

H-184

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: May 17, 1979

-----  
Forwarded to:

Honorable Joan Claybrook  
Administrator  
National Highway Traffic Safety  
Administration  
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

H-79-27 and -28

-----

About 3:30 p.m. on August 22, 1978, an ambulance responding to an emergency call and traveling at a calculated speed of 90 to 95 mph failed to negotiate a curve on New Hampshire State Route 116 east of Littleton, New Hampshire, and rolled over. Two persons in the ambulance were killed and the driver was injured. 1/

The ambulance was a modified 1974 Chevrolet Suburban Custom 10, VIN CCY 164F127588, owned and operated by the Ross Ambulance Service of Littleton. It was originally manufactured as a multipurpose passenger vehicle with a gross vehicle weight rating (GVWR) 2/ of 5,400 pounds. The vehicle was later modified by Yankee Coach, Inc., to be used as an ambulance. Ownership passed from Yankee Coach, Inc., to the Ludlow (Massachusetts) Fire Department, and finally on March 3, 1978, to the Ross Ambulance Service. At the time of the accident, the vehicle, including the driver and three passengers, weighed 6,930 pounds--3,800 pounds (55 percent) on the rear axle and 3,130 pounds (45 percent) on the front axle. This total weight was 1,530 pounds (28 percent) over the original gross vehicle weight rating.

The exterior modifications to the accident vehicle included the installation of a custom, reinforced and insulated fiberglass roof cap, extending the full width and length of the roof, to provide 54 inches of headroom in the rear compartment, and the installation of a metal step

1/ For more detailed information, read "Highway Accident Report--Ross Ambulance Service, Ambulance Overturn, State Route 116, Littleton, New Hampshire, August 22, 1978" (NTSB-HAR-79-4).

2/ Gross vehicle weight rating is determined by the manufacturer in establishing the maximum capacity of the vehicle and is the total weight of the chassis, body, and payload. (Motor Truck Engineering Handbook, James N. Fitch, p. 24.)

installed below the bumper across the rear of the vehicle, attached to the chassis by angle iron brackets. Interior modifications included the installation of a vinyl-linoleum-covered plywood floor panel set on 2-by 4-inch stringers, unsecured to the vehicle's metal floor; a plywood partition with sliding plexiglass panels installed between the driver's compartment and the rear compartment, to which a rearfacing bench seat and a jump kit rack were attached; a squad bench along the right side of the rear compartment; and cabinets, to which the stretcher clamp-rail was attached, along the left side of the rear compartment. Two portable oxygen bottles were secured in the upper left corner of the rear compartment. The partition, benches, and cabinets were secured to the vehicle sidewalls by means of "L" brackets. These components rested on but were not attached to the plywood or metal floor.

The postcrash inspection of the ambulance indicated that the fiberglass rooftop cap had shattered and separated completely from the body; all the glass was missing except the vent panel in the right front door and the left rear window glass between pillars C and D. The left front door was operable though severely buckled. The left side rear door and both right doors were jammed shut. The rear access doors were open and deformed.

The interior of the ambulance body was severely damaged. The flooring, oxygen bottles, litter, cabinets, and bench were either destroyed or ejected from the ambulance. Because the plywood flooring was not secured to the floor or chassis, everything attached to or resting on it came loose when the ambulance rolled over. All body structures were deformed downward and to the right.

A review of the Federal Motor Vehicle Safety Standards (FMVSS) revealed that there are no standards or specifications which assure that the total design and construction of ambulances as modified by the after-market installers are of sufficient structural strength and stability to withstand impact forces similar to requirements imposed on the original vehicle manufacturer. FMVSS 208, "Occupant Crash Protection in Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses," applied to the 1974 Chevrolet Suburban Custom 10 Van as manufactured. However, this protection was not extended to the patient(s) or medical personnel occupying the body of the ambulance since it did not apply to the modifications made after the vehicle was sold by the manufacturer.

There are no performance requirements for the after-market modifications to vehicle structural integrity, crashworthiness, interior occupant protection, and the anchorage of items such as litters, benches, cabinets, oxygen bottles, or flooring. The only guidance concerning these safety factors provided for the after-market installers is as follows:

1. General Services Administration (GSA) Specification KKK-A-1822 dated January 2, 1974. It provides specifications for the use of new commercial vehicles modified as ambulances and purchased with Federal funds. Ambulances complying with these specifications need only meet the requirements of FMVSS 105, 106, and 116 (Brakes), be capable of a sustained speed of 70 mph, have a fuel range of at least 150 miles, and other vehicle performance characteristics.
2. Truck Body and Equipment Association, Ambulance Manufacturers Division (AMD): Standards 101, Static Load Test for Ambulance Body Structure; 003, Oxygen Tank Retention System; 004, Litter Retention System; 005, Ambulance Electrical System; and 006, Sound Level Test Code for Ambulance Patient Compartment Interiors.
3. NHTSA Ambulance Design Criteria sets forth as a guideline the same criteria as the AMD standards.

A review of the Truck Body Equipment Association, AMD Standard 101 showed that:

1. The Static Load Test for Ambulance Body Structures partially corresponds to FMVSS 220, Vehicle Rollover and calls for the similar requirements. This does afford some degree of crash protection to the occupants of the ambulance.
2. The Oxygen Tank Retention System provides for the retention of the oxygen bottle within the bottle holder against a force equal to 25 times the weight of a fully loaded oxygen bottle.
3. The Litter Retention System shall not fail or release when subjected to a force of 1,500 pounds. The system is attached to the side wall of the ambulance.

Although the integrity of the vehicle involved in this accident is not being challenged because of the excessive speed involved, the condition of the vehicle after impact demonstrates a need to include a performance-type standard in Federal Specification GSA KKK-A-1822, as it relates to vehicle operation, body assembly, anchorage of equipment within the ambulance, and occupant protection. Current Federal crashworthiness standards <sup>3/</sup> are based on a 30-mph impact speed into a barrier. However, the national speed limit is 55 mph and most State statutes permit ambulances to exceed the posted speed limits in emergency situations. Speed limit exceptions and emergency situations set the stage for high-speed crashes of ambulances.

<sup>3/</sup> Part 571: FMVSS 213, Windshield Mounting; FMVSS 219, Windshield Zone Intrusion; FMVSS 301, Fuel System Integrity.


Federal regulations should also include standards on general body construction and ambulance body structure that insures that patients and medical technicians riding in the ambulance body have the same protection as the driver. The completed ambulance should be capable of withstanding reasonable impact forces. The current FMVSS standards are applicable only to the basic vehicle before modification, rather than to the complete after-market product.

Therefore, the National Transportation Safety Board recommends that the National Highway Traffic Safety Administration:

Extend the application of Federal Motor Vehicle Safety Standards 220, Schoolbus Rollover Protection; 221, Schoolbus Body Joint Strength; and 301, Fuel System Integrity to include ambulances and other emergency vehicles. (Class II, Priority Action) (H-79-27)

Study the feasibility of extending Federal Motor Vehicle Safety Standards relating to vehicle interior padding, occupant protection, and the anchorages of seats, flooring, and equipment to include ambulances and other emergency vehicles. (Class III, Longer Term Action) (H-79-28)

KING, Chairman, DRIVER, Vice Chairman, McADAMS and HOGUE, Members, concurred in these recommendations.

  
By James B. King  
Chairman