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Figure 1: Burn pattern from engine backfiring

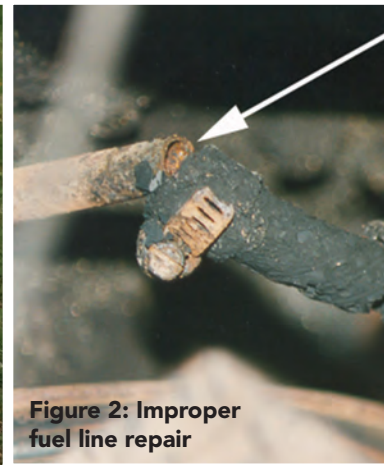


Figure 2: Improper fuel line repair



Figure 3: Chafed wiring

Antique Vehicle Fire Losses

By Charles C. Roberts, Jr., Ph.D., P.E.

SOME ANTIQUE VEHICLES CAN BE very pricey, in the area of six figures, depending on the rarity and the degree of restoration. Fires that occur in these types of vehicles will often cause severe damage or a total loss of the vehicle. Typical fire causation in antique vehicles is not similar to that of modern vehicles. Antique vehicles are equipped with carburetors that can cause fires from fuel leakage and backfiring. Improper replacement of critical components can cause fires. Old or replaced wiring is also a possible ignition source for antique vehicle fires. The following case studies illustrate what one can expect when analyzing a fire in an antique vehicle.

Figure 1 shows a burn pattern on a 1956 Chevrolet that was a result of backfiring.

This is the condition when the fuel/air mixture is ignited when the intake valve is open, resulting in fuel and flame being ejected into the air filter housing. A fire typically spreads throughout the engine compartment, causing severe damage. Backfiring is a result of an ignition problem, either because of a lack of maintenance or an improper tune-up of the vehicle. If an automotive shop had tuned up the vehicle recently, then they may be responsible for the deficiencies in tuning the vehicle and the backfiring.

Figure 2 is an example of improper fuel line repair. It is known that when some mechanics are working on an antique vehicle that certain parts may not be available and a substitution is made.

This vehicle had fuel leakage from a fuel line that caused a fire. Rather than replace the whole assembly, the fuel line was cut while work was being performed on the carburetor so that the carburetor fuel fitting could be easily removed. A rubber hose was used to reconnect the fuel lines after the carburetor repair. This eventually began to leak because of the jagged edge of the old fuel line and the high temperatures in the engine compartment. The leaking fuel was ignited causing severe damage to the vehicle. This is a result of improper fuel line repair.

Figure 3 shows a loose wire that had rubbed against a metal tube, causing a short circuit and fire. When this vehicle

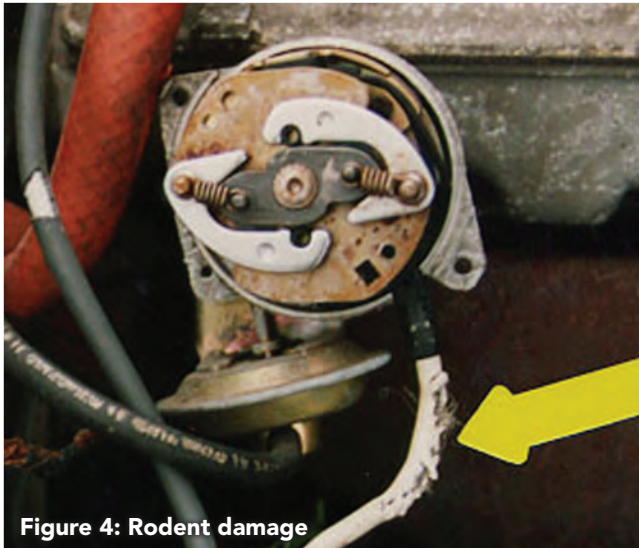


Figure 4: Rodent damage



Figure 5: Deteriorated cloth wiring



Figure 6: Engine oil leakage

was designed, proper wiring techniques had not been standardized, resulting in a variety of methods in securing wiring. Consequently, when a vehicle is rewired due to deterioration of the original wiring, attention to wire chaffing may not have been an ingredient in the repair. This wire was improperly secured, rubbed against the metal tube as a result of engine vibration, the insulation wore off and the wire short-circuited, causing the fire.

Antique vehicles are often stored for a period of time, especially during the winter months. Rodents can set up a home in the vehicle and chew on wiring as shown in Figure 4. It is often theorized that the rodents like the plasticizers in the polymer wiring, which encourages chewing, resulting in damage to the wiring. Since the electrical insulation has been removed, this can cause electrical faults through the development of a short circuit, resulting in a fire.

Many antique vehicles are still equipped with cloth wire insulation as shown in Figure 5. This wiring may not be replaced when the vehicle is restored, as doing so diminishes the original value of the

“ A fire typically spreads throughout the engine compartment, causing severe damage. ”

vehicle. The cloth wiring can deteriorate over time, resulting in a loss of electrical insulation, a short circuit and possible fire.

Engine oil leakage onto hot engine components is a cause of fires in antique vehicles. Antique vehicles often have element-type oil filters encased in a canister as shown in Figure 6. Oil leakage from these units can be a result of canister oil seal deterioration or improper replacement of the filter element.

Fire causation in antique vehicles differs from that in modern vehicles

because of the older technology. For instance, with the advent of fuel injection, carburetor-related fires do not manifest themselves in modern vehicles but do in antique vehicles. Fewer automotive

mechanics are knowledgeable with respect to repairing antique vehicles, which can result in an improper repair causing a fire. This article presented case studies on what to expect when investigating antique automotive vehicle fires.

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