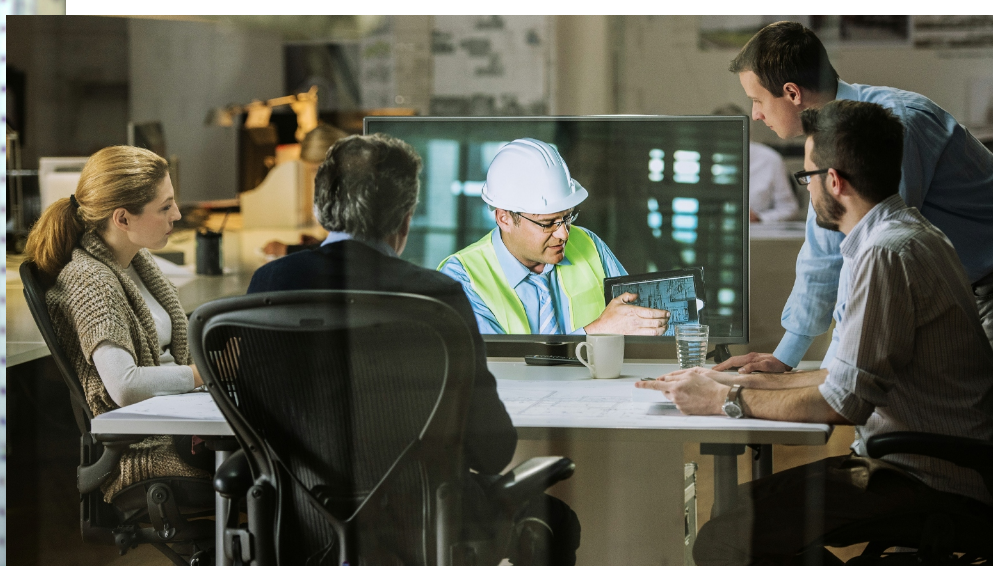
Choosing the right controls contractor can make all the difference

When it comes to project planning regarding controls interface with various systems, from process to HVAC, utilities, and vendor equipment, it is not uncommon for instrumentation and controls contractors to encounter project plans that are lacking in detail. This means that choosing the most capable contractor is more important than ever.

Design gaps are typically the result of planning decisions made due to project budget constraints. As a result, vendor-fabricated remote control panels and instruments are increasingly shipped to the jobsite to be configured, mounted and wired in the field with minimal information as to how this is to be done. Thus, it's left up the instrumentation and controls contractor to identify terminations on equipment to pick up discrete and analog points, and to determine wiring for remote control panels and transmitters outside of equipment boundaries.

Quality contractors like Omni can effectively identify missing design details and take appropriate measures to fill them in. To start, we partner with the owner and engineers to thoroughly assess P&IDs, system architecture, network layout, instrument specifications, and user considerations. We obtain all as-built controls and coordinate all interface with vendors, as well. As an experienced, highly-capable instrumentation contractor, we can effectively chart missing details and head off potential problems, finger-pointing contests, change orders, and project delays.

The end result: smoother startup and commissioning, improved user satisfaction, and a better overall project.



OMNI INSTRUMENTATION & ELECTRICAL SERVICES, INC.

Omni Instrumentation & Electrical Services, Inc.
NJ Office: 112A Sylvania Pl., South Plainfield NJ 07080 | PH 908.412.7130
MD Office: 3600 Commerce Dr., Suite 613, Baltimore MD 21227 | PH 240.341.7915
www.omniinst.com

The OMNI Transmitter

ELECTRICAL INSTRUMENTATION CONTROLS

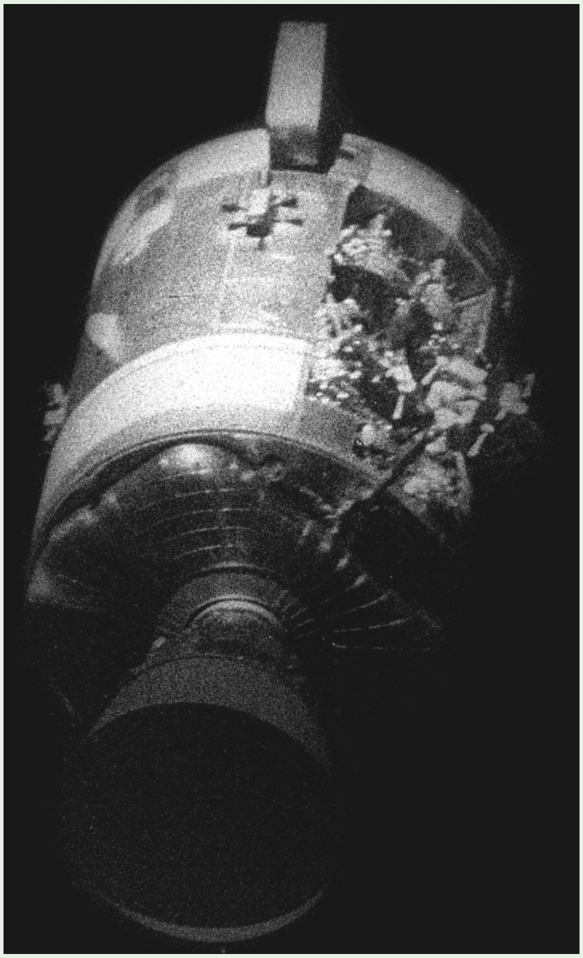
Electrical Preventive Maintenance

It goes without saying that, when it comes to a facility's preventive maintenance, electrical systems usually take a backseat to HVAC. Many people assume that electrical systems don't require regular maintenance, but the fact is, the failure rate for electrical components is three times higher in systems without an electrical preventive maintenance (EPM) program in place. Half of all electrical failures are due to either loose connections or parts, or exposure to moisture, both of which can be averted with regular EPM.

Many EPM programs are available online for download and can usually be customized by a knowledgeable facilities manager to meet a facility's needs, or an electrical PM specialist like Omni can assist in its development. Once in place, most EPM programs are relatively straightforward and inexpensive to implement.

There are basic items that should be inspected, tested, or serviced. A thermal scan should be performed on panels and transformers to check for excessive heat. Electrical connections should be inspected and re-torqued to the proper tightness. Heat tracing should be verified and tested on all hydronic lines. Motors should be checked for vibration and bearings for lubrication and wear. Generators and automatic transfer switches should be tested on a regular basis, and a UPS system test should be performed to ensure that batteries operate and backup power will be available when needed most. Frequency of maintenance should depend on the type of component or equipment, its criticality, and the physical environment.

Electrical & Instrumentation in History: Apollo 13



In a memorable scene from the 1995 film *Apollo 13*, astronaut Ken Mattingly, played by Gary Sinise, struggles to work out a critical power-up procedure for the spaceship's crippled command module. Again and again, he exceeds the amperage necessary to get the crew home alive while precious time ticks away. What happened in real life was slightly different, but just as gripping.

On April 13, 1970, an oxygen tank on Apollo 13's service module exploded, crippling the spacecraft. The command module, or CM, rapidly began losing oxygen, forcing astronauts Jim Lovell, Fred Haise and Jack Swigert to vacate to the lunar module and shut down the CM to conserve its remaining resources.

Quickly developing a new CM power-up sequence for reentry into Earth's atmosphere was among the many critical steps needed to return Apollo 13 safely. Mission control determined that they'd need to use as few systems as possible, powering them up as late as possible, to preserve enough battery power to get the crew home. Normally, a spaceship's instrumentation would be the first system turned on during power-up, but the new sequence called for instrumentation to remain off until the last minute, just in time for a final check before reentry, to save amperage. The new procedure was verified in the simulator by several NASA astronauts – none of whom were Mattingly.

The plan was extremely risky because it meant the entire power-up procedure would be performed in the blind, without instrumentation to guide the crew, despite their having endured four days of stress, near-freezing temperatures, dehydration and very little sleep. One small mistake in the sequence could have spelled disaster, but the exhausted astronauts implemented it perfectly. On April 17, 1970, capsule and crew splashed down safely in the South Pacific, and the rest is history.

The OMNI Transmitter

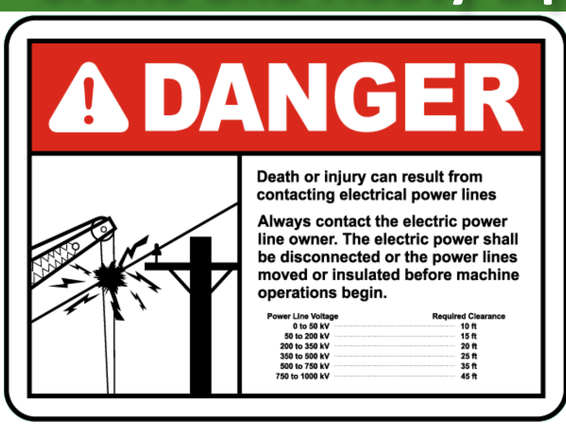
ELECTRICAL
INSTRUMENTATION
CONTROLS

Network Design Best Practices

A network is critical to a facility's control and process, and if it is not designed, installed, and certified properly, a wide range of problems are likely to occur. Many of these problems tend to be elusive or intermittent and can cause costly process interruptions and losses. Symptoms of a network issue can include loss of communication on individual devices or an entire network, intermittent loss of segments or devices, bad or frozen values in the control room, excessive low frequency or AC noise on a network segment, and devices sending error messages, retransmits, or bad-quality status. Here is a list of do's and don'ts to prevent network problems:

- Trunk or spur lines should not exceed the maximum allowable distance.
- Shields are not grounds and should not be tied to the same ground bus as the power grounds. Shields should only be grounded at one location to avoid ground loops. Multi-point grounds can be used in some situations, but must be done correctly. Heat-shrink bare shield wires to avoid accidentally grounding the shield of one segment to another.
- Maintain separation between network cables and high voltage cables.
- A loose connection at a terminal block or connector can cause sporadic communication issues with a single instrument or entire segments.
- Avoid segment overload, which can cause devices to drop off the segment or pull down the entire segment.
- Instruments should be certified and designed for the type of network on which they are being installed.
- Trunk and spur cables should be checked for damage, and cables should not exceed the minimum bend radius.
- Pre-test network segments before instruments are connected to save precious time during installation. By confirming that the trunk and backbone hardware are installed properly, they can be eliminated as the source if problems occur after instruments are connected.
- Certify the network once <u>all</u> devices are installed, powered up and commissioned for accurate network status and to provide a baseline if a problem or fault occurs in the future.
- Facility personnel should receive network training and should be able to perform basic network troubleshooting when trouble occurs.

Crane and Heavy Equipment Safety Near Overhead Lines



Complying with OSHA standards and guidelines while operating cranes and other heavy equipment when working in close proximity to overhead power lines is critical to the health and safety of workers. Jobsites that are near overhead power lines must undergo a 360-degree hazard assessment before equipment can be brought in. If it is found that equipment could exceed minimum required distances, the contractor must either coordinate with the power company to have the lines de-energized and visibly grounded, or arrangements must be made with the line owner to have them moved to an acceptable clearance distance.

When working near power lines 50 kV or less, OSHA requires that all parts of the equipment and its load must maintain a distance of at least 10 feet. The required distance increases incrementally as voltage increases, maxing out at 45 feet for voltages of 750-1000 kV. If the voltage cannot be determined, equipment must be kept at least 45 feet away. All tag lines must be of a non-conductive material to prevent electrocution. An elevated warning line, barricade or line of electrocution hazard warning signs equipped with high-visibility flags must be erected 20 feet from the power line in view of the crane or heavy equipment operator. Finally, at least one of the following must be utilized by the contractor to ensure worker safety: a dedicated spotter, proximity alarm, range control device, range of motion limiting device, and/or insulating link.