Table 1 Glossary of variables used in the generic case, "tank2" (skirt-supported propellant tank) (This is part of the tank2.DEF file, created automatically by the GENOPT processor, GENTEXT, with use of information, variable names and one-line definitions provided by the GENOPT user.)

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C=================================================================================================
C  ARRAY   NUMBER OF          PROMPT
C    ?    (ROWS,COLS)  ROLE  NUMBER   NAME                 DEFINITION OF VARIABLE
C                            (tank2.PRO)
C=================================================================================================
C    n   (    0,    0)    2      10   GRAV     = acceleration of gravity
C    n   (    0,    0)    2      20   DIAVEH   = diameter of launch vehicle
C    n   (    0,    0)    2      30   AFTDIA   = diameter of the aft dome of the tank
C    n   (    0,    0)    2      35   AFTHI    = height of the aft dome of the tank
C    n   (    0,    0)    2      40   FWDDIA   = diameter of the forward dome of the tank
C    n   (    0,    0)    2      45   FWDHI    = height of the forward dome of the tank
C    n   (    0,    0)    2      50   FLTANK   = axial dist. from aft dome apex to fwd dome apex
C    n   (    0,    0)    2      55   ZAPEX    = global axial coordinate of the aft dome apex
C    n   (    0,    0)    2      60   DENPRP   = weight density of the propellant
C    n   (    0,    0)    2      65   ZCG      = global axial coordinate of the tank cg
C    n   (    0,    0)    1      70   THKAFT   = thickness of the tank aft dome skin
C    n   (    0,    0)    1      75   THKMID   = thickness of the tank cylinder skin
C    n   (    0,    0)    1      80   THKFWD   = thickness of the forward tank dome skin
C    n   (    0,    0)    1      90   STRSPC   = spacing of the tank orthogrid stringers
C    n   (    0,    0)    1      95   RNGSPC   = spacing of the tank orthogrid rings
C    n   (    0,    0)    1     100   STRTHK   = thickness of the tank orthogrid stringers
C    n   (    0,    0)    1     105   STRHI    = height of the tank orthogrid stringers
C    n   (    0,    0)    1     110   RNGTHK   = thickness of the tank orthogrid rings
C    n   (    0,    0)    1     115   RNGHI    = height of the tank orthogrid rings
C    n   (    0,    0)    2     125   ETANK    = Young's modulus of the cold tank material
C    n   (    0,    0)    2     130   NUTANK   = Poisson's ratio of the tank material
C    n   (    0,    0)    2     135   DENTNK   = mass density of the tank material
C    n   (    0,    0)    2     140   ALTNK    = coef.thermal expansion of tank material
C    n   (    0,    0)    2     150   IAXIS    = tank is vertical (1) or horizontal (2)
C    n   (    0,    0)    2     160   IZTANK   = skirt support ring number in ZTANK(IZTANK)
C    y   (    2,    0)    1     165   ZTANK    = global axial coordinate of tank support ring
C    y   (    2,    0)    1     170   ZGRND    = global axial coordinate of "ground"
C    y   (    2,    0)    2     180   RNGTYP   = propellant tank reinforcement type
C    n   (    0,    0)    2     190   IDUBAXL  = propellant tank reinforcement type number in
DUBAXL(IDUBAXL)
C    y   (    2,    0)    1     195   DUBAXL   = axial length of the propellant tank doubler
C    y   (    2,    0)    1     200   DUBTHK   = max.thickness of the propellant tank doubler
C    y   (    2,    0)    1     210   TRNGTH   = thickness of the tank reinforcement ring
C    y   (    2,    0)    1     215   TRNGHI   = height of the tank reinforcement ring
C    y   (    2,    0)    2     220   TRNGE    = hoop modulus of the tank ring
C    y   (    2,    0)    2     225   ALRNGT   = coef.of thermal expansion of the tank ring
C    n   (    0,    0)    2     235   ISKRTYP  = skirt type number in SKRTYP(ISKRTYP)
C    y   (    2,    0)    2     240   SKRTYP   = skirt type index
C    y   (    2,    0)    1     250   LNGTNK1  = tank-end length of one-layered skirt part
C    y   (    2,    0)    1     255   THKTNK1  = tank-end thickness of tapered skirt part
C    y   (    2,    0)    1     260   LNGTNK2  = tank-end length of tapered prongs
C    y   (    2,    0)    1     265   THKTNK2  = tank-end thickness of one tapered prong
C    y   (    2,    0)    1     270   LNGVEH1  = "ground" end length of one-layered skirt part
C    y   (    2,    0)    1     275   THKVEH1  = "ground"-end thickness of tapered skirt part
C    y   (    2,    0)    1     280   LNGVEH2  = "ground"-end length of tapered prongs
C    y   (    2,    0)    1     285   THKVEH2  = "ground"-end thickness of one tapered prong
C    y   (    2,    0)    2     300   WALTYP   = type of wall constructions in skirt type SKRTYP
C    n   (    0,    0)    2     310   ITHICK   = thickness index in THICK(ITHICK)
C    y   (   15,    0)    1     315   THICK    = thickness of a lamina
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C    y   (  15,    0)    1      320   ANGLE    = layup angle
C    y   (  15,    0)    2      325   MATTYP   = Material type
C    n   (   0,    0)    2      335   JLAYTYP  = wall type number in LAYTYP(ILAYTYP,JLAYTYP)
C    n   (   0,    0)    2      340   ILAYTYP  = layer number in LAYTYP(ILAYTYP,JLAYTYP)
C    y   (  90,    2)    2      345   LAYTYP   = layer type index
C    n   (   0,    0)    2      355   IE1      = material type in E1(IE1)
C    y   (   2,    0)    2      360   E1       = modulus in the fiber direction
C    y   (   2,    0)    2      365   E2       = modulus transverse to fibers
C    y   (   2,    0)    2      370   G12      = in-plane shear modulus
C    y   (   2,    0)    2      375   NU       = small Poisson's ratio
C    y   (   2,    0)    2      380   G13      = x-z out-of-plane shear modulus
C    y   (   2,    0)    2      385   G23      = y-z out-of-plane shear modulus
C    y   (   2,    0)    2      390   ALPHA1   = coef.of thermal expansion along fibers
C    y   (   2,    0)    2      395   ALPHA2   = coef.of thermal expan.transverse to fibers
C    y   (   2,    0)    2      400   TEMTUR   = curing delta temperature (positive)
C    y   (   2,    0)    2      405   COND1    = conductivity along the fibers
C    y   (   2,    0)    2      410   COND2    = conductivity transverse to fibers
C    y   (   2,    0)    2      415   DENSTY   = weight density of the material
C    n   (   0,    0)    2      425   WGT      = objective=WGT*(empty tank mass) +(1-
WGT)*(conductance)
C    n   (   0,    0)    2      430   TNKNRM   = normalizing empty tank mass
C    n   (   0,    0)    2      435   CONNRM   = normalizing total skirt conductance
C    n   (   0,    0)    2      445   IPHASE   = IPHASE=1=launch phase; IPHASE=2=orbital phase
C    n   (   0,    0)    2      455   NCASES   = Number of load cases (number of environments)  in
PRESS(NCASES)
C    y   (  20,    0)    3      460   PRESS    = propellant tank ullage pressure
C    y   (  20,    0)    3      465   GAXIAL   = quasi-static axial g-loading
C    y   (  20,    0)    3      470   GLATRL   = quasi-static lateral g-loading
C    y   (  20,    0)    3      475   TNKCOOL  = propellant tank cool-down from cryogen
C    n   (   0,    0)    2      485   JFREQ    = vibration mode type in FREQ(NCASES,JFREQ)
C    y   (  20,    4)    4      490   FREQ     = free vibration frequency (cps)
C    y   (  20,    4)    5      495   FREQA    = minimum allowable frequency (cps)
C    y   (  20,    4)    6      500   FREQF    = factor of safety for freqency
C    n   (   0,    0)    2      510   JSTRES1  = stress component number in STRES1(NCASES,JSTRES1)
C    y   (  20,    6)    4      515   STRES1   = maximum stress in material 1
C    y   (  20,    6)    5      520   STRES1A  = maximum allowable stress in material 1
C    y   (  20,    6)    6      525   STRES1F  = factor of safety for stress, matl 1
C    y   (  20,    6)    4      530   STRES2   = maximum stress in material 2
C    y   (  20,    6)    5      535   STRES2A  = maximum allowable stress in material 2
C    y   (  20,    6)    6      540   STRES2F  = factor of safety for stress, matl 2
C    n   (   0,    0)    2      550   JSHLBUK  = skirt number (1 for aft skirt) in
SHLBUK(NCASES,JSHLBUK)
C    y   (  20,    2)    4      555   SHLBUK   = buckling of skirt as a shell
C    y   (  20,    2)    5      560   SHLBUKA  = allowable for shell buckling of skirt
C    y   (  20,    2)    6      565   SHLBUKF  = factor of safety for shell buckling of skirt
C    y   (  20,    2)    4      570   FORCE    = launch-hold force in a skirt
C    y   (  20,    2)    5      575   FORCEA   = maximum allowable launch-hold force in skirt
C    y   (  20,    2)    6      580   FORCEF   = factor of safety for launch-hold force
C    y   (  20,    2)    4      585   TNKSTR   = maximum stress in the propellant tank
C    y   (  20,    2)    5      590   TNKSTRA  = allowable for propellant tank stress
C    y   (  20,    2)    6      595   TNKSTRF  = factor of safety for tank stress
C    y   (  20,    2)    4      600   TNKBUK   = propellant tank buckling load factor
C    y   (  20,    2)    5      605   TNKBUKA  = allowable for propellant tank buckling
C    y   (  20,    2)    6      610   TNKBUKF  = factor of safety for tank buckling
C    n   (   0,    0)    7      620   CONDCT   = WGTxTOTMAS/TNKNRM +(1-WGT)xCONDCT/CONNRM
C===========================================================================================
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Table 2 Input data for the GENOPT processor, BEGIN (oneskirt.BEG file) (These input data are provided by the End user for the generic case called "tank2" and the specific case called "oneskirt".)

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================================================================================
      N          $ Do you want a tutorial session and tutorial output?
   386.4000      $ acceleration of gravity: GRAV
       300       $ diameter of launch vehicle: DIAVEH
       200       $ diameter of the aft dome of the tank: AFTDIA
        50       $ height of the aft dome of the tank: AFTHI
       200       $ diameter of the forward dome of the tank: FWDDIA
        50       $ height of the forward dome of the tank: FWDHI
       400       $ axial dist. from aft dome apex to fwd dome apex: FLTANK
       100       $ global axial coordinate of the aft dome apex: ZAPEX
  0.2560000E-02 $ weight density of the propellant: DENPRP
       300       $ global axial coordinate of the tank cg: ZCG
  0.1000000      $ thickness of the tank aft dome skin: THKAFT
  0.1000000      $ thickness of the tank cylinder skin: THKMID
  0.1000000      $ thickness of the forward tank dome skin: THKFWD
        10       $ spacing of the tank orthogrid stringers: STRSPC
        10       $ spacing of the tank orthogrid rings: RNGSPC
  0.5000000      $ thickness of the tank orthogrid stringers: STRTHK
         1       $ height of the tank orthogrid stringers: STRHI
  0.5000000      $ thickness of the tank orthogrid rings: RNGTHK
         1       $ height of the tank orthogrid rings: RNGHI
  0.1000000E+08 $ Young's modulus of the cold tank material: ETANK
  0.3000000      $ Poisson's ratio of the tank material: NUTANK
  0.2500000E-03 $ mass density of the tank material: DENTNK
  0.1000000E-04 $ coef.thermal expansion of tank material: ALTNK
         1       $ tank is vertical (1) or horizontal (2): IAXIS
         1       $ Number IZTANK  of rows in the array  ZTANK: IZTANK
       300       $ global axial coordinate of tank support ring: ZTANK(  1)
        50       $ global axial coordinate of "ground": ZGRND(  1)
         1       $ propellant tank reinforcement type: RNGTYP(  1)
         1       $ Number IDUBAXL of rows in the array  DUBAXL: IDUBAXL
        30       $ axial length of the propellant tank doubler: DUBAXL(  1)
  0.1000000      $ max.thickness of the propellant tank doubler: DUBTHK(  1)
  0.2000000      $ thickness of the tank reinforcement ring: TRNGTH(  1)
   1.000000      $ height of the tank reinforcement ring: TRNGHI(  1)
  0.1000000E+08 $ hoop modulus of the tank ring: TRNGE(  1)
  0.1000000E-04 $ coef.of thermal expansion of the tank ring: ALRNGT(  1)
         1       $ Number ISKRTYP of rows in the array  SKRTYP: ISKRTYP
         1       $ skirt type index: SKRTYP(  1)
         5       $ tank-end length of one-layered skirt part: LNGTNK1(  1)
  0.2500000      $ tank-end thickness of tapered skirt part: THKTNK1(  1)
         5       $ tank-end length of tapered prongs: LNGTNK2(  1)
  0.5000000E-01 $ tank-end thickness of one tapered prong: THKTNK2(  1)
         5       $ "ground" end length of one-layered skirt part: LNGVEH1(  1)
  0.2500000      $ "ground"-end thickness of tapered skirt part: THKVEH1(  1)
         5       $ "ground"-end length of tapered prongs: LNGVEH2(  1)
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 0.5000000E-01 $ "ground"-end thickness of one tapered prong: TNKVEH2(  1)
       1       $ type of wall constructions in skirt type SKRTYP: WALTYP(  1)
       6       $ Number ITHICK  of rows in the array  THICK: ITHICK
 0.3000000E-01 $ thickness of a lamina: THICK(  1)
 0.3000000E-01 $ thickness of a lamina: THICK(  2)
 0.3000000E-01 $ thickness of a lamina: THICK(  3)
 0.3000000E-01 $ thickness of a lamina: THICK(  4)
 0.3000000E-01 $ thickness of a lamina: THICK(  5)
 0.3000000E-01 $ thickness of a lamina: THICK(  6)
      45       $ layup angle: ANGLE(  1)
     -45       $ layup angle: ANGLE(  2)
      45       $ layup angle: ANGLE(  3)
     -45       $ layup angle: ANGLE(  4)
      45       $ layup angle: ANGLE(  5)
     -45       $ layup angle: ANGLE(  6)
       1       $ Material type: MATTYP(  1)
       1       $ Material type: MATTYP(  2)
       1       $ Material type: MATTYP(  3)
       1       $ Material type: MATTYP(  4)
       1       $ Material type: MATTYP(  5)
       1       $ Material type: MATTYP(  6)
       1       $ Number JLAYTYP of columns in the array, LAYTYP: JLAYTYP
      12       $ Number ILAYTYP of rows in this column of LAYTYP: ILAYTYP
       1       $ layer type index: LAYTYP(  1,  1)
       2       $ layer type index: LAYTYP(  2,  1)
       3       $ layer type index: LAYTYP(  3,  1)
       4       $ layer type index: LAYTYP(  4,  1)
       5       $ layer type index: LAYTYP(  5,  1)
       6       $ layer type index: LAYTYP(  6,  1)
       6       $ layer type index: LAYTYP(  7,  1)
       5       $ layer type index: LAYTYP(  8,  1)
       4       $ layer type index: LAYTYP(  9,  1)
       3       $ layer type index: LAYTYP( 10,  1)
       2       $ layer type index: LAYTYP( 11,  1)
       1       $ layer type index: LAYTYP( 12,  1)
       1       $ Number IE1     of rows in the array  E1: IE1
 0.2100000E+08 $ modulus in the fiber direction: E1(  1)
  1600000.     $ modulus transverse to fibers: E2(  1)
  679000.0     $ in-plane shear modulus: G12(  1)
 0.2300000E-01 $ small Poisson's ratio: NU(  1)
  627000.0     $ x-z out-of-plane shear modulus: G13(  1)
  334000.0     $ y-z out-of-plane shear modulus: G23(  1)
 0.1000000E-05 $ coef.of thermal expansion along fibers: ALPHA1(  1)
 0.1000000E-04 $ coef.of thermal expan.transverse to fibers: ALPHA2(  1)
     000       $ curing delta temperature (positive): TEMTUR(  1)
 0.7270000E-02 $ conductivity along the fibers: COND1(  1)
 0.4370000E-02 $ conductivity transverse to fibers: COND2(  1)
 0.5700000E-01 $ weight density of the material: DENSTY(  1)
 0.5000000     $ objective=WGT*(empty tank mass) +(1-WGT)*(conductance): WGT
  10.00000     $ normalizing empty tank mass: TNKNRM
 0.2000000E-02 $ normalizing total skirt conductance: CONNRM
       1       $ IPHASE=1=launch phase; IPHASE=2=orbital phase: IPHASE
       2       $ Number NCASES  of load cases (environments): NCASES
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       25        $ propellant tank ullage pressure: PRESS(  1)
       25        $ propellant tank ullage pressure: PRESS(  2)
       10        $ quasi-static axial g-loading: GAXIAL(  1)
        0        $ quasi-static axial g-loading: GAXIAL(  2)
        0        $ quasi-static lateral g-loading: GLATRL(  1)
      -10        $ quasi-static lateral g-loading: GLATRL(  2)
     -200        $ propellant tank cool-down from cryogen: TNKCOOL(  1)
     -200        $ propellant tank cool-down from cryogen: TNKCOOL(  2)
        4        $ Number JFREQ   of columns in the array, FREQ: JFREQ
       10        $ minimum allowable frequency (cps): FREQA(  1,  1)
       10        $ minimum allowable frequency (cps): FREQA(  2,  1)
       10        $ minimum allowable frequency (cps): FREQA(  1,  2)
       10        $ minimum allowable frequency (cps): FREQA(  2,  2)
       10        $ minimum allowable frequency (cps): FREQA(  1,  3)
       10        $ minimum allowable frequency (cps): FREQA(  2,  3)
       10        $ minimum allowable frequency (cps): FREQA(  1,  4)
       10        $ minimum allowable frequency (cps): FREQA(  2,  4)
  1.200000       $ factor of safety for freqency: FREQF(  1,  1)
  1.200000       $ factor of safety for freqency: FREQF(  2,  1)
  1.200000       $ factor of safety for freqency: FREQF(  1,  2)
  1.200000       $ factor of safety for freqency: FREQF(  2,  2)
  1.200000       $ factor of safety for freqency: FREQF(  1,  3)
  1.200000       $ factor of safety for freqency: FREQF(  2,  3)
  1.200000       $ factor of safety for freqency: FREQF(  1,  4)
  1.200000       $ factor of safety for freqency: FREQF(  2,  4)
        5        $ Number JSTRES1 of columns in the array, STRES1: JSTRES1
   140571        $ maximum allowable stress in material 1: STRES1A(  1,  1)
   140571        $ maximum allowable stress in material 1: STRES1A(  2,  1)
   104714        $ maximum allowable stress in material 1: STRES1A(  1,  2)
   104714        $ maximum allowable stress in material 1: STRES1A(  2,  2)
    10557        $ maximum allowable stress in material 1: STRES1A(  1,  3)
    10557        $ maximum allowable stress in material 1: STRES1A(  2,  3)
    14529        $ maximum allowable stress in material 1: STRES1A(  1,  4)
    14529        $ maximum allowable stress in material 1: STRES1A(  2,  4)
     6290        $ maximum allowable stress in material 1: STRES1A(  1,  5)
     6290        $ maximum allowable stress in material 1: STRES1A(  2,  5)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  1,  1)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  2,  1)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  1,  2)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  2,  2)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  1,  3)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  2,  3)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  1,  4)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  2,  4)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  1,  5)
  1.500000       $ factor of safety for stress, matl 1: STRES1F(  2,  5)
   140571        $ maximum allowable stress in material 2: STRES2A(  1,  1)
   140571        $ maximum allowable stress in material 2: STRES2A(  2,  1)
   104714        $ maximum allowable stress in material 2: STRES2A(  1,  2)
   104714        $ maximum allowable stress in material 2: STRES2A(  2,  2)
    10557        $ maximum allowable stress in material 2: STRES2A(  1,  3)
    10557        $ maximum allowable stress in material 2: STRES2A(  2,  3)
    14529        $ maximum allowable stress in material 2: STRES2A(  1,  4)
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     14529      $ maximum allowable stress in material 2: STRES2A(  2,  4)
      6290      $ maximum allowable stress in material 2: STRES2A(  1,  5)
      6290      $ maximum allowable stress in material 2: STRES2A(  2,  5)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  1,  1)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  2,  1)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  1,  2)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  2,  2)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  1,  3)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  2,  3)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  1,  4)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  2,  4)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  1,  5)
   1.500000     $ factor of safety for stress, matl 2: STRES2F(  2,  5)
        2       $ Number JSHLBUK of columns in the array, SHLBUK: JSHLBUK
        1       $ allowable for shell buckling of skirt: SHLBUKA(  1,  1)
        1       $ allowable for shell buckling of skirt: SHLBUKA(  2,  1)
        1       $ allowable for shell buckling of skirt: SHLBUKA(  1,  2)
        1       $ allowable for shell buckling of skirt: SHLBUKA(  2,  2)
        2       $ factor of safety for shell buckling of skirt: SHLBUKF(  1,  1)
        2       $ factor of safety for shell buckling of skirt: SHLBUKF(  2,  1)
        2       $ factor of safety for shell buckling of skirt: SHLBUKF(  1,  2)
        2       $ factor of safety for shell buckling of skirt: SHLBUKF(  2,  2)
     15000      $ maximum allowable launch-hold force in skirt: FORCEA(  1,  1)
     15000      $ maximum allowable launch-hold force in skirt: FORCEA(  2,  1)
     15000      $ maximum allowable launch-hold force in skirt: FORCEA(  1,  2)
     15000      $ maximum allowable launch-hold force in skirt: FORCEA(  2,  2)
        1       $ factor of safety for launch-hold force: FORCEF(  1,  1)
        1       $ factor of safety for launch-hold force: FORCEF(  2,  1)
        1       $ factor of safety for launch-hold force: FORCEF(  1,  2)
        1       $ factor of safety for launch-hold force: FORCEF(  2,  2)
     50000      $ allowable for propellant tank stress: TNKSTRA(  1,  1)
     50000      $ allowable for propellant tank stress: TNKSTRA(  2,  1)
     50000      $ allowable for propellant tank stress: TNKSTRA(  1,  2)
     50000      $ allowable for propellant tank stress: TNKSTRA(  2,  2)
       1.5      $ factor of safety for tank stress: TNKSTRF(  1,  1)
       1.5      $ factor of safety for tank stress: TNKSTRF(  2,  1)
       1.5      $ factor of safety for tank stress: TNKSTRF(  1,  2)
       1.5      $ factor of safety for tank stress: TNKSTRF(  2,  2)
        1       $ allowable for propellant tank buckling: TNKBUKA(  1,  1)
        1       $ allowable for propellant tank buckling: TNKBUKA(  2,  1)
        1       $ allowable for propellant tank buckling: TNKBUKA(  1,  2)
        1       $ allowable for propellant tank buckling: TNKBUKA(  2,  2)
       2.0      $ factor of safety for tank buckling: TNKBUKF(  1,  1)
       2.0      $ factor of safety for tank buckling: TNKBUKF(  2,  1)
       2.0      $ factor of safety for tank buckling: TNKBUKF(  1,  2)
       2.0      $ factor of safety for tank buckling: TNKBUKF(  2,  2)
================================================================================
```

FOOTNOTE: Some Conventions are as follows:
An "A" added to a behavioral variable name means "allowable"
An "F" added to a behavioral variable name means "factor of safety"
Array Indices, i,j,k:

FREQ(i,j) = modal vibration frequency: i = load case; j = vibration mode
j = 1 means first eigenvalue for n = 0 waves (usually the mode with significant axial motion of the tank)
j = 2 means first eigenvalue for n = 1 waves (a mode with significant lateral-pitch motion of the tank)
j = 3 means first eigenvalue for n = 2 waves (a mode in which the tank wall deforms with 2 circ. waves)
j = 4 means first eigenvalue for n = 3 or 4 waves (a mode in which the tank wall deforms)

STRESSi(j,k) = stress component in strut: i = material no., j=load case, k = stress component
i = 1 means "material no. 1" which also means "strut type no. 1" (aft ring of struts)
i = 2 means "material no. 2" which also means "strut type no. 2" (forward ring of struts)
j = 1 means “Load Case 1” (See the section above entitled TWO LOAD CASES)
j = 2 means “Load Case 2” (See the section above entitled TWO LOAD CASES)
k = 1 means tension along the fibers of a ply
k = 2 means compression along the fibers of a ply
k = 3 means tension transverse to the fibers of a ply
k = 4 means compression transverse to the fibers of a ply
k = 5 means in-plane shear in a ply

SHLBUK(i,j) = buckling of the strut as a thin shell: i = load case; j = strut type
j = 1 means the type of strut attached to the aft propellant tank support ring.
j = 2 means the type of strut attached to the forward propellant tank support ring.

TNKSTR(i,j) = maximum effective stress: i = load case; j = meridian number
j = 1 = effective stress in the tank is the maximum from the distribution along meridian no. 1
j = 2 = effective stress in the tank is the maximum from the distribution along meridian no. 2

TNKBUK(i,j) = buckling load factor: i = load case; j = meridian number
j = 1 means buckling load factor of the tank from the prebuckling stress distribution along meridian no. 1
j = 2 means buckling load factor of the tank from the prebuckling stress distribution along meridian no. 2

Table 3 Maximum stresses (psi) in the optimized "oneskirt" configuration under Load Cases 1 and 2 predicted by the GENOPT/BIGBOSOR4 model

===

Load Case 1 (10g axial acceleration, 25 psi ullage pressure, 200 deg. tank cool-down):

```
Stress=  9.1942E+02 fiber tension : matl=2 ,    A , seg=3 , node=90, layer=12,z= 0.17  ;FS=  1.50
Stress=  3.3538E+04 fiber tension : matl=3 ,    A , seg=17, node=7 , layer=1 , z=-0.49  ;FS=  1.50
Stress=  1.8489E+04 fiber compres.: matl=2 ,  A , seg=4 , node=13, layer=11,z= 0.12  ;FS=  1.50
Stress=  5.8708E+03 fiber compres.: matl=3 ,  A , seg=21, node=50, layer=1 ,z=-0.43  ;FS=  1.50
Stress=  2.4409E+03 transv tension: matl=2 ,   A , seg=3 , node=94, layer=10,z= 0.12  ;FS=  1.50
Stress=  2.9366E+04 transv tension: matl=3 ,   A , seg=18, node=7 , layer=1 , z=-0.03  ;FS=  1.50
Stress=  4.1398E+02 transv compres: matl=2 , A , seg=3 , node=2 , layer=1 ,  z=-0.17  ;FS=  1.50
Stress=  1.7041E+04 transv compres: matl=3 , A , seg=23, node=5 , layer=1 , z=-0.44  ;FS=  1.50
Stress=  5.6036E+02 in-plane shear: matl=2 ,   A , seg=3 , node=94, layer=3 , z=-0.12  ;FS=  1.50
Stress=  2.1462E+04 effect. stress: matl=1 ,     A , seg=4 , node=2 , layer=14,  z= 0.18  ;FS=  1.50
Stress=  1.8987E+04 effect. stress: matl=4 ,     A , seg=16, node=9 , layer=2 ,  z=-0.09  ;FS=  1.50
Stress=  2.8270E+04 effect. stress: matl=5 ,     A , seg=19, node=2 , layer=3 ,  z= 0.03  ;FS=  1.50
Stress=  3.1977E+04 effect. stress: matl=6 ,     A , seg=18, node=6 , layer=2 ,  z= 0.03  ;FS=  1.50
Stress=  2.1141E+04 effect. stress: matl=7 ,     A , seg=33, node=13, layer=2 , z= 0.04  ;FS=  1.50

Modified maximum stress components for Load Case  1 STRESS2(i),i=1,6=
   fiber tension   fiber compres. transv tension  transv compres  in-plane shear   effect. stress
   3.3538E+04     8.8282E+03     2.9366E+04     1.7041E+04     4.4544E+03     3.1977E+04
```

Load Case 2 (10g lateral acceleration, 25 psi ullage pressure, 200 deg. tank cool-down):

```
Stress=  1.8841E+03 fiber tension : matl=2 ,    A , seg=3 , node=9 , layer=12, z= 0.17  ;FS=  1.50
Stress=  3.3333E+04 fiber tension : matl=3 ,    A , seg=22, node=8 , layer=1 , z=-0.44  ;FS=  1.50
Stress=  1.6076E+04 fiber compres.: matl=2 ,  A , seg=4 , node=13, layer=11,z= 0.12  ;FS=  1.50
Stress=  6.8810E+03 fiber compres.: matl=3 ,  A , seg=21, node=50, layer=1 ,z=-0.43  ;FS=  1.50
Stress=  2.4820E+03 transv tension: matl=2 ,   A , seg=3 , node=93, layer=10,z= 0.12  ;FS=  1.50
Stress=  2.6867E+04 transv tension: matl=3 ,   A , seg=21, node=47, layer=1 ,z=-0.03  ;FS=  1.50
Stress=  1.4473E+03 transv compres: matl=2 , A , seg=3 , node=2 , layer=1 ,  z=-0.17  ;FS=  1.50
Stress=  1.8667E+04 transv compres: matl=3 , A , seg=23, node=5 , layer=1 , z=-0.44  ;FS=  1.50
Stress=  6.0517E+02 in-plane shear: matl=2 ,   A , seg=3 , node=5 , layer=3 ,  z=-0.12  ;FS=  1.50
Stress=  2.2347E+04 effect. stress: matl=1 ,     A , seg=4 , node=2 , layer=1 ,  z=-0.18  ;FS=  1.50
Stress=  1.4335E+04 effect. stress: matl=4 ,     A , seg=16, node=9 , layer=2 , z=-0.09  ;FS=  1.50
Stress=  2.6055E+04 effect. stress: matl=5 ,     A , seg=20, node=12, layer=3 ,z= 0.03  ;FS=  1.50
Stress=  2.8461E+04 effect. stress: matl=6 ,     A , seg=21, node=48, layer=2 ,z= 0.03  ;FS=  1.50
Stress=  2.3645E+04 effect. stress: matl=7 ,     A , seg=33, node=6 , layer=2 , z= 0.04  ;FS=  1.50

Modified maximum stress components for Load Case  2 STRESS2(i),i=1,6=
   fiber tension   fiber compres. transv tension  transv compres  in-plane shear   effect. stress
   3.3333E+04     7.6760E+03     2.6867E+04     1.8667E+04     4.8106E+03     2.8461E+04
```

===

Table 4 Maximum stresses (psi) in the optimized "twoskirt" configuration under Load Cases 1 and 2 as predicted by GENOPT/BIGBOSOR4

```
==========================================================================
```

Load Case 1 (10g axial acceleration, 25 psi ullage pressure, 200 deg. tank cool-down):

```
Stress=  2.7506E+04 fiber tension : matl=2 ,   A , seg=36, node=7 , layer=10,z= 0.04  ;FS=  1.50
Stress=  3.3583E+04 fiber tension : matl=3 ,   A , seg=16, node=5 , layer=1 , z=-0.46  ;FS=  1.50
Stress=  2.8580E+04 fiber compres.: matl=2,  A , seg=4 , node=13, layer=13,z= 0.05  ;FS=  1.50
Stress=  2.4008E+04 fiber compres.: matl=3,  A , seg=22, node=2 , layer=1,  z=-0.44  ;FS=  1.50
Stress=  4.7809E+03 transv tension: matl=2 ,  A , seg=36, node=8 , layer=12,z= 0.06  ;FS=  1.50
Stress=  1.9012E+04 transv tension: matl=3 ,  A , seg=19, node=3 , layer=1,  z=-0.06  ;FS=  1.50
Stress=  1.7932E+04 transv compres: matl=3, A , seg=15, node=11, layer=1, z=-0.46  ;FS=  1.50
Stress=  5.5800E+02 in-plane shear: matl=2 ,  A , seg=35, node=2 , layer=2 , z=-0.06  ;FS=  1.50
Stress=  3.2173E+04 effect. stress: matl=1 ,    A , seg=35, node=2 , layer=1 , z=-0.07  ; FS=  1.50
Stress=  2.4268E+04 effect. stress: matl=4 ,    A , seg=6 , node=2 , layer=2 ,  z = 0.06  ;FS=  1.50
Stress=  2.4061E+04 effect. stress: matl=5 ,    A , seg=18, node=12, layer=3, z= 0.07  ; FS=  1.50
Stress=  2.7316E+04 effect. stress: matl=6 ,    A , seg=19, node=2 , layer=2 , z= 0.06  ; FS=  1.50
Stress=  2.3496E+04 effect. stress: matl=7 ,    A , seg=33, node=13, layer=2, z= 0.04  ; FS=  1.50

Modified maximum stress components for Load Case  1 STRESS2(i),i=1,6=
    fiber tension   fiber compres. transv tension  transv compres in-plane shear    effect. stress
    3.3583E+04     2.4008E+04     2.2643E+04     1.7932E+04     4.4356E+03     3.2173E+04
```

Load Case 2 (10g lateral acceleration, 25 psi ullage pressure, 200 deg. tank cool-down):

```
Stress=  3.4188E+04 fiber tension : matl=2 ,    A , seg=3 , node=93, layer=9 ,  z= 0.03  ;FS=  1.50
Stress=  3.4335E+04 fiber tension : matl=3 ,    A , seg=23, node=9 , layer=1 ,  z=-0.44  ;FS=  1.50
Stress=  3.0823E+04 fiber compres.: matl=2 ,  A , seg=35, node=1 , layer=12, z= 0.05  ;FS=  1.50
Stress=  2.0893E+04 fiber compres.: matl=3 ,  A , seg=22, node=2 , layer=1,   z=-0.44  ;FS=  1.50
Stress=  5.2071E+03 transv tension: matl=2 ,   A , seg=3 , node=92, layer=12, z= 0.05  ;FS=  1.50
Stress=  1.8089E+04 transv tension: matl=3 ,   A , seg=33, node=13, layer=1,  z=-0.04  ;FS=  1.50
Stress=  8.0684E+01 transv compres: matl=2 , A , seg=36, node=98, layer=10,z= 0.04  ;FS=  1.50
Stress=  1.7819E+04 transv compres: matl=3 , A , seg=24, node=4 , layer=1 ,  z=-0.44  ;FS=  1.50
Stress=  2.1950E+03 in-plane shear: matl=2 ,   A , seg=4 , node=1 , layer=3 ,   z=-0.04  ;FS=  1.50
Stress=  3.4632E+04 effect. stress: matl=1 ,     A , seg=4 , node=2 , layer=1 ,   z=-0.05  ;FS=  1.50
Stress=  1.8883E+04 effect. stress: matl=4 ,     A , seg=6 , node=2 , layer=2 ,   z= 0.06  ;FS=  1.50
Stress=  2.2342E+04 effect. stress: matl=5 ,     A , seg=18, node=12, layer=3 , z= 0.07  ;FS=  1.50
Stress=  2.5577E+04 effect. stress: matl=6 ,     A , seg=19, node=2 , layer=2 ,  z= 0.06  ;FS=  1.50
Stress=  2.6047E+04 effect. stress: matl=7 ,     A , seg=33, node=13, layer=2,  z= 0.04  ;FS=  1.50

Modified maximum stress components for Load Case  2 STRESS2(i),i=1,6=
    fiber tension   fiber compres.  transv tension transv compres  in-plane shear   effect. stress
    3.4335E+04     2.0893E+04     2.4662E+04     1.7819E+04     1.7448E+04     3.4632E+04
==========================================================================
```

Table 5 Predictions by GENOPT/tank2 of buckling of the aft conical skirt under Load Case 1 for the optimized "twoskirt" configuration

```
Buckling in the propellant tank/skirt system from the
 prebuckling load distribution on the meridian at angle,
 CIRCANG(JCOL)=  0.0000E+00 in which JCOL = 1
The valid BIGBOSOR4 input file is called: twoskirt.BEHX911

 BUCKLING OF THE PROPELLANT TANK/SKIRT SYSTEM FROM THE BIGBOSOR4 MODEL
  6.3407E+00(n=   3 circ.waves); IFAILD= 0
  6.3295E+00(n=   5 circ.waves); IFAILD= 0
  6.3129E+00(n=   7 circ.waves); IFAILD= 0
  6.2907E+00(n=   9 circ.waves); IFAILD= 0
  6.2631E+00(n=  11 circ.waves); IFAILD= 0
  6.2294E+00(n=  13 circ.waves); IFAILD= 0
  6.1897E+00(n=  15 circ.waves); IFAILD= 0
  6.1437E+00(n=  17 circ.waves); IFAILD= 0
  6.0902E+00(n=  19 circ.waves); IFAILD= 0
  6.0329E+00(n=  21 circ.waves); IFAILD= 0
  5.9862E+00(n=  23 circ.waves); IFAILD= 0
  5.9573E+00(n=  25 circ.waves); IFAILD= 0
  5.9460E+00(n=  27 circ.waves); IFAILD= 0 ←critical buckling load factor
  5.9520E+00(n=  29 circ.waves); IFAILD= 0
  5.9575E+00(n=  31 circ.waves); IFAILD= 0
  5.9633E+00(n=  33 circ.waves); IFAILD= 0
  5.9873E+00(n=  35 circ.waves); IFAILD= 0
  6.0297E+00(n=  37 circ.waves); IFAILD= 0
  6.0905E+00(n=  39 circ.waves); IFAILD= 0
  6.1694E+00(n=  41 circ.waves); IFAILD= 0
  6.2660E+00(n=  43 circ.waves); IFAILD= 0
  6.3798E+00(n=  45 circ.waves); IFAILD= 0
  6.5102E+00(n=  47 circ.waves); IFAILD= 0
  6.6189E+00(n=  49 circ.waves); IFAILD= 0
  etc.
----------------------------------------------------------------------


PANDA2-type buckling predictions corresponding to the
 prebuckled state along the skirt meridian at theta=  0.0000E+00
degrees...
 In this buckling analysis there are two PANDA2 models:
 Model 1: The full length of the effective cylindrical shell
          is included and Nx,Ny,Nxy at the midlength of the
          skirt are considered to be the prebuckled state
          which is uniform over the entire PANDA2 model.
 Model 2: 1/4th of the length nearest the large-diameter end
          of the conical skirt is included, and Nx,0.,Nxy
```

```
          ten nodal points from the large-diameter end are
          considered to be the uniform prebuckled state.
 We use the minimum of the two buckling load factors from
 PANDA2 Model 1 and PANDA2 Model 2 as the buckling load
 obtained from a PANDA2 analysis.
 Listed next are the assumed prebuckled state, length and
 radius of the effective cylindrical shell, buckling mode,
 (MSKIN,NSKIN,SLOPE), and buckling load factor for Model 1:
 Buckling load factor predicted from a PANDA2-type model of
 the aft skirt for Load Case  1:
 Average Load Set A prebuckling resultants used in the PANDA2 model:
 Average axial resultant over meridian length,NXAVE = -2.8593E+02
 Average hoop  resultant over meridian length,NYAVE = -2.9823E+00
 Average in-plane shear resultant,            NXYAVE=  0.0000E+00
 Average Load Set B prebuckling resultants used in the PANDA2 model:
 Average axial resultant over meridian length,NXFIX =  1.4326E+03
 Average hoop  resultant over meridian length,NYFIX =  6.2338E-01
 Length of the equivalent cylindrical shell,  FLEFF =  1.3928E+02
 Radius of the equivalent cylindrical shell,  RAVE  =  1.3393E+02
 Critical buckling mode:
 Number of axial half-waves over shell length,MSKIN =   1
 Number of circ. half-waves over 180 degrees, NSKIN =  15
 Slope of the buckling nodal lines,           SLOPE =  0.0000E+00
 SLOPE=dy/dx in Fig. 9(b) of 1987 "Theoretical Basis paper.
 "Bump-up" factor to adjust for milder imperfection
  sensitivity factor when in-plane shear is significant  1.0000E+00
 The actual buckling load factor,EIGLOC*FKNOCK/RATIO=  5.6307E+00

 PANDA2-type buckling predictions corresponding to the
 prebuckled state along the skirt meridian at theta=  0.0000E+00
degrees...
 Model 2: 1/4th of the length nearest the large-diameter end
          of the conical skirt is included, and Nx,0.,Nxy
          ten nodal points from the large-diameter end are
          considered to be the uniform prebuckled state.
 We use the minimum of the two buckling load factors from
 PANDA2 Model 1 and PANDA2 Model 2 as the buckling load
 obtained from a PANDA2 analysis.
 Listed next are the assumed prebuckled state, length and
 radius of the effective cylindrical shell, buckling mode,
 (MSKIN,NSKIN,SLOPE), and buckling load factor for Model 2:
 Buckling load factor predicted from a PANDA2-type model of
 the aft skirt for Load Case  1:
 Average Load Set A prebuckling resultants used in the PANDA2 model:
 Average axial resultant over meridian length,NXAVE = -2.4787E+02
 Average hoop  resultant over meridian length,NYAVE =  0.0000E+00
 Average in-plane shear resultant,            NXYAVE=  0.0000E+00
 Average Load Set B prebuckling resultants used in the PANDA2 model:
```

```
 Average axial resultant over meridian length,NXFIX =  1.2235E+03
 Average hoop  resultant over meridian length,NYFIX =  0.0000E+00
 Length of the equivalent cylindrical shell,  FLEFF =  3.4821E+01
 Radius of the equivalent cylindrical shell,  RAVE  =  1.6071E+02
 Critical buckling mode:
 Number of axial half-waves over shell length,MSKIN =   3
 Number of circ. half-waves over 180 degrees, NSKIN =  32
 Slope of the buckling nodal lines,           SLOPE =  1.0167E-01
 SLOPE=dy/dx in Fig. 9(b) of 1987 "Theoretical Basis paper.
 "Bump-up" factor to adjust for milder imperfection
  sensitivity factor when in-plane shear is significant  1.0000E+00
 The actual buckling load factor,EIGLOC*FKNOCK/RATIO=  5.6305E+00

 Minimum buckling load from PANDA2 Models 1 & 2, EIGMIN=  5.6305E+00
 For the buckling load factor, GENOPT/SKIRT uses the minimum
 buckling load from PANDA2 for the aft and forward (if any)
 skirt(s) and the buckling load from the BIGBOSOR4 model.
 The buckling load from the BIGBOSOR4 model is EIGCRT=  5.9460E+00
=====================================================================
```

Table 6 Predictions by GENOPT/tank2 of buckling of the aft conical skirt under Load Case 2 for the optimized "twoskirt" configuration according to the PANDA-type Model 1 with use of the prebuckling resultants at the midlength of the meridian of Segment 3 of the aft conical skirt at the circumferential coordinate, theta = 90 degrees. The following list is part of the twoskirt.OPM file corresponding to the optimized "twoskirt" design subjected to Load Case 2 (Load Set A = 10 g lateral acceleration, Load Set B = 25 psi internal ullage pressure in the propellant tank plus 200-degree uniform propellant tank cool-down plus axisymmetric non-uniform thermal loading of the aft conical skirt)

```
=============================================================================
PANDA2-type buckling predictions corresponding to the
prebuckled state along the skirt meridian at theta=  9.0000E+01 degrees...
Listed next are the assumed prebuckled state, length and
 radius of the effective cylindrical shell, buckling mode,
 (MSKIN,NSKIN,SLOPE), and buckling load factor for Model 1:
 Buckling load factor predicted from a PANDA2-type model of
 the aft skirt for Load Case  2:
 Average Load Set A prebuckling resultants used in the PANDA2 model:
 Average axial resultant over meridian length,NXAVE = -2.2837E+01
 Average hoop  resultant over meridian length,NYAVE = -1.5016E-06
 Average in-plane shear resultant,            NXYAVE=  2.5361E+02
 Average Load Set B prebuckling resultants used in the PANDA2 model:
 Average axial resultant over meridian length,NXFIX =  1.4326E+03
 Average hoop  resultant over meridian length,NYFIX =  6.2338E-01
 Length of the equivalent cylindrical shell,  FLEFF =  1.3928E+02
 Radius of the equivalent cylindrical shell,  RAVE  =  1.3393E+02
 Critical buckling mode:
 Number of axial half-waves over shell length,MSKIN =   1
 Number of circ. half-waves over 180 degrees, NSKIN =  23
 Slope of the buckling nodal lines,           SLOPE =  1.9008E-01
 SLOPE=dy/dx in Fig. 9(b) of 1987 "Theoretical Basis paper.
 "Bump-up" factor to adjust for milder imperfection
  sensitivity factor when in-plane shear is significant  1.5000E+00
 The actual buckling load factor,EIGLOC*FKNOCK/RATIO=  1.3022E+00
=============================================================================
```

The purpose of the "bump-up" factor listed here is to compensate for the use in the "tank2" formulation of a factor of safety (F.S.) for skirt buckling, TNKBUKF=2.0 (listed in Table 2) that is too high for the much milder sensitivity to initial imperfections of conical or cylindrical shells under primarily in-plane shear loading rather than uniform axial compression. In the "tank2" formulation we assume that an appropriate knockdown factor for shell buckling under primarily in-plane shear loading is 1/F.S. = 1/1.3333 rather than 1/2.0, which is more appropriate for axial compression of the laminated composite skirt configurations processed in this paper. The **"Bump-up" factor is given by 2.0/1.3333 = 1.50** in this particular case (Load Case 2 loading at theta=90 deg.).

Table 7 Summary of predictions from STAGS for the maximum stress components in the laminated composite parts of the skirt supports of the optimized configuration called "twoskirt", with predictions from GENOPT/BIGBOSOR4

Aft Skirt Stresses, Load Case 1

Layer	Stress (psi)				
	Fiber Direction		Transverse Direction		Shear
	Max	Min	Max	Min	|Max|
1	2283	1864	-1161	-13210	2899
2	2281	1848	-1142	-13220	2900
3	17050	9339	1740	1050	2500
4	16720	9608	1740	1041	2448
5	16410	9877	1745	1031	2400
6	16140	10150	1759	1022	2357
7	15940	10410	1773	1012	2326
8	15740	10600	1787	1003	2295
9	15550	10680	1801	993	2264
10	15360	10730	1815	983	2233
11	2267	1706	-972	-13270	2907
12	2266	1691	-952	-13270	2908

Forward Skirt Stresses, Load Case 1

Layer	Stress (psi)				
	Fiber Direction		Transverse Direction		Shear
	Max	Min	Max	Min	|Max|
1	2912	2474	-485	-11140	2067
2	2909	2476	-473	-11150	2068
3	23790	14930	2064	1604	3580
4	23630	15140	2064	1597	3553
5	23460	15340	2063	1590	3528
6	23330	15340	2072	1584	3506
7	23190	15550	2083	1577	3485
8	23060	15730	2093	1570	3463
9	22920	15830	2104	1563	3442
10	22790	15910	2115	1557	3420
11	2890	2486	-363	-11180	2071
12	2888	2487	-351	-11180	2071

Prediction from BIGBOSOR4, Load Case 1 (only the maximum stress determined from either the aft skirt or the forward skirt appears in the GENOPT/BIGBOSOR4 output). From Table 4, Load Case 1:
Stress=2.7506E+04 psi, fiber tension: matl=2, A, seg=36, node=7, layer=10, z= 0.04
Segment 36 is the laminated composite part of Segment No. 3 of the forward skirt.

Aft Skirt Stresses, Load Case 2

Layer	Stress (psi)				
	Fiber Direction		Transverse Direction		Shear
	Max	Min	Max	Min	|Max|
1	3331	1361	4762	-22320	6599
2	3329	1342	4761	-22320	6598
3	31440	2460	2369	737	6422
4	31280	2840	2379	726	6399
5	31130	3220	2388	714	6381
6	31060	3594	2398	702	6373
7	31080	3970	2408	689	6368
8	31110	4099	2417	677	6365
9	31130	4132	2427	665	6361
10	31160	4153	2436	652	6357
11	3312	1164	4753	-22310	6588
12	3311	1143	4752	-22310	6586

Forward Skirt Stresses, Load Case 2

Layer	Stress (psi)				
	Fiber Direction		Transverse Direction		Shear
	Max	Min	Max	Min	|Max|
1	3197	1535	3668	-21290	5600
2	3195	1563	3668	-21300	5600
3	30440	3228	2320	811	6432
4	30250	3551	2324	794	6401
5	30080	3876	2334	777	6370
6	29920	4198	2344	761	6340
7	29770	4519	2354	744	6309
8	29620	4647	2364	727	6279
9	29470	4685	2373	710	6249
10	29320	4716	2383	693	6218
11	3181	1533	3663	-21340	5599
12	3180	1504	3662	-21350	5599

Prediction from BIGBOSOR4, Load Case 2 (only the maximum stress determined from either the aft skirt or the forward skirt appears in the GENOPT/BIGBOSOR4 output). From Table 4, Load Case 2:
Stress=3.4188E+04 psi, fiber tension: matl=2, A, seg=3, node=93, layer=9, z= 0.03
Segment No. 3 is in the laminated composite part of the aft skirt.