AN IMPROVED THREE DIMENSIONAL COMPUTER SIMULATION OF VEHICLE CRASH VICITIMS VOL. III - USER'S MANUAL

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16. Abstract

A digital computer program to simulate in three dimensions one or mor motor vehicle crash victims either occupant or pedestrian has been develo The ground work for the program was performed in Phases I and II. In the present version, numerous improvements in the modeling have been made. I this version, disjoint sets of connected rigid bodies may be specified si ulating multiple victims and victim interaction. Additional ellipsoids a or planes may be attached to any segment. Position, rolling and sliding constraints between segments is now a user option. Modeling of impulsive forces arising at first contact has been incorporated in this version. I proved modeling of joint-stop torques plus the capability of locking and locking joints has been added to the program. Adjustments to the exponen integration technique has reduced run time substantially. Because of the improvements, the model is no longer restricted to a particular crash vic simulation and may be considered a general three dimensional simulation.

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FOREWORD

This report, consisting of four volumes, describes the further development of the Calspan Three-Dimensional Crash Victim Simulation computer program to enhance its usability.

A digital computer program to simulate in three dimensions one or more motor vehicle crash victims, either occupant or pedestrian has been developed. The ground work for the program was performed in Phases I and II*. In the present version, numerous improvements in the modeling have been made. Because of these improvements, this simulation may be considered highly adaptable to general three-dimensional motion and has capabilities well beyond those of previous models.

The research effort summarized in this report was performed for National Highway Traffic Safety Administration, Department of Transportation under Contract No. Calspan HS-053-2-485. John T. Fleck of the Computer Mathematics Department of Calspan Corporation served as principal investigator.

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* Phases I and II were both jointly sponsored by NHTSA and the Motor Vehicles Manufacturers Association.

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SECTION 1

INTRODUCTION

For nearly a decade, research in computer simulation of the automobile crash victim, both vehicle occupants (References 1, 2, 3 and 4) and pedestrians (Reference 5),has been performed at Calspan. Prior to the present research, efforts at Calspan were confined to planar motion, with emphasis on frontal collisions. The present research was motivated by the need for a tool to study the highly variable, three-dimensional contact force environment and dynamics of a motor vehicle crash victim, either occupant or pedestrian, such as experienced in oblique vehicle collisions or sideswipe pedestrian accidents. An increasingly complete system representation, essential for simulation of the complex physical event, has become feasible because of the trend toward decreasing computer costs. The present body dynamics model is aimed at achieving an acceptable balance between required system representation and computation cost.

The model was developed to complement experimental research in automobile crash environments and to provide a functional instrument for parametric investigations. The equations of motion and constraint are formulated from Euler's rigid body equations in a manner that allows variation of the number of segments and joints in the formulation. In this respect, the present model differs from existing three-dimensional occupant models, most of which were formulated with Lagrange's equations of motion. These include models developed by the Texas Transportation Institute (twelve segments, thirty-one degrees of freedom), Reference 6; the Highway Safety Research Institute (three segments, twelve degrees of freedom), Reference 7; and work reported by the Society of Automotive Engineers of Japan (three segments, twelve degrees of freedom), Reference 8.

Evolution of the 3-D Model is documented in Phases I and II,(References 9 and 10) in which versions I and II of the program were developed under the joint sponsorship of the Department of Transportation and the Motor Vehicle Manufacturers Association.

The Phase I effort consisted primarily of the formulation and implementation in the computer program of a fifteen-segment body dynamics model with forty degrees of freedom, a contact model to generate external forces acting on the simulated crash victim, and a graphics display model to simplify diagnosis and interpretation of results. In addition, an injury criteria model, to provide a means of readily assessing the degree of injury sustained by the simulated crash victim, was developed and partially implemented in the computer program.

The Phase II effort consisted in a continuing research effort, generalization of the computer program and experimental validation of the model. Program generalizations consisted primarily of the addition of an airbag model, a program for a passenger compartment with six degrees of freedom to simulate crashes in which the motor vehicle undergoes general three-dimentional motions, treatment of multiple impacts between the crash victim and vehicle, initialization of the crash victim, and improvements in input/output format. In addition, other generalizations, such as incorporation of a variable-step exponential integrator to reduce computation costs, were included.

The current version (Version III) is a generalization of the Calspan 3-D Crash Victim Simulation Model (Version II) which was completed in December 1972. An important generalization is that the program is now available to accommodate any desired number of segments up to the storage limits specified for the program. The vehicle and the ground are now considered segments and are designated as segment N+1 and N+2 respectively, for a system in which N occupant segments are used. Disjoint sets of segments may now be defined, enabling the user to model multiple occupants and the interactions that may occur. This capability is realized by utilizing a "tree structure" for defining the connection between segments and allowing specification of a "null joint" indicating no connection between the segments involved. The basic reference system for describing the segments is located at the c.g. of the segment aligned with the principal moment of inertia axes (i.e. the inertia tensor is diagonal.)

In the present version, each segment has a contact ellipsoid associated with it which is used by the contact routines to determine forces and torques during contact. The location and orientation of the ellipsoid may be defined in any position with respect to the segment c.g. but must be specified at the time of input. Additional ellipsoids and planes which are inputted separately may be associated with any desired segment.

The lowest numbered segment in each set is the reference segment for that set. Specification of a joint array JNT(j) defines the connectivity of the model as a "tree structure." A set of connected segments are disjoined from another set by setting JNT(j)=0 to denote a null joint. The program is structured such that when JNT(j)> 0, joint j is associated with a flexible element.

Additional program flexibility is obtained through addition of types of constraints that can be applied between segments. Version III provides two types of position constraints, sliding or rolling constraints, tension elements and flexible elements.

External forces and torques are applied to the segments during contact with another segment, restraint belt, airbag or vehicle and/or ground surface. The contact forces are computed using a user specified force deflection function in four types of contact: ellipsoid-plane, ellipsoid-ellipsoid, ellipsoid-belt, and ellipsoid-airbag.

Torques at the joints are computed as a function of relative orientation and relative angular velocity. Asymmetrical torques are also computed if the angular motion exceeds the joint stop contour designated for that particular joint (e.g. neck, elbow, ankle.)

As an additional feature the user may now specify either of two symmetry modes for each segment. The first mode is a 2-D symmetry in which

the motion is confined to the x, z inertial plane. The second mode is a mirror type symmetry in which symmetrical parts of the body (e.g. arms or legs) may have equal but opposite motion (mirrored in x, z plane.)

Due to the increased flexibility of Version III its potential uses are numerous. A few of the many possible applications of the program are listed below:

(a) Standard 15 segment occupant of Version II

(b) Multiple occupants - interacting with each other and/or the vehicle and ground

(c) Pedestrian struck by vehicle

(d) Airplane occupant in crash environment including situations of current special interest where the seat is a separate segment or set of segments

(e) Motorcycle, or bicycle, driver or victim where the cycle can be regarded as a set of segments

(f) General 3-D motion of sets of interconnected or disjoint rigid segments.

The program is well suited to the study of small aircraft, bus, train or rapid transit occupant in high deceleration or crash environments. The effect of interior design, seat structure, or restraint systems as injury producers in any of these vehicles may be analyzed by this program. As an example, the seat structure can be modeled as a segment or set of segments. A joint is used to connect the seat and the vehicle frame. As an alternate method, the position constraint capability of the program is used to connect the seat and vehicle frame.

Documentation of version III is presented in four volumes:

Volume I	Engineering Manual
Volume II	Model Validation
Volume III	User's Manual
Volume IV	Programmer's Manual

Under this cover, Volume III contains information needed for program use. Input and output features of the program are described in sections 2 and 3, acquainting the user with the control available to him. The next section presents a summary of error messages which are printed by the program when an error situation is detected. Section 5 contains the Job Control Language setup for the IBM 370/168. Also included in Volume III is a detailed description of all input parameters, input array dimensions, and appropriate units. Sample input and output for a particular configuration is included to verify input procedures, and acquaint the user with the output format. Dictionaries of analysis and program variables are provided in order to relate the analysis variables defined in Volume I with the program variables used in the code. Cross referencing of subroutine calls and cross referencing of common block variable usage in the subroutines are presented in chart form.

Under a separate cover, Volume I contains a detailed development of the mathematical equations used in the program. This includes a derivation of the system and constraint equations and, techniques used for defining external joint torques. In addition the geometrical relationships used to define the various types of contacts are described along with the techniques used to compute forces produced by these contacts. Also included is a derivation of the equations of motion using a Lagrangian approach, which is compared to the Eulerian Method used to derive the equations utilized in the program.

Also under a separate cover, Volume II presents the results of the model validation study performed in Phase II. In this volume, predicted responses have been compared with results from a variety of experiments, which

include static bench tests to validate the airbag shape algorithm, pendulum tests with a dummy torso form restrained and decelerated by an airbag, anthropomorphic dummy tests on an impact sled with both belt and airbag restraints, and a full-scale car-to-car crash test with an automobile containing anthropsmorphic dummies.

Volume IV, also under a separate cover, is the programmer's manual and contains specific information necessary for program modification. This includes a detailed documentation of all subroutines used in the program, and complete listing of the source decks. This volume also contains cross referencing of subroutines called by other subroutines plus a cross reference of all variables carried in common blocks. An overall flow chart and program flow description indicates the general flow of the computational structure. Analysis and program variables are described in this manual for completeness.

INPUT DATA FEATURES

The card input required by the Calspan 3D Crash Victim program is of fixed format and is in modular form. A complete description of each required input variable appears in Section 7. The modularity of the input makes it possible for complete sets to be replaced by existing sets that have been previously used.

The format for each card appears in the input description. Standard FORTRAN naming conventions are used throughout, i.e. variables with first letter A-H or O-Z are real (actually double precision for IBM computers), those with first letter I-N represent integers. Several names, titles and other descriptive data are alphanumeric. Generally, all real variables have a format of F n.0 where n is the field width. On most computers E,D and F formats are completely interchangeable and one may input an exponential number (e.g. 10^{-6} as 1.0 D-6) provided it is right adjusted in the field. All other real numbers should be punched with a decimal point to override the 0 in the format description. The normal right adjusting of all integers and left adjusting for all alphanumeric data applies.

Following is a summary of all the input cards. A more complete description appears in the input description.

A. Main Program Input

A.1.a-c	Date, restart control card run description
A.2.a-n	Variable changes for restart procedure
A.3	Unit names and components of g
A.4	Integrator parameters
A.5	NPRT array for output control

B. Subroutine BINPUT

B.1	Body description
B.2.a-i	Physical characteristics of segment ellipsoids
B.3.a-j	Physical characteristics of joints
B.4.a-j	Joint spring function coefficients
B.5.a-j	Joint viscous function coefficients
B.6.a-i	Integrator convergence test inputs for each segment
B.7.a-n	Controls for flexible elements

C. Subroutine VINPUT

C.1	Crash vehicle deceleration description
C.2	Deceleration control input data
C.3.a-n	One direction deceleration tables
C.4.a-m	Six degree of freedom deceleration tables

D. Subroutine SINPUT

D.1	Number of planes, belts, bags, ellipsoids, constraints and spring dampers
D.2.a-d	Plane description and input data
D.3.a-c	Belt description and input data
D.4.a-h	Airbag description and input data
D.5.a-j	Additional ellipsoid contact surface input data
D.6.a-j	Constraint input description data
D.7	Symmetry options input data
D.8.a-j	Spring damper input

E. Subroutine CINPUT (Function definitions)

E.1	Function number and description
E.2	Function control input
E.3	Polynomial type function definition
E.4.a-n	Tabular function definition

F. Subroutine CINPUT (Allowed contacts)

F.1.a-n	Matrix for plane-segment contact functions
F.2.a-n	Matrix for belt-segment contact functions
F.3.a-n	Matrix for segment-segment contact functions
F.4.a-n	Matrix of airbag-segment allowed contacts

G. Subroutine INITIAL

G.1.	Printer plot origin coordinates
G.2.a-m	Initial position and velocity for reference segments
G.3.a-n	Initial yaw, pitch and roll angles and angular velocities of body segments

H. Subroutine HEDING

H.1.a-n	Control of optional output for segment linear accelerations
H.2.a-n	Control of optional output for segment linear velocities
H.3.a-n	Control of optional output for segment linear displacements
H.4	Control of optional output for segment linear angular accelerations
H.5	Control of optional output for segment linear velocities
H.6	Control of optional output for segment angular displacements
H.7	Control of optional output for segment joint parameters

SECTION 3

OUTPUT DATA FEATURES

All of the output produced by the Calspan 3D Crash Victim program is optional and is controlled by various control input variables, primarily by input cards A.5, H.1-H.7 and indirectly by cards F.1-F.4.

FORTRAN output unit no. 1, a tape containing data written by the main program is designed to be useful for plotting ellipsoidal segment plots at the print time point intervals specified by DT on card A.4. Its existence and frequency are controlled by the value of NPRT(1) on card A.5.

FORTRAN output units 2 and 3, to be printed on the system output, are printer plots written by SUBROUTINE PRIPLT depicting Y-Z and X-Z views of the location of the segment c.g.'s and joint locations, and outline of the airbags. These have been called stick-man plots, appear to be confusing at first, but, as one becomes accustomed to the input segment and joint symbols, are valuable tools in obtaining a quick view of what has happened to the crash vicitm. They also are produced at the time point intervals specified by DT on card A.4. Their existence and frequency are controlled by the value of NPRT(5) and (6) on card A.5.

FORTRAN output unit no. 6 (the standard system output unit) contains the following output:

1. A complete annotated printout of all the card input, generally in the basic card format.

2. Tables of segment linear and angular position information and joint forces and torques are produced by SUBROUTINE PRINT as called by main program at the print time intervals specified by DT on card A.4. Its existence and frequency are controlled by NPRT(3) on card A.5.

3. A table of computer elapsed CPU times used by the primary subroutines and number of calls to these subroutines as produced by SUBROUTINE ELTIME. It may be printed at the print time point intervals specified by DT on card A.4 at a frequency controlled by NPRT(2) on card A.5. If it is not called for, it is produced once at the successful completion of the run.

4. Various diagnostic type output that is produced at every call to various subroutines as controlled by the values of NPRT(7) to NPRT(26). This output is intended for diagnostic or check-out purposes only, and if used indiscriminantly, can result in voluminous amounts of output. This output is not completely labeled and the user should consult the various subroutine listings for a description of the variables printed.

Subroutine OUTPUT (and HEDING) produce output on FORTRAN output unit numbers commencing with no. 21 and use as many units as required by the contents of input cards H.1-H.7 and F.1-F.4. A minimum of 20 units is required here but we have seen runs where 45 units were required.

It is realized that this amount of output units perhaps taxes the facilities of some computer systems. The alternatives were writing data on an output unit and writing a post processing step, or writing all the data onto one unit and sorting the data before output. Both of these methods were attempted and resulted in greatly increased computer costs and perhaps incompatibility with other computer systems and were therefore discarded.

The output produced on these units are as follows:

1. Components of segment linear accelerations in local segment reference (to simulate accelerometer data) of points on segments as specified by cards H.1.

2. Components of segment linear velocities in vehicle reference (to correspond to a camera attached to the vehicle) of points on segments as specified on cards H.2.

3. Components of segment linear displacements in vehicle reference of points on segments as specified on cards H.3.

4-6. Components of segment angular accelerations, velocities and rotations in vehicle reference of segments as specified on cards H.4-H.6.

7. Joint parameter data (angles and torques) of joints specified on card H.7.

8. Contact forces data for all allowed contacts between planes and segments as specified on cards F.1.

9. Contact force data for all allowed contacts between belts and segments as specified on cards F.2.

10. Contact force data for all allowed contacts between segments as specified on cards F.3.

11. Airbag parameters and contact forces for all allowed contacts between airbags and segments as specified on cards F.4.

All of the above data is printed (one line per unit) in tabular form, each line representing the conditions that exist at the end of each successful integration step in SUBROUTINE DINT. These time points automatically include the print time points. Each page is numbered in form of NT.XX where NT is the FORTRAN output unit number and XX starts at .01 and increments by .01 every 45 lines of output. This means that the data on each NT unit with the same .XX represent the same time points.

To help estimate the number of output units required, the number of data points for each unit is as follows:

Type	No. Of Points Per Unit
1. Segment linear accelerations	3 points per unit
2. Segment linear velocities	3 points per unit
3. Segment linear positions	3 points per unit
4. Segment angular accelerations	3 segments per unit
5. Segment angular velocities	3 segments per unit
6. Segment linear positions	3 segments per unit
7. Joint torques and forces	2 joints per unit
8. Plane-segment contacts	2 contacts per unit
9. Belt-segment contacts	2 contacts per unit
10. Segment-segment contacts	1 contact per unit
11. Airbag-segment contacts	4 data points per unit (number of data points is the number of segments contacting the airbag, the number of reaction panels plus 5)

Each portion of the above numbers require an entire unit.

Illustrative samples of all of the above types of output are shown in Section 9.

DESCRIPTION OF THE RESTART PROCEDURE

The Calspan 3-D Crash Victim Simulation Program has a built-in optional restart procedure that is versatile, is easy to use and is independent of the computer and operating system being used.

To use the restart procedure, the following steps must be followed:

1) Any computer simulator run (including a restart run itself) may be a base run by defining the restart output unit IRSOUT $\neq$ 0 on card A.1.A.

2) To restart the base run, define the restart input unit IRSIN $\neq$ 0 and the restart time (RSTIME) on card A.1.A. and redefine the date and run description on cards A.1.A-A.1.C.

3) Program modifications are made on cards A.2 which permit the user to change any variables in the program labeled common blocks. No further input is required for the restart run.

4) For the restart run, the program is loaded into the computer as normal. However, the user should include the necessary Job Control Language (JCL) to define the restart input and output units.

To use the restart procedure, the user should be aware of the following procedures, considerations and restrictions.

1) The procedure consists of two subroutines (RSTART and SEARCH called by the main program) written entirely in FORTRAN IV and is therefore completely independent of the computer and operating system being used.

2) The restart procedure is completely optional. Its use is controlled by three additional input parameters on the first input card in such a manner that blank or zero values deactivate the procedure. This permits its optional use without disturbing the organization of current input decks.

3) Any computer simulation can be made the base run by defining IRSOUT $\neq$ 0 on card A.1.A. This defines the restart output unit (a value of 3 or 4 is suggested since the program uses units 1, 2, 5, 6, 7 and 21 and up) and requires the proper JCL to define this output unit.

4) During execution of the base run, an initial record is written on the restart output unit containing all the information in the program labeled common blocks that were defined by the input and initialization portions of the program.

5) At equally spaced simulation time intervals (DT as specified on card A.4), when the integration returns control to the main program to perform optional output, time point records are written on the restart output unit. These records contain all information in the program labeled common blocks that are time dependent and/or necessary to restart the program. The writing of the restart unit in no way disturbs the normal operation of the computer simulation.

6) To restart, the program is reloaded in the normal manner (program changes since the base run are permissible if the changes did not affect the format and contents of the restartunit.) Input cards A.1.A, A.1.B and A.1.C are required defining a new date, run description, the restart input unit number (IRSIN) and the restart time (RSTIME, an integral multiple of DT). IRSOUT may be defined, if desired, to generate an

additional restart output unit. Again make sure the proper JCL is included for units IRSIN and IRSOUT.

7) The program reads the initial input record from the restart input unit described in step 4. The program then bypasses the remainder of the input and initialization steps. One set of A.2 cards are then processed to modify any of the input or initialization data from the base run that is to apply to the new run. If the new value of IRSOUT is non-zero, step 4 is repeated for the new restart output unit with the input modifications, if any.

8) The program then advances the computer simulation time in DT increments by reading the restart input unit records, instead of calling the integrating routine DINT, up to and including the restart time RSTIME. After each step, the main program performs any optional output that is required including writing the time point record onto the new restart output unit, if required. In addition, the restart procedure calls Subroutine OUTPUT at each DT time increment to write a line of output on all the time history output units, thereby producing abbreviated time histories prior to the resumption of normal operation.

9) Immediately preceeding the resumption of normal operation at the restart time RSTIME, the second set of A.2 input cards is read allowing the user to change any variable in the labeled common blocks to be used by the program during the succeeding normal operation of the program.

10. All program modifications are made through the use of the input cards A.2. Two sets (each terminated by a blank card) are processed, the first after the input record is read from the restart input time, and the second just prior to resumption of normal operation of the program. Through the use of these cards, the user has the capability of changing any variable in the program labeled common blocks. The program merely makes the changes indicated by the user and no attempt is made to check the validity or consistency of the modifications. The program modifications fall into five broad categories as follows:

A. Desirable (and useful) Modifications

1. To control the length of the run (NSTEPS, DT)
2. To control optional output (elements of NPRT array)
3. To control the integrator (HMIN,HMAX,NDINT,SGTEST)

B. Permissible Modifications

1. Any alphanumeric variables used for identification purposes

C. Restrictive Modifications

1. In general, any variable that affects the position and velocity of segments through contacts or constraints can be modified before they become active

D. Useless Modifications

1. Many variables would be recomputed before they are used or supplied for output purposes
2. Variables that would not normally be used by the current options and controls in effect

3. Input parameters that are modified or used to establish initial conditions and hence are no longer active in the program

E. Prohibited Modifications

1. Modifications that would cause abrupt discontinuities in the integration procedure
2. Geometrical dimensions of the body segments and joints used to compute segment positions by the CHAIN procedure
3. Controls of contacts, constraints that are currently active
4. Control of force deflection characteristic functions that are currently loading or reloading.

In general, the user should carefully evaluate the potential effects of restart modifications before prescribing them.

ERROR MESSAGES

In addition to the normal operating system error messages, which may differ from computer to computer and therefore will not be discussed here, several error messages exist in the program, some of which cause the program to immediately terminate. They are as follows:

1. "FUNCTION NO. nn HAS ALREADY BEEN INPUTTED AND WILL BE REPLACED BY NEXT FUNCTION."

   The function number nn as supplied on card E.1 for SUBROUTINE CINPUT has been duplicated, the last one loaded will be used and any previous ones will be discarded.

2. "CONTACT INPUT ERROR. PROGRAM TERMINATED"

   The contact surface number NJ (plane, belt or segment no.) on cards F.1.B,F.2.B, or F.3.B are not in order or do not agree with the required number of cards from cards F.1.A, F.2.A or F.3.A in SUBROUTINE CINPUT.

3. "FUNCTION NO. nn HAS NOT BEEN DEFINED. PROGRAM TERMINATED."

   The function number nn as supplied as an element of the NF array on cards F.1.B, F.2.B or F.3.B was not defined on one of the cards E.1 in SUBROUTINE CINPUT.

4. "DSETD RENORMALIZATION DID NOT CONVERGE, DET = $\pm$ x.xxxxx xxxxx xxxxx D$\pm$xx"

   The normalization of the direction cosine matrix in SUBROUTINE DSETD has not converged in 10 iterations to a value of 1.0 ± 10^{-6} and the last value has been accepted by the program.

5. "DSETQ RENORMALIZATION DID NOT CONVERGE,
DET = ± x.xxxxx xxxxx xxxxx D ± xx"

Same as 4. except for SUBROUTINE DSETQ.

6. "DSMSOL MATRIX SINGULAR."

The program will terminate if the matrix of coefficients supplied to SUBROUTINE DSMSOL is singular. DSMSOL is currently called by Subroutines EDEPTH, INTERS, SEGSEG and IMPLS2.

7. "EDEPTH ITERATION DID NOT CONVERGE"

The iteration in SUBROUTINE EDEPTH has not converged to the desired cirteria in 50 steps. The last computed values will be accepted and the program will continue.

8. "MAXIMUM DIMENSION OF 140 ON C ARRAY HAS BEEN EXCEEDED IN SUBROUTINE FSMSOL. TO CORRECT PROBLEM, REDUCE NUMBER OF CONSTRAINTS OR INCREASE THE 140 DIMENSION ON C IN COMMON/ TEMPVS/ IN THE DAUX SUBROUTINES AND INCREASE CORE SIZE ACCORDINGLY. PROGRAM IS BEING TERMINATED. COMPLETE PRINT-OUT OF IJK, RHS, AND C ARRAYS FOLLOW."

9. "IMPROPER ARGUMENTS TO SUBROUTINE IMPULS. ARGUMENTS=11, mm, nn. PROGRAM TERMINATED."

Controls for impulse option are probably incorrect.

10. "INTERS INTERATION DID NOT CONVERGE."

The iteration in SUBROUTINE INTERS has not converged to the desired criteria in 50 steps. The last computed values will be accepted and the program will continue.

11. "PLANE INDEX INPUT ERROR, jj, j"

The numbers identifying the plane must be supplied in consecutive order on cards D.2.a in SUBROUTINE SINPUT. Program is terminated.

12. "ERROR IN SUBROUTINE CINPUT, SIZE OF TAB ARRAY = xxxxx. PROGRAM TERMINATED.

The dimension of the TAB array in COMMON/TABLES/ is 2000 and has been exceeded. Reduce the number of functions and resubmit program.

13. "NJNT = xxx, NQ = xxx, NS = xxx and NJ2 = xxx. THIS EXCEEDS THE ARRAY SIZES FOR RHS AND IJK IN SUBROUTINE DAUX. PROGRAM TERMINATED.

Either reduce the number of segments, joints or constraints used or increase the dimension 54 for RHS and IJK in COMMON/TEMPVS/ in all of the DAUX routines.

14. "NUMBER OF VARIABLES IN SUBROUTINE DINT IS xxx AND EXCEEDS THE ARRAY SIZES OF 120. PROGRAM TERMINATED.

Either reduce the size of the input options used or increase the dimension 120 in COMMON/CDINT/ and COMMON/COMAIN/.

15. DINT CONV. TEST [T,II,TT,TE,(XTEST(I),I=II,I2] TEST FAILED AT TIME = x.xxxxxx.

The convergence test in Subroutine DINT has failed for the indicated values. This is for informative purposes only. A complete history of all the convergence test criteria may be obtained by setting NPRT(25) = 1 on card A.5.

16. SUBROUTINE RSTART INPUT ERROR.
[values of AVAR, INDEX, NCOM, ITEM, ITYPE, RR,II,AA]
PROGRAM IS BEING TERMINATED.

The restart redefinition data on card A.2.A is incorrect. Check spelling of variable name (make sure name was left adjusted in field), value of INDEX against the dimensions for the variable and type of variable.

17. INPUT ERROR ON CARD B.7.A, NFX = mm BUT NFLX = nn AS COMPUTED FROM CARDS B.3. PROGRAM TERMINATED.

18. INPUT ERROR ON CARD B.7.J, SEGMENT NO. nn IS NOT AN INTERIOR SEGMENT OF A FLEXIBLE ELEMENT FROM DATA ON CARDS B.3. PROGRAM TERMINATED.

In general, all of the input is printed out and, if an input error exists, one should be able to tell from the printout approximately where the error has occurred. Since all of the input is of fixed form and controlled by other input variables, a counting error will generally cause unpredictable results but an examination of the print out should identify the point at which error occurred.

The last set of input cards (Cards H.1-H.7) are not printed, and if an error occurs here the program will probably end with an end of file message for the input data set, the output of the initial positions being the last output.

The two most common errors that have occurred at CALSPAN have been:

1. Not supplying enough data set definitions in the job control language as required by SUBROUTINES OUTPUT and HEDING. The

required number is controlled by the contents of cards H.1-H.7 and the number of allowed contacts.

2. Very often, several underflow messages have occurred in SUBROUTINE VISPR as a result of cross operations with very small values of ω. As long as the systems properly sets these underflowed quantities to zero, these underflows are permissible. However, recent program modifications have been made to eliminate these underflows.

```
//XX2314    JOB    (Y,
//  N91102,5791,46,BY),'JOHN BALCERAK',CLASS=D
//S1   EXEC FORTHLG,GCORE=380K,GTIME=5,GLINES=30000
//LKED.SYSIN DD *
    INCLUDE LOADLIB(BYCVRFV6)
    ENTRY MAIN
//GO.FT06F001 DD SYSOUT=A,SPACE=(4,GGLINES,RLSE),
//            UNIT=SYSOUT,
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=6384,BUFNO=1)
//GO.FT01F001 DD UNIT=STRACK,DSN=GG3U1204,DISP=(NEW,KEEP),
//            DCB=(RECFM=VBS,BLKSIZE=12000,LRECL=32000)
//GO.FT02F001 DD SYSOUT=A,SPACE=(TRK,(40,10),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=6384,BUFNO=1)
//GO.FT21F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT22F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT23F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT24F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT25F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT26F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT27F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT28F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT29F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT30F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT31F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT32F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT33F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT34F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT35F001 DD SYSOUT=A,SPACE=(TRK,(2,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT36F001 DD SYSOUT=A,SPACE=(TRK,(0,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT37F001 DD SYSOUT=A,SPACE=(TRK,(0,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT38F001 DD SYSOUT=A,SPACE=(TRK,(0,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT39F001 DD SYSOUT=A,SPACE=(TRK,(0,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT40F001 DD SYSOUT=A,SPACE=(TRK,(0,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.FT41F001 DD SYSOUT=A,SPACE=(TRK,(0,2),RLSE),
//            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=665,BUFNO=1)
//GO.SYSIN DD *
```

SECTION 7

INPUT DESCRIPTION

INPUT DESCRIPTION FOR THE CALSPAN 3-D CRASH VICTIM SIMULATION PROGRAM
REV 10 09/13/74 |

ANY LINE WITH A "|" AT THE RIGHT INDICATES A CHANGE MADE TO THE INPUT DESCRIPTION SINCE CALSPAN REPORT NO. VJ-2978-V-2.

OUTLINE OF INPUT TO THE PROGRAM :

CARDS A - DATE AND RUN DESCRIPTION, UNITS OF INPUT AND OUTPUT, CONTROL OF RESTART, INTEGRATOR AND OPTIONAL OUTPUT.

CARDS B - PHYSICAL CHARACTERISTICS OF THE SEGMENTS AND JOINTS.

CARDS C - DESCRIPTION OF THE VEHICLE MOTION.

CARDS D - CONTACT PLANES, BELTS, AIR BAGS, CONTACT ELLIPSOIDS, CONSTRAINTS, AND SYMMETRY OPTIONS.

CARDS E - FUNCTIONS DEFINING FORCE-DEFLECTIONS, INERITIAL SPIKE, ENERGY ABSORPTION FACTOR, AND FRICTION COEFFICIENTS.

CARDS F - ALLOWED CONTACTS AMONG SEGMENTS, PLANES, BELTS, AIR BAGS AND CONTACT ELLIPSOIDS.

CARDS G - INITIAL ORIENTATIONS AND VELOCITIES OF THE SEGMENTS.

CARDS H - CONTROL OF OUTPUT OF TIME HISTORY OF SELECTED SEGMENT MOTIONS AND JOINT PARAMETERS.

THE SYMBOL # IS USED TO INDICATE "NOT EQUAL" |

A. MAIN PROGRAM INPUT

CARD A.1.A	FORMAT (3A4,2I4,F8.0)
DATE(I),I=1,3	DATE OF THE RUN (12 CHARACTERS).
IRSIN	RESTART INPUT UNIT NO. IF BLANK OR ZERO, ALL INPUT TO BE SUPPLIED ON CARDS A.3 TO CARDS H.7. IF NONZERO (SUGGESTED VALUE =4) INPUT WILL BE SUPPLIED FROM A PREVIOUS RESTART TAPE AND CARDS A.1.B,C AND A.2.
IRSOUT	RESTART OUTPUT UNIT NO. IF NONZERO (SUGGESTED VALUE =3). RECORDS WILL BE WRITTEN ON THIS OUTPUT UNIT FOR FUTURE RESTART RUNS. AN INITIAL RECORD CONTAINING ALL INPUT AND INITIALIZATION DATA WILL BE WRITTEN PLUS A TIME POINT RECORD AT EVERY TIME INTERVAL AS SPECIFIED BY DT ON CARD A.4.
RSTIME	RESTART TIME (SEC.) REQUIRED IF IRSIN # 0. SHOULD BE NONZERO AND AN INTEGER MULTIPLE OF DT ON CARD A.4. PROGRAM WILL READ RECORDS FROM THE PREVIOUS RESTART TAPE UP TO AND INCLUDING THIS TIME, MAKE CHANGES PER CARD A.2 AND CONTINUE OPERATION FROM THERE.
CARDS A.1.B - A.1.C	FORMAT (20A4/20A4)
COMENT(I),I=1,40	DESCRIPTION OF THE RUN (160 CHARACTERS ON TWO CARDS).

THESE CARDS REQUIRED ONLY IF IRSIN > 0 , IN WHICH CASE ALL OTHER INPUT AS SPECIFIED ON CARDS A.3 TO H.7 ARE BYPASSED. TWO SETS OF A.2 (EACH TERMINATED WITH A BLANK CARD) ARE REQUIRED. THE FIRST SET IS PROCESSED AFTER THE INITIAL INPUT RECORD IS READ FROM INPUT UNIT IRSIN AND, IF IRSOUT # 0, BEFORE THE INPUT RECORD IS WRITTEN ON OUTPUT UNIT IRSOUT. THE SECOND SET IS PROCESSED AFTER THE TIME POINT RECORD FOR TIME = RSTIME HAS BEEN READ AND, IF IRSOUT # 0, AFTER THE SAME RECORD IS WRITTEN ON OUTPUT UNIT IRSOUT, BUT BEFORE THE PROGRAM RESUMES OPERATION.

CARDS A.2.A - A.2.N	FORMAT(A8, 4I4, 2(F8.0, I8, A8))
AVAR	ALPHANUMERIC NAME (LEFT ADJUSTED IN FIELD) OF VARIABLE TO BE REDEFINED FOR RESTART. PROGRAM IS CAPABLE OF CHANGING ANY VARIABLE IN THE LABELED COMMON BLOCKS AS USED AFTER ALL INITIALIZATION HAS BEEN PERFORMED. THE USER SHOULD ASCERTAIN THAT CHANGING THIS VARIABLE IS VALID FOR THE PROGRAM.
INDEX(I),I=1,3	THE ARRAY INDICES, IF ANY, OF THE VARIABLE. MUST AGREE IN NUMBER AND THE VALUES MUST BE LESS THAN OR EQUAL TO THE DIMENSIONS OF THE VARIABLE. BLANK OR ZERO FOR NO DIMENSION.
ITYPE	SUPPLY 1,2 OR 3 TO INDICATE THAT THE NEW VALUE IS TO BE REAL(RR), INTEGER(II) OR ALPHANUMERIC(AA). MUST AGREE WITH THE TYPE OF THE VARIABLE WITHIN THE PROGRAM.
RR,II OR AA	NEW VALUE OF THE VARIABLE AVAR TO BE SUPPLIED IN THE APPROPRIATE FIELD DETERMINED BY THE VALUE OF ITYPE.
RROLD,IIOLD OR AAOLD	THE PREVIOUS VALUE OF THE VARIABLE AVAR IN THE APPROPRIATE FIELD ACCORDING TO THE ITYPE VALUE. INTEGER OR ALPHANUMERIC DATA WILL BE TESTED EXACTLY, REAL DATA TO 5 SIGNIFICANT DIGITS. IF THE CURRENT VALUE IS DIFFERENT, THE PROGRAM WILL TERMINATE WITH AN ERROR MESSAGE. IF ZERO OR BLANK IS SUPPLIED,NO CHECK IS PERFORMED.

THESE A.2 CARDS WILL BE PROCESSED UNTIL A BLANK VALUE FOR AVAR IS ENCOUNTERED. NO FURTHER INPUT IS REQUIRED.

CARD A.3	FORMAT (3A4, 3F12.0)
UNITL	UNIT OF LENGTH (4 CHARACTERS)
UNITM	UNIT OF FORCE (MASS) (4 CHARACTERS)
UNITT	UNIT OF TIME (4 CHARACTERS).

NOTE : UNITL, UNITM AND UNITT SHOULD CORRESPOND TO THE USER'S INPUTS. THROUGHOUT THIS DESCRIPTION, INCHES, POUNDS AND SECONDS (IN,LBS,SEC) ARE USED AS SAMPLE UNITS.

GRAVTY(I),I=1,3	THE X, Y AND Z COMPONENTS OF GRAVITY (IN/SEC**2).
CARD A.4	FORMAT (2I4, 4F8.0)
NDINT	NUMBER OF ITERATIONS FOR FINAL CONVERGENCE TEST OF THE INTEGRATOR SUBROUTINE DINT (MINIMUM VALUE = 2, SUGGESTED VALUE = 4).
NSTEPS	NUMBER OF INTEGRATION STEPS (OR OUTPUT TIME POINTS) FOR THE INTEGRATOR ROUTINE. MAY BE ZERO TO OBTAIN INITIAL CONDITIONS.
DT	MAIN PROGRAM TIME INTERVAL FOR INTEGRATOR ROUTINE OUTPUT (SEC). TOTAL TIME OF RUN WILL BE NSTEPS*DT SECONDS WITH MAIN PROGRAM TAPE 1, PRINTER PLOT AND OPTIONAL OUTPUT PRODUCED EVERY DT SECONDS.
HO	INITIAL INTEGRATOR STEP SIZE (SEC).
HMAX	MAXIMUM INTEGRATOR STEP SIZE (SEC). FOR BEST EFFICIENCY DT SHOULD BE AN INTEGRAL MULTIPLE OF HMAX AND HMAX A POWER OF TWO MULTIPLE OF HO. (SUGGESTED VALUE = 0.001 SEC.)
HMIN	MINIMUM INTEGRATOR STEP SIZE (SEC). IF A FIXED STEP SIZE IS DESIRED, SET HMIN GREATER THAN HMAX, AND STEP SIZE WILL DOUBLE FROM HO UNTIL HMAX IS ACHIEVED.

CARD A.5 FORMAT (40I2)

NPRT(I),I=1,40 AN ARRAY OF INDICATORS THAT CONTROL VARIOUS OPTIONAL DIAGNOSTIC OUTPUT FOR THE PROGRAM. A VALUE OF ZERO OR BLANK INDICATES NO OUTPUT FOR THAT PARTICULAR ITEM. IN GENERAL, A VALUE OF 1 MEANS THAT THE OUTPUT WILL BE PRODUCED EVERY TIME A PARTICULAR SUBROUTINE IS EXECUTED. HOWEVER, FOR ELEMENTS 1-6 THE VALUE INDICATES THE PRINT FREQUENCY, E.G., A VALUE OF 5 WILL PRODUCE OUTPUT EVERY 5TH EXECUTION OF THE SUBROUTINE. OUTPUT PRODUCED BY ELEMENTS 7-26 IS INTENDED FOR DIAGNOSTIC OR "CHECK OUT" PURPOSES AND IS NOT COMPLETELY LABELED. THE USER SHOULD CONSULT THE LISTING OF THE SUBROUTINE FOR A DESCRIPTION OF THE VARIABLES THAT ARE PRINTED.

THE NPRT ARRAY

ELEMENT NO.	SUBROUTINE	OUTPUT PRODUCED
1	MAIN	TAPE 1 OUTPUT
2	MAIN	ELTIME OUTPUT
3	MAIN	SUBROUTINE PRINT OUTPUT
4	NOT USED	
5	PRIPLT	Y-Z VIEW PRINTER PLOT
6	PRIPLT	X-Z VIEW PRINTER PLOT
7	BINPUT	HA, HB
8*	DAUX	IJK,RHS,C ARRAYS
9	DAUX	SUBROUTINE PRINT OUTPUT
10	IMPULS	DIAGNOSTIC OUTPUT
11	SETUP1	U2,V1 ARRAYS
12	VISPR	DIAGNOSTIC OUTPUT
13	PRIPLT	CJOINT ARRAY
14	NOT USED	
15	BELTG	DIAGNOSTIC OUTPUT
16	NOT USED	
17	EDEPTH	DIAGNOSTIC OUTPUT
18	NOT USED	
19	NOT USED	
20	CHAIN	XCOMP,XVCOMP,SEGLP,SEGLV
21	AIRBAG	DIAGNOSTIC OUTPUT
22	AIRBG1	DIAGNOSTIC OUTPUT
23	AIRBG3	DIAGNOSTIC OUTPUT
24	UPDATE	ROLL-SLIDE TEST OUTPUT
25	DINT	CONVERGENCE TEST DATA
26	DINT	SUBROUTINE OUTPUT EVERY STEP

* A VALUE OF NPRT(8) = 2 WILL PRINT ARRAYS BEFORE AND AFTER THE FIRST CALL TO SUBROUTINE FSMSOL ONLY.

B. SUBROUTINE BINPUT

CARD B.1 — FORMAT (2I6, 8X, 5A4)

NSEG	THE NUMBER OF SEGMENTS (MAXIMUM = 20). NOTE: THE VEHICLE AND GROUND WILL BE ASSIGNED SEGMENT NUMBERS NSEG+1 AND NSEG+2.
NJNT	THE NUMBER OF JOINTS (MAXIMUM = 21). NOTE: NORMALLY NJNT = NSEG-1, BUT JOINT NUMBERS NSEG AND NSEG+1 MAY BE USED TO CONNECT THE VEHICLE AND THE GROUND TO LOWER NUMBERED SEGMENTS.
BDYTTL(I),I=1,5	DESCRIPTION OF THE CRASH VICTIM (20 CHARACTERS).

CARDS B.2.A - B.2.I (NSEG CARDS) — FORMAT (A4, 1X, A1, 10F6.0)

EACH CARD (I) FOR I = 1, NSEG WILL CONTAIN INPUT DATA FOR THE ITH SEGMENT. THE SEGMENT IDENTIFYING NUMBERS (I) WILL BE REFERRED TO ON LATER INPUT CARDS.

SEG(I)	AN ABBREVIATION OF THE NOMENCLATURE OF THE ITH SEGMENT (4 CHARACTERS).
CGS(I)	THE PLOT SYMBOL OF THE SEGMENT C.G. (1 CHARACTER).
W(I)	THE WEIGHT OF THE SEGMENT (LBS).
PHI(J,I),J=1,3	THE PRINCIPAL MOMENTS OF INERTIA OF THE SEGMENT ABOUT THE X, Y, AND Z AXES OF THE SEGMENT (LBS-SEC**2-IN). THERE ARE NO RESTRICTIONS ON THE VALUES OF W(I) OR PHI(J,I), THEY MAY BE NEGATIVE OR ZERO. IF ANY COMPONENT IS ZERO, IT IS ASSUMED THAT THE SYSTEM IS SUITABLY CONSTRAINED SO THAT THE SYSTEM MATRIX IS NONSINGULAR.
BD(J,I),J=1,3	THE X, Y, AND Z SEMIAXES OF THE SEGMENT CONTACT ELLIPSOID (IN).
BD(J,I),J=4,6	THE LOCATION OF THE CENTER OF THE SEGMENT CONTACT ELLIPSOID, WITH RESPECT TO THE CENTER OF GRAVITY OF THE SEGMENT, IN THE LOCAL BODY SEGMENT REFERENCE(IN). THESE PRIMARY CONTACT ELLIPSOIDS ARE GIVEN THE SAME INDENTIFYING NUMBER AS THE SEGMENT. THEY MAY BE REDEFINED WITH AN ARBITRARY ORIENTATION ON CARDS D.5.

ARDS B.3.A - B.3.J. FORMAT (A4, 1X, A1, 2I4, 6F6.0/ 14X, 6F6.0)
(2*NJNT CARDS - 2 CARDS FOR EACH JOINT)

EACH CARD (J) FOR J = 1, NJNT WILL CONTAIN INPUT DATA FOR THE JTH JOINT. THE JOINT IDENTIFYING NUMBERS (J) WILL BE REFERRED TO ON LATER INPUT CARDS.

JOINT(J) — AN ABBREVIATION OF THE NOMENCLATURE OF THE JTH JOINT (4 CHARACTERS).

JS(J) — PLOT SYMBOL OF THE JOINT LOCATION (1 CHARACTER).

JNT(J) — MAGNITUDE INDICATES THE NUMBER OF THE SEGMENT THAT IS CONNECTED TO SEGMENT J+1 BY JOINT J. IF NEGATIVE, JOINT J IS ASSOCIATED WITH A FLEXIBLE ELEMENT. IF ZERO, SEGMENT J+1 IS THE REFERENCE SEGMENT OF ANOTHER BODY. (|JNT(J)| < J+1).

IPIN(J) — 0 - THERE ARE TO BE NO CONSTRAINTS ON JOINT J.
1 - JOINT J IS PINNED (HINGE).
2 - JOINT J IS NOT PINNED (BALL AND SOCKET).
3 - JOINT J IS GLOBALGRAPHIC (BALL AND SOCKET)
4 - JOINT J IS AN EULER JOINT.
NON-ZERO VALUES FOR IPIN MAY BE SUPPLIED AS POSITIVE OR NEGATIVE TO INDICATE THAT THE INITIAL CONDITION OF THE JOINT IS UNLOCKED (POSITIVE) OR UNLOCKED (NEGATIVE).
AN EULER JOINT MAY USE THE GLOBALGRAPHIC OPTION.
SPECIFY IGLOB = 1 ON CARD F.4.A
THE INITIAL STATE OF AN EULER JOINT IS SET BY USE OF IPIN AS FOLLOWS

IPIN	IEULER	STATE	
4	8	FREE	
- 4	7	ALL AXES LOCKED	
- 5	6	SPIN	FREE, OTHERS LOCKED
- 6	5	NUTATION	FREE, OTHERS LOCKED
- 7	4	PRECESSION	FREE, OTHERS LOCKED
- 8	3	SPIN	LOCKED, OTHERS FREE
- 9	2	NUTATION	LOCKED, OTHERS FREE
-10	1	PRECESSION	LOCKED, OTHERS FREE

(PRECESSION ABOUT Z
NUTATION ABOUT RESULTANT X
SPIN ABOUT RESULTANT Z)

IF IPIN IS LESS THAN -3 PROGRAM WILL SET IEULER AS ABOVE AND THEN SET IPIN = -4.

SR(I,2*J-1),I=1,3 — COORDINATES OF LOCATION OF JOINT J (IN.) IN THE LOCAL REFERENCE SYSTEM OF SEGMENT JNT(J).

SR(I,2*J),I=1,3 — COORDINATES OF LOCATION OF JOINT J (IN.) IN THE LOCAL REFERENCE SYSTEM OF SEGMENT J+1.

```
FOLLOWING DATA IS ON 2ND CARD FOR EACH JOINT.

YPR1(I,J),I=1,3      THE YAW, PITCH AND ROLL ANGLES (DEGREES)
                     SPECIFYING THE PRINCIPAL AXES OF JOINT J IN
                     THE LOCAL REFERENCE SYSTEM OF SEGMENT JNT(J).
                     YAW   ABOUT Z AXIS
                     PITCH ABOUT RESULTANT Y AXIS
                     ROLL  ABOUT RESULTANT X AXIS

YPR2(I,J),I=1,3      THE YAW, PITCH AND ROLL ANGLES (DEGREES)
                     SPECIFYING THE PRINCIPAL AXES OF JOINT J IN
                     THE LOCAL REFERENCE SYSTEM OF SEGMENT J+1.
                     THE Z AXIS IS THE REFERENCE AXIS TO DEFINE
                     FLEXURE. THE Y AXIS IS USED AS THE PIN AXIS
                     EXCEPT FOR THE SPECIAL EULER JOINTS. THE XY
                     PLANE IS USED FOR GLOBALGRAPHIC JOINTS WITH
                     X AS THE REFERENCE AXIS.


CARDS B.4.A - B.4.J      FORMAT (2 (4F6.0, F12.0))
    (NJNT SETS OF CARDS, ONE FOR EACH JOINT J. IF |IPIN(J)| # 4,
     EACH SET READS VALUES FOR 3*J-2 AND 3*J-1 ON ONE CARD ONLY.
    IF |IPIN(J)| = 4 , JOINT J IS AN EULER JOINT AND A SECOND CARD
    IS NECESSARY TO READ VALUES FOR 3*J)

    SPRING(I,3*J-2),     THE FLEXURAL SPRING CHARACTERISTICS FOR
           I=1,5         JOINT J. IF J IS AN EULER JOINT, THE SPRING
                         CHARACTERISTICS ABOUT THE PRECESSION AXIS.

    SPRING(I,3*J-1),     THE TORSIONAL SPRING CHARACTERISTICS FOR
           I=1,5         JOINT J. IF J IS AN EULER JOINT, THE SPRING
                         CHARACTERISTICS ABOUT THE NUTATION AXIS.

    SPRING(I,3*J),       SECOND CARD OF EACH SET IS REQUIRED
           I=1,5         ONLY IF J IS AN EULER JOINT, THE SPRING
                         CHARACTERISTICS ABOUT THE SPIN AXIS.

                I=1      LINEAR SPRING COEFFICIENT
                         (IN-LBS/DEG).

                I=2      QUADRATIC SPRING COEFFICIENT
                         (IN-LBS/DEG**2).

                I=3      CUBIC SPRING COEFFICIENT
                         (IN-LBS/DEG**3).

                I=4      ENERGY DISSIPATION COEFFICIENT
                         (DIMENSIONLESS).
                         A VALUE OF 1. SPECIFIES NO LOSS
                         A VALUE OF 0. SPECIFIES MAXIMUM LOSS

                I=5      JOINT STOP LOCATION WITH RESPECT TO
                         THE CENTER OF SYMMETRY (DEG).
                         FOR A VALUE OF ZERO THE ROUTINE WILL USE ONLY
                         THE LINEAR SPRING COEFFICIENT AND WILL APPLY
                         THE ENERGY DISSIPATION FACTOR
```

CARDS B.5.A - B.5.J FORMAT(5F6.0, 18X, 2F6.0)
(NJNT SETS OR CARDS, ONE FOR EACH JOINT J. IF |IPIN(J)| # 4, VALUES FOR 3*J-2 ARE ON ONE CARD ONLY. IF |IPIN(J)| = 4, J IS AN EULER JOINT AND VALUES FOR 3*J-1 AND 3*J ARE REQUIRED ON A SECOND AND THIRD CARD OF EACH SET.)

VISC(I,3*J-2), I=1,7	THE VISCOUS CHARACTERISTICS FOR JOINT J. IF J IS AN EULER JOINT, THE VISCOUS CHARACTERISTICS ABOUT THE PRECESSION AXIS.
VISC(I,3*J-1), I=1,7	THE SECOND CARD OF EACH SET IS REQUIRED ONLY IF J IS AN EULER JOINT, THE VISCOUS CHARACTERISTICS ABOUT THE NUTATION AXIS.
VISC(I,3*J) I=1,7	THE THIRD CARD OF EACH SET IS REQUIRED ONLY IF J IS AN EULER JOINT, THE VISCOUS CHARACTERISTICS ABOUT THE SPIN AXIS.
I=1	VISCOUS COEFFICIENT (IN-LB-SEC/DEG).
I=2	COULOMB FRICTION COEFFICIENT (IN-LB).
I=3	RELATIVE ANGULAR VELOCITY OF JOINT AT WHICH FULL COULOMB FRICTION IS APPLIED (DEG/SEC). MUST BE GREATER THAN 0.
I=4	T1: THE MAXIMUM TORQUE (IN-LBS) ALLOWED FOR A LOCKED JOINT (OR EULER AXIS). IF EXCEEDED, THE JOINT WILL UNLOCK. IF T1 = 0, THE TEST WILL NOT BE PERFORMED.
I=5	T2: THE MINIMUM TORQUE (IN-LBS) ALLOWED FOR JOINT J TO REMAIN UNLOCKED. IF T2 = 0, THE TEST WILL NOT BE PERFORMED.
I=6	T3: THE MINIMUM ANGULAR VELOCITY (RAD/SEC) NECESSARY FOR JOINT J TO REMAIN UNLOCKED. IF T3 = 0, THE TEST WILL NOT BE PERFORMED.
I=7	E = (1+U)/2 WHERE U IS THE CLASSICAL COEFFICIENT OF RESTITUTION TO BE USED FOR THE IMPULSE OPTION IF THE JOINT HITS THE JOINT STOP (0<E<1 OR -1<U<+1). A VALUE OF E = 0 MEANS THAT THE IMPULSE OPTION WILL NOT BE EXERCISED FOR THIS JOINT.

CARDS B.6.A - B.6.I (NSEG CARDS)	FORMAT (12F6.0)
SGTEST(1,1,I)	MAGNITUDE TEST FOR THE ANGULAR VELOCITY OF SEGMENT NO. I (RAD/SEC).
SGTEST(2,1,I)	ABSOLUTE ERROR TEST FOR THE ANGULAR VELOCITY OF SEGMENT NO. I (RAD/SEC).
SGTEST(3,1,I)	RELATIVE ERROR TEST FOR THE ANGULAR VELOCITY OF SEGMENT NO. I (DIMENSIONLESS).
SGTEST(1,2,I) (2,2,I) (3,2,I)	SAME AS ABOVE, BUT FOR THE LINEAR VELOCITY OF SEGMENT NO. I (IN/SEC).
SGTEST(1,3,I) (2,3,I) (3,3,I)	SAME AS ABOVE, BUT FOR THE ANGULAR ACCELERATION OF SEGMENT NO. I (RAD/SEC**2).
SGTEST(1,4,I) (2,4,I) (3,4,I)	SAME AS ABOVE BUT FOR THE LINEAR ACCELERATION OF SEGMENT NO. I (IN/SEC**2).

THESE CONVERGENCE TESTS ARE PERFORMED IN SUBROUTINE DINT ON THE RESULTANT OF THE DERIVATIVE VECTORS. THE LINEAR VELOCITIES AND ACCELERATIONS ARE COMPUTED ONLY FOR REFERENCE SEGMENTS (I.E. SEGMENT NO. 1 AND THOSE SEGMENTS I WHERE JNT(I-1) < 1), THEREFORE ANY TEST NUMBERS SUPPLIED FOR LINEAR VELOCITIES AND ACCELERATIONS OF OTHER SEGMENTS WILL BE IGNORED. THE TESTS FOR CONVERGENCE ARE PERFORMED IN THE FOLLOWING ORDER :

1) IF THE MAGNITUDE TEST IS ZERO, NO TESTING IS DONE FOR THAT VARIABLE.

2) IF THE MAGNITUDE OF THE RESULTANT VECTOR IS LESS THAN THE MAGNITUDE TEST,THE ROUTINE HAS PASSED THE CONVERGENCE TEST FOR THAT VARIABLE.

3) IF THE ABSOLUTE ERROR TEST IS GREATER THAN ZERO, AND THE MAGNITUDE OF THE ABSOLUTE ERROR (DIFFERENCE BETWEEN THE PREDICTED AND COMPUTED VECTOR) IS LESS THAN THE ABSOLUTE ERROR TEST, THE ROUTINE HAS PASSED THE CONVERGENCE TEST FOR THAT VARIABLE.

4) IF THE RELATIVE ERROR OF THE MAGNITUDE OF THE ABSOLUTE ERROR COMPARED TO THE MAGNITUDE OF THE COMPUTED VECTOR IS GREATER THAN THE RELATIVE ERROR TEST, THE CONVERGENCE TEST HAS FAILED.

IF NFLX # 0, CARDS B.7 ARE REQUIRED. EACH FLEXIBLE ELEMENT AS DEFINED ON CARDS B.3 CONTAINS AT LEAST THREE CONNECTED SEGMENTS CONSISTING OF A REFERENCE SEGMENT, ONE OR MORE INTERIOR SEGMENTS AND A TERMINATING SEGMENT. EACH JOINT IN THE ELEMENT SHOULD HAVE A NEGATIVE VALUE FOR JNT, AND THE NUMBER OF INTERIOR SEGMENTS WILL BE ONE LESS THAN THE NUMBER OF NEGATIVE VALUES OF JNT FOR EACH ELEMENT. NFLX IS THE TOTAL NUMBER OF INTERIOR SEGMENTS OF ALL FLEXIBLE ELEMENTS.

CARD B.7.A — FORMAT (18I4)

NFX	THE NUMBER OF INTERIOR SEGMENTS FOR WHICH HF ARRAYS ARE TO BE SUPPLIED.
KNT(K),K=1,NFX	THE INTERIOR SEGMENT IDENTIFICATION NUMBERS IN THE ORDER OF THE HF ARRAYS TO BE SUPPLIED. IF THE VALUES OF NFX AND KNT ARE NOT CONSISTENT WITH THE NEGATIVE VALUES OF JNT ON CARDS B.3 THE PROGRAM WILL TERMINATE WITH AN APPROPRIATE ERROR MESSAGE.

CARDS B.7.B - B.7.N — FORMAT (12F6.0)
(4*NFX CARDS, 4 CARDS FOR EACH SEGMENT IN THE ORDER AS THEY ARE DEFINED IN THE KNT VECTOR.)

(HF(I,J,K),J=1,12) ,I=1,4	THE COEFFICIENTS OF THE QUADRATIC FORM FUNCTION USED TO DEFINE THE ORIENTATION OF INTERIOR SEGMENT KNT(K) WITH RESPECT TO REFERENCE SEGMENT OF THE ELEMENT.

FORM THE COLUMN VECTOR V WITH FOUR COMPONENTS Y,P,R AND 1, WHERE Y,P,R ARE THE YAW, PITCH AND ROLL OF THE TERMINATING SEGMENT RELATIVE TO THE REFERENCE SEGMENT. LET H BE A SYMMETRIC 4X4 MATRIX SUCH THAT F(V) = 1/2 V.HV REPRESENTS A QUADRATIC SCALAR FUNCTION OF THE VARIABLES Y,P AND R IN RADIANS. THUS

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      YAW OF SEGMENT KNT(K) = 1/2 V.HF(I,J  ,K)V
    PITCH OF SEGMENT KNT(K) = 1/2 V.HF(I,J+4,K)V
     ROLL OF SEGMENT KNT(K) = 1/2 V.HF(I,J+8,K)V      (I,J=1,4)
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C. SUBROUTINE VINPUT

CARD C.1	FORMAT (20A4)
VPSTTL(I),I=1,20	DESCRIPTION OF THE CRASH VEHICLE DECELERATION (80 CHARACTERS).
CARD C.2	FORMAT (8F6.0, I6, 2F6.0)
ANGLE(I),I=1,3	FOR THE HALF SINE-WAVE DECELERATION (NATAB = 0) OR FOR THE UNIDIRECTIONAL DECELERATION TABULAR INPUT (NATAB > 0), ANGLE(1) AND ANGLE(2) REPRESENT THE AZIMUTH AND ELEVATION (OBLIQUE ANGLES) OF THE DIRECTION OF THE DECELERATION IMPULSE (DEG). ANGLE(3) IS NOT USED AND THE INITIAL YAW, PITCH AND ROLL OF THE VEHICLE ARE ASSUMED TO BE ZERO. FOR THE OMNIDIRECTIONAL TABULAR INPUT (NATAB < 0). THEY REPRESENT THE INITIAL YAW, PITCH AND ROLL OF THE VEHICLE (DEG).
VMPH	THE INITIAL VELOCITY OF THE CRASH VEHICLE (IN/SEC - UNITS AS SPECIFIED ON CARD A.3)
VTIME	THE TIME DURATION OF THE DECELERATION IMPULSE (SEC). REQUIRED ONLY IF NATAB = 0. A VALUE OF ZERO IS NOT PERMITTED IF NATAB=0.
XO(I),I=1,3	THE INITIAL X, Y, AND Z COORDINATES OF THE VEHICLE REFERENCE ORIGIN IN INERTIAL REFERENCE (IN).
NATAB	INTEGER NUMBER OF TIME POINTS FOR WHICH VEHICLE DECELERATION DATA IS TO BE SUPPLIED. THE ALGEBRAIC SIGN OF NATAB DETERMINES THE TYPE OF VEHICLE MOTION AS FOLLOWS: IF NATAB = 0, THE DIRECTION IMPULSE IS AN ANALYTICAL HALF-SINE WAVE FUNCTION THAT DECELERATES THE VEHICLE FROM AN INITIAL SPEED OF VMPH TO ZERO IN VTIME SECONDS. IF NATAB > 0, THE VEHICLE MOTION IS UNIDIRECTIONAL AND ONLY THE RESULTANT LINEAR DECELERATION IS INPUTTED IN TABULAR FORM ON CARDS C.3. (NATAB SHOULD BE ODD AND MAXIMUM VALUE IS 99.) IF NATAB < 0, THE VEHICLE MOTION IS ALSO ROTATIONAL, AND THE COMPONENTS OF BOTH LINEAR AND ANGULAR ACCELERATION ARE INPUTTED IN TABULAR FORM ON CARDS C.4. (MINIMUM VALUE OF NATAB IS -100.)

ATO	THE BEGINNING TIME POINT FOR THE DECELERATION TABLE INPUT (SEC).
ADT	FIXED TIME INTERVAL FOR THE DECELERATION TABLE INPUT (SEC).

CARDS C.3.A - C.3.N FORMAT (12F6.0)

THESE CARDS ARE REQUIRED ONLY IF NATAB > 0.

ATAB(1,I),I=1,NATAB THE NATAB VALUES OF DECELERATION (G'S) FOR THE CRASH VEHICLE FOR FIXED TIME INTERVALS

T(I) = ATO + (I-1)*ADT FOR I=1,NATAB.

INPUT 12 NUMBERS PER CARD, USE AS MANY CARDS AS NECESSARY. SINCE A SIMPSON'S INTEGRATION IS USED TO COMPUTE VELOCITY AND POSITION, THE VALUE OF NATAB SHOULD BE ODD AND THE LAST VALUE IN THE TABLE SHOULD BE ZERO. HOWEVER, THE PROGRAM WILL EXTEND THE TABLE IF NECESSARY TO FULFILL THESE REQUIREMENTS.

CARDS C.4.A - C.4.M FORMAT (10X, 6F10.0)

MATAB CARDS ARE REQUIRED ONLY IF NATAB < 0 (MATAB = -NATAB)

EACH CARD (I) WILL CONTAIN THE LINEAR AND ANGULAR ACCELERATIONS FOR TIME T(I) = ATO + (I-1)*ADT FOR I = 1,MATAB.

ATAB(J,I),I=1,3	THE VALUES OF THE X, Y, AND Z COMPONENTS OF LINEAR DECELERATION (G'S) FOR TIME POINT T(I).
ATAB(J,I),J=4,6	THE VALUES OF THE COMPONENTS OF ANGULAR ACCELERATION (DEG/SEC**2) FOR TIME POINT T(I).

D. SUBROUTINE SINPUT

CARD D.1	FORMAT (6I6)
NPL	THE NUMBER OF PLANES DESCRIBING A CONTACT PANEL OF THE VEHICLE (20 MAXIMUM).
NBLT	THE NUMBER OF BELTS USED TO RESTRAIN THE CRASH VICTIM (8 MAXIMUM).
NBAG	THE NUMBER OF AIR BAGS USED TO RESTRAIN THE CRASH VICTIM (5 MAXIMUM).
NELP	THE NUMBER OF CONTACT ELLIPSOIDS TO BE SUPPLIED ON CARDS D.5.
NQ	THE NUMBER OF CONSTRAINTS TO BE SUPPLIED ON CARDS D.6. EACH CONSTRAINT TYPE 5 WILL BE CONSIDERED AS TWO CONSTRAINTS REQUIRING TWO SETS OF CARDS (NOTE: THE PROGRAM WILL LATER INCREMENT NQ BY 1 FOR EACH NF(1) = 0 ON CARDS F.1.B AND F.3.B AND THE FINAL MAXIMUM ON NQ IS 12).
NSD	THE NUMBER OF SPRING DAMPERS TO BE SUPPLIED ON CARDS D.8 (20 MAXIMUM).

IF NPL # 0, NPL SETS OF D.2 ARE REQUIRED.

CARD D.2.A	FORMAT (I4, 4X, 5A4)
J	THE NUMBER IDENTIFYING THE PLANE, MUST BE INPUTTED AS SUCCESSIVE INTEGERS 1, 2, 3,...., NPL.
PLTTL(I,J),I=1,5	A 20 CHARACTER DESCRIPTION OF THE JTH PANEL.
CARDS D.2.B - D.2.D	FORMAT (3F12.0)
P1(I),I=1,3	THE X,Y AND Z COORDINATES OF POINT P1 IN VEHICLE (OR SEGMENT TO WHICH PLANE IS ATTACHED) REFERENCE (IN).
P2(I),I=1,3	THE X,Y AND Z COORDINATES OF POINT P2 IN VEHICLE (OR SEGMENT TO WHICH PLANE IS ATTACHED) REFERENCE (IN).
P3(I),I=1,3	THE X,Y AND Z COORDINATES OF POINT P3 IN VEHICLE (OR SEGMENT TO WHICH PLANE IS ATTACHED) REFERENCE (IN).

WHERE P1, P2, AND P3 ARE 3 OF THE CORNERS OF A BOUNDED RECTANGULAR PLANE SUCH THAT THE EDGE P1P2 IS 90 DEGREES CLOCKWISE (AS VIEWED FROM THE EXTERNAL SURFACE) FROM THE EDGE P1P3.

IF NBLT ≠ 0, NBLT SETS OF D.3 ARE REQUIRED.

CARD D.3.A	FORMAT (5A4)
BLTTTL(I,J),I=1,5	A 20 CHARACTER DESCRIPTION OF THE JTH BELT.
CARD D.3.B	FORMAT (6F12.0)
BELT(I,J),I=1,3	X,Y, AND Z COORDINATES, IN VEHICLE (OR SEGMENT TO WHICH BELT IS ANCHORED) REFERENCE, OF ANCHOR POINT A FOR THE JTH BELT (IN).
BELT(I,J),I=4,6	X,Y, AND Z COORDINATES, IN VEHICLE (OR SEGMENT TO WHICH BELT IS ANCHORED) REFERENCE, OF ANCHOR POINT B FOR THE JTH BELT (IN).

NOTE: THE PROGRAM MUST PASS A PLANE THROUGH THE THREE POINTS, ANCHOR POINT A, ANCHOR POINT B, AND A FIXED POINT ON THE CONTACTED BODY SEGMENT. IF ANCHOR POINTS A AND B COINCIDE, THEY MUST BE SEPARATED SLIGHTLY FOR INPUT SUCH THAT THE DESIRED BELT PLANE WILL BE DEFINED.

CARD D.3.C	FORMAT (5F12.0)
BELT(I,J),I=7,9	X, Y, AND Z COORDINATES, IN LOCAL BODY SEGMENT REFERENCE (BUT WITH RESPECT TO ELLIPSOID CENTER, NOT C.G.), OF THE FIXED CONTACT POINT ON THE BODY SEGMENT FOR THE JTH BELT (IN).
BELT(10,J)	CURRENTLY NOT USED BY THE PROGRAM.
BELT(11,J)	BELT SLACK (IN). THE SLACK, WHEN ADDED TO THE INITIAL GEOMETRIC LENGTH, RESULTS IN THE INITIAL BELT LENGTH. IF DESIRED, THE INITIAL BELT LENGTH MAY BE INPUTTED AS A NEGATIVE NUMBER AND THE PROGRAM WILL COMPUTE THE SLACK.

IF NBAG # 0, NBAG SETS OF D.4 ARE REQUIRED BY SUBROUTINE AIRBG1.

CARD D.4.A	FORMAT (5A4, I4)
BAGTTL(I,J),I=1,5	A 20 CHARACTER DESCRIPTION OF THE JTH AIR BAG.
NPANEL(J)	NUMBER OF VEHICLE CONTACT PANELS THAT ARE ALLOWED TO INTERACT WITH THE JTH AIR BAG (MAXIMUM = 4).
CARD D.4.B	FORMAT(6F12.0)
AB(I,J),I=1,3	THE X, Y AND Z SEMIAXES OF THE JTH AIR BAG WHEN FULLY INFLATED AND UNDEFORMED (IN).
BFA(I,J),I=1,3	THE X,Y AND Z COORDINATES OF THE CENTER OF THE AIR BAG CONTACT ELLIPSOID WITH RESPECT TO THE AIR BAG CENTER OF GRAVITY (IN).
CARD D.4.C	FORMAT (6F12.0)
YB,PB,RB	THE INITIAL ORIENTATION (YAW, PITCH, AND ROLL) OF THE JTH AIR BAG IN THE VEHICLE REFERENCE (DEG).
ZDEP(I,J),I=1,3	THE X, Y, AND Z COORDINATES OF THE DEPLOYMENT POINT OF THE JTH AIR BAG IN THE LOCAL REFERENCE OF THE 1ST PANEL ON CARD D.4.G (IN).
CARD D.4.D	FORMAT (6F12.0)
XBM(J)	WEIGHT OF AIR BAG MEMBRANE AND CONTENTS (LBS).
CYTD(J)	GAS SUPPLY ACTUATOR FIRING TIME AFTER THE START OF VEHICLE DECELERATION (SEC).
CYPA(J)	ATMOSPHERIC PRESSURE (PSIA).
CYSP(J)	INITIAL GAS SUPPLY PRESSURE (PSIG).
CYTO(J)	INITIAL GAS SUPPLY TEMPERATURE (DEG R).
CYVO(J)	GAS SUPPLY RESERVOIR VOLUME (IN**3).

CARD D.4.E	FORMAT (6F12.0)
CYCD(J)	SONIC THROAT DISCHARGE COEFFICIENT (DIMENSIONLESS).
CYK(J)	RATIO OF SPECIFIC HEATS OF SUPPLY GAS (DIMENSIONLESS).
CYR(J)	SPECIFIC GAS CONSTANT (IN/DEG R).
CYAT(J)	SONIC THROAT AREA (IN**2).
CYPV(J)	VENT PRESSURE OF THE EXHAUST ORIFICE (PSIG).
CYCDO(J)	EXHAUST ORIFICE DISCHARGE COEFFICIENT (DIMENSIONLESS).
CARD D.4.F	FORMAT (5F12.0)
CYAO(J)	EXHAUST ORIFICE AREA (IN**2).
SPRK(J)	SPRING CONSTANT OF A LINEAR SPRING USED TO SIMULATE ATTACHMENT OF THE BAG AT THE DEPLOYMENT POINT IN THE VEHICLE (LB/IN).
VSCS(J)	COEFFICIENT OF SLIDING FRICTION OF THE AIR BAG (DIMENSIONLESS)
CK(J)	PARAMETER USED TO STABILIZE AIR BAG NUMERICAL INTEGRATION (SEC**-1). SUGGESTED VALUE = 250.
CMASS(J)	MULTIPLIER TO INCREASE OR DECREASE THE MASS OF THE AIR BAG TO ARTIFICIALLY DAMPEN THE INTEGRATED AIR BAG MOTION.

NPANEL(J) SETS OF THE FOLLOWING TWO CARDS ARE REQUIRED TO DEFINE THE ELLIPSOIDS USED TO APPROXIMATE THE CONTACT PANELS FOR THE JTH AIR BAG. THE FIRST PANEL IS THE REACTION PANEL.

CARD D.4.G	FORMAT (6F12.0)
B(I,K,J),I=1,3	X, Y, AND Z SEMIAXES FOR THE KTH PANEL FOR THE JTH AIR BAG (IN).
BFB(I,K,J),I=1,3	THE LOCATION OF THE CENTER OF THE PANEL ELLIPSOID WITH RESPECT TO ITS CENTER OF GRAVITY (IN).
CARD D.4.H	FORMAT (6F12.0)
ZR(I,K,J),I=1,3	X, Y, AND Z COORDINATES IN VEHICLE REFERENCE OF THE CENTER OF GRAVITY OF THE KTH PANEL OF THE JTH AIR BAG (IN).
YP,PP,RP	THE ORIENTATION, YAW, PITCH, AND ROLL OF THE KTH PANEL (DEG).

IF NELP # 0, NELP D.5 CARDS ARE REQUIRED BY SUBROUTINE SINPUT.

NOTE: NELP IS THE NUMBER OF CONTACT ELLIPSOIDS TO BE SUPPLIED HERE, NOT THE NUMBER OF CONTACT ELLIPSOIDS IN THE PROGRAM. THE FIRST NSEG ELLIPSOIDS WERE SUPPLIED ON CARDS B.2.A - B.2.I WITH NO ANGULAR ROTATIONS. THEY MAY BE REPLACED HERE IF DESIRED.

CARDS D.5.A - D.5.J (NELP CARDS)	FORMAT (I6, 9F6.0)
M	CONTACT ELLIPSOID NUMBER. MAX = 24. IF M < NSEG, DATA WILL REPLACE INPUT SUPPLIED ON CARDS B.2.A - B.2.I.
P1(I),I=1,3	THE X, Y, AND Z SEMIAXES OF THE CONTACT ELLIPSOID (IN).
P2(I),I=1,3	THE X, Y, AND Z COORDINATES OF THE ELLIPSOID OFFSET FROM THE SEGMENT CENTER OF GRAVITY.
P3(I),I=1,3	THE YAW, PITCH AND ROLL (DEGREES) OF THE CONTACT ELLIPSOID FROM THE PRINCIPAL AXIS OF THE SEGMENT.

IF NQ # 0, NQ D.6 CARDS ARE REQUIRED BY SUBROUTINE SINPUT.

CARDS D.6.A - D.6.J (NQ CARDS)	FORMAT (3I6, 6F6.0)
KQTYPE(J)	TYPE NO. OF THE JTH CONSTRAINT 1: POINT SPECIFIED BY RK1 ON SEGMENT KQ1 WILL BE CONSTRAINED TO BE THE SAME AS THE POINT SPECIFIED BY RK2 ON SEGMENT KQ2. 2: POINT SPECIFIED BY RK1 ON SEGMENT KQ1 WILL BE CONSTRAINED TO REMAIN AT AN EQUAL DISTANCE (D > 0) FROM THE POINT SPECIFIED BY RK2 ON SEGMENT KQ2. 5: TENSION ELEMENT CONSTRAINT CONNECTING POINT RK1 ON SEGMENT KQ1 TO POINT RK2 ON SEGMENT RK2 (REQUIRES TWO CARDS WITH KQTYPE, KQ1 AND KQ2 THE SAME ON BOTH).
KQ1(J)	SEGMENT IDENTIFICATION NUMBER OF THE 1ST SPECIFIED POINT.
KQ2(J)	SEGMENT IDENTIFICATION NUMBER OF THE 2ND SPECIFIED POINT.
RK1(I,J),I=1,3	COORDINATES OF SPECIFIED POINT ON SEGMENT KQ1 (IN). IF KQTYPE = 5, THE SECOND CARD WILL CONTAIN THE EFFECTIVE MASSES MA, MB AND MAB (LB.SEC**2/IN) IN PLACE OF RK1.
RK2(I,J),I=1,3	COORDINATES OF SPECIFIED POINT ON SEGMENT KQ2 (IN). IF KQTYPE = 5, THE SECOND CARD WILL CONTAIN THE SPRING CONSTANT K (LB/IN), THE VISCOUS DAMPING CONSTANT D (LB SEC/IN) AND THE REFERENCE LENGTH L (IN) IN PLACE OF RK2.

CARD D.7 IS ALWAYS REQUIRED. SUPPLY BLANK CARD FOR NORMAL 3D MOTION.

CARD D.7 FORMAT (18I4) IF NSEG>18, USE 2 CARDS.

NSYM(J),J=1,NSEG — CONTROLS SYMMETRY OPTION OF BODY SEGMENTS AS FOLLOWS :

NSYM(J) = 0 : NORMAL THREE DIMENSIONAL MOTION FOR BODY SEGMENT J.

NSYM(J) = J : MOTION OF BODY SEGMENT J WILL BE RESTRICTED TO THE X-Z PLANE WITH NO LATERAL MOTION, HENCE IT WILL BE TWO DIMENSIONAL.

NSYM(J) = K : BODY SEGMENTS J AND K ARE TO REMAIN SYMMETRICAL WITH NO LATERAL MOTION. THE MOTION OF EACH WILL BE REPLACED WITH THEIR AVERAGE AND RESTRICTED TO THE LOCAL X-Z PLANE. NSYM(K) MUST EQUAL J.

NSYM(J) = -K : BODY SEGMENTS J AND K ARE TO REMAIN MIRROR SYMMETRICAL WITH RESPECT TO THE X-Z PLANE. EQUAL BUT OPPOSITE LATERAL MOTION IS PERMITTED. NSYM(K) MUST EQUAL -J.

NOTE : IN THE ABOVE SYMMETRY OPTIONS, THE USER MUST TAKE EXTREME CARE THAT ALL INPUT WILL ALLOW THE SYMMETRY TO EXIST.

IF NSD # 0. NSD D.8 CARDS ARE REQUIRED BY SUBROUTINE SINPUT.

CARDS D.8.A - D.8.J (NSD CARDS) FORMAT (2I3, 11F6.0)

MSDM(J)
MSDN(J) — SEGMENT IDENTIFICATION NUMBERS (M AND N) TO WHICH THE JTH SPRING DAMPER IS ATTACHED.

APSDM(I,J),I=1,3
APSDN(I,J),I=1,3 — COORDINATES OF ATTACHMENT POINTS IN LOCAL SEGMENT REFERENCE ON SEGMENTS M AND N FOR THE JTH SPRING DAMPER (IN.)

ASD(I,J),I=1,5 — COEFFICIENTS OF QUADRATIC FUNCTIONS TO COMPUTE THE SPRING FORCE (FS) AND THE VISCOUS FORCE (FD) FOR THE JTH SPRING DAMPER USING THE RELATIONSHIPS

I=1 : D0 (IN)
I=2 : A1 (LB/IN)
I=3 : A2 (LB/IN**2)
I=4 : B1 (LB SEC/IN)
I=5 : B2 (LB SEC**2/IN**2)

$$FS = (D-D0)*(|A1| + A2*|D-D0|)$$
$$FD = DV*(B1 + B2*|DV|)$$

WHERE D AND DV ARE THE DISTANCE AND ITS TIME DERIVATIVE BETWEEN THE POINTS APSDM AND APSDN. IF A1 < 0. AND (D-D0) < 0., PROGRAM WILL SET FS= 0., I.E. THIS WILL ACT AS A TENSION ELEMENT.

E. SUBROUTINE CINPUT (FUNCTIONS INPUT)

THESE FUNCTIONS ARE REFERRED TO BY NUMBER IN THE NF ARRAYS REQUIRED ON CARDS F.1.B, F.2.B, F.3.B AND F.4.B. THEY ARE USED TO DEFINE THE FORCE DEFLECTION, INERTIAL SPIKE, R (ENERGY ABSORPTION) FACTOR, G (DEFLECTION) FACTOR AND FRICTION COEFFICENT FUNCTIONS.

EACH FUNCTION MAY BE SUBDIVIDED, IF DESIRED, INTO TWO SEPARATE PARTS, F1 AND F2, WHERE

F1(D) IS DEFINED FOR 0 .LE. DO .LE. D .LE. |D1|

F2(D) IS DEFINED FOR |D1| .LE. D .LE. |D2|.

IN ADDITION, EACH PART OF EACH FUNCTION MAY BE DEFINED IN EITHER OF THREE FUNCTIONAL FORMS: CONSTANT VALUE, TABULAR DATA, OR A FIFTH DEGREE POLYNOMIAL. THE EXISTENCE AND FORM OF EACH FUNCTION PART IS DETERMINED BY THE SUPPLIED VALUES OF DO, D1, AND D2 AS FOLLOWS:

F1	F2	DO	D1	D2
CONSTANT	-	0	0	F1 = D2
TABULAR	-	DO .GE. 0	D1 .LT. 0	0
POLYNOMIAL	-	DO .GE. 0	D1 .GT. 0	0
TABULAR	POLYNOMIAL	DO .GE. 0	D1 .LT. 0	D2 .GT. 0
POLYNOMIAL	TABULAR	DO .GE. 0	D1 .GT. 0	D2 .LT. 0
POLYNOMIAL	POLYNOMIAL	DO .GE. 0	D1 .GT. 0	D2 .GT. 0

THE CONSTANT FORM IS APPLICABLE TO F1 ONLY BECAUSE THE ROUTINES ASSUME

IF D .GT. |D2| THEN F(D) = F(|D2|) FOR D2 .NE. 0 OR

IF D .GT. |D1| THEN F(D) = F(|D1|) FOR D2 = 0.

THE CASE OF BOTH F1 AND F2 BEING TABULAR IS UNNECESSARY.

A MAXIMUM OF 50 FUNCTIONS MAY BE SUPPLIED TO THE PROGRAM. EACH FUNCTION WILL REQUIRE THE FOLLOWING INPUT.

CARD E.1	FORMAT (I4, 4X, 5A4)
I	THE FUNCTION IDENTIFYING NUMBER. THESE NUMBERS NEED NOT BE SUPPLIED IN NUMERIC ORDER. IF THE SAME NUMBER IS USED MORE THAN ONCE, A WARNING WILL BE PRINTED AND THE LAST ONE SUPPLIED WILL BE USED. THE END OF THE FUNCTION INPUT IS INDICATED BY SUPPLYING A SINGLE CARD WITH I > 50.
KTITLE	A 20 CHARACTER ALPHANUMERIC TITLE DESCRIBING THE FUNCTION.

CARD E.2 FORMAT (5F12.0)

D0	THE LOWER ABSCISSA VALUE OF THE FIRST PART OF THE FUNCTION, F1. D0 MUST BE NON-NEGATIVE (UNITS ARE IN. EXCEPT FOR THE BELT STRESS-STRAIN FUNCTIONS WHERE THEY ARE IN/IN).
D1	THE MAGNITUDE OF D1 IS THE UPPER ABSCISSA VALUE OF F1 AND THE LOWER ABSCISSA VALUE OF F2, IF ANY. D1 < 0 INDICATES F1 IS TABULAR, D1 > 0 INDICATES F1 IS A POLYNOMIAL, AND D1 = 0 INDICATES F1 = D2, A CONSTANT.
D2	IF D1 = 0, D2 IS THE CONSTANT VALUE OF F1. OTHERWISE, THE MAGNITUDE OF D2 IS THE UPPER ABSCISSA VALUE OF F2. IF D2 = 0, F2 IS NOT DEFINED; IF D2 IS NEGATIVE, F2 IS TABULAR; AND IF D2 IS POSITIVE, F2 IS A POLYNOMIAL.
D3	IF THE FUNCTION IS TO BE USED FOR AN INERTIAL SPIKE, D3 REPRESENTS THE ABSCISSA VALUE FOR WHICH THE INERTIAL SPIKE IS TO BE IGNORED IF UNLOADING OCCURS AFTER DEFLECTION EXCEEDS D3. IF THE FUNCTION IS TO BE USED FOR A COEFFICIENT OF FRICTION, D3 = (1+U)/2 WHERE U IS THE COEFFICIENT OF RESTITUTION FOR THE IMPULSE OPTION (0<D3<1 OR -1<U<+1). A VALUE OF D3 = 0 MEANS THAT THE IMPULSE OPTION WILL NOT BE USED FOR THOSE CONTACTS USING THIS FUNCTION. WHEN THE GLOBALGRAPHIC OPTION IS USED, A FRICTION FUNCTION IS DEFINED AND THE VALUE OF D3 IS USED TO SPECIFY THE IMPULSE. (SEE CARD B.5.)
D4	IF THE FUNCTION IS TO BE USED AS A FORCE DEFLECTION FUNCTION BY SUBROUTINE PLELP, D4=RHO, THE SCALAR THAT DETERMINES THE POINT OF FORCE APPLICATION. SUPPLY ZERO FOR POINT OF MAXIMUM PENETRATION, ONE FOR CENTER OF INTERSECTION ELLIPSE. IF USED AS THE FRICTION FUNCTION FOR A ROLL-SLIDE CONSTRAINT, D4 IF THE COEFFICIENT OF STATIC FRICTION TO BE USED FOR THE ROLL CONSTRAINT.

THE DEFINITIONS OF F1 AND F2, IF THEY EXIST, ARE NOW SUPPLIED ON CARD E.3 FOR THE FIFTH DEGREE POLYNOMIAL DEFINITION, OR ON CARDS E.4 FOR THE TABULAR DEFINITION.

CARD E.3	FORMAT (6F12.0)
A0,A1,A2,A3,A4,A5	COEFFICIENTS OF FIFTH-DEGREE POLYNOMIAL F = A0 + A1*X + A2*X**2 + A3*X**3 + A4*X**4 + A5*X**5 (UNITS ARE DEPENDENT ON USE OF FUNCTION.)
CARD E.4.A	FORMAT (I6)
NPI	THE NUMBER OF DATA POINTS TO BE SUPPLIED TO IDENTIFY THE FUNCTION IF IT IS DEFINED IN TABULAR FORM.
CARDS E.4.B - E.4.N	FORMAT (6F12.0)
(X(I),Y(I),I=1,NPI)	THE ABSCISSA AND ORDINATE VALUES OF THE DATA POINTS USED TO DEFINE THE TABULAR FORM OF THE FUNCTION. THE PROGRAM WILL LINEARLY INTERPOLATE TO DETERMINE INTERMEDIATE VALUES. SUPPLY 3 POINTS PER CARD; USE AS MANY CARDS AS REQUIRED. (UNITS ARE DEPENDENT ON USE OF FUNCTION.)

F. SUBROUTINE CINPUT (ALLOWED CONTACTS)

IF NPL # 0, F.1 IS REQUIRED.

CARD F.1.A	FORMAT (18I4)	IF NPL>18, USE 2 CARDS.
MNPL(J),J=1,NPL	FOR PLANE J, THE NUMBER OF SEGMENTS FOR WHICH SEGMENT-PLANE CONTACT IS ALLOWED. NPL IS THE NUMBER OF PLANES FROM CARD D.1. THE VALUE OF ANY MNPL FOR PLANE J MAY BE ZERO AND THE MAXIMUM VALUE IS 5. HOWEVER IF IT IS REQUIRED TO HAVE MORE THAN 5 SEGMENTS CONTACT THE SAME PLANE, SET UP TWO OR MORE IDENTICAL PLANES AND PERMIT A MAXIMUM OF 5 SEGMENTS TO CONTACT EACH PLANE.	

FOR EACH PLANE J, MNPL(J) CARDS OF THE FOLLOWING MUST BE SUPPLIED.

CARDS F.1.B - F.1.N	FORMAT (9I4)	
NJ	THE PLANE NUMBER FOR WHICH CONTACT IS ALLOWED. NJ MUST CORRESPOND TO J ABOVE. THERE MUST BE MNPL(J) CARDS WITH THIS SAME NJ. IF MNPL(J) = 0, NO NJ = J SHOULD BE PRESENT.	
NS(1)	THE SEGMENT NUMBER TO WHICH PLANE J IS ATTACHED. IF VEHICLE, SUPPLY NSEG+1, IF GROUND, SUPPLY NSEG+2.	
NS(2)	THE SEGMENT NUMBER (DETERMINED BY THE CARD NUMBER I UNDER CARD B.2.A FOR WHICH CONTACT WITH THE NJTH PLANE IS ALLOWED.	
NS(3)	THE NUMBER OF THE CONTACT ELLIPSOID ASSOCIATED WITH THE SEGMENT NS(2).	

NF(1)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE FORCE-DEFLECTION FUNCTION FOR THIS CONTACT. IF NF(1) = 0, A ROLLING - SLIDING CONSTRAINT OPTION WILL BE EXERCISED BY THE PROGRAM FOR THIS CONTACT WHICH DOES NOT REQUIRE NF(2), NF(3) OR NF(4) BUT DOES REQUIRE A FRICTION COEFFICIENT FUNCTION TO BE DEFINED BY NF(5). THE VALUE OF D3 ON CARD E.2 OF THIS FUNCTION SHOULD BE 0.5 (NON-ZERO TO ACTIVATE THE IMPULSE AND TO SET THE NORMAL COMPONENT OF RELATIVE VELOCITY TO ZERO AFTER THE IMPULSE HAS BEEN APPLIED). ALSO THE INITIAL POSITIONS ON CARDS G.2 MUST BE SUCH THAT CONTACT DOES NOT EXIST AT TIME = 0.
NF(2)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE INERTIAL SPIKE FUNCTION FOR THIS CONTACT. IF NF(2) = 0, NO INERTIAL SPIKE EXISTS.
NF(3)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE R (ENERGY-ABSORPTION) FACTOR FUNCTION. IF NF(3) = 0, A DEFAULT VALUE OF R = 1 IS ASSUMED.
NF(4)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE G (DEFLECTION) FACTOR FUNCTION. IF NF(4) = 0, A DEFAULT VALUE OF G = 0 IS ASSUMED.
NF(5)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE FRICTION COEFFICIENT FUNCTION.

IF NBLT # 0, F.2 IS REQUIRED.

CARD F.2.A	FORMAT (8I4)
MNBLT(J),J=1,NBLT	FOR BELT J, THE NUMBER OF SEGMENTS FOR WHICH SEGMENT-BELT INTERACTION IS ALLOWED. NBLT IS THE NUMBER OF BELTS FROM CARD D.1. EACH MNBLT MAY HAVE A VALUE OF 0 OR 1 ONLY.

FOR EACH BELT J, MNBLT(J) CARDS OF THE FOLLOWING MUST BE SUPPLIED.

CARDS F.2.B - F.2.N	FORMAT (9I4)
NJ	THE BELT NUMBER TO BE CONTACTED, MUST CORRESPOND TO J ABOVE. THERE MUST BE MNBLT(J) CARDS WITH THE SAME NJ. IF MNBLT(J) = 0, NO NJ = J SHOULD BE PRESENT.
NS(1)	THE SEGMENT NUMBER TO WHICH BELT NJ IS ATTACHED. IF VEHICLE, SUPPLY NSEG+1, IF GROUND, SUPPLY NSEG+2.
NS(2)	THE SEGMENT NUMBER (DETERMINED BY THE CARD NUMBER I UNDER CARD B.2.A) FOR WHICH INTERACTION WITH THE NJTH BELT IS ALLOWED.
NS(3)	THE NUMBER OF THE CONTACT ELLIPSOID ASSOCIATED WITH THE SEGMENT NS(2).
NF(1)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE FORCE-DEFLECTION FUNCTION FOR THIS CONTACT. THE ABSCISSA FOR THIS FUNCTION SHOULD BE STRAIN (IN/IN).
NF(I),I=2,4	SAME DEFINITION AS ON CARD F.1.B ABOVE.
NF(5)	IF NON-ZERO, FULL BELT FRICTION IS ASSUMED, I.E., FORCES ARE COMPUTED FOR EACH HALF OF THE BELT SEPARATELY. IF ZERO, ZERO BELT FRICTION IS ASSUMED, I.E., BELT TENSION IS IS THE SAME AT BOTH BELT ANCHOR POINTS.

A BLANK F.3.A CARD IS REQUIRED FOR NO SEGMENT-SEGMENT CONTACTS.

CARD F.3.A	FORMAT (18I4) IF NSEG>18, USE TWO CARDS.
MNSEG(J),J=1,NSEG	FOR SEGMENT J, THE NUMBER OF SEGMENTS FOR WHICH SEGMENT-SEGMENT CONTACT IS ALLOWED. NSEG IS THE NUMBER OF SEGMENTS FROM CARD B.1. EACH SEGMENT CONTACT, A VERSUS B, MAY BE INPUTTED EITHER WAY EXCEPT WHERE AN INTERIOR CONTACT IS DESIRED (SEE NS(3)). ANY OR ALL VALUES OF MNSEG MAY BE ZERO. THE MAXIMUM VALUE FOR EACH MNSEG IS 5.

FOR EACH SEGMENT J, MNSEG(J) CARDS OF THE FOLLOWING MUST BE SUPPLIED.

CARDS F.3.B - F.3.N	FORMAT (9I4).
NJ	THE SEGMENT NUMBER TO BE CONTACTED, MUST CORRESPOND TO J ABOVE. THERE MUST BE MNSEG(J) CARDS WITH THIS SAME NJ. IF MNSEG(J) = 0, NO NJ = J SHOULD BE PRESENT.
NS(1)	THE NUMBER OF THE CONTACT ELLIPSOID ASSOCIATED WITH SEGMENT NJ.
NS(2)	THE SEGMENT NUMBER (DETERMINED BY THE CARD NUMBER I UNDER CARD B.2.A) FOR WHICH CONTACT WITH THE NJTH SEGMENT IS ALLOWED.
NS(3)	THE NUMBER OF THE CONTACT ELLIPSOID ASSOCIATED WITH THE SEGMENT NS(2). IF NEGATIVE, AN INTERIOR CONTACT WILL BE ASSUMED WITH ELLIPSOID NS(1) INSIDE NS(3).
NF(I),I=1,5	SAME DEFINITIONS AS ON CARD F.1.B ABOVE.

IF NJNT > 0, F.4.A IS REQUIRED.
SUPPLY IGLOB=1 FOR GLOBALGRAPHIC OPTION, OTHERWISE SUPPLY 0 OR BLANK

CARD F.4.A	FORMAT (18I4) IF NJNT>18, USE TWO CARDS.
IGLOB(J),J=1,NJNT	FOR EACH JOINT J, SUPPLY 1 FOR IGLOB(J) IF IPIN(J) IS +3 OR -3 ON CARDS B.3.A - B.3.J; OTHERWISE SUPPLY ZERO OR BLANK. ONE CARD F.4.J MUST BE SUPPLIED BELOW FOR EACH J FOR WHICH IGLOB(J) =1.
CARDS F.4.B - F.4.J	FORMAT (9I4)
NJ	THE IDENTIFICATION NUMBER FOR A GLOBALGRAPHIC JOINT, MUST CORRESPOND TO J ABOVE AND CARDS MUST BE SUPPLIED IN ASCENDING ORDER ON NJ.
NS(I),I=1,3	CURRENTLY NOT USED BY PROGRAM.
NF(1)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE TORQUE-DEFLECTION FOR THIS GLOBALGRAPHIC JOINT. THE ORDINATE FOR THIS FUNCTION SHOULD BE TORQUE (IN. LB.) AND THE ABSCISSA IS THE ANGULAR DEFLECTION (RADIANS) INTO THE STOP.
NF(2)	THE FUNCTION NUMBER FROM CARD E.1 TO DEFINE THE HERRON FORMULAS FOR T (JOINT STOP ANGLE IN RADIANS) AND ITS DERIVATIVE TP WITH RESPECT TO PHI BOTH AS FUNCTIONS OF PHI (THE JOINT ANGLE FROM THE REFERENCE AXIS IN RADIANS). NORMALLY THEY WILL BE COMPUTED BY T = P1 + SP*P2 TP = P1' + CP*P2 + SP*P2' WHERE P1,P2 ARE THE 5TH DEGREE POLYNOMIAL EVALUATIONS OF COS(PHI) USING THE TWO POLYNOMIALS F1 AND F2 OBTAINED BY SETTING BOTH D1,D2 > 0 ON CARD E.2; P1',P2' ARE THEIR DERIVATIVES WITH RESPECT TO PHI; AND CP,SP ARE COS(PHI) AND SIN(PHI). IF D1,D2 ARE NOT BOTH POSITIVE, T AND TP WILL BE EVALUATED AS FUNCTIONS OF PHI IN RADIANS (0 < PHI < 2*PI) AS SPECIFIED ON CARDS E.1 - E.4 FOR FUNCTION NF(2).
NF(I),I=3,5	SAME DEFINITIONS AS ON CARD F.1.B ABOVE

IF NBAG # 0, NBAG CARDS OF THE FOLLOWING MUST BE SUPPLIED. SINCE THE AIR BAG ROUTINES DO NOT USE THE FORCE-DEFLECTION FUNCTIONS, THIS INPUT HAS DIFFERENT FORMATS THAN THE ABOVE ALLOWED CONTACTS.

CARDS F.5.A - F.5.N	FORMAT (2I4, 20I2)
K	THE AIR BAG NUMBER CORRESPONDING TO THE INDEX J UNDER CARDS D.4 ABOVE. K MUST BE IN NUMERIC ORDER K = 1 TO NBAG, WHERE NBAG IS THE NUMBER OF AIR BAGS DEFINED ON CARD D.1.
NK	THE NUMBER OF SEGMENTS ALLOWED TO CONTACT THE KTH AIR BAG. THE MAXIMUM VALUE IS 10. IF NK = 0, THE REMAINDER OF THE CARD IS BLANK.
MBAG(2,I,K), MBAG(3,I,K),I=1,NK	THE SEGMENT NUMBERS (DETERMINED BY THE CARD NUMBER I UNDER CARD B.2.A) EACH FOLLOWED BY THE NUMBER OF THE ASSOCIATED CONTACT ELLIPSOID FOR WHICH CONTACT FORCES WITH THE KTH AIR BAG WILL BE COMPUTED.

G. SUBROUTINE INITAL

CARD G.1 — FORMAT (3F10.0, 5I4)

ZPLT(I),I=1,3	THE X, Y, AND Z PLOT COORDINATES (FOR SUBROUTINE PRIPLT) OF THE ORIGIN OF THE VEHICLE REFERENCE SYSTEM. $0 < X < 61$, $0 < Y < 61$, $0 < Z < 121$
I1,J1,I2,J2	NOT USED BY THE CURRENT PROGRAM.
I3	IF ZERO, SEGMENT AND ANGULAR VELOCITIES ARE NOT SUPPLIED ON THE FOLLOWING CARDS BUT ARE SET EQUAL TO THE INITIAL VEHICLE VELOCITY. IF I3 # 0, SEGLV AND WMGDEG MUST BE SUPPLIED.

ONE G.2 CARD MUST BE SUPPLIED FOR EACH REFERENCE SEGMENT (I.E., SEGMENT NO. 1 AND FOR EACH SEGMENT J+1 WHERE JNT(J) = 0 ON CARDS B.3) IN ASCENDING SEGMENT NUMBER SEQUENCE.

CARDS G.2.A - G.2.M — FORMAT (6F10.0)

SEGLP(I,J),I=1,3	THE INITIAL X, Y, AND Z COORDINATES OF THE JTH BODY SEGMENT IN INERTIAL REFERENCE (IN).
SEGLV(I,J),I=1,3	THE INITIAL X, Y, AND Z COMPONENTS OF VELOCITY OF THE JTH BODY SEGMENT IN INERTIAL REFERENCE (IN/SEC). THESE FIELDS MAY BE LEFT BLANK IF I3 = 0 ON CARD G.1 IN WHICH CASE THE INITIAL VELOCITY OF THE VEHICLE WILL BE USED.

CARDS G.3.A - G.3.N (NSEG CARDS) — FORMAT (6F10.0)

YPR(I,J),I=1,3	THE INITIAL YAW, PITCH AND ROLL ANGLES OF THE JTH BODY SEGMENT (DEGREES).

NOTE: THE DIRECTION COSINE MATRICES OF THE BODY SEGMENTS ARE INITIALLY COMPUTED BY ASSUMING THE ORDER OF THE ROTATING ANGLES IS REVERSED, I.E., ROLL,PITCH,YAW.
(ROLL ABOUT X, PITCH ABOUT Y, AND YAW ABOUT Z.)

WMGDEG(I,J),I=1,3	THE INITIAL COMPONENTS OF ANGULAR VELOCITY ABOUT THE LOCAL X,Y AND Z AXES OF THE JTH BODY SEGMENT (DEG/SEC). IF I3 = 0 ON CARD G.1, THE INITIAL ANGULAR VELOCITY OF THE VEHICLE WILL BE CONVERTED TO THE SEGMENT REFERENCE AND WILL BE USED.

H. SUBROUTINE HEDING

THIS SUBROUTINE PROVIDES INPUT TO CONTROL THE DESIRED TIME HISTORY OUTPUT OF SELECTED SEGMENT LINEAR AND ANGULAR ACCELERATIONS, VELOCITIES, AND DISPLACEMENTS, AND JOINT PARAMETERS.

H.1 SEGMENT LINEAR ACCELERATIONS (K = 1)

CARD H.1.A — FORMAT (2I6, 3F12.6)

NSG(K)	THE NUMBER OF SELECTED POINTS ON THE VARIOUS BODY SEGMENTS FOR WHICH TIME HISTORIES ARE DESIRED. THE MAXIMUM VALUE FOR NSG(K) IS 20. IF NSG(K) IS 0, INSERT 2 BLANK CARDS. IF NSG(K) IS 1, A SINGLE BLANK CARD SHOULD FOLLOW CARD H.1.K.
MSG(1,K)	THE SEGMENT NUMBER AS DETERMINED BY INDEX I ON CARDS B.2.A - B.2.N OF THE FIRST POINT.
XSG(I,1,K),I=1,3	THE X, Y, AND Z COORDINATES IN SEGMENT REFERENCE OF THE FIRST POINT (INCHES).

FOLLOWED BY NSG(K)-1 CARDS OF THE FOLLOWING (J = 2, NSG(K))

CARDS H.1.B - H.1.N — FORMAT (I12, 3F12.6)

MSG(J,K)	SAME AS ABOVE BUT FOR THE JTH POINT.
XSG(I,J,K),I=1,3	SAME AS ABOVE BUT FOR THE JTH POINT.

H.2 SEGMENT LINEAR VELOCITIES (K = 2)

CARDS H.2.A - H.2.N — FORMAT (2I6, 3F12.6/(I12, 3F12.6))

DESCRIPTION SAME AS FOR H.1.

H.3 SEGMENT LINEAR DISPLACEMENTS (K = 3)

CARDS H.3.A - H.3.N — FORMAT (2I6, 3F12.6/(I12, 3F12.6))

DESCRIPTION SAME AS FOR H.1.

H.4 SEGMENT ANGULAR ACCELERATIONS (K = 4)

CARD H.4	FORMAT (12I6/I12, 3I6)
NSG(K)	THE NUMBER OF SELECTED BODY SEGMENTS FOR WHICH TIME HISTORIES ARE DESIRED. INSERT BLANK CARD IF NONE ARE DESIRED (NSEG MAXIMUM).
MSG(J,K),J=1,KSG WHERE KSG=NSG(K)	THE SEGMENT NUMBERS AS DETERMINED BY INDEX I ON CARDS B.2.A - B.2.N. IF NSG(K) > 11, USE THE SECOND CARD, LEAVING THE FIRST FIELD OF 6 COLUMNS BLANK. IF NSG(K) = 11, A SECOND CARD, COMPLETELY BLANK, SHOULD FOLLOW THIS CARD.

H.5 SEGMENT ANGULAR VELOCITIES (K = 5)

CARD H.5 FORMAT (12I6/I12, 3I6)

DESCRIPTION SAME AS FOR H.4.

H.6 SEGMENT ANGULAR DISPLACEMENTS (K = 6)

CARD H.6 FORMAT (12I6/I12, 3I6)

DESCRIPTION SAME AS FOR H.4.

H.7 JOINT PARAMETERS (K = 7)

CARD H.7	FORMAT (12I6/I12, 2I6)
NSG(K)	THE NUMBER OF SELECTED JOINTS FOR WHICH TIME HISTORIES ARE DESIRED. INSERT BLANK CARD IF NONE ARE DESIRED (NJNT MAXIMUM).
MSG(J,K),J=1,KSG WHERE KSG=NSG(K)	THE JOINT NUMBERS AS DETERMINED BY INDEX J ON CARDS B.3.A - B.3.J. IF NSG(K) > 11, USE A SECOND CARD LEAVING THE FIRST FIELD OF 6 COLUMNS BLANK. IF NSG(K) = 11, A SECOND CARD, COMPLETELY BLANK, SHOULD FOLLOW THIS CARD.

SECTION 8

SAMPLE INPUT

CALSPAN 3-D CRASH VICTIM SIMULATION PROGRAM

OCT 16,1973

CARDS

N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

UNITL = IN. UNITM = LB. UNITT = SEC. GRAVITY VECTOR = (0.0 , 0.0 , 386.0980)

NDINT = 4 NSTEPS = 20 DT =0.005000 H0 =0.000500 HMAX =0.002000 HMIN =0.000200

NPRT ARRAY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CRASH VICTIM SIERRA 292-1030-2004 15 SEGMENTS 14 JOINTS CARDS 8.2

SEGMENT I	SYM	PLOT	WEIGHT (LB.)	SEGMENT MOMENT OF INERTIA (LB.-SEC.**2- IN.) X	Y	Z	SEGMENT CONTACT ELLIPSOID SEMI AXES (IN.) X	Y	Z	CENTER (IN.) X	Y	Z
1	LT	5	35.750	1.76000	1.14000	1.71000	5.94	5.94	7.60	0.0	0.0	0.0
2	CT	4	9.380	0.32500	0.31400	0.14900	4.21	6.35	7.03	0.0	0.0	-2.00
3	UT	3	31.750	2.32000	1.65000	1.33000	4.41	5.78	4.94	0.0	0.0	0.0
4	N	2	3.130	0.04000	0.04000	0.00650	2.57	2.28	3.23	0.0	0.0	0.0
5	H	1	10.130	0.25900	0.31100	0.20000	3.99	3.10	4.59	0.0	0.0	0.0
6	RUL	6	17.440	0.72700	0.70300	0.15400	2.99	3.74	12.40	0.0	0.0	-2.60
7	RLL	7	6.970	0.44000	0.44200	0.01900	2.36	2.23	9.07	0.0	0.0	-0.45
8	RF	8	2.750	0.03830	0.04340	0.01320	1.52	1.80	5.22	0.0	0.0	0.95
9	LUL	9	17.440	0.72700	0.70300	0.15400	2.99	3.74	12.40	0.0	0.0	-2.60
10	LLL	A	6.970	0.44000	0.44200	0.01900	2.36	2.23	9.07	0.0	0.0	-0.45
11	LF	B	2.750	0.03830	0.04340	0.01320	1.52	1.80	5.22	0.0	0.0	0.95
12	RUA	C	5.260	0.16400	0.16600	0.01410	2.07	1.64	6.38	0.0	0.0	0.0
13	RLA	D	4.790	0.25900	0.25900	0.01150	1.30	1.21	8.38	0.0	0.0	0.0
14	LUA	E	5.260	0.16400	0.16600	0.01410	2.07	1.64	6.38	0.0	0.0	0.0
15	LLA	F	4.790	0.25900	0.25900	0.01150	1.30	1.21	8.38	0.0	0.0	0.0

CARDS 3.3

JOINT I	SYM	PLOT	JNT	PIN	LOCATION (IN.) - SEG(JNT) X	Y	Z	LOCATION (IN.) - SEG(J+1) X	Y	Z	CENTER OF SYMMETRY (DEG) YAW	PITCH	ROLL
1	P	P	1	0	-1.60	0.0	-2.50	-1.50	0.0	2.50	0.0	0.0	0.0
2	W	O	2	0	-1.50	0.0	-2.30	-1.50	0.0	6.80	0.0	0.0	0.0
3	NP	N	3	0	-0.90	0.0	-2.20	0.0	0.0	3.80	0.0	0.0	0.0
4	HP	M	4	0	0.0	0.0	-1.20	-1.10	0.0	3.30	0.0	0.0	0.0
5	RH	Q	1	0	2.10	4.45	2.50	0.0	0.0	-7.31	0.0	66.50	-5.72
6	RK	R	6	1	0.0	0.0	6.79	0.0	0.0	-7.48	0.0	-56.80	0.0
7	RA	S	7	0	0.0	0.0	8.69	1.54	0.0	-1.28	0.0	81.00	0.0
8	LH	T	1	0	2.10	-4.45	2.50	0.0	0.0	-7.31	0.0	66.50	5.72
9	LK	U	9	1	0.0	0.0	6.79	0.0	0.0	-7.48	0.0	-56.80	0.0
10	LA	V	10	0	0.0	0.0	8.69	1.54	0.0	-1.28	0.0	81.00	0.0
11	RS	W	3	0	-0.80	7.60	-1.60	0.0	0.0	-5.25	0.0	57.50	-10.19
12	RE	X	12	1	0.0	0.0	5.45	0.0	0.0	-6.58	0.0	64.30	0.0
13	LS	Y	3	0	-0.80	-7.60	-1.60	0.0	0.0	-5.25	0.0	57.50	10.19
14	LE	Z	14	1	0.0	0.0	5.45	0.0	0.0	-6.58	0.0	64.30	0.0

JOINT TORQUE CHARACTERISTICS

FLEXURAL SPRING CHARACTERISTICS

JOINT		SPRING COEF. (IN. LB./DEG**J) LINEAR (J=1)	QUADRATIC (J=2)	CUBIC (J=3)	ENERGY DISSIPATION COEF.	JOINT STOP (DEG)
1	P	209.440	609.230	0.0	1.000	5.000
2	W	20.944	60.923	0.0	1.000	35.000
3	NP	17.174	60.923	0.0	1.000	25.000
4	HP	41.293	60.923	0.0	1.000	25.000
5	RH	0.0	609.230	0.0	1.000	85.500
6	RK	0.0	16.754	0.0	1.000	58.300
7	RA	0.0	627.510	0.0	1.000	37.000
8	LH	0.0	609.230	0.0	1.000	85.500
9	LK	0.0	16.754	0.0	1.000	58.300
10	LA	0.0	627.510	0.0	1.000	37.000
11	RS	0.0	609.230	0.0	1.000	122.500
12	RE	0.0	11.697	0.0	1.000	65.300
13	LS	0.0	609.230	0.0	1.000	122.500
14	LE	0.0	11.697	0.0	1.000	65.300

TORSIONAL SPRING CHARACTERISTICS

		SPRING COEF. (IN. LB./DEG**J) LINEAR (J=1)	QUADRATIC (J=2)	CUBIC (J=3)	ENERGY DISSIPATION COEF.	JOINT STOP (DEG)
1	P	343.830	609.230	0.0	1.000	5.000
2	W	34.383	60.923	0.0	1.000	35.000
3	NP	8.011	60.923	0.0	1.000	35.000
4	HP	8.011	60.923	0.0	1.000	35.000
5	RH	0.0	609.230	0.0	1.000	55.500
6	RK	0.0	0.0	0.0	0.0	0.0
7	RA	0.0	94.431	0.0	1.000	20.700
8	LH	0.0	609.230	0.0	1.000	55.500
9	LK	0.0	0.0	0.0	0.0	0.0
10	LA	0.0	94.431	0.0	1.000	20.700
11	RS	0.0	609.230	0.0	1.000	180.000
12	RE	0.0	0.0	0.0	0.0	0.0
13	LS	0.0	609.230	0.0	1.000	180.000
14	LE	0.0	0.0	0.0	0.0	0.0

FLEXURAL VISCOUS CHARACTERISTICS

JOINT		VISCOUS COEFFICIENT (IN. LB.SEC./DEG)	COULOMB FRICTION COEF. (IN. LB.)	FULL FRICTION ANGULAR VELOCITY - (DEG/SEC.)	-	-
1	P	104.720	600.00	30.00	0.0	0.0
2	W	10.472	60.00	30.00	0.0	0.0
3	NP	1.745	10.00	30.00	0.0	0.0
4	HP	1.745	10.00	30.00	0.0	0.0
5	RH	3.997	229.00	30.00	0.0	0.0
6	RK	3.456	198.00	30.00	0.0	0.0
7	RA	0.436	25.00	30.00	0.0	0.0
8	LH	3.997	229.00	30.00	0.0	0.0
9	LK	3.456	198.00	30.00	0.0	0.0
10	LA	0.436	25.00	30.00	0.0	0.0
11	RS	3.229	185.00	30.00	0.0	0.0
12	RE	1.292	74.00	30.00	0.0	0.0
13	LS	3.229	185.00	30.00	0.0	0.0
14	LE	1.292	74.00	30.00	0.0	0.0

TORSIONAL VISCOUS CHARACTERISTICS

		VISCOUS COEFFICIENT (IN. LB.SEC./DEG)	COULOMB FRICTION COEF. (IN. LB.)	FULL FRICTION ANGULAR VELOCITY - (DEG/SEC.)	-	-
1	P	130.900	750.00	30.00	0.0	0.0
2	W	13.090	75.00	30.00	0.0	0.0
3	NP	5.236	30.00	30.00	0.0	0.0
4	HP	5.236	30.00	30.00	0.0	0.0
5	RH	4.887	280.00	30.00	0.0	0.0
6	RK	0.0	0.0	30.00	0.0	0.0
7	RA	0.105	6.00	30.00	0.0	0.0
8	LH	4.887	280.00	30.00	0.0	0.0
9	LK	0.0	0.0	30.00	0.0	0.0
10	LA	0.105	6.00	30.00	0.0	0.0
11	RS	0.733	42.00	30.00	0.0	0.0
12	RE	0.0	0.0	30.00	0.0	0.0
13	LS	0.733	42.00	30.00	0.0	0.0
14	LE	0.0	0.0	30.00	0.0	0.0

SEGMENT INTEGRATION CONVERGENCE TEST INPUT

SEGMENT		ANGULAR VELOCITIES (RAD/SEC.)			LINEAR VELOCITIES (IN./SEC.)			ANGULAR ACCELERATIONS (RAD/SEC.**2)			LINEAR ACCELERATIONS (IN./SEC.**2)		
NO.	SYM	MAG. TEST	ABS. ERROR	REL. ERROR	MAG. TEST	ABS. ERROR	REL. ERROR	MAG. TEST	ABS. ERROR	REL. ERROR	MAG. TEST	ABS. ERROR	REL. ERROR
1	LT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.00	20.00	0.1000
2	CT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	UT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	RUL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	RLL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	RF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	LUL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	LLL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	LF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	RUA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	RLA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	LUA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	LLA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

VEHICLE DECELERATION INPUTS

CARDS C

HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.

YAW	PITCH	ROLL	VMPH	VTIME	XO(X)	XO(Y)	XO(Z)	NATAB	ATO	AT
30.000	0.0	0.0	31.500	0.150	0.0	0.0	0.0	0	0.0	0.0

PASSENGER COMPARTMENT DISPLACEMENT HISTORY
ANALYTICAL HALF-SINE WAVE DECELERATION
VO= 31.50 MPH, UNIQUE ANGLES= 30.00, 0.0 DEGREES, TIME DURATION = 0.150 SEC.

PLANE INPUTS

PLANE NO. 1 WINDSHIELD

	X	Y	Z
POINT 1	38.9000	50.0000	-27.3000
POINT 2	12.1000	50.0000	-45.3000
POINT 3	38.9000	-50.0000	-27.3000

PLANE NO. 2 DASHBOARD

	X	Y	Z
POINT 1	20.0000	50.0000	-18.0000
POINT 2	20.0000	50.0000	-31.0000
POINT 3	20.0000	-50.0000	-18.0000

PLANE NO. 3 FRONT SEAT BACK

	X	Y	Z
POINT 1	1.9000	-50.0000	-6.3000
POINT 2	-2.4000	-50.0000	-25.9000
POINT 3	1.9000	50.0000	-6.3000

PLANE NO. 4 FRONT SEAT CUSHION

	X	Y	Z
POINT 1	1.9000	50.0000	-6.3000
POINT 2	19.4000	50.0000	-10.4000
POINT 3	1.9000	-50.0000	-6.3000

PLANE NO. 5 FLOOR

	X	Y	Z
POINT 1	-12.0000	50.0000	0.0
POINT 2	34.4000	50.0000	0.0
POINT 3	-12.0000	-50.0000	0.0

PLANE NO. 6 TOEBOARD

	X	Y	Z
POINT 1	34.4000	50.0000	0.0
POINT 2	47.5000	50.0000	-14.9000
POINT 3	34.4000	-50.0000	0.0

PLANE NO. 7 REAR SEAT BACK

	X	Y	Z
POINT 1	-34.1000	-50.0000	-6.3000
POINT 2	-38.4000	-50.0000	-25.9000
POINT 3	-34.1000	50.0000	-6.3000

PLANE NO. 8 REAR SEAT CUSHION

	X	Y	Z
POINT 1	-34.1000	50.0000	-6.3000
POINT 2	-16.6000	50.0000	-10.4000
POINT 3	-34.1000	-50.0000	-6.3000

PLANE INPUTS

PLANE NO. 9 FRONT SEAT TOP

	X	Y	Z
POINT 1	-8.6700	50.0000	-24.6500
POINT 2	-2.4000	50.0000	-25.9000
POINT 3	-8.2700	-50.0000	-24.6500

PLANE NO. 10 REAR OF FRONT SEAT

	X	Y	Z
POINT 1	-3.9700	50.0000	-5.0500
POINT 2	-8.2700	50.0000	-24.6500
POINT 3	-3.9700	-50.0000	-5.0500

BELT INPUTS

CARDS D.3

BELT NO. 1 FRONT LAP BELT

ANCHOR POINT A			ANCHOR POINT B		
X	Y	Z	X	Y	Z
1.10000000	7.00000000	0.0	1.10000000	-7.00000000	0.0

FIXED POINT ON SEGMENT				SLACK(+)
X	Y	Z	BLANK	LENGTH(-)
4.53884347	0.0	-3.00000000	0.0	0.250000000

AIRBAG INPUTS

AIRBAG NO. 1 TEST CASE AIR BAG

	AIR BAG SEMIAXES			C.G. OFFSET	
18.8000000	20.8000000	12.9000000	0.0	0.0	0.0
				DEPLOYMENT POINT	
YAW	PITCH	ROLL		0.0	0.0
0.0	0.0	0.0	-4.00000000		
					CYVO
XBM	CYTO	CYPA	CYSP	CYTO	134.744000
1.00000000	0.0	14.3000000	3350.00000	530.000000	
					CYSDO
CYCD	CYK	CYR	CYAT	CYPV	0.600000000
0.740000000	1.40000000	639.600000	0.750000000	0.500000000	
CYAU	SPRM	VSCS	CK	CMAS	
25.4000000	1000.00000	0.200000000	250.000000	1.00000000	

PANEL NO. 1

	PANEL ELLIPSOID SEMIAXES			C.G. OFFSET	
4.00000000	28.0000000	28.0000000	0.0	0.0	0.0
			YAW	PITCH	ROLL
	PANEL LOCATION				
39.0000000	0.0	-26.5000000	0.0	0.0	0.0

PANEL NO. 2

	PANEL ELLIPSOID SEMIAXES			C.G. OFFSET	
4.00000000	40.0000000	40.0000000	0.0	0.0	0.0
			YAW	PITCH	ROLL
	PANEL LOCATION				
26.7786000	0.0	-43.3773600	0.0	46.0000000	0.0

CARD D.

BUOY SEGMENT SYMMETRY INPUT

SEG NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NSYM(J)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FUNCTION NO. 1 NORMAL LOADING FORCE CARDS E

D0	D1	D2	D3	D4
0.0	8.1900	0.0	0.0	1.0000

FIRST PART OF FUNCTION - 5TH DEGREE POLYNOMIAL

A0	A1	A2	A3	A4	A5
0.0	109.950000	50.356900	-16.025200	1.005800	0.0

FUNCTION NO. 2 SPIKE LOADING FORCE CARDS E

D0	D1	D2	D3	D4
0.0	1.0000	0.0	0.5000	0.0

FIRST PART OF FUNCTION - 5TH DEGREE POLYNOMIAL

A0	A1	A2	A3	A4	A5
0.0	3090.100000	510.460000	-7187.400000	3587.280000	0.0

CARDS

FUNCTION NO. 3 RESTRAINT BELT

D0	D1	D2	D3	D4
0.0	-0.3800	0.0	0.0	0.0

FIRST PART OF FUNCTION - 20 TABULAR POINTS

D	F(D)
0.0	0.0
0.020000	200.0000
0.040000	400.0000
0.060000	605.0000
0.080000	820.0000
0.100000	1025.0000
0.120000	1250.0000
0.140000	1525.0000
0.160000	1840.0000
0.180000	2060.0000
0.200000	2350.0000
0.220000	2640.0000
0.240000	2920.0000
0.260000	3220.0000
0.280000	3520.0000
0.300000	3830.0000
0.320000	4150.0000
0.340000	4470.0000
0.360000	4800.0000
0.380000	5110.0000

CARDS

FUNCTION NO. 4 CONSTANT F=0.54

D0	D1	D2	D3	D4
0.0	0.0	0.5400	0.0	0.0

FUNCTION IS CONSTANT 0.540000

FUNCTION NO. 5 CONSTANT F=0.58 CARDS E

D0	D1	D2	D3	D4
0.0	0.0	0.5800	0.0	0.0

FUNCTION IS CONSTANT 0.580000

FUNCTION NO. 6 DASHBOARD LOADING CARDS E

D0	D1	D2	D3	D4
0.0	-5.0000	0.0	0.0	1.0000

FIRST PART OF FUNCTION - 6 TABULAR POINTS

D	F(D)
0.0	0.0
1.000000	470.0000
2.000000	890.0000
3.000000	1220.0000
4.000000	1470.0000
5.000000	1580.0000

FUNCTION NO. 7 CONSTANT F=0.88 CARDS E

D0	D1	D2	D3	D4
0.0	0.0	0.8800	0.0	0.0

FUNCTION IS CONSTANT 0.880000

CARDS

FUNCTION NO. 8 CONSTANT F=0.1

D0	D1	D2	D3	D4
0.0	0.0	0.1000	0.0	0.0

FUNCTION IS CONSTANT 0.100000

CARDS

FUNCTION NO. 9 STIFF SURFACES

D0	D1	D2	D3	D4
0.0	-4.0000	0.0	0.0	1.0000

FIRST PART OF FUNCTION - 5 TABULAR POINTS

D	F(D)
0.0	0.0
1.000000	860.0000
2.000000	1690.0000
3.000000	2270.0000
4.000000	2580.0000

CARDS

FUNCTION NO. 10 SEAT CUSHION

D0	D1	D2	D3	D4
0.0	-6.0000	0.0	0.0	1.0000

FIRST PART OF FUNCTION - 7 TABULAR POINTS

D	F(D)
0.0	0.0
1.000000	40.0000
2.000000	70.0000
3.000000	100.0000
4.000000	170.0000
5.000000	280.0000
6.000000	700.0000

FUNCTION NO. 11 CONSTANT F=0.9 CARDS E

D0	D1	D2	D3	D4
0.0	0.0	0.9000	0.0	0.0

FUNCTION IS CONSTANT 0.900000

FUNCTION NO. 12 SEAT CUSHION, CF CARDS E

D0	D1	D2	D3	D4
0.0	-5.0000	0.0	0.0	0.0

FIRST PART OF FUNCTION - 6 TABULAR POINTS

D	F(D)
0.0	7.0000
1.000000	7.0000
2.000000	3.1000
3.000000	2.4000
4.000000	1.6000
5.000000	1.2000

FUNCTION NO. 13 CONSTANT F=0.67 CARDS E

D0	D1	D2	D3	D4
0.0	0.0	0.6700	0.0	0.0

FUNCTION IS CONSTANT 0.670000

CARDS

FUNCTION NO. 14 UNLOADING G FUNCTION

D0	D1	D2	D3	D4
0.0	-1000.0000	0.0	0.0	0.0

FIRST PART OF FUNCTION - 4 TABULAR POINTS

D	F(D)
0.0	0.0
0.500000	0.0
0.600000	0.9500
1000.000000	0.9500

CARDS

FUNCTION NO. 15 UNLOADING R FUNCTION

D0	D1	D2	D3	D4
0.0	-1000.0000	0.0	0.0	0.0

FIRST PART OF FUNCTION - 4 TABULAR POINTS

D	F(D)
0.0	1.0000
0.500000	1.0000
0.600000	0.0500
1000.000000	0.0500

CARDS

FUNCTION NO. 16 CONSTANT F=1.0

D0	D1	D2	D3	D4
0.0	0.0	1.0000	0.0	0.0

FUNCTION IS CONSTANT 1.000000

FUNCTION NO. 17 CONSTANT F=0.5 CARDS E

D0	D1	D2	D3	D4
0.0	0.0	0.5000	0.0	0.0

FUNCTION IS CONSTANT 0.500000

FUNCTION NO. 18 CONSTANT F=0.31 CARDS E

D0	D1	D2	D3	D4
0.0	0.0	0.3100	0.0	0.0

FUNCTION IS CONSTANT 0.310000

ALLOWED CONTACTS AND ASSOCIATED FUNCTIONS

CARDS F.1

PLANE	SEGMENT	FORCE DEFLECTION	INERTIAL SPIKE	R FACTOR	G FACTOR	FRICTION COEF.
1- 16 WINDSHIELD	5- 5 H	1 NORMAL LOADING FORCE	2 SPIKE LOADING FORCE	15 UNLOADING R FUNCTION	14 UNLOADING G FUNCTION	13 CONSTANT F=0.67
2- 16 DASHBOARD	3- 3 UT	6 DASHBOARD LOADING	0	8 CONSTANT F=0.1	7 CONSTANT F=0.88	17 CONSTANT F=0.5
3- 16 FRONT SEAT BACK	1- 1 LT	10 SEAT CUSHION	0	11 CONSTANT F=0.9	8 CONSTANT F=0.1	12 SEAT CUSHION, CF
3- 16 FRONT SEAT BACK	3- 3 UT	10 SEAT CUSHION	0	11 CONSTANT F=0.9	8 CONSTANT F=0.1	12 SEAT CUSHION, CF
4- 16 FRONT SEAT CUSHION	1- 1 LT	10 SEAT CUSHION	0	11 CONSTANT F=0.9	8 CONSTANT F=0.1	12 SEAT CUSHION, CF
5- 16 FLOOR	8- 8 RF	9 STIFF SURFACES	0	8 CONSTANT F=0.1	7 CONSTANT F=0.88	17 CONSTANT F=0.5
5- 16 FLOOR	11- 11 LF	9 STIFF SURFACES	0	8 CONSTANT F=0.1	7 CONSTANT F=0.88	17 CONSTANT F=0.5
6- 16 TOEBOARD	8- 8 RF	9 STIFF SURFACES	0	8 CONSTANT F=0.1	7 CONSTANT F=0.88	17 CONSTANT F=0.5
6- 16 TOEBOARD	11- 11 LF	9 STIFF SURFACES	0	8 CONSTANT F=0.1	7 CONSTANT F=0.88	17 CONSTANT F=0.5

CARDS F.3

BELT	SEGMENT	FORCE DEFLECTION	INERTIAL SPIKE	R FACTOR	G FACTOR	FRICTION COEF.
1- 16 FRONT LAP BELT	1- 1 LT	3 RESTRAINT BELT	0	17 CONSTANT F=0.5	18 CONSTANT F=0.31	16 CONSTANT F=1.0

CARDS F.3

SEGMENT	SEGMENT	FORCE DEFLECTION	INERTIAL SPIKE	R FACTOR	G FACTOR	FRICTION COEF.
6- 6 RUL	13- 13 RLA	4 DASHBOARD LOADING	0	0	0	17 CONSTANT F=0.5
9- 9 LUL	15- 15 LLA	4 DASHBOARD LOADING	0	0	0	17 CONSTANT F=0.5

CARDS F.4

AIRBAG VS. SEGMENTS

NO. 1 TEST CASE AIR BAG	5- 5 H	3- 3 UT	2- 2 ET	1- 1 LT	6- 6 RUL	9- 9 LUL	13- 13 RLA	15- 15 LLA

INITIAL BODY POSITIONS

SEGMENT NO.	SEG	INITIAL POSITION (IN.) X	Y	Z	INITIAL VELOCITY (IN./SEC.) X	Y	Z	ROTATION (DEG) YAW	PITCH	ROLL
1	LT	5.01678	0.0	-11.51630	480.12448	277.20000	0.0	0.0	12.00000	0.0
2	CT	3.87941	0.0	-16.38625	480.12448	277.20000	0.0	0.0	12.00000	0.0
3	UT	1.98741	0.0	-25.26759	480.12448	277.20000	0.0	0.0	12.00000	0.0
4	N	-0.14039	0.0	-30.96916	480.12448	277.20000	0.0	0.0	12.00000	0.0
5	H	-0.00003	0.0	-35.59952	480.12448	277.20000	0.0	0.0	12.00000	0.0
6	RUL	14.56234	4.45000	-11.70570	480.12448	277.20000	0.0	0.0	107.50000	0.0
7	RLL	26.76809	4.45000	-8.93945	480.12448	277.20000	0.0	0.0	50.00000	0.0
8	RF	35.42749	4.45000	-3.34427	480.12448	277.20000	0.0	0.0	140.00000	0.0
9	LUL	14.56234	-4.45000	-11.70570	480.12448	277.20000	0.0	0.0	107.50000	0.0
10	LLL	26.76809	-4.45000	-8.93945	480.12448	277.20000	0.0	0.0	50.00000	0.0
11	LF	35.42749	-4.45000	-3.34427	480.12448	277.20000	0.0	0.0	140.00000	0.0
12	RUA	0.87223	7.60000	-21.43610	480.12448	277.20000	0.0	0.0	0.0	0.0
13	RLA	7.37122	7.60000	-14.95676	480.12448	277.20000	0.0	0.0	81.00000	0.0
14	LUA	0.87223	-7.60000	-21.43610	480.12448	277.20000	0.0	0.0	0.0	0.0
15	LLA	7.37122	-7.60000	-14.95676	480.12448	277.20000	0.0	0.0	81.00000	0.0

SECTION 9

SAMPLE OUTPUT

VEHICLE POSITION DATA FOR TIME = 0.0 SEC.

LINEAR DECELERATION (G'S)	LINEAR VELOCITY (IN./SEC.)	LINEAR DISPLACEMENT (IN.)	ANGULAR ACCELERATION (DEG/SEC.**2)	ANGULAR VELOCITY (DEG/SEC.)	ANGULAR ROTATION (DEG)
0.0	480.12448	0.0	0.0	0.0	0.0
0.0	277.20000	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0

MAIN FUNCTIONS FOR TIME = 0.0 SEC.

SEGMENT		ANGULAR ROTATION (DEG) YAW	PITCH	ROLL	ANGULAR VELOCITY (RAD/SEC.) X	Y	Z	ANGULAR ACCELERATION (RAD/SEC.**2) X	Y	Z
1	LT	0.0	12.0000	0.0	0.0	0.0	0.0	2.48690D-14	-1.22463D 02	-7.10543D-15
2	CT	0.0	12.0000	0.0	0.0	0.0	0.0	0.0	3.96743D 01	0.0
3	UT	0.0	12.0000	0.0	0.0	0.0	0.0	1.06581D-14	-1.10019D 01	0.0
4	N	0.0	12.0000	0.0	0.0	0.0	0.0	0.0	2.36571D 01	0.0
5	H	0.0	12.0000	0.0	0.0	0.0	0.0	0.0	-2.16638D 00	0.0
6	RUL	0.0	107.5000	0.0	0.0	0.0	0.0	8.92896D 01	6.14675D 01	-1.17836D 02
7	RLL	0.0	50.0000	0.0	0.0	0.0	0.0	-5.14063D 01	1.03978D 02	-1.38619D 02
8	RF	0.0	140.0000	0.0	0.0	0.0	0.0	-3.93985D 01	9.98806D 02	-1.37536D 02
9	LUL	0.0	107.5000	0.0	0.0	0.0	0.0	-8.92896D 01	6.14675D 01	1.17836D 02
10	LLL	0.0	50.0000	0.0	0.0	0.0	0.0	5.14063D 01	1.03978D 02	1.38619D 02
11	LF	0.0	140.0000	0.0	0.0	0.0	0.0	3.93985D 01	9.98806D 02	1.37536D 02
12	RUA	0.0	0.0	0.0	0.0	0.0	0.0	2.38297D 02	-1.83454D 02	1.71451D 03
13	RLA	0.0	81.0000	0.0	0.0	0.0	0.0	-1.64830D 03	1.24092D 03	5.52957D 02
14	LUA	0.0	0.0	0.0	0.0	0.0	0.0	-2.88297D 02	-1.83454D 02	-1.71451D 03
15	LLA	0.0	81.0000	0.0	0.0	0.0	0.0	1.64830D 03	1.24092D 03	-5.52957D 02

SEGMENT		LINEAR POSITION (IN.) X	Y	Z	LINEAR VELOCITY (IN./SEC.) X	Y	Z	LINEAR ACCELERATION (IN./SEC.**2) X	Y	Z
1	LT	5.0168	0.0	-11.5163	480.12448	277.20000	0.0	-66.681720	-0.000000	562.000913
2	CT	3.6794	0.0	-16.3862	480.12448	277.20000	0.0	82.655151	0.0	269.099571
3	UT	1.9874	0.0	-25.2874	480.12448	277.20000	0.0	82.380967	0.000000	346.870437
4	N	-0.1404	0.0	-30.9692	480.12448	277.20000	0.0	16.065106	0.0	350.843345
5	H	-0.0000	0.0	-35.5995	480.12448	277.20000	0.0	-4.214763	0.0	357.590224
6	RUL	14.5623	4.4500	-11.7057	480.12448	277.20000	0.0	-447.794623	-652.707229	448.675473
7	RLL	26.7681	4.4500	-8.9394	480.12448	277.20000	0.0	-73.365276	-874.464679	-545.168932
8	RF	35.4275	4.4500	-3.3443	480.12448	277.20000	0.0	516.784289	-165.509075	-3237.430070
9	LUL	14.5623	-4.4500	-11.7057	480.12448	277.20000	0.0	-447.794623	652.707229	448.675473
10	LLL	26.7681	-4.4500	-8.9394	480.12448	277.20000	0.0	-73.365276	874.464679	-545.168932
11	LF	35.4275	-4.4500	-3.3443	480.12448	277.20000	0.0	516.784289	165.509075	-3237.430070
12	RUA	0.8722	7.6000	-21.4361	480.12448	277.20000	0.0	-865.362296	-1513.561757	334.601321
13	RLA	7.3712	7.6000	-14.9568	480.12448	277.20000	0.0	-587.858018	7761.063783	-7730.122528
14	LUA	0.8722	-7.6000	-21.4361	480.12448	277.20000	0.0	-865.362296	1513.561757	334.601321
15	LLA	7.3712	-7.6000	-14.9568	480.12448	277.20000	0.0	-587.858018	-7761.063783	-7730.122528

SEGMENT		U1 ARRAY (IN./SEC.**2) EXTERNAL LINEAR ACCELERATIONS X	Y	Z	U2 ARRAY (RAD/SEC.**2) EXTERNAL ANGULAR ACCELERATIONS X	Y	Z
1	CT	42.0332	0.0	-407.6328	0.0	-4.30672	0.0
2	CT	0.0	0.0	386.0880	0.0	0.0	0.0
3	UT	121.5365	0.0	399.4239	0.0	0.04284	0.0
4	H	0.0	0.0	386.0880	0.0	0.0	0.0
5	M	0.0	0.0	386.0880	0.0	0.0	0.0
6	RUL	352.5797	-1768.4130	2051.3511	-0.71903	-9.48298	500.19269
7	RLL	0.0	0.0	386.0880	0.0	0.0	0.0
8	RF	-5975.4880	0.0	-10228.1801	0.0	-1288.68042	0.0
9	LUL	352.5257	1768.4130	2051.3511	0.71903	-9.48298	-500.19269
10	LLL	0.0	0.0	386.0880	0.0	0.0	0.0
11	LF	-5970.4880	0.0	-10228.1801	0.0	-1288.68042	0.0
12	RUA	0.0	0.0	386.0880	0.0	0.0	0.0
13	RLA	-1283.9175	6438.6476	-5676.9993	-2177.97023	1914.38156	-836.91220
14	LUA	0.0	0.0	386.0880	0.0	0.0	0.0
15	LLA	-1283.9175	-6438.6476	-5676.9993	2177.97023	1914.38156	836.91220

JOINT		PIN	JOINT FORCES (LB.) X	Y	Z	JOINT TORQUES (IN. LB.) X	Y	Z	RELATIVE ANGULAR VELOCITY (RAD/SEC.)
1	P	0	-7.9181	0.0	-97.2550	0.0	0.0	0.0	0.0
2	W	0	-9.5182	0.0	-94.4128	0.0	0.0	0.0	0.0
3	NP	0	0.0197	0.0	-1.0334	0.0	0.0	0.0	0.0
4	HP	0	-0.1106	0.0	-0.7477	0.0	0.0	0.0	0.0
5	RH	0	8.7683	33.4321	-39.4132	0.0	0.0	0.0	0.0
6	RK	1	44.9396	-18.9855	32.9813	-71.59929	0.0	69.42608	0.0
7	RA	0	46.2041	-1.1789	49.7932	0.0	0.0	0.0	0.0
8	LH	0	8.7683	-33.4321	-39.4132	0.0	0.0	0.0	0.0
9	LK	1	44.9396	18.9855	32.9813	71.59929	0.0	-89.42608	0.0
10	LA	0	46.2041	1.1789	49.7932	0.0	0.0	0.0	0.0
11	RS	0	-3.1559	-4.2140	-28.1735	0.0	0.0	0.0	0.0
12	RE	1	8.6307	16.4086	-25.4721	-20.01162	0.0	24.17464	0.0
13	LS	0	-3.1559	4.2140	-26.1735	0.0	0.0	0.0	0.0
14	LE	1	8.6307	-16.4086	-25.4721	20.01162	0.0	-24.17464	0.0

ELAPSED CPU TIME = 1.18 SECONDS

SUB	CALLS	TIME	%
MAIN3D	1	8	6.78
INPUT	1	30	25.42
DINT	1	0	0.0
PRIPLT	1	19	16.10
DZP	0	0	0.0
PDAUX	1	1	0.85
UPDATE	1	0	0.0
OUTPUT	1	54	45.76
DAUX	1	0	0.0
SETUP	2	0	0.0
CHAIN	2	0	0.0
CONTCT	1	0	0.0
VISPR	1	1	0.85
DAUX11	1	1	0.85
DAUX12	1	0	0.0
DAUX22	1	0	0.0
DAUX31	1	0	0.0
DAUX32	1	0	0.0
DAUX33	1	0	0.0
FSMSGL	1	2	1.69
PLELP	9	1	0.85
BELTRT	1	1	0.85
SEGSEG	2	0	0.0
AIRSAG	1	0	0.0
TOTAL		118	100.00

VEHICLE POSITION DATA FOR TIME = 0.020000 SEC.

LINEAR DECELERATION (G'S)	LINEAR VELOCITY (IN./SEC.)	LINEAR DISPLACEMENT (IN.)	ANGULAR ACCELERATION (DEG/SEC.**2)	ANGULAR VELOCITY (DEG/SEC.)	ANGULAR ROTATION (DEG)
5.29675	459.37001	9.46331	0.0	0.0	0.0
3.05808	265.21740	5.46365	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0

MAIN FUNCTIONS FOR TIME = 0.020000 SEC.

SEGMENT	ANGULAR ROTATION (DEG) YAW	PITCH	ROLL	ANGULAR VELOCITY (RAD/SEC.) X	Y	Z	ANGULAR ACCELERATION (RAD/SEC.**2) X	Y	Z
1 LT	0.2302	11.7053	0.2583	5.65001D-01	-8.15837D-01	5.83667D-01	5.88677D 01	-5.95932D 01	5.94141D 01
2 CT	0.2338	11.7017	0.2372	5.28456D-01	-8.45579D-01	5.86790D-01	5.89393D 01	-6.75494D 01	1.30007D 00
3 UT	0.2673	11.7402	0.0758	1.35695D-01	-7.18174D-01	5.87796D-01	3.45225D 01	-7.37064D 01	3.69097D 01
4 N	0.2360	11.5475	0.2133	2.92537D-01	-3.32077D-01	5.48775D-01	9.27002D 00	-4.24737D 01	5.11650D 01
5 H	0.2065	11.8159	0.2235	3.43182D-01	-2.29131D-01	5.11274D-01	2.78959D 00	-2.23491D 01	3.52886D 01
6 RUL	-0.8173	107.6291	-0.9344	-5.27202D-01	3.23692D-01	7.90692D-01	-5.12208D 01	1.90864D 01	7.45274D 01
7 RLL	0.4082	50.0759	0.4369	3.79166D-01	2.00987D-01	8.66570D-01	3.54031D 01	1.36215D 01	8.32107D 01
8 RF	-0.4590	140.0759	-0.4251	-4.70714D-01	-2.37330D-02	1.22326D 00	-1.88732D 01	5.67237D 01	9.03803D 01
9 LUL	-1.2033	107.5700	-1.4315	-5.34065D-01	1.55520D-01	7.82094D-01	-4.94046D 01	8.21873D 00	7.56105D 01
10 LLL	0.6740	49.9537	0.6765	3.80973D-01	-1.09169D-01	8.73421D-01	3.74096D 01	-2.60889D 01	8.27111D 01
11 LF	-0.9614	139.9623	-0.8349	-4.23364D-01	-4.94959D-01	1.35656D 00	-2.77296D 01	4.85977D 01	8.91700D 01
12 RUA	0.8013	-0.0653	-0.4760	-3.60486D-03	-1.84772D-01	6.23167D-01	4.91562D 01	-6.57104D 01	2.83336D 01
13 RLA	-2.4067	82.0035	-3.2896	-6.74620D-01	8.45333D-03	1.14110D-01	-2.13630D 01	-5.67548D 01	5.24559D 01
14 LUA	-0.2955	-0.2407	0.4526	1.84792D-01	-4.34815D-01	5.48923D-01	1.94526D 01	-6.81082D 01	4.59238D 01
15 LLA	2.7354	81.8464	3.0830	-4.91367D-01	-3.98738D-01	2.40860D-01	-4.28040D 01	-8.33637D 01	2.55917D 01

SEGMENT	LINEAR POSITION (IN.) X	Y	Z	LINEAR VELOCITY (IN./SEC.) X	Y	Z	LINEAR ACCELERATION (IN./SEC.**2) X	Y	Z
1 LT	14.5190	5.4827	-11.5052	465.70633	268.10679	1.95191	-1264.966932	-857.922705	123.241910
2 CT	13.4068	5.4999	-16.3808	469.75729	270.80380	1.08423	-955.946733	-652.693798	72.641905
3 UT	11.5503	5.5109	-25.2918	476.39602	272.57734	-0.49194	-312.577649	-281.222382	-45.686740
4 N	9.4396	5.5136	-30.9805	479.04206	273.87103	-1.70271	-4.384932	-140.154699	-174.893365
5 H	9.5941	5.5363	-35.6102	480.21865	275.92037	-1.68491	116.656364	-20.109675	-174.973033
6 RUL	24.0355	9.9515	-11.6772	461.30273	271.75915	4.79533	-1627.630754	-511.452304	452.989150
7 RLL	36.2431	9.9535	-8.9330	461.60094	272.51005	1.55148	-1612.644507	-424.447558	252.399920
8 RF	44.9160	9.9279	-3.3494	462.72161	267.94158	0.23608	-1536.426415	-844.448069	41.095167
9 LUL	24.0654	1.0681	-11.7089	465.73642	271.83624	-0.00077	-1197.205023	-516.059907	-87.590521
10 LLL	36.2691	1.0605	-8.9456	464.23991	272.61536	-0.37667	-1340.295479	-471.475102	0.652797
11 LF	44.9203	1.0415	-3.3440	464.27171	267.73710	1.29324	-1363.225796	-990.559115	77.390104
12 RUA	10.4005	13.1513	-21.4349	472.27211	272.71425	0.63167	-772.387515	-461.507793	185.924681
13 RLA	16.9068	13.3006	-15.0713	471.20673	277.15786	0.53965	-1183.755764	-592.607491	555.770956
14 LUA	10.4514	-2.1334	-21.4346	479.27909	271.79212	-3.22893	-343.611347	-291.586810	-441.457704
15 LLA	16.9418	-2.2194	-15.0730	476.55041	274.01257	-0.62500	-793.974654	-119.672752	100.449231

SEGMENT		U1 ARRAY (IN./SEC.**2) EXTERNAL LINEAR ACCELERATIONS X	Y	Z	U2 ARRAY (RAD/SEC.**2) EXTERNAL ANGULAR ACCELERATIONS X	Y	Z
1	LT	-2568.5837	-1424.0944	35.3508	115.05304	-230.83205	141.56891
2	CT	0.0	0.0	386.0880	-55.33662	966.41636	-157.88442
3	UT	67.3007	-499.6144	359.7005	58.97730	220.69388	127.89369
4	N	0.0	0.0	386.0880	-370.93730	-874.63763	51.16504
5	H	0.0	0.0	386.0880	-24.81610	-37.32145	23.37211
6	RUL	0.0	0.0	386.0880	-65.77543	-785.33775	-811.96083
7	RLL	0.0	0.0	386.0880	104.85876	133.17320	-985.68793
8	RF	-11105.7600	-2574.4384	-5950.4448	-446.19459	-1898.47106	-1401.34969
9	LUL	0.0	0.0	386.0880	-66.15000	-843.76759	-799.10656
10	LLL	0.0	0.0	386.0880	94.84414	202.97064	-1227.72154
11	LF	-13239.1290	-2710.0465	-7283.5666	-509.57740	-2342.61656	-1562.89397
12	RUA	0.0	0.0	386.0880	782.37241	-1354.45907	-1901.18087
13	RLA	0.0	0.0	386.0880	47.97754	-160.39537	-598.80284
14	LUA	0.0	0.0	386.0880	235.20767	-852.40738	-352.74810
15	LLA	0.0	0.0	386.0880	-22.72360	-29.94560	333.08833

JOINT		IPIN	JOINT FORCES (LB.) X	Y	Z	JOINT TORQUES (IN. LB.) X	Y	Z	RELATIVE ANGULAR VELOCITY (RAD/SEC.)
1	P	0	-91.2196	-15.3033	-75.6609	-254.33301	-211.38190	78.54409	0.047072
2	W	0	-67.9975	0.5536	-68.0457	-277.62261	92.12978	60.37447	0.417228
3	NP	0	2.9847	-3.2381	-19.2687	14.61813	46.68237	-5.08850	0.417292
4	HP	0	3.0603	-2.1019	-14.7209	5.23450	11.63289	-5.54031	0.120343
5	XH	0	-34.9265	-13.4444	43.2842	108.87479	482.12259	-79.85106	1.179272
6	RK	1	39.0469	4.6556	40.2627	93.57234	-69.50011	-146.01069	[illegible]
7	RA	0	63.1593	12.5223	42.6761	12.16371	-11.46621	-46.06175	[illegible]
8	LH	0	5.4374	-18.6864	24.2383	105.54575	441.77558	-81.37025	1.016022
9	LK	1	59.5164	4.6259	45.6349	93.17197	-151.12455	-153.02283	0.264895
10	LA	0	83.7119	12.9569	52.4301	13.08074	-18.09360	-43.76374	1.145153
11	RS	0	-25.2096	-13.6436	-0.6218	-126.99973	264.97935	39.37776	[illegible]
12	RE	1	-14.6563	-7.3522	2.1052	-6.99662	-31.31240	49.77776	0.703733
13	LS	0	-14.5332	-5.4573	-14.8181	-40.85755	142.45466	-9.34062	0.237167
14	LE	1	-9.8492	-1.4847	-3.5438	-0.16604	7.79035	-3.56285	0.040393

ELAPSED CPU TIME = 24.13 SECONDS

SUB	CALLS	TIME	%
MAIN3D	1	33	1.37
INPUT	1	30	1.24
DINT	5	83	3.44
PRIPLT	5	93	3.85
DZP	248	40	1.66
PUAUX	249	145	6.01
UPDATE	59	12	0.50
OUTPUT	30	136	5.64
DAUX	249	87	3.61
SETUP	498	109	4.52
CHAIN	250	126	5.22
CONTCT	249	33	1.37
VISPR	249	182	7.54
DAUX11	249	178	7.38
DAUX12	249	99	4.10
DAUX22	249	48	1.99
DAUX31	249	0	0.0
DAUX32	249	1	0.04
DAUX33	249	2	0.08
FSMSOL	249	291	12.06
PLELP	2241	201	8.33
BELTRT	249	74	3.07
SEGSEG	498	116	4.81
AIRBAG	249	294	12.18
TOTAL		2413	100.00

DATE: OCT 16,1973

RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.

CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR ACCELERATIONS (G'S) IN LOCAL REFERENCE

TIME (MSEC)	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT X	Y	Z	RES	POINT (0.0 , 0.0 , 7.50) ON SEGMENT NO. 1 - LT X	Y	Z	RES	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 3 - UT X	Y	Z	RES
0.0	-0.47	-0.00	1.39	1.47	-2.68	-0.00	1.39	3.20	0.62	0.00	0.52	0.97
0.250	0.03	-0.01	0.71	0.71	-0.36	-0.02	0.75	0.77	0.19	-0.00	0.57	0.63
0.500	0.03	-0.04	0.31	0.31	0.02	-0.05	0.33	0.31	-0.02	-0.01	0.35	0.35
0.750	-0.10	-0.06	0.14	0.18	-0.05	-0.11	0.16	0.19	-0.09	-0.02	0.19	0.21
1.250	-0.24	-0.12	-0.06	0.23	-0.13	-0.20	-0.06	0.25	-0.29	-0.05	-0.01	0.29
1.750	-0.40	-0.18	-0.20	0.48	-0.30	-0.29	-0.20	0.46	-0.45	-0.08	-0.17	0.49
2.250	-0.53	-0.24	-0.28	0.65	-0.46	-0.38	-0.28	0.66	-0.59	-0.12	-0.26	0.66
2.750	-0.65	-0.30	-0.33	0.79	-0.61	-0.47	-0.33	0.83	-0.71	-0.16	-0.32	0.80
3.250	-0.78	-0.35	-0.37	0.93	-0.75	-0.56	-0.37	0.90	[illegible]	-0.19	-0.37	0.90
3.750	-0.89	[illegible]	-0.37	1.08	-0.85	[illegible]	-0.37	1.19	-0.97	-0.23	[illegible]	0.94
4.750	-1.06	[illegible]	-0.38	1.34	-1.15	-0.81	-0.38	1.44	[illegible]	-0.32	-0.40	1.07
5.000	-1.13	-0.53	-0.37	1.52	-1.22	-0.84	-0.37	1.53	[illegible]	-0.34	-0.49	1.07
6.000	-1.29	-0.71	-0.34	1.51	-1.27	-1.05	-0.34	1.51	[illegible]	-0.41	-0.49	1.05
8.000	-1.46	-1.01	-0.13	1.74	[illegible]	-1.02	-0.19	2.09	[illegible]	[illegible]	-0.34	0.97
9.000	[illegible]	[illegible]	[illegible]	1.79	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.49
10.000	-1.27	[illegible]	0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.22	[illegible]	1.01
10.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11.000	-2.02	-1.38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.[illegible]
11.500	-2.16	-1.41	0.04	2.06	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.45
12.500	-2.49	-1.50	0.03	2.91	-3.94	-2.23	0.03	4.51	-0.10	-0.85	-0.08	0.50
13.500	-2.67	-1.61	-0.03	3.12	-4.04	-2.45	-0.04	4.72	-0.37	-0.81	-0.02	0.89
14.500	-2.87	-1.65	-0.06	3.31	-3.53	-2.96	-0.06	4.60	-0.48	-0.90	0.12	1.03
15.000	-2.[illegible]	-1.67	-0.04	3.25	-3.58	-2.72	-0.05	4.74	-0.57	-0.85	0.09	1.11
15.500	-3.04	-1.19	-0.02	3.53	-4.35	-2.64	-0.09	5.[illegible]	-0.54	-0.78	[illegible]	0.9[illegible]
16.000	-3.12	-1.09	-0.13	3.65	-4.4[illegible]	-2.77	-0.14	[illegible]	-0.56	-0.70	-0.11	0.96
16.500	-3.13	-1.90	-0.19	3.67	-4.41	-2.81	-0.20	5.23	-0.55	-0.74	-0.17	0.95
17.500	-3.16	-1.99	-0.24	3.75	-4.39	-2.95	-0.26	5.29	-0.63	-0.72	-0.21	0.98
18.500	-3.22	-2.10	-0.29	3.86	-4.40	-3.09	-0.30	5.39	-0.68	-0.67	-0.24	0.99
19.500	-3.25	-2.17	-0.33	3.92	-4.40	-3.34	-0.35	5.54	-0.75	-0.63	-0.26	1.02
20.000	-3.28	-2.21	-0.34	3.97	-4.43	-3.38	-0.36	5.59	-0.77	-0.57	-0.28	1.00
22.000	-3.32	-2.85	-0.43	4.40	-4.72	-2.31	-0.46	5.27	-0.91	-0.23	-0.40	1.02
22.250	-3.39	-2.20	-0.46	4.07	-4.63	-3.27	-0.49	5.70	-0.90	-0.23	-0.41	1.01
22.500	-3.42	-2.32	-0.48	4.16	-4.66	-3.70	-0.51	5.97	-0.91	-0.39	-0.43	1.08
22.750	-3.45	-2.44	-0.49	4.25	-4.63	-3.81	-0.52	6.06	-0.93	-0.36	-0.44	1.03
23.250	-3.51	-2.52	-0.52	4.35	-4.75	-3.99	-0.55	6.22	-0.96	-0.33	-0.45	1.11
23.750	-3.57	-2.57	-0.54	4.43	-4.80	-4.07	-0.57	6.32	-1.00	-0.29	-0.46	1.14
24.250	-3.62	-2.62	-0.56	4.50	-4.85	-4.15	-0.60	6.41	-1.04	-0.26	-0.48	1.17
25.000	-3.69	-2.68	-0.60	4.60	-4.91	-4.29	-0.64	6.55	-1.10	-0.20	-0.51	1.23
26.000	-3.78	-2.77	-0.67	4.74	-4.95	-4.47	-0.72	6.70	-1.18	-0.11	-0.55	1.30
27.000	-3.84	-2.82	-0.71	4.81	-4.97	-4.54	-0.76	6.78	-1.24	-0.25	-0.57	1.39
29.000	-4.00	-3.01	-0.76	5.06	-5.24	-5.05	-0.83	7.32	-1.41	-0.23	-0.62	1.56
30.000	-4.30	-3.00	-0.61	5.30	-5.10	-4.65	-0.88	6.96	-1.41	-0.26	-0.64	1.57
32.000	-4.52	-2.75	-0.84	5.36	-5.96	-4.48	-0.93	7.51	-1.72	-0.28	-0.72	1.88
33.000	-4.68	-2.81	-0.84	5.52	-6.10	-4.15	-0.93	7.44	-1.79	-0.26	-0.70	1.94
34.000	-4.82	-2.70	-0.83	5.58	-6.32	-3.95	-0.94	7.51	-1.90	-0.20	-0.67	2.03

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR ACCELERATIONS (G'S) IN LOCAL REFERENCE

TIME (MSEC)	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 3 - UT			
	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
35.000	-5.00	-2.63	-0.85	5.71	-6.43	-3.81	-0.96	7.54	-1.09	-0.17	-0.64	2.10
37.000	-5.47	-2.54	-0.87	6.00	-6.83	-3.50	-1.01	7.74	-2.18	-0.20	-0.60	2.27
39.000	-5.77	-2.37	-0.92	6.31	-7.29	-3.16	-1.07	8.02	-2.38	-0.26	-0.60	2.47
40.000	-5.96	-2.21	-0.94	6.43	-7.55	-3.02	-1.10	8.20	-2.49	-0.20	-0.58	2.56
41.000	-7.11	-2.00	-0.67	7.43	-6.67	-2.67	-1.04	7.26	-4.96	-0.64	0.13	5.00
42.000	-8.50	-1.93	-0.35	9.12	-5.95	-1.67	-0.52	6.20	-9.20	-1.17	1.17	9.35
44.000	-11.63	-1.92	1.21	12.05	-3.89	-0.45	1.07	4.06	-16.22	-2.44	3.60	16.50
44.500	-9.66	-1.86	0.85	6.97	-11.79	-2.69	0.71	12.12	-6.15	-0.70	-0.02	6.19
44.625	-6.64	-1.66	0.49	6.86	-11.51	-2.66	0.35	11.82	-3.73	-0.30	-0.54	3.78
44.750	-6.64	-1.73	0.42	6.87	-11.43	-2.69	0.28	11.74	-3.71	-0.44	-0.53	3.77
44.875	-6.67	-1.72	0.35	6.90	-11.27	-2.65	0.21	11.58	-3.71	-0.44	-0.50	3.77
45.000	-6.73	-1.72	0.28	6.96	-11.06	-2.60	0.13	11.36	-3.70	-0.44	-0.43	3.76
45.250	-6.98	-1.70	0.15	7.19	-10.45	-2.45	0.00	10.74	-4.33	-0.44	-0.29	4.36
45.500	-7.07	-1.67	0.05	7.26	-10.22	-2.39	-0.10	10.50	-4.46	-0.45	-0.24	4.49
46.000	-7.57	-1.62	-0.11	7.75	-9.18	-2.16	-0.27	9.43	-5.72	-0.52	0.10	5.74
46.500	-7.21	-1.54	-0.19	7.97	-8.90	-1.96	-0.35	9.12	-6.20	-0.54	0.20	6.23
47.000	-8.09	-1.47	-0.23	8.22	-8.61	-1.80	-0.39	8.80	-6.81	-0.60	0.34	6.85
48.000	-8.59	-1.29	-0.16	9.08	-7.25	-1.32	-0.32	7.37	-9.44	-0.80	0.88	9.52
49.000	-9.62	-1.12	0.06	9.09	-7.94	-0.85	-0.05	7.99	-9.96	-0.37	0.96	10.04
50.000	-9.11	-0.96	0.12	9.16	-6.10	-0.79	-0.03	6.13	-10.37	-0.52	0.93	10.44
52.000	-10.06	-1.00	0.45	10.14	-5.30	-0.52	0.32	5.34	-14.74	-0.95	1.69	14.91
54.000	-9.97	-0.70	0.74	10.02	-6.54	-1.03	0.63	6.65	-14.46	-0.95	1.72	14.57
54.250	-8.07	-1.06	0.27	8.14	-10.73	-1.40	0.16	10.82	-7.55	-0.52	-0.38	7.58
54.500	-7.97	-1.13	0.16	8.05	-10.66	-1.35	0.06	10.75	-7.55	-0.56	-0.39	7.55
54.750	-7.97	-1.12	0.04	8.05	-10.38	-1.30	-0.06	10.46	-7.51	-0.54	-0.37	7.54
55.000	-8.05	-1.11	-0.07	8.13	-9.99	-1.28	-0.18	10.07	-7.44	-0.55	-0.36	7.47
55.500	-8.28	-1.09	-0.19	8.30	-9.25	-1.21	-0.30	9.33	-5.72	-0.62	-0.33	[illegible]
56.000	-8.24	-1.09	-0.26	8.32	-9.16	-1.15	-0.38	9.24	-8.22	-0.67	-0.31	8.21
57.000	-8.75	-1.08	-0.20	8.82	-8.11	-1.05	-0.32	8.19	-8.83	-0.56	0.26	9.57
58.000	-8.86	-1.11	-0.03	8.95	-8.55	-1.05	-0.15	8.66	-9.63	-0.51	0.51	9.49
59.000	-8.90	-0.70	-0.12	8.99	-8.13	-1.17	-0.24	8.22	-9.78	-0.41	0.59	9.91
60.000	-9.13	-0.53	0.03	9.15	-8.50	-0.93	-0.09	8.55	-9.86	-0.36	0.68	9.91
62.000	-9.26	-0.85	0.22	9.30	-7.28	-1.28	0.11	7.39	-12.67	-0.76	1.40	12.77
63.000	-9.34	-0.92	0.15	9.39	-7.28	-0.11	0.04	7.28	-12.10	-0.68	1.04	12.17
64.250	-8.18	-1.02	0.00	8.25	-10.66	-0.41	-0.11	10.67	-7.51	-0.77	-0.22	7.55
64.500	-8.30	-1.06	-0.05	8.37	-10.46	-0.36	-0.16	10.48	-7.37	-0.76	-0.19	7.41
64.750	-8.35	-1.06	-0.07	8.42	-10.45	-0.67	-0.19	10.46	-7.33	-0.76	-0.17	7.33
65.000	-8.47	-1.12	-0.10	8.54	-10.34	-0.75	-0.22	10.37	-7.17	-0.75	-0.16	7.22
65.500	-8.62	-1.11	-0.08	8.69	-10.17	-0.90	-0.20	10.21	-7.05	-0.75	0.04	7.12
66.000	-8.61	-1.16	-0.07	8.69	-10.46	-0.95	-0.19	10.51	-7.54	-0.76	0.05	7.68
67.000	-9.24	-1.[illegible]	-0.07	9.24	-9.47	[illegible]	-0.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
68.000	-9.34	-1.07	-0.15	9.43	-8.24	[illegible]	-0.27	[illegible]	[illegible]	-0.79	[illegible]	[illegible]
68.500	[illegible]	-1.10	-0.18	8.93	-11.[illegible]	[illegible]	[illegible]	10.[illegible]	[illegible]	-0.76	[illegible]	[illegible]
69.000	-8.98	-1.14	-0.16	8.92	-11.28	-1.01	-0.06	11.[illegible]	-7.49	-0.80	0.11	7.18
69.500	-8.92	-1.14	-0.31	9.69	-10.31	-1.02	-0.43	10.37	-7.17	-0.79	0.11	7.23

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR ACCELERATIONS (G'S) IN LOCAL REFERENCE

TIME	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 3 - UT			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
70.000	-8.97	-1.18	-0.27	9.05	-10.51	-0.85	-0.39	10.55	-7.10	-0.70	0.12	7.15
71.000	-9.20	-1.05	-0.38	9.26	-9.74	-1.23	-0.51	9.83	-7.37	-0.79	0.24	7.92
72.000	-9.30	-1.16	-0.34	9.38	-10.03	-1.68	-0.47	10.19	-7.75	-0.69	0.40	7.79
74.000	-10.20	-1.04	0.33	10.26	-9.79	-3.55	0.19	10.42	-10.23	1.17	1.17	10.46
75.000	-10.66	-1.03	0.59	10.72	-8.75	-2.32	0.44	9.06	-12.22	0.12	2.07	12.40
76.000	-9.59	-1.24	1.16	10.13	-10.75	-2.64	1.01	11.12	-13.13	-0.62	2.22	13.33
77.000	-10.94	-1.54	1.26	11.12	-9.41	-2.[illegible]	1.11	9.43	-12.77	-0.62	2.35	13.09
78.000	-11.06	-1.80	1.57	11.31	-10.34	-[illegible]	[illegible]	10.92	-12.83	-0.40	2.3[illegible]	12.75
80.000	-11.51	-1.93	2.19	11.88	-11.32	-4.05	2.00	12.19	-13.34	0.10	3.00	13.67
81.000	-11.10	-2.92	1.69	11.63	-12.1[illegible]	-4.79	1.70	13.19	-12.3[illegible]	0.45	[illegible].77	12.67
84.000	-11.48	-3.45	1.90	12.14	-13.[illegible]1	-5.83	1.65	14.63	-10.66	-0.01	2.83	12.75
85.000	-11.92	-4.02	1.50	12.67	-13.44	-6.19	1.26	14.84	-7.50	-0.23	1.81	7.71
87.000	-11.85	-4.84	1.63	12.90	-14.39	-7.5[illegible]	1.33	16.49	-7.36	-0.16	2.50	7.75
89.000	-11.99	-5.72	1.31	13.41	-15.33	-8.[illegible]	1.43	17.72	-7.24	-0.25	2.[illegible]7	7.83
90.000	-13.[illegible]	-6.01	1.5[illegible]	1[illegible].72	-15.[illegible]	-[illegible]	1.[illegible]	1[illegible].1[illegible]	-6.1[illegible]	-[illegible]	[illegible]	[illegible]
92.000	-12.24	-6.40	1.92	14.04	-16.[illegible]	-1[illegible].9[illegible]	1.3[illegible]	19.31	-6.77	-0.75	2.[illegible]3	7.57
93.000	-13.43	-6.72	1.96	15.17	-15.3[illegible]	-11.33	1.36	1[illegible].16	-6.89	-0.75	3.72	7.96
94.000	-13.38	-7.04	2.34	15.29	-16.24	-11.46	1.67	19.24	-7.47	-0.87	4.09	8.56
95.000	-13.66	-7.54	2.32	15.78	-16.22	-12.23	1.59	20.37	-7.76	-0.75	4.30	8.91
97.000	-14.09	-9.01	2.30	16.85	-17.35	-12.92	1.39	21.67	-7.87	-0.88	4.40	9.14
98.000	-14.14	-9.26	2.18	17.05	-17.[illegible]	-14.4[illegible]	1.1[illegible]	22.62	-7.[illegible]1	-1.[illegible]	4.3[illegible]	9.20
99.000	-14.67	-10.46	2.15	18.1[illegible]	-17.[illegible]1	-1[illegible].2[illegible]	1.05	23.55	-7.[illegible]1	-1.41	4.42	9.38
100.000	-14.97	-11.22	2.12	18.63	-18.91	-1[illegible].48	0.94	23.10	-7.4[illegible]	-1.46	4.1[illegible]	9.[illegible]

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR ACCELERATIONS (G'S) IN LOCAL REFERENCE

TIME	POINT (-1.00, 0.0 , 2.00) ON SEGMENT NO. 3 - UT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H				POINT (2.00, 0.0 , -1.00) ON SEGMENT NO. 5 - H			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
0.0	-0.04	-0.00	0.89	0.90	-0.20	0.0	0.90	0.93	-0.20	0.0	0.91	0.94
0.250	0.11	-0.00	0.65	0.66	-0.17	-0.00	0.66	0.68	-0.16	0.00	0.68	0.70
0.500	-0.09	-0.01	0.32	0.33	-0.13	-0.00	0.35	0.37	-0.11	0.00	0.39	0.41
0.750	-0.14	-0.03	0.16	0.22	-0.11	-0.00	0.19	0.22	-0.09	0.00	0.24	0.26
1.250	-0.33	-0.06	-0.03	0.34	-0.09	-0.00	0.01	0.09	-0.06	0.00	0.06	0.09
1.750	-0.47	-0.10	-0.18	0.51	-0.08	-0.01	-0.13	0.16	-0.04	0.01	-0.05	0.07
2.250	-0.60	-0.14	-0.27	0.67	-0.10	-0.01	-0.21	0.23	-0.04	0.01	-0.11	0.12
2.750	-0.71	-0.19	-0.32	0.80	-0.12	-0.02	-0.25	0.28	-0.05	0.01	-0.12	0.14
3.250	-0.80	-0.22	-0.36	0.90	-0.14	-0.03	-0.28	0.32	-0.07	0.02	-0.13	0.15
3.750	-0.86	-0.27	-0.38	0.98	-0.17	-0.04	-0.29	0.34	-0.09	0.02	-0.12	0.15
4.750	-0.95	-0.37	-0.40	1.09	-0.22	-0.06	-0.29	0.37	-0.13	0.03	-0.10	0.17
5.000	-0.92	-0.38	-0.40	1.07	-0.23	-0.06	-0.29	0.38	-0.14	0.03	-0.10	0.17
6.000	-0.69	-0.46	-0.40	1.08	-0.27	-0.09	-0.30	0.41	-0.17	0.03	-0.11	0.20
8.000	-0.75	-0.74	-0.31	1.10	-0.26	-0.14	-0.24	0.39	-0.21	0.02	-0.13	0.24
9.000	-0.61	-0.81	-0.25	1.05	-0.23	-0.19	-0.20	0.36	-0.20	0.03	-0.13	0.24
10.000	-0.55	-0.99	-0.09	1.14	-0.20	-0.22	-0.07	0.30	-0.19	0.03	-0.06	0.20
10.500	-0.59	-1.09	-0.12	1.16	-0.18	-0.25	-0.11	0.32	-0.17	0.04	-0.10	0.20
11.000	-0.42	-1.07	-0.20	1.17	-0.14	-0.27	-0.19	0.36	-0.15	0.03	-0.19	0.24
11.500	-0.42	-1.02	-0.16	1.11	-0.11	-0.29	-0.17	0.35	-0.12	0.02	-0.20	0.23
12.500	-0.47	-0.94	-0.21	1.07	-0.03	-0.32	-0.22	0.39	-0.05	-0.01	-0.27	0.27
13.500	-0.77	-0.92	-0.22	1.22	0.05	-0.33	-0.23	0.41	0.02	-0.04	-0.30	0.30
14.500	-0.90	-1.07	-0.09	1.40	0.13	-0.31	-0.11	0.35	0.06	-0.06	-0.20	0.27
15.000	-1.03	-1.15	-0.14	1.55	0.16	-0.30	-0.15	0.37	0.13	-0.06	-0.22	0.26
15.500	-0.95	-0.94	-0.23	1.36	0.19	-0.31	-0.22	0.43	0.18	-0.06	-0.25	0.31
16.000	-0.94	-0.97	-0.31	1.39	0.22	-0.31	-0.29	0.48	0.21	-0.06	-0.30	0.37
16.500	-0.94	-0.93	-0.36	1.37	0.25	-0.31	-0.33	0.51	0.25	-0.06	-0.31	0.41
17.500	-1.00	-0.95	-0.40	1.44	0.29	-0.29	-0.35	0.54	0.31	-0.06	-0.30	0.44
18.500	-1.06	-0.91	-0.43	1.46	0.33	-0.26	-0.36	0.55	0.37	-0.05	-0.28	0.47
19.500	-1.15	-0.91	-0.46	1.53	0.37	-0.23	-0.37	0.57	0.42	-0.03	-0.27	0.50
20.000	-1.15	-0.85	-0.47	1.50	0.39	-0.21	-0.38	0.58	0.44	-0.02	-0.26	0.52
22.000	-1.31	-0.49	-0.60	1.52	0.45	-0.16	-0.47	0.67	0.54	0.04	-0.30	0.62
22.250	-1.27	-0.53	-0.61	1.50	0.46	-0.15	-0.47	0.68	0.55	0.04	-0.30	0.62
22.500	-1.29	-0.74	-0.62	1.61	0.47	-0.13	-0.49	0.69	0.56	0.05	-0.30	0.63
22.750	-1.30	-0.71	-0.63	1.61	0.47	-0.11	-0.49	0.69	0.56	0.06	-0.30	0.64
23.250	-1.35	-0.69	-0.65	1.65	0.49	-0.07	-0.50	0.70	0.58	0.08	-0.30	0.66
23.750	-1.39	-0.67	-0.67	1.68	0.50	-0.04	-0.51	0.71	0.60	0.10	-0.30	0.68
24.250	-1.43	-0.65	-0.68	1.72	0.51	0.00	-0.52	0.73	0.62	0.13	-0.30	0.70
25.000	-1.50	-0.61	-0.72	1.77	0.53	0.06	-0.55	0.76	0.64	0.17	-0.31	0.73
26.000	-1.59	-0.64	-0.77	1.84	0.55	0.14	-0.58	0.81	0.67	0.24	-0.31	0.77
27.000	-1.65	-0.74	-0.79	1.97	0.56	0.21	-0.59	0.83	0.70	0.31	-0.29	0.82
29.000	-1.83	-0.66	-0.84	2.12	0.57	0.39	-0.60	0.92	0.73	0.49	-0.27	0.92
30.000	-1.97	-0.71	-0.82	2.04	0.57	0.43	-0.57	0.92	0.74	0.58	-0.22	0.96
32.000	-2.12	-0.70	-0.95	2.42	0.52	0.57	-0.62	0.99	0.74	0.65	-0.16	1.00
33.000	-2.19	-0.67	-0.93	2.47	0.52	0.62	-0.60	1.01	0.74	0.69	-0.14	1.01
34.000	-2.25	-0.55	-0.92	2.57	0.51	0.67	-0.57	1.02	0.75	0.73	-0.11	1.03

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR ACCELERATIONS (G'S) IN LOCAL REFERENCE

TIME (MSEC)	POINT (-1.00, 0.0 , 2.00) ON SEGMENT NO. 3 - UT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H				POINT (2.00, 0.0 , -1.00) ON SEGMENT NO. 5 - H			
	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
35.000	-2.44	-0.54	-0.90	2.66	0.50	0.74	-0.34	1.04	0.72	0.75	-0.06	1.04
37.000	-2.66	-0.56	-0.89	2.86	0.48	0.86	-0.49	1.10	0.71	0.86	0.01	1.12
39.000	-2.89	-0.61	-0.91	3.09	0.46	0.91	-0.46	1.12	0.71	0.91	0.07	1.16
40.000	-3.02	-0.51	-0.91	3.20	0.46	0.94	-0.44	1.13	0.71	0.95	0.11	1.19
41.000	-5.78	-0.89	-0.34	5.85	-0.96	0.82	0.10	1.27	-0.74	0.75	0.59	1.21
42.000	-9.98	-1.23	0.71	10.08	-3.80	0.50	1.11	3.99	-3.57	0.16	1.62	3.92
44.000	-16.82	-2.15	3.27	17.27	-9.26	-0.43	3.40	9.88	-9.19	-1.38	3.59	9.97
44.500	-5.96	-0.74	-0.00	6.00	-3.27	1.21	0.72	3.56	-2.80	1.13	1.74	3.48
44.625	-3.24	-0.25	-0.37	3.27	-2.32	1.11	0.69	2.66	-1.55	1.10	2.31	2.99
44.750	-3.31	-0.44	-0.40	3.36	-2.24	1.06	0.64	2.56	-1.49	1.10	2.20	2.87
44.875	-3.37	-0.44	-0.41	3.42	-2.16	1.02	0.60	2.47	-1.45	1.09	2.09	2.77
45.000	-3.42	-0.45	-0.41	3.47	-2.11	0.99	0.57	2.40	-1.43	1.09	2.00	2.69
45.250	-4.21	-0.45	-0.31	4.25	-2.27	0.93	0.53	2.52	-1.74	1.06	1.69	2.64
45.500	-4.45	-0.45	-0.31	4.48	-2.27	0.89	0.46	2.48	-1.78	1.02	1.53	2.55
46.000	-5.92	-0.51	-0.08	5.94	-2.81	0.82	0.48	2.97	-2.54	0.91	1.11	2.91
46.500	-6.49	-0.51	-0.02	6.51	-3.13	0.74	0.49	3.26	-2.92	0.76	1.01	3.18
47.000	-7.16	-0.54	0.09	7.18	-3.62	0.66	0.54	3.72	-3.45	0.57	0.96	3.63
48.000	-9.47	-0.64	0.68	9.91	-5.62	0.47	0.95	5.71	-5.07	0.14	0.96	5.74
49.000	-10.21	-0.66	0.74	10.26	-6.52	0.41	1.05	6.61	-6.51	-0.04	1.12	6.69
50.000	-10.73	-0.54	0.76	10.78	-7.47	0.36	1.04	7.55	-7.64	-0.09	1.19	7.64
52.000	-14.67	-0.47	1.90	14.90	-11.51	0.22	1.77	11.94	-12.10	-0.64	1.29	12.15
54.000	-14.12	-0.14	1.82	14.24	-12.97	0.97	1.59	13.10	-13.35	0.80	0.93	13.40
54.250	-6.90	-0.46	-0.12	6.91	-8.61	0.96	0.97	8.72	-7.83	1.00	2.65	8.33
54.500	-7.03	-0.50	-0.19	7.05	-8.39	0.87	0.80	8.47	-7.71	0.92	2.27	8.09
54.750	-7.08	-0.47	-0.22	7.10	-8.21	0.80	0.68	8.27	-7.63	0.85	1.96	7.92
55.000	-7.04	-0.49	-0.23	7.06	-8.03	0.74	0.59	8.14	-7.53	0.77	1.72	7.81
55.500	-8.00	-0.55	-0.08	8.01	-8.49	0.71	0.46	8.24	[illegible]	0.71	[illegible]	8.36
56.000	-8.08	-0.57	-0.10	8.10	-8.44	0.64	0.38	8.47	[illegible]	0.56	0.12	8.34
57.000	-9.44	-0.67	0.34	9.47	-9.66	0.63	0.45	9.71	-9.35	0.41	0.35	9.56
58.000	-9.58	-0.83	0.47	9.63	-9.97	0.62	0.54	10.01	-10.17	0.31	0.29	10.18
59.000	-9.75	-0.06	0.53	9.77	-10.28	0.62	0.59	10.31	-10.50	0.29	0.29	10.51
60.000	-9.82	-0.01	0.64	9.84	-10.63	0.63	0.72	10.67	-10.83	0.31	0.46	10.84
62.000	-12.82	-0.36	1.26	12.89	-13.94	0.92	1.00	13.41	-14.01	0.54	0.19	14.02
64.000	-11.88	-0.62	1.09	11.94	-13.32	1.39	0.79	13.41	-13.82	1.41	-0.10	13.89
64.250	-7.24	-0.84	-0.15	7.29	-8.73	0.95	0.40	8.79	-8.46	1.21	[illegible]	8.64
64.500	-7.11	-0.82	-0.12	7.16	-8.51	0.88	0.39	8.57	-8.21	1.15	0.01	8.44
64.750	-7.08	-0.82	-0.13	7.13	-8.31	0.82	0.36	8.36	-8.14	1.06	0.21	8.25
65.000	-6.95	-0.82	-0.11	7.00	-8.13	0.76	0.36	8.17	-7.99	0.93	0.75	8.08
65.500	-7.56	-0.74	0.04	7.60	-8.45	0.80	0.36	8.49	-8.44	1.01	0.49	8.52
66.000	-7.64	-0.75	0.03	7.63	-8.20	0.74	0.35	8.24	-8.31	0.97	0.48	8.37
67.000	-8.17	-0.65	0.38	8.21	-8.95	0.89	0.49	9.01	-9.16	1.01	0.51	9.22
68.000	-7.94	-0.65	0.37	7.98	-8.78	0.90	0.53	8.94	-8.95	1.03	0.35	9.00
68.500	-7.34	-0.73	-0.01	7.38	-7.44	0.68	0.35	7.48	-7.45	0.94	0.45	7.51
69.000	-7.84	-0.76	-0.12	7.88	-7.19	0.65	0.26	7.23	-7.22	0.80	0.35	7.27
69.500	-7.33	-0.73	-0.02	7.36	-6.99	0.63	0.34	7.03	-7.03	0.78	0.40	7.08

DATE: OCT 16,1973

RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.

CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR ACCELERATIONS (G'S) IN LOCAL REFERENCE

TIME (MSEC)	POINT (-1.00, 0.0 , 2.00) ON SEGMENT NO. 3 - UT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H				POINT (2.00, 0.0 , -1.00) ON SEGMENT NO. 5 - H			
	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
70.000	-7.24	-0.71	-0.01	7.27	-6.82	0.62	0.37	6.86	-6.85	0.75	0.44	6.91
71.000	-8.12	-0.63	0.18	8.15	-7.60	0.84	0.48	7.66	-7.71	0.95	0.39	7.78
72.000	-8.02	-0.50	0.21	8.04	-7.29	0.83	0.55	7.36	-7.39	0.95	0.48	7.48
74.000	-10.25	1.43	1.15	10.41	-11.00	1.79	1.43	11.24	-11.11	1.70	1.36	11.32
75.000	-12.43	0.49	1.91	12.56	-14.70	1.45	1.40	14.85	-15.41	0.88	0.20	15.44
76.000	-13.47	-0.36	1.99	13.63	-16.84	1.66	1.40	16.97	-17.65	0.93	-0.13	17.60
77.000	-12.55	-0.20	2.39	12.81	-16.32	1.97	1.55	16.49	-18.36	1.36	-0.30	18.35
78.000	-12.22	-0.08	2.48	12.47	-18.97	2.20	1.55	19.16	-19.96	1.53	-0.35	20.09
80.000	-13.04	0.48	3.10	13.41	-20.29	3.25	2.01	20.64	-21.39	3.23	-0.17	21.64
82.000	-12.42	0.60	2.69	12.72	-17.88	3.78	1.90	18.36	-18.71	4.11	0.25	19.16
84.000	-10.43	-0.31	2.46	10.72	-13.67	3.61	1.99	14.28	-14.25	4.21	0.82	14.89
85.000	-7.17	-0.82	1.91	7.47	-7.64	1.80	2.59	8.12	-7.72	2.22	1.93	8.26
87.000	-7.82	-1.68	2.21	8.16	-5.93	1.69	2.63	6.70	-5.26	2.04	2.37	[illegible]
89.000	-8.08	-0.97	2.49	8.49	-4.27	1.45	3.17	5.51	-4.04	1.72	[illegible]	5.70
90.000	-7.09	-1.42	2.47	7.64	-2.55	0.83	3.29	4.25	-2.27	1.11	[illegible]	4.06
92.000	-7.96	-1.72	2.81	8.63	-2.80	1.16	3.69	4.78	-2.53	2.09	4.15	5.71
93.000	-7.66	-1.52	3.26	8.47	-3.69	1.65	4.11	5.82	-3.46	2.33	4.57	6.19
94.000	-8.25	-1.75	3.57	9.15	-4.07	2.24	4.46	6.44	-3.81	2.72	4.99	6.84
95.000	-8.57	-1.60	3.75	9.49	-4.15	2.52	4.70	6.75	-3.97	2.97	5.27	7.19
97.000	-8.77	-1.97	3.82	9.77	-3.75	2.72	4.95	6.79	-3.40	3.19	5.59	7.35
98.000	-8.53	-2.27	3.80	9.60	-3.07	2.46	5.11	6.45	-2.93	2.81	6.03	7.16
99.000	-8.22	-2.67	3.86	9.47	-2.07	1.95	5.39	6.39	-1.53	2.09	6.52	7.01
100.000	-8.28	-2.69	3.88	9.53	-1.59	1.74	5.58	6.06	-0.95	1.20	6.85	7.11

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR VELOCITIES (IN./SEC.) IN VEHICLE REFERENCE

TIME	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.250	0.03	0.00	0.10	0.10	-0.06	0.00	0.12	0.13	0.03	0.00	0.08	0.08
0.500	0.05	0.00	0.13	0.14	-0.03	0.00	0.15	0.16	0.03	0.01	0.12	0.13
0.750	0.07	0.01	0.16	0.17	-0.01	0.00	0.17	0.17	0.03	0.02	0.16	0.16
1.250	0.09	0.02	0.17	0.19	0.02	0.00	0.18	0.19	0.09	0.05	0.17	0.20
1.750	0.10	0.04	0.16	0.19	0.05	0.00	0.17	0.18	0.13	0.09	0.17	0.23
2.250	0.11	0.06	0.13	0.18	0.08	-0.00	0.14	0.16	0.20	0.15	0.14	0.28
2.750	0.12	0.08	0.10	0.17	0.11	-0.01	0.10	0.14	0.30	0.22	0.10	0.39
3.250	0.13	0.11	0.06	0.18	0.13	-0.02	0.06	0.14	0.42	0.30	0.06	0.52
3.750	0.14	0.14	0.03	0.20	0.15	-0.03	0.02	0.15	0.56	0.40	0.01	0.70
4.750	0.17	0.21	-0.04	0.27	0.17	-0.05	-0.04	0.18	0.89	0.64	-0.08	1.10
5.000	0.19	0.23	-0.05	0.30	0.18	-0.06	-0.05	0.20	0.99	0.71	-0.10	1.23
6.000	0.29	0.31	-0.08	0.43	0.20	-0.09	-0.06	0.23	1.44	1.00	-0.17	1.76
8.000	0.66	0.49	-0.05	0.83	0.23	-0.17	0.04	0.29	2.38	1.74	-0.31	3.13
9.000	0.98	0.59	0.03	1.14	0.23	-0.22	0.19	0.36	3.45	2.26	-0.39	4.14
10.000	1.33	0.72	0.15	1.52	0.14	-0.27	0.40	0.50	4.52	2.86	-0.49	5.37
10.500	1.54	0.78	0.22	1.74	0.15	-0.31	0.51	0.62	5.06	3.17	[illegible]	[illegible]
11.000	1.76	0.85	0.30	1.98	0.16	-0.34	0.64	0.74	5.57	3.46	[illegible]	[illegible]
11.500	1.96	0.92	0.39	2.20	0.12	-0.37	0.78	0.88	6.13	3.74	[illegible]	7.20
12.500	2.35	1.07	0.59	2.65	0.05	-0.47	1.03	1.17	7.35	4.33	-0.62	8.56
13.500	2.71	1.25	0.80	3.09	-0.08	-0.58	1.39	1.51	8.67	4.96	-0.70	10.02
14.500	3.14	1.46	1.01	3.61	-0.24	-0.71	1.72	1.87	10.35	5.70	-0.85	11.85
15.000	3.37	1.57	1.12	3.88	-0.28	-0.81	1.88	2.07	11.31	6.08	-0.92	12.97
15.500	3.60	1.69	1.22	4.16	-0.29	-0.90	2.04	2.24	12.18	6.55	-0.92	13.96
16.000	3.92	1.80	1.32	4.42	-0.30	-0.97	2.18	2.40	12.97	6.96	-1.04	14.76
16.500	4.07	1.92	1.42	4.72	-0.28	-1.02	2.33	2.55	13.88	7.37	-1.10	15.75
17.500	4.64	2.17	1.59	5.36	-0.20	-1.12	2.59	2.83	15.76	8.20	-1.26	17.81
18.500	5.27	2.44	1.75	6.06	-0.06	-1.24	2.85	3.10	17.70	9.13	-1.41	19.97
19.500	5.96	2.73	1.89	6.82	0.14	-1.37	3.08	3.37	19.76	10.16	-1.59	22.28
20.000	6.34	2.89	1.95	7.23	0.28	-1.43	3.19	3.51	20.85	10.70	-1.68	23.50
22.000	6.02	3.55	2.18	9.04	1.03	-1.86	3.59	4.17	25.37	13.23	-2.07	28.69
22.250	3.26	3.62	2.20	9.28	1.15	-1.94	3.63	4.23	25.97	13.50	-2.12	29.35
22.500	6.50	3.72	2.22	9.54	1.27	-1.85	3.67	4.30	26.57	13.92	-2.17	30.03
22.750	8.74	3.82	2.24	9.80	1.39	-1.88	3.71	4.39	27.18	14.14	-2.23	30.72
23.250	9.23	4.01	2.27	10.31	1.65	-1.96	3.78	4.57	28.41	14.80	-2.34	32.12
23.750	9.72	4.20	2.31	10.84	1.91	-2.06	3.86	4.77	29.67	15.48	-2.46	33.56
24.250	10.24	4.40	2.34	11.38	2.19	-2.16	3.93	4.98	30.96	16.17	-2.58	35.03
25.000	11.03	4.69	2.38	12.22	2.63	-2.32	4.02	5.34	32.94	17.26	-2.76	37.29
26.000	12.13	5.10	2.42	13.38	3.28	-2.55	4.13	5.86	35.65	18.78	-3.02	40.41
27.000	13.29	5.52	2.43	14.59	3.99	-2.81	4.21	6.44	38.47	20.38	-3.28	43.66
29.000	15.60	6.52	2.44	17.27	5.59	-3.04	4.34	7.70	44.46	24.12	-3.82	50.73
30.000	17.12	7.06	2.44	18.68	6.45	-3.08	4.39	8.39	47.53	25.82	-4.08	54.25
32.000	19.89	8.34	2.44	21.70	8.26	-2.73	4.50	9.80	53.98	29.51	-4.61	61.69
33.000	21.29	9.08	2.44	23.27	9.17	-2.49	4.55	10.53	57.24	31.56	-4.85	65.55
34.000	22.69	9.84	2.44	24.85	10.05	-2.22	4.60	11.27	60.59	33.69	-5.09	69.51

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.0 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 298-1090-2004

SEGMENT LINEAR VELOCITIES (IN./SEC.) IN VEHICLE REFERENCE

TIME (MSEC)	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H			
	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
35.000	24.11	10.72	2.44	26.50	10.92	-1.82	4.65	12.01	64.04	35.89	-5.34	73.61
37.000	26.98	12.68	2.46	29.91	12.67	-0.79	4.75	13.56	71.16	40.64	-5.90	82.15
39.000	29.87	14.65	2.48	33.45	14.43	0.53	4.84	15.23	78.63	45.63	-6.22	91.12
40.000	31.28	16.03	2.49	35.24	15.27	1.36	4.89	16.09	82.44	48.18	-6.41	95.79
41.000	32.65	17.32	2.53	37.04	16.14	2.31	4.93	17.04	86.29	50.79	-6.55	100.34
42.000	33.41	18.74	2.77	38.41	17.74	3.60	4.97	18.77	89.32	53.39	-6.11	104.24
44.000	32.85	21.51	4.11	39.48	19.02	7.18	5.90	21.17	93.90	57.15	-4.54	110.02
44.500	33.29	22.19	4.49	40.26	19.48	7.96	6.26	21.95	95.14	58.19	-4.08	111.60
44.625	33.48	22.38	4.57	40.53	19.46	8.09	6.36	22.01	95.52	58.55	-4.02	112.11
44.750	33.67	22.56	4.64	40.81	19.42	8.24	6.46	22.07	95.92	58.88	-3.96	112.62
44.875	33.87	22.78	4.70	41.09	19.40	8.39	6.55	22.13	96.34	59.22	-3.91	113.15
45.000	34.06	22.99	4.77	41.36	19.39	8.54	6.64	22.20	96.74	59.56	-3.86	113.67
45.250	34.43	23.38	4.89	41.91	19.39	8.85	6.80	22.38	97.53	60.23	-3.76	114.70
45.500	34.79	23.79	5.00	42.44	19.45	9.17	6.94	22.60	98.33	60.90	-3.67	115.72
46.000	35.46	24.61	5.20	43.47	19.67	9.86	7.19	23.15	99.92	62.24	-3.48	117.77
46.500	36.06	25.45	5.39	44.46	20.05	10.61	7.38	23.85	101.40	63.57	-3.27	119.72
47.000	36.62	26.31	5.58	45.43	20.50	11.40	7.54	24.64	102.81	64.89	-3.03	121.61
48.000	37.58	28.10	5.98	47.31	21.65	13.14	7.85	26.52	105.37	67.52	-2.45	125.17
49.000	38.34	29.95	6.44	49.06	23.11	15.03	8.14	28.75	107.26	70.05	-1.60	128.11
50.000	39.08	31.93	6.97	50.94	24.66	17.05	8.48	31.16	108.54	72.73	-0.58	130.65
52.000	40.49	35.74	8.11	54.61	28.07	20.97	9.22	36.23	109.82	77.33	1.65	134.32
54.000	41.86	39.74	9.53	58.50	31.96	25.29	10.18	42.01	108.68	82.38	4.53	136.45
54.250	42.16	40.26	9.68	59.09	32.23	25.81	10.32	42.57	108.84	83.06	4.81	137.00
54.500	42.53	40.78	9.80	59.74	32.38	26.31	10.47	43.02	109.17	83.78	5.04	137.71
54.750	42.91	41.31	9.92	60.38	32.53	26.81	10.61	43.47	109.52	84.51	5.25	138.44
55.000	43.29	41.83	10.03	61.03	32.71	27.32	10.73	43.95	109.90	85.23	5.44	139.18
55.500	44.04	42.90	10.23	62.33	33.15	28.35	10.96	44.97	110.65	86.67	5.80	140.67
56.000	44.77	43.98	10.42	63.62	33.64	29.42	11.16	46.06	111.44	88.12	6.15	142.20
57.000	46.17	46.13	10.75	66.14	34.70	31.56	11.49	48.29	112.96	90.93	6.75	145.17
58.000	47.47	48.31	11.05	68.63	35.86	33.78	11.77	50.65	114.32	93.68	7.33	147.58
59.000	48.76	50.54	11.43	71.15	37.08	36.02	12.12	53.10	115.52	96.45	8.03	150.71
60.000	50.01	52.82	11.89	73.71	38.37	38.29	12.52	55.64	116.48	99.28	8.79	153.30
62.000	52.43	57.50	12.98	78.89	41.28	42.81	13.44	60.98	117.52	105.15	10.62	158.05
64.000	54.71	62.28	14.00	84.07	44.76	47.43	14.20	66.75	117.58	111.57	12.61	162.58
64.250	55.05	62.86	14.09	84.74	45.10	48.08	14.28	67.45	117.85	112.38	12.80	163.35
64.500	55.45	63.44	14.19	85.45	45.25	48.72	14.41	68.04	118.24	113.14	12.94	164.16
64.750	55.87	64.03	14.28	86.17	45.47	49.34	14.52	68.65	118.67	113.93	13.08	165.03
65.000	56.30	64.61	14.38	86.90	45.72	49.96	14.63	69.29	119.11	114.71	13.24	165.89
65.500	57.12	65.78	14.56	88.33	46.21	51.18	14.86	70.54	119.99	116.27	13.53	167.63
66.000	57.95	66.95	14.76	89.76	46.70	52.39	15.07	71.78	120.92	117.82	13.80	169.39
67.000	59.59	69.29	15.24	92.66	48.26	54.80	15.52	74.65	122.68	120.95	14.63	172.50
68.000	61.02	71.66	15.60	95.40	49.69	57.18	15.83	77.40	122.70	124.16	15.34	175.93
68.500	61.75	72.84	15.75	96.79	50.26	58.39	15.99	78.69	124.54	125.73	15.62	177.66
69.000	62.[illegible]9	74.03	15.92	98.24	50.60	59.62	16.20	79.87	126.12	127.27	15.80	179.87
69.500	63.38	75.22	16.06	99.67	51.15	60.85	16.35	81.16	127.40	128.81	16.05	181.88

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR VELOCITIES (IN./SEC.) IN VEHICLE REFERENCE

TIME	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
70.000	64.15	76.41	16.20	101.08	51.72	62.06	16.49	82.45	128.53	130.35	16.29	183.79
71.000	65.62	78.81	16.52	103.88	52.82	64.51	16.82	85.05	130.66	133.44	16.84	187.52
72.000	67.00	81.22	16.78	106.62	53.86	66.90	17.06	87.57	132.84	136.56	17.34	191.30
74.000	69.60	86.06	17.61	112.07	55.78	70.87	17.79	91.92	135.05	143.12	18.53	199.22
75.000	70.75	88.55	18.33	114.81	56.69	72.64	18.41	93.96	136.14	146.55	19.80	201.00
76.000	71.75	90.95	19.06	117.41	58.61	74.43	19.91	96.61	135.12	150.11	21.01	203.06
77.000	72.62	93.22	20.15	119.87	60.28	76.18	19.79	99.14	133.00	153.70	22.59	204.50
78.000	73.46	95.47	20.95	122.27	61.61	78.00	20.44	101.48	130.83	157.30	23.74	205.97
80.000	75.25	99.67	23.37	127.21	62.67	81.52	22.72	105.30	126.95	165.02	26.35	211.08
82.000	76.82	103.70	25.68	131.62	63.36	84.14	25.04	108.27	127.20	173.07	29.24	216.91
84.000	78.18	106.78	27.20	135.31	[illegible]	85.52	27.11	110.17	[illegible]	181.03	32.5[illegible]	223.55
85.000	78.74	108.20	29.28	136.93	82.[illegible]	86.22	28.05	110.35	[illegible]	185.19	33.70	227.35
87.000	79.53	110.42	31.25	139.62	62.25	86.54	29.81	110.73	121.[illegible]	191.94	36.44	235.55
89.000	79.91	112.06	33.01	141.54	59.45	85.87	31.29	109.63	139.65	198.19	38.58	245.55
90.000	80.10	112.62	33.80	142.27	57.92	85.21	31.91	107.86	144.12	201.37	40.12	250.86
92.000	80.00	113.61	35.29	143.36	54.41	83.47	32.92	104.95	153.58	208.93	43.04	263.64
93.000	79.80	114.03	36.11	143.73	52.33	82.19	33.40	103.13	158.[illegible]	214.[illegible]	44.79	269.[illegible]2
94.000	79.14	114.32	37.01	143.88	50.49	80.[illegible]	33.56	100.9[illegible]	163.33	217.83	45.[illegible]4	275.96
95.000	78.44	114.41	37.94	143.61	46.44	79.2[illegible]	34.4[illegible]	97.27	164.61	221.36	47.76	280.11
97.000	76.43	113.44	39.51	142.38	43.75	73.73	34.74	92.51	171.[illegible]	228.98	52.05	288.64
98.000	75.33	112.65	40.13	141.33	41.27	70.70	34.68	88.91	174.66	233.29	55.41	296.65
99.000	73.94	111.66	40.76	139.99	38.32	68.05	34.68	85.45	178.23	236.03	57.64	301.33
100.000	72.39	110.20	41.17	138.13	35.16	65.02	34.43	81.54	181.89	238.69	59.85	305.99

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR DISPLACEMENTS (IN.) IN VEHICLE REFERENCE

TIME (MSEC)	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H			
	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
0.0	5.02	0.0	-11.52	12.56	6.60	0.0	-4.08	7.76	-0.00	0.0	-35.60	35.60
0.250	5.02	0.00	-11.52	12.56	6.60	0.00	-4.08	7.76	-0.00	0.00	-35.60	35.60
0.500	5.02	0.00	-11.52	12.56	6.60	0.00	-4.08	7.76	-0.00	0.00	-35.60	35.60
0.750	5.02	0.00	-11.52	12.56	6.60	0.00	-4.08	7.76	-0.00	0.00	-35.60	35.60
1.250	5.02	0.00	-11.52	12.56	6.60	0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
1.750	5.02	0.00	-11.52	12.56	6.60	0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
2.250	5.02	0.00	-11.52	12.56	6.60	0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
2.750	5.02	0.00	-11.52	12.56	6.60	0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
3.250	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
3.750	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
4.750	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
5.000	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
6.000	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.00	0.00	-35.60	35.60
6.000	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.01	0.00	-35.60	35.60
9.000	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.01	0.01	-35.60	35.60
10.000	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.01	0.01	-35.60	35.60
10.500	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.02	0.01	-35.60	35.60
11.000	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.02	0.01	-35.60	35.60
11.500	5.02	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.02	0.01	-35.60	35.60
12.500	5.03	0.00	-11.52	12.56	6.60	-0.00	-4.08	7.76	0.03	0.02	-35.60	35.60
13.500	5.03	0.01	-11.51	12.56	6.60	-0.00	-4.08	7.76	0.04	0.02	-35.60	35.60
14.500	5.03	0.01	-11.51	12.56	6.60	-0.00	-4.08	7.76	0.05	0.03	-35.60	35.60
15.000	5.03	0.01	-11.51	12.56	6.60	-0.00	-4.08	7.76	0.05	0.03	-35.60	35.60
15.500	5.03	0.01	-11.51	12.56	6.60	-0.00	-4.08	7.76	0.06	0.03	-35.60	35.60
16.000	5.04	0.01	-11.51	12.57	6.60	-0.00	-4.07	7.75	0.06	0.04	-35.60	35.60
16.500	5.04	0.01	-11.51	12.57	6.60	-0.00	-4.07	7.75	0.07	0.04	-35.61	35.61
17.500	5.04	0.01	-11.51	12.57	6.60	-0.00	-4.07	7.75	0.09	0.05	-35.61	35.61
18.500	5.05	0.02	-11.51	12.57	6.60	-0.01	-4.07	7.75	0.10	0.06	-35.61	35.61
19.500	5.05	0.02	-11.51	12.57	6.60	-0.01	-4.07	7.75	0.12	0.07	-35.61	35.61
20.000	5.06	0.02	-11.51	12.57	6.60	-0.01	-4.06	7.75	0.13	0.07	-35.61	35.61
22.000	5.07	0.03	-11.50	12.57	6.60	-0.01	-4.06	7.75	0.16	0.10	-35.61	35.61
22.250	5.07	0.03	-11.50	12.57	6.60	-0.01	-4.06	7.75	0.18	0.10	-35.61	35.61
22.500	5.07	0.03	-11.50	12.57	6.60	-0.01	-4.06	7.75	0.19	0.10	-35.62	35.62
22.750	5.08	0.03	-11.50	12.57	6.60	-0.01	-4.05	7.75	0.20	0.11	-35.62	35.62
23.250	5.09	0.03	-11.50	12.57	6.60	-0.01	-4.05	7.75	0.21	0.11	-35.62	35.62
23.750	5.09	0.03	-11.50	12.57	6.60	-0.01	-4.05	7.75	0.23	0.12	-35.62	35.62
24.250	5.09	0.03	-11.50	12.57	6.60	-0.02	-4.05	7.74	0.24	0.13	-35.62	35.62
25.000	5.10	0.04	-11.49	12.57	6.60	-0.02	-4.05	7.74	0.26	0.14	-35.62	35.62
26.000	5.11	0.04	-11.49	12.58	6.60	-0.02	-4.05	7.74	0.28	0.15	-35.63	35.63
27.000	5.12	0.05	-11.49	12.59	6.61	-0.02	-4.04	7.75	0.30	0.16	-35.63	35.63
29.000	5.15	0.06	-11.48	12.59	6.61	-0.02	-4.04	7.75	0.32	0.17	-35.63	35.63
30.000	5.17	0.07	-11.48	12.60	6.62	-0.03	-4.03	7.75	0.35	0.18	-35.63	35.63
32.000	5.21	0.08	-11.46	12.61	6.63	-0.03	-4.03	7.75	0.40	0.20	-35.64	35.64
33.000	5.23	0.09	-11.47	12.62	6.64	-0.04	-4.02	7.76	0.45	0.22	-35.64	35.64
34.000	5.25	0.10	-11.47	12.62	6.65	-0.04	-4.01	7.77	0.57	0.30	-35.65	35.65
					6.66	-0.04	-4.01	7.77	0.62	0.34	-35.65	35.66
									0.68	0.37	-35.66	35.67

DATE: OCT 16.1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR DISPLACEMENTS (IN.) IN VEHICLE REFERENCE

TIME	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - R			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
35.000	5.27	0.11	-11.47	12.62	6.67	-0.05	-4.00	7.78	0.74	0.40	-35.66	35.67
37.000	5.32	0.13	-11.46	12.64	6.69	-0.05	-3.99	7.79	0.88	0.48	-35.67	35.69
39.000	5.38	0.16	-11.46	12.66	6.72	-0.05	-3.98	7.81	1.03	0.57	-35.69	35.70
40.000	5.41	0.18	-11.46	12.67	6.74	-0.05	-3.98	7.82	1.11	0.61	-35.69	35.71
41.000	5.44	0.19	-11.45	12.68	6.75	-0.05	-3.97	7.83	1.19	0.66	-35.70	35.72
42.000	5.47	0.21	-11.45	12.70	6.77	-0.04	-3.97	7.85	1.28	0.71	-35.70	35.73
44.000	5.54	0.25	-11.45	12.72	6.80	-0.03	-3.96	7.87	1.46	0.83	-35.71	35.75
44.500	5.56	0.26	-11.44	12.72	6.81	-0.03	-3.95	7.88	1.51	0.85	-35.72	35.76
44.625	5.56	0.27	-11.44	12.73	6.82	-0.03	-3.95	7.88	1.52	0.86	-35.72	35.76
44.750	5.57	0.27	-11.44	12.73	6.82	-0.03	-3.95	7.88	1.54	0.87	-35.72	35.76
44.875	5.57	0.27	-11.44	12.73	6.82	-0.02	-3.95	7.88	1.55	0.88	-35.72	35.76
45.000	5.57	0.27	-11.44	12.73	6.82	-0.02	-3.95	7.88	1.56	0.89	-35.72	35.76
45.250	5.58	0.28	-11.44	12.73	6.83	-0.02	-3.95	7.89	1.59	0.90	-35.72	35.77
45.500	5.59	0.29	-11.44	12.74	6.83	-0.02	-3.95	7.89	1.61	0.91	-35.72	35.77
46.000	5.61	0.30	-11.44	12.74	6.84	-0.01	-3.94	7.90	1.66	0.94	-35.72	35.77
46.500	5.63	0.31	-11.43	12.75	6.85	-0.01	-3.94	7.90	1.71	0.99	-35.72	35.78
47.000	5.64	0.32	-11.43	12.75	6.86	-0.00	-3.94	7.91	1.76	1.01	-35.73	35.78
48.000	5.68	0.35	-11.42	12.76	6.88	0.01	-3.93	7.93	1.86	1.07	-35.73	35.79
49.000	5.72	0.38	-11.42	12.78	6.91	0.02	-3.92	7.94	1.97	1.14	-35.73	35.80
50.000	5.76	0.41	-11.41	12.79	6.93	0.04	-3.91	7.96	2.08	1.21	-35.73	35.81
52.000	5.84	0.48	-11.40	12.81	6.98	0.08	-3.89	8.00	2.30	1.36	-35.73	35.83
54.000	5.92	0.55	-11.38	12.84	7.04	0.12	-3.87	8.04	2.52	1.52	-35.72	35.85
54.250	5.93	0.56	-11.38	12.84	7.05	0.13	-3.87	8.05	2.54	1.54	-35.72	35.85
54.500	5.94	0.57	-11.37	12.85	7.06	0.14	-3.87	8.05	2.57	1.56	-35.72	35.85
54.750	5.95	0.58	-11.37	12.85	7.07	0.14	-3.87	8.06	2.60	1.59	-35.72	35.85
55.000	5.96	0.59	-11.37	12.85	7.08	0.15	-3.86	8.06	2.63	1.61	-35.72	35.85
55.500	5.98	0.62	-11.36	12.86	7.09	0.16	-3.86	8.08	2.68	1.65	-35.72	35.86
56.000	6.01	0.64	-11.36	12.87	7.11	0.18	-3.85	8.09	2.74	1.69	-35.71	35.86
57.000	6.05	0.68	-11.35	12.88	7.14	0.21	-3.84	8.11	2.85	1.78	-35.71	35.87
58.000	6.10	0.73	-11.34	12.89	7.18	0.24	-3.83	8.14	2.96	1.88	-35.70	35.87
59.000	6.15	0.78	-11.33	12.91	7.21	0.28	-3.82	8.17	3.08	1.97	-35.69	35.88
60.000	6.20	0.83	-11.31	12.93	7.25	0.31	-3.81	8.20	3.19	2.07	-35.68	35.89
62.000	6.30	0.94	-11.29	12.96	7.33	0.39	-3.78	8.26	3.43	2.27	-35.67	35.90
64.000	6.41	1.06	-11.26	13.00	7.42	0.48	-3.75	8.33	3.66	2.49	-35.64	35.92
64.250	6.42	1.08	-11.26	13.01	7.43	0.50	-3.75	8.34	3.69	2.52	-35.64	35.92
64.500	6.43	1.09	-11.26	13.01	7.44	0.51	-3.75	8.35	3.72	2.55	-35.64	35.92
64.750	6.45	1.11	-11.25	13.02	7.45	0.52	-3.74	8.35	3.75	2.57	-35.63	35.92
65.000	6.46	1.12	-11.25	13.02	7.46	0.53	-3.74	8.36	3.78	2.60	-35.63	35.92
65.500	6.49	1.16	-11.24	13.03	7.49	0.56	-3.73	8.38	3.84	2.66	-35.62	35.93
66.000	6.52	1.19	-11.23	13.04	7.51	0.58	-3.72	8.40	3.90	2.72	-35.62	35.93
67.000	6.58	1.26	-11.22	13.07	7.56	0.64	-3.71	8.44	4.02	2.84	-35.60	35.94
68.000	6.64	1.33	-11.20	13.09	7.61	0.69	-3.69	8.48	4.15	2.96	-35.59	35.95
68.500	6.67	1.37	-11.20	13.10	7.63	0.72	-3.68	8.50	4.21	3.02	-35.58	35.95
69.000	6.70	1.40	-11.19	13.12	7.66	0.75	-3.68	8.53	4.27	3.09	-35.57	35.96
69.500	6.73	1.44	-11.18	13.13	7.68	0.78	-3.67	8.55	4.33	3.15	-35.56	35.96

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 EPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT LINEAR DISPLACEMENTS (IN.) IN VEHICLE REFERENCE

TIME (MSEC)	POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 7.60) ON SEGMENT NO. 1 - LT				POINT (0.0 , 0.0 , 0.0) ON SEGMENT NO. 5 - H			
	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
70.000	6.75	1.48	-11.17	13.14	7.71	0.81	-3.66	8.57	4.40	3.22	-35.56	35.97
71.000	6.83	1.55	-11.16	13.17	7.76	0.88	-3.64	8.62	4.53	3.35	-35.54	35.98
72.000	6.89	1.63	-11.14	13.20	7.81	0.94	-3.63	8.66	4.66	3.48	-35.52	35.99
74.000	7.03	1.80	-11.10	13.27	7.92	1.08	-3.59	8.77	4.93	3.76	-35.49	36.02
75.000	7.10	1.89	-11.09	13.30	7.98	1.15	-3.57	8.82	5.07	3.91	-35.47	36.04
76.000	7.17	1.98	-11.07	13.34	8.04	1.22	-3.56	8.87	5.20	4.06	-35.45	36.05
77.000	7.24	2.07	-11.05	13.37	8.10	1.30	-3.54	8.93	5.33	4.21	-35.42	36.07
78.000	7.32	2.17	-11.03	13.41	8.16	1.38	-3.52	8.99	5.47	4.36	-35.40	36.09
80.000	7.47	2.36	-10.98	13.49	8.28	1.54	-3.47	9.11	5.73	4.69	-35.35	36.12
82.000	7.62	2.56	-10.93	13.57	8.41	1.70	-3.42	9.24	5.98	5.02	-35.30	36.15
84.000	7.77	2.78	-10.88	13.66	8.53	1.87	-3.37	9.37	6.24	5.38	-35.23	36.18
85.000	7.85	2.88	-10.85	13.70	8.60	1.96	-3.34	9.43	6.36	5.56	-35.20	36.20
87.000	8.01	3.10	-10.79	13.79	8.72	2.13	-3.29	9.56	6.62	5.94	-35.13	36.24
89.000	8.17	3.32	-10.73	13.89	8.85	2.30	-3.23	9.69	6.89	6.33	-35.06	36.28
90.000	8.25	3.44	-10.69	13.94	8.90	2.39	-3.19	9.76	7.03	6.53	-35.02	36.31
92.000	8.41	3.66	-10.62	14.04	9.02	2.56	-3.13	9.88	7.33	6.94	-34.93	36.36
93.000	8.49	3.78	-10.59	14.09	9.07	2.64	-3.10	9.94	7.49	7.15	-34.89	36.39
94.000	8.57	3.89	-10.55	14.14	9.12	2.72	-3.06	10.00	7.65	7.37	-34.84	36.43
95.000	8.65	4.01	-10.51	14.19	9.17	2.80	-3.03	10.06	7.81	7.59	-34.80	36.46
97.000	8.80	4.23	-10.44	14.30	9.26	2.96	-2.96	10.16	8.15	8.04	-34.69	36.53
98.000	8.88	4.35	-10.40	14.35	9.31	3.03	-2.92	10.21	8.32	8.27	-34.64	36.57
99.000	8.95	4.46	-10.36	14.40	9.35	3.10	-2.89	10.26	8.50	8.50	-34.58	36.61
100.000	9.03	4.57	-10.32	14.45	9.38	3.16	-2.86	10.31	8.68	8.74	-34.52	36.66

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR ACCELERATIONS (DEG/SEC.**2) IN VEHICLE REFERENCE

TIME	SEGMENT NO. 1 - LT				SEGMENT NO. 3 - UT				SEGMENT NO. 5 - H			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
0.0	0.00	-7016.60	-0.00	7016.60	0.00	-630.37	0.0	630.37	0.0	-124.12	0.0	124.12
0.250	28.51	-958.15	18.43	958.75	-0.01	-370.80	12.97	371.02	1.13	-239.20	0.46	239.20
0.500	80.15	-44.71	58.45	108.81	-0.56	-759.48	49.22	761.07	7.20	-505.77	3.41	506.53
0.750	134.35	133.01	105.62	216.58	-1.16	-535.73	96.19	544.30	19.93	-535.68	10.27	537.15
1.250	228.34	528.33	206.96	450.30	-6.92	-469.22	211.41	514.69	65.23	-637.26	37.75	641.70
1.750	311.80	279.54	313.52	523.12	-8.20	-268.99	335.04	429.74	130.89	-870.04	82.87	884.41
2.250	399.34	214.90	420.18	618.23	-3.27	-86.08	471.00	478.81	213.10	-1125.30	143.52	1154.26
2.750	482.35	134.38	514.37	717.84	-16.52	16.65	597.38	597.85	299.70	-1403.82	215.20	1451.49
3.250	561.16	77.62	630.72	847.78	-22.73	81.52	738.70	743.53	393.79	-1675.42	300.24	1747.07
3.750	640.94	-105.85	700.59	955.42	-20.50	116.32	839.71	847.98	493.92	-1983.87	391.65	1991.28
4.750	820.16	-226.35	956.93	1260.47	-51.37	42.22	1132.79	1134.74	695.76	-2101.71	606.05	2295.33
5.000	770.62	-280.86	1015.23	1305.15	-91.25	164.74	1195.43	1210.18	743.59	-2137.29	639.76	2342.56
6.000	972.98	-605.91	1164.97	1718.53	-95.[illegible]	-54.86	1269.47	1274.20	896.16	-2095.50	855.78	2433.75
8.000	763.43	-2456.27	1736.25	3109.43	-186.[illegible]	-1316.69	2091.05	2332.58	1245.34	-1240.83	1200.58	2140.55
9.000	1178.50	-2748.67	1600.71	3392.26	-316.[illegible]	-1064.99	2226.59	2488.34	1687.17	-761.23	1559.23	2420.17
10.000	1291.19	-1715.46	2020.34	2948.18	-505.86	-1332.62	2713.48	3064.95	1813.07	-196.11	1845.23	2594.41
10.500	1326.62	-2124.53	1679.75	3131.61	-274.47	-1020.60	2624.45	2829.26	2121.24	-139.41	2004.16	2977.05
11.000	1422.08	-3768.05	1642.00	4377.97	-292.[illegible]	-1924.07	2891.[illegible]	3233.07	2276.57	9.45	[illegible]	3[illegible].77
11.500	1659.10	-3530.04	1866.91	4323.82	-251.[illegible]	-2327.32	2894.62	3349.73	2259.33	338.50	2329.30	3269.11
12.500	2039.81	-4224.25	2041.04	5115.76	-125.15	-2931.88	2199.76	3667.46	2006.91	537.44	2396.00	3165.23
13.500	2444.12	-3987.89	2248.27	5189.58	139.13	-4474.45	2387.03	4939.21	1664.71	723.04	2372.53	2987.40
14.500	3747.70	-1933.34	2466.84	4835.53	714.39	-4703.50	2293.82	5281.56	966.68	983.02	2251.18	2639.81
15.000	3088.24	-3048.51	2539.00	5027.64	1086.91	-5054.51	2311.58	5663.68	758.36	726.51	2255.53	2488.04
15.500	2175.39	-3543.94	2922.13	5082.39	757.25	-4497.96	2164.39	5048.73	1019.02	358.68	2277.79	2570.99
16.000	2572.76	-3918.07	2726.35	5422.48	987.45	-4393.20	2207.90	5095.27	987.02	90.97	2286.56	2432.53
16.500	2620.04	-3735.42	2673.09	5238.35	1042.06	-4210.46	2194.84	4861.19	934.73	-125.25	2273.75	2461.57
17.500	2762.05	-3568.35	2842.42	5333.05	1397.61	-4185.70	2129.58	4899.85	632.33	-526.00	2226.10	2373.19
18.500	2885.37	-3435.64	3095.13	5449.53	1622.22	-4219.42	2122.28	4993.91	359.17	-848.66	2111.45	2303.79
19.500	3372.13	-3376.40	3411.87	5866.19	1970.89	-4363.07	2164.34	5254.06	256.08	-1137.48	2055.19	2362.89
20.000	3372.87	-3357.14	3404.18	5851.08	1977.99	-4223.07	2114.74	5120.44	159.83	-1280.51	2021.89	2398.60
22.000	-1621.85	-4066.19	1859.63	4773.51	1910.36	-4432.41	1833.13	5162.95	345.82	-1903.99	2024.51	2800.61
22.250	3080.75	-3643.53	3227.11	5758.36	2100.89	-4165.19	2211.08	5162.50	385.51	-1958.25	1958.51	2796.27
22.500	3953.66	-3651.52	3220.39	6271.84	2743.15	-4200.48	2199.75	5480.44	105.54	-2035.[illegible]	1911.00	2794.93
22.750	3958.74	-3609.79	3591.61	6437.69	2759.99	-4214.98	2123.30	5467.36	-60.44	-2100.80	1870.13	2912.25
23.250	4213.23	-3638.73	3926.94	6812.68	2917.16	-4304.42	2107.55	5610.68	-301.28	-2218.09	1807.52	2873.98
23.750	4302.99	-3632.36	3946.48	6876.37	3055.48	-4365.87	2126.51	5737.50	-456.91	-2331.64	1752.02	2952.10
24.250	4421.95	-3619.32	3994.17	6971.83	3226.21	-4425.00	2139.59	5879.36	-591.80	-2453.22	1708.75	3045.76
25.000	4611.01	-3598.29	4077.99	7130.15	3455.11	-4487.13	2137.40	6053.19	-737.71	-2635.90	1644.59	3193.40
26.000	4857.62	-3452.79	4201.01	7291.56	3709.62	-4598.65	2111.26	6274.26	-920.18	-2923.28	1567.91	3442.47
27.000	4946.65	-3376.93	3917.42	7156.34	4062.34	-4642.07	2724.00	6743.27	-854.62	-2184.1[illegible]	1595.96	3674.52
29.000	5853.50	-3674.50	5029.12	8547.34	3865.87	-4595.15	2091.83	6315.39	-830.29	-2668.91	1674.17	4[illegible].13
30.000	4687.90	-2423.41	4022.58	6635.47	4021.36	-3604.25	1773.86	5604.06	-368.42	-2870.53	1754.25	4263.91
32.000	4911.05	-4304.32	2480.26	6985.50	4480.73	-4541.06	315.15	6387.29	-139.31	-5034.09	949.63	5124.76
33.000	3779.02	-4271.76	1513.45	5900.81	4494.78	-4537.32	-163.26	6388.52	200.56	-4985.10	526.28	5016.81
34.000	3467.16	-4695.09	964.17	5770.25	4325.93	-4894.75	-308.18	6539.66	454.43	-5070.55	155.09	5093.26

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VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR ACCELERATIONS (DEG/SEC.**2) IN VEHICLE REFERENCE

TIME (MSEC)	SEGMENT NO. 1 - LT X	Y	Z	RES	SEGMENT NO. 3 - UT X	Y	Z	RES	SEGMENT NO. 5 - H X	Y	Z	RES
35.000	3300.58	-4291.53	302.49	5422.41	4194.55	-5152.32	-315.21	6651.32	463.03	-5180.80	-130.63	5203.10
37.000	2638.27	-4391.91	-1224.50	5267.71	4091.57	-5570.83	-302.37	6913.57	785.00	-5455.83	-329.64	5521.97
39.000	2142.65	-4566.93	-2531.64	5644.20	4040.76	-5908.25	-430.72	7170.82	1663.09	-5823.95	-798.02	6109.10
40.000	2160.04	-4762.91	-2722.64	5899.02	3605.65	-6188.88	-553.10	7183.93	1857.63	-5999.53	-816.27	6333.35
41.000	1709.77	1124.53	-4131.69	4633.48	3941.48	-9313.04	-2457.48	10407.07	3673.70	-5381.78	-2939.13	7011.28
42.000	-923.53	8442.07	-5155.36	10431.63	3438.45	-8934.02	-5453.35	11019.67	6880.65	-5567.11	-7174.79	11393.53
44.000	-4297.65	23039.94	-11039.54	25907.18	1718.29	-5769.86	-9645.79	11371.21	14817.68	-1943.57	-17104.05	23118.52
44.500	2331.15	-15016.20	-5942.15	16316.54	992.69	1629.19	-960.69	2292.22	-3565.24	-11053.71	1008.43	11606.60
44.625	2817.31	-14250.63	-3629.25	14973.14	-272.41	5036.25	-472.27	5115.39	-2684.33	-17665.69	1374.82	17921.27
44.750	2661.37	-14025.75	-4256.82	14900.66	456.60	4154.01	-856.41	4265.88	-1874.64	-17045.84	1410.31	17201.13
44.875	2616.57	-13469.88	-4248.36	14383.04	676.36	3391.67	-1183.34	3655.30	-1062.83	-16365.29	1392.28	16458.76
45.000	2472.05	-12677.99	-4276.85	13606.43	865.79	2859.74	-1477.74	3333.30	-410.15	-15688.50	1318.54	15749.16
45.250	2202.34	-10104.32	-4435.54	11208.44	1200.28	953.01	-2203.83	2684.39	740.71	-12634.67	1033.31	12703.69
45.500	1997.90	-9279.64	-4561.17	10567.91	1404.59	-173.11	-2590.99	2952.29	1549.94	-11474.[illegible]	748.13	11604.92
46.000	1484.79	-4747.81	-5082.53	7097.50	1791.54	-2553.64	-3052.90	[illegible]	2899.[illegible]	-6768.55	-[illegible]	7369.05
46.500	1122.22	-3247.76	-5300.00	6216.43	1749.44	-3501.53	-4103.47	5679.95	3617.66	-5544.91	-1571.53	6804.64
47.000	806.29	-1558.66	-5767.43	6047.53	1687.20	-4125.17	-4531.91	6356.25	4413.36	-4421.66	-3082.88	6966.37
48.000	9.65	5022.14	-7096.59	8693.88	1565.88	-5118.27	-6564.94	8470.37	6490.40	403.72	-6752.11	9374.39
49.000	-818.82	3106.10	-7346.99	8018.51	1318.66	-3177.85	-6916.86	7725.32	6362.20	-1050.05	-8178.93	10415.14
50.000	-624.30	2914.46	-7321.08	7905.30	821.60	-2133.08	-7629.14	7964.22	6639.73	-1459.01	-9235.05	11462.05
52.000	-1414.59	13945.36	-7330.10	15774.25	254.38	-519.77	-10674.14	10689.01	9143.64	5546.47	-13987.42	17407.21
54.000	986.[illegible]	10010.22	-6613.22	12037.97	-82.66	3437.44	-8426.20	9101.30	8960.21	7504.35	-4618.45	10604.44
54.250	945.18	-7736.69	-4961.80	9241.22	563.75	7005.70	-1967.66	7298.59	463.47	-18342.49	510.75	18355.45
54.500	655.29	-7822.20	-5206.32	9419.24	816.20	5522.54	-2340.37	6053.53	1620.69	-15991.97	51.46	16073.57
54.750	549.24	-6962.17	-5134.02	8668.21	815.59	4603.81	-2553.12	5327.16	2500.74	-13908.99	-373.57	14136.92
55.000	525.90	-5607.55	-5116.89	7609.45	887.01	4165.41	-2698.85	5041.95	3199.23	-12239.77	-957.59	12687.16
55.500	363.55	-2832.46	-5412.08	6168.05	991.73	2302.11	-3550.71	4370.90	4305.64	-8367.[illegible]	-1863.39	7914.[illegible]
56.000	205.75	-2627.29	-5541.70	5956.41	988.79	1368.25	-3637.83	4009.55	4830.57	-4554.18	-2916.45	7347.63
57.000	-108.53	1923.59	-5597.35	5919.02	857.64	757.15	-5009.68	5128.65	6123.68	2[illegible]	-5109.72	5338.02
58.000	-109.90	983.84	-5690.79	5776.26	809.47	340.08	-4439.43	4525.42	6028.13	3177.55	-5954.53	9004.55
59.000	1440.07	2490.65	-2613.90	4024.32	-1128.36	134.23	-4986.65	5114.47	6035.08	3583.53	-6158.81	9337.82
60.000	1232.03	1909.64	-4233.53	4305.22	-1187.08	433.76	-4807.15	4970.52	6277.24	3137.66	-6166.25	9341.98
62.000	1353.33	5860.83	-6634.08	9104.15	-281.31	-1885.23	-7650.94	7884.80	7822.53	9206.98	-7601.91	14274.08
64.000	-2273.24	6142.45	-8073.40	10396.01	1327.31	2275.31	-7772.43	8206.67	6559.98	10077.06	-2540.59	12289.64
64.250	-1674.49	-7088.21	-5728.92	9266.45	1681.78	2819.75	-1070.21	3453.22	1750.49	-6326.14	2506.54	7026.16
64.500	-1361.14	-6156.50	-5616.79	8495.47	1624.54	2662.09	-1230.64	3355.01	2413.71	-5553.71	2107.90	6416.27
64.750	-1106.09	-6005.81	-5516.72	8229.66	1607.47	2224.55	-1277.36	3027.25	2977.70	-4803.32	1748.39	5915.69
65.000	-979.48	-5308.65	-5436.13	7662.53	1550.33	2354.57	-1247.64	3082.87	3407.56	-4272.97	1296.87	5614.05
65.500	-487.29	-4361.80	-5494.25	7032.04	1228.57	1214.01	-1876.06	2550.06	4176.84	-1221.32	735.36	4413.43
66.000	-418.35	-5236.63	-5533.68	7631.64	1110.52	-149.35	-1709.66	2044.14	4380.36	-924.60	299.78	4486.31
67.000	-159.79	-404.63	-6339.45	6354.36	788.35	1483.87	-3048.04	3480.50	5197.06	3392.41	-646.52	6239.86
68.000	15.67	696.63	-6411.19	6438.91	737.99	1532.19	-3145.39	3575.71	5099.73	2353.87	-512.74	5642.20
68.500	-409.[illegible]	-4511.65	-5975.65	7745.93	836.78	-918.95	-1706.98	2111.51	4285.72	-886.12	219.05	4382.25
69.000	-213.7	-7912.75	-5296.20	9930.53	897.43	-3958.63	-1990.57	4516.64	4247.05	-693.70	197.27	4307.85
69.500	-[illegible].68	-3654.19	-5249.76	6759.34	800.99	-1712.63	-2135.14	2851.93	4204.55	-353.24	157.85	4227.32

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR ACCELERATIONS (DEG/SEC.**2) IN VEHICLE REFERENCE

TIME	SEGMENT NO. 1 - LT				SEGMENT NO. 3 - UT				SEGMENT NO. 5 - H			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
70.000	-794.42	-4288.22	-5401.67	6942.47	734.26	-1568.86	-2331.89	2904.85	4125.60	-486.71	41.63	4154.42
71.000	717.09	-1377.17	-5301.42	5524.12	560.73	-2841.61	-3809.56	4785.60	4569.36	1254.86	-349.22	4751.39
72.000	1702.80	-1919.80	-3931.71	4695.05	337.82	-3129.80	-4191.30	5241.63	4574.25	1010.15	-297.16	4693.98
74.000	7529.54	1427.16	-1642.40	7637.61	1544.29	790.12	-8041.76	8226.73	2594.42	1134.12	-1856.07	3701.05
75.000	3970.95	5613.41	-2494.23	7468.98	839.95	-2373.56	-9158.83	9499.61	9085.99	14579.09	-10099.41	19927.45
76.000	4316.30	-1944.52	-4512.76	6405.43	2109.48	-3941.11	-9037.21	10082.34	8677.10	17167.69	-11263.08	22290.81
77.000	4400.97	4778.15	-4013.13	7635.73	1420.50	1989.53	-8979.34	9306.16	8855.25	20738.75	-10004.64	24669.90
78.000	4289.47	2387.25	-3224.44	5873.29	1310.77	3341.54	-8711.25	9421.77	8478.96	21449.35	-7769.59	24337.91
80.000	6396.81	917.64	-3359.76	7283.52	1192.76	3253.93	-9578.61	10186.29	8771.51	24097.02	-4166.13	25990.04
82.000	5706.99	-2723.51	-2018.37	6637.85	2310.46	-758.04	-6737.74	7163.10	8092.32	18197.65	519.60	19918.03
84.000	7202.12	-4187.59	107.10	8704.62	5428.63	260.55	-2974.54	6195.63	6287.69	12007.54	2437.43	14911.17
85.000	6566.28	-3957.85	1763.58	7886.57	6491.55	3527.97	1213.77	7487.32	4341.10	1659.71	2597.24	5389.75
87.000	9314.16	-6906.02	2480.61	11857.49	6375.59	-5130.59	96.76	8187.28	2547.71	-1397.74	2765.11	4013.72
89.000	9496.62	-9171.41	5037.26	14130.62	7386.81	-9123.74	372.26	11745.05	1760.43	-5018.26	2182.88	5748.45
90.000	10732.89	-8754.69	4971.21	14715.72	8276.23	-10434.48	3755.88	13838.86	2091.29	-6049.61	2245.44	6782.41
92.000	13712.56	-11359.85	4181.18	18291.06	10061.71	-13415.18	2880.68	17014.79	10472.60	-4914.26	5317.52	12731.90
93.000	13880.12	-5026.54	5513.10	15756.12	8885.35	-7512.00	1244.61	11701.65	4945.75	-4596.04	3099.07	7618.13
94.000	13274.89	-7739.91	5683.45	16383.35	10279.34	-8627.42	877.94	13448.72	5276.15	-5593.26	2991.61	8250.58
95.000	14075.19	-6640.05	5046.74	16442.84	10131.20	-9046.47	582.10	13594.81	5269.29	-6075.81	2126.26	8525.20
97.000	11818.15	-6878.96	2900.16	15063.72	12884.43	-9044.07	836.23	15763.98	5876.62	-7867.88	2599.88	10158.62
98.000	15440.03	-8806.81	4278.58	18232.80	13871.88	-8123.26	986.45	16105.58	5328.69	-9814.18	1778.64	11309.28
99.000	14384.43	-8795.26	5293.05	17671.58	14528.59	-7978.70	1468.85	16640.22	3371.74	-12108.30	310.37	12559.51
100.000	15752.38	-10829.00	7964.73	20706.49	14157.79	-9248.20	1748.46	17000.86	3396.08	-13607.47	745.40	14044.65

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR VELOCITIES (DEG/SEC.) IN VEHICLE REFERENCE

TIME	SEGMENT NO. 1 - LT				SEGMENT NO. 3 - UT				SEGMENT NO. 5 - H			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.250	0.00	-0.69	0.00	0.69	0.00	0.01	0.00	0.01	0.00	-0.02	0.00	0.02
0.500	0.02	-0.67	0.01	0.67	0.00	-0.11	0.01	0.11	0.00	-0.09	0.00	0.09
0.750	0.05	-0.59	0.02	0.59	0.01	-0.27	0.03	0.27	0.00	-0.21	0.00	0.21
1.250	0.16	-0.55	0.08	0.57	0.02	-0.49	0.10	0.51	0.03	-0.52	0.01	0.52
1.750	0.32	-0.37	0.17	0.52	0.04	-0.57	0.24	0.62	0.08	-0.89	0.03	0.90
2.250	0.54	-0.20	0.31	0.65	0.08	-0.62	0.44	0.76	0.18	-1.38	0.06	1.40
2.750	0.80	-0.08	0.50	0.94	0.12	-0.66	0.70	0.96	0.32	-2.02	0.13	2.05
3.250	1.12	0.00	0.71	1.33	0.18	-0.61	1.03	1.21	0.51	-2.78	0.21	2.84
3.750	1.49	0.04	0.99	1.79	0.25	-0.56	1.40	1.53	0.77	-3.66	0.34	3.75
4.750	2.36	0.00	1.61	2.86	0.44	-0.49	2.37	2.46	1.45	-5.78	0.70	6.00
5.000	2.62	-0.06	1.81	3.19	0.49	-0.50	2.66	2.75	1.66	-6.31	0.82	6.58
6.000	3.65	-0.68	2.65	4.56	0.64	-0.46	3.87	3.95	2.68	-8.44	1.36	8.98
8.000	6.02	-3.31	4.29	8.10	1.25	-0.95	6.38	6.57	5.57	-11.79	2.88	13.27
9.000	7.34	-5.77	5.50	10.54	2.00	-2.09	8.37	8.86	7.15	-12.66	3.88	15.05
10.000	9.08	-9.18	6.78	14.58	2.83	-3.70	10.65	11.62	9.23	-13.17	5.20	16.90
10.500	10.01	-10.70	7.53	16.48	3.16	-4.59	12.00	13.23	10.33	-13.24	5.95	17.82
11.000	10.91	-12.31	8.31	18.43	3.29	-5.25	13.33	14.70	11.63	-13.35	6.78	18.96
11.500	11.86	-14.15	9.05	20.56	3.41	-6.32	14.58	16.26	12.97	-13.26	7.68	20.08
12.500	14.09	-17.67	10.53	24.93	3.69	-9.24	16.83	19.55	15.55	-12.65	9.57	22.21
13.500	16.68	-21.49	12.10	29.77	4.06	-12.46	18.97	23.05	17.85	-12.00	11.52	24.40
14.500	19.64	-26.03	13.83	35.42	5.12	-16.78	20.94	27.32	19.64	-11.41	13.53	26.44
15.000	21.43	-28.16	14.64	38.29	5.61	-19.45	21.94	29.85	20.15	-11.05	14.52	27.18
15.500	23.26	-30.02	15.66	41.08	6.38	-21.80	22.95	32.29	20.73	-10.78	15.53	28.06
16.000	24.86	-31.71	16.75	43.64	7.03	-23.84	23.95	34.51	21.46	-10.71	16.55	29.14
16.500	26.33	-33.55	17.84	46.23	7.79	-26.17	24.93	36.97	22.17	-10.68	17.56	30.24
17.500	29.45	-37.30	19.96	51.55	9.28	-30.53	26.92	41.74	23.39	-10.94	19.60	32.42
18.500	32.39	-41.11	22.18	57.13	11.20	-34.64	28.66	46.33	24.32	-11.60	21.65	34.57
19.500	36.67	-44.69	24.59	62.97	13.38	-38.89	30.42	51.15	24.97	-12.55	23.61	36.58
20.000	38.63	-46.74	25.97	65.96	14.67	-41.12	31.33	53.74	25.28	-13.15	24.59	37.64
22.000	48.21	-53.99	31.75	79.04	20.29	-49.55	34.67	63.79	26.75	-16.37	28.51	42.38
22.250	48.62	-54.90	32.39	80.17	20.93	-50.62	35.04	65.03	26.95	-16.86	28.98	43.01
22.500	49.66	-55.80	33.05	81.68	21.64	-51.66	35.46	66.29	27.15	-17.36	29.43	43.64
22.750	50.77	-56.71	33.67	83.23	22.44	-52.71	35.84	67.57	27.25	-17.88	29.89	44.22
23.250	53.13	-58.53	35.06	86.48	24.05	-54.83	36.59	70.17	27.34	-18.97	30.80	45.34
23.750	55.55	-60.37	36.55	89.83	25.77	-56.99	37.33	72.84	27.34	-20.11	31.70	46.44
24.250	58.13	-62.19	38.03	93.24	27.54	-59.18	38.07	75.56	27.26	-21.31	32.59	47.54
25.000	62.06	-64.90	40.30	98.42	30.36	-62.53	39.14	79.77	27.04	-23.25	33.91	49.21
26.000	67.58	-68.46	43.36	105.52	34.32	-67.05	40.51	85.53	26.56	-26.05	35.64	51.52
27.000	73.38	-71.97	46.68	112.88	38.56	-71.66	42.11	91.62	25.97	-29.12	37.33	53.99
29.000	84.01	-79.10	53.34	127.12	49.26	-81.30	45.47	105.38	25.51	-36.07	41.03	60.29
30.000	88.72	-82.75	56.26	133.86	53.50	-85.96	46.28	111.33	24.93	-39.99	42.73	63.61
32.000	94.[illegible]	-90.24	60.79	145.57	62.57	-94.37	46.38	122.74	25.03	-48.43	45.39	70.97
33.000	100.63	-94.11	61.85	151.03	66.98	-99.35	45.52	128.17	25.26	-53.45	46.13	74.88
34.000	104.33	-98.20	62.25	156.23	71.38	-103.90	44.36	133.64	25.78	-59.48	46.33	78.94

DATE: OCT 16,1973
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VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR VELOCITIES (DEG/SEC.) IN VEHICLE REFERENCE

TIME	SEGMENT NO. 1 - LT				SEGMENT NO. 3 - UT				SEGMENT NO. 5 - H			
(MSEC)	X	Y	Z	RES	X	Y	Z	RES	X	Y	Z	RES
35.000	107.88	-102.53	62.26	161.33	75.77	-108.63	43.15	139.30	26.21	-63.60	46.22	82.88
37.000	114.35	-111.15	60.36	170.51	84.63	-118.84	40.78	151.48	27.45	-74.28	45.45	91.31
39.000	119.70	-119.82	55.86	178.34	92.54	-130.31	38.23	164.33	29.72	-85.52	44.02	100.67
40.000	121.60	-124.25	52.80	181.82	96.18	-136.30	37.00	170.87	31.39	-91.41	42.90	105.70
41.000	123.55	-127.96	49.34	184.58	99.59	-143.34	35.32	178.07	33.44	-97.29	41.25	110.83
42.000	123.61	-121.49	44.84	179.03	102.34	-153.33	30.85	187.32	37.69	-103.07	35.75	115.42
44.000	114.57	-106.94	29.33	159.44	103.82	-172.35	14.65	201.74	49.19	-109.21	6.59	119.95
44.500	113.38	-106.76	26.90	158.04	103.05	-170.64	13.80	199.81	47.60	-115.38	5.42	124.93
44.625	113.70	-106.29	26.18	159.18	103.13	-169.88	13.77	199.21	47.29	-117.59	5.56	126.36
44.750	113.95	-110.00	25.51	160.42	103.12	-169.27	13.72	198.68	47.08	-119.86	5.78	128.90
44.875	114.22	-111.67	24.86	161.67	103.15	-168.75	13.61	198.25	46.97	-122.03	5.95	130.89
45.000	114.49	-113.22	24.21	162.82	103.21	-168.36	13.45	197.94	46.95	-124.05	6.11	132.78
45.250	114.96	-115.96	22.93	164.89	103.38	-167.76	12.99	197.40	47.11	-127.76	6.34	136.32
45.500	115.34	-118.20	21.66	166.56	103.59	-167.52	12.39	197.35	47.49	-131.05	6.47	139.53
46.000	115.90	-121.55	19.05	169.03	104.14	-169.04	10.80	197.99	48.64	-136.07	6.34	144.64
46.500	116.14	-123.13	16.33	170.05	104.73	-169.21	8.80	199.19	50.31	-140.02	5.57	148.89
47.000	116.19	-123.83	13.53	170.35	105.26	-170.77	6.58	200.71	52.06	-143.24	4.10	152.46
48.000	115.49	-122.08	7.18	168.21	106.19	-175.09	1.19	204.77	56.23	-148.51	-1.32	156.93
49.000	114.02	-116.38	-0.03	162.92	106.39	-178.92	-5.33	208.23	60.38	-150.57	-6.39	162.50
50.000	112.54	-109.76	-7.00	157.36	106.73	-180.24	-12.07	209.82	64.40	-155.42	-18.29	169.22
52.000	109.65	-93.77	-20.60	145.74	104.61	-178.81	-23.79	209.16	73.77	-157.54	-42.46	179.07
54.000	105.60	-73.77	-31.46	132.60	102.89	-169.20	-43.75	202.80	77.93	-159.14	-57.81	186.39
54.250	105.39	-73.94	-32.73	132.83	102.78	-166.61	-44.31	200.71	78.20	-163.22	-58.11	190.08
54.500	105.38	-75.49	-34.16	134.05	102.81	-165.14	-44.72	199.60	78.54	-167.85	-58.20	194.24
54.750	105.38	-77.11	-35.51	135.32	102.92	-163.77	-45.23	198.65	79.10	-171.94	-58.44	198.08
55.000	105.35	-78.57	-36.89	136.51	103.03	-162.61	-45.83	197.88	79.81	-175.29	-58.30	201.47
55.500	105.23	-80.76	-39.60	138.43	103.27	-160.38	-47.30	196.94	81.59	-180.49	-59.94	206.95
56.000	104.98	-82.38	-42.28	139.98	103.56	-159.85	-48.86	196.64	83.69	-184.32	-61.61	211.59
57.000	104.24	-84.51	-47.90	142.49	103.88	-159.13	-52.72	197.21	88.24	-187.09	-66.42	217.26
58.000	103.35	-85.19	-52.75	143.95	103.94	-159.10	-57.03	198.42	92.68	-187.69	-72.53	221.53
59.000	102.73	-85.23	-57.22	145.23	103.86	-159.18	-60.23	199.38	96.94	-187.47	-78.85	225.30
60.000	102.33	-84.61	-61.01	146.12	103.33	-158.93	-64.59	200.27	101.20	-185.03	-85.66	227.67
62.000	102.13	-79.78	-71.95	148.23	101.60	-157.33	-75.56	202.11	111.92	-175.53	-99.84	230.83
64.000	101.50	-69.17	-87.51	150.81	99.43	-154.48	-88.14	203.76	121.20	-165.12	-108.05	230.45
64.250	100.80	-69.02	-89.17	151.25	99.89	-153.35	-88.57	203.32	121.80	-166.34	-105.81	231.73
64.500	100.17	-70.72	-90.60	152.46	100.28	-152.42	-88.76	202.89	122.39	-168.15	-105.39	233.15
64.750	99.72	-72.15	-92.05	153.70	100.67	-151.70	-88.99	202.65	123.09	-169.72	-105.07	234.51
65.000	99.31	-73.28	-93.48	154.82	101.02	-151.23	-89.28	202.60	123.91	-170.97	-104.34	235.74
65.500	98.58	-75.53	-96.31	157.15	101.66	-150.39	-89.96	202.59	125.79	-172.59	-104.64	237.92
66.000	97.95	-77.30	-99.25	159.68	102.18	-149.56	-90.55	202.50	127.05	-173.85	-104.53	239.52
67.000	96.90	-77.72	-105.15	162.75	102.97	-150.16	-92.58	204.26	132.39	-176.14	-105.44	244.27
68.000	96.07	-76.91	-111.52	166.08	103.72	-148.56	-94.57	204.36	136.99	-175.30	-106.24	246.59
68.500	95.57	-77.82	-114.64	168.32	104.15	-147.36	-95.22	204.40	139.08	-176.13	-106.52	248.42
69.000	94.85	-81.17	-118.06	171.83	104.49	-149.25	-96.04	205.95	141.11	-177.15	-106.64	250.33
69.500	94.29	-82.71	-121.19	174.41	104.87	-150.65	-97.03	207.63	143.10	-178.36	-106.76	252.36

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR VELOCITIES (DEG/SEC.) IN VEHICLE REFERENCE

TIME (MSEC)	SEGMENT NO. 1 - LT X	Y	Z	RES	SEGMENT NO. 3 - UT X	Y	Z	RES	SEGMENT NO. 5 - M X	Y	Z	RES
70.000	93.88	-83.62	-124.23	176.64	105.16	-151.65	-98.19	209.04	145.14	-178.70	-106.99	253.86
71.000	92.97	-85.69	-130.14	181.54	105.60	-152.90	-101.15	211.57	149.26	-179.12	-107.77	256.86
72.000	92.64	-87.76	-135.51	186.14	105.95	-154.74	-104.48	214.68	153.50	-179.63	-108.23	259.69
74.000	98.81	-91.55	-143.90	197.11	106.06	-155.41	-110.54	218.22	157.85	-182.45	-111.73	265.87
75.000	104.08	-92.73	-147.74	203.12	105.76	-153.47	-119.16	221.22	163.04	-173.69	-117.39	265.58
76.000	108.65	-85.07	-150.80	204.40	105.53	-152.96	-127.95	225.62	171.41	-155.79	-128.10	264.69
77.000	112.40	-76.13	-154.99	206.78	105.57	-149.97	-136.32	228.51	179.49	-136.98	-137.96	264.60
78.000	115.45	-73.69	-159.00	209.86	105.83	-146.88	-144.20	231.45	187.47	-115.52	-145.57	263.97
80.000	121.83	-77.62	-167.50	221.19	107.74	-147.35	-159.97	242.71	204.61	-72.03	-154.40	266.26
82.000	130.91	-82.43	-175.06	233.62	113.18	-145.05	-172.22	252.01	221.13	-37.27	-154.91	272.55
84.000	143.63	-87.94	-181.33	247.13	121.35	-144.41	-178.90	259.97	237.96	-18.68	-150.25	282.05
85.000	149.50	-91.44	-183.50	253.74	128.08	-143.69	-179.11	262.93	244.92	-14.11	-147.00	286.00
87.000	164.29	-107.79	-186.42	270.86	141.18	-144.45	-176.60	268.30	251.44	-19.74	-142.96	289.91
89.000	183.23	-130.80	-186.97	292.64	154.63	-162.08	-176.37	285.10	254.29	-27.92	-141.07	292.13
90.000	193.21	-143.51	-185.55	303.90	161.85	-172.69	-176.42	295.19	256.71	-32.66	-139.97	294.21
92.000	215.72	-168.90	-181.49	328.64	182.16	-197.89	-174.09	320.39	263.22	-43.54	-135.61	299.28
93.000	229.59	-180.97	-179.34	342.96	191.69	-210.99	-174.78	334.50	275.02	-49.97	-132.80	309.46
94.000	244.91	-191.59	-177.07	357.83	200.04	-219.81	-175.15	344.98	278.23	-55.47	-131.04	312.50
95.000	256.06	-201.64	-174.43	370.08	210.21	-229.05	-175.56	357.04	283.16	-61.98	-129.67	317.55
97.000	293.75	-221.35	-169.97	405.19	229.44	-248.91	-177.32	382.16	293.98	-77.30	-126.69	329.32
98.000	311.97	-231.31	-168.89	423.50	244.36	-259.55	-177.32	398.14	299.34	-86.96	-126.74	336.50
99.000	325.86	-242.90	-167.10	439.44	257.09	-269.42	-177.35	412.48	302.54	-98.32	-128.26	343.00
100.000	339.18	-254.79	-164.96	455.16	271.80	-279.39	-177.01	428.10	304.89	-111.12	-130.73	349.65

DATE: OCT 16.1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR DISPLACEMENTS (DEG) IN VEHICLE REFERENCE

TIME	SEGMENT NO. 1 - LT				SEGMENT NO. 3 - UT				SEGMENT NO. 5 - H			
(MSEC)	YAW	PITCH	ROLL	RES	YAW	PITCH	ROLL	RES	YAW	PITCH	ROLL	RES
0.0	0.0	12.00	0.0	12.00	0.0	12.00	0.0	12.00	0.0	12.00	0.0	12.00
0.250	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
0.500	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
0.750	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
1.250	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
1.750	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
2.250	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
2.750	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
3.250	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
3.750	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00
4.750	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	11.99	0.00	11.99
5.000	0.00	12.00	0.00	12.00	0.00	12.00	0.00	12.00	0.00	11.99	0.00	11.99
6.000	0.01	12.00	0.01	12.00	0.01	12.00	0.00	12.00	0.00	11.95	0.00	11.98
8.000	0.02	11.99	0.02	11.99	0.02	12.00	0.00	12.00	0.01	11.96	0.01	11.96
9.000	0.02	11.99	0.02	11.99	0.03	11.99	0.00	11.99	0.01	11.95	0.02	11.95
10.000	0.03	11.98	0.03	11.98	0.04	11.99	0.01	11.99	0.02	11.94	0.03	11.94
10.500	0.03	11.98	0.04	11.98	0.04	11.99	0.01	11.99	0.02	11.93	0.03	11.93
11.000	0.04	11.97	0.04	11.97	0.05	11.99	0.01	11.99	0.03	11.92	0.04	11.92
11.500	0.05	11.97	0.05	11.97	0.06	11.98	0.01	11.98	0.03	11.92	0.04	11.92
12.500	0.06	11.95	0.06	11.95	0.07	11.98	0.02	11.98	0.04	11.90	0.06	11.90
13.500	0.07	11.93	0.08	11.93	0.09	11.97	0.02	11.97	0.06	11.89	0.08	11.89
14.500	0.09	11.91	0.10	11.91	0.11	11.95	0.02	11.95	0.08	11.88	0.10	11.88
15.000	0.10	11.89	0.11	11.89	0.12	11.94	0.03	11.94	0.08	11.87	0.11	11.87
15.500	0.11	11.88	0.12	11.88	0.14	11.93	0.03	11.93	0.09	11.87	0.12	11.87
16.000	0.12	11.86	0.13	11.86	0.15	11.92	0.03	11.92	0.10	11.86	0.13	11.86
16.500	0.13	11.85	0.14	11.85	0.16	11.91	0.04	11.91	0.12	11.86	0.14	11.86
17.500	0.16	11.81	0.17	11.81	0.19	11.88	0.05	11.88	0.14	11.85	0.16	11.85
18.500	0.18	11.77	0.20	11.77	0.22	11.85	0.06	11.85	0.16	11.83	0.19	11.84
19.500	0.21	11.73	0.24	11.73	0.25	11.81	0.07	11.81	0.19	11.82	0.21	11.83
20.000	0.23	11.71	0.26	11.71	0.27	11.79	0.08	11.79	0.21	11.82	0.22	11.82
22.000	0.31	11.60	0.35	11.61	0.34	11.70	0.11	11.70	0.27	11.79	0.28	11.79
22.250	0.32	11.59	0.36	11.60	0.35	11.69	0.12	11.69	0.28	11.78	0.28	11.79
22.500	0.33	11.58	0.37	11.59	0.36	11.67	0.12	11.68	0.29	11.78	0.29	11.78
22.750	0.34	11.56	0.38	11.57	0.37	11.66	0.13	11.67	0.30	11.77	0.30	11.78
23.250	0.36	11.53	0.41	11.55	0.39	11.63	0.14	11.64	0.31	11.76	0.31	11.77
23.750	0.38	11.50	0.44	11.52	0.41	11.61	0.15	11.61	0.33	11.75	0.32	11.76
24.250	0.41	11.47	0.47	11.49	0.43	11.58	0.16	11.59	0.35	11.74	0.34	11.75
25.000	0.45	11.42	0.51	11.44	0.47	11.53	0.19	11.54	0.38	11.73	0.36	11.74
26.000	0.50	11.36	0.58	11.38	0.51	11.47	0.22	11.48	0.42	11.70	0.39	11.71
27.000	0.56	11.29	0.65	11.32	0.56	11.40	0.26	11.41	0.46	11.67	0.41	11.69
29.000	0.69	11.13	0.81	11.16	0.67	11.24	0.34	11.27	0.55	11.61	0.47	11.63
30.000	0.76	11.05	0.89	11.11	0.72	11.16	0.40	11.19	0.60	11.57	0.49	11.59
32.000	0.92	10.87	1.08	10.96	0.84	10.97	0.51	11.01	0.70	11.49	0.54	11.51
33.000	1.00	10.78	1.18	10.88	0.90	10.87	0.58	10.92	0.75	11.43	0.57	11.46
34.000	1.08	10.68	1.28	10.80	0.95	10.77	0.64	10.83	0.80	11.37	0.59	11.41

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15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR DISPLACEMENTS (DEG) IN VEHICLE REFERENCE

TIME (MSEC)	SEGMENT NO. 1 - LT YAW	PITCH	ROLL	RES	SEGMENT NO. 3 - UT YAW	PITCH	ROLL	RES	SEGMENT NO. 5 - H YAW	PITCH	ROLL	RES
35.000	1.16	10.58	1.39	10.72	1.01	10.66	0.72	10.73	0.85	11.31	0.62	11.36
37.000	1.32	10.36	1.61	10.55	1.12	10.43	0.88	10.52	0.95	11.17	0.67	11.23
39.000	1.48	10.13	1.84	10.37	1.24	10.18	1.05	10.30	1.05	11.01	0.72	11.08
40.000	1.55	10.00	1.96	10.28	1.29	10.05	1.15	10.18	1.10	10.92	0.75	11.00
41.000	1.63	9.87	2.08	10.19	1.34	9.90	1.24	10.06	1.15	10.83	0.78	10.91
42.000	1.69	9.74	2.20	10.10	1.39	9.75	1.34	9.93	1.20	10.73	0.82	10.82
44.000	1.81	9.51	2.44	9.94	1.47	9.42	1.54	9.64	1.25	10.51	0.90	10.62
44.500	1.83	9.45	2.49	9.91	1.49	9.33	1.59	9.56	1.26	10.46	0.93	10.58
44.625	1.84	9.44	2.51	9.90	1.49	9.31	1.61	9.54	1.26	10.44	0.93	10.55
44.750	1.84	9.42	2.52	9.89	1.49	9.29	1.62	9.53	1.26	10.43	0.94	10.53
44.875	1.85	9.41	2.54	9.88	1.50	9.27	1.63	9.51	1.27	10.41	0.95	10.52
45.000	1.85	9.39	2.55	9.87	1.50	9.25	1.64	9.49	1.27	10.40	0.95	10.51
45.250	1.86	9.37	2.58	9.85	1.51	9.20	1.67	9.45	1.27	10.36	0.96	10.48
45.500	1.87	9.33	2.61	9.83	1.52	9.16	1.69	9.42	1.28	10.33	0.97	10.44
46.000	1.89	9.27	2.66	9.79	1.53	9.08	1.74	9.34	1.28	10.26	1.00	10.38
46.500	1.91	9.21	2.72	9.75	1.54	8.99	1.79	9.27	1.29	10.20	1.02	10.32
47.000	1.93	9.15	2.78	9.71	1.55	8.90	1.84	9.20	1.30	10.12	1.04	10.25
48.000	1.96	9.02	2.89	9.62	1.57	8.73	1.95	9.05	1.31	9.98	1.10	10.11
49.000	1.98	8.90	3.00	9.54	1.59	8.55	2.05	8.90	1.31	9.83	1.15	9.97
50.000	1.99	8.78	3.11	9.47	1.59	8.36	2.15	8.75	1.31	9.68	1.21	9.83
52.000	2.00	8.57	3.33	9.35	1.58	8.00	2.35	8.45	1.27	9.36	1.35	9.53
54.000	1.97	8.39	3.54	9.26	1.53	7.64	2.55	8.17	1.18	9.04	1.50	9.22
54.250	1.97	8.37	3.57	9.25	1.52	7.60	2.58	8.14	1.17	9.00	1.52	9.19
54.500	1.96	8.35	3.59	9.25	1.51	7.56	2.60	8.10	1.16	8.96	1.54	9.15
54.750	1.96	8.33	3.62	9.24	1.50	7.52	2.63	8.07	1.14	8.92	1.56	9.11
55.000	1.95	8.31	3.65	9.23	1.50	7.47	2.65	8.04	1.13	8.87	1.58	9.07
55.500	1.94	8.27	3.70	9.21	1.48	7.39	2.70	7.98	1.11	8.78	1.61	8.98
56.000	1.93	8.23	3.75	9.19	1.46	7.31	2.75	7.91	1.08	8.69	1.65	8.90
57.000	1.90	8.14	3.85	9.15	1.42	7.15	2.85	7.79	1.03	8.51	1.74	8.73
58.000	1.86	8.05	3.96	9.10	1.38	6.99	2.95	7.68	0.98	8.32	1.83	8.56
59.000	1.82	7.96	4.06	9.06	1.33	6.83	3.05	7.56	0.91	8.13	1.92	8.39
60.000	1.78	7.88	4.16	9.02	1.28	6.66	3.15	7.45	0.85	7.94	2.02	8.22
62.000	1.67	7.70	4.36	8.95	1.16	6.34	3.35	7.24	0.69	7.58	2.23	7.92
64.000	1.54	7.55	4.56	8.90	1.02	6.03	3.55	7.04	0.51	7.25	2.46	7.66
64.250	1.52	7.53	4.59	8.89	1.00	5.99	3.57	7.02	0.48	7.20	2.49	7.63
64.500	1.50	7.51	4.61	8.89	0.98	5.95	3.60	7.00	0.46	7.16	2.52	7.60
64.750	1.48	7.49	4.64	8.88	0.96	5.91	3.62	6.97	0.44	7.12	2.56	7.57
65.000	1.46	7.48	4.66	8.88	0.94	5.87	3.65	6.95	0.42	7.08	2.59	7.54
65.500	1.42	7.44	4.71	8.87	0.90	5.80	3.70	6.91	0.37	6.99	2.65	7.48
66.000	1.38	7.40	4.76	8.85	0.86	5.72	3.75	6.87	0.33	6.90	2.71	7.42
67.000	1.29	7.32	4.85	8.83	0.78	5.57	3.85	6.79	0.24	6.73	2.84	7.30
68.000	1.19	7.24	4.95	8.80	0.69	5.42	3.95	6.72	0.15	6.55	2.98	7.20
68.500	1.14	7.20	5.00	8.79	0.65	5.34	4.00	6.69	0.10	6.47	3.05	7.15
69.000	1.09	7.16	5.04	8.78	0.61	5.27	4.05	6.66	0.06	6.38	3.12	7.10
69.500	1.04	7.11	5.09	8.77	0.58	5.19	4.11	6.63	0.01	6.29	3.19	7.05

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VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

SEGMENT ANGULAR DISPLACEMENTS (DEG) IN VEHICLE REFERENCE

TIME	SEGMENT NO. 1 - LT				SEGMENT NO. 3 - UT				SEGMENT NO. 5 - H			
(MSEC)	YAW	PITCH	ROLL	RES	YAW	PITCH	ROLL	RES	YAW	PITCH	ROLL	RES
70.000	0.98	7.07	5.14	8.76	0.52	5.12	4.16	6.60	-0.04	6.20	3.26	7.01
71.000	0.86	6.99	5.23	8.74	0.43	4.96	4.26	6.54	-0.13	6.02	3.41	6.92
72.000	0.74	6.90	5.32	8.71	0.33	4.81	4.37	6.49	-0.22	5.84	3.56	6.85
74.000	0.49	6.72	5.51	8.68	0.13	4.50	4.58	6.41	-0.41	5.49	3.88	6.74
75.000	0.35	6.62	5.61	8.67	0.02	4.34	4.63	6.38	-0.51	5.31	4.05	6.71
76.000	0.22	6.53	5.72	8.68	-0.09	4.19	4.79	6.36	-0.61	5.15	4.21	6.70
77.000	0.08	6.45	5.83	8.69	-0.22	4.04	4.90	6.35	-0.73	5.00	4.39	6.72
78.000	-0.07	6.38	5.95	8.72	-0.35	3.69	5.00	6.35	-0.86	4.88	4.58	6.77
80.000	-0.37	6.23	6.19	8.80	-0.65	3.60	5.22	6.39	-1.13	4.70	4.98	6.97
82.000	-0.68	6.07	6.44	8.90	-0.97	3.30	5.44	6.46	-1.40	4.61	5.41	7.28
84.000	-1.01	5.95	6.72	9.04	-1.31	3.01	5.69	6.59	-1.67	4.58	5.87	7.68
85.000	-1.16	5.82	6.87	9.12	-1.48	2.87	5.81	6.68	-1.80	4.57	6.11	7.90
87.000	-1.50	5.62	7.19	9.31	-1.82	2.59	6.09	6.90	-2.05	4.56	6.61	8.35
89.000	-1.86	5.40	7.54	9.53	-2.17	2.29	6.34	7.17	-2.29	4.53	7.12	8.82
90.000	-2.03	5.27	7.74	9.65	-2.34	2.13	6.56	7.32	-2.41	4.51	7.38	9.06
92.000	-2.35	4.97	8.16	9.92	-2.68	1.78	6.92	7.66	-2.65	4.46	7.90	9.53
93.000	[illegible]	[illegible]	8.39	10.08	-2.84	1.58	7.11	7.84	-2.76	4.43	8.17	9.78
94.000	-2.67	[illegible]	[illegible]	10.25	-3.01	1.36	7.32	8.07	-2.87	4.39	[illegible]	10.04
[illegible]	-2.83	4.44	8.96	10.43	[illegible]	1.14	[illegible]	[illegible]	-2.98	4.34	[illegible]	10.29
[illegible]	-3.13	[illegible]	[illegible]	[illegible]	-3.33	[illegible]	[illegible]	[illegible]	-3.19	4.24	9.32	[illegible]
98.000	-3.28	3.54	9.79	11.11	-3.70	0.47	[illegible]	9.07	[illegible]	4.17	9.62	11.10
99.000	-3.42	3.62	10.12	11.38	-3.88	0.23	8.52	9.37	-3.70	4.10	9.93	11.37
100.000	-3.57	3.40	10.47	11.66	-4.06	-0.03	8.80	9.69	-3.51	4.01	10.24	11.65

JOINT PARAMETERS

TIME (MSEC)	JOINT NO. 4 - HP FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)	JOINT NO. 3 - NP FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.250	0.00	0.0	1.1707D-03	8.6673D-07	9.5445D-01	9.5563D-01	0.00	0.0	9.5964D-04	9.8992D-07	8.9576D-01	8.9672D-01
0.500	0.00	0.00	4.7348D-03	1.1229D-05	1.8057D 00	1.8104D 00	0.00	0.00	3.8182D-03	1.2971D-05	1.8497D 00	1.8535D 00
0.750	0.00	0.00	1.0416D-02	4.6623D-05	2.5230D 00	2.5334D 00	0.00	0.00	8.6079D-03	5.5480D-05	2.6300D 00	2.6386D 00
1.250	0.00	0.00	2.5669D-02	2.6959D-04	3.2686D 00	3.2945D 00	0.00	0.00	2.1220D-02	3.3888D-04	3.2286D 00	3.2491D 00
1.750	0.00	0.00	4.2910D-02	7.8330D-04	3.4666D 00	3.5095D 00	0.00	0.00	3.3339D-02	1.0755D-03	2.8315D 00	2.8651D 00
2.250	0.00	0.00	6.0169D-02	1.6984D-03	3.3537D 00	3.4136D 00	0.00	0.00	4.3145D-02	2.4475D-03	1.9451D 00	1.9859D 00
2.750	0.00	0.00	7.6301D-02	3.0414D-03	3.0964D 00	3.1717D 00	0.00	0.00	4.7672D-02	4.6388D-03	1.4142D 00	1.4328D 00
3.250	0.00	0.00	9.1217D-02	4.8247D-03	2.9393D 00	3.0279D 00	0.00	0.00	4.6107D-02	7.5756D-03	2.6647D 00	2.6538D 00
3.750	0.00	0.00	1.0535D-01	7.1052D-03	2.9357D 00	3.0361D 00	0.00	0.00	4.0079D-02	1.0315D-02	4.6420D 00	4.6323D 00
4.750	0.01	0.00	1.3641D-01	1.3031D-02	3.6466D 00	3.7753D 00	0.00	0.00	5.3344D-02	1.2647D-02	8.9141D 00	8.9460D 00
5.000	0.01	0.00	1.4497D-01	1.4338D-02	3.8389D 00	3.9763D 00	0.00	0.00	6.8237D-02	1.8501D-02	9.9305D 00	9.9812D 00
6.000	0.01	0.00	1.8667D-01	2.2724D-02	5.1220D 00	5.3008D 00	0.01	0.00	1.5956D-01	4.1944D-02	1.3726D 01	1.3875D 01
8.000	0.02	0.00	3.2141D-01	4.1165D-02	8.7722D 00	9.0859D 00	0.03	0.00	4.3363D-01	1.0317D-01	1.7934D 01	1.8372D 01
9.000	0.02	0.01	4.1420D-01	5.2780D-02	1.0155D 01	1.0560D 01	0.03	0.01	5.8167D-01	5.3188D-02	1.8866D 01	1.9441D 01
10.000	0.02	0.01	5.1536D-01	5.8614D-02	1.0726D 01	1.1221D 01	0.04	0.01	7.3420D-01	6.8724D-02	1.9407D 01	2.0112D 01
10.500	0.03	0.01	5.6546D-01	6.6854D-02	1.0847D 01	1.1387D 01	0.05	0.01	8.0748D-01	7.7005D-02	2.0699D 01	2.1446D 01
11.000	0.03	0.01	6.1784D-01	7.5626D-02	1.1415D 01	1.2005D 01	0.05	0.01	8.5467D-01	8.6401D-02	2.2292D 01	2.3102D 01
11.500	0.03	0.01	6.7205D-01	8.4825D-02	1.1650D 01	1.2289D 01	0.06	0.01	9.6464D-01	9.6063D-02	2.3522D 01	2.4375D 01
12.500	0.04	0.01	7.7332D-01	1.0357D-01	1.0766D 01	1.1472D 01	0.07	0.01	1.1224D 00	1.1504D-01	2.6106D 01	2.7024D 01
13.500	0.04	0.02	8.6170D-01	1.2117D-01	9.8900D 00	1.0619D 01	0.07	0.02	1.2662D 00	1.3375D-01	2.9352D 01	3.0340D 01
14.500	0.04	0.02	9.1829D-01	1.3846D-01	9.1578D 00	9.7665D 00	0.08	0.02	1.4559D 00	1.5115D-01	3.1843D 01	3.2853D 01
15.000	0.04	0.02	9.3875D-01	1.4654D-01	8.5084D 00	9.0034D 00	0.09	0.02	1.5363D 00	1.5984D-01	3.3738D 01	3.4754D 01
15.500	0.04	0.02	9.5114D-01	1.5490D-01	7.2365D 00	7.5828D 00	0.09	0.02	1.6174D 00	1.6856D-01	3.6145D 01	3.7216D 01
16.000	0.04	0.02	9.5447D-01	1.6335D-01	7.2878D 00	7.4671D 00	0.10	0.02	1.7084D 00	1.7721D-01	3.8060D 01	3.9197D 01
16.500	0.04	0.02	9.4998D-01	1.7170D-01	7.6874D 00	7.6817D 00	0.11	0.02	1.8059D 00	1.8599D-01	4.0174D 01	4.1361D 01
17.500	0.04	0.02	9.1863D-01	1.8832D-01	9.6873D 00	9.4579D 00	0.12	0.03	2.0216D 00	2.0339D-01	4.3459D 01	4.4753D 01
18.500	0.04	0.03	8.6662D-01	2.0533D-01	1.1584D 01	1.1291D 01	0.13	0.03	2.2644D 00	2.2020D-01	4.5869D 01	4.7312D 01
19.500	0.04	0.03	7.9787D-01	2.2198D-01	1.3337D 01	1.3044D 01	0.15	0.03	2.5204D 00	2.3770D-01	4.8447D 01	5.0043D 01
20.000	0.04	0.03	7.5689D-01	2.3070D-01	1.4320D 01	1.4051D 01	0.15	0.03	2.6600D 00	2.4645D-01	4.9710D 01	5.1446D 01
22.000	0.03	0.03	5.8210D-01	2.6751D-01	1.7460D 01	1.7353D 01	0.19	0.04	3.2703D 00	2.8565D-01	5.4228D 01	5.6496D 01
22.250	0.03	0.03	5.6158D-01	2.7232D-01	1.7805D 01	1.7721D 01	0.20	0.04	3.3529D 00	2.9044D-01	5.4820D 01	5.7167D 01
22.500	0.03	0.03	5.4251D-01	2.7701D-01	1.8352D 01	1.8320D 01	0.20	0.04	3.4367D 00	2.9547D-01	5.5146D 01	5.7535D 01
22.750	0.02	0.04	5.2742D-01	2.8176D-01	1.8810D 01	1.8817D 01	0.20	0.04	3.5199D 00	3.0056D-01	5.5528D 01	5.7950D 01
23.250	0.02	0.04	5.0739D-01	2.9151D-01	1.9642D 01	1.9714D 01	0.21	0.04	3.6864D 00	3.1091D-01	5.6413D 01	5.8830D 01
23.750	0.02	0.04	5.0267D-01	3.0163D-01	2.0442D 01	2.0566D 01	0.22	0.04	3.8538D 00	3.2165D-01	5.7437D 01	6.0037D 01
24.250	0.02	0.04	5.1468D-01	3.1216D-01	2.1251D 01	2.1422D 01	0.23	0.04	4.0224D 00	3.3281D-01	5.8583D 01	6.1265D 01
25.000	0.03	0.04	5.6469D-01	3.2890D-01	2.2427D 01	2.2682D 01	0.25	0.04	4.2773D 00	3.5042D-01	6.0595D 01	6.3387D 01
26.000	0.03	0.04	6.8397D-01	3.5314D-01	2.4122D 01	2.4532D 01	0.27	0.05	4.6230D 00	3.7585D-01	6.3440D 01	6.6370D 01
27.000	0.04	0.05	8.4872D-01	3.7990D-01	2.5962D 01	2.6555D 01	0.29	0.05	4.9779D 00	4.0393D-01	6.6478D 01	6.9580D 01
29.000	0.06	0.06	1.2659D 00	4.4727D-01	3.0070D 01	3.1115D 01	0.33	0.06	5.7369D 00	4.6979D-01	7.4707D 01	7.8235D 01
30.000	0.07	0.06	1.5147D 00	4.8531D-01	3.2637D 01	3.3930D 01	0.36	0.06	6.1394D 00	5.1046D-01	7.8941D 01	8.1655D 01
32.000	0.10	0.07	2.0691D 00	5.6644D-01	3.7360D 01	3.9301D 01	0.41	0.07	7.0977D 00	5.7761D-01	8.3395D 01	8.7979D 01
33.000	0.11	0.07	2.4220D 00	5.9958D-01	3.8384D 01	4.0454D 01	0.44	0.08	7.5873D 00	6.1031D-01	8.6511D 01	9.1656D 01
34.000	0.13	0.08	2.7695D 00	6.2894D-01	3.9789D 01	4.2414D 01	0.47	0.08	8.1065D 00	6.4022D-01	8.9399D 01	9.5194D 01

JOINT PARAMETERS

TIME (MSEC)	JOINT NO. 4 - HP FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)	JOINT NO. 3 - NP FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)
35.000	0.15	0.08	3.1346D 00	6.5656D-01	4.1129D 01	4.4137D 01	0.50	0.08	8.6587D 00	6.6881D-01	9.2973D 01	9.9430D 01
37.000	0.18	0.09	3.9233D 00	7.0931D-01	4.4664D 01	4.8471D 01	0.57	0.09	9.8724D 00	7.2051D-01	9.9909D 01	1.0774D 02
39.000	0.23	0.10	4.7951D 00	7.6770D-01	4.8042D 01	5.3526D 01	0.66	0.10	1.1257D 01	7.6593D-01	1.0452D 02	1.1395D 02
40.000	0.25	0.10	5.2641D 00	7.9330D-01	5.0294D 01	5.5463D 01	0.70	0.10	1.2001D 01	7.9287D-01	1.0674D 02	1.1651D 02
41.000	0.27	0.10	5.7524D 00	8.2006D-01	5.2088D 01	5.7799D 01	0.74	0.10	1.2778D 01	8.1990D-01	1.0911D 02	1.1926D 02
42.000	0.30	0.11	6.3162D 00	8.5357D-01	5.9450D 01	6.5808D 01	0.79	0.11	1.3567D 01	8.4232D-01	1.1094D 02	1.1987D 02
44.000	0.38	0.12	8.0315D 00	9.7937D-01	1.1616D 02	1.2330D 02	0.87	0.11	1.4906D 01	9.1693D-01	9.5488D 01	1.0544D 02
44.500	0.41	0.13	8.6395D 00	1.0176D 00	1.1122D 02	1.1943D 02	0.88	0.12	1.5132D 01	9.5517D-01	8.9733D 01	9.9066D 01
44.625	0.41	0.13	8.7853D 00	1.0266D 00	1.0747D 02	1.1590D 02	0.88	0.12	1.5181D 01	9.6460D-01	8.7633D 01	9.6992D 01
44.750	0.42	0.13	8.9265D 00	1.0358D 00	1.0313D 02	1.1178D 02	0.89	0.12	1.5229D 01	9.7352D-01	8.6065D 01	9.5465D 01
44.875	0.43	0.13	9.0616D 00	1.0449D 00	9.9057D 01	1.0790D 02	0.89	0.12	1.5276D 01	9.8237D-01	8.4709D 01	9.4217D 01
45.000	0.43	0.13	9.1922D 00	1.0538D 00	9.5420D 01	1.0444D 02	0.89	0.12	1.5323D 01	9.9100D-01	8.3571D 01	9.3140D 01
45.250	0.44	0.13	9.4381D 00	1.0710D 00	8.9188D 01	9.8527D 01	0.90	0.13	1.5415D 01	1.0073D 00	8.1750D 01	9.1502D 01
45.500	0.45	0.14	9.6689D 00	1.0874D 00	8.4175D 01	9.3788D 01	0.90	0.13	1.5505D 01	1.0239D 00	8.0527D 01	9.0350D 01
46.000	0.47	0.14	1.0111D 01	1.1178D 00	7.8747D 01	8.8841D 01	0.91	0.13	1.5676D 01	1.0531D 00	7.9130D 01	8.9005D 01
46.500	0.49	0.14	1.0526D 01	1.1452D 00	7.6330D 01	8.6846D 01	0.92	0.13	1.5844D 01	1.0751D 00	7.8784D 01	8.8540D 01
47.000	0.51	0.15	1.0935D 01	1.1702D 00	7.6008D 01	8.6922D 01	0.93	0.14	1.6004D 01	1.1024D 00	7.8885D 01	8.9420D 01
48.000	0.55	0.15	1.1815D 01	1.2201D 00	8.6106D 01	9.7732D 01	0.95	0.14	1.6274D 01	1.1427D 00	9.1092D 01	9.9393D 01
49.000	0.60	0.16	1.2830D 01	1.2698D 00	9.4053D 01	1.0647D 02	0.96	0.15	1.6496D 01	1.1816D 00	9.3584D 01	9.0759D 01
50.000	0.65	0.17	1.3902D 01	1.3245D 00	9.8949D 01	1.1226D 02	0.97	0.15	1.6661D 01	1.2245D 00	8.7680D 01	9.2367D 01
52.000	0.77	0.18	1.6467D 01	1.4756D 00	1.2904D 02	1.4434D 02	0.97	0.16	1.6647D 01	1.3042D 00	1.1079D 02	1.1256D 02
54.000	0.92	0.20	1.9591D 01	1.6237D 00	1.4592D 02	1.6301D 02	0.95	0.18	1.6335D 01	1.4820D 00	1.3537D 02	1.3425D 02
54.250	0.94	0.20	1.9989D 01	1.6389D 00	1.3404D 02	1.5359D 02	0.95	0.19	1.6269D 01	1.4999D 00	1.3374D 02	1.3274D 02
54.500	0.96	0.21	2.0347D 01	1.6560D 00	1.1979D 02	1.3978D 02	0.94	0.19	1.6207D 01	1.5152D 00	1.2955D 02	1.2877D 02
54.750	0.97	0.21	2.0659D 01	1.6718D 00	1.0733D 02	1.2768D 02	0.94	0.19	1.6151D 01	1.5309D 00	1.2610D 02	1.2555D 02
55.000	0.98	0.21	2.0946D 01	1.6874D 00	9.6967D 01	1.1764D 02	0.94	0.19	1.6098D 01	1.5456D 00	1.2344D 02	1.2210D 02
55.500	1.01	0.21	2.1426D 01	1.7170D 00	8.1462D 01	1.0261D 02	0.93	0.20	1.6009D 01	1.5760D 00	1.1937D 02	1.1946D 02
56.000	1.02	0.22	2.1819D 01	1.7453D 00	6.9439D 01	9.0923D 01	0.93	0.20	1.5936D 01	1.6031D 00	1.1546D 02	1.1607D 02
57.000	1.06	0.22	2.2502D 01	1.8014D 00	5.8721D 01	8.0590D 01	0.92	0.21	1.5829D 01	1.6549D 00	1.1097D 02	1.1229D 02
58.000	1.08	0.23	2.3067D 01	1.8608D 00	5.2784D 01	7.4642D 01	0.92	0.21	1.5766D 01	1.7123D 00	1.0591D 02	1.0778D 02
59.000	1.11	0.24	2.3561D 01	1.9282D 00	4.9038D 01	7.0637D 01	0.92	0.22	1.5730D 01	1.7746D 00	1.0078D 02	1.0289D 02
60.000	1.13	0.25	2.4070D 01	2.0149D 00	4.9949D 01	7.1686D 01	0.91	0.23	1.5699D 01	1.8344D 00	9.6910D 01	9.8723D 01
62.000	1.18	0.27	2.5092D 01	2.1782D 00	6.3143D 01	8.5021D 01	0.91	0.25	1.5584D 01	2.0029D 00	9.2292D 01	9.2876D 01
64.000	1.24	0.29	2.6473D 01	2.3447D 00	7.1454D 01	9.6280D 01	0.89	0.27	1.5366D 01	2.1509D 00	9.3664D 01	9.1133D 01
64.250	1.25	0.29	2.6642D 01	2.3573D 00	6.5693D 01	9.0740D 01	0.89	0.27	1.5253D 01	2.1661D 00	9.2519D 01	8.9647D 01
64.500	1.26	0.30	2.6790D 01	2.3711D 00	5.7932D 01	8.3076D 01	0.88	0.27	1.5199D 01	2.1791D 00	9.0770D 01	8.7616D 01
64.750	1.26	0.30	2.6916D 01	2.3835D 00	5.0520D 01	7.5686D 01	0.88	0.27	1.5143D 01	2.1922D 00	8.8994D 01	8.5552D 01
65.000	1.27	0.30	2.7028D 01	2.3956D 00	4.4443D 01	6.9601D 01	0.88	0.28	1.5085D 01	2.2039D 00	8.7467D 01	8.3762D 01
65.500	1.28	0.30	2.7206D 01	2.4177D 00	3.5919D 01	6.0842D 01	0.87	0.28	1.4966D 01	2.2266D 00	8.5319D 01	8.1159D 01
66.000	1.28	0.30	2.7344D 01	2.4380D 00	2.9073D 01	5.3414D 01	0.86	0.28	1.4841D 01	2.2472D 00	8.3282D 01	7.9390D 01
67.000	1.29	0.31	2.7557D 01	2.4756D 00	2.1656D 01	4.4244D 01	0.85	0.28	1.4571D 01	2.2794D 00	8.2071D 01	7.4469D 01
68.000	1.30	0.31	2.7703D 01	2.5046D 00	2.0155D 01	4.1920D 01	0.83	0.29	1.4269D 01	2.3097D 00	8.4536D 01	7.8455D 01
68.500	1.30	0.31	2.7754D 01	2.5174D 00	1.7607D 01	3.7658D 01	0.82	0.29	1.4109D 01	2.3217D 00	8.5215D 01	7.4894D 01
69.000	1.30	0.32	2.7776D 01	2.5290D 00	1.6682D 01	3.3709D 01	0.81	0.29	1.3940D 01	2.3376D 00	8.3663D 01	7.6768D 01
69.500	1.30	0.32	2.7781D 01	2.5385D 00	1.6507D 01	3.0532D 01	0.80	0.29	1.3761D 01	2.3423D 00	8.3011D 01	7.5706D 01

DATE: OCT 10-1970
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

JOINT PARAMETERS

	JOINT NO. 4 - HP						JOINT NO. 3 - NP					
TIME (MSEC)	FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)	FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)
70.000	1.30	0.32	2.7780D 01	2.5469D 00	1.6839D 01	2.9048D 01	0.79	0.29	1.3573D 01	2.3436D 00	8.3159D 01	7.5520D 01
71.000	1.30	0.32	2.7741D 01	2.5539D 00	1.7600D 01	2.8292D 01	0.77	0.29	1.3173D 01	2.3568D 00	8.5505D 01	7.7864D 01
72.000	1.30	0.32	2.7702D 01	2.5518D 00	1.8408D 01	2.8029D 01	0.74	0.29	1.2737D 01	2.3565D 00	8.9082D 01	8.0906D 01
74.000	1.29	0.32	2.7546D 01	2.5268D 00	3.1161D 01	1.4679D 01	0.68	0.29	1.1738D 01	2.2928D 00	9.0546D 01	8.2025D 01
75.000	1.28	0.31	2.7339D 01	2.5167D 00	2.9755D 01	2.2324D 01	0.65	0.28	1.1221D 01	2.2357D 00	9.3565D 01	8.4725D 01
76.000	1.28	0.31	2.7267D 01	2.4969D 00	3.3426D 01	4.5949D 01	0.62	0.28	1.0606D 01	2.2055D 00	9.7953D 01	8.9117D 01
77.000	1.29	0.31	2.7419D 01	2.4627D 00	4.4673D 01	6.3494D 01	0.58	0.27	9.8978D 00	2.1890D 00	1.0736D 02	9.8607D 01
78.000	1.30	0.31	2.7767D 01	2.4755D 00	5.8369D 01	8.0657D 01	0.53	0.27	9.0622D 00	2.1810D 00	1.1979D 02	1.1132D 02
80.000	1.36	0.31	2.8976D 01	2.4606D 00	8.1831D 01	1.0794D 02	0.40	0.27	6.8021D 00	2.1323D 00	1.5863D 02	1.5180D 02
82.000	1.45	0.30	3.0896D 01	2.3708D 00	9.7323D 01	1.2602D 02	0.21	0.26	3.5700D 00	2.0636D 00	1.9653D 02	1.9295D 02
84.000	1.55	0.27	3.3065D 01	2.2324D 00	1.0176D 02	1.3198D 02	0.08	0.24	1.4355D 00	1.9383D 00	2.2486D 02	2.2558D 02
85.000	1.60	0.26	3.4166D 01	2.1009D 00	1.0422D 02	1.3555D 02	0.18	0.23	3.1207D 00	1.9410D 00	2.2788D 02	2.3034D 02
87.000	1.70	0.24	3.6297D 01	1.9078D 00	1.0297D 02	1.3657D 02	0.41	0.20	7.0423D 00	1.6323D 00	2.1516D 02	2.2165D 02
89.000	1.80	0.21	3.8396D 01	1.7067D 00	1.0770D 02	1.4429D 02	0.64	0.18	1.1017D 01	1.4385D 00	2.1187D 02	2.2230D 02
90.000	1.85	0.20	3.9477D 01	1.6090D 00	1.0860D 02	1.4667D 02	0.76	0.17	1.2991D 01	1.3441D 00	2.1476D 02	2.2710D 02
92.000	1.96	0.18	4.1836D 01	1.4355D 00	1.0963D 02	1.5084D 02	0.98	0.15	1.6914D 01	1.1695D 00	2.2766D 02	2.4396D 02
93.000	2.02	0.17	4.3045D 01	1.3465D 00	1.1558D 02	1.5795D 02	1.11	0.14	1.9053D 01	1.0902D 00	2.3063D 02	2.4980D 02
94.000	2.08	0.16	4.4339D 01	1.2620D 00	1.1994D 02	1.6370D 02	1.23	0.12	2.1141D 01	9.9021D-01	2.2848D 02	2.4866D 02
95.000	2.15	0.15	4.5676D 01	1.1720D 00	1.2216D 02	1.6723D 02	1.35	0.11	2.3184D 01	8.9654D-01	2.2738D 02	2.4949D 02
97.000	2.27	0.12	4.8437D 01	9.8405D-01	1.2648D 02	1.7430D 02	1.59	0.09	2.7304D 01	6.8686D-01	2.2692D 02	2.5297D 02
98.000	2.34	0.11	4.9839D 01	8.9233D-01	1.2789D 02	1.7711D 02	1.71	0.07	2.9315D 01	5.9190D-01	2.2154D 02	2.4930D 02
99.000	2.41	0.10	5.1268D 01	8.0555D-01	1.2935D 02	1.8002D 02	1.82	0.06	3.1245D 01	4.9288D-01	2.1199D 02	2.4125D 02
100.000	2.47	0.09	5.2696D 01	7.2220D-01	1.2853D 02	1.8062D 02	1.92	0.05	3.3039D 01	4.1918D-01	2.0197D 02	2.3251D 02

JOINT PARAMETERS

TIME (MSEC)	JOINT NO. 6 - RK FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)	JOINT NO. 9 - LK FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)
0.0	0.70	0.0	0.0	0.0	0.0	0.0	0.70	0.0	0.0	0.0	0.0	0.0
0.250	0.70	0.0	0.0	0.0	1.2704D 00	1.2704D 00	0.70	0.0	0.0	0.0	1.2736D 00	1.2736D 00
0.500	0.70	0.0	0.0	0.0	5.1470D-01	5.1470D-01	0.70	0.0	0.0	0.0	5.2373D-01	5.2373D-01
0.750	0.70	0.0	0.0	0.0	2.2387D-01	2.2387D-01	0.70	0.0	0.0	0.0	2.3576D-01	2.3576D-01
1.250	0.70	0.0	0.0	0.0	9.1402D-01	9.1402D-01	0.70	0.0	0.0	0.0	9.1917D-01	9.1917D-01
1.750	0.70	0.0	0.0	0.0	1.7125D 00	1.7125D 00	0.70	0.0	0.0	0.0	1.6118D 00	1.6118D 00
2.250	0.70	0.0	0.0	0.0	1.2850D 00	1.2850D 00	0.70	0.0	0.0	0.0	1.5522D 00	1.5522D 00
2.750	0.70	0.0	0.0	0.0	6.3744D-01	6.3744D-01	0.70	0.0	0.0	0.0	2.0518D 00	2.0518D 00
3.250	0.70	0.0	0.0	0.0	2.6143D 00	2.6143D 00	0.70	0.0	0.0	0.0	4.7066D 00	4.7066D 00
3.750	0.70	0.0	0.0	0.0	5.8288D 00	5.8288D 00	0.70	0.0	0.0	0.0	8.8196D 00	8.8196D 00
4.750	0.70	0.0	0.0	0.0	1.3506D 01	1.3506D 01	0.70	0.0	0.0	0.0	1.9598D 01	1.9598D 01
5.000	0.70	0.0	0.0	0.0	1.5236D 01	1.5236D 01	0.70	0.0	0.0	0.0	2.2321D 01	2.2321D 01
6.000	0.70	0.0	0.0	0.0	2.1528D 01	2.1528D 01	0.70	0.0	0.0	0.0	3.3018D 01	3.3018D 01
8.000	0.71	0.0	0.0	0.0	3.2988D 01	3.2988D 01	0.71	0.0	0.0	0.0	5.2362D 01	5.2362D 01
9.000	0.71	0.0	0.0	0.0	1.9675D 01	1.9675D 01	0.72	0.0	0.0	0.0	5.6053D 01	5.6053D 01
10.000	0.71	0.0	0.0	0.0	7.4028D 00	7.4028D 00	0.73	0.0	0.0	0.0	4.9258D 01	4.9258D 01
10.500	0.71	0.0	0.0	0.0	1.0335D 00	1.0335D 00	0.73	0.0	0.0	0.0	4.4143D 01	4.4143D 01
11.000	0.71	0.0	0.0	0.0	6.2675D 00	6.2675D 00	0.73	0.0	0.0	0.0	4.1228D 01	4.1228D 01
11.500	0.71	0.0	0.0	0.0	1.0555D 01	1.0555D 01	0.73	0.0	0.0	0.0	4.0247D 01	4.0247D 01
12.500	0.71	0.0	0.0	0.0	3.2656D 00	3.2656D 00	0.74	0.0	0.0	0.0	5.6162D 01	5.6162D 01
13.500	0.71	0.0	0.0	0.0	1.2540D 01	1.2540D 01	0.74	0.0	0.0	0.0	7.3554D 01	7.3554D 01
14.500	0.71	0.0	0.0	0.0	3.3658D 01	3.3658D 01	0.75	0.0	0.0	0.0	6.9367D 01	6.9367D 01
15.000	0.72	0.0	0.0	0.0	4.8400D 01	4.8400D 01	0.75	0.0	0.0	0.0	6.6447D 01	6.6447D 01
15.500	0.72	0.0	0.0	0.0	5.7970D 01	5.7970D 01	0.76	0.0	0.0	0.0	7.6847D 01	7.6847D 01
16.000	0.72	0.0	0.0	0.0	6.2504D 01	6.2504D 01	0.76	0.0	0.0	0.0	8.8199D 01	8.8199D 01
16.500	0.72	0.0	0.0	0.0	6.8328D 01	6.8328D 01	0.77	0.0	0.0	0.0	9.9530D 01	9.9530D 01
17.500	0.73	0.0	0.0	0.0	7.9368D 01	7.9368D 01	0.78	0.0	0.0	0.0	1.1331D 02	1.1331D 02
18.500	0.74	0.0	0.0	0.0	7.3984D 01	7.3984D 01	0.79	0.0	0.0	0.0	1.2831D 02	1.2831D 02
19.500	0.75	0.0	0.0	0.0	7.3609D 01	7.3609D 01	0.80	0.0	0.0	0.0	1.4669D 02	1.4669D 02
20.000	0.75	0.0	0.0	0.0	7.0787D 01	7.0787D 01	0.81	0.0	0.0	0.0	1.5267D 02	1.5267D 02
22.000	0.76	0.0	0.0	0.0	4.1757D 01	4.1757D 01	0.84	0.0	0.0	0.0	1.9631D 02	1.9631D 02
22.250	0.76	0.0	0.0	0.0	4.4185D 01	4.4185D 01	0.85	0.0	0.0	0.0	2.0585D 02	2.0585D 02
22.500	0.76	0.0	0.0	0.0	4.9377D 01	4.9377D 01	0.85	0.0	0.0	0.0	2.1702D 02	2.1702D 02
22.750	0.77	0.0	0.0	0.0	5.4635D 01	5.4635D 01	0.86	0.0	0.0	0.0	2.1785D 02	2.1785D 02
23.250	0.77	0.0	0.0	0.0	6.4268D 01	6.4268D 01	0.87	0.0	0.0	0.0	2.3967D 02	2.3967D 02
23.750	0.77	0.0	0.0	0.0	7.3672D 01	7.3672D 01	0.88	0.0	0.0	0.0	2.4115D 02	2.4115D 02
24.250	0.78	0.0	0.0	0.0	8.3778D 01	8.3778D 01	0.89	0.0	0.0	0.0	2.5194D 02	2.5194D 02
25.000	0.78	0.0	0.0	0.0	9.9866D 01	9.9866D 01	0.91	0.0	0.0	0.0	2.6911D 02	2.6911D 02
26.000	0.79	0.0	0.0	0.0	1.2361D 02	1.2361D 02	0.94	0.0	0.0	0.0	2.9727D 02	2.9727D 02
27.000	0.81	0.0	0.0	0.0	1.4915D 02	1.4915D 02	0.97	0.0	0.0	0.0	3.1267D 02	3.1267D 02
29.000	0.84	0.0	0.0	0.0	2.0022D 02	2.0022D 02	1.05	0.0	0.0	0.0	3.4755D 02	3.4755D 02
30.000	0.86	0.0	0.0	0.0	2.2500D 02	2.2500D 02	1.10	0.0	0.0	0.0	3.6695D 02	3.6695D 02
32.000	0.91	0.0	0.0	0.0	2.7560D 02	2.7560D 02	1.21	0.0	0.0	0.0	4.1731D 02	4.1731D 02
33.000	0.94	0.0	0.0	0.0	3.1295D 02	3.1295D 02	1.27	0.0	0.0	0.0	4.3754D 02	4.3754D 02
34.000	0.98	0.0	0.0	0.0	3.2990D 02	3.2990D 02	1.35	0.0	0.0	0.0	4.6392D 02	4.6392D 02

JOINT PARAMETERS

TIME (MSEC)	JOINT NO. 6 - RK FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)	JOINT NO. 9 - LK FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)
35.000	1.02	0.0	0.0	0.0	3.5099D 02	3.5099D 02	1.43	0.0	0.0	0.0	4.9328D 02	4.9328D 02
37.000	1.12	0.0	0.0	0.0	4.0199D 02	4.0199D 02	1.62	0.0	0.0	0.0	5.6606D 02	5.6606D 02
39.000	1.26	0.0	0.0	0.0	4.6721D 02	4.6721D 02	1.86	0.0	0.0	0.0	6.5566D 02	6.5566D 02
40.000	1.34	0.0	0.0	0.0	5.0079D 02	5.0079D 02	2.00	0.0	0.0	0.0	7.0310D 02	7.0310D 02
41.000	1.44	0.0	0.0	0.0	5.3682D 02	5.3682D 02	2.15	0.0	0.0	0.0	7.5122D 02	7.5122D 02
42.000	1.54	0.0	0.0	0.0	5.5698D 02	5.5698D 02	2.32	0.0	0.0	0.0	7.7001D 02	7.7001D 02
44.000	1.75	0.0	0.0	0.0	5.6891D 02	5.6891D 02	2.65	0.0	0.0	0.0	7.0191D 02	7.0191D 02
44.500	1.80	0.0	0.0	0.0	5.9432D 02	5.9432D 02	2.72	0.0	0.0	0.0	7.2723D 02	7.2723D 02
44.625	1.81	0.0	0.0	0.0	6.0330D 02	6.0330D 02	2.74	0.0	0.0	0.0	7.3564D 02	7.3564D 02
44.750	1.83	0.0	0.0	0.0	6.1227D 02	6.1227D 02	2.76	0.0	0.0	0.0	7.4454D 02	7.4454D 02
44.875	1.84	0.0	0.0	0.0	6.2133D 02	6.2133D 02	2.78	0.0	0.0	0.0	7.5367D 02	7.5367D 02
45.000	1.86	0.0	0.0	0.0	6.3019D 02	6.3019D 02	2.80	0.0	0.0	0.0	7.6269D 02	7.6269D 02
45.250	1.89	0.0	0.0	0.0	6.4779D 02	6.4779D 02	2.84	0.0	0.0	0.0	7.8053D 02	7.8053D 02
45.500	1.93	0.0	0.0	0.0	6.6484D 02	6.6484D 02	2.88	0.0	0.0	0.0	7.9786D 02	7.9786D 02
46.000	2.00	0.0	0.0	0.0	6.9816D 02	6.9816D 02	2.97	0.0	0.0	0.0	8.3002D 02	8.3002D 02
46.500	2.07	0.0	0.0	0.0	7.3034D 02	7.3034D 02	3.07	0.0	0.0	0.0	8.6105D 02	8.6105D 02
47.000	2.15	0.0	0.0	0.0	7.6260D 02	7.6260D 02	3.16	0.0	0.0	0.0	8.8644D 02	8.8644D 02
48.000	2.32	0.0	0.0	0.0	8.2766D 02	8.2766D 02	3.37	0.0	0.0	0.0	9.2783D 02	9.2783D 02
49.000	2.51	0.0	0.0	0.0	8.9560D 02	8.9560D 02	3.58	0.0	0.0	0.0	9.0836D 02	9.0836D 02
50.000	2.73	0.0	0.0	0.0	9.6459D 02	9.6459D 02	3.80	0.0	0.0	0.0	9.8264D 02	9.8264D 02
52.000	3.20	0.0	0.0	0.0	9.9868D 02	9.9868D 02	4.24	0.0	0.0	0.0	9.6620D 02	9.6620D 02
54.000	3.72	0.0	0.0	0.0	1.1112D 03	1.1112D 03	4.64	0.0	0.0	0.0	1.0297D 03	1.0297D 03
54.250	3.76	0.0	0.0	0.0	1.1324D 03	1.1324D 03	4.70	0.0	0.0	0.0	1.0444D 03	1.0444D 03
54.500	3.85	0.0	0.0	0.0	1.1540D 03	1.1540D 03	4.77	0.0	0.0	0.0	1.0581D 03	1.0581D 03
54.750	3.92	0.0	0.0	0.0	1.1749D 03	1.1749D 03	4.83	0.0	0.0	0.0	1.0694D 03	1.0694D 03
55.000	3.99	0.0	0.0	0.0	1.1952D 03	1.1952D 03	4.89	0.0	0.0	0.0	1.0775D 03	1.0775D 03
55.500	4.14	0.0	0.0	0.0	1.2339D 03	1.2339D 03	5.02	0.0	0.0	0.0	1.0885D 03	1.0885D 03
56.000	4.29	0.0	0.0	0.0	1.2700D 03	1.2700D 03	5.15	0.0	0.0	0.0	1.0936D 03	1.0936D 03
57.000	4.61	0.0	0.0	0.0	1.3259D 03	1.3259D 03	5.41	0.0	0.0	0.0	1.0860D 03	1.0860D 03
58.000	4.95	0.0	0.0	0.0	1.3849D 03	1.3849D 03	5.66	0.0	0.0	0.0	1.0854D 03	1.0854D 03
59.000	5.30	0.0	0.0	0.0	1.4320D 03	1.4320D 03	5.92	0.0	0.0	0.0	1.1357D 03	1.1357D 03
60.000	5.66	0.0	0.0	0.0	1.4651D 03	1.4651D 03	6.20	0.0	0.0	0.0	1.1470D 03	1.1470D 03
62.000	6.41	0.0	0.0	0.0	1.5319D 03	1.5319D 03	6.77	0.0	0.0	0.0	1.2194D 03	1.2194D 03
64.000	7.20	0.0	0.0	0.0	1.6144D 03	1.6144D 03	7.36	0.0	0.0	0.0	1.2159D 03	1.2159D 03
64.250	7.30	0.0	0.0	0.0	1.6161D 03	1.6161D 03	7.44	0.0	0.0	0.0	1.2173D 03	1.2173D 03
64.500	7.40	0.0	0.0	0.0	1.6234D 03	1.6234D 03	7.51	0.0	0.0	0.0	1.2232D 03	1.2232D 03
64.750	7.50	0.0	0.0	0.0	1.6305D 03	1.6305D 03	7.58	0.0	0.0	0.0	1.2285D 03	1.2285D 03
65.000	7.61	0.0	0.0	0.0	1.6375D 03	1.6375D 03	7.66	0.0	0.0	0.0	1.2337D 03	1.2337D 03
65.500	7.82	0.0	0.0	0.0	1.6509D 03	1.6509D 03	7.81	0.0	0.0	0.0	1.2459D 03	1.2459D 03
66.000	8.03	0.0	0.0	0.0	1.6625D 03	1.6625D 03	7.96	0.0	0.0	0.0	1.2581D 03	1.2581D 03
67.000	8.46	0.0	0.0	0.0	1.6988D 03	1.6988D 03	8.27	0.0	0.0	0.0	1.3010D 03	1.3010D 03
68.000	8.89	0.0	0.0	0.0	1.7216D 03	1.7216D 03	8.60	0.0	0.0	0.0	1.3261D 03	1.3261D 03
68.500	9.12	0.0	0.0	0.0	1.7339D 03	1.7339D 03	8.76	0.0	0.0	0.0	1.3368D 03	1.3368D 03
69.000	9.34	0.0	0.0	0.0	1.7487D 03	1.7487D 03	8.92	0.0	0.0	0.0	1.3464D 03	1.3464D 03
69.500	9.55	0.0	0.0	0.0	1.7588D 03	1.7388D 03	9.09	0.0	0.0	0.0	1.3452D 03	1.3452D 03

DATE: OCT 16,1973 PAGE: 29.03

RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.

CRASH VICTIM: SIERRA 292-1050-2004

JOINT PARAMETERS

	JOINT NO. 6 - RK						JOINT NO. 9 - LK					
TIME (MSEC)	FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)	FLEX. ANGLE (DEG)	TORS. ANGLE (DEG)	FLEXURAL SPRING TORQUE (IN. LB.)	TORSIONAL SPRING TORQUE (IN. LB.)	VISCOUS + COULOMB TORQUE (IN. LB.)	RESULTANT TORQUE (IN. LB.)
70.000	9.79	0.0	0.0	0.0	1.7719D 03	1.7719D 03	9.26	0.0	0.0	0.0	1.3285D 03	1.3285D 03
71.000	10.25	0.0	0.0	0.0	1.8037D 03	1.8037D 03	9.59	0.0	0.0	0.0	1.3688D 03	1.3688D 03
72.000	10.72	0.0	0.0	0.0	1.8385D 03	1.8385D 03	9.93	0.0	0.0	0.0	1.3875D 03	1.3875D 03
74.000	11.69	0.0	0.0	0.0	1.9200D 03	1.9200D 03	10.61	0.0	0.0	0.0	1.3299D 03	1.3299D 03
75.000	12.19	0.0	0.0	0.0	1.9487D 03	1.9487D 03	10.95	0.0	0.0	0.0	1.3717D 03	1.3717D 03
76.000	12.70	0.0	0.0	0.0	1.9803D 03	1.9803D 03	11.29	0.0	0.0	0.0	1.4051D 03	1.4051D 03
77.000	13.22	0.0	0.0	0.0	2.0045D 03	2.0045D 03	11.64	0.0	0.0	0.0	1.4553D 03	1.4553D 03
78.000	13.75	0.0	0.0	0.0	2.0455D 03	2.0455D 03	12.01	0.0	0.0	0.0	1.4585D 03	1.4585D 03
80.000	14.83	0.0	0.0	0.0	2.0847D 03	2.0847D 03	12.75	0.0	0.0	0.0	1.4953D 03	1.4953D 03
82.000	15.93	0.0	0.0	0.0	2.0950D 03	2.0950D 03	13.49	0.0	0.0	0.0	1.4740D 03	1.4740D 03
84.000	17.04	0.0	0.0	0.0	2.0926D 03	2.0926D 03	14.20	0.0	0.0	0.0	1.4206D 03	1.4206D 03
85.000	17.57	0.0	0.0	0.0	2.0314D 03	2.0314D 03	14.56	0.0	0.0	0.0	1.4008D 03	1.4008D 03
87.000	18.58	0.0	0.0	0.0	1.9546D 03	1.9546D 03	15.26	0.0	0.0	0.0	1.4358D 03	1.4358D 03
89.000	19.59	0.0	0.0	0.0	1.9853D 03	1.9853D 03	15.95	0.0	0.0	0.0	1.3012D 03	1.3012D 03
90.000	20.10	0.0	0.0	0.0	1.9562D 03	1.9562D 03	16.27	0.0	0.0	0.0	1.3127D 03	1.3127D 03
92.000	21.10	0.0	0.0	0.0	1.9475D 03	1.9475D 03	16.91	0.0	0.0	0.0	1.3173D 03	1.3173D 03
93.000	21.60	0.0	0.0	0.0	1.9471D 03	1.9471D 03	17.23	0.0	0.0	0.0	1.3541D 03	1.3541D 03
94.000	22.10	0.0	0.0	0.0	1.9148D 03	1.9148D 03	17.55	0.0	0.0	0.0	1.2650D 03	1.2650D 03
95.000	22.57	0.0	0.0	0.0	1.8563D 03	1.8563D 03	17.87	0.0	0.0	0.0	1.3477D 03	1.3477D 03
97.000	23.51	0.0	0.0	0.0	1.6266D 03	1.6266D 03	18.46	0.0	0.0	0.0	1.2734D 03	1.2734D 03
98.000	23.90	0.0	0.0	0.0	1.6207D 03	1.6207D 03	18.74	0.0	0.0	0.0	1.1957D 03	1.1957D 03
99.000	24.30	0.0	0.0	0.0	1.6718D 03	1.6718D 03	19.01	0.0	0.0	0.0	1.1368D 03	1.1368D 03
100.000	24.71	0.0	0.0	0.0	1.6819D 03	1.6819D 03	19.26	0.0	0.0	0.0	1.0955D 03	1.0955D 03

CONTACT FORCES – VEHICLE PANELS VS. SEGMENTS

TIME (MSEC)	PANEL 3 (FRONT SEAT BACK) VS. SEGMENT 1 (LT) DEFLECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z	PANEL 3 (FRONT SEAT PACK) VS. SEGMENT 3 (UT) DEFLECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN. (VEHICLE REFERENCE) X	Y	Z
0.0	0.778	31.12	0.0	31.12	0.96	0.0	-10.59	0.256	10.23	0.0	10.23	-2.07	0.0	-24.39
0.250	0.778	31.12	10.75	32.92	0.96	0.00	-10.59	0.256	10.23	5.82	11.77	-2.07	0.00	-24.39
0.500	0.778	31.12	20.44	37.23	0.96	0.00	-10.59	0.256	10.23	8.51	13.31	-2.07	0.00	-24.39
0.750	0.778	31.12	27.39	41.43	0.96	0.00	-10.59	0.256	10.23	10.05	14.34	-2.07	0.00	-24.39
1.250	0.778	31.12	31.72	44.44	0.96	0.00	-10.59	0.256	10.23	10.73	14.83	-2.07	0.00	-24.39
1.750	0.778	31.12	33.02	45.37	0.96	0.00	-10.59	0.256	10.23	10.73	14.82	-2.07	0.00	-24.39
2.250	0.778	31.12	30.15	43.33	0.96	0.00	-10.59	0.256	10.23	10.03	14.32	-2.07	0.00	-24.39
2.750	0.778	31.11	25.02	40.31	0.96	0.00	-10.59	0.256	10.22	9.85	14.20	-2.07	0.00	-24.39
3.250	0.778	31.11	20.78	37.41	0.96	0.00	-10.59	0.256	10.22	12.00	14.94	-2.07	0.00	-24.39
3.750	0.778	31.11	15.94	34.65	0.96	0.00	-10.59	0.254	10.22	12.89	17.45	-2.07	0.00	-24.[illegible]
4.750	0.778	31.10	11.67	33.29	0.96	0.00	-10.59	0.255	10.21	15.[illegible]	21.16	-2.07	0.00	-24.[illegible]
5.000	0.778	31.10	13.04	33.72	0.96	0.00	-10.59	0.255	10.21	20.28	22.71	-2.07	0.00	-24.39
6.000	0.777	31.09	20.31	37.14	0.96	0.00	-10.59	0.255	10.20	26.03	27.96	-2.07	0.00	-24.39
8.000	0.776	31.05	37.52	48.70	0.96	0.00	-10.59	0.254	10.14	42.14	43.35	-2.07	0.00	-24.39
9.000	0.776	31.01	43.24	53.21	0.96	0.00	-10.59	0.252	10.07	49.73	50.79	-2.07	0.01	-24.39
10.000	0.774	30.95	55.35	63.-5	0.96	0.00	-10.59	0.250	9.96	61.92	62.72	-2.07	0.01	-24.39
10.500	0.774	30.93	55.59	61.89	0.96	0.01	-10.5[illegible]	0.248	9.89	65.26	66.09	-2.07	0.01	-24.39
11.000	0.773	30.90	51.01	57.64	0.96	0.01	-10.53	0.246	9.81	65.66	66.30	-2.07	0.01	-24.39
11.500	0.772	30.86	51.77	60.27	0.96	0.01	-10.53	0.244	9.72	66.02	66.71	-2.07	0.01	-24.39
12.500	0.770	30.77	48.72	57.62	0.96	0.01	-10.58	0.239	9.50	66.47	67.15	-2.07	0.02	-24.39
13.500	0.768	30.67	50.20	58.63	0.96	0.01	-10.58	0.233	9.22	64.56	65.22	-2.07	0.02	-24.39
14.500	0.765	30.55	60.35	67.64	0.96	0.01	-10.57	0.226	8.89	62.23	62.86	-2.07	0.03	-24.39
15.000	0.764	30.49	63.02	70.01	0.96	0.01	-10.57	0.221	8.70	60.59	61.51	-2.07	0.03	-24.38
15.500	0.762	30.42	63.11	70.06	0.96	0.02	-10.57	0.217	8.49	59.43	60.03	-2.07	0.03	-24.39
16.000	0.761	30.35	60.69	68.03	0.96	0.02	-10.57	0.212	8.27	57.87	58.46	-2.07	0.04	-24.38
16.500	0.759	30.27	59.90	67.12	0.96	0.02	-10.56	0.206	8.02	56.19	56.76	-2.07	0.04	-24.38
17.500	0.755	30.10	65.51	72.09	0.97	0.02	-10.56	0.194	7.50	52.49	53.07	-2.07	0.05	-24.38
18.500	0.751	29.90	72.81	78.71	0.97	0.03	-10.55	0.181	6.90	48.31	48.80	-2.07	0.06	-24.38
19.500	0.745	29.68	82.79	87.95	0.97	0.03	-10.54	0.166	6.23	43.63	44.08	-2.06	0.07	-24.37
20.000	0.743	29.55	85.88	90.82	0.97	0.04	-10.54	0.158	5.87	41.10	41.51	-2.06	0.07	-24.37
22.000	0.730	28.98	95.75	100.04	0.97	0.05	-10.52	0.121	4.23	29.62	29.92	-2.06	0.10	-24.36
22.250	0.728	28.90	97.18	101.38	0.97	0.05	-10.52	0.116	4.00	28.02	28.31	-2.06	0.10	-24.36
22.500	0.726	28.81	104.53	108.43	0.97	0.05	-10.52	0.110	3.77	26.40	26.66	-2.06	0.11	-24.36
22.750	0.724	28.73	110.28	113.96	0.98	0.05	-10.52	0.105	3.53	24.73	24.98	-2.06	0.11	-24.36
23.250	0.720	28.54	118.45	121.84	0.98	0.06	-10.51	0.094	3.04	21.29	21.51	-2.06	0.12	-24.35
23.750	0.716	28.35	124.33	127.52	0.98	0.06	-10.51	0.082	2.53	17.70	17.88	-2.06	0.13	-24.35
24.250	0.711	28.15	130.51	133.52	0.98	0.06	-10.50	0.070	1.99	13.96	14.10	-2.06	0.13	-24.35
25.000	0.704	27.83	139.51	142.26	0.98	0.07	-10.49	0.051	1.15	8.06	8.14	-2.06	0.15	-24.35
26.000	0.693	27.35	151.56	154.01	0.98	0.08	-10.48	0.024	0.0	0.0	0.0	-2.06	0.17	-24.34
27.000	0.682	26.83	159.63	161.67	0.99	0.09	-10.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.000	0.655	25.64	179.48	181.30	0.99	0.11	-10.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.000	0.639	24.96	174.73	176.51	0.99	0.12	-10.43	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.000	0.605	23.44	164.05	165.72	1.00	0.15	-10.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.000	0.586	22.58	158.08	159.68	1.00	0.16	-10.38	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.000	0.565	21.67	151.70	153.24	1.01	0.18	-10.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CONTACT FORCES - VEHICLE PANELS VS. SEGMENTS

	PANEL 3 (FRONT SEAT BACK) VS. SEGMENT 1 (LT)							PANEL 3 (FRONT SEAT BACK) VS. SEGMENT 3 (RT)						
TIME (MSEC)	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z
35.000	0.564	20.70	144.90	146.50	1.01	0.19	-10.34	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.000	0.496	18.68	130.04	131.36	1.02	0.23	-10.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.000	0.443	16.22	115.52	114.67	1.03	0.27	-10.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.000	0.414	14.95	104.63	105.69	1.04	0.29	-10.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.000	0.384	13.62	95.32	96.28	1.04	0.31	-10.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.000	0.353	12.25	85.72	86.59	1.05	0.34	-10.19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.000	0.292	9.51	66.60	67.23	1.06	0.39	-10.14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.500	0.277	8.84	61.87	62.50	1.06	0.40	-10.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.625	0.273	8.67	60.67	61.29	1.06	0.41	-10.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.750	0.269	8.49	59.46	60.07	1.06	0.41	-10.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.875	0.265	8.32	58.25	58.84	1.06	0.41	-10.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.000	0.261	8.15	57.03	57.61	1.06	0.42	-10.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.250	0.253	7.80	54.57	55.13	1.06	0.42	-10.11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.500	0.245	7.44	52.09	52.62	1.07	0.43	-10.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.000	0.229	6.72	47.06	47.54	1.07	0.44	-10.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.500	0.213	5.99	41.94	42.37	1.07	0.46	-10.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.000	0.196	5.25	36.74	37.12	1.08	0.47	-10.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48.000	0.162	3.73	26.13	26.40	1.08	0.50	-10.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49.000	0.127	2.18	15.29	15.44	1.09	0.53	-10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.000	0.091	0.61	4.25	4.29	1.09	0.57	-9.97	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.000	0.018	0.0	0.0	0.0	1.11	0.64	-9.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

CONTACT FORCES - VEHICLE PANELS VS. SEGMENTS

	PANEL 3 (FRONT SEAT BACK) VS. SEGMENT 1 (LT)							PANEL 3 (FRONT SEAT BACK) VS. SEGMENT 3 (UT)						
TIME (MSEC)	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z
70.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
97.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CONTACT FORCES - VEHICLE PANELS VS. SEGMENTS

	PANEL 4 (FRONT SEAT CUSHION) VS. SEGMENT 1 (LT)							PANEL 5 (FLOOR) VS. SEGMENT 8 (RF)						
TIME (MSEC)	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z
0.0	3.231	116.19	0.0	116.19	5.96	0.0	-7.25	0.044	38.16	0.0	38.16	33.09	4.45	0.00
0.250	3.231	116.19	12.15	116.82	5.96	0.00	-7.25	0.044	37.95	8.45	38.88	33.09	4.45	0.00
0.500	3.231	116.19	7.93	116.46	5.96	0.00	-7.25	0.044	37.44	9.49	38.62	33.09	4.45	0.00
0.750	3.231	116.19	4.13	116.27	5.96	0.00	-7.25	0.043	36.74	9.14	37.86	33.09	4.45	-0.00
1.250	3.231	116.20	3.58	116.25	5.96	0.00	-7.25	0.044	34.98	8.38	35.97	33.09	4.45	-0.00
1.750	3.232	116.21	10.14	116.65	5.96	0.00	-7.25	0.044	32.93	7.97	33.99	33.09	4.45	-0.00
2.250	3.232	116.21	17.13	117.47	5.96	0.00	-7.25	0.044	30.60	7.19	31.61	33.09	4.45	-0.00
2.750	3.232	116.22	23.32	118.53	5.96	0.00	-7.25	0.043	28.19	7.21	29.46	33.09	4.45	0.00
3.250	3.232	116.22	29.91	120.01	5.96	0.00	-7.25	0.043	26.55	6.52	27.34	33.09	4.45	-0.00
3.750	3.232	116.22	36.74	121.69	5.96	0.00	-7.25	0.043	24.56	5.80	25.26	33.09	4.45	0.0
4.750	3.232	116.22	47.17	125.43	5.96	0.00	-7.25	0.042	20.50	4.30	21.06	33.09	4.45	0.00
5.000	3.232	116.22	51.54	127.26	5.96	0.00	-7.25	0.042	19.58	3.91	19.97	33.09	4.45	0.00
6.000	3.232	116.22	68.06	134.69	5.96	0.00	-7.25	0.042	15.36	2.77	15.61	33.09	4.45	0.0
8.000	3.232	116.22	108.22	156.61	5.96	0.00	-7.25	0.041	6.87	1.45	7.02	33.09	4.45	0.00
9.000	3.232	116.24	133.94	177.34	5.96	0.00	-7.25	0.040	3.67	1.38	3.92	33.09	4.45	0.00
10.000	3.232	116.26	149.77	189.59	5.96	0.00	-7.25	0.040	2.61	1.31	2.92	33.09	4.45	0.00
10.500	3.233	116.28	168.28	204.54	5.97	0.00	-7.25	0.040	2.96	1.48	3.31	33.09	4.45	0.00
11.000	3.233	116.30	187.10	220.30	5.97	0.00	-7.25	0.040	3.98	1.99	4.44	33.09	4.45	0.00
11.500	3.233	116.32	195.13	227.17	5.97	0.00	-7.25	0.040	5.78	2.89	6.47	33.09	4.45	0.00
12.500	3.234	116.39	213.11	242.82	5.97	0.00	-7.25	0.041	12.76	6.23	14.27	33.09	4.45	-0.00
13.500	3.235	116.48	216.42	247.54	5.97	0.01	-7.25	0.042	22.43	11.22	25.08	33.09	4.45	0.00
14.500	3.237	116.58	225.55	253.90	5.97	0.01	-7.25	0.043	27.92	13.96	31.21	33.10	4.45	0.00
15.000	3.238	116.64	234.39	261.81	5.97	0.01	-7.25	0.042	25.10	12.55	28.07	33.10	4.45	0.00
15.500	3.239	116.71	250.49	276.35	5.97	0.01	-7.25	0.042	23.94	11.97	26.77	33.10	4.45	0.00
16.000	3.240	116.78	257.88	283.08	5.97	0.01	-7.25	0.042	22.24	11.12	24.87	33.10	4.45	0.00
16.500	3.241	116.85	257.94	283.18	5.97	0.01	-7.25	0.042	20.42	10.21	22.83	33.10	4.45	-0.00
17.500	3.243	117.02	258.09	283.38	5.98	0.01	-7.26	0.042	17.86	8.93	19.97	33.10	4.45	0.00
18.500	3.246	117.21	258.25	283.60	5.98	0.01	-7.26	0.042	19.85	9.93	22.20	33.10	4.46	0.0
19.500	3.249	117.42	258.43	283.85	5.98	0.02	-7.26	0.042	21.25	10.63	23.76	33.11	4.46	-0.00
20.000	3.250	117.53	258.52	283.98	5.98	0.02	-7.26	0.042	22.87	11.44	25.57	33.11	4.46	0.00
22.000	3.257	118.02	258.94	284.57	5.99	0.02	-7.26	0.042	24.78	12.39	27.70	33.12	4.46	0.00
22.250	3.258	118.09	259.00	284.65	5.99	0.02	-7.26	0.043	27.15	13.58	30.36	33.12	4.46	-0.00
22.500	3.259	118.16	259.06	284.73	6.00	0.02	-7.26	0.043	29.27	14.63	32.72	33.12	4.46	0.00
22.750	3.260	118.23	259.12	284.82	6.00	0.02	-7.26	0.043	31.24	15.62	34.93	33.12	4.46	-0.00
23.250	3.262	118.37	259.24	284.99	6.00	0.03	-7.26	0.043	34.23	17.11	38.27	33.12	4.46	0.00
23.750	3.265	118.52	259.36	285.16	6.00	0.03	-7.26	0.044	35.94	17.97	40.18	33.13	4.46	0.00
24.250	3.267	118.68	259.49	285.34	6.01	0.03	-7.26	0.044	36.78	18.39	41.12	33.13	4.46	0.00
25.000	3.270	118.92	259.69	285.62	6.01	0.03	-7.26	0.044	37.18	18.59	41.57	33.13	4.47	0.00
26.000	3.275	119.25	259.97	286.01	6.02	0.04	-7.26	0.044	36.02	18.01	40.27	33.14	4.47	-0.00
27.000	3.280	119.61	260.25	286.42	6.03	0.04	-7.27	0.044	33.62	16.81	37.59	33.15	4.47	-0.00
29.000	3.291	120.37	260.87	287.30	6.05	0.05	-7.27	0.044	36.21	18.10	40.48	33.16	4.47	0.00
30.000	3.297	120.78	261.19	287.77	6.06	0.06	-7.27	0.044	38.11	19.05	42.61	33.17	4.48	-0.00
32.000	3.310	121.67	261.87	288.76	6.09	0.07	-7.28	0.046	39.39	19.69	44.04	33.19	4.48	-0.00
33.000	3.316	122.14	262.23	289.28	6.10	0.08	-7.28	0.047	40.49	20.25	45.27	33.21	4.49	0.00
34.000	3.323	122.63	262.60	289.82	6.12	0.09	-7.29	0.048	41.63	20.81	46.54	33.22	4.49	-0.00

CONTACT FORCES - VEHICLE PANELS VS. SEGMENTS

	PANEL 4 (FRONT SEAT CUSHION) VS. SEGMENT 1 (LT)							PANEL 5 (FLOOR) VS. SEGMENT 8 (RF)						
TIME (MSEC)	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z
35.000	3.331	123.15	262.57	290.38	6.14	0.09	-7.29	0.050	42.83	21.42	47.89	33.23	4.56	-0.00
37.000	3.346	124.24	263.76	291.55	6.17	0.12	-7.30	0.053	45.66	22.83	51.05	33.26	4.50	0.00
39.000	3.363	125.41	264.56	292.78	6.22	0.14	-7.31	0.058	49.52	24.76	55.37	33.30	4.51	0.00
40.000	3.372	126.03	264.98	293.42	6.24	0.15	-7.32	0.060	51.82	25.91	57.94	33.31	4.52	0.0
41.000	3.381	126.66	265.40	294.07	6.27	0.17	-7.32	0.063	54.21	27.11	60.61	33.33	4.52	0.00
42.000	3.390	127.33	265.82	294.74	6.29	0.19	-7.33	0.066	56.78	28.39	63.48	33.35	4.53	-0.00
44.000	3.411	128.78	266.79	296.18	6.34	0.22	-7.34	0.076	64.95	32.48	72.62	33.39	4.54	0.00
44.500	3.416	129.15	266.94	296.54	6.36	0.23	-7.34	0.079	67.51	33.76	75.49	33.40	4.54	0.00
44.625	3.418	129.25	267.00	296.64	6.36	0.24	-7.35	0.079	68.15	34.07	76.17	33.40	4.54	0.00
44.750	3.419	129.35	267.05	296.73	6.36	0.24	-7.35	0.080	68.74	34.37	76.86	33.40	4.54	0.00
44.875	3.421	129.45	267.11	296.83	6.37	0.24	-7.35	0.081	69.35	34.68	77.54	33.40	4.54	0.00
45.000	3.422	129.56	267.17	296.93	6.37	0.24	-7.35	0.081	69.95	34.98	78.21	33.40	4.54	0.00
45.250	3.425	129.76	267.29	297.13	6.38	0.25	-7.35	0.083	71.15	35.57	79.55	33.41	4.54	0.00
45.500	3.428	129.97	267.41	297.33	6.38	0.25	-7.35	0.084	72.32	36.16	80.86	33.41	4.55	0.00
46.000	3.434	130.40	267.66	297.73	6.40	0.27	-7.35	0.087	74.62	37.31	83.43	33.42	4.55	0.0
46.500	3.441	130.84	267.90	298.15	6.41	0.28	-7.36	0.089	76.85	38.43	85.92	33.43	4.55	0.00
47.000	3.447	131.29	268.15	298.57	6.43	0.29	-7.36	0.092	79.03	39.51	88.36	33.44	4.55	0.00
48.000	3.460	132.22	268.64	299.42	6.46	0.32	-7.37	0.097	83.19	41.60	93.01	33.45	4.56	0.00
49.000	3.474	133.20	269.14	300.30	6.49	0.34	-7.37	0.101	87.06	43.53	97.34	33.47	4.56	0.00
50.000	3.489	134.22	269.64	301.20	6.52	0.37	-7.38	0.105	90.43	45.21	101.10	33.48	4.57	0.00
52.000	3.520	136.41	270.62	303.06	6.58	0.44	-7.40	0.110	94.64	47.32	105.81	33.49	4.58	0.00
54.000	3.555	138.34	271.59	305.02	6.65	0.51	-7.41	0.114	98.23	49.12	109.83	33.51	4.59	0.00
54.250	3.559	139.16	271.70	305.27	6.66	0.52	-7.42	0.114	91.00	45.50	101.74	33.52	4.59	0.00
54.500	3.564	139.49	271.82	305.52	6.67	0.53	-7.42	0.113	83.91	41.95	93.81	33.52	4.59	-0.00
54.750	3.569	139.81	271.94	305.77	6.68	0.54	-7.42	0.112	77.04	38.52	86.14	33.52	4.59	0.00
55.000	3.573	140.14	272.05	306.02	6.69	0.55	-7.42	0.111	70.82	35.41	79.18	33.52	4.59	0.00
55.500	3.583	140.81	272.27	306.53	6.71	0.57	-7.43	0.110	60.84	30.42	68.03	33.52	4.60	0.00
56.000	3.593	141.50	272.49	307.03	6.72	0.59	-7.43	0.110	54.59	27.29	61.03	33.53	4.60	0.00
57.000	3.613	142.89	272.90	308.04	6.76	0.64	-7.44	0.110	55.40	27.70	61.94	33.54	4.60	0.00
58.000	3.633	144.33	273.27	309.04	6.80	0.68	-7.45	0.111	72.91	36.45	81.51	33.55	4.61	-0.00
59.000	3.654	145.91	273.61	310.03	6.84	0.73	-7.46	0.112	76.77	38.39	85.83	33.55	4.61	-0.00
60.000	3.676	147.33	273.90	311.01	6.89	0.78	-7.47	0.111	74.62	37.31	83.43	33.56	4.62	0.00
62.000	3.722	150.56	274.35	312.94	6.97	0.89	-7.49	0.112	78.37	39.18	87.62	33.57	4.63	0.00
64.000	3.771	154.00	274.56	314.80	7.07	1.01	-7.51	0.109	40.66	20.33	45.46	33.58	4.64	-0.00
64.250	3.778	154.45	274.57	315.03	7.08	1.02	-7.51	0.109	43.62	21.81	48.77	33.58	4.64	0.00
64.500	3.784	154.89	274.57	315.25	7.09	1.04	-7.52	0.109	47.17	23.58	52.74	33.58	4.64	0.0
64.750	3.791	155.35	274.57	315.47	7.10	1.06	-7.52	0.110	51.71	25.86	57.82	33.59	4.64	0.00
65.000	3.797	155.80	274.56	315.69	7.11	1.07	-7.52	0.110	57.07	28.52	63.80	33.59	4.64	0.00
65.500	3.810	156.72	274.54	316.12	7.14	1.10	-7.53	0.111	67.11	33.56	75.03	33.59	4.65	-0.00
66.000	3.824	157.65	274.49	316.54	7.16	1.14	-7.53	0.111	75.15	37.58	84.02	33.59	4.65	-0.00
67.000	3.851	159.55	274.33	317.36	7.21	1.20	-7.55	0.112	83.17	41.58	92.99	33.60	4.65	0.00
68.000	3.879	161.50	274.09	318.13	7.27	1.27	-7.56	0.112	76.58	38.29	85.62	33.60	4.66	0.00
68.500	3.893	162.50	273.93	318.50	7.29	1.31	-7.56	0.111	75.68	37.84	84.62	33.60	4.66	0.0
69.000	3.907	163.51	273.74	318.86	7.32	1.35	-7.57	0.111	75.22	37.61	84.10	33.61	4.66	0.00
69.500	3.922	164.52	273.54	319.20	7.35	1.38	-7.58	0.112	75.97	37.98	84.93	33.61	4.67	0.0

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

CONTACT FORCES - VEHICLE PANELS VS. SEGMENTS

	PANEL 4 (FRONT SEAT CUSHION) VS. SEGMENT 1 (LT)							PANEL 5 (FLOOR) VS. SEGMENT 8 (RF)						
TIME (MSEC)	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) (VEHICLE REFERENCE) X	Y	Z
70.000	3.936	165.35	273.30	319.53	7.35	1.42	-7.53	0.112	80.02	40.01	89.46	33.61	4.67	0.00
71.000	3.966	167.64	272.75	320.14	7.43	1.50	-7.60	0.112	82.65	41.32	92.40	33.62	4.67	0.0
72.000	3.997	169.96	272.03	320.70	7.49	1.58	-7.61	0.112	84.56	42.28	94.54	33.62	4.68	0.0
74.000	4.059	176.49	278.22	329.47	7.61	1.75	-7.64	0.113	94.22	47.11	105.34	33.62	4.69	0.00
75.000	4.091	180.35	281.50	334.16	7.67	1.83	-7.65	0.112	79.11	[illegible]	88.45	33.63	[illegible]	0.0
76.000	4.123	183.73	284.49	338.91	7.73	1.92	-7.67	0.111	76.11	[illegible]	85.38	33.63	4.70	[illegible]
77.000	4.159	187.52	288.00	343.74	7.80	2.01	-7.69	0.112	70.73	[illegible]	79.00	33.64	[illegible]	-0.00
78.000	4.195	191.43	291.37	348.63	7.86	2.11	-7.70	0.112	73.35	36.68	82.01	33.64	4.71	-0.00
80.000	4.270	199.69	297.95	356.68	7.99	2.20	-7.73	0.111	68.70	34.35	76.81	33.64	4.71	0.00
82.000	4.350	208.55	304.44	369.02	8.13	2.51	-7.76	0.108	30.41	15.21	34.00	33.64	4.72	0.00
84.000	4.436	217.96	310.73	379.55	8.26	2.72	-7.79	0.108	32.94	16.47	35.53	33.65	4.73	0.00
85.000	4.481	222.86	313.74	384.84	8.33	2.82	-7.81	0.103	32.71	16.35	34.37	33.66	4.74	[illegible]
87.000	4.573	233.00	319.42	395.57	8.47	3.04	-7.84	0.102	37.43	18.77	41.96	33.68	4.75	0.00
89.000	4.663	243.49	324.51	405.70	8.61	3.27	-7.87	0.113	81.19	40.60	89.79	33.70	4.75	[illegible]
90.000	4.717	248.85	326.81	410.77	8.67	3.39	-7.89	0.110	62.06	31.03	69.39	33.70	4.76	0.00
92.000	4.816	259.76	330.63	420.62	8.81	3.60	-7.92	0.109	41.76	20.87	46.65	33.72	4.76	0.00
93.000	4.866	265.28	332.54	425.39	8.88	3.72	-7.94	0.111	65.04	32.52	72.71	33.72	4.76	0.0
94.000	4.917	270.87	334.04	430.06	8.95	3.83	-7.95	0.113	91.87	45.93	102.71	33.73	4.76	0.0
95.000	4.968	276.52	335.32	434.63	9.01	3.95	-7.97	0.113	93.87	46.94	104.95	33.73	4.76	0.00
97.000	5.072	310.37	372.44	484.81	9.14	4.17	-8.00	0.110	52.81	26.40	59.04	33.74	4.75	0.00
98.000	5.124	332.29	398.75	519.05	9.20	4.29	-8.01	0.104	6.53	3.27	7.30	33.75	4.75	0.0
99.000	5.177	354.26	425.11	553.37	9.27	4.40	-8.03	0.100	0.0	0.0	0.0	33.76	4.74	-0.00
100.000	5.229	376.16	451.40	587.59	9.33	4.51	-8.04	0.099	0.0	0.0	0.0	33.77	4.73	0.00

CONTACT FORCES - BELTS VS. SEGMENTS

BELT 1 (FRONT LAP BELT) VS. SEGMENT 1 (LT)

TIME (MSEC)	ANCHOR POINT A STRAIN (IN./ IN.)	ANCHOR POINT A FORCE (LB.)	ANCHOR POINT B STRAIN (IN./ IN.)	ANCHOR POINT B FORCE (LB.)
0.0	-0.005664	0.0	-0.005664	0.0
0.250	-0.005665	0.0	-0.005665	0.0
0.500	-0.005666	0.0	-0.005666	0.0
0.750	-0.005668	0.0	-0.005668	0.0
1.250	-0.005671	0.0	-0.005670	0.0
1.750	-0.005675	0.0	-0.005672	0.0
2.250	-0.005678	0.0	-0.005673	0.0
2.750	-0.005682	0.0	-0.005672	0.0
3.250	-0.005685	0.0	-0.005670	0.0
3.750	-0.005689	0.0	-0.005665	0.0
4.750	-0.005699	0.0	-0.005647	0.0
5.000	-0.005702	0.0	-0.005643	0.0
6.000	-0.005717	0.0	-0.005614	0.0
8.000	-0.005764	0.0	-0.005526	0.0
9.000	-0.005800	0.0	-0.005467	0.0
10.000	-0.005849	0.0	-0.005395	0.0
10.500	-0.005878	0.0	-0.005357	0.0
11.000	-0.005911	0.0	-0.005315	0.0
11.500	-0.005948	0.0	-0.005269	0.0
12.500	-0.006035	0.0	-0.005170	0.0
13.500	-0.006143	0.0	-0.005060	0.0
14.500	-0.006273	0.0	-0.004936	0.0
15.000	-0.006351	0.0	-0.004867	0.0
15.500	-0.006432	0.0	-0.004795	0.0
16.000	-0.006519	0.0	-0.004719	0.0
16.500	-0.006612	0.0	-0.004638	0.0
17.500	-0.006814	0.0	-0.004460	0.0
18.500	-0.007036	0.0	-0.004259	0.0
19.500	-0.007280	0.0	-0.004031	0.0
20.000	-0.007410	0.0	-0.003906	0.0
22.000	-0.007986	0.0	-0.003316	0.0
22.250	-0.008064	0.0	-0.003231	0.0
22.500	-0.008142	0.0	-0.003143	0.0
22.750	-0.008222	0.0	-0.003054	0.0
23.250	-0.008384	0.0	-0.002867	0.0
23.750	-0.008551	0.0	-0.002669	0.0
24.250	-0.008722	0.0	-0.002460	0.0
25.000	-0.008987	0.0	-0.002124	0.0
26.000	-0.009356	0.0	-0.001634	0.0
27.000	-0.009742	0.0	-0.001091	0.0
29.000	-0.010566	0.0	0.000170	1.70
30.000	-0.010990	0.0	0.000879	8.79
32.000	-0.011853	0.0	0.002450	24.50
33.000	-0.012279	0.0	0.003309	33.09
34.000	-0.012695	0.0	0.004207	42.07

CONTACT FORCES - BELTS VS. SEGMENTS

BELT 1 (FRONT LAP BELT) VS. SEGMENT 1 (LT)

TIME (MSEC)	ANCHOR POINT A STRAIN (IN./ IN.)	ANCHOR POINT A FORCE (LB.)	ANCHOR POINT B STRAIN (IN./ IN.)	ANCHOR POINT B FORCE (LB.)
35.000	-0.013100	0.0	0.005146	51.46
37.000	-0.012359	0.0	0.007132	71.32
39.000	-0.014512	0.0	0.009228	92.28
40.000	-0.014792	0.0	0.010313	103.13
41.000	-0.015034	0.0	0.011418	114.18
42.000	-0.015242	0.0	0.012528	125.28
44.000	-0.015558	0.0	0.014590	145.90
44.500	-0.015615	0.0	0.015059	150.59
44.625	-0.015629	0.0	0.015177	151.77
44.750	-0.015642	0.0	0.015293	152.93
44.875	-0.015654	0.0	0.015410	154.10
45.000	-0.015667	0.0	0.015527	155.27
45.250	-0.015690	0.0	0.015759	157.59
45.500	-0.015712	0.0	0.015991	159.91
46.000	-0.015749	0.0	0.016453	164.53
46.500	-0.015777	0.0	0.016913	169.13
47.000	-0.015794	0.0	[illegible]	[illegible]
48.000	-0.015796	0.0	[illegible]	[illegible]
49.000	-0.015746	0.0	0.019145	191.45
50.000	-0.015647	0.0	0.019990	199.90
52.000	-0.015298	0.0	0.021598	215.98
54.000	-0.014763	0.0	0.023076	230.76
54.250	-0.014685	0.0	0.023255	232.55
54.500	-0.014603	0.0	0.023434	234.34
54.750	-0.014519	0.0	0.023613	236.13
55.000	-0.014431	0.0	0.023792	237.92
55.500	-0.014244	0.0	0.024149	241.49
56.000	-0.014043	0.0	0.024506	245.06
57.000	-0.013593	0.0	0.025222	252.22
58.000	-0.013079	0.0	0.025943	259.43
59.000	-0.012507	0.0	0.026680	266.80
60.000	-0.011880	0.0	0.027432	274.32
62.000	-0.010445	0.0	0.028931	289.31
64.000	-0.008722	0.0	0.030435	304.35
64.250	-0.008483	0.0	0.030621	306.21
64.500	-0.008238	0.0	0.030808	308.08
64.750	-0.007988	0.0	0.030996	309.96
65.000	-0.007733	0.0	0.031185	311.85
65.500	-0.007205	0.0	0.031565	315.65
66.000	-0.006655	0.0	0.031951	319.51
67.000	-0.005487	0.0	0.032737	327.37
68.000	-0.004224	0.0	0.033545	335.45
68.500	-0.003558	0.0	0.033956	339.56
69.000	-0.002866	0.0	0.034372	343.72
69.500	-0.002149	0.0	0.034794	347.94

DATE: OCT 16,1973

RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.

CRASH VICTIM: SIERRA 292-1050-2004

CONTACT FORCES - BELTS VS. SEGMENTS

BELT 1 (FRONT LAP BELT) VS. SEGMENT 1 (LT)

TIME (MSEC)	ANCHOR POINT A STRAIN (IN./ IN.)	ANCHOR POINT A FORCE (LB.)	ANCHOR POINT B STRAIN (IN./ IN.)	ANCHOR POINT B FORCE (LB.)
70.000	-0.001405	0.0	0.035225	352.25
71.000	0.000159	1.59	0.036109	361.09
72.000	0.001826	18.26	0.037027	370.27
74.000	0.005434	54.34	0.039007	390.07
75.000	0.007339	73.39	0.040072	400.74
76.000	0.009312	93.12	0.041183	412.13
77.000	0.011349	113.49	0.042335	423.94
78.000	0.013450	134.50	0.043517	435.05
80.000	0.017524	175.24	0.045963	461.12
82.000	0.022417	224.17	0.048499	487.11
84.000	0.027196	271.96	0.051162	514.41
85.000	0.029648	296.48	0.052554	528.68
87.000	0.034650	346.50	0.055473	558.50
89.000	0.039755	397.55	0.058603	590.63
90.000	0.042301	423.59	0.060263	607.63
92.000	0.047441	476.27	0.063793	645.33
93.000	0.050002	502.52	0.065672	665.98
94.000	0.052534	528.48	0.067612	686.83
95.000	0.055040	554.16	0.069603	708.23
97.000	0.059919	604.17	0.073742	752.73
98.000	0.062266	629.36	0.075878	775.69
99.000	0.064572	654.15	0.078045	798.98
100.000	0.066822	678.34	0.080229	822.35

CONTACT FORCES — SEGMENT NO. 6 (RUL) VS. SEGMENT NO. 13 (RLA)

TIME (MSEC)	DEFLECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) SEG. 6 LOCAL REFERENCE X	Y	Z	SEG. 13 LOCAL REFERENCE X	Y	Z
0.0	0.236	110.87	0.0	110.87	1.71	2.79	0.25	-0.44	-0.36	7.08
0.250	0.235	110.46	47.46	120.22	1.71	2.79	0.25	-0.44	-0.36	7.08
0.500	0.233	109.35	54.67	122.25	1.71	2.79	0.25	-0.45	-0.36	7.08
0.750	0.229	107.65	53.83	120.36	1.71	2.79	0.26	-0.45	-0.36	7.08
1.250	0.219	102.70	51.35	114.82	1.71	2.80	0.26	-0.45	-0.36	7.08
1.750	0.204	95.60	47.95	107.22	1.71	2.80	0.27	-0.45	-0.37	7.09
2.250	0.186	87.59	43.79	97.93	1.72	2.81	0.28	-0.45	-0.37	7.10
2.750	0.166	78.07	39.04	87.29	1.72	2.82	0.29	-0.46	-0.37	7.11
3.250	0.144	67.71	33.86	75.70	1.72	2.83	0.30	-0.46	-0.37	7.12
3.750	0.121	56.82	28.41	63.53	1.73	2.84	0.31	-0.46	-0.38	7.13
4.750	0.073	34.49	17.24	38.56	1.74	2.86	0.34	-0.47	-0.38	7.16
5.000	0.062	29.00	14.50	32.42	1.74	2.87	0.35	-0.47	-0.39	7.17
6.000	0.017	8.21	4.10	9.17	1.75	2.89	0.37	-0.49	-0.39	7.18
8.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CONTACT FORCES - SEGMENT NO. 6 (RUL) VS. SEGMENT NO. 13 (RLA)

TIME (MSEC)	DEFL-ECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) SEG. 6 LOCAL REFERENCE X	Y	Z	SEG. 13 LOCAL REFERENCE X	Y	Z
35.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.625	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.875	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.000	0.026	12.23	6.11	13.67	1.35	3.10	1.34	-0.39	-0.55	6.78
64.250	0.031	14.70	7.35	16.43	1.34	3.10	1.34	-0.39	-0.55	6.77
64.500	0.036	17.08	8.54	19.10	1.34	3.10	1.34	-0.39	-0.55	6.76
64.750	0.041	19.36	9.68	21.65	1.33	3.10	1.34	-0.39	-0.55	6.75
65.000	0.046	21.54	10.77	24.08	1.33	3.10	1.35	-0.39	-0.55	6.74
65.500	0.054	25.57	12.79	28.59	1.32	3.10	1.35	-0.39	-0.56	6.73
66.000	0.062	29.12	14.56	32.56	1.31	3.10	1.36	-0.39	-0.56	6.71
67.000	0.074	34.68	17.34	38.78	1.30	3.10	1.37	-0.38	-0.56	6.67
68.000	0.081	38.18	19.09	42.69	1.28	3.10	1.38	-0.38	-0.57	6.64
68.500	0.083	39.12	19.56	43.74	1.27	3.11	1.39	-0.38	-0.57	6.62
69.000	0.084	39.54	19.77	44.21	1.26	3.11	1.39	-0.37	-0.58	6.61
69.500	0.084	39.48	19.74	44.14	1.26	3.11	1.40	-0.37	-0.58	6.59

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

CONTACT FORCES - SEGMENT NO. 6 (RUL) VS. SEGMENT NO. 13 (RLA)

TIME (MSEC)	DEFLECTION (IN.)	NORMAL FORCE (LB.)	FRICTION FORCE (LB.)	RESULTANT FORCE (LB.)	CONTACT LOCATION (IN.) SEG. 6 LOCAL REFERENCE X	Y	Z	SEG. 13 LOCAL REFERENCE X	Y	Z
70.000	0.083	38.93	19.47	43.53	1.25	3.12	1.41	-0.37	-0.58	6.58
71.000	0.078	36.76	18.38	41.10	1.24	3.13	1.42	-0.37	-0.59	6.54
72.000	0.071	33.41	16.70	37.35	1.22	3.14	1.44	-0.37	-0.60	6.51
74.000	0.055	24.63	12.42	27.76	1.20	3.16	1.47	-0.36	-0.62	6.44
75.000	0.044	20.68	10.34	23.12	1.19	3.16	1.49	-0.36	-0.63	6.40
76.000	0.035	16.60	8.34	18.64	1.17	3.19	1.50	-0.36	-0.64	6.36
77.000	0.028	13.19	6.59	14.74	1.16	3.20	1.52	-0.36	-0.65	6.32
78.000	0.022	10.33	5.17	11.55	1.14	3.21	1.54	-0.35	-0.66	6.28
80.000	0.016	7.52	3.81	8.51	1.12	3.22	1.57	-0.34	-0.68	6.20
82.000	0.017	8.19	4.[illegible]	9.15	1.09	[illegible]	1.61	-0.33	-0.70	6.[illegible]
84.000	0.021	9.[illegible]	4.[illegible]	10.[illegible]	1.0[illegible]	[illegible]	1.6[illegible]	-0.[illegible]	-0.[illegible]	6.[illegible]
85.000	0.021	9.[illegible]	4.9[illegible]	11.01	1.0[illegible]	[illegible]	1.6[illegible]	-0.[illegible]	-0.7[illegible]	[illegible]
87.000	0.017	8.16	4.08	9.12	1.02	3.[illegible]	1.74	-0.33	-0.74	5.92
89.000	0.011	5.08	2.54	5.68	1.00	3.25	1.80	-0.30	-0.76	5.76
90.000	0.008	3.86	1.93	4.31	0.98	3.2[illegible]	1.83	-0.30	-0.77	5.68
92.000	0.002	0.73	0.36	0.81	0.96	3.27	1.91	-0.29	-0.79	5.53
93.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
97.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PARAMETERS FOR AIRBAG NO. 1 TEST CASE AIR BAG

TIME (MSEC)	SUPPLY PRES. (PSIG)	CYLINDER TEMP. (DEG.R)	STATIC PRES. (PSIG)	AIRBAG CENTER X	Y	Z	AIRBAG SEMIAXES A	B	C	ORIENTATION (DEG.) YAW	PITCH	ROLL
0.0	3364.30	530.00	0.0	35.00	0.0	-26.50	0.0	0.0	0.0	0.0	0.0	0.0
0.250	3326.56	528.29	0.0	30.69	0.0	-26.50	4.31	4.77	2.96	0.0	0.0	0.0
0.500	3289.31	526.60	0.0	29.59	0.0	-26.50	5.41	5.99	3.72	0.0	0.0	0.0
0.750	3252.[illegible]	524.91	0.0	28.81	0.0	-26.50	6.19	7.[illegible]	4.24	0.0	0.0	0.0
1.250	3180.37	521.55	0.0	27.70	0.0	-26.50	7.[illegible]	8.00	5.01	0.0	0.0	0.0
1.750	3110.04	518.23	0.0	26.87	0.0	-26.50	8.13	9.00	5.58	0.0	0.0	0.0
2.250	3041.46	514.94	0.0	26.19	0.0	-26.50	8.91	9.75	6.04	0.0	0.0	0.0
2.750	2974.64	511.68	0.0	25.62	0.0	-26.50	9.38	10.36	6.44	0.0	0.0	0.0
3.250	2909.47	508.46	0.0	25.13	0.0	-26.50	9.87	10.93	6.79	0.0	0.0	0.0
3.750	2845.[illegible]	[illegible]	0.0	24.[illegible]	[illegible]	[illegible]	10.21	11.4[illegible]	7.0[illegible]	0.0	[illegible]	[illegible]
4.750	2723.[illegible]	488.55	0.0	[illegible]	0.0	[illegible]	[illegible]	[illegible]	[illegible]	0.0	[illegible]	[illegible]
5.000	2663.91	497.39	0.0	[illegible]	[illegible]	[illegible]	11.2[illegible]	1[illegible]	7.[illegible]	0.0	[illegible]	[illegible]
6.000	2578.95	491.24	0.0	23.1[illegible]	0.0	[illegible]	11.85	13.11	[illegible]	0.0	0.0	0.0
8.000	2365.45	478.26	0.0	22.16	0.0	-26.50	12.84	14.20	8.21	0.0	0.0	0.0
9.000	2266.32	473.43	0.0	21.75	0.0	-26.50	13.25	14.66	9.09	0.0	0.0	0.0
10.000	2171.91	467.71	0.0	21.38	0.0	-26.50	13.62	15.06	9.34	0.0	0.0	0.0
10.500	2128.39	464.89	0.0	21.21	0.0	-26.50	13.79	15.25	[illegible]	0.0	[illegible]	[illegible]
11.000	2081.96	462.09	0.0	21.05	0.0	-26.50	13.95	15.[illegible]	[illegible]	[illegible]	0.0	0.0
11.500	2038.59	459.32	0.0	20.89	0.0	-26.50	14.11	15.62	9.68	0.0	0.0	[illegible]
12.500	1954.91	453.85	0.0	20.60	0.0	-26.50	14.40	15.93	[illegible]	0.0	0.0	0.0
13.500	1875.14	448.48	0.0	20.33	0.0	-26.50	14.67	16.23	10.[illegible]	0.0	0.0	0.0
14.500	1799.36	443.21	0.0	20.08	0.0	-26.50	14.92	16.51	10.24	0.0	0.0	0.0
15.000	1762.35	440.60	0.0	19.95	0.0	-26.50	15.05	16.65	10.32	0.0	0.0	0.0
15.500	1726.49	438.02	0.0	19.83	0.0	-26.50	15.17	16.78	10.41	0.0	0.0	0.0
16.000	1691.46	435.46	0.0	19.72	0.0	-26.50	15.28	16.91	10.49	0.0	0.0	0.0
16.500	1657.24	432.93	0.0	19.60	0.0	-26.50	15.40	17.03	10.56	0.0	0.0	0.0
17.500	1591.16	427.92	0.0	19.38	0.0	-26.50	15.62	17.28	10.72	0.0	0.0	0.0
18.500	1528.06	423.01	0.0	19.17	0.0	-26.50	15.83	17.51	10.86	0.0	0.0	0.0
19.500	1467.81	418.17	0.0	18.97	0.0	-26.50	16.03	17.73	11.00	0.0	0.0	0.0
20.000	1438.71	415.79	0.0	18.88	0.0	-26.50	16.12	17.84	11.06	0.0	0.0	0.0
22.000	1328.70	406.44	0.0	18.50	0.0	-26.50	16.50	18.25	11.32	0.0	0.0	0.0
22.250	1315.64	405.30	0.0	18.47	0.0	-26.50	16.53	18.29	11.34	0.0	0.0	0.0
22.500	1302.73	404.16	0.0	18.43	0.0	-26.50	16.57	18.34	11.37	0.0	0.0	0.0
22.750	1289.95	403.02	0.0	18.39	0.0	-26.50	16.61	18.38	11.40	0.0	0.0	0.0
23.250	1264.84	400.76	0.0	18.30	0.0	-26.50	16.70	18.48	11.46	0.0	0.0	0.0
23.750	1240.28	398.52	0.0	18.22	0.0	-26.50	16.78	18.57	11.52	0.0	0.0	0.0
24.250	1216.27	396.30	0.0	18.14	0.0	-26.50	16.86	18.66	11.57	0.0	0.0	0.0
25.000	1181.24	393.01	0.0	18.02	0.0	-26.50	16.98	18.79	11.65	0.0	0.0	0.0
26.000	1136.30	388.68	0.0	17.86	0.0	-26.50	17.14	18.96	11.76	0.0	0.0	0.0
27.000	1093.32	384.42	0.0	17.71	0.0	-26.50	17.29	19.13	11.87	0.0	0.0	0.0
29.000	1012.80	376.11	0.0	17.40	0.0	-26.50	17.60	19.47	12.08	0.0	0.0	0.0
30.000	975.[illegible]	372.05	0.0	17.26	0.0	-26.50	17.74	19.62	12.17	0.0	0.0	0.0
32.000	904.40	364.14	0.0	16.97	0.0	-26.50	18.03	19.95	12.37	0.0	0.0	0.0
33.000	871.2[illegible]	360.27	0.0	16.84	0.0	-26.50	18.16	20.09	12.46	0.0	0.0	0.0
34.000	838.5[illegible]	356.47	0.0	16.70	0.0	-26.50	18.30	20.24	12.55	0.0	0.0	0.0

PARAMETERS FOR AIRBAG NO. 1 TEST CASE AIR BAG

TIME (MSEC)	SUPPLY PRES. (PSIG)	CYLINDER TEMP. (DEG.R)	STATIC PRES. (PSIG)	AIRBAG CENTER X	Y	Z	AIRBAG SEMIAXES A	B	C	ORIENTATION (DEG.) YAW	PITCH	ROLL
35.000	809.05	352.73	0.0	16.56	0.0	-26.50	18.44	20.40	12.65	0.0	0.0	0.0
37.000	751.88	345.42	0.0	16.27	0.0	-26.50	18.73	20.72	12.85	0.0	0.0	0.0
39.000	699.27	338.34	0.0	16.20	0.0	-26.59	18.80	20.80	12.90	0.0	0.0	0.0
40.000	674.55	334.87	0.0	16.12	-0.05	-26.59	18.80	20.80	12.90	0.0	0.0	0.0
41.000	650.83	331.47	0.21	16.00	-0.12	-26.51	18.80	20.80	12.90	0.12	-0.01	-0.00
42.000	628.05	328.11	0.62	15.92	-0.19	-26.56	18.80	20.80	12.90	0.28	-0.08	-0.02
44.000	585.16	321.55	1.32	16.12	-0.27	-26.95	18.80	20.80	12.90	0.39	-0.70	-0.13
44.500	574.99	319.94	0.46	16.26	-0.26	-27.09	18.80	20.80	12.90	0.51	-0.89	-0.18
44.625	572.47	319.54	0.26	16.29	-0.26	-27.13	18.80	20.80	12.90	0.54	-1.07	-0.19
44.750	569.97	319.14	0.25	16.32	-0.26	-27.16	18.80	20.80	12.90	0.57	-1.15	-0.20
44.875	567.48	318.74	0.24	16.36	-0.26	-27.19	18.80	20.80	12.90	0.60	-1.23	-0.21
45.000	565.00	318.34	0.24	16.38	-0.26	-27.23	18.80	20.80	12.90	0.63	-1.31	-0.22
45.250	560.08	317.55	0.28	16.43	-0.26	-27.29	18.80	20.80	12.90	0.69	-1.45	-0.24
45.500	555.21	316.75	0.28	16.48	-0.27	-27.35	18.80	20.80	12.90	0.74	-1.59	-0.26
46.000	545.62	315.18	0.38	16.54	-0.29	-27.45	18.80	20.80	12.90	0.82	-1.65	-0.29
46.500	536.21	313.62	0.42	16.58	-0.32	-27.55	18.80	20.80	12.90	0.90	-2.09	-0.33
47.000	526.99	312.07	0.47	16.61	-0.35	-27.65	18.80	20.80	12.90	0.96	-2.27	-0.36
48.000	509.69	309.00	0.73	16.63	-0.45	-27.81	18.80	20.80	12.90	1.04	-2.71	-0.41
49.000	491.87	305.93	0.79	16.62	-0.55	-27.96	18.80	20.80	12.90	1.09	-3.19	-0.46
50.000	475.62	303.00	0.85	16.62	-0.65	-28.10	18.80	20.80	12.90	1.11	-3.67	-0.50
52.000	444.09	297.18	1.28	16.64	-0.88	-28.37	18.80	20.80	12.90	1.03	-4.82	-0.57
54.000	415.19	291.52	1.33	16.77	-1.10	-28.66	18.80	20.80	12.90	0.93	-6.25	-0.65
54.250	411.73	290.82	0.72	16.81	-1.13	-28.70	18.80	20.80	12.90	0.90	-6.47	-0.67
54.500	408.30	290.13	0.71	16.84	-1.15	-28.74	18.80	20.80	12.90	0.76	-6.69	-0.68
54.750	404.91	289.43	0.70	16.87	-1.18	-28.77	18.80	20.80	12.90	0.73	-6.91	-0.69
55.000	401.54	288.75	0.69	16.90	-1.21	-28.81	18.80	20.80	12.90	0.70	-7.03	-0.70
55.500	394.92	287.38	0.75	16.93	-1.27	-28.87	18.80	20.80	12.90	0.64	-7.45	-0.72
56.000	388.41	286.02	0.74	16.95	-1.33	-28.93	18.80	20.80	12.90	0.58	-7.91	-0.74
57.000	375.77	283.32	0.88	16.96	-1.46	-29.02	18.80	20.80	12.90	0.47	-8.67	-0.77
58.000	363.59	280.67	0.89	16.94	-1.59	-29.10	18.80	20.80	12.90	0.36	-9.12	-0.80
59.000	351.86	278.05	0.90	16.91	-1.72	-29.16	18.80	20.80	12.90	0.25	-9.78	-0.82
60.000	340.57	275.47	0.92	16.86	-1.85	-29.22	18.80	20.80	12.90	0.13	-10.44	-0.84
62.000	319.19	270.42	1.16	16.81	-2.12	-29.32	18.80	20.80	12.90	-0.15	-11.82	-0.89
64.000	299.34	265.50	1.16	16.81	-2.39	-29.42	18.80	20.80	12.90	-0.51	-13.35	-0.98
64.250	296.96	264.90	0.68	16.83	-2.43	-29.44	18.80	20.80	12.90	-0.57	-13.58	-1.00
64.500	294.60	264.29	0.66	16.84	-2.46	-29.45	18.80	20.80	12.90	-0.62	-13.79	-1.01
64.750	292.26	263.69	0.64	16.85	-2.50	-29.47	18.80	20.80	12.90	-0.67	-14.00	-1.02
65.000	289.95	263.09	0.62	16.86	-2.53	-29.48	18.80	20.80	12.90	-0.73	-14.21	-1.04
65.500	285.37	261.90	0.60	16.87	-2.60	-29.51	18.80	20.80	12.90	-0.82	-14.59	-1.06
66.000	280.89	260.72	0.64	16.87	-2.67	-29.53	18.80	20.80	12.90	-0.91	-14.95	-1.09
67.000	272.15	259.37	0.71	16.84	-2.81	-29.57	18.80	20.80	12.90	-1.08	-15.60	-1.13
68.000	263.72	256.06	0.68	16.81	-2.96	-29.61	18.80	20.80	12.90	-1.25	-16.23	-1.18
68.500	259.62	254.92	0.56	16.79	-3.03	-29.63	18.80	20.80	12.90	-1.34	-16.54	-1.21
69.000	255.59	253.76	0.54	16.77	-3.11	-29.65	18.80	20.80	12.90	-1.42	-16.84	-1.24
69.500	251.63	252.65	0.52	16.75	-3.18	-29.67	18.80	20.80	12.90	-1.50	-17.12	-1.26

DATE: OCT 16,1973

RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.

CRASH VICTIM: SIERRA 292-1050-2004

PARAMETERS FOR AIRBAG NO. 1 TEST CASE AIR BAG

TIME (MSEC)	SUPPLY PRES. (PSIG)	CYLINDER TEMP. (DEG.R)	STATIC PRES. (PSIG)	AIRBAG CENTER X	Y	Z	AIRBAG SEMIAXES A	B	C	ORIENTATION (DEG.) YAW	PITCH	ROLL
70.000	247.74	251.53	0.51	16.73	-3.25	-29.69	18.80	20.80	12.90	-1.57	-17.40	-1.29
71.000	240.17	249.31	0.57	16.66	-3.40	-29.72	18.80	20.80	12.90	-1.72	-17.90	-1.35
72.000	232.86	247.12	0.55	16.64	-3.17	-30.01	18.80	20.80	12.90	0.17	-16.49	-2.01
74.000	218.59	242.02	0.84	16.67	-2.51	-30.73	18.80	20.80	12.90	5.13	-12.43	-3.52
75.000	212.42	240.71	1.10	16.72	-2.31	-31.01	18.80	20.80	12.90	6.47	-11.07	-4.10
76.000	206.06	238.63	1.23	16.76	-2.21	-31.22	18.80	20.80	12.90	8.32	-10.27	-4.62
77.000	199.92	236.58	1.31	16.81	-2.18	-31.36	18.80	20.80	12.90	9.78	-9.[illegible]	-5.1[illegible]
78.000	194.30	234.56	1.33	16.84	-2.22	-31.45	18.80	20.80	12.90	9.91	-10.[illegible]	-5.[illegible]
80.000	182.73	23[illegible]	1.42	16.81	-2.42	-31.52	18.[illegible]	20.80	12.90	10.47	-10.[illegible]	-6.70
82.000	172.31	226.71	1.41	16.74	-2.7[illegible]	-31.[illegible]	18.80	20.80	12.90	10.[illegible]	-14.[illegible]	-7.67
84.000	162.37	222.90	0.72	16.69	-3.07	-31.[illegible]	18.80	20.80	12.90	10.85	-14.79	-8.[illegible]
85.000	157.69	221.07	0.53	16.59	-3.11	-31.53	18.80	20.80	12.90	10.97	-14.[illegible]6	-9.[illegible]
87.000	148.79	217.45	0.45	16.44	-3.40	-31.52	18.80	20.80	12.90	10.93	-16.39	-9.71
89.000	140.46	213.86	0.33	16.61	-3.69	-31.63	18.80	20.80	12.90	10.50	-14.05	-10.18
90.000	136.50	212.14	0.24	16.85	-3.79	-31.73	18.80	20.80	12.90	10.[illegible]	-13.22	-10.40
92.000	128.95	208.72	0.23	17.16	-3.95	-31.86	18.80	20.80	12.90	10.[illegible]	-14.11	-10.[illegible]
93.000	125.35	207.04	0.35	17.25	-4.03	-31.91	18.80	20.80	12.90	10.17	-13.11	-11.[illegible]
94.000	121.97	205.38	0.38	17.30	-4.12	-31.94	18.80	20.80	12.90	10.1[illegible]	-13.57	-11.28
95.000	118.50	203.74	0.40	17.31	-4.20	-31.93	18.80	20.80	12.90	10.20	-13.68	-11.4[illegible]
97.000	112.07	200.52	0.39	17.21	-4.38	-31.94	18.80	20.80	12.90	10.30	-13.99	-11.[illegible]
98.000	109.01	198.94	0.34	17.14	-4.47	-31.93	18.80	20.80	12.90	10.37	-14.24	-12.01
99.000	106.04	197.38	0.26	17.06	-4.56	-31.91	18.80	20.80	12.90	10.44	-14.51	-12.18
100.000	103.16	195.83	0.22	16.97	-4.65	-31.88	18.80	20.80	12.90	10.50	-14.78	-12.34

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RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.

CRASH VICTIM: SIERRA 292-1050-2004

CONTACT FORCES (LB.) ON AIRBAG NO. 1 TEST CASE AIR BAG

TIME	AIRBAG 1 VS. SPRF			AIRBAG 1 VS. PNL1			AIRBAG 1 VS. PNL2			AIRBAG 1 VS. H		
(MSEC)	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE: OCT 16,1973
RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.
VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 150 MSEC.
CRASH VICTIM: SIERRA 292-1050-2004

CONTACT FORCES (LB.) ON AIRBAG NO. 1 TEST CASE AIR BAG

TIME	AIRBAG 1 VS. SPRF			AIRBAG 1 VS. PNL1			AIRBAG 1 VS. PNL2			AIRBAG 1 VS. H		
(MSEC)	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
35.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.000	79.03	45.63	-0.19	0.0	0.0	0.0	-5.08	1.12	7.63	20.82	2.46	18.62
42.000	196.27	113.14	6.00	0.0	0.0	0.0	-11.59	2.47	17.51	60.13	8.06	57.27
44.000	284.97	167.33	33.94	0.0	0.0	0.0	-22.16	4.55	33.71	122.42	28.25	156.48
44.500	86.34	142.77	216.73	0.0	0.0	0.0	-27.13	-2.91	20.54	32.02	-0.99	58.06
44.625	0.0	0.0	0.0	-1.19	-0.21	0.12	-19.76	-1.83	14.81	18.39	-0.06	31.63
44.750	0.0	0.0	0.0	-1.86	-0.32	0.19	-19.93	-1.76	14.90	17.74	0.07	30.25
44.875	0.0	0.0	0.0	-2.45	-0.41	0.27	-20.20	-1.69	15.06	17.27	0.19	29.21
45.000	0.0	0.0	0.0	-2.99	-0.49	0.35	-20.58	-1.61	15.20	16.98	0.32	28.47
45.250	0.0	0.0	0.0	-4.17	-0.65	0.52	-25.23	-1.52	18.73	20.25	0.40	33.50
45.500	0.0	0.0	0.0	-5.31	-0.75	0.74	-27.12	-1.55	19.96	20.62	0.81	32.87
46.000	0.0	0.0	0.0	-8.52	-1.02	1.35	-39.0[illegible]	-1.45	28.52	20.69	1.46	47.0[illegible]
46.500	0.0	0.0	0.0	-11.46	-0.56	2.19	-46.97	1.10	34.26	32.76	2.57	51.9[illegible]
47.000	0.0	0.0	0.0	-14.66	0.75	2.70	-56.01	6.32	42.65	38.64	4.04	59.22
48.000	0.0	0.0	0.0	-24.02	3.07	3.57	-86.16	17.28	72.73	62.62	7.57	94.8[illegible]
49.000	0.0	0.0	0.0	-36.61	4.97	1.6[illegible]	-96.[illegible]	23.14	[illegible]	71.[illegible]	[illegible]	[illegible]
50.000	0.0	0.0	0.0	-28.47	[illegible]	-0.[illegible]	-1[illegible]	26.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
52.000	0.0	0.0	0.0	-41.24	7.0[illegible]	-2.[illegible]	-171.[illegible]	40.[illegible]	[illegible]	[illegible]	12.6[illegible]	[illegible]
54.000	0.0	0.0	0.0	-43.42	6.59	-5.26	-206.47	28.57	160.71	131.74	-4.14	211.4[illegible]
54.250	0.0	0.0	0.0	-30.22	4.60	-3.89	-125.69	16.12	[illegible].86	73.08	-4.17	101.64
54.500	0.0	0.0	0.0	-31.46	4.83	-3.99	-125.05	17.14	97.21	72.34	-3.56	98.69
54.750	0.0	0.0	0.0	-32.51	5.02	-4.07	-124.57	18.18	97.75	71.92	-2.96	96.22
55.000	0.0	0.0	0.0	-33.42	5.19	-4.15	-124.25	19.22	98.4[illegible]	71.79	-2.38	94.17
55.500	0.0	0.0	0.0	-37.73	5.87	-4.6[illegible]	-136.9[illegible]	22.37	105.6[illegible]	79.72	-2.37	103.93
56.000	0.0	0.0	0.0	-38.90	6.07	-4.83	-137.32	24.30	111.9[illegible]	80.92	-1.43	101.69
57.000	0.0	0.0	0.0	-47.07	7.22	-5.91	-163.73	30.69	125.[illegible]	99.01	-1.5[illegible]	12[illegible]
58.000	0.0	0.0	0.0	-46.77	6.83	-6.28	-166.53	32.64	139.75	102.93	-1.52	123.0[illegible]
59.000	0.0	0.0	0.0	-45.20	6.31	-6.36	-168.37	33.65	142.21	108.97	-2.14	123.67
60.000	0.0	0.0	0.0	-42.49	5.72	-6.17	-169.03	34.04	143.14	113.61	-3.45	124.67
62.000	0.0	0.0	0.0	-49.56	6.49	-7.33	-214.63	43.22	181.82	150.72	-9.59	170.34
64.000	0.0	0.0	0.0	-37.80	4.50	-5.94	-206.79	33.89	165.74	143.72	-22.01	170.02
64.250	0.0	0.0	0.0	-19.08	2.35	-2.90	-118.36	18.80	94.25	84.74	-14.99	87.3[illegible]
64.500	0.0	0.0	0.0	-18.91	2.36	-2.84	-114.99	19.96	92.38	83.27	-14.43	13.74
64.750	0.0	0.0	0.0	-18.63	2.36	-2.76	-111.75	19.11	90.42	81.94	-13.94	80.27
65.000	0.0	0.0	0.0	-18.26	2.34	-2.67	-108.66	19.24	88.67	80.74	-13.53	77.26
65.500	0.0	0.0	0.0	-19.31	2.51	-2.79	-114.61	20.98	94.35	86.35	-14.85	81.80
66.000	0.0	0.0	0.0	-18.05	2.39	-2.55	-109.14	21.05	91.23	84.54	-14.56	76.92
67.000	0.0	0.0	0.0	-19.26	2.60	-2.66	-120.72	24.42	102.50	96.15	-18.04	88.44
68.000	0.0	0.0	0.0	-15.33	2.11	-2.06	-112.54	23.80	97.16	94.14	-19.23	80.47
68.500	0.0	0.0	0.0	-9.52	1.34	-1.24	-88.63	19.46	77.75	77.91	-16.30	61.76
69.000	0.0	0.0	0.0	-7.85	1.12	-1.00	-84.04	19.09	74.89	76.20	-16.44	59.35
69.500	0.0	0.0	0.0	-6.13	0.88	-0.76	-79.74	18.68	72.18	74.58	-16.68	55.34

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RUN DESCRIPTION: N91 TEST CASE FOR WASHINGTON CLASS TO ILLUSTRATE INPUT DESCRIPTION.
15 SEGMENTS. CAR-TO-CAR CRASH. FRONT SEAT DUMMY WITH SEAT BELT AND AIR BAG.

VEHICLE DECELERATION: HALF-SINE WAVE VEHICLE DECELERATION - 31.5 MPH = 46.2 FPS OVER 100 MSEC.

CRASH VICTIM: SIERRA 292-1050-2004

CONTACT FORCES (LB.) ON AIRBAG NO. 1 TEST CASE AIR BAG

TIME	AIRBAG 1 VS. SPRF			AIRBAG 1 VS. PNL1			AIRBAG 1 VS. PNL2			AIRBAG 1 VS. H		
(MSEC)	X	Y	Z	X	Y	Z	X	Y	Z	Y	Y	Z
70.000	0.0	0.0	0.0	-4.36	0.64	-0.50	-75.[illegible]	18.21	[illegible]	7[illegible]	-[illegible]	5[illegible].64
71.000	0.0	0.0	0.0	-3.61	0.45	-0.36	-24.[illegible]	20.[illegible]	[illegible]	[illegible]	-21.[illegible]	[illegible]
72.000	455.08	3935.25	-2554.40	0.0	0.0	0.0	-7[illegible].42	16.11	[illegible]	[illegible]	[illegible]	[illegible]
74.000	0.0	0.0	0.0	-1.23	-0.20	0.16	-113.[illegible]	-30.[illegible]	[illegible]	13[illegible]	-4[illegible]	75.7[illegible]
75.000	0.0	0.0	0.0	-19.65	-3.16	2.44	-216.76	-58.13	302.54	179.21	-[illegible]	117.[illegible]
76.000	0.0	0.0	0.0	-32.01	-5.23	3.50	-273.40	-74.27	378.37	203.09	-43.61	139.32
77.000	0.0	0.0	0.0	-42.15	-7.25	4.49	-316.31	-88.97	427.78	219.82	-49.72	151.38
78.000	0.0	0.0	0.0	-48.49	-9.38	3.43	-351.70	-106.68	434.72	227.29	-55.72	159.77
80.000	0.0	0.0	0.0	-55.30	-10.72	-5.61	-504.75	-2.49	3[illegible].[illegible]	247.[illegible]	-75.4[illegible]	1[illegible].78
82.000	0.0	0.0	0.0	-41.4[illegible]	2.13	-8.45	-406.52	70.71	[illegible]	221.4[illegible]	-81.4[illegible]	112.73
84.000	0.0	0.0	0.0	-21.48	1.20	-4.31	-302.29	47.61	[illegible].21	174.[illegible]	-76.[illegible]	[illegible]
85.000	0.0	0.0	0.0	-4.45	0.29	-0.87	-165.51	27.74	132.01	10[illegible].23	-47.03	23.89
87.000	0.0	0.0	0.0	-0.11	0.01	-0.02	-127.09	23.09	103.35	80.41	-43.47	13.64
89.000	847.23	-18.50	-282.81	0.0	0.0	0.0	-91.65	18.75	77.[illegible]	60.99	-35.98	5.17
90.000	625.07	393.80	-63.69	0.0	0.0	0.0	-61.53	17.91	65.65	41.1[illegible]	-26.40	3.81
92.000	0.0	0.0	0.0	-5.38	0.17	0.97	-76.91	22.42	[illegible]	45.11	-32.89	[illegible].97
93.000	0.0	0.0	0.0	-1[illegible].92	1.19	2.79	-110.22	31.90	[illegible]	57.03	-38.40	-0.35
94.000	0.0	0.0	0.0	-21.72	2.40	2.98	-125.72	35.96	135.[illegible]	6[illegible].92	-4[illegible].31	-[illegible].94
95.000	0.0	0.0	0.0	-24.09	3.98	1.44	-134.60	37.78	140.28	61.73	-44.57	-4.5[illegible]
97.000	0.0	0.0	0.0	-23.40	4.02	-1.58	-132.65	36.48	134.69	56.87	-45.51	-6.0[illegible]
98.000	0.0	0.0	0.0	-17.42	1.64	-3.09	-117.00	30.59	113.13	46.58	-40.24	-[illegible].55
99.000	0.0	0.0	0.0	-11.83	0.97	-2.19	-89.13	23.62	87.21	35.86	-31.19	-5.48
100.000	0.0	0.0	0.0	-8.14	0.63	-1.52	-71.98	19.50	72.01	29.04	-26.55	-4.91

SECTION 10

PROGRAM VARIABLE DICTIONARY BY LABELED COMMON BLOCKS

Dimensions for the variables defined below generally will determine indexing rules unless otherwise specified in the definitions.

Dimension	Definition of Corresponding Index
3	The x, y and z coordinates of a point or components of a vector
4	The index for airbag panels (K=1, NPANEL(J)for J=1, NBAG)
5	The index for airbags (J=1, NBAG)
8	The index for belts (J=1 , NBLT)
12	The index for constraints (J=1, NQ)
20	The index for forces print out (J=1, NPSF, NBSF, NSSF or NBGSF)
20	The index for planes (J=1, NPL)
20	The index for spring dampers (J=1, NSD)
21	The index for joints of the crash victim (J=1, NJNT)
22	The index for segments of the crash victim (J=1, NSEG)
24	The index for pairs of values for constraints. The odd (2J-1) and even (2J) refer to segments KQ1 and KQ2 (J=1, NQ)
25	The index for ellipsoids (J=1, NELP)
42	The index for pairs of values for joints. The odd value (2J-1) refers to segment JNT(J) and the even value to segment J+1(J=1, NJNT)
120	The index for functions being integrated by Subroutine DINT (J=1, NEQ)

Normal FORTRAN naming conventions apply throughout, i.e. if the variable name begins with the letters I-N, the variable is an integer and if the variable name begins with A-H or O-Z, it is real (double precision for IBM computers.) The only exception are those variables that consist of alphanumeric characters.

ABDATA

ABC	(3,5)	Airbag ellipsoid semiaxes
ZA	(3,5)	Position of airbag c.g. in inertial reference
DA	(3,3,5)	Airbag direction cosine matrix
BFA	(3,5)	Fully inflated airbag c.g. offset (Card D.4.B)
BCGV	(3,5)	Velocity of airbag c.g. in inertial reference
BMEG	(3,5)	Angular velocity of airbag in local reference

CDINT

E	(3,120)	
F	(5,120)	Intermediate storage of function evaluations in Subroutine DINT
GG	(5,120)	
Y	(5,120)	
U	(5,120)	
H		Current value of the independent variable step size in Subroutine DINT
HPRINT		Saved value of H while integrating to print point only
TSAVE		Currently not used by program
TPRINT		Value of next print time point
TSTART		Start time of an integration step
ICNT		Count of successive integration steps for which convergence has been successful
IDBL		Maximum value for ICNT before test to double step size is performed
IFLAG		Currently not used by program

CMATRX

V1	(3,21)	Right hand side of system of equations $B_{11}\ddot{x} + B_{12}\dot{\omega} + B_{13} f = V_1$
V2	(3,21)	Right hand side of system of equations $B_{22}\ddot{x} + B_{24} t = V_2$
V3	(3,12)	Right hand side of system of equations $B_{31}\ddot{x} + B_{32}\dot{\omega} + B_{35} q = V_3$
B12	(3,3,42)	Subarray elements of B_{12}
A22	(3,3,42)	Subarray elements of A_{22}
F	(3,21)	Components of force acting on the joints from the solution of system equations
TQ	(3,21)	Components of torque acting on the joints from the solution of system equations
WJ	(21)	Relative angular velocity of each joint

CNSNTS

PI	3.1415 92653 58979 324D0
RADIAN	1.7453 29251 99432 96D-1
G	Resultant of gravity vector
THIRD	3.3333 33333 33333 33D-1
EPS1	1.0D-1
EPS4	1.0D-4
EPS6	1.0D-6
EPS8	1.0D-8
EPS12	1.0D-12
EPS15	1.0D-15
EPS20	1.0D-20
EPS24	1.0D-24

CNSNTS (Cont'd)

UNITL		Unit of length (Card A.3)
UNITM		Unit of force or mass (Card A.3)
UNITT		Unit of time (Card A.3)
GRAVITY	(3)	Gravity vector (Card A.3)

CNTSRF

PL	(17,20)	Array of parameters that define each plane (See description of Subroutine SINPUT)
GAB	(8,3)	Not used by the program
BELT	(20,8)	Array of parameters that define each belt (Cards D.3.A - D.3.C)
TPTS	(6,8)	Location of belt tangent points in inertial reference
BD	(24,25)	Array of parameters that define each ellipsoid (See description of Subroutine SINPUT)

COMAIN

VAR	(120)	Integrated function values supplied by Subroutine DINT to Subroutine PDAUX
DER	(120)	Function derivatives supplied by Subroutine PDAUX to Subroutine DINT
DT		Time interval for main program output time points (Card A.4)
HO		Initial integrator step size (Card A.4)

COMAIN (Cont'd)

HMAX	Maximum integrator step size (Card A.4)
HMIN	Mimimum integrator step size (Card A.4)
RSTIME	Restart time (Card A.1.A)
ISTEP	Current integration step number
NSTEPS	No. of integration steps for duration of simulation (Card A.4)
NDINT	No. of iterations for convergence test for Subroutine DINT (Card A.4)
NEQ	Total number of functions integrated by Subroutine DINT
IRSIN	Restart input unit no. (Card A.1.A)
IRSOUT	Restart output unit no. (Card A.1.A)

CONTRL

NSEG	Number of body segments of crash victim (Max=20) (Card B.1)
NJNT	Number of joints (Card B.1)
NS3	3 x NSEG
NJ3	3 x NJNT
NPL	Number of plane definitions supplied on Cards D.2 (Max=20)
NBLT	Number of belt definitions supplied on Cards D.3 (Max=8)

CONTRL (Cont'd)

NBAG		Number of airbag definitions supplied on Cards D.4 (Max=5)
NVEH		Segment identification number for the vehicle (NVEH=NSEG+1)
NGRND		Segment identification number for the ground (NGRND=NSEG+2)
NPRT	(40)	Indicators that control optional output of the program (Card A.5)

CSTRNT

A13	(3,3,24)	Subarray elements of A_{13} for system of equations $M\ddot{x} + A_{11}f + A_{13}q = U_1$
A23	(3,3,24)	Subarray elements of A_{23} for system of equations $\dot{q}\dot{\omega} + A_{21}f + A_{22}t + A_{23}q = U_2$
B31	(3,3,24)	Subarray elements of B_{31} for system of equations defining constraints
B32	(3,3,24)	Subarray elements of B_{32} for system of equations defining constraints
HHT	(3,3,12)	Array hh^T or $I-hh^T$ for each constraint
RK1	(3,12)	Specified point on segment number KQ1 (Card D.6)
RK2	(3,12)	Specified point on segment number KQ2 (Card D.6)
QQ	(3,12)	Computed force necessary to maintain each constraint
TQQ	(3,12)	Normal vector at the point of contact for each constraint

CSTRNT (Cont'd)

RQQ	(3,12)	R dot term for constraint equation
HQQ	(3,12)	Reference vector at point of constraint
SQQ	(3,12)	R term for constraint equation
CFQQ	(12)	Coefficient of friction for each constraint
NQ		The number of constraints in the program (Card D.1)
KQ1	(12)	Segment identification number of the 1st specified point (Card D.6)
KQ2	(12)	Segment identification number of the 2nd specified point (Card D.6)
KQTYPE	(12)	Constraint type number (Card D.6)

DAMPER

APSDM	(3,20)	Attachment point in local reference of segment M for spring dampers (Card D.8)
APSDN	(3,20)	Attachment point in local reference of segment N for spring dampers (Card D.8)
ASD	(5,20)	Spring and viscous force function coefficients (Card D.8)
NSD		No. of spring dampers (Max=20) (Card D.1)
MSDM	(20)	Identification number of segment M (Card D.8)
MSDN	(20)	Identification number of segment N (Card D.8)

DESCRP

PHI	(3,22)	Segment principal moments of inertia (Cards B.2)
W	(22)	Segment mass (Cards B.2)
SR	(3,42)	Joint locations in local reference of adjacent segments (Cards B.3)
HA	(3,42)	Principle line of joint from which flexure angle is measured
HB	(3,42)	Perpendicular to HA (pin axis if joint is pinned)
HT	(3,3,42)	Principal axes of the joints
RPHI	(3,22)	Reciprocal moments of inertia for each segment
RW	(22)	Reciprocal mass (g/w) for each segment
SPRING	(5,42)	Flexural and torsional spring characteristics (Cards B.4)
VISC	(5,42)	Flexural and torsional viscous characteristics (Cards B.5)
JNT	(21)	Magnitude indicates the segment identification number that is connected to segment J+1 by joint J (Cards B.3)
IPIN	(21)	Indicator of joint type (Card B.3)
NS		Number of singular segments, i.e., W or at least one component of PHI is zero
ISING	(22)	Indicator (value=1) that segment is singular

FLXBLE

HF	(4,12,8)	Coefficients of quadratic function defining relative orientation of interior segments of flexible elements
B42	(3,3,24)	Subarray elements of matrix B_{42} in the constraint equations for flexible elements
V4	(3,8)	Right hand side of the constraint equations for flexible elements.
NFLEX	(3,8)	The identification numbers of reference, interior and terminating segments for each interior segment
NFLX		Total number of interior segments of all flexible elements.

FORCES

PSF	(7,20)	Array of output values for plane-segment contacts
BSF	(4,20)	Array of output values for belt-segment contacts
SSF	(10,20)	Array of output values for segment-segment contacts
BAGSF	(3,20)	Array of output values for airbag-segment contacts
NPSF		Number of plane-segment contacts (Max=20)
NBSF		Number of belt-segment contacts (Max=20)
NSSF		Number of segment-segment contacts (Max=20)
NBGSF		Number of items to be printed for airbag-segment contacts (Max=20)
NPANEL	(6)	Number of reaction panels for each airbag (J=1, NBAG)
PRJNT	(6,21)	Output arrays for joint parameters

INTEST

SGTEST	(3,4,22)	Integrator convergence test input numbers (Cards B.6)
XTEST	(3,88)	Integrator convergence test numbers set up by PDAUX for DINT

JBARTZ

MNPL	(20)	Number of segments to contact each plane (Card F.1.A)
MNBLT	(8)	Number of segments to contact each belt (Card F.2.A)
MNSEG	(22)	Number of segments to contact each segment (Card F.3.A)
MNBAG	(6)	Number of segments to contact each airbag
MPL	(3,5,20)	Segment and ellipsoid identification numbers for each plane-segment contact
MBLT	(3,5,8)	Segment and ellipsoid identification numbers for each belt-segment contact
MSEG	(3,5,22)	Segment and ellipsoid identification numbers for each segment-segment contact
MBAG	(3,10,6)	Segment and ellipsoid identification numbers for each airbag-segment contact (Cards F.4)
NTPL	(5,20)	Index to NTAB array for each plane-segment contact
NTBLT	(5,8)	Index to NTAB array for each belt-segment contact
NTSEG	(5,22)	Index to NTAB array for each segment-segment contact

RSAVE

XSG	(3,20,3)	Points in local segment reference for first three types of time history output (Cards H.1-H.3)
NSG	(7)	No. of segments for each type of time history output (Max=20) (Cards H.1-H.7)
MSG	(20,7)	The segment identification numbers for each type of time history output (Cards H.1-H.7)

SGMNTS

D	(3,3,22)	Segment direction cosine matrix
WMEC	(3,22)	Segment angular velocity in local reference
WMEGD	(3,22)	Segment angular acceleration in local reference
U1	(3,22)	Total external forces on each segment
U2	(3,22)	Total external torques on each segment
SEGLP	(3,22)	Segment c.g. linear position in inertial reference
SEGLV	(3,22)	Segment c.g. linear velocity in inertial reference
SEGLA	(3,22)	Segment c.g. linear acceleration in inertial reference
NSYM	(22)	Indicators that control the symmetry options for body segments (Cards D.7)

TABLES

MXNTI		Dimension (50) of NTI array
MXNTB		Number of elements in the NTAB array
MXTB1		Number of elements in TAB array used to define functions
MXTB2		Total number of elements in TAB array
NTI	(50)	Index pointers to the TAB array for data defining function no. I.
NTAB	(500)	Index pointers to TAB array for each function used for allowed contacts
TAB	(2000)	Subdivided into arrays containing function definitions and update information for each allowed contact

TEMPVI

TTI	(3)	Value of U1 array for impulse
R1I	(3)	Value of RK1 for current constraint or impulse
R2I	(3)	Value of RK2 for current constraint or impulse
CREST		Coefficient of restitution for current impulse
JSTOP	(3,2,21)	Indicators to signify joint is in joint stop

TEMPVS

Variables in this labeled common block are temporary for each subroutine that refers to it.

TITLES

DATE	(3)	Date of computer run in 12 alphanumeric characters (Card A.1.A)
COMENT	(40)	160 character description of the run (Cards A.1.B - A.1.C)
VPSTTL	(20)	80 character description of the crash vehicle deceleration (Card C.1)
BDYTTL	(5)	20 character description of the crash victim (Card B.1)
BLTTTL	(5,8)	20 character description of each belt (Cards D.3)
PLTTL	(5,20)	20 character description of each plane (Cards D.2)
BAGTTL	(5,6)	20 character description of each airbag (Cards D.4)
SEG	(22)	4 character segment nomenclature (Cards B.2)
JOINT	(21)	4 character joint nomenclature (Cards B.3)
CGS	(22)	1 character plot symbol of the segment C.G. (Cards B.2)
JS	(21)	1 character plot symbol of the joint location (Cards B.3)

VPOSTN

TIME		Current value of time of simulation
XO	(3)	Initial position of vehicle reference origin in inertial reference (Card C.2)
XDOTO	(3)	Initial velocity of vehicle reference origin in inertial reference
XCOMP	(3)	Current position of vehicle reference origin in inertial reference

VPOSTN (Cont'd)

XVCOMP	(3)	Current velocity of vehicle reference origin in inertial reference
AX	(3)	Unit vector of deceleration impulse direction
ANGLE	(3)	Oblique angles of deceleration impulse (Card C.2)
VMPH		Initial velocity of the vehicle (MPH) (Card C.2)
VTIME		Time duration of the deceleration impulse (Card C.2)
ATAB	(15,100)	Tables of computed or supplied (Cards C.3 or C.4) values of linear deceleration (1-3), velocities (4-6), displacements (7-9), angular accelerations (10-12) and velocities (13-15) of vehicle motion
AT0		Beginning time point of the deceleration table input (Card C.2)
ADT		Fixed time interval for deceleration table input (Card C.2)
OMEGA		Frequency of the half-sine wave deceleration type (Card C.2)
NATAB		Number of points in deceleration table. Sign determines type (Card C.2)
NACLR		Not used by program
DVEH	(3,3)	Current direction cosine matrix of vehicle
VMEG	(3)	Current angular velocity of vehicle in vehicle reference
VMEGD	(3)	Current angular acceleration of vehicle reference origin in inertial reference
XACOMP	(3)	Current linear acceleration of vehicle reference origin in inertial reference
THET	(3)	Incremental angular motion of vehicle motion
ZPLT	(3)	Plot coordinates of the vehicle reference origin (Card C.1.A)

WJONES

FORCE	(3,5)	Total forces acting on airbag
TORA	(3,5)	Total torques acting on airbag
XBM	(5)	Weight of airbag membrane and contents (Card D.4.D)
ZDEP	(3,5)	Deployment point of airbag in local reference of 1st reaction panel (Card D.4.C)
VBAGG	(5)	Geometric volume of fully inflated airbag
VSCS	(5)	Coefficient of sliding friction of the airbag (Card D.4.F)
BPHI	(3,5)	Computed principal moments of inertia of the airbag
DBR	(3,3,5)	Direction cosine matrix of airbag relative to vehicle
DPVCTR	(3,5)	Vector along which airbag c.g. lies during bag inflation
DEPLOY	(3,5)	Location of deployment point
AB	(3,5)	Semiaxes of fully inflated ellipsoid airbag (Cards D.4.B)
SPRK	(5)	Spring constant of a linear spring used to simulate attachment of the airbag at the deployment point (Card D.4.F)
CYTD	(5)	Gas supply actuator firing time (Card D.4.D)
CYPA	(5)	Atmospheric pressure (Card D.4.D)
CYSP	(5)	Initial gas supply pressure (Card D.4.D)
CYTO	(5)	Initial gas supply temperature (Card D.4.D)
CYVO	(5)	Gas supply reservoir volume (Card D.4.D)
CYCD	(5)	Sonic throat discharge coefficient (Card D.4.E)
CYK	(5)	Ratio of specific heats of supply gas (Card D.4.E)

WJONES (Cont'd)

CYR	(5)	Specific gas constant (Card D.4.E)
CYAT	(5)	Sonic throat area (Card D.4.E)
CYPV	(5)	Vent pressure of the exhaust orifice (Card D.4.E)
CYCDO	(5)	Exhaust orifice discharge coefficient (Card D.4.E)
CYAO	(5)	Exhaust orifice area (Card D.4.F)
CYPO	(5)	Initial air cylinder gauge supply pressure
CYSS	(5)	Speed of sound
CYLO	(5)	Characteristic length
CYC	(5)	Air cylinder gas constant
CYRHOO	(5)	Initial air cylinder density
CYVMAX	(5)	Air cylinder maximum volume
CYORFC	(5)	Air cylinder exhaust orifice constant
CYRHO	(5)	Density of air cylinder gas supply
CYT	(5)	Temperature of air cylinder gas supply
CYP	(5)	Pressure of air cylinder gas supply
CYMIN	(5)	Mass flow into the airbag
CYMOUT	(5)	Mass flow out of airbag
BAGPV	(5)	Undeformed airbag volume
PD	(5)	Airbag pressure differential
VBAG	(5)	Airbag volume
VOLBP	(5)	Total volume of intersection of airbag with contacting segments and panels
SWITCH	(5)	Reciprocal density of airbag at time of initial full inflation

WJONES (Cont'd)

IFULL	(6)	Indicates that airbag is fully inflated
TMP	(18)	Temporary storage
TMP1	(3)	Temporary storage
A	(3,3)	3 x 3 matrix defining ellipsoid $X^T AX=1$ for airbag
PF	(3)	Not used by program
TORQ	(3)	Torque on airbag caused by contacting ellipsoid
TQB	(3,10)	Torque on contacting segment caused by airbag
FRB	(3,10)	Force on airbag by contacting body segments
VOL	(10)	Intersection volume of airbag and contacting segments
DELF	(3)	Force acting on airbag due to linear spring function
B	(9,4,5)	3 x 3 matrix defining ellipsoid $X^TBX=1$ for reaction panel
ZB	(3,4,5)	Location of panel c.g. in inertial reference
ZR	(3,4,5)	Location of panel c.g. in vehicle reference (Card D.4.H)
BFB	(9,4,5)	c.g. offset of reaction panel (Card D.4.G)
DRR	(9,4,5)	Direction cosine matrix of reaction panel relative to inertial reference
DB	(9,4,5)	Direction cosine matrix of reaction panel relative to inertial reference
PCGV	(3,4,5)	Velocity of panel c.g. In inertial reference
PMEG	(3,4,5)	Panel angular velocity in local reference

WJONES (Cont'd)

VOLP	(4,5)	Intersection volume of airbag and reaction panels
FRA	(3,4)	Force an airbag by contacting reaction panels
PREVT		Value of TIME at previous airbag integration step
CK	(5)	Parameter used to stabilize airbag numerical integration (Card D.4.F)
CMASS	(5)	Mulitplier to increase or decrease the mass of the airbag to artificially dampen the integrated airbag motion (Card D.4.F)

SECTION 11

ANALYSIS VARIABLE DICTIONARY

Analysis Variable	Program Variable	Description	Pg of Best Explanation
A,B	A,BD,B	General Variables defining Matrices	21
A	A,BD,B	Matrix defining the contact ellipsoid	21
A_M	BD (7,L)	Contact ellipsoid matrix for segment M	198
A_{11}			
A_{13}	A13(,,2*k)	Matrix Coefficients for System Equations	138
A_{21}	A2		
A_{22}			
A_{23}	A23(,,2*k)		
a,b,c		Arbitrary vectors used in discussion of and cross product identity	14
a,b,c		Components of a vector in local coordinates	84
a_0	F(3,I)	Coefficients of the polynomial approximation to f(x,t) in the exponential integrator	150
a_1	F(4,I)		
a_2	F(5,I)		
a	ABC, AB	Scaled semi-axis (X axis of the air bag)	217
a_1,b_1,c_1		Semi-axes of the fully inflated air bag	218
a,b,c		Semi-axes of the airbag during inflation	218

* PAGE NUMBERS ARE REFERENCED TO VOLUME I

Analysis Variable	Program Variable	Description	Pg of Best Explanation
B_{11}	B2(, , 2*J)	Matrix Coefficients of the System Equations	138
B_{22}			
B_{12}			
B_{33}			
C		Constant matrix used to define locked joint constraint	92
C_{11}		Matrix coefficients of the reduced system equations used to solve for constraint forces and torques	148
C_{12}			
C_{13}			
C_{22}			
C_{33}			
C_0		Coefficients of the cubic part of the force function for computing force deflection	237
C_1	TAB		
C_2			
C_3			
C_f	CF, CFQQ VSCS	Coefficient of friction between two surfaces	200

Analysis Variable	Program Variable	Description	Pg of Be Explanat
D_n	D(, , N)	Direction cosine matrix of the nth local system	9
d		Scalar corresponding to the distance vector	96
d_{mn}	D(M, N,)	Element in the mth row and n^{th} column of the direction cosine matrix (D)	9
e_1		Exponential forms defined recursively. Used in the exponential integrator	150
e_2			
e_3			
E		Ellipsoid matrix	208

Analysis Variable	Program Variable	Description	Pg of Best Explanatio
Fnk	U1	K^{th} external force applied to segment N	86
fnj	TQ	Constraint force on the nth segment applied at joint j	86
f_1		Value of derivative at step 1	152
f_2		Value of derivative at step 2	153
f_3		Value of derivative at step 3	153
f_4		Value of derivative at step 4	154
		Used in the exponential integration	
f(x, t)		Functional form of the derivative $\dot{x} = f(x, t)$	152
f_{nor}		Normal component of the contact force	200
$f_i(\ )_{i=A_1B}$		Function of penetration parameter used to describe forces resulting from contact	203
$F_C(\ )$		Force function of penetration parameter described by cubic	236
$F_Q(\ )$		Force function of penetration parameter described by quadric	238
G		Deflection factor used in force-deflection routine	234

Analysis Variable	Program Variable	Description	Pg of Best Explanation
h		Arbitrary vector used in discussion of dot and cross product	14
h_n	HB	Unit vector along pin axis in segment ns local system	93
h		Unit vector along pin axis in inertial reference	92
h		Unit vector in the direction of ρ	97
h_1	D1	Defined by $n_1 = h/2$ for step 2 of the exponential integrator	152
h		Integration step size in the exp. integrator	152
h_A	HA(, 2*J-1)	Orthogonal unit vectors fixed in segment k where segment k is joined to segment j + 1 thru joint j	159
h_B	HB(, 2*J-1)		
h_A'	HA(, 2*J)	Orthogonal unit vectors fixed in segment j+1, used to define joint flexure and twist torque	159
h_B'	HB(, 2*J)		
h_B		Unit vector defined by rotating h_B through an angle about the h_A @ h_A' axis	159
i, j, k		Unit vectors defining orthonormal inertial reference system	7
im, jm, km		Orthonormal vectors defining the mth local system	7
I		Identity matrix	

Analysis Variable	Program Variable	Description	Pg of Best Explanation
l_n	BD(I+3. N)	Offset of ellipsoid n from the nth local system origin	20
l_n		Vector locating the center of contact ellipsoid from segment n's c.g in n's local system	102
M_n	W(N)	Mass matrix of the nth segment	140
m	M	Used to define m^{th} segment	Sect. 4.0
N	NSEG	Total number of segments	138
n		Used to define the nth arbitrary segment most often as a subscript	Sect. 4.0

Analysis Variable	Program Variable	Description	Pg of B Explanat
P_1, P_2, P_3	P1, P2, P3	Location of three points defining a plane	17
P	P	Penetration distance for the specification of contact forces (ellipsoid-ellipsoid)	206
PA		Penetration distance of airbag into contacting ellipsoid	220
PB		Penetration distance of contacting ellipsoid B into airbag	220
P		Defined by $/PA - PB/^2$ for airbag	220
q_1, q_2, q_3		Unit vectors representing lines in a plane	18
q	QQ(, k)	Constraint force for position constraint	97
q	QQ	Constraint force for rolling constraint	99
q	QQ	Constraint force for sliding constraint	101
q_0, q_1, q_2		Coefficients used in the quadratic unloading curve in force deflection routine	239

Analysis Variable	Program Variable	Description	Pg of Best Explanation
r		Vector from ellipsoid center to ellipsoid surface	21
r_n		Vector locating a point in segment n in segment n's local system	94
r_{nj}	SR(,2*J)	Location of joint j in n's local system	25
r_n		Vector locating a point in segment n in segment n's local system. Used for position, sliding and rolling constraints	99
r_A		Radius of curvature of the airbag	221
r_B		Radius of curvature of the contacting ellipsoid	221
r_C		Defined by $r_C = (r_A + r_B)/2$	221
r		Radius of constructed circle for airbag contact computation	221
R		Absorption factor used in force-deflection routine	234
S_1	SPRING(1, JT)	Constants used to define spring torques at the joints	162
S_2	SPRING(2, JT)		
S_3	SPRING(3, JT)		
S_4	SPRING(4, JT)		
S_5	SPRING(5, JT)		

Analysis Variable	Program Variable	Description	Pg of Best Explanation
t	TQQ	Unit Vector defined normal to a plane	102
t	TQ	Constraint torque at the joint	94
t		Unit vector normal to the ellipsoid at r_n in inertial reference	22
t_n		Unit vector normal to the ellipsoid at r_n in n's local system	103
t	T	Independent variable of integration	151
t		Outward normal to the plane	102
T_A	TA	Vector from anchor point A to fixed point (used in belt routine)	208
T_B	TB	Vector from anchor point B to fixed point (used in belt routine)	208
T_C	TC	Vector defining the belt plane (used in belt routine)	208
T	CV	Viscous torque at the joint	161
T_S	CSA, CSB	Spring torque at the joint	161
U_{2n}	UZ(, N)	Right hand side of the joint constraint equation for segment n	90
U_x		Unit vector in the positive x direction of the panel attached to the airbag	217

Analysis Variable	Program Variable	Description	Pg of Best Explanation
V_{3n}	V3(, N)	Right hand side of distance, sliding or rolling constraint equation for segment n.	145
V_{REL}		Relative velocity between contact ellipsoids during slide	198
V_1^*	V1(, J)	Right side of reduced system equations used to solve for the constraint forces and torques	148
V_2^*	V2(, J)		
V_3^*	V3(, k)		
V_r	VR	Relative velocity between the ellipsoid and plane at the point of contact	200
V_{rt}	TT	Tangential component of V_r	200
V_1	VISC(1, JT)	Constants used to compute viscous joint torques	163
V_2	VISC(2, JT)		
V_3	VISC(3, JT)		
V_g	VBAG	Geometric volume of the airbag	218
V_b		Instantaneous volume of the airbag	232
V_s		Volume of revolution of a sector of a circle	221
V_R		Volume of a ring	223
V		Volume of circle intersection	223

Analysis Variable	Program Variable	Description	Pg of Best Explanation
x_i	SEGLP(, I)	Vector position of segment i in inertial reference	83
x_0, y_0, z_0	XO( )	Components of c. g position in inertial coordinates	83
$\dot{x}$	DER(I)	Derivative of the state x(t)	151
x_0	F(1, I)	Value of the state at the start of the integration step	152
x_1		Value of the state at h_1 } in the exponential integration	152
x_2		Value of the state for step 2 } in the exponential integration	
x_3		Value of the state for step 3 } in the exponential integration	153
x_4		Value of the state for step 4 } in the exponential integration	154
x_E	XE	Vector to the center of the belt plane ellipse from the center of the contacting ellipsoid	208
x_A	XA	Location of airbag c. g. in inertial coordinated	220
x_B	BD	Location of the segment c. g to which the contacting ellipsoid is attached	220

Analysis Variable	Program Variable	Description	Pg of Best Explanation
Y		Arbitrary vector locating a point in segment m in inertial reference	7
y_n	PSF,GSF,SSF	Vector from the c.g of segment n to the point of application of the contact force	198
y_2		Parameter used to define the inertial spike in the force deflection routine	237
z_A	ZA	Location of anchor point A relative to the contacting ellipsoid center	208
z_B	ZB	Location of anchor point B relative to the contacting ellipsoid center	208
z	ZR	Location of the center of the primary reaction panel with respect to the vehicle reference for airbag	217
z_d	DEPLOY	Location of the airbag deployment point with respect to the center of the primary panel	217
z_b	ZA	Location of the airbag center with respect to the vehicle origin	217

Analysis Variable	Program Variable	Description	Pg of Best Explanation
α	F(2, I)	Constant used in the approximation of the function f(x, t) for the exponential integrator	150
α_{max}		Maximum value of the parameter α in the integrator	152
α_2	PL(11, J)	Parameters used to define the extent of a finite plane	199
α_3	PL(12, J)		
α		Defined by the equation $\alpha = r_c \sin\phi$ used for airbag volume of contact computations	223
β	BTE	Distance represented by the vector $\vec{\beta}$, ($\beta = \lvert\vec{\beta}\rvert$)	17
β		Vector connecting the centers of two contacting ellipsoids used for sliding and rolling constraints	102
β	BTE	Distance from segment c.g to contacting plane	198
β_1	PL(8, J)	Parameters used to define the size of a finite plane	199
β_2	PL(9, J)		
β_3	PL(10, J)		
$\tilde{\beta}$	BET	Distance from ellipsoid center to belt plane	208
β		Parameter defined by $\beta^2 = r_A^2 - \alpha$ in the computation of the airbag contact volume	224

Analysis Variable	Program Variable	Description	Pg of Best Explanation
γ		Parameter used to define the tangent point in the belt plane	211
δ		Distance between point of maximum penetration and the ellipse resulting from the plane-ellipsoid contact	198
δ		Force deflection parameter, a geometric property of the surface	234
δ_i $i=1,2$		Values of δ used to describe different regions of the force deflection curve	235
δ_{cubic} δ_{quad} δ_{ref} δ_{co}		Values of δ used to define the specific force deflection curve	236
Δ		Parameter defined by the equation $\Delta = \delta_{ref} - \delta_{cubic}$	236

Analysis Variable	Program Variable	Description	Pg of Best Explanatio
θ		The flexure angle used in computing joint torque	159
λ		Arbitrary scalar used in the constraint equations	97
μ		Parameter used to compute r_n' for the sliding and rolling constraints	105
μ		Scalar proportionality constant used to compute contact forces	197
ρ		Shortest vector from origin to plane	16
ρ		Vector defining the fixed distance in the fixed distance constraint	95
ρ	CFQQ(F)	Friction coefficient for the sliding constraint	100

Analysis Variable	Program Variable	Description	Pg of Best Explanation
τ_{ex}	TQ(, N)	Torques from external sources on the nth segment	87
τ_{cons}	TQQ(, N)	Torques (couples) due to constraints on the nth segment	87
Φ_n	PHI(, N)	Inertia tensor for the nth segment	140
Φ_{xx} Φ_{yy} Φ_{zz}	BPHI	Principal inertial components of the airbag	219
Φ_A, Φ_B		Angle of a line drawn from the center of the circle to points of intersection. Used to compute contact volume for the airbag	224
ω_n	WMEG(, N)	Angular velocity vector for the nth segment in n's local coordinate system	87

VERIFICATION OF THE PROGRAM FEATURES

A set of five test runs were made and included with the program on the tape (GBCV30) submitted at the completion of the contract. These runs were made with the final version of the program as listed on the above tape.

It is recommended that the user correlate the input data for each test run with the input description of the program. This exercise is the best method of understanding the use of the many features of the program.

Test run 0 is a verification of the standard 15 segment crash victim using the same data as was used on previous test runs submitted during the course of the contract. Test runs 1 through 4 illustrate the use of most of the special features of the program.

The only principal features of the program which are not included in these runs are the use of the Globalgraphic Joint Stop and the use of the Euler Joint. The input description clearly specifies how these two options are selected.

Table (12.1) is a summary of the test runs executed for program verification.

TABLE 12.1 CATALOGUE OF COMPUTER EXECUTIONS FOR CONTRACT

RUN NO.	PURPOSE	DESCRIPTION	NOTES
GB2572	Joint Lock, Unlock and Dr. Kanes Theory	Three - 3 seg bodies First - joints do not lock Second - joints lock and unlock Third - joints remain locked Case 0 (mass = 35.75, 9.38, 31.75 lbs)	
GB2117		Three - 3 seg bodies Same as above Case 8 (mass = 0.1389, 0.01, 0.05 lb in/sec^2)	
GB2809		Three - 3 seg bodies Same as above Case 10 (mass = 0.86965, 0.026, 0.086)	
GB3460		Three - 3 seg bodies Case 0 - unlocked joints Case 8 - unlocked joints Case 10 - unlocked joints	
GB3757		Same as GB3460 except all joints are locked	
GB2407	Program Precision	Results compared with GB2572 for accuracy and precision sensitivity	
	Quick Response	Check out of program modifications for quick response	
BY4400	Position Constraint	Check out of two types of position constraints with pedestrian	

RUN NO.	PURPOSE	DESCRIPTION	NOTES
	Integrator Test Variables	Integrator test values were varied by a factor of 10 and the results compared	
BY3113	Symmetry Check	Two types of symmetry modes were checked out using 15 segment man model	
BY4139	Rolling Constraint	Checkout of rolling constraint using 15 segment man model	
Base Run: BY3214 BY1384 BY5396	Integration	Improvements demonstrated in integration procedure	
BY3240	Impulse	Results demonstrated impulsive force capability	
Test Run: 0 LGCB33Y	Demonstrates that the final version has not destroyed any of the features of earlier versions	Basic 15 segment crash victim air bag - seat belt	

RUN NO.	PURPOSE	DESCRIPTIONS	NOTES
1 LGGB14Z	Use of disjoint sets of segments	7 - segments	
	Demonstrate free fall	Seg # 1-2 dumbell - balljoint	Note 1g acceleration
	Contact with stiff planar surface	3-4 dumbell - balljoint stiff surface	
	Impulse on contact - coefficient of restitution = 1	5-6 dumbell - balljoint soft surface - impulse	Note X,Z velocity of segment 6 at t=1.75ms. X velocity → 0 Z velocity reverses
	Use of roll-slide, impulse on first contact with coefficient of restitution=0. Use of additional ellipsoid and interior contact ellipsoids	7 ball rolling on inside of sphere	Note change in velocity at t=2ms.(time of first contact.) Velocity changes from free fall to a velocity paralles to the surface
2 LCGB17V	Use of disjoint sets of segments. Metric system Gravity in X direction	4 - segments	
	Illustrates use of lock-unlock capability of joints	1-2 dumbell - ball joint initially locked	Note unlock of joint with relock at 0.625ms unlock and relock at 1.00ms-compare angular velocities at these times

RUN NO.	PURPOSE	DESCRIPTIONS	NOTES
	Illustrates use of arbitrarily oriented pin axis, roll-slide on plane with impulse on contact - use of offset ellipsoid	3-4 dumbell - angled pin joint-roll slide on planar surface	Note impulse on contact at 1.625ms. and change from roll to slide condition
3 LCGB304	Use of disjoint sets of segments	10 segments	
	Illustrate use of massless segment	Seg # 1-2-3 segment 2 has 0 mass and 0 inertia, ball joint, and pin joint	Note that motion of segment 2 is determined from motion of segment 1 and 3.
	Illustrate use of flexible element	4-5-6 flexible element ball joint	Note that segment 5 maintains a relative pitch angle of one half of the angle between segments 4 and 6
	Illustrate use of spring-damper connected between segments 7 and 8	7-8 dumbell ball joint	
	Illustrate use of tension element connected between segments 9 and 10	9-10 dumbell ball joint	

RUN NO.	PURPOSE	DESCRIPTIONS	NOTES
4 LGCB26D	Illustrates how features of the program may be used to obtain an improved shoulder. The scapula is modeled as a segment which can roll or slide on the chest and is constrained by the use of a fixed distance constraint to simulate the clavicle and spring damper to simulate muscles. The arm is connected to the scapula by a ball joint.	3 Segments 1 chest 2 scapula 3 arm	

TEST RUN #1 7 Segments

in-lb-sec units, gravity vector 0, 0, 386.088 in/sec^2 (z direction)

All segments

Weight	10 lbs
Inertia	0.5, 0.5, 0.5 lb-sec^2-in
Contact Ellipsoid	4" radii spheres centered at cg

ball joints

flexure spring	1000 in lb/deg. , stop 20 deg.
torsion spring	500 in lb/deg. , stop 30 deg.

Integrator Test Numbers 40, 10, 0.05 (Reference segments only)

Print interval	5ms	1,3,5,7
Initial step	0.25ms	
Max. step	1.0ms	
Min. step	0.2ms	

Segments

1-2	Free fall
3-4	Segment 4 to contact plane 1 with 10000 lb/in force, friction coef. = 0.5
5-6	Segment 6 to contact plane 2 with 10 lb/in force, friction coef. = 0.5, elastic impulse on contact coef. of restitution = 1.
7	Roll-slide on 32" radius sphere attached to ground, friction coef. = 0.5, static friction coef. = 2.0 impulse on contact; coef. of restitution = 0

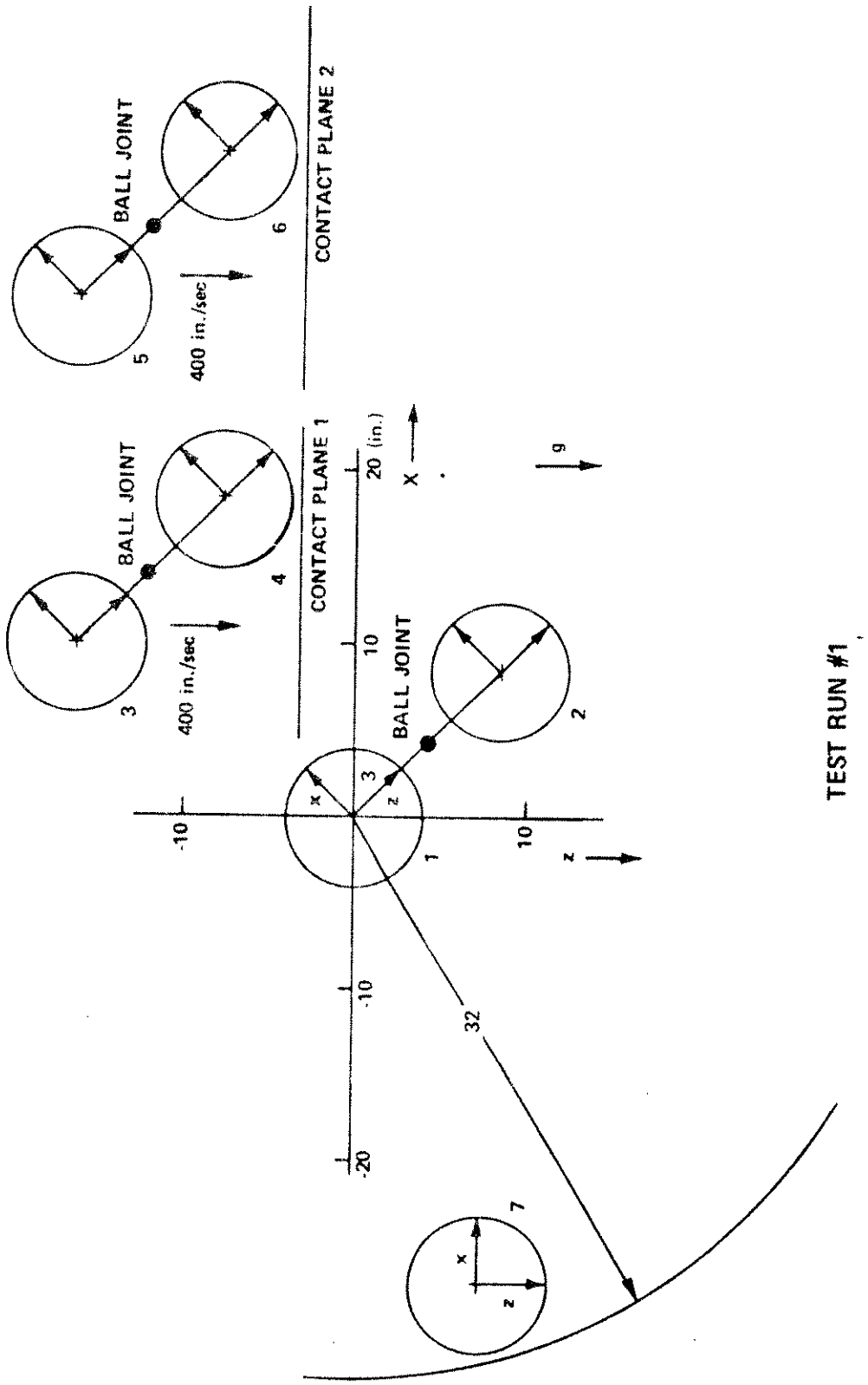

BALL JOINT
BALL JOINT
BALL JOINT
CONTACT PLANE 2
CONTACT PLANE 1
400 in./sec
400 in./sec
20 (in.)
10
-10
-20
10
-10
32
1
2
3
4
5
6
7
x
z
g
TEST RUN #1

FIGURE 12.1

TEST RUN #2 4 Segments

cm-kg-sec units, gravity vector 980.66, 0, 0 cm/sec^2 (x direction)

All Segments

Weight	5 kg
Inertia	0.5, 0.5, 0.5 kg-sec^2-cm
Contact ellipsoids	10 cm spheres offset $\pm$ 1cm on x axis

Joints

Flexure spring	1000 kg-cm/deg , 1 kg cm /deg^2, energy dissipation 0.5 ; stop 50 deg
Torsion spring	500 kg-cm/deg stop 30 deg
Viscous char.	1 kg cm sec/deg, ramp 10deg/sec
Joint 1	initially locked unlock at 1000 kg-cm relock at 10 kg-cm, 0.5 rad/sec
Joint 3	impulse at joint stop, coef. of restitution = 0

Integrator Test Numbers 100, 25, 0.05 (reference segments only)

Print interval	2ms	1,3
Initial step	0.25ms	
Max. step	1.0ms	
Min. step	0.2 ms	

Segments

1-2 Segment 2 to contact plane 1 attached to ground, force= 1800 kg/cm, friction coef. = 0.05

3-4 Segment 4 to roll-slide on plane 1 attached to vehicle , friction coef=0.5, static friction coef. = 2.0 coef. of restitution on impact = 0.

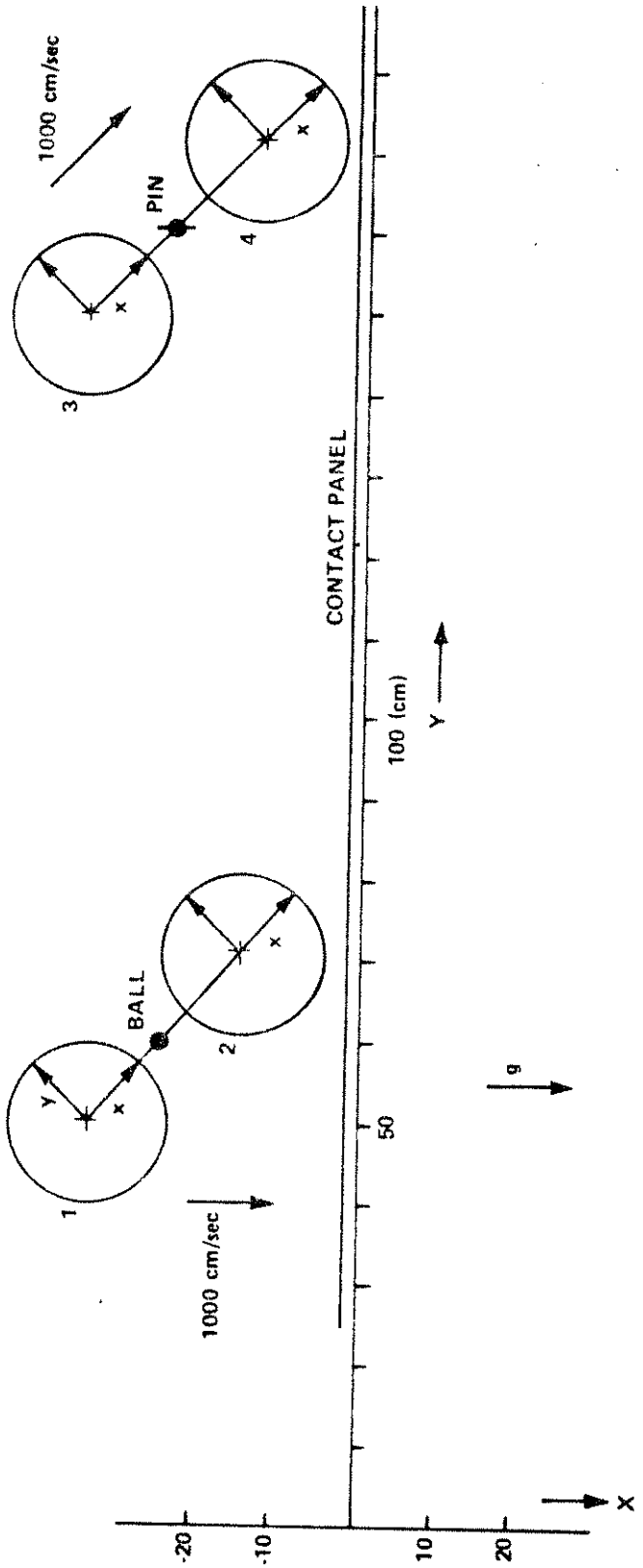


FIGURE 12.2

ZQ-5801-L-1

TEST RUN #3 10 segments

in-lb-sec units, gravity vector 0, 0, 386.088 in/sec^2

All segments

Weight 10 lbs
Inertia 0.5, 0.5, 0.5 lb-sec^2-in

(Segment 2 has wt=inertia=0)

Contact Ellipsoids - 10 in radii spheres centered on cg

Joints
flexure
spring 1000 lb-in/deg

torsion
spring 500 lb-in/deg

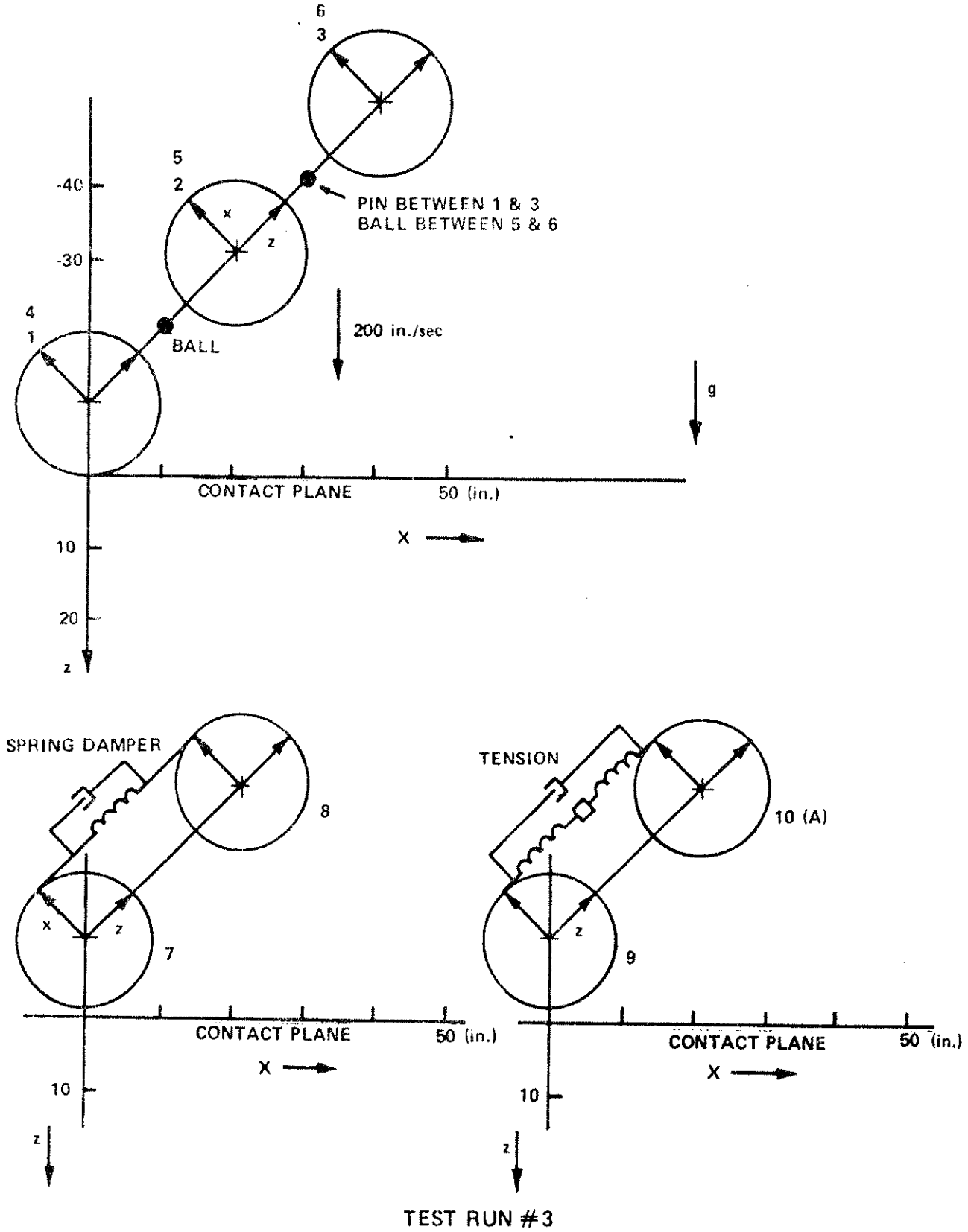
viscous
char none

Integrater Test Numbers 100, 25, .05 (reference segments only)

Print interval 5ms , 1,4,7,9
Initial step 0.25ms, Max. 1ms, Min. 0.25ms

Segments

1-2-3	Segment 1 to contact plane 1, force 1000 lb/in, coef. of friction 0.5 Segment 2 is singular (zero mass)
4-5-6	Segment 4 to contact plane 1 (as above) flexible element with segment 5 to maintain a yaw, pitch, roll of one-half of the relative yaw, pitch and roll between 4 and 6
7-8	Segment 7 to contact plane 1 (as above) Spring damper attached between segments, 30 in. nominal length, spring constant 80000 lb/in damping constant 100 lb sec/in
9-10	Segment 9 to contact plane 1 (as above) Tension element attached between segments 30 in. nominal length, spring constant 10000 lb/in damping constant 10 lb sec/in effective masses 0.01, 0.01, 0.005 lb sec^2/in



TEST RUN #3

FIGURE 12.3

SUBROUTINE, COMMON BLOCK AND VARIABLE CROSS REFERENCE CHARTS

Several subroutine cross reference charts are presented to assist the user in locating variable usage in the program. A matrix of common block usage in the program subroutines is presented in Figure 13.1. Subroutine call cross reference information is Figures 13.2 and 13.3. The program uses its own set of utility routines and calls to these subroutines are referenced in Figure 13.4. The next five figures 13.5 thru 13.10 present variable, subroutine cross reference by common blocks.

CALLING ROUTINE	[illegible]	CTIRT	CURRER	[illegible]	[illegible]	[illegible]	COMMIN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TABLES	[illegible]	TEMPVS	TITLES	VPOSIN	[illegible]
AIPERO						X		X								X		X					X	X
AIPCS1	X				X			X					X									X	X	X
AIPEDS	X				X			X					X										X	X
BELTS					X			X													X			
BELRPT													X					X	X		X		X	
BSG					X																X			
BINPUT					X	X		X				X			X						X	X		
CHAIN								X										X			X		X	
CINPUT								X	X										X		X	X		
CONTCT								X					X			X			X					
DAUX				X	X			X	X		X	X						X			X			
DAUX11				X				X			X							X			X			
DAUX12				X				X			X										X			
DAUX22			X	X				X										X			X			
DAUX[illegible]				X				X	X												X			
DAUX[illegible]				X				X	X												X			
DAUX33				X				X	X									X			X			
DAUX44				X				X	X		X	X						X			X			
DAUX55				X	X			X	X		X	X						X			X			
DAMPIN			X															X						
DIMN		X			X			X							X									
EDEPTH					X			X																
EJOINT			X	X				X			X							X			X			
FLXSEG												X						X			X			
FSMID																								
HEDING					X		X	X					X			X	X				X	X		
IMPLSE								X	X									X						
IMPULS								X	X							X		X	X	X			X	
INITAL								X										X			X	X	X	
INTERP																								
MAINSD								X										X				X	X	
OUTPUT					X			X					X			X	X	X			X		X	
PANEL																							X	
PCRJN								X			X				X			X			X			
PLELP									X												X			
PLSECF									X									X	X	X	X			
PRINT				X	X			X	X		X							X				X	X	
PRIPLT	X					X		X			X					X		X			X	X	X	
RSTART	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X		X	X	X
SEARCH																								
SEGSEG						X			X				X					X	X		X			
SETUP1				X				X			X							X			X			
SETUP2					X			X	X		X							X			X			
SINPUT					X	X		X	X	X								X			X	X		
SPEAMP										X								X			X			
UPDATE								X	X		X		X			X		X	X	X				
UPDFCC																			X					
VEHPOS					X			X										X					X	
VINPUT					X			X			X							X				X	X	
VISPR				X	X			X			X		X					X		X	X		X	

MATRIX OF COMMON BLOCK USAGE

FIGURE 13.1

CALLING ROUTINE	AIRBAG	AIRB01	AIRB03	BELTC	BELTS1	BOG	BINPUT	CHAIN	CINPUT	CONTCT	DAUX	DAUX11	DAUX12	DAUX22	DAUX31	DAUX32	DAUX33	DAUX44	DAUX55	DAHPIN	DINT	EDEPTH	EJOINT	FLXSEC	FSMSOL
AIRBAG						X																			
AIRB01																									
AIRB03																									
BELTC																									
BELTS1																									
BOG																						X			
BINPUT																									
CHAIN																									
CINPUT																									
CONTCT	X				X																				
DAUX								X		X		X	X	X	X	X	X	X	X					X	X
DAUX11																									
DAUX12																									
DAUX22																				X					
DAUX31																									
DAUX32																									
DAUX33																									
DAUX44																									
DAUX55																									
DAHPIN																									
DINT																									
EDEPTH																									
EJOINT																									
FLXSEC																									
FSMSOL																									
HEDING																									
IMPLS2											X														
IMPULS											X														
INITAL								X																	
INTERS																									
MAINSQ							X		X												X				
OUTPUT																									
PANEL																									
PDAUX											X														
PLELP																									
PLSECF																									
PRINT																									
PRIPLT																									
RSTART																									
SEARCH																									
SEGSEG																									
SETUP1																									
SETUP2																				X					
SINPUT		X																							
SPDAMP																									
UPDATE			X								X														
UPDTDC																									
VEHPOS																									
VINPUT																									
VISPR																									

MATRIX OF SUBROUTINE USAGE

PART I

FIGURE 13.2

CALLING ROUTINE	CALLED ROUTINES																					
	HEDING	IMPLS2	IMPULS	INITAL	INTERS	MATRIX	OUTPUT	PRINT	PRIPLT	PLELP	FLSEOF	PRINT	PRIPLT	RSTART	SEARCH	SEGSEG	SETUP1	SETUP2	SINPUT	SPDAMP	UPDATE	UPDFIC	VEHPOS	VINPUT	VISPR
AIRBAG																									
AIRBG1																									
AIRBG3								X																	
BELTO																									
BELTRT																									
BGO					X																				
BINPUT																									
CHAIN																							X		
CINPUT																									
CONTOT										X						X									
DAUX												X					X	X		X					X
DAUX11																									
DAUX12																									
DAUX22																									
DAUX21																									
DAUX32																									
DAUX33																									
DAUX44																									
DAUX55																									
DHAPIN																									
DINT							X		X												X				
EDEFTH																									
EJOINT																									
FLXSEG																									
FSMET																									
HEDING																									
IMPLS2												X													
IMPULS							X			X		X				X									X
INITAL																									
INTERS																									
MATRIX				X								X	X	X					X				X		
OUTPUT	X																								
PRINT																									
PRIPLT																									
PDPUP																									
PLELP											X														
FLSEOF																									
PRINT																									
PRIPLT																									
RSTART							X								X										
SEARCH																									
SEGSEG					X						X														
SETUP1																									
SETUP2																									
SINPUT																									
SPDAMP																									
UPDATE	X	X					X					X						X				X			
UPDFIC																									
VEHPOS																									
VINPUT																									
VISPR																									

MATRIX OF SUBROUTINE USAGE

PART II

FIGURE 13.3

CALLING ROUTINE	BLDIA	CFALIT	CROSS	DUT	DUIT	UTILITY ROUTINES: DKEYFR	DCETD	DCETQ	DGMSQL	DCT	EFUNCT	FLOWC	ELTIME	EULRAD	EXALFD	FRLDFL	LTIME	MIT	ORTHO	PLIAYZ	RCRT	RDT	SPRNCF	VISCOS	XDY	YFRDEG
AIRBAG													X													
AIRBC1			X	X		X												X								
AIRBC3			X	X			X						X					X								X
BELTC			X									X						X								
BELTRT			X	X	X								X			X		X								
BCG			X	X														X	X		X					
BINPUT						X							X													
CHAIN			X	X									X													
CINPUT															X											
CONTCT													X													
DAUX													X													
DAUX11													X													
DAUX12													X													
DAUX22													X													
DAUX31													X													
DAUX32													X													
DAUX33													X													
DAUX44													X													
DAUX55													X													
DHHPIN																										
DCNT									X				X													
EDEPTH								X										X								
EJOINT			X	X							X		X	X				X				X				
FLXSEG			X	X	X								X					X							X	
FSMSQL													X													
HEDING																										
IMPLS2				X				X					X													
IMPULS			X	X									X					X								
INITAL				X		X							X					X								
INTERS								X										X								
MAIN3D													X													
OUTPUT			X	X	X								X					X								X
PANEL			X	X														X								
PDAUX			X					X					X													
PLELP			X		X								X					X								
PLSEOF			X	X											X	X		X								
PRINT				X																						X
PRIFLT				X									X								X					
RSTART													X													
SEARCH																										
SEGSEG			X	X	X				X				X						X							
SETUP1			X	X									X													
SETUP2			X	X	X								X						X							
SINPUT			X	X		X																				
SPCAMP				X									X						X							
UPDATE													X												X	
UPDFDC																X	X									
VEMPOS							X																			X
VINPUT						X	X																X	X		
VISPR													X													

MATRIX OF SUBROUTINE USAGE

PART III

FIGURE 13.4

CROSS REFERENCE OF VARIABLES IN LABELED COMMON - PART 1

NOMENCLATURE
A - SUB ARGUMENT
F - FETCHED
S - STORED
C - COMMON USED

	AIRBAC	AIRBC1	AIRBC3	BELTG	BELTRT	BCG	BINPUT	CHAIN	CINPUT	CONTCT	DAUX	DAUX11	DAUX12	DAUX22	DAUX31	DAUX32	DAUX33	DAUX44	DAUX55	DHHPIN	DINT	EDEPTH	EDINT	FLXSEC	FSMSOL	HEDING	IMPLS2	IMPULS	INITAL	INTERS	MAIN3D	OUTPUT	PANEL	PDAUX	PLELP	PLSEGF	PRINT	PRTPLT	RSTART	SEARCH	SEGSEC	SETUP1	SETUP2	SINPUT	SPDAMP	UPDATE	UPDFDC	VEHPOS	VINPUT	VISFR
ABDATA																																																	
ABC (3,5)	C	C	C																											C							C	C											
ZA (3,5)	F	S	SF																											F							F	F											
DA (3,3,5)	FA	SFA	SFA			FA																								F							F												
BFA (3,5)	FA	S A	SFA			FA																								F							F												
BCGV (3,5)	FA	SF	FA			FA																								F							FA												
BMEC (3,5)	FA	SFA	SFA																																														
CBINT																																																	
E (3,120)																					C																	C												
F (5,120)																					SFA																													
GG (5,120)																					SF																													
Y (5,120)																					SFA																													
U (5,120)																					SF																													
H																					SF																													
HPRINT																					SFA																													
TSAVE																					SF																													
TPRINT																					SF																													
TSTART																					SF																													
ICNT																					SF																													
IOBL																					SF																													
IFLAG																					SF																													
EULER																																																	
IEULER (22)														C						C																		C												
HTR (3,3,21)														F						F																														
RNG (3,21)																																																	
RNGD (3,21)																																																	
FE (3,21)																																																	
TOE (3,21)																																																	
CONST (3,21)																																																	
CMATRX																																																	
V1 (3,21)											C	C	C	C	C	C	C	I	C								C	C								C		C			C	C			C				C
V2 (3,21)												F		F													S	S													SFA								
V3 (3,12)																	F						S				S	S													S								
B12 (3,3,42)											F	F	F		F			F	F																						S		SFA						
B22 (3,3,42)													F	F		F		F	F																								S A						
F (3,21)											SF																									F													
TQ (3,21)											SF																									F									F				SF
WJ (21)																																					F								F				S
CNSNTS																																																	
PI		C	C	C		C	C				C								C		C	C				C			C	C	C	C					C		C				C	C				C	C	C
RADIAN		F		F		F																																									F	F		
G							F																						F		S	F					F										F	F		
THIRD		F	F				F												F													F					F													
EPS1																					F																													
EPS4				F																																														
EPS8				F		F																F																												F
EPS8																					F		F																											
EPS12											F												F							F												F								
EPS15																																																		F
EPS20											F																			F																				
EPS24																					F																													
UNITL							F																			F			F		SF					F							F					F		
UNITH							F																			F					SF					F													
UNITT							F																			F			F		SF					F												F	
GRAVTY (3)											F								F												SF																			

CROSS REFERENCE OF VARIABLES IN LABELED COMMON - PART 2

NOMENCLATURE
A - SUB ARGUMENT
F - FETCHED
S - STORED
C - COMMON USED

	AIRBAG	AIRBGL	AIRBG3	BELTG	BELTR1	BNG	BINPUT	CHAIN	CINPUT	CONTCT	DAUX	DAUX11	DAUX12	DAUX22	DAUX31	DAUX32	DAUX33	DAUX44	DAUX55	DHHPIN	DINT	EDEPTH	EJECT	FLXSEG	FSMSOL	HEDING	IMPLS2	IMPULS	INITAL	INTERS	MAIN3D	OUTPUT	PANEL	PDAUX	PLSCOP	PLSEOF	PRINT	PRPLOT	RSTART	SEARCH	SESSEN	SETCTL	SETUP	SINPUT	SPDAMP	UPDATE	UPDFLT	VEHFON	VINPUT	VISFR
ON1SAF																																																	
PL (17,20)	C				C		C																							C				C			C		C				C						
GAB (8,3)																														F				FA									SFA						
BELT (20,8)				FA	SFA																									F																			
IP15 (6,8)					S																									F													S						
BO (24,25)	FA			FA	FA		F																							F				FA			S R			FA			S						
COMMIN																																						C											
VOR (120)																					FA					C				I			SFA																	
DER (120)																														Q			S R																	
DT																					FA									R																				
HO																					FA									SFA																				
HMAX																					FA									SFA																				
HMIN																										SF				SFA																				
RSTIME																														SFA																				
ISTEP																														SF																				
NSTEPS																					FA									SFA																				
NDINT																														R																				
NEO																										F				SFA																				
IRSIN																														SFA																				
IRSOUT																																																	
CONTRL	C	C	C	C			C	C	C	C	C	C	C	C	C	C	C	C	C		C	C	C			C	C	C	C			C		C			C	C	C		C	C	C		C		C		C	C
NSEG							C	C	F	F	F	F	F	F	F	F	F	F	F				F			F	F	F	F			F		F			F	F	F			F	F							
NJNT							F																														F												
N53																														S																				
N33																														S																				
NPL									F	F																F				F													SF		F					
NBLT									F	F																F				F							F						SF		F					
NBRC	F	F	F								F																	F																						
NVEH											F																																							
NORND											F										F	F						F		SF																				
NPRT (40)	F	F	F	F			F	F			SF																																							
CSTMNT																																																	
A13 (3,3,24)									C		C				C	C	C	C	C								C	C						C	C	C		C		C		C							
A23 (3,3,24)											F				F	F	F	F	F									FA														SFA							
B33 (3,3,24)											F				F	F	F	F	F									FA														SFA							
B32 (3,3,24)															F	F	F	F	F																							SFA							
HNT (3,3,12)																																			S		FR					FR	SF						
RK1 (3,12)																																			S		FR					FR	SF						
RK2 (3,12)																																					F								F				
QQ (3,12)											SF																	FA																	F				
TQQ (3,12)																																			S								FA						
RQQ (3,12)																																		S R	S		F			S A			F						
HQQ (3,12)																																			S								FR						
SQQ (3,12)																																					F			S			F						
CFQQ (12)																																											F						
NQ									SF		F				F	F	F	F	F								F	F									F						SF		F				
KQ1 (12)									S		F				F	F	F	F	F								F	F									F						SF		F				
KQ2 (12)									S		F				F	F	F	F	F								F	F									F						SF		F				
KQTYPE (12)									S		F				F	F	F	F	F									F									F						SF		F				
DAMPER																																																	
APSDR (3,20)																																							C				C	C					
APSDN (3,20)																																							SF				FR						
NSB (5,32)																																							SF				F						
NSD																																							SF				F						
NSBM (80)																																							SF				F						
NSDM (20)																																							SF				F						

FIGURE 13.6

ZQ-5180-L-1

CROSS REFERENCE OF VARIABLES IN LABELED COMMON - PART 3

NOMENCLATURE R - SUB ARGUMENT F - FETCHED S - STORED C - COMMON USED	AIRBAG	AIRBG1	AIRBG3	BELTG	BELTRT	BRG	C1INPUT	CHAIN	C2INPUT	CONTCT	DAUX	DAUX11	DAUX12	DAUX21	DAUX22	DAUX33	DAUX44	DAUX55	DAMPIN	DINT	EFFECT	FLXSEG	FSMSOL	HEDING	IMPLS2	IMPULS	INITIAL	INTERS	MOINNT	OUTPUT	PANEL	PDAUX	PLELP	PLSCTL	PRINT	PRSALT	RSTART	SEARCH	SCNDEL	SETUP1	SETUP2	SINPUT	SPDAMP	UPBUFF	UPDBCD	VEHCDS	VINAFT	VISPB
DESCMP																																																
PHI (3,22)							C	C	C		C	C	C	C	C	C	C	C	C						C	C	C					C		C		C	C			C	C						C	C
H (22)							SF											F	F																												S	
SR (3,42)																F																														S	
HR (3,42)							SF	FA																											FA				FA								
HB (3,42)														F					F																				FA									
HT (3,3,42)							SF																																FA									
RPHI (3,22)											F	F	F	F	F	F	F								F	F																					
RW (22)											F	F			F	F										F																						
SPRING (5,42)							SF																																							S		
VISC (5,42)							SF																			F																						
JNT (21)							SF	F			F	F	F	F	F		F	F							F	F	F							F					F	F						F	F	F
IPIN (21)							SF				F		F	F	F		F	F	F													F			F				F	F								
NS							SF				F		F				F	F																												S		
ISING (22)							SF				F							F																														
IGLOB (21)									SF													F																										
FLXBLE																																																
HF (4,12,8)							C				C							C				C															C											
B42 (3,3,24)							SF				F							F				FR																										
V4 (3,8)											SF						F					SFR																										
NFLEX (3,8)							SF				F						F					S A																										
NFLX							SF				F						F					F																										
FORCES																																																
FSF (7,20)	C	C	C		C					C														C					C				C				C							C					C
BSF (4,20)					S																								SF			S																	
SSF (10,20)																													F																				
BRGSF (3,20)	S		S A																										F									S A										
NFSF										SF																			F																			
NBSF					F					SF																																		SF				
NSSF										SF																																						
NBGSF	SF		SF																																			FA						SF				
NPANEL (8)	F	SF	F																					F					F																				
PRJNT (6,21)																													SF																			S
INTEST																																																
SOTEST (3,4,22)							C													C												C				C													
RTEST (3,88)							SF													F												F																	
JBARTZ																																																
MNPL (20)	C		C						C	C														C	C				C						C	C							C						
MNBLT (8)									SF	F														F											F								F						
MNSEG (22)									SF	F														F											F								F						
MNBRG (6)	F		F						SF	F														F					F						F								F						
MPL (3,5,20)									S															F																									
MBLT (3,5,8)									S	F														F																									
MSEG (3,5,22)									S	F														F																									
MBRG (3,10,6)	F								SF															F																									
NTPL (5,20)									S	F																F																							
NTBLT (5,8)									S	F																F																							
NTSEG (5,22)									S	F																F																							
RSAVE																																																
XSG (3,20,3)																								C					C								C												
YSG (7)																								SF					FR																				
ZSG (20,7)																								SF					F																				
																								SF					F																				

FIGURE 13.7

ZQ-5180-L-1

NOMENCLATURE A - SUB ARGUMENT F - FETCHED S - STORED C - COMMON USED	ATARRC	ATARCC	ATARCC	BELTLA	BELTRA	BIN	BINPUT	CHAIN	CINPUT	CONTCT	DAMPIT	DAUXT1	DAUXT2	DAUXT3	DAMT3	DAMT3C	DAMT4	DAUXSC	DAMFIN	DINT	EDFIT	FLIN	FLXSEC	FSMSOL	HEDING	IMPLS2	IMPULS	INITIAL	INTERS	MAINRD	OUTPUT	PANEL	PUNCH	PLELA	PLSECF	PRINT	PRTPLT	RSTART	SEARCH	SETUP1	SETUP2	SETUP3	SIMPLIT	SPBUMP	UPDATE	UPDATE	VEHPOS	INTPLA	PLSTA
SCMNTS																																																		
D (3,3,22)					C			C			C	C				C	C	C	C				C				C																				C			
WMEG (3,22)					FA			FA			F								F				FA				FA																							
WMEGD (3,22)								FA															FA				FA																							
U1 (3,22)	SF				SF						SF																																							
U2 (3,22)	SF				SF						SF																																							
SEQLP (3,22)	FA				F																																													
SEQLV (3,22)	A																																																	
SEQLQ (3,22)								SF			SF																																							
NSTM (22)								SF																																										
TABLES																																																		
MXNTI					C				C	C																	C							C	C				C							C	C			
MXNTB									S																																									
MXTB1									S																																									
MXTB2									SF																																									
NTI (50)									SF																																									
NTAB (500)					F				SF	F																																								
TAB (2000)										S																	F																							
TEMPV1																																																		
T11 (3)																						C					C								C															
R11 (3)																						S					F								S															
R21 (3)																											FA								S															
CRESI																											FA								S															
JSTOP (4,2,21)																						S					F																							
TITLES																						S																												
DATE (3)			C					C			C														C				C							C	C	C					C							
COMENT (40)																									F					SF																			SF	
VPSTTL (20)								SF																	F					SF																				
BDYTTL (5)											F														F					F													SF							
BLTTTL (5,8)											F														F					F													SF							
PLTTL (5,20)											F														F					F																				
BAGTTL (5,6)			SF					SF			F														F					F																			S		
SEQ (22)								SF																						F																				
JOINT (21)								SF																						F																				
COS (22)								SF																						F																				
JS (21)								SF																						F																				
VPOSTN	C		C	C			C																					C		C	C	C				C	C	C									C	C	C	
TIME	F			F			F																					F								F	F										F	SF		
X0 (3)			F																																	F	F										F	SF		
XDOTO (3)			F																																	F	F										SF	SFA		
XCOMP (3)				F																																SF	SF											SF		
XVCOMP (3)				F																																												SF		
RX (3)																																															F	SF		
RANGLE (3)																																															F	SF		
VMPH																																															F	SF		
VTIME																																															F	SF		
RTAB (15,100)																																															F	SF		
RIO																																															F	SF		
RBI																																																		
OMEGA																																																		
WATAB																																																		
WRCLR																																																		
DYEV (3,2			FA	FA																																														
VMEG (3)			FA	FA																																														
VMEGD (3)																																																		
XACOMP (3)																																																		
THET (3)																																																		
ZPLT (3)																																																		

FIGURE 13.8

ZQ-5180-L-1

CROSS REFERENCE OF VARIABLES IN LABELED COMMON - PART 5

NOMENCLATURE
A - SUB ARGUMENT
F - FETCHED
S - STORED
C - COMMON USED

		HIARCHO	AIARCI	AIARCO3	BELTG	BELTRT	BCG	BINPUT	CHAIN	CINPUT	CONTCT	DAUX	DAUX11	DAUX12	DAUX22	DAUX31	DAUX32	DAUX33	DAUX44	DAUX55	DHHPIN	DINT	EPEFFX	EXCITAT	FLXSEC	FSMSOL	HEDING	IMPLS2	IMPULS	INITIAL	INTERS	MAIN3D	OUTPUT	PANEL	PDBRK	PLILF	PLSECS	PRINT	PRTBLT	RSTART	SECAUTH	SECSEC	SETUP1	SETUP2	SINPUT	SFDAMP	UPDATE	UPDFBC	VEHPOS	VINPUT	VISCOR
NJONES		C	C	C																																																
FORCE	(3,5)	SF		SF																																																
TORR	(3,5)	SF		SF																																				C													
XBM	(5)		SF	F																																																
ZDEP	(3,5)		SF	F																																																
VBREG	(5)		SF	F																																																
VSCS	(5)	FQ	SF																																																	
BPHI	(3,5)		S	F																																																
DBR	(3,3,5)		SFA	FA																																																
DPVCTR	(3,5)		S	F																																																
DEPLOY	(3,5)		SFA	F																																																
AB	(3,5)		SF	F																																																
SPRK	(5)		SF	F																																																
CYTO	(5)	F	SF	F																																																
CYPA	(5)	F	SF	F																																																
CYSP	(5)		SF																																																	
CYTO	(5)		SF	F																																																
CYVO	(5)		SF	F																																																
CYCD	(5)		SF																																																	
CYK	(5)	F	SF	F																																																
CYR	(5)		SF																																																	
CYRT	(5)		SF																																																	
CYPV	(5)		SF																																																	
CYCDO	(5)		SF																																																	
CYRO	(5)		SF																																																	
CYPO	(5)		SF	F																																																
CYSS	(5)		SF																																																	
CYLO	(5)		SF																																																	
CYC	(5)		SF	F																																																
CYRMOD	(5)		SF	F																																																
CYWMAX	(5)		SF	F																																																
CYORFC	(5)		SF	F																																																
CYRMO	(5)			SF																																																
CYT	(5)			SF																																																
CYP	(5)			SF																																																
CYMIN	(5)			SF																																																
CYMOUT	(5)			SF																																																
BRCPV	(5)	F		SF																																																
PD	(5)	SF		SF																																																
VBRG	(5)	F		SF																																																
VOLBP	(5)	SF		F																																																
SWITCH	(5)			SF																																																
IFULL	(6)	F	S	SF																																																
IMP	(18)		SFA	SFA																																																
IMPI	(3)			SFA																																																
A	(3,3)	SFA																																																		
PF	(3)																																																			
TORQ	(3)	SFA																																																		
TQB	(3,10)	SFA																																																		
FRB	(3,10)	SFA																																																		
VOL	(10)	SFA																																																		
DELF	(3)			SFA																																																	
B	(9,4,5)	FA	SF																																																	
ZB	(3,4,5)	FQ		SFA																																																
ZR	(3,4,5)		SF																																																	
BFB	(9,4,5)	FA	SF	F																																																
BRA	(9,4,5)		SFQ	FQ																																																
NR	(9,4,5)	FQ		SFA																																																
PTGV	(3,4,5)	FA		FA																																																
PMCO	(3,4,5)	FA		S A																																																
VOLP	(4,5)	SFA		F																																																
FRA	(3,4)	SFA																																																		
PREVT			S	SF																																																
CK	(5)		SF	F																																																
CMASS	(5)		SF	F																																																

FIGURE 13.9

SECTION 14

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