

REI's Technical Corner

By Tom Jones, REI General Manager

REI does not endorse the use of NLJD technology for the testing and detection of electronics associated with Explosive Ordinance due to the inherent risks associated with unknown explosive devices.

The ORION has a new Remote Control Port!

With increased awareness of terrorist threats, many organizations around the world are using Non-Linear Junction Detector (NLJD) technology to search for electronics associated with explosive devices. REI has responded to this market specifically with some new enhancements for the ORION.

NLJD Technology and Explosive Ordinance Detection (EOD)

An NLJD works on the principle that if an electronic device is radiated with a strong Radio Frequency signal, then the semiconductor components will be excited and re-radiate at harmonic frequencies of the original transmit signal. Furthermore, NLJD technology has been used around the world for many years to search for the electronics associated with explosive devices. In fact, in many regions of the world, NLJD's are commonly used for detecting land mines. This is cause for concern because there is no guarantee that the transmit signal from an NLJD would not cause a detonation, and many NLJD's transmit rather strong transmit waveforms. Furthermore, it is certainly possible that the explosive device is designed to detonate from the NLJD transmit signal. On the other hand, another theory is that the terrorist does not want the ordinance to explode at the improper time, therefore, there is a hope that the explosive device is designed to not detonate on a NLJD signal. Regardless, when using a NLJD to search for electronics associated with any sort of explosives, **extreme care** should be taken. Here are some important considerations:

1. How much transmit power? Some NLJD's on the market that radiate up to 150 watts of power. These units should never be used for EOD. With this much energy, the electronic circuits may function unpredictably, possibly causing detonation. Only low power NLJD's should be used with a very sensitive receiver. The ORION has an extremely sensitive receiver and also has a DSP (Digital Signal Processing) integration system to further increase detection sensitivity using minimal power. This is very advantageous in EOD situations. For more detailed information visit www.reiusa.net.
2. Continuous Wave (CW) or Pulsed NLJD system? There are different theories about using a CW or pulsed NLJD system in EOD environments. We do not intend to make a recommendation here, but only to address issues of concern. One theory is that using a pulsed system with a low duty cycle reduces the chance of detonation because this type of transmission uses less total energy compared to a traditional CW system. This is only a theory and should not be strictly followed because safety depends strictly on the type of detonation circuit. On the other hand, the more common theory is that a CW system is less likely to cause a detonation because the pulsing may trigger the detonator. Again, this depends on the detonator circuit, and the CW theory may be the prevailing theory only because historically, most NLJD's used CW waveforms. The ORION is capable of operating with either CW or pulsed waveforms. The key is to know your potential threat, have some prediction of the level of sophistication of the threat, and protect the operator regardless of threat assumptions.

Remote ORION Mode

In 2002, REI developed a method to operate the ORION from a remote location using a cable. This is currently achieved using a separate remote control pendant (RCM-4000) that is attached to the ORION using a 60ft cable. This function is well documented on our web site at www.reiusa.net. This option was developed from a customer request to have the ORION remote for the safety of the operator. The theory is that the ORION may be placed on a Tri-Pod over a suspect threat. Then the operator can turn on and control the ORION to evaluate the device from a safe distance. See the picture below:



Below is a picture of the complete ORION remote system including a tri-pod and an ORION with a toolkit.

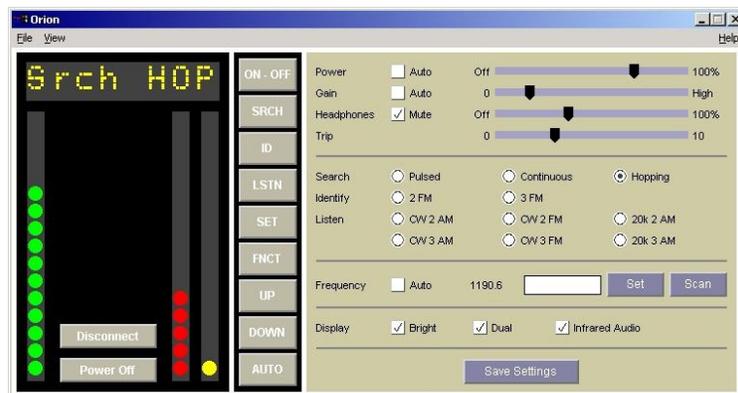


Mailroom Application

Another application of a remote ORION is for use in a mailroom because it is too difficult and time consuming to X-ray and review all incoming packages. The concept is to examine all incoming packages with the ORION remote option in a safe configuration, possibly using a conveyor belt and a secure inspection room. If electronics are present, then the package is further examined by X-rayed or other means. This method provides quick evidence about the potential for an electronic detonator without visual inspection of an X-ray for each package.

New Improvements to the ORION Remote System

The current Remote option is currently being upgraded so that the ORION can simply be plugged into a computer for controlling and displaying the ORION response with optional software. After October 1, 2003, all ORIONs will have a new port on the back of the transceiver. This port allows the ORION to be plugged into a standard PC computer using the serial port. This port will also allow future control and programming of the ORION functionality. One concept is the ability of the ORION to be placed in a specific mode, locking the operational settings for EOD environments. For example, if the user wants to operate in a CW mode with a limited transmit power, then the software could be used to “LOCK” the functionality so that the user cannot accidentally change the mode of operation making the unit less safe. Provided below is a screen shot of this new ORION software feature.



For more information about these and other new developments, contact REI at sales@reiusa.net.