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STATISTICAL ANALYSIS OF THE MVMA SIDE IMPACT TEST DATA

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FINAL REPORT

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16. Abstract

Results of a statistical analysis of 40 full-scale side impact tests conducted by MVMA to evaluate NHTSA and European test procedures are presented. The first sixteen tests were conducted with the NHTSA side impact dummy following the NHTSA-proposed test procedures. The remaining 24 tests were conducted with the European side impact dummy, and included the both the NHTSA and European test procedures, as well as a combination of the two. The objectives of the tests were to determine the ability of the test procedures and dummies to discriminate the effects of deliberate changes in the test vehicle, and to evaluate the compatibility of the NHTSA and European test procedures.

The effect of door padding was highly significant under all conditions tested for many of the dummy measures (particularly upper body). The ability of the EUROSID to detect the stiffened vehicle side structure was inconsistent. Some of the lower body measures were able to discriminate the changes in side structure when the European barrier face was used. When tested according to the NHTSA procedure, most of the dummy injury measures were higher for the EUROSID as compared to the NHTSA SID. Among the injury measures, the Thoracic Trauma Index (TTI) in particular, and deceleration measures in general, had smaller variances and discriminated effects with greater statistical significance. Variability was substantially greater for the Viscous Criterion and deflection measures.

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Contents

1 INTRODUCTION

1.1 Background

Over the past several years the Motor Vehicle Manufacturers Association (MVMA) has been conducting a test program to evaluate the National Highway Traffic Safety Administration (NHTSA) and European Experimental Vehicle Committee (EEVC) side impact testing procedures and some of their individual components. Testing started in 1982 with an evaluation of the NHTSA full vehicle side impact test. This test series consisted of 16 runs using identical Ford LTD cars and the current NHTSA Side Impact Dummy (SID). The independent variables for this first test series included two levels of interior door padding, the baseline vehicle side structure versus a reinforced side structure, and two locations of the dummy based on proximity to the struck-side door. The eight-run test matrix included all combinations of the three independent variables, each having two levels. The eight-run test matrix was repeated with a second SID allowing estimation of the variance between similar dummies (reproducibility). The objective of this test series was to evaluate the variability of the proposed NHTSA side impact test procedure and the ability of the test to discriminate the effects of the independent variables.

The results from the initial series of tests were promising. Reproducibility from dummy to dummy was good, as was the variability of most injury measures. The effects of the door padding and the reinforced side structure were significant, while the proximity of the dummy to the struck door did not have a significant effect on injury measures. The results of these tests are presented in a report from MGA Research Corporation entitled, *Summary of Side Impact Crash Testing and Crush Testing – Final Report*[1].

MVMA went on to conduct three additional series of tests, each with eight runs, for a total of 24 additional tests. These additional tests were conducted to investigate the compatibility of the European testing procedures with the NHTSA procedures. All 24 test were conducted with the recently introduced European Side Impact Dummy, EUROSID.

Unlike the original series of 16 runs, each of the additional series of tests investigates only two variables, vehicle side structure and door padding. The third variable, which considered the proximity of the dummy to the struck side door, was found to have no significant effect on the dummy's response; therefore, it was eliminated from the design matrix, reducing the number of tests by half. The two remaining variables, at two levels each, provided four sets of conditions. Replicated once, these four sets of conditions provided eight tests in each series.

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1. *Summary of Side Impact Crash Testing and Crush Testing – Final Report.* MGA File No. C85 A-26. This report is also available from NTIS and is filed in NHTSA Docket 79-04.

The three test series varied according to the test procedure followed (a crabbed or a 90 degree impact) and the barrier face used on the striking vehicle (NHTSA or EEVC). The three series configurations formed were a pure NHTSA test using the EUROSID, a pure European test (90 degree barrier and the EEVC barrier face) using EUROSID, and the NHTSA (crabbed) barrier with the EEVC barrier face using EUROSID. Each of these configurations can be compared to the NHTSA procedure and SID tested in the initial 16-run series. In all, data from 40 full-scale tests are available to evaluate and compare NHTSA and European side impact test procedures.

1.2 Analysis Objectives

The analysis objectives are twofold. Each of the three additional series of tests can be analyzed separately in the same manner as the initial series. The objectives of this analysis are the same: to evaluate the variability of the test and its ability to discriminate between the effects of two levels of door padding and between two levels of side structure. Dependent variables for the analysis are the various injury measures derived from the dynamic measurements made in the dummy.

The second level of analysis addresses comparisons across the three additional test series plus the initial test series. Here the independent variables are the SID (NHTSA versus European), the test procedure (NHTSA crabbed barrier versus EEVC 90 degree barrier), and the barrier face (NHTSA versus EEVC). The objectives are to evaluate the association of the variables distinguishing the four test series with the levels and variability of the injury measures, as well as their ability to detect changes in the basic independent variables, door padding and side structure.

1.3 Organization of Report

The material in this report is organized into five sections. The first three, Introduction, Experimental Design, and Summary are intended to provide an overview and summary of this effort. Section 4 presents the separate analysis of each test series. Here the focus is on the ability of the various dummy measures to detect changes in door padding or side structure. The analysis of the initial 16-run series is repeated here for purposes of comparison. Comparisons across the four test series are presented in Section 5. Here, an effort is made to relate the differences in the test series to the factors distinguishing one series from another (i.e. the dummy, crabbed barrier, and barrier face).

2 EXPERIMENTAL DESIGN

The test matrix was designed as a replicated 2 by 2 factorial experiment. The four runs correspond to the four possible combinations of the upper and lower level of the two independent variables, door padding and side structure. Replication of each of the four runs allows estimation of the variance. The design is balanced and orthogonal.

The two independent variables, struck side door padding and the composition of the vehicle side structure, were investigated at two levels of treatment. The struck side door interior trim panel was replaced with either a piece of 0.125 inch thick masonite hardboard or 0.125 inch thick hardboard padded with Arcel 506 foam, 5 inches thick at the thorax and 6 inches thick at the pelvis. The extremely thick foam was chosen to prevent the dummy from bottoming out on the hardboard beneath. The arm rest attached to the door panel had also been removed to prevent additional variations induced by the dummy arm rest interactions.

The vehicle side structure was left as received from the manufacturer for the baseline level, or modified to give about twice the lateral strength as the unmodified vehicle. These modifications consisted of strengthening the "A" pillars and placing a strengthening channel between the "B" pillars.

It must be noted that the above modifications to the door padding and side structure were not intended to be production-feasible. The modifications were intended to investigate the dummies' ability to detect large changes in potential countermeasures. Also, the test dummy was placed in the passenger position to avoid interactions with the drive controls, which might confound the experiment.

This basic eight-run design was used for each of the three additional series of tests with the EUROSID. This design differs from the initial 16-run series only in the omission of a variable specifying the proximity of the dummy to the struck side door and the use of only a single dummy for all 24 tests.

The three eight-run test series were distinguished by the test procedure used. In order to better quantify the effects of some of the components of the NHTSA and European side impact tests on the dummy's response, certain factors were manipulated among the tests. In the first set of eight runs, the NHTSA SID was replaced with the EUROSID, and tested with the crabbed (NHTSA) barrier and the NHTSA barrier face. When examined in light of the original sixteen tests, these tests would provide a comparison of the two dummies under the same (NHTSA) conditions. The second series of eight tests were designed to mimic the European test performed on an American car. The conventional (90 degree) barrier and the EEVC barrier face were used. This test would allow direct comparison of the NHTSA and EEVC testing procedures on the same vehicle. The last series of tests was a hybrid that involved using the NHTSA crabbed barrier where the barrier face

normally used in the NHTSA test had been replaced with an EEVC barrier face. Comparing these tests with the full NHTSA test using EUROSID would provide a means of quantifying the changes brought about by using the softer EEVC barrier face. Again, a single European Side Impact Dummy was used in all of the 24 tests comprising these three series.

For each of the 24 full-scale side impact tests, the following variables were recorded:

- Upper and lower spine lateral acceleration (G) levels
- Upper, center, and lower rib lateral acceleration (G) levels
- Lateral and resultant pelvic acceleration (G) levels
- Right iliac and pubic symphysis pelvic forces
- Resultant head acceleration (G) levels
- Upper, center, and lower rib deflections
- Lateral door accelerations (4 locations)
- Lateral far sill acceleration (G) levels
- Longitudinal CG Barrier acceleration (G) level
- Delta MBD Contact

Other injury measurements computed from the recorded variables include:

- Thoracic Trauma Index (TTI), by three methods
- Viscous Criterion (V*C), for each rib
- Head Injury Criterion (HIC)

The test data sets were processed and provided by MVMA as a set of scalar values. No further processing of the data was carried out by UMTRI for the analysis. However, in an effort to limit the analytic effort, the original data set was reduced to 18 dependent variables. This was accomplished by deleting the measures recorded on the body of the vehicle and by removing redundant values such as two of the calculated TTI values. Thus, all of the injury measures were included as dependent variables (except the two redundant TTI calculations). The full matrix of test data provided for analysis can be found in Appendix F.

3 SUMMARY

This section presents an overview of the findings, organized topically. More complete discussions are presented in the remainder of the report describing each of the analyses that were carried out.

3.1 Ability to Detect Change

Each of the test series was designed to determine how well that particular test configuration and dummy could discriminate between two levels of door padding and side structure. In general, door padding had a large effect that was highly significant. Padding reduced injury measures from 25 to 50 percent. From this point of view, the results were similar from all four test series (including the original 16-run series). Most of the dummy measures showed this effect.

In contrast, the ability of the test to discriminate the effect of the reinforced side structure was inconsistent. When a side structure effect was significant, the magnitude of the effect was usually less than half the effect of padding, with a correspondingly lower significance level. Of more importance is that the side structure effect usually occurred in combination with the padding-structure interaction term. The net effect of the reinforced side structure was to *reduce* the effect of the padding. In other words, padding and side structure were interchangeable in the sense that the reinforced side structure somewhat reduced the need for padding. However, the combination of padding *and* the reinforced side structure never produced injury measures appreciably lower than those achieved by padding alone. The appearance of this side structure effect varied from one injury measure to another, from the NHTSA SID to the EUROSID, and from the NHTSA to the EEVC barrier face. This finding is discussed further under both Dummies and Test Procedures below.

3.2 Injury Measures

The comparison of injury measures is largely a comparison of their variability. This analysis did not address biofidelity. Measures with low variance discriminated the difference in the various levels with higher statistical significance than more variable measures. Deceleration measures in general, and the TTI in particular, had lower variances. Deflection measures and the Viscous Criterion had substantially higher variances. The force at the right pelvic iliac showed a substantially higher coefficient of variation than other pelvic measures, and did not discriminate effects well.

3.3 Dummies

The EUROSID consistently produced higher injury measures than the NHTSA SID. The difference was greatest when the EUROSID was placed in the NHTSA test (crabbed barrier and NHTSA face). The two dummies produced the most similar results when the EUROSID was tested with the crabbed barrier (NHTSA) and the EEVC barrier face. Nearly all of the differences in mean values of the injury measures from one test series to another were statistically significant.

Of particular interest is the ability of the EUROSID to measure rib deflections, and support calculation of the Viscous Injury Criterion. However, the rib deflections were found to be much more variable than acceleration measures, and the Viscous Criterion were highly variable as well. Average values for the Viscous Criterion ranged from 0.2 to 0.4 m/s, well below the EEVC-suggested tolerance limit of 1.0 m/s. This limit was not exceeded in any test.

Variability of the thorax decelerations and TTI were comparable in the EUROSID and NHTSA SID. Each dummy detected the effects of door padding comparably. Pelvic measures were somewhat less variable in the EUROSID. Overall, the EUROSID did not discriminate the effect of side structure as did the NHTSA SID. The TTI from the EUROSID never showed a side structure effect like that seen in the NHTSA SID. However, the ability of other injury measures, particularly those in the pelvis, to discriminate the effect of the reinforced side structure seemed to vary with the type of barrier face used. This finding is summarized in the next section.

3.4 Test Procedures

The four test series did not provide a balanced design when combined, since the NHTSA SID was run only in the complete NHTSA test procedure. Thus, the various configurations tested do not allow the effects of each of these variables (crabbed barrier, and barrier face) to be estimated independently. Inferences with regard to these variables can be based only on pairwise comparisons of the four test series. However, the primary difference observed was a tendency for the lower-body measures to show a significant effect for the side structure variable in the last two test series employing the EEVC barrier face. This effect was more pronounced in the last series that combined the crabbed barrier and the EEVC barrier face. The nature of the effect was to significantly lower the effect of the door padding when it was combined with the reinforced side structure.

When tested with the NHTSA procedure (NHTSA face on the crabbed barrier), none of the EUROSID injury measures detected an effect of side structure as did the NHTSA SID in the same test procedure. When tested in the European test procedure (EEVC face on the 90 degree barrier), the EUROSID pelvic measures showed a side structure effect. In the combined test with the crabbed barrier and the EEVC barrier face, some of the EUROSID upper body measures as well as the pelvic measures discriminated the effect of side structure. Thus, the EEVC barrier face is associated with an increased ability of the EUROSID to detect the effect of the reinforced side structure.

3.5 Homogeneity of Variance

It is appropriate to take the view that these tests are primarily concerned with variability. The variability of a measure determines the significance level for a given magnitude of effect observed. The basic assumption of the analysis of variance carried out for each test series was that the variance of each measure was the same for each test condition. As discussed in the next section, this assumption is examined by the "non-homogeneity test," and for the most part, variances were not shown to violate this assumption to a significant degree. However, sample sizes were not sufficient for this test to have much power, so that even relatively large variance differences were not statistically significant.

An alternative approach was explored which viewed the signal to noise ratio as the primary dependent variable. This approach acknowledges that the ability of a test to discriminate between levels of an effect is not related solely to the magnitude of the effect, or to the variability of the measure, but to the ratio of the signal level to signal variability. If test variability is also influenced by the various independent variables, then analysis of the signal/noise ratio might produce a more meaningful result incorporating both aspects of the problem. In general, this was not the case. Signal to noise ratios did not generally show any strong relation to the independent variables. Thus, there is very little indication that the variance is influenced by the independent variables. Variances are, in fact, relatively homogeneous, and simpler measures like the coefficient of variation are adequate to characterize the variability of a measure.

4 SEPARATE ANALYSIS OF EACH SERIES

Each of the last three series of tests employing the EUROSID, referred to as Series B through D in this report, was analyzed separately. The objective of this analysis is to determine the ability of the test to detect changes in the dummy injury measures that are related to the modifications to the interior door padding and side structure of the vehicle. The results of these three separate analyses are presented in this section. Although the results of the original 16-run series, referred to as Series A in this report, have already been published by MGA, this analysis was repeated here first to facilitate comparisons. Before relating the results, a brief description of the analytic method used is provided.

4.1 Analysis of Variance

When a comparison is made between two measures that are assumed to be distributed normally, two characteristics of the response should be considered, the mean value and the variance. Comparing the means of the values alone may not be sufficient. For example, two quantities can have very different means, but if one or both of the quantities have a large variance, the difference observed may be only the result of the random variation of the measures, and, thus, not statistically significant. Consequently, the variation of a measure becomes a very important characteristic. The basic approach taken here is to view the responses and changes in response in relation to the variability of the response.

The technique employed is the analysis of variance (ANOVA). The factorial design in two levels is a very efficient one for analysis. Factorial designs are balanced in that all combinations of the two levels of each of the independent variables are run. An important consequence of the factorial design matrix is that independent estimates are produced for the main (linear) effect of each variable, as well as the interaction of the variables. Furthermore, each estimate has the same variance. The basic model employed for each analysis is the following:

$$I.M. = C + b_1*VSS + b_2*DP + b_{12}*VSS*DP$$

Where: I.M. = the injury measure
C = constant, or average value for a measure
VSS = vehicle side structure
DP = door padding
b_1 = effect of vehicle side structure level
b_2 = effect of door padding level
b_{12} = effect of the interaction of side structure and door padding

The high and low levels of the two independent variables have been assigned the values +1 or –1. The +1 level of the factor corresponds to the unmodified side structure or the unpadded interior door padding (i.e., VSS =+1 or DP =

+1). The –1 level corresponds to the reinforced side structure or the padded interior door (i.e., VSS = –1 or DP = –1). For the factorial design with the levels of the independent variables recoded in this manner, the estimated effects are identical to the coefficients in the linear least squares model of the same form. The two approaches are equivalent in this application.

We would expect the rather extreme countermeasures employed to produce significant and predictable outcomes. For example, it could be expected that a reinforced side structure should significantly reduce injury measures. We would then expect to see positive values for the main effects of vehicle side structure producing a reduction in the measure when combined with the –1 (reinforced structure) level. As we will see, in some cases this is true and in others it is not.

The statistical significance of each coefficient estimated by the model is measured by an F ratio. The F distribution provides the probability (significance level) for a particular F ratio. This probability reflects the chances of the effect occurring simply as the result of the variability of the measure. Thus, if the probability is very small, the effect is said to be significantly greater than the variability of the measure. The probability for a particular F-ratio depends on the sample sizes, and is shown below. The first set of values is for the original 16-run series, and the second set apply to all three of the additional eight-run series. For a given sample size, the higher the F-ratio, the more significant the result.

	F Ratio Level	
Alpha Level	Series A	Series B, C, & D
.01	9.33	21.2
.05	4.75	7.71
.10	3.18	4.54

The listing below explains the notation used for the dependent and independent variables. The injury measures (dependent variables) have been broken into three groups as shown. The two head injury measures have been excluded from the graphical presentations, although the analyses was carried out for them. This reduces the number of dependent variables to 16.

Dependent Variables

1. Acceleration Based Measures

   - TTI NHTSA Rule Maker –> TTI
   - Upper Rib Peak Lateral Acceleration –> UR g's

- Center Rib Peak Lateral Acceleration –> CR g's
- Lower Rib Peak Lateral Acceleration –> LR g's

2. Deflection Based Measures
   - V*C Maximum Upper Rib –> U V*C
   - V*C Maximum Center Rib –> C V*C
   - V*C Maximum Lower Rib –> L V*C
   - Upper Rib Deflection, (in) –> UR DEF
   - Center Rib Deflection, (in) –> CR DEF
   - Lower Rib Deflection, (in) –> LR DEF
3. Remaining Acceleration Based and Pelvic Measures
   - Upper Spine Peak Lateral Acceleration –> US g's
   - Lower Spine Peak Lateral Acceleration –> LS g's
   - Pelvis Peak Lateral Acceleration –> PL g's
   - Pelvis Peak Resultant Acceleration –> RP g's
   - Pelvic Force, Right Iliac –> PFRI
   - Pelvic Force, Pubic Symphysis –> PFPS

<u>Independent Variables</u>

Vehicle Side Structure –> VSS

Interior Door Padding –> DP

The analysis of variance table allows each of the terms in the model to be evaluated. The ANOVA table breaks the total variation in the data (sum of squares) into five orthogonal components: one associated with each of the four coefficients in the model plus a residual (error) sum of squares. Each has one degree of freedom. The test of significance is based on a comparison of the mean square error associated with the particular coefficient (effect) with the residual mean square error. With one degree of freedom, the mean square error is the same as the sum of squares. An effect is said to be significant if it's mean square error is substantially larger than the residual sum of squares. This is equivalent to saying that the variability accounted for, or removed from the data, by the effect is large in comparison to the variability of the injury measure. When used with a factorial design, this commonly used technique is quite powerful. The accuracy of the calculated significance level requires the error to be normally distributed, but the

estimates of the effects are robust (accurate) even in the face of rather extreme deviations from normality.

There is another advantage that arises from the use of this model with the replicated four-run factorial design employed for each test series. Each of the four replicated runs provides an independent estimate of the variance of each injury measure. The four replicates in a test series can be averaged to provide an estimate with four degrees of freedom. These estimates are compared across measures within a test series, and across series for the same injury measure. They provide an estimate of the inherent variability of each injury measure *that is not influenced* by the effects of either the door padding or the side structure. As such, this estimate is referred to as a "pure error" estimate.

When used with a factorial design with four unique test conditions, the model shown above is "saturated" since there are four coefficients in the model. If there were only four observations (no replications), the model would reproduce the data *exactly*. With the replicate observations at each test condition, the model will *exactly* reproduce the average of the replicate runs at each test condition. In this application, the residual mean square calculated in the ANOVA is exactly the pure error estimate described above. Thus, the significance tests from the ANOVA are based on a comparison with a pure error estimate that is not inflated by the effects of any of the independent variables in the model. Since the orthogonal design produces independent estimates of each coefficient, the omission of terms that are not found to be significant does not affect the estimate for the coefficients remaining in the model. A single ANOVA table provides all of the information that would be obtained by running one-way ANOVA tables on each factor separately.

The pure error variance is also used in the construction of the confidence intervals on the differences of the mean values. When the variances for two means are pooled and the intervals are constructed, the intervals can be examined to determine the significance of the differences in the average level of an injury measure from one test series to another.

A basic assumption of the method employed is that the variance of a measure is constant from run to run. In order to verify this assumption, Bartlett's test for homogeneity of the variances was carried out as part of every analysis. Box's small sample approximation for the F distribution was used to calculate the significance level for this test, since the cell sizes were always less than 10. Based on this test, the variances were seldom found to be significantly different. Hence the assumption of homogeneity is not contraindicated. However, the sample sizes were quite small for this test and, consequently, the differences in variance would have to be quite large in order to be significant. This aspect of the analysis is addressed further in the last section where a signal to noise ratio is used as the dependent variable.

4.2 Series A: Original 16 Tests, NHTSA Test Procedure and SID

For comparison, the analysis of the original 16-run is repeated here. The TTI measure, lower rib peak lateral acceleration, and the resultant pelvis peak acceleration showed the ability to discriminate between both the door padding levels and the vehicle side structure. A significant interaction term was also present in the lower rib peak lateral acceleration. The upper rib lateral acceleration, and upper and lower spine lateral acceleration showed the ability to discriminate door padding, while the resultant head acceleration discriminated the side structure.

With the use of the reinforced side structure, all of the measures available showed a decrease in their response levels. This result tends to support the expectation that a reinforced side structure should reduce the injury measure. The addition of door padding also reduced the response of the injury measures. Figure 1 shows the observed levels of the TTI for each of the 16 runs in the original series of tests. The effects described are readily apparent. The observations are ordered according to the levels of the independent variables, and should be viewed in groups of four. For example, the first four bars are the runs with the baseline structure and no door padding. Of these, the first two are the two NHTSA SID dummies at the far seating location (proximity to the struck side), followed by the same two dummies at the near seating location. There is little difference among these four runs, reflecting the original finding of no significant difference among SID dummies or for proximity to the struck side. Consequently, these variables have been dropped from the present analysis, and the four runs are viewed as replications of the baseline structure, no padding condition. The second group of four bars corresponds to the baseline structure with door padding. The last two groups of four show the tests with the reinforced side structure, first without padding and lastly, with padding.

Viewing Figure 1, door padding has the largest effect, reducing the TTI. Comparing the last eight bars with the first, one sees that the TTI is lower on the average for the reinforced structure, but that the effect of padding is somewhat smaller. In particular, the combination of padding and the reinforced structure (the last group), is not appreciably lower than padding in the baseline structure (the second group). Although the interaction term in the model is not statistically significant, its effect clearly is of practical significance.

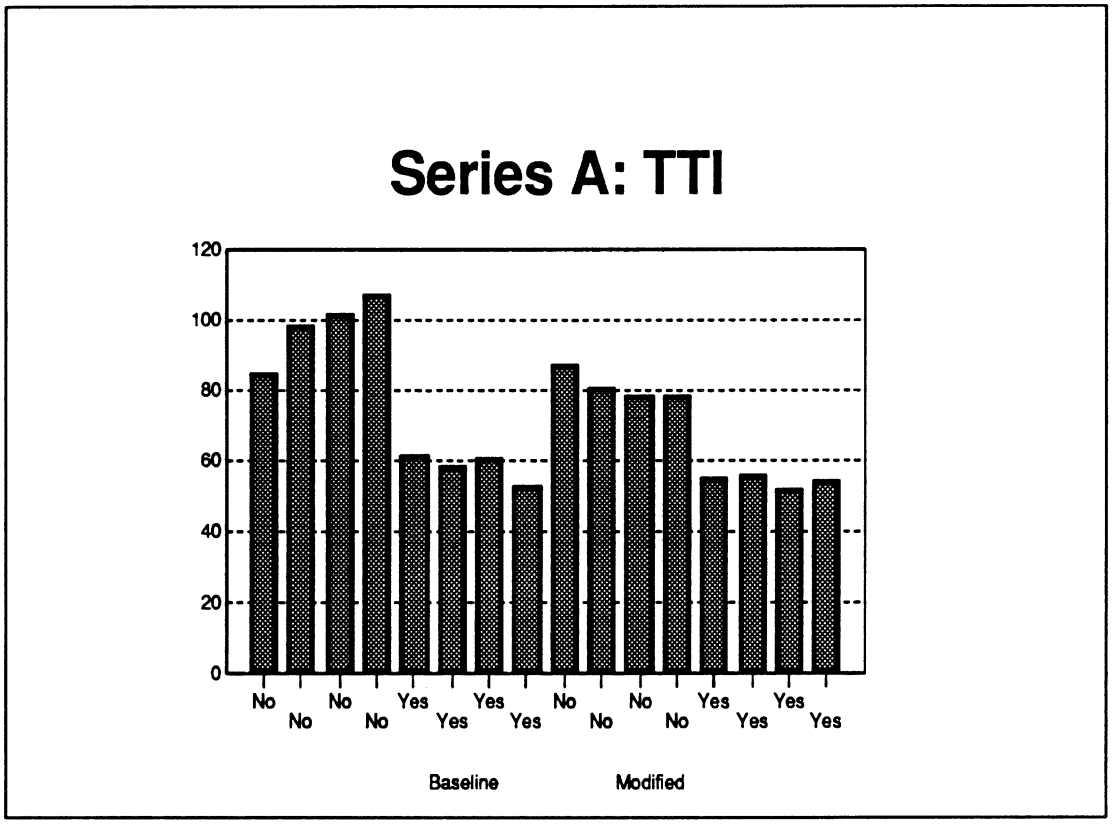

Figure 1: Series A, Thoracic Trauma Index

Figure 2 shows a similar result for resultant pelvic peak acceleration. The upper rib peak acceleration also detected the influence of padding, but the side structure effect was not statistically significant. Observations for this injury measure are shown in Figure 3. The increased variability of this measure appears to contribute to its inability to discriminate the effects. These figures are characteristic of the results of the original 16-run test series, and provide a reference for viewing the results of the next three series conducted with the EUROSID. F-ratios for each of the three terms in the model are shown for each injury measure as bar charts in Appendix A, Figures A-1 and A-2. The complete results of the analysis of variance, including the magnitude of the effects and significance levels are in Appendix B.

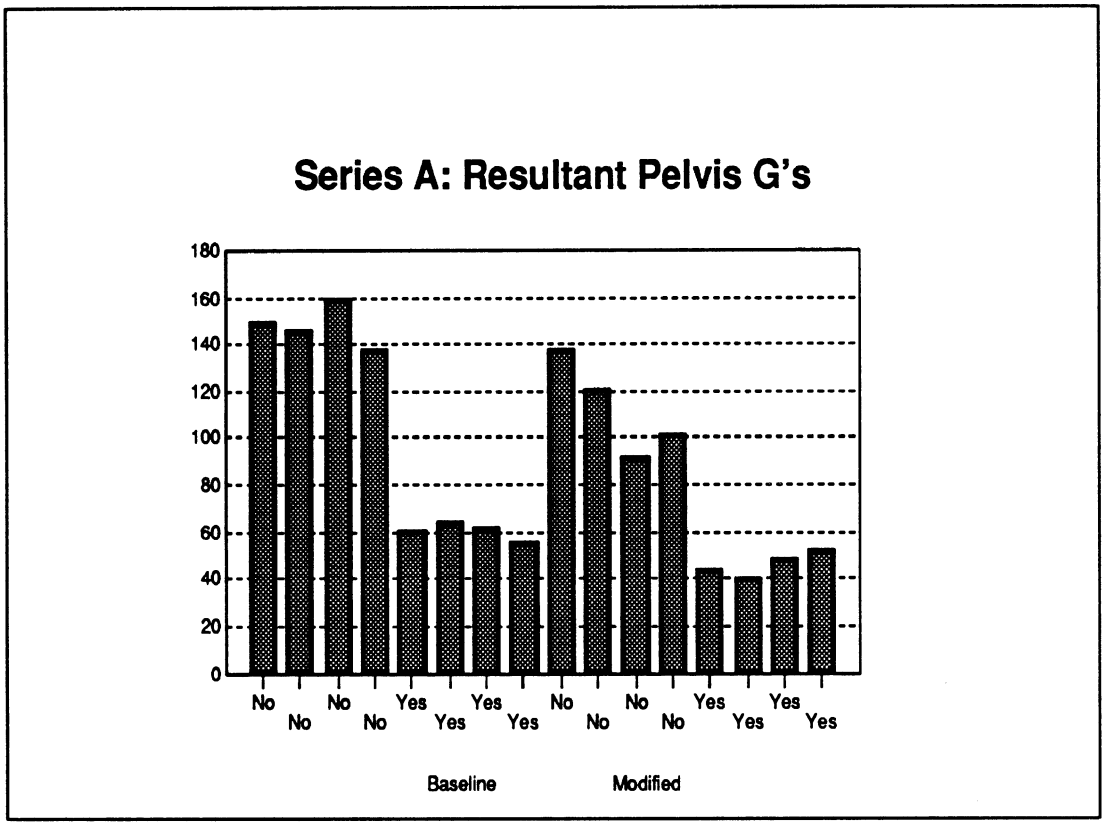

Figure 2: Series A, Resultant Pelvic Acceleration

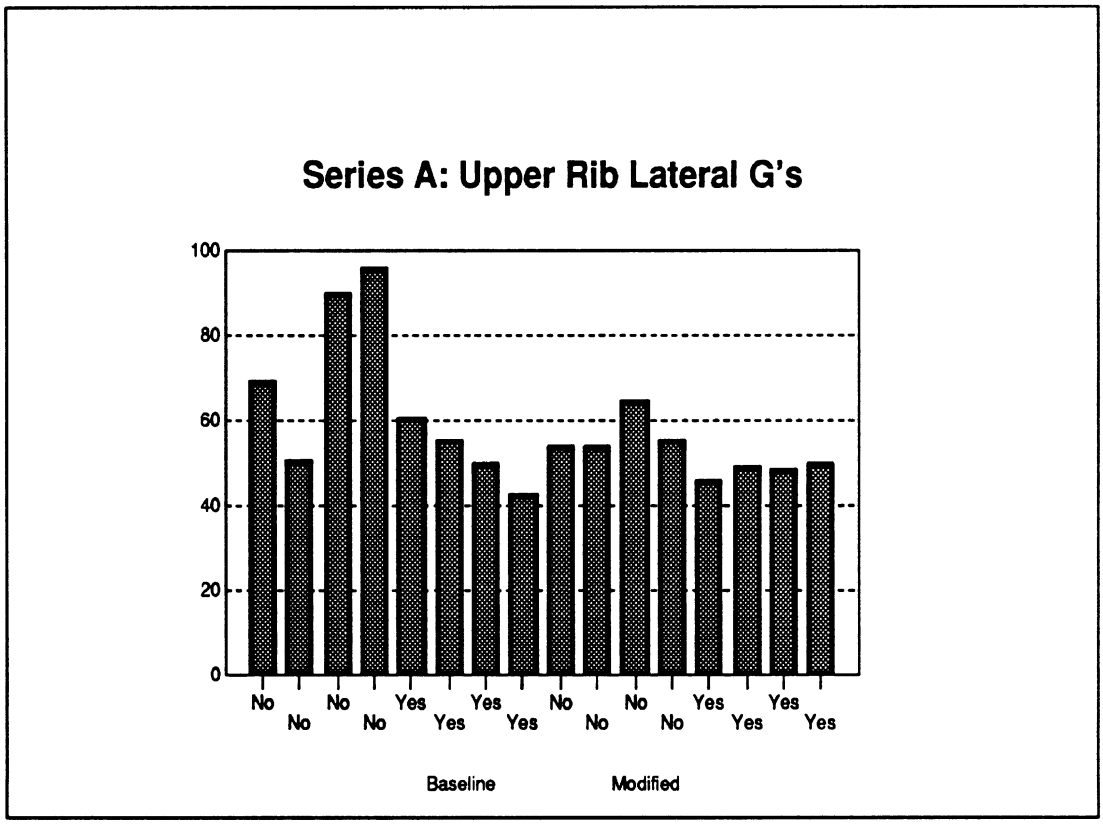

Figure 3: Series A, Upper Rib Acceleration

4.3 Series B: NHTSA Test Procedure with the EUROSID

Many of the dependent variables show the ability to detect the effect of door padding. Exceptions to this include the Viscous Criterion for the lower rib, pelvic forces on the right iliac, the resultant head acceleration, Head Injury Criterion, and the three rib deflection measurements.

The ability of the EUROSID injury measures to detect changes in the side structure of the vehicle was not evident in this test series. None of the measures examined could detect side structure changes at a significant level. It is this aspect of the response of the EUROSID that is most different from the NHTSA SID results. Strengthening the side structure actually increased certain responses. Injury measures such as TTI and the V*C measures increased as did the rib deflections and accelerations. Figure 4 shows the TTI response. The lower rib lateral acceleration shown in Figure 5 illustrates the increased response for the modified side structure even more clearly. The upper rib Viscous Criterion and deflection, shown in Figures 6 and 7, also show this tendency. Examination of the F ratios shows that very little statistical significance can be attached to these results. The increased variability of the deflection-based measures is also illustrated by the last two figures. A complete set of F-ratio bar charts for this series of tests can be found in Figures A-3, A-4, and A-5. A final observation is that although the right iliac force detected a significant effect of padding, the direction of the effect is opposite all the other measures. The right iliac force is higher, on the average, with padding. This result is inconsistent with the indications of all other injury measures.

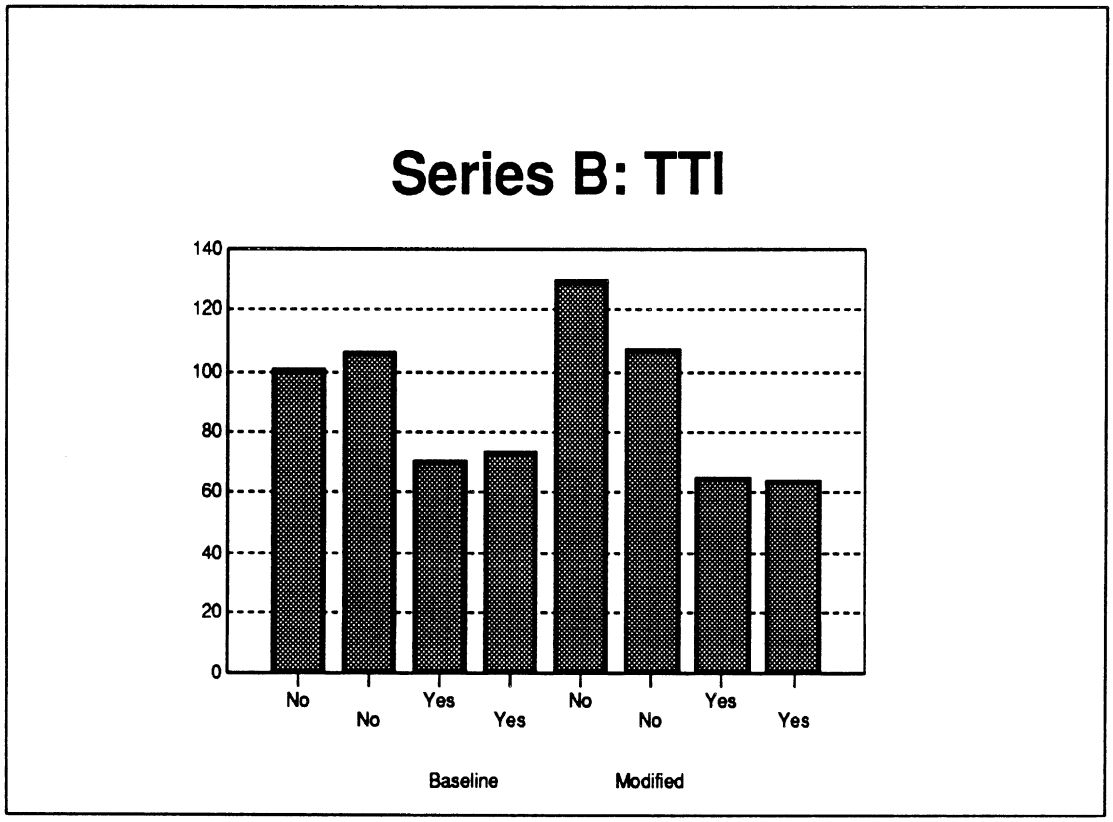

Figure 4: Series B, Thoracic Trauma Index

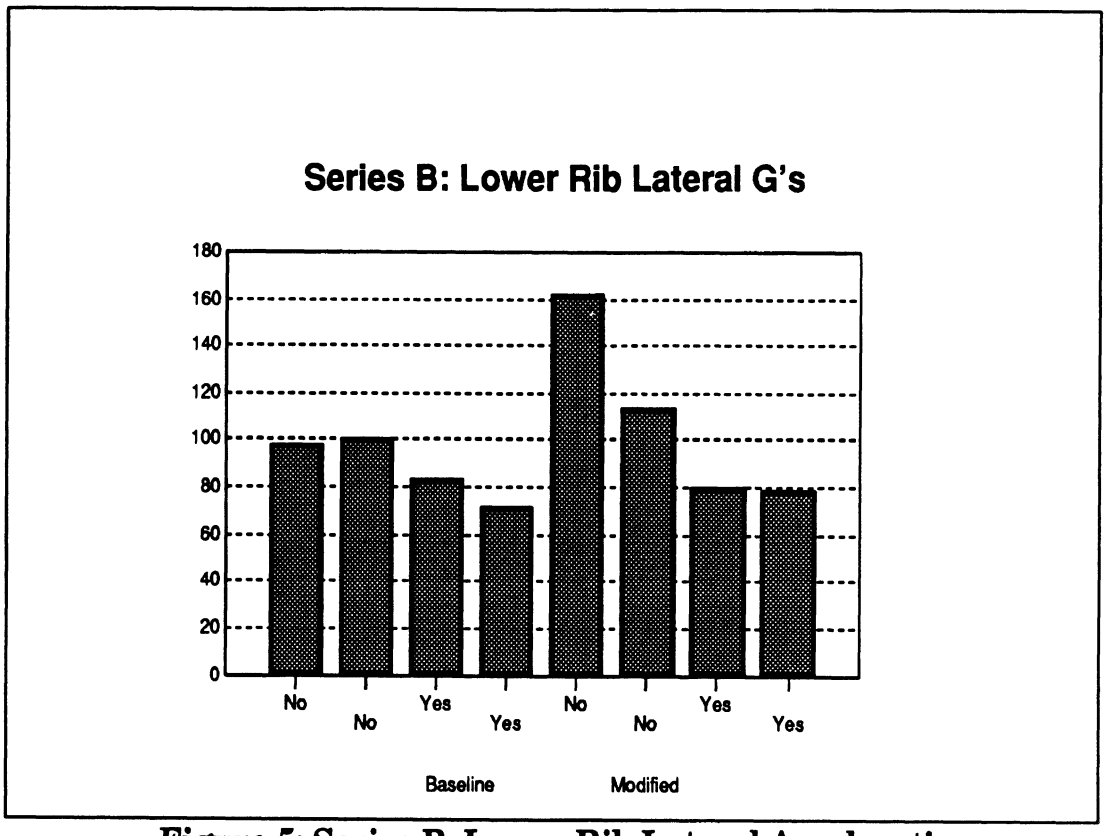

Figure 5: Series B, Lower Rib Lateral Acceleration

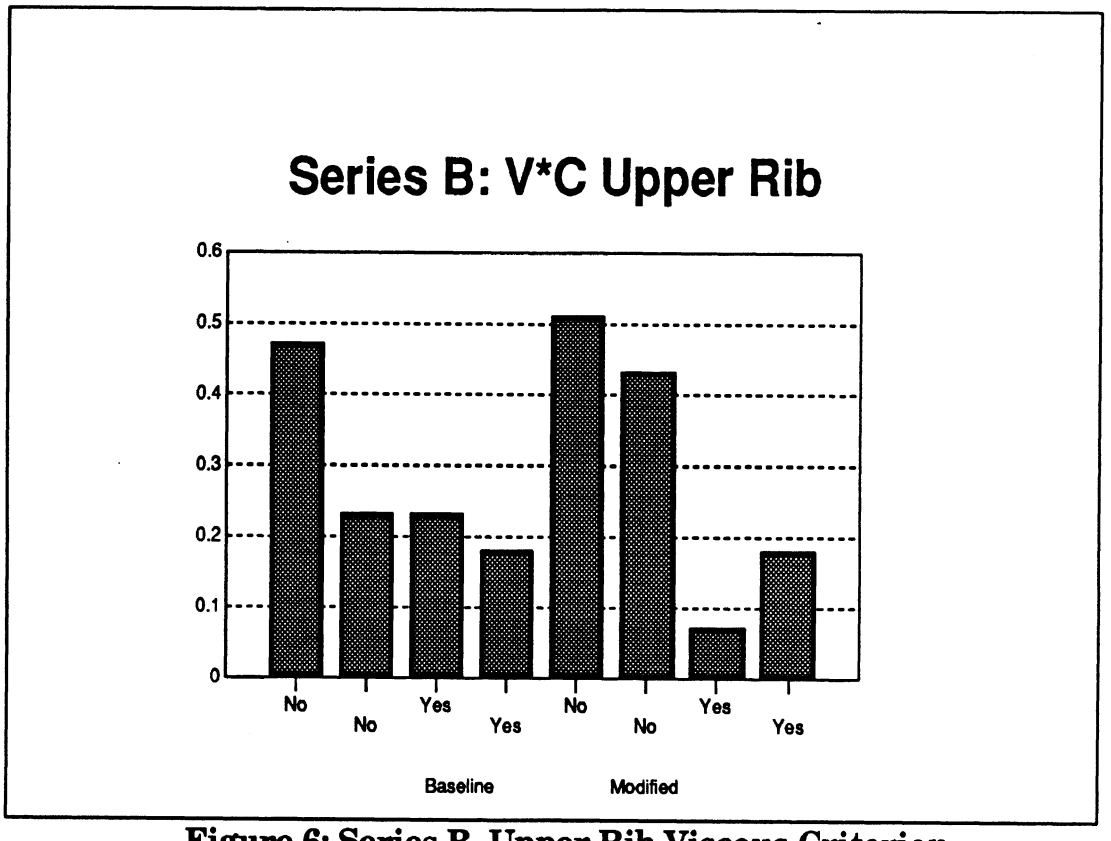

Figure 6: Series B, Upper Rib Viscous Criterion

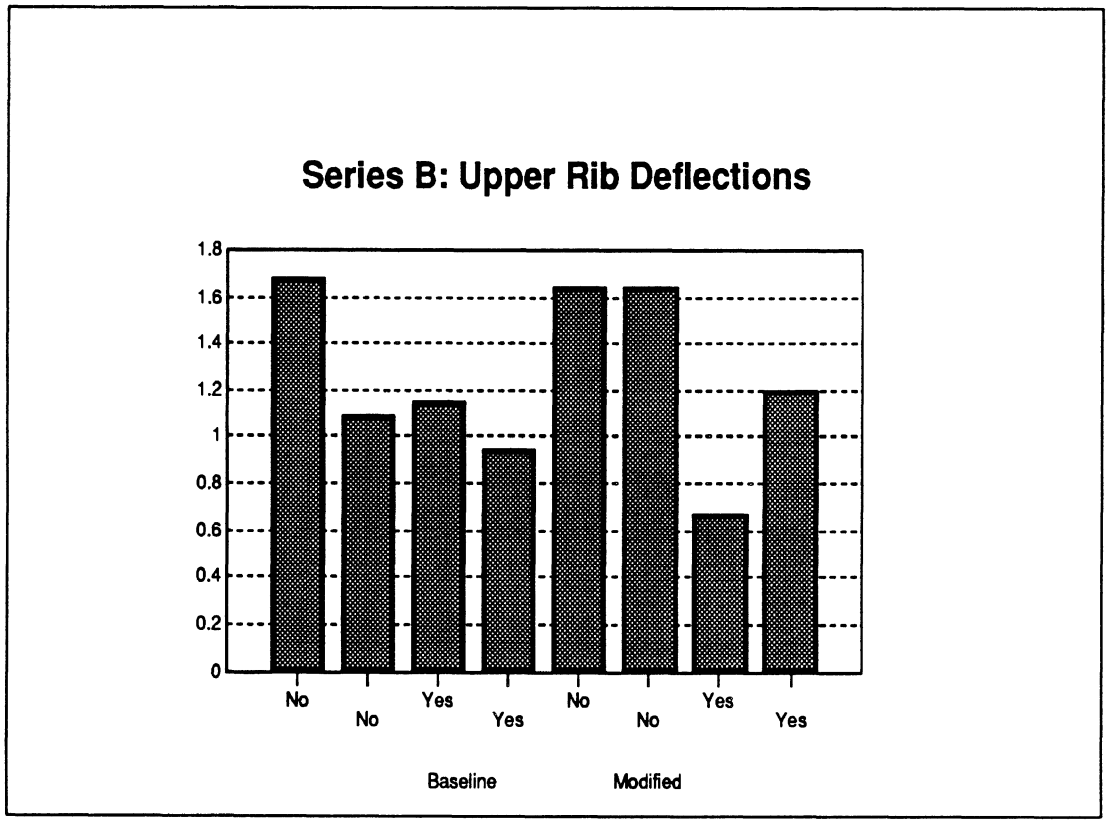

Figure 7: Series B, Upper Rib Deflection

4.4 Series C: European Test Procedure with the EUROSID

Again, many of the dependent variables detected the door padding changes. Exceptions were the Viscous Criterion for the center and lower rib, pelvic forces on the right iliac, and the center and lower rib deflections.

When tested according to the European procedure, some of the injury measures exhibited the ability to discriminate change in the side structure of the vehicle: these were the lower rib acceleration, lateral and resultant pelvis acceleration, pelvic force on the pubic symphysis, resultant head acceleration and Head Injury Criterion, and, to a small extent the upper rib deflection. It is interesting to note that the measures with the highest F ratios all seemed to be associated with the pelvic or the lower rib cage area. None of the measures produced a significant interaction term. F ratio bar charts for this series of tests can be found in Figures A-6, A-7, and A-8.

Perhaps of more interest is the direction of the side structure effect. Strengthening of the side structure produced a reduction in the TTI and lateral pelvic acceleration, but an increase for the V*C measures, the center rib acceleration, the lower rib acceleration, and the rib deflections. Figure 8 shows the lateral pelvic acceleration response. This response is more similar to the pelvic accelerations in the NHTSA SID in the original series. The upper rib Viscous Criterion is shown in Figure 9. This result is similar to Series B.

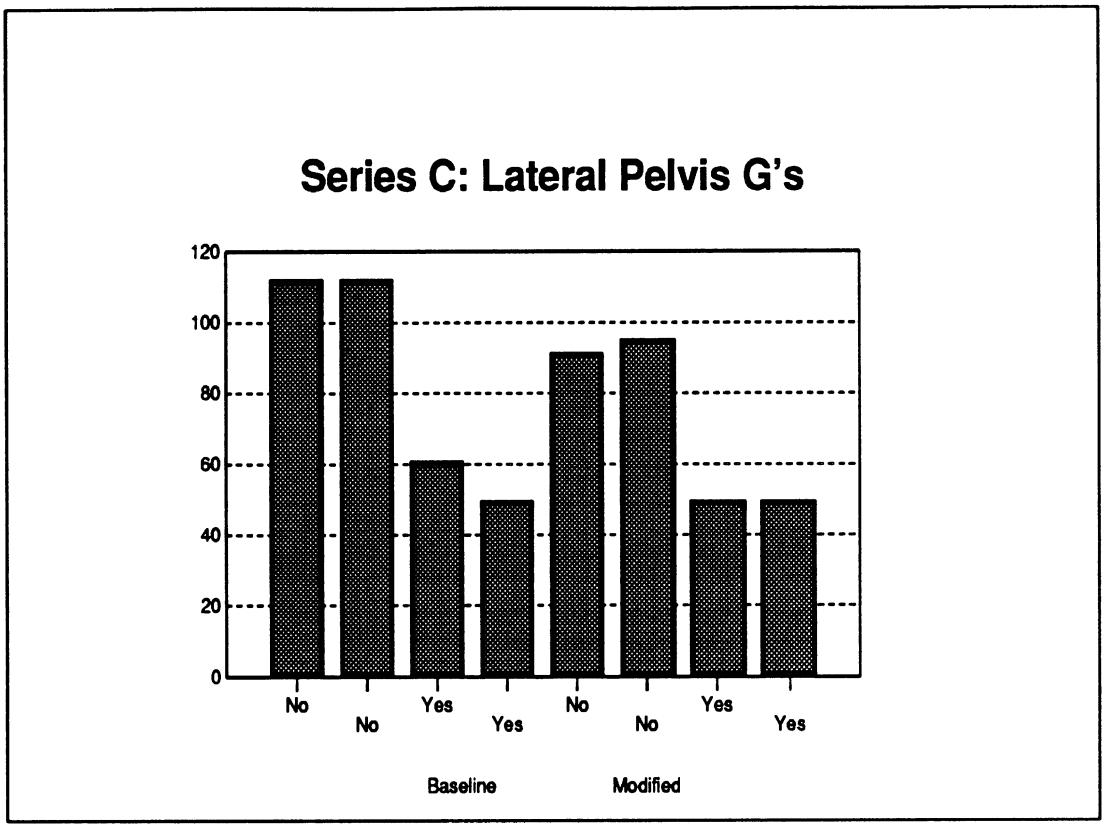

Figure 8: Series C, Lateral Pelvic Acceleration

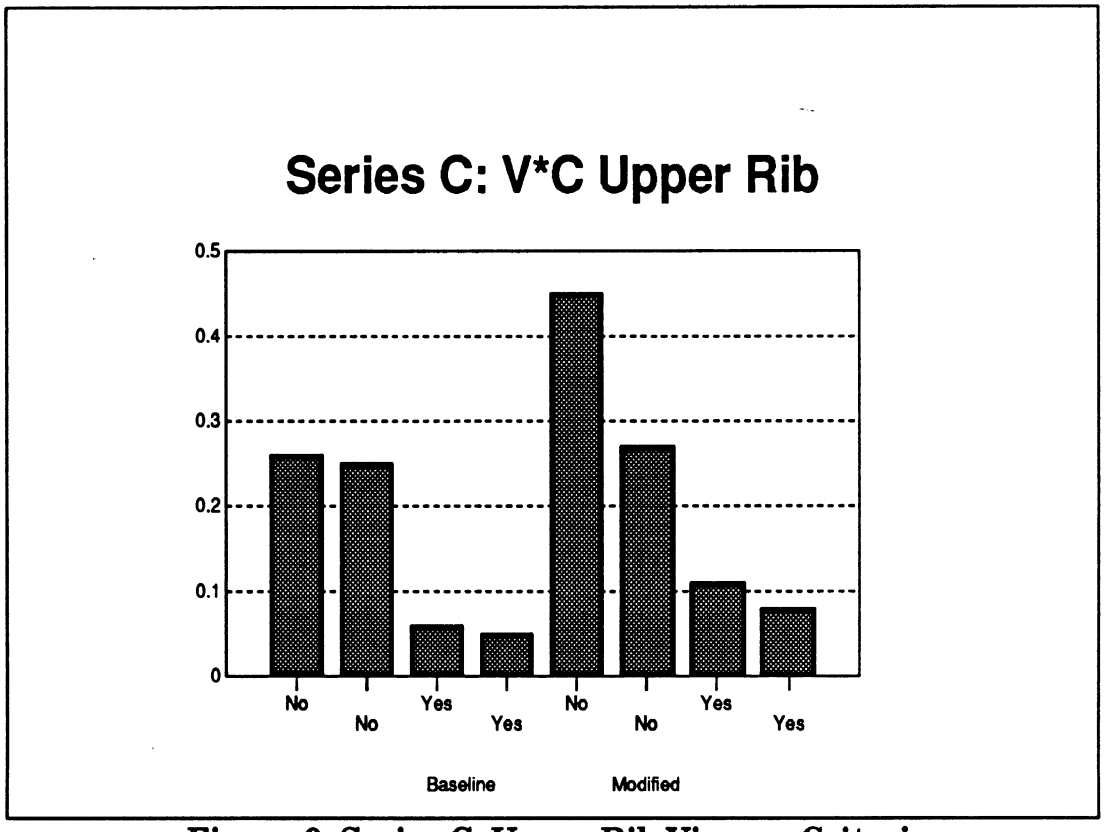

Figure 9: Series C, Upper Rib Viscous Criterion

The statistical support for some of these results is indicated by p values (significance levels) found in Appendix B. In general, the upper body measures show an increase for the modified side structure. However, the magnitude of the effect is often very small, and never statistically significant. The pelvic measures show a decrease for the modified side structure that is statistically significant for both lateral and resultant pelvic acceleration.

4.5 Series D: NHTSA (Crabbed) Barrier, EEVC Barrier Face and the EUROSID

The discriminating ability of the EUROSID was most similar to the NHTSA SID in this test series. As we have seen in the previous test configurations, many of the injury measures detected the door padding levels. Insufficient data were collected on the right iliac pelvic force, so a statistical analysis was not carried out. Variables that did not show statistically significant results in detecting door padding included the Viscous Criterion on the center and lower rib, resultant head acceleration and Head Injury Criterion, and the lower rib deflection.

In this test series, some upper body measures, as well as the pelvic measures, discriminated between the two side structures. These included the upper and lower rib lateral acceleration, upper and lower spine lateral acceleration, lateral and resultant pelvis acceleration, pelvic force on the pubic symphysis, and the upper rib deflection. Many of these also show significant interaction terms as did the NHTSA SID. For nearly all of these, the reinforced side structure reduced the injury measure. However, the lower rib has consistently shown increased injury measures for the modified side structure. In particular, the lateral acceleration of the lower rib in this series shows this effect to be statistically significant. The F ratio bar charts for this series of tests can be found in Figures A-9, A-10, and A-11.

Upper rib lateral acceleration and resultant pelvic acceleration responses are shown in Figures 10 and 11. Each of these shows the effect of door padding and side structure to be most similar to the NHTSA SID in Series A. Figure 12 shows the upper rib deflection. Although the F-ratios in Figure A-10 are comparable to the measures shown in Figures 10 and 11, the pattern of responses is not. In particular, the interaction between padding and structure is of the opposite sign. In Figure 12, padding has a larger effect when combined with the modified side structure. This is the only measure to produce such a result in all four series of tests. Although the EUROSID provides many additional injury measures as compared to the NHTSA SID, the results have sometimes been anomalous over the 24-test series.

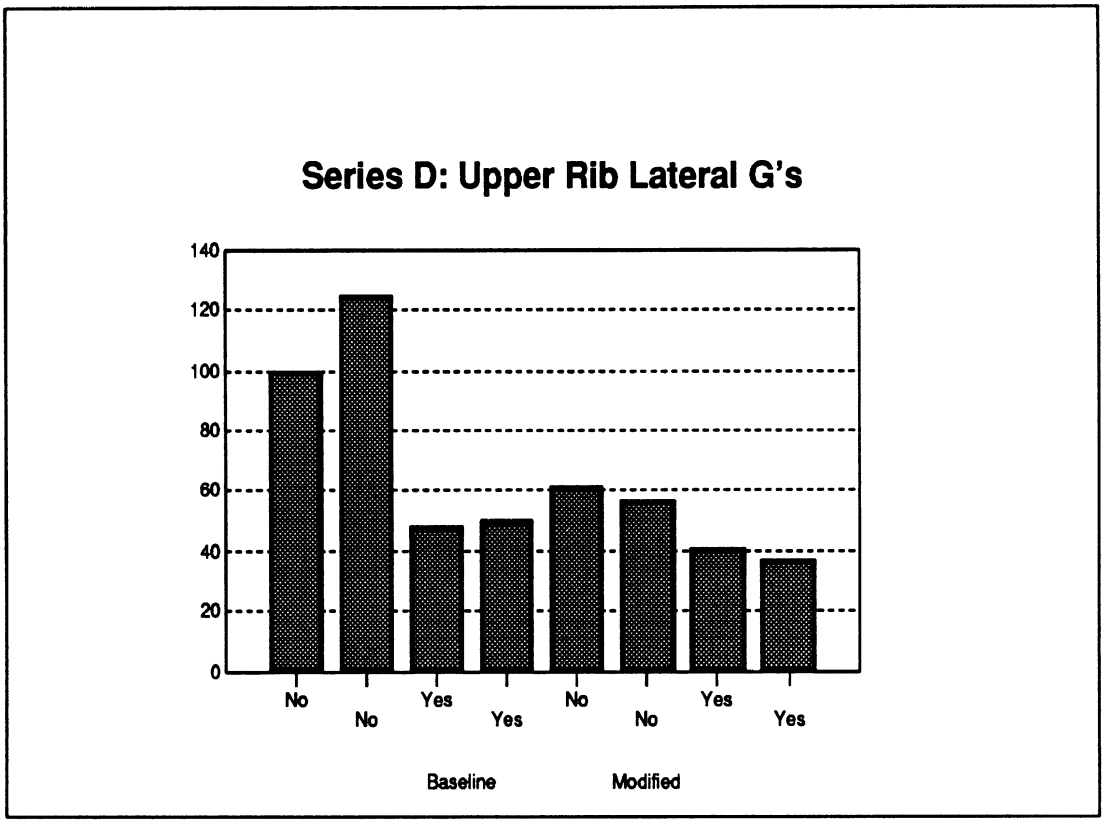

Figure 10: Series D, Upper Rib Lateral Acceleration

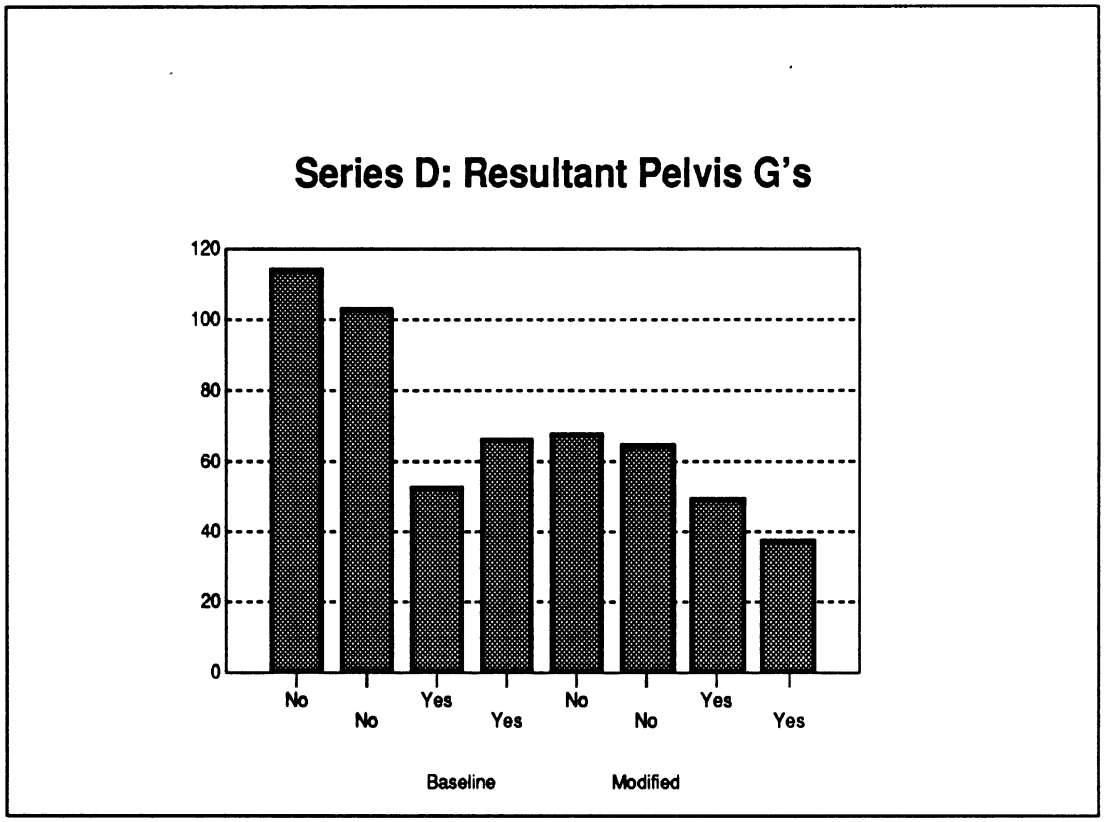

Figure 11: Series D, Resultant Pelvic Acceleration

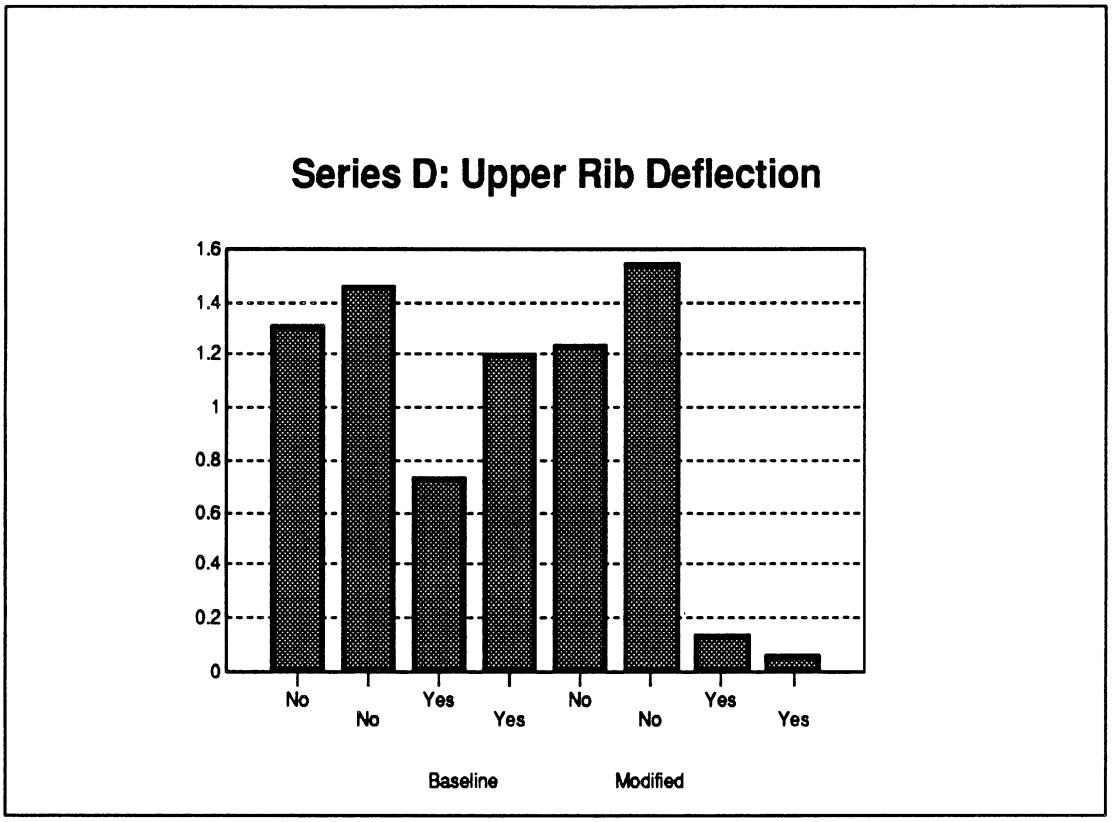

Figure 12: Series D, Upper Rib Deflection

5 COMPARISONS ACROSS TEST SERIES

5.1 Comparison of Means Across Series

As an initial look at the data, the mean values of each series were examined. The means can be found in the spreadsheet in Appendix C or as part of the ANOVA outputs in Appendix B. Figures A-12 through A-16 are bar charts of these mean responses.

The majority, 72 percent, of the highest mean values occur in the Series B that uses the NHTSA test procedure with the EUROSID. The most notable of these include: TTI, V*C for the center and lower rib, lateral acceleration on the center and lower rib, lateral and resultant pelvis acceleration, and the center and lower rib deflections. The head g force and HIC mean values were also the highest in this series. Even on the variables where the series did not produce the highest mean, it produced the second highest mean response. These observations provide further indications of the high response values produced by this test configuration.

It is more difficult to develop a clear pattern for the series producing the lowest mean response. The series using the NHTSA test procedure and the EEVC barrier face with EUROSID produced many low values as did the pure European series. For the variables that could be compared to the original pure NHTSA series, it also produced a number of the lowest mean values. In general, Series D combining the EEVC barrier face with the NHTSA (crabbed) barrier produced results with the EUROSID that were most similar to the NHTSA SID in the NHTSA test procedure, Series A.

5.2 Confidence Intervals on Differences of Response Means

Pairwise differences were computed for the response variables and then 95% confidence intervals were constructed. The results of these computations can be found in the spreadsheet output in Appendix C. If an interval contains 0, we can be reasonably certain the means of the two series do not differ significantly.

The TTI in the original NHTSA SID series appears to be significantly lower than for any of the tests involving the EUROSID. The series using the NHTSA (crabbed) barrier with the EEVC barrier face and the EUROSID shows the closest agreement to the original NHTSA test.

The Viscous Criterion numbers obtained from EUROSID for the additional three runs agree well, with the difference between the pure European test, Series C, and the NHTSA (crabbed) barrier with the EEVC barrier face and EUROSID, Series D, giving the narrowest confidence interval.

Upper and lower rib acceleration for the original NHTSA SID series are seen to be significantly lower than any of the values for the other series. This is consistent with the TTI result in that the TTI is calculated from the rib accelerations.

The upper and lower lateral spine accelerations for the original NHTSA test are significantly higher than the values for the other three series. The closest pairwise agreement is among the EUROSID series between the pure European test, Series C and the NHTSA (crabbed) barrier using the EEVC barrier face, Series D.

Lateral and resultant pelvis acceleration are all significantly pairwise different. The largest values for both lateral and pelvis acceleration occur in Series B where the EUROSID is used with NHTSA test procedure. The lowest values occur with the EUROSID when the NHTSA barrier face is used in place of the NHTSA barrier face in Series D.

Pelvic forces could be measured only on the EUROSID. The pairwise differences for these variables varied greatly. The largest difference occurred on the pubic symphysis between NHTSA test with EUROSID and the pure European test. The smallest difference occurred for the pubic symphysis between the pure European test and the NHTSA (crabbed) barrier with the EEVC barrier face.

The largest difference for head resultant acceleration occurred between the tests involving EUROSID and SID in the pure NHTSA test configurations. The NHTSA SID's value was significantly smaller than EUROSID's, showing that these two dummies are very different with respect to the head resultants. When the confidence intervals on the head resultant acceleration between pure NHTSA test and the European test using EUROSID are examined, the interval shows no significant difference. This would indicate that the type of test has a large influence on EUROSID's response. The high variability and low discrimination power of the NHTSA test using EUROSID should be kept in mind.

The results of the Head Injury Criterion tend to follow the head resultant acceleration findings. This is not surprising considering that Head Injury Criterion are calculated by using the head resultant acceleration. The confidence intervals on the Head Injury Criterion numbers again show that the SID's response is significantly lower than the EUROSID's. As was seen in the previous variable, the pure NHTSA test with EUROSID produces the largest mean value and variance.

The rib deflection measures showed no significant differences in their pairwise comparisons, perhaps due to a high amount of variability for this measure.

5.3 Calculation of Pure Error Variance

One of the important aspects of the comparisons across the test series is the variance of each injury measure. This can be examined by looking at the pure error variance as calculated from the following formula:

$$(\text{Replicate \#1} - \text{Replicate \#2})^2 / 2$$

By summing all of the variances in a particular series and dividing by number of terms in the summation, it is possible to compute an estimate of the variance for that series, giving a value of pure error variance for that configuration. The pure error variance is used because this quantity is not inflated by the effects of the independent variables, door padding and side structure. Results of this calculation can be found in the spreadsheet in Appendix D for each injury measure and test series.

One item worth noting in examining the variances is the number of high or low variance values that occur in a particular series. Seventy-two percent of the high values of variance occur in the series that uses the NHTSA test procedure and the EUROSID dummy, Series B. Fifty percent of the low variance values occur in the pure European series (C) with another 28% in Series D which used the NHTSA (crabbed) barrier and the EEVC barrier face with the EUROSID.

The original NHTSA series with SID produced only nine variables that could be compared with the other three series, but for the comparisons that could be made, it produced the lowest variance on one-third of the variables, the TTI and the two rib accelerations. The two series using the EEVC barrier face equally dividing the remaining two-thirds of the lowest variances. These included the head, spine, and pelvic measures, plus the upper rib deflection. The pure NHTSA test with SID produced the highest variance in one variable, the upper rib deflection. The NHTSA test procedure with the EUROSID produced the highest variance on five of the variables including the head measures, the pelvic acceleration, and the two rib accelerations. The pure European series produced the highest variance on the TTI and the two rib accelerations.

5.4 Coefficients of Variation

The coefficient of variation is a commonly used measure expressing the variation of a response as a percentage of its mean value. This is easily calculated by the following formula:

$$CV = 100(s / \bar{y})$$

The results of these calculations can be found in Appendix E.

Figures A-17, A-18, and A-19 show the values of the coefficients of variation plotted on a bar chart. The most outstanding values are those associated with the head measures (head acceleration and HIC), the three V*C measures, and the right iliac pelvic force. All of these measures contain at least one value that exceeds the 30% level. The TTI measure appears to be one of the best behaved with only the pure European series producing a value that exceeds the 10% level. In many of the measures it can be seen that the series using the NHTSA test procedure with the EUROSID, Series B, either has the highest or second highest coefficient of variation. This is due to the high variance present in this series, as was discussed in Section 4.3.

The smallest coefficients of variation were produced by measures from either the original NHTSA SID series or the pure European series using EUROSID, Series C. It should be noted that even though the coefficient of variation was low for the pure European test, its ability to discriminate between the counter measures was poorer than the discrimination ability of the NHTSA series.

5.5 Application of Taguchi's Signal to Noise Ratio

After examining the main effects of the independent variables and variations of the dependent variables it appeared that combining the level of a response variable with its variability in some fashion would help in the evaluation of a measures ability to discriminate effects. The measure chosen was a Taguchi formulation of the signal to noise ratio. Its formula is as follows:

$$SN_i = 10\log(\bar{y}_i^2 / s_i^2)$$

It is easily seen that the signal to noise ratio is closely related to the inverse of the coefficient of variation (see discussion in previous section). The signal to noise ratio should provide a maximum value for the combination of parameter levels that produce the minimum coefficient of variation. By using the signal to noise ratio as the primary dependent variable in analysis, we can investigate the effects of the independent variables on the magnitude and the variability of the measure.

The analysis failed to show any strong relationship between the independent variables and the signal to noise ratio. This is not to say that the measure proved useless; it provided much of the same information previously found in the ANOVA's and the coefficients of variation. However, this result confirms the earlier results of the homogeneity of the variance tests, again showing no significant relationship between the independent variables and the variance of the injury measures.

Appendix A

Figures

This Appendix includes the figures for F ratios, coefficients of variation, and mean values referred to in the text. Figures A-1 through A-11 show the F ratio values for each series, Figures A-12 through A-16 show the mean values of the response variables across the series, and Figures A-17 through A-19 show the coefficients of variations for each measure.

The table below shows the F ratios values needed to attain a desired significance level. Note the change in the F ratio values from the A series to the B, C, and D series due to the changes in the degrees of freedom in the denominator of the ratio.

	F Ratio Level	
Alpha Level	Series A	Series B, C, & D
.01	9.33	21.2
.05	4.75	7.71
.10	3.18	4.54

The listing below explains the notation used for the dependent and independent variables. The injury measures (dependent variables) have been broken into three groups as shown below. The two head injury measures have been excluded from the graphical presentations, although the analyses was carried out for them. This reduces the number of dependent variables to 16.

Dependent Variables

1. Acceleration Based Measures
   - TTI NHTSA Rule Maker -> TTI
   - Upper Rib Peak Lateral Acceleration -> UR g's
   - Center Rib Peak Lateral Acceleration -> CR g's
   - Lower Rib Peak Lateral Acceleration -> LR g's

2. Deflection Based Measures
   - V*C Maximum Upper Rib –> U V*C
   - V*C Maximum Center Rib –> C V*C
   - V*C Maximum Lower Rib –> L V*C
   - Upper Rib Deflection, (in) –> UR DEF
   - Center Rib Deflection, (in) –> CR DEF
   - Lower Rib Deflection, (in) –> LR DEF
3. Remaining Acceleration Based and Pelvic Measures
   - Upper Spine Peak Lateral Acceleration –> US g's
   - Lower Spine Peak Lateral Acceleration –> LS g's
   - Pelvis Peak Lateral Acceleration –> PL g's
   - Pelvis Peak Resultant Acceleration –> RP g's
   - Pelvic Force, Right Iliac –> PFRI
   - Pelvic Force, Pubic Symphysis –> PFPS

<u>Independent Variables</u>

Vehicle Side Structure –> VSS

Interior Door Padding –> DP

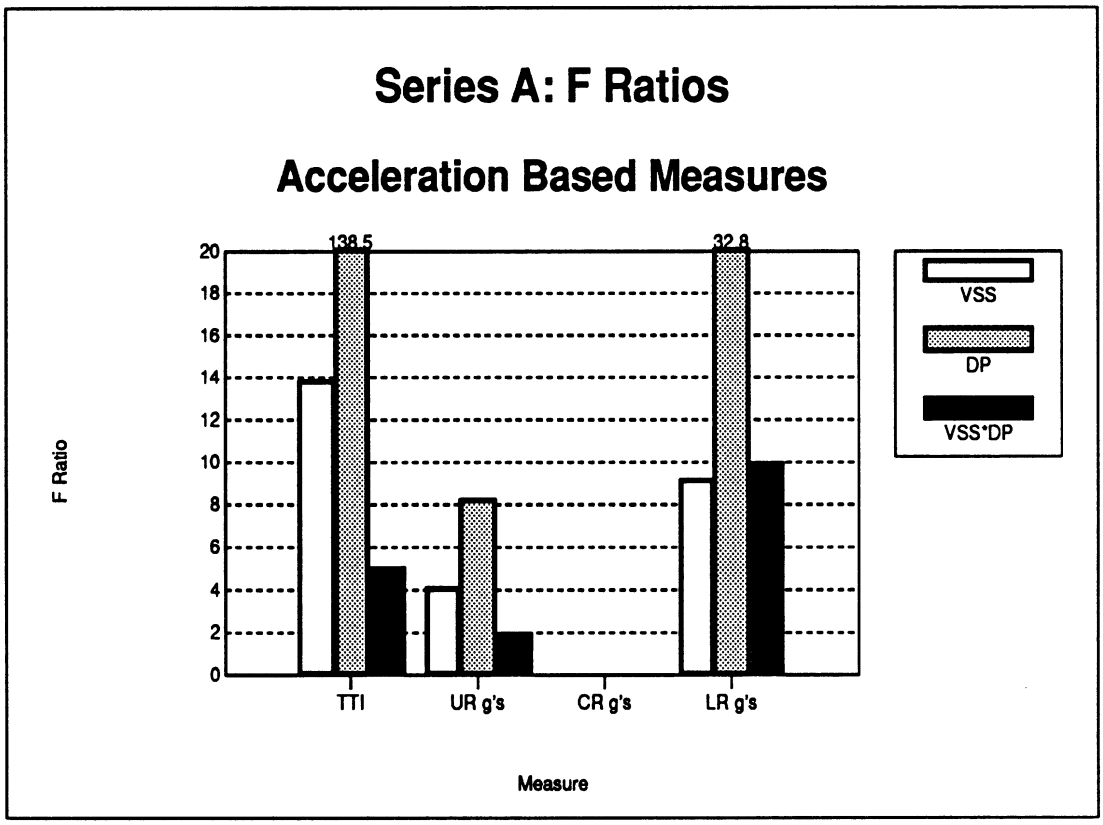

Figure A-1: NHTSA Test Procedure and SID

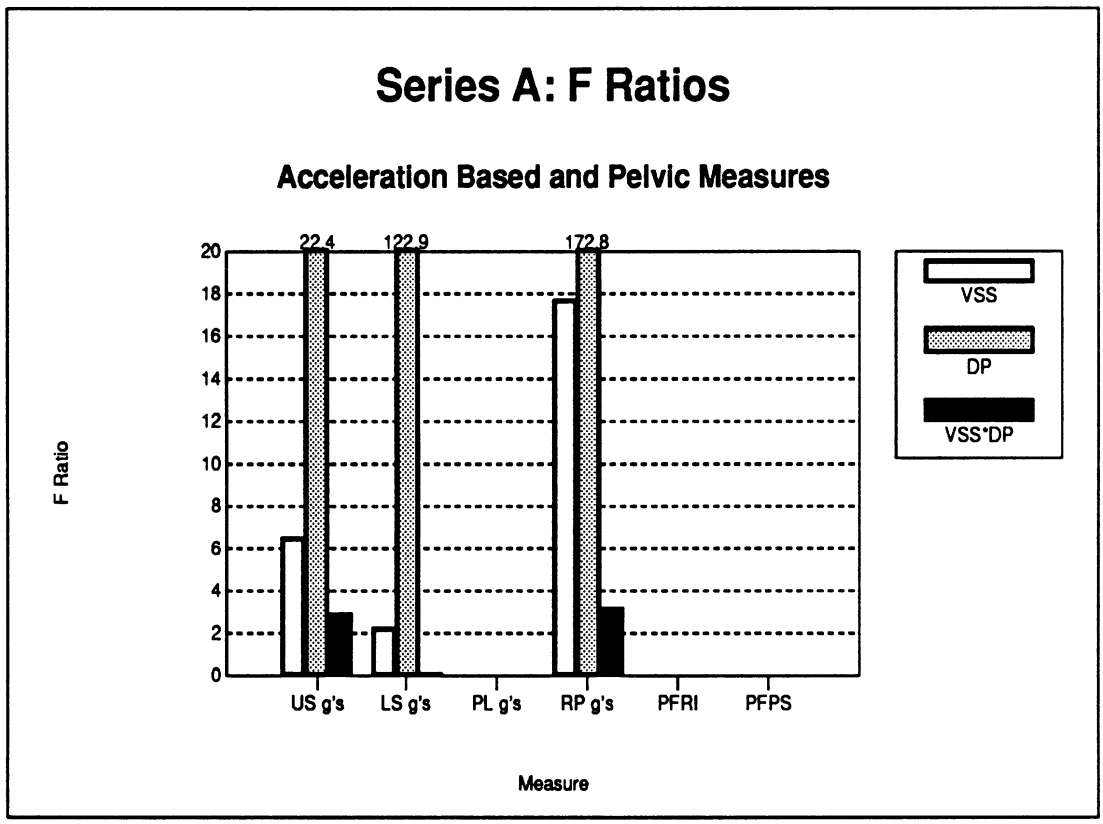

Figure A-2: NHTSA Test Procedure and SID

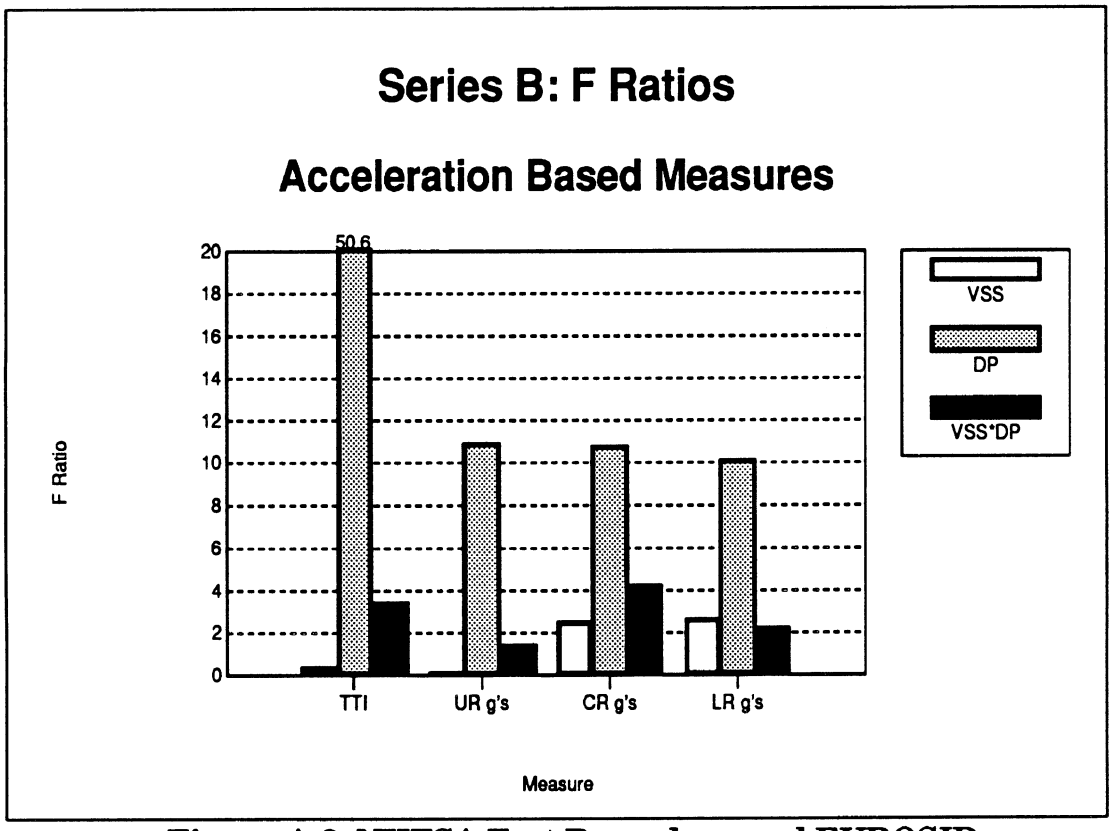

Figure A-3: NHTSA Test Procedure and EUROSID

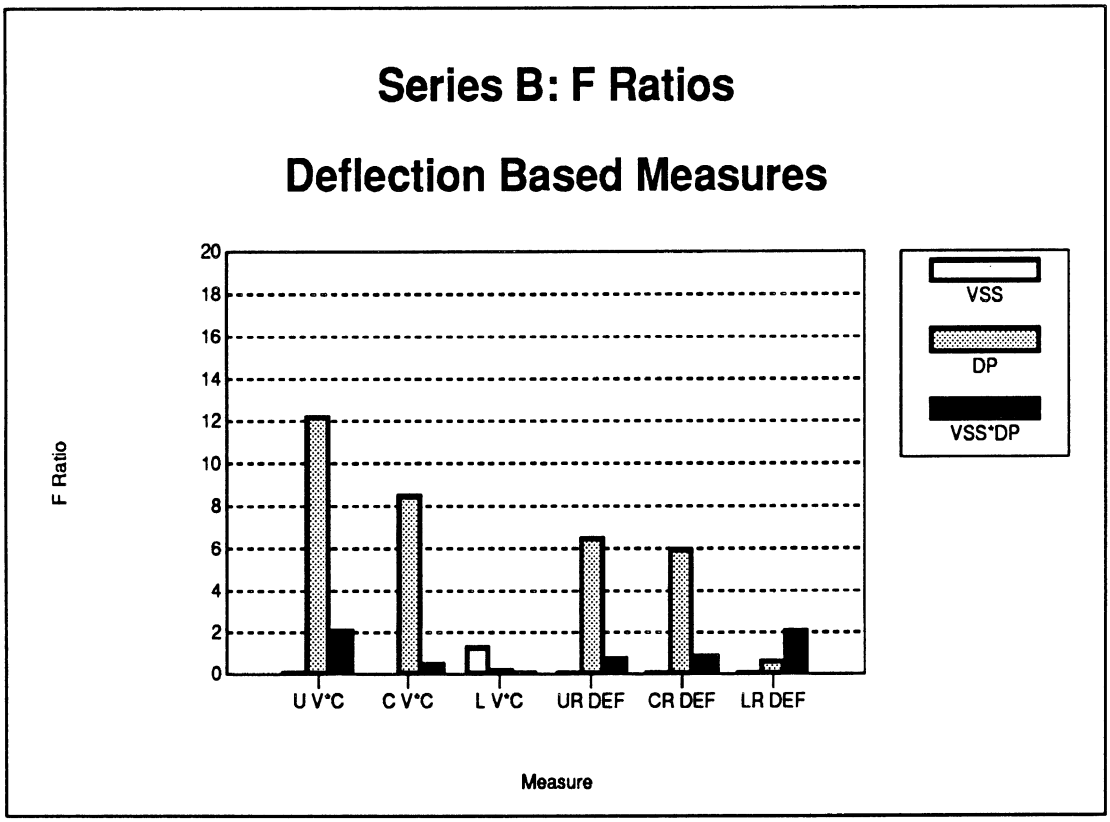

Figure A-4: NHTSA Test Procedure and EUROSID

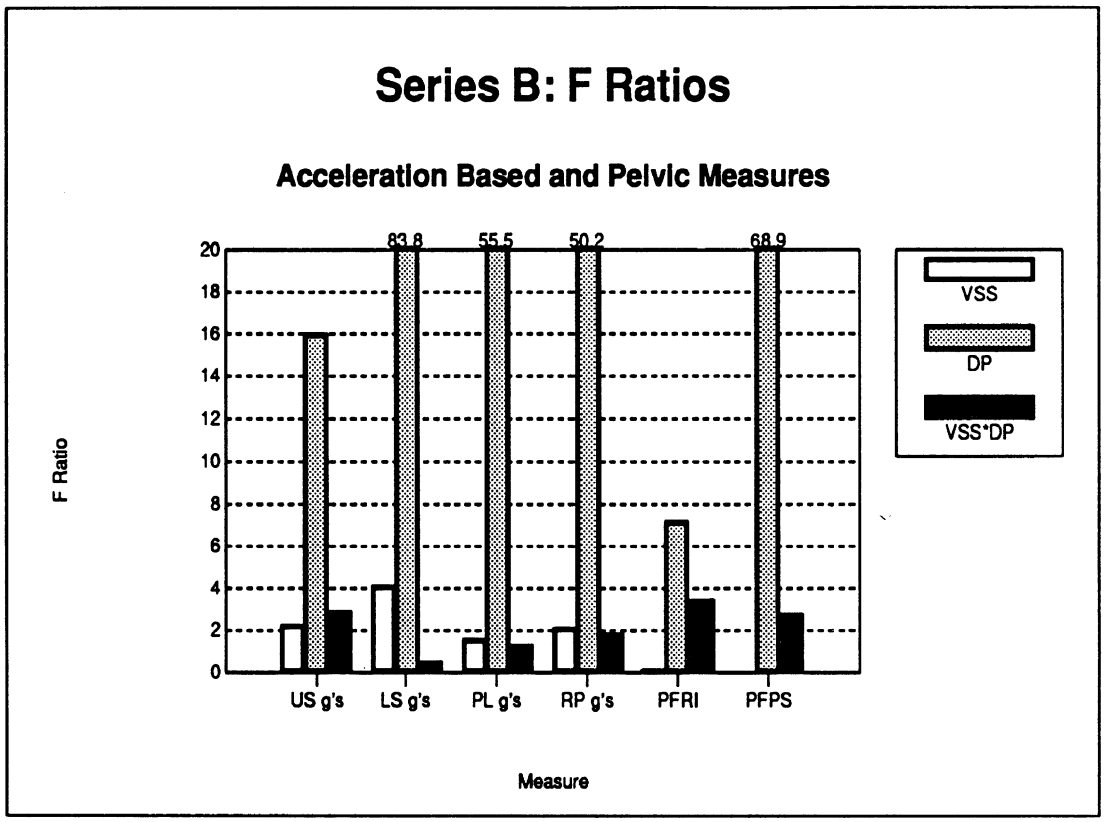

Figure A-5: NHTSA Test Procedure and EUROSID

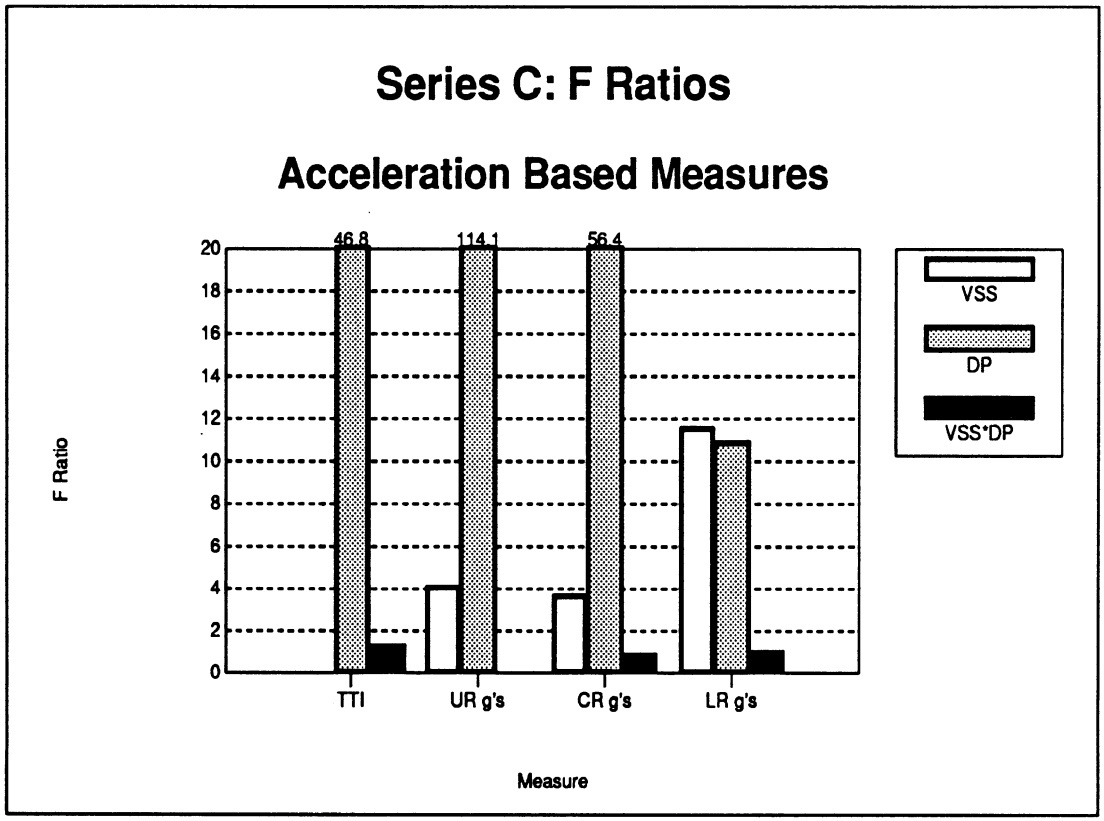

Figure A-6: EEVC Test Procedure and EUROSID

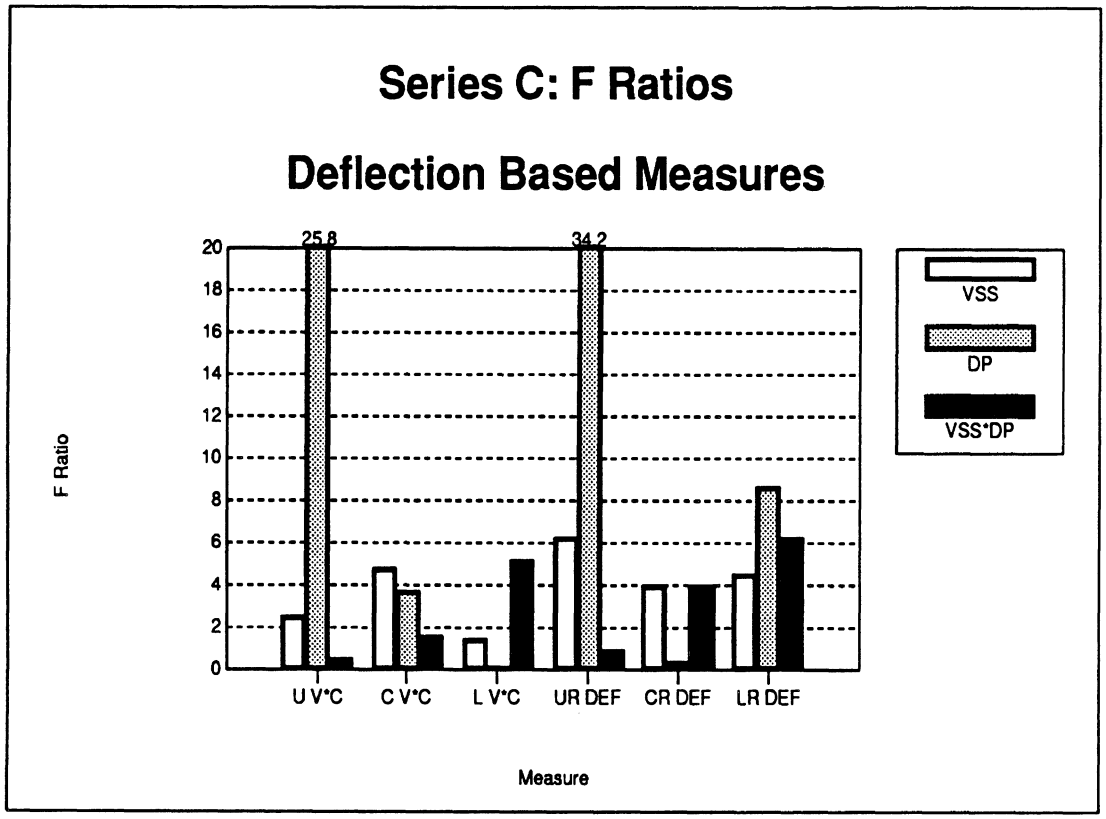

Figure A-7: EEVC Test Procedure and EUROSID

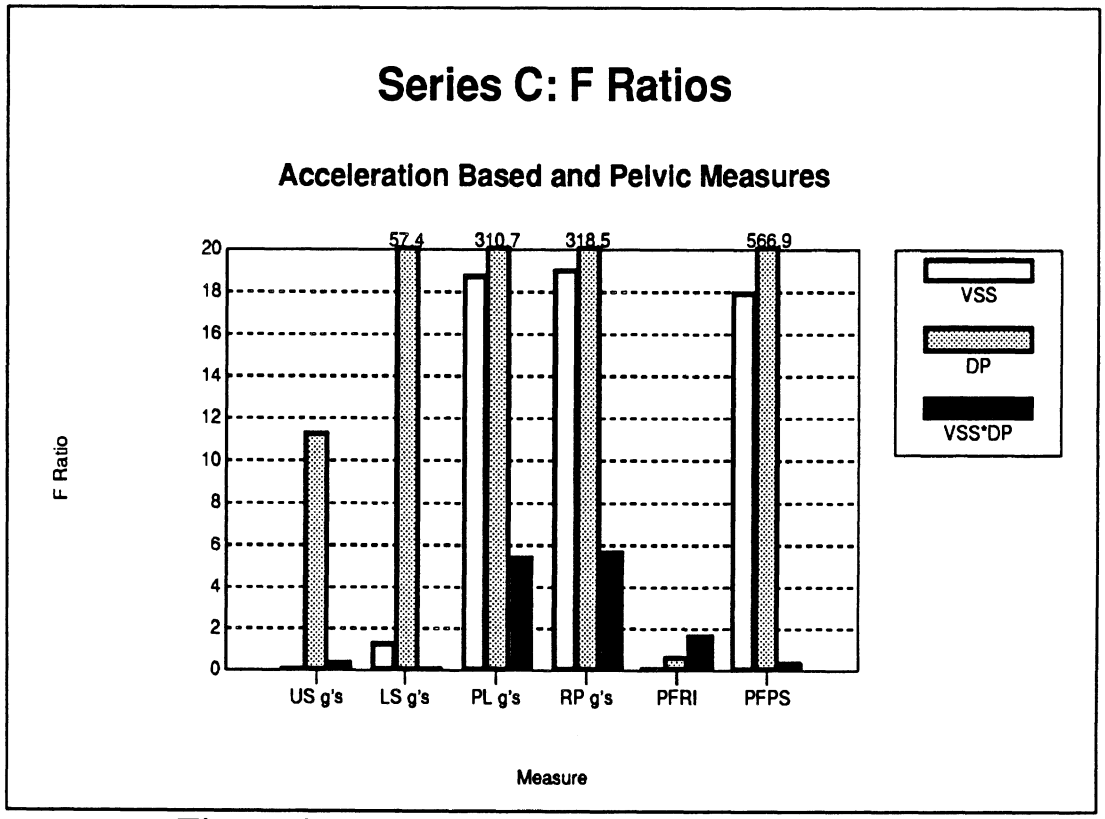

Figure A-8: EEVC Test Procedure and EUROSID

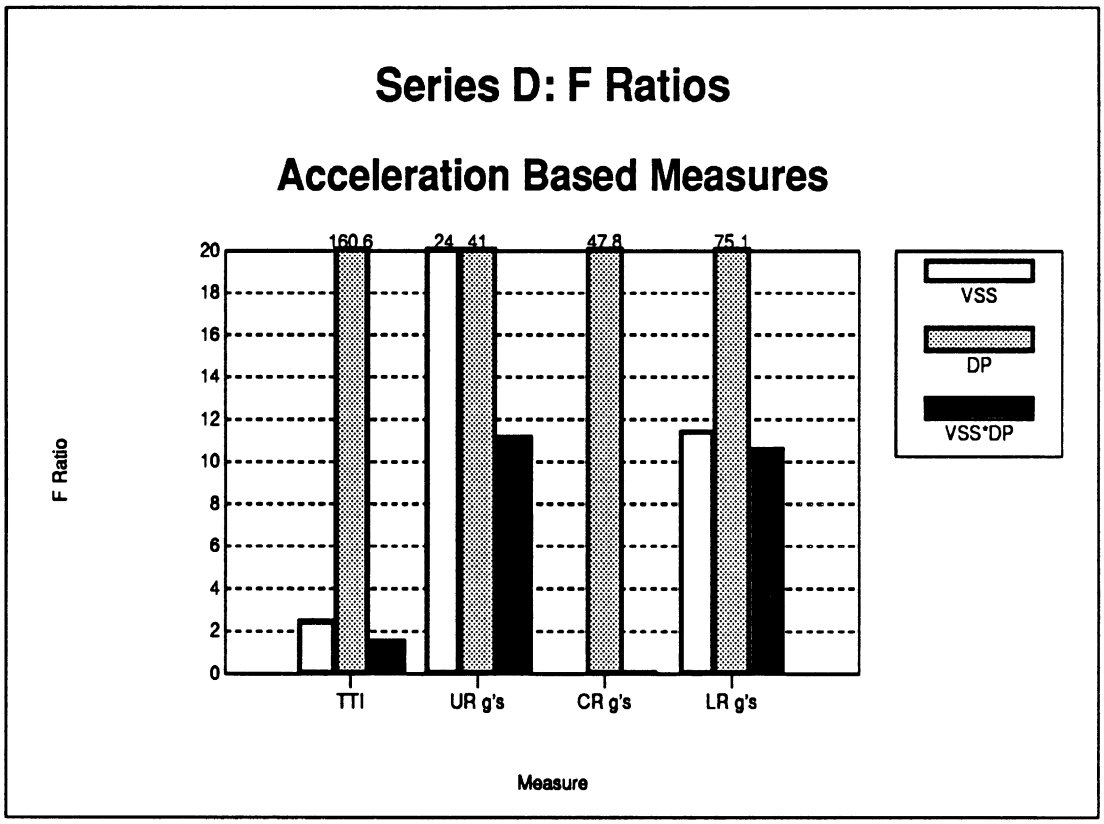

Figure A-9: NHTSA (Crabbed) Barrier, EEVC Barrier Face, and EUROSID

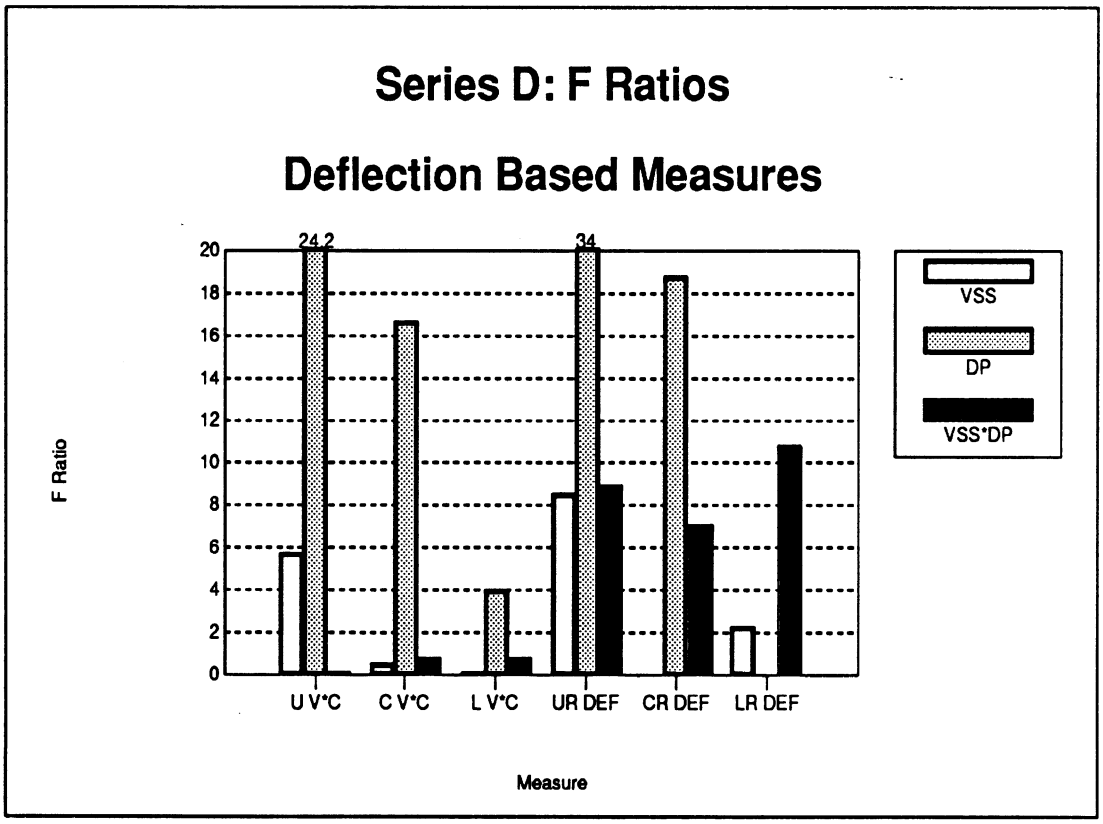

Figure A-10: NHTSA (Crabbed) Barrier, EEVC Barrier Face, and EUROSID

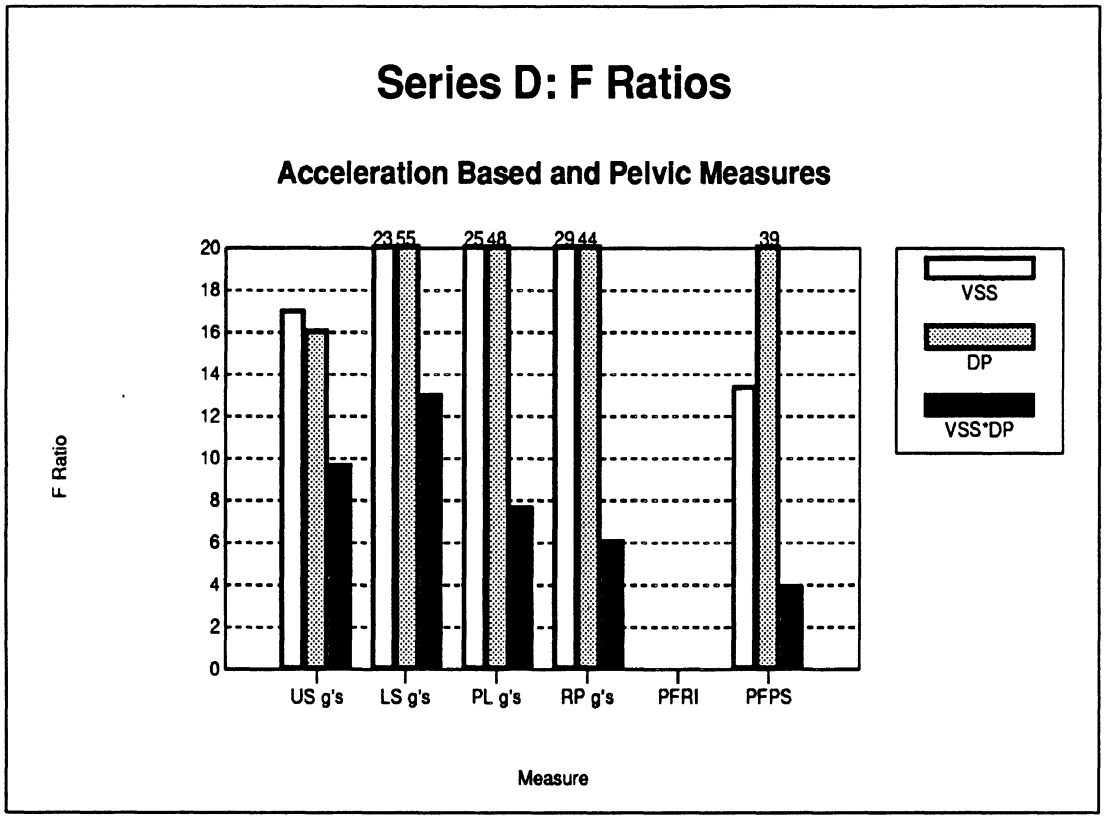

Figure A-11: NHTSA (Crabbed) Barrier, EEVC Barrier Face, and EUROSID

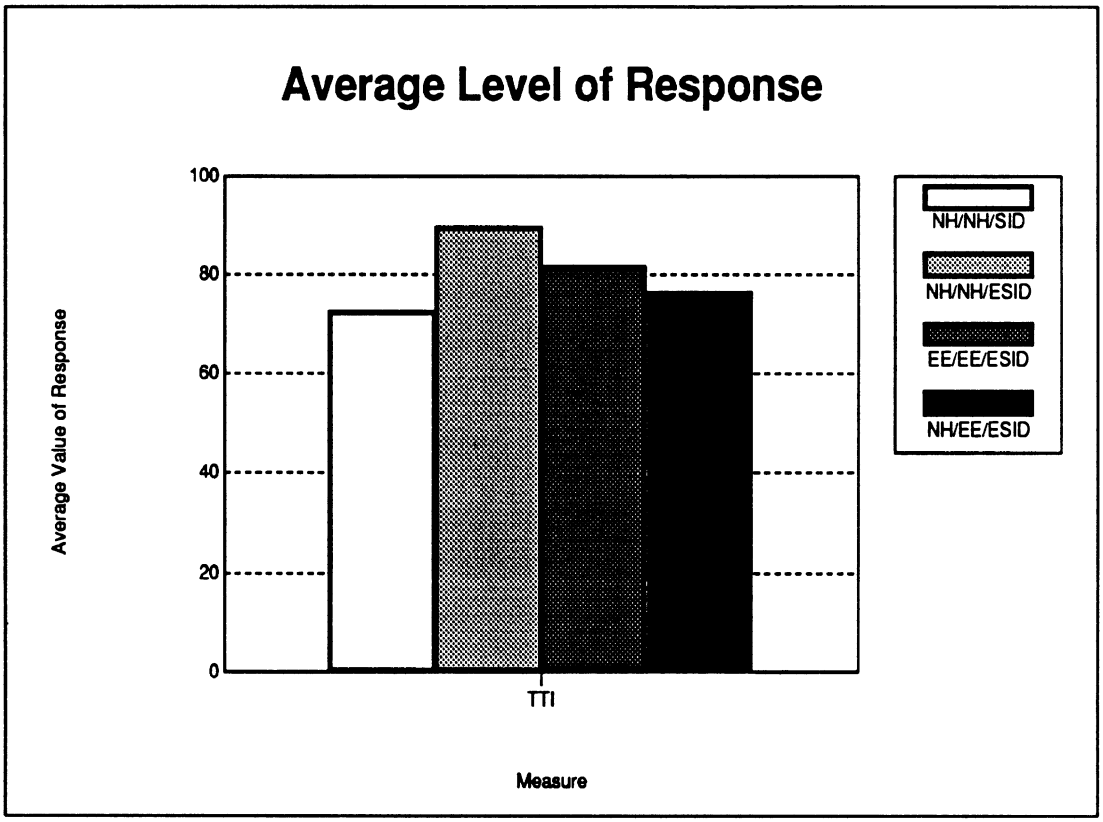

Figure A-12: Average Values Across Series

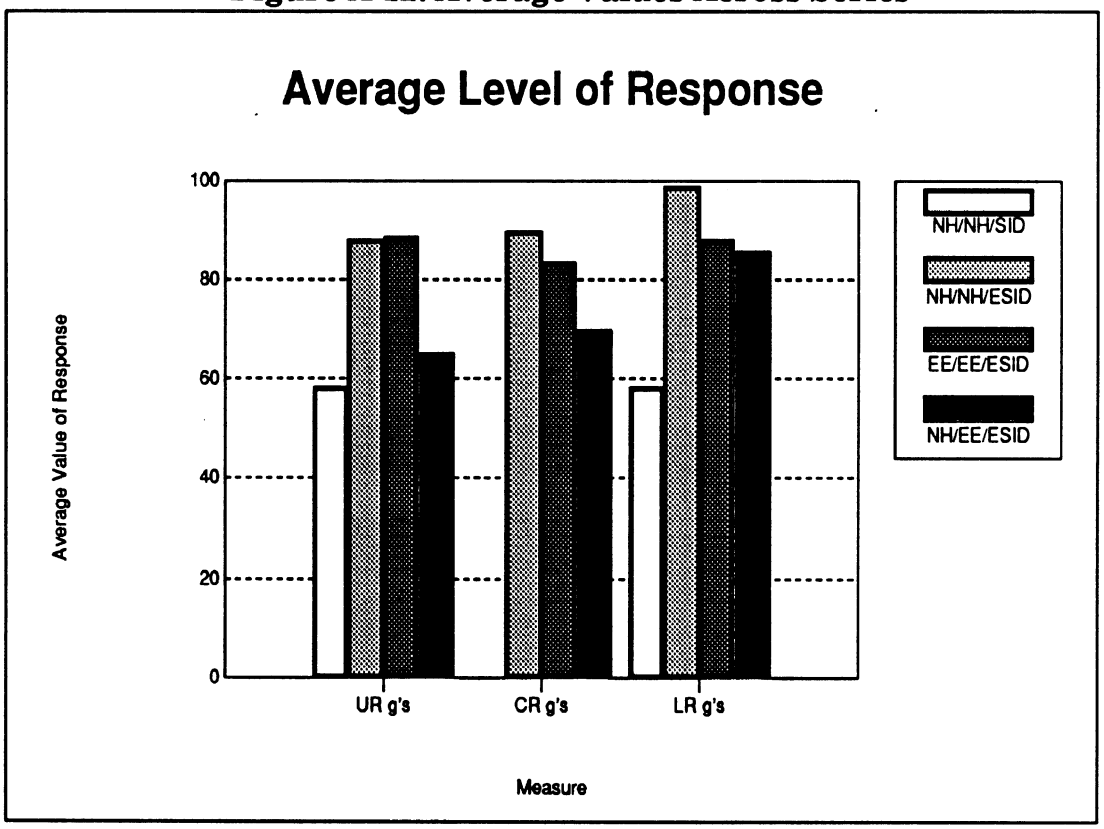

Figure A-13: Average Values Across Series

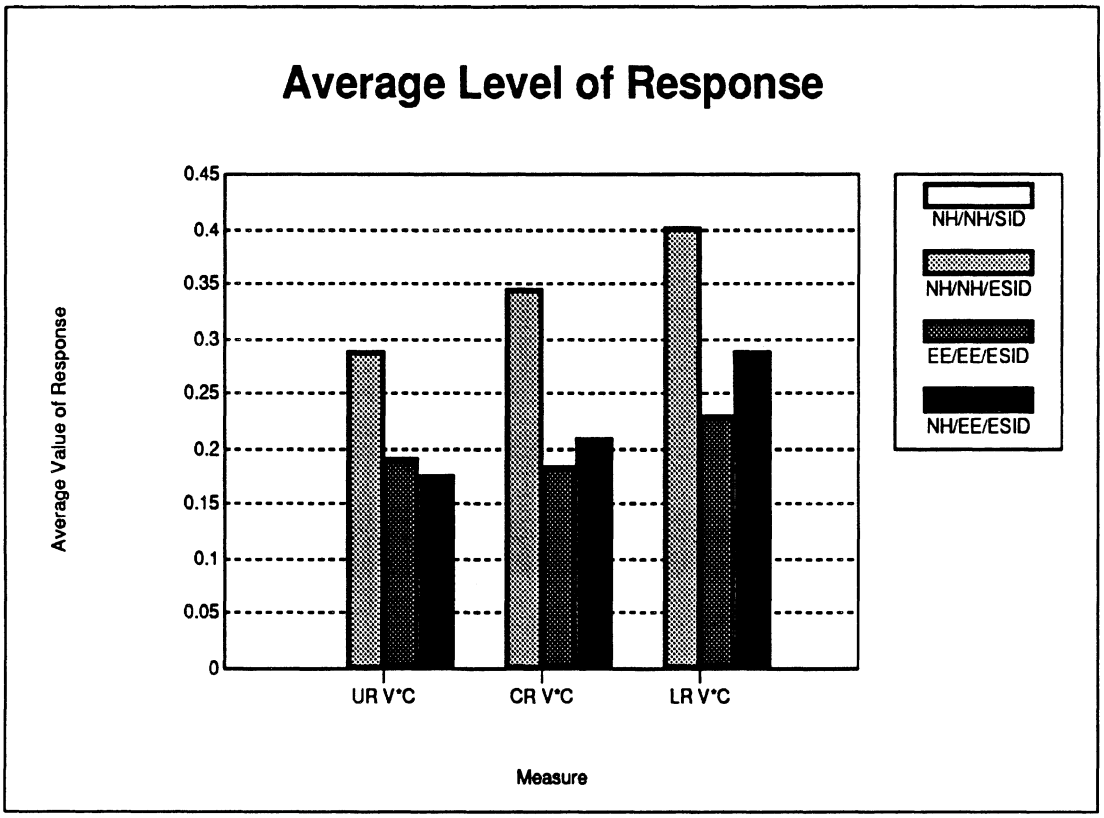

Figure A-14: Average Values Across Series

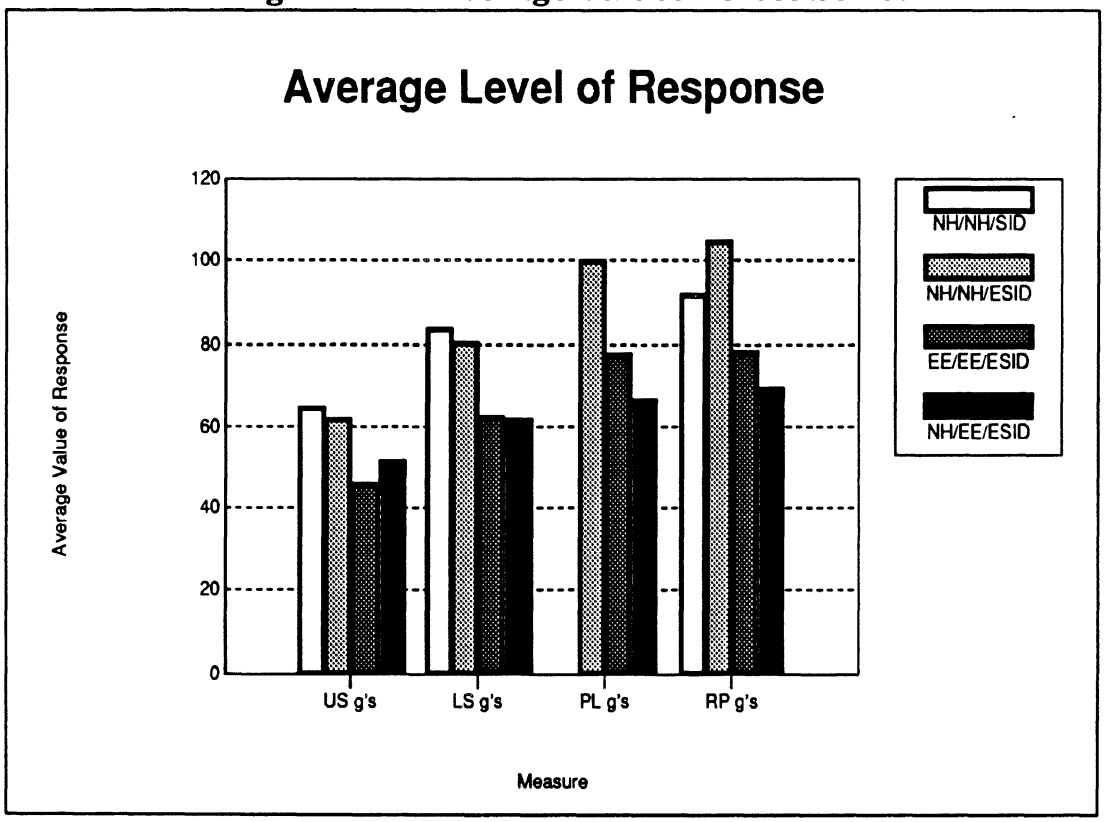

Figure A-15: Average Values Across Series

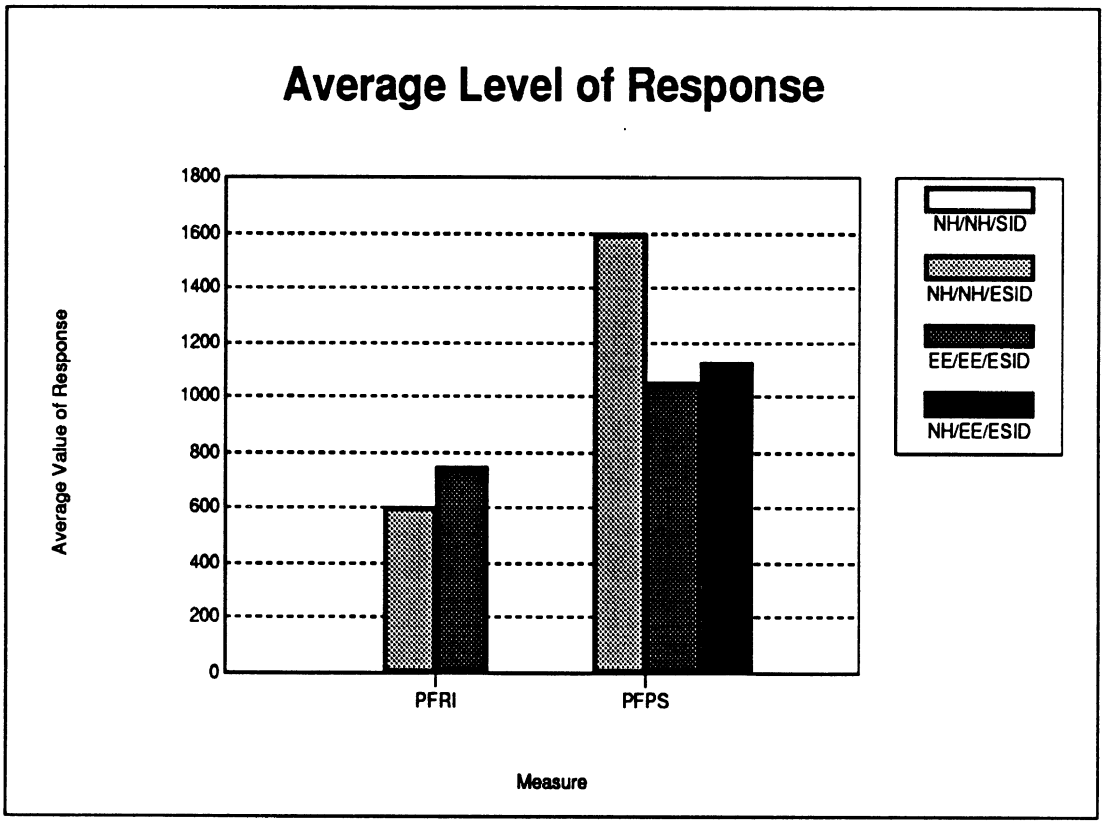

Figure A-16: Average Values Across Series

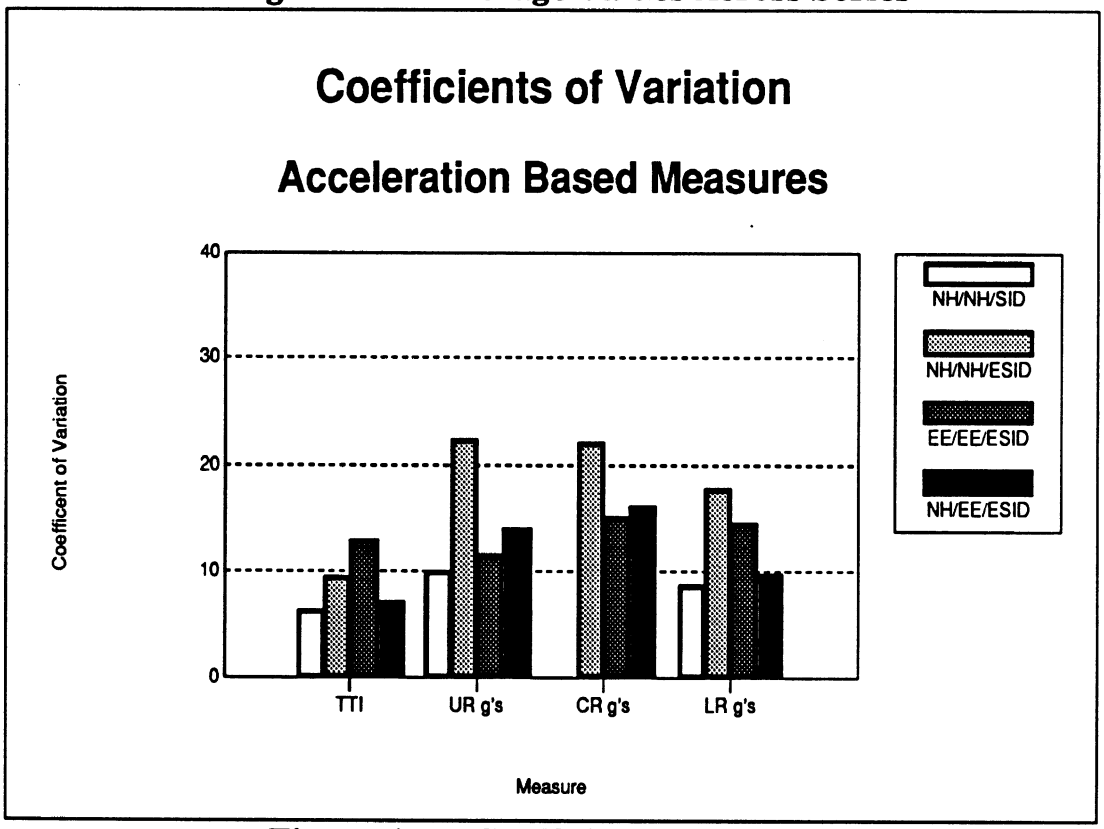

Figure A-17: Coefficients of Variation

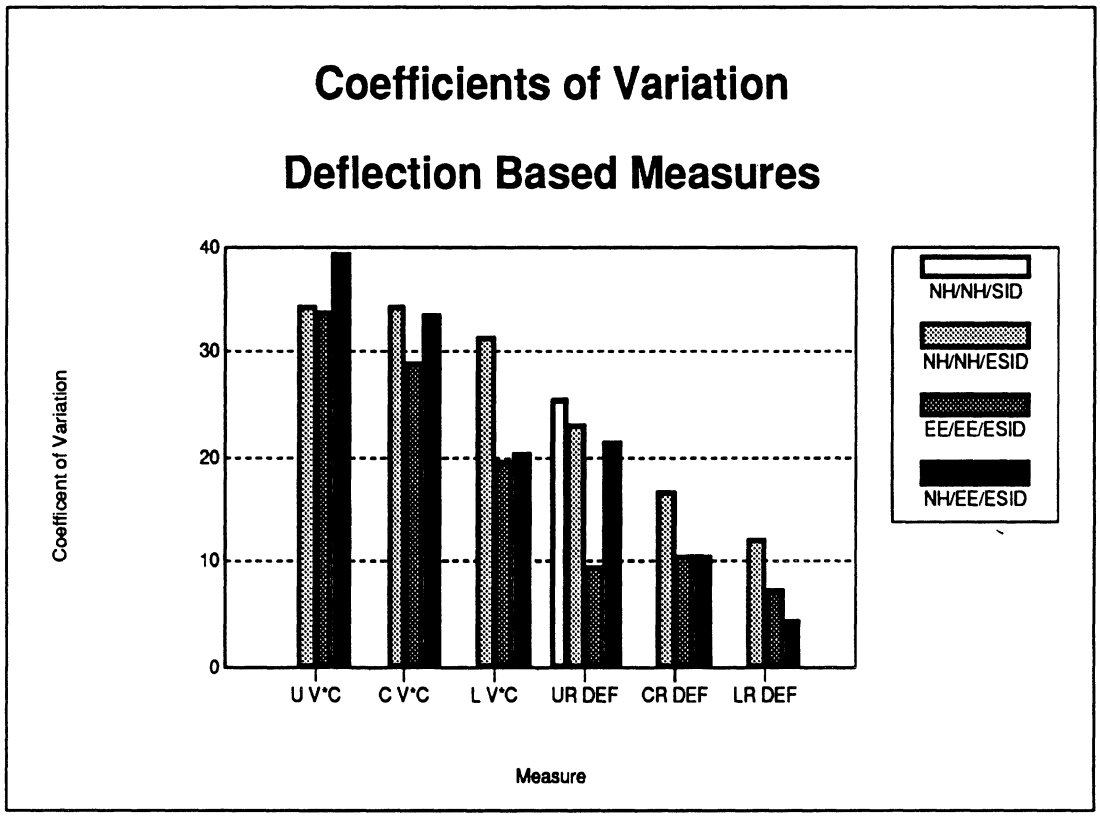

Figure A-18: Coefficients of Variation

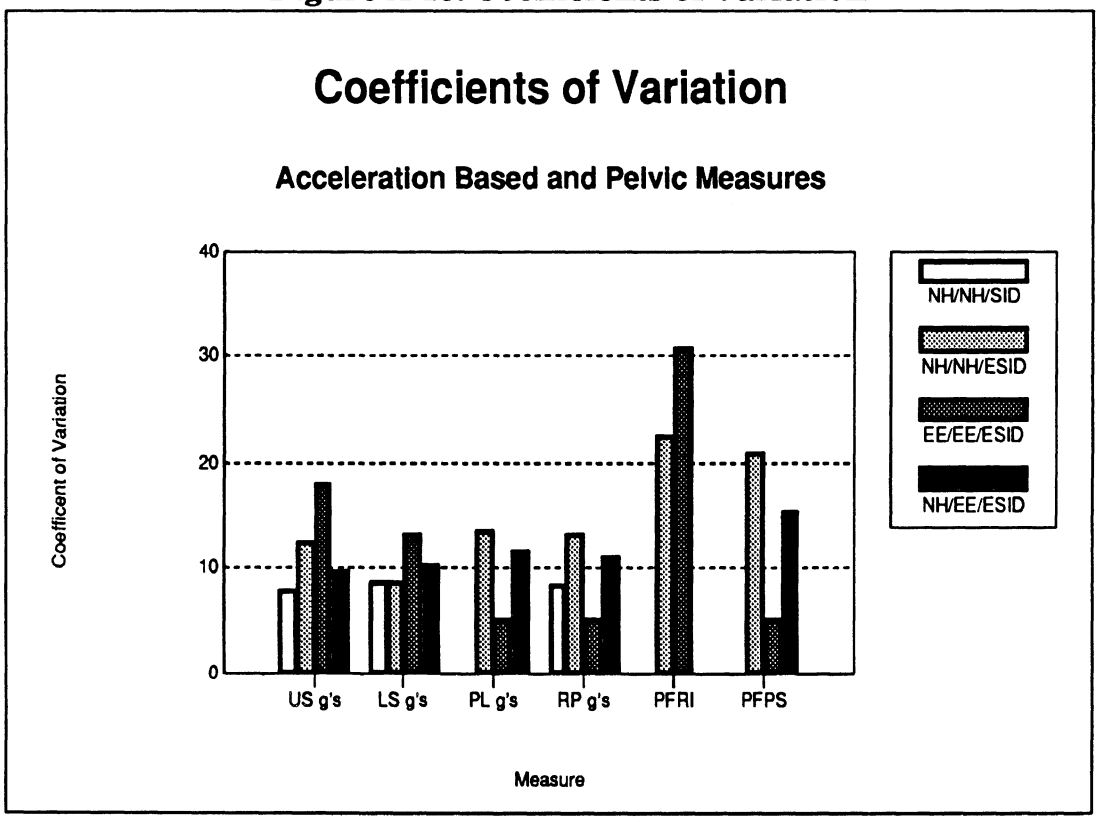

Figure A-19: Coefficients of Variation

Appendix B

Results From ANOVA's For All Data Sets

The following pages contain all of the ANOVA's performed on the data sets. The response variables have been divided into two groups for each analysis. The first group, Part I analysis, looks at the Thoracic Trauma Indexes (TTI), Viscous Criteria (V*C), and the lateral rib accelerations. The second group examines the remaining response variables.

The limited instrumentation of the NHTSA SID precludes the investigation of all 18 responses, therefore only 12 variables for the series using the SID are present.

Data Set A Mulitvariate Analysis of Variance
Part I

This series of tests uses the SID Dummy, the NHTSA test procedure and the NHTSA Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- TTIDATRP –> TTI [Age=0] – g's Data Report
- TTINHRMK –> TTI [Age=0] – g's NHTSA Rule Maker
- TTINHRS –> TTI [Age=0] – g's NHTSA Research
- LATRUPGS –> Lateral Rib Upper (g's)
- LATRLOGS –> Lateral Rib Lower (g's)

==========

NUMBER OF CASES PROCESSED: 16

DEPENDENT VARIABLE MEANS

TTIDATRP	TTINHRMK	TTINHRS	LATRUPGS	LATRLOGS
73.244	72.813	73.188	58.354	58.291

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		TTIDATRP	TTINHRMK	TTINHRS	LATRUPGS	LATRLOGS
CONSTANT		73.244	72.813	73.188	58.354	58.291
VSS	1	5.330	5.250	5.312	5.776	7.662
DOORPAD	1	16.618	16.625	16.563	8.201	14.526
VSS DOORPAD	1 1	3.189	3.188	3.188	4.027	8.029

SQUARED MULTIPLE CORRELATIONS

TTIDATRP	TTINHRMK	TTINHRS	LATRUPGS	LATRLOGS
0.930	0.929	0.931	0.543	0.812

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	454.542	1	454.542	14.339	0.003
ERROR	380.395	12	31.700		
TTINHRMK	441.000	1	441.000	13.813	0.003
ERROR	383.125	12	31.927		
TTINHRS	451.562	1	451.562	14.518	0.002
ERROR	373.250	12	31.104		
LATRUPGS	533.726	1	533.726	4.079	0.066
ERROR	1570.127	12	130.844		
LATRLOGS	939.269	1	939.269	9.117	0.011
ERROR	1236.275	12	103.023		

MULTIVARIATE TEST STATISTICS

WILKS' LAMBDA =	0.354				
F-STATISTIC =	2.924	DF =	5, 8	PROB =	0.086
PILLAI TRACE =	0.646				
F-STATISTIC =	2.924	DF =	5, 8	PROB =	0.086
HOTELLING-LAWLEY TRACE =	1.827				
F-STATISTIC =	2.924	DF =	5, 8	PROB =	0.086

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	4418.261	1	4418.261	139.379	0.000
ERROR	380.395	12	31.700		
TTINHRMK	4422.250	1	4422.250	138.511	0.000
ERROR	383.125	12	31.927		
TTINHRS	4389.063	1	4389.063	141.109	0.000
ERROR	373.250	12	31.104		
LATRUPGS	1076.004	1	1076.004	8.224	0.014

ERROR	1570.127	12	130.844		
LATRLOGS	3375.901	1	3375.901	32.768	0.000
ERROR	1236.275	12	103.023		

MULTIVARIATE TEST STATISTICS

WILKS' LAMBDA =	0.069			
F-STATISTIC =	21.713	DF =	5, 8	PROB = 0.000
PILLAI TRACE =	0.931			
F-STATISTIC =	21.713	DF =	5, 8	PROB = 0.000
HOTELLING-LAWLEY TRACE =	13.571			
F-STATISTIC =	21.713	DF =	5, 8	PROB = 0.000

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	162.690	1	162.690	5.132	0.043
ERROR	380.395	12	31.700		
TTINHRMK	162.563	1	162.563	5.092	0.043
ERROR	383.125	12	31.927		
TTINHRS	162.563	1	162.563	5.226	0.041
ERROR	373.250	12	31.104		
LATRUPGS	259.452	1	259.452	1.983	0.184
ERROR	1570.127	12	130.844		
LATRLOGS	1031.534	1	1031.534	10.013	0.008
ERROR	1236.275	12	103.023		

MULTIVARIATE TEST STATISTICS

WILKS' LAMBDA =	0.410			
F-STATISTIC =	2.307	DF =	5, 8	PROB = 0.140
PILLAI TRACE =	0.590			
F-STATISTIC =	2.307	DF =	5, 8	PROB = 0.140
HOTELLING-LAWLEY TRACE =	1.442			
F-STATISTIC =	2.307	DF =	5, 8	PROB = 0.140

Data Set A Mulitvariate Analysis of Variance
Part II

This series of tests uses the SID Dummy, the NHTSA test procedure, and the NHTSA Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- LSUPGS –> Lateral Spine Upper g's
- LSLOGS –> Lateral Spine Lower g's
- RSLPELGS –> Resultant Pelvis g's
- HEADGS –> Resultant Head g's
- LDA3GS –> Lateral Door Acceleration, Location #3 g's
- LATFSGS –> Lateral Far Sill g's
- DELMBDCT –> Delta MBD Contact Inches

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NUMBER OF CASES PROCESSED:
16

DEPENDENT VARIABLE MEANS

LSUPGS	LSLOGS	RSLPELGS	HEADGS
64.832	83.904	92.146	59.811

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		LSUPGS	LSLOGS	RSLPELGS	HEADGS
CONSTANT		64.832	83.904	92.146	59.811
VSS	1	6.851	2.882	12.319	18.200
DOORPAD	1	12.782	21.131	38.529	6.716
VSS DOORPAD	1 1	4.553	0.331	5.163	6.580

SQUARED MULTIPLE CORRELATIONS

LSUPGS	LSLOGS	RSLPELGS	HEADGS
0.726	0.913	0.942	0.450

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	750.897	1	750.897	6.451	0.026
ERROR	1396.751	12	116.396		
LSLOGS	132.883	1	132.883	2.285	0.156
ERROR	697.709	12	58.142		
RSLPELGS	2428.272	1	2428.272	17.669	0.001
ERROR	1649.210	12	137.434		
HEADGS	5299.840	1	5299.840	7.751	0.017
ERROR	8204.860	12	683.738		

MULTIVARIATE TEST STATISTICS

WILKS' LAMBDA =	0.277			
F-STATISTIC =	5.859	DF =	4, 9	PROB = 0.013
PILLAI TRACE =	0.723			
F-STATISTIC =	5.859	DF =	4, 9	PROB = 0.013
HOTELLING-LAWLEY TRACE =	2.604			
F-STATISTIC =	5.859	DF =	4, 9	PROB = 0.013

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	2614.021	1	2614.021	22.458	0.000
ERROR	1396.751	12	116.396		
LSLOGS	7144.053	1	7144.053	122.872	0.000
ERROR	697.709	12	58.142		
RSLPELGS	23752.204	1	23752.204	172.826	0.000
ERROR	1649.210	12	137.434		
HEADGS	721.728	1	721.728	1.056	0.324
ERROR	8204.860	12	683.738		

MULTIVARIATE TEST STATISTICS

WILKS' LAMBDA =	0.056				
F-STATISTIC =	38.168	DF =	4,	9	PROB = 0.000
PILLAI TRACE =	0.944				
F-STATISTIC =	38.168	DF =	4,	9	PROB = 0.000
HOTELLING-LAWLEY TRACE =	16.963				
F-STATISTIC =	38.168	DF =	4,	9	PROB = 0.000

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	331.695	1	331.695	2.850	0.117
ERROR	1396.751	12	116.396		
LSLOGS	1.749	1	1.749	0.030	0.865
ERROR	697.709	12	58.142		
RSLPELGS	426.526	1	426.526	3.103	0.104
ERROR	1649.210	12	137.434		
HEADGS	692.742	1	692.742	1.013	0.334
ERROR	8204.860	12	683.738		

MULTIVARIATE TEST STATISTICS

WILKS' LAMBDA =	0.649				
F-STATISTIC =	1.217	DF =	4,	9	PROB = 0.369
PILLAI TRACE =	0.351				
F-STATISTIC =	1.217	DF =	4,	9	PROB = 0.369
HOTELLING-LAWLEY TRACE =	0.541				
F-STATISTIC =	1.217	DF =	4,	9	PROB = 0.369

Data Set B Mulitvariate Analysis of Variance
Part I

This series of tests uses the EUROSID Dummy, the NHTSA test procedure, and the NHTSA Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- TTIDATRP –> TTI [Age=0] – g's Data Report
- TTINHRMK –> TTI [Age=0] – g's NHTSA Rule Maker
- TTINHRS –> TTI [Age=0] – g's NHTSA Research
- VCUPRB –> V*C Max – m/sec Upper Rib
- VCCNRB –> V*C Max – m/sec Center Rib
- VCLORB –> V*C Max – m/sec Lower Rib
- LATRUPGS –> Lateral Rib Upper (g's)
- LATRCNGS –> Lateral Rib Center (g's)
- LATRLOGS –> Lateral Rib Lower (g's)

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NUMBER OF CASES PROCESSED: 8

DEPENDENT VARIABLE MEANS

TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
90.214	89.813	90.125	0.288	0.345

VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
0.401	87.906	89.526	98.695

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
CONSTANT		90.214	89.813	90.125	0.288	0.345
VSS	1	–1.829	–1.813	–1.625	–0.010	–0.005
DOORPAD	1	21.314	21.313	21.125	0.123	0.123
VSS DOORPAD	1 1	–5.659	–5.563	–5.625	–0.050	–0.028

		VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
CONSTANT		0.401	87.906	89.526	98.695
VSS	1	–0.051	–1.204	–11.024	–10.120
DOORPAD	1	0.019	22.941	22.941	19.855
VSS DOORPAD	1 1	–0.009	–8.429	–14.449	–9.280

SQUARED MULTIPLE CORRELATIONS

TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
0.931	0.932	0.929	0.782	0.692

VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
0.276	0.756	0.815	0.789

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	26.755	1	26.755	0.368	0.577
ERROR	290.741	4	72.685		
TTINHRMK	26.281	1	26.281	0.366	0.578
ERROR	286.875	4	71.719		
TTINHRS	21.125	1	21.125	0.289	0.619
ERROR	292.500	4	73.125		

VCUPRB	0.001	1	0.001	0.081	0.790
ERROR	0.039	4	0.010		
VCCNRB	0.000	1	0.000	0.014	0.911
ERROR	0.056	4	0.014		
VCLORB	0.021	1	0.021	1.312	0.316
ERROR	0.064	4	0.016		
LATRUPGS	11.592	1	11.592	0.030	0.871
ERROR	1549.955	4	387.489		
LATRCNGS	972.185	1	972.185	2.499	0.189
ERROR	1556.260	4	389.065		
LATRLOGS	819.315	1	819.315	2.631	0.180
ERROR	1245.755	4	311.439		

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	3634.208	1	3634.208	49.999	0.002
ERROR	290.741	4	72.685		
TTINHRMK	3633.781	1	3633.781	50.667	0.002
ERROR	286.875	4	71.719		
TTINHRS	3570.125	1	3570.125	48.822	0.002
ERROR	292.500	4	73.125		
VCUPRB	0.120	1	0.120	12.219	0.025
ERROR	0.039	4	0.010		
VCCNRB	0.120	1	0.120	8.560	0.043
ERROR	0.056	4	0.014		
VCLORB	0.003	1	0.003	0.176	0.697
ERROR	0.064	4	0.016		
LATRUPGS	4210.408	1	4210.408	10.866	0.030
ERROR	1549.955	4	387.489		
LATRCNGS	4210.408	1	4210.408	10.822	0.030
ERROR	1556.260	4	389.065		
LATRLOGS	3153.768	1	3153.768	10.126	0.033
ERROR	1245.755	4	311.439		

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	256.172	1	256.172	3.524	0.134
ERROR	290.741	4	72.685		

TTINHRMK	247.531	1	247.531	3.451	0.137
ERROR	286.875	4	71.719		
TTINHRS	253.125	1	253.125	3.462	0.136
ERROR	292.500	4	73.125		
VCUPRB	0.020	1	0.020	2.036	0.227
ERROR	0.039	4	0.010		
VCCNRB	0.006	1	0.006	0.431	0.547
ERROR	0.056	4	0.014		
VCLORB	0.001	1	0.001	0.038	0.854
ERROR	0.064	4	0.016		
LATRUPGS	568.351	1	568.351	1.467	0.293
ERROR	1549.955	4	387.489		
LATRCNGS	1670.131	1	1670.131	4.293	0.107
ERROR	1556.260	4	389.065		
LATRLOGS	688.947	1	688.947	2.212	0.211
ERROR	1245.755	4	311.439		

Data Set B Mulitvariate Analysis of Variance
Part II

This series of tests uses the EUROSID Dummy, the NHTSA test procedure, and the NHTSA Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- LSUPGS –> Lateral Spine Upper g's
- LSLOGS –> Lateral Spine Lower g's
- LATPELGS –> Lateral Pelvis g's
- RSLPELGS –> Resultant Pelvis g's
- PFRTIL –> Pelvic Force, Right Iliac (lbs)
- PFPBSYS –> Pelvic Force, Pubic Sysmphsis (lbs)
- HEADGS –> Resultant Head g's
- HEADHIC –> Head HIC
- RBDEFUP –> Rib Deflection, Upper (in)
- RBDEFCN –> Rib Deflection, Center (in)
- RBDEFLO –> Rib Deflection, Lower (in)
- LDA2GS –> Lateral Door Acceleration, Location #2 g's
- LDA3GS –> Lateral Door Acceleration, Location #3 g's
- LDA4GS –> Lateral Door Acceleration, Location #4 g's
- LLGCGBGS –> Longitudinal CG Barrier g's
- DELMBDCT –> Delta MBD Contact Inches

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NUMBER OF CASES PROCESSED: 8

DEPENDENT VARIABLE MEANS

LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFRTIL
61.779	80.099	99.966	104.868	603.445

PFPBSYS	HEADGS	HEADHIC	RBDEFUP	RBDEFCN
1592.404	88.324	269.269	1.251	1.408

RBDEFLO
1.399

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFRTIL
CONSTANT		61.779	80.099	99.966	104.868	603.445
VSS	1	4.086	5.011	5.941	7.070	9.120
DOORPAD	1	10.799	22.851	35.879	34.670	–129.163
VSS DOORPAD	1 1	–4.549	–1.781	–5.596	–6.723	–88.728

		PFPBSYS	HEADGS	HEADHIC	RBDEFUP	RBDEFCN
CONSTANT		1592.404	88.324	269.269	1.251	1.408
VSS	1	9.281	27.711	90.284	–0.036	–0.023
DOORPAD	1	979.334	8.396	42.014	0.261	0.203
VSS DOORPAD	1 1	–198.239	–16.811	–60.031	–0.091	–0.078

		RBDEFLO
CONSTANT		1.399
VSS	1	–0.024
DOORPAD	1	0.049

VSS	1	
DOORPAD	1	–0.089

SQUARED MULTIPLE CORRELATIONS

LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFRTIL
0.840	0.957	0.936	0.931	0.726
PFPBSYS	**HEADGS**	**HEADHIC**	**RBDEFUP**	**RBDEFCN**
0.947	0.510	0.537	0.649	0.632
RBDEFLO				
0.421				

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	133.580	1	133.580	2.283	0.205
ERROR	234.040	4	58.510		
LSLOGS	200.901	1	200.901	4.029	0.115
ERROR	199.476	4	49.869		
LATPELGS	282.388	1	282.388	1.523	0.285
ERROR	741.803	4	185.451		
RSLPELGS	399.879	1	399.879	2.086	0.222
ERROR	766.875	4	191.719		
PFRTIL	665.395	1	665.395	0.036	0.859
ERROR	74235.908	4	18558.977		
PFPBSYS	689.133	1	689.133	0.006	0.941
ERROR	445196.845	4	111299.211		
HEADGS	6143.307	1	6143.307	2.855	0.166
ERROR	8606.205	4	2151.551		
HEADHIC	65209.244	1	65209.244	2.802	0.169
ERROR	93085.146	4	23271.287		
RBDEFUP	0.011	1	0.011	0.125	0.742
ERROR	0.337	4	0.084		
RBDEFCN	0.004	1	0.004	0.073	0.800
ERROR	0.221	4	0.055		
RBDEFLO	0.005	1	0.005	0.152	0.717
ERROR	0.119	4	0.030		

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	932.904	1	932.904	15.944	0.016
ERROR	234.040	4	58.510		
LSLOGS	4177.437	1	4177.437	83.768	0.001
ERROR	199.476	4	49.869		
LATPELGS	10298.278	1	10298.278	55.531	0.002
ERROR	741.803	4	185.451		
RSLPELGS	9616.071	1	9616.071	50.157	0.002
ERROR	766.875	4	191.719		
PFRTIL	133463.611	1	133463.611	7.191	0.055
ERROR	74235.908	4	18558.977		
PFPBSYS	7672756.751	1	7672756.751	68.938	0.001
ERROR	445196.845	4	111299.211		
HEADGS	563.976	1	563.976	0.262	0.636
ERROR	8606.205	4	2151.551		
HEADHIC	14121.242	1	14121.242	0.607	0.480
ERROR	93085.146	4	23271.287		
RBDEFUP	0.546	1	0.546	6.490	0.063
ERROR	0.337	4	0.084		
RBDEFCN	0.328	1	0.328	5.938	0.071
ERROR	0.221	4	0.055		
RBDEFLO	0.019	1	0.019	0.639	0.469
ERROR	0.119	4	0.030		

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	165.529	1	165.529	2.829	0.168
ERROR	234.040	4	58.510		
LSLOGS	25.383	1	25.383	0.509	0.515
ERROR	199.476	4	49.869		
LATPELGS	250.544	1	250.544	1.351	0.310
ERROR	741.803	4	185.451		
RSLPELGS	361.536	1	361.536	1.886	0.242
ERROR	766.875	4	191.719		
PFRTIL	62980.554	1	62980.554	3.394	0.139
ERROR	74235.908	4	18558.977		
PFPBSYS	314388.816	1	314388.816	2.825	0.168
ERROR	445196.845	4	111299.211		
HEADGS	2260.945	1	2260.945	1.051	0.363

ERROR	8606.205	4	2151.551		
HEADHIC	28830.008	1	28830.008	1.239	0.328
ERROR	93085.146	4	23271.287		
RBDEFUP	0.067	1	0.067	0.792	0.424
ERROR	0.337	4	0.084		
RBDEFCN	0.048	1	0.048	0.870	0.404
ERROR	0.221	4	0.055		
RBDEFLO	0.063	1	0.063	2.119	0.219
ERROR	0.119	4	0.030		

Data Set C Mulitvariate Analysis of Variance
Part I

This series of tests uses the EUROSID Dummy, the European test procedure, and the EEVC Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- TTIDATRP –> TTI [Age=0] – g's Data Report
- TTINHRMK –> TTI [Age=0] – g's NHTSA Rule Maker
- TTINHRS –> TTI [Age=0] – g's NHTSA Research
- VCUPRB –> V*C Max – m/sec Upper Rib
- VCCNRB –> V*C Max – m/sec Center Rib
- VCLORB –> V*C Max – m/sec Lower Rib
- LATRUPGS –> Lateral Rib Upper (g's)
- LATRCNGS –> Lateral Rib Center (g's)
- LATRLOGS –> Lateral Rib Lower (g's)

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NUMBER OF CASES PROCESSED: 8

DEPENDENT VARIABLE MEANS

TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
82.145	81.500	82.250	0.191	0.184

VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
0.229	88.338	83.673	88.059

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
CONSTANT		82.145	81.500	82.250	0.191	0.184
VSS	1	0.068	0.125	0.250	–0.036	–0.041
DOORPAD	1	25.400	25.500	25.500	0.116	0.036
VSS DOORPAD	1 1	4.058	4.125	4.000	–0.016	–0.024

		VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
CONSTANT		0.229	88.338	83.673	88.059
VSS	1	–0.019	7.315	–8.583	–15.426
DOORPAD	1	–0.004	38.908	33.735	15.044
VSS DOORPAD	1 1	–0.036	–0.195	4.255	–4.741

SQUARED MULTIPLE CORRELATIONS

TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
0.923	0.923	0.924	0.878	0.716

VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
0.625	0.967	0.938	0.855

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	0.036	1	0.036	0.000	0.986
ERROR	441.600	4	110.400		
TTINHRMK	0.125	1	0.125	0.001	0.975
ERROR	444.750	4	111.188		
TTINHRS	0.500	1	0.500	0.005	0.950
ERROR	441.000	4	110.250		

VCUPRB	0.011	1	0.011	2.510	0.188
ERROR	0.017	4	0.004		
VCCNRB	0.014	1	0.014	4.797	0.094
ERROR	0.011	4	0.003		
VCLORB	0.003	1	0.003	1.398	0.303
ERROR	0.008	4	0.002		
LATRUPGS	428.074	1	428.074	4.034	0.115
ERROR	424.504	4	106.126		
LATRCNGS	589.274	1	589.274	3.651	0.129
ERROR	645.578	4	161.394		
LATRLOGS	1903.754	1	1903.754	11.512	0.027
ERROR	661.480	4	165.370		

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	5161.280	1	5161.280	46.751	0.002
ERROR	441.600	4	110.400		
TTINHRMK	5202.000	1	5202.000	46.786	0.002
ERROR	444.750	4	111.188		
TTINHRS	5202.000	1	5202.000	47.184	0.002
ERROR	441.000	4	110.250		
VCUPRB	0.108	1	0.108	25.818	0.007
ERROR	0.017	4	0.004		
VCCNRB	0.011	1	0.011	3.705	0.127
ERROR	0.011	4	0.003		
VCLORB	0.000	1	0.000	0.056	0.825
ERROR	0.008	4	0.002		
LATRUPGS	12110.348	1	12110.348	114.113	0.000
ERROR	424.504	4	106.126		
LATRCNGS	9104.402	1	9104.402	56.411	0.002
ERROR	645.578	4	161.394		
LATRLOGS	1810.515	1	1810.515	10.948	0.030
ERROR	661.480	4	165.370		

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	131.706	1	131.706	1.193	0.336
ERROR	441.600	4	110.400		

TTINHRMK	136.125	1	136.125	1.224	0.331
ERROR	444.750	4	111.188		
TTINHRS	128.000	1	128.000	1.161	0.342
ERROR	441.000	4	110.250		
VCUPRB	0.002	1	0.002	0.504	0.517
ERROR	0.017	4	0.004		
VCCNRB	0.005	1	0.005	1.590	0.276
ERROR	0.011	4	0.003		
VCLORB	0.011	1	0.011	5.224	0.084
ERROR	0.008	4	0.002		
LATRUPGS	0.304	1	0.304	0.003	0.960
ERROR	424.504	4	106.126		
LATRCNGS	144.840	1	144.840	0.897	0.397
ERROR	645.578	4	161.394		
LATRLOGS	179.836	1	179.836	1.087	0.356
ERROR	661.480	4	165.370		

Data Set C Mulitvariate Analysis of Variance
Part II

This series of tests uses the EUROSID Dummy, the European test procedure, and the EEVC Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- LSUPGS –> Lateral Spine Upper g's
- LSLOGS –> Lateral Spine Lower g's
- LATPELGS –> Lateral Pelvis g's
- RSLPELGS –> Resultant Pelvis g's
- PFRTIL –> Pelvic Force, Right Iliac (lbs)
- PFPBSYS –> Pelvic Force, Pubic Sysmphsis (lbs)
- HEADGS –> Resultant Head g's
- HEADHIC –> Head HIC
- RBDEFUP –> Rib Deflection, Upper (in)
- RBDEFCN –> Rib Deflection, Center (in)
- RBDEFLO –> Rib Deflection, Lower (in)
- LDA2GS –> Lateral Door Acceleration, Location #2 g's
- LDA3GS –> Lateral Door Acceleration, Location #3 g's
- LDA4GS –> Lateral Door Acceleration, Location #4 g's
- LLGCGBGS –> Longitudinal CG Barrier g's
- DELMBDCT –> Delta MBD Contact Inches

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NUMBER OF CASES PROCESSED: 8

DEPENDENT VARIABLE MEANS

LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFRTIL
46.119	62.760	77.330	78.589	748.320
PFPBSYS	**HEADGS**	**HEADHIC**	**RBDEFUP**	**RBDEFCN**
1053.496	74.851	184.816	1.024	0.984
RBDEFLO				
1.083				

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFRTIL
CONSTANT		46.119	62.760	77.330	78.589	748.320
VSS	1	0.974	3.313	6.170	6.399	22.088
DOORPAD	1	9.926	22.290	25.075	26.199	–63.298
VSS DOORPAD	1 1	–1.709	0.608	3.295	3.509	–108.130

		PFPBSYS	HEADGS	HEADHIC	RBDEFUP	RBDEFCN
CONSTANT		1053.496	74.851	184.816	1.024	0.984
VSS	1	81.344	20.631	73.846	–0.086	–0.074
DOORPAD	1	457.024	26.379	108.111	0.201	–0.021
VSS DOORPAD	1 1	–11.104	–0.721	36.321	0.031	–0.074

		RBDEFLO
CONSTANT		1.083
VSS	1	–0.060
DOORPAD	1	–0.083

VSS	1	
DOORPAD	1	–0.070

SQUARED MULTIPLE CORRELATIONS

LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFRTIL
0.746	0.936	0.988	0.988	0.377
PFPBSYS	**HEADGS**	**HEADHIC**	**RBDEFUP**	**RBDEFCN**
0.993	0.840	0.847	0.912	0.673
RBDEFLO				
0.829				

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	7.586	1	7.586	0.109	0.758
ERROR	278.668	4	69.667		
LSLOGS	87.781	1	87.781	1.269	0.323
ERROR	276.753	4	69.188		
LATPELGS	304.551	1	304.551	18.816	0.012
ERROR	64.745	4	16.186		
RSLPELGS	327.552	1	327.552	19.002	0.012
ERROR	68.953	4	17.238		
PFRTIL	3902.861	1	3902.861	0.073	0.800
ERROR	213863.094	4	53465.773		
PFPBSYS	52934.445	1	52934.445	17.959	0.013
ERROR	11790.257	4	2947.564		
HEADGS	3405.188	1	3405.188	7.989	0.048
ERROR	1704.930	4	426.233		
HEADHIC	43626.149	1	43626.149	6.545	0.063
ERROR	26660.659	4	6665.165		
RBDEFUP	0.060	1	0.060	6.289	0.066
ERROR	0.038	4	0.009		
RBDEFCN	0.044	1	0.044	3.960	0.117
ERROR	0.044	4	0.011		
RBDEFLO	0.029	1	0.029	4.553	0.100
ERROR	0.025	4	0.006		

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	788.244	1	788.244	11.314	0.028
ERROR	278.668	4	69.667		
LSLOGS	3974.753	1	3974.753	57.448	0.002
ERROR	276.753	4	69.188		
LATPELGS	5030.045	1	5030.045	310.762	0.000
ERROR	64.745	4	16.186		
RSLPELGS	5490.996	1	5490.996	318.536	0.000
ERROR	68.953	4	17.238		
PFRTIL	32052.588	1	32052.588	0.599	0.482
ERROR	213863.094	4	53465.773		
PFPBSYS	1670965.665	1	1670965.665	566.897	0.000
ERROR	11790.257	4	2947.564		
HEADGS	5566.708	1	5566.708	13.060	0.022
ERROR	1704.930	4	426.233		
HEADHIC	93504.339	1	93504.339	14.029	0.020
ERROR	26660.659	4	6665.165		
RBDEFUP	0.324	1	0.324	34.242	0.004
ERROR	0.038	4	0.009		
RBDEFCN	0.004	1	0.004	0.329	0.597
ERROR	0.044	4	0.011		
RBDEFLO	0.054	1	0.054	8.609	0.043
ERROR	0.025	4	0.006		

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	23.359	1	23.359	0.335	0.594
ERROR	278.668	4	69.667		
LSLOGS	2.952	1	2.952	0.043	0.846
ERROR	276.753	4	69.188		
LATPELGS	86.856	1	86.856	5.366	0.081
ERROR	64.745	4	16.186		
RSLPELGS	98.491	1	98.491	5.714	0.075
ERROR	68.953	4	17.238		
PFRTIL	93536.775	1	93536.775	1.749	0.256
ERROR	213863.094	4	53465.773		
PFPBSYS	986.346	1	986.346	0.335	0.594
ERROR	11790.257	4	2947.564		
HEADGS	4.162	1	4.162	0.010	0.926

ERROR	1704.930	4	426.233		
HEADHIC	10553.866	1	10553.866	1.583	0.277
ERROR	26660.659	4	6665.165		
RBDEFUP	0.008	1	0.008	0.826	0.415
ERROR	0.038	4	0.009		
RBDEFCN	0.044	1	0.044	3.960	0.117
ERROR	0.044	4	0.011		
RBDEFLO	0.039	1	0.039	6.198	0.068
ERROR	0.025	4	0.006		

Data Set D Mulitvariate Analysis of Variance
Part I

This series of tests uses the EUROSID Dummy, the NHTSA test procedure, and the EEVC Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- TTIDATRP –> TTI [Age=0] – g's Data Report
- TTINHRMK –> TTI [Age=0] – g's NHTSA Rule Maker
- TTINHRS –> TTI [Age=0] – g's NHTSA Research
- VCUPRB –> V*C Max – m/sec Upper Rib
- VCCNRB –> V*C Max – m/sec Center Rib
- VCLORB –> V*C Max – m/sec Lower Rib
- LATRUPGS –> Lateral Rib Upper (g's)
- LATRCNGS –> Lateral Rib Center (g's)
- LATRLOGS –> Lateral Rib Lower (g's)

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NUMBER OF CASES PROCESSED:
8

DEPENDENT VARIABLE MEANS

TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
76.816	76.625	77.125	0.176	0.209

VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
0.289	65.075	69.658	85.870

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
CONSTANT		76.816	76.625	77.125	0.176	0.209
VSS	1	3.299	3.000	2.875	0.059	0.016
DOORPAD	1	24.254	24.000	24.125	0.121	0.101
VSS DOORPAD	1 1	2.061	2.375	2.375	0.004	–0.021

		VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
CONSTANT		0.289	65.075	69.658	85.870
VSS	1	–0.006	15.925	–0.385	–10.163
DOORPAD	1	0.041	20.795	27.573	26.025
VSS DOORPAD	1 1	–0.019	10.755	0.700	–9.818

SQUARED MULTIPLE CORRELATIONS

TTIDATRP	TTINHRMK	TTINHRS	VCUPRB	VCCNRB
0.973	0.976	0.976	0.882	0.816

VCLORB	LATRUPGS	LATRCNGS	LATRLOGS
0.545	0.951	0.923	0.960

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	87.054	1	87.054	2.625	0.181
ERROR	132.659	4	33.165		
TTINHRMK	72.000	1	72.000	2.510	0.188
ERROR	114.750	4	28.688		
TTINHRS	66.125	1	66.125	2.251	0.208
ERROR	117.500	4	29.375		

VCUPRB	0.028	1	0.028	5.679	0.076
ERROR	0.019	4	0.005		
VCCNRB	0.002	1	0.002	0.428	0.549
ERROR	0.020	4	0.005		
VCLORB	0.000	1	0.000	0.090	0.780
ERROR	0.014	4	0.003		
LATRUPGS	2028.845	1	2028.845	24.374	0.008
ERROR	332.954	4	83.239		
LATRCNGS	1.186	1	1.186	0.009	0.928
ERROR	508.960	4	127.240		
LATRLOGS	826.211	1	826.211	11.449	0.028
ERROR	288.663	4	72.166		

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	4705.955	1	4705.955	141.896	0.000
ERROR	132.659	4	33.165		
TTINHRMK	4608.000	1	4608.000	160.627	0.000
ERROR	114.750	4	28.688		
TTINHRS	4656.125	1	4656.125	158.506	0.000
ERROR	117.500	4	29.375		
VCUPRB	0.118	1	0.118	24.188	0.008
ERROR	0.019	4	0.005		
VCCNRB	0.082	1	0.082	16.610	0.015
ERROR	0.020	4	0.005		
VCLORB	0.014	1	0.014	3.903	0.119
ERROR	0.014	4	0.003		
LATRUPGS	3459.456	1	3459.456	41.561	0.003
ERROR	332.954	4	83.239		
LATRCNGS	6081.942	1	6081.942	47.799	0.002
ERROR	508.960	4	127.240		
LATRLOGS	5418.405	1	5418.405	75.083	0.001
ERROR	288.663	4	72.166		

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
TTIDATRP	33.990	1	33.990	1.025	0.369
ERROR	132.659	4	33.165		

TTINHRMK	45.125	1	45.125	1.573	0.278
ERROR	114.750	4	28.688		
TTINHRS	45.125	1	45.125	1.536	0.283
ERROR	117.500	4	29.375		
VCUPRB	0.000	1	0.000	0.023	0.886
ERROR	0.019	4	0.005		
VCCNRB	0.004	1	0.004	0.732	0.441
ERROR	0.020	4	0.005		
VCLORB	0.003	1	0.003	0.806	0.420
ERROR	0.014	4	0.003		
LATRUPGS	925.360	1	925.360	11.117	0.029
ERROR	332.954	4	83.239		
LATRCNGS	3.920	1	3.920	0.031	0.869
ERROR	508.960	4	127.240		
LATRLOGS	771.066	1	771.066	10.685	0.031
ERROR	288.663	4	72.166		

Data Set D Mulitvariate Analysis of Variance
Part II

This series of tests uses the EUROSID Dummy, the NHTSA test procedure, and the EEVC Barrier Face.

Independent Variables are:

- VSS –> Vehicle side structure
- DOORPAD –> Struck side door padding

Dependent Variables are:

- LSUPGS –> Lateral Spine Upper g's
- LSLOGS –> Lateral Spine Lower g's
- LATPELGS –> Lateral Pelvis g's
- RSLPELGS –> Resultant Pelvis g's
- PFRTIL –> Pelvic Force, Right Iliac (lbs)
- PFPBSYS –> Pelvic Force, Pubic Sysmphsis (lbs)
- HEADGS –> Resultant Head g's
- HEADHIC –> Head HIC
- RBDEFUP –> Rib Deflection, Upper (in)
- RBDEFCN –> Rib Deflection, Center (in)
- RBDEFLO –> Rib Deflection, Lower (in)
- LDA2GS –> Lateral Door Acceleration, Location #2 g's
- LDA3GS –> Lateral Door Acceleration, Location #3 g's
- LDA4GS –> Lateral Door Acceleration, Location #4 g's
- LLGCGBGS –> Longitudinal CG Barrier g's
- DELMBDCT –> Delta MBD Contact Inches

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NUMBER OF CASES PROCESSED:
8

DEPENDENT VARIABLE MEANS

LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFPBSYS
51.491	61.931	67.013	69.455	1122.320

HEADGS	HEADHIC	RBDEFUP	RBDEFCN	RBDEFLO
68.059	167.306	0.961	1.116	1.280

ESTIMATES OF EFFECTS $B = (X'X)^{-1} X'Y$

		LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFPBSYS
CONSTANT		51.491	61.931	67.013	69.455	1122.320
VSS	1	7.284	10.946	13.650	14.598	222.708
DOORPAD	1	7.081	16.666	19.040	18.010	377.430
VSS DOORPAD	1 1	5.494	8.111	7.623	6.743	120.598

		HEADGS	HEADHIC	RBDEFUP	RBDEFCN	RBDEFLO
CONSTANT		68.059	167.306	0.961	1.116	1.280
VSS	1	20.031	51.364	0.214	0.004	–0.030
DOORPAD	1	5.631	–11.261	0.429	0.181	–0.000
VSS DOORPAD	1 1	–9.776	–58.169	–0.219	–0.111	–0.065

SQUARED MULTIPLE CORRELATIONS

LSUPGS	LSLOGS	LATPELGS	RSLPELGS	PFPBSYS
0.914	0.958	0.953	0.952	0.933

HEADGS	HEADHIC	RBDEFUP	RBDEFCN	RBDEFLO
0.477	0.670	0.928	0.866	0.765

TEST FOR EFFECT CALLED:
VSS

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	424.424	1	424.424	16.991	0.015
ERROR	99.917	4	24.979		
LSLOGS	958.563	1	958.563	23.674	0.008
ERROR	161.961	4	40.490		
LATPELGS	1490.580	1	1490.580	24.686	0.008
ERROR	241.524	4	60.381		
RSLPELGS	1704.696	1	1704.696	28.819	0.006
ERROR	236.610	4	59.153		
PFPBSYS	396789.044	1	396789.044	13.460	0.021
ERROR	117917.569	4	29479.392		
HEADGS	3210.008	1	3210.008	2.766	0.172
ERROR	4642.718	4	1160.680		
HEADHIC	21105.879	1	21105.879	3.480	0.136
ERROR	24258.134	4	6064.534		
RBDEFUP	0.366	1	0.366	8.454	0.044
ERROR	0.173	4	0.043		
RBDEFCN	0.000	1	0.000	0.008	0.933
ERROR	0.056	4	0.014		
RBDEFLO	0.007	1	0.007	2.286	0.205
ERROR	0.013	4	0.003		

TEST FOR EFFECT CALLED:
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	401.153	1	401.153	16.059	0.016
ERROR	99.917	4	24.979		
LSLOGS	2222.111	1	2222.111	54.880	0.002
ERROR	161.961	4	40.490		
LATPELGS	2900.173	1	2900.173	48.031	0.002
ERROR	241.524	4	60.381		
RSLPELGS	2594.881	1	2594.881	43.868	0.003
ERROR	236.610	4	59.153		
PFPBSYS	1139627.239	1	1139627.239	38.658	0.003
ERROR	117917.569	4	29479.392		
HEADGS	253.688	1	253.688	0.219	0.664
ERROR	4642.718	4	1160.680		
HEADHIC	1014.526	1	1014.526	0.167	0.703
ERROR	24258.134	4	6064.534		
RBDEFUP	1.471	1	1.471	34.012	0.004

ERROR	0.173	4	0.043		
RBDEFCN	0.263	1	0.263	18.756	0.012
ERROR	0.056	4	0.014		
RBDEFLO	0.000	1	0.000	0.000	1.000
ERROR	0.013	4	0.003		

TEST FOR EFFECT CALLED:
VSS
BY
DOORPAD

UNIVARIATE F TESTS

VARIABLE	SS	DF	MS	F	P
LSUPGS	241.450	1	241.450	9.666	0.036
ERROR	99.917	4	24.979		
LSLOGS	526.339	1	526.339	12.999	0.023
ERROR	161.961	4	40.490		
LATPELGS	464.820	1	464.820	7.698	0.050
ERROR	241.524	4	60.381		
RSLPELGS	363.690	1	363.690	6.148	0.068
ERROR	236.610	4	59.153		
PFPBSYS	116350.056	1	116350.056	3.947	0.118
ERROR	117917.569	4	29479.392		
HEADGS	764.601	1	764.601	0.659	0.463
ERROR	4642.718	4	1160.680		
HEADHIC	27068.828	1	27068.828	4.463	0.102
ERROR	24258.134	4	6064.534		
RBDEFUP	0.383	1	0.383	8.854	0.041
ERROR	0.173	4	0.043		
RBDEFCN	0.099	1	0.099	7.066	0.056
ERROR	0.056	4	0.014		
RBDEFLO	0.034	1	0.034	10.730	0.031
ERROR	0.013	4	0.003		

Appendix C

Confidence Intervals on Mean Values and Differences of Means

The following pages contain 95% confidence intervals on the means of the response variables and 95% confidence intervals on the differences of the means. The variance used in each mean interval is calculated by using the pure error variance for that measure divided by the number of runs. The variance of the differences is the sum of the variances for the two means.

AVERAGE VALUES WITHIN EACH DATA SET

TEST TYPE	TTI NHTSA RULEMAKE	V*C MAX - M/SEC UPPER RIB	V*C MAX - M/SEC CENTER RIB	V*C MAX - M/SEC LOWER RIB	LA UPPER G'S
A -> NHTSA/NHTSA/SID	72.8125				58.35437
B -> NHTSA/NHTSA/EUROSID	89.8125	0.2875	0.345	0.40125	87.90625
C -> EEVC/EEVC/EUROSID	81.5	0.19125	0.18375	0.22875	88.3375
D -> NHTSA/EEVC/EUROSID	76.625	0.17625	0.20875	0.28875	65.075
VARIANCES					
A	21.625				35.10621
B	71.71875	0.009825	0.014025	0.016012	387.4888
C	111.1875	0.004187	0.002837	0.002013	106.126
D	28.6875	0.004862	0.004937	0.003487	83.2386
95% CONFIDENCE INTERVALS ON MEANS					
A UPPER	75.09113				61.25765
A LOWER	70.53387				55.4511
B UPPER	95.681	0.356187	0.427066	0.488938	101.5471
B LOWER	83.944	0.218813	0.262934	0.313562	74.26543
C UPPER	88.807	0.236092	0.220663	0.259837	95.47625
C LOWER	74.193	0.146408	0.146837	0.197663	81.19875
D UPPER	80.33657	0.224572	0.257443	0.329673	71.39728
D LOWER	72.91343	0.127928	0.160057	0.247827	58.75272

TERIAL RIBS CENTER G'S	LOWER G'S	LATERAL UPPER G'S	SPINE LOWER G'S	LATERAL PELVIS G'S	RESULTANT PELVIS G'S	PELVIC RIGHT ILIAC	FORCE-LB PUBIC SYSMPHS
	58.29063	64.83187	83.90437		92.14562		
89.52625	98.695	61.77875	80.09875	99.96625	104.8675	603.445	1592.404
83.6725	88.05875	46.11875	62.76	77.33	78.58875	748.32	1053.496
69.6575	85.87	51.49125	61.93125	67.0125	69.455		1122.32
	26.24358	26.72956	53.66197		61.04657		
389.0651	311.4386	58.51009	49.86896	185.4507	191.7187	18558.98	111299.2
161.3944	165.3701	69.66706	69.18833	16.18615	17.23821	53465.77	2947.564
127.24	72.16578	24.97926	40.49016	60.38107	59.15257		29479.39
	60.80082	67.36521	87.49384		95.97411		
	55.78043	62.29854	80.31491		88.31714		
103.1948	110.9242	67.07937	84.99232	109.4031	114.4625	697.8485	1823.587
75.85771	86.46582	56.47813	75.20518	90.52944	95.27254	509.0415	1361.22
92.476	96.97002	51.9027	68.52405	80.11794	81.46586	908.5519	1091.118
74.869	79.14748	40.3348	56.99595	74.54206	75.71164	588.0881	1015.874
77.47419	91.75677	54.95464	66.34071	72.3972	74.78464		1241.299
61.84081	79.98323	48.02786	57.52179	61.6278	64.12536		1003.341

RESULTANT HEAD G'S	HEAD HIC	RIB DEFLECTION UPPER INCHES	CENTER INCHES	LOWER INCHES
59.81125	197.7181	1.6775		
88.32375	269.2688	1.25125	1.4075	1.39875
74.85125	184.8162	1.02375	0.98375	1.0825
68.05875	167.3063	0.96125	1.11625	1.28
699.6163	16105.99	0.182075		
2151.551	23271.29	0.084137	0.05525	0.029738
426.2325	6665.165	0.009463	0.010987	0.006325
1160.68	6064.534	0.043237	0.014013	0.00315
72.77188	259.9037	1.886584		
46.85062	135.5325	1.468416		
120.4668	374.98	1.452255	1.570384	1.518249
56.18071	163.5575	1.050245	1.244616	1.279251
89.15778	241.3902	1.091158	1.056387	1.137611
60.54472	128.2423	0.956342	0.911113	1.027389
91.66719	221.271	1.105342	1.198279	1.318893
44.45031	113.3415	0.817158	1.034221	1.241107

AVERAGE VALUES WITHIN EACH DATA SET

TEST TYPE	TTI NHTSA RULEMAKE	V*C MAX - M/SEC UPPER RIB	V*C MAX - M/SEC CENTER RIB	V*C MAX - M/SEC LOWER RIB	LA UPPER G'S
A -> NHTSA/NHTSA/SID	72.8125				58.35437
B -> NHTSA/NHTSA/EUROSID	89.8125	0.2875	0.345	0.40125	87.90625
C -> EEVC/EEVC/EUROSID	81.5	0.19125	0.18375	0.22875	88.3375
D -> NHTSA/EEVC/EUROSID	76.625	0.17625	0.20875	0.28875	65.075
VARIANCES					
A	21.625				35.10621
B	71.71875	0.009825	0.014025	0.016012	387.4888
C	111.1875	0.004187	0.002837	0.002013	106.126
D	28.6875	0.004862	0.004937	0.003487	83.2386
DIFFERENCES BETWEEN MEAN VALUES					
A - B	-17				-29.5519
A - C	-8.6875				-29.9831
A - D	-3.8125				-6.72063
B - C	8.3125	0.09625	0.16125	0.1725	-0.43125
B - D	13.1875	0.11125	0.13625	0.1125	22.83125
C - D	4.875	0.015	-0.025	-0.06	23.2625
POOLED VARIANCES					
A & B	62.09375				222.9343
A & C	80.5125				91.63166
A & D	42.0125				80.95089
B & C	189.9063	7.014012	7.016863	7.018025	500.6147
B & D	107.4063	7.014687	7.018962	7.0195	477.7274
C & D	146.875	7.00905	7.007775	7.0055	196.3646
95% CONFIDENCE INTERVALS					
A - B UPPER	-14.6593				-25.1167
A - B LOWER	-19.3407				-33.9871
A - C UPPER	-6.02214				-27.1397
A - C LOWER	-11.3529				-32.8266
A - D UPPER	-1.88713				-4.04802
A - D LOWER	-5.73787				-9.39323
B - C UPPER	13.0806	1.012596	1.077782	1.089108	7.3103
B - C LOWER	3.544396	-0.8201	-0.75528	-0.74411	-8.1728
B - D UPPER	16.77334	1.02764	1.052919	1.029204	30.39376
B - D LOWER	9.60166	-0.80514	-0.78042	-0.8042	15.26874
C - D UPPER	9.068243	0.931022	0.890938	0.85579	28.111
C - D LOWER	0.681757	-0.90102	-0.94094	-0.97579	18.414

TERAL RIBS CENTER G'S	LOWER G'S	LATERAL UPPER G'S	SPINE LOWER G'S	LATERAL PELVIS G'S	RESULTANT PELVIS G'S	PELVIC RIGHT ILIAC	FORCE-LB PUBIC SYSMPHS
	58.29063	64.83187	83.90437		92.14562		
89.52625	98.695	61.77875	80.09875	99.96625	104.8675	603.445	1592.404
83.6725	88.05875	46.11875	62.76	77.33	78.58875	748.32	1053.496
69.6575	85.87	51.49125	61.93125	67.0125	69.455	331.7487	1122.32
	26.24358	26.72956	53.66197		61.04657		
389.0651	311.4386	58.51009	49.86896	185.4507	191.7187	18558.98	111299.2
161.3944	165.3701	69.66706	69.18833	16.18615	17.23821	53465.77	2947.564
127.24	72.16578	24.97926	40.49016	60.38107	59.15257	127219.1	29479.39
	-40.4044	3.053125	3.805625		-12.7219		
	-29.7681	18.71312	21.14437		13.55687		
	-27.5794	13.34063	21.97312		22.69062		
5.85375	10.63625	15.66	17.33875	22.63625	26.27875	-144.875	538.9075
19.86875	12.825	10.2875	18.1675	32.95375	35.4125	271.6962	470.0838
14.015	2.18875	-5.3725	0.82875	10.3175	9.13375	416.5713	-68.8238
	178.5816	61.03426	83.93415		157.5153	8667.856	51946.63
	110.4163	66.24085	92.94985		76.09107	24957.69	1382.53
	66.92094	45.38655	79.55738		95.6511	59375.93	13764.05
557.4594	483.8088	135.1771	126.0573	208.6369	215.9569	72031.75	114253.8
523.305	390.6044	90.48935	97.35912	252.8318	257.8712	145785.1	140785.6
295.6343	244.5359	101.6463	116.6785	83.56722	83.39079	180691.9	32433.96
	-36.4348	5.373785	6.527036		-8.99379		
	-44.3739	0.732465	1.084214		-16.45		
	-26.6468	21.13074	24.00822		16.14802		
	-32.8895	16.29551	18.28053		10.96573		
	-25.1494	15.34181	24.62263		25.59578		
	-30.0094	11.33944	19.32362		19.78547		
14.02301	18.24675	19.68279	21.22347	27.63397	31.36338	-52.013	655.8605
-2.31551	3.025754	11.63721	13.45403	17.63853	21.19412	-237.737	421.9545
27.7838	19.66325	13.57886	21.58151	38.45539	40.9687		599.9078
11.9537	5.986755	6.996144	14.75349	27.45211	29.8563		340.2597
19.96413	7.599375	-1.88413	4.566166	13.48046	12.29337		-6.51112
8.065869	-3.22187	-8.86087	-2.90867	7.154537	5.974128		-131.136

RESULTANT HEAD G'S	HEAD HIC	RIB DEFLECTION UPPER INCHES	CENTER INCHES	LOWER INCHES
59.81125	197.7181	1.6775		
88.32375	269.2688	1.25125	1.4075	1.39875
74.85125	184.8162	1.02375	0.98375	1.0825
68.05875	167.3063	0.96125	1.11625	1.28
699.6163	16105.99	0.182075		
2151.551	23271.29	0.084137	0.05525	0.029738
426.2325	6665.165	0.009463	0.010987	0.006325
1160.68	6064.534	0.043237	0.014013	0.00315
-28.5125	-71.5506	0.42625		
-15.04	12.90188	0.65375		
-8.2475	30.41188	0.71625		
13.4725	84.4525	0.2275	0.42375	0.31625
20.265	101.9625	0.29	0.29125	0.11875
6.7925	17.51	0.0625	-0.1325	-0.1975
1710.674	26972.92	7.221339		
905.5248	19223.4	7.186491		
1248.267	18943.1	7.202253		
2584.784	29943.45	7.0936	7.066237	7.036062
3319.231	29342.82	7.127375	7.069262	7.032888
1593.912	12736.7	7.0527	7.025	7.009475
-16.2266	-22.7654	1.22449		
-40.7984	-120.336	-0.37199		
-6.10129	54.08695	1.450062		
-23.9787	-28.2832	-0.14256		
2.247404	71.29559	1.513435		
-18.7424	-10.4718	-0.08093		
31.06341	144.3249	1.14903	1.343501	1.234035
-4.11841	24.58005	-0.69403	-0.496	-0.60153
40.19902	161.2314	1.213721	1.211198	1.036328
0.330983	42.69358	-0.63372	-0.6287	-0.79883
20.60614	56.55852	0.981369	0.784563	0.718549
-7.02114	-21.5385	-0.85637	-1.04956	-1.11355

Appendix D

Pure Error Sum of Squares and Pure Error Variance

This appendix contains the results of the pure error sum of squares and pure error variance calculations. The pure error variance is calculated from the following formula:

$$(\text{Replicate 1} - \text{Replicate 2})^2 / 2$$

By summing these values for a particular variable in a series and dividing by the degrees of freedom, we can obtain the pooled variance for that variable.

ESTIMATED VARIANCE AT EACH SET OF CONDITIONS

[REPLICATE #1 - REPLICATE #2]^2 / 2

REPLICATE NUMBERS

MVMA NUMBER	MVMA NUMBER	VEHICLE SIDE STRUCTURE	DOOR PADDING	DUMMY DOOR SPACING	TEST PROCEDURE	DUMMY TYPE
3	4	Baseline	No	Far	NHTSA	SID
1	2	Baseline	No	Near	NHTSA	SID
6	7	Baseline	Yes	Far	NHTSA	SID
5	8	Baseline	Yes	Near	NHTSA	SID
15	16	Modified	No	Near	NHTSA	SID
9	12	Modified	No	Far	NHTSA	SID
13	14	Modified	Yes	Far	NHTSA	SID
10	11	Modified	Yes	Near	NHTSA	SID
19	24	Baseline	No	Far	NHTSA	EUROSID
20	22	Baseline	Yes	Far	NHTSA	EUROSID
17.1	21	Modified	No	Far	NHTSA	EUROSID
18	23	Modified	Yes	Far	NHTSA	EUROSID
26	29	Baseline	No	Far	EUROPEAN	EUROSID
27	28	Baseline	Yes	Far	EUROPEAN	EUROSID
25	31	Modified	No	Far	EUROPEAN	EUROSID
30	32	Modified	Yes	Far	EUROPEAN	EUROSID
33	37	Baseline	No	Far	NHTSA	EUROSID
35	39	Baseline	Yes	Far	NHTSA	EUROSID
34	38	Modified	No	Far	NHTSA	EUROSID
36	40	Modified	Yes	Far	NHTSA	EUROSID

POOLED VARIANCE (SUM OF DIFFERENCES SQUARED / 2, DIVIDED BY THE DEG

	TTI (age=0) - G'S DATA REPORT 1	NHTSA RULEMAKE 2	NHTSA RESEARCH 3	V*C MAX - M/ UPPER RIB 4	CENTER RIB 5
DATA SET A	170.4314	173	170.5		
PURE ERROR VARIANCE	21.30393	21.625	21.3125		
DATA SET B	290.7412	286.875	292.5	0.0393	0.0561
PURE ERROR VARIANCE	72.68531	71.71875	73.125	0.009825	0.014025
DATA SET C	441.6001	444.75	441	0.01675	0.01135
PURE ERROR VARIANCE	110.4	111.1875	110.25	0.004187	0.002837
DATA SET D	132.6591	114.75	117.5	0.01945	0.01975
PURE ERROR VARIANCE	33.16476	28.6875	29.375	0.004862	0.004937

BARRIER FACE	TEST SPEED MPH	REPORT AVAILABLE	FILM AVAILABLE	TTI (age=0) - G'S DATA REPORT 1	NHTSA RULEMAKE 2	NHTSA RESEARCH 3	V*C UPPER RIB 4
NHTSA	0	Yes	Yes	93.845	98	98	
NHTSA	0.045	Yes	Yes	12.6002	15.125	12.5	
NHTSA	0.005	Yes	Yes	5.28125	4.5	4.5	
NHTSA	0.005	Yes	Yes	32.805	32	32	
NHTSA	0	Yes	Yes	0.3042	0.125	0.5	
NHTSA	0	Yes	Yes	22.64645	21.125	18	
NHTSA	0	Yes	Yes	0.28125	0.125	0.5	
NHTSA	0.005	Yes	Yes	2.66805	2	4.5	
NHTSA	0.02	Yes	Yes	16.4738	15.125	18	0.0288
NHTSA	0	Yes	Yes	9.5048	6.125	8	0.00125
NHTSA	0.02	Yes	Yes	263.8104	264.5	264.5	0.0032
NHTSA	0	Yes	Yes	0.9522	1.125	2	0.00605
EEVC	0.005	Yes	Yes	127.0418	120.125	128	5E-05
EEVC	0.005	Yes	Yes	8.44605	8	8	5E-05
EEVC	0	Yes	Yes	265.8818	276.125	264.5	0.0162
EEVC	0.02	Yes	Yes	40.23045	40.5	40.5	0.00045
EEVC	561.125	Yes	Yes	2.3328	2	4.5	0.0162
EEVC	0	No	Yes	37.845	36.125	40.5	0.0032
EEVC	0.005	Yes	Yes	33.62	36.125	32	5E-05
EEVC	554.445	Yes	Yes	58.86125	40.5	40.5	0

REES OF FREEDOM)

SEC	LATERIAL RIBS			LATERIAL SPINE		LATERAL PELVIS	RESULTANT PELVIS
LOWER RIB	UPPER G'S	CENTER G'S	LOWER G'S	UPPER G'S	LOWER G'S	G'S	G'S
6	7	8	9	10	11	12	13
	280.8496		209.9486	213.8365	429.2957		488.3725
	35.10621		26.24358	26.72956	53.66197		61.04657
0.06405	1549.955	1556.26	1245.755	234.0403	199.4758	741.8029	766.8747
0.016012	387.4888	389.0651	311.4386	58.51009	49.86896	185.4507	191.7187
0.00805	424.5039	645.5775	661.4805	278.6682	276.7533	64.7446	68.95285
0.002013	106.126	161.3944	165.3701	69.66706	69.18833	16.18615	17.23821
0.01395	332.9544	508.9599	288.6631	99.91705	161.9607	241.5243	236.6103
0.003487	83.2386	127.24	72.16578	24.97926	40.49016	60.38107	59.15257

MAX - M/SEC		LATERIAL RIBS			LATERIAL SPINE		LATERAL
CENTER RIB 5	LOWER RIB 6	UPPER G'S 7	CENTER G'S 8	LOWER G'S 9	UPPER G'S 10	LOWER G'S 11	PELVIS G'S 12
		171.4952		8.20125	128.4805	272.8448	
		15.51245		46.4648	1.0658	0.08405	
		17.11125		0.75645	1.60205	0.2048	
		26.3538		64.7522	52.8392	29.9538	
		42.59645		58.86125	0.12005	3.1752	
		0.08		1.74845	15.29045	117.5044	
		6.73445		26.42645	13.15845	0.34445	
		0.96605		2.7378	1.28	5.1842	
0.03125	0.0162	7.80125	38.80805	4.205	0.66125	99.1232	158.0642
0.00405	0.0008	87.9138	0.2592	72	0.53045	96.605	73.81125
0.02	0.005	1432.195	1100.743	1169.345	232.8482	1.4792	462.6882
0.0008	0.04205	22.0448	416.4498	0.2048	0.00045	2.26845	47.2392
5E-05	0	211.5625	49.2032	37.06605	31.5218	63.845	0.0338
0	0.0008	102.5312	14.9058	12.5	47.33645	5.15205	58.32
0.01125	0.0072	106.4341	566.8344	458.4392	198.8018	207.6722	6.2658
5E-05	5E-05	3.9762	14.63405	153.4752	1.0082	0.08405	0.125
0.00605	0.01125	315.005	120.28	5.67845	75.645	119.9701	64.41125
0.00405	0.0018	2.645	12.5	72	18	14.58	95.22
0.00245	0.00045	9.5922	237.4021	104.1125	4.35125	1.9208	6.125
0.0072	0.00045	5.7122	138.7778	106.8722	1.9208	25.4898	75.76805

PELVIC FORCE-LB		RESULTANT		RIB DEFLECTION		
RIGHT ILIAC 14	PUBIC SYSMPHS 15	HEAD G'S 16	HEAD HIC 17	UPPER INCHES 18	CENTER INCHES 19	LOWER INCHES 20
		5596.931	68716.26	1.4566		
		699.6163	11452.71	0.182075		
74235.91	445196.8	8606.205	93085.15	0.33655	0.221	0.11895
18558.98	111299.2	2151.551	23271.29	0.084137	0.05525	0.029738
213863.1	11790.26	1704.93	26660.66	0.03785	0.04395	0.0253
53465.77	2947.564	426.2325	6665.165	0.009463	0.010987	0.006325
	117917.6	4642.718	24258.13	0.17295	0.05605	0.0126
	29479.39	1160.68	6064.534	0.043237	0.014013	0.00315

RESULTANT PELVIS G'S 13	PELVIC RIGHT ILIAC 14	FORCE-LB PUBIC SYSMPHS 15	RESULTANT HEAD G'S 16	HEAD HIC 17	RIB DEFLECTION UPPER INCHES 18	CENTER INCHES 19	LOWER INCHES 20
5.0562			50.90405		0.0018		
240.4624			2551.837		0.00245		
6.30125			14.9058	572.5728	0.00845		
21.125			2909.319	64954.89	0.0098		
55.02005			13.005	1836.18	0.00405		
149.9912			54.39245	1254.504	0.0018		
6.5522			2.2472	79.38	1.42805		
3.8642			0.32	18.7272	0.0002		
233.9284	15475.68	354195.8	960.9728	132.0313	0.17405	0.1568	0.06125
54.08	1190.232	82946.64	7159.258	92484.4	0.02205	0.0578	0.03645
463.9058	45831.81	7600.212	481.7408	334.8872	0	0.0032	0.02
14.96045	11738.18	454.2098	4.23405	133.8248	0.14045	0.0032	0.00125
0.01125	18053.8	29.3378	1614.256	21100.74	0.0032	0.03125	0.0072
60.9408	1777.868	3814.138	76.75605	26.2088	5E-05	0.00045	0.00405
8	193510.4	4287.38	11.7128	5347.848	0.0338	0.0098	0.0128
0.0008	520.9992	3659.401	2.205	185.8592	0.0008	0.00245	0.00125
64.86605	372643.4	29110.43	2314.04	3471.111	0.01125	0.0072	0.00405
89.78	0	89.78	510.4012	121.68	0.11045	0.0242	0.00245
4.83605	757.3832	2255.904	1816.236	20636.99	0.04805	0.00845	5E-05
77.1282	135475.7	86461.45	2.0402	28.35045	0.0032	0.0162	0.00605

ABDOMEN CONTACT SWITCHES	LATERAL DOOR ACCELERATION LOC #1 G'S	LOC #2 G'S	LOC #3 G'S	LOC #4 G'S	LATERAL FAR SILL G'S	LONG. CG BARRIER G'S	VEHICLE WEIGHT LBS
	14348.18	0.0648	53.97605	0	8.2418	0.4608	364.5
	15118.87	74.78645	475.8612	0	70.0928	0.09245	32
	1739.91	1705.864	0.6728	19.0962	0	0.0512	0.5
	199.4004	36.4658	209.5104	919.3472	30.8898	0.2592	60.5
	26.0642	11839.53	28.125	12.85245	3.0258	0.2592	264.5
	0.0162	14.09805	41.0418	34.19645	35.36405	0.18605	200
	118.8882	414.1442	55.125	0.0392	9.37445	143.4818	578
	27.90045	250.6561	198.8018	23.6672	23.2562	0.0512	8
No Contac	79.8848	16.07445	10.62605	4455.68	70.21125	0.03125	50
No Contac	30066.42	285.844	52.6338	1276.64	771.4592	0.66125	0.5
No Contac	388.3685	72.2402	520.3538	5.2488	24.43005	0.57245	84.5
No Contac	101.6738	259.0088	108.7813	19.7192	30.96845	0.02645	50
No Contac	2051.201	1.23245	45.22005	141.6244	0.1152	0.02205	4.5
No Contac	239.5861	48.70845	102.5312	0.0002	44.65125	0.66125	180.5
No Contac	290.1641	2338.596	730.7664	34.52805	1.82405	2.4642	84.5
No Contac	0.04805	218.8232	208.08	58.21205	0.00405	0.0008	2
No Contac	15984.72	10940.16	16086.8	1598.951	485.4728	72.9632	5284501
	0	0	0	0	0	0	0
No Contac	344.2688	422.8232	523.5848	223.6612	10.90445	0.28125	0.5
No Contac	8551.704	12304.1	23609.65	3057.62	168.1778	97.4408	5346450

MBD WEIGHT LBS	DELTA MBD CONTACT INCHES
	0.08
	2
	0.5
	24.5
	0.405
	0.605
	0
	1.445
0	0.02
0	2
50	0.5
0	1.28
0	0.5
0	0.18
0	0.125
0	0.72
4521025	2
0	0
0	0
4521025	0.125

Appendix E

Coefficients of Variation

The following pages contain the results of calculations for the coefficients of variation. The variance used is a pure error variance representing only the error of measure without including the variation induced by the levels of the independent variables.

The coefficients of variation were calculated by the following formula:

$$CV = 100(s / \bar{y})$$

The empty cells found on the spread sheet are the results of either the limited instrumentation of SID or missing data.

AVERAGE VALUES WITHIN EACH DATA SET

TEST TYPE	TTI (age=0) - G'S DATA REPORT	NHTSA RULEMAKE	NHTSA RESEARCH	V*C MAX - M/ UPPER RIB	CENTER RIB
NHTSA/NHTSA/SID	73.24375	72.8125	73.1875		
NHTSA/NHTSA/EUROSID	90.21375	89.8125	90.125	0.2875	0.345
EEVC/EEVC/EUROSID	82.145	81.5	82.25	0.19125	0.18375
NHTSA/EEVC/EUROSID	76.81625	76.625	77.125	0.17625	0.20875

POOLED VARIANCE (SUM OF DIFFERENCES SQUARED / 2, DIVIDED BY THE D

TEST TYPE	TTI (age=0) - G'S DATA REPORT 1	NHTSA RULEMAKE 2	NHTSA RESEARCH 3	V*C MAX - M/ UPPER RIB 4	CENTER RIB 5
NHTSA/NHTSA/SID	170.4314	173	170.5		
	21.30393	21.625	21.3125		
NHTSA/NHTSA/EUROSID	290.7412	286.875	292.5	0.0393	0.0561
	72.68531	71.71875	73.125	0.009825	0.014025
EEVC/EEVC/EUROSID	441.6001	444.75	441	0.01675	0.01135
	110.4	111.1875	110.25	0.004187	0.002837
NHTSA/EEVC/EUROSID	132.6591	114.75	117.5	0.01945	0.01975
	33.16476	28.6875	29.375	0.004862	0.004937

COEFFICIENTS OF VARIANCE

TEST TYPE	TTI (age=0) - G'S DATA REPORT	NHTSA RULEMAKE	NHTSA RESEARCH	V*C MAX - M/ UPPER RIB	CENTER RIB
NHTSA/NHTSA/SID	6.301722	6.386635	6.307834		
NHTSA/NHTSA/EUROSID	9.450409	9.429303	9.488284	34.47692	34.32672
EEVC/EEVC/EUROSID	12.79097	12.9381	12.76596	33.83576	28.98949
NHTSA/EEVC/EUROSID	7.496963	6.989979	7.027385	39.56404	33.661

SEC LOWER RIB	LATERAL RIBS UPPER G'S	CENTER G'S	LOWER G'S	LATERAL UPPER G'S	SPINE LOWER G'S	LATERAL PELVIS G'S	RESULTANT PELVIS G'S
	58.35437		58.29063	64.83187	83.90437		92.14562
0.40125	87.90625	89.52625	98.695	61.77875	80.09875	99.96625	104.8675
0.22875	88.3375	83.6725	88.05875	46.11875	62.76	77.33	78.58875
0.28875	65.075	69.6575	85.87	51.49125	61.93125	67.0125	69.455

EGREES OF FREEDOM)

SEC LOWER RIB	LATERAL RIBS UPPER G'S	CENTER G'S	LOWER G'S	LATERAL UPPER G'S	SPINE LOWER G'S	LATERAL PELVIS G'S	RESULTANT PELVIS G'S
6	7	8	9	10	11	12	13
	280.8496		209.9486	213.8365	429.2957		488.3725
	35.10621		26.24358	26.72956	53.66197		61.04657
0.06405	1549.955	1556.26	1245.755	234.0403	199.4758	741.8029	766.8747
0.016012	387.4888	389.0651	311.4386	58.51009	49.86896	185.4507	191.7187
0.00805	424.5039	645.5775	661.4805	278.6682	276.7533	64.7446	68.95285
0.002013	106.126	161.3944	165.3701	69.66706	69.18833	16.18615	17.23821
0.01395	332.9544	508.9599	288.6631	99.91705	161.9607	241.5243	236.6103
0.003487	83.2386	127.24	72.16578	24.97926	40.49016	60.38107	59.15257

SEC LOWER RIB	LATERAL RIBS UPPER G'S	CENTER G'S	LOWER G'S	LATERAL UPPER G'S	SPINE LOWER G'S	LATERAL PELVIS G'S	RESULTANT PELVIS G'S
	10.15356		8.788461	7.97457	8.730693		8.47922
31.53658	22.39287	22.03234	17.88097	12.38159	8.816362	13.62263	13.20357
19.61132	11.6618	15.18313	14.60347	18.09823	13.25359	5.20264	5.283062
20.45197	14.02001	16.19362	9.892913	9.706359	10.2746	11.59564	11.07346

PELVIC FORCE-LB RESULTANT				RIB DEFLECTION		
RIGHT ILIAC	PUBIC SYSMPHS	HEAD G'S	HEAD HIC	UPPER INCHES	CENTER INCHES	LOWER INCHES
		59.81125	197.7181	1.6775		
603.445	1592.404	88.32375	269.2688	1.25125	1.4075	1.39875
748.32	1053.496	74.85125	184.8162	1.02375	0.98375	1.0825
331.7487	1122.32	68.05875	167.3063	0.96125	1.11625	1.28

PELVIC FORCE-LB RESULTANT				RIB DEFLECTION		
RIGHT ILIAC	PUBIC SYSMPHS	HEAD G'S	HEAD HIC	UPPER INCHES	CENTER INCHES	LOWER INCHES
14	15	16	17	18	19	20
		5596.931	128847.9	1.4566		
		699.6163	16105.99	0.182075		
74235.91	445196.8	8606.205	93085.15	0.33655	0.221	0.11895
18558.98	111299.2	2151.551	23271.29	0.084137	0.05525	0.029738
213863.1	11790.26	1704.93	26660.66	0.03785	0.04395	0.0253
53465.77	2947.564	426.2325	6665.165	0.009463	0.010987	0.006325
508876.6	117917.6	4642.718	24258.13	0.17295	0.05605	0.0126
127219.1	29479.39	1160.68	6064.534	0.043237	0.014013	0.00315

PELVIC FORCE-LB RESULTANT				RIB DEFLECTION		
RIGHT ILIAC	PUBIC SYSMPHS	HEAD G'S	HEAD HIC	UPPER INCHES	CENTER INCHES	LOWER INCHES
		44.22289	64.18702	25.43681		
22.5756	20.95043	52.51681	56.65317	23.18199	16.70005	12.32855
30.89944	5.153457	27.5819	44.17385	9.501869	10.65528	7.34687
107.5145	15.29828	50.05785	46.54645	21.63186	10.60465	4.384755

Appendix F

MVMA Side Impact Test Data Summary

The attached are summary sheets for 41 side inmpact tests conducted by the MVMA in a factorial experiment design to investigate the repeatability and reproducability of:

Proposed NHTSA Side Impact Test Procedure

Proposed EEVC[2] Side Impact Test Procedure

Proposed NHTSA Side Impact Dummy (SID)

Proposed EEVC Side Impact Dummy (EUROSID)

EEVC Barrier Face

NHTSA Barrier Face

The data summary sheets are self explanatory except for a few specific items.

Test Number refers to the MVMA six digit test number which can be decoded as follows: 880321, the first two digits are the calendar year, second two digits are the month and the final two digits comprise the day of the month. The NHTSA file number is also given for those who would wish to request the data from NHTSA as the test reports are filed in the NHTSA docket.

Vehicles were either modified or left in baseline condition. The modification was structural changes that essentially doubled the static crush force on the side of the vehicle. Baseline denotes that no modification to the structural elements of the side were made.

Vehicles either had padding or no padding. The padding was 5 inches thick at the thorax and 6 inches at the pelvis. The test program was not to evaluate padding but rather a padding thickness was chosen to significantly alter test results from a non padded vehicle.

All vehicles had the arm rest removed to reduce variability from the dummy interacting with the arm rest.

All vehicles has a 1/8 inch thick hardboard substituted for the interior door trim panel.

All vehicles tested were 1985 Model Year Ford LTD's.

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2. EEVC is the European Experimental Vehicle Committee comprised of European government representatives.

The first 16 tests were for a matrix of padded, non padded, baseline and structurally modified with the dummy placed next to the door and then replicated with the dummy placed 6 inches from the door. The purpose was to obtain an estimation of the effect of spacing from the door. A statistical analysis of the first test series showed that dummy spacing was not significant and this condition was eliminated from the other test series.

Copies of each full test reports for each of the test series, with full details, are available in the NHTSA docket or from MVMA.

NOTES:

TEST #s in the 800s used SID
TESTs remaining used EUROSID
P = Primary Sensor
R = Redundant Sensor
V*C = Viscous Criteria; refer to the 30th Stapp Car Crash Conference Report (Society of Automotive Engineers P189) for details.

S I D E I M P A C T R E S U L T S

****

* TEST NUMBER : 880308 MVMA 1165 NHTSA *

* MODIFIED VEHICLE NO PADDING) 1985 FORD LTD *

* NHTSA TEST PROCEDURE *

* EUROSID DUMMY *

****

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	147.24
UPPER RIB(R)	141.26
MIDDLE RIB(P)	161.48
MIDDLE RIB(R)	163.99
LOWER RIB(P)	162.13
LOWER RIB(R)	161.56
UPPER SPINE(P)	83.83
UPPER SPINE(R)	82.75
LOWER SPINE(P)	98.86
LOWER SPINE(R)	99.25
HEAD Y-DIRECTION	68.82
HEAD RESULTANT	70.30
PELVIS Y-DIRECTION	125.65

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.63
MIDDLE RIB	1.75
LOWER RIB	1.66

MAXIMUM V*C CALCULATION

UPPER RIB	0.51
MIDDLE RIB	0.60
LOWER RIB	0.53

MISC. DATA

THORACIC TRAUMA INDEX (P)		130.5
THORACIC TRAUMA INDEX (R),		131.6
HEAD INJURY CRITERION		268.1
	T1	49.250
	T2	62.125

```
**************************************************
*   TEST NUMBER : 880424 MVMA   1168 NHTSA       *
*   MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD *
*   NHTSA TEST PROCEDURE  WITH EEVC BARRIER FACE  *
*   EUROSID DUMMY                                 *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	37.42
UPPER RIB(R)	37.05
MIDDLE RIB(P)	34.84
MIDDLE RIB(R)	33.36
LOWER RIB(P)	52.88
LOWER RIB(R)	50.87
UPPER SPINE(P)	41.64
UPPER SPINE(R)	42.24
LOWER SPINE(P)	38.86
LOWER SPINE(R)	38.79
HEAD Y-DIRECTION	14.75
HEAD RESULTANT	31.61
PELVIS Y-DIRECTION	34.69

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.06
MIDDLE RIB	0.91
LOWER RIB	1.30

MAXIMUM V*C CALCULATION

UPPER RIB	0.01
MIDDLE RIB	0.13
LOWER RIB	0.22

MISC. DATA

THORACIC TRAUMA INDEX	(P)	45.9
THORACIC TRAUMA INDEX	(R),	44.8
HEAD INJURY CRITERION		65.3
	T1	62.500
	T2	98.500

```
************************************************
*   TEST NUMBER : 880321 MVMA   1161 NHTSA     *
*   BASELINE VEHICLE NO PADDING)1985  FORD  LTD *
*   NHTSA TEST PROCEDURE WITH EEVC BARRIER FACE *
*   EUROSID DUMMY                              *
************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	125.10
UPPER RIB(R)	122.21
MIDDLE RIB(P)	89.79
MIDDLE RIB(R)	89.47
LOWER RIB(P)	90.23
LOWER RIB(R)	88.32
UPPER SPINE(P)	65.20
UPPER SPINE(R)	65.11
LOWER SPINE(P)	89.91
LOWER SPINE(R)	90.81
HEAD Y-DIRECTION	37.06
HEAD RESULTANT	49.93
PELVIS Y-DIRECTION	102.39

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.46
MIDDLE RIB	1.25
LOWER RIB	1.22

MAXIMUM V*C CALCULATION

UPPER RIB	0.45
MIDDLE RIB	0.36
LOWER RIB	0.38

MISC. DATA

THORACIC TRAUMA INDEX (P)		107.5
THORACIC TRAUMA INDEX (R),		106.5
HEAD INJURY CRITERION		107.6
	T1	51.500
	T2	68.250

```
**************************************************
*    TEST NUMBER : 880412 MVMA   1169 NHTSA      *
*   BASELINE VEHICLE NO PADDING 1985  FORD  LTD  *
*   NHTSA TEST PROCEDURE WITH EEVC BARRIER FACE  *
*   EUROSID DUMMY                                *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	100.01
UPPER RIB(R)	98.94
MIDDLE RIB(P)	105.25
MIDDLE RIB(R)	104.75
LOWER RIB(P)	93.64
LOWER RIB(R)	87.12
UPPER SPINE(P)	77.50
UPPER SPINE(R)	77.64
LOWER SPINE(P)	105.40
LOWER SPINE(R)	105.79
HEAD Y-DIRECTION	82.68
HEAD RESULTANT	117.96
PELVIS Y-DIRECTION	111.30

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.31
MIDDLE RIB	1.13
LOWER RIB	1.14

MAXIMUM V*C CALCULATION

UPPER RIB	0.27
MIDDLE RIB	0.25
LOWER RIB	0.23

MISC. DATA

THORACIC TRAUMA INDEX (P)		105.3
THORACIC TRAUMA INDEX (R)		105.3
HEAD INJURY CRITERION		190.9
	T1	178.125
	T2	180.500

```
**********************************************
*    TEST NUMBER : 880404 MVMA    1163 NHTSA  *
*   BASELINE/PADDED VEHICLE)1985  FORD  LTD   *
*   NHTSA TEST PROCEDURE WITH EEVC BARRIER    *
*   EUROSID DUMMY                             *
**********************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	50.58
UPPER RIB(R)	49.68
MIDDLE RIB(P)	40.45
MIDDLE RIB(R)	43.53
LOWER RIB(P)	64.92
LOWER RIB(R)	61.52
UPPER SPINE(P)	49.15
UPPER SPINE(R)	49.63
LOWER SPINE(P)	50.84
LOWER SPINE(R)	51.44
HEAD Y-DIRECTION	69.30
HEAD RESULTANT	76.26
PELVIS Y-DIRECTION	58.79

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.20
MIDDLE RIB	1.16
LOWER RIB	1.35

MAXIMUM V*C CALCULATION

UPPER RIB	0.15
MIDDLE RIB	0.19
LOWER RIB	0.29

MISC. DATA

THORACIC TRAUMA INDEX (P)	57.9
THORACIC TRAUMA INDEX (R),	56.5
HEAD INJURY CRITERION	280.3
T1	53.875
T2	74.250

```
**************************************************
*    TEST NUMBER : 880422 MVMA    1171 NHTSA     *
*   BASELINE/PADDED VEHICLE)1985  FORD  LTD      *
*   NHTSA TEST PROCEDURE WITH EEVC BARRIER FACE  *
*   EUROSID DUMMY                                *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	48.32
UPPER RIB(R)	47.46
MIDDLE RIB(P)	38.05
MIDDLE RIB(R)	38.11
LOWER RIB(P)	52.86
LOWER RIB(R)	51.62
UPPER SPINE(P)	43.15
UPPER SPINE(R)	43.70
LOWER SPINE(P)	45.43
LOWER SPINE(R)	45.68
HEAD Y-DIRECTION	98.68
HEAD RESULTANT	108.21
PELVIS Y-DIRECTION	45.30

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.73
MIDDLE RIB	0.94
LOWER RIB	1.28

MAXIMUM V*C CALCULATION

UPPER RIB	0.07
MIDDLE RIB	0.10
LOWER RIB	0.23

MISC. DATA

THORACIC TRAUMA INDEX (P)		49.1
THORACIC TRAUMA INDEX (R),		48.6
HEAD INJURY CRITERION		295.9
	T1	56.625
	T2	72.500

```
**************************************************
*    TEST NUMBER : 880328 MVMA    1162 NHTSA     *
*    MODIFIED VEHICLE NO PADDING)1985 FORD LTD   *
*   NHTSA TEST PROCEDURE WITH EEVC BARRIER FACE  *
*   EUROSID DUMMY                                *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	56.45
UPPER RIB(R)	56.47
MIDDLE RIB(P)	86.02
MIDDLE RIB(R)	86.02
LOWER RIB(P)	124.66
LOWER RIB(R)	123.60
UPPER SPINE(P)	44.32
UPPER SPINE(R)	44.84
LOWER SPINE(P)	58.56
LOWER SPINE(R)	59.40
HEAD Y-DIRECTION	24.64
HEAD RESULTANT	33.30
PELVIS Y-DIRECTION	60.60

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.54
MIDDLE RIB	1.47
LOWER RIB	1.59

MAXIMUM V*C CALCULATION

UPPER RIB	0.24
MIDDLE RIB	0.35
LOWER RIB	0.37

MISC. DATA

THORACIC TRAUMA INDEX (P)		91.6
THORACIC TRAUMA INDEX (R),		91.5
HEAD INJURY CRITERION		61.3
	T1	55.125
	T2	76.375

```
**************************************************
*    TEST NUMBER : 880415 MVMA    1170 NHTSA     *
*   MODIFIED VEHICLE NO PADDING)1985  FORD  LTD  *
*   NHTSA TEST PROCEDURE WITH EEVC BARRIER FACE  *
*   EUROSID DUMMY                                *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	61.38
UPPER RIB(R)	58.76
MIDDLE RIB(P)	107.81
MIDDLE RIB(R)	108.97
LOWER RIB(P)	139.09
LOWER RIB(R)	137.91
UPPER SPINE(P)	47.27
UPPER SPINE(R)	47.08
LOWER SPINE(P)	60.52
LOWER SPINE(R)	61.08
HEAD Y-DIRECTION	88.12
HEAD RESULTANT	93.57
PELVIS Y-DIRECTION	65.65

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.24
MIDDLE RIB	1.34
LOWER RIB	1.37

MAXIMUM V*C CALCULATION

UPPER RIB	0.23
MIDDLE RIB	0.28
LOWER RIB	0.34

MISC. DATA

THORACIC TRAUMA INDEX (P)		99.8
THORACIC TRAUMA INDEX (R),		99.5
HEAD INJURY CRITERION		264.4
	T1	62.125
	T2	71.500

```
**************************************************
*    TEST NUMBER : 880425 MVMA    1172 NHTSA     *
*   MODIFIED/PADDED VEHICLE)1985 FORD  LTD       *
*   NHTSA TEST PROCEDURE WITH EEVC BARRIER FACE  *
*   EUROSID DUMMY                                *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	40.76
UPPER RIB(R)	38.34
MIDDLE RIB(P)	50.31
MIDDLE RIB(R)	46.41
LOWER RIB(P)	67.11
LOWER RIB(R)	64.87
UPPER SPINE(P)	42.93
UPPER SPINE(R)	43.64
LOWER SPINE(P)	46.00
LOWER SPINE(R)	46.50
HEAD Y-DIRECTION	13.55
HEAD RESULTANT	33.63
PELVIS Y-DIRECTION	45.96

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.14
MIDDLE RIB	0.74
LOWER RIB	1.19

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	0.10
LOWER RIB	0.25

MISC. DATA

THORACIC TRAUMA INDEX (P)	56.6
THORACIC TRAUMA INDEX (R),	55.7
HEAD INJURY CRITERION	72.8
T1	59.500
T2	84.500

```
************************************************
*    TEST NUMBER : 870917 MVMA    1094 NHTSA    *
*   BASELINE NO PADDING VEHICLE)1985  FORD  LTD *
*   NHTSA TEST PROCEDURE                         *
*   EUROSID DUMMY                                *
************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	103.19
UPPER RIB(R)	101.23
MIDDLE RIB(P)	82.59
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	97.70
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	71.54
UPPER SPINE(R)	71.90
LOWER SPINE(P)	99.14
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	73.17
HEAD RESULTANT	129.54
PELVIS Y-DIRECTION	120.59

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.68
MIDDLE RIB	1.79
LOWER RIB	1.51

MAXIMUM V*C CALCULATION

UPPER RIB	0.47
MIDDLE RIB	0.56
LOWER RIB	0.45

MISC. DATA

THORACIC TRAUMA INDEX (P)	101.2
THORACIC TRAUMA INDEX (R)	NOT APP.
HEAD INJURY CRITERION	333.4
T1	136.000
T2	138.875

```
************************************************
*    TEST NUMBER : 871005 MVMA     1098 NHTSA   *
*   BASELINE VEHICLE NO PADDING)1985  FORD  LTD *
*   NHTSA TEST PROCEDURE                        *
*   EUROSID DUMMY                               *
************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	99.24
UPPER RIB(R)	93.63
MIDDLE RIB(P)	91.40
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	100.60
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	72.69
UPPER SPINE(R)	72.74
LOWER SPINE(P)	113.22
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	83.30
HEAD RESULTANT	85.70
PELVIS Y-DIRECTION	140.35

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.09
MIDDLE RIB	1.23
LOWER RIB	1.16

MAXIMUM V*C CALCULATION

UPPER RIB	0.23
MIDDLE RIB	0.31
LOWER RIB	0.27

MISC. DATA

THORACIC TRAUMA INDEX (P)	106.9
THORACIC TRAUMA INDEX (R)	NOT APP.
HEAD INJURY CRITERION	349.7
T1	48.500
T2	62.500

```
**********************************************
*    TEST NUMBER : 870921 MVMA  1095 NHTSA     *
*    BASELINE VEHICLE/PADDING)1985  FORD  LTD  *
*    NHTSA TEST PROCEDURE                      *
*    EUROSID DUMMY                             *
**********************************************
```

MAXIMUM ACCELERATION (G s)	
UPPER RIB(P)	65.56
UPPER RIB(R)	63.29
MIDDLE RIB(P)	69.65
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	84.50
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	59.10
UPPER SPINE(R)	53.50
LOWER SPINE(P)	57.09
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	139.90
HEAD RESULTANT	184.28
PELVIS Y-DIRECTION	65.96

MAXIMUM DEFLECTIONS (INCHES)	
UPPER RIB	1.15
MIDDLE RIB	1.43
LOWER RIB	1.55

MAXIMUM V*C CALCULATION	
UPPER RIB	0.23
MIDDLE RIB	0.29
LOWER RIB	0.36

MISC. DATA		
THORACIC TRAUMA INDEX (P)		70.8
THORACIC TRAUMA INDEX (R)		NOT APP.
HEAD INJURY CRITERION		592.6
	T1	145.625
	T2	147.750

```
**********************************************************
*    TEST NUMBER : 870928 MVMA   1096 NHTSA              *
*    BASELINE VEHICLE WITH PADDING)1985  FORD  LTD       *
*    NHTSA TEST PROCEDURE                                *
*    EUROSID DUMMY                                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)	
UPPER RIB(P)	78.82
UPPER RIB(R)	75.35
MIDDLE RIB(P)	70.37
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	71.20
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	60.13
UPPER SPINE(R)	61.41
LOWER SPINE(P)	70.99
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	51.59
HEAD RESULTANT	64.62
PELVIS Y-DIRECTION	72.62

MAXIMUM DEFLECTIONS (INCHES)	
UPPER RIB	0.94
MIDDLE RIB	1.09
LOWER RIB	1.41

MAXIMUM V*C CALCULATION	
UPPER RIB	0.18
MIDDLE RIB	0.20
LOWER RIB	0.32

MISC. DATA	
THORACIC TRAUMA INDEX (P)	74.9
THORACIC TRAUMA INDEX (R)	NOT APP.
HEAD INJURY CRITERION	162.5
T1	53.500
T2	89.500

```
************************************************************
*    TEST NUMBER : 870824 MVMA   1093 NHTSA                *
*    MODIFIED VEHICLE WITHOUT PADDING)1985  FORD  LTD      *
*    NHTSA TEST PROCEDURE                                  *
*    EUROSID DUMMY                                         *
************************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	155.65
UPPER RIB(R)	152.57
MIDDLE RIB(P)	154.42
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	135.69
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	66.92
UPPER SPINE(R)	66.95
LOWER SPINE(P)	103.42
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	56.51
HEAD RESULTANT	491.25
PELVIS Y-DIRECTION	127.99

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.58
MIDDLE RIB	1.65
LOWER RIB	1.61

MAXIMUM V*C CALCULATION

UPPER RIB	0.56
MIDDLE RIB	0.66
LOWER RIB	0.59

MISC. DATA

THORACIC TRAUMA INDEX (P)	129.5
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**********************************************************
*     TEST NUMBER : 870924 MVMA   1076 NHTSA             *
*     MODIFIED VEHICLE/NO PADDING)1985  FORD  LTD        *
*     NHTSA TEST PROCEDURE                               *
*     EUROSID DUMMY                                      *
**********************************************************

          MAXIMUM ACCELERATION (G s)
      ------------------------------------
      UPPER RIB(P)          93.72
      UPPER RIB(R)          88.52
      MIDDLE RIB(P)        114.48
      MIDDLE RIB(R)        NOT MEASURED
      LOWER RIB(P)         113.77
      LOWER RIB(R)         NOT MEASURED

      UPPER SPINE(P)        62.25
      UPPER SPINE(R)        61.38
      LOWER SPINE(P)       100.58
      LOWER SPINE(R)       NOT MEASURED

      HEAD Y-DIRECTION      94.38
      HEAD RESULTANT       101.34

      PELVIS Y-DIRECTION   141.29


                MAXIMUM DEFLECTIONS (INCHES)
      ---------------------------------------
      UPPER RIB              1.64
      MIDDLE RIB             1.67
      LOWER RIB              1.46


                MAXIMUM V*C CALCULATION
      ---------------------------------
      UPPER RIB              0.43
      MIDDLE RIB             0.40
      LOWER RIB              0.43


                           MISC. DATA
      ---------------------------------
    THORACIC TRAUMA INDEX (P)     107.5
    THORACIC TRAUMA INDEX (R)      NOT APPLICABLE
    HEAD INJURY CRITERION     294.0
                         T1     46.625
                         T2     57.375
```

```
**********************************************************
*    TEST NUMBER : 870827 MVMA    1075 NHTSA             *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD       *
*    NHTSA TEST PROCEDURE                                *
*    EUROSID DUMMY                                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	54.42
UPPER RIB(R)	53.89
MIDDLE RIB(P)	48.73
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	79.85
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	42.33
UPPER SPINE(R)	41.84
LOWER SPINE(P)	51.52
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	12.62
HEAD RESULTANT	33.95
PELVIS Y-DIRECTION	45.49

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.66
MIDDLE RIB	1.11
LOWER RIB	1.31

MAXIMUM V*C CALCULATION

UPPER RIB	0.07
MIDDLE RIB	0.18
LOWER RIB	0.28

MISC. DATA

THORACIC TRAUMA INDEX (P)	65.7
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	68.8
T1	52.000
T2	79.375

```
**********************************************************
*    TEST NUMBER : 871001   1097 NHTSA                   *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD       *
*    NHTSA TEST PROCEDURE                                *
*    EUROSID DUMMY                                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	61.06
UPPER RIB(R)	60.62
MIDDLE RIB(P)	77.59
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	79.34
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	107.36
UPPER SPINE(R)	42.36
LOWER SPINE(P)	49.39
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	17.12
HEAD RESULTANT	36.86
PELVIS Y-DIRECTION	58.05

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.20
MIDDLE RIB	1.19
LOWER RIB	1.68

MAXIMUM V*C CALCULATION

UPPER RIB	0.18
MIDDLE RIB	0.22
LOWER RIB	0.57

MISC. DATA

THORACIC TRAUMA INDEX (P)		64.4
THORACIC TRAUMA INDEX (R)		NOT APPLICABLE
HEAD INJURY CRITERION		85.1
	T1	50.125
	T2	76.250

```
*******************************************************
*    TEST NUMBER : 871014 MVMA   1135 NHTSA           *
*    BASELINE VEHICLE NO PADDING )1985  FORD  LTD     *
*    EEVC TEST PROCEDURE                              *
*    EUROSID DUMMY                                    *
*******************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	124.08
UPPER RIB(R)	121.67
MIDDLE RIB(P)	118.04
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	87.24
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	51.34
UPPER SPINE(R)	51.90
LOWER SPINE(P)	83.32
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	142.49
HEAD RESULTANT	149.55
PELVIS Y-DIRECTION	104.58

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.21
MIDDLE RIB	0.94
LOWER RIB	0.93

MAXIMUM V*C CALCULATION

UPPER RIB	0.26
MIDDLE RIB	0.16
LOWER RIB	0.17

MISC. DATA

THORACIC TRAUMA INDEX (P)	103.7
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	505.8
T1	53.875
T2	57.625

```
*******************************************************
*    TEST NUMBER : 871112 MVMA   1138 NHTSA           *
*    BASELINE VEHICLE NO PADDING)1985  FORD  LTD      *
*    EEVC TEST PROCEDURE                              *
*    EUROSID DUMMY                                    *
*******************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	144.65
UPPER RIB(R)	142.51
MIDDLE RIB(P)	108.21
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	78.63
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	59.28
UPPER SPINE(R)	58.55
LOWER SPINE(P)	94.62
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	91.06
HEAD RESULTANT	92.73
PELVIS Y-DIRECTION	106.32

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.13
MIDDLE RIB	0.69
LOWER RIB	0.81

MAXIMUM V*C CALCULATION

UPPER RIB	0.25
MIDDLE RIB	0.15
LOWER RIB	0.17

MISC. DATA

THORACIC TRAUMA INDEX (P)	119.6
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	300.4
T1	55.125
T2	64.375

```
*******************************************************
*    TEST NUMBER : 871102 MVMA   1136 NHTSA           *
*    BASELINE VEHICLE WITH PADDING)1985  FORD  LTD    *
*    EEVC TEST PROCEDURE                              *
*    EUROSID DUMMY                                    *
*******************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	49.78
UPPER RIB(R)	46.42
MIDDLE RIB(P)	39.83
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	59.83
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	34.01
UPPER SPINE(R)	34.50
LOWER SPINE(P)	41.47
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	68.53
HEAD RESULTANT	76.02
PELVIS Y-DIRECTION	48.51

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.71
MIDDLE RIB	0.99
LOWER RIB	1.13

MAXIMUM V*C CALCULATION

UPPER RIB	0.05
MIDDLE RIB	0.13
LOWER RIB	0.23

MISC. DATA

THORACIC TRAUMA INDEX (P)		50.7
THORACIC TRAUMA INDEX (R)		NOT APPLICABLE
HEAD INJURY CRITERION		117.8
	T1	54.750
	T2	76.500

```
**********************************************************
*    TEST NUMBER : 871109 MVMA   1137 NHTSA              *
*    BASELINE VEHICLE WITH PADDING)1985  FORD  LTD       *
*    EEVC TEST PROCEDURE                                 *
*    EUROSID DUMMY                                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	64.10
UPPER RIB(R)	60.61
MIDDLE RIB(P)	34.37
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	64.83
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	43.74
UPPER SPINE(R)	44.44
LOWER SPINE(P)	44.78
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	51.70
HEAD RESULTANT	63.63
PELVIS Y-DIRECTION	60.22

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.70
MIDDLE RIB	1.02
LOWER RIB	1.22

MAXIMUM V*C CALCULATION

UPPER RIB	0.06
MIDDLE RIB	0.13
LOWER RIB	0.27

MISC. DATA

THORACIC TRAUMA INDEX (P)		54.8
THORACIC TRAUMA INDEX (R)		NOT APPLICABLE
HEAD INJURY CRITERION		110.6
	T1	55.750
	T2	79.125

```
*********************************************************
*    TEST NUMBER : 871008 MVMA   1134 NHTSA             *
*    MODIFIED VEHICLE NO PADDING)1985  FORD  LTD        *
*    EEVC TEST PROCEDURE                                *
*    EUROSID DUMMY                                      *
*********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	112.83
UPPER RIB(R)	108.47
MIDDLE RIB(P)	104.90
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	108.13
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	46.81
UPPER SPINE(R)	48.73
LOWER SPINE(P)	70.94
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	77.92
HEAD RESULTANT	83.74
PELVIS Y-DIRECTION	93.90

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.15
MIDDLE RIB	1.04
LOWER RIB	1.05

MAXIMUM V*C CALCULATION

UPPER RIB	0.27
MIDDLE RIB	0.21
LOWER RIB	0.22

MISC. DATA

THORACIC TRAUMA INDEX (P)		91.9
THORACIC TRAUMA INDEX (R)		NOT APPLICABLE
HEAD INJURY CRITERION		234.5
	T1	59.250
	T2	67.125

```
************************************************************
*    TEST NUMBER : 871130 MVMA   1140 NHTSA                *
*    MODIFIED VEHICLE WITHOUT PADDING)1985  FORD  LTD      *
*    EEVC TEST PROCEDURE                                   *
*    EUROSID DUMMY                                         *
************************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	127.42
UPPER RIB(R)	126.00
MIDDLE RIB(P)	138.57
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	138.41
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	66.75
UPPER SPINE(R)	66.32
LOWER SPINE(P)	91.32
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	68.35
HEAD RESULTANT	78.90
PELVIS Y-DIRECTION	91.55

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	1.40
MIDDLE RIB	1.18
LOWER RIB	1.20

MAXIMUM V*C CALCULATION

UPPER RIB	0.45
MIDDLE RIB	0.36
LOWER RIB	0.34

MISC. DATA

THORACIC TRAUMA INDEX (P)	114.9
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	131.1
T1	55.875
T2	70.375

```
**********************************************************
*    TEST NUMBER : 871116 MVMA   1139 NHTSA              *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD       *
*    EEVC TEST PROCEDURE                                 *
*    EUROSID DUMMY                                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	43.33
UPPER RIB(R)	44.37
MIDDLE RIB(P)	60.07
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	92.46
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	34.22
UPPER SPINE(R)	33.99
LOWER SPINE(P)	37.97
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	12.79
HEAD RESULTANT	28.17
PELVIS Y-DIRECTION	48.94

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.96
MIDDLE RIB	1.04
LOWER RIB	1.19

MAXIMUM V*C CALCULATION

UPPER RIB	0.08
MIDDLE RIB	0.17
LOWER RIB	0.21

MISC. DATA

THORACIC TRAUMA INDEX (P)		65.20
THORACIC TRAUMA INDEX (R)		NOT APPLICABLE
HEAD INJURY CRITERION		48.80
	T1	53.50
	T2	81.75

```
**********************************************************
*    TEST NUMBER : 871203 MVMA   1141 NHTSA              *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD       *
*    EEVC TEST PROCEDURE                                 *
*    EUROSID DUMMY                                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	40.51
UPPER RIB(R)	38.61
MIDDLE RIB(P)	65.48
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	74.94
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	32.80
UPPER SPINE(R)	33.01
LOWER SPINE(P)	37.56
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	11.42
HEAD RESULTANT	26.07
PELVIS Y-DIRECTION	48.80

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	0.92
MIDDLE RIB	0.97
LOWER RIB	1.13

MAXIMUM V*C CALCULATION

UPPER RIB	0.11
MIDDLE RIB	0.16
LOWER RIB	0.22

MISC. DATA

THORACIC TRAUMA INDEX (P)	56.3
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	29.5
T1	56.875
T2	84.625

```
**************************************************
*    TEST NUMBER :  850529 MVMA   849 NHTSA      *
*    BASELINE VEHICLE NO PADDING)1985  FORD  LTD  *
*    NHTSA TEST PROCEDURE                        *
*    SID DUMMY SEATED NEXT TO DOOR               *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	90.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	99.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	105.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	105.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	149.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	102.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**********************************************************
*    TEST NUMBER :  850603 MVMA   850 NHTSA              *
*    BASELINE VEHICLE NO PADDING)1985  FORD  LTD         *
*    NHTSA TEST PROCEDURE                                *
*    SID DUMMY SEATED NEXT TO DOOR                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	95.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	109.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	105.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	105.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	138.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	107.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
*******************************************************
*    TEST NUMBER :  850607 MVMA   851 NHTSA           *
*    BASELINE VEHICLE NO PADDING)1985  FORD  LTD      *
*    NHTSA TEST PROCEDURE                             *
*    SID DUMMY SEATED 6 INCHES FROM DOOR              *
*******************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	68.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	70.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	64.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	99.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	154.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	84.5
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**************************************************
*    TEST NUMBER :  850617 MVMA   852 NHTSA      *
*    BASELINE VEHICLE NO PADDING)1985  FORD  LTD  *
*    NHTSA TEST PROCEDURE                        *
*    SID DUMMY SEATED 6 INCHES FROM DOOR         *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	50.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	74.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	80.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	123.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	144.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	98.5
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
*****************************************************
*   TEST NUMBER :  850626 MVMA   853 NHTSA          *
*   BASELINE VEHICLE WITH PADDING)1985  FORD  LTD   *
*   NHTSA TEST PROCEDURE                            *
*   SID DUMMY SEATED NEXT TO DOOR                   *
*****************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	42.00
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	38.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	62.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	51.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	51.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	52.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
*******************************************************
*    TEST NUMBER :  850716 MVMA   869 N TSA           *
*    BASELINE VEHICLE WITH PADDING)1985  FORD  LTD    *
*    NHTSA TEST PROCEDURE                             *
*    SID DUMMY SEATED NEXT TO DOOR                    *
*******************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	49.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	49.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	60.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	71.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	59.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	60.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
*********************************************************
*     TEST NUMBER :  850703 MVMA   854 NHTSA            *
*     BASELINE VEHICLE WITH PADDING)1985  FORD  LTD     *
*     NHTSA TEST PROCEDURE                              *
*     SID DUMMY SEATED 6 INCHES FROM DOOR               *
*********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	61.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	44.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	53.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	63.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	54.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	62.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
*********************************************************
*    TEST NUMBER :  850715 MVMA   868 NHTSA             *
*    BASELINE VEHICLE WITH PADDING)1985  FORD  LTD      *
*    NHTSA TEST PROCEDURE                               *
*    SID DUMMY SEATED 6 INCHES FROM DOOR                *
*********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	55.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	43.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	51.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	63.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	51.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	59.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
*****************************************************
*    TEST NUMBER :  851007 MVMA    885 NHTSA        *
*    MODIFIED VEHICLE NO PADDING)1985  FORD  LTD    *
*    NHTSA TEST PROCEDURE                           *
*    SID DUMMY SEATED NEXT TO DOOR                  *
*****************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	63.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	49.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	61.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	93.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	91.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	78.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**************************************************
*    TEST NUMBER :  851018 MVMA    886 NHTSA     *
*    MODIFIED VEHICLE NO PADDING)1985  FORD  LTD  *
*    NHTSA TEST PROCEDURE                        *
*    SID DUMMY SEATED NEXT TO DOOR               *
**************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	55.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	59.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	62.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	95.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	93.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	77.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
************************************************************
*    TEST NUMBER :  850805 MVMA    870 NHTSA               *
*    MODIFIED VEHICLE WITHOUT PADDING)1985  FORD  LTD      *
*    NHTSA TEST PROCEDURE                                  *
*    SID DUMMY SEATED 6 INCHES FROM DOOR                   *
************************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	54.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	60.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	66.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	100.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	115.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	80.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**********************************************************
*    TEST NUMBER :  850830 MVMA    882 NHTSA             *
*    MODIFIED VEHICLE WITHOUT PADDING)1985  FORD  LTD    *
*    NHTSA TEST PROCEDURE                                *
*    SID DUMMY SEATED 6 INCHES FROM DOOR                 *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	53.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	58.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	72.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	116.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	139.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	87.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**********************************************************
*    TEST NUMBER :  850808 MVMA    880 NHTSA             *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD       *
*    NHTSA TEST PROCEDURE                                *
*    SID DUMMY SEATED NEXT TO DOOR                       *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	48.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	43.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	47.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	56.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	44.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	52.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
*********************************************************
*    TEST NUMBER :  850819 MVMA    881 NHTSA            *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD      *
*    NHTSA TEST PROCEDURE                               *
*    SID DUMMY SEATED NEXT TO DOOR                      *
*********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	49.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	46.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	49.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	59.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	48.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	54.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**********************************************************
*    TEST NUMBER :  850904 MVMA    883 NHTSA             *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD       *
*    NHTSA TEST PROCEDURE                                *
*    SID DUMMY SEATED 6 INCHES FROM DOOR                 *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	48.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	40.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	48.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	62.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	38.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	55.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE

```
**********************************************************
*    TEST NUMBER :  851002 MVMA    884 NHTSA             *
*    MODIFIED VEHICLE WITH PADDING)1985  FORD  LTD       *
*    NHTSA TEST PROCEDURE                                *
*    SID DUMMY SEATED 6 INCHES FROM DOOR                 *
**********************************************************
```

MAXIMUM ACCELERATION (G s)

UPPER RIB(P)	46.00
UPPER RIB(R)	NOT MEASURED
MIDDLE RIB(P)	NOT MEASURED
MIDDLE RIB(R)	NOT MEASURED
LOWER RIB(P)	46.00
LOWER RIB(R)	NOT MEASURED
UPPER SPINE(P)	53.00
UPPER SPINE(R)	NOT MEASURED
LOWER SPINE(P)	62.00
LOWER SPINE(R)	NOT MEASURED
HEAD Y-DIRECTION	NOT MEASURED
HEAD RESULTANT	NOT MEASURED
PELVIS Y-DIRECTION	42.00

MAXIMUM DEFLECTIONS (INCHES)

UPPER RIB	NOT MEASURED
MIDDLE RIB	NOT MEASURED
LOWER RIB	NOT MEASURED

MAXIMUM V*C CALCULATION

UPPER RIB	NOT APPLICABLE
MIDDLE RIB	NOT APPLICABLE
LOWER RIB	NOT APPLICABLE

MISC. DATA

THORACIC TRAUMA INDEX (P)	54.0
THORACIC TRAUMA INDEX (R)	NOT APPLICABLE
HEAD INJURY CRITERION	NOT APPLICABLE
T1	NOT APPLICABLE
T2	NOT APPLICABLE