

HIGH VOLTAGE LINE PROXIMITY WARNING

THE **SKY RADIO II** SYSTEM

BY

MADE-SA

A. T. M. S.

The Manufacturer

- **MADE**-SA was formed in 1991 by **M**ark, **A**lan, **D**idier & **E**rick to apply advanced technologies to the production of operational aids for the electric power distribution industry.
- Products include cable and conductor identifiers, power quality recorders and transformer testers. All these involve complex signal analysis, which is why **MADE** was approached by EDF and the concrete pump trade association SNPB to develop this electric power line warning system.

The **SKY RADIO 2** system

- What it does
- How it does it
- System evolution
- Why it is used
- What is gained
- Operator comments

What it does

- It gives a warning of the approach of any part of high-lift equipment (Crane, Nacelle, Concrete Pump) to a live high voltage line.
- There are two thresholds, warning and danger, and the equipment owner can choose between six different levels of audible and visual warning, varying from a beeping buzzer to completely stopping the movement of the equipment.

What it does

- The operator cannot modify the system set-up, but he can respond to a warning by changing to report mode which enables him to continue working with frequent reminders of the HV line proximity.
- The operator carries on him a remote buzzer/controller so as to be always aware of the system state.
- The system records all operator actions.

How it does it

- The multiple sensors are placed at strategic points on the high-lift equipment, and continuously monitor the surrounding electric (not magnetic) field.
- This field increases in strength linearly on approach to a high voltage alternating current line, and the sensor output can be set by the manufacturer to trigger an alarm at a chosen distance from the line.

How it does it

- The sensors continuously signal the strength of the electric field to the central controller, which controls the buzzer, the horn and two sets of contacts which can be used for other warnings or to stop the equipment movement.
- The sensors and controller are self testing ten times per second to warn of any malfunction.

System evolution

- In 2000 EDF approached MADE-SA to create such a system because of the company's competence in signal analysis. EDF's motivation was to reduce the cost to them of line contacts.
- The sensing technique was quickly established and the first system, SKY³ (cube'd), was developed in 2001 using a cable to connect the sensors to the central controller.
- This system works well and was a commercial success.

System evolution

- In 2003, a new system, SKY Radio, was developed to avoid the necessity and cost of installing the cable bus, and the risk of this cable being damaged by foliage etc.
- Communication between sensors and controller is by an approved radio link.
- Sky Radio is much easier to install, and avoids cable problems due to foliage etc.

System evolution

- The latest system, SKY Radio II, has a double radio link and sensors which serve as relays so as to ensure continuous communication with all sensors and avoid any system interruptions.
- There are 1,300 SKY Radio systems in use, making a total of well over 2,000 systems of all versions.

Why it is used

- The system is proposed by the manufacturer as an operational aid, but it is obviously intended to enhance operator safety, as well as reducing the risk of damage to both the high-lift equipment and the electrical distribution network.
- This last aim is why EDF initiated the development of the system, and would like it's use to be compulsory.

Why it is used

- In France, the equivalent of the UK Health & Safety Executive participated in the development of the system and strongly encourages its use.
- In the UK, the HSE has stated it has no objection to its use in conjunction with established procedures, which we do not seek to replace.

Why it is used

- Although it is fitted to all types of high-lift equipment, the biggest users of SKY Radio are the owners of concrete pumps as these are employed in so many different environments.
- Most of the smaller companies install SKY Radio straight away on all their pumps.
- The larger companies (100+ pumps) have typically installed SKY Radio on a dozen pumps initially, and then equipped their complete fleet.

Why it is used

- All the member companies of the French SNPB (National Concrete Pumpers Association) have equipped their pumps, ***although there is no legal obligation.***
- The largest of these is Inter Service Pompe with a fleet of over 500 pumps, and they have had no HV incidents in the three years since installation.

Why it is used

- We encounter two groups of pump operators.
 - Experienced. Suspicious of new gadgets, and convinced that their experience will protect them from incident. This is understandable as these guys are proud of their field experience.
 - Beginner. Aware of the benefits of modern technology, and keen to learn how the system can help them.

Once accustomed to the system, both groups of operators are thankful for the effort made by the owner to protect them, and the equipment, from an ***inaudible*** and ***invisible*** risk.

Why it is used

- All too often we find that we are asked to install the system by a company which has just suffered an HV incident or accident.
- We believe that the investment in a SKY Radio system is justified the first day the alarm sounds, even if there is only the possibility of an accident.

What is gained

- Peace of mind is a nebulous phrase which nevertheless has a clear value. Both owner and operator acquire this once a system is installed.
- Operator loyalty. Once accustomed to an ever vigilant protector, an operator is reluctant to leave for another company not using the system.
- Many operators have obtained reduced insurance premiums, and we can provide justification for this for your insurer.

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Operator comments

- "The system worked well during a line replacement at St. Cyr."
- "I was surprised when the nacelle was stopped by the system as I was unaware of the nearby line. The possibility of releasing the system in report mode enabled me to continue working circumspectly."
- "One feels more at ease with this warning system."