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## TROLLEYPONDER/ECOTAG/RADAR RFID Newsletter #99

28 April 2014

Your latest copy of our regular newsletter keeping you up to date with developments.

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#### **1. Major changes to world trade in the past month**

This weekend we have two radar systems in transit to overseas clients both with complicated shipping arrangements. Whereas we have shipped in the past about 500 such systems using couriers, the 1st April saw the introduction of new rules and measures that make the shipping of some goods nearly impossible. Even a major courier company like FEDEX said they could not transport the systems with the new rules.

Inside most watches, calculators, computer motherboards and virtually any device that can remember a date setting, lies a small coin cell battery that keeps the date chip running. These cell batteries usually contain lithium in small amounts to give a battery that has very low leakage and usually a five year operating life. It is these batteries that are the target of new regulations from the 1st April which make their transport by air or sea extremely difficult.

Since 2013, IATA (the airline association) has introduced new regulations that declared any form of lithium battery as a dangerous cargo. Prior to the 1st April, the small coin cells mentioned above were excluded in certain circumstances, but from the 1st April this exemption falls away and any item that includes one of these batteries is now classified as dangerous cargo and subject to new transport regulations. In most cases this involves special packaging, a limit on the number of batteries in the package, special labelling of the cargo and an accompanying lithium battery certificate even if the battery is encased inside an electronic system.

In the USA situation, for local transport, import or export, this cargo may not be transported on any passenger aircraft and can only be moved by "*cargo only*" aircraft.

There are further regulations concerning the lithium batteries, requiring them only to be made in approved UN certified factories.

In our radar system we provide transponders that have a 40 metre range and which contain one of

these small batteries. The batteries are installed in manufacture and are deep inside the packaging of the transponder before the transponder is finally encased in a rubber sleeve. They are electrically disconnected during transport and are not accessible from outside the transponder.

The new transport rules are going to mean that we change the design of the transponder to either:-

- 1) use a different chemistry rechargeable battery and supply a recharge circuit for users to recharge the encased battery. The leakage for rechargeable batteries is much higher than lithium batteries and typically a rechargeable battery will run flat in a storage situation in 3 months compared to the five years of a lithium battery.
- 2) use an externally accessible battery holder so that the user can locally buy lithium batteries and install them themselves when they receive the equipment. We can then fly the equipment with no batteries included. This solution is further complicated in that the positioning of the battery in the transponder is critical in order to preserve the RF performance and its waterproof nature.

## **2. Energy conversion**

A really impressive technology is developing at present relating to the useful conversions of solar energy.

Solar panels are becoming quite cheap and have a long operating life (20 years if well made). However they are difficult to interface to harness the available power. A typical panel might have an open circuit voltage of 22 volts, a short circuit current of 3 amps and have an optimum power transfer point elsewhere say at 15 volts. In addition a cloud passing across the direct sun path might cause the output power to drop to just 10% of the energy compared to the energy without the cloud. All this means that one is getting continually fluctuating energy from the panels and it is very difficult to design for a steady load- especially something using a motor.

In the past one might have stored the energy in some form of battery, but this gives very little of the potential energy available from the solar panel to a useful load. Batteries are expensive, difficult to charge and discharge quickly, have small capacities and a limited life.

The ideal situation is to immediately convert the solar energy to mains electricity that is compatible with the supplied mains and to use the energy in the normal AC load of the building, reducing the amount of energy drawn from the municipal supply.

You cannot use any inverter to convert the DC voltage from the solar panel to AC mains compatible energy. It has to be generated in exact phase and frequency with the incoming mains otherwise it is going to be vaporised.

The type of inverter needed is called a Grid-Tie inverter.

It is wired directly onto the mains supply and the solar panel provides the energy. The inverter continually monitors the solar panel and as soon as there is sufficient energy it starts to monitor the AC mains supply determining the frequency and the phase angles.

It starts its inverter at the same frequency as the incoming mains supply but at a low output voltage and gets the two voltages in exact phase with each other. It then increases the output voltage to start supplying in phase electricity and using up the available solar power.

On the solar input side it adjusts the load voltage to get maximum power transfer from the solar

panel by monitoring the DC voltage and current to operate at the Maximum Power transfer point. It continually adjusts these values so that it can handle variations in the available solar power such as might happen with a cloud passing through the direct sun path.

The inverter has another feature called islanding, which shuts down the entire process in the event of an incoming mains failure.

Grid-Tie inverters have been around for a long time for major solar and wind turbine installations. They have however been quite expensive (US\$1500 for a 15KVA system)

The new development is in the form of micro grid-tie inverters which allow simple systems of 300 watts or 500 watts to be implemented in modular form. These are not wired into the main switch board of the establishment, but plug into a normal AC outlet in a room. They are also cascadable allowing many 300 watt or 500 watt units to work in parallel so that larger loads can be addressed. They also cost only about US\$100 each.

We have three of these systems running at present which generate about 40% of the electricity used during daytime. We have power meters on the incoming mains power supplied from the municipality and on the power supplied from the solar panels and continuously monitor the effectiveness of the system. When clouds pass over the setup one instantly observes the change in output from the solar network and the increase from the municipal network to keep the building load running optimally.

Electricity meters that monitor the incoming supply from the municipality supply are becoming electronic based rather than the historic magnetic type. The electronic meters cannot determine the direction of the current flow and so it is important that one does not generate more electricity from the solar network than the building is using as any oversupply will flow back into the municipal network and generate a charge on the meter despite no electricity being used. Hence during times of full sun one can reduce the municipal consumption down to nearly zero using the grid tie inverters, but in cloudy conditions or when night falls, the building needs to run on municipal supply.

At current electricity rates, we expect payback within 5 years without any form of solar subsidy.

### **3. Product range**

Trolley Scan are a manufacturer of UHF RFID systems. Trolley Scan manufacture fixed readers, portable readers and RFID-radar systems (Real Time Locating systems that give accurate position information) as well as a variety of transponders for different applications. Transponders come in the form of passive transponders with operating ranges up to 20 metres and battery assisted transponders with an operating range up to 40 metres. Trolley Scan also combine some of these components into packages for end users which are supplied with the appropriate software. Typical applications are asset management, notebook tracking, equipment barriers, store control, sheep and cattle tracking, event logging and sports timing systems.

Trolley Scan have been delivering their RFID solutions for the past 15 years and offer full support for all their equipment.

### **4. Getting your own complete RFID/radar system**

You can order RFID systems or RFID-radar systems from [TrolleyScan.com](http://TrolleyScan.com)

Trolley Scan provide small RFID reader systems which give new users the ability to evaluate UHF RFID and their applications without needing specialised skills.

Trolley Scan provide a variety of easy starter systems for first time users who have an application

that needs a solution. Typical packages are :

- ? Standard UHF long range readers with antennas and 100 transponders
- ? RFID-radar system comprising long range reader, antennas and a variety of different transponders.
- ? RFID-asset tracking systems comprising portable reader, antenna and a variety of transponders with software.
- ? RFID-notebook/laptop tracking system comprising reader, antennas, transponders and software

In addition components such as readers and transponders are available

These systems are already operating in 52 countries.

To find out details of the systems and to order see <http://trolleyscan.com/>