

# FIRE & RESCUE SERVICE BENEFITS FROM 'LIFESAVING' TRAINING AID

## INTRODUCTION:

Our understanding of the world around us is filtered through our five senses: sight, hearing, taste, smell, and touch. Around 70% of our understanding of the world is gleaned through sight; 15% through hearing; 5% through touch; 5% through taste; and 5% through smell. Firefighters wearing a breathing apparatus and protective clothing often work in smoke-filled environments where visibility is almost non-existent, hearing is limited because of the roar of the fire and the noise of the equipment, the sense of smell and taste is rendered useless by the breathing apparatus, and any sense of touch is hampered by the wearing of thick gloves.

## PROBLEM:

Under such conditions, training is paramount for the protection of firefighters. Early systems for capturing performance information during a training sessions had suffered from water and condensation damage and were prone to giving inaccurate and inconsistent results.

## SOLUTION:

CAS worked with the fire and rescue training organization to develop a reliable and waterproof data logger to provide firefighters with a second-by-second record of how quickly and effectively they brought a blaze under control.



The specially packaged [Squirrel SQ16 series](#) data logger has proved so successful under rigorous test conditions that the service company is recommending the logger to other fire service training organizations. The data logger is crucial in training firefighters to control potentially lethal blaze conditions such as 'flashover' and 'backdraft'. The success of the project is the result of a marriage between the practical experience of controlling fires under difficult conditions and the hi-tech expertise to accurately monitor every facet of the development of a fire and of a firefighter's progress in controlling it.

Ordinarily, electronics, water, and heat do not mix and there is an awful lot of water flying around in a training exercise. Now, the Squirrel is encased in a robust waterproof case with waterproof power links. To combat condensation, the logger is calibrated and sealed in the comfort of an office rather than on the training ground. The newly modified Squirrel SQ16 series data logger is a vital part of a training regime that relies on developing substantial fires in the confined spaces of specially modified steel cargo containers in patterns and intensities that replicate realistic conditions and are repeatable so firefighters can effectively tackle the same fires over and over again.

Three sensors are fitted in the containers at head height; standing, kneeling down, and in the crawling position. As a training firefighter tackles a blaze, the logger plots the temperature from the three sensors at one-second intervals. The logger is then simply plugged into a PC and the data is downloaded. The data from each sensor is displayed on one graph so the firefighter and instructors can analyze performance in the classroom later.

When the fire takes hold at the far end of the container, the heat intensity near the ceiling reaches a point where the atmosphere/smoke is close to spontaneous combustion. If a firefighter does not react quickly and apply water the ceiling will ignite engulfing the entire room (and firefighters) in flame, creating the classic dangerous '[flashover](#)' conditions. If insufficient water is applied, the 'flashover' will occur anyway. If the firefighter applies too much water, the intense heat mixed with superheated steam will be forced down, burning the firefighter.

The trick is to spray the ceiling area in front of the blaze in the first instance with just enough water to lower the temperature of the atmosphere, but not too much water to push the heat down onto the firefighter. The ideal graph profile in these controlled training conditions will show temperatures at all three heights being reduced at roughly the same rate. If the middle graph (monitoring temperature at kneeling head height) goes up while the ceiling temperature graph comes down rapidly, it is a clear indication that the firefighter has sprayed too much water at the ceiling and created dangerous levels of hot steam lower down.

A further addition to the Squirrel adds a pressure sensor to capture the relative pressure of a sealed room during a fire; this is being used to help instructors better understand how to recognize and combat lethal 'backdraft' conditions. [Backdraft](#) occurs when a fire in a sealed space, such as a room, becomes starved of oxygen and begins to die down. If

a firefighter opens a door or window to such a space, fresh oxygen is sucked in and super-charges the fire. Within seconds, the blaze explodes out of the newly created opening and can engulf the unwary firefighter.

By plotting the cycle of a fire in a sealed space, the instructors better understand how to tackle such fires safely. So far, the logger has produced graphs that resemble a roller coaster cycle as the fire becomes starved of oxygen and dies down, then flares up again as the drop in pressure leads to oxygen being sucked in

from around door and window frames. It then dies down again and the pattern is repeated, sometimes several times.

Backdrafts are much more common now than they were 20 years ago because buildings are better insulated. This means heat is reflected back into a room to create more volatile conditions. [Double-glazing](#) windows, too, has played a role in the increase of backdraught



because they do not shatter as easily as single-glazed windows when the pressure drops.

## BENEFITS

Accurately logged data also has a vital health & safety role to play in the training environment. If an officer is injured during training, the logger can help reveal the problem. One instructor commented, “The new data logging system developed by CAS and ourselves is the best on the market. It is robust, easy to use, and accurate. We are so pleased with it that we are actively recommending that other training organizations should be using it.”

A great deal of technical expertise went into solving the practical problems firefighters face in the field where lots of water and extreme heat make it a hostile environment for sensitive electronics. Technicians also looked at the practical problems firefighters may face in using the Squirrel in the field. So, as well as developing a completely waterproof case for the logger, they developed oversized switches and ports so firefighters with large padded gloves could operate the equipment more easily.

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For further information on the newly modified [Grant Squirrel SQ16 series data logger](#), or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Application Specialist at **(800) 956-4437** or [www.DataLoggerInc.com](http://www.DataLoggerInc.com).