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Structural Damage Prediction and Analysis for Hypervelocity Impact

BUMPERII Suggestion and Problem Reports

Prepared for:
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LOCKHEED MARTIN

MAF/MMA 31-100 (3/95)
The SD_SURF computer programs and user's guide were prepared under contract NAS8-38856 from NASA Marshall Space Flight Center (MSFC). In the course of preparing the SD_SURF space debris analysis code, several problems and possibilities for improvement of the BUMPERII code were documented and sent to MSFC. These suggestions and problem reports are included here as part of the contract final report.

The study contract (NAS8-38856) title was "Structural Damage Prediction and Analysis for Hypervelocity Impacts." The Technical Monitors were Joel Williamsen, Greg Olsen, and Jennifer Robinson. The code and user's manual were created between October, 1990 and September, 1992.
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Date: January 28, 1992

Subject: Reducing BUMPERII Memory Requirements
  • Error in Dimensioning IDG
  • RESPONSE Array Size

This describes two changes to BUMPERII version 1.2.a which should significantly reduce the memory requirements.

Error in Dimensioning IDG
The variable IDG is dimensioned improperly in the DATA subroutine in GEOMETRY. (IDG is the working array which contains grid point locations in global coordinates.) It is INTEGER*4 IDG(IELM) but it should be INTEGER*4 IDG(IELM*4) to allow for four nodes per element. IELM, in COMMON1.BLK, is a parameter for the number of elements to be processed. This would be consistent with the dimensioning of the grid point locations, DIMENSION GRID(3,IELM*4), in the preceding line in BUMPERII. (It also may be appropriate to define GRID as REAL*4 for some compilers.) When IDG was improperly dimensioned, garbage was being written into other variables if the number of elements in the Supertab file was more than one fourth of IELM.

BUMPERII internal checks found no node data for some elements. It is not known whether there could be any cases the error would not be detected.

RESPONSE Array Size
The RESPONSE array was dimensioned as (70,90,100) in COMMON2.BLK and COMMON4.BLK. The 70 is for the number of velocities and is appropriate for the RESPONSE output. The 100 is the number of shield PIDs being processed. It may need to be 100 for CONTOUR, but any number greater than or equal to the PIDs in the Supertab file will suffice. The only issue is whether the 90 is necessary to cover the obliquities. I believe that the RESPONSE subroutine only creates arrays in 5 degree increments which requires a dimension of 19 rather than 90. This will significantly reduce BUMPERII memory requirements.

These changes allow BUMPERII version 1.2.a to run realistic space debris problems on a Macintosh using 4 Meg of RAM using LANGUAGE SYSTEMS FORTRAN version 2.1. (Changes to If-Then loops were also included as previously described.) (This was without dynamic memory allocation due to problems encountered in execution. LS FORTRAN Version 3 may be able to further reduce this size with dynamic memory allocation.) With proper dimensioning IELM need only be larger than the number of elements in the Supertab file. MB17-ALL.UNI with 2100 elements was processed on the Macintosh with IELM set at 2500 rather than 15000 as distributed. The Macintosh version was set for 35 PIDs to cover MB17-ALL.UNI. The number of threats strongly influences the total memory requirements. To run the above conditions the space debris default of 45 was set as the maximum number of threats. To run a meteoroid analysis on a Macintosh, drastic changes are still needed (such as dynamic memory allocation or virtual memory).

[Signature]
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Program Manager
Hypervelocity Impacts Study

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Recommended Changes to BUMPERII Read/Write

Revise READ and WRITE Statements for arrays in binary files in BUMPER, GEOM

- READ or WRITE in a DO-LOOP writes out control information for each record

- READ or WRITE of an array writes out control information once
  - For example READ ((GEOMETRY(I,J),I=1,EXPOSED(IT))J=1,IT)

- Example of a test GEOREAD subprogram on TUBES

<table>
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<tr>
<th>DO-LOOP</th>
<th>Array</th>
<th>Savings</th>
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<tr>
<td>file size on VAX</td>
<td>95 blocks</td>
<td>58 blocks</td>
</tr>
<tr>
<td>CPU time to Read</td>
<td>4.58 sec</td>
<td>1.45 sec</td>
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- Similar file size savings are available with RESPONSE files
  - File sizes are not as large and therefore not as critical

- A flag could be used to make BUMPERII "downward" compatible
  - For example the 1 or 2 for debris/meteoroid analysis could be written out 3 or 4
to set a flag that the new read and writes are used
Compile Problems with BUMPERII version 1.2a  1/16/92

The following sections show the changes made to BUMPERII Version 1.2.a to allow it to compile and run using LANGUAGE SYSTEMS FORTRAN for the Macintosh.

The array size in the common blocks was reduced to ensure compatibility with Macintosh memory limitations. A parameter was introduced in the COMMON4.BLK so that the number of shields would not have to be reentered each time. The entire Common4.blk is attached at the end. It should be noted that the memory manager got confused in RESPONSE when the "-dyn" switch was used for dynamic memory allocation.

The original compile instruction and errors are reported first. The changes to the code to fix these errors is then given. "!!!!" is used to highlight the specific lines or sections which were changed. The only problem was that Language Systems FORTRAN does not support jumping into a DO loop, or IF...THEN...ELSE block. Relatively minor changes to the code could avoid this problem in the future if compatibility with Language Systems FORTRAN is desired.

The use of a Line Feed in the output is not needed on the Macintosh and the character was replaced with a space. (Exact change is shown at end.)

Finally, the LIBSDATE TIME call on the VAX is different than the Macintosh. This cannot be changed but it is only a minor nuisance.

This is the compile command. The first three switches maximize VAX compatibility. The last switch allows the program to run in the background under MULTIFINDER.

RUNBIGMACII MacBumperIIv12a -ansi -saveall -u -bkg=2

This is the original diagnostics. The corrections will follow.

90     READ ( 2,20 )DLINE

Delta

### FORTRAN - A GOTO or IF is Attempting to jump into a DO loop, IF...THEN...ELSE or a SELECT CASE block
File "MacBumperIIv12a.f"; Line 3944

#-----------------------------

200    CONTINUE

Delta

### FORTRAN - A GOTO or IF is Attempting to jump into a DO loop, IF...THEN...ELSE or a SELECT CASE block
File "MacBumperIIv12a.f"; Line 4360

#-----------------------------

600    IF (IBOTH.EQ.2) PENTABFILE=SPENTFILE(IC)
Delta

### FORTRAN - A GOTO or IF is Attempting to jump into a DO loop, IF...THEN...ELSE or a SELECT CASE block
File "MacBumperIIv12a.f"; Line 5054

#-----------------------------

### MPW Shell - Execution of RUNBIGMACII7000 terminated.
THE FOLLOWING SECTIONS SHOW THE CHANGES MADE TO BUMPERII VERSION 1.2.A TO ALLOW IT TO COMPILe USING LANGUAGE SYSTEMS FORTRAN FOR THE MACINTOSH.

File "MacBumperIIvl2a.f"; Line 3944
C
C      READ ( 2,20 )DLINE
C     !!! THE ABOVE WAS COMMENTED OUT AND REPEATED WITHOUT THE 90
C     !!! THIS SECTION IS THE REPEATED BELOW (OUT OF IF-BLOCK) WITH THE 90
C       READ ( 2,20 )DLINE
C         READ ( DLINE(1:6),30,ERR=90,END=100 )IVAL
C         IF ( IVAL.NE.-1 ) GO TO 90
C         GO TO 10
C
C       END IF
C
C     END IF
C
C     !!! MAC VERSION: THIS SECTION IS REPEATED FROM ABOVE WITH THE 90
C     90     READ ( 2,20 )DLINE
C     READ ( DLINE(1:6),30,ERR=90,END=100 )IVAL
C     IF ( IVAL.NE.-1 ) GO TO 90
C     GO TO 10

File "MacBumperIIvl2a.f"; Line 4360
CALL INPUT_R (CTYPE,IC,ITYPE,MLI,PFUNC,PFuncl,IMat,
1  SHTHK,STAND,VWTHK,BHARD,C,DENS,FSU,FTU,FY,SHPV,WILKC,
2  SMATRL,METRIC,SCType,SavTk,SMLI,ShDen,VWDen,Idens,
3  INTERP_DIAM,THICK,ANGLE,ADEN,ADAR,MODWILK,IBOTHr,
4  WILKMULT,SMODWILK,SWILKMULT,SPUNC,SIMAT,SPENTFILE,
5  FID,LASTPID)
C
C     !!! THE FOLLOWING LINE WAS CHANGED FROM 200 TO 201 AND 201 IS
C     ADDED LATER FOR MAC COMPATIBILITY
C     IF(IBATCOM.EQ.1) GOTO 201
C
C     IF (IBOTHr.EQ.2.AND.IC.EQ.1) THEN
...
...
...
     ENDIF
C
C     Convert the diameter to cm
C     DIAM = DIA * 2.54
C
C     Store the diameter in RTABLE
C     RTABLE(J,I,IC)=DIAM

100     CONTINUE
200     CONTINUE
C     !!! THE FOLLOWING LINE WAS ADDED FOR MAC COMPATIBILITY
201     CONTINUE
C
C     SKIP IF SECOND PASS DURING A COMBINED RUN
C THE FOLLOWING SECTION WAS DONE BY BJORKMAN & CO. (WP-01).
C
IF (PFUNC.NE.5) GO TO 145
GOTO 143
144 WRITE (6,151)
151 FORMAT (/,' UNABLE TO OPEN PENETRATION FILE')
143 PENTABOLD=PENTABFILE.''
IF (INDEX(PENTABOLD,'').LT.2) PENTABFILE='PEN.TAB'
JOT = INDEX ( PENTABFILE, ' ' ) JOT+3
FORM='/I1X,' 'PENETRATION TABLE FILENAME <CR=',A'//LENGTH//',',') > ',S'
PENTABOLD=PENTABFILE
149 WRITE (6,FORM) PENTABFILE
READ ( 5,'(A)',ERR=143 ) ANSWER
IF (ANSWER(I:1).EQ.'?') THEN
CALL DIRLIST
GOTO 149
END IF
IF ( ANSWER(I:4).EQ. ) THEN
PENTABFILE=PENTABOLD
ELSE
READ ( ANSWER(I:80),' (BN, A) ',ERR=I43 ) PENTABFILE
END IF
C !!!! 600 WAS DELETED FROM THE FOLLOWING LINE AND THE ENTIRE SECTION
C IS REPEATED OUTSIDE OF THE IF BLOCK FOR MACINTOSH COMPATABILITY
IF (IBOTHR.EQ.2) PENTABFILE=SPENTFILE(IC)
Open (Unit=20, file=pentabfile, status=' old', ERR=I44)
IF (IBATCOM.EQ.1.AND.IBOTH.NE.2) THEN
WRITE (13, '(A)') PENTABFILE
GOTO 146
END IF
C ANGLE INDICE
Do 146 I=1,3
C PLATE THICKNESS INDICE IN INCHES.
Do 147 J=1,4
Read (20,*) Thick(J),Angle(I)
C VELOCITY INDICE IN INCHES
Do 148 K=1,7
Read (20,*) Interp_Diam(K,J,I)
148 CONTINUE
147 CONTINUE
146 CONTINUE
REWIND 20
Close (Unit=20)
145 CONTINUE
C THE ABOVE SECTION WAS DONE BY BJORKMAN & CO. (WP-01).
C
IF (IBOTH.R.EQ.2) GOTO 425
C
Determine the shield material.
C
WRITE ( 6,160 )
160 FORMAT (/I1X,'SHIELD MATERIAL ')
C
Write out the material list.
DO 180 I=1,ML

WRITE ( 6,170 )I,MATERIAL(I)
170  FORMAT ( 3X, I2,'- ',A )

CONTINUE

For the initial case, set the material default number equal to one. For all other cases use the previous shield material number as the default. If an error is detected on the read, repeat the process.

IF ( IC .EQ. 1 ) THEN
  WRITE ( 6,220 )
  READ ( 5,'(A)') ANSWER
  IF ( ANSWER(1:4).EQ.' ') ANSWER='1'
  READ(ANSWER(1:4),200,ERR=190)MATIN
200  FORMAT (BN, I4)
ELSE
  IF (MATIN.EQ.0) MATIN=I
  WRITE ( 6,230 ) MATIN
  READ ( 5,'(A)') ANSWER
  IF (ANSWER(I:4).NE.' ') THEN
    READ(ANSWER(I:4),200,ERR=210)MATIN
  END IF
ENDIF

MAT(1)=MATIN
220  FORMAT (IX,'SELECT MATERIAL NUMBER (<CR>=I) > ',$)
230  FORMAT (IX,'SELECT MATERIAL NUMBER (<CR>=I2) > ',$)

Check that the value read in is contained in the list.

IF (MAT(1).LT.I.OR.MAT(1).GT. ML ) GO TO 150
IF(IBATCOM.EQ.I) WRITE(13,'(Ii)') MAT(1)
SMATRL(IC, I)=MATERIAL( MAT(1) )

Determine the shield thickness. For the initial case there is no default, for all other cases use the previous value as the default.

IF ( IC.EQ.1.OR.SHTHK.LT.0. ) THEN
  WRITE ( 6,270 )LUNITS
  READ ( 5,* ,ERR=240 ) SHTHKIN
ELSE
  WRITE ( 6,280 ) SHTHKIN,LUNITS
  READ ( 5,'(A)' ) ANSWER
  IF ( ANSWER(1:4).NE.' ') THEN
    READ(ANSWER(1:4),260,ERR=250)SHTHKIN
  END IF
ENDIF

IF (IBATCOM.EQ.I) WRITE (13,*) SHTHKIN

END IF

Determine the vessel wall material. Use the same technique as used
to determine the shield material.

290 IF (CTYPE.EQ.1.AND.IMAT.NE.1) GOTO 339
    WRITE ( 6,300 )
300 FORMAT (/IX,'VESSEL WALL MATERIAL' )
    IF ( CTYPE.EQ.1 ) MAT(1) = 1
    DO 310 I=1,ML
        WRITE ( 6,170 )I,MATERIAl(I)
    310 CONTINUE

    IF ( IC.EQ.1 ) THEN
        WRITE ( 6,220 )
        READ ( 5,'(A)' ) ANSWER
        IF ( ANSWER(I:4) .EQ. ' ') ANSWER='1'
        READ ( ANSWER(1:4),200,ERR=320 ) MAT(2)
    ELSE
        WRITE ( 6,230 ) MAT(2)
        READ ( 5,'(A)' ) ANSWER
        IF ( ANSWER(I:4) .NE.' ') THEN
            READ ( ANSWER(I:4),200,ERR=330 )MAT(2)
        END IF
    END IF

    IF (MAT(2).LT.1 .OR. MAT(2).GT.ML ) GO TO 290
    IF(IBATCOM.EQ.1) WRITE(13,'(Ii) ') MAT(2)
    SMATRL(IC,2) = MATERIAL ( MAT(2) )

Determine the vessel wall thickness.

339 IF ( IC .EQ. 1 ) THEN
340 WRITE ( 6,360 )LUNITS
    READ ( 5,* ,ERR=340 ) VWTHKIN
    ELSE
350 WRITE ( 6,370 ) VWTHKIN,LUNITS
    READ ( 5,'(A)' ) ANSWER
    IF ( ANSWER(1:12) .NE.' ') THEN
        READ ( ANSWER(1:12),260,ERR=350 ) VWTHKIN
    END IF
END IF

360 FORMAT (/IX,'VESSEL WALL THICKNESS (',A,') = ',F10.5,' (',A,') > ',$)
370 FORMAT (/IX,'VESSEL WALL THICKNESS <CR> = ',F10.5,' (',A,') > ',$)
    IF(IBATCOM.EQ.1) WRITE(13,* ) VWTHKIN

Determine the shield stand-off distance.

380 IF ( IC.EQ.1 ) THEN
    IF (CTYPE.EQ.3) THEN
        WRITE ( 6,371 )LUNITS
    ELSE
        WRITE ( 6,400 )LUNITS
    END IF
    READ ( 5,* ,ERR=380 ) STANDIN
    ELSE

5

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390 IF (CTYPE.EQ.3) THEN
    WRITE (6,381) STANDIN,LUNITS
ELSE
    WRITE (6,410)STANDIN,LUNITS
END IF
READ (5,'(A)') ANSWER
IF (ANSWER(1:4).NE.' ') THEN
    READ (ANSWER(1:12),260,ERR=390) STANDIN
END IF
END IF

371 FORMAT (/IX,'TOTAL BUMPER SPACING ('A,') = > ',$,)
400 FORMAT (/IX,'SHIELD STAND-OFF ('A,') = > ',$,)
381 FORMAT (/IX,'TOTAL BUMPER SPACING <CR> = ',
    F10.5,'(',A,') > ',$,)
410 IF(IBATCOM.EQ.1) WRITE(13,'*') STANDIN
C
C Determine if MLI is to be included, but not for the pen4 penetration
C function
C
IF ( PFUNC.EQ.1.OR.PFUNC.EQ.3.OR.PFUNC.EQ.4 ) THEN

420 FORMAT (/IX,'INCLUDE 30 LAYERS OF MLI AGAINST VESSEL WALL',
    '<CR>=(YES) > ',$)
READ (5,'(A)') ANSWER
IF (ANSWER(1:4).EQ.' ') ANSWER='Y'
IF (IBATCOM.EQ.1) THEN
    WRITE(13,'(A)') ANSWER
RETURN
END IF
IF (ANSWER(1:1).EQ.'Y' .OR. ANSWER(1:1).EQ.'y' ) THEN
    MLI=.TRUE.
ELSE
    MLI=.FALSE.
END IF
END IF
END IF
END IF

C
C !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
C THE FOLLOWING SECTIONS WERE EXTRACTED FROM ABOVE IF-BLOCK
C FOR MAC COMPATIBILITY. - N.ELFER
C
GOTO 425

644 WRITE(6,651)
651 FORMAT ('/,' UNABLE TO OPEN PENETRATION FILE')
643 PENTABOLD=PENTABFILE//''
IF (INDEX(PENTABOLD,'.') .LT.2) PENTABFILE='PEN.TAB'
JOT = INDEX(' PENTABFILE,'')
WRITE (LENGTH,'(I2)') JOT+3
FORM='('/IX,'PENETRATION TABLE FILENAME <CR='',A//'LENGTH//' 
    ',') > ',$)'
PENTABOLD=PENTABFILE
WRITE(6,FORM) PENTABFILE
READ (5,'(A)',ERR=643) ANSWER
IF (ANSWER(1:1).EQ.'?') THEN
CALL DIRLIST
GOTO 649
END IF
IF ( ANSWER(1:1).EQ. ' ' ) THEN
  PENTABFILE=PENTABOLD
ELSE
  READ ( ANSWER(1:80), '(BN,A)', ERR=643 ) PENTABFILE
END IF
IF (IBOTHR.EQ.2) PENTABFILE=SPENTFILE(IC)
Open (Unit=20, file=pentabfile, status='old', ERR=644)
IF (IBATCOM.EQ.1 .AND. IBOTHR.NE.2) THEN
  WRITE(13, '(A)') PENTABFILE
GOTO 646
END IF
C ANGLE INDICE
Do 646 I=1,3
C PLATE THICKNESS INDICE IN INCHES.
Do 647 J=1,4
  Read (20,*), Thick(J),Angle(I)
C VELOCITY INDICE IN INCHES
Do 648 K=1,7
  Read (20,*), Interp_Diam(K,J,I)
  CONTINUE
647 CONTINUE
646 CONTINUE
REWIND 20
Close (Unit=20)
645 CONTINUE
C
C THE ABOVE SECTION WAS DONE BY BJORKMAN & CO. (WP-01).
C
C THE ABOVE SECTION WAS REPEATED FOR MAC COMPATIBILITY
C IXX WAS CHANGED TO 6XX (600 STAYED THE SAME) - N.ELFERN
C !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

TO AVOID A NON-PRINTING CHARACTER IN THE MAC OUTPUT THE FOLLOWING CHANGE WAS MADE:
C
C DS=CHAR(10)
C !!!!! DS WAS CHANGED FROM CHAR(10)=LF TO (32)=SPACE
DS=CHAR(32)

DUE TO DIFFERENCES IN THE LIBRARY CALL THE FOLLOWING CHANGES WERE MADE AS NEEDED (3 PLACES):
C
C CALL LIB$DATE_TIME(BUMDTTM)
C !!!!! DATE ONLY RECORDED FOR MAC VERSION
C CALL DATE(BUMDTTM)
  or
C CALL TIME(BUMDTTM)

THIS IS THE REVISED COMMON4.BLK TO SET THE SIZE OF THE THREAT ARRAYS:

C
C Common Block for Response in BUMPERII
C
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icase = maximum number of shield cases

INTEGER ICASE
PARAMETER (ICASE=3)

CHARACTER OFILE1, OFILE2, MATFILE
CHARACTER ANSWER
CHARACTER UNITS, SMATRL(ICASE, 2)
REAL RTABLE(70,90,ICASE), WILKMULT

C WAS 50 - MAC

REAL SAVTK(ICASE,3), SHDEN(ICASE), VWDEN(ICASE)
REAL BHARD(3), C(3), DENS(3), FSU(3), FTU(3), FY(3), SHPV(3),
1 MILKC(3), ANGLE(3), INTERP_DIAM(7,4,3),
2 ADAR(ICASE)

INTEGER CTYPES, IC, ITYPE, NANG, NVEL, PFUNC, PFUNCI, SCTYPE(ICASE),
1 IDENS, IBATCOM, ITYPEIN, MODWILK, IBOOTH

LOGICAL INITIAL, METRIC, MLI, SMLI(ICASE)

C Common Block for PEN_4 Subroutine of BUMPERII

CHARACTER SHAPE*3
LOGICAL PENNON, SHATER
INTEGER MAXK(10), PRMAT, PRMATI, TARMAT(10), TMATSP(10), PLATE,
1 BIN, NBIN, I
REAL RF(10), RC(10), NF, J, MR, MPROJ, LASTSP, LRM, FMASS(10),
1 DIAM, VI, VR, VILRM, EPSIL, GAMMA, VI1, PI, THETA, SUMSP,
1 A, B, D, R, X, Y, TOVERD, RH, PLATEM, FTHETA, ALIMAS, VC, DELJ, DELJ2,
1 P, EFFP, PGRADY, THETA1, AVGMAS, RP, F1, VI, THICK(10), SPACE(9),
1 THICK1(10), PDENSE(3), PSSTDV(3), PRTUFF(3),
1 VIX, MRMAX, MPROJX, DENSE(10)
DOUBLE PRECISION INTACT, HOAREA, SUMPR(10), NR, PCR, LAMBDA, SIGSQ,
1 SIGMA, AS, AC, THETAR

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To: Greg Olsen NASA-MSFC ED52  
    Scott Hill NASA-MSFC ED52  

Date: May 19, 1992  

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Subject: BUMPERII compatability problems with Language Systems FORTRAN

A problem was discovered using the REGRESSION option of RESPONSE on the Macintosh. The problem did not occur on the VAX. It occurred because of inconsistent variable data types when calling a subroutine.

The subroutine SETBIN called the subroutine BINOMI:

```fortran
CALL Binomi(k,N1,Pk,P1)
```

The variable "k" was INTEGER*2 in SETBIN. The others were REAL*8.

The BINOMI subroutine received kl as REAL*8. The original line was:

```fortran
SUBROUTINE Binomi(kl,NrBIN, Pk, PcrBIN)
```

where "kl" was declared as REAL*8 in the subroutine. (All of the variables were REAL*8 in the subroutine.) However, on the Macintosh, using Language Systems FORTRAN, this lack of agreement left "kl" with a value of 3.1...E-310. While this was effectively zero, BINOMI was very sensitive to the differences and produced erroneous results.

A work around was devised:

The subroutine was changed to introduce an integer*2 dummy variable. The dummy variable could then be properly transformed to a REAL*8:

```fortran
SUBROUTINE Binomi(kintbin,NrBIN,Pk,PcrBIN)

integer*2 kintbin

kl=kintbin*1.0D0
```

This works and will be incorporated in the Macintosh version. Other potential changes in the BINOMI subroutine include:

- Deleting LAMBDA1 since it is not used.
- Defining LOWER1 and KB as INTEGER*2 instead of REAL*8
- Deleting LAMBDA in COMMON.BLK since it is not used. (It was left over from version 1.2)
- The following line seems to be in error:

```fortran
3060 IF (Top.GE.NrBIN.OR.Pk.GE.1E23) GOTO 3050
```

Pk is a probability and should never exceed 1.0. The comparison to 1E23 seems to be incorrect. Perhaps 1E-3? All in all it seems irrelevant to the cases encountered under the REGRESSION subroutine.
To determine if this problem exists in other subroutines, the FORTRAN-lint program was run. It identified one other location where different variable types were used in calling and running a subroutine. This will also have to be fixed for the Language Systems FORTRAN compiled code to operate correctly. The entire LINT output is included for reference since it may be of use in cleaning up BUMPERII.

Norman Elfer 5/19/92
(504)-863-2284
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Program BUMPER
File BUMPERII.FOR
Line 1

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine BATCHCOM
File BUMPERII.FOR
Line 105

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine INPUT_B
File BUMPERII.FOR
Line 247

> READ ( IU, '(A)', ERR=255 ) DLINE
>

BUMPERII.FOR:INPUT_B line 332:
SYNTAX WARNING #46- branch into block if via label 255.

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine COMTEXT
File BUMPERII.FOR
Line 450

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine GEOMETRY
File BUMPERII.FOR
Line 478

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine ZERO_G
File BUMPERII.FOR
Line 789

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine HEADER
File BUMPERII.FOR
Line 805

> IF ( OFILE(1:3).EQ. ' ' ) OFILE=ANSWER
>

BUMPERII.FOR:HEADER line 1150:
SYNTAX FYI #105- string will be truncated (from 80 to 50 chars).

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

SYNTAX FYI #138- unused labels: 150

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Subroutine INPUT G

File BUMPERII.FOR Line 1220

> 179 READ ( ANSWER(1:80), 215, ERR=206 ) AREAMAX

Usage FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine MAKE THREAT

File BUMPERII.FOR Line 1465

Usage FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine DTHREAT SUB

File BUMPERII.FOR Line 1490

Usage FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Syntax FYI #138- unused labels: 290, 200

Subroutine NDTHREAT

File BUMPERII.FOR Line 1848

Usage FYI #127- local variables set but never referenced: H (Line 2061)

Usage FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, I1, I2, VDISTA, C1, C2, C3, C4, VBEG, VEND

Syntax FYI #138- unused labels: 290

Subroutine GAUSS

File BUMPERII.FOR Line 2141

Implicit #125- symbols were implicitly typed:

(R*4) FUN

Function PRV

File BUMPERII.FOR Line 2173

Usage Error #126- local variables referenced but never set: H (Line 2181)

Usage FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
Subroutine NMTHREAT  File BUMPERII.FOR  Line 2188
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, RESF

Subroutine NORMAL  File BUMPERII.FOR  Line 2716
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine BREAKER  File BUMPERII.FOR  Line 2823
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine JOINER  File BUMPERII.FOR  Line 2873
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine DIVIDE4  File BUMPERII.FOR  Line 2907
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine DMDE3  File BUMPERII.FOR  Line 2975
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine CENTROID  File BUMPERII.FOR  Line 3104
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine INTEKSEC  File BUMPERII.FOR  Line 3210
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine AREA SUB  File BUMPERII.FOR  Line 3338
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine WKITEAREA  File BUMPERII.FOR  Line 3454
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

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Subroutine RADIUS
File BUMPERII.FOR
Line 3490

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine BACKSIDE
File BUMPERII.FOR
Line 3575

USAGE FYI #126- local variables referenced but never set: TR (Line 3791)

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine TRANS
File BUMPERII.FOR
Line 3814

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine QSORT
File BUMPERII.FOR
Line 3915

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine SHADOW
File BUMPERII.FOR
Line 4068

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, H, CHRDUMMY

Subroutine OUTPUT
File BUMPERII.FOR
Line 4433

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine ROTATOR
File BUMPERII.FOR
Line 4497

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine DATA
File BUMPERII.FOR
Line 4561

> 90 READ ( 2,20 )DLINE
> ^
BUMPERII.FOR:DATA line 4790:
SYNTAX WARNING #53- branch to label 90 from outside block if.

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine PATOUT
File BUMPERII.FOR
Line 4907

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, VERS

Subroutine RESPONSE
File BUMPERII.FOR
Line 4992
Subroutine INPUT_R_UNITS  File BUMPERII.FOR  Line 6095  
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY

Subroutine INPUT_R_CONFIG  File BUMPERII.FOR  Line 6148  
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY

Subroutine SPINPUT_R  File BUMPERII.FOR  Line 6204  
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY

Subroutine DPINPUT_R  File BUMPERII.FOR  Line 6330  
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY

Subroutine INPUT_R_GETPENTAB  File BUMPERII.FOR  Line 6449  
> 143  PENTABOLD=PENTABFILE//' . '  
> ^  
BUMPERII.FOR:INPUT_R_GETPENTAB line 6458:  
SYNTAX FYI #105- string will be truncated (from 51 to 50 chars).

>148  CONTINUE  
>^  
BUMPERII.FOR:INPUT_R_GETPENTAB line 6507:  
SYNTAX WARNING #54- Branch to label 148 from outside do loop.

>146  CONTINUE  
>^  
BUMPERII.FOR:INPUT_R_GETPENTAB line 6509:  
SYNTAX WARNING #54- Branch to label 146 from outside do loop.

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY
SYNTAX FYI #138- unused labels:  145

Subroutine INPUT_R_WILK  File BUMPERII.FOR  Line 6522  
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY

Subroutine MWINPUT_R  File BUMPERII.FOR  Line 6630  
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY

Subroutine MWINPUT  File BUMPERII.FOR  Line 6693  
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLJ, EL, H, CHRDUMMY

*******************************************************************************

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******************************************************************************
Subroutine INPUT R VW File BUMPERII.FOR Line 6788
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
******************************************************************************

Subroutine INPUT R SHIELD File BUMPERII.FOR Line 6923
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
SYNTAX FYI #138- unused labels: 180
******************************************************************************
Subroutine INPUT R STAND File BUMPERII.FOR Line 7076
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
******************************************************************************
Subroutine INPUT R MLI File BUMPERII.FOR Line 7143
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
******************************************************************************
Subroutine INPUT R VARS File BUMPERII.FOR Line 7187
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
******************************************************************************
Subroutine SETMETRICS File BUMPERII.FOR Line 7336
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
******************************************************************************
Subroutine INPUT R OUT File BUMPERII.FOR Line 7369
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
******************************************************************************
Subroutine DOUBLE File BUMPERII.FOR Line 7590
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
USAGE WARNING #245- local variables may be referenced before set: C2 (Line 7752), DIAM2 (Line 7753), DIAM4 (Line 7780), ERFILE (Line 7766)
******************************************************************************
Subroutine BALLIST File BUMPERII.FOR Line 7851
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
USAGE WARNING #245- local variables may be referenced before set: DIA1 (Line 7994), DIA2 (Line 7994), VEL1 (Line 7994), VEL2 (Line 7994)
******************************************************************************
Subroutine MLIADJUST File BUMPERII.FOR Line 8021
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
******************************************************************************

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Subroutine CUREPAL
File BUMPERII.FOR  Line 8052
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine GLASS
File BUMPERII.FOR  Line 8147
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine TILE
File BUMPERII.FOR  Line 8210
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine SPDEVEL2
File BUMPERII.FOR  Line 8271
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine BRISTOW
File BUMPERII.FOR  Line 8283
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

USAGE WARNING #245- local variables may be referenced before set: PLP1 (Line 8401), DIAL (Line 8401)

Subroutine WILKIN
File BUMPERII.FOR  Line 8475
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine REGRESS
File BUMPERII.FOR  Line 8595
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine OPEN4
File BUMPERII.FOR  Line 8729
USAGE WARNING #127- local variables set but never referenced: SMALL (Line 8751), RECIPSQRT2PI (Line 8752)
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, NH, NR2, HNT, LSTTPK, EXPONENT, TOPCOUNT, BOTTOMCOUNT1, BOTTOMCOUNT2, SPACING, SOUNDVEL, THETDIAM, SHOCKPROJVEL, HARDNESS, EPSILON04

Subroutine FRACT
File BUMPERII.FOR  Line 8814
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine LARMR
File BUMPERII.FOR  Line 8828
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

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Subroutine MASSERR
File BUMPERII.FOR
Line 8843

USAGE ERROR #126- local variables referenced but never set: THETA (Line 8855)

USAGE FYI #128- local variables declared but unused: THOS

Subroutine PEN4
File BUMPERII.FOR
Line 8864

USAGE WARNING #127- local variables set but never referenced: DIA2 (Line 9061), VEL2 (Line 9063)

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

USAGE WARNING #245- local variables may be referenced before set: DIAL (Line 9061), VELL (Line 9063)

Subroutine NPEN4
File BUMPERII.FOR
Line 9075

Subroutine PENK
File BUMPERII.FOR
Line 9409

CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine MINII
File BUMPERII.FOR
Line 9484

USAGE FYI #128- local variables declared but unused: BINSDO

Subroutine PRS
File BUMPERII.FOR
Line 9499

USAGE WARNING #245- local variables may be referenced before set: LASTTE (Line 9520)

Subroutine SETBIN
File BUMPERII.FOR
Line 9556

CALL Binomi(k,Ni,Pk,Pl)

> BUMPERII.FOR:SETBIN line 9572:
INTERFACE ERROR #55- 1"2 actual arg passed to a R*8 dummy arg.

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine BINOMI
File BUMPERII.FOR
Line 9584

USAGE WARNING #127- local variables set but never referenced: LAMBDA BIN (Line 9590)

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

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Subroutine MASCHR File BUMPERII.FOR Line 9632
USAGE ERROR #126- local variables referenced but never set: ALFA (Line 9662)
USAGE WARNING #127- local variables set but never referenced: FRGLIM (Line 9670)
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, TD

Subroutine SHCONS File BUMPERII.FOR Line 9720
USAGE ERROR #126- local variables referenced but never set: ALPHA (Line 9724)

Subroutine SHHOLD File BUMPERII.FOR Line 9768
USAGE FYI #128- local variables declared but unused: M
USAGE FYI #124- unused dummy arguments: VI, TD, THETA1

Subroutine BINLIM File BUMPERII.FOR Line 9791
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, BININT

Subroutine COUNTR File BUMPERII.FOR Line 9841
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
USAGE WARNING #245- local variables may be referenced before set: ITARS1 (Line 9907), DIGTP1 (Line 9906), DIGTP2 (Line 9910), DIGTP3 (Line 9911), DIGTP4 (Line 9912), DIGTP5 (Line 9913)

BUMPERII.FOR:COUNTR line 9855:
INTERFACE FYI #121- common block /COUNT/ member names differ (compared to initial use in routine PENK).

Subroutine RESVEL File BUMPERII.FOR Line 9978
USAGE FYI #128- local variables declared but unused: VOCM

Subroutine INTERP File BUMPERII.FOR Line 10037
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine INTERPOLATE File BUMPERII.FOR Line 10071
USAGE WARNING #245- local variables may be referenced before set: NSAV (Line 10106)

Function HS3TBL File BUMPERII.FOR Line 10113
USAGE FYI #128- local variables declared but unused: HSMCON, SUBNAM
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*******************************************************************************
Subroutine RICHARDSON File BUMPERII.FOR Line 10317
USAGE WARNING #127- local variables set but never referenced: E1 (Line 10343)
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, RHP
*******************************************************************************
Subroutine DEVELOPMENTAL7 File BUMPERII.FOR Line 10485
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL8 File BUMPERII.FOR Line 10546
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL9 File BUMPERII.FOR Line 10609
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL10 File BUMPERII.FOR Line 10672
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL11 File BUMPERII.FOR Line 10735
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL12 File BUMPERII.FOR Line 10798
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL13 File BUMPERII.FOR Line 10861
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL14 File BUMPERII.FOR Line 10924
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL15 File BUMPERII.FOR Line 10987
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Subroutine DEVELOPMENTAL16 File BUMPERII.FOR Line 11050
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

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Subroutine MULTISHOCK  File BUMPERII.FOR  Line 11113

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

USAGE WARNING #245- local variables may be referenced before set: ERFILE (Line 11177)

Subroutine MESH  File BUMPERII.FOR  Line 11273

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, TSOD

USAGE WARNING #245- local variables may be referenced before set: ERFILE (Line 11341)

Subroutine HYBRID_MS  File BUMPERII.FOR  Line 11427

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine MWDEVELOPMENTAL1  File BUMPERII.FOR  Line 11530

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine MWDEVELOPMENTAL2  File BUMPERII.FOR  Line 11542

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine MWDEVELOPMENTAL3  File BUMPERII.FOR  Line 11555

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine SINGLE  File BUMPERII.FOR  Line 11567

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine SPDEVEL1  File BUMPERII.FOR  Line 11639

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine NONOPTIMUM  File BUMPERII.FOR  Line 11651

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

USAGE WARNING #245- local variables may be referenced before set: ERFILE (Line 11721)

Subroutine NEWNONOPTIMUM  File BUMPERII.FOR  Line 11808

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

USAGE WARNING #245- local variables may be referenced before set: ERFILE (Line 11883)
Subroutine SHIELD  File BUMPERII.FOR  Line 11969

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
SYNTAX FYI #138- unused labels: 314

Subroutine ZERO_S  File BUMPERII.FOR  Line 12327

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine SETDIAMS  File BUMPERII.FOR  Line 12342

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine LASTOUT  File BUMPERII.FOR  Line 12369

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H

Subroutine HEADER_S  File BUMPERII.FOR  Line 12557

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine INPUT  File BUMPERII.FOR  Line 12745

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, ITF

SYNTAX FYI #138- unused labels: 365

Subroutine GEOREAD  File BUMPERII.FOR  Line 13147

> GFILE=ANSWER
> BUMPERII.FOR:GEOREAD line 13203:
SYNTAX FYI #105- string will be truncated (from 80 to 50 chars).

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, ITF

SYNTAX FYI #138- unused labels: 56

Subroutine RESREAD  File BUMPERII.FOR  Line 13413

> RFILE=ANSWER
> BUMPERII.FOR:RESREAD line 13468:
SYNTAX FYI #105- string will be truncated (from 80 to 50 chars).

USAGE WARNING #127- local variables set but never referenced: C8A (Line 13639), C8B (Line 13639), D2 (Line 13653)

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
Subroutine CRITDIA File BUMPERII.FOR Line 13784
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H

Subroutine FLUX File BUMPERII.FOR Line 13947
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine FLUX20001 File BUMPERII.FOR Line 13970
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine FLUX791 File BUMPERII.FOR Line 14065
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Function DEBFLUX File BUMPERII.FOR Line 14125
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, PDF

Subroutine SOLKEAD File BUMPERII.FOR Line 14262
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, LUXMON, LUXYR

Subroutine FILL File BUMPERII.FOR Line 14355
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine FORMATOUT File BUMPERII.FOR Line 14425
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
SYNTAX FYI #138- unused labels: 60

Subroutine SUPER File BUMPERII.FOR Line 14653
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
SYNTAX FYI #138- unused labels: 70

Subroutine PATRES File BUMPERII.FOR Line 14804
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, IFL
Subroutine CONTOUR File BUMPERII.FOR Line 14878

USAGE WARNING #127- local variables set but never referenced: CHRDUMMY (Line 15255)

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, PNPS

SYNTAX FYI #138- unused labels: 320

Subroutine OPENCTR File BUMPERII.FOR Line 15274

BUMPERII.FOR:OPENCTR line 15300:
SYNTAX FYI #105- string will be truncated (from 80 to 50 chars).

BUMPERII.FOR:OPENCTR line 15301:
SYNTAX FYI #105- string will be truncated (from 80 to 50 chars).

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY, LLENGTH

Subroutine ZERO_C File BUMPERII.FOR Line 15332

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

Subroutine CINPUT File BUMPERII.FOR Line 15349

SYNTAX FYI #138- unused labels: 65

Subroutine ALTITUDE File BUMPERII.FOR Line 15916

BUMPERII.FOR:ALTITUDE line 16006:
SYNTAX WARNING #46- branch into block if via label 172.

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY

SYNTAX FYI #138- unused labels: 151

Subroutine CINPUT_RANGE File BUMPERII.FOR Line 16038

USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
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*******************************************************************************
Subroutine INPUT_C_SHIELD File BUMPERII.FOR Line 16121
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

> 360 IF ( IBATCOM.NE.3 ) WRITE ( OU, 370 ) LUNITD
BUMPERII.FOR: INPUT_C_MW line 16368:
SYNTAX WARNING #53- Branch to label 360 from outside block if.

*******************************************************************************
Subroutine INPUT_C_MW File BUMPERII.FOR Line 16296
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

*******************************************************************************
Subroutine INPUT_C_VW File BUMPERII.FOR Line 16545
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

*******************************************************************************
Subroutine CRESOUT File BUMPERII.FOR Line 16712
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

*******************************************************************************
Subroutine CRESPONSE File BUMPERII.FOR Line 16859
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

*******************************************************************************
Subroutine LASTOUT_C File BUMPERII.FOR Line 17163
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
SYNTAX FYI #138- unused labels: 314
*******************************************************************************
Subroutine DP_C_OUT File BUMPERII.FOR Line 17225
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

*******************************************************************************
Subroutine SP_C_OUT File BUMPERII.FOR Line 17287
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

*******************************************************************************
Subroutine MW_C_OUT1 File BUMPERII.FOR Line 17347
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************

*******************************************************************************
Subroutine MW_C_OUT2 File BUMPERII.FOR Line 17418
USAGE FYI #128- local variables declared but unused: WORKSPACE, TCA, CHECKWKSP, DLU, EL, H, CHRDUMMY
*******************************************************************************
Global checking:

INTERFACE FYI #131- unused functions: PRV

INTERFACE FYI #132- unused subroutines: DEVELOPMENTAL7

USAGE ERROR #133- common block members referenced but not set: /ALL1/SHAPE


ERROR IN FUNCTION PRV IN BUMPERII version 1.3 8/26/92

To determine the space debris probability distribution for various velocities, the subroutine GAUSS calls an EXTERNAL function PRV using function FUN. The calling line is:

\[ SS = SS + W(JLOC) \cdot (FUN(XM+DX) + FUN(XM-DX)) \]

BUMPERII version 1.2a used a REAL FUNCTION PRV(VR) where VR was a local dummy variable. However, BUMPERII version 1.3 has no local dummy variable (“REAL FUNCTION PRV”). VR used in the equation is a global variable that is defined elsewhere. The variables in the calling subroutine are not passed to PRV and the equation is evaluated twice at the same velocity. To correct this problem a dummy variable VV was used: REAL FUNCTION PRV(VV) (REAL*4 VV) and VV was substituted for VR in PRV. The effect on SS (unnormalized) is negligible (<1% typically), as shown below. However, in the interest of producing accurate, readable and transportable code, it should be corrected.

Norman Elfer

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