PB 86-200789

Field Test Evaluation of Rearview Mirror Systems for Commercial Vehicles

Vector Enterprises, Inc., Santa Monica, CA

Prepared for

National Highway Traffic Safety Administration
Washington, DC

Sep 85

PB86-200789



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

DOT HS 806 948
Final Report

September 1985

Field Test Evaluation of Rearview Mirror Systems for Commercial Vehicles

This document is available to the public from the National Technical Information Service, Springfield, Virginia 22161.

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear only because they are considered essential to the object of this report.

N O T I C E

THIS DOCUMENT HAS BEEN REPRODUCED FROM THE BEST COPY FURNISHED US BY THE SPONSORING AGENCY. ALTHOUGH IT IS RECOGNIZED THAT CERTAIN PORTIONS ARE ILLEGIBLE, IT IS BEING RELEASED IN THE INTEREST OF MAKING AVAILABLE AS MUCH INFORMATION AS POSSIBLE.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 806 948		

4. Title and Subtitle	5. Report Date
Field Test Evaluation of Rearview Mirror Systems for commercial vehicles.	6. Performing Organization Code
	8. Performing Organization Report No.
7. Author(s) Smith, R.L., Mulholland, M.U., and Burger, W.J.	
9. Performing Organization Name and Address Vector Enterprises, Inc. 1550-17th Street Santa Monica, CA 90404	10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTNH22-81-C-07337
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street Washington, DC 20590	13. Type of Report and Period Covered 14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This study was a two-year field evaluation of two experimental rear-view mirror systems. One system was a 40 inch radius of curvature convex mirror having a width of 10 inches and a height of 6.5 inches. The second system was a dual plane/convex mirror mounted one above the other. The convex mirror had a curvature of 21 inches in radius and both mirrors were 6.5 inches in width and 6.0 inches in height. Each experimental system was installed on nearly 2,000 Bell Telephone Company vans, and in terms of accident rates, subsequently compared to a control group of Bell vans having conventional, original equipment manufacture (plane) mirror systems varying in widths from 5.0 to 7.0 inches and in heights from 7.0 to 9.0 inches.

The vans accumulated a total of 91,633,662 miles within a region of seven states. The results indicated a statistically significant 17.6 percent reduction in accident rate in the single convex mirror group as compared to the control group. The dual plane/convex mirror group, however, yielded essentially the same accident rate as the control group. It is concluded that accident rate reduction and cost-benefit analyses strongly support the installation of the single convex mirror system on vans at manufacture.

17. Key Words	18. Distribution Statement
1. Vehicle mirrors 2. Rear-view visibility 3. Indirect Visibility 4. Accident prevention	Document is available to the public from the National Technical Information Service, Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	52	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

ACKNOWLEDGEMENTS

Many thanks are due staff members of the Southern Bell and South Central Bell telephone companies which provided the vehicles for this study. In particular, we wish to thank Misters Larry Ross, William Parks, Gary Pecic, Mark Cochran, Mike McNeil, George Murrel, and Bob Geisler for their cooperation.

A special thanks is also due Dr. Robert L. Henderson, who was the Contract Technical Monitor and a significant contributor throughout most of this study and the preliminary laboratory and field research leading to this study.

TABLE OF CONTENTS

I. INTRODUCTION. I-1
A. Purpose. I-1
B. Background. I-1

II. METHODOLOGY. II-1
A. Rationale. II-1
B. Fleet Selection and Sample Size. II-1
C. Mirror Specifications. II-2
D. Mirror Manufacture and Installation. II-3
E. Instruction on Mirrors and their Usage. II-7
F. Data Collection. II-7
G. Classifying Accidents According to Mirror-Relatedness. . II-8
H. Data Reduction. II-11

III. RESULTS. III-1
A. Overall Results. III-1
B. Accident Rates by Fleets and Geographic Regions. III-6
C. Left and Right Mirrors. III-10
D. Cost Analyses. III-10

IV. CONCLUSIONS AND RECOMMENDATIONS. IV-1
A. Mirror Systems. IV-1
B. Some Philosophical Considerations. IV-2

V. REFERENCES. V-1

APPENDIX A A-1

APPENDIX B B-1

APPENDIX C C-1

LIST OF ILLUSTRATIONS

FIGURE		PAGE
I-1	Ground areas and FOV seen through left and right mirrors of a plane mirror system.	I-2
II-1	Ground areas and FOV seen through left and right mirrors of the convex system.	II-5
II-2	Ground areas and FOV seen through left and right dual mirrors.	II-6
III-1	Accident rate as a function of mirror system for both fleets.	III-3
III-2	Accident rate as a function of mirror system for each fleet.	III-7
III-3	Accident rate as a function of mirror system for South Central Bell and Georgia.	III-8
III-4	Accident rate as a function of mirror system and location.	III-9

LIST OF TABLES

TABLE		PAGE
II-1	Recommended mirror systems for field testing	II-4
II-2	Mirror-relatedness judgment scale	II-9
III-1	Mileage accumulated, number of vehicles, accidents and accident rates for each mirror system	III-2
III-2	Computation of expected numbers of accidents	III-5
III-3	Left and right mirror related accidents	III-11
III-4	Numbers of cost estimates to repair company (CV) other (OV) vehicles	III-13
III-5	Estimated average costs to repair both vehicles for accidents occurring in each of the mirror system groups	III-14

I. INTRODUCTION

A. PURPOSE

The purpose of this report is to describe the results of a two-year field study which evaluated two experimental rear-view mirror systems in terms of accident rates. The mirrors were installed on groups of Bell Telephone Company vans and accident rates were compared with those of a similar group of vans equipped with conventional, original equipment manufacture (OEM) mirrors.

B. BACKGROUND

Historically, rear-view mirror systems of small vehicles have consisted of left outside and center inside mirrors. In making left maneuvers, therefore, drivers have been able to moniter rearward and left side traffic conditions by employing either or both mirrors and/or direct looks to the left and rear. In order to safely initiate right maneuvers, however, direct looks to the right and right rear have been essential, rather than supplemental. With the advent of vans, whose designs often made it impossible to obtain direct visual information of targets in the right adjacent lane, a right outside mirror became essential. Thus, where the design of a van does not provide a driver with a total indirect field of view comparable to that required of passenger cars employing inside mirrors, a right outside mirror became a requirement under Federal Motor Vehicle Safety Standard (FMVSS) 111. Typically, the left and right standard OEM mirrors on vans are plane mirrors, 5 inches in width and 7 inches in height. Aftermarket plane mirrors (which can also be installed at manufacture) include 6.5 x 6, 5 x 8, 6 x 9, 6 x 10 and 7.5 x 10. Although left and right mirrors of each pair are identical in size, the fields of view (FOV's) they provide drivers are quite different, due to the large variation in eye-to mirror distance, i.e., the distance is much greater for the right outside mirror. For example, Figure 1-1 shows the ground areas visible to drivers through the 6 x 9 inch pair of mirrors. As can be seen, a substantial blind area exists in the right adjacent lane. And while a significant blind area also exists in the left lanes, drivers can at least compensate for this deficiency by employing direct looks, and viewing the left mirror at different angles.

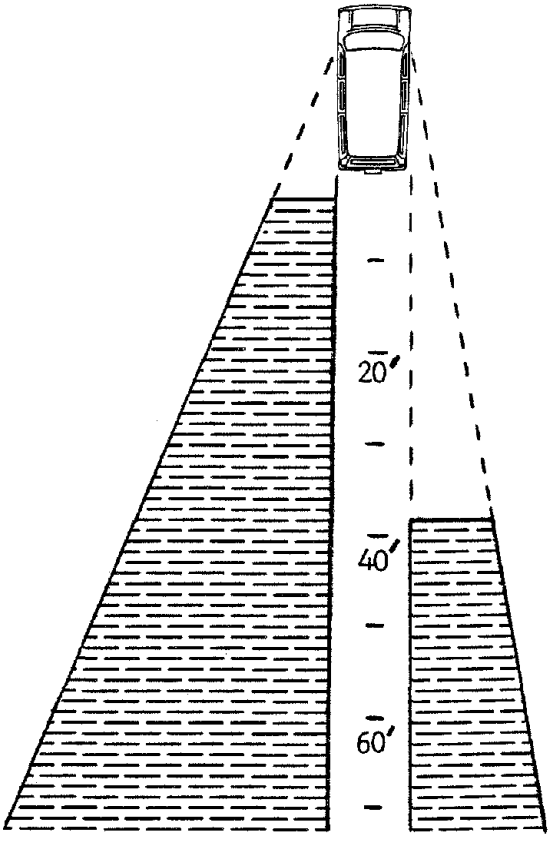


FIGURE I-1. Ground areas and FOV seen through left and right mirrors of a plane mirror system. (6" wide x 9" high).

7<

In order to provide a comparable horizontal FOV on the right side of vans, a plane mirror would have to have a width of approximately 15 inches. Not only would such a size be unacceptable with respect to obscuring forward vision, it would still present a large and dangerous blind area which could not be compensated for by direct looks. Thus, solutions to right outside FOV problems cannot be derived from the use of conventional plane mirrors. The most obvious potential solutions are comprised of a convex mirror or a combination plane/convex mirror system.

Convex mirrors have one major advantage over plane mirrors and several disadvantages. The advantage lies in the fact that they provide a wider FOV than plane mirrors per unit size. Moreover, the shorter the radius of curvature (the greater the convexity), the larger the FOV. Unfortunately, the FOV gain is accompanied by the minification of visual imagery. This minification results in images which appear further away and moving more slowly than they actually are. Furthermore, linearity is reduced as images of on-coming vehicles are seen to progressively move away (laterally) from the driver as they approach him.

A previous study evaluated over 40 mirror configurations, including variables of mirror size, convexity and single versus dual mirror systems (Burger, Mulholland, Smith and Sharkey, 1980; Burger, Mulholland, Smith, Bardales and Sharkey, 1980). Promising findings were observed for a 40 inch radius convex mirror alone or in combination with a plane mirror. Less total looking time and shorter decision times for right maneuvers were required for these systems than for the OEM or other selected systems. However, it was also observed that if the plane/convex system was adjusted to yield non-overlapping FOV's, the system lost its advantage over the OEM and other systems.

II. METHODOLOGY

A. RATIONALE

The project required the fleet comparison of two experimental mirror systems with a control group equipped with a standard OEM mirror system. One experimental system was to consist of convex mirrors only, while the other was to involve a pair of dual plane/convex mirrors. The design specifications for the experimental systems were to be established jointly by Vector and NHTSA personnel, based on two criteria: (1) minimum size to meet FMVSS 111; and (2) previous mirror performance data. Initially, 500 vehicles per group were required and the accident data collection period was tentatively scheduled for 12 months. However, an analysis of fleet accident rates was required in order to determine necessary sample sizes and a data collection period.

B. FLEET SELECTION AND SAMPLE SIZE

More than 30 van fleets nationwide were contacted to obtain accident rate data, descriptions of mirror systems employed, accident reporting procedures and the degree of willingness to participate in the field study. All but two fleets were unsuitable for the study because they failed to meet essential criteria. In particular, most of the fleets had already been retrofitted with aftermarket mirror systems which made it impossible to establish a control group among these fleets.

The two fleets which did meet essential criteria were divisions of American Telephone and Telegraph Corporation, i.e., Southern Bell and South Central Bell. These fleets also expressed considerable interest in participating and had excellent accident reporting, description and recording systems. Southern Bell vans had only OEM mirror systems. South Central Bell, however, had converted approximately 800 of its vans to a dual plane/convex mirror system. This state-of-affairs influenced the selection of experimental mirror systems, as noted below.

The AT & T Corporation volunteered accident data for 1981 for Southern and South Central Bell fleets, as well as for all Bell fleets, comprised of 97,002 vans. Using a standard formula for determining sample sizes to detect a difference between groups (Council, Stewart, Reinfurt and Hunter, 1980), a sample size of 2,000 vehicles per group was found necessary for a data collection period of two years. As input data, the formula required accident rate data and proposed or acceptable alpha and beta errors (see Appendix A for a discussion of alpha and beta errors).

The actual number of vehicles included in this study were fewer than planned, however, and there were several reasons for this outcome. A major reason was the retirement of many vehicles immediately before and sometime after the data collection period began, due to cost-cutting policies instituted by the Bell companies following their corporate breakaway from AT & T. Additionally, final mileage data were not available for some vehicles and could not be retrieved, so these vehicles had to be excluded from the data base. Finally, not quite 2,000 vehicles per mirror group were selected by the fleets initially.

C. MIRROR SPECIFICATIONS

The initial desire was to design the convex mirror system and the dual plane/convex mirror system to just meet the FOV requirements of MVSS III. As noted in Section I, a 40" radius of curvature (ROC) convex mirror was found in our previous research to yield the most promise either as a stand alone system or in combination with a plane mirror. Lesser and greater convexities presented poorer results. Thus, the 40" ROC was recommended for the stand alone convex mirror system. However, since the minimum size of this mirror that is necessary to just meet FMVSS III requirements still yielded a significant blind spot on the right side of a vehicle, its width was extended to greatly reduce that blind area. In addition, because of the short eye-to-mirror distance on the left side of the vehicle and drivers' abilities to look directly to the left and left rear, no advantage was indicated for a convex mirror on the left. Hence, retention of the left OEM mirror was recommended.

The dual system employed by South Central Bell included a 21" ROC mirror, substantially more convex than previous research would recommend. Nevertheless, there were good reasons for testing this system. First, it was widely employed nationwide. Second, it was very close to the FMVSS 111 FOV requirements. And third, since it was already installed on some 800 South Central Bell vans, the overall cost of the study would be reduced with respect to the purchase and installation of mirror systems. Therefore, this specific dual system was recommended.

Table II-1 provides the specifications of the three recommended systems. Figures II-1 and II-2 show the FOV's for the convex and dual systems, respectively, and both may be contrasted with the FOV of a standard OEM system shown in Figure I-1. Because the control and convex systems consisted of OEM Plane mirror systems on the left, the dual mirror system yielded a much larger FOV on the left. The convex system yielded a slightly larger FOV than the dual system on the right and it did so with lesser convexity but greater width.

D. MIRROR MANUFACTURE AND INSTALLATION

The convex mirror was manufactured by Donnely Mirrors, Inc., according to specifications, and shipped to Velvac Corporation for installation in mounting heads. Velvac reshaped off-the-shelf heads and support brackets to hold the rounded mirrors properly so as to protect them from breaking during normal operational handling. Velvac also put the following inscription on this mirror: "Objects in mirror are closer than they appear." The dual system was an off-the-shelf product.

The dual and convex mirror systems were purchased in quantities which permitted retrofitting the appropriate numbers of vehicles and maintaining 5% spares to account for breakage during the two year data collection period.

The mirrors were shipped to the Bell fleets in November of 1982. Installation on vans began in December, 1982 at over 500 locations in seven states. Most of the vans were retrofitted by the end of February, 1983 and almost all were retrofitted by April. As will be noted in Section III, however, the numbers of mirrors installed were not quite as many as originally requested.

TABLE II-1

Recommended Mirror Systems
for field testing

MIRROR SYSTEM	LEFT	RIGHT
Control	7.0 x 9.0 plane 6.0 x 9.0 plane 5.0 x 7.0 plane	7.0 x 9.0 plane 6.0 x 9.0 plane 5.0 x 7.0 plane
Convex (Convex= 40" ROC)	7.0 x 9.0 plane 6.0 x 9.0 plane 5.0 x 7.0 plane	10.0 x 6.5 convex
Dual (Convex= 21" ROC)	6.5 x 6.0 plane 6.5 x 6.0 convex	6.5 x 6.0 plane 6.5 x 6.0 convex

NOTE: (1) All dimensions are in inches

(2) The 3 size variations for the control system and for the left side of the convex system reflect those variations that actually existed in the Bell fleets. The upper and lower variations yielded slightly wider and narrower FOV's, respectively, than the central mirror system which is described in Figure I-1.

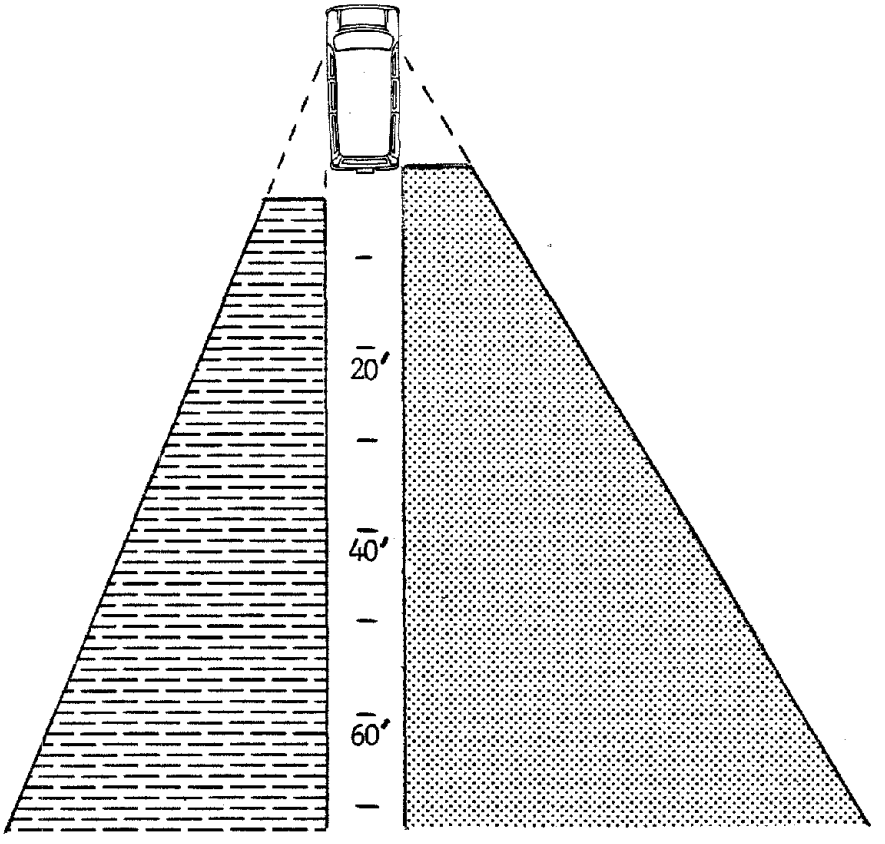


FIGURE II-1. Ground areas and FOV seen through left plane and right convex mirrors of the convex system.

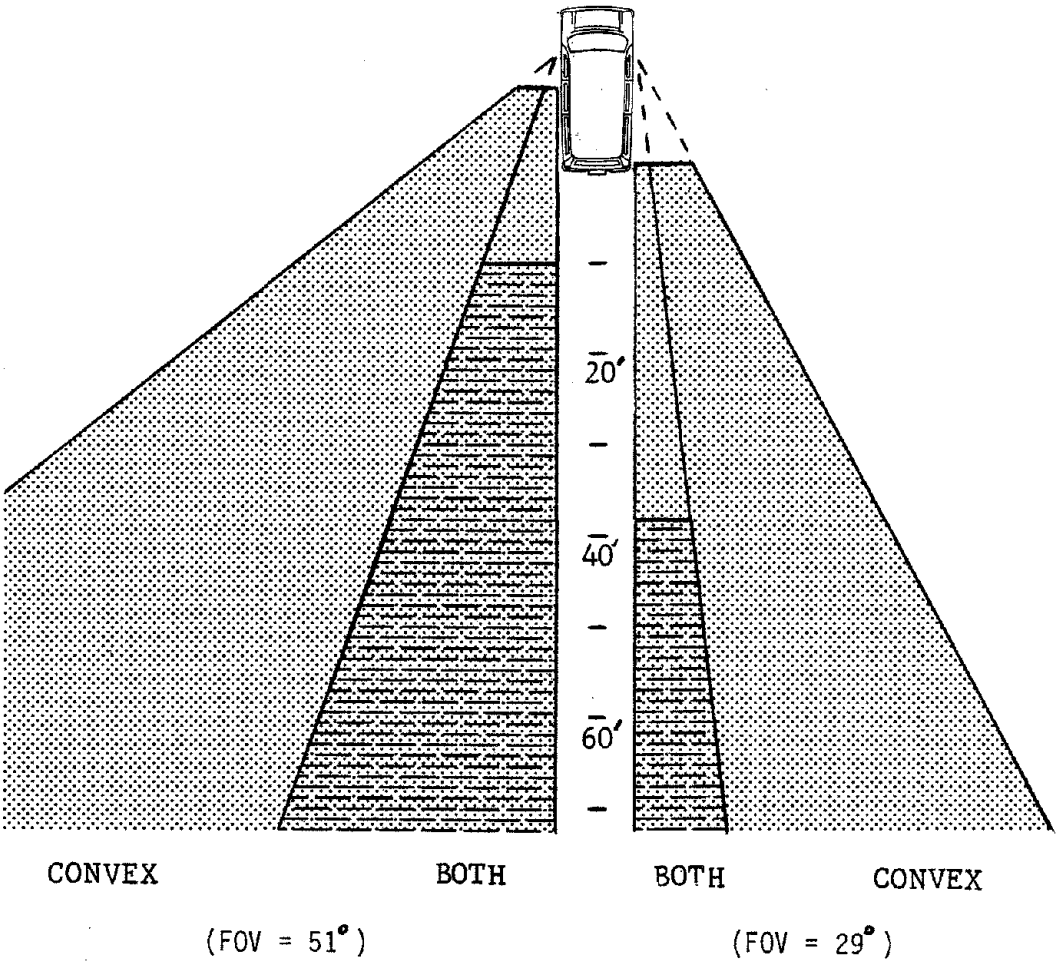


FIGURE II-2. Ground areas seen through left and right mirrors of the dual system. The left and right plane mirrors provided FOV's of 20° and 7° , respectively.

Thus, sample sizes were somewhat smaller than desired and the data collection period for all vehicles was somewhat shorter, on the average, than desired because the end date was March 31, 1985. The Bell fleets installed all of the mirrors themselves, with the exception of Florida. Southern Bell hired an outside contractor to install mirrors in that state.

E. INSTRUCTIONS ON MIRRORS AND THEIR USAGE

Printed materials were given to the fleets which described the dimensions and characteristics of the mirror systems, their FOV's, adjustment procedures, specific uses of the mirrors, their advantages and disadvantages and cautions. These materials are presented in Appendix B. The fleets were encouraged to provide copies of these materials to all drivers of vehicles selected for this study in order to reduce uncertaincies and enable drivers to quickly learn proper usage of the mirrors.

F. DATA COLLECTION

The Bell fleets agreed to submit to Vector reports of accidents for study vans on a monthly basis. Unfortunately, the break-up of AT & T corporation during the early part of this field study placed greater burdens and pressures on the new independent Bell companies and accident report submissions were generally quite variable. Initially, accident reports were AT & T forms. Subsequently, they were modified somewhat and emerged as independent Bell forms. Examples of these forms are given in Appendix C.

Large differences in level of detail were provided in the accident reports. Some reports contained as many as 10 to 15 pages of information, while others consisted of only one or two pages. Most reports provided illustrations of the accidents which were quite useful. All things considered, sufficient information was given for all but a few accidents to adequately describe those accidents.

G. CLASSIFYING ACCIDENTS ACCORDING TO MIRROR-RELATEDNESS

Since this study was concerned with evaluating specific mirror systems with respect to their contribution to reducing accidents, only accidents in which mirrors were employed were, strictly speaking, relevant for subsequent data analysis. As will be noted below, however, the determination of relevancy was at best a most difficult and often impossible task.

An attempt to establish relevancy was the development of a judgment scale from "1" to "6" which was then used to classify accidents in terms of the degree to which they were related to mirrors. Table II-2 illustrates the scale and provides examples of accidents for each scale value. Values of 5 to 1 represented increasing degrees of mirror relatedness. A value of 6 indicated no possible association with mirrors whatsoever.

The selection of accident types for each scale value was, of course, based on expert judgment as no empirical bases existed for matching accidents with degree of mirror relatedness. The criteria employed in the selection of accident types were the likelihood of a mirror's use and/or its utility in a given situation. For example, since direct visibility to the right rear of vans was not possible, right side mirrors seemed likely to be used in many backing accidents. Clearly, they could be useful, whether or not they were used.

Two human factors researchers who specialized in automotive visibility problems, especially indirect visibility, independently rated all accidents. Subsequently, the two researchers discussed each accident in which disagreement occurred and then arrived at a common consensus. Although no reliability statistics were applied to the two researchers' ratings, excellent initial agreement was observed. Less than 10 percent of the accidents received different ratings and many of these differed by only one scale value. Reaching a common consensus was found to be a relatively easy and rapid task.

Although the classifying of accidents according to the above criteria would seem to be theoretically sound and to have face validity, the technique is nevertheless not without serious problems.

TABLE II-2

MIRROR-RELATEDNESS JUDGMENT SCALE

Scale Value	Value Description	Accident Examples
1	Definitely related	*Most backing accidents *Some lane change maneuvers
2	Probably related	*A few backing accidents *Some lane change maneuvers *Some turns
3	Possibly related	*Rear-ended another vehicle *Turned into another vehicle
4	Unknown	*Not enough information
5	Possibly not related	*Rear-ended by another vehicle *Struck by another vehicle
6	Definitely not related	*Vehicle struck while parked *Other vehicle out of control

NOTE: the scale value "5" is typically used when mirror-relatedness appears unlikely but cannot be ruled-out logically.

In fact, there is a good reason to believe that accidents cannot be categorized into more classes than the simple dichotomy of relevant and nonrelevant accidents. Some examples should illustrate the justification for this conclusion.

Many of the accidents resulted from fleet personnel backing their vans into other vehicles or objects. Clearly, mirrors are relevant aids in the backing process. However, there is no way to determine whether or not a mirror was indeed employed by a driver and it simply cannot be assumed that a mirror <u>was</u> used.

Many accidents occurred when fleet vans struck other vehicles or were struck by other vehicles while moving. In all cases, the accidents could possibly have been due to failure to employ a rear-view mirror or conversely, expending too much time observing a mirror while attempting to acquire information rearward. To illustrate a specific instance, a moving van being rear-ended by a following vehicle could possibly have avoided that collision had the driver observed the following vehicle in his mirror(s) and, subsequently, maneuvered his vehicle accordingly. In other words, if a driver sees a vehicle closing on him and about to rear-end him, it does not seem likely that he would not react and simply let the accident happen. A more likely explanation is that he did not observe his mirror(s).

In effect, there were virtually no accidents in which it could be determined whether a mirror was or was not used. And although accidents could be rather easily categorized in a double blind judgement task in terms of the degree to which they potentially related to mirrors, there was no logic which permitted this categorization scheme to be highly correlated with what actually happened. Backing accidents are excellent cases in point. They received the highest mirror-relatedness rating ("1") but, as noted previously, mirrors may or may not have been employed. During the analyses of accident reports, many cases were observed in which we concluded that the accidents would not have occurred had drivers used their mirrors because struck vehicles or objects <u>had</u> to be visible on the mirrors. Therefore, all accidents receiving ratings of 1 through 5 were used in the data analysis.

Closely associated with the above problem was the analysis of accidents in terms of left and right outside mirrors. For example, if while backing his vehicle a driver struck another vehicle or object with the right side of his van, this accident would clearly be related to a right outside mirror and not a left mirror. However, the identical argument presented above is also relevant here. In brief, because an accident was a right side accident, it does not follow that the right mirror was employed. To compound the problem, analyzing the data in terms of left and right accidents as a function of mirror systems results in very small numbers which are not very meaningful. Some results from this analysis will be presented later to illustrate the problem.

H. DATA REDUCTION

When accident reports were received, information regarding the specific mirror installed on the vehicle was eliminated and replaced by a code by a staff member who was not involved in the mirror-relatedness judgment task. Subsequently, the reports were rated as to degree of mirror-relatedness. The reports were then entered into an Apple II-C computer.

A program was developed which permitted the printout of accident frequencies as a function of mirror system, mirror-relatedness, geographic region and left and right accidents. The program also permitted the computation of average estimated costs to repair striking and struck vehicles.

No actual analyses of the data were performed until the initial and final mileage for each vehicle were entered into the computer since accident rates could not be computed without exact exposure information. All analyses, including the computation of accident rates and the application of statistical tests, were relatively simple and, therefore, performed on a hand calculator.

III. RESULTS

A. OVERALL RESULTS

The total number of accidents recorded for the vehicles included in the study was 683. However, 246 of these accidents received "6" ratings in the mirror-relatedness judgment task and were thus excluded from analysis. Typical examples of "6" ratings were accidents in which a fleet van was struck while parked and unattended or while stopped at an intersection because of a red traffic light. The remaining 437 accidents were judged to have had some relationship or possible relationship with mirrors.

Table III-1 presents the total mileage accumulated by each mirror system group, the numbers of vehicles involved, the numbers of accidents and the accident rates for each mirror system group. Figure III-1 shows a bar graph of accident rates which illustrates the differences observed between the mirror groups. The convex mirror group accident rate was 17.6% lower than the OEM group rate, while the dual mirror group rate was somewhat higher.

Two statistical tests were applied to the accident data, a Chi square (X^2) test for frequency data and a "Z" test between rates employed by Reilly, Kurke and Buchenmaier (1980) in a similar field test. The "Z" test is more sensitive than the Chi square test because it accounts for mileage driven as well as accident frequencies, whereas Chi square only accounts for accident frequencies (although mileage data are used to derive theoretical or expected frequencies, as will be seen).

As applied here, the Chi square formula is:

$$X^2 = \frac{(FC_0 - FC_E)^2}{FC_E} + \frac{(FE_0 - FE_E)^2}{FE_E}$$

TABLE III-1

MILEAGE ACCUMULATED, NUMBER OF VEHICLES, ACCIDENTS AND ACCIDENT RATES FOR EACH MIRROR SYSTEM

	TOTAL MILEAGE	NUMBER OF VEHICLES	NUMBER OF ACCIDENTS	ACCIDENT RATE (PER MILLION MILES)
OEM	25,643,210	1,652	126	4.914
DUAL	36,601,352	1,856	192	5.246
CONVEX	29,389,100	1,698	119	4.049

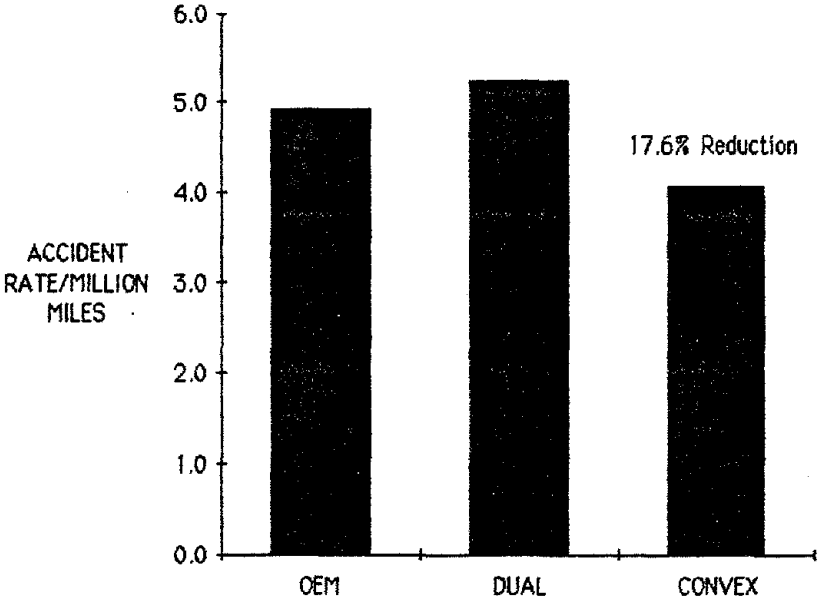


FIGURE III-1. Accident rate as a function of mirror system for both fleets.

Where:

FC_0 = observed accident frequency of the control group (OEM)

FC_E = expected accident frequency of the control group

FE_0 = observed accident frequency of the experimental group (Convex or Dual)

FE_E = expected accident frequency of the experimental group

The expected frequencies were computed by use of mileage data and are shown in Table III-2. For example, the accumulated mileage for the convex mirror group was greater than that of the OEM group and represented 53.4% of the total mileage accumulated by both groups. It would be expected, therefore, that the convex mirror group would be involved in 53.4% of the total accidents, given no difference in effectiveness between the mirror systems. The last column in Table III-2 presents the expected frequency (130.83) which derives from multiplying 53.4% (actually 0.534) times the total number of accidents for the two groups, i.e., 245. The expected frequency for the OEM system was found to be 114.17. Similar expected frequencies were computed for the OEM and dual systems when these systems were compared, as shown in the lower half of Table III-2.

Chi square was 2.30 for the OEM and convex mirror group comparison, 4.96 for the dual and convex mirror group comparison and 0.032 for the OEM and dual mirror group comparison. The former two values are significant at the .15 and .05 levels, respectively, and well within the .20 level selected for this study, while the last value is not significant. Thus, the Chi square test indicates that the convex mirror was effective in reducing accidents (by 17.6%), while the dual mirror system was not.

The "Z" test formula is:

$$Z = (\hat{\emptyset}_1 - \hat{\emptyset}_2) \,/\, \hat{\emptyset}\left[(1/X_{1+} + 1/X_{2+})\right]^{1/2}$$

Where:

X_{1+} = sum of miles driven by test vehicles in 1 million mile units

X_{2+} = sum of miles driven by control vehicles in 1 million mile units.

$\hat{\emptyset}_1 = Y_{1+}/X_{1+}$ = test group accident rate

$\hat{\emptyset}_2 = Y_{2+}/X_{2+}$ = control group accident rate

$\hat{\emptyset} = (Y_{1+} + Y_{2+}) / (X_{1+} + X_{2+})$

Y_{1+} = Number of test group accidents

Y_{2+} = Number of control group accidents

TABLE III-2

COMPUTATION OF EXPECTED
NUMBERS OF ACCIDENTS

MIRROR	MILEAGE	% OF TOTAL MILEAGE	ACCIDENTS	EXPECTED ACCIDENTS
OEM	25,643,210	46.6	126	114.17
CONVEX	29,389,100	53.4	119	130.83
TOTAL	55,032,100		245	245.00
DUAL	36,601,352	55.5	192	172.61
CONVEX	29,389,100	45.5	119	138.39
TOTAL	65,990,452		311	311.00

The computed Z value for the comparison of the OEM and convex mirror groups was 1.52 which was significant at nearly the .05 level of confidence, i.e., .06. Thus, the Z test results confirmed those of the Chi square test and even more strongly indicated the superiority of the convex mirror over the OEM mirror.

B. ACCIDENT RATES BY FLEETS AND GEOGRAPHIC REGIONS

Figure III-2 shows accidents rates for the three mirror groups with respect to the two Bell Telephone fleets, South Central Bell and Southern Bell. These results appear to be quite contradictory, with the convex mirror showing a 38.3 reduction in accident rate in the South Central fleet and essentially no reduction in the Southern fleet. Moreover, the dual mirror appears slightly superior to the OEM system in the South Central fleet and strongly inferior in the Southern fleet.

Examination of the distribution of mirror systems throughout the seven states revealed that good matched groups existed in all five South Central Bell states and in the Southern Bell state of Georgia but not in the state of Florida. Figure III-3 shows the accident rates of both fleets after excluding the data of Florida. The convex mirror group exhibited a 29.7 % reduction in accidents. A Chi square test of the difference between the OEM and convex groups yielded a value of 4.01, significant at the .05 level.

Detailed analyses of Florida mirror distributions and accident rates did not provide relationships explaining the reason why the convex mirror failed to show superiority over the OEM system consistent with the results from the other six states. However, it became clear that the discrepancy was centered principally in Southern Florida and almost exclusively in the Miami area. In fact, when Southern Florida is compared with all other areas combined, including the remainder of Florida, the discrepancy becomes highly visible (Figure III-4). Not only was the convex mirror (and dual system) associated with a higher accident rate than the OEM mirror in Southern Florida, all accident rates were uncharacteristically high in that area. This cannot simply be attributed to higher population because similar trends were not observed in other dense areas such as Atlanta and Birmingham. Unfortunately, no adequate explanation was found to explain the Miami results.

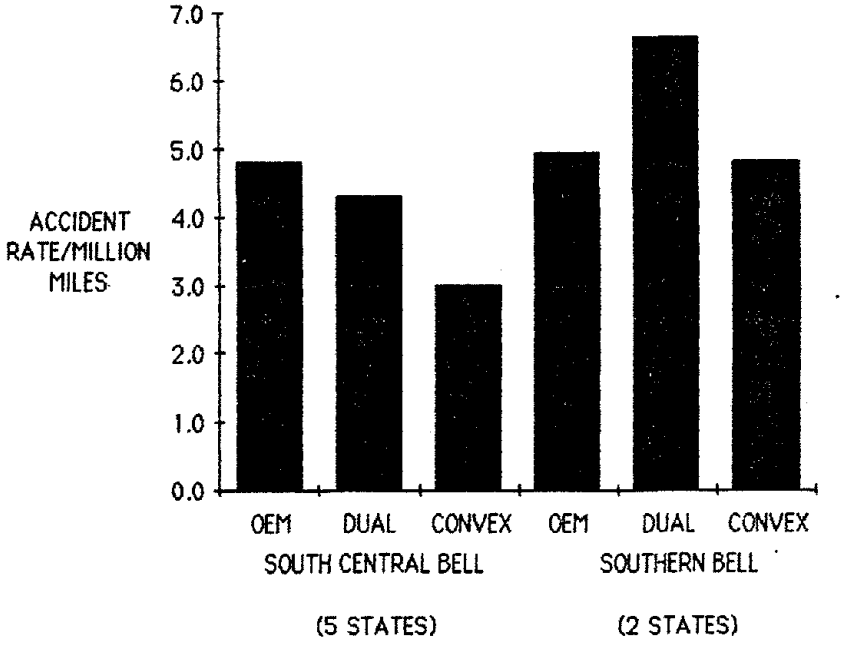


FIGURE III-2. Accident rate as a function of mirror system for each fleet.

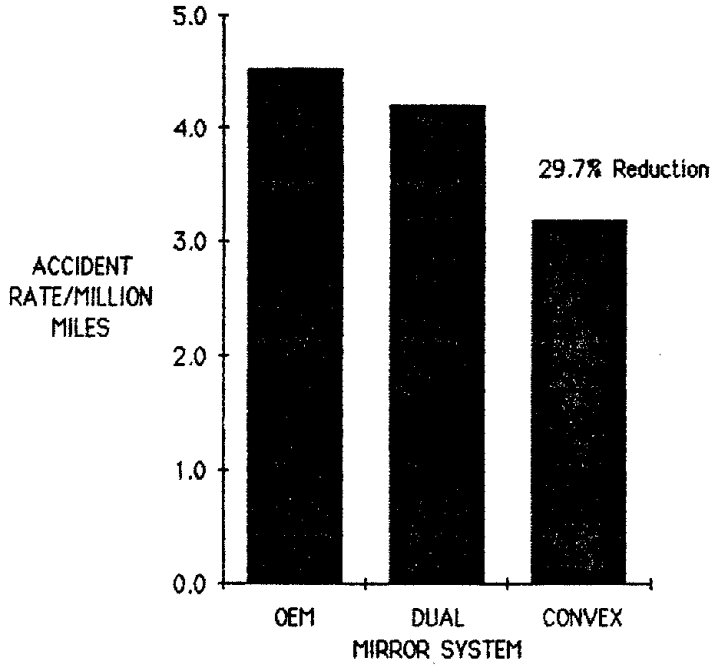


FIGURE III-3. Accident rate as a function of mirror system for South Central Bell and Georgia. (Florida data omitted).

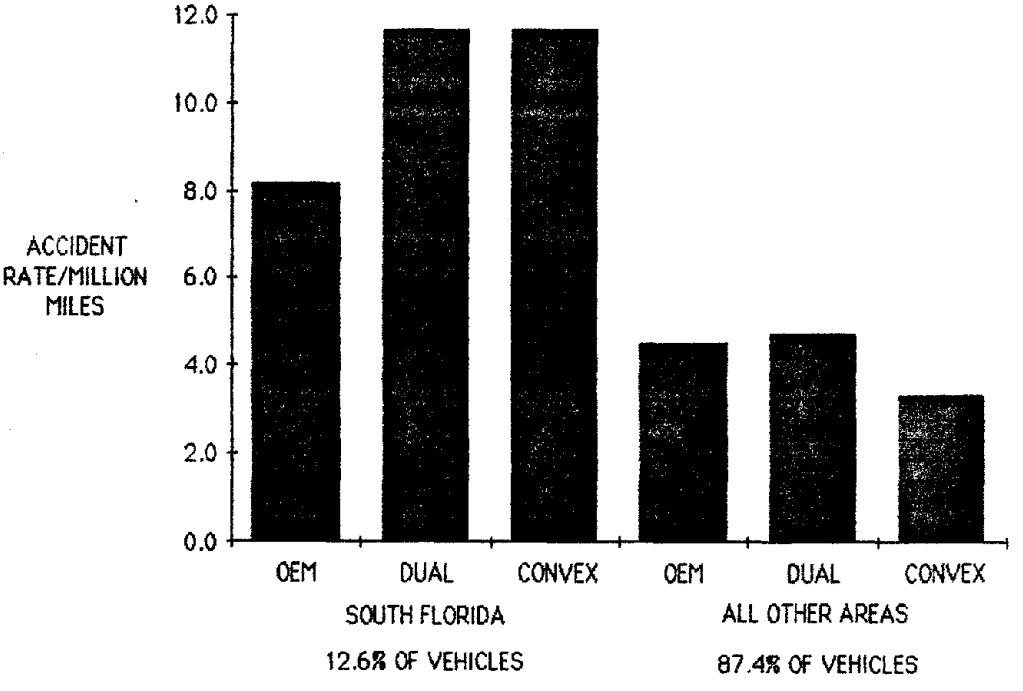


FIGURE III-4. Accident rate as a function of mirror system and location.

However, variations throughout a seven state region must certainly be expected by chance and it is to be noted that the Southern Florida data involved only 12.6% of the vehicles in the study, while the data for all remaining areas involved 87.4% of the vehicles. The convex mirror in the latter group showed a 26.1% reduction in accidents

The analyses discussed in this section are, of course, ad hoc. The sample in this study was comprised of all vehicles in both fleets. The most appropriate analysis was comprised of the statistical tests described in Section A. Despite variations between and within fleets,which would certainly be expected, the overall results showed the convex mirror to be significantly better than the OEM mirror.

C. LEFT AND RIGHT MIRRORS

Where possible, accidents were categorized in terms of relevancy of left and right mirror systems. For example, if an accident could have involved a left mirror and use of a right mirror would have been meaningless, the accident was classified as a left mirror related accident. Table III-3 presents the actual numbers of left and right mirror related accidents for the three mirror systems and the theoretically expected numbers when exposure (mileage) differences are accounted for.

Perhaps the first point to note with regard to Table III-3 is that the numbers are relatively small and probably too small to permit meaningful analyses. Second, the theoretical frequencies for the right mirror systems are almost identical to the actual accident frequencies. Third, actual accidents for the left OEM system were fewer than expected, while they were higher than expected for the dual system and as expected for the convex system. However, in view of the fact that the left mirrors involved in the OEM and convex systems were identical, observed differences between the systems must be viewed as chance occurrences and certainly not due to mirror systems. In any event, as emphasized, the numbers of such accidents were too small to consider seriously.

D. COST ANALYSES

Although desirable for evaluating accident severity, actual cost-to-repair data are difficult, if not impossible, to obtain. In discussions with the participating fleets, it was agreed that where provided on the accident forms, estimated cost-to-repair information would be used even though it

TABLE III-3

LEFT AND RIGHT MIRROR RELATED ACCIDENTS

	Mirror System	Actual Accidents	Theoretical Frequencies
Left Accidents:	OEM	11	17.9
	DUAL	33	26.6
	CONVEX	20	20.5
Right Accidents:	OEM	21	24.6
	DUAL	38	35.15
	CONVEX	29	28.22

was recognized that such data would not be provided for all accidents and would only represent an on-the scene estimate of costs.

Table III-4 shows the numbers of cost estimates for company (CV) and other (OV) vehicles provided in the accident reports for each mirror system group.

The numbers ranged from about half of the accidents to nearly all of the accidents. Since there appeared to be no systematic basis for providing and withholding cost estimates, it would seem that the estimates should yield representative average costs of accidents for each mirror system group.

Table III-5 presents the estimated costs to repair both vehicles for each mirror system group. The upper row includes two OEM and one dual group (other) vehicles that were totaled (completely destroyed); $8,000.00 was assumed as a loss in each case. The middle row omits these costs and thus their influence on the averages. As can be seen, the totaled vehicles represented the essential difference between the OEM and convex groups' cost estimates. The average cost to repair both vehicles in the dual group, however, remained 10 to 16 percent higher than those in the OEM and convex groups, respectively, when the totaled vehicles were omitted.

It is difficult to draw rigorous conclusions from the above cost data. On the one hand, the few totaled vehicles heavily influenced the averages when a comparison is made between the OEM and convex groups. On the other hand, the omission of totaled vehicles in computing averages is also unrealistic because the accidents and higher costs did occur. In the absence of complete data, perhaps a moderately conservative conclusion should be drawn, i.e., assuming average repair costs midway between the inclusion and omission of totaled vehicles (Table III-5). In such a case, the estimated costs to repair convex group vehicles were 4% and 11% lower than those of OEM and dual group vehicles, respectively. The 4% is not a large reduction but it is nevertheless worthwhile when consideration is given to mirror selection at manufacture and to its potential impact nationwide. For present purposes, it represents another factor supporting the use of the convex mirror. Thus, not only did the convex mirror group exhibit a significantly lower accident rate than the OEM group, accident severity was also somewhat lower.

TABLE III-4

NUMBERS OF COST ESTIMATES TO REPAIR
COMPANY (CV) AND OTHER (OV) VEHICLES

	Mirror Sytem		
	OEM	DUAL	CONVEX
Numbers of Accidents	126	192	119
Cost Estimates-CV	58	100	64
Cost Estimates-OV	121	73	65

TABLE III-5

ESTIMATED AVERAGE COSTS TO REPAIR BOTH VEHICLES FOR ACCIDENTS OCCURRING IN EACH OF THE MIRROR SYSTEM GROUPS

	OEM	DUAL	CONVEX
With Totaled Vehicles	$1,194	$1,209	$1,043
Without Totaled Vehicles	990	1,149	1,043
Average	1,092	1,179	1,043

IV. CONCLUSIONS AND RECOMMENDATIONS

A. MIRROR SYSTEMS

As can be seen in Figure I-1, the OEM plane mirror system provides an inadequate FOV on the right side of vans. Moreover, for commercial and some private vans which typically have occluded right side windows, due to various types of equipment and cargo, the existing narrrow FOV may be considered dangerous for use in such maneuvers as lane changing. The blind area in the right adjacent lane is very extensive. Therefore, it seems imperative that a right side mirror system be employed which reduces the blind area substantially. The 40" ROC convex mirror and the dual plane/convex mirror were two potential solutions, although the latter system contained a mirror that was considered more convex than desirable. However, its widespread use and other factors provided good basis for including it in this study.

The results of this study indicate that the convex mirror will facilitate the reduction in accidents, while the dual system will not. In addition to accident reduction, other reasons may be advanced for recommending the installation of such a convex mirror on vans. First, it greatly reduces the current blind area on the right side of vans. Second, its convexity is moderate compared to that of the dual system and many other after market convex mirrors and thus it does not substantially minify images. And third, the cost of installing the convex mirror at manufacture over and above the cost of an OEM mirror appears negligible. Therefore, there appears to be essentially no risk but potentially significant benefits associated with installing the convex mirror during manufacture.

With regard to the dual mirror system, it was noted in Section I that a dual plane/convex mirror system which included a 40 inch radius of curvature mirror had been shown to yield promising results compared to many other mirror systems, providing the two mirrors were adjusted to provide overlapping fields of view (Burger, et al., 1980; Burger, et al., 1980).

Its advantage was lost when the mirrors did not provide drivers with overlapping fields. Thus, it is possible that despite instructions given to the Bell fleets, drivers may have adjusted their dual mirror systems inappropriately.

Of perhaps more importance is the fact that the dual system included a much higher convexity mirror (i.e., 20 inches of radius) than the 40 inch mirror employed in this study. In effect, the dual convex mirror greatly minifies images and, therefore, presents target vehicles as being much more further away and moving much more slowly than they actually are. In any event, despite the performance of the dual system in this study, the concept of dual plane/convex systems remains viable, as supported by the previous research cited above.

B. SOME PHILOSOPHICAL CONSIDERATIONS

The results of this study are considered uniquely significant for two reasons. First, it is apparently the first time that actual accident rates have been shown to differ with different mirror systems. And second, the very fact that mirror systems differentially influenced accident rates sufficiently to be observed in sample sizes and data collection periods of the sizes and lengths, respectively, employed in this study is quite surprising. This is so because mirror systems have often been considered to play a minor role in driving, relative to the overall visibility system, and because of man's most formidable capability, learning and adapting to less than optimal systems.

With regard to learning and adapting, it was noted earlier in this report that drivers move their heads and torsos in order to incresase the FOV from their left outside mirrors. This action effectively compensates for an otherwise inadequate mirror system. A mirror system which does not require compensating behavior would be expected to improve driver performance but such improvement might be observed only with large sample sizes and a large accident data base.

With respect to right outside mirrors, drivers cannot significantly increase the FOV by body movements because of the relatively long eye-to-mirror distances. Thus, this compensating behavior is not used in the driving task.

However, more subtle compensating behaviors may nevertheless be employed. For example, poor visibility on the right side may influence drivers to reduce the number of right lane changes, right turns and certain backing maneuvers. It is only natural that most drivers would reduce certain maneuvers, the greater the risk involved.

In effect, poor systems, whether vehicle visibility or any of innumerable other systems, may be at least partially compensated for by human adaptive processes. It is a mistake, however, to assume that a system becomes operationally safe and effective because of these processes. Rather, it seems more correct to say that a poor system is rendered less poor but still less than optimum. The reason is that some adaptive processes comprise added loads on drivers which are likely to be the first to suffer degradation in critical or emergency situations.

The availability and use of mirror systems may be compared with the availability and use of seat belts. It is known that many people do not use seat belts even though they are available and have been proven to reduce injury severity. Observations reveal that drivers sometimes do not use mirrors or do not use them properly during maneuvers in which they would provide valuable information. Just as a seat belt cannot reduce accident severity if it is not used, improved mirrors also cannot facilitate driver performance if they are not used or not used properly.

In summary, the results of this study seem particularly significant because differences were observed between mirror systems despite likely driver compensating behaviors and despite small sample sizes and a relatively short data collection period and despite the use of fleets which had relatively low accident rates to begin with and despite the likelihood that mirrors were not always used or used properly.

V. REFERENCES

Burger, W.J., Mulholland, M.U., Smith, R.L., Bardales, M. and Sharkey, T.J. Passenger vehicle, light truck and van convex mirror optimization and evaluation studies: Volume 2, evaluation of alternative mirror configurations. Vector Enterprises, Inc., Santa Monica, Californa, December 1980.

Burger, W.J., Mulholland, M.U., Smith, R.L. and Sharkey, T.J. Passenger vehicle, light truck and van convex mirror optimization and evaluation studies: Volume 1, convex mirror optimization. Vector Enterprises, Inc., Santa Monica California, August 1980.

Chapanis, A. Research techniques in human engineering. Baltimore: The Johns Hopkins Press, 1959.

Finian, J.L. The system concept and methodological decision. In R.M. Gagne (Ed.), Psychological principles in system development. New York: Rinehart and Winston, 1962.

Guilford, J.P. Fundamental statistics in psychology and education. New York: McGraw-Hill Book Campan, Inc. 1956.

Wallis, W.A. and Roberts, H.V. Statistics: a new approach. Glencoe, Illinois: The Free Press, 1960.

Wilson, E.B., Jr. An introduction to scientific research. New York: McGraw-Hill Book Company, Inc., 1952.

APPENDIX A

RATIONALE FOR SELECTING
SIGNIFICANCE
LEVELS

This appendix presents rationale underlying the bases for selecting an alpha level for purposes of determing whether observed statistical differences among experimental groups are significant.

Alpha and Beta are two types of errors that can be committed when making statistical inferences. An alpha error is the rejection of an observed difference when it is a real difference, while a beta error is the acceptance of the difference as real when it is actually false or a chance occurrence. Keeping sample size constant, decreasing the alpha error will increase the beta error and vice versa.

Experimentors almost universally select alpha levels of .05 or .01, meaning that they accept 5% or 1% chances, respectively, of accepting a false observed difference. Generally, no consideration at all is given to the risk of committing beta errors. This emphasis is not always applicable or appropriate, as noted by Guilford (1956), Chapanis (1959), Finan (1962), Wallis and Roberts (1960) and others, when dealing with non-theoretical matters. Consider, for example, the following statements by Finan. "Criteria of acceptable inference that minimize the likelihood of Type I (alpha) errors are seldom appropriate for practical problems. Indeed, the methods of statistical hypothesis-testing generally appear to be better suited to the requirements of the theoretical researcher. The practitioner is usually more interested in the estimation question of how much difference, than the hypothesis-testing question of whether there is any difference." "...a small difference that falls considerably below the criterion of conventional statistical significance may represent a finding of extreme practical value."

Wilson (1952) emphasized that "...a choice of significance level does not have to be made if any decision is to be reached as a result of an experiment. This will inevitably be a somewhat arbitrary exercise of judgement in the best of circumstances, and it seems reasonable to include in the bases of this judgment all the pertinent information. Books on statistics are likely to dismiss this question with the statement that usually 5% or sometimes 1% is taken as the (alpha) level. A more realistic statement would seem to be that a level somewhere between 40% and 0.0001% will be appropriate for most cases, the exact value being the result of considerable thought on the part of the investigator..."

Statisticians Wallis and Roberts (1960) also emphasized the dangers of accepting the risk of a large beta error. "If a finding is 'insignificant', it is necessary to examine the risk of Type II error which was involved in the test procedure. If the risk of Type II error is large, as it is likely to be if the sample is small and the risk of Type I error low, the finding of ' no significant difference' must be viewed with great reserve. The sample size may be so small and the risk of Type I error so small that even a fairly substantial effect would have little chance of being detected. Under such circumstances, failure to find an effect is not particularly indicative that there is none. In scientific work, the consequences of erroneous claims of verification of new hypotheses are serious, and the risk of Type I error is usually set low: 0.01 and even 0.001 are not uncommon. For practical action, a higher risk of Type I error may be acceptable. But generalization is hazardous, for it is necessary to consider carefully in advance just how serious are the consequences of each kind of error in each specific instance."

Thus, one must consider the practical consequences of both types of error in practical settings where costs and benefits play major roles in decision making. For example, if the cost of accepting a false difference is very high and the cost of rejecting a true difference is low, the alpha level should be set high, e.g., .01 or higher. On the other hand, if the cost of accepting a false difference is low and the cost of rejecting a true difference is high, the alpha level should be set low, e.g., .2 or lower.

Consider now the problem and costs associated with mirror systems on vans. The OEM system consists of two plane mirrors, one on the left side and one on the right side. As noted elsewhere, almost no owners of vans, private or commercial, drive their vehicles without the installation of one or more additional mirrors. In effect, the modifications existing on almost all vans are essentially indentical in number and costs to those which were evaluated in this study. Moreover, the cost of installing one of the two experimental mirror systems during vehicle manufacture over and above the cost of the present OEM plane mirror may only be a few dollars. Thus, the cost of rejecting a difference that is real in the present study will tend to be relatively substantial. Reducing the van accident rate by as little as 5% would have monetary and safety benefits nationwide.

However, the sample size and data gathering period necessary for detecting small percentage differences were clearly beyond the scope of this project. Nevertheless, it is important to stress that the alpha level should be low because benefits completely outweigh costs.

To illustrate the cost-benefit analysis, assume the added cost per vehicle of $3.00 to install convex mirrors during manufacture. The total cost for 2,000 vehicles would be $6,000.00. Assuming a low accident reduction of 10 accidents per two year period, total accident reduction would be 25 for five years, roughly the life of the vehicle in a fleet (but not its total life). Assuming an average cost of repair of $400.00, the total savings would be $10,000.00, $4,000.00 more than the cost. In reality, however, this figure is a gross underestimate because (1) one or more other vehicles are usually involved in the accidents and, therefore, repair costs may be doubled, and (2) there are other costs with fleet accidents such as person-hours lost. With respect to the latter, drivers are temporarily prevented from performing work, supervisors often travel to the scene of the accident, meetings are held between the drivers and one or more fleet personnel, accident reports are filed and other paperwork is performed. In effect, the non-repair costs of an accident may range from $100.00 to $300.00 or more.

Thus, the alpha level selected for this study was .20.

Reproduced from
best available copy.

APPENDIX B

MIRROR DESCRIPTIVE AND INSTRUCTIONAL MATERIALS DESTRIBUTED TO FLEETS

This is a brief description of each of the mirror systems with notes about the features of the mirrors and cautions on using the mirrors. The features and cautions are also illustrated in the table and figures which accompany this page. Please refer to the table and figures for further explanation.

SYSTEM I: OEM Mirror (Original equipment manufacture)
Dimension: Left- 9" w x 6" h, plane mirror
Right-same
Caution: There is a large blind spot on the right hand side, an area that isn't visible through the mirrors. The driver must turn and look directly out the right side windows in order to see vehicles near the van (see Figure 1).

SYSTEM II: Dual mirror
Dimension: Left-Top, 6.5" w x 6" h plane mirror
Bottom-6.5" w x 6" h convex mirror (21" radius of curvature)
Right-same
Caution: since they are very curved, the convex mirror allows the driver to see a large area but also makes the objects seem further away than they are. These convex mirrors are only to be used for detecting objects or vehicles near the van, for distances from the rear bumper to about 60' behind the van. The plane or flat mirrors are to be used for judging the distance to the objects and for detecting objects 40 or more feet behind the van. Remember to use both mirrors; don't just rely on one of the mirrors on either side.

SYSTEM III: Plane and Special Convex mirror
Dimension: Left-same as OEM, System I
Right-10" w x 6.5" h convex mirror (40" radius of curvature)
Caution: The right hand side convex mirror has the inscription, "objects in mirror are closer than they appear." This mirror is less curved than the convex mirror in the Dual system but it is larger, so it views approximately the same area. The convex mirror is to be used for both detecting objects and making distance judgments. Since the mirror is convex, the objects in the mirror will appear to be further away than they really are. The driver must learn to adjust his/her judgment of distance. The driver should use extra caution and use inside mirror and direct looks out the window while getting accustomed to the mirror.

MIRROR ADJUSTMENT
All of the mirrors are to be adjusted so that the driver sees the following areas or objects in the mirror. (1) The inside edge of the mirror should "see" the edge of the vehicle.
(2) The top edge of the mirror should "see" the horizon behind the van.
In addition, the bottom edge of the convex mirrors will allow the driver to see the ground below the rear bumper of the vehicle (See Figure 1).

MIRROR ADJUSTMENT PROCEDURE
(1) Always loosen the mirror head clamp before adjusting the mirror.
(2) Always grasp the mirror by the edge of the mirror head; do not press on the glass as you may break it.
(3) Always retighten the head clamp after adjusting the mirror.

FIGURE ONE: FIELD OF VIEW MAPS
FIELD OF VIEW AND THE GROUND AREAS SEEN THROUGH EACH OF THE MIRROR SYSTEMS

KEY:

Field of view through mirror

Ground areas seen through the mirrors

PLANE, "flat"

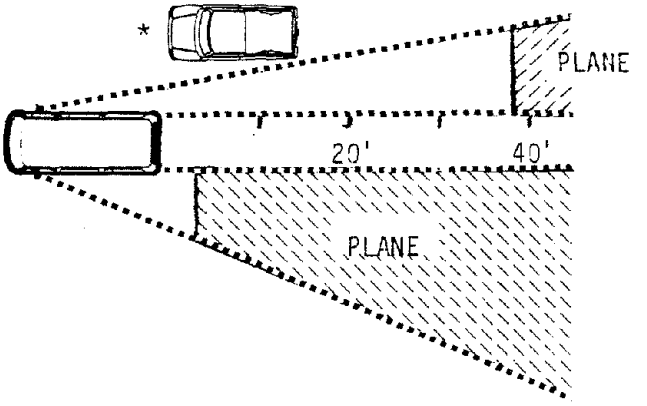
CONVEX,"curved"

BOTH(PLANE & CONVEX)

I. OEM Mirrors

Left: 9 X 6 Plane
Right: Same

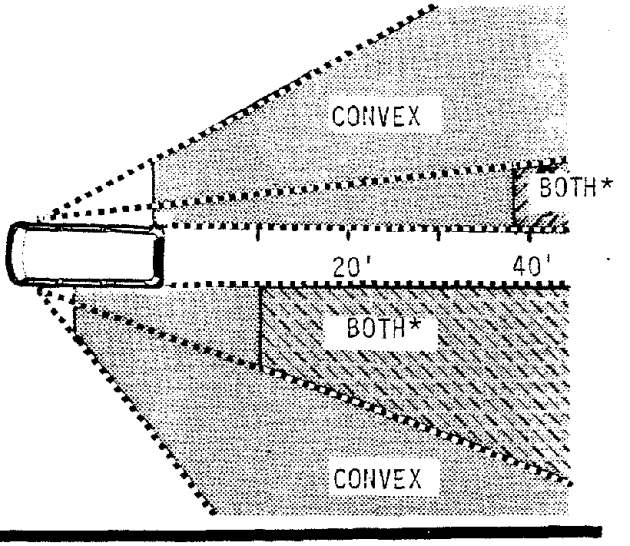
*(car in right lane is not visible in right side mirror)



II. DUAL Mirrors

Left: 6.5 X 6 Plane and
6.5 X 6 Convex (21" ROC)
Right: Same

*(area seen in Plane mirror also seen in Convex)



III. PLANE and CONVEX Mirrors

Left: 9 X 6 Plane
Right: 10 X 6.5 Convex (40" ROC)

*(no Plane mirror on right side)

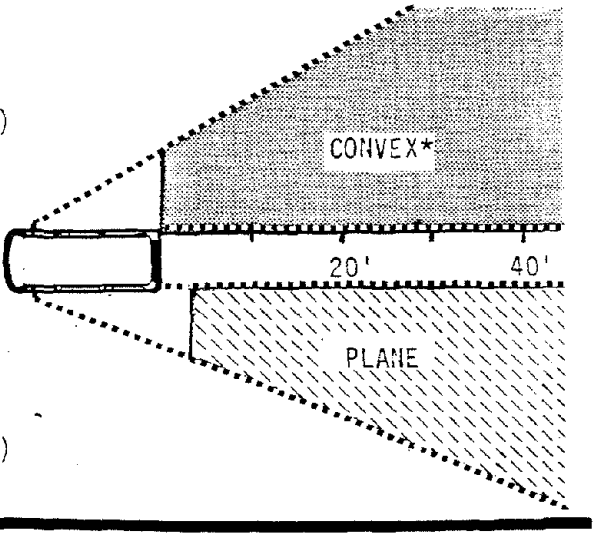


TABLE ONE MIRROR USAGE

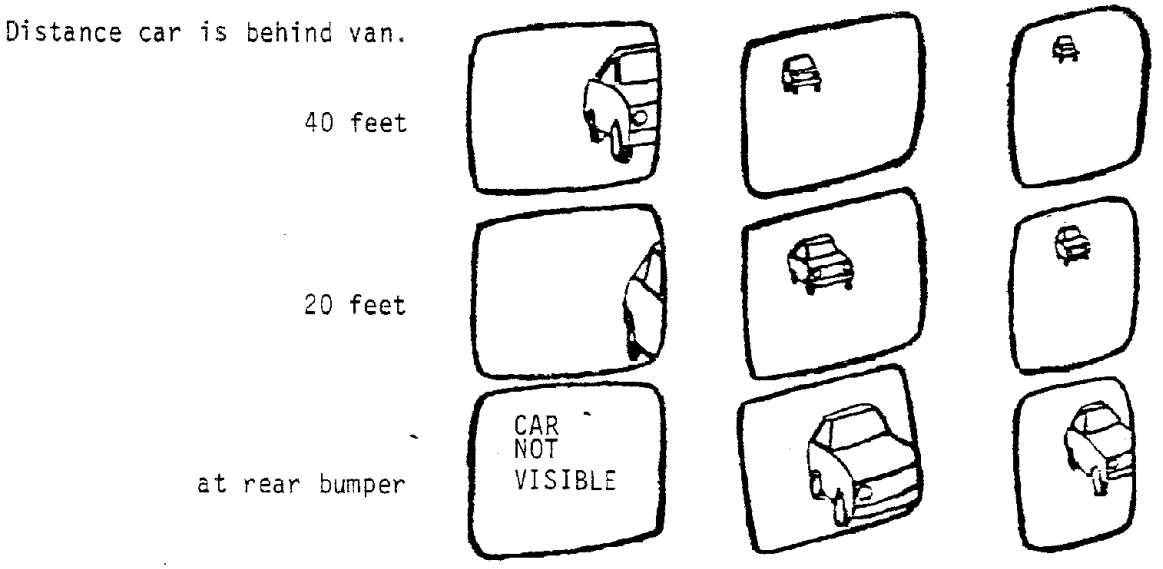
Mirrors are used for detecting objects, people, or other vehicles, and for judging the distance to the objects. This table illustrates which mirrors are to be used for detection and which are to be used for distance judgements. PLEASE HEED THE PRECAUTIONS.

GROUP	MIRROR Side	Type	USE TO DETECT OBJECTS/VEHICLES	USE TO JUDGE DISTANCE	PRECAUTIONS FOR USAGE
I ORIGINAL	Left	Plane	yes	yes	?Right Plane: Large blind spot on right side: Driver must turn head.
	Right	Plane	?	yes	
II DUAL	Left	Plane	yes	yes	? Right Plane: Large blind spot on right side: Driver must use convex to detect objects or vehicles near the van.
		Convex	yes	no	
	Right	Plane	?	yes	
		Convex	yes	no	
III SPECIAL CONVEX	Left	Plane	yes	yes	? Right Convex: Requires learning to make distance estimates: turn head, use inside mirror until accustomed to mirror.
	Right	Convex	yes	?	

FIGURE TWO Image Size in Right Mirrors

The figure below illustrates the image size, in the mirror, of a car approaching the van on the right hand side. Each of the three mirror systems is shown. Notice that the car appears to be much smaller and further away in the convex mirrors. However, the convex mirrors have a larger field of view, so the car is visible in the convex mirror when it isn't visible in the plane mirror.

SYSTEM	I. OEM	III. CONVEX	II. DUAL
MIRROR TYPE	Flat	Moderate Convex	Very Convex
IMAGE SIZE	"normal"	1/2 size	1/3 size



Reproduced from
best available copy.

APPENDIX C

EARLY (AT & T) AND LATER ACCIDENT REPORT FORMS AND CODING SHEETS

(10)

E 10253
7/79

BELL SYSTEM REPORT OF MOTOR VEHICLE ACCIDENT

Computer Input Items

	1	2	3	4	5	6	7	8
A	ACDR	SEC	CASE NUMBER	OSHA ESTAB	REPORT PER	VEH TYPE	VEH TRANS	VEHICLE NUMBER
		A	K090	[redacted]	0383	1	[redacted]	1 1 0 H H H 2 1 8 0

	9	10	11	12
B	DEPT	UNIT CODE E D C B A F	ACC CLASS	COMPANY DRIVER'S NAME
	1 1	A D A B 3 3	2	[redacted]

	13	14	15	16	17	18	19	20	21
C	SEX	EEO	AGE	NCS	DRIV TRNG	REF TRNG	AAP CLASS	JOB FUNCTION CODE	SOCIAL SECURITY NUMBER
	1	[redacted]	27	05	6	1	05	K/30	[redacted]

	22	23	24	25	26	27	28	29	30	31	32	33	34	35
D	ACCIDENT DATE	DAY	TIME	LITE COND	WEA COND	TYPE SURF.	ROAD COND	LOC	RST DEV.	EMP INJ.	NON-EMP INJ	DAMAGE	PRIOR ACC	DRIVING ANAL
	[redacted]	4	09	1	1	1	1	9	[redacted]	[redacted]	[redacted]	2	[redacted]	31

	36	37	38	39	40	41	42	43
E	COLL TYPE	DIR TRAV OTH VEH	ACTION CO VEH	ACTION OTH VEH	IMPACT CO VEH	IMPACT OTH VEH	COSTS	SPECIAL STUDIES
	1	2	54	16	5	1	$ [redacted] .00	[redacted] 00

PUT IN COMPUTER [redacted]

	44
F	ACCIDENT DESCRIPTION
	C W B K D I N I S I V

Accident Information Items

1 [redacted] STATE/AREA GA/ATL

	COMPANY VEHICLE A	OTHER VEHICLE "B" (Use Additional Sheet if More Than One)
4	[redacted]	[redacted]
5	[redacted]	[redacted]
6	[redacted]	[redacted]
7	[redacted]	[redacted]
8	[redacted]	[redacted]
9	[redacted]	[redacted]
10	[redacted]	YEAR AND MAKE OF VEHICLE: 1980 BMW 320
11	[redacted]	VEHICLE BODY TYPE: 2 Door
12	[redacted]	[redacted]
13	[redacted]	EST REPAIR COST $60.00
14	[redacted]	[redacted]
15	[redacted]	[redacted]
16	[redacted]	[redacted]
17	[redacted]	[redacted]

[redacted]

25 DESCRIPTION OF ACCIDENT (Note: If Additional Space Is Required, Use An Attachment – Show "See Attachment")

Camaro vehicle backed into Van-Camper vehicle. Van-Camper vehicle had stopped behind Camaro vehicle. Camaro vehicle was in the process of backing to the curb to park, but was not aware that van-Camper vehicle was behind him.

26 Sketch The Scene Of The Accident, Writing In Street Or Highway Names Or Numbers And Points Of Reference. Identify Vehicles As "A" And "B". If Additional Space Is Required, Use An Attachment – Show "See Attachment". INDICATE NORTH BY ARROW



SEE ATTACHMENT

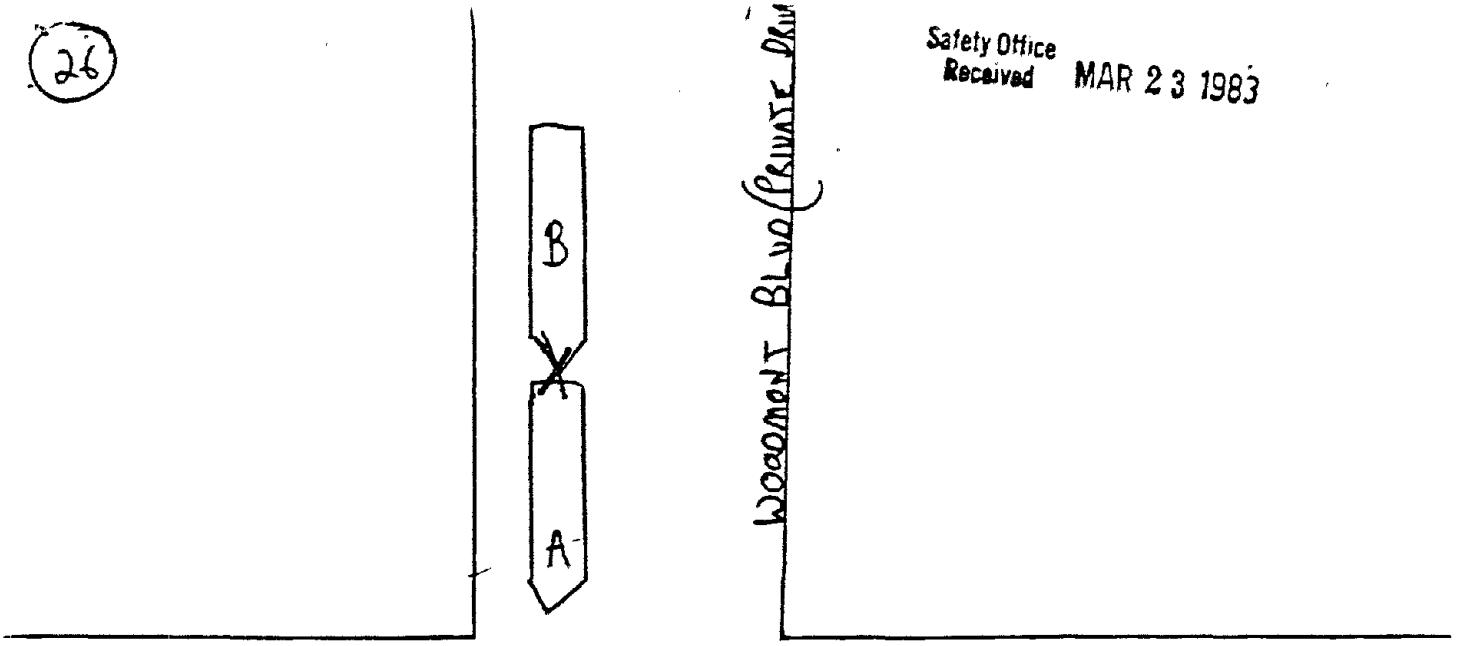
[redacted]

27 DRIVER SUPERVISOR'S NAME TELEPHONE NUMBER

[redacted]

(26)

Safety Office
Received MAR 23 1983



"A" = COMPANY VEHICLE
"B" = NON COMPANY VEHICLE

N

Form E-10253-RF
Front (1-84

BELLSOUTH

Safety Results Plan
Motor Vehicle Accident Report . 189

Computer Input Items

	1. Co. Code	2. ACDR	3. Sec.	4. OSHA Establishment	5. Case Number	6. Report Per.	7. Veh. Type	8. Veh. Trans.	9. Vehicle Number
A	E		Y		0,0,2,6	4,4,C,2	2		2,D-4,4,9,3,9-1,7,9

	10. Dept.	11. Responsibility Code	12. Acc. Class	13. Company Driver's Name
B	1,1 JONES	2,2,1,3,1,2,0,5,0	W	

	14.	15. EEO	16. Age	17. NCS	18. Driv. Trng.	19. Ref. Trng.	20. Job Group	21. Job Title Code	22. Job Function Code	23. Social Security Number
C			3,2	1,4	3	1	0,5	0,5,0,3	4,2,3,0	

	24. Accident Date	25. Day	26. Time	27. Lite Cond.	28. Wea. Cond.	29. Type Surf.	30. Road Cond.	31. Loc.	32. Rst. Dev.	33. Emp. Inj.	34. Non-Emp. Inj.	35. Dam-age	36. Prior Acc.	37. Driving Ana.
D		W	1,7	2	2	1	2	2				2		7,0

	38. Coll. Type	39. Dir. Trav. Oth. Veh.	40. Action Co. Veh.	41. Action Oth. Veh.	42. Impact Co. Veh.	43. Impact Oth. Veh.	44. $ Costs .00	45. Special Studies
E	1	5	1,0	3,7	2	7		

	46. Accident Description
F	VEHICLE FAILED TO YIELD TO EMP RT OF WY - HIT BY C

Put In Computer	
By	
Date	

Accident Information Items

1. Company	Area	Department	Division	District	Address

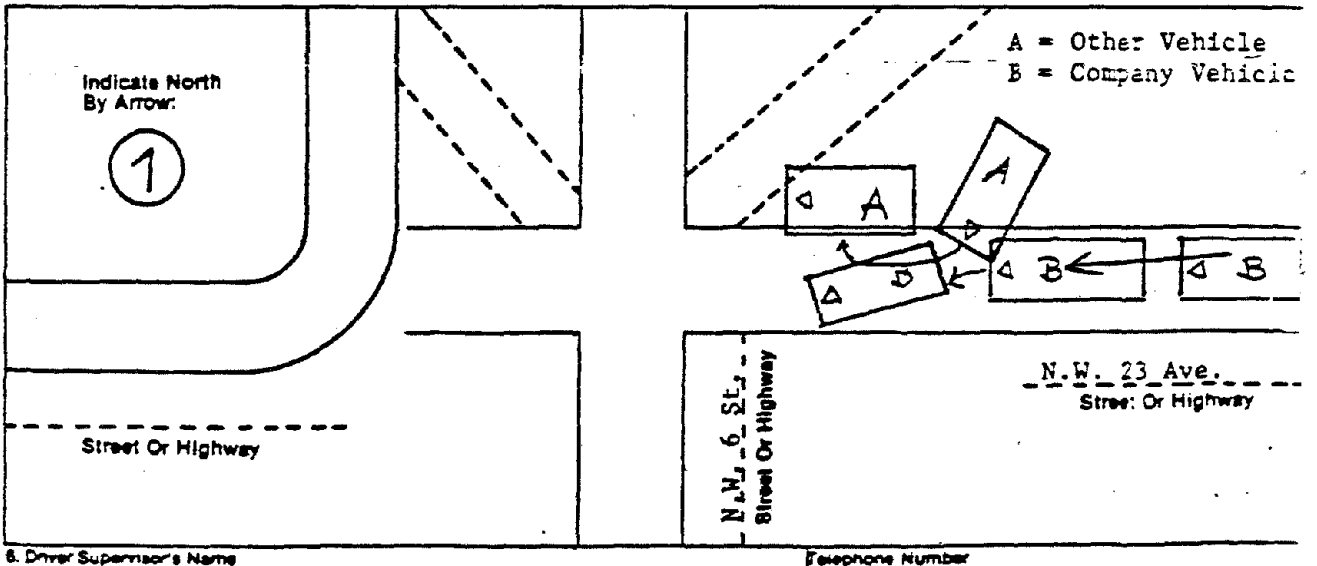
2. Date	Time	AM / PM	Light Cond.	Weather	Type Surface	Road Cond.	Restraint Devices Used	Number Of Prior Acc.

3. Exact Location Of Accident (Intersection, Driveway, Address, Etc.)	Driver Analysis	Accident Classification
Roadway - Nonintersection, [illegible]		

4. Description Of Accident: (Note: If Additional Space Is Required, Use An Attachment-Show: "See Attachment")

Company vehicle was traveling west on 23 Ave. when other vehicle pulled out in front of Company vehicle from a parking lot. Employee in Company vehicle attempted to swe to the left in order to avoid colliding with other vehicle. Company vehicle struck other vehicle on driver's side, causing other vehicle to skid into a utility pole. Other vehicle struck Company vehicle on right front side.

5. Sketch The Scene Of The Accident, Writing In Street Or Highway Names Or Numbers And Points Of Reference. Identify Vehicles "A" And "B". If Additional Space Is Required, Use An Attachment-Show: "See Attachment".



6. Driver Supervisor's Name
C. A. Louie

Telephone Number
(904) 378-9094

Motor Vehicle Accident Report

Company Vehicle A				Other Vehicle "B" (Use Add'l. Forms If More Than One)			
7. Driver's Name		☐ Male ☐ Female	Age	Driver's Name (Full Name)		☐ Male ☐ Female	Age
8. N.C.S. Yrs.	Date Formal Trng.	Date Refresh. Trng.	Job Group	Address (Street, No., City, State)			
9. JFC	S.S. #	R. C.		Tel. # ( )			
10. Title		JTC	EEO	Owner's Name			
11. Home Address (Street, City)				Owner's Address (Street, No., City, State)			
12. Co. Driver's Certificate Exp. Date	State Driver's License No. And Exp. Date			Driver's License No. And State		Expiration Date	
13. State Driver's Restrictions		Year And Make Of Veh.		Year And Make Of Vehicle	1978 Datsun		
14. Vehicle Body Type	Vehicle License No., State, Yr.			Vehicle Body Type	2 Door	Vehicle License No., State, Yr.	
15. Vehicle No.	Transmission ☐ Auto ☐ Manual	Approx. Speed		Name Of Insurance Co.		Approx. Speed	5 MPH
16. Damage To Company Motor Vehicle		Est. Repair Cost	$500.00	Damage To Public Vehicle Or Property		Est. Repair Cost	$2100.00
17. Driver Injuries Claimed				Driver Injuries Claimed			
18. Medical Assistance Rendered Where And By Whom?				Medical Assistance Rendered Where And By Whom?			
19. Others Claiming Injuries	☐ Yes ☐ No -See Below			Others Claiming Injuries	☐ Yes ☐ No -See Below		
20. Names and Addresses Of Uninjured Passengers				Names and Addresses Of Uninjured Passengers			

21. Traffic Violation Charges — Against Whom — Investigation Officer, Name, Badge #, Town

22. Witnesses: Name — Address — Tel. No.

Injuries Claimed Other Than Drivers: (Please Separate Form K-15-RF For Each Employee Requiring Medical Aid.)

23. Name _____ (Print Full Name) ☐ Male ☐ Female	Name _____ (Print Full Name) ☐ Male ☐ Female
24. Residence _____ Address _____	Residence _____ Address _____
25. Nature And Extent Of Injuries Claimed	Nature And Extent Of Injuries Claimed
26. Medical Fac. Where Taken	Medical Fac. Where Taken
27. ☐ In Vehicle "A" (Company) ☐ ____ Age ☐ Pedestrian ☐ In Vehicle "B" (Other) ☐ Passenger ☐ Other	☐ In Vehicle "A" (Company) ☐ ____ Age ☐ Pedestrian ☐ In Vehicle "B" (Other) ☐ Passenger ☐ Other
28. Persons Furnishing Information	Telephone Number
29. Person Preparing Form	
30. Noted By — Title — Date	Noted By — Title — Date
Noted By — Title — Date	Noted By — Title — Date

ITEM CODE	SUBJECT DESCRIPTION	COMPUTER NAME
18	REFRESHER DRIVER'S TRAINING	DRIVER REF TRAINING REF TRNG
	Optional The amount of time since the Company Driver last received or administered refresher-type Driver's Training (Bell System Accident Prevention Plan Package No 16—Defensive Driving or equivalent)	
0	No Refresher Training	
1	Less Than 1 Year	
2	1 to 2 Years	
3	2 to 3 Years	
4	3 to 4 Years	
5	4 to 5 Years	
6	5 Years and Over	
19	AAP CLASSIFICATION	AAP CLASS AAP
	The Company Driver's Affirmative Action Plan Classification Number	
01	3rd Level Management and Above	
02	2nd Level Management	
03	1st Level Management	
04	1st Level Management—Administrative	
05	Salesworkers	
06	Skilled Craft—Outside	
07	Skilled Craft—Inside	
08	No Longer Valid	
09	Semiskilled Craft—Outside	
10	Semiskilled Craft—Inside	
11	Clerical—Skilled	
12	Clerical—Semiskilled	
13	Clerical—Entry	
14	Operators	
15	Service Workers	
20	JOB FUNCTION CODE	JOB FUNCTION CODE JFC
	The Company Driver's 4-digit job function code (Dominant Function Code) Positions 5 and 6 are provided for operating companies' use and may be alpha or numeric characters	
21	SOCIAL SECURITY NUMBER	SOCIAL SECURITY NUMBER SOCSEC
	The Company Driver's Social Security Number excluding hyphens.	
22	ACCIDENT DATE	ACCIDENT DATE DATE
	MMDDYYThe month (01-12), day (01-31), and Year (79, 80, etc.) of the motor vehicle accident	
23	DAY OF WEEK	DAY OF WEEK DWEEK
	The day of the week on which the accident occurred	
1	Sunday	
2	Monday	
3	Tuesday	
4	Wednesday	
5	Thursday	
6	Friday	
7	Saturday	

ITEM CODE	SUBJECT DESCRIPTION	COMPUTER NAME
24	TIME OF DAY	TIME OF DAY TIME
	The time of day the accident occurred	
00	12 01 AM - 1 00 AM	
01	1 01 - 2 00 AM	
02	2 01 - 3 00 AM	
03	3 01 - 4 00 AM	
04	4 01 - 5 00 AM	
05	5 01 - 6 00 AM	
06	6 01 - 7 00 AM	
07	7 01 - 8 00 AM	
08	8 01 - 9 00 AM	
09	9 01 - 10 00 AM	
10	10 01 - 11 00 AM	
11	11 01 - 12 00 Noon	
12	12 01 - 1 00 PM	
13	1 01 - 2 00 PM	
14	2 01 - 3 00 PM	
15	3 01 - 4 00 PM	
16	4 01 - 5 00 PM	
17	5 01 - 6 00 PM	
18	6 01 - 7 00 PM	
19	7 01 - 8 00 PM	
20	8 01 - 9 00 PM	
21	9 01 - 10 00 PM	
22	10 01 - 11 00 PM	
23	11 01 - 12 00 Midnight	
25	LIGHT CONDITIONS	LITE COND LITE COND
	The light conditions at the time of the accident	
1	Daylight	
2	Dawn or Dusk	
3	Dark—But Illuminated (Streetlights, etc)	
4	Dark	
26	WEATHER CONDITIONS	WEA COND WEA COND
	The weather conditions at the time of the accident	
1	Clear	
2	Rain	
3	Cloudy, Overcast	
4	Snow, Sleet, or Hail	
5	Fog, Smog, or Smoke	
6	Blowing Sand, Dust or Snow	
7	Severe Winds	
27	ROAD SURFACE TYPE	TYPE SURF TYPE SURF
	The type of road surface at the scene of the accident	
1	Asphalt	
2	Concrete	
3	Gravel	
4	Dirt	
5	Sand	
6	Other	

ITEM CODE	SUBJECT DESCRIPTION	COMPUTER NAME
28	ROAD SURFACE CONDITION The road surface condition at the time of the accident	ROAD COND ROAD COND
1	Dry	
2	Wet	
3	Icy	
4	Snow, Packed	
5	Slushy	
6	Muddy	
7	Loose Sand, Gravel, etc	
8	Holes, Ruts, Bumps, etc	
9	Other	
29	ACCIDENT LOCATION The location of the accident	ACC LOC ACC LOC
1	Roadway—Intersection	
2	Roadway—Nonintersection	
3	Access or Exit Ramp	
4	Driveway	
5	Alley	
6	Public Parking Lot/Garage	
7	Company Parking Lot/Garage	
8	Expressway, etc	
9	Other	
30	RESTRAINT DEVICES	RESTRAINT DEV RST DEV
Y or 1	Yes	
N or 2	No	
U or 3	Not applicable (unattended vehicle, non employee, legally parked, etc.) Whether or not all occupants in the Company motor vehicle were using the available restraint devices (lap belts, shoulder belts, etc) at the time of the accident. If lap belts and shoulder belts were available, both must have been in use for this item to be coded 'Yes'. NOTE On case input, either the alpha or numeric character may be entered. If the alpha value is input, the computer converts it to its numeric equivalent and stores that value. Ad hoc requests must use the numeric value. All output reports will reflect the numeric value	
31	EMPLOYEE PERSONAL INJURIES The number of company employees injured (excluding first aid-type injuries) and/or killed resulting from the motor vehicle accident.	EMP INJ EMP INJ
0	No injuries or fatalities	
1 to 8	Number of company employee(s) injured and/or killed	
9	More than 8	
32	NON-EMPLOYEE PERSONAL INJURIES The number of non-company persons claiming injuries (excluding first aid-type injuries) and/or killed resulting from the motor vehicle accident	OTHER INJ OTH INJ
0	No injuries or fatalities	
1 to 8	Number of non-company person(s) claiming injury and/or killed	
9	More than 8	
33	DAMAGE The extent of known property damage resulting from the motor vehicle accident	DAMAGE DAMAGE
0	None	
1	Company Vehicle(s) Only	
2	Company Vehicle(s) and Other Vehicle(s)	
3	Company Vehicle(s) and Other Property	
4	Company Vehicle(s) and Other Vehicle(s) and Other Property	
5	Other Vehicle(s) and Other Property	
6	Other Vehicle(s) Only	
7	Other Property Only	
34	PRIOR COMPANY MOTOR VEHICLE ACCIDENTS Optional. The total number of prior measured motor vehicle accidents for this particular driver. Do not include current accident in count of prior accidents	PRIOR ACC PRIOR ACC
0	None	
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	
9	9 or More	
35	ANALYSIS OF COMPANY DRIVER'S DEFENSIVE DRIVING PERFORMANCE Optional. The action (or lack of action) of the company driver as related to defensive driving performance	DRIVING ANAL DRIV ANAL
	(1) Proceeding ahead, changing lanes, passing	
10	Insufficient space cushion—front, back, sides	
11	Failure to adjust speed at hill, curve, intersection, blind spots, etc	
12	Failure to anticipate traffic light change	
13	Failure to anticipate action of others	
14	Failure to signal lane change intentions well in advance	
15	Failure to check surroundings before changing lanes or passing	
	(2) Turns, Intersections	
20	Failure to signal well in advance of turn	
21	Improper position of vehicle for turning maneuver	
22	Failure to check for other vehicle(s)	
23	Did not anticipate the action of others	
24	Failure to be certain other driver(s) is aware of his/her intention	
25	Failure to yield right-of-way	
26	Insufficient space cushion—front, sides, rear	
	(3) Backing Maneuver, Parking Maneuver	
30	Poor selection of parking space or positioning of vehicle	
31	Backing maneuver unnecessary	
32	Failure to back into parking space on arrival so as to avoid backing out on departure	
33	Available person not used as guide	
	(4) Pedestrians	
40	Driver failed to make presence known well in advance	
41	Driver failed to adjust speed	
42	Driver did not anticipate pedestrain action	
	(5) Road Conditions, Weather, Hazard	
50	Did not detect hazard or weather condition soon enough to make an adjustment	

ITEM CODE	SUBJECT DESCRIPTION	COMPUTER NAME
61	Did not adjust for hazard or weather condition	
	(6) Miscellaneous	
60	Performed illegal driving maneuver	
61	Fell asleep	
62	Fainted, suffered a seizure, suffered a heart attack, etc	
63	Under the influence of alcohol, drugs, medication etc	
64	Poor selection of route	
65	Failure to make circle check	
66	Did not detect object or hazard	
69	Failure to perform some other action which he or she could have reasonably performed to prevent the accident	
	(7) NonPreventable	
70	Nonpreventable accident—Company driver did everything he or she could to prevent the accident	
	(8) Excludable	
80	Excludable accident	

36	COLLISION TYPE	COLL TYPE COLL TYPE
	The type of collision	
1	Collision With Another Vehicle	
2	Collision With Other Moving Object(s) Other Than Another Vehicle, eg, Trains, bicycles, animals, etc	
3	Collision With Pedestrian(s)	
4	Collision With Stationary Object(s) (other than motor vehicle)	
5	Noncollision (eg, overturned, ran off road, etc)	
6	Multiple Collision Type (ie, chain reaction or any combination of Codes 1 through 5)	

37	OTHER VEHICLE - DIRECTION OF TRAVEL	DIR TRAV OTH VEH DIR TRAV OTH VEH
	The direction the other vehicle was traveling (in relation to the company vehicle) at the time of the accident. In multivehicle accidents, this code is for the other vehicle that first made contact with the company vehicle	
0	No Other Vehicle Involved	
1	Not Assigned	
2	Same Direction	
3	Opposite Direction	
4	From Company Driver's Left	
5	From Company Driver's Right	
6	Other	

38	ACTION OF COMPANY VEHICLE	ACTION CO VEH ACTION CO VEH
	The action of the company vehicle at the time of the accident	
	(1) Movements essentially straight ahead (include curves in roadway)	
10	Proceeding straight ahead	
11	Changing to left lane or swerving to left	
12	Changing to right lane or swerving to right	
13	Merging (roadway narrows—Does not include entering or leaving traffic, see Codes 30 through 47 of item 38)	
14	Skidding or spinning	
15	Slowing or stopping	
16	Stopped in traffic lane	
17	Starting from a stop	
18	Passing on left	
19	Passing on right	
	(2) Turning Movements	
20	Making left turn	
21	Making right turn	
22	Making U-turn	
	(3) Entering Traffic Lane	
30	From entrance ramp on left	
31	From entrance ramp on right	
32	From shoulder on left	
33	From shoulder on right	
34	From parking space at left curb	
35	From parking space at right curb	
36	From driveway or alley on left	
37	From driveway or alley on right	
	(4) Leaving Traffic Lane—Forward Direction	
40	To exit ramp on left	
41	To exit ramp on right	
42	To shoulder on left	
43	To shoulder on right	
44	Forward into parking space at left curb	
45	Forward into parking space at right curb	
46	To driveway or alley on left	
47	To driveway or alley on right	
	(5) Backing Maneuvers	
50	In roadway	
51	Parallel parking on left side	
52	Parallel parking on right side	
53	Left into diagonal or perpendicular parking space	
54	Right into diagonal or perpendicular parking space	
55	Left from diagonal or perpendicular parking space	
56	Right from diagonal or perpendicular parking space	
57	Into driveway or alley	
58	From driveway or alley	
59	Backing—Other	
	(6) Miscellaneous Movements	
60	Properly parked	
61	Double parked	
62	Improperly parked—Other	
63	Pushing another vehicle	
64	Being pushed	
65	Driverless vehicle in motion	
66	Other	

39	ACTION OF OTHER VEHICLE	ACTION OTH VEH ACTION OTH VEH
	The action of the other involved vehicle at the time of the accident. In multivehicle accidents code reflects vehicle that first made contact with the company vehicle. Code 70 implies no other vehicle involved	
	(1) Movements essentially straight ahead (includes curves in roadway)	
10	Proceeding straight ahead	
11	Changing to left lane or swerving to left	
12	Changing to right lane or swerving to right	
13	Merging (roadway narrows—does not include entering or leaving traffic, see Codes 30 through 47 of item 39)	
14	Skidding or spinning	

ITEM CODE	SUBJECT DESCRIPTION	COMPUTER NAME
15	Slowing or stopping	
16	Stopped in traffic lane	
17	Starting from a stop	
18	Passing on left	
19	Passing on right	
	(2) Turning Movements	
20	Making left turn	
21	Making right turn	
22	Making U-turn	
	(3) Entering Traffic Lane	
30	From entrance ramp on left	
31	From entrance ramp on right	
32	From shoulder on left	
33	From shoulder on right	
34	From parking space at left curb	
35	From parking space at right curb	
36	From driveway or alley on left	
37	From driveway or alley on right	
	(4) Leaving Traffic Lane—Forward Direction	
40	To exit ramp on left	
41	To exit ramp on right	
42	To shoulder on left	
43	To shoulder on right	
44	Forward into parking space at left curb	
45	Forward into parking space at right curb	
46	To driveway or alley on left	
47	To driveway or alley on right	
	(5) Backing Maneuvers	
50	In roadway	
51	Parallel parking on left side	
52	Parallel parking on right side	
53	Left into diagonal or perpendicular parking space	
54	Right into diagonal or perpendicular parking space	
55	Left from diagonal or perpendicular parking space	
56	Right from diagonal or perpendicular parking space	
57	Into driveway	
58	From driveway	
59	Backing—Other	
	(6) Miscellaneous Movements	
60	Properly parked	
61	Double parked	
62	Improperly parked—Other	
63	Pushing another vehicle	
64	Being pushed	
65	Driverless vehicle in motion	
66	Other	
	(7) No Other Vehicle Involved	
70	No other vehicle involved	

0 COMPANY VEHICLE'S POINT OF IMPACT — IMPACT CO VEH / IMPACT CO VEH

The portion of the company vehicle that received first impact of the accident. The terms right side and left side are defined from the reference point of being seated in the company vehicle facing forward.

0	Miscellaneous (includes noncollision accidents accidents caused by cargo falling from the vehicle etc)
1	Front
2	Right Side—Forward of Front Wheel
3	Right Side—Center
4	Right Side - Behind Rear Wheel
5	Rear
6	Left Side—Behind Rear Wheel
7	Left Side—Center
8	Left Side—Forward of Front Wheel
9	Top Undercarriage (includes tires) or Overturned

41 POINT OF IMPACT — OTHER VEHICLE — IMPACT OTH VEH / IMPACT OTH VEH

The portion of the other involved vehicle that received first impact of the accident. The terms right side and left side are defined from the reference point of being seated in the other involved vehicle facing forward.

0	No other vehicle or known damage involved
1	Front
2	Right Side—Forward of Front Wheel
3	Right Side—Center
4	Right Side—Behind Rear Wheel
5	Rear
6	Left Side—Behind Rear Wheel
7	Left Side—Center
8	Left Side—Forward of Front Wheel
9	Top Undercarriage (includes tires) or Overturned

42 COSTS — COSTS / COSTS

Optional. Costs of accident. Operating company will determine which costs are included. Whole dollar values entered only. Dollar sign not entered.

43 SPECIAL STUDIES — SPECIAL STUDIES / SPECSTUD

Optional. For use for special studies as designated by AT&T, individual operating companies, or local units. Positions 1 and 2 are reserved for AT&T use. Positions 3 through 10 are available for operating company and/or local unit use as designated by each operating company. Any alphanumeric characters may be used.

44 ACCIDENT DESCRIPTION — ACCIDENT DESCRIPTION / ADESC

A brief description of how the accident occurred.

45 DATE CASE ENTERED INTO MVAS — DATE FIRST ENTERED / ENTRY

This item is not input by the user. MVAS adds a 'G' line to each case. The first item on the 'G' line is the date the case was first entered into the system. This item can be referenced in Ad hoc.

46 DATE CASE LAST REVISED — DATE LAST REVISION / REVDATE

This item is not input by the user. MVAS adds a 'G' line to each case. The second item on the 'G' line is the date of the most recent revision to the case. On initial entry of a case this item is the same as the entry date. This item can be referenced in Ad hoc.

PUT IN COMPUTER BLOCK

This block is to be initialed and dated when the case has been entered into the computer (add change deactivate reactivate).

ITEM CODE	SUBJECT DESCRIPTION	COMPUTER NAME
7	Trucks (regardless of GVW) equipped with derricks and derrick diggers. Excludes high-pressure earth-boring machines (e.g. Sterling high-pressure diggers)	
8	Truck-Tractors (fifth wheel type) and all supply or equipment delivery trucks having a GVW of 11,001 pounds and over. Includes supply vehicles with power equipment such as winches, tailgates or elevators	
9	All intermediate, full-size, compact and subcompact cars and station wagons regardless of vehicle use	
7 VEHICLE TRANSMISSION		**VEHICLE TRANSMISSION VEH TRANS**
A or 1	Automatic Shift	
M or 2	Manual Shift	
	NOTE On case input, either the alpha or the numeric character may be entered. If the alpha value is input, the computer converts it to its numeric equivalent and stores that value. Ad hoc requests must use the numeric value. All output reports will reflect the numeric value	
8 VEHICLE NUMBER		**VEHICLE NUMBER VEH NUM**
	The company assigned vehicle number (maximum of 12 digits) for the motor vehicle involved in the accident. If the vehicle is not owned by the company, enter the word 'leased' or 'rented' (excluding quotes). Do not include employee owned vehicles. All entries are left justified in this field and exclude dashes	
9 DEPARTMENT CODE		**DEPARTMENT DEPT**
	The Standard Department Code Identifier	
01	Comptrollers	
08	Public Services	
11	Network Distribution Services	
14	Data Systems	
18	Directory	
20	Network Engineering	
22	Executive	
30	Support Services	
38	Legal	
39	Labor Relations	
44	Network Switched Services	
45	Network Planning and Design	
52	Network Operator Services	
54	Corporate Planning	
56	Business Marketing	
57	Business Services	
62	Personnel	
66	Public Relations	
68	Rates and Revenues	
70	Government Relations and Regulatory Matters	
81	Corporate Staff	
84	Treasury	
87	Residence Marketing	
88	Residence Services	
99	Other	
10 LOCAL UNIT CODE		**UNIT CODE UNIT**
XXXXXX(XXX)	The six alphanumeric unit organization code established by each operating company. (The three additional positions in the F field are optional.)	
11 ACCIDENT CLASSIFICATION		**ACCIDENT CLASS ACC CLASS**
X or 0	Excluded	
M or 1	Measured—No Differentiation Breakdown Made	
P or 2	Measured—Preventable, Optional	
N or 3	Measured—Nonpreventable, Optional	
C or 4	Measured—Primary Fault—Company Driver, Optional	
A or 5	Measured—Primary Fault—Another, Not Company Driver, Optional	
U or 6	Measured—Primary Fault—Undetermined, Optional	
L or 7	Measured—Legal Department Restricts Release of Information, Optional	
	NOTE On case input, either the alpha or the numeric character may be entered. If the alpha value is input, the computer converts it to its numeric equivalent and stores that value. Ad hoc requests must use the numeric value. All output reports will reflect the numeric value	
12 COMPANY DRIVER'S NAME		**DRIVER NAME NAME**
	Left justified in the field, the employee's last name, a space, first name, a space, and middle initial. If the 18 spaces provided are insufficient, the employee's first name may be represented by only an initial, and the space between the first and middle initials may be omitted	
13 SEX		**DRIVER SEX SEX**
M or 1	Male	
F or 2	Female	
	NOTE On case input, either the alpha or numeric character may be entered. If the alpha value is input, the computer converts it to its numeric equivalent and stores that value. Ad hoc requests must use the numeric value. All output reports will reflect the numeric value	
14 EEO CODE		**DRIVER EEO CODE EEO**
	The Equal Employment Opportunity code number for the Company Driver	
3	White	
5	Hispanic	
6	Black	
7	Asian—Pacific Islander	
8	American Indian—Alaskan Native	
15 AGE		**DRIVER AGE AGE**
16 to 70	The Company Driver's age as of last birthday	
16 NCS		**DRIVER NCS YEARS NCS**
00 to 50	The Company Driver's full years of Net Credited Service	
17 FORMAL DRIVER'S TRAINING		**DRIVER TRAINING DRIV TRNG**
	Optional. The number of full years since the Company Driver satisfactorily completed a formal driver's Training Course (Advanced Driver's Performance Training—PTC 190—or equivalent)	
0	No Formal Training	
1	Less Than 1 Year	
2	1 to 2 Years	
3	2 to 3 Years	
4	3 to 4 Years	
5	4 to 5 Years	
6	5 to 10 Years	
7	10 to 15 Years	
8	15 to 20 Years	
9	20 Years and Over	

AT&T

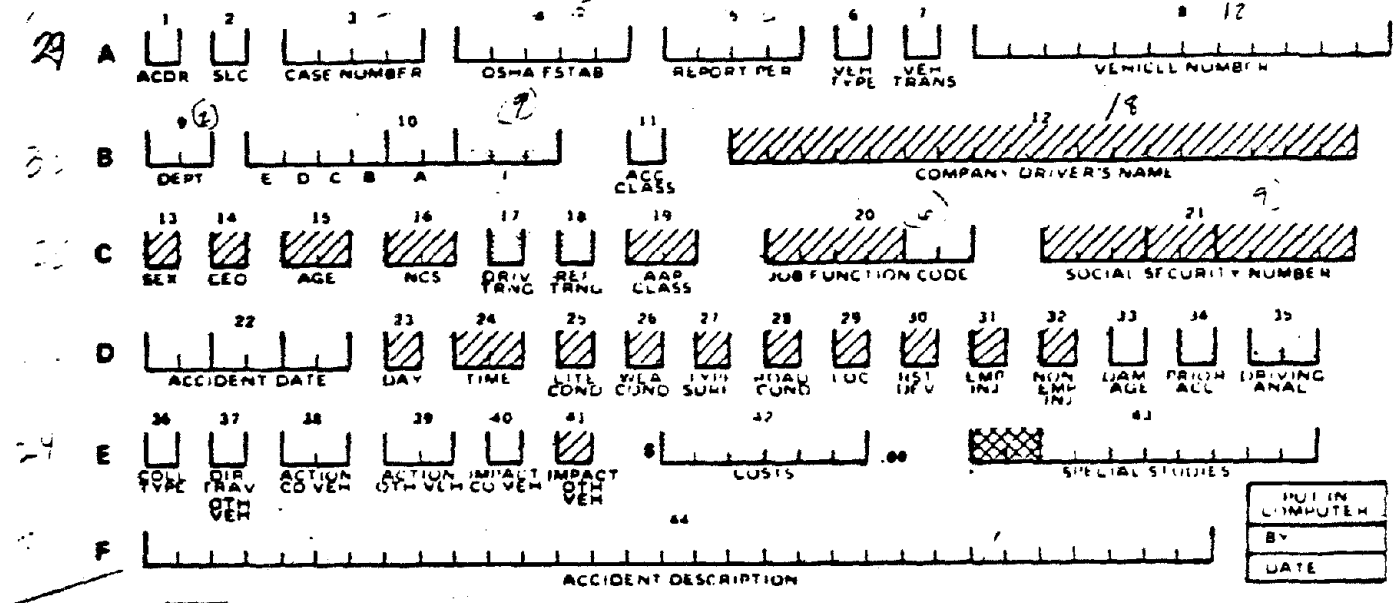
E-10489
ISSUE 2
MARCH, 1981

MOTOR VEHICLE ACCIDENT SUMMARY (MVAS) SYSTEM COMPUTER ITEMS

BELL SYSTEM REPORT OF MOTOR VEHICLE ACCIDENT

E 10253
7/79

Computer Input Items



COMPLETELY OPTIONAL

NOT REQUIRED FOR EXCLUDED CASES

REQUIRED FOR AT&T SPECIAL STUDIES

REFER TO SECTION VIII OF THE BELL SYSTEM SAFETY RESULTS PLAN FOR ADDITIONAL INFORMATION

ITEM CODE	SUBJECT DESCRIPTION	COMPUTER NAME
1	**ADD, CHANGE, DEACTIVATE, OR REACTIVATE**	**LAST ACTION ACDR**
A	A new case added to the system	
C	A change (revision) to a case made subsequent to initial entry	
D	A deactivated case not tallied in the standard reports	
R	Used to reactivate a case previously deactivated After reactivation, 'C' will appear in the ACDR field in the data base	
2	**SECURITY GROUP**	**SECURITY SEC**
A-Z	Assigned by each operating company Allows each user or group to have access only to their data	
3	**CASE NUMBER**	**CASE NUMBER CASE**
0001 to 9999	The case number assigned to the case	
4	**OSHA ESTABLISHMENT**	**OSHA ESTAB OSHA**
NNNNN	This 5 digit numeric item is composed of two parts The first two digits are the numeric code assigned to the company (02-62); the last three digits are assigned by each operating company to each OSHA establishment location (001-999)	
5	**REPORT PERIOD**	**REPORT PERIOD PERIOD**
MMYY	The month (01-12) and year (79, 80 etc.) in which the report is to be counted for internal company results	
6	**VEHICLE TYPE**	**VEHICLE TYPE VEH TYPE**
1	Vehicles up to 8500 pounds Gross Vehicle Weight (GVW) not identified in any other group	
2	Vehicles between 8501 and 11,000 pounds GVW not identified in any other group	
3	Trucks with GVW of 11,001 pounds and over equipped with aerial ladders or lifts Excludes aerial lift trucks specifically designed to place aerial cable (e.g. Telsta, Servilift, and PICO plant placers)	
4	All special purpose vehicles (regardless of GVW) that require time reporting of use by the user department – such as those equipped with air compressors, TV or microwave towers, cranes, high-pressure earth-boring machines, (e.g. Mitey-Mite and Cal-e-arm). Also, all trucks (regardless of GVW) equipped with aerial lifts specifically designed to place aerial cable (e.g. Telsta, Servilift, and PICO plant placers) Not included are dump trucks, tow trucks, etc	
5	Not assigned	
6	Trucks with GVW of 11,001 pounds and over not identified in any other group	