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Examining Reported Stolen and Burnt Vehicles: A Multi-Disciplinary Approach

REFERENCES: NFPA 912, A Guide for Fire and Explosion Investigation, 2001 Edition ; A.A. Moenshens, J.E. Starrs, C.E. Henderson, F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, Foundation Press Inc, Westbury N.Y., 1995.

ABSTRACT: Evidence taken from a burnt vehicle can lead to more information than just whether there was an ignitable fluid present. The condition of the engine and transmission prior to the fire and the condition of the ignition and securing systems for the vehicle may all be determined from forensic evidence examinations. The fire investigator can gather the necessary evidence and pass it on to others with specialized training and add to the information base he can obtain from the remains of the burnt vehicle. This may then lead to information regarding the condition of the engine, transmission and the vehicle's security system, which can help in the overall determinations made upon the conclusion of the case.

KEYWORDS: *Forensic ignition examination, arson, insurance fraud, microscopic examination, Key pathway, Lock examinations*

This is the first in a series of articles on reported stolen and burnt vehicles. The other articles will cover each of the specific skill; areas needed to complete the whole case examination. Some of the topics to be covered include origin and cause determination, ignition examination and engine and transmission evaluations.

It is common for a fire investigator to be assigned a case that involves a reported stolen and burnt vehicle. The information that can be realized can include information on the condition of the mechanical operation of the vehicle and the condition of the security systems of the vehicle. The key to obtaining this wider range of information is premised on the inclusion of other specialists in the investigative process.

In most reported stolen and burnt vehicles the key information to be addressed is - Was the vehicle actually stolen? Whether the vehicle was intentionally burnt or not almost becomes secondary in these types of cases. The

use of another specially trained individual to collect evidence regarding the condition of the security systems of the vehicle can be substituted for a fire investigator if the fire is not an issue with the case you are working.

An important concept for the fire investigator or evidence collection person to incorporate into his/her examination practices is to realize that he does not have all of the necessary skills to make an informed determination on the evidence in these other areas. Some of the personnel that have specialized training are in fields such as mechanical and forensic lock evaluation. These are people who are specifically trained in the forensic examination practices in their particular fields.

In this article we shall concentrate on the securing system aspect. The same general concepts that are presented in regards to lock evaluation people holds true with those who possess similar skills in other areas, such as mechanical examinations.

The article is divided into a number of steps. In each of the steps different people are called on to evaluate the evidence and then develop information from the evidence based on their training and experience. It is this co-operation between individuals possessing skills in different fields that produces a determination based on the evidence obtained that allows a complete picture to be seen, not just pieces of the picture. Keep in mind that no one person can be every thing to every body. It is impossible for one person to obtain the necessary skills in all fields. In a Clint Eastwood movie he states " *A man has got to know his limitations*" and this quote holds true with this type of work. The last thing that you want to happen is for an attorney in open court to painfully point out your limitations and in turn have a judge deny you expert witness status.

While we are discussing the experience and training of individuals, it is paramount that who ever works on one of these cases has the proper training and experience in the field they profess to hold special skills and knowledge in. It is imperative to carefully review and verify their resumes. This is the only way to guaranty that their skill level is at the level necessary to be able to qualify in court.

Since some of these cases end up in the court system, it is important to find out how many court cases these individuals have actually testified in, how many times they have been deposed and what type of formal training they have had. It is also extremely important to find out if they were ever denied expert status by a court for any reason.

Whether you use one particular person or not should depend on the outcome of the resume review and the amount of court related experience they have. The time invested in the verification of resumes and background will pay off in the long run in terms of less legal problems with cases. Verification of the resume and background of the technician you plan to use can not be stated strongly enough as a safe guard against unqualified people being given case work and causing problems that could easily be avoided.

The Vehicle Examination

Pre-examination History

As with any investigation gathering as much information on the case prior to the actual examination is helpful. Was the vehicle reported stolen and recovered burnt? Is there anything unusual about this case or was the vehicle found in a deserted area? These are a few of examples of the information that is easily obtainable.

The fire investigator or evidence collection person should become familiar with the type of ignition lock assembly the vehicle had, as well as if there were any electronic systems on the vehicle. The position of the ignition lock may vary with different makes and models and this information is important in the evidence collection stage of the examination.

One of the pieces of information that is important to the ignition systems examination is how many keys exist for this vehicle and is there an after market remote start feature on this vehicle. Whether the vehicle had an electronic anti-theft system and also what type of anti-theft systems were present are also important to the overall ignition systems evaluation.

The pre-examination phase of the case is as important as the vehicle examination. This pre examination phase is what gives the investigator basic knowledge that prevents him from making a costly mistake or missing important potential evidence during the vehicle examination phase.

Vehicle Examination

This article will not go into detail on the fire origin and cause examination. This article is being written to point out the importance of inter-disciplinary efforts

in evaluating a reported stolen and burnt vehicle, for that matter this interdisciplinary approach to investigations works in all types of losses, not only fires or stolen vehicles.

The examination of the burnt vehicle proceeds as any other fire investigation. Use the procedures that have been developed and are published in a number of books and guidelines, such as the N.F.P.A. 921. It is at this point in the investigation that the chance for evidence collection and observations is at hand. If all of the available observations and evidence is not taken at this time, it may never be able to be recovered or documented in the future. The key word at this point in the vehicle examination is diligence.

The observations made as to whether there were items in the vehicle, such as radios, after market items or alarm systems, may not be important to the fire origin and cause determinations but can be important in terms of indications of theft. Whether the vehicle was stolen to obtain the airbags, radio or other components, is one of the potential motives the vehicle examination can address.

These observations are important in the investigation, not only from an origin and cause standpoint but also from a theft standpoint. Were there items missing from the vehicle or was there damage that would indicate security system components being physically bypassed. The importance of the observations made during the vehicle examination can not be overstated. For that reason a check sheet should be used during each vehicle examination. By following a set procedure, such as a procedure guided by a check sheet, an investigator is far less likely to miss something.

Evidence Collection:

Documentation

The documentation of the vehicle and the evidence that is collected is very important. If the documentation of the evidence is not properly done then the evidence may be later disallowed in court. Keep in mind that photographs are the most important component of your report and they are also the least expensive segment of the case.

The chain of custody is also part of the documentation process. Make out separate chain of custody sheets for each separate piece of evidence. There are commercially produced custody sheets available and it is recommended that

whichever sheet you use, make sure that it is completely filled out for each piece of evidence collected. Keep in mind that you must account for the whereabouts of the evidence from the time you collect it until the time the case is finalized. If the chain is broken and there was an unaccountable time frame, then there is a chance that the evidence may be thrown out of court. This disallowed evidence may neutralize your entire case.

Recognition of evidence in a burnt vehicle is a matter of practice and knowledge. The types of evidence that can be obtained from a burnt vehicle can be accelerant samples, melted and burnt ignition lock components, engine oil filter or samples and automatic transmission fluid filter or samples. There may be other pieces of evidence present and collectable but for this article, we will limit our concerns to the partial list mentioned above.

Each of the types of evidence requires different handling techniques and packaging. Again there are reference sources that can detail how to handle the accelerant samples in order to preserve the possibility of chemically testing this sample. The NFPA 921 guideline is one of those references.

Evidence Important to Securing System evaluation

The ignition evidence that is important to the securing systems evaluation can be in the debris on the driver's side front floor or on the steering column. Where the evidence is located depends on the degree of fire damage and other factors. If nothing is left on the steering column, the debris is where the evidence is located. If the fire was less intense, the evidence may still be on the column or partly on the column and partly in the debris on the floor.

The debris that is of most importance is on the driver's side front floor. If the lock components are found on the passenger side front floor then this must be considered a strong indication of the ignition lock having been by passed. In other words, the ignition lock may have been defeated.

The engine oil filter or oil sample and the transmission filter or transmission fluid sample allow the condition of the engine and transmission to be determined. These samples are collected from the engine and transmission located in the engine compartment. There are a number of procedures for the analysis. Which procedure you choose depends solely on the case manager and they're own preferences to the procedure used. The results of these types of analysis is, in general terms, the overall condition of the engine or transmission. For a more specific analysis the

engine or transmission needs to be carefully disassembled and each of the parts examined. As you can image this is a very expensive and time consuming procedure.

Collection practices

To collect the accelerant samples, clean tools are used to cut the sample from the floor, seat or other section of the vehicle where the sample is suspected to be present. The sample is then packaged in a clean metal paint can and sealed. The appropriate labels are applied and the can is then ready to be transported for testing.

The ignition component evidence can be packaged in bags and boxes that are large enough to contain them. Great care needs to be taken to package the evidence in order to prevent the small pieces from falling out of the bags or boxes. Many of the components that need to be examined are small and are easily lost if the packaging is not strong enough to prevent tearing or if it has holes which would allow the contents to fall out. The size and form of this type of evidence can range from a large amount of loose debris to an entire steering column. Due to the differing size and shapes of the evidence the packaging will vary greatly for this evidence, the key to the proper packaging is its strength.

The collection of the engine oil filter or oil sample is very simple. The tools and the training levels of the individual are rather basic. If the filter is removed, it is a simple task of unscrewing the filter. If a sample is taken, simple vacuum pumps can be used to extract the oil sample.

The removal of the transmission filter is very basic in terms of skill levels and tools. The actual process is more difficult in so far as the vehicle must typically be lifted. For the removal of a fluid sample, this can be done with a simple vacuum pump. The packaging of these filters or fluid samples needs to be done using a spill proof container.

Ignition System Examination:

What Can the Evidence Tell Us

The results of the accelerant testing can tell if there is any residue of an ignitable fluid present. Caution needs to be taken in the analysis of this test. Many

factors can affect the test results including time and the degree of weathering the sample was exposed to prior to it's being collected.

The results of the engine and transmission analysis will tell the overall condition of the vehicle's powertrain components. This testing was discussed previously and, as with the accelerant testing, these results are useful in terms of the general condition of the engine or transmission.

The results of the ignition systems evaluation can help the investigation by determining if there is physical evidence of the lock being tampered with, picked or forced. The primary question that is answered is whether the lock was mechanically compromised.

The Ignition Analysis Process

The evaluation process has numerous steps. Each step can at any time find physical evidence of mechanical bypassing of the lock. The first step in the process of ignition evaluation is the physical separation of the useless debris from the ignition systems components. This step is very labor intensive and takes a person who is very familiar with the separate small components that make up these securing systems for each specific vehicle.

Once the components are recovered from the debris the examination of each and every separate piece is conducted. This examination is conducted under moderate magnification to see if there are signs of force having been applied to the components or obvious marks consistent with picking. As mentioned above, the presence of these types of signs or marks would cause this case to be determined that the lock had indications of being mechanically compromised.

Once the previous steps have been passed, the microscopic examination takes place. The internal components of the lock cylinder and the keys are the primary items being microscopically examined. Are there any marks that would indicate picking, tampering or force being applied to the lock cylinder that would indicate a cylinder compromise?

If the keys to the vehicle are available then the keys can be microscopically examined. Whether there are any marks on the keys indicating the keys were used to make another key is one of the questions that can be answered. The examination of the internal lock cylinder components and the keys are the final steps in the evaluation of the securing systems. If there are no marks or indications of the lock

being bypassed then the ignition is determined to have been intact. If there are indications pointing to the lock being picked, tampered with or forced, then the ignition is determined to have been defeated. As with any other type of examination there may be inconclusive determinations due to a lack of some important lock components or due to a severe degree of fire damage.

Who Should Be Doing This Evaluation

The technical skills necessary for this type of examination calls for people with knowledge of vehicle locking systems and the components, mechanical skills and skills in fire investigation. This does not mean to say that the person needs to be a locksmith, but they do need to have a working knowledge of the locks. The major skill necessary is in-depth knowledge of the marks consistent with picking and tampering and the ways that these locks are mechanically bypassed. An understanding of evidence handling and the laws governing evidence as well as a good working knowledge of microscope use are also needed.

Whoever is assigned the task of the collection of the evidence needs to have basic fire investigation training. The basic understanding of the process of fire and how it affects those items it comes in contact with is necessary for the proper recognition and handling of burnt evidence. This basic fire training is even more important when dealing with components from vehicle lock systems. These components are small and the form and shape they take when fire damaged can vary greatly from their original form. Fire training also helps during the evaluation phase of the analysis process. Discerning fire related damage from physical damage dictates the understanding of the effects of heat and fire on different materials. Without at least basic fire training, even a master locksmith can not authoritatively differentiate the two types of damage, fire vs. physical.

Coloration of the Information Obtained:

After all the testing procedures are completed and the results are available, everything is carefully reviewed. The sum of the information obtained from the separate tests is what gives the case manager a more complete picture of what happened in regards to the reported stolen and burnt vehicle.

Does the vehicle have evidence of a securing system compromise? Was the engine and transmission in good or poor condition? Was the fire in the vehicle intentional or accidental? With the answers to these questions the case manager now has the tools necessary to make a well-informed decision. The more

information that the manager can obtain the more likely the proper decision can be made.

One of the uses for this information is in organizing the questions to be asked during the statement under oath that is sometimes taken from the insured. The information can also confirm what the insured gives as the circumstances or indicate that the insured is being less than forthcoming in his statement.

To summarize this article, the use of different skilled people in different areas of the examination gives the case manager more information to work with. The more information available also allows the case manager the tools with which he or she can make a fairer and faster decision on the claim for the insured.

The results of the testing and the weight the results can be given is all predicated on the training, experience and skill level of the person conducting the evaluation of the evidence. Mistakes made during the recognition, collection, handling and evaluation of the evidence may dictate if this evidence is even accepted into court. Remember the best and most powerful evidence in the world does your case no good if it can not be presented to the jury in your court case.