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Safety Systems for Bus Conversions/Motorhomes

By
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RV Safety Systems

I have written two previous articles for Bus Conversion Magazine:

- **Bus/Motorhome Fires – Prevention, Detection and Suppression** (published in the March 2004 issue – also published at: http://www.rvsafetysystems.com/Fire%20article.htm)
- **Safety-Related Alarm Systems for Buses/Motorhomes** (published in the March 2005 issue – also published at: http://www.rvsafetysystems.com/Alarm%20article.htm

This article will be an update of the 2005 article. It will focus on fire detection/suppression systems and tire pressure monitor systems. Since 2005, significant changes have taken place in both markets and the RV owner now has several new options.

When I present my seminars at various trade shows, I tell the audiences that I will focus on two questions:

1. Why should I consider investing in safety-related systems?
2. Do I want to consider an active or passive system?

The first question is obvious, but the decision can be challenging. The second question needs some explanation on my part and some thought on the reader's part. For the systems described in this article, passive systems are systems that are available to protect you and your belongings, but do not have an active display to report operating status or furnish information about your system functions. An example of a passive system is the "idiot" lights on the dash of your car that tell you that something is wrong. We faithfully believe that they will function properly if the need arises. For many people, a passive system is sufficient. Being an engineer, I want to know what is going on – I need data! I need to see gages in my car and in the bus. Thus, I prefer what I call active systems – ones that give me data and tell me they are functioning properly.

Fire Detection and Suppression Systems.

I will focus on systems for the engine and generator compartments. However, I will also address other possible areas of protection later in this article.

Let's address the "why should I consider buying a fire detection/suppression system?" question. In the 2005 article I cite some pretty revealing statistics and studies that suggest bus/recreational vehicle fires occur much more often that some folks would guess. In addition, many bus conversion folks have been to wrecking yards where burned-out buses or recreational vehicle were prevalent. Or we have seen articles or internet pages that show dramatic fires. Let me give you a couple of examples that relate

directly to our lifestyle. We are members of the Converted Coach Chapter of FMCA. At least 5 of our members have had generator fires! In terms of devastating engine fires, probably the most "notorious" is the Gary Swaim Fire (see Fig. 1). Gary has documented this horrendous event on a special website that all recreational vehicle owners should read (http://swaimquest.com/Coach_Fire.aspx).

When I wrote the 2005 article, there were very limited options for detecting and/or suppressing fires in engine or generator compartments. I had developed a detection system, but had not yet developed a suppression system. Since that time at least four companies market systems that are designed for, or applicable to, recreational vehicles:

- RV Safety Systems (http://www.rvsafetysystems.com/Fire%20Detection%20and%20Suppression.htm)
- FireTrace "tubing" system (www.firetrace.com)
- Fire Life Safety (www.macthefireguy.com)
- Emergency Suppression Systems, Inc. (http://essfire.com)

Each system is fully capable of detecting and suppressing a fire in the compartment that the system is selected for. Each system can extinguish a generator fire even if the owner is not present – a huge fear of mine. The RV Safety Systems EG-400 system can automatically shut down the generator and/or propane

Let's discuss each system in a bit of detail.

The RV Safety Systems' EG-400 system is based on an electronic monitoring of the engine and generator compartment temperatures. This is an active system that displays the temperature and tells the owner that the system is functioning properly (see Fig. 2.). The system has two levels of alarm for each compartment. The first level is a trigger temperature the owner sets, based on his observation of the temperature history in each compartment of his particular vehicle. It is an early warning low-level audible alarm. If the system detects a compartment temperature of 400 degrees, an aggressive audible alarm is sounded, and a relay is latched that triggers a fire suppression valve (see Fig. 3) which dispenses a very high performance fire suppression material (water-based surfactant adopted from racing technology) into the compartments. Additionally, the system can also shut the generator and/or propane off. The cost of this system is about $1100, plus installation.

The FireTrace system utilizes special plastic tubing mounted in the compartment to be protected. The tubing is connected to a pressurized vessel containing fire suppression material. The tubing is designed to melt during a fire and dispense fire suppression material in the affected area. The pressure vessel has a pressure switch which notifies the owner that the system has discharged. This system has been used on various industrial applications, but to my knowledge, has not been applied to recreational vehicle applications. The company does not have a standard off-the-shelf system. Rather, it prefers to specifically design the system to the application. Prices are reported to be in the $3000-$4000 range. This system falls into the passive category.

The Fire Life Safety system is very simple. A pressure bottle with a temperature sensitive spray head (similar to what is used in commercial buildings) is mounted in the engine and/or generator compartment. If the compartment reaches the temperature limit of the head (approximately 280

degrees) the system discharges. This system uses the same highly effective racing-based fire suppression material that RV Safety System uses in the EG-400 system. The system is not an electronic-based system and thus does not have the ability to shut off the propane or generator. There is an optional alarm system to notify the owner that the system has discharged. If pressure vessels are placed in both the generator and engine compartments, the cost would be in the $1200 range ($1500 with the alarm option). As was the case with the FireTrace system, this system is passive in design.

The newest product on the market is a system marketed by Emergency Suppression Systems, Inc. As of mid-April, their website indicates that the system is still in development. I to the development person at the Quartzsite show this year, and briefly looked at the equipment. The system is based on an automotive racing system. It does have some electronics, but appeared to be a passive system. They indicated that the system would be in the $2000 range. Since it is based on racing technology, it should be an effective system.

I have reviewed marine fire suppression systems, but I do not feel that they would provide adequate protection for recreational vehicles. Most use a halon or "halon replacement" material. Halon extinguishes a fire by displacing the oxygen. In a confined area halon is superior to almost any fire fighting material. It would be quite effective for extinguishing the initial fire in an engine or generator compartment, but would not offer protection for a secondary or flash-back fire since the compartments would be flooded with oxygen seconds after the fire was extinguished.

One other comment about fire suppression systems. The systems mentioned above could be applied to areas other than the engine and generator compartments. I am working with an OEM who is going to build a handicapped motorhome for a person confined to a wheel chair. We will furnish the same engine/generator system for installation in the interior of the coach to prevent the owner from being trapped in a burning coach.

I have had many questions about protecting other areas such as utilities in the bay area or refrigerator flue fires (the major manufacturer's recalls have triggered significant concern). Each of these areas can be protected by halon-type system (they are reasonably enclosed areas). One source for halon systems with temperature sensitive heads is: http://www.safecraft.com/ (look for AT3 and AT5 units). Halon systems are in the $300-$500 range, depending on the size of the pressure vessel.

Tire Pressure Monitoring Systems.

I was a Doran dealer for over 3 years (I now market SilverLeaf electronics systems) and have observed many changes in products and vendors. The past 6 months have witnessed drastic changes in this market. I will give you an update on all of the recent changes.

Before we get into the specifics of the various product lines, I need to address the "why buy" question. As is the case with engine and generator fires, horror stories about tire failures abound. Government statistics suggest that 80-90% of all tire failures are the result of under-inflated tires. As of 2008, the government regulations require tire pressure monitor systems on all cars sold in the USA. On the bus and RV forums, there are many reports of tire failures that result in significant collateral damage to the RV or towed vehicle. In at least one case, a towed vehicle tire failure caused a fire that destroyed the towed vehicle AND the coach. We talked to the folks involved in the total loss and it was amazing that the trauma was still as vivid as when it occurred almost two years earlier. Indeed, there was a possibility that they could have been trapped when the motorhome ended up very close to a bridge

guard rail! While most of us are very careful to inspect our tires frequently, that does not protect us from a tire failure caused by picking up a foreign object while driving down the road.

The following is a list of tire pressure monitoring system vendors (as of April 2008)

- **SmarTire** (www.smartire.com)
- **Tire Sentry** (www.tiresentry.com)
- **Pressure Pro** (http://www.advantagepressurepro.com/)
- **Doran 360RV** (www.doranmfg.com)
- **Tire-SafeGuard** (www.tireinsight.com)
- **Saf-Tee tire pressure monitor** (http://truckerspartstore.com)
- **SilverLeaf Electronics** (http://www.silverleafelectronics.com/ and www.rvsafetysystems.com)

I will describe each of the systems in some detail, but first, a few general comments. With the exception of SmarTire, and a couple of models of Tire SafeGuard, all of the above tire pressure monitor systems have the tire pressure sensor mounted on the valve stem (SmarTire and two of the Tire SafeGuard systems have sensors mounted on the inside of the tire on the rim). One question that is often asked is if the sensor affects the balance of the tire. Mosts sensors are less than 1 ounce (Pressure Pro is 0.7 ounces) and are mounted about halfway out the radius of the tire/wheel combination (less impact on tire balance). Because of the generally large size of the tire/rim combination on buses or motorhomes, there should be no balance issue. Towed tires are smaller, but I have not heard of any significant issue. The other general category of questions involves tire valve stems. The first issue is the use of rubber stems. There have been a significant number of reported issues with rubber stems. It is recommended that they be replaced with metal stems. Another issue involves extenders to position the sensor so that it can be easily removed for tire service. I always caution against extenders if at all possible. There are inferior quality extenders on the market and they can be an additional source of leakage. If extenders are required, they should be purchased from a reputable truck tire dealer, or a known reputable vendor.

Most of the systems are active type systems - at times. With the exception of the Tire Sentry, they all display the pressure of each tire (and temperature if so equipped). Most go into a “sleep” mode where the pressure is not displayed (the system is still working). During the sleep mode, there is usually some indicator (e.g. a small flashing green light). These indicators can often be hard to see. I always check my system at each rest stop to make sure the cigar lighter plug has not become dislodged.

Prices for a 12-tire system vary from around $600 to over $1000, depending on the system.

Now, let's briefly talk about each system.

The SmarTire system has been an industry standard for the truck industry for many years and is well accepted in the RV industry as well. It measures both pressure and temperature. Perhaps the only drawback is that the tire must be partially dismounted to install the system. It does not allow for switching from one towed to another without dismounting the tires (generally not a big problem). The cost of this system is higher than most of the other systems.

The Tire Sentry system is strictly passive, as it does not display the tire pressure. The sensors must be selected based on the tire pressure for each tire.

The Pressure Pro product is the most popular stem-mounted system and has been in production for several years. Prior to this year, Pressure Pro and Doran marketed the same system (both companies participated in the development of the system). Because it has been on the market for several years, its track record is well established. The system is robust and reliable.

The Doran 360RV is a brand new system developed by a long-established company with a great deal of tire pressure monitor experience. The system was released for sale in February 2008. It appears to be a very well designed system with a significantly improved owner interface.

Tire-SafeGuard was originally introduced with only the stem mounted sensors. These sensors have a "pass through design" that permits adding air to the tire without removing the sensor. Recently, they have added two different rim mounted (inside the tire) sensor systems.

Saf-Tee tire pressure monitoring system is very new to the RV market. Their website has been constantly changing since late last year. They indicate they have been in the truck tire market for a couple of years, but that cannot be confirmed. Their product design for the RV market does not appear to be finalized according to many posts on the RV forums. They appear to be offering the system at a reduced price for their initial offering, although their website does not have pricing (as of this writing).

SilverLeaf Electronics is best known for their "glass dash" technology. However, they currently offer a tire pressure monitoring system which uses existing sensor systems. They have a proprietary system which translates the wireless information from the sensors into a format that can be displayed on their engine/transmission information display systems. Combining information sources into one display reduces clutter in the dash area and eliminates complicated mounting of several monitors. By the time this article is published, they plan to announce a significant new display technology for tire pressures.

General Thoughts

Purchasing safety systems generally requires a lot of consideration. There are lots of places to spend money in the RV way of life. One has to consider the consequences of a fire or tire failure. In almost every case, one incident would pay for the protective system – often may times over! Indeed, my best customers are folks who have had a fire or damage from a tire failure. In addition, it is impossible to put a value on "peace of mind". The bottom line, is that the RV owner now has many choices for protective systems.

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