

REC Newsnote #7

Air Bags: Expected Impact of this Safety Equipment on Fire Suppression Vehicles

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In Model Year 1994, some models of light duty* trucks included driver's side air bags.** Some Northeast Agencies were concerned about potential inadvertent deployment of these air bags in off road situations. Also, the construction of brush guarding and addition of heavy duty bumpers could effect the integrity of these frontal impact safety systems. This report answers five questions about this topic.

Which vehicles currently have air bags or will likely have them in the future?

Where are the sensors located and how are they activated?

Will a vehicle still operate if a bag deploys inadvertently?

Who is authorized to reload an air bag that has been deployed?

Can front bumpers be replaced with heavier models and brush protection?

The Roscommon Equipment Center requested information from the three major U.S. based light duty truck manufacturers. General Motors and the Ford Motor Company did not reply. Chrysler Corporation did reply, although there was an indication that concerns for liability and proprietary information might limit the response. Additionally, we obtained service manuals for the Chrysler and Ford trucks that currently have air bags. Most of the information contained within this report was constructed from Chrysler's written response and a telephone conversation with a company representative. We believe this information can be generalized to other manufacturers.

What Trucks Will This Affect?

Some model year 1994 Dodge and Ford light duty vehicles come with air bags. Regulations require air bags on vehicles rated at 8,500 lbs. gross vehicle weight rating (GVWR) or less by model year 1995. All the trucks with this body style utilize the same steering wheels, dash and body components. If all like vehicles have the same components, it normally simplifies the manufacturing process. Hence, agencies should expect that all light duty trucks will have these systems in the next few years. Federal regulations and company marketing decisions change regularly and agencies will need to inquire about the availability of these safety systems each model year.

How Does the System Work?

Normally there are one to five sensors that trigger air bag inflation. They are usually located under the hood. Placement varies by vehicle. Vehicle deceleration triggers the sensors that deploy the air bag. A front impact with approximately 40 to 50 G's*** of deceleration will trigger deployment. The sensors send an electronic signal to the air bag module that triggers inflation. Sodium azide, a chemical sealed in the inflation unit, chemically reacts to produce nitrogen gas. This gas inflates the bag. Inflation takes about 1/20 of a second.

Forward deceleration is the only measurement used to activate the system. Side impacts or rear impacts will not deploy the air bags unless the event also includes the required level of deceleration from the front. These sensors are designed to discriminate between significant and minor collisions. According to Chrysler, the systems have been tested extensively to make sure they do not deploy inadvertently when used off road, on rough roads, or when plowing snow.

Can You Drive a Vehicle After Deployment?

If a vehicle's air bag deploys as intended, damage to the vehicle will likely be significant and its usefulness for that day will be done. If inadvertent deployment occurs, the bag can be tucked back inside the steering wheel hub trim cover and carefully driven. Note that if a vehicle is damaged in a crash and the air bag does not deploy, the electrical system might be damaged making the system susceptible to unwanted deployment. The battery cables can be disconnected to avoid further damage to the system.

Who Can Reload the Air Bag?

Reinstalling the air bag could be done by agency shops or personnel. Each individual agency must assess the need and cost for training its shop personnel to reinstall these devices. Parts availability at each shop location should be part of the assessment. To date there is no evidence that inadvertent deployment will be common. Inflated air bag modules are hazardous waste. If the vehicle is severely damaged and the bag did not deploy, it should be deployed by a dealer or trained technician prior to vehicle repair.

Can You Add Heavy Duty Bumpers and Brush Guards to these Vehicles?

In Dodge trucks there are two impact sensors; one located on each inner fender extension behind the grill opening reinforcement. A safing sensor is located in the steering wheel air bag module. The Ford F-Series trucks have two impact sensors; one on the radiator support and one on the right frame rail well under the cab. The safing sensor for Ford trucks is located under the hood on the right side cowl. None of these locations should hinder the addition of heavy duty bumpers, grills or limb risers. Since the sensors measure deceleration, not deformation of the vehicle due to impact, heavy duty bumpers will not affect proper deployment.

Before designing and mounting brush protection or bumpers, check the vehicle's service manual. The manual will show sensor and wire locations. Make sure the design does not interfere with or damage these components.

Summary

Air bag systems are currently on some 1994 light duty truck models. Within the next few years it is likely that all light duty trucks being produced will have air bag systems. Forward deceleration of approximately 40-50 G's triggers sensors that deploy the air bag. Manufacturers have tested the system off road and with snow plows. Inadvertent deployment is not likely based on these tests. If inadvertent deployment occurs, the driver can tuck the air bag back into the steering wheel hub cover and continue on. An agency shop could reinstall the air bag, although we believe that the need for this will be rare. Some training and a service manual will be necessary for the agency shops to perform this task. Since the sensors work on deceleration and are normally located "under the hood", adding reinforced bumpers, grill guards, and limb risers should not interfere with air bag systems. Check the vehicle's service manual for sensor location to make sure that user added equipment does not interfere with a sensor.

References

1994 RAM Truck 1500-3500 Service Manual. Chrysler Corporation 1993.
Air Bag Systems in Your Car. "What the Public Needs to Know". SAE J2074. SAE International 1993.
Ford 1994. Econoline, F-150, F-250, F-350, Bronco and F-Super Duty Body/Chassis Service Manual.
Ford Motor Company 1993.
Personal Communication. Chrysler Corporation. April 4, 1994.

** Light duty trucks are those normally associated with the "pickup" truck style. The smaller light duty trucks usually have cargo boxes and single rear wheels. These vehicles are available as chassis or dual wheel trucks also, normally up to 12,000 or 13,000 GVWR.*

*** Air bag is the common name for an inflatable restraint system.*

**** A "G" is a unit of force equal to that exerted by gravity on a body at rest. It is used to indicate the force the body is subjected to when accelerated (decelerated).*