When did the Alarm in My IUV Go to Harvard?

IUV Buzzers Get Smart

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In 1968, the first true electronic alarm was offered to the market and engineers and system designers grasped pretty quickly that these alarms were a major advance over the current state-of-the-art electro-mechanical alarms. The new alarm technology utilized a piezoelectric transducer and solid state electronic circuit components to produce a loud sound with very little power and no physical wear-out mechanism. Adoption of the new alarm technology across all industries (including IUV's) happened quickly and it dramatically increased the reliability and efficacy of the warning sound portion of these applications.

Mallory Sonalert audible alarm model no SC628 introduced in 1968 and still available in basically the same package and performance 40 years later.

Fast forward 32 years later to the beginning of the 21st century, and unfortunately, not much had changed in the world of electronic alarms. In the year 2000, electronic alarms were still being designed with standard circuit components (capacitors, resistors, transistors, etc.) which meant that developing a new sound or model could take a couple of months because of the prototyping and manual assembly involved. Also, only a limited number of different types of sounds and timings were available due to space limitations and cost. Of course, some things had changed by 2000. Engineers now used computers to design electronic circuits and circuit boards, the electronic components inside the audible alarms had shrunk enabling more circuitry to be added, and new integrated circuit (IC) chips were available that enabled the design of some unique alarm models. However, these changes were much more incremental as compared to the technology jump that happened thirty two years earlier.

This static state of affairs changed quickly for audible alarm technology with the use of microcontrollers as the core technology inside the audible alarm circuitry beginning in the mid to late 2000's. With this new technology, the signal that controls the audible sound is generated by software code which is downloaded into a programmable microcontroller. The microcontroller is mounted on a circuit board along with other components to provide the complete circuitry controlling the audible alarm. While it used to take a couple of months to develop a new sound, with microcontroller technology, a unique sound can be created in a single afternoon by tinkering with the software. What about physical samples? In the past, it could take two to four additional weeks for engineering to prototype the circuit, make a circuit board, and painstakingly build it by hand. With the microcontroller technology, partial assemblies are already built up by production waiting for the microcontroller to be programmed. Once the software code is developed to produce a new sound, samples can be

A microcontroller is also known as a "computer on a chip". It is an integrated circuit (IC) which utilizes software and may contain multiple inputs and outputs.

finished and ready to ship in a day or two. Compressing the design cycle is not the only advantage of the microcontroller technology. The previous generation of alarms could be considered "dumb" alarms because they would make the same sound after being activated. Microcontroller technology now enables "smart" alarms which can do much more than just make the same static sound. This new capability opens up incredible opportunities for IUV system designers to develop something unique for their vehicle which can enhance value and increase safety.

What Does This Mean for My IUV?

The main uses of audible alarms and buzzers in IUV's include:

- Dashboard (Engine Over-Temp, Low Oil Pressure, etc.)
- Forward Horn
- Moving Parts (Platform Moving, Load Bed Dumping, etc.)
- Tilt Warning
- Back-up Alarm

Mallory's new 22mm alarm series coming in late 2011 offers an ultra-miniature panel mount package with microcontroller based circuitry that can generate nearly unlimited sound options.

All these areas can take advantage of the new microcontroller technology in audible alarms. Notice that the key to the above sentence is "take advantage". Now that audible alarm designers can offer a nearly unlimited amount of sound types, IUV designers need to think out-of-the-box and collaborate with audible alarm companies earlier in the design process. For example, some dashboard warnings are time critical. When the engine is over-heating or the oil pressure drops too low, the IUV driver must act quickly to shut down the vehicle to avoid engine damage. Rather than using a constant tone or a simple beeping tone, IUV's could utilize an alarm that makes a double beep sound (i.e. beep, beep, pause, beep, beep, pause, etc.). This unique sound would capture the operator's attention much quicker.

Other new unique warning sound ideas include:

- Sounds which get louder over time.
- Beeping sounds that speed up or slow down over time.
- Warning sounds that automatically turn off after a period of time (or delay some number of seconds before turning on).
- Alarm units that can be temporarily silenced by the operator while the condition that caused the alarm is being attended to.
- Multiple unique warning sounds in one package.

The list of possibilities grows even larger if the IUV designer starts early in the design process and involves the audible supplier from the very beginning of the design cycle. With the microcontroller inside the alarm, there are opportunities for the alarm to communicate with the host system and offer

even more intelligence. For example, how about an alarm that can do a self-test to verify it's working properly? This function is not useful on its own, so the alarm would need to communicate with the vehicle's host controller to do such a test and report back to the host that all is OK.

Mallory's SC Series which uses standard circuitry was introduced in 1968 and offers nine unique sounds and 150 model numbers.

As an IUV Designer, Why Do I Care that My Audible Alarm Got Educated?

Most uses for audible alarms in IUV's are for safety and this makes sense. Operators of IUV's are not playing a video game, so sounds are only needed when additional attention is required from the operator (or a nearby pedestrian). Although there have been many safety improvements in IUV's over the years, there are plenty of opportunities to improve the IUV user's experience and improve safety and efficiency.

Mallory's SCE Series which uses microcontroller circuitry was introduced in 2006 and offers 20 unique sounds and 650 model numbers (and growing).

Common complaints with the use of alarms in IUV's include:

- Excessive noise level exposure resulting in annoyance, fatigue, & hearing loss.
- Pedestrians becoming habituated to alarm sounds.
- Multiple alarm sounds causing confusion.
- Operators disabling/disconnecting alarms.

Because of a lack of options available with previous alarm technology, IUV designers were limited in how they could implement the warning sounds. With the new audible alarm capabilities, IUV designers can work to eliminate the conditions which lead to the above complaints and increase safety and operator comfort even more. For those IUV designers who embrace the new alarm technology and take advantage of it, they can realize long term sales gains from those satisfied users who are willing to reward IUV suppliers who provide more value for their money. Improvements in safety will also lead to less accidents and less long term liability for the IUV supplier and owner.

Don't let the smarts in your IUV's audible alarm go unused. Contact your audible supplier for ideas on how to make your IUV safer, more efficient, and offer more value for the buyer.