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RESEARCH SAFETY VEHICLE PROGRAM (PHASE I)- VOLUME II RSV PROGRAM DEFINITION AND FOUNDATION, ACCIDENT DATA, AUTOMOBILE USAGE, NATURAL RESOURCES, RELATED SAFETY COST

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16 Abstract

Background data are developed to support the Research Safety Vehicle (RSV) specifications generated in Volume III of this report series. Trends are analyzed to define constraints that would have influence on the RSV in its time frame--circa 1985. Included are automobile usage, population growth, economic and resources status. An immutable weight limit of 3000 lbs. provided physical constraints; and anticipated fuel and materials costs suggested economic constraints. Safety-related performance ranges were derived from accident configurations and frequencies combined with automobile physical design and weight constraints.

Alternative personal transportation systems offer no relief from dependence on the family automobile. Economic, energy, ecological and materials limitations will force a continuous demand for more efficient vehicles; and that demand will be met in part with a continuous shift toward lighter, smaller vehicles. Accident data analyses suggest that this shift will have a favorable effect on highway safety. However, the increased exposure (total number of vehicles) and increased awareness of the highway toll call for a greater emphasis on vehicle safety measures. Societal costs and vehicle safety-related costs are reviewed. Careful integration of safety into the vehicle design is found to be necessary in the face of the many constraints and the changing mix.

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Table 3-15
PERCENT OF INTRUSION RELATED INJURY BY TYPE OF COLLISION

	NON-ROLLOVER		ROLLOVER	
	ANY INJURY	SERIOUS INJURY	ANY INJURY	SERIOUS INJURY
MINIMAL INTRUSION (1" - 6")	24.8	0.8	40.6	0.0
MAJOR INTRUSION (OVER 6")	70.0	5.6	61.1	4.4

With minimal compartment invasion (1" - 6"), the probability of experiencing serious injury as a result of contact with an intruding component can be considered negligible, thus, redesigning to influence only minor intrusion would have little or no effect on the risk of serious injury.

Design Implications of Vehicle Intrusion

To significantly reduce ejection, particularly in rollover accidents, the use of restraints was recommended in the preceding section. However, when limitations are imposed on occupant movement by the lap and shoulder belt, or any other restraint system, minimizing intrusion becomes increasingly important.

In rollover accidents, for example, accident investigations involving unrestrained occupants indicate that they are often thrown from the seat and are not affected by intrusion of the top structure. A fully restrained occupant in such an accident would remain upright in his seat and could not avoid contact with the intruding top. Similarly in side impacts, a restrained occupant in any of the outer seating positions is within a few inches of the side structure. Thus, in any vehicle in which the occupants are to be restrained, it is essential to limit intrusion for side impacts and rollovers.