

Challenge Electronics Technical Report: Marine Applications

Powering Production Through Innovation



Challenge Electronics is a global supplier of audible components. Our goal is to be louder, smaller, more energy efficient, more rugged and more cost effective.

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Finding Safe Harbor for Electronic Sounding Devices

Written by Challenge Electronics Engineering

Introduction:

Harnessing the power of aquatic environments is a phenomenon that mankind has utilized for centuries, utilizing it for commerce, travel, and luxury. From electronic GPS systems, engine heat indicators and onboard microwaves, the unique harsh environments of marine applications require extensive design and innovation. This technical article will discuss multiple design parameters that Challenge Electronics incorporates when developing a product that is ideal for Marine Applications.

False Alarms from Water Entering System

In harsh environment applications, a false alarm caused by water entering the system can lead to costly and confusing situations. This issue originates at the design of the electronic connection. In the typical setup for an alarm, the positive terminal of the device is wired to the power source and the negative terminal is linked to a device used to activate the alarm when required. If water entered the component and contacted either the switch or sensor, the alarm could be activated, creating a false alarm. To eliminate the chances of a false alarm caused by water, Challenge Electronics utilizes the rugged testing of Ingress Protection (IP) Ratings, as well as Isolation Circuits to eliminate the chances of a false alarm. These ratings provide our customers with peace of mind, ensuring that our IPX7, IP65, and IP68 rugged products will operate in any marine application, with no fear of false alarms.

Permanent Water Damage to Components

Alongside false alarms from electrical connections, any water that contacts the inner components for extended periods of time can cause irreversible damage to the entire product. The combination of exposure to water and a direct current (DC) results in *galvanic corrosion*, which forms irreversible damage to the audio components diaphragm, electrical connections, and internal circuitry. To stop this from occurring, innovative coatings on the diaphragms are applied to ensure that galvanic corrosion will not occur. Once coated, this is confirmed by testing the audio component using the Ingress Protection (IP) Test Procedure.

Casing Material Selection

Specific plastic casing and potting materials must be used when designing a component for Marine Applications. At Challenge, we incorporate rugged-grade plastics into our designs, allowing for high levels of resistance against water, oil, and chemicals. We do not use any nylon-based products since nylon absorbs moisture, compromising the components' structural integrity. We also utilize our spliced wire leads designs, durable heat-shrink tubing, and water-resistant glue to create an airtight, and water-tight seal, known as a hermetic seal.

Location of Sound Port

The sound port can be located at any given location of the audio component for Marine Applications. The alarm sound port should have a single hole and be directed downward to allow water to drain from the alarm after immersion. Any water in the sound chamber will reduce the output sound level or in some cases prevent the alarm from producing any sound.

For additional information regarding Challenge Electronics' product design, innovative testing, and new products, please [click here](#) to visit our website.

