

LSI WIRELESS TECHNOLOGY

LSI Radio

Installed LSI sensors are generally installed to communicate with a display which monitors and displays the information for the equipment operator. Communication is bi-directional, from sensors to display and from display to sensors. Two-way communication has better range, is more reliable and permits longer sensor battery life than one-way radio communication technologies.

Two-Way Communication

Sensors know when the display is turned off and go into a listening mode to conserve battery life. Energy savings gained in the listening mode leave more battery power for when it is needed. The high power, high speed transmissions of LSI products have much better range than comparable products.

The display provides feedback to the sensor on the quality of radio communication much like two people talking on the phone can tell each other to speak up, or to stop shouting. When the signal is very good radio power is reduced; reduced power consumption improves battery life. Furthermore, just like the two people talking on the phone, a sensor knows when the display has received a signal. The sensor will transmit until the message is received, and then it will stop transmitting, instead of shouting endlessly to be sure the message gets through.

Designed to Get the Job Done

Every aspect of the LSI radio system has been developed and optimized for use on heavy equipment including radio frequency, modulation, protocol and software operation, and antenna layout. We believe that we have the best radio technology for cranes on the market.

Radio Frequency and Wavelength

The radio frequency has been chosen to get the maximum radio transmission on a crane. For communication between boom mounted sensors and a cabin mounted display the signal must often go through, or around, the structure of the boom and other obstacles.

A good analogy for radio communication on a metal structure is seeing a flash light in the dark. You don't need to actually see the lamp to see the light as long as it reflects off a building, the ground or anything else. Radio waves can bounce several times too, as long as the wave length is optimized for the reflecting surfaces. The 4000 foot range of LSI products is a major advantage for installations on heavy machinery where it is often difficult to have a clear line of sight between sensors and display.

Of course radio expertise is not required to get successful performance from LSI products. The all-inclusive design ensures top level communication across a broad spectrum of applications and environments.



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Radio Modulation

LSI utilizes the latest direct sequence spread spectrum technology that spreads the signal over many channels at the same time instead of trying to switch from one channel to another like the outdated Frequency Hopping Spread Spectrum does. The direct sequence technology improves signal propagation on and around all types of structures, is less susceptible to radio interference and permits higher radio transmission power. The extra radio power increases the potential for multiple bounces to ensure reliable communication.

Interference on a channel won't bring the system down; as long as a significant portion of the signal can be recovered from the other channels, the information gets through. This addresses the challenges of high radio traffic installations like shipyards and ports that are regularly swept with high power radio signals on many frequencies.

Radio Protocol

This is the heart of the two-way communication link. If a communication signal (packet) is not acknowledged by the receiver, the transmitter sends the packet again. If the signal strength is not high enough, it is increased. A security code is encrypted into each packet to ensure consistency. If something is not right with a packet, a new transmission is requested.

The sensors and the display all listen to the same radio network, they are all linked together. If something prevents a display from receiving a signal from a sensor, any other sensor can be setup to repeat the signal until it reaches the display. For example, if a load that is picked down a deep hole with a load cell above the hook challenges the radio signal, then an anti-two-block sensor can be setup as a repeater to relay the load cell signal to the display.

Software

The two-way communication opens the door to a world of new features not possible before. For example, onsite sensor calibration is stored by the sensor itself, not the display. Once a load pin is calibrated on the crane, any compatible display can listen to the load pin signal and display the correctly calibrated load data. This can not be easily accomplished with wired and one-way communication systems.

Antennas

The long range communication of LSI products eliminates the need for external antennas mounted on the machinery cab to ensure communication between the sensors and display.

The external whip antenna on each LSI sensor ensures the signal has the best profile for transmission to the display in a way both internal and under-the-cover antennas can't.



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