

CASE REPORT

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Determination of Cause of Damage to an Automobile

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ABSTRACT: Two cases in which there was unusual damage sustained by vehicles during a collision sequence are presented and discussed. The specific causes of the vehicular damage are identified, and the relationship between the analysis of the damage and the stated sequence of events is presented. An accurate understanding of the actual events that occurred in the collision sequences was obtained through the photographic and collision deformation analyses conducted.

KEYWORDS: criminalistics, automobiles, collision research, vehicular damage, collision deformation, photographic analysis

The ability to identify or determine the specific cause of damage to an automobile is often important to determine the actual sequence of events that occurred and the behavior of the various parties involved in a collision. Two cases are presented in which an analysis of photographic records of vehicular damage, in conjunction with that of the area in which the collision occurred, was used to identify what transpired during the collision sequence.

Case 1

Circumstances Surrounding the Analysis

A private automobile being chased by a police patrol car for a speeding violation was reportedly rammed by the driver into the police vehicle at two separate points during the chase sequence. To determine the actual actions of the separate parties during the chase, it was necessary to analyze and determine the cause of the damage sustained by the two vehicles.

The police vehicle was a 1977 four-door Dodge passenger sedan, and the other vehicle was a 1964 two-door Ford hardtop. The reported contacts between the vehicles was: first the patrol car being "rammed in the front" by the left (that is, driver's) side of the Ford on the lawn of a private residence and, then, the front of the Ford striking the patrol car on the left front side, while both vehicles were travelling through a peach orchard. The primary analysis in this case consisted of comparing the photographically documented damage to the vehicles (and an ac-

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tual inspection of one of the vehicles), an inspection of the area where the collision reported occurred, and identifying the unique damage causing potential of the area.

Damage to Vehicles

Figures 1, 2, and 3 show, respectively, the front, left front corner, and left rear side of the patrol car. Representative areas that were damaged on this vehicle can be seen in these figures. Details of the damage sustained at the left front turn signal lens (Fig. 2) and along the left side rear quarter panel (Fig. 3) are also visible. The damaged areas on the vehicle all are linear surface scratches, thin indentations of irregular shape, or points of spot or localized damage. It



FIG. 1—Front of the police patrol vehicle.



FIG. 2—Left (driver's side) front corner of patrol vehicle.

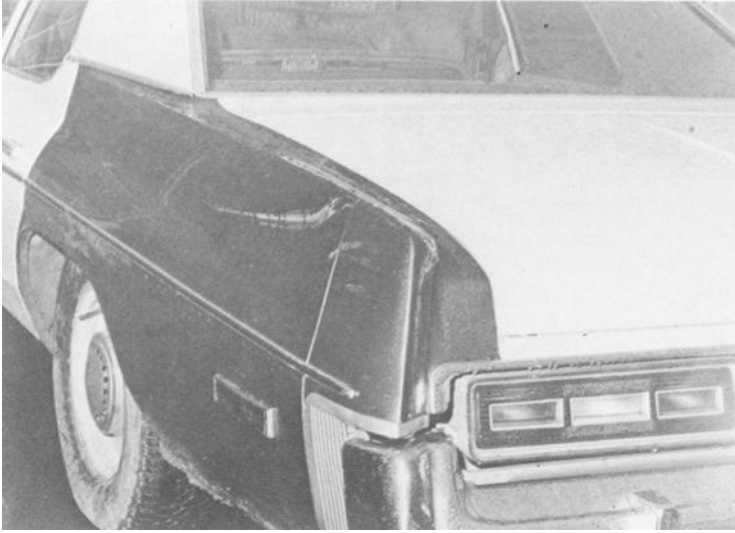


FIG. 3—*Left rear of patrol vehicle.*

can also be seen in Figs. 1 and 2 that there was no damage sustained by the front bumper or grill of the vehicle, even in the area of, and extending in front of, the signal housing.

A similar type of damage was sustained by the Ford. Figures 4 and 5 show the front and right (that is, passenger) side of the vehicle. Again narrow, longitudinal indentations were present on the vehicle, and there was no front end damage to the vehicle, aside from that at the corners which showed the characteristics described.

Neither vehicle, therefore, displayed the type of damage that would be consistent with the reported vehicular contacts, nor were there any other indicators (for example, paint transfer between vehicles) of direct collision contact between them.

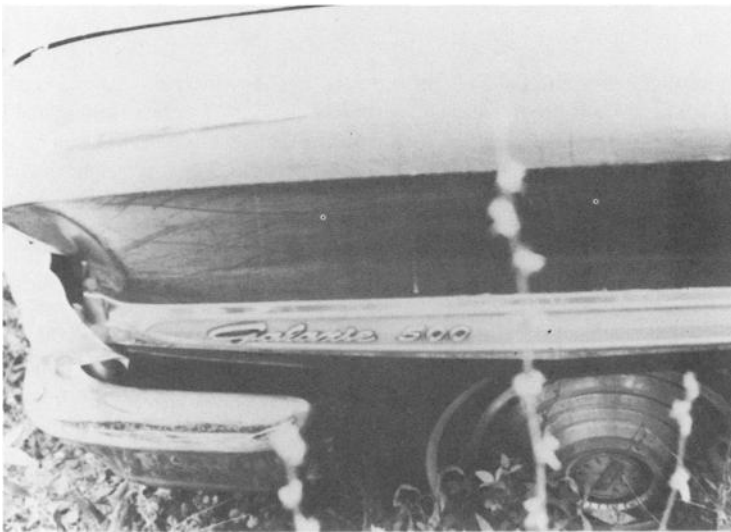


FIG. 4—*Front of Ford.*



FIG. 5—Left (driver's) side of Ford.

The Chase Area

A portion of the area where the chase of the Ford by the patrol car occurred is presented in Figs. 6 and 7. The rows of peach trees and relatively clear aisles between them can be seen in Fig. 6, and the nature and configuration of the pruned limbs of a typical tree can be seen in Fig. 7. The solid and wedge shaped edges of some of the cut branches, the height of the branches above the ground, and their extension into the aisles can be seen.

Analysis

A comparison of the height of the pruned tree limbs and of the scratches on the Ford and on the Dodge (through their photographic images) indicated that all were located in the same height range above the ground surface. Therefore by relating the nature, location, and details of the damage to both the Dodge patrol car and the Ford and the physical features of the environment in which the chase occurred, it became evident that the damage sustained by both vehicles was caused by coming into contact with branches of the peach trees while the vehicles were moving through the orchard; there were no collisions between the vehicles, as had been reported.



FIG. 6—*Typical section of peach orchard.*



FIG. 7—*Representative tree in orchard.*

Case 2

Circumstances Surrounding the Analysis

Two vehicles travelling on an interstate highway, with three lanes in the direction of travel, were reportedly involved in an accident. From the statements of the drivers of the vehicles (there were no witnesses), it was unclear what had occurred. The position of the vehicles on the

roadway, the movement of the vehicles, and their condition at times during the accident could not be determined solely from the drivers' statements. One of the vehicles involved was a 1977 Pacer passenger vehicle, and the other was a 1972 Chevrolet truck with a "step-van" type body, and a hydraulic chain secured, rear liftgate installed. From the statements taken at the accident scene, it was determined that the truck was in front of the automobile.

Damage to the Vehicles

The passenger automobile sustained somewhat unusual damage. Figure 8 shows the front, or damaged portion, of the vehicle. The engine compartment hood had been detached from the vehicle as a result of the collision, there was distributed front end damage and deformation, and an unique tear along the left front fender. This damage was coded, according to the Society of Automotive Engineers Recommended Practice J224a as: 01FLMA3.² The last two coding digits specifically represent the fender damage (that is, A, damage caused by an overhanging object, and 3, the depth, or extent of the tear). The damage to the fender seems to have been caused by a thin object.

Photographs of the specific truck involved in the collision were not available, although photographs of similar vehicles were utilized in the analysis. The driver of the truck initially felt a "bump," heard a "noise," and then his truck turned out of his control. It was also stated that after the truck came to rest, the liftgate was partially on the ground and partially raised at an angle.

Analysis

The damage sustained by the Pacer automobile is consistent with it having been caused by the liftgate of the truck in a lowered, or partially lowered, position. The direction of the force causing the damage came from the right of straight ahead (that is, the 01 direction in the defor-

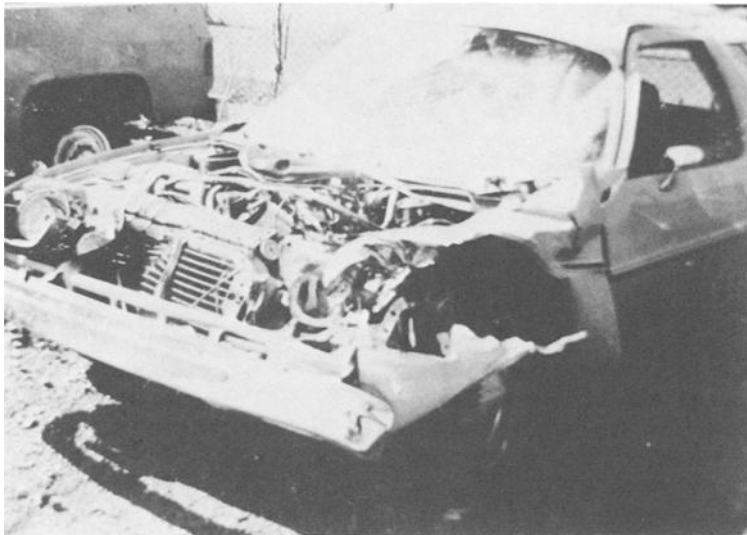


FIG. 8—Damage sustained by Pacer automobile.

²This Recommended Practice, Collision Deformation Classification, presently in version J224Mar80, provides for an identification and classification of collision sustained damage in terms of a seven-unit alphanumeric code. The code represents direct contact damage as opposed to collision induced deformation.

mation coding). The photographic analysis of the damage, therefore, has provided a basis from which to determine the relative position of the two vehicles with respect to each other, and thereby, with respect to the different lanes of travel. The analysis of the forces causing the damage to the Pacer, objects applying them, and the direction of their application has also shown that it is likely that the liftgate of the truck was in a lowered position before the collision, rather than having been lowered as a result of the collision. The chain securing the liftgate in the upright position, therefore, probably failed before, rather than a result of, the collision between the vehicles.

The probable sequence of events, therefore, was: the initial failure of the chain on the liftgate, which initiated the loss of control of the truck; then the collision between the Pacer automobile and the raised portion of the liftgate.

Conclusion

The detailed analysis of the specific cause of damage to an automobile involved in a collision, or a collision-like situation, is often important to determine the actual events or the sequence of events that occurred. Photographs of the vehicle(s) and of the area can often be used to analyse specific damage and reasonably determine what had occurred.

Bibliography

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