



## National Fire Fighter Near-Miss Reporting System Strut-Related Reports

Report #	Synopsis	Page #
05-519	Vehicle hood strut explodes and injures a firefighter.	2
06-185	Lift strut explodes during vehicle fire.	3
06-215	Bumper strut explodes during vehicle fire training.	5
07-791	Hydraulic strut acts as missile in vehicle fire.	6
07-1045	Engine driver hit in shoulder with strut from auto fire.	8
08-002	Fingertip amputated during extrication training.	9
08-225	Strut BLEVE's during car fire.	10
08-317	Gas strut rockets within inches of firefighter.	11
08-360	Two gas struts explode during vehicle fire training.	12
08-610	Two hood struts fire out of vehicle.	13
09-141	Strut from vehicle fire strikes apparatus.	14
09-142	Strut explodes during extrication training.	16

**Report Number:** 05-519

**Report Date:** 09/17/2005 23:59

**Synopsis:** Vehicle hood strut explodes and injures a firefighter.

**Demographics**

**Department type:** Paid Municipal

**Job or rank:** Captain

**Department shift:** Other

**Age:** 34 - 42

**Years of fire service experience:** 11 - 13

**Region:** FEMA Region IX

**Service Area:** Urban

**Event Information**

**Event type:** Fire emergency event: structure fire, vehicle fire, wildland fire, etc.

**Event date and time:** 07/03/2003 14:00

**Hours into the shift:** 5 - 8

**Event participation:** Involved in the event

**What were the contributing factors?** Situational Awareness

**What do you believe is the loss potential?** Lost time injury and Life threatening injury

**Event Description**

Responded to a report of a vehicle fire. Upon arrival, we found a late model (vehicle make and model deleted) with total engine compartment involvement and involvement into the passenger compartment. After an initial attack, I attempted to release the hood without success from the passenger dash. I then attempted to access the release from under the hood. While on one knee, directly in front of the bumper I heard an explosion. An engine hood strut struck me in the forearm. Luckily, the forearm was up covering my face and neck at that time. The exiting strut hit my arm with great force causing nerve damage to my arm that required an extended time off.

**Lessons Learned**

What I have learned.... I attack all car fires from an angle keeping clear of the bumper and hood. I will continue to wear full protective clothing. I will conduct a risk vs. gain and realize a fully involved car fire does not require that I put myself in harm's way and will not hesitate to cool more, use axes/saws etc. to cut into the hood to extinguish the fire.

**Report Number:** 06-185

**Report Date:** 03/24/2006 16:33

**Synopsis:** Lift strut explodes during vehicle fire.

**Demographics**

**Department type:** Paid Municipal

**Job or rank:** Deputy Chief

**Department shift:** Straight days (8 hour)

**Age:** 43 - 51

**Years of fire service experience:** 14 - 16

**Region:** FEMA Region IX

**Service Area:** Urban

**Event Information**

**Event type:** Fire emergency event: structure fire, vehicle fire, wildland fire, etc.

**Event date and time:** 12/08/2006 16:20

**Hours into the shift:** 5 - 8

**Event participation:** Told to and submitted by safety officer

**Do you think this will happen again?** Uncertain

**What were the contributing factors?** Situational Awareness

**What do you believe is the loss potential?** Property damage

**Event Description**

Incident: December 8th, 2005. 16:19 hrs. reported car fire. EN (number deleted) is dispatched to a car fire in parking lot. LT (number deleted) is clearing a call and offers to respond. LT (number deleted) reports on scene and advises of an engine compartment fire. They don turnouts and attempt to open the hood of the car.

While LT(number deleted) crew is putting on turnouts/SCBA they hear a loud "pop", witness a object explode through the front grill of the car and land approximately 30 feet away. The object is a gas filled lift strut, used to lift hoods, hatchbacks etc.

Fortunately, LT (number deleted) parked to the side of the car and no firefighters were in front of it. This serves as a good reminder to seriously consider the safe placement of resources at all scenes--including apparatus and personnel.

**Lessons Learned**

Car fires are inherently "easy" and "fun" calls. It is possible to become even a bit complacent.

Firefighters should approach cautiously and keep in mind the many hazards that can be encountered while fighting car fires: pressurized containers, struts, bumpers etc., as well as the behavior of these vessels after being exposed to high temperatures.

A few years ago, a firefighter on the East Coast was impaled with a strut in the thigh after it failed.

And as Captain so eloquently put it: "It would have been unfortunate if our boot got skewered-- lots of paperwork". This brings to mind that even though we are all responsible for

our personal safety, the company officer wears many hats on a scene like this--including safety officer.

Again, thanks to Captain (name deleted) for bringing this issue forward. If anyone ever has anything they feel is worthy of sharing with others--please send it forward. Better to learn today than pay for it tomorrow with a significant injury/illness.

**Report Number:** 06-215

**Report Date:** 04/02/2006 23:57

**Synopsis:** Bumper strut explodes during vehicle fire training.

**Demographics**

**Department type:** Paid Municipal

**Job or rank:** Other : Fire Training Officer

**Department shift:** 24 hours on - 24 hours off

**Age:** 25 - 33

**Years of fire service experience:** 11 - 13

**Region:** FEMA Region IX

**Service Area:** Urban

**Event Information**

**Event type:** Training activities: formal training classes, in-station drills, multi-company drills, etc.

**Event date and time:** 03/31/2006 14:00

**Hours into the shift:** 5 - 8

**Event participation:** Witnessed event but not directly involved in the event

**Do you think this will happen again?** Yes

**What were the contributing factors?** Situational Awareness and Training Issue

**What do you believe is the loss potential?** Life threatening injury and Lost time injury

**Event Description**

A group of recruit firefighters was instructed to overhaul a smoldering vehicle while performing training for vehicle fire fighting. The recruits had been taught to only approach a burning vehicle from 45 degree angles. While waiting for a hoseline to be repositioned and others to obtain tools, the group of 5 were staged approximately 15' from the smoldering vehicle at a 45 degree angle. Suddenly a loud explosion was heard and the front right bumper strut shot out. This 5" x 10" piece of metal with a shock welded to the back of it hit some other cars before coming to rest approximately 50-60' away. Fortunately, crews were working from safe angles. This incident further reinforced the need to cool bumpers and other areas containing shocks and struts from a distance. Nobody was injured.

**Lessons Learned**

The incident reinforced the importance of accountability, communications, safety zones at training drills, and proper instruction and supervision throughout the entire drill from set up to going home. All participants in this type of training need to be safely staged at a distance and not enter hazard zones unless properly equipped.

**Report Number:** 07-791

**Report Date:** 03/11/2007 20:39

**Synopsis:** Hydraulic strut acts as missile in vehicle fire.

**Demographics**

**Department type:** Paid Municipal

**Job or rank:** Captain

**Department shift:** 24 hours on - 24 hours off

**Age:** 34 - 42

**Years of fire service experience:** 17 - 20

**Region:** FEMA Region IX

**Service Area:** Suburban

**Event Information**

**Event type:** Fire emergency event: structure fire, vehicle fire, wildland fire, etc.

**Event date and time:** 03/11/2007 15:29

**Hours into the shift:** 5 - 8

**Event participation:** Involved in the event

**Weather at time of event:** Clear and Dry

**Do you think this will happen again?** Yes

**What were the contributing factors?**

- Communication
- Decision Making
- Procedure
- Accountability
- Situational Awareness

**What do you believe is the loss potential?**

- Property damage
- Minor injury
- Life threatening injury
- Lost time injury

**Event Description**

Station A [number deleted], Station B [number deleted], and the BC responded to a vehicle fire with residential exposures. Upon arrival, Eng A found a fully involved vehicle fire with an immediate residential exposure to the west (15-20 feet).

Upon securing a water supply it was noticed that another vehicle (vehicle #2) was positioned between the fully involved vehicle (vehicle #1) and the residential exposure (less than 5 feet).

Vehicle #2 had just started to combust as crosslays were being deployed. As the crosslays were being extended into position, the rescue crew was approaching from the south when a

loud “pop” came from vehicle #1. Multiple “pops” occurred throughout the incident until fire control was obtained.

The rescue crew observed a missile fly through the air and land parallel to the staging of their rescue (approximately 75 yards from the vehicle).

The vehicle fires were declared loss stopped with no damage to the structure.

The missile was retrieved and examined by the on scene crews and turned over to the deputy fire marshal for investigation.

The missile was later identified as the female end of the hood opening strut, which while in the closed position lays horizontal in a forward orientation under the hood. The strut measures 12’ long with a diameter equivalent to that of a nickel coin.

The trajectory of the strut was in direct orientation to that of the front of the vehicle. According to the rescue crew, the strut arced through the air halfway through the flight began to yaw and tumble, reaching a height of approximately seven feet.

No injuries occurred on the fire ground.

### **Lessons Learned**

Knowledge, proper training, and situational awareness need to be emphasized along with proper SOG’s. Firefighter’s respond to vehicle fires regularly; a very common call... Where everything goes as planned... Fire goes out; pick it all up and go home.

But, add numerous exposures, especially a residential exposure, and it is very easy to misalign priorities. This can cause unsafe actions to be taken on the fire scene.

Maintaining distance and remembering the forty-five degree rule, working in teams, keeping up on new vehicle construction and added safety features can help with safe operation while on a vehicle fire scene.

Turnouts are fire resistant and not shrapnel proof. Remember the calculated risk management plan:

- We will risk our lives a lot, in a calculated manner, to save SAVABLE lives.
- We will risk our lives a Little, in a calculated manner, to save SAVABLE property.
- We will not risk our lives at all for lives or property that are already Lost.

**Report Number:** 07-1045

**Report Date:** 09/09/2007 11:50

**Synopsis:** Engine driver hit in shoulder with strut from auto fire.

### **Demographics**

**Department type:** Combination, Mostly paid

**Job or rank:** Driver / Engineer

**Department shift:** 24 hours on - 48 hours off

**Age:** 25 - 33

**Years of fire service experience:** 7 - 10

**Region:** FEMA Region V

**Service Area:** Suburban

### **Event Information**

**Event type:** Fire emergency event: structure fire, vehicle fire, wildland fire, etc.

**Event date and time:** 09/08/2007 16:55

**Hours into the shift:** 9 - 12

**Event participation:** Involved in the event

**Weather at time of event:** Clear and Dry

**Do you think this will happen again?**

**What were the contributing factors?** Other

**What do you believe is the loss potential?** Life threatening injury

### **Event Description**

As the engine crew arrived at a car fire, I stopped the engine about 75 feet from the fire that seemed to be consuming the entire engine compartment. I am unsure because the hood was still closed, but the smoke was dark and heavy. I assisted the crew with pulling a 1 3/4" pre-connect and as I was flaking the hose, facing away from the vehicle, I felt like someone punched me in the left shoulder. Just before this, there were a couple of pops that came from the vehicle. I looked and saw that there was a burn mark on my shirt. After supplying water and the fire was under control, a police officer said that he saw something fly from the vehicle and it traveled about 150'-175'. The officer said that he saw it go by me, but didn't know that it hit me. After searching, one of the officers found a gas strut cylinder from the hood of the vehicle that was on fire. We are not sure of its path of travel out of the car, but that is what grazed my shoulder and then traveled another 100' or so and broke the windshield of a minivan.

### **Lessons Learned**

The lessons that we learned are to expect anything and do your best to stay away from the front of a vehicle on fire. During discussion, we also agreed that before prying the front of a hood of a vehicle on fire, consider prying from the sides, and get water on the fire first. I don't think that the situation can be corrected, but I can say that I was lucky.

**Report Number:** 08-002

**Report Date:** 01/01/2008 21:26

**Synopsis:** Fingertip amputated during extrication training.

**Demographics**

**Department type:** Combination, Mostly volunteer

**Job or rank:** Lieutenant

**Department shift:** Other

**Age:** 52 - 60

**Years of fire service experience:** 30+

**Region:** FEMA Region V

**Service Area:** Rural

**Event Information**

**Event type:** Training activities: formal training classes, in-station drills, multi-company drills, etc.

**Event date and time:** 08/04/2007 09:45

**Hours into the shift:**

**Event participation:** Involved in the event

**Weather at time of event:** Clear and Dry

**What were the contributing factors?** Situational Awareness and Human Error

**What do you believe is the loss potential?** Lost time injury

**Event Description**

During department extrication training, I was setting up [strut name withheld] Stabilization Struts to stabilize a vehicle on its side. I extended the [strut] with my left hand. When it was fully extended I looked to see where the "locking pin" had been laid - - when I did the [strut] slipped out of my left hand and collapsed into its self. When it collapsed, the long finger of my right hand was inadvertently in the hole where the pin is supposed to go. The entire fingerprint area was amputated but missed the bone. In the E.R. talking with the doctor, he mentioned that it was probably a good thing I did not have any gloves on because it was a very clean / straight cut without jagged edges making it easier to re-attach to my finger. He also mentioned that if I would have had on "extrication" type gloves it probably would have jammed the [strut] and I would have had them on my lap as I was riding to the hospital in the ambulance to have it removed in the ER. With the best healing the doctor has ever seen in this type of accident, I was back on duty ten weeks later.

**Lessons Learned**

I feel that the [strut] needs a small design change to prevent this from happening again.

**Report Number:** 08-225

**Report Date:** 05/07/2008 1030

**Synopsis:** Strut BLEVE's during car fire.

**Demographics**

**Department type:** Combination, Mostly volunteer

**Job or rank:** Lieutenant

**Department shift:** Other : 24 on, 48 off, 24 on, 96 off

**Age:** 34 - 42

**Years of fire service experience:** 14 - 16

**Region:** FEMA Region I

**Service Area:** Suburban

**Event Information**

**Event type:** Fire emergency event: structure fire, vehicle fire, wildland fire, etc.

**Event date and time:** 08/15/2007 0000

**Hours into the shift:**

**Event participation:** Involved in the event

**Weather at time of event:** Clear and Dry

**What were the contributing factors?** Situational Awareness

**What do you believe is the loss potential?** Life threatening injury

**Event Description**

At 1008 units were dispatched to a car fire with an exposure to a residence. Upon arrival, units found a fully involved Jeep Cherokee approximately 10 feet from a residence and the fire was confined to the vehicle. The response included an engine with two personnel, a tanker with two personnel and a Chief. A 1 ¾ inch handline was stretched, the exposure was cooled and the vehicle fire was extinguished without incident. During the investigation of the fire, a ruptured strut from the rear hatch was found approximately 40 feet from the vehicle. The strut had landed on the front lawn and had started a small fire in the grass. It was determined that prior to the fire department arrival the strut BLEVE and flew from the vehicle. The rear hatch of this vehicle is a composite material and was totally consumed at the time of arrival of the engine. It is unknown if the strut flew from the vehicle up through the rear window or out through a side window.

**Lessons Learned**

This incident reinforces the need to be aware of your surroundings and potential hazards at incidents. Firefighters must be aware of the various high pressure cylinders that are found in a vehicle that can rupture during a vehicle fire. The fire attack must be made with consideration to the direction these cylinders may travel if they rupture.

The cylinder of this hatch strut flared out with sharp edges when it BLEVE'd and it was hot enough to start a small fire when it landed on the lawn. If this strut had struck a firefighter there could have been severe traumatic as well as heat injuries. This event stresses the need for all personnel operating on the fireground to be wearing full protective clothing. If this strut had ruptured after the fire department arrival on scene, back-up personnel could have been injured due to the distance the strut traveled.

**Report Number:** 08-317

**Report Date:** 06/30/2008 16:29

**Synopsis:** Gas strut rockets within inches of firefighter.

**Demographics**

**Department type:** Combination, Mostly paid

**Job or rank:** Fire Chief

**Department shift:** 24 hours on - 24 hours off

**Age:** 34 - 42

**Years of fire service experience:** 21 - 23

**Region:** FEMA Region VII

**Service Area:** Suburban

**Event Information**

**Event type:** Fire emergency event: structure fire, vehicle fire, wildland fire, etc.

**Event date and time:** 03/01/2008 20:30

**Hours into the shift:**

**Event participation:** Involved in the event

**Weather at time of event:** Clear with Wet Surfaces

**What were the contributing factors?** Unknown

**What do you believe is the loss potential?** Life threatening injury

**Event Description**

We responded to a vehicle fire at approximately 20:30 hours. It was a dark, cool, crisp evening. We arrived on scene to find a Jeep Cherokee nose to a garage door of a single family residence. The engine compartment was fully involved with heavy fire exposed to house and interior of vehicle. The rear hatch of car was open. The engine company arrived and attacked engine and garage first. I was walking approximately 20' to rear of the vehicle when the heat of fire caused the gas strut on rear hatch to rocket within 12" of my head, and it went through the door of the fire truck.

**Lessons Learned**

I learned about paying closer attention to those gas cylinders in an emergency.

**Report Number:** 08-360

**Report Date:** 07/30/2008 20:41

**Synopsis:** Two gas struts explode during vehicle fire training.

**Demographics**

**Department type:** Training Academy

**Job or rank:** Training Officer

**Age:** 34 - 42

**Years of fire service experience:** 17 - 20

**Region:** FEMA Region III

**Service Area:** Suburban

**Event Information**

**Event type:** Training activities: formal training classes, in-station drills, multi-company drills, etc.

**Event date and time:** 07/26/2008 14:30

**Event participation:** Told of event, but neither involved nor witnessed event

**Weather at time of event:** Clear and Dry

**What were the contributing factors?** Training Issue, Situational Awareness and Procedure

**What do you believe is the loss potential?** Lost time injury, Minor injury and Life threatening injury

**Event Description**

During a live vehicle fire training event at the county fire training grounds, two gas struts exploded sending a projectile approximately 95 feet from the vehicles being used for the training. As the lead instructor, I was working with other students and heard what sounded like tires exploding. At the actual location of the incident, there were two state certified suppression instructors conducting this portion of the training session. At the conclusion of the training I met with the other instructors to investigate the explosions. We found a piece of the strut that holds the rear hatch of a mini van located behind the engine approximately 95 feet from the training vehicle. We looked into the vehicle and found the remains of the other two struts lying in the debris left over from the fire session. Original prep of the vehicles included removal of the fuel tanks and other flammable items. The struts were overlooked. The potential for injury was extensive. However, the proper accountability of the students in the staging area and the students paying attention to the training avoided fire fighters being located in an area of danger.

**Lessons Learned**

When conducting live fire training using vehicles, inspection of the vehicles must be performed prior to setting any fires. During this inspection ensure all gas struts and other potential BLEVE items are removed in addition to the fuel tanks. Locate staging and rehab areas a safe distance from the vehicle (minimum of 200 feet) if applicable. Maintain constant accountability of all students during training sessions to ensure student do not venture into potentially dangerous locations.

**Report Number:** 08-610

**Report Date:** 11/21/2008 09:24

**Synopsis:** Two hood struts fire out of vehicle.

**Demographics**

**Department type:** Combination, Mostly volunteer

**Job or rank:** Fire Chief

**Department shift:** Respond from home

**Age:** 43 - 51

**Years of fire service experience:** 27 - 30

**Region:** FEMA Region I

**Service Area:** Suburban

**Event Information**

**Event type:** Fire emergency event: structure fire, vehicle fire, wildland fire, etc.

**Event date and time:** 11/09/2008 17:00

**Event participation:** Told of event, but neither involved nor witnessed event

**Weather at time of event:** Clear and Dry

**What do you believe is the loss potential?** Minor injury, Lost time injury and Life threatening injury

**Event Description**

Brackets [] denote reviewer de-identification.

On Sunday, November 9th, at 17:00, [name deleted] fire department was dispatched to a vehicle fire at a senior housing complex. Upon arrival, the Chief noted a vehicle fire. The engine compartment was well involved with extension to the passenger compartment. Several attempts were made by on scene personnel to extinguish the blaze before the fire department arrived due to the close proximity of the fire to a nearby structure. Police, fire, and the homeowner all attempted to quell the fire with extinguishers directed through the front side of the vehicle. Engine [1], first on scene, arrived and deployed a 1-3/4 attack line. Second due was water supply. There were two personnel on the line and a third was working the hood to gain access. As in most vehicle fires, there were pops, hisses, booms, and bangs, as most of the components of the vehicle began to fail. It was noted after extinguishment that the two hood struts had fired out of the front of the vehicle and buried themselves 12 inches into the ground. We assume that this occurred prior to the opening of the hood based on the angle of the strut in the ground. A major safety concern was that there were several attempts to extinguish the fire from the front area of the vehicle prior to our arrival. Even after we were on scene, the threat for serious injury was huge. This is a true case of "Good intentions having Bad results."

[Reviewer's Note: Pictures for the report have been posted on the Resources Page.]

**Lessons Learned**

All vehicles involved in fire have hazards. Never let your guard down!

**Report Number:** 09-141

**Report Date:** 02/06/2009 11:21

**Synopsis:** Strut from vehicle fire strikes apparatus.

**Demographics**

**Department type:** Training Academy

**Job or rank:** Assistant Chief

**Department shift:** Straight days (8 hour)

**Age:** 43 - 51

**Years of fire service experience:** 24 - 26

**Region:** FEMA Region V

**Service Area:** Suburban

**Event Information**

**Event type:** Training activities: formal training classes, in-station drills, multi-company drills, etc.

**Event date and time:** 08/21/2007 13:00

**Hours into the shift:**

**Event participation:** Told of event, but neither involved nor witnessed event

**Weather at time of event:** Clear and Dry

**What were the contributing factors?**

- Accountability
- Equipment
- Human Error
- SOP / SOG
- Situational Awareness

**What do you believe is the loss potential?**

- Minor injury
- Property damage
- Lost time injury
- Life threatening injury

**Event Description**

During a live vehicle fire training exercise, a strut from one of the vehicles became a projectile, striking and damaging a tire on the engine. The pump operator was only two feet away at the time and could have easily been impaled by or struck by the strut causing either death or a serious injury.

**Lessons Learned**

Follow standard operating procedures and basic safe practices. Review common hazards associated with vehicle fires prior to conducting the training. Insure that vehicles are properly prepared for the specific training being conducted. Never assume that someone else has done

your job. Additionally, anyone working within the hot zone should be wearing the appropriate PPE for his or her job.

**Report Number:** 09-142

**Report Date:** 02/06/2009 11:24

**Synopsis:** Strut explodes during extrication training.

**Demographics**

**Department type:** Training Academy

**Job or rank:** Other : Training Supervisor

**Department shift:** Straight days (8 hour)

**Age:** 43 - 51

**Years of fire service experience:** 30+

**Region:** FEMA Region V

**Service Area:** Suburban

**Event Information**

**Event type:** Training activities: formal training classes, in-station drills, multi-company drills, etc.

**Event date and time:** 07/15/2006 14:00

**Event participation:** Witnessed event but not directly involved in the event

**Weather at time of event:** Clear and Dry

**What were the contributing factors?** Human Error

**What do you believe is the loss potential?** Property damage and Lost time injury

**Event Description**

Squared brackets [] denote reviewer de-identification

The incident occurred during an auto extrication training session held at the [fire academy]. The instructor to student ratio for the hands on training is 1 to 5, with a safety officer.

The students had finished their classroom portion and reported to the training pad for the hands on. The cars used are delivered fully ready to go. The batteries are removed and all struts and other devices that will harm the instructors and students are removed.

Today the instructors did not do their walk around checking the safety of the cars and a strut was missed. As the training proceeded, the strut was cut and exploded. This launched the rod past a group of the students. None was injured, but the group did stop work and did the walk around they should have.

**Lessons Learned**

Have the instructors and students double check the vehicles for the dangers that were taught in the classroom portion of the training.